



Sun VirtualBox®

Programming Guide and Reference

Version 3.0.6

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<http://www.virtualbox.org>

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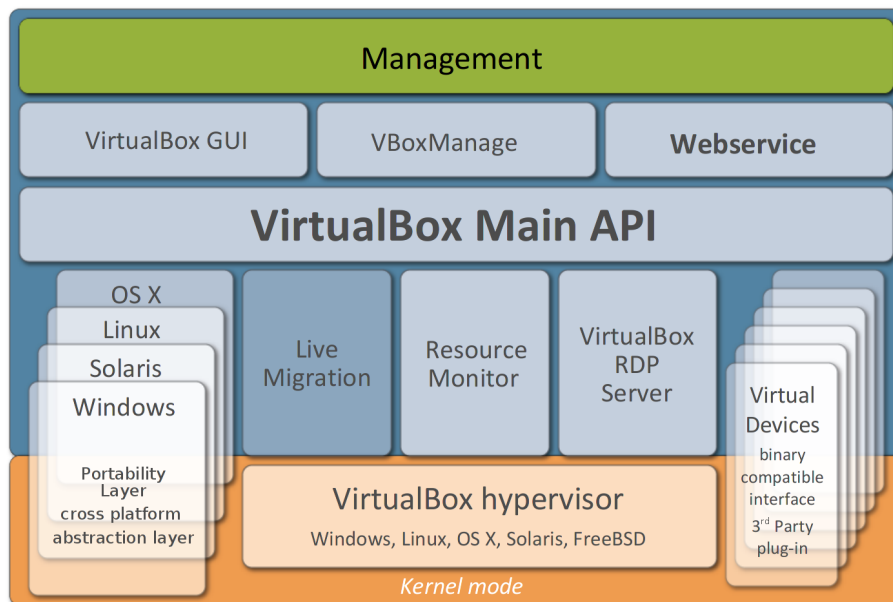
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1 Introduction

VirtualBox comes with comprehensive support for third-party developers. This Software Development Kit (SDK) contains all the documentation and interface files that are needed to write code that interacts with VirtualBox.

1.1 Modularity: the building blocks of VirtualBox

VirtualBox is cleanly separated into several layers, which can be visualized like in the picture below:



The orange area represents code that runs in kernel mode, the blue area represents userspace code.

At the bottom of the stack resides the hypervisor – the core of the virtualization engine, controlling execution of the virtual machines and making sure they do not conflict with each other or whatever the host computer is doing otherwise.

On top of the hypervisor, additional internal modules provide extra functionality. For example, the RDP server, which can deliver the graphical output of a VM remotely to an RDP client, is a separate module that is only loosely tacked into the virtual graphics

device. Live Migration and Resource Monitor are additional modules currently in the process of being added to VirtualBox.

What is primarily of interest for purposes of the SDK is the API layer block that sits on top of all the previously mentioned blocks. This API, which we call the “**Main API**”, exposes the entire feature set of the virtualization engine below. It is completely documented in this SDK Reference – see chapter 9, *Classes (interfaces)*, page 50 and chapter 10, *Enumerations (enums)*, page 234 – and available to anyone who wishes to control VirtualBox programmatically. We chose the name “Main API” to differentiate it from other programming interfaces of VirtualBox that may be publicly accessible.

With the Main API, you can create, configure, start, stop and delete virtual machines, retrieve performance statistics about running VMs, configure the VirtualBox installation in general, and more. In fact, internally, the front-end programs `VirtualBox` and `VBoxManage` use nothing but this API as well – there are no hidden backdoors into the virtualization engine for our own front-ends. This ensures the entire Main API is both well-documented and well-tested. (The same applies to `VBoxHeadless`, which is not shown in the image.)

1.2 Two guises of the same “Main API”: the web service or COM/XPCOM

There are several ways in which the Main API can be called by other code:

1. VirtualBox comes with a **web service** that maps nearly the entire Main API. The web service ships in a stand-alone executable (`vboxwebsrv`) that, when running, acts as an HTTP server, accepts SOAP connections and processes them. Since the entire web service API is publicly described in a web service description file (in WSDL format), you can write client programs that call the web service in any language with a toolkit that understands WSDL. These days, that includes most programming languages that are available: Java, C++, .NET, PHP, Python, Perl and probably many more.

All of this is explained in detail in subsequent chapters of this book.

There are two ways in which you can write client code that uses the web service:

- a) For Java with JAX-WS as well as Python, the SDK contains easy-to-use classes that allow you to use the web service in an object-oriented, straightforward manner. We shall refer to this as the “**object-oriented web service (OOWS)**”.

The OO bindings for Java are described in chapter 2.1, *The object-oriented web service for JAX-WS*, page 21, those for Python in chapter 2.2, *The object-oriented web service for Python*, page 25.

- b) Alternatively, you can use the web service directly, without the object-oriented client layer. We shall refer to this as the “**raw web service**”.

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You will then have neither native object orientation nor full type safety, since web services are neither object-oriented nor stateful. However, in this way, you can write client code even in languages for which we do not ship object-oriented client code; all you need is a programming language with a toolkit that can parse WSDL and generate client wrapper code from it.

We describe this further in chapter 3, [Using the raw web service with any language](#), page 27, with samples for Java and Perl.

2. Internally, for portability and easier maintenance, the Main API is implemented using the **Component Object Model (COM)**, an interprocess mechanism for software components originally introduced by Microsoft for Microsoft Windows. On a Windows host, VirtualBox will use Microsoft COM; on other hosts where COM is not present, it ships with XPCOM, a free software implementation of COM originally created by the Mozilla project for their browsers.

So, if you are familiar with COM and the C++ programming language (or with any other programming language that can handle COM/XPCOM objects, such as Java, Visual Basic or C#), then you can use the COM/XPCOM API directly. VirtualBox comes with all necessary files and documentation to build fully functional COM applications. For an introduction, please see chapter 5, [The VirtualBox COM/XPCOM API](#), page 36 below.

The VirtualBox front-ends (the graphical user interfaces as well as the command line), which are all written in C++, use COM/XPCOM to call the Main API. Technically, the web service is another front-end to this COM API, mapping almost all of it to SOAP clients.

If you wonder which way to choose, here are a few comparisons:

Web service	COM/XPCOM
Pro: Easy to use with Java and Python with the object-oriented web service; extensive support even with other languages (C++, .NET, PHP, Perl and others)	Con: Requires compiled C++ code, verbose code, high learning curve
Pro: Client can be on remote machine	Con: Client must be locally linked to VirtualBox code
Con: Significant overhead due to XML marshalling over the wire for each method call	Pro: Relatively high execution speed

In the following chapters, we will describe the different ways in which to program VirtualBox, starting with the method that is easiest to use and then increase complexity as we go along.

1.3 About web services in general

Web services are a particular type of programming interface. Whereas, with “normal” programming, a program calls an application programming interface (API) defined by another program or the operating system and both sides of the interface have to agree on the calling convention and, in most cases, use the same programming language, web services use Internet standards such as HTTP and XML to communicate.¹

In order to successfully use a web service, a number of things are required – primarily, a web service accepting connections; service descriptions; and then a client that connects to that web service. The connections are governed by the SOAP standard, which describes how messages are to be exchanged between a service and its clients; the service descriptions are governed by WSDL.

In the case of VirtualBox, this translates into the following three components:

1. The VirtualBox web service (the “server”): this is the `vboxwebsrv` executable shipped with VirtualBox. Once you start this executable (which acts as a HTTP server on a specific TCP/IP port), clients can connect to the web service and thus control a VirtualBox installation.
2. VirtualBox also comes with WSDL files that describe the services provided by the web service. You can find these files in the `sdk/bindings/webservice/` directory. These files are understood by the web service toolkits that are shipped with most programming languages and enable you to easily access a web service even if you don’t use our object-oriented client layers.
3. A client that connects to the web service in order to control the VirtualBox installation.

Unless you play with some of the samples shipped with VirtualBox, this needs to be written by you.

1.4 Running the web service

The web service ships in an stand-alone executable, `vboxwebsrv`, that, when running, acts as a HTTP server, accepts SOAP connections and processes them – remotely or from the same machine.

¹In some ways, web services promise to deliver the same thing as CORBA and DCOM did years ago. However, while these previous technologies relied on specific binary protocols and thus proved to be difficult to use between diverging platforms, web services circumvent these incompatibilities by using text-only standards like HTTP and XML. On the downside (and, one could say, typical of things related to XML), a lot of standards are involved before a web service can be implemented. Many of the standards invented around XML are used one way or another. As a result, web services are slow and verbose, and the details can be incredibly messy. The relevant standards here are called SOAP and WSDL, where SOAP describes the format of the messages that are exchanged (an XML document wrapped in an HTTP header), and WSDL is an XML format that describes a complete API provided by a web service. WSDL in turn uses XML Schema to describe types, which is not exactly terse either. However, as you will see from the samples provided in this chapter, the VirtualBox web service shields you from these details and is easy to use.

Note: The web service executable is not contained with the VirtualBox SDK, but instead ships with the standard VirtualBox binary package for your specific platform. Since the SDK contains only platform-independent text files and documentation, the binaries are instead shipped with the platform-specific packages.

The `vboxwebsrv` program, which implements the web service, is a text-mode (console) program which, after being started, simply runs until it is interrupted with Ctrl-C or a kill command.

Once the web service is started, it acts as a front-end to the VirtualBox installation of the user account that it is running under. In other words, if the web service is run under the user account of `user1`, it will see and manipulate the virtual machines and other data represented by the VirtualBox data of that user (e.g., on a Linux machine, under `/home/user1/.VirtualBox`; see the VirtualBox User Manual for details on where this data is stored).

1.4.1 Command line options of `vboxwebsrv`

The web service supports the following command line options:

- `--help` (or `-h`): print a brief summary of command line options.
- `--background` (or `-b`): run the web service as a background daemon. This option is not supported on Windows hosts.
- `--host` (or `-H`): This specifies the host to bind to and defaults to “localhost”.
- `--port` (or `-p`): This specifies which port to bind to on the host and defaults to 18083.
- `--timeout` (or `-t`): This specifies the session timeout, in seconds, and defaults to 300 (five minutes). A web service client that has logged on but makes no calls to the web service will automatically be disconnected after the number of seconds specified here, as if it had called the `IWebSessionManager::logoff()` method provided by the web service itself.

It is normally vital that each web service client call this method, as the web service can accumulate large amounts of memory when running, especially if a web service client does not properly release managed object references. As a result, this timeout value should not be set too high, especially on machines with a high load on the web service, or the web service may eventually deny service.

- `--check-interval` (or `-i`): This specifies the interval in which the web service checks for timed-out clients, in seconds, and defaults to 5. This normally does not need to be changed.

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- `--verbose` (or `-v`): Normally, the webservice outputs only brief messages to the console each time a request is served. With this option, the webservice prints much more detailed data about every request and the COM methods that those requests are mapped to internally, which can be useful for debugging client programs.
- `--logfile` (or `-F`) `<file>`: If this is specified, the webservice not only prints its output to the console, but also writes it to the specified file. The file is created if it does not exist; if it does exist, new output is appended to it. This is useful if you run the webservice unattended and need to debug problems after they have occurred.

1.4.2 Authenticating at web service logon

As opposed to the COM/XPCOM variant of the Main API, a client that wants to use the web service must first log on by calling the `IWebSessionManager::logon()` API (see chapter 9.57.3, [logon](#), page 233) that is specific to the web service. Logon is necessary for the web service to be stateful; internally, it maintains a session for each client that connects to it.

The `IWebSessionManager::logon()` API takes a user name and a password as arguments, which the web service then passes to a customizable authentication plugin that performs the actual authentication.

For testing purposes, it is recommended that you first disable authentication with this command:

```
VBoxManage setproperty webservauthlibrary null
```

Warning: This will cause all logons to succeed, regardless of user name or password. This should of course not be used in a production environment.

Generally, the mechanism by which clients are authenticated is configurable by way of the `VBoxManage` command:

```
VBoxManage setproperty webservauthlibrary default|null|<library>
```

This way you can specify any shared object/dynamic link module that conforms with the specifications for authentication modules as laid out in section 9.3 of the VirtualBox User Manual; the web service uses the same kind of modules as the VirtualBox RDP server.

By default, after installation, the web service uses the `VRDPAAuth` module that ships with VirtualBox. This module uses PAM on Linux hosts to authenticate users. Any valid username/password combination is accepted, it does not have to be the username and password of the user running the webservice daemon. Unless `vboxwebsrv` runs as root, PAM authentication can fail, because sometimes the file `/etc/shadow`, which is used by PAM, is not readable. On most Linux distribution PAM uses a `suid root` helper internally, so make sure you test this before deploying it.

1.4.3 Solaris host: starting the web service via SMF

On Solaris hosts, the VirtualBox web service daemon is integrated into the SMF framework. You can change the parameters, but don't have to if the defaults below already match your needs:

```
svccfg -s svc:/application/virtualbox/web service:default setprop config/host=localhost
svccfg -s svc:/application/virtualbox/web service:default setprop config/port=18083
svccfg -s svc:/application/virtualbox/web service:default setprop config/user=root
```

If you made any change, don't forget to run the following command to put the changes into effect immediately:

```
svcadm refresh svc:/application/virtualbox/web service:default
```

If you forget the above command then the previous settings will be used when enabling the service. Check the current property settings with:

```
svccfg -p config svc:/application/virtualbox/web service:default
```

When everything is configured correctly you can start the VirtualBox web service with the following command:

```
svcadm enable svc:/application/virtualbox/web service:default
```

For more information about SMF, please refer to the Solaris documentation.

2 The object-oriented web service (OOWS)

As explained in chapter 1.2, *Two guises of the same “Main API”: the web service or COM/XPCOM*, page 15, VirtualBox ships with client-side libraries for Java and Python that allow you to use the VirtualBox web service in an intuitive, object-oriented way. These libraries shield you from the client-side complications of managed object references and other implementation details that come with the VirtualBox web service. (If you do want to use the web service directly, have a look at chapter 3, *Using the raw web service with any language*, page 27).

We recommend that you start your experiments with the VirtualBox web service by using our object-oriented client libraries for JAX-WS, a web service toolkit for Java, which enables you to write code to interact with VirtualBox in the simplest manner possible.

2.1 The object-oriented web service for JAX-WS

JAX-WS is a powerful toolkit by Sun Microsystems to build both server and client code with Java. It is part of Java 6 (JDK 1.6), but can also be obtained separately for Java 5 (JDK 1.5). The VirtualBox SDK comes with precompiled OOWS bindings for both Java 5 and 6.

The following sections explain how to get the JAX-WS sample code running and explain a few common practices when using the JAX-WS object-oriented web service.

2.1.1 Preparations

Since JAX-WS is already integrated into Java 6, no additional preparations are needed for Java 6.

If you are using Java 5 (JDK 1.5.x), you will first need to download and install an external JAX-WS implementation, as Java 5 does not support JAX-WS out of the box; for example, you can download one from here: <https://jax-ws.dev.java.net/2.1.4/JAXWS2.1.4-20080502.jar>. Then perform the installation (`java -jar JAXWS2.1.4-20080502.jar`).

2.1.2 Getting started: running the sample code

To run the OOWS for JAX-WS samples that we ship with the SDK, perform the following steps:

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1. Open a terminal and change to the directory where the JAX-WS samples reside.¹ Examine the header of `Makefile` to see if the supplied variables (Java compiler, Java executable) and a few other details match your system settings.
2. To start the VirtualBox web service, open a second terminal and change to the directory where the VirtualBox executables are located. Then type:

```
./vboxwebsrv -v
```

The web service now waits for connections and will run until you press Ctrl+C in this second terminal. The `-v` argument causes it to log all connections to the terminal. (See chapter 1.4, *Running the web service*, page 17 for details on how to run the web service.)

3. Back in the first terminal and still in the samples directory, to start a simple client example just type:

```
make run16
```

if you're on a Java 6 system; on a Java 5 system, run `make run15` instead.

This should work on all Unix-like systems such as Linux and Solaris. For Windows systems, use commands similar to what is used in the `Makefile`.

This will compile the `clienttest.java` code on the first call and then execute the resulting `clienttest` class to show the locally installed VMs (see below).

The `clienttest` sample imitates a few typical command line tasks that `VBoxManage`, VirtualBox's regular command-line front-end, would provide (see the VirtualBox User Manual for details). In particular, you can run:

- `java clienttest show vms`: show the virtual machines that are registered locally.
- `java clienttest list hostinfo`: show various information about the host this VirtualBox installation runs on.
- `java clienttest startvm <vmname|uuid>`: start the given virtual machine.

The `clienttest.java` sample code illustrates common basic practices how to use the VirtualBox OOWS for JAX-WS, which we will explain in more detail in the following chapters.

2.1.3 Logging on to the web service

Before a web service client can do anything useful, two objects need to be created, as can be seen in the `clienttest` constructor:

¹In `sdk/bindings/webservice/java/jax-ws/samples/`.

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1. An instance of [IWebsessionManager](#), which is an interface provided by the web service to manage “web sessions” – that is, stateful connections to the web service with persistent objects upon which methods can be invoked.

In the OOWS for JAX-WS, the [IWebsessionManager](#) class must be constructed explicitly, and a URL must be provided in the constructor that specifies where the web service (the server) awaits connections. The code in `clienttest.java` connects to “[http://localhost:18083/](#)”, which is the default.

The port number, by default 18083, must match the port number given to the `vboxwebsrv` command line; see chapter [1.4.1](#), [Command line options of vboxwebsrv](#), page 18.

2. After that, the code calls [IWebsessionManager::logon\(\)](#), which is the first call that actually communicates with the server. This authenticates the client with the web service and returns an instance of [IVirtualBox](#), the most fundamental interface of the VirtualBox web service, from which all other functionality can be derived.

If logon doesn’t work, please take another look at chapter [1.4.2](#), [Authenticating at web service logon](#), page 19.

2.1.4 Obtaining basic machine information. Reading attributes

To enumerate virtual machines, one would look at the “machines” array attribute in the [IVirtualBox](#) object returned by the `logon()` call mentioned above (see [IVirtualBox::machines2](#)). This array contains all virtual machines currently registered with the host, each of them being an instance of [IMachine](#). From each such instance, one can query additional information, such as the UUID, the name, memory, operating system and more by looking at the attributes; see the attributes list in the [IMachine documentation](#).

Note that attributes are mapped to corresponding “get” and (if the attribute is not read-only) “set” methods. So when the documentation says that [IMachine](#) has a “[name](#)” attribute, this means you need to code something like the following to get the machine’s name:

```
IMachine machine = ...;
String name = machine.getName();
```

2.1.5 Changing machine settings. Sessions

As said in the previous section, to read a machine’s attribute, one invokes the corresponding “get” method. One would think that to change settings of a machine, it would suffice to call the corresponding “set” method – for example, to set a VM’s memory to 1024 MB, one would call `setMemorySize(1024)`. Try that, and you will get an error: “The machine is not mutable.”

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So unfortunately, things are not that easy. VirtualBox is a complicated environment in which multiple processes compete for possibly the same resources, especially machine settings. As a result, machines must be “locked” before they can either be modified or started. This is to prevent multiple processes from making conflicting changes to a machine: it should, for example, not be allowed to change the memory size of a virtual machine while it is running. (You can’t add more memory to a real computer while it is running either, at least not to an ordinary PC.) Also, two processes must not change settings at the same time, or start a machine at the same time.

These requirements are implemented in the Main API by way of “sessions”, in particular, the [ISession](#) interface. Each process has its own instance of [ISession](#). In the web service, you cannot create such an object, but `vboxwebsrv` creates one for you when you log on, which you can obtain by calling [IWebSessionManager::getSessionObject\(\)](#).

This session object must then be used like a mutex semaphore in common programming environments; in VirtualBox terminology, one must “open a direct session” on a machine before it can be modified. This is done by calling [IVirtualBox::openSession\(\)](#).

After the direct session has been opened, the [ISession::machine](#) attribute contains a copy of the original [IMachine](#) object upon which the session was opened, but this copy is “mutable”: you can invoke “set” methods on it.

Finally, it is important to never forget to close the session again, by calling [ISession::close\(\)](#). Otherwise, when the calling process ends, the machine will receive the state “aborted”, which can lead to loss of data.

So the sequence to change a machine’s memory to 1024 MB is something like this:

```
IWebSessionManager mgr ...;
IVirtualBox vbox = mgr.logon(user, pass);
...
IMachine machine = ...; // read-only machine
ISession session = mgr.getSessionObject();
vbox.openSession(session, machine.getId()); // machine is now locked
IMachine mutable = session.getMachine(); // obtain mutable machine
mutable.setMemorySize(1024);
mutable.saveSettings(); // write settings to XML
session.close();
```

2.1.6 Starting machines

To start a virtual machine, in VirtualBox terminology, one “opens a remote session” for it by calling [IVirtualBox::openRemoteSession\(\)](#). In doing so, the caller instructs the VirtualBox engine to start a new process with the virtual machine in it, since to the host, each virtual machine looks like a single process, even if it has hundreds of its own processes inside. (This new VM process in turn opens a direct session on the machine, thus locking it to prevent access from other processes; this is why opening another session will fail while the VM is running.)

Starting a machine looks something like this:

```
IWebSessionManager mgr ...;
IVirtualBox vbox = mgr.logon(user, pass);
...
```


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```
IMachine machine = ...; // read-only machine
IProgress prog = vbox.openRemoteSession(oSession,
                                     machine.getId(),
                                     "gui", // session type
                                     ""); // possibly environment setting
prog.waitForCompletion(10000); // give the process 10 secs
if (prog.getResultCode() != 0) // check success
    System.out.println("Session failed!")
```

Note that no in-process (local) session object is needed here since we instruct VirtualBox to spawn a new process, which will have its own session object.

2.1.7 Object management

The current OOWS for JAX-WS has certain memory management related limitations. When you no longer need an object, call its `IManagedObjectRef::release()` method explicitly, which frees appropriate managed reference, as is required by the raw webservice; see chapter 3.3.3, *Managed object references*, page 31 for details. This limitation may be reconsidered in a future version of the VirtualBox SDK.

2.2 The object-oriented web service for Python

VirtualBox comes with two flavors of a Python API: one for web service, discussed here, and one for the COM/XPCOM API discussed in chapter 5.1, *Python COM API*, page 36. The client code is mostly similar, except for the initialization part, so it's up to the application developer to choose the appropriate technology. Moreover, a common Python glue layer exists, abstracting out concrete platform access details, see chapter 5.2, *Common Python bindings layer*, page 37.

As indicated in chapter 1.2, *Two guises of the same "Main API": the web service or COM/XPCOM*, page 15, the COM/XPCOM API gives better performance without the SOAP overhead, enables certain features not possible via SOAP (e.g. callbacks) and does not require a web server to be running. On the other hand, the COM/XPCOM Python API requires a suitable Python bridge for your Python installation (VirtualBox ships the most important ones for each platform²), and you cannot connect to VirtualBox remotely. On Windows, you can use the Main API from Python if the Win32 extensions package for Python³ is installed.

The VirtualBox OOWS for Python relies on the Python ZSI SOAP implementation (see <http://pywebsvcs.sourceforge.net/zsi.html>), which you will need to install locally before trying the examples.

To get started, change to `bindings/webservice/python/samples/`, which contains an example of a simple interactive shell to control a VirtualBox instance. Just type `PYTHONPATH=../lib python ./vboxshell.py` or simply `make` to start the

²On Mac OS X only the Python versions bundled with the OS are officially supported. This means Python 2.3 for 10.4, Python 2.5 for 10.5 and Python 2.5 and 2.6 for 10.6.

³See http://sourceforge.net/project/showfiles.php?group_id=78018.

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shell. See chapter 6, *The VirtualBox shell*, page 44 for more details on the shell's functionality. For you, as a VirtualBox application developer, the vboxshell sample could be interesting as an example of to write code targeting both local and remote cases (COM/XPCOM and SOAP). The common part of the shell is the same – the only difference is how it interacts with the invocation layer.

3 Using the raw web service with any language

The following examples show you how to use the raw web service, without the object-oriented client-side code that was described in the previous chapter.

3.1 Raw web service example for Java with Axis

Axis is an older web service toolkit created by the Apache foundation. If your distribution does not have it installed, you can get a binary from <http://www.apache.org>. The following examples assume that you have Axis 1.4 installed.

The VirtualBox SDK ships with an example for Axis that, again, is called `clienttest.java` and that imitates a few of the commands of `VBoxManage` over the wire.

Then perform the following steps:

1. Create a working directory somewhere. Under your VirtualBox installation directory, find the `sdk/webService/samples/java/axis/` directory and copy the file `clienttest.java` to your working directory.
2. Open a terminal in your working directory. Execute the following command:

```
java org.apache.axis.wsdl.WSDL2Java /path/to/vboxwebService.wsdl
```

The `vboxwebService.wsdl` file should be located in the `sdk/webService/` directory.

If this fails, your Apache Axis may not be located on your system classpath, and you may have to adjust the `CLASSPATH` environment variable. Something like this:

```
export CLASSPATH="/path-to-axis-1_4/lib/*":$CLASSPATH
```

Use the directory where the Axis JAR files are located. Mind the quotes so that your shell passes the `"*"` character to the java executable without expanding. Alternatively, add a corresponding `-classpath` argument to the `"java"` call above.

If the command executes successfully, you should see an `"org"` directory with sub-directories containing Java source files in your working directory. These classes represent the interfaces that the VirtualBox web service offers, as described by the WSDL file.

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This is the bit that makes using web services so attractive to client developers: if a language's toolkit understands WSDL, it can generate large amounts of support code automatically. Clients can then easily use this support code and can be done with just a few lines of code.

3. Next, compile the `clienttest.java` source:

```
javac clienttest.java
```

This should yield a “`clienttest.class`” file.

4. To start the VirtualBox web service, open a second terminal and change to the directory where the VirtualBox executables are located. Then type:

```
./vboxwebsrv -v
```

The web service now waits for connections and will run until you press Ctrl+C in this second terminal. The `-v` argument causes it to log all connections to the terminal. (See chapter 1.4, *Running the web service*, page 17 for details on how to run the web service.)

5. Back in the original terminal where you compiled the Java source, run the resulting binary, which will then connect to the web service:

```
java clienttest
```

The client sample will connect to the web service (on localhost, but the code could be changed to connect remotely if the web service was running on a different machine) and make a number of method calls. It will output the version number of your VirtualBox installation and a list of all virtual machines that are currently registered (with a bit of seemingly random data, which will be explained later).

3.2 Raw web service example for Perl

We also ship a small sample for Perl. It uses the SOAP::Lite perl module to communicate with the VirtualBox web service.

The `sdk/bindings/webservice/perl/lib/` directory contains a pre-generated Perl module that allows for communicating with the web service from Perl. You can generate such a module yourself using the “stubmaker” tool that comes with SOAP::Lite, but since that tool is slow as well as sometimes unreliable, we are shipping a working module with the SDK for your convenience.

Perform the following steps:

1. If SOAP::Lite is not yet installed on your system, you will need to install the package first. On Debian-based systems, the package is called `libsoap-lite-perl`; on Gentoo, it's `dev-perl/SOAP-Lite`.
2. Open a terminal in the `sdk/bindings/webservice/perl/samples/` directory.

3 Using the raw web service with any language

3. To start the VirtualBox web service, open a second terminal and change to the directory where the VirtualBox executables are located. Then type:

```
./vboxwebsrv -v
```

The web service now waits for connections and will run until you press Ctrl+C in this second terminal. The -v argument causes it to log all connections to the terminal. (See chapter 1.4, *Running the web service*, page 17 for details on how to run the web service.)

4. In the first terminal with the Perl sample, run the clienttest.pl script:

```
perl -I ../lib clienttest.pl
```

3.3 Programming considerations for the raw web service

If you use the raw web service, you need to keep a number of things in mind, or you will sooner or later run into issues that are not immediately obvious. By contrast, the object-oriented client-side libraries described in chapter 2, *The object-oriented web service (OOWS)*, page 21 take care of these things automatically and thus greatly simplify using the web service.

3.3.1 Fundamental conventions

If you are familiar with other web services, you may find the VirtualBox web service to behave a bit differently to accommodate for the fact that VirtualBox web service more or less maps the VirtualBox Main COM API. The following main differences had to be taken care of:

- Web services, as expressed by WSDL, are not object-oriented. Even worse, they are normally stateless (or, in web services terminology, “loosely coupled”). Web service operations are entirely procedural, and one cannot normally make assumptions about the state of a web service between function calls.
In particular, this normally means that you cannot work on objects in one method call that were created by another call.
- By contrast, the VirtualBox Main API, being expressed in COM, is object-oriented and works entirely on objects, which are grouped into public interfaces, which in turn have attributes and methods associated with them.

For the VirtualBox web service, this results in three fundamental conventions:

1. All **function names** in the VirtualBox web service consist of an interface name and a method name, joined together by an underscore. This is because there are only functions (“operations”) in WSDL, but no classes, interfaces, or methods.

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In addition, all calls to the VirtualBox web service (except for logon, see below) take a **managed object reference** as the first argument, representing the object upon which the underlying method is invoked. (Managed object references are explained in detail below; see chapter 3.3.3, *Managed object references*, page 31.)

So, when one would normally code, in the pseudo-code of an object-oriented language, to invoke a method upon an object:

```
IMachine machine;  
result = machine.getName();
```

In the VirtualBox web service, this looks something like this (again, pseudo-code):

```
IMachineRef machine;  
result = IMachine_getName(machine);
```

2. To make the web service stateful, and objects persistent between method calls, the VirtualBox web service introduces a **session manager** (by way of the *IWeb-sessionManager* interface), which manages object references. Any client wishing to interact with the web service must first log on to the session manager and in turn receives a managed object reference to an object that supports the *IVirtual-Box* interface (the basic interface in the Main API).

In other words, as opposed to other web services, **the VirtualBox web service is both object-oriented and stateful.**

3.3.2 Example: A typical web service client session

A typical short web service session to retrieve the version number of the VirtualBox web service (to be precise, the underlying Main API version number) looks like this:

1. A client logs on to the web service by calling *IWeb-sessionManager::logon()* with a valid user name and password. See chapter 1.4.2, *Authenticating at web service logon*, page 19 for details about how authentication works.
2. On the server side, *vboxwebsrv* creates a session, which persists until the client calls *IWeb-sessionManager::logoff()* or the session times out after a configurable period of inactivity (see chapter 1.4.1, *Command line options of vboxwebsrv*, page 18).

For the new session, the web service creates an instance of *IVirtualBox*. This interface is the most central one in the Main API and allows access to all other interfaces, either through attributes or method calls. For example, *IVirtualBox* contains a list of all virtual machines that are currently registered (as they would be listed on the left side of the VirtualBox main program).

The web service then creates a managed object reference for this instance of *IVirtualBox* and returns it to the calling client, which receives it as the return value of the logon call. Something like this:

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```
string oVirtualBox;  
oVirtualBox = webservice.IWebSessionManager_logon("user", "pass");
```

(The managed object reference “oVirtualBox” is just a string consisting of digits and dashes. However, it is a string with a meaning and will be checked by the web service. For details, see below. As hinted above, [IWebSessionManager::logon\(\)](#) is the *only* operation provided by the web service which does not take a managed object reference as the first argument!)

3. The VirtualBox Main API documentation says that the `IVirtualBox` interface has a [version](#) attribute, which is a string. For each attribute, there is a “get” and a “set” method in COM, which maps to according operations in the web service. So, to retrieve the “version” attribute of this `IVirtualBox` object, the web service client does this:

```
string version;  
version = webservice.IVirtualBox_getVersion(oVirtualBox);  
  
print version;
```

And it will print “3.0.6”.

4. The web service client calls [IWebSessionManager::logoff\(\)](#) with the VirtualBox managed object reference. This will clean up all allocated resources.

3.3.3 Managed object references

To a web service client, a managed object reference looks like a string: two 64-bit hex numbers separated by a dash. This string, however, represents a COM object that “lives” in the web service process. The two 64-bit numbers encoded in the managed object reference represent a session ID (which is the same for all objects in the same web service session, i.e. for all objects after one logon) and a unique object ID within that session.

Managed object references are created in two situations:

1. When a client logs on, by calling [IWebSessionManager::logon\(\)](#).

Upon logon, the web session manager creates one instance of [IVirtualBox](#) and another object of [ISession](#) representing the web service session. This can be retrieved using [IWebSessionManager::getSessionObject\(\)](#).

(Technically, there is always only one [IVirtualBox](#) object, which is shared between all sessions and clients, as it is a COM singleton. However, each session receives its own managed object reference to it. The [ISession](#) object, however, is created and destroyed for each session.)

2. Whenever a web service clients invokes an operation whose COM implementation creates COM objects.

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For example, `VirtualBox::createMachine()` creates a new instance of `IMachine`; the COM object returned by the COM method call is then wrapped into a managed object reference by the web server, and this reference is returned to the web service client.

Internally, in the web service process, each managed object reference is simply a small data structure, containing a COM pointer to the “real” COM object, the web session ID and the object ID. This structure is allocated on creation and stored efficiently in hashes, so that the web service can look up the COM object quickly whenever a web service client wishes to make a method call. The random session ID also ensures that one web service client cannot intercept the objects of another.

Managed object references are not destroyed automatically and must be released by explicitly calling `IManagedObjectRef::release()`. This is important, as otherwise hundreds or thousands of managed object references (and corresponding COM objects, which can consume much more memory!) can pile up in the web service process and eventually cause it to deny service.

To reiterate: The underlying COM object, which the reference points to, is only freed if the managed object reference is released. It is therefore vital that web service clients properly clean up after the managed object references that are returned to them.

When a web service client calls `IWebSessionManager::logoff()`, all managed object references created during the session are automatically freed. For short-lived sessions that do not create a lot of objects, logging off may therefore be sufficient, although it is certainly not “best practice”.

3.3.4 Some more detail about web service operation

3.3.4.1 SOAP messages

Whenever a client makes a call to a web service, this involves a complicated procedure internally. These calls are remote procedure calls. Each such procedure call typically consists of two “message” being passed, where each message is a plain-text HTTP request with a standard HTTP header and a special XML document following. This XML document encodes the name of the procedure to call and the argument names and values passed to it.

To give you an idea of what such a message looks like, assuming that a web service provides a procedure called “SayHello”, which takes a string “name” as an argument and returns “Hello” with a space and that name appended, the request message could look like this:

```
<?xml version="1.0" encoding="UTF-8"?>
<SOAP-ENV:Envelope
  xmlns:SOAP-ENV="http://schemas.xmlsoap.org/soap/envelope/"
  xmlns:SOAP-ENC="http://schemas.xmlsoap.org/soap/encoding/"
  xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
  xmlns:xsd="http://www.w3.org/2001/XMLSchema"
  xmlns:test="http://test/">
  <SOAP-ENV:Body>
```


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```
<test:SayHello>
  <name>Peter</name>
</test:SayHello>
</SOAP-ENV:Body>
</SOAP-ENV:Envelope>
```

A similar message – the “response” message – would be sent back from the web service to the client, containing the return value “Hello Peter”.

Most programming languages provide automatic support to generate such messages whenever code in that programming language makes such a request. In other words, these programming languages allow for writing something like this (in pseudo-C++ code):

```
webServiceClass service("localhost", 18083); // server and port
string result = service.SayHello("Peter"); // invoke remote procedure
```

and would, for these two pseudo-lines, automatically perform these steps:

1. prepare a connection to a web service running on port 18083 of “localhost”;
2. for the `SayHello()` function of the web service, generate a SOAP message like in the above example by encoding all arguments of the remote procedure call (which could involve all kinds of type conversions and complex marshalling for arrays and structures);
3. connect to the web service via HTTP and send that message;
4. wait for the web service to send a response message;
5. decode that response message and put the return value of the remote procedure into the “result” variable.

3.3.4.2 Service descriptions in WSDL

In the above explanations about SOAP, it was left open how the programming language learns about how to translate function calls in its own syntax into proper SOAP messages. In other words, the programming language needs to know what operations the web service supports and what types of arguments are required for the operation’s data in order to be able to properly serialize and deserialize the data to and from the web service. For example, if a web service operation expects a number in “double” floating point format for a particular parameter, the programming language cannot send to it a string instead.

For this, the Web Service Definition Language (WSDL) was invented, another XML substandard that describes exactly what operations the web service supports and, for each operation, which parameters and types are needed with each request and response message. WSDL descriptions can be incredibly verbose, and one of the few good things that can be said about this standard is that it is indeed supported by most programming languages.

3 Using the raw web service with any language

So, if it is said that a programming language “supports” web services, this typically means that a programming language has support for parsing WSDL files and somehow integrating the remote procedure calls into the native language syntax – for example, like in the Java sample shown in chapter 3.1, [Raw web service example for Java with Axis](#), page 27.

For details about how programming languages support web services, please refer to the documentation that comes with the individual languages. Here are a few pointers:

1. For **C++**, among many others, the gSOAP toolkit is a good option. Parts of gSOAP are also used in VirtualBox to implement the VirtualBox web service.
2. For **Java**, there are several implementations already described in this document (see chapter 2.1, [The object-oriented web service for JAX-WS](#), page 21 and chapter 3.1, [Raw web service example for Java with Axis](#), page 27).
3. **Perl** supports WSDL via the SOAP::Lite package. This in turn comes with a tool called `stubmaker.pl` that allows you to turn any WSDL file into a Perl package that you can import. (You can also import any WSDL file “live” by having it parsed every time the script runs, but that can take a while.) You can then code (again, assuming the above example):

```
my $result = servicename->sayHello("Peter");
```

A sample that uses SOAP::Lite was described in chapter 3.2, [Raw web service example for Perl](#), page 28.

4 Using the Main API documentation to write web service clients

As “interfaces”, “attributes” and “methods” are COM concepts, please read the documentation in chapter 9, *Classes (interfaces)*, page 50 and chapter 10, *Enumerations (enums)*, page 234 with the following notes in mind.

The **object-oriented web service for JAX-WS** attempts to map the Main API as closely as possible to the Java and Python languages. In other words, objects are objects, interfaces become classes, and you can call methods on objects as you would on local objects.

The main difference remains with attributes: to read an attribute, call a “getXXX” method, with “XXX” being the attribute name with a capitalized first letter. So when the Main API Reference says that `IMachine` has a “name” attribute, call `getName()` on an `IMachine` object to obtain a machine’s name. Unless the attribute is marked as read-only in the documentation, there will also be a corresponding “set” method.

With the **raw webservice**, due to the limitations of SOAP and WSDL lined out in chapter 3.3.1, *Fundamental conventions*, page 29, things are more complicated:

1. Any COM method call becomes a **plain function call** in the raw web service, with the object as an additional first parameter (before the “real” parameters listed in the documentation). So when the documentation says that the `IVirtualBox` interface supports the `createMachine()` method, the web service operation is `IVirtualBox_createMachine()`, and a managed object reference to an `IVirtualBox` object must be passed as the first argument.
2. For **attributes** in interfaces, there will be at least one “get” function; there will also be a “set” function, unless the attribute is “readonly”. The attribute name will be appended to the “get” or “set” prefix, with a capitalized first letter. So, the “version” readonly attribute of the `IVirtualBox` interface can be retrieved by calling `IVirtualBox_getVersion()`.
3. Whenever the API documentation says that a method (or an attribute getter) returns an **object**, it will returned a managed object reference in the web service instead. As said above, managed object references should be released if the web service client does not log off again immediately!

5 The VirtualBox COM/XPCOM API

If you do not require *remote* procedure calls such as those offered by the VirtualBox web service, and if you know Python or C++ as well as COM, you might find it preferable to program VirtualBox's Main API directly via COM.

COM stands for “Component Object Model” and is a standard originally introduced by Microsoft in the 1990s for Microsoft Windows. It allows for organizing software in an object-oriented way and across processes; code in one process may access objects that live in another process.

COM has several advantages: it is language-neutral, meaning that even though all of VirtualBox is internally written in C++, programs written in other languages could communicate with it. COM also cleanly separates interface from implementation, so that external programs need not know anything about the messy and complicated details of VirtualBox internals.

On a Windows host, all parts of VirtualBox will use the COM functionality that is native to Windows. On other hosts (including Linux), VirtualBox comes with a built-in implementation of XPCOM, as originally created by the Mozilla project, which we have enhanced to support interprocess communication on a level comparable to Microsoft COM. Internally, VirtualBox has an abstraction layer that allows the same VirtualBox code to work both with native COM as well as our XPCOM implementation.

5.1 Python COM API

On Windows, Python scripts can use COM and VirtualBox interfaces to control almost all aspects of virtual machine execution. As an example, use the following commands to instantiate the VirtualBox object and start a VM:

```
vbox = win32com.client.Dispatch("VirtualBox.VirtualBox")
session = win32com.client.Dispatch("VirtualBox.Session")
uuid = "uuid of machine to start"
progress = vbox.openRemoteSession(session, uuid, "gui", "")
progress.waitForCompletion(-1)
```

Also, see `/bindings/mscom/python/samples/vboxshell.py` for more advanced usage scenarios. However, unless you have specific requirements, we strongly recommend to use the generic glue layer described in the next section to access MS COM objects.

5.2 Common Python bindings layer

As different wrappers ultimately provide access to the same underlying API, and to simplify porting and development of Python application using the VirtualBox Main API, we developed a common glue layer that abstracts out most platform-specific details from the application and allows the developer to focus on application logic.

In this layer, the class `VirtualBoxManager` hides most platform-specific details. It can be used to access both the local (COM) and the webservice-based API. The following code can be used by an application to use the glue layer.

```
# This code assumes vboxapi.py from VirtualBox distribution
# being in PYTHONPATH, or installed system-wide
# from vboxapi
import VirtualBoxManager

# This code initializes VirtualBox manager with default style
# and parameters
virtualBoxManager = VirtualBoxManager(None, None)

# Alternatively, one can be more verbose, and initialize
# glue with webservice backend, and provide authentication
# information
virtualBoxManager = VirtualBoxManager("WEBSERVICE",
                                     {'url': 'http://myhost.com:18083/',
                                      'user': 'me',
                                      'password': 'secret'})
```

We supply the `VirtualBoxManager` constructor with 2 arguments: style and parameters. Style defines which bindings style to use (could be “MSCOM”, “XPCOM” or “WEBSERVICE”), and if set to `None` defaults to usable platform bindings (MS COM on Windows, XPCOM on other platforms). The second argument defines parameters, passed to the platform-specific module, as we do in the second example, where we pass username and password to be used to authenticate against the web service.

After obtaining the `VirtualBoxManager` instance, one can perform operations on the `IVirtualBox` class. For example, the following code will start a virtual machine by name or ID:

```
vbox = virtualBoxManager.vbox
mgr = virtualBoxManager.mgr
print "Version is", vbox.version

def machById(id):
    mach = None
    for m in virtualBoxManager.getArray(vbox, 'machines'):
        if m.name == id or mach.id == id:
            mach = m
            break
    return mach

name = "Linux"
mach = machById(name)
if mach is None:
```

5 The VirtualBox COM/XPCOM API

```
        print "cannot find machine",name
    else:
        session = mgr.getSessionObject(vbox)
        # one can also start headless session with "vrdp" instead of "gui"
        progress = vb.openRemoteSession(session, mach.id, "gui", "")
        progress.waitForCompletion(-1)
        session.close()
```

This code also shows cross-platform access to array properties (certain limitations prevent one from using `vbox.machines` to access a list of available virtual machines in case of XPCOM), and a mechanism of uniform session creation (`virtualBoxManager.mgr.getSessionObject()`).

5.3 C++ COM API

VirtualBox ships with sample programs that demonstrate how to use the Main API to implement a number of tasks on your host platform. These samples can be found in the `/bindings/xpcom/samples` directory for Linux, Mac OS X and Solaris and `/bindings/mscom/samples` for Windows. The two samples are actually different, because the one for Windows uses native COM, whereas the other uses our XPCOM implementation, as described above.

Since COM and XPCOM are conceptually very similar but vary in the implementation details, we have created a “glue” layer that shields COM client code from these differences. All VirtualBox uses is this glue layer, so the same code written once works on both Windows hosts (with native COM) as well as on other hosts (with our XPCOM implementation). It is recommended to always use this glue code instead of using the COM and XPCOM APIs directly, as it is very easy to make your code completely independent from the platform it is running on.

In order to encapsulate platform differences between Microsoft COM and XPCOM, the following items should be kept in mind when using the glue layer:

1. **Attribute getters and setters.** COM has the notion of “attributes” in interfaces, which roughly compare to C++ member variables in classes. The difference is that for each attribute declared in an interface, COM automatically provides a “get” method to return the attribute’s value. Unless the attribute has been marked as “readonly”, a “set” attribute is also provided.

To illustrate, the `IVirtualBox` interface has a “version” attribute, which is read-only and of the “wstring” type (the standard string type in COM). As a result, you can call the “get” method for this attribute to retrieve the version number of VirtualBox.

Unfortunately, the implementation differs between COM and XPCOM. Microsoft COM names the “get” method like this: `get_Attribute()`, whereas XPCOM uses this syntax: `GetAttribute()` (and accordingly for “set” methods). To hide these differences, the VirtualBox glue code

provides the `COMGETTER(attrib)` and `COMSETTER(attrib)` macros. So, `COMGETTER(version)()` (note, two pairs of brackets) expands to `get_Version()` on Windows and `GetVersion()` on other platforms.

2. **Unicode conversions.** While the rest of the modern world has pretty much settled on encoding strings in UTF-8, COM, unfortunately, uses UCS-16 encoding. This requires a lot of conversions, in particular between the VirtualBox Main API and the Qt GUI, which, like the rest of Qt, likes to use UTF-8.

To facilitate these conversions, VirtualBox provides the `com::Bstr` and `com::Utf8Str` classes, which support all kinds of conversions back and forth.

3. **COM autopointers.** Possibly the greatest pain of using COM – reference counting – is alleviated by the `ComPtr<>` template provided by the `ptr.h` file in the glue layer.

5.4 C binding to XPCOM API

Note: This section currently applies to Linux hosts only.

Starting with version 2.2, VirtualBox offers a C binding for the XPCOM API.

The C binding provides a layer enabling object creation, method invocation and attribute access from C.

5.4.1 Getting started

The following sections describe how to use the C binding in a C program.

For Linux, a sample program is provided which demonstrates use of the C binding to initialize XPCOM, get handles for VirtualBox and Session objects, make calls to list and start virtual machines, and uninitialize resources when done. The program uses the VBoxGlue library to open the C binding layer during runtime.

The sample program `tstXPCOMCGlue` is located in the `bin` directory and can be run without arguments. It lists registered machines on the host along with some additional information and ask for a machine to start. The source for this program is available in `sdk/bindings/xpcom/cbinding/samples/` directory. The source for the VBoxGlue library is available in the `sdk/bindings/xpcom/cbinding/` directory.

5.4.2 XPCOM initialization

Just like in C++, XPCOM needs to be initialized before it can be used. The `VBoxCAPI_v2_5.h` header provides the interface to the C binding. Here's how to initialize XPCOM:

5 The VirtualBox COM/XPCOM API

```
#include "VBoxCAPI_v2_5.h"
...
PCVBOXXPCOM g_pVBoxFuncs = NULL;
IVirtualBox *vbox        = NULL;
ISession *session        = NULL;

/*
 * VBoxGetXPCOMCFunctions() is the only function exported by
 * VBoxXPCOMC.so and the only one needed to make virtualbox
 * work with C. This functions gives you the pointer to the
 * function table (g_pVBoxFuncs).
 *
 * Once you get the function table, then how and which functions
 * to use is explained below.
 *
 * g_pVBoxFuncs->pfnComInitialize does all the necessary startup
 * action and provides us with pointers to vbox and session handles.
 * It should be matched by a call to g_pVBoxFuncs->pfnComUninitialize()
 * when done.
 */

g_pVBoxFuncs = VBoxGetXPCOMCFunctions(VBOX_XPCOMC_VERSION);
g_pVBoxFuncs->pfnComInitialize(&vbox, &session);
```

If either `vbox` or `session` is still `NULL`, initialization failed and the XPCOM API cannot be used.

5.4.3 XPCOM method invocation

Method invocation is straightforward. It looks pretty much like the C++ way, augmented with an extra indirection due to accessing the vtable and passing a pointer to the object as the first argument to serve as the `this` pointer.

Using the C binding, all method invocations return a numeric result code.

If an interface is specified as returning an object, a pointer to a pointer to the appropriate object must be passed as the last argument. The method will then store an object pointer in that location.

In other words, to call an object's method what you need is

```
IObject *object;
nsresult rc;
...
/*
 * Calling void IObject::method(arg, ...)
 */
rc = object->vtbl->Method(object, arg, ...);

...
IFoo *foo;
/*
 * Calling IFoo IObject::method(arg, ...)
 */
rc = object->vtbl->Method(object, args, ..., &foo);
```


5 The VirtualBox COM/XPCOM API

As a real-world example of a method invocation, let's call [IVirtualBox::openRemoteSession](#) which returns an IProgress object. Note again that the method name is capitalized.

```
IProgress *progress;
...
rc = vbox->vtbl->OpenRemoteSession(
    vbox,          /* this */
    session,       /* arg 1 */
    id,            /* arg 2 */
    sessionType,   /* arg 3 */
    env,           /* arg 4 */
    &progress       /* Out */
);
```

5.4.4 XPCOM attribute access

A construct similar to calling non-void methods is used to access object attributes. For each attribute there exists a getter method, the name of which is composed of `Get` followed by the capitalized attribute name. Unless the attribute is read-only, an analogous `Set` method exists. Let's apply these rules to read the [IVirtualBox::revision](#) attribute.

Using the `IVirtualBox` handle `vbox` obtained above, calling its `GetRevision` method looks like this:

```
PRUint32 rev;

rc = vbox->vtbl->GetRevision(vbox, &rev);
if (NS_SUCCEEDED(rc))
{
    printf("Revision: %u\n", (unsigned)rev);
}
```

All objects with their methods and attributes are documented in chapter 9, [Classes \(interfaces\)](#), page 50.

5.4.5 String handling

When dealing with strings you have to be aware of a string's encoding and ownership.

Internally, XPCOM uses UTF-16 encoded strings. A set of conversion functions is provided to convert other encodings to and from UTF-16. The type of a UTF-16 character is `PRUnichar`. Strings of UTF-16 characters are arrays of that type. Most string handling functions take pointers to that type. Prototypes for the following conversion functions are declared in `VBBoxCAPI_v2_5.h`.

5.4.5.1 Conversion of UTF-16 to and from UTF-8

```
int (*pfnUtf16ToUtf8)(const PRUnichar *pwszString, char **ppszString);
int (*pfnUtf8ToUtf16)(const char *pszString, PRUnichar **ppwszString);
```

5.4.5.2 Ownership

The ownership of a string determines who is responsible for releasing resources associated with the string. Whenever XPCOM creates a string, ownership is transferred to the caller. To avoid resource leaks, the caller should release resources once the string is no longer needed.

5.4.6 XPCOM uninitialization

Uninitialization is performed by `g_pVBoxFuncs->pfnComUninitialize()`. If your program can exit from more than one place, it is a good idea to install this function as an exit handler with Standard C's `atexit()` just after calling `g_pVBoxFuncs->pfnComInitialize()`, e.g.

```
#include <stdlib.h>
#include <stdio.h>

...

/*
 * Make sure g_pVBoxFuncs->pfnComUninitialize() is called at exit, no
 * matter if we return from the initial call to main or call exit()
 * somewhere else. Note that atexit registered functions are not
 * called upon abnormal termination, i.e. when calling abort() or
 * signal(). Separate provisions must be taken for these cases.
 */

if (atexit(g_pVBoxFuncs->pfnComUninitialize()) != 0) {
    fprintf(stderr, "failed to register g_pVBoxFuncs->pfnComUninitialize()\n");
    exit(EXIT_FAILURE);
}
```

Another idea would be to write your own `void myexit(int status)` function, calling `g_pVBoxFuncs->pfnComUninitialize()` followed by the real `exit()`, and use it instead of `exit()` throughout your program and at the end of `main`.

If you expect the program to be terminated by a signal (e.g. user types CTRL-C sending SIGINT) you might want to install a signal handler setting a flag noting that a signal was sent and then calling `g_pVBoxFuncs->pfnComUninitialize()` later on (usually *not* from the handler itself.)

That said, if a client program forgets to call `g_pVBoxFuncs->pfnComUninitialize()` before it terminates, there is a mechanism in place which will eventually release references held by the client. You should not rely on this, however.

5.4.7 Compiling and linking

A program using the C binding has to open the library during runtime using the help of glue code provided and as shown in the example `tstXPCOMCGLue.c`. Compilation and linking can be achieved, e.g., with a makefile fragment similar to

5 The VirtualBox COM/XPCOM API

```
# Where is the XPCOM include directory?
INCS_XPCOM    = -I../..//include
# Where is the glue code directory?
GLUE_DIR      = ..
GLUE_INC      = -I..

#Compile Glue Library
VBoxXPCOMCGlue.o: $(GLUE_DIR)/VBoxXPCOMCGlue.c
    $(CC) $(CFLAGS) $(INCS_XPCOM) $(GLUE_INC) -o $@ -c $<

# Compile.
program.o: program.c VBoxCAPI_v2_5.h
    $(CC) $(CFLAGS) $(INCS_XPCOM) $(GLUE_INC) -o $@ -c $<

# Link.
program: program.o VBoxXPCOMCGlue.o
    $(CC) -o $@ $^ -ldl
```

6 The VirtualBox shell

VirtualBox comes with an extensible shell, which allows you to control your virtual machines from the command line. It is also a nontrivial example of how to use the VirtualBox APIs from Python, for all three COM/XPCOM/WS styles of the API. You can easily extend this shell with your own commands.

7 Main API change log

Generally, VirtualBox will maintain API compatibility within a major release; a major release occurs when the first or the second of the three version components of VirtualBox change (that is, in the x.y.z scheme, a major release is one where x or y change, but not when only z changes).

In other words, updates like those from 2.0.0 to 2.0.2 will not come with API breakages.

Migration between major releases most likely will lead to API breakage, so please make sure you updated code accordingly. JAX-WS Java wrappers enforce that mechanism, by putting VirtualBox classes into version specific packages, such as `org.virtualbox_2_2`. This approach allows to connect to multiple VirtualBox versions simultaneously from the same Java application.

The following lists incompatible changes that the Main API underwent since the original release of this SDK Reference with VirtualBox 2.0. A change is deemed “incompatible” only if it breaks existing client code (e.g. changes in method parameter lists, renamed or removed interfaces and similar). In other words, the list does not contain new interfaces, methods or attributes or other changes that do not affect existing client code.

7.1 Incompatible API changes with version 2.1

- With VirtualBox 2.1, error codes were added to many error infos that give the caller a machine-readable (numeric) feedback in addition to the error string that has always been available. This is an ongoing process, and future versions of this SDK reference will document the error codes for each method call.
- The hard disk and other media interfaces were completely redesigned. This was necessary to account for the support of VMDK, VHD and other image types; since backwards compatibility had to be broken anyway, we seized the moment to redesign the interfaces in a more logical way.
 - Previously, the old `IHardDisk` interface had several derivatives called `IVirtualDiskImage`, `IVMDKImage`, `IVHDImage`, `IISCSIHardDisk` and `ICustomHardDisk` for the various disk formats supported by VirtualBox. The new `IHardDisk2` interface that comes with version 2.1 now supports all hard disk image formats itself.
 - [IHardDiskFormat](#) is a new interface to describe the available back-ends for hard disk images (e.g. VDI, VMDK, VHD or iSCSI). The `IHardDisk2::format` attribute can be used to find out the back-end that is in use

for a particular hard disk image. [ISystemProperties::hardDiskFormats\[\]](#) contains a list of all back-ends supported by the system. [ISystemProperties::defaultHardDiskFormat](#) contains the default system format.

- In addition, the new [IMedium](#) interface is a generic interface for hard disk, DVD and floppy images that contains the attributes and methods shared between them. It can be considered a parent class of the more specific interfaces for those images, which are now [IHardDisk2](#), [IDVDImage2](#) and [IFloppyImage2](#).

In each case, the “2” versions of these interfaces replace the earlier versions that did not have the “2” suffix. Previously, the [IDVDImage](#) and [IFloppyImage](#) interfaces were entirely unrelated to [IHardDisk](#).

- As a result, all parts of the API that previously referenced [IHardDisk](#), [IDVDImage](#) or [IFloppyImage](#) or any of the old subclasses are gone and will have replacements that use [IHardDisk2](#), [IDVDImage2](#) and [IFloppyImage2](#); see, for example, [IMachine::attachHardDisk2](#).
 - In particular, the [IVirtualBox::hardDisks2](#) array replaces the earlier [IVirtualBox::hardDisks](#) collection.
- [IGuestOSType](#) was extended to group operating systems into families and for 64-bit support.
 - The [IHostNetworkInterface](#) interface was completely rewritten to account for the changes in how Host Interface Networking is now implemented in VirtualBox 2.1.
 - The [IVirtualBox::machines2\[\]](#) array replaces the former [IVirtualBox::machines](#) collection.
 - Added [IHost::getProcessorFeature\(\)](#) and [ProcessorFeature](#) enumeration.
 - The parameter list for [IVirtualBox::createMachine\(\)](#) was modified.
 - Added [IMachine::pushGuestProperty\(\)](#).
 - New attributes in [IMachine](#): [accelerate3DEnabled](#), [HWVirtExVPIDEnabled](#), [guestPropertyNotificationPatterns](#), [CPUCount](#).
 - Added [IConsole::powerUpPaused\(\)](#) and [IConsole::getGuestEnteredACPIMode\(\)](#).
 - Removed [ResourceUsage](#) enumeration.

7.2 Incompatible API changes with version 2.2

- Added explicit version number into JAX-WS Java package names, such as `org.virtualbox_2_2`, allowing connect to multiple VirtualBox clients from single Java application.

7 Main API change log

- The interfaces having a “2” suffix attached to them with version 2.1 were renamed again to have that suffix removed. This time around, this change involves only the name, there are no functional differences.

As a result, IDVDImage2 is now [IDVDImage](#); IHardDisk2 is now [IHardDisk](#); IHardDisk2Attachment is now [IHardDiskAttachment](#).

Consequently, all related methods and attributes that had a “2” suffix have been renamed; for example, IMachine::attachHardDisk2 now becomes [IMachine::attachHardDisk\(\)](#).

- [IVirtualBox::openHardDisk\(\)](#) has an extra parameter for opening a disk read/write or read-only.
- The remaining collections were replaced by more performant safe-arrays. This affects the following collections:
 - IGuestOSTypeCollection
 - IHostDVDDriveCollection
 - IHostFloppyDriveCollection
 - IHostUSBDeviceCollection
 - IHostUSBDeviceFilterCollection
 - IProgressCollection
 - ISharedFolderCollection
 - ISnapshotCollection
 - IUSBDeviceCollection
 - IUSBDeviceFilterCollection
- Since “Host Interface Networking” was renamed to “bridged networking” and host-only networking was introduced, all associated interfaces needed renaming as well. In detail:
 - The HostNetworkInterfaceType enum has been renamed to [HostNetworkInterfaceMediumType](#)
 - The IHostNetworkInterface::type attribute has been renamed to [IHostNetworkInterface::mediumType](#)
 - INetworkAdapter::attachToHostInterface() has been renamed to [INetworkAdapter::attachToBridgedInterface\(\)](#)
 - In the IHost interface, createHostNetworkInterface() has been renamed to [createHostOnlyNetworkInterface\(\)](#)
 - Similarly, removeHostNetworkInterface() has been renamed to [removeHostOnlyNetworkInterface\(\)](#)

7.3 Incompatible API changes with version 3.0

- In the object-oriented web service bindings for JAX-WS, proper inheritance has been introduced for some classes, so explicit casting is no longer needed to call methods from a parent class. In particular, [IHardDisk](#) and other classes now properly derive from [IMedium](#).
- All object identifiers (machines, snapshots, disks, etc) switched from GUIDs to strings (now still having string representation of GUIDs inside). As a result, no particular internal structure can be assumed for object identifiers; instead, they should be treated as opaque unique handles. This change mostly affects Java and C++ programs; for other languages, GUIDs are transparently converted to strings.
- The uses of NULL strings have been changed greatly. All out parameters now use empty strings to signal a null value. For in parameters both the old NULL and empty string is allowed. This change was necessary to support more client bindings, especially using the webservice API. Many of them either have no special NULL value or have trouble dealing with it correctly in the respective library code.
- The type of [IVirtualBoxErrorInfo::resultCode](#) changed from `result` to `long`.
- The parameter list of [IVirtualBox::openHardDisk](#) was changed.
- The method `IConsole::discardSavedState` was renamed to [IConsole::forgetSavedState](#), and a parameter was added.
- The method `IConsole::powerDownAsync` was renamed to [IConsole::powerDown](#), and the previous method with that name was deleted. So effectively a parameter was added.
- In the [IFramebuffer](#) interface, the following were removed:
 - the `operationSupported` attribute;
(as a result, the `FramebufferAccelerationOperation` enum was no longer needed and removed as well);
 - the `solidFill()` method;
 - the `copyScreenBits()` method.
- In the [IDisplay](#) interface, the following were removed:
 - the `setupInternalFramebuffer()` method;
 - the `lockFramebuffer()` method;
 - the `unlockFramebuffer()` method;
 - the `registerExternalFramebuffer()` method.

8 License information

The sample code files shipped with the SDK are generally licensed liberally to make it easy for anyone to use this code for their own application code.

The Java files under `bindings/webservice/java/jax-ws/` (library files for the object-oriented web service) are, by contrast, licensed under the GNU Lesser General Public License (LGPL) V2.1.

See `sdk/bindings/webservice/java/jax-ws/src/COPYING.LIB` for the full text of the LGPL 2.1.

When in doubt, please refer to the individual source code files shipped with this SDK.

9 Classes (interfaces)

9.1 IAppliance

Represents a platform-independent appliance in OVF format. An instance of this is returned by [VirtualBox::createAppliance\(\)](#), which can then be used to import and export appliances with VirtualBox.

The OVF standard suggests two different physical file formats:

1. If the OVF is distributed as a set of files, then `file` must be a fully qualified path name to an existing OVF descriptor file with an `.ovf` file extension. If this descriptor file references other files, as OVF appliances distributed as a set of files most likely do, those files must be in the same directory as the descriptor file.
2. If the OVF is distributed as a single file, it must be in TAR format and have the `.ova` file extension. This TAR file must then contain at least the OVF descriptor files and optionally other files.

At this time, VirtualBox does not yet support the packed (TAR) variant; support will be added with a later version.

Importing an OVF appliance into VirtualBox as instances of [IMachine](#) involves the following sequence of API calls:

1. Call [VirtualBox::createAppliance\(\)](#). This will create an empty IAppliance object.
2. On the new object, call [read\(\)](#) with the full path of the OVF file you would like to import. So long as this file is syntactically valid, this will succeed and return an instance of IAppliance that contains the parsed data from the OVF file.
3. Next, call [interpret\(\)](#), which analyzes the OVF data and sets up the contents of the IAppliance attributes accordingly. These can be inspected by a VirtualBox front-end such as the GUI, and the suggestions can be displayed to the user. In particular, the [virtualSystemDescriptions\[\]](#) array contains instances of [VirtualSystemDescription](#) which represent the virtual systems in the OVF, which in turn describe the virtual hardware prescribed by the OVF (network and hardware adapters, virtual disk images, memory size and so on). The GUI can then give the user the option to confirm and/or change these suggestions.
4. If desired, call [VirtualSystemDescription::setFinalValues\(\)](#) for each virtual system to override the suggestions made by the [interpret\(\)](#) routine.

5. Finally, call `importMachines()` to create virtual machines in VirtualBox as instances of `IMachine` that match the information in the virtual system descriptions.

Exporting VirtualBox machines into an OVF appliance involves the following steps:

1. As with importing, first call `VirtualBox::createAppliance()` to create an empty `IAppliance` object.
2. For each machine you would like to export, call `IMachine::export()` with the `IAppliance` object you just created. This creates an instance of `IVirtualSystemDescription` inside the appliance.
3. If desired, call `IVirtualSystemDescription::setFinalValues()` for each virtual system to override the suggestions made by the `export()` routine.
4. Finally, call `write()` with a path specification to have the OVF file written.

9.1.1 Attributes

9.1.1.1 path (read-only)

```
wstring IAppliance::path
```

Path to the main file of the OVF appliance, which is either the `.ovf` or the `.ova` file passed to `read()` (for import) or `write()` (for export). This attribute is empty until one of these methods has been called.

9.1.1.2 disks (read-only)

```
wstring IAppliance::disks[]
```

Array of virtual disk definitions. One such description exists for each disk definition in the OVF; each string array item represents one such piece of disk information, with the information fields separated by tab (`\\t`) characters.

The caller should be prepared for additional fields being appended to this string in future versions of VirtualBox and therefore check for the number of tabs in the strings returned.

In the current version, the following eight fields are returned per string in the array:

1. Disk ID (unique string identifier given to disk)
2. Capacity (unsigned integer indicating the maximum capacity of the disk)
3. Populated size (optional unsigned integer indicating the current size of the disk; can be approximate; -1 if unspecified)
4. Format (string identifying the disk format, typically “<http://www.vmware.com/specifications/vmdk.html#>”)

9 Classes (interfaces)

5. Reference (where to find the disk image, typically a file name; if empty, then the disk should be created on import)
6. Image size (optional unsigned integer indicating the size of the image, which need not necessarily be the same as the values specified above, since the image may be compressed or sparse; -1 if not specified)
7. Chunk size (optional unsigned integer if the image is split into chunks; presently unsupported and always -1)
8. Compression (optional string equalling “gzip” if the image is gzip-compressed)

9.1.1.3 virtualSystemDescriptions (read-only)

`IVirtualSystemDescription IAppliance::virtualSystemDescriptions[]`

Array of virtual system descriptions. One such description is created for each virtual system found in the OVF. This array is empty until either `interpret()` (for import) or `IMachine::export()` (for export) has been called.

9.1.2 createVFSExplorer

`IVFSExplorer IAppliance::createVFSExplorer(
[in] wstring aUri)`

Returns a `IVFSExplorer` object for the given URI.

9.1.3 getWarnings

`wstring[] IAppliance::getWarnings()`

Returns textual warnings which occurred during execution of `interpret()`.

9.1.4 importMachines

`IProgress IAppliance::importMachines()`

Imports the appliance into VirtualBox by creating instances of `IMachine` and other interfaces that match the information contained in the appliance as closely as possible, as represented by the import instructions in the `virtualSystemDescriptions[]` array.

Calling this method is the final step of importing an appliance into VirtualBox; see `IAppliance` for an overview.

Since importing the appliance will most probably involve copying and converting disk images, which can take a long time, this method operates asynchronously and returns an `IProgress` object to allow the caller to monitor the progress.

9.1.5 interpret

```
void IAppliance::interpret()
```

Interprets the OVF data that was read when the appliance was constructed. After calling this method, one can inspect the [virtualSystemDescriptions\[\]](#) array attribute, which will then contain one [IVirtualSystemDescription](#) for each virtual machine found in the appliance.

Calling this method is the second step of importing an appliance into VirtualBox; see [IAppliance](#) for an overview.

After calling this method, one should call [getWarnings\(\)](#) to find out if problems were encountered during the processing which might later lead to errors.

9.1.6 read

```
void IAppliance::read(  
    [in] wstring file)
```

Reads an OVF file into the appliance object.

This method succeeds if the OVF is syntactically valid and, by itself, without errors. The mere fact that this method returns successfully does not mean that VirtualBox supports all features requested by the appliance; this can only be examined after a call to [interpret\(\)](#).

9.1.7 write

```
IProgress IAppliance::write(  
    [in] wstring format,  
    [in] wstring path)
```

Writes the contents of the appliance exports into a new OVF file.

Calling this method is the final step of exporting an appliance from VirtualBox; see [IAppliance](#) for an overview.

Since exporting the appliance will most probably involve copying and converting disk images, which can take a long time, this method operates asynchronously and returns an [IProgress](#) object to allow the caller to monitor the progress.

9.2 IAudioAdapter

The [IAudioAdapter](#) interface represents the virtual audio adapter of the virtual machine. Used in [IMachine::audioAdapter](#).

9.2.1 Attributes

9.2.1.1 enabled (read/write)

`boolean IAudioAdapter::enabled`

Flag whether the audio adapter is present in the guest system. If disabled, the virtual guest hardware will not contain any audio adapter. Can only be changed when the VM is not running.

9.2.1.2 audioController (read/write)

`AudioControllerType IAudioAdapter::audioController`

The audio hardware we emulate.

9.2.1.3 audioDriver (read/write)

`AudioDriverType IAudioAdapter::audioDriver`

Audio driver the adapter is connected to. This setting can only be changed when the VM is not running.

9.3 IBIOSSettings

The IBIOSSettings interface represents BIOS settings of the virtual machine. This is used only in the `IMachine::BIOSSettings` attribute.

9.3.1 Attributes

9.3.1.1 logoFadeIn (read/write)

`boolean IBIOSSettings::logoFadeIn`

Fade in flag for BIOS logo animation.

9.3.1.2 logoFadeOut (read/write)

`boolean IBIOSSettings::logoFadeOut`

Fade out flag for BIOS logo animation.

9.3.1.3 logoDisplayTime (read/write)

`unsigned long IBIOSSettings::logoDisplayTime`

BIOS logo display time in milliseconds (0 = default).

9.3.1.4 logImagePath (read/write)

wstring IBIOSSettings::logImagePath

Local file system path for external BIOS image.

9.3.1.5 bootMenuMode (read/write)

BIOSBootMenuMode IBIOSSettings::bootMenuMode

Mode of the BIOS boot device menu.

9.3.1.6 ACPIEnabled (read/write)

boolean IBIOSSettings::ACPIEnabled

ACPI support flag.

9.3.1.7 IOAPICEnabled (read/write)

boolean IBIOSSettings::IOAPICEnabled

IO APIC support flag. If set, VirtualBox will provide an IO APIC and support IRQs above 15.

9.3.1.8 timeOffset (read/write)

long long IBIOSSettings::timeOffset

Offset in milliseconds from the host system time. This allows for guests running with a different system date/time than the host. It is equivalent to setting the system date/time in the BIOS except it is not an absolute value but a relative one. Guest Additions time synchronization honors this offset.

9.3.1.9 PXEDebugEnabled (read/write)

boolean IBIOSSettings::PXEDebugEnabled

PXE debug logging flag. If set, VirtualBox will write extensive PXE trace information to the release log.

9.4 IConsole

The IConsole interface represents an interface to control virtual machine execution.

The console object that implements the IConsole interface is obtained from a session object after the session for the given machine has been opened using one of [IVirtualBox::openSession\(\)](#), [IVirtualBox::openRemoteSession\(\)](#) or [IVirtualBox::openExistingSession\(\)](#) methods.

Methods of the IConsole interface allow the caller to query the current virtual machine execution state, pause the machine or power it down, save the machine state or take a snapshot, attach and detach removable media and so on.

See also: ISession

9.4.1 Attributes

9.4.1.1 machine (read-only)

[IMachine](#) IConsole::machine

Machine object this console is sessioned with.

Note: This is a convenience property, it has the same value as [ISession::machine](#) of the corresponding session object.

9.4.1.2 state (read-only)

[MachineState](#) IConsole::state

Current execution state of the machine.

Note: This property always returns the same value as the corresponding property of the IMachine object this console is sessioned with. For the process that owns (executes) the VM, this is the preferable way of querying the VM state, because no IPC calls are made.

9.4.1.3 guest (read-only)

[IGuest](#) IConsole::guest

Guest object.

9.4.1.4 keyboard (read-only)

`IKeyboard IConsole::keyboard`

Virtual keyboard object.

Note: If the machine is not running, any attempt to use the returned object will result in an error.

9.4.1.5 mouse (read-only)

`IMouse IConsole::mouse`

Virtual mouse object.

Note: If the machine is not running, any attempt to use the returned object will result in an error.

9.4.1.6 display (read-only)

`IDisplay IConsole::display`

Virtual display object.

Note: If the machine is not running, any attempt to use the returned object will result in an error.

9.4.1.7 debugger (read-only)

`IMachineDebugger IConsole::debugger`

Note: This attribute is not supported in the web service.

Debugging interface.

9.4.1.8 USBDevices (read-only)

`IUSBDevice IConsole::USBDevices[]`

Collection of USB devices currently attached to the virtual USB controller.

Note: The collection is empty if the machine is not running.

9.4.1.9 remoteUSBDevices (read-only)

`IHostUSBDevice IConsole::remoteUSBDevices[]`

List of USB devices currently attached to the remote VRDP client. Once a new device is physically attached to the remote host computer, it appears in this list and remains there until detached.

9.4.1.10 sharedFolders (read-only)

`ISharedFolder IConsole::sharedFolders[]`

Collection of shared folders for the current session. These folders are called transient shared folders because they are available to the guest OS running inside the associated virtual machine only for the duration of the session (as opposed to `IMachine::sharedFolders[]` which represent permanent shared folders). When the session is closed (e.g. the machine is powered down), these folders are automatically discarded.

New shared folders are added to the collection using `createSharedFolder()`. Existing shared folders can be removed using `removeSharedFolder()`.

9.4.1.11 remoteDisplayInfo (read-only)

`IRemoteDisplayInfo IConsole::remoteDisplayInfo`

Interface that provides information on Remote Display (VRDP) connection.

9.4.2 adoptSavedState

```
void IConsole::adoptSavedState(
    [in] wstring savedStateFile)
```

Associates the given saved state file to the virtual machine.

On success, the machine will go to the Saved state. Next time it is powered up, it will be restored from the adopted saved state and continue execution from the place where the saved state file was created.

The specified saved state file path may be absolute or relative to the folder the VM normally saves the state to (usually, `IMachine::snapshotFolder`).

Note: It's a caller's responsibility to make sure the given saved state file is compatible with the settings of this virtual machine that represent its virtual hardware (memory size, hard disk configuration etc.). If there is a mismatch, the behavior of the virtual machine is undefined.

If this method fails, the following error codes may be reported:

- `VBOX_E_INVALID_VM_STATE`: Virtual machine state neither PoweredOff nor Aborted.

9.4.3 attachUSBDevice

```
void IConsole::attachUSBDevice(
    [in] wstring id)
```

Attaches a host USB device with the given UUID to the USB controller of the virtual machine.

The device needs to be in one of the following states: [Busy](#), [Available](#) or [Held](#), otherwise an error is immediately returned.

When the device state is [Busy](#), an error may also be returned if the host computer refuses to release it for some reason.

See also: [IUSBController::deviceFilters](#), [USBDeviceState](#)

If this method fails, the following error codes may be reported:

- [VBOX_E_INVALID_VM_STATE](#): Virtual machine state neither Running nor Paused.
- [VBOX_E_PDM_ERROR](#): Virtual machine does not have a USB controller.

9.4.4 createSharedFolder

```
void IConsole::createSharedFolder(
    [in] wstring name,
    [in] wstring hostPath,
    [in] boolean writable)
```

Creates a transient new shared folder by associating the given logical name with the given host path, adds it to the collection of shared folders and starts sharing it. Refer to the description of [ISharedFolder](#) to read more about logical names.

If this method fails, the following error codes may be reported:

- [VBOX_E_INVALID_VM_STATE](#): Virtual machine in Saved state or currently changing state.
- [VBOX_E_FILE_ERROR](#): Shared folder already exists or not accessible.

9.4.5 detachUSBDevice

```
IUSBDevice IConsole::detachUSBDevice(
    [in] wstring id)
```

Detaches an USB device with the given UUID from the USB controller of the virtual machine.

After this method succeeds, the VirtualBox server re-initiates all USB filters as if the device were just physically attached to the host, but filters of this machine are ignored to avoid a possible automatic re-attachment.

See also: [IUSBController::deviceFilters](#), [USBDeviceState](#)

If this method fails, the following error codes may be reported:

- `VBOX_E_PDM_ERROR`: Virtual machine does not have a USB controller.
- `E_INVALIDARG`: USB device not attached to this virtual machine.

9.4.6 `discardCurrentSnapshotAndState`

`IProgress IConsole::discardCurrentSnapshotAndState()`

This method is equivalent to doing `discardSnapshot` (`currentSnapshot.id()`, `progress`) followed by `discardCurrentState()`.

As a result, the machine will be fully restored from the snapshot preceding the current snapshot, while both the current snapshot and the current machine state will be discarded.

If the current snapshot is the first snapshot of the machine (i.e. it has the only snapshot), the current machine state will be discarded **before** discarding the snapshot. In other words, the machine will be restored from its last snapshot, before discarding it. This differs from performing a single `discardSnapshot()` call (note that no `discardCurrentState()` will be possible after it) to the effect that the latter will preserve the current state instead of discarding it.

Unless explicitly mentioned otherwise, all remarks and limitations of the above two methods also apply to this method.

Note: The machine must not be running, otherwise the operation will fail.

Note: If the machine state is `Saved` prior to this operation, the saved state file will be implicitly discarded (as if `forgetSavedState()` were called).

Note: This method is more efficient than calling both of the above methods separately: it requires less IPC calls and provides a single progress object.

If this method fails, the following error codes may be reported:

- `VBOX_E_INVALID_VM_STATE`: Virtual machine is running.

9.4.7 `discardCurrentState`

`IProgress IConsole::discardCurrentState()`

This operation is similar to [discardSnapshot\(\)](#) but affects the current machine state. This means that the state stored in the current snapshot will become a new current state, and all current settings of the machine and changes stored in differencing hard disks will be lost.

After this operation is successfully completed, new empty differencing hard disks are created for all normal hard disks of the machine.

If the current snapshot of the machine is an online snapshot, the machine will go to the [Saved](#), so that the next time it is powered on, the execution state will be restored from the current snapshot.

Note: The machine must not be running, otherwise the operation will fail.

Note: If the machine state is [Saved](#) prior to this operation, the saved state file will be implicitly discarded (as if [forgetSavedState\(\)](#) were called).

If this method fails, the following error codes may be reported:

- `VBOX_E_INVALID_VM_STATE`: Virtual machine is running.

9.4.8 discardSnapshot

```
IProgress IConsole::discardSnapshot (
    [in] wstring id)
```

Starts discarding the specified snapshot. The execution state and settings of the associated machine stored in the snapshot will be deleted. The contents of all differencing hard disks of this snapshot will be merged with the contents of their dependent child hard disks to keep the, disks valid (in other words, all changes represented by hard disks being discarded will be propagated to their child hard disks). After that, this snapshot's differencing hard disks will be deleted. The parent of this snapshot will become a new parent for all its child snapshots.

If the discarded snapshot is the current one, its parent snapshot will become a new current snapshot. The current machine state is not directly affected in this case, except that currently attached differencing hard disks based on hard disks of the discarded snapshot will be also merged as described above.

If the discarded snapshot is the first one (the root snapshot) and it has exactly one child snapshot, this child snapshot will become the first snapshot after discarding. If there are no children at all (i.e. the first snapshot is the only snapshot of the machine), both the current and the first snapshot of the machine will be set to `null`. In all other cases, the first snapshot cannot be discarded.

You cannot discard the snapshot if it stores [Normal](#) (non-differencing) hard disks that have differencing hard disks based on them. Snapshots of such kind can be discarded only when every normal hard disk has either no children at all or exactly one

child. In the former case, the normal hard disk simply becomes unused (i.e. not attached to any VM). In the latter case, it receives all the changes stored in the child hard disk, and then it replaces the child hard disk in the configuration of the corresponding snapshot or machine.

Also, you cannot discard the snapshot if it stores hard disks (of any type) having differencing child hard disks that belong to other machines. Such snapshots can be only discarded after you discard all snapshots of other machines containing “foreign” child disks, or detach these “foreign” child disks from machines they are attached to.

One particular example of the snapshot storing normal hard disks is the first snapshot of a virtual machine that had normal hard disks attached when taking the snapshot. Be careful when discarding such snapshots because this implicitly commits changes (made since the snapshot being discarded has been taken) to normal hard disks (as described above), which may be not what you want.

The virtual machine is put to the [Discarding](#) state until the discard operation is completed.

Note: The machine must not be running, otherwise the operation will fail.

Note: Child hard disks of all normal hard disks of the discarded snapshot must be accessible (see [IMedium::state](#)) for this operation to succeed. In particular, this means that all virtual machines, whose hard disks are directly or indirectly based on the hard disks of discarded snapshot, must be powered off.

Note: Merging hard disk contents can be very time and disk space consuming, if these disks are big in size and have many children. However, if the snapshot being discarded is the last (head) snapshot on the branch, the operation will be rather quick.

Note: Note that discarding the current snapshot will implicitly call [IMachine::saveSettings\(\)](#) to make all current machine settings permanent.

If this method fails, the following error codes may be reported:

- `VBOX_E_INVALID_VM_STATE`: Virtual machine is running.

9.4.9 findUSBDeviceByAddress

```
IUSBDevice IConsole::findUSBDeviceByAddress(  
    [in] wstring name)
```

Searches for a USB device with the given host address.

See also: `IUSBDevice::address`

If this method fails, the following error codes may be reported:

- `VBOX_E_OBJECT_NOT_FOUND`: Given name does not correspond to any USB device.

9.4.10 findUSBDeviceById

```
IUSBDevice IConsole::findUSBDeviceById(  
    [in] wstring id)
```

Searches for a USB device with the given UUID.

See also: `IUSBDevice::id`

If this method fails, the following error codes may be reported:

- `VBOX_E_OBJECT_NOT_FOUND`: Given id does not correspond to any USB device.

9.4.11 forgetSavedState

```
void IConsole::forgetSavedState(  
    [in] boolean remove)
```

Forgets the saved state of the virtual machine previously created by `saveState()`. Next time the machine is powered up, a clean boot will occur. If `remove` is `true` the saved state file is deleted.

Note: This operation is equivalent to resetting or powering off the machine without doing a proper shutdown in the guest OS.

If this method fails, the following error codes may be reported:

- `VBOX_E_INVALID_VM_STATE`: Virtual machine not in state Saved.

9.4.12 getDeviceActivity

```
DeviceActivity IConsole::getDeviceActivity(  
    [in] DeviceType type)
```

Gets the current activity type of a given device or device group.

If this method fails, the following error codes may be reported:

- `E_INVALIDARG`: Invalid device type.

9.4.13 getGuestEnteredACPIMode

```
boolean IConsole::getGuestEnteredACPIMode()
```

Checks if the guest entered the ACPI mode G0 (working) or G1 (sleeping). If this method returns `false`, the guest will most likely not respond to external ACPI events.

If this method fails, the following error codes may be reported:

- `VBOX_E_INVALID_VM_STATE`: Virtual machine not in Running state.

9.4.14 getPowerButtonHandled

```
boolean IConsole::getPowerButtonHandled()
```

Checks if the last power button event was handled by guest.

If this method fails, the following error codes may be reported:

- `VBOX_E_PDM_ERROR`: Checking if the event was handled by the guest OS failed.

9.4.15 pause

```
void IConsole::pause()
```

Pauses the virtual machine execution.

If this method fails, the following error codes may be reported:

- `VBOX_E_INVALID_VM_STATE`: Virtual machine not in Running state.
- `VBOX_E_VM_ERROR`: Virtual machine error in suspend operation.

9.4.16 powerButton

```
void IConsole::powerButton()
```

Sends the ACPI power button event to the guest.

If this method fails, the following error codes may be reported:

- `VBOX_E_INVALID_VM_STATE`: Virtual machine not in Running state.
- `VBOX_E_PDM_ERROR`: Controlled power off failed.

9.4.17 powerDown

`IProgress IConsole::powerDown()`

Initiates the power down procedure to stop the virtual machine execution.

The completion of the power down procedure is tracked using the returned `IProgress` object. After the operation is complete, the machine will go to the `PoweredOff` state.

If this method fails, the following error codes may be reported:

- `VBOX_E_INVALID_VM_STATE`: Virtual machine must be `Running`, `Paused` or `Stuck` to be powered down.

9.4.18 powerUp

`IProgress IConsole::powerUp()`

Starts the virtual machine execution using the current machine state (that is, its current execution state, current settings and current hard disks).

If the machine is powered off or aborted, the execution will start from the beginning (as if the real hardware were just powered on).

If the machine is in the `Saved` state, it will continue its execution the point where the state has been saved.

Note: Unless you are trying to write a new `VirtualBox` front-end that performs direct machine execution (like the `VirtualBox` or `VBoxSDL` front-ends), don't call `powerUp()` in a direct session opened by `IVirtualBox::openSession()` and use this session only to change virtual machine settings. If you simply want to start virtual machine execution using one of the existing front-ends (for example the `VirtualBox` GUI or headless server), simply use `IVirtualBox::openRemoteSession()`; these front-ends will power up the machine automatically for you.

See also: `#saveState`

If this method fails, the following error codes may be reported:

- `VBOX_E_INVALID_VM_STATE`: Virtual machine already running.
- `VBOX_E_HOST_ERROR`: Host interface does not exist or name not set.
- `VBOX_E_FILE_ERROR`: Invalid saved state file.

9.4.19 powerUpPaused

`IProgress IConsole::powerUpPaused()`

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Identical to `powerUp` except that the VM will enter the [Paused](#) state, instead of [Running](#).

See also: `#powerUp`

If this method fails, the following error codes may be reported:

- `VBOX_E_INVALID_VM_STATE`: Virtual machine already running.
- `VBOX_E_HOST_ERROR`: Host interface does not exist or name not set.
- `VBOX_E_FILE_ERROR`: Invalid saved state file.

9.4.20 registerCallback

```
void IConsole::registerCallback(  
    [in] IConsoleCallback callback)
```

Note: This method is not supported in the web service.

Registers a new console callback on this instance. The methods of the callback interface will be called by this instance when the appropriate event occurs.

9.4.21 removeSharedFolder

```
void IConsole::removeSharedFolder(  
    [in] wstring name)
```

Removes a transient shared folder with the given name previously created by [createSharedFolder\(\)](#) from the collection of shared folders and stops sharing it.

If this method fails, the following error codes may be reported:

- `VBOX_E_INVALID_VM_STATE`: Virtual machine in Saved state or currently changing state.
- `VBOX_E_FILE_ERROR`: Shared folder does not exists.

9.4.22 reset

```
void IConsole::reset()
```

Resets the virtual machine.

If this method fails, the following error codes may be reported:

- `VBOX_E_INVALID_VM_STATE`: Virtual machine not in Running state.
- `VBOX_E_VM_ERROR`: Virtual machine error in reset operation.

9.4.23 resume

```
void IConsole::resume()
```

Resumes the virtual machine execution.

If this method fails, the following error codes may be reported:

- `VBOX_E_INVALID_VM_STATE`: Virtual machine not in Paused state.
- `VBOX_E_VM_ERROR`: Virtual machine error in resume operation.

9.4.24 saveState

```
IProgress IConsole::saveState()
```

Saves the current execution state of a running virtual machine and stops its execution.

After this operation completes, the machine will go to the Saved state. Next time it is powered up, this state will be restored and the machine will continue its execution from the place where it was saved.

This operation differs from taking a snapshot to the effect that it doesn't create new differencing hard disks. Also, once the machine is powered up from the state saved using this method, the saved state is deleted, so it will be impossible to return to this state later.

Note: On success, this method implicitly calls [IMachine::saveSettings\(\)](#) to save all current machine settings (including runtime changes to the DVD drive, etc.). Together with the impossibility to change any VM settings when it is in the Saved state, this guarantees adequate hardware configuration of the machine when it is restored from the saved state file.

Note: The machine must be in the Running or Paused state, otherwise the operation will fail.

See also: [takeSnapshot\(\)](#)

If this method fails, the following error codes may be reported:

- `VBOX_E_INVALID_VM_STATE`: Virtual machine state neither Running nor Paused.
- `VBOX_E_FILE_ERROR`: Failed to create directory for saved state file.

9.4.25 sleepButton

```
void IConsole::sleepButton()
```

Sends the ACPI sleep button event to the guest.

If this method fails, the following error codes may be reported:

- `VBOX_E_INVALID_VM_STATE`: Virtual machine not in Running state.
- `VBOX_E_PDM_ERROR`: Sending sleep button event failed.

9.4.26 takeSnapshot

```
IProgress IConsole::takeSnapshot(  
    [in] wstring name,  
    [in] wstring description)
```

Saves the current execution state and all settings of the machine and creates differencing images for all normal (non-independent) hard disks.

This method can be called for a PoweredOff, Saved, Running or Paused virtual machine. When the machine is PoweredOff, an offline [ISnapshot](#) is created, in all other cases – an online snapshot.

The taken snapshot is always based on the [current snapshot](#) of the associated virtual machine and becomes a new current snapshot.

Note: This method implicitly calls [IMachine::saveSettings\(\)](#) to save all current machine settings before taking an offline snapshot.

See also: [ISnapshot](#), [saveState\(\)](#)

If this method fails, the following error codes may be reported:

- `VBOX_E_INVALID_VM_STATE`: Virtual machine currently changing state.

9.4.27 unregisterCallback

```
void IConsole::unregisterCallback(  
    [in] IConsoleCallback callback)
```

Note: This method is not supported in the web service.

Unregisters the console callback previously registered using [registerCallback\(\)](#).

If this method fails, the following error codes may be reported:

- `E_INVALIDARG`: Given `callback` handler is not registered.

9.5 IConsoleCallback

Note: This interface is not supported in the web service.

This interface is used by a client of the Main API that need to be notified of events. For example, a graphical user interface can use this to learn about machine state changes so they can update the list of virtual machines without having to rely on polling.

Whenever relevant events occur in VirtualBox, the callbacks in objects of this interface are called. In order for this to be useful, a client needs to create its own subclass that implements this interface in which the methods for the relevant callbacks are overridden. An instance of this subclass interface can then be passed to [IConsole::registerCallback\(\)](#).

9.5.1 onAdditionsStateChange

```
void IConsoleCallback::onAdditionsStateChange()
```

Notification when a Guest Additions property changes. Interested callees should query IGuest attributes to find out what has changed.

9.5.2 onCanShowWindow

```
boolean IConsoleCallback::onCanShowWindow()
```

Notification when a call to [IMachine::canShowConsoleWindow\(\)](#) is made by a front-end to check if a subsequent call to [IMachine::showConsoleWindow\(\)](#) can succeed.

The callee should give an answer appropriate to the current machine state in the `canShow` argument. This answer must remain valid at least until the next [machine state](#) change.

Note: This notification is not designed to be implemented by more than one callback at a time. If you have multiple IConsoleCallback instances registered on the given IConsole object, make sure you simply do nothing but return `true` and `S_OK` from all but one of them that actually manages console window activation.

9.5.3 onDVDDriveChange

```
void IConsoleCallback::onDVDDriveChange()
```

Notification when a property of the virtual [DVD drive](#) changes. Interested callees should use IDVDDrive methods to find out what has changed.

9.5.4 onFloppyDriveChange

```
void IConsoleCallback::onFloppyDriveChange()
```

Notification when a property of the virtual [floppy drive](#) changes. Interested callees should use IFloppyDrive methods to find out what has changed.

9.5.5 onKeyboardLedsChange

```
void IConsoleCallback::onKeyboardLedsChange(  
    [in] boolean numLock,  
    [in] boolean capsLock,  
    [in] boolean scrollLock)
```

Notification when the guest OS executes the KBD_CMD_SET_LEDS command to alter the state of the keyboard LEDs.

9.5.6 onMouseCapabilityChange

```
void IConsoleCallback::onMouseCapabilityChange(  
    [in] boolean supportsAbsolute,  
    [in] boolean needsHostCursor)
```

Notification when the mouse capabilities reported by the guest have changed. The new capabilities are passed.

9.5.7 onMousePointerShapeChange

```
void IConsoleCallback::onMousePointerShapeChange(  
    [in] boolean visible,  
    [in] boolean alpha,  
    [in] unsigned long xHot,  
    [in] unsigned long yHot,  
    [in] unsigned long width,  
    [in] unsigned long height,  
    [in] [ptr] octet shape)
```

Note: This method is not supported in the web service.

Notification when the guest mouse pointer shape has changed. The new shape data is given.

9.5.8 onNetworkAdapterChange

```
void IConsoleCallback::onNetworkAdapterChange(
    [in] INetworkAdapter networkAdapter)
```

Notification when a property of one of the virtual [network adapters](#) changes. Interested callees should use INetworkAdapter methods and attributes to find out what has changed.

9.5.9 onParallelPortChange

```
void IConsoleCallback::onParallelPortChange(
    [in] IParallelPort parallelPort)
```

Notification when a property of one of the virtual [parallel ports](#) changes. Interested callees should use ISerialPort methods and attributes to find out what has changed.

9.5.10 onRuntimeError

```
void IConsoleCallback::onRuntimeError(
    [in] boolean fatal,
    [in] wstring id,
    [in] wstring message)
```

Notification when an error happens during the virtual machine execution. There are three kinds of runtime errors:

- *fatal*
- *non-fatal with retry*
- *non-fatal warnings*

Fatal errors are indicated by the `fatal` parameter set to `true`. In case of fatal errors, the virtual machine execution is always paused before calling this notification, and the notification handler is supposed either to immediately save the virtual machine state using [IConsole::saveState\(\)](#) or power it off using [IConsole::powerDown\(\)](#). Resuming the execution can lead to unpredictable results.

Non-fatal errors and warnings are indicated by the `fatal` parameter set to `false`. If the virtual machine is in the Paused state by the time the error notification is received, it means that the user can *try to resume* the machine execution after attempting to solve the problem that caused the error. In this case, the notification handler is supposed to show an appropriate message to the user (depending on the value of the `id` parameter) that offers several actions such as *Retry*, *Save* or *Power Off*. If the user wants to retry, the notification handler should continue the machine execution using the [IConsole::resume\(\)](#) call. If the machine execution is not Paused during this notification, then it means this notification is a *warning* (for example, about a fatal

condition that can happen very soon); no immediate action is required from the user, the machine continues its normal execution.

Note that in either case the notification handler **must not** perform any action directly on a thread where this notification is called. Everything it is allowed to do is to post a message to another thread that will then talk to the user and take the corresponding action.

Currently, the following error identifiers are known:

- "HostMemoryLow"
- "HostAudioNotResponding"
- "VDIStorageFull"

Note: This notification is not designed to be implemented by more than one callback at a time. If you have multiple IConsoleCallback instances registered on the given IConsole object, make sure you simply do nothing but return S_OK from all but one of them that does actual user notification and performs necessary actions.

9.5.11 onSerialPortChange

```
void IConsoleCallback::onSerialPortChange(  
    [in] ISerialPort serialPort)
```

Notification when a property of one of the virtual [serial ports](#) changes. Interested callees should use ISerialPort methods and attributes to find out what has changed.

9.5.12 onSharedFolderChange

```
void IConsoleCallback::onSharedFolderChange(  
    [in] Scope scope)
```

Notification when a shared folder is added or removed. The `scope` argument defines one of three scopes: [global shared folders](#) (Global), [permanent shared folders](#) of the machine (Machine) or [transient shared folders](#) of the machine (Session). Interested callees should use query the corresponding collections to find out what has changed.

9.5.13 onShowWindow

```
unsigned long long IConsoleCallback::onShowWindow()
```


Notification when a call to `IMachine::showConsoleWindow()` requests the console window to be activated and brought to foreground on the desktop of the host PC.

This notification should cause the VM console process to perform the requested action as described above. If it is impossible to do it at a time of this notification, this method should return a failure.

Note that many modern window managers on many platforms implement some sort of focus stealing prevention logic, so that it may be impossible to activate a window without the help of the currently active application (which is supposedly an initiator of this notification). In this case, this method must return a non-zero identifier that represents the top-level window of the VM console process. The caller, if it represents a currently active process, is responsible to use this identifier (in a platform-dependent manner) to perform actual window activation.

This method must set `winId` to zero if it has performed all actions necessary to complete the request and the console window is now active and in foreground, to indicate that no further action is required on the caller's side.

Note: This notification is not designed to be implemented by more than one callback at a time. If you have multiple `IConsoleCallback` instances registered on the given `IConsole` object, make sure you simply do nothing but return `S_OK` from all but one of them that actually manages console window activation.

9.5.14 onStateChange

```
void IConsoleCallback::onStateChange(  
    [in] MachineState state)
```

Notification when the execution state of the machine has changed. The new state will be given.

9.5.15 onStorageControllerChange

```
void IConsoleCallback::onStorageControllerChange()
```

Notification when a property of one of the virtual [storage controllers](#) changes. Interested callees should query the corresponding collections to find out what has changed.

9.5.16 onUSBControllerChange

```
void IConsoleCallback::onUSBControllerChange()
```

Notification when a property of the virtual [USB controller](#) changes. Interested callees should use `IUSBController` methods and attributes to find out what has changed.

9.5.17 onUSBDeviceStateChange

```
void IConsoleCallback::onUSBDeviceStateChange(  
    [in] IUSBDevice device,  
    [in] boolean attached,  
    [in] IVirtualBoxErrorInfo error)
```

Notification when a USB device is attached to or detached from the virtual USB controller.

This notification is sent as a result of the indirect request to attach the device because it matches one of the machine USB filters, or as a result of the direct request issued by [IConsole::attachUSBDevice\(\)](#) or [IConsole::detachUSBDevice\(\)](#).

This notification is sent in case of both a succeeded and a failed request completion. When the request succeeds, the `error` parameter is `null`, and the given device has been already added to (when `attached` is `true`) or removed from (when `attached` is `false`) the collection represented by [IConsole::USBDevices\[\]](#). On failure, the collection doesn't change and the `error` parameter represents the error message describing the failure.

9.5.18 onVRDPServerChange

```
void IConsoleCallback::onVRDPServerChange()
```

Notification when a property of the [VRDP server](#) changes. Interested callees should use [IVRDPServer](#) methods and attributes to find out what has changed.

9.6 IConsoleCallback

9.7 IDHCPServer

The [IDHCPServer](#) interface represents the `vbox dhcp` server configuration.

To enumerate all the `dhcp` servers on the host, use the [IVirtualBox::DHCPservers\[\]](#) attribute.

9.7.1 Attributes

9.7.1.1 enabled (read/write)

```
boolean IDHCPServer::enabled
```

specifies if the `dhcp` server is enabled

9.7.1.2 IPAddress (read-only)

```
wstring IDHCPServer::IPAddress
```

specifies server IP

9.7.1.3 networkMask (read-only)

wstring IDHCPServer::networkMask

specifies server network mask

9.7.1.4 networkName (read-only)

wstring IDHCPServer::networkName

specifies internal network name the server is used for

9.7.1.5 lowerIP (read-only)

wstring IDHCPServer::lowerIP

specifies from IP adres in server address range

9.7.1.6 upperIP (read-only)

wstring IDHCPServer::upperIP

specifies to IP adres in server address range

9.7.2 setConfiguration

```
void IDHCPServer::setConfiguration(  
    [in] wstring IPAddress,  
    [in] wstring networkMask,  
    [in] wstring FromIPAddress,  
    [in] wstring ToIPAddress)
```

configures the server

If this method fails, the following error codes may be reported:

- **E_INVALIDARG**: invalid configuration supplied

9.7.3 start

```
void IDHCPServer::start(  
    [in] wstring networkName,  
    [in] wstring trunkName,  
    [in] wstring trunkType)
```

Starts DHCP server process.

If this method fails, the following error codes may be reported:

- **E_FAIL**: Failed to start the process.

9.7.4 stop

```
void IDHCPServer::stop()
```

Stops DHCP server process.

If this method fails, the following error codes may be reported:

- `E_FAIL`: Failed to stop the process.

9.8 IDVDDrive

The IDVDDrive interface represents the virtual CD/DVD drive of the virtual machine. An object of this type is returned by [IMachine::DVDDrive](#).

9.8.1 Attributes

9.8.1.1 state (read-only)

```
DriveState IDVDDrive::state
```

Current drive state.

9.8.1.2 passthrough (read/write)

```
boolean IDVDDrive::passthrough
```

When a host drive is mounted and passthrough is enabled the guest OS will be able to directly send SCSI commands to the host drive. This enables the guest OS to use CD/DVD writers but is potentially dangerous.

9.8.2 captureHostDrive

```
void IDVDDrive::captureHostDrive(  
    [in] IHostDVDDrive drive)
```

Captures the specified host CD/DVD drive.

9.8.3 getHostDrive

```
IHostDVDDrive IDVDDrive::getHostDrive()
```

Returns the currently mounted host CD/DVD drive.

9.8.4 getImage

```
IDVDImage IDVDDrive::getImage()
```

Returns the currently mounted CD/DVD image.

9.8.5 mountImage

```
void IDVDDrive::mountImage(  
    [in] wstring imageId)
```

Mounts a CD/DVD image with the specified UUID.

If this method fails, the following error codes may be reported:

- **VBOX_E_FILE_ERROR**: Invalid image file location.
- **VBOX_E_OBJECT_NOT_FOUND**: Could not find a CD/DVD image matching `imageId`.
- **VBOX_E_INVALID_OBJECT_STATE**: Invalid media state.

9.8.6 unmount

```
void IDVDDrive::unmount()
```

Unmounts the currently mounted image or host drive.

9.9 IDVDImage

The `IDVDImage` interface represents a medium containing the image of a CD or DVD disk in the ISO format.

This is a subclass of [IMedium](#); see remarks there.

9.10 IDisplay

The `IDisplay` interface represents the virtual machine's display.

The object implementing this interface is contained in each [IConsole::display](#) attribute and represents the visual output of the virtual machine.

The virtual display supports pluggable output targets represented by the `IFramebuffer` interface. Examples of the output target are a window on the host computer or an RDP session's display on a remote computer.

9.10.1 Attributes

9.10.1.1 width (read-only)

```
unsigned long IDisplay::width
```

Current display width.

9.10.1.2 height (read-only)

```
unsigned long IDisplay::height
```

Current display height.

9.10.1.3 bitsPerPixel (read-only)

```
unsigned long IDisplay::bitsPerPixel
```

Current guest display color depth. Note that this may differ from [IFrame-buffer::bitsPerPixel](#).

9.10.2 completeVHWACommand

```
void IDisplay::completeVHWACommand(  
    [in] [ptr] octet command)
```

Note: This method is not supported in the web service.

Signals that the Video HW Acceleration command has completed.

9.10.3 drawToScreen

```
void IDisplay::drawToScreen(  
    [in] [ptr] octet address,  
    [in] unsigned long x,  
    [in] unsigned long y,  
    [in] unsigned long width,  
    [in] unsigned long height)
```

Note: This method is not supported in the web service.

Draws a 32-bpp image of the specified size from the given buffer to the given point on the VM display.

If this method fails, the following error codes may be reported:

- `E_NOTIMPL`: Feature not implemented.
- `VBOX_E_IPRT_ERROR`: Could not draw to screen.

9.10.4 getFramebuffer

```
void IDisplay::getFramebuffer(  
    [in] unsigned long screenId,  
    [out] IFramebuffer framebuffer,  
    [out] long xOrigin,  
    [out] long yOrigin)
```

Note: This method is not supported in the web service.

Queries the framebuffer for given screen.

9.10.5 invalidateAndUpdate

```
void IDisplay::invalidateAndUpdate()
```

Does a full invalidation of the VM display and instructs the VM to update it.
If this method fails, the following error codes may be reported:

- **VBOX_E_IPRT_ERROR:** Could not invalidate and update screen.

9.10.6 resizeCompleted

```
void IDisplay::resizeCompleted(  
    [in] unsigned long screenId)
```

Signals that a framebuffer has completed the resize operation.
If this method fails, the following error codes may be reported:

- **VBOX_E_NOT_SUPPORTED:** Operation only valid for external frame buffers.

9.10.7 setFramebuffer

```
void IDisplay::setFramebuffer(  
    [in] unsigned long screenId,  
    [in] IFramebuffer framebuffer)
```

Note: This method is not supported in the web service.

Sets the framebuffer for given screen.

9.10.8 setSeamlessMode

```
void IDisplay::setSeamlessMode(  
    [in] boolean enabled)
```

Enables or disables seamless guest display rendering (seamless desktop integration) mode.

Note: Calling this method has no effect if [IGuest::supportsSeamless](#) returns false.

9.10.9 setVideoModeHint

```
void IDisplay::setVideoModeHint(  
    [in] unsigned long width,  
    [in] unsigned long height,  
    [in] unsigned long bitsPerPixel,  
    [in] unsigned long display)
```

Asks VirtualBox to request the given video mode from the guest. This is just a hint and it cannot be guaranteed that the requested resolution will be used. Guest Additions are required for the request to be seen by guests. The caller should issue the request and wait for a resolution change and after a timeout retry.

Specifying 0 for either `width`, `height` or `bitsPerPixel` parameters means that the corresponding values should be taken from the current video mode (i.e. left unchanged).

If the guest OS supports multi-monitor configuration then the `display` parameter specifies the number of the guest display to send the hint to: 0 is the primary display, 1 is the first secondary and so on. If the multi-monitor configuration is not supported, `display` must be 0.

If this method fails, the following error codes may be reported:

- `E_INVALIDARG`: The `display` is not associated with any monitor.

9.10.10 takeScreenShot

```
void IDisplay::takeScreenShot(  
    [in] [ptr] octet address,  
    [in] unsigned long width,  
    [in] unsigned long height)
```

Note: This method is not supported in the web service.

9 Classes (interfaces)

Takes a screen shot of the requested size and copies it to the 32-bpp buffer allocated by the caller and pointed to by `address`.

Note: This API can be used only by the COM/XPCOM C++ API as it requires pointer support. Use [takeScreenShotSlow\(\)](#) with other language bindings.

If this method fails, the following error codes may be reported:

- `E_NOTIMPL`: Feature not implemented.
- `VBOX_E_IPRT_ERROR`: Could not take a screenshot.

9.10.11 takeScreenShotSlow

```
octet[] IDisplay::takeScreenShotSlow(  
    [in] unsigned long width,  
    [in] unsigned long height)
```

Takes a guest screen shot of the requested size and returns it as an array of bytes in uncompressed 32-bit ARGB format. This API is slow, but could be the only option to get guest screenshot for scriptable languages not allowed to manipulate with addresses directly.

If this method fails, the following error codes may be reported:

- `E_NOTIMPL`: Feature not implemented.
- `VBOX_E_IPRT_ERROR`: Could not take a screenshot.

9.10.12 updateCompleted

```
void IDisplay::updateCompleted()
```

Signals that a framebuffer has completed the update operation.

If this method fails, the following error codes may be reported:

- `VBOX_E_NOT_SUPPORTED`: Operation only valid for external frame buffers.

9.11 IFloppyDrive

The `IFloppyDrive` interface represents the virtual floppy drive of the virtual machine. An object of this type is returned by [IMachine::floppyDrive](#).

9.11.1 Attributes

9.11.1.1 enabled (read/write)

`boolean IFloppyDrive::enabled`

Flag whether the floppy drive is enabled. If it is disabled, the floppy drive will not be reported to the guest OS.

9.11.1.2 state (read-only)

`DriveState IFloppyDrive::state`

Current drive state.

9.11.2 captureHostDrive

```
void IFloppyDrive::captureHostDrive(  
    [in] IHostFloppyDrive drive)
```

Captures the specified host floppy drive.

9.11.3 getHostDrive

`IHostFloppyDrive IFloppyDrive::getHostDrive()`

Returns the currently mounted host floppy drive.

9.11.4 getImage

`IFloppyImage IFloppyDrive::getImage()`

Returns the currently mounted floppy image.

9.11.5 mountImage

```
void IFloppyDrive::mountImage(  
    [in] wstring imageId)
```

Mounts a floppy image with the specified UUID.

If this method fails, the following error codes may be reported:

- `VBOX_E_FILE_ERROR`: Invalid image file location.
- `VBOX_E_OBJECT_NOT_FOUND`: Could not find a floppy image matching `imageID`.
- `VBOX_E_INVALID_OBJECT_STATE`: Invalid media state.

9.11.6 unmount

```
void IFloppyDrive::unmount()
```

Unmounts the currently mounted image or host drive.

9.12 IFloppyImage

The IFloppyImage interface represents a medium containing the image of a floppy disk. This is a subclass of [IMedium](#); see remarks there.

9.13 IFramebuffer

Note: This interface is not supported in the web service.

9.13.1 Attributes

9.13.1.1 address (read-only)

```
octet IFramebuffer::address
```

Address of the start byte of the frame buffer.

9.13.1.2 width (read-only)

```
unsigned long IFramebuffer::width
```

Frame buffer width, in pixels.

9.13.1.3 height (read-only)

```
unsigned long IFramebuffer::height
```

Frame buffer height, in pixels.

9.13.1.4 bitsPerPixel (read-only)

```
unsigned long IFramebuffer::bitsPerPixel
```

Color depth, in bits per pixel. When [pixelFormat](#) is [FOURCC_RGB](#), valid values are: 8, 15, 16, 24 and 32.

9.13.1.5 bytesPerLine (read-only)

`unsigned long IFramebuffer::bytesPerLine`

Scan line size, in bytes. When `pixelFormat` is `FOURCC_RGB`, the size of the scan line must be aligned to 32 bits.

9.13.1.6 pixelFormat (read-only)

`unsigned long IFramebuffer::pixelFormat`

Frame buffer pixel format. It's either one of the values defined by `FramebufferPixelFormat` or a raw FOURCC code.

Note: This attribute must never return `Opaque` – the format of the buffer `address` points to must be always known.

9.13.1.7 usesGuestVRAM (read-only)

`boolean IFramebuffer::usesGuestVRAM`

Defines whether this frame buffer uses the virtual video card's memory buffer (guest VRAM) directly or not. See `requestResize()` for more information.

9.13.1.8 heightReduction (read-only)

`unsigned long IFramebuffer::heightReduction`

Hint from the frame buffer about how much of the standard screen height it wants to use for itself. This information is exposed to the guest through the VESA BIOS and VMMDev interface so that it can use it for determining its video mode table. It is not guaranteed that the guest respects the value.

9.13.1.9 overlay (read-only)

`IFramebufferOverlay IFramebuffer::overlay`

Note: This attribute is not supported in the web service.

An alpha-blended overlay which is superposed over the frame buffer. The initial purpose is to allow the display of icons providing information about the VM state, including disk activity, in front ends which do not have other means of doing that. The overlay is designed to be controlled exclusively by `IDisplay`. It has no locking of its own, and any changes made to it are not guaranteed to be visible until the affected portion of `IFramebuffer` is updated. The overlay can be created lazily the first time it is requested. This attribute can also return `null` to signal that the overlay is not implemented.

9.13.1.10 winId (read-only)

```
unsigned long long IFramebuffer::winId
```

Platform-dependent identifier of the window where context of this frame buffer is drawn, or zero if there's no such window.

9.13.2 getVisibleRegion

```
unsigned long IFramebuffer::getVisibleRegion(  
    [in] [ptr] octet rectangles,  
    [in] unsigned long count)
```

Note: This method is not supported in the web service.

Returns the visible region of this frame buffer.

If the `rectangles` parameter is `null` then the value of the `count` parameter is ignored and the number of elements necessary to describe the current visible region is returned in `countCopied`.

If `rectangles` is not `null` but `count` is less than the required number of elements to store region data, the method will report a failure. If `count` is equal or greater than the required number of elements, then the actual number of elements copied to the provided array will be returned in `countCopied`.

Note: The address of the provided array must be in the process space of this `IFramebuffer` object.

Note: Method not yet implemented.

9.13.3 lock

```
void IFramebuffer::lock()
```

Locks the frame buffer. Gets called by the `IDisplay` object where this frame buffer is bound to.

9.13.4 notifyUpdate

```
void IFramebuffer::notifyUpdate(
    [in] unsigned long x,
    [in] unsigned long y,
    [in] unsigned long width,
    [in] unsigned long height)
```

Notifies about an update. Gets called by the display object where this buffer is registered.

9.13.5 processVHWACommand

```
void IFramebuffer::processVHWACommand(
    [in] [ptr] octet command)
```

Note: This method is not supported in the web service.

Posts a Video HW Acceleration Command to the frame buffer for processing. The commands used for 2D video acceleration (DDraw surface creation/destroying, blitting, scaling, color conversion, overlaying, etc.) are posted from guest to the host to be processed by the host hardware.

Note: The address of the provided command must be in the process space of this IFramebuffer object.

9.13.6 requestResize

```
boolean IFramebuffer::requestResize(
    [in] unsigned long screenId,
    [in] unsigned long pixelFormat,
    [in] [ptr] octet VRAM,
    [in] unsigned long bitsPerPixel,
    [in] unsigned long bytesPerLine,
    [in] unsigned long width,
    [in] unsigned long height)
```

Note: This method is not supported in the web service.

Requests a size and pixel format change.

There are two modes of working with the video buffer of the virtual machine. The *indirect* mode implies that the IFramebuffer implementation allocates a memory buffer

for the requested display mode and provides it to the virtual machine. In *direct* mode, the `IFramebuffer` implementation uses the memory buffer allocated and owned by the virtual machine. This buffer represents the video memory of the emulated video adapter (so called *guest VRAM*). The direct mode is usually faster because the implementation gets a raw pointer to the guest VRAM buffer which it can directly use for visualizing the contents of the virtual display, as opposed to the indirect mode where the contents of guest VRAM are copied to the memory buffer provided by the implementation every time a display update occurs.

It is important to note that the direct mode is really fast only when the implementation uses the given guest VRAM buffer directly, for example, by blitting it to the window representing the virtual machine's display, which saves at least one copy operation comparing to the indirect mode. However, using the guest VRAM buffer directly is not always possible: the format and the color depth of this buffer may be not supported by the target window, or it may be unknown (opaque) as in case of text or non-linear multi-plane VGA video modes. In this case, the indirect mode (that is always available) should be used as a fallback: when the guest VRAM contents are copied to the implementation-provided memory buffer, color and format conversion is done automatically by the underlying code.

The `pixelFormat` parameter defines whether the direct mode is available or not. If `pixelFormat` is `Opaque` then direct access to the guest VRAM buffer is not available – the `VRAM`, `bitsPerPixel` and `bytesPerLine` parameters must be ignored and the implementation must use the indirect mode (where it provides its own buffer in one of the supported formats). In all other cases, `pixelFormat` together with `bitsPerPixel` and `bytesPerLine` define the format of the video memory buffer pointed to by the `VRAM` parameter and the implementation is free to choose which mode to use. To indicate that this frame buffer uses the direct mode, the implementation of the `usesGuestVRAM` attribute must return `true` and `address` must return exactly the same address that is passed in the `VRAM` parameter of this method; otherwise it is assumed that the indirect strategy is chosen.

The `width` and `height` parameters represent the size of the requested display mode in both modes. In case of indirect mode, the provided memory buffer should be big enough to store data of the given display mode. In case of direct mode, it is guaranteed that the given `VRAM` buffer contains enough space to represent the display mode of the given size. Note that this frame buffer's `width` and `height` attributes must return exactly the same values as passed to this method after the resize is completed (see below).

The `finished` output parameter determines if the implementation has finished resizing the frame buffer or not. If, for some reason, the resize cannot be finished immediately during this call, `finished` must be set to `false`, and the implementation must call `IDisplay::resizeCompleted()` after it has returned from this method as soon as possible. If `finished` is `false`, the machine will not call any frame buffer methods until `IDisplay::resizeCompleted()` is called.

Note that if the direct mode is chosen, the `bitsPerPixel`, `bytesPerLine` and `pixelFormat` attributes of this frame buffer must return exactly the same values as specified in the parameters of this method, after the resize is completed. If the indirect mode is chosen,

these attributes must return values describing the format of the implementation's own memory buffer [address](#) points to. Note also that the [bitsPerPixel](#) value must always correlate with [pixelFormat](#). Note that the [pixelFormat](#) attribute must never return [Opaque](#) regardless of the selected mode.

Note: This method is called by the IDisplay object under the [lock\(\)](#) provided by this IFramebuffer implementation. If this method returns `false` in `finished`, then this lock is not released until [IDisplay::resizeCompleted\(\)](#) is called.

9.13.7 setVisibleRegion

```
void IFramebuffer::setVisibleRegion(  
    [in] [ptr] octet rectangles,  
    [in] unsigned long count)
```

Note: This method is not supported in the web service.

Suggests a new visible region to this frame buffer. This region represents the area of the VM display which is a union of regions of all top-level windows of the guest operating system running inside the VM (if the Guest Additions for this system support this functionality). This information may be used by the frontends to implement the seamless desktop integration feature.

Note: The address of the provided array must be in the process space of this IFramebuffer object.

Note: The IFramebuffer implementation must make a copy of the provided array of rectangles.

Note: Method not yet implemented.

9.13.8 unlock

```
void IFramebuffer::unlock()
```

Unlocks the frame buffer. Gets called by the IDisplay object where this frame buffer is bound to.

9.13.9 videoModeSupported

```
boolean IFramebuffer::videoModeSupported(
    [in] unsigned long width,
    [in] unsigned long height,
    [in] unsigned long bpp)
```

Returns whether the frame buffer implementation is willing to support a given video mode. In case it is not able to render the video mode (or for some reason not willing), it should return `false`. Usually this method is called when the guest asks the VMM device whether a given video mode is supported so the information returned is directly exposed to the guest. It is important that this method returns very quickly.

9.14 IFramebufferOverlay

Note: This interface is not supported in the web service.

The IFramebufferOverlay interface represents an alpha blended overlay for displaying status icons above an IFramebuffer. It is always created not visible, so that it must be explicitly shown. It only covers a portion of the IFramebuffer, determined by its width, height and co-ordinates. It is always in packed pixel little-endian 32bit ARGB (in that order) format, and may be written to directly. Do re-read the width though, after setting it, as it may be adjusted (increased) to make it more suitable for the front end.

9.14.1 Attributes

9.14.1.1 x (read-only)

```
unsigned long IFramebufferOverlay::x
```

X position of the overlay, relative to the frame buffer.

9.14.1.2 y (read-only)

```
unsigned long IFramebufferOverlay::y
```

Y position of the overlay, relative to the frame buffer.

9.14.1.3 visible (read/write)

```
boolean IFramebufferOverlay::visible
```

Whether the overlay is currently visible.

9.14.1.4 alpha (read/write)

```
unsigned long IFramebufferOverlay::alpha
```

The global alpha value for the overlay. This may or may not be supported by a given front end.

9.14.2 move

```
void IFramebufferOverlay::move(  
    [in] unsigned long x,  
    [in] unsigned long y)
```

Changes the overlay's position relative to the IFramebuffer.

9.15 IGuest

The IGuest interface represents information about the operating system running inside the virtual machine. Used in [IConsole::guest](#).

IGuest provides information about the guest operating system, whether Guest Additions are installed and other OS-specific virtual machine properties.

9.15.1 Attributes

9.15.1.1 OSTypeId (read-only)

```
wstring IGuest::OSTypeId
```

Identifier of the Guest OS type as reported by the Guest Additions. You may use [IVirtualBox::getGuestOSType\(\)](#) to obtain an IGuestOSType object representing details about the given Guest OS type.

Note: If Guest Additions are not installed, this value will be the same as [IMachine::OSTypeId](#).

9.15.1.2 additionsActive (read-only)

```
boolean IGuest::additionsActive
```

Flag whether the Guest Additions are installed and active in which case their version will be returned by the [additionsVersion](#) property.

9.15.1.3 additionsVersion (read-only)

```
wstring IGuest::additionsVersion
```

Version of the Guest Additions (3 decimal numbers separated by dots) or empty when the Additions are not installed. The Additions may also report a version but yet not be active as the version might be refused by VirtualBox (incompatible) or other failures occurred.

9.15.1.4 supportsSeamless (read-only)

```
boolean IGuest::supportsSeamless
```

Flag whether seamless guest display rendering (seamless desktop integration) is supported.

9.15.1.5 supportsGraphics (read-only)

```
boolean IGuest::supportsGraphics
```

Flag whether the guest is in graphics mode. If it is not, then seamless rendering will not work, resize hints are not immediately acted on and guest display resizes are probably not initiated by the guest additions.

9.15.1.6 memoryBalloonSize (read/write)

```
unsigned long IGuest::memoryBalloonSize
```

Guest system memory balloon size in megabytes.

9.15.1.7 statisticsUpdateInterval (read/write)

```
unsigned long IGuest::statisticsUpdateInterval
```

Interval to update guest statistics in seconds.

9.15.2 getStatistic

```
unsigned long IGuest::getStatistic(  
    [in] unsigned long cpuId,  
    [in] GuestStatisticType statistic)
```

Query specified guest statistics as reported by the VirtualBox Additions.

9.15.3 setCredentials

```
void IGuest::setCredentials(
    [in] wstring userName,
    [in] wstring password,
    [in] wstring domain,
    [in] boolean allowInteractiveLogon)
```

Store login credentials that can be queried by guest operating systems with Additions installed. The credentials are transient to the session and the guest may also choose to erase them. Note that the caller cannot determine whether the guest operating system has queried or made use of the credentials.

If this method fails, the following error codes may be reported:

- `VBOX_E_VM_ERROR`: VMM device is not available.

9.16 IGuestOSType

Note: With the web service, this interface is mapped to a structure. Attributes that return this interface will not return an object, but a complete structure containing the attributes listed below as structure members.

9.16.1 Attributes

9.16.1.1 familyId (read-only)

```
wstring IGuestOSType::familyId
```

Guest OS family identifier string.

9.16.1.2 familyDescription (read-only)

```
wstring IGuestOSType::familyDescription
```

Human readable description of the guest OS family.

9.16.1.3 id (read-only)

```
wstring IGuestOSType::id
```

Guest OS identifier string.

9.16.1.4 description (read-only)

```
wstring IGuestOSType::description
```

Human readable description of the guest OS.

9.16.1.5 is64Bit (read-only)

`boolean IGuestOSType::is64Bit`

Returns `true` if the given OS is 64-bit

9.16.1.6 recommendedIOAPIC (read-only)

`boolean IGuestOSType::recommendedIOAPIC`

Returns `true` if IO APIC recommended for this OS type.

9.16.1.7 recommendedVirtEx (read-only)

`boolean IGuestOSType::recommendedVirtEx`

Returns `true` if VT-x or AMD-V recommended for this OS type.

9.16.1.8 recommendedRAM (read-only)

`unsigned long IGuestOSType::recommendedRAM`

Recommended RAM size in Megabytes.

9.16.1.9 recommendedVRAM (read-only)

`unsigned long IGuestOSType::recommendedVRAM`

Recommended video RAM size in Megabytes.

9.16.1.10 recommendedHDD (read-only)

`unsigned long IGuestOSType::recommendedHDD`

Recommended hard disk size in Megabytes.

9.16.1.11 adapterType (read-only)

`NetworkAdapterType IGuestOSType::adapterType`

Returns recommended network adapter for this OS type.

9.17 IHardDisk

The IHardDisk interface represents a virtual hard disk drive used by a virtual machine. This is a subclass of [IMedium](#); see remarks there.

Hard Disk Types

There are three types of hard disks: [Normal](#), [Immutable](#) and [Writethrough](#). The type of the hard disk defines how the hard disk is attached to a virtual machine and what happens when a [ISnapshot](#) of the virtual machine with the attached hard disk is taken. The type of the hard disk is defined by the [type](#) attribute.

All hard disks can be also divided in two groups: *base* hard disks and *differencing* hard disks. A base hard disk contains all sectors of the hard disk data in its own storage and therefore can be used independently. On the contrary, a differencing hard disk is a “delta” to some other disk and contains only those sectors which differ from that other disk, which is then called a *parent*. The differencing hard disk is said to be *linked to* that parent. The parent may be itself a differencing image, thus forming a chain of linked hard disks. The last element in that chain (sometimes referred to as the root hard disk) must always be a base. Note that several differencing hard disks may be linked to the same parent hard disk.

Differencing hard disks can be distinguished from base hard disks by querying the [parent](#) attribute: base hard disks do not have parents they would depend on, so the value of this attribute is always `null` for them. Using this attribute, it is possible to walk up the hard disk tree (from the child hard disk to its parent). It is also possible to walk down the tree using the [children\[\]](#) attribute.

Note that the type of all differencing hard disks is [Normal](#); all other values are meaningless for them. Base hard disks may be of any type.

Creating Hard Disks

New base hard disks are created using [IVirtualBox::createHardDisk\(\)](#). Existing hard disks are opened using [IVirtualBox::openHardDisk\(\)](#). Differencing hard disks are usually implicitly created by VirtualBox when needed but may also be created explicitly using [createDiffStorage\(\)](#).

After the hard disk is successfully created (including the storage unit) or opened, it becomes a known hard disk (remembered in the internal media registry). Known hard disks can be attached to a virtual machine, accessed through [IVirtualBox::getHardDisk\(\)](#) and [IVirtualBox::findHardDisk\(\)](#) methods or enumerated using the [IVirtualBox::hardDisks\[\]](#) array (only for base hard disks).

The following methods, besides [IMedium::close\(\)](#), automatically remove the hard disk from the media registry:

- [deleteStorage\(\)](#)
- [mergeTo\(\)](#)

If the storage unit of the hard disk is a regular file in the host’s file system then the rules stated in the description of the [IMedium::location](#) attribute apply when setting its value. In addition, a plain file name without any path may be given, in which case the [default hard disk folder](#) will be prepended to it.

Automatic composition of the file name part

Another extension to the [IMedium::location](#) attribute is that there is a possibility to cause VirtualBox to compose a unique value for the file name part of the location using the UUID of the hard disk. This applies only to hard disks in [NotCreated](#) state, e.g. before the storage unit is created, and works as follows. You set the value of the [IMedium::location](#) attribute to a location specification which only contains the path specification but not the file name part and ends with either a forward slash or a backslash character. In response, VirtualBox will generate a new UUID for the hard disk and compose the file name using the following pattern:

```
<path>/{<uuid>}.<ext>
```

where `<path>` is the supplied path specification, `<uuid>` is the newly generated UUID and `<ext>` is the default extension for the storage format of this hard disk. After that, you may call any of the methods that create a new hard disk storage unit and they will use the generated UUID and file name.

Attaching Hard Disks

Hard disks are attached to virtual machines using the [IMachine::attachHardDisk\(\)](#) method and detached using the [IMachine::detachHardDisk\(\)](#) method. Depending on their [type](#), hard disks are attached either *directly* or *indirectly*.

When a hard disk is being attached directly, it is associated with the virtual machine and used for hard disk operations when the machine is running. When a hard disk is being attached indirectly, a new differencing hard disk linked to it is implicitly created and this differencing hard disk is associated with the machine and used for hard disk operations. This also means that if [IMachine::attachHardDisk\(\)](#) performs a direct attachment then the same hard disk will be returned in response to the subsequent [IMachine::getHardDisk\(\)](#) call; however if an indirect attachment is performed then [IMachine::getHardDisk\(\)](#) will return the implicitly created differencing hard disk, not the original one passed to [IMachine::attachHardDisk\(\)](#). The following table shows the dependency of the attachment type on the hard disk type:

Hard Disk TypeDirect or Indirect?Normal (Base) Normal base hard disks that do not have children (i.e. differencing hard disks linked to them) and that are not already attached to virtual machines in snapshots are attached **directly**. Otherwise, they are attached **indirectly** because having dependent children or being part of the snapshot makes it impossible to modify hard disk contents without breaking the integrity of the dependent party. The [readOnly](#) attribute allows to quickly determine the kind of the attachment for the given hard disk. Note that if a normal base hard disk is to be indirectly attached to a virtual machine with snapshots then a special procedure called *smart attachment* is performed (see below). Normal (Differencing) Differencing hard disks are like normal base hard disks: attached **directly** if they do not have children and are not attached to virtual machines in snapshots, and **indirectly** otherwise. Note that the smart attachment procedure is never performed for differencing hard disks. Immutable Immutable hard disks are always attached **indirectly** because they are designed to be non-writable. If an immutable hard disk is attached to a virtual machine

with snapshots then a special procedure called smart attachment is performed (see below). Writethrough hard disks are always attached **directly**, also as designed. This also means that writethrough hard disks cannot have other hard disks linked to them at all.

Note that the same hard disk, regardless of its type, may be attached to more than one virtual machine at a time. In this case, the machine that is started first gains exclusive access to the hard disk and attempts to start other machines having this hard disk attached will fail until the first machine is powered down.

Detaching hard disks is performed in a *deferred* fashion. This means that the given hard disk remains associated with the given machine after a successful `IMachine::detachHardDisk()` call until `IMachine::saveSettings()` is called to save all changes to machine settings to disk. This deferring is necessary to guarantee that the hard disk configuration may be restored at any time by a call to `IMachine::discardSettings()` before the settings are saved (committed).

Note that if `IMachine::discardSettings()` is called after indirectly attaching some hard disks to the machine but before a call to `IMachine::saveSettings()` is made, it will implicitly delete all differencing hard disks implicitly created by `IMachine::attachHardDisk()` for these indirect attachments. Such implicitly created hard disks will also be immediately deleted when detached explicitly using the `IMachine::detachHardDisk()` call if it is made before `IMachine::saveSettings()`. This implicit deletion is safe because newly created differencing hard disks do not contain any user data.

However, keep in mind that detaching differencing hard disks that were implicitly created by `IMachine::attachHardDisk()` before the last `IMachine::saveSettings()` call will **not** implicitly delete them as they may already contain some data (for example, as a result of virtual machine execution). If these hard disks are no more necessary, the caller can always delete them explicitly using `deleteStorage()` after they are actually de-associated from this machine by the `IMachine::saveSettings()` call.

Smart Attachment

When normal base or immutable hard disks are indirectly attached to a virtual machine then some additional steps are performed to make sure the virtual machine will have the most recent “view” of the hard disk being attached. These steps include walking through the machine’s snapshots starting from the current one and going through ancestors up to the first snapshot. Hard disks attached to the virtual machine in all of the encountered snapshots are checked whether they are descendants of the given normal base or immutable hard disk. The first found child (which is the differencing hard disk) will be used instead of the normal base or immutable hard disk as a parent for creating a new differencing hard disk that will be actually attached to the machine. And only if no descendants are found or if the virtual machine does not have any snapshots then the normal base or immutable hard disk will be used itself as a parent for this differencing hard disk.

It is easier to explain what smart attachment does using the following example:

BEFORE attaching B.vdi:

AFTER attaching B.vdi:

9 Classes (interfaces)

Snapshot 1 (B.vdi)	Snapshot 1 (B.vdi)
Snapshot 2 (D1->B.vdi)	Snapshot 2 (D1->B.vdi)
Snapshot 3 (D2->D1.vdi)	Snapshot 3 (D2->D1.vdi)
Snapshot 4 (none)	Snapshot 4 (none)
CurState (none)	CurState (D3->D2.vdi)

NOT

...

CurState (D3->B.vdi)

The first column is the virtual machine configuration before the base hard disk `B.vdi` is attached, the second column shows the machine after this hard disk is attached. Constructs like `D1->B.vdi` and similar mean that the hard disk that is actually attached to the machine is a differencing hard disk, `D1.vdi`, which is linked to (based on) another hard disk, `B.vdi`.

As we can see from the example, the hard disk `B.vdi` was detached from the machine before taking Snapshot 4. Later, after Snapshot 4 was taken, the user decides to attach `B.vdi` again. `B.vdi` has dependent child hard disks (`D1.vdi`, `D2.vdi`), therefore it cannot be attached directly and needs an indirect attachment (i.e. implicit creation of a new differencing hard disk). Due to the smart attachment procedure, the new differencing hard disk (`D3.vdi`) will be based on `D2.vdi`, not on `B.vdi` itself, since `D2.vdi` is the most recent view of `B.vdi` existing for this snapshot branch of the given virtual machine.

Note that if there is more than one descendant hard disk of the given base hard disk found in a snapshot, and there is an exact device, channel and bus match, then this exact match will be used. Otherwise, the youngest descendant will be picked up.

There is one more important aspect of the smart attachment procedure which is not related to snapshots at all. Before walking through the snapshots as described above, the backup copy of the current list of hard disk attachment is searched for descendants. This backup copy is created when the hard disk configuration is changed for the first time after the last `IMachine::saveSettings()` call and used by `IMachine::discardSettings()` to undo the recent hard disk changes. When such a descendant is found in this backup copy, it will be simply re-attached back, without creating a new differencing hard disk for it. This optimization is necessary to make it possible to re-attach the base or immutable hard disk to a different bus, channel or device slot without losing the contents of the differencing hard disk actually attached to the machine in place of it.

9.17.1 Attributes

9.17.1.1 format (read-only)

wstring IHardDisk::format

Storage format of this hard disk.

The value of this attribute is a string that specifies a backend used to store hard disk data. The storage format is defined when you create a new hard disk or automatically detected when you open an existing hard disk medium, and cannot be changed later.

The list of all storage formats supported by this VirtualBox installation can be obtained using [ISystemProperties::hardDiskFormats\[\]](#).

9.17.1.2 type (read/write)

[HardDiskType](#) [IHardDisk::type](#)

Type (role) of this hard disk.

The following constraints apply when changing the value of this attribute:

- If a hard disk is attached to a virtual machine (either in the current state or in one of the snapshots), its type cannot be changed.
- As long as the hard disk has children, its type cannot be set to [Writethrough](#).
- The type of all differencing hard disks is [Normal](#) and cannot be changed.

The type of a newly created or opened hard disk is set to [Normal](#).

9.17.1.3 parent (read-only)

[IHardDisk](#) [IHardDisk::parent](#)

Parent of this hard disk (a hard disk this hard disk is directly based on).

Only differencing hard disks have parents. For base (non-differencing) hard disks, `null` is returned.

9.17.1.4 children (read-only)

[IHardDisk](#) [IHardDisk::children\[\]](#)

Children of this hard disk (all differencing hard disks directly based on this hard disk). A `null` array is returned if this hard disk does not have any children.

9.17.1.5 root (read-only)

[IHardDisk](#) [IHardDisk::root](#)

Root hard disk of this hard disk.

If this is a differencing hard disk, its root hard disk is the base hard disk the given hard disk branch starts from. For all other types of hard disks, this property returns the hard disk object itself (i.e. the same object this property is read on).

9.17.1.6 readOnly (read-only)

`boolean IHardDisk::readOnly`

Returns `true` if this hard disk is read-only and `false` otherwise.

A hard disk is considered to be read-only when its contents cannot be modified without breaking the integrity of other parties that depend on this hard disk such as its child hard disks or snapshots of virtual machines where this hard disk is attached to these machines. If there are no children and no such snapshots then there is no dependency and the hard disk is not read-only.

The value of this attribute can be used to determine the kind of the attachment that will take place when attaching this hard disk to a virtual machine. If the value is `false` then the hard disk will be attached directly. If the value is `true` then the hard disk will be attached indirectly by creating a new differencing child hard disk for that. See the interface description for more information.

Note that all [Immutable](#) hard disks are always read-only while all [Writethrough](#) hard disks are always not.

Note: The read-only condition represented by this attribute is related to the hard disk type and usage, not to the current [media state](#) and not to the read-only state of the storage unit.

9.17.1.7 logicalSize (read-only)

`unsigned long long IHardDisk::logicalSize`

Logical size of this hard disk (in megabytes), as reported to the guest OS running inside the virtual machine this disk is attached to. The logical size is defined when the hard disk is created and cannot be changed later.

Note: Reading this property on a differencing hard disk will return the size of its [root](#) hard disk.

Note: For hard disks whose state is `state` is [Inaccessible](#), the value of this property is the last known logical size. For [NotCreated](#) hard disks, the returned value is zero.

9.17.1.8 autoReset (read/write)

```
boolean IHardDisk::autoReset
```

Whether this differencing hard disk will be automatically reset each time a virtual machine it is attached to is powered up.

See [reset\(\)](#) for more information about resetting differencing hard disks.

Note: Reading this property on a base (non-differencing) hard disk will always `false`. Changing the value of this property in this case is not supported.

9.17.2 cloneTo

```
IProgress IHardDisk::cloneTo(
    [in] IHardDisk target,
    [in] HardDiskVariant variant,
    [in] IHardDisk parent)
```

Starts creating a clone of this hard disk in the format and at the location defined by the `target` argument.

The target hard disk must be either in [NotCreated](#) state (i.e. must not have an existing storage unit) or in [Created](#) state (i.e. created and not locked, and big enough to hold the data or else the copy will be partial). Upon successful completion, the cloned hard disk will contain exactly the same sector data as the hard disk being cloned, except that in the first case a new UUID for the clone will be randomly generated, and in the second case the UUID will remain unchanged.

The `parent` argument defines which hard disk will be the parent of the clone. Passing a `null` reference indicates that the clone will be a base image, i.e. completely independent. It is possible to specify an arbitrary hard disk for this parameter, including the parent of the hard disk which is being cloned. Even cloning to a child of the source hard disk is possible. Note that when cloning to an existing image, the `parent` argument is ignored.

After the returned progress object reports that the operation is successfully complete, the target hard disk gets remembered by this VirtualBox installation and may be attached to virtual machines.

Note: This hard disk will be placed to [LockedRead](#) state for the duration of this operation.

If this method fails, the following error codes may be reported:

- `E_NOTIMPL`: The specified cloning variant is not supported at the moment.

9.17.3 compact

`IProgress IHardDisk::compact()`

Starts compacting of this hard disk. This means that the disk is transformed into a possibly more compact storage representation. This potentially creates temporary images, which can require a substantial amount of additional disk space.

This hard disk will be placed to [LockedWrite](#) state and all its parent hard disks (if any) will be placed to [LockedRead](#) state for the duration of this operation.

Please note that the results can be either returned straight away, or later as the result of the background operation via the object returned via the `progress` parameter.

If this method fails, the following error codes may be reported:

- `VBOX_E_NOT_SUPPORTED`: Hard disk format does not support compacting (but potentially needs it).

9.17.4 createBaseStorage

`IProgress IHardDisk::createBaseStorage(
[in] unsigned long long logicalSize,
[in] HardDiskVariant variant)`

Starts creating a hard disk storage unit (fixed/dynamic, according to the variant flags) in the background. The previous storage unit created for this object, if any, must first be deleted using [deleteStorage\(\)](#), otherwise the operation will fail.

Before the operation starts, the hard disk is placed in [Creating](#) state. If the create operation fails, the media will be placed back in [NotCreated](#) state.

After the returned progress object reports that the operation has successfully completed, the media state will be set to [Created](#), the hard disk will be remembered by this VirtualBox installation and may be attached to virtual machines.

If this method fails, the following error codes may be reported:

- `VBOX_E_NOT_SUPPORTED`: The variant of storage creation operation is not supported. See [IHardDiskFormat::capabilities](#).

9.17.5 createDiffStorage

`IProgress IHardDisk::createDiffStorage(
[in] IHardDisk target,
[in] HardDiskVariant variant)`

Starts creating an empty differencing storage unit based on this hard disk in the format and at the location defined by the `target` argument.

The target hard disk must be in [NotCreated](#) state (i.e. must not have an existing storage unit). Upon successful completion, this operation will set the type of the target

hard disk to [Normal](#) and create a storage unit necessary to represent the differencing hard disk data in the given format (according to the storage format of the target object).

After the returned progress object reports that the operation is successfully complete, the target hard disk gets remembered by this VirtualBox installation and may be attached to virtual machines.

Note: The hard disk will be set to [LockedRead](#) state for the duration of this operation.

If this method fails, the following error codes may be reported:

- `VBOX_E_OBJECT_IN_USE`: Hard disk not in `NotCreated` state.

9.17.6 deleteStorage

[IProgress](#) `IHardDisk::deleteStorage()`

Starts deleting the storage unit of this hard disk.

The hard disk must not be attached to any known virtual machine and must not have any known child hard disks, otherwise the operation will fail. It will also fail if there is no storage unit to delete or if deletion is already in progress, or if the hard disk is being in use (locked for read or for write) or inaccessible. Therefore, the only valid state for this operation to succeed is [Created](#).

Before the operation starts, the hard disk is placed to [Deleting](#) state and gets removed from the list of remembered hard disks (media registry). If the delete operation fails, the media will be remembered again and placed back to [Created](#) state.

After the returned progress object reports that the operation is complete, the media state will be set to [NotCreated](#) and you will be able to use one of the storage creation methods to create it again.

See also: `#close()`

Note: If the deletion operation fails, it is not guaranteed that the storage unit still exists. You may check the [IMedium::state](#) value to answer this question.

If this method fails, the following error codes may be reported:

- `VBOX_E_OBJECT_IN_USE`: Hard disk is attached to a virtual machine.
- `VBOX_E_NOT_SUPPORTED`: Storage deletion is not allowed because neither of storage creation operations are supported. See [IHardDiskFormat::capabilities](#).

9.17.7 `getProperties`

```
wstring[] IHardDisk::getProperties(
    [in] wstring names,
    [out] wstring returnNames[])
```

Returns values for a group of properties in one call.

The names of the properties to get are specified using the `names` argument which is a list of comma-separated property names or an empty string if all properties are to be returned. Note that currently the value of this argument is ignored and the method always returns all existing properties.

The list of all properties supported by the given hard disk format can be obtained with [IHardDiskFormat::describeProperties\(\)](#).

The method returns two arrays, the array of property names corresponding to the `names` argument and the current values of these properties. Both arrays have the same number of elements with each element at the given index in the first array corresponds to an element at the same index in the second array.

Note that for properties that do not have assigned values, an empty string is returned at the appropriate index in the `returnValues` array.

9.17.8 `getProperty`

```
wstring IHardDisk::getProperty(
    [in] wstring name)
```

Returns the value of the custom hard disk property with the given name.

The list of all properties supported by the given hard disk format can be obtained with [IHardDiskFormat::describeProperties\(\)](#).

Note that if this method returns an empty string in `value`, the requested property is supported but currently not assigned any value.

If this method fails, the following error codes may be reported:

- `VBOX_E_OBJECT_NOT_FOUND`: Requested property does not exist (not supported by the format).
- `E_INVALIDARG`: `name` is null or empty.

9.17.9 `mergeTo`

```
IProgress IHardDisk::mergeTo(
    [in] wstring targetId)
```

Starts merging the contents of this hard disk and all intermediate differencing hard disks in the chain to the given target hard disk.

The target hard disk must be either a descendant of this hard disk or its ancestor (otherwise this method will immediately return a failure). It follows that there are two logical directions of the merge operation: from ancestor to descendant (*forward merge*)

9 Classes (interfaces)

and from descendant to ancestor (*backward merge*). Let us consider the following hard disk chain:

```
Base <- Diff_1 <- Diff_2
```

Here, calling this method on the `Base` hard disk object with `Diff_2` as an argument will be a forward merge; calling it on `Diff_2` with `Base` as an argument will be a backward merge. Note that in both cases the contents of the resulting hard disk will be the same, the only difference is the hard disk object that takes the result of the merge operation. In case of the forward merge in the above example, the result will be written to `Diff_2`; in case of the backward merge, the result will be written to `Base`. In other words, the result of the operation is always stored in the target hard disk.

Upon successful operation completion, the storage units of all hard disks in the chain between this (source) hard disk and the target hard disk, including the source hard disk itself, will be automatically deleted and the relevant hard disk objects (including this hard disk) will become uninitialized. This means that any attempt to call any of their methods or attributes will fail with the "Object not ready" (`E_ACCESSDENIED`) error. Applied to the above example, the forward merge of `Base` to `Diff_2` will delete and uninitialized both `Base` and `Diff_1` hard disks. Note that `Diff_2` in this case will become a base hard disk itself since it will no longer be based on any other hard disk.

Considering the above, all of the following conditions must be met in order for the merge operation to succeed:

- Neither this (source) hard disk nor any intermediate differencing hard disk in the chain between it and the target hard disk is attached to any virtual machine.
- Neither the source hard disk nor the target hard disk is an [Immutable](#) hard disk.
- The part of the hard disk tree from the source hard disk to the target hard disk is a linear chain, i.e. all hard disks in this chain have exactly one child which is the next hard disk in this chain. The only exception from this rule is the target hard disk in the forward merge operation; it is allowed to have any number of child hard disks because the merge operation will not change its logical contents (as it is seen by the guest OS or by children).
- None of the involved hard disks are in [LockedRead](#) or [LockedWrite](#) state.

Note: This (source) hard disk and all intermediates will be placed to [Deleting](#) state and the target hard disk will be placed to [LockedWrite](#) state and for the duration of this operation.

9.17.10 reset

```
IProgress IHardDisk::reset()
```

Starts erasing the contents of this differencing hard disk.

This operation will reset the differencing hard disk to its initial state when it does not contain any sector data and any read operation is redirected to its parent hard disk.

This hard disk will be placed to [LockedWrite](#) for the duration of this operation.

If this method fails, the following error codes may be reported:

- `VBOX_E_NOT_SUPPORTED`: This is not a differencing hard disk.
- `VBOX_E_INVALID_OBJECT_STATE`: Hard disk is not in [Created](#) or [Inaccessible](#) state.

9.17.11 setProperties

```
void IHardDisk::setProperties(
    [in] wstring names[],
    [in] wstring values[])
```

Sets values for a group of properties in one call.

The names of the properties to set are passed in the `names` array along with the new values for them in the `values` array. Both arrays have the same number of elements with each element at the given index in the first array corresponding to an element at the same index in the second array.

If there is at least one property name in `names` that is not valid, the method will fail before changing the values of any other properties from the `names` array.

Using this method over [setProperty\(\)](#) is preferred if you need to set several properties at once since it will result into less IPC calls.

The list of all properties supported by the given hard disk format can be obtained with [IHardDiskFormat::describeProperties\(\)](#).

Note that setting the property value to `null` or an empty string is equivalent to deleting the existing value. A default value (if it is defined for this property) will be used by the format backend in this case.

9.17.12 setProperty

```
void IHardDisk::setProperty(
    [in] wstring name,
    [in] wstring value)
```

Sets the value of the custom hard disk property with the given name.

The list of all properties supported by the given hard disk format can be obtained with [IHardDiskFormat::describeProperties\(\)](#).

Note that setting the property value to `null` or an empty string is equivalent to deleting the existing value. A default value (if it is defined for this property) will be used by the format backend in this case.

If this method fails, the following error codes may be reported:

- `VBOX_E_OBJECT_NOT_FOUND`: Requested property does not exist (not supported by the format).
- `E_INVALIDARG`: `name` is `null` or empty.

9.18 IHardDiskAttachment

Note: With the web service, this interface is mapped to a structure. Attributes that return this interface will not return an object, but a complete structure containing the attributes listed below as structure members.

The `IHardDiskAttachment` interface represents a hard disk attachment of a virtual machine.

Every hard disk attachment specifies a slot of the virtual hard disk controller and a virtual hard disk attached to this slot.

The array of hard disk attachments is returned by [IMachine::hardDiskAttachments\[\]](#).

9.18.1 Attributes

9.18.1.1 hardDisk (read-only)

`IHardDisk` `IHardDiskAttachment::hardDisk`

Hard disk object associated with this attachment.

9.18.1.2 controller (read-only)

`wstring` `IHardDiskAttachment::controller`

Interface bus of this attachment.

9.18.1.3 port (read-only)

`long` `IHardDiskAttachment::port`

Port number of this attachment.

9.18.1.4 device (read-only)

`long` `IHardDiskAttachment::device`

Device slot number of this attachment.

9.19 IHardDiskFormat

The IHardDiskFormat interface represents a virtual hard disk format.

Each hard disk format has an associated backend which is used to handle hard disks stored in this format. This interface provides information about the properties of the associated backend.

Each hard disk format is identified by a string represented by the `id` attribute. This string is used in calls like `IVirtualBox::createHardDisk()` to specify the desired format.

The list of all supported hard disk formats can be obtained using `ISystemProperties::hardDiskFormats[]`.

See also: IHardDisk

9.19.1 Attributes

9.19.1.1 id (read-only)

```
wstring IHardDiskFormat::id
```

Identifier of this format.

The format identifier is a non-null non-empty ASCII string. Note that this string is case-insensitive. This means that, for example, all of the following strings:

```
"VDI"
"vdi"
"vDI"
```

refer to the same hard disk format.

This string is used in methods of other interfaces where it is necessary to specify a hard disk format, such as `IVirtualBox::createHardDisk()`.

9.19.1.2 name (read-only)

```
wstring IHardDiskFormat::name
```

Human readable description of this format.

Mainly for use in file open dialogs.

9.19.1.3 fileExtensions (read-only)

```
wstring IHardDiskFormat::fileExtensions[]
```

Array of strings containing the supported file extensions.

The first extension in the array is the extension preferred by the backend. It is recommended to use this extension when specifying a location of the storage unit for a new hard disk.

Note that some backends do not work on files, so this array may be empty.

See also: IHardDiskFormat::capabilities

9.19.1.4 capabilities (read-only)

```
unsigned long IHardDiskFormat::capabilities
```

Capabilities of the format as a set of bit flags.

For the meaning of individual capability flags see [HardDiskFormatCapabilities](#).

9.19.2 describeProperties

```
void IHardDiskFormat::describeProperties(  
    [out] wstring names[],  
    [out] wstring description[],  
    [out] DataType types[],  
    [out] unsigned long flags[],  
    [out] wstring defaults[])
```

Returns several arrays describing the properties supported by this format.

An element with the given index in each array describes one property. Thus, the number of elements in each returned array is the same and corresponds to the number of supported properties.

The returned arrays are filled in only if the [Properties](#) flag is set. All arguments must be non-null.

See also: [DataType](#) See also: [DataFlags](#)

9.20 IHost

The IHost interface represents the physical machine that this VirtualBox installation runs on.

An object implementing this interface is returned by the [IVirtualBox::host](#) attribute. This interface contains read-only information about the host's physical hardware (such as what processors and disks are available, what the host operating system is, and so on) and also allows for manipulating some of the host's hardware, such as global USB device filters and host interface networking.

9.20.1 Attributes

9.20.1.1 DVDDrives (read-only)

```
IHostDVDDrive IHost::DVDDrives[]
```

List of DVD drives available on the host.

9.20.1.2 floppyDrives (read-only)

```
IHostFloppyDrive IHost::floppyDrives[]
```

List of floppy drives available on the host.

9.20.1.3 USBDevices (read-only)

`IHostUSBDevice IHost::USBDevices[]`

List of USB devices currently attached to the host. Once a new device is physically attached to the host computer, it appears in this list and remains there until detached.

Note: If USB functionality is not available in the given edition of VirtualBox, this method will set the result code to `E_NOTIMPL`.

9.20.1.4 USBDeviceFilters (read-only)

`IHostUSBDeviceFilter IHost::USBDeviceFilters[]`

List of USB device filters in action. When a new device is physically attached to the host computer, filters from this list are applied to it (in order they are stored in the list). The first matched filter will determine the [action](#) performed on the device.

Unless the device is ignored by these filters, filters of all currently running virtual machines ([IUSBController::deviceFilters\[\]](#)) are applied to it.

Note: If USB functionality is not available in the given edition of VirtualBox, this method will set the result code to `E_NOTIMPL`.

See also: `IHostUSBDeviceFilter`, `USBDeviceState`

9.20.1.5 networkInterfaces (read-only)

`IHostNetworkInterface IHost::networkInterfaces[]`

List of host network interfaces currently defined on the host.

9.20.1.6 processorCount (read-only)

`unsigned long IHost::processorCount`

Number of (logical) CPUs installed in the host system.

9.20.1.7 processorOnlineCount (read-only)

`unsigned long IHost::processorOnlineCount`

Number of (logical) CPUs online in the host system.

9.20.1.8 memorySize (read-only)

```
unsigned long IHost::memorySize
```

Amount of system memory in megabytes installed in the host system.

9.20.1.9 memoryAvailable (read-only)

```
unsigned long IHost::memoryAvailable
```

Available system memory in the host system.

9.20.1.10 operatingSystem (read-only)

```
wstring IHost::operatingSystem
```

Name of the host system's operating system.

9.20.1.11 OSVersion (read-only)

```
wstring IHost::OSVersion
```

Host operating system's version string.

9.20.1.12 UTCTime (read-only)

```
long long IHost::UTCTime
```

Returns the current host time in milliseconds since 1970-01-01 UTC.

9.20.1.13 Acceleration3DAvailable (read-only)

```
boolean IHost::Acceleration3DAvailable
```

Returns `true` when the host supports 3D hardware acceleration.

9.20.2 createHostOnlyNetworkInterface

```
IProgress IHost::createHostOnlyNetworkInterface(  
    [out] IHostNetworkInterface hostInterface)
```

Creates a new adapter for Host Only Networking.

If this method fails, the following error codes may be reported:

- `E_INVALIDARG`: Host network interface name already exists.

9.20.3 createUSBDeviceFilter

```
IHostUSBDeviceFilter IHost::createUSBDeviceFilter(  
    [in] wstring name)
```

Creates a new USB device filter. All attributes except the filter name are set to empty (any match), *active* is *false* (the filter is not active).

The created filter can be added to the list of filters using [insertUSBDeviceFilter\(\)](#).

See also: #USBDeviceFilters

9.20.4 findHostDVDDrive

```
IHostDVDDrive IHost::findHostDVDDrive(  
    [in] wstring name)
```

Searches for a host DVD drive with the given *name*.

If this method fails, the following error codes may be reported:

- `VBOX_E_OBJECT_NOT_FOUND`: Given *name* does not correspond to any host drive.

9.20.5 findHostFloppyDrive

```
IHostFloppyDrive IHost::findHostFloppyDrive(  
    [in] wstring name)
```

Searches for a host floppy drive with the given *name*.

If this method fails, the following error codes may be reported:

- `VBOX_E_OBJECT_NOT_FOUND`: Given *name* does not correspond to any host floppy drive.

9.20.6 findHostNetworkInterfaceById

```
IHostNetworkInterface IHost::findHostNetworkInterfaceById(  
    [in] wstring id)
```

Searches through all host network interfaces for an interface with the given GUID.

Note: The method returns an error if the given GUID does not correspond to any host network interface.

9.20.7 findHostNetworkInterfaceByName

```
IHostNetworkInterface IHost::findHostNetworkInterfaceByName(  
    [in] wstring name)
```

Searches through all host network interfaces for an interface with the given name.

Note: The method returns an error if the given name does not correspond to any host network interface.

9.20.8 findHostNetworkInterfacesOfType

```
IHostNetworkInterface[] IHost::findHostNetworkInterfacesOfType(  
    [in] HostNetworkInterfaceType type)
```

Searches through all host network interfaces and returns a list of interfaces of the specified type

9.20.9 findUSBDeviceByAddress

```
IHostUSBDevice IHost::findUSBDeviceByAddress(  
    [in] wstring name)
```

Searches for a USB device with the given host address.

See also: IHostUSBDevice::address

If this method fails, the following error codes may be reported:

- VBOX_E_OBJECT_NOT_FOUND: Given name does not correspond to any USB device.

9.20.10 findUSBDeviceById

```
IHostUSBDevice IHost::findUSBDeviceById(  
    [in] wstring id)
```

Searches for a USB device with the given UUID.

See also: IHostUSBDevice::id

If this method fails, the following error codes may be reported:

- VBOX_E_OBJECT_NOT_FOUND: Given id does not correspond to any USB device.

9.20.11 getProcessorDescription

```
wstring IHost::getProcessorDescription(  
    [in] unsigned long cpuId)
```

Query the model string of a specified host CPU.

Note: This function is not implemented in the current version of the product.

9.20.12 getProcessorFeature

```
boolean IHost::getProcessorFeature(  
    [in] ProcessorFeature feature)
```

Query whether a CPU feature is supported or not.

9.20.13 getProcessorSpeed

```
unsigned long IHost::getProcessorSpeed(  
    [in] unsigned long cpuId)
```

Query the (approximate) maximum speed of a specified host CPU in Megahertz.

9.20.14 insertUSBDeviceFilter

```
void IHost::insertUSBDeviceFilter(  
    [in] unsigned long position,  
    [in] IHostUSBDeviceFilter filter)
```

Inserts the given USB device to the specified position in the list of filters.

Positions are numbered starting from 0. If the specified position is equal to or greater than the number of elements in the list, the filter is added at the end of the collection.

Note: Duplicates are not allowed, so an attempt to insert a filter already in the list is an error.

Note: If USB functionality is not available in the given edition of VirtualBox, this method will set the result code to `E_NOTIMPL`.

See also: `#USBDeviceFilters`

If this method fails, the following error codes may be reported:

- `VBOX_E_INVALID_OBJECT_STATE`: USB device filter is not created within this VirtualBox instance.
- `E_INVALIDARG`: USB device filter already in list.

9.20.15 removeHostOnlyNetworkInterface

```
IProgress IHost::removeHostOnlyNetworkInterface(  
    [in] wstring id,  
    [out] IHostNetworkInterface hostInterface)
```

Removes the given Host Only Networking interface.

If this method fails, the following error codes may be reported:

- `VBOX_E_OBJECT_NOT_FOUND`: No host network interface matching `id` found.

9.20.16 removeUSBDeviceFilter

```
IHostUSBDeviceFilter IHost::removeUSBDeviceFilter(  
    [in] unsigned long position)
```

Removes a USB device filter from the specified position in the list of filters.

Positions are numbered starting from 0. Specifying a position equal to or greater than the number of elements in the list will produce an error.

Note: If USB functionality is not available in the given edition of VirtualBox, this method will set the result code to `E_NOTIMPL`.

See also: `#USBDeviceFilters`

If this method fails, the following error codes may be reported:

- `E_INVALIDARG`: USB device filter list empty or invalid `position`.

9.21 IHostDVDDrive

The `IHostDVDDrive` interface represents the physical CD/DVD drive hardware on the host. Used indirectly in [IHost::DVDDrives\[\]](#).

9.21.1 Attributes

9.21.1.1 name (read-only)

```
wstring IHostDVDDrive::name
```

Returns the platform-specific device identifier. On DOS-like platforms, it is a drive name (e.g. R:). On Unix-like platforms, it is a device name (e.g. `/dev/hdc`).

9.21.1.2 description (read-only)

```
wstring IHostDVDDrive::description
```

Returns a human readable description for the drive. This description usually contains the product and vendor name. An empty string is returned if the description is not available.

9.21.1.3 udi (read-only)

```
wstring IHostDVDDrive::udi
```

Returns the unique device identifier for the drive. This attribute is reserved for future use instead of [name](#). Currently it is not used and may return an empty string on some platforms.

9.22 IHostFloppyDrive

The IHostFloppyDrive interface represents the physical floppy drive hardware on the host. Used indirectly in [IHost::floppyDrives\[\]](#).

9.22.1 Attributes

9.22.1.1 name (read-only)

```
wstring IHostFloppyDrive::name
```

Returns the platform-specific device identifier. On DOS-like platforms, it is a drive name (e.g. A:). On Unix-like platforms, it is a device name (e.g. /dev/fd0).

9.22.1.2 description (read-only)

```
wstring IHostFloppyDrive::description
```

Returns a human readable description for the drive. This description usually contains the product and vendor name. An empty string is returned if the description is not available.

9.22.1.3 udi (read-only)

```
wstring IHostFloppyDrive::udi
```

Returns the unique device identifier for the drive. This attribute is reserved for future use instead of [name](#). Currently it is not used and may return an empty string on some platforms.

9.23 IHostNetworkInterface

Represents one of host's network interfaces. IP V6 address and network mask are strings of 32 hexadecimal digits grouped by four. Groups are separated by colons. For example, fe80:0000:0000:0000:021e:c2ff:fed2:b030.

9.23.1 Attributes

9.23.1.1 name (read-only)

```
wstring IHostNetworkInterface::name
```

Returns the host network interface name.

9.23.1.2 id (read-only)

```
wstring IHostNetworkInterface::id
```

Returns the interface UUID.

9.23.1.3 networkName (read-only)

```
wstring IHostNetworkInterface::networkName
```

Returns the name of a virtual network the interface gets attached to.

9.23.1.4 dhcpEnabled (read-only)

```
boolean IHostNetworkInterface::dhcpEnabled
```

Specifies whether the DHCP is enabled for the interface.

9.23.1.5 IPAddress (read-only)

```
wstring IHostNetworkInterface::IPAddress
```

Returns the IP V4 address of the interface.

9.23.1.6 networkMask (read-only)

```
wstring IHostNetworkInterface::networkMask
```

Returns the network mask of the interface.

9.23.1.7 IPV6Supported (read-only)

```
boolean IHostNetworkInterface::IPV6Supported
```

Specifies whether the IP V6 is supported/enabled for the interface.

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9.23.1.8 IPV6Address (read-only)

`wstring IHostNetworkInterface::IPV6Address`

Returns the IP V6 address of the interface.

9.23.1.9 IPV6NetworkMaskPrefixLength (read-only)

`unsigned long IHostNetworkInterface::IPV6NetworkMaskPrefixLength`

Returns the length IP V6 network mask prefix of the interface.

9.23.1.10 hardwareAddress (read-only)

`wstring IHostNetworkInterface::hardwareAddress`

Returns the hardware address. For Ethernet it is MAC address.

9.23.1.11 mediumType (read-only)

`HostNetworkInterfaceMediumType IHostNetworkInterface::mediumType`

Type of protocol encapsulation used.

9.23.1.12 status (read-only)

`HostNetworkInterfaceStatus IHostNetworkInterface::status`

Status of the interface.

9.23.1.13 interfaceType (read-only)

`HostNetworkInterfaceType IHostNetworkInterface::interfaceType`

specifies the host interface type.

9.23.2 dhcpRediscover

`void IHostNetworkInterface::dhcpRediscover()`

refreshes the IP configuration for dhcp-enabled interface.

9.23.3 enableDynamicIpConfig

`void IHostNetworkInterface::enableDynamicIpConfig()`

enables the dynamic IP configuration.

9.23.4 enableStaticIpConfig

```
void IHostNetworkInterface::enableStaticIpConfig(  
    [in] wstring IPAddress,  
    [in] wstring networkMask)
```

sets and enables the static IP V4 configuration for the given interface.

9.23.5 enableStaticIpConfigV6

```
void IHostNetworkInterface::enableStaticIpConfigV6(  
    [in] wstring IPV6Address,  
    [in] unsigned long IPV6NetworkMaskPrefixLength)
```

sets and enables the static IP V6 configuration for the given interface.

9.24 IHostUSBDevice

The IHostUSBDevice interface represents a physical USB device attached to the host computer.

Besides properties inherited from IUSBDevice, this interface adds the [state](#) property that holds the current state of the USB device.

See also: IHost::USBDevices, IHost::USBDeviceFilters

9.24.1 Attributes

9.24.1.1 state (read-only)

```
USBDeviceState IHostUSBDevice::state
```

Current state of the device.

9.25 IHostUSBDeviceFilter

The IHostUSBDeviceFilter interface represents a global filter for a physical USB device used by the host computer. Used indirectly in [IHost::USBDeviceFilters\[\]](#).

Using filters of this type, the host computer determines the initial state of the USB device after it is physically attached to the host's USB controller.

Note: The [remote](#) attribute is ignored by this type of filters, because it makes sense only for [machine USB filters](#).

See also: IHost::USBDeviceFilters

9.25.1 Attributes

9.25.1.1 action (read/write)

`USBDeviceFilterAction` `IHostUSBDeviceFilter::action`

Action performed by the host when an attached USB device matches this filter.

9.26 IInternalMachineControl

Note: This interface is not supported in the web service.

9.26.1 adoptSavedState

```
void IInternalMachineControl::adoptSavedState(  
    [in] wstring savedStateFile)
```

Gets called by `IConsole::adoptSavedState`.

If this method fails, the following error codes may be reported:

- `VBOX_E_FILE_ERROR`: Invalid saved state file path.

9.26.2 autoCaptureUSBDevices

```
void IInternalMachineControl::autoCaptureUSBDevices()
```

Requests a capture all matching USB devices attached to the host. When the request is completed, the VM process will get a `IInternalSessionControl::onUSBDeviceAttach()` notification per every captured device.

9.26.3 beginSavingState

```
void IInternalMachineControl::beginSavingState(  
    [in] IProgress progress,  
    [out] wstring stateFilePath)
```

Called by the VM process to inform the server it wants to save the current state and stop the VM execution.

9.26.4 beginTakingSnapshot

```
void IInternalMachineControl::beginTakingSnapshot (
    [in] IConsole initiator,
    [in] wstring name,
    [in] wstring description,
    [in] IProgress progress,
    [out] wstring stateFilePath,
    [out] IProgress serverProgress)
```

Called by the VM process to inform the server it wants to take a snapshot. If this method fails, the following error codes may be reported:

- VBOX_E_FILE_ERROR: Settings file not accessible.
- VBOX_E_XML_ERROR: Could not parse the settings file.

9.26.5 captureUSBDevice

```
void IInternalMachineControl::captureUSBDevice (
    [in] wstring id)
```

Requests a capture of the given host USB device. When the request is completed, the VM process will get a [IInternalSessionControl::onUSBDeviceAttach\(\)](#) notification.

9.26.6 detachAllUSBDevices

```
void IInternalMachineControl::detachAllUSBDevices (
    [in] boolean done)
```

Notification that a VM that is being powered down. The done parameter indicates whether which stage of the power down we're at. When done = false the VM is announcing its intentions, while when done = true the VM is reporting what it has done.

Note: In the done = true case, the server must run its own filters and filters of all VMs but this one on all detach devices as if they were just attached to the host computer.

9.26.7 detachUSBDevice

```
void IInternalMachineControl::detachUSBDevice (
    [in] wstring id,
    [in] boolean done)
```


9 Classes (interfaces)

Notification that a VM is going to detach (`done = false`) or has already detached (`done = true`) the given USB device. When the `done = true` request is completed, the VM process will get a [InternalSessionControl::onUSBDeviceDetach\(\)](#) notification.

Note: In the `done = true` case, the server must run its own filters and filters of all VMs but this one on the detached device as if it were just attached to the host computer.

9.26.8 discardCurrentSnapshotAndState

```
IProgress IInternalMachineControl::discardCurrentSnapshotAndState(  
    [in] IConsole initiator,  
    [out] MachineState machineState)
```

Gets called by `IConsole::discardCurrentSnapshotAndState`.

If this method fails, the following error codes may be reported:

- `VBOX_E_INVALID_OBJECT_STATE`: Virtual machine does not have any snapshot.

9.26.9 discardCurrentState

```
IProgress IInternalMachineControl::discardCurrentState(  
    [in] IConsole initiator,  
    [out] MachineState machineState)
```

Gets called by `IConsole::discardCurrentState`.

If this method fails, the following error codes may be reported:

- `VBOX_E_INVALID_OBJECT_STATE`: Virtual machine does not have any snapshot.

9.26.10 discardSnapshot

```
IProgress IInternalMachineControl::discardSnapshot(  
    [in] IConsole initiator,  
    [in] wstring id,  
    [out] MachineState machineState)
```

Gets called by `IConsole::discardSnapshot`.

If this method fails, the following error codes may be reported:

- `VBOX_E_INVALID_OBJECT_STATE`: Snapshot has more than one child snapshot.

9.26.11 endSavingState

```
void IInternalMachineControl::endSavingState(  
    [in] boolean success)
```

Called by the VM process to inform the server that saving the state previously requested by #beginSavingState is either successfully finished or there was a failure.

If this method fails, the following error codes may be reported:

- VBOX_E_FILE_ERROR: Settings file not accessible.
- VBOX_E_XML_ERROR: Could not parse the settings file.

9.26.12 endTakingSnapshot

```
void IInternalMachineControl::endTakingSnapshot(  
    [in] boolean success)
```

Called by the VM process to inform the server that the snapshot previously requested by #beginTakingSnapshot is either successfully taken or there was a failure.

9.26.13 getIPCId

```
wstring IInternalMachineControl::getIPCId()
```

9.26.14 lockMedia

```
void IInternalMachineControl::lockMedia()
```

Locks all media attached to the machine for writing and parents of attached different hard disks (if any) for reading. This operation is atomic so that if it fails no media is actually locked.

This method is intended to be called when the machine is in Starting or Restoring state. The locked media will be automatically unlocked when the machine is powered off or crashed.

9.26.15 onSessionEnd

```
IProgress IInternalMachineControl::onSessionEnd(  
    [in] ISession session)
```

Triggered by the given session object when the session is about to close normally.

9.26.16 pullGuestProperties

```
void IInternalMachineControl::pullGuestProperties(  
    [out] wstring name[],  
    [out] wstring value[],  
    [out] unsigned long long timestamp[],  
    [out] wstring flags[])
```

Get the list of the guest properties matching a set of patterns along with their values, time stamps and flags and give responsibility for managing properties to the console.

9.26.17 pushGuestProperties

```
void IInternalMachineControl::pushGuestProperties(  
    [in] wstring name[],  
    [in] wstring value[],  
    [in] unsigned long long timestamp[],  
    [in] wstring flags[])
```

Set the list of the guest properties matching a set of patterns along with their values, time stamps and flags and return responsibility for managing properties to IMachine.

9.26.18 pushGuestProperty

```
void IInternalMachineControl::pushGuestProperty(  
    [in] wstring name,  
    [in] wstring value,  
    [in] unsigned long long timestamp,  
    [in] wstring flags)
```

Update a single guest property in IMachine.

9.26.19 runUSBDeviceFilters

```
void IInternalMachineControl::runUSBDeviceFilters(  
    [in] IUSBDevice device,  
    [out] boolean matched,  
    [out] unsigned long maskedInterfaces)
```

Asks the server to run USB devices filters of the associated machine against the given USB device and tell if there is a match.

Note: Intended to be used only for remote USB devices. Local ones don't require to call this method (this is done implicitly by the Host and USBProxy-Service).

9.26.20 setRemoveSavedState

```
void IInternalMachineControl::setRemoveSavedState(  
    [in] boolean aRemove)
```

Updates the flag whether saved state is removed on a machine state change from Saved to PoweredOff.

9.26.21 updateState

```
void IInternalMachineControl::updateState(  
    [in] MachineState state)
```

Updates the VM state.

Note: This operation will also update the settings file with the correct information about the saved state file and delete this file from disk when appropriate.

9.27 IInternalSessionControl

Note: This interface is not supported in the web service.

9.27.1 accessGuestProperty

```
void IInternalSessionControl::accessGuestProperty(  
    [in] wstring name,  
    [in] wstring value,  
    [in] wstring flags,  
    [in] boolean isSetter,  
    [out] wstring retValue,  
    [out] unsigned long long retTimestamp,  
    [out] wstring retFlags)
```

Called by [IMachine::getGuestProperty\(\)](#) and by [IMachine::setGuestProperty\(\)](#) in order to read and modify guest properties.

If this method fails, the following error codes may be reported:

- `VBOX_E_INVALID_VM_STATE`: Machine session is not open.
- `VBOX_E_INVALID_OBJECT_STATE`: Session type is not direct.

9.27.2 assignMachine

```
void IInternalSessionControl::assignMachine(  
    [in] IMachine machine)
```

Assigns the machine object associated with this direct-type session or informs the session that it will be a remote one (if `machine == null`).

If this method fails, the following error codes may be reported:

- `VBOX_E_INVALID_VM_STATE`: Session state prevents operation.
- `VBOX_E_INVALID_OBJECT_STATE`: Session type prevents operation.

9.27.3 assignRemoteMachine

```
void IInternalSessionControl::assignRemoteMachine(  
    [in] IMachine machine,  
    [in] IConsole console)
```

Assigns the machine and the (remote) console object associated with this remote-type session.

If this method fails, the following error codes may be reported:

- `VBOX_E_INVALID_VM_STATE`: Session state prevents operation.

9.27.4 enumerateGuestProperties

```
void IInternalSessionControl::enumerateGuestProperties(  
    [in] wstring patterns,  
    [out] wstring key[],  
    [out] wstring value[],  
    [out] unsigned long long timestamp[],  
    [out] wstring flags[])
```

Return a list of the guest properties matching a set of patterns along with their values, time stamps and flags.

If this method fails, the following error codes may be reported:

- `VBOX_E_INVALID_VM_STATE`: Machine session is not open.
- `VBOX_E_INVALID_OBJECT_STATE`: Session type is not direct.

9.27.5 getPID

```
unsigned long IInternalSessionControl::getPID()
```

PID of the process that has created this Session object.

9.27.6 getRemoteConsole

`IConsole IInternalSessionControl::getRemoteConsole()`

Returns the console object suitable for remote control.

If this method fails, the following error codes may be reported:

- `VBOX_E_INVALID_VM_STATE`: Session state prevents operation.
- `VBOX_E_INVALID_OBJECT_STATE`: Session type prevents operation.

9.27.7 onDVDDriveChange

`void IInternalSessionControl::onDVDDriveChange()`

Triggered when settings of the DVD drive object of the associated virtual machine have changed.

If this method fails, the following error codes may be reported:

- `VBOX_E_INVALID_VM_STATE`: Session state prevents operation.
- `VBOX_E_INVALID_OBJECT_STATE`: Session type prevents operation.

9.27.8 onFloppyDriveChange

`void IInternalSessionControl::onFloppyDriveChange()`

Triggered when settings of the floppy drive object of the associated virtual machine have changed.

If this method fails, the following error codes may be reported:

- `VBOX_E_INVALID_VM_STATE`: Session state prevents operation.
- `VBOX_E_INVALID_OBJECT_STATE`: Session type prevents operation.

9.27.9 onNetworkAdapterChange

`void IInternalSessionControl::onNetworkAdapterChange(
[in] INetworkAdapter networkAdapter)`

Triggered when settings of a network adapter of the associated virtual machine have changed.

If this method fails, the following error codes may be reported:

- `VBOX_E_INVALID_VM_STATE`: Session state prevents operation.
- `VBOX_E_INVALID_OBJECT_STATE`: Session type prevents operation.

9.27.10 onParallelPortChange

```
void IInternalSessionControl::onParallelPortChange(  
    [in] IParallelPort parallelPort)
```

Triggered when settings of a parallel port of the associated virtual machine have changed.

If this method fails, the following error codes may be reported:

- VBOX_E_INVALID_VM_STATE: Session state prevents operation.
- VBOX_E_INVALID_OBJECT_STATE: Session type prevents operation.

9.27.11 onSerialPortChange

```
void IInternalSessionControl::onSerialPortChange(  
    [in] ISerialPort serialPort)
```

Triggered when settings of a serial port of the associated virtual machine have changed.

If this method fails, the following error codes may be reported:

- VBOX_E_INVALID_VM_STATE: Session state prevents operation.
- VBOX_E_INVALID_OBJECT_STATE: Session type prevents operation.

9.27.12 onSharedFolderChange

```
void IInternalSessionControl::onSharedFolderChange(  
    [in] boolean global)
```

Triggered when a permanent (global or machine) shared folder has been created or removed.

Note: We don't pass shared folder parameters in this notification because the order in which parallel notifications are delivered is not defined, therefore it could happen that these parameters were outdated by the time of processing this notification.

If this method fails, the following error codes may be reported:

- VBOX_E_INVALID_VM_STATE: Session state prevents operation.
- VBOX_E_INVALID_OBJECT_STATE: Session type prevents operation.

9.27.13 onShowWindow

```
void IInternalSessionControl::onShowWindow(
    [in] boolean check,
    [out] boolean canShow,
    [out] unsigned long long winId)
```

Called by [IMachine::canShowConsoleWindow\(\)](#) and by [IMachine::showConsoleWindow\(\)](#) in order to notify console callbacks [IConsoleCallback::onCanShowWindow\(\)](#) and [IConsoleCallback::onShowWindow\(\)](#).

If this method fails, the following error codes may be reported:

- `VBOX_E_INVALID_OBJECT_STATE`: Session type prevents operation.

9.27.14 onStorageControllerChange

```
void IInternalSessionControl::onStorageControllerChange()
```

Triggered when settings of a storage controller of the associated virtual machine have changed.

If this method fails, the following error codes may be reported:

- `VBOX_E_INVALID_VM_STATE`: Session state prevents operation.
- `VBOX_E_INVALID_OBJECT_STATE`: Session type prevents operation.

9.27.15 onUSBControllerChange

```
void IInternalSessionControl::onUSBControllerChange()
```

Triggered when settings of the USB controller object of the associated virtual machine have changed.

If this method fails, the following error codes may be reported:

- `VBOX_E_INVALID_VM_STATE`: Session state prevents operation.
- `VBOX_E_INVALID_OBJECT_STATE`: Session type prevents operation.

9.27.16 onUSBDeviceAttach

```
void IInternalSessionControl::onUSBDeviceAttach(
    [in] IUSBDevice device,
    [in] IVirtualBoxErrorInfo error,
    [in] unsigned long maskedInterfaces)
```

Triggered when a request to capture a USB device (as a result of matched USB filters or direct call to [IConsole::attachUSBDevice\(\)](#)) has completed. A `nullerror` object means success, otherwise it describes a failure.

If this method fails, the following error codes may be reported:

- `VBOX_E_INVALID_VM_STATE`: Session state prevents operation.
- `VBOX_E_INVALID_OBJECT_STATE`: Session type prevents operation.

9.27.17 `onUSBDeviceDetach`

```
void IInternalSessionControl::onUSBDeviceDetach(  
    [in] wstring id,  
    [in] IVirtualBoxErrorInfo error)
```

Triggered when a request to release the USB device (as a result of machine termination or direct call to `IConsole::detachUSBDevice()`) has completed. A `nullerror` object means success, otherwise it describes a failure.

If this method fails, the following error codes may be reported:

- `VBOX_E_INVALID_VM_STATE`: Session state prevents operation.
- `VBOX_E_INVALID_OBJECT_STATE`: Session type prevents operation.

9.27.18 `onVRDPServerChange`

```
void IInternalSessionControl::onVRDPServerChange()
```

Triggered when settings of the VRDP server object of the associated virtual machine have changed.

If this method fails, the following error codes may be reported:

- `VBOX_E_INVALID_VM_STATE`: Session state prevents operation.
- `VBOX_E_INVALID_OBJECT_STATE`: Session type prevents operation.

9.27.19 `uninitialize`

```
void IInternalSessionControl::uninitialize()
```

Uninitializes (closes) this session. Used by VirtualBox to close the corresponding remote session when the direct session dies or gets closed.

If this method fails, the following error codes may be reported:

- `VBOX_E_INVALID_VM_STATE`: Session state prevents operation.

9.27.20 updateMachineState

```
void IInternalSessionControl::updateMachineState(  
    [in] MachineState aMachineState)
```

Updates the machine state in the VM process. Must be called only in certain cases (see the method implementation).

If this method fails, the following error codes may be reported:

- `VBOX_E_INVALID_VM_STATE`: Session state prevents operation.
- `VBOX_E_INVALID_OBJECT_STATE`: Session type prevents operation.

9.28 IKeyboard

The IKeyboard interface represents the virtual machine's keyboard. Used in [IConsole::keyboard](#).

Use this interface to send keystrokes or the Ctrl-Alt-Del sequence to the virtual machine.

9.28.1 putCAD

```
void IKeyboard::putCAD()
```

Sends the Ctrl-Alt-Del sequence to the keyboard. This function is nothing special, it is just a convenience function calling [putScancodes\(\)](#) with the proper scancodes.

If this method fails, the following error codes may be reported:

- `VBOX_E_IPRT_ERROR`: Could not send all scan codes to virtual keyboard.

9.28.2 putScancode

```
void IKeyboard::putScancode(  
    [in] long scancode)
```

Sends a scancode to the keyboard.

If this method fails, the following error codes may be reported:

- `VBOX_E_IPRT_ERROR`: Could not send scan code to virtual keyboard.

9.28.3 putScancodes

```
unsigned long IKeyboard::putScancodes(  
    [in] long scancodes[])
```

Sends an array of scancodes to the keyboard.

If this method fails, the following error codes may be reported:

- `VBOX_E_IPRT_ERROR`: Could not send all scan codes to virtual keyboard.

9.29 ILocalOwner

Note: This interface is not supported in the web service.

The ILocalOwner interface allows to register local objects (created without COM calls, but with new()). Once registered, calls to methods of such objects can be made from remote COM processes. The main usecase is the event callback implementation where API clients provide callback objects.

9.29.1 setLocalObject

```
void ILocalOwner::setLocalObject (
    [in] $unknown object)
```

Set local object.

9.30 IMachine

The IMachine interface represents a virtual machine, or guest, created in VirtualBox.

This interface is used in two contexts. First of all, a collection of objects implementing this interface is stored in the [IVirtualBox::machines\[\]](#) attribute which lists all the virtual machines that are currently registered with this VirtualBox installation. Also, once a session has been opened for the given virtual machine (e.g. the virtual machine is running), the machine object associated with the open session can be queried from the session object; see [ISession](#) for details.

The main role of this interface is to expose the settings of the virtual machine and provide methods to change various aspects of the virtual machine's configuration. For machine objects stored in the [IVirtualBox::machines\[\]](#) collection, all attributes are read-only unless explicitly stated otherwise in individual attribute and method descriptions. In order to change a machine setting, a session for this machine must be opened using one of [IVirtualBox::openSession\(\)](#), [IVirtualBox::openRemoteSession\(\)](#) or [IVirtualBox::openExistingSession\(\)](#) methods. After the session has been successfully opened, a mutable machine object needs to be queried from the session object and then the desired settings changes can be applied to the returned object using IMachine attributes and methods. See the ISession interface description for more information about sessions.

Note that the IMachine interface does not provide methods to control virtual machine execution (such as start the machine, or power it down) – these methods are grouped in a separate IConsole interface. Refer to the IConsole interface description to get more information about this topic.

See also: ISession, IConsole

9.30.1 Attributes

9.30.1.1 parent (read-only)

`IVirtualBox IMachine::parent`

Associated parent object.

9.30.1.2 accessible (read-only)

`boolean IMachine::accessible`

Whether this virtual machine is currently accessible or not.

The machine is considered to be inaccessible when:

- It is a registered virtual machine, and
- Its settings file is inaccessible (for example, it is located on a network share that is not accessible during VirtualBox startup, or becomes inaccessible later, or if the settings file can be read but is invalid).

Otherwise, the value of this property is always `true`.

Every time this property is read, the accessibility state of this machine is re-evaluated. If the returned value is `false`, the `accessError` property may be used to get the detailed error information describing the reason of inaccessibility.

When the machine is inaccessible, only the following properties can be used on it:

- `parent`
- `id`
- `settingsFilePath`
- `accessible`
- `accessError`

An attempt to access any other property or method will return an error.

The only possible action you can perform on an inaccessible machine is to unregister it using the `IVirtualBox::unregisterMachine()` call (or, to check for the accessibility state once more by querying this property).

Note: In the current implementation, once this property returns `true`, the machine will never become inaccessible later, even if its settings file cannot be successfully read/written any more (at least, until the VirtualBox server is restarted). This limitation may be removed in future releases.

9.30.1.3 accessError (read-only)

`IVirtualBoxErrorInfo IMachine::accessError`

Error information describing the reason of machine inaccessibility.

Reading this property is only valid after the last call to `accessible` returned `false` (i.e. the machine is currently inaccessible). Otherwise, a `null` `IVirtualBoxErrorInfo` object will be returned.

9.30.1.4 name (read/write)

`wstring IMachine::name`

Name of the virtual machine.

Besides being used for human-readable identification purposes everywhere in VirtualBox, the virtual machine name is also used as a name of the machine's settings file and as a name of the subdirectory this settings file resides in. Thus, every time you change the value of this property, the settings file will be renamed once you call `saveSettings()` to confirm the change. The containing subdirectory will be also renamed, but only if it has exactly the same name as the settings file itself prior to changing this property (for backward compatibility with previous API releases). The above implies the following limitations:

- The machine name cannot be empty.
- The machine name can contain only characters that are valid file name characters according to the rules of the file system used to store VirtualBox configuration.
- You cannot have two or more machines with the same name if they use the same subdirectory for storing the machine settings files.
- You cannot change the name of the machine if it is running, or if any file in the directory containing the settings file is being used by another running machine or by any other process in the host operating system at a time when `saveSettings()` is called.

If any of the above limitations are hit, `saveSettings()` will return an appropriate error message explaining the exact reason and the changes you made to this machine will not be saved.

Note: For “legacy” machines created using the `IVirtualBox::createLegacyMachine()` call, the above naming limitations do not apply because the machine name does not affect the settings file name. The settings file name remains the same as it was specified during machine creation and never changes.

9.30.1.5 description (read/write)

wstring IMachine::description

Description of the virtual machine.

The description attribute can contain any text and is typically used to describe the hardware and software configuration of the virtual machine in detail (i.e. network settings, versions of the installed software and so on).

9.30.1.6 id (read-only)

wstring IMachine::id

UUID of the virtual machine.

9.30.1.7 OSTypeId (read/write)

wstring IMachine::OSTypeId

User-defined identifier of the Guest OS type. You may use [VirtualBox::getGuestOSType\(\)](#) to obtain an [IGuestOSType](#) object representing details about the given Guest OS type.

Note: This value may differ from the value returned by [IGuest::OSTypeId](#) if Guest Additions are installed to the guest OS.

9.30.1.8 HardwareVersion (read/write)

wstring IMachine::HardwareVersion

Hardware version identifier. Internal use only for now.

9.30.1.9 CPUCount (read/write)

unsigned long IMachine::CPUCount

Number of virtual CPUs in the VM.

9.30.1.10 memorySize (read/write)

unsigned long IMachine::memorySize

System memory size in megabytes.

9.30.1.11 memoryBalloonSize (read/write)

unsigned long IMachine::memoryBalloonSize

Initial memory balloon size in megabytes.

9.30.1.12 statisticsUpdateInterval (read/write)

`unsigned long IMachine::statisticsUpdateInterval`

Initial interval to update guest statistics in seconds.

9.30.1.13 VRAMSize (read/write)

`unsigned long IMachine::VRAMSize`

Video memory size in megabytes.

9.30.1.14 accelerate3DEnabled (read/write)

`boolean IMachine::accelerate3DEnabled`

This setting determines whether VirtualBox allows guests to make use of the 3D graphics support available on the host. Currently limited to OpenGL only.

9.30.1.15 monitorCount (read/write)

`unsigned long IMachine::monitorCount`

Number of virtual monitors.

Note: Only effective on Windows XP and later guests with Guest Additions installed.

9.30.1.16 BIOSSettings (read-only)

`IBIOSSettings IMachine::BIOSSettings`

Object containing all BIOS settings.

9.30.1.17 HWVirtExEnabled (read/write)

`boolean IMachine::HWVirtExEnabled`

This setting determines whether VirtualBox will try to make use of the host CPU's hardware virtualization extensions such as Intel VT-x and AMD-V. Note that in case such extensions are not available, they will not be used.

9.30.1.18 HWVirtExNestedPagingEnabled (read/write)

`boolean IMachine::HWVirtExNestedPagingEnabled`

This setting determines whether VirtualBox will try to make use of the nested paging extension of Intel VT-x and AMD-V. Note that in case such extensions are not available, they will not be used.

9.30.1.19 HWVirtExVPIDEnabled (read/write)

boolean IMachine::HWVirtExVPIDEnabled

This setting determines whether VirtualBox will try to make use of the VPID extension of Intel VT-x. Note that in case such extensions are not available, they will not be used.

9.30.1.20 PAEEnabled (read/write)

boolean IMachine::PAEEnabled

This setting determines whether VirtualBox will expose the Physical Address Extension (PAE) feature of the host CPU to the guest. Note that in case PAE is not available, it will not be reported.

9.30.1.21 snapshotFolder (read/write)

wstring IMachine::snapshotFolder

Full path to the directory used to store snapshot data (differencing hard disks and saved state files) of this machine.

The initial value of this property is [<path_to_settings_file>](#)/[<machine_uuid>](#).

Currently, it is an error to try to change this property on a machine that has snapshots (because this would require to move possibly large files to a different location). A separate method will be available for this purpose later.

Note: Setting this property to `null` or to an empty string will restore the initial value.

Note: When setting this property, the specified path can be absolute (full path) or relative to the directory where the [machine settings file](#) is located. When reading this property, a full path is always returned.

Note: The specified path may not exist, it will be created when necessary.

9.30.1.22 VRDPService (read-only)

[IVRDPService](#) IMachine::VRDPService

VRDP service object.

9.30.1.23 hardDiskAttachments (read-only)

`IHardDiskAttachment IMachine::hardDiskAttachments[]`

Array of hard disks attached to this machine.

9.30.1.24 DVDDrive (read-only)

`IDVDDrive IMachine::DVDDrive`

Associated DVD drive object.

9.30.1.25 floppyDrive (read-only)

`IFloppyDrive IMachine::floppyDrive`

Associated floppy drive object.

9.30.1.26 USBController (read-only)

`IUSBController IMachine::USBController`

Associated USB controller object.

Note: If USB functionality is not available in the given edition of VirtualBox, this method will set the result code to E_NOTIMPL.

9.30.1.27 audioAdapter (read-only)

`IAudioAdapter IMachine::audioAdapter`

Associated audio adapter, always present.

9.30.1.28 storageControllers (read-only)

`IStorageController IMachine::storageControllers[]`

Array of storage controllers attached to this machine.

9.30.1.29 settingsFilePath (read-only)

`wstring IMachine::settingsFilePath`

Full name of the file containing machine settings data.

9.30.1.30 settingsFileVersion (read-only)

wstring IMachine::settingsFileVersion

Current version of the format of the settings file of this machine ([settingsFilePath](#)).
The version string has the following format:

`x.y-platform`

where `x` and `y` are the major and the minor format versions, and `platform` is the platform identifier.

The current version usually matches the value of the [IVirtualBox::settingsFormatVersion](#) attribute unless the settings file was created by an older version of VirtualBox and there was a change of the settings file format since then.

Note that VirtualBox automatically converts settings files from older versions to the most recent version when reading them (usually at VirtualBox startup) but it doesn't save the changes back until you call a method that implicitly saves settings (such as [setExtraData\(\)](#)) or call [saveSettings\(\)](#) explicitly. Therefore, if the value of this attribute differs from the value of [IVirtualBox::settingsFormatVersion](#), then it means that the settings file was converted but the result of the conversion is not yet saved to disk.

The above feature may be used by interactive front-ends to inform users about the settings file format change and offer them to explicitly save all converted settings files (the global and VM-specific ones), optionally create backup copies of the old settings files before saving, etc.

See also: [IVirtualBox::settingsFormatVersion](#), [saveSettingsWithBackup\(\)](#)

9.30.1.31 settingsModified (read-only)

boolean IMachine::settingsModified

Whether the settings of this machine have been modified (but neither yet saved nor discarded).

Note: Reading this property is only valid on instances returned by [ISession::machine](#) and on new machines created by [IVirtualBox::createMachine\(\)](#) or opened by [IVirtualBox::openMachine\(\)](#) but not yet registered, or on unregistered machines after calling [IVirtualBox::unregisterMachine\(\)](#). For all other cases, the settings can never be modified.

Note: For newly created unregistered machines, the value of this property is always `true` until [saveSettings\(\)](#) is called (no matter if any machine settings have been changed after the creation or not). For opened machines the value is set to `false` (and then follows to normal rules).

9.30.1.32 sessionState (read-only)

`SessionState IMachine::sessionState`

Current session state for this machine.

9.30.1.33 sessionType (read-only)

`wstring IMachine::sessionType`

Type of the session. If `sessionState` is `SessionSpawning` or `SessionOpen`, this attribute contains the same value as passed to the `IVirtualBox::openRemoteSession()` method in the `type` parameter. If the session was opened directly using `IVirtualBox::openSession()`, or if `sessionState` is `SessionClosed`, the value of this attribute is an empty string.

9.30.1.34 sessionPid (read-only)

`unsigned long IMachine::sessionPid`

Identifier of the session process. This attribute contains the platform-dependent identifier of the process that has opened a direct session for this machine using the `IVirtualBox::openSession()` call. The returned value is only valid if `sessionState` is `SessionOpen` or `SessionClosing` (i.e. a session is currently open or being closed) by the time this property is read.

9.30.1.35 state (read-only)

`MachineState IMachine::state`

Current execution state of this machine.

9.30.1.36 lastStateChange (read-only)

`long long IMachine::lastStateChange`

Time stamp of the last execution state change, in milliseconds since 1970-01-01 UTC.

9.30.1.37 stateFilePath (read-only)

`wstring IMachine::stateFilePath`

Full path to the file that stores the execution state of the machine when it is in the `Saved` state.

Note: When the machine is not in the `Saved` state, this attribute is an empty string.

9.30.1.38 logFolder (read-only)

wstring IMachine::logFolder

Full path to the folder that stores a set of rotated log files recorded during machine execution. The most recent log file is named `VBox.log`, the previous log file is named `VBox.log.1` and so on (up to `VBox.log.3` in the current version).

9.30.1.39 currentSnapshot (read-only)

ISnapshot IMachine::currentSnapshot

Current snapshot of this machine.

Note: A <code>null</code> object is returned if the machine doesn't have snapshots.
--

See also: [ISnapshot](#)

9.30.1.40 snapshotCount (read-only)

unsigned long IMachine::snapshotCount

Number of snapshots taken on this machine. Zero means the machine doesn't have any snapshots.

9.30.1.41 currentStateModified (read-only)

boolean IMachine::currentStateModified

Returns `true` if the current state of the machine is not identical to the state stored in the current snapshot.

The current state is identical to the current snapshot right after one of the following calls are made:

- [IConsole::discardCurrentState\(\)](#) or [IConsole::discardCurrentSnapshotAndState\(\)](#)
- [IConsole::takeSnapshot\(\)](#) (issued on a powered off or saved machine, for which [settingsModified](#) returns `false`)
- [setCurrentSnapshot\(\)](#)

The current state remains identical until one of the following happens:

- settings of the machine are changed
- the saved state is discarded
- the current snapshot is discarded

- an attempt to execute the machine is made

Note: For machines that don't have snapshots, this property is always `false`.

9.30.1.42 sharedFolders (read-only)

`ISharedFolder IMachine::sharedFolders[]`

Collection of shared folders for this machine (permanent shared folders). These folders are shared automatically at machine startup and available only to the guest OS installed within this machine.

New shared folders are added to the collection using `createSharedFolder()`. Existing shared folders can be removed using `removeSharedFolder()`.

9.30.1.43 clipboardMode (read/write)

`ClipboardMode IMachine::clipboardMode`

Synchronization mode between the host OS clipboard and the guest OS clipboard.

9.30.1.44 guestPropertyNotificationPatterns (read/write)

`wstring IMachine::guestPropertyNotificationPatterns`

A comma-separated list of simple glob patterns. Changes to guest properties whose name matches one of the patterns will generate an `IVirtualBoxCall-back::onGuestPropertyChange()` signal.

9.30.2 addStorageController

```
IStorageController IMachine::addStorageController(  
    [in] wstring name,  
    [in] StorageBus connectionType)
```

Adds a new storage controller (SCSI or SATA controller) to the machine and returns it as an instance of `IStorageController`.

`name` identifies the controller for subsequent calls such as `getStorageControllerByName()` or `removeStorageController()` or `attachHardDisk()`.

After the controller has been added, you can set its exact type by setting the `IStorageController::controllerType`.

If this method fails, the following error codes may be reported:

- `VBOX_E_OBJECT_IN_USE`: A storage controller with given name exists already.
- `E_INVALIDARG`: Invalid `controllerType`.

9.30.3 attachHardDisk

```
void IMachine::attachHardDisk(
    [in] wstring id,
    [in] wstring name,
    [in] long controllerPort,
    [in] long device)
```

Attaches a virtual hard disk ([IHardDisk](#), identified by the given UUID `id`) to the given hard disk controller ([IStorageController](#), identified by `name`), at the indicated port and device.

For the IDE bus, the `controllerPort` parameter can be either 0 or 1, to specify the primary or secondary IDE controller, respectively. For the primary controller of the IDE bus, `device` can be either 0 or 1, to specify the master or the slave device, respectively. For the secondary IDE controller, the device number must be 1 because VirtualBox reserves the secondary master for the CD-ROM drive.

For an SATA controller, `controllerPort` must be a number ranging from 0 to 29. For a SCSI controller, `controllerPort` must be a number ranging from 0 to 15.

For both SCSI and SATA, the `device` parameter is unused and must be 0.

The specified device slot must not have another disk attached to it, or this method will fail.

See [IHardDisk](#) for more detailed information about attaching hard disks.

Note: You cannot attach a hard disk to a running machine. Also, you cannot attach a hard disk to a newly created machine until this machine's settings are saved to disk using [saveSettings\(\)](#).

Note: If the hard disk is being attached indirectly, a new differencing hard disk will implicitly be created for it and attached instead. If the changes made to the machine settings (including this indirect attachment) are later cancelled using [discardSettings\(\)](#), this implicitly created differencing hard disk will implicitly be deleted.

If this method fails, the following error codes may be reported:

- `E_INVALIDARG`: SATA device, SATA port, IDE port or IDE slot out of range.
- `VBOX_E_INVALID_OBJECT_STATE`: Attempt to attach hard disk to an unregistered virtual machine.
- `VBOX_E_INVALID_VM_STATE`: Invalid machine state.
- `VBOX_E_OBJECT_IN_USE`: Hard disk already attached to this or another virtual machine.

9.30.4 canShowConsoleWindow

```
boolean IMachine::canShowConsoleWindow()
```

Returns `true` if the VM console process can activate the console window and bring it to foreground on the desktop of the host PC.

Note: This method will fail if a session for this machine is not currently open.

If this method fails, the following error codes may be reported:

- `VBOX_E_INVALID_VM_STATE`: Machine session is not open.

9.30.5 createSharedFolder

```
void IMachine::createSharedFolder(
    [in] wstring name,
    [in] wstring hostPath,
    [in] boolean writable)
```

Creates a new permanent shared folder by associating the given logical name with the given host path, adds it to the collection of shared folders and starts sharing it. Refer to the description of [ISharedFolder](#) to read more about logical names.

If this method fails, the following error codes may be reported:

- `VBOX_E_OBJECT_IN_USE`: Shared folder already exists.
- `VBOX_E_FILE_ERROR`: Shared folder `hostPath` not accessible.

9.30.6 deleteSettings

```
void IMachine::deleteSettings()
```

Deletes the settings file of this machine from disk. The machine must not be registered in order for this operation to succeed.

Note: [settingsModified](#) will return `true` after this method successfully returns.

Note: Calling this method is only valid on instances returned by [ISession::machine](#) and on new machines created by [IVirtualBox::createMachine\(\)](#) or opened by [IVirtualBox::openMachine\(\)](#) but not yet registered, or on unregistered machines after calling [IVirtualBox::unregisterMachine\(\)](#).

Note: The deleted machine settings file can be restored (saved again) by calling [saveSettings\(\)](#).

If this method fails, the following error codes may be reported:

- `VBOX_E_INVALID_VM_STATE`: Cannot delete settings of a registered machine or machine not mutable.
- `VBOX_E_IPRT_ERROR`: Could not delete the settings file.

9.30.7 detachHardDisk

```
void IMachine::detachHardDisk(  
    [in] wstring name,  
    [in] long controllerPort,  
    [in] long device)
```

Detaches the virtual hard disk attached to a device slot of the specified bus.

Detaching the hard disk from the virtual machine is deferred. This means that the hard disk remains associated with the machine when this method returns and gets actually de-associated only after a successful [saveSettings\(\)](#) call. See [IHardDisk](#) for more detailed information about attaching hard disks.

Note: You cannot detach the hard disk from a running machine.

Note: Detaching differencing hard disks implicitly created by [attachHardDisk\(\)](#) for the indirect attachment using this method will **not** implicitly delete them. The [IHardDisk::deleteStorage\(\)](#) operation should be explicitly performed by the caller after the hard disk is successfully detached and the settings are saved with [saveSettings\(\)](#), if it is the desired action.

If this method fails, the following error codes may be reported:

- `VBOX_E_INVALID_VM_STATE`: Attempt to detach hard disk from a running virtual machine.
- `VBOX_E_OBJECT_NOT_FOUND`: No hard disk attached to given slot/bus.
- `VBOX_E_NOT_SUPPORTED`: Hard disk format does not support storage deletion.

9.30.8 discardSettings

```
void IMachine::discardSettings()
```

Discards any changes to the machine settings made since the session has been opened or since the last call to [saveSettings\(\)](#) or [discardSettings\(\)](#).

Note: Calling this method is only valid on instances returned by [ISession::machine](#) and on new machines created by [IVirtualBox::createMachine\(\)](#) or opened by [IVirtualBox::openMachine\(\)](#) but not yet registered, or on unregistered machines after calling [IVirtualBox::unregisterMachine\(\)](#).

If this method fails, the following error codes may be reported:

- `VBOX_E_INVALID_VM_STATE`: Virtual machine is not mutable.

9.30.9 enumerateGuestProperties

```
void IMachine::enumerateGuestProperties(
    [in] wstring patterns,
    [out] wstring name[],
    [out] wstring value[],
    [out] unsigned long long timestamp[],
    [out] wstring flags[])
```

Return a list of the guest properties matching a set of patterns along with their values, time stamps and flags.

9.30.10 export

```
IVirtualSystemDescription IMachine::export(
    [in] IAppliance aAppliance)
```

Exports the machine to an OVF appliance. See [IAppliance](#) for the steps required to export VirtualBox machines to OVF.

9.30.11 findSnapshot

```
ISnapshot IMachine::findSnapshot(
    [in] wstring name)
```

Returns a snapshot of this machine with the given name.

If this method fails, the following error codes may be reported:

- `VBOX_E_OBJECT_NOT_FOUND`: Virtual machine has no snapshots or snapshot not found.

9.30.12 getBootOrder

```
DeviceType IMachine::getBootOrder(
    [in] unsigned long position)
```

Returns the device type that occupies the specified position in the boot order.

@todo [remove?] If the machine can have more than one device of the returned type (such as hard disks), then a separate method should be used to retrieve the individual device that occupies the given position.

If there are no devices at the given position, then **Null** is returned.

@todo getHardDiskBootOrder(), getNetworkBootOrder()

If this method fails, the following error codes may be reported:

- **E_INVALIDARG**: Boot position out of range.

9.30.13 getExtraData

```
wstring IMachine::getExtraData(
    [in] wstring key)
```

Returns associated machine-specific extra data.

If the requested data **key** does not exist, this function will succeed and return an empty string in the **value** argument.

If this method fails, the following error codes may be reported:

- **VBOX_E_FILE_ERROR**: Settings file not accessible.
- **VBOX_E_XML_ERROR**: Could not parse the settings file.

9.30.14 getGuestProperty

```
void IMachine::getGuestProperty(
    [in] wstring name,
    [out] wstring value,
    [out] unsigned long long timestamp,
    [out] wstring flags)
```

Reads an entry from the machine's guest property store.

If this method fails, the following error codes may be reported:

- **VBOX_E_INVALID_VM_STATE**: Machine session is not open.

9.30.15 getGuestPropertyTimestamp

```
unsigned long long IMachine::getGuestPropertyTimestamp(
    [in] wstring property)
```

Reads a property timestamp from the machine's guest property store.

If this method fails, the following error codes may be reported:

- **VBOX_E_INVALID_VM_STATE**: Machine session is not open.

9.30.16 getGuestPropertyValue

```
wstring IMachine::getGuestPropertyValue(
    [in] wstring property)
```

Reads a value from the machine's guest property store.

If this method fails, the following error codes may be reported:

- `VBOX_E_INVALID_VM_STATE`: Machine session is not open.

9.30.17 getHardDisk

```
IHardDisk IMachine::getHardDisk(
    [in] wstring name,
    [in] long controllerPort,
    [in] long device)
```

Returns the virtual hard disk attached to a device slot of the specified bus.

Note that if the hard disk was indirectly attached by [attachHardDisk\(\)](#) to the given device slot then this method will return not the same object as passed to the [attachHardDisk\(\)](#) call. See [IHardDisk](#) for more detailed information about attaching hard disks.

If this method fails, the following error codes may be reported:

- `VBOX_E_OBJECT_NOT_FOUND`: No hard disk attached to given slot/bus.

9.30.18 getHardDiskAttachmentsOfController

```
IHardDiskAttachment[] IMachine::getHardDiskAttachmentsOfController(
    [in] wstring name)
```

Returns an array of hard disk attachments which are attached to the the controller with the given name.

If this method fails, the following error codes may be reported:

- `VBOX_E_OBJECT_NOT_FOUND`: A storage controller with given name doesn't exist.

9.30.19 getNetworkAdapter

```
INetworkAdapter IMachine::getNetworkAdapter(
    [in] unsigned long slot)
```

Returns the network adapter associated with the given slot. Slots are numbered sequentially, starting with zero. The total number of adapters per machine is defined by the [ISystemProperties::networkAdapterCount](#) property, so the maximum slot number is one less than that property's value.

If this method fails, the following error codes may be reported:

- `E_INVALIDARG`: Invalid slot number.

9.30.20 getNextExtraDataKey

```
void IMachine::getNextExtraDataKey(
    [in] wstring key,
    [out] wstring nextKey,
    [out] wstring nextValue)
```

Returns the machine-specific extra data key name following the supplied key.

An error is returned if the supplied `key` does not exist. An empty string is returned in `nextKey` if the supplied key is the last key. When supplying `null` or an empty string for the key, the first key item is returned in `nextKey` (if there is any). `nextValue` is an optional parameter and if supplied, the next key's value is returned in it.

If this method fails, the following error codes may be reported:

- `VBOX_E_OBJECT_NOT_FOUND`: Extra data key not found.

9.30.21 getParallelPort

```
IParallelPort IMachine::getParallelPort(
    [in] unsigned long slot)
```

Returns the parallel port associated with the given slot. Slots are numbered sequentially, starting with zero. The total number of parallel ports per machine is defined by the `ISystemProperties::parallelPortCount` property, so the maximum slot number is one less than that property's value.

If this method fails, the following error codes may be reported:

- `E_INVALIDARG`: Invalid slot number.

9.30.22 getSerialPort

```
ISerialPort IMachine::getSerialPort(
    [in] unsigned long slot)
```

Returns the serial port associated with the given slot. Slots are numbered sequentially, starting with zero. The total number of serial ports per machine is defined by the `ISystemProperties::serialPortCount` property, so the maximum slot number is one less than that property's value.

If this method fails, the following error codes may be reported:

- `E_INVALIDARG`: Invalid slot number.

9.30.23 getSnapshot

```
ISnapshot IMachine::getSnapshot(
    [in] wstring id)
```

Returns a snapshot of this machine with the given UUID. A `null` UUID can be used to obtain the first snapshot taken on this machine. This is useful if you want to traverse the whole tree of snapshots starting from the root.

If this method fails, the following error codes may be reported:

- `VBOX_E_OBJECT_NOT_FOUND`: Virtual machine has no snapshots or snapshot not found.

9.30.24 `getStorageControllerByName`

```
IStorageController IMachine::getStorageControllerByName(  
    [in] wstring name)
```

Returns a storage controller with the given name.

If this method fails, the following error codes may be reported:

- `VBOX_E_OBJECT_NOT_FOUND`: A storage controller with given name doesn't exist.

9.30.25 `removeSharedFolder`

```
void IMachine::removeSharedFolder(  
    [in] wstring name)
```

Removes the permanent shared folder with the given name previously created by `createSharedFolder()` from the collection of shared folders and stops sharing it.

If this method fails, the following error codes may be reported:

- `VBOX_E_INVALID_VM_STATE`: Virtual machine is not mutable.
- `VBOX_E_OBJECT_NOT_FOUND`: Shared folder name does not exist.

9.30.26 `removeStorageController`

```
void IMachine::removeStorageController(  
    [in] wstring name)
```

Removes a storage controller from the machine.

If this method fails, the following error codes may be reported:

- `VBOX_E_OBJECT_NOT_FOUND`: A storage controller with given name doesn't exist.

9.30.27 saveSettings

```
void IMachine::saveSettings()
```

Saves any changes to machine settings made since the session has been opened or a new machine has been created, or since the last call to [saveSettings\(\)](#) or [discardSettings\(\)](#). For registered machines, new settings become visible to all other VirtualBox clients after successful invocation of this method.

Note: The method sends [IVirtualBoxCallback::onMachineDataChange\(\)](#) notification event after the configuration has been successfully saved (only for registered machines).

Note: Calling this method is only valid on instances returned by [ISession::machine](#) and on new machines created by [IVirtualBox::createMachine\(\)](#) but not yet registered, or on unregistered machines after calling [IVirtualBox::unregisterMachine\(\)](#).

If this method fails, the following error codes may be reported:

- `VBOX_E_FILE_ERROR`: Settings file not accessible.
- `VBOX_E_XML_ERROR`: Could not parse the settings file.
- `E_ACCESSDENIED`: Modification request refused.

9.30.28 saveSettingsWithBackup

```
wstring IMachine::saveSettingsWithBackup()
```

Creates a backup copy of the machine settings file ([settingsFilePath](#)) in case of auto-conversion, and then calls [saveSettings\(\)](#).

Note that the backup copy is created **only** if the settings file auto-conversion took place (see [settingsFileVersion](#) for details). Otherwise, this call is fully equivalent to [saveSettings\(\)](#) and no backup copying is done.

The backup copy is created in the same directory where the original settings file is located. It is given the following file name:

```
original.xml.x.y-platform.bak
```

where `original.xml` is the original settings file name (excluding path), and `x.y-platform` is the version of the old format of the settings file (before auto-conversion).

If the given backup file already exists, this method will try to add the .N suffix to the backup file name (where N counts from 0 to 9) and copy it again until it succeeds. If all suffixes are occupied, or if any other copy error occurs, this method will return a failure.

If the copy operation succeeds, the `bakFileName` return argument will receive a full path to the created backup file (for informational purposes). Note that this will happen even if the subsequent `saveSettings()` call performed by this method after the copy operation, fails.

Note: The VirtualBox API never calls this method. It is intended purely for the purposes of creating backup copies of the settings files by front-ends before saving the results of the automatically performed settings conversion to disk.

See also: `settingsFileVersion`

If this method fails, the following error codes may be reported:

- `VBOX_E_FILE_ERROR`: Settings file not accessible.
- `VBOX_E_XML_ERROR`: Could not parse the settings file.
- `VBOX_E_INVALID_VM_STATE`: Virtual machine is not mutable.
- `E_ACCESSDENIED`: Modification request refused.

9.30.29 setBootOrder

```
void IMachine::setBootOrder(  
    [in] unsigned long position,  
    [in] DeviceType device)
```

Puts the given device to the specified position in the boot order.

To indicate that no device is associated with the given position, `Null` should be used.

@todo `setHardDiskBootOrder()`, `setNetworkBootOrder()`

If this method fails, the following error codes may be reported:

- `E_INVALIDARG`: Boot position out of range.
- `E_NOTIMPL`: Booting from USB device currently not supported.

9.30.30 setCurrentSnapshot

```
void IMachine::setCurrentSnapshot(  
    [in] wstring id)
```

Sets the current snapshot of this machine.

Note: In the current implementation, this operation is not implemented.

9.30.31 setExtraData

```
void IMachine::setExtraData(  
    [in] wstring key,  
    [in] wstring value)
```

Sets associated machine-specific extra data.

If you pass `null` or an empty string as a `key` value, the given `key` will be deleted.

Note: Before performing the actual data change, this method will ask all registered callbacks using the [IVirtualBoxCallback::onExtraDataCanChange\(\)](#) notification for a permission. If one of the callbacks refuses the new value, the change will not be performed.

Note: On success, the [IVirtualBoxCallback::onExtraDataChange\(\)](#) notification is called to inform all registered callbacks about a successful data change.

Note: This method can be called outside the machine session and therefore it's a caller's responsibility to handle possible race conditions when several clients change the same key at the same time.

If this method fails, the following error codes may be reported:

- `VBOX_E_FILE_ERROR`: Settings file not accessible.
- `VBOX_E_XML_ERROR`: Could not parse the settings file.

9.30.32 setGuestProperty

```
void IMachine::setGuestProperty(  
    [in] wstring property,  
    [in] wstring value,  
    [in] wstring flags)
```

Sets, changes or deletes an entry in the machine's guest property store.

If this method fails, the following error codes may be reported:

- `E_ACCESSDENIED`: Property cannot be changed.
- `E_INVALIDARG`: Invalid flags.
- `VBOX_E_INVALID_VM_STATE`: Virtual machine is not mutable or session not open.
- `VBOX_E_INVALID_OBJECT_STATE`: Cannot set transient property when machine not running.

9.30.33 setGuestPropertyValue

```
void IMachine::setGuestPropertyValue(  
    [in] wstring property,  
    [in] wstring value)
```

Sets, changes or deletes a value in the machine's guest property store. The flags field will be left unchanged or created empty for a new property.

If this method fails, the following error codes may be reported:

- **E_ACCESSDENIED**: Property cannot be changed.
- **VBOX_E_INVALID_VM_STATE**: Virtual machine is not mutable or session not open.
- **VBOX_E_INVALID_OBJECT_STATE**: Cannot set transient property when machine not running.

9.30.34 showConsoleWindow

```
unsigned long long IMachine::showConsoleWindow()
```

Activates the console window and brings it to foreground on the desktop of the host PC. Many modern window managers on many platforms implement some sort of focus stealing prevention logic, so that it may be impossible to activate a window without the help of the currently active application. In this case, this method will return a non-zero identifier that represents the top-level window of the VM console process. The caller, if it represents a currently active process, is responsible to use this identifier (in a platform-dependent manner) to perform actual window activation.

Note: This method will fail if a session for this machine is not currently open.

If this method fails, the following error codes may be reported:

- **VBOX_E_INVALID_VM_STATE**: Machine session is not open.

9.31 IMachineDebugger

Note: This interface is not supported in the web service.
--

9.31.1 Attributes

9.31.1.1 singlestep (read/write)

`boolean IMachineDebugger::singlestep`

Switch for enabling singlestepping.

9.31.1.2 recompileUser (read/write)

`boolean IMachineDebugger::recompileUser`

Switch for forcing code recompilation for user mode code.

9.31.1.3 recompileSupervisor (read/write)

`boolean IMachineDebugger::recompileSupervisor`

Switch for forcing code recompilation for supervisor mode code.

9.31.1.4 PATMEnabled (read/write)

`boolean IMachineDebugger::PATMEnabled`

Switch for enabling and disabling the PATM component.

9.31.1.5 CSAMEnabled (read/write)

`boolean IMachineDebugger::CSAMEnabled`

Switch for enabling and disabling the CSAM component.

9.31.1.6 logEnabled (read/write)

`boolean IMachineDebugger::logEnabled`

Switch for enabling and disabling logging.

9.31.1.7 HWVirtExEnabled (read-only)

`boolean IMachineDebugger::HWVirtExEnabled`

Flag indicating whether the VM is currently making use of CPU hardware virtualization extensions.

9.31.1.8 HWVirtExNestedPagingEnabled (read-only)

```
boolean IMachineDebugger::HWVirtExNestedPagingEnabled
```

Flag indicating whether the VM is currently making use of the nested paging CPU hardware virtualization extension.

9.31.1.9 HWVirtExVPIDEnabled (read-only)

```
boolean IMachineDebugger::HWVirtExVPIDEnabled
```

Flag indicating whether the VM is currently making use of the VPID VT-x extension.

9.31.1.10 PAEEnabled (read-only)

```
boolean IMachineDebugger::PAEEnabled
```

Flag indicating whether the VM is currently making use of the Physical Address Extension CPU feature.

9.31.1.11 virtualTimeRate (read/write)

```
unsigned long IMachineDebugger::virtualTimeRate
```

The rate at which the virtual time runs expressed as a percentage. The accepted range is 2% to 20000%.

9.31.1.12 VM (read-only)

```
unsigned long long IMachineDebugger::VM
```

Gets the VM handle. This is only for internal use while we carve the details of this interface.

9.31.2 dumpStats

```
void IMachineDebugger::dumpStats(  
    [in] wstring pattern)
```

Dumps VM statistics.

9.31.3 getStats

```
void IMachineDebugger::getStats(  
    [in] wstring pattern,  
    [in] boolean withDescriptions,  
    [out] wstring stats)
```

Get the VM statistics in a XMLish format.

9.31.4 injectNMI

```
void IMachineDebugger::injectNMI()
```

Inject an NMI into a running VT-x/AMD-V VM.

9.31.5 resetStats

```
void IMachineDebugger::resetStats(  
    [in] wstring pattern)
```

Reset VM statistics.

9.32 IManagedObjectRef

Note: This interface is supported in the web service only, not in COM/XPCOM.

Managed object reference.

Only within the webservice, a managed object reference (which is really an opaque number) allows a webservice client to address an object that lives in the address space of the webservice server.

Behind each managed object reference, there is a COM object that lives in the webservice server's address space. The COM object is not freed until the managed object reference is released, either by an explicit call to [release\(\)](#) or by logging off from the webservice ([IWebSessionManager::logoff\(\)](#)), which releases all objects created during the webservice session.

Whenever a method call of the VirtualBox API returns a COM object, the webservice representation of that method will instead return a managed object reference, which can then be used to invoke methods on that object.

9.32.1 getInterfaceName

```
wstring IManagedObjectRef::getInterfaceName()
```

Returns the name of the interface that this managed object represents, for example, "IMachine", as a string.

9.32.2 release

```
void IManagedObjectRef::release()
```

Releases this managed object reference and frees the resources that were allocated for it in the webservice server process. After calling this method, the identifier of the reference can no longer be used.

9.33 IMedium

The IMedium interface is a common interface for all objects representing virtual media such as hard disks, CD/DVD images and floppy images.

Each medium is associated with a storage unit (such as a file on the host computer or a network resource) that holds actual data. The location of the storage unit is represented by the #location attribute. The value of this attribute is media type dependent.

The exact media type may be determined by querying the appropriate interface such as:

- [IHardDisk](#) (virtual hard disks)
- [IDVDImage](#) (standard CD/DVD ISO image files)
- [IFloppyImage](#) (raw floppy image files)

Existing media are opened using the following methods, depending on the media type:

- [IVirtualBox::openHardDisk\(\)](#)
- [IVirtualBox::openDVDImage\(\)](#)
- [IVirtualBox::openFloppyImage\(\)](#)

New hard disk media are created using the [IVirtualBox::createHardDisk\(\)](#) method. CD/DVD and floppy images are created outside VirtualBox, usually by storing a copy of the real medium of the corresponding type in a regular file.

Known Media

When an existing medium gets opened for the first time, it gets automatically remembered by the given VirtualBox installation or, in other words, becomes a *known medium*. Known media are stored in the media registry transparently maintained by VirtualBox and stored in settings files so that this registry is preserved when VirtualBox is not running.

Newly created virtual hard disks get remembered only when the associated storage unit is actually created (see IHardDisk for more details).

All known media can be enumerated using [IVirtualBox::hardDisks\[\]](#), [IVirtualBox::DVDImages\[\]](#) and [IVirtualBox::floppyImages\[\]](#) attributes. Individual media can be quickly found by UUID using [IVirtualBox::getHardDisk\(\)](#) and similar methods or by location using [IVirtualBox::findHardDisk\(\)](#) and similar methods.

Only known media can be attached to virtual machines.

Removing known media from the media registry is performed when the given medium is closed using the [close\(\)](#) method or when its associated storage unit is deleted (only for hard disks).

Accessibility Checks

The given medium (with the created storage unit) is considered to be *accessible* when its storage unit can be read. Accessible media are indicated by the [Created](#) value

of the [state](#) attribute. When the storage unit cannot be read (for example, because it is located on a disconnected network resource, or was accidentally deleted outside VirtualBox), the medium is considered to be *inaccessible* which is indicated by the [Inaccessible](#) state. The details about the reason of being inaccessible can be obtained using the [lastAccessError](#) attribute.

A new accessibility check is performed each time the [state](#) attribute is read. Please note that this check may take long time (several seconds or even minutes, depending on the storage unit location and format), and will block the calling thread until finished. For this reason, it is recommended to never read this attribute on the main UI thread to avoid making the UI unresponsive.

Note that when VirtualBox starts up (e.g. the VirtualBox object gets created for the first time), all known media are in the [Inaccessible](#) state but the value of the [lastAccessError](#) attribute is an empty string because no actual accessibility check is made on startup. This is done to make the VirtualBox object ready for serving requests as fast as possible and let the end-user application decide if it needs to check media accessibility right away or not.

9.33.1 Attributes

9.33.1.1 id (read-only)

```
wstring IMedium::id
```

UUID of the medium. For a newly created medium, this value is a randomly generated UUID.

Note: For media in one of `MediaState_NotCreated`, `MediaState_Creating` or `MediaState_Deleting` states, the value of this property is undefined and will most likely be an empty UUID.

9.33.1.2 description (read/write)

```
wstring IMedium::description
```

Optional description of the medium. For newly created media, the value of this attribute value is an empty string.

Media types that don't support this attribute will return `E_NOTIMPL` in attempt to get or set this attribute's value.

Note: For some storage types, reading this attribute may return an outdated (last known) value when [state](#) is [Inaccessible](#) or [LockedWrite](#) because the value of this attribute is stored within the storage unit itself. Also note that changing the attribute value is not possible in such case, as well as when the medium is the [LockedRead](#) state.

9.33.1.3 state (read-only)

```
MediaState IMedium::state
```

Current media state. Inspect [MediaState](#) values for details.

Reading this attribute may take a long time because an accessibility check of the storage unit is performed each time the attribute is read. This check may cause a significant delay if the storage unit of the given medium is, for example, a file located on a network share which is not currently accessible due to connectivity problems – the call will not return until a timeout interval defined by the host OS for this operation expires.

If the last known state of the medium is [Created](#) and the accessibility check fails then the state would be set to [Inaccessible](#) and [lastAccessError](#) may be used to get more details about the failure. If the state of the medium is [LockedRead](#) or [LockedWrite](#) then it remains the same, and a non-empty value of [lastAccessError](#) will indicate a failed accessibility check in this case.

Note that not all media states are applicable to all media types. For example, states [NotCreated](#), [LockedWrite](#), [Creating](#), [Deleting](#) are meaningless for [IDVDImage](#) and [IFloppyImage](#) media.

9.33.1.4 location (read/write)

```
wstring IMedium::location
```

Location of the storage unit holding media data.

The format of the location string is media type specific. For media types using regular files in a host's file system, the location string is the full file name.

Some media types may support changing the storage unit location by simply changing the value of this property. If this operation is not supported, the implementation will return `E_NOTIMPL` in attempt to set this attribute's value.

When setting a value of the location attribute which is a regular file in the host's file system, the given file name may be either relative to the [VirtualBox home folder](#) or absolute. Note that if the given location specification does not contain the file extension part then a proper default extension will be automatically appended by the implementation depending on the media type.

9.33.1.5 name (read-only)

```
wstring IMedium::name
```

Name of the storage unit holding media data.

The returned string is a short version of the [location](#) attribute that is suitable for representing the medium in situations where the full location specification is too long (such as lists and comboboxes in GUI frontends). This string is also used by frontends to sort the media list alphabetically when needed.

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For example, for locations that are regular files in the host's file system, the value of this attribute is just the file name (+ extension), without the path specification.

Note that as opposed to the [location](#) attribute, the name attribute will not necessarily be unique for a list of media of the given type and format.

9.33.1.6 size (read-only)

```
unsigned long long IMedium::size
```

Physical size of the storage unit used to hold media data (in bytes).

Note: For media whose [state](#) is [Inaccessible](#), the value of this property is the last known size. For [NotCreated](#) media, the returned value is zero.

9.33.1.7 lastAccessError (read-only)

```
wstring IMedium::lastAccessError
```

Text message that represents the result of the last accessibility check.

Accessibility checks are performed each time the [state](#) attribute is read. An empty string is returned if the last accessibility check was successful. A non-empty string indicates a failure and should normally describe a reason of the failure (for example, a file read error).

9.33.1.8 machineIds (read-only)

```
wstring IMedium::machineIds[]
```

Array of UUIDs of all machines this medium is attached to.

A `null` array is returned if this medium is not attached to any machine or to any machine's snapshot.

Note: The returned array will include a machine even if this medium is not attached to that machine in the current state but attached to it in one of the machine's snapshots. See [getSnapshotIds\(\)](#) for details.

9.33.2 close

```
void IMedium::close()
```


Closes this medium.

The hard disk must not be attached to any known virtual machine and must not have any known child hard disks, otherwise the operation will fail.

When the hard disk is successfully closed, it gets removed from the list of remembered hard disks, but its storage unit is not deleted. In particular, this means that this hard disk can be later opened again using the [IVirtualBox::openHardDisk\(\)](#) call.

Note that after this method successfully returns, the given hard disk object becomes uninitialized. This means that any attempt to call any of its methods or attributes will fail with the "Object not ready" (E_ACCESSDENIED) error.

If this method fails, the following error codes may be reported:

- `VBOX_E_INVALID_OBJECT_STATE`: Invalid media state (other than not created, created or inaccessible).
- `VBOX_E_OBJECT_IN_USE`: Medium attached to virtual machine.
- `VBOX_E_FILE_ERROR`: Settings file not accessible.
- `VBOX_E_XML_ERROR`: Could not parse the settings file.

9.33.3 getSnapshotIds

```
wstring[] IMedium::getSnapshotIds(  
    [in] wstring machineId)
```

Returns an array of UUIDs of all snapshots of the given machine where this medium is attached to.

If the medium is attached to the machine in the current state, then the first element in the array will always be the ID of the queried machine (i.e. the value equal to the `machineId` argument), followed by snapshot IDs (if any).

If the medium is not attached to the machine in the current state, then the array will contain only snapshot IDs.

The returned array may be `null` if this medium is not attached to the given machine at all, neither in the current state nor in one of the snapshots.

9.33.4 lockRead

```
MediaState IMedium::lockRead()
```

Locks this medium for reading.

The read lock is shared: many clients can simultaneously lock the same media for reading unless it is already locked for writing (see [lockWrite\(\)](#)) in which case an error is returned.

When the medium is locked for reading, it cannot be modified from within VirtualBox. This means that any method that changes the properties of this medium or contents of the storage unit will return an error (unless explicitly stated otherwise)

and that an attempt to start a virtual machine that wants to modify the medium will also fail.

When the virtual machine is started up, it locks for reading all media it uses in read-only mode. If some media cannot be locked for reading, the startup procedure will fail.

The medium locked for reading must be unlocked using the `unlockRead()` method. Calls to `lockRead()` can be nested and must be followed by the same number of paired `unlockRead()` calls.

This method sets the media state to `LockedRead` on success. The state prior to this call must be `Created`, `Inaccessible` or `LockedRead`. As you can see, inaccessible media can be locked too. This is not an error; this method performs a logical lock that prevents modifications of this media through the VirtualBox API, not a physical lock of the underlying storage unit.

This method returns the current state of the medium **before** the operation.

If this method fails, the following error codes may be reported:

- `VBOX_E_INVALID_OBJECT_STATE`: Invalid media state (e.g. not created, locked, inaccessible, creating, deleting).

9.33.5 lockWrite

```
MediaState IMedium::lockWrite()
```

Locks this medium for writing.

The write lock, as opposed to `lockRead()`, is exclusive: there may be only one client holding a write lock and there may be no read locks while the write lock is held.

When the medium is locked for writing, it cannot be modified from within VirtualBox and it is not guaranteed that the values of its properties are up-to-date. Any method that changes the properties of this medium or contents of the storage unit will return an error (unless explicitly stated otherwise) and an attempt to start a virtual machine wanting to modify or to read the medium will fail.

When the virtual machine is started up, it locks for writing all media it uses to write data to. If any medium could not be locked for writing, the startup procedure will fail.

The medium locked for writing must be unlocked using the `unlockWrite()` method. Calls to `lockWrite()` can **not** be nested and must be followed by a `unlockWrite()` call before the next `lockWrite` call.

This method sets the media state to `LockedWrite` on success. The state prior to this call must be `Created` or `Inaccessible`. As you can see, inaccessible media can be locked too. This is not an error; this method performs a logical lock preventing modifications of this media through the VirtualBox API, not a physical lock of the underlying storage unit.

For both, success and failure, this method returns the current state of the medium **before** the operation.

If this method fails, the following error codes may be reported:

- `VBOX_E_INVALID_OBJECT_STATE`: Invalid media state (e.g. not created, locked, inaccessible, creating, deleting).

9.33.6 unlockRead

`MediaState IMedium::unlockRead()`

Cancels the read lock previously set by `lockRead()`.

For both, success and failure, this method returns the current state of the medium **after** the operation.

See `lockRead()` for more details.

If this method fails, the following error codes may be reported:

- `VBOX_E_INVALID_OBJECT_STATE`: Medium not locked for reading.

9.33.7 unlockWrite

`MediaState IMedium::unlockWrite()`

Cancels the write lock previously set by `lockWrite()`.

For both, success and failure, this method returns the current state of the medium **after** the operation.

See `lockWrite()` for more details.

If this method fails, the following error codes may be reported:

- `VBOX_E_INVALID_OBJECT_STATE`: Medium not locked for writing.

9.34 IMouse

The `IMouse` interface represents the virtual machine's mouse. Used in `IConsole::mouse`.

Through this interface, the virtual machine's virtual mouse can be controlled.

9.34.1 Attributes

9.34.1.1 absoluteSupported (read-only)

`boolean IMouse::absoluteSupported`

Whether the guest OS supports absolute mouse pointer positioning or not.

Note: VirtualBox Guest Tools need to be installed to the guest OS in order to enable absolute mouse positioning support. You can use the `IConsoleCallback::onMouseCapabilityChange()` callback to be instantly informed about changes of this attribute during virtual machine execution.

See also: `putMouseEventAbsolute()`

9.34.2 putMouseEvent

```
void IMouse::putMouseEvent (
    [in] long dx,
    [in] long dy,
    [in] long dz,
    [in] long buttonState)
```

Initiates a mouse event using relative pointer movements along x and y axis. If this method fails, the following error codes may be reported:

- **E_ACCESSDENIED**: Console not powered up.
- **VBOX_E_IPRT_ERROR**: Could not send mouse event to virtual mouse.

9.34.3 putMouseEventAbsolute

```
void IMouse::putMouseEventAbsolute (
    [in] long x,
    [in] long y,
    [in] long dz,
    [in] long buttonState)
```

Positions the mouse pointer using absolute x and y coordinates. These coordinates are expressed in pixels and start from [1, 1] which corresponds to the top left corner of the virtual display.

Note: This method will have effect only if absolute mouse positioning is supported by the guest OS.

See also: [absoluteSupported](#)

If this method fails, the following error codes may be reported:

- **E_ACCESSDENIED**: Console not powered up.
- **VBOX_E_IPRT_ERROR**: Could not send mouse event to virtual mouse.

9.35 INetworkAdapter

Represents a virtual network adapter that is attached to a virtual machine. Each virtual machine has a fixed number of network adapter slots with one instance of this attached to each of them. Call [IMachine::getNetworkAdapter\(\)](#) to get the network adapter that is attached to a given slot in a given machine.

Each network adapter can be in one of five attachment modes, which are represented by the [NetworkAttachmentType](#) enumeration; see the [attachmentType](#) attribute.

9.35.1 Attributes

9.35.1.1 adapterType (read/write)

`NetworkAdapterType` `INetworkAdapter::adapterType`

Type of the virtual network adapter. Depending on this value, VirtualBox will provide a different virtual network hardware to the guest.

9.35.1.2 slot (read-only)

`unsigned long` `INetworkAdapter::slot`

Slot number this adapter is plugged into. Corresponds to the value you pass to `IMachine::getNetworkAdapter()` to obtain this instance.

9.35.1.3 enabled (read/write)

`boolean` `INetworkAdapter::enabled`

Flag whether the network adapter is present in the guest system. If disabled, the virtual guest hardware will not contain this network adapter. Can only be changed when the VM is not running.

9.35.1.4 MACAddress (read/write)

`wstring` `INetworkAdapter::MACAddress`

Ethernet MAC address of the adapter, 12 hexadecimal characters. When setting it to `null` or an empty string, VirtualBox will generate a unique MAC address.

9.35.1.5 attachmentType (read-only)

`NetworkAttachmentType` `INetworkAdapter::attachmentType`

9.35.1.6 hostInterface (read/write)

`wstring` `INetworkAdapter::hostInterface`

Name of the host network interface the VM is attached to.

9.35.1.7 internalNetwork (read/write)

`wstring` `INetworkAdapter::internalNetwork`

Name of the internal network the VM is attached to.

9.35.1.8 NATNetwork (read/write)

wstring INetworkAdapter::NATNetwork

Name of the NAT network the VM is attached to.

9.35.1.9 cableConnected (read/write)

boolean INetworkAdapter::cableConnected

Flag whether the adapter reports the cable as connected or not. It can be used to report offline situations to a VM.

9.35.1.10 lineSpeed (read/write)

unsigned long INetworkAdapter::lineSpeed

Line speed reported by custom drivers, in units of 1 kbps.

9.35.1.11 traceEnabled (read/write)

boolean INetworkAdapter::traceEnabled

Flag whether network traffic from/to the network card should be traced. Can only be toggled when the VM is turned off.

9.35.1.12 traceFile (read/write)

wstring INetworkAdapter::traceFile

Filename where a network trace will be stored. If not set, VBox-pid.pcap will be used.

9.35.2 attachToBridgedInterface

void INetworkAdapter::attachToBridgedInterface()

Attach the network adapter to a bridged host interface.

9.35.3 attachToHostOnlyInterface

void INetworkAdapter::attachToHostOnlyInterface()

Attach the network adapter to the host-only network.

9.35.4 attachToInternalNetwork

```
void INetworkAdapter::attachToInternalNetwork()
```

Attach the network adapter to an internal network.

9.35.5 attachToNAT

```
void INetworkAdapter::attachToNAT()
```

Attach the network adapter to the Network Address Translation (NAT) interface.

9.35.6 detach

```
void INetworkAdapter::detach()
```

Detach the network adapter

9.36 IParallelPort

The IParallelPort interface represents the virtual parallel port device.

The virtual parallel port device acts like an ordinary parallel port inside the virtual machine. This device communicates to the real parallel port hardware using the name of the parallel device on the host computer specified in the `#path` attribute.

Each virtual parallel port device is assigned a base I/O address and an IRQ number that will be reported to the guest operating system and used to operate the given parallel port from within the virtual machine.

See also: `IMachine::getParallelPort`

9.36.1 Attributes

9.36.1.1 slot (read-only)

```
unsigned long IParallelPort::slot
```

Slot number this parallel port is plugged into. Corresponds to the value you pass to [IMachine::getParallelPort\(\)](#) to obtain this instance.

9.36.1.2 enabled (read/write)

```
boolean IParallelPort::enabled
```

Flag whether the parallel port is enabled. If disabled, the parallel port will not be reported to the guest OS.

9.36.1.3 IOBase (read/write)

```
unsigned long IParallelPort::IOBase
```

Base I/O address of the parallel port.

9.36.1.4 IRQ (read/write)

```
unsigned long IParallelPort::IRQ
```

IRQ number of the parallel port.

9.36.1.5 path (read/write)

```
wstring IParallelPort::path
```

Host parallel device name. If this parallel port is enabled, setting a null or an empty string as this attribute's value will result into an error.

9.37 IPerformanceCollector

The IPerformanceCollector interface represents a service that collects and stores performance metrics data.

Performance metrics are associated with objects of interfaces like IHost and IMachine. Each object has a distinct set of performance metrics. The set can be obtained with [getMetrics\(\)](#).

Metric data is collected at the specified intervals and is retained internally. The interval and the number of retained samples can be set with [setupMetrics\(\)](#).

Metrics are organized hierarchically, with each level separated by a slash (/) character. Generally, the scheme for metric names is like this:

```
Category/Metric[/SubMetric][:aggregation]
```

“Category/Metric” together form the base metric name. A base metric is the smallest unit for which a sampling interval and the number of retained samples can be set. Only base metrics can be enabled and disabled. All sub-metrics are collected when their base metric is collected. Collected values for any set of sub-metrics can be queried with [queryMetricsData\(\)](#).

For example “CPU/Load/User:avg” metric name stands for the “CPU” category, “Load” metric, “User” submetric, “average” aggregate. An aggregate function is computed over all retained data. Valid aggregate functions are:

- avg – average
- min – minimum
- max – maximum

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When setting up metric parameters, querying metric data, enabling or disabling metrics wildcards can be used in metric names to specify a subset of metrics. For example, to select all CPU-related metrics use `CPU/*`, all averages can be queried using `*:avg` and so on. To query metric values without aggregates `*:` can be used.

The valid names for base metrics are:

- CPU/Load
- CPU/MHz
- RAM/Usage

The general sequence for collecting and retrieving the metrics is:

- Obtain an instance of `IPerformanceCollector` with `IVirtualBox::performanceCollector`
- Allocate and populate an array with references to objects the metrics will be collected for. Use references to `IHost` and `IMachine` objects.
- Allocate and populate an array with base metric names the data will be collected for.
- Call `setupMetrics()`. From now on the metric data will be collected and stored.
- Wait for the data to get collected.
- Allocate and populate an array with references to objects the metric values will be queried for. You can re-use the object array used for setting base metrics.
- Allocate and populate an array with metric names the data will be collected for. Note that metric names differ from base metric names.
- Call `queryMetricsData()`. The data that have been collected so far are returned. Note that the values are still retained internally and data collection continues.

For an example of usage refer to the following files in VirtualBox SDK:

- Java: `bindings/webservice/java/jax-ws/samples/metrictest.java`
- Python: `bindings/xpcom/python/sample/shellcommon.py`

9.37.1 Attributes

9.37.1.1 `metricNames` (read-only)

```
wstring IPerformanceCollector::metricNames[]
```

Array of unique names of metrics.

This array represents all metrics supported by the performance collector. Individual objects do not necessarily support all of them. `getMetrics()` can be used to get the list of supported metrics for a particular object.

9.37.2 disableMetrics

```
IPerformanceMetric[] IPerformanceCollector::disableMetrics(  
    [in] wstring metricNames[],  
    [in] $unknown objects[])
```

Turns off collecting specified base metrics. Returns an array of **IPerformanceMetric** describing the metrics have been affected.

Note: Null or empty metric name array means all metrics. Null or empty object array means all existing objects. If metric name array contains a single element and object array contains many, the single metric name array element is applied to each object array element to form metric/object pairs.

9.37.3 enableMetrics

```
IPerformanceMetric[] IPerformanceCollector::enableMetrics(  
    [in] wstring metricNames[],  
    [in] $unknown objects[])
```

Turns on collecting specified base metrics. Returns an array of **IPerformanceMetric** describing the metrics have been affected.

Note: Null or empty metric name array means all metrics. Null or empty object array means all existing objects. If metric name array contains a single element and object array contains many, the single metric name array element is applied to each object array element to form metric/object pairs.

9.37.4 getMetrics

```
IPerformanceMetric[] IPerformanceCollector::getMetrics(  
    [in] wstring metricNames[],  
    [in] $unknown objects[])
```

Returns parameters of specified metrics for a set of objects.

Note: Null metrics array means all metrics. Null object array means all existing objects.

9.37.5 queryMetricsData

```
long[] IPerformanceCollector::queryMetricsData(
    [in] wstring metricNames[],
    [in] $unknown objects[],
    [out] wstring returnMetricNames[],
    [out] $unknown returnObjects[],
    [out] wstring returnUnits[],
    [out] unsigned long returnScales[],
    [out] unsigned long returnSequenceNumbers[],
    [out] unsigned long returnDataIndices[],
    [out] unsigned long returnDataLengths[])
```

Queries collected metrics data for a set of objects.

The data itself and related metric information are returned in seven parallel and one flattened array of arrays. Elements of `returnMetricNames`, `returnObjects`, `returnUnits`, `returnScales`, `returnSequenceNumbers`, `returnDataIndices` and `returnDataLengths` with the same index describe one set of values corresponding to a single metric.

The `returnData` parameter is a flattened array of arrays. Each start and length of a sub-array is indicated by `returnDataIndices` and `returnDataLengths`. The first value for metric `metricNames[i]` is at `returnData[returnIndices[i]]`.

Note: Null or empty metric name array means all metrics. Null or empty object array means all existing objects. If metric name array contains a single element and object array contains many, the single metric name array element is applied to each object array element to form metric/object pairs.

Note: Data collection continues behind the scenes after call to `queryMetricsData`. The return data can be seen as the snapshot of the current state at the time of `queryMetricsData` call. The internally kept metric values are not cleared by the call. This makes possible querying different subsets of metrics or aggregates with subsequent calls. If periodic querying is needed it is highly suggested to query the values with `interval*count` period to avoid confusion. This way a completely new set of data values will be provided by each query.

9.37.6 setupMetrics

```
IPerformanceMetric[] IPerformanceCollector::setupMetrics(
    [in] wstring metricNames[],
    [in] $unknown objects[],
    [in] unsigned long period,
    [in] unsigned long count)
```

Sets parameters of specified base metrics for a set of objects. Returns an array of [IPerformanceMetric](#) describing the metrics have been affected.

Note: Null or empty metric name array means all metrics. Null or empty object array means all existing objects. If metric name array contains a single element and object array contains many, the single metric name array element is applied to each object array element to form metric/object pairs.

9.38 IPerformanceMetric

The IPerformanceMetric interface represents parameters of the given performance metric.

9.38.1 Attributes

9.38.1.1 metricName (read-only)

```
wstring IPerformanceMetric::metricName
```

Name of the metric.

9.38.1.2 object (read-only)

```
$unknown IPerformanceMetric::object
```

Object this metric belongs to.

9.38.1.3 description (read-only)

```
wstring IPerformanceMetric::description
```

Textual description of the metric.

9.38.1.4 period (read-only)

```
unsigned long IPerformanceMetric::period
```

Time interval between samples, measured in seconds.

9.38.1.5 count (read-only)

```
unsigned long IPerformanceMetric::count
```

Number of recent samples retained by the performance collector for this metric. When the collected sample count exceeds this number, older samples are discarded.

9.38.1.6 unit (read-only)

```
wstring IPerformanceMetric::unit
```

Unit of measurement.

9.38.1.7 minimumValue (read-only)

```
long IPerformanceMetric::minimumValue
```

Minimum possible value of this metric.

9.38.1.8 maximumValue (read-only)

```
long IPerformanceMetric::maximumValue
```

Maximum possible value of this metric.

9.39 IProgress

The `IProgress` interface is used to track and control asynchronous tasks within `VirtualBox`.

An instance of this is returned every time `VirtualBox` starts an asynchronous task (in other words, a separate thread) which continues to run after a method call returns. For example, `IConsole::saveState()`, which saves the state of a running virtual machine, can take a long time to complete. To be able to display a progress bar, a user interface such as the `VirtualBox` graphical user interface can use the `IProgress` object returned by that method.

Note that `IProgress` is a “read-only” interface in the sense that only the `VirtualBox` internals behind the Main API can create and manipulate progress objects, whereas client code can only use the `IProgress` object to monitor a task’s progress and, if `cancelable` is `true`, cancel the task by calling `cancel()`.

A task represented by `IProgress` consists of either one or several sub-operations that run sequentially, one by one (see `operation` and `operationCount`). Every operation is identified by a number (starting from 0) and has a separate description.

You can find the individual percentage of completion of the current operation in `operationPercent` and the percentage of completion of the task as a whole in `percent`.

Similarly, you can wait for the completion of a particular operation via `waitForOperationCompletion()` or for the completion of the whole task via `waitForCompletion()`.

9.39.1 Attributes

9.39.1.1 id (read-only)

```
wstring IProgress::id
```

ID of the task.

9.39.1.2 description (read-only)

wstring IProgress::description

Description of the task.

9.39.1.3 initiator (read-only)

\$unknown IProgress::initiator

Initiator of the task.

9.39.1.4 cancelable (read-only)

boolean IProgress::cancelable

Whether the task can be interrupted.

9.39.1.5 percent (read-only)

unsigned long IProgress::percent

Current progress value of the task as a whole, in percent. This value depends on how many operations are already complete. Returns 100 if [completed](#) is true.

9.39.1.6 timeRemaining (read-only)

long IProgress::timeRemaining

Estimated remaining time until the task completes, in seconds. Returns 0 once the task has completed; returns -1 if the remaining time cannot be computed, in particular if the current progress is 0.

Even if a value is returned, the estimate will be unreliable for low progress values. It will become more reliable as the task progresses; it is not recommended to display an ETA before at least 20% of a task have completed.

9.39.1.7 completed (read-only)

boolean IProgress::completed

Whether the task has been completed.

9.39.1.8 canceled (read-only)

boolean IProgress::canceled

Whether the task has been canceled.

9.39.1.9 resultCode (read-only)

`long IProgress::resultCode`

Result code of the progress task. Valid only if `completed` is `true`.

9.39.1.10 errorInfo (read-only)

`IVirtualBoxErrorInfo IProgress::errorInfo`

Extended information about the unsuccessful result of the progress operation. May be `null` if no extended information is available. Valid only if `completed` is `true` and `resultCode` indicates a failure.

9.39.1.11 operationCount (read-only)

`unsigned long IProgress::operationCount`

Number of sub-operations this task is divided into. Every task consists of at least one suboperation.

9.39.1.12 operation (read-only)

`unsigned long IProgress::operation`

Number of the sub-operation being currently executed.

9.39.1.13 operationDescription (read-only)

`wstring IProgress::operationDescription`

Description of the sub-operation being currently executed.

9.39.1.14 operationPercent (read-only)

`unsigned long IProgress::operationPercent`

Progress value of the current sub-operation only, in percent.

9.39.2 cancel

`void IProgress::cancel()`

Cancels the task.

Note: If <code>cancelable</code> is <code>false</code> , then this method will fail.

If this method fails, the following error codes may be reported:

- `VBOX_E_INVALID_OBJECT_STATE`: Operation cannot be canceled.

9.39.3 waitForCompletion

```
void IProgress::waitForCompletion(  
    [in] long timeout)
```

Waits until the task is done (including all sub-operations) with a given timeout in milliseconds; specify -1 for an indefinite wait.

If this method fails, the following error codes may be reported:

- `VBOX_E_IPRT_ERROR`: Failed to wait for task completion.

9.39.4 waitForOperationCompletion

```
void IProgress::waitForOperationCompletion(  
    [in] unsigned long operation,  
    [in] long timeout)
```

Waits until the given operation is done with a given timeout in milliseconds; specify -1 for an indefinite wait.

If this method fails, the following error codes may be reported:

- `VBOX_E_IPRT_ERROR`: Failed to wait for operation completion.

9.40 IRemoteDisplayInfo

Note: With the web service, this interface is mapped to a structure. Attributes that return this interface will not return an object, but a complete structure containing the attributes listed below as structure members.

Contains information about the remote display (VRDP) capabilities and status. This is used in the [IConsole::remoteDisplayInfo](#) attribute.

9.40.1 Attributes

9.40.1.1 active (read-only)

```
boolean IRemoteDisplayInfo::active
```

Whether the remote display connection is active.

9.40.1.2 numberOfClients (read-only)

```
unsigned long IRemoteDisplayInfo::numberOfClients
```

How many times a client connected.

9.40.1.3 beginTime (read-only)

```
long long IRemoteDisplayInfo::beginTime
```

When the last connection was established, in milliseconds since 1970-01-01 UTC.

9.40.1.4 endTime (read-only)

```
long long IRemoteDisplayInfo::endTime
```

When the last connection was terminated or the current time, if connection is still active, in milliseconds since 1970-01-01 UTC.

9.40.1.5 bytesSent (read-only)

```
unsigned long long IRemoteDisplayInfo::bytesSent
```

How many bytes were sent in last or current, if still active, connection.

9.40.1.6 bytesSentTotal (read-only)

```
unsigned long long IRemoteDisplayInfo::bytesSentTotal
```

How many bytes were sent in all connections.

9.40.1.7 bytesReceived (read-only)

```
unsigned long long IRemoteDisplayInfo::bytesReceived
```

How many bytes were received in last or current, if still active, connection.

9.40.1.8 bytesReceivedTotal (read-only)

```
unsigned long long IRemoteDisplayInfo::bytesReceivedTotal
```

How many bytes were received in all connections.

9.40.1.9 user (read-only)

```
wstring IRemoteDisplayInfo::user
```

Login user name supplied by the client.

9.40.1.10 domain (read-only)

```
wstring IRemoteDisplayInfo::domain
```

Login domain name supplied by the client.

9.40.1.11 **clientName (read-only)**

wstring IRemoteDisplayInfo::clientName

The client name supplied by the client.

9.40.1.12 **clientIP (read-only)**

wstring IRemoteDisplayInfo::clientIP

The IP address of the client.

9.40.1.13 **clientVersion (read-only)**

unsigned long IRemoteDisplayInfo::clientVersion

The client software version number.

9.40.1.14 **encryptionStyle (read-only)**

unsigned long IRemoteDisplayInfo::encryptionStyle

Public key exchange method used when connection was established. Values: 0 - RDP4 public key exchange scheme. 1 - X509 certificates were sent to client.

9.41 **ISerialPort**

The ISerialPort interface represents the virtual serial port device.

The virtual serial port device acts like an ordinary serial port inside the virtual machine. This device communicates to the real serial port hardware in one of two modes: host pipe or host device.

In host pipe mode, the #path attribute specifies the path to the pipe on the host computer that represents a serial port. The #server attribute determines if this pipe is created by the virtual machine process at machine startup or it must already exist before starting machine execution.

In host device mode, the #path attribute specifies the name of the serial port device on the host computer.

There is also a third communication mode: the disconnected mode. In this mode, the guest OS running inside the virtual machine will be able to detect the serial port, but all port write operations will be discarded and all port read operations will return no data.

See also: IMachine::getSerialPort

9.41.1 Attributes

9.41.1.1 slot (read-only)

```
unsigned long ISerialPort::slot
```

Slot number this serial port is plugged into. Corresponds to the value you pass to [IMachine::getSerialPort\(\)](#) to obtain this instance.

9.41.1.2 enabled (read/write)

```
boolean ISerialPort::enabled
```

Flag whether the serial port is enabled. If disabled, the serial port will not be reported to the guest OS.

9.41.1.3 IOBase (read/write)

```
unsigned long ISerialPort::IOBase
```

Base I/O address of the serial port.

9.41.1.4 IRQ (read/write)

```
unsigned long ISerialPort::IRQ
```

IRQ number of the serial port.

9.41.1.5 hostMode (read/write)

```
PortMode ISerialPort::hostMode
```

How is this port connected to the host.

Note: Changing this attribute may fail if the conditions for [path](#) are not met.

9.41.1.6 server (read/write)

```
boolean ISerialPort::server
```

Flag whether this serial port acts as a server (creates a new pipe on the host) or as a client (uses the existing pipe). This attribute is used only when [hostMode](#) is `PortMode_HostPipe`.

9.41.1.7 path (read/write)

```
wstring ISerialPort::path
```

Path to the serial port's pipe on the host when [hostMode](#) is `PortMode_HostPipe`, or the host serial device name when [hostMode](#) is `PortMode_HostDevice`. For both cases, setting a `null` or empty string as the attribute's value is an error. Otherwise, the value of this property is ignored.

9.42 ISession

The `ISession` interface represents a serialization primitive for virtual machines.

With `VirtualBox`, every time one wishes to manipulate a virtual machine (e.g. change its settings or start execution), a session object is required. Such an object must be passed to one of the session methods that open the given session, which then initiates the machine manipulation.

A session serves several purposes: it identifies to the inter-process `VirtualBox` code which process is currently working with the virtual machine, and it ensures that there are no incompatible requests from several processes for the same virtual machine. Session objects can therefore be thought of as mutex semaphores that lock virtual machines to prevent conflicting accesses from several processes.

How sessions objects are used depends on whether you use the Main API via COM or via the webservice:

- When using the COM API directly, an object of the `Session` class from the `VirtualBox` type library needs to be created. In regular COM C++ client code, this can be done by calling `createLocalObject()`, a standard COM API. This object will then act as a local session object in further calls to open a session.
- In the webservice, the session manager (`IWebSessionManager`) instead creates one session object automatically when [IWebSessionManager::logon\(\)](#) is called. A managed object reference to that session object can be retrieved by calling [IWebSessionManager::getSessionObject\(\)](#). This session object reference can then be used to open sessions.

Sessions are mainly used in two variations:

- To start a virtual machine in a separate process, one would call [IVirtualBox::openRemoteSession\(\)](#), which requires a session object as its first parameter. This session then identifies the caller and lets him control the started machine (for example, pause machine execution or power it down) as well as be notified about machine execution state changes.
- To alter machine settings, or to start machine execution within the current process, one needs to open a direct session for the machine first by calling [IVirtualBox::openSession\(\)](#). While a direct session is open within one process, no any

other process may open another direct session for the same machine. This prevents the machine from being changed by other processes while it is running or while the machine is being configured.

One also can attach to an existing direct session already opened by another process (for example, in order to send a control request to the virtual machine such as the pause or the reset request). This is done by calling [IVirtualBox::openExistingSession\(\)](#).

Note: Unless you are trying to write a new VirtualBox front-end that performs direct machine execution (like the VirtualBox or VBoxSDL front-ends), don't call [IConsole::powerUp\(\)](#) in a direct session opened by [IVirtualBox::openSession\(\)](#) and use this session only to change virtual machine settings. If you simply want to start virtual machine execution using one of the existing front-ends (for example the VirtualBox GUI or headless server), simply use [IVirtualBox::openRemoteSession\(\)](#); these front-ends will power up the machine automatically for you.

9.42.1 Attributes

9.42.1.1 state (read-only)

[SessionState](#) [ISession::state](#)

Current state of this session.

9.42.1.2 type (read-only)

[SessionType](#) [ISession::type](#)

Type of this session. The value of this attribute is valid only if the session is currently open (i.e. its #state is [SessionType_SessionOpen](#)), otherwise an error will be returned.

9.42.1.3 machine (read-only)

[IMachine](#) [ISession::machine](#)

Machine object associated with this session.

9.42.1.4 console (read-only)

[IConsole](#) [ISession::console](#)

Console object associated with this session.

9.42.2 close

```
void ISession::close()
```

Closes a session that was previously opened.

It is recommended that every time an “open session” method (such as [IVirtualBox::openRemoteSession\(\)](#) or [IVirtualBox::openSession\(\)](#)) has been called to manipulate a virtual machine, the caller invoke `ISession::close()` when it’s done doing so. Since sessions are serialization primitives much like ordinary mutexes, they are best used the same way: for each “open” call, there should be a matching “close” call, even when errors occur.

Otherwise, if a direct session for a machine opened with [IVirtualBox::openSession\(\)](#) is not explicitly closed when the application terminates, the state of the machine will be set to [Aborted](#) on the server.

Generally, it is recommended to close all open sessions explicitly before terminating the application (regardless of the reason for the termination).

Note: Do not expect the session state ([state](#) to return to “Closed” immediately after you invoke `ISession::close()`, particularly if you have started a remote session to execute the VM in a new process. The session state will automatically return to “Closed” once the VM is no longer executing, which can of course take a very long time.

If this method fails, the following error codes may be reported:

- `E_UNEXPECTED`: Session is not open.

9.43 ISharedFolder

Note: With the web service, this interface is mapped to a structure. Attributes that return this interface will not return an object, but a complete structure containing the attributes listed below as structure members.

The `ISharedFolder` interface represents a folder in the host computer’s file system accessible from the guest OS running inside a virtual machine using an associated logical name.

There are three types of shared folders:

- *Global* ([IVirtualBox::sharedFolders\[\]](#)), shared folders available to all virtual machines.
- *Permanent* ([IMachine::sharedFolders\[\]](#)), VM-specific shared folders available to the given virtual machine at startup.

- *Transient* (`IConsole::sharedFolders[]`), VM-specific shared folders created in the session context (for example, when the virtual machine is running) and automatically discarded when the session is closed (the VM is powered off).

Logical names of shared folders must be unique within the given scope (global, permanent or transient). However, they do not need to be unique across scopes. In this case, the definition of the shared folder in a more specific scope takes precedence over definitions in all other scopes. The order of precedence is (more specific to more general):

1. Transient definitions
2. Permanent definitions
3. Global definitions

For example, if MyMachine has a shared folder named `C_DRIVE` (that points to `C:\`), then creating a transient shared folder named `C_DRIVE` (that points to `C:\\\\WINDOWS`) will change the definition of `C_DRIVE` in the guest OS so that `\\\\VBOXSVR\\C_DRIVE` will give access to `C:\\WINDOWS` instead of `C:\\` on the host PC. Removing the transient shared folder `C_DRIVE` will restore the previous (permanent) definition of `C_DRIVE` that points to `C:\\` if it still exists.

Note that permanent and transient shared folders of different machines are in different name spaces, so they don't overlap and don't need to have unique logical names.

Note: Global shared folders are not implemented in the current version of the product.

9.43.1 Attributes

9.43.1.1 name (read-only)

```
wstring ISharedFolder::name
```

Logical name of the shared folder.

9.43.1.2 hostPath (read-only)

```
wstring ISharedFolder::hostPath
```

Full path to the shared folder in the host file system.

9.43.1.3 accessible (read-only)

```
boolean ISharedFolder::accessible
```

Whether the folder defined by the host path is currently accessible or not. For example, the folder can be inaccessible if it is placed on the network share that is not available by the time this property is read.

9.43.1.4 writable (read-only)

```
boolean ISharedFolder::writable
```

Whether the folder defined by the host path is writable or not.

9.43.1.5 lastAccessError (read-only)

```
wstring ISharedFolder::lastAccessError
```

Text message that represents the result of the last accessibility check.

Accessibility checks are performed each time the [accessible](#) attribute is read. An empty string is returned if the last accessibility check was successful. A non-empty string indicates a failure and should normally describe a reason of the failure (for example, a file read error).

9.44 ISnapshot

The ISnapshot interface represents a snapshot of the virtual machine.

The *snapshot* stores all the information about a virtual machine necessary to bring it to exactly the same state as it was at the time of taking the snapshot. The snapshot includes:

- all settings of the virtual machine (i.e. its hardware configuration: RAM size, attached hard disks, etc.)
- the execution state of the virtual machine (memory contents, CPU state, etc.).

Snapshots can be *offline* (taken when the VM is powered off) or *online* (taken when the VM is running). The execution state of the offline snapshot is called a *zero execution state* (it doesn't actually contain any information about memory contents or the CPU state, assuming that all hardware is just powered off).

Snapshot branches

Snapshots can be chained. Chained snapshots form a branch where every next snapshot is based on the previous one. This chaining is mostly related to hard disk branching (see [IHardDisk](#) description). This means that every time a new snapshot is created, a new differencing hard disk is implicitly created for all normal hard disks attached to the given virtual machine. This allows to fully restore hard disk contents when the machine is later reverted to a particular snapshot.

In the current implementation, multiple snapshot branches within one virtual machine are not allowed. Every machine has a single branch, and [IConsole::takeSnapshot\(\)](#) operation adds a new snapshot to the top of that branch.

Existing snapshots can be discarded using [IConsole::discardSnapshot\(\)](#).

Current snapshot

Every virtual machine has a current snapshot, identified by [IMachine::currentSnapshot](#). This snapshot is used as a base for the *current machine state* (see below), to the effect

that all normal hard disks of the machine and its execution state are based on this snapshot.

In the current implementation, the current snapshot is always the last taken snapshot (i.e. the head snapshot on the branch) and it cannot be changed.

The current snapshot is `null` if the machine doesn't have snapshots at all; in this case the current machine state is just current settings of this machine plus its current execution state.

Current machine state

The current machine state is what represented by `IMachine` instances got directly from `IVirtualBox` using `getMachine()`, `findMachine()`, etc. (as opposed to instances returned by `machine`). This state is always used when the machine is **powered on**.

The current machine state also includes the current execution state. If the machine is being currently executed (`IMachine::state` is **Running** and above), its execution state is just what's happening now. If it is powered off (**PoweredOff** or **Aborted**), it has a zero execution state. If the machine is saved (**Saved**), its execution state is what saved in the execution state file (`IMachine::stateFilePath`).

If the machine is in the saved state, then, next time it is powered on, its execution state will be fully restored from the saved state file and the execution will continue from the point where the state was saved.

Similarly to snapshots, the current machine state can be discarded using `IConsole::discardCurrentState()`.

Taking and discarding snapshots

The table below briefly explains the meaning of every snapshot operation:

Operation	Meaning	Remarks
<code>IConsole::takeSnapshot()</code>	Save the current state of the virtual machine, including all settings, contents of normal hard disks and the current modifications to immutable hard disks (for online snapshots)	The current state is not changed (the machine will continue execution if it is being executed when the snapshot is taken)
<code>IConsole::discardSnapshot()</code>	Forget the state of the virtual machine stored in the snapshot: dismiss all saved settings and delete the saved execution state (for online snapshots)	Other snapshots (including child snapshots, if any) and the current state are not directly affected
<code>IConsole::discardCurrentState()</code>	Restore the current state of the virtual machine from the state stored in the current snapshot, including all settings and hard disk contents	The current state of the machine existed prior to this operation is lost
<code>IConsole::discardCurrentSnapshotAndState()</code>	Completely revert the virtual machine to the state it was in before the current snapshot has been taken. The current state, as well as the current snapshot, are lost	

9.44.1 Attributes

9.44.1.1 id (read-only)

`wstring ISnapshot::id`

UUID of the snapshot.

9.44.1.2 name (read/write)

`wstring ISnapshot::name`

Short name of the snapshot.

9.44.1.3 description (read/write)

`wstring ISnapshot::description`

Optional description of the snapshot.

9.44.1.4 timeStamp (read-only)

`long long ISnapshot::timeStamp`

Time stamp of the snapshot, in milliseconds since 1970-01-01 UTC.

9.44.1.5 online (read-only)

`boolean ISnapshot::online`

`true` if this snapshot is an online snapshot and `false` otherwise.

Note: When this attribute is `true`, the `IMachine::stateFilePath` attribute of the `machine` object associated with this snapshot will point to the saved state file. Otherwise, it will be an empty string.

9.44.1.6 machine (read-only)

`IMachine ISnapshot::machine`

Virtual machine this snapshot is taken on. This object stores all settings the machine had when taking this snapshot.

Note: The returned machine object is immutable, i.e. no any settings can be changed.

9.44.1.7 parent (read-only)

`ISnapshot ISnapshot::parent`

Parent snapshot (a snapshot this one is based on).

Note: It's not an error to read this attribute on a snapshot that doesn't have a parent – a `null` object will be returned to indicate this.

9.44.1.8 children (read-only)

`ISnapshot ISnapshot::children[]`

Child snapshots (all snapshots having this one as a parent).

Note: In the current implementation, there can be only one child snapshot, or no children at all, meaning this is the last (head) snapshot.

9.45 IStorageController

Represents a storage controller that is attached to a virtual machine ([IMachine](#)). Just as hard disks are attached to storage controllers in a real computer, virtual hard disks (represented by [IHardDisk](#)) are attached to virtual storage controllers, represented by this interface.

VirtualBox supports three types of virtual storage controller hardware: IDE, SCSI, and SATA (see [bus](#)). Depending on which of these three is used, certain sub-types are available and can be selected in [controllerType](#).

9.45.1 Attributes

9.45.1.1 name (read-only)

`wstring IStorageController::name`

Name of the storage controller, as originally specified with [IMachine::addStorageController\(\)](#). This then uniquely identifies this controller with other method calls such as [IMachine::attachHardDisk\(\)](#).

9.45.1.2 maxDevicesPerPortCount (read-only)

`unsigned long IStorageController::maxDevicesPerPortCount`

Maximum number of devices which can be attached to one port.

9.45.1.3 minPortCount (read-only)

`unsigned long IStorageController::minPortCount`

Minimum number of ports that [portCount](#) can be set to.

9.45.1.4 maxPortCount (read-only)

`unsigned long IStorageController::maxPortCount`

Maximum number of ports that [portCount](#) can be set to.

9.45.1.5 instance (read/write)

```
unsigned long IStorageController::instance
```

The instance number of the device in the running VM.

9.45.1.6 portCount (read/write)

```
unsigned long IStorageController::portCount
```

The number of currently usable ports on the controller. The minimum and maximum number of ports for one controller are stored in [minPortCount](#) and [maxPortCount](#).

9.45.1.7 bus (read-only)

```
StorageBus IStorageController::bus
```

The connection type of the storage controller.

9.45.1.8 controllerType (read/write)

```
StorageControllerType IStorageController::controllerType
```

Type of the virtual storage controller. Depending on this value, VirtualBox will provide a different virtual storage controller hardware to the guest.

For SCSI controllers, the default type is LsiLogic.

9.45.2 GetIDEEmulationPort

```
long IStorageController::GetIDEEmulationPort(  
    [in] long devicePosition)
```

Gets the corresponding port number which is emulated as an IDE device.

If this method fails, the following error codes may be reported:

- **E_INVALIDARG:** The `devicePosition` is not in the range 0 to 3.
- **E_NOTIMPL:** The storage controller type is not SATAIntelAhci.

9.45.3 SetIDEEmulationPort

```
void IStorageController::SetIDEEmulationPort(  
    [in] long devicePosition,  
    [in] long portNumber)
```

Sets the port number which is emulated as an IDE device.

If this method fails, the following error codes may be reported:

- **E_INVALIDARG:** The `devicePosition` is not in the range 0 to 3 or the `portNumber` is not in the range 0 to 29.
- **E_NOTIMPL:** The storage controller type is not SATAIntelAhci.

9.46 ISystemProperties

The ISystemProperties interface represents global properties of the given VirtualBox installation.

These properties define limits and default values for various attributes and parameters. Most of the properties are read-only, but some can be changed by a user.

9.46.1 Attributes

9.46.1.1 minGuestRAM (read-only)

```
unsigned long ISystemProperties::minGuestRAM
```

Minimum guest system memory in Megabytes.

9.46.1.2 maxGuestRAM (read-only)

```
unsigned long ISystemProperties::maxGuestRAM
```

Maximum guest system memory in Megabytes.

9.46.1.3 minGuestVRAM (read-only)

```
unsigned long ISystemProperties::minGuestVRAM
```

Minimum guest video memory in Megabytes.

9.46.1.4 maxGuestVRAM (read-only)

```
unsigned long ISystemProperties::maxGuestVRAM
```

Maximum guest video memory in Megabytes.

9.46.1.5 minGuestCPUCount (read-only)

```
unsigned long ISystemProperties::minGuestCPUCount
```

Minimum CPU count.

9.46.1.6 maxGuestCPUCount (read-only)

```
unsigned long ISystemProperties::maxGuestCPUCount
```

Maximum CPU count.

9.46.1.7 maxVDISize (read-only)

```
unsigned long long ISystemProperties::maxVDISize
```

Maximum size of a virtual disk image in Megabytes.

9.46.1.8 networkAdapterCount (read-only)

```
unsigned long ISystemProperties::networkAdapterCount
```

Number of network adapters associated with every [IMachine](#) instance.

9.46.1.9 serialPortCount (read-only)

```
unsigned long ISystemProperties::serialPortCount
```

Number of serial ports associated with every [IMachine](#) instance.

9.46.1.10 parallelPortCount (read-only)

```
unsigned long ISystemProperties::parallelPortCount
```

Number of parallel ports associated with every [IMachine](#) instance.

9.46.1.11 maxBootPosition (read-only)

```
unsigned long ISystemProperties::maxBootPosition
```

Maximum device position in the boot order. This value corresponds to the total number of devices a machine can boot from, to make it possible to include all possible devices to the boot list. See also: [IMachine::setBootOrder\(\)](#)

9.46.1.12 defaultMachineFolder (read/write)

```
wstring ISystemProperties::defaultMachineFolder
```

Full path to the default directory used to create new or open existing machines when a settings file name contains no path.

The initial value of this property is [<VirtualBox_home>/Machines](#).

Note: Setting this property to <code>null</code> or an empty string will restore the initial value.
--

Note: When settings this property, the specified path can be absolute (full path) or relative to the VirtualBox home directory . When reading this property, a full path is always returned.

Note: The specified path may not exist, it will be created when necessary.

See also: [IVirtualBox::createMachine\(\)](#), [IVirtualBox::openMachine\(\)](#)

9.46.1.13 defaultHardDiskFolder (read/write)

wstring ISystemProperties::defaultHardDiskFolder

Full path to the default directory used to create new or open existing virtual disks.

This path is used when the storage unit of a hard disk is a regular file in the host's file system and only a file name that contains no path is given.

The initial value of this property is <[VirtualBox_home](#)>/HardDisks.

Note: Setting this property to `null` or empty string will restore the initial value.

Note: When settings this property, the specified path can be relative to the [VirtualBox home directory](#) or absolute. When reading this property, a full path is always returned.

Note: The specified path may not exist, it will be created when necessary.

See also: [IHardDisk](#), [IVirtualBox::createHardDisk\(\)](#), [IVirtualBox::openHardDisk\(\)](#), [IMedium::location](#)

9.46.1.14 hardDiskFormats (read-only)

IHardDiskFormat ISystemProperties::hardDiskFormats[]

List of all hard disk storage formats supported by this VirtualBox installation.

Keep in mind that the hard disk format identifier ([IHardDiskFormat::id](#)) used in other API calls like [IVirtualBox::createHardDisk\(\)](#) to refer to a particular hard disk format is a case-insensitive string. This means that, for example, all of the following strings:

```
"VDI"
"vdi"
"vDI"
```

refer to the same hard disk format.

Note that the virtual hard disk framework is backend-based, therefore the list of supported formats depends on what backends are currently installed.

See also: [IHardDiskFormat](#),

9.46.1.15 defaultHardDiskFormat (read/write)

wstring ISystemProperties::defaultHardDiskFormat

Identifier of the default hard disk format used by VirtualBox.

The hard disk format set by this attribute is used by VirtualBox when the hard disk format was not specified explicitly. One example is [IVirtualBox::createHardDisk\(\)](#) with the empty format argument. A more complex example is implicit creation of differencing hard disks when taking a snapshot of a virtual machine: this operation will try to use a format of the parent hard disk first and if this format does not support differencing hard disks the default format specified by this argument will be used.

The list of supported hard disk formats may be obtained by the [hardDiskFormats\[\]](#) call. Note that the default hard disk format must have a capability to create differencing hard disks; otherwise operations that create hard disks implicitly may fail unexpectedly.

The initial value of this property is "VDI" in the current version of the VirtualBox product, but may change in the future.

Note: Setting this property to `null` or empty string will restore the initial value.

See also: [hardDiskFormats\[\]](#), [IHardDiskFormat::id](#), [IVirtualBox::createHardDisk\(\)](#)

9.46.1.16 remoteDisplayAuthLibrary (read/write)

wstring ISystemProperties::remoteDisplayAuthLibrary

Library that provides authentication for VRDP clients. The library is used if a virtual machine's authentication type is set to "external" in the VM RemoteDisplay configuration.

The system library extension (".DLL" or ".so") must be omitted. A full path can be specified; if not, then the library must reside on the system's default library path.

The default value of this property is "VRDPAuth". There is a library of that name in one of the default VirtualBox library directories.

For details about VirtualBox authentication libraries and how to implement them, please refer to the VirtualBox manual.

Note: Setting this property to `null` or empty string will restore the initial value.

9.46.1.17 webServiceAuthLibrary (read/write)

wstring ISystemProperties::webServiceAuthLibrary

Library that provides authentication for webservice clients. The library is used if a virtual machine's authentication type is set to "external" in the VM RemoteDisplay configuration and will be called from within the [IWebSessionManager::logon\(\)](#) implementation.

As opposed to [remoteDisplayAuthLibrary](#), there is no per-VM setting for this, as the webservice is a global resource (if it is running). Only for this setting (for the webservice), setting this value to a literal "null" string disables authentication, meaning that [IWebSessionManager::logon\(\)](#) will always succeed, no matter what user name and password are supplied.

The initial value of this property is "VRDPAuth", meaning that the webservice will use the same authentication library that is used by default for VBoxVRDP (again, see [remoteDisplayAuthLibrary](#)). The format and calling convention of authentication libraries is the same for the webservice as it is for VBoxVRDP.

Note: Setting this property to null or empty string will restore the initial value.

9.46.1.18 LogHistoryCount (read/write)

unsigned long ISystemProperties::LogHistoryCount

This value specifies how many old release log files are kept.

9.46.1.19 defaultAudioDriver (read-only)

AudioDriverType ISystemProperties::defaultAudioDriver

This value hold the default audio driver for the current system.

9.47 IUSBController

9.47.1 Attributes

9.47.1.1 enabled (read/write)

boolean IUSBController::enabled

Flag whether the USB controller is present in the guest system. If disabled, the virtual guest hardware will not contain any USB controller. Can only be changed when the VM is powered off.

9.47.1.2 enabledEhci (read/write)

```
boolean IUSBController::enabledEhci
```

Flag whether the USB EHCI controller is present in the guest system. If disabled, the virtual guest hardware will not contain a USB EHCI controller. Can only be changed when the VM is powered off.

9.47.1.3 USBStandard (read-only)

```
unsigned short IUSBController::USBStandard
```

USB standard version which the controller implements. This is a BCD which means that the major version is in the high byte and minor version is in the low byte.

9.47.1.4 deviceFilters (read-only)

```
IUSBDeviceFilter IUSBController::deviceFilters[]
```

List of USB device filters associated with the machine.

If the machine is currently running, these filters are activated every time a new (supported) USB device is attached to the host computer that was not ignored by global filters ([IHost::USBDeviceFilters\[\]](#)).

These filters are also activated when the machine is powered up. They are run against a list of all currently available USB devices (in states [Available](#), [Busy](#), [Held](#)) that were not previously ignored by global filters.

If at least one filter matches the USB device in question, this device is automatically captured (attached to) the virtual USB controller of this machine.

See also: [IUSBDeviceFilter](#), [IUSBController](#)

9.47.2 createDeviceFilter

```
IUSBDeviceFilter IUSBController::createDeviceFilter(  
    [in] wstring name)
```

Creates a new USB device filter. All attributes except the filter name are set to empty (any match), *active* is *false* (the filter is not active).

The created filter can then be added to the list of filters using [insertDeviceFilter\(\)](#).

See also: [#deviceFilters](#)

If this method fails, the following error codes may be reported:

- `VBOX_E_INVALID_VM_STATE`: The virtual machine is not mutable.

9.47.3 insertDeviceFilter

```
void IUSBController::insertDeviceFilter(  
    [in] unsigned long position,  
    [in] IUSBDeviceFilter filter)
```

Inserts the given USB device to the specified position in the list of filters. Positions are numbered starting from 0. If the specified position is equal to or greater than the number of elements in the list, the filter is added to the end of the collection.

Note: Duplicates are not allowed, so an attempt to insert a filter that is already in the collection, will return an error.

See also: [#deviceFilters](#)

If this method fails, the following error codes may be reported:

- `VBOX_E_INVALID_VM_STATE`: Virtual machine is not mutable.
- `E_INVALIDARG`: USB device filter not created within this VirtualBox instance.
- `VBOX_E_INVALID_OBJECT_STATE`: USB device filter already in list.

9.47.4 removeDeviceFilter

```
IUSBDeviceFilter IUSBController::removeDeviceFilter(  
    [in] unsigned long position)
```

Removes a USB device filter from the specified position in the list of filters. Positions are numbered starting from 0. Specifying a position equal to or greater than the number of elements in the list will produce an error.

See also: [#deviceFilters](#)

If this method fails, the following error codes may be reported:

- `VBOX_E_INVALID_VM_STATE`: Virtual machine is not mutable.
- `E_INVALIDARG`: USB device filter list empty or invalid `position`.

9.48 IUSBDevice

The `IUSBDevice` interface represents a virtual USB device attached to the virtual machine.

A collection of objects implementing this interface is stored in the [IConsole::USBDevices\[\]](#) attribute which lists all USB devices attached to a running virtual machine's USB controller.

9.48.1 Attributes

9.48.1.1 id (read-only)

```
wstring IUSBDevice::id
```

Unique USB device ID. This ID is built from #vendorId, #productId, #revision and #serialNumber.

9.48.1.2 vendorId (read-only)

```
unsigned short IUSBDevice::vendorId
```

Vendor ID.

9.48.1.3 productId (read-only)

```
unsigned short IUSBDevice::productId
```

Product ID.

9.48.1.4 revision (read-only)

```
unsigned short IUSBDevice::revision
```

Product revision number. This is a packed BCD represented as unsigned short. The high byte is the integer part and the low byte is the decimal.

9.48.1.5 manufacturer (read-only)

```
wstring IUSBDevice::manufacturer
```

Manufacturer string.

9.48.1.6 product (read-only)

```
wstring IUSBDevice::product
```

Product string.

9.48.1.7 serialNumber (read-only)

```
wstring IUSBDevice::serialNumber
```

Serial number string.

9.48.1.8 address (read-only)

wstring IUSBDevice::address

Host specific address of the device.

9.48.1.9 port (read-only)

unsigned short IUSBDevice::port

Host USB port number the device is physically connected to.

9.48.1.10 version (read-only)

unsigned short IUSBDevice::version

The major USB version of the device - 1 or 2.

9.48.1.11 portVersion (read-only)

unsigned short IUSBDevice::portVersion

The major USB version of the host USB port the device is physically connected to - 1 or 2. For devices not connected to anything this will have the same value as the version attribute.

9.48.1.12 remote (read-only)

boolean IUSBDevice::remote

Whether the device is physically connected to a remote VRDP client or to a local host machine.

9.49 IUSBDeviceFilter

The IUSBDeviceFilter interface represents an USB device filter used to perform actions on a group of USB devices.

This type of filters is used by running virtual machines to automatically capture selected USB devices once they are physically attached to the host computer.

A USB device is matched to the given device filter if and only if all attributes of the device match the corresponding attributes of the filter (that is, attributes are joined together using the logical AND operation). On the other hand, all together, filters in the list of filters carry the semantics of the logical OR operation. So if it is desirable to create a match like “this vendor id OR this product id”, one needs to create two filters and specify “any match” (see below) for unused attributes.

All filter attributes used for matching are strings. Each string is an expression representing a set of values of the corresponding device attribute, that will match the given filter. Currently, the following filtering expressions are supported:

- *Interval filters.* Used to specify valid intervals for integer device attributes (Vendor ID, Product ID and Revision). The format of the string is:

```
int: ((m) | ([m]-[n])) (, (m) | ([m]-[n])) *
```

where *m* and *n* are integer numbers, either in octal (starting from 0), hexadecimal (starting from 0x) or decimal (otherwise) form, so that *m* < *n*. If *m* is omitted before a dash (-), the minimum possible integer is assumed; if *n* is omitted after a dash, the maximum possible integer is assumed.

- *Boolean filters.* Used to specify acceptable values for boolean device attributes. The format of the string is:

```
true|false|yes|no|0|1
```

- *Exact match.* Used to specify a single value for the given device attribute. Any string that doesn't start with `int:` represents the exact match. String device attributes are compared to this string including case of symbols. Integer attributes are first converted to a string (see individual filter attributes) and then compared ignoring case.
- *Any match.* Any value of the corresponding device attribute will match the given filter. An empty or `null` string is used to construct this type of filtering expressions.

Note: On the Windows host platform, interval filters are not currently available. Also all string filter attributes ([manufacturer](#), [product](#), [serialNumber](#)) are ignored, so they behave as *any match* no matter what string expression is specified.

See also: `IUSBController::deviceFilters`, `IHostUSBDeviceFilter`

9.49.1 Attributes

9.49.1.1 name (read/write)

```
wstring IUSBDeviceFilter::name
```

Visible name for this filter. This name is used to visually distinguish one filter from another, so it can neither be `null` nor an empty string.

9.49.1.2 active (read/write)

```
boolean IUSBDeviceFilter::active
```

Whether this filter active or has been temporarily disabled.

9.49.1.3 vendorId (read/write)

```
wstring IUSBDeviceFilter::vendorId
```

[Vendor ID](#) filter. The string representation for the *exact matching* has the form XXXX, where X is the hex digit (including leading zeroes).

9.49.1.4 productId (read/write)

```
wstring IUSBDeviceFilter::productId
```

[Product ID](#) filter. The string representation for the *exact matching* has the form XXXX, where X is the hex digit (including leading zeroes).

9.49.1.5 revision (read/write)

```
wstring IUSBDeviceFilter::revision
```

[Product revision number](#) filter. The string representation for the *exact matching* has the form IIFF, where I is the decimal digit of the integer part of the revision, and F is the decimal digit of its fractional part (including leading and trailing zeros). Note that for interval filters, it's best to use the hexadecimal form, because the revision is stored as a 16 bit packed BCD value; so the expression `int:0x0100-0x0199` will match any revision from 1.0 to 1.99.

9.49.1.6 manufacturer (read/write)

```
wstring IUSBDeviceFilter::manufacturer
```

[Manufacturer](#) filter.

9.49.1.7 product (read/write)

```
wstring IUSBDeviceFilter::product
```

[Product](#) filter.

9.49.1.8 serialNumber (read/write)

```
wstring IUSBDeviceFilter::serialNumber
```

[Serial number](#) filter.

9.49.1.9 port (read/write)

```
wstring IUSBDeviceFilter::port
```

[Host USB port](#) filter.

9.49.1.10 remote (read/write)

wstring IUSBDeviceFilter::remote

Remote state filter.

Note: This filter makes sense only for machine USB filters, i.e. it is ignored by IHostUSBDeviceFilter objects.

9.49.1.11 maskedInterfaces (read/write)

unsigned long IUSBDeviceFilter::maskedInterfaces

This is an advanced option for hiding one or more USB interfaces from the guest. The value is a bit mask where the bits that are set means the corresponding USB interface should be hidden, masked off if you like. This feature only works on Linux hosts.

9.50 IVFSExplorer

The VFSExplorer interface unifies access to different file system types. This includes local file systems as well remote file systems like S3. For a list of supported types see [VFSType](#). An instance of this is returned by [IAppliance::createVFSExplorer\(\)](#).

9.50.1 Attributes

9.50.1.1 path (read-only)

wstring IVFSExplorer::path

Returns the current path in the virtual file system.

9.50.1.2 type (read-only)

[VFSType](#) IVFSExplorer::type

Returns the file system type which is currently in use.

9.50.2 cd

[IProgress](#) IVFSExplorer::cd(
[in] wstring **aDir**)

Change the current directory level.

9.50.3 cdUp

`IProgress IVFSExplorer::cdUp()`

Go one directory upwards from the current directory level.

9.50.4 entryList

```
void IVFSExplorer::entryList(  
    [out] wstring aNames[],  
    [out] unsigned long aTypes[])
```

Returns a list of files/directories after a call to `update()`. The user is responsible for keeping this internal list up to date.

9.50.5 exists

```
wstring[] IVFSExplorer::exists(  
    [in] wstring aNames[])
```

Checks if the given file list exists in the current directory level.

9.50.6 remove

```
IProgress IVFSExplorer::remove(  
    [in] wstring aNames[])
```

Deletes the given files in the current directory level.

9.50.7 update

`IProgress IVFSExplorer::update()`

Updates the internal list of files/directories from the current directory level. Use `entryList()` to get the full list after a call to this method.

9.51 IVRDPSever

9.51.1 Attributes

9.51.1.1 enabled (read/write)

`boolean IVRDPSever::enabled`

VRDP server status.

9.51.1.2 port (read/write)

`unsigned long IVRDPServer::port`

VRDP server port number.

Note: Setting the value of this property to 0 will reset the port number to the default value which is currently 3389. Reading this property will always return a real port number, even after it has been set to 0 (in which case the default port is returned).

9.51.1.3 netAddress (read/write)

`wstring IVRDPServer::netAddress`

VRDP server address.

9.51.1.4 authType (read/write)

`VRDPAuthType IVRDPServer::authType`

VRDP authentication method.

9.51.1.5 authTimeout (read/write)

`unsigned long IVRDPServer::authTimeout`

Timeout for guest authentication. Milliseconds.

9.51.1.6 allowMultiConnection (read/write)

`boolean IVRDPServer::allowMultiConnection`

Flag whether multiple simultaneous connections to the VM are permitted. Note that this will be replaced by a more powerful mechanism in the future.

9.51.1.7 reuseSingleConnection (read/write)

`boolean IVRDPServer::reuseSingleConnection`

Flag whether the existing connection must be dropped and a new connection must be established by the VRDP server, when a new client connects in single connection mode.

9.52 IVirtualBox

The IVirtualBox interface represents the main interface exposed by the product that provides virtual machine management.

An instance of IVirtualBox is required for the product to do anything useful. Even though the interface does not expose this, internally, IVirtualBox is implemented as a singleton and actually lives in the process of the VirtualBox server (VBoxSVC.exe). This makes sure that IVirtualBox can track the state of all virtual machines on a particular host, regardless of which frontend started them.

To enumerate all the virtual machines on the host, use the [machines\[\]](#) attribute.

9.52.1 Attributes

9.52.1.1 version (read-only)

```
wstring IVirtualBox::version
```

A string representing the version number of the product. The format is 3 integer numbers divided by dots (e.g. 1.0.1). The last number represents the build number and will frequently change.

9.52.1.2 revision (read-only)

```
unsigned long IVirtualBox::revision
```

The internal build revision number of the product.

9.52.1.3 packageType (read-only)

```
wstring IVirtualBox::packageType
```

A string representing the package type of this product. The format is OS_ARCH_DIST where OS is either WINDOWS, LINUX, SOLARIS, DARWIN. ARCH is either 32BITS or 64BITS. DIST is either GENERIC, UBUNTU_606, UBUNTU_710, or something like this.

9.52.1.4 homeFolder (read-only)

```
wstring IVirtualBox::homeFolder
```

Full path to the directory where the global settings file, VirtualBox.xml, is stored.

In this version of VirtualBox, the value of this property is always <user_dir>/VirtualBox (where <user_dir> is the path to the user directory, as determined by the host OS), and cannot be changed.

This path is also used as the base to resolve relative paths in places where relative paths are allowed (unless otherwise expressly indicated).

9.52.1.5 settingsFilePath (read-only)

wstring IVirtualBox::settingsFilePath

Full name of the global settings file. The value of this property corresponds to the value of [homeFolder](#) plus `/VirtualBox.xml`.

9.52.1.6 settingsFileVersion (read-only)

wstring IVirtualBox::settingsFileVersion

Current version of the format of the global VirtualBox settings file (`VirtualBox.xml`). The version string has the following format:

`x.y-platform`

where `x` and `y` are the major and the minor format versions, and `platform` is the platform identifier.

The current version usually matches the value of the [settingsFormatVersion](#) attribute unless the settings file was created by an older version of VirtualBox and there was a change of the settings file format since then.

Note that VirtualBox automatically converts settings files from older versions to the most recent version when reading them (usually at VirtualBox startup) but it doesn't save the changes back until you call a method that implicitly saves settings (such as [setExtraData\(\)](#)) or call [saveSettings\(\)](#) explicitly. Therefore, if the value of this attribute differs from the value of [settingsFormatVersion](#), then it means that the settings file was converted but the result of the conversion is not yet saved to disk.

The above feature may be used by interactive front-ends to inform users about the settings file format change and offer them to explicitly save all converted settings files (the global and VM-specific ones), optionally create backup copies of the old settings files before saving, etc.

See also: [settingsFormatVersion](#), [saveSettingsWithBackup\(\)](#)

9.52.1.7 settingsFormatVersion (read-only)

wstring IVirtualBox::settingsFormatVersion

Most recent version of the settings file format.
The version string has the following format:

`x.y-platform`

where `x` and `y` are the major and the minor format versions, and `platform` is the platform identifier.

VirtualBox uses this version of the format when saving settings files (either as a result of method calls that require to save settings or as a result of an explicit call to [saveSettings\(\)](#)).

See also: `settingsFileVersion`

9.52.1.8 host (read-only)

[IHost](#) `IVirtualBox::host`

Associated host object.

9.52.1.9 systemProperties (read-only)

[ISystemProperties](#) `IVirtualBox::systemProperties`

Associated system information object.

9.52.1.10 machines (read-only)

[IMachine](#) `IVirtualBox::machines[]`

Array of machine objects registered within this VirtualBox instance.

9.52.1.11 hardDisks (read-only)

[IHardDisk](#) `IVirtualBox::hardDisks[]`

Array of hard disk objects known to this VirtualBox installation.

This array contains only base (root) hard disks. All differencing hard disks of the given base hard disk can be enumerated using [IHardDisk::children\[\]](#).

9.52.1.12 DVDImages (read-only)

[IDVDImage](#) `IVirtualBox::DVDImages[]`

Array of CD/DVD image objects registered with this VirtualBox instance.

9.52.1.13 floppyImages (read-only)

[IFloppyImage](#) `IVirtualBox::floppyImages[]`

Array of floppy image objects registered with this VirtualBox instance.

9.52.1.14 progressOperations (read-only)

[IProgress](#) `IVirtualBox::progressOperations[]`

9.52.1.15 guestOSTypes (read-only)

[IGuestOSType](#) `IVirtualBox::guestOSTypes[]`

9.52.1.16 sharedFolders (read-only)

[ISharedFolder](#) `IVirtualBox::sharedFolders[]`

Collection of global shared folders. Global shared folders are available to all virtual machines.

New shared folders are added to the collection using [createSharedFolder\(\)](#). Existing shared folders can be removed using [removeSharedFolder\(\)](#).

Note: In the current version of the product, global shared folders are not implemented and therefore this collection is always empty.

9.52.1.17 performanceCollector (read-only)

[IPerformanceCollector](#) `IVirtualBox::performanceCollector`

Associated performance collector object.

9.52.1.18 DHCP Servers (read-only)

[IDHCP Server](#) `IVirtualBox::DHCP Servers[]`

dhcp server settings.

9.52.2 createAppliance

[IAppliance](#) `IVirtualBox::createAppliance()`

Creates a new appliance object, which represents an appliance in the Open Virtual Machine Format (OVF). This can then be used to import an OVF appliance into VirtualBox or to export machines as an OVF appliance; see the documentation for [IAppliance](#) for details.

9.52.3 createDHCP Server

[IDHCP Server](#) `IVirtualBox::createDHCP Server(
[in] wstring name)`

Creates a dhcp server settings to be used for the given internal network name
If this method fails, the following error codes may be reported:

- `E_INVALIDARG`: Host network interface `name` already exists.

9.52.4 createHardDisk

```
IHardDisk IVirtualBox::createHardDisk(
    [in] wstring format,
    [in] wstring location)
```

Creates a new base hard disk object that will use the given storage format and location for hard disk data.

Note that the actual storage unit is not created by this method. In order to do it, and before you are able to attach the created hard disk to virtual machines, you must call one of the following methods to allocate a format-specific storage unit at the specified location:

- [IHardDisk::createBaseStorage\(\)](#)
- [IHardDisk::createDiffStorage\(\)](#)

Some hard disk attributes, such as [IHardDisk::id](#), may remain uninitialized until the hard disk storage unit is successfully created by one of the above methods.

After the storage unit is successfully created, the hard disk gets remembered by this VirtualBox installation and will be accessible through [getHardDisk\(\)](#) and [findHardDisk\(\)](#) methods. Remembered root (base) hard disks are also returned as part of the [hardDisks\[\]](#) array. See [IHardDisk](#) for more details.

The list of all storage formats supported by this VirtualBox installation can be obtained using [ISystemProperties::hardDiskFormats\[\]](#). If the `format` attribute is empty or `null` then the default storage format specified by [ISystemProperties::defaultHardDiskFormat](#) will be used for creating a storage unit of the hard disk.

Note that the format of the location string is storage format specific. See [IMedium::location](#), [IHardDisk](#) and [ISystemProperties::defaultHardDiskFolder](#) for more details.

If this method fails, the following error codes may be reported:

- `VBOX_E_OBJECT_NOT_FOUND`: `format` identifier is invalid. See [ISystemProperties::hardDiskFormats\[\]](#).
- `VBOX_E_FILE_ERROR`: `location` is a not valid file name (for file-based formats only).

9.52.5 createLegacyMachine

```
IMachine IVirtualBox::createLegacyMachine(
    [in] wstring name,
    [in] wstring osTypeId,
    [in] wstring settingsFile,
    [in] wstring id)
```

Creates a new virtual machine in “legacy” mode, using the specified settings file to store machine settings.

As opposed to machines created by [createMachine\(\)](#), the settings file of the machine created in “legacy” mode is not automatically renamed when the machine name is changed – it will always remain the same as specified in this method call.

The specified settings file name can be absolute (full path) or relative to the [VirtualBox home directory](#). If the file name doesn’t contain an extension, the default extension (.xml) will be appended.

Note that the configuration of the newly created machine is not saved to disk (and therefore no settings file is created) until [IMachine::saveSettings\(\)](#) is called. If the specified settings file already exists, this method will fail with `VBOX_E_FILE_ERROR`.

See [createMachine\(\)](#) for more information.

@deprecated This method may be removed later. Use [createMachine\(\)](#) instead.

Note: There is no way to change the name of the settings file of the machine created in “legacy” mode.

If this method fails, the following error codes may be reported:

- `VBOX_E_OBJECT_NOT_FOUND`: `osTypeId` is invalid.
- `VBOX_E_FILE_ERROR`: `settingsFile` is invalid or the settings file already exists or could not be created due to an I/O error.
- `E_INVALIDARG`: `name` or `settingsFile` is empty or null.

9.52.6 createMachine

```
IMachine IVirtualBox::createMachine(
    [in] wstring name,
    [in] wstring osTypeId,
    [in] wstring baseFolder,
    [in] wstring id)
```

Creates a new virtual machine.

The new machine is created unregistered, with the initial configuration set according to the specified guest OS type. A typical sequence of actions to create a new virtual machine is as follows:

1. Call this method to have a new machine created. The returned machine object will be “mutable” allowing to change any machine property.
2. Configure the machine using the appropriate attributes and methods.
3. Call [IMachine::saveSettings\(\)](#) to write the settings to the machine’s XML settings file. The configuration of the newly created machine will not be saved to disk until this method is called.

4. Call `registerMachine()` to add the machine to the list of machines known to VirtualBox.

You should specify valid name for the newly created machine when calling this method. See the `IMachine::name` attribute description for more details about the machine name.

The specified guest OS type identifier must match an ID of one of known guest OS types listed in the `guestOSTypes[]` array.

Every machine has a *settings file* that is used to store the machine configuration. This file is stored in a directory called the *machine settings subfolder*. Both the settings subfolder and file will have a name that corresponds to the name of the virtual machine. You can specify where to create the machine setting subfolder using the `baseFolder` argument. The base folder can be absolute (full path) or relative to the [VirtualBox home directory](#).

If `baseFolder` is a `null` or empty string (which is recommended), the [default machine settings folder](#) will be used as a base folder for the created machine. Otherwise the given base folder will be used. In either case, the full path to the resulting settings file has the following structure:

```
<base_folder>/<machine_name>/<machine_name>.xml
```

Note that if the resulting settings file already exists, this method will fail with `..`.

Optionally, you may specify an UUID of to assign to the created machine. However, this is not recommended and you should normally pass an empty (`null`) UUID to this method so that a new UUID will be automatically generated for every created machine. You can use UUID 00000000-0000-0000-0000-000000000000 as `null` value.

Note: There is no way to change the name of the settings file or subfolder of the created machine directly.

If this method fails, the following error codes may be reported:

- `VBOX_E_OBJECT_NOT_FOUND`: `osTypeId` is invalid.
- `VBOX_E_FILE_ERROR`: Resulting settings file name is invalid or the settings file already exists or could not be created due to an I/O error.
- `E_INVALIDARG`: `name` is empty or `null`.

9.52.7 createSharedFolder

```
void IVirtualBox::createSharedFolder(
    [in] wstring name,
    [in] wstring hostPath,
    [in] boolean writable)
```

Creates a new global shared folder by associating the given logical name with the given host path, adds it to the collection of shared folders and starts sharing it. Refer to the description of [ISharedFolder](#) to read more about logical names.

Note: In the current implementation, this operation is not implemented.

9.52.8 findDHCPServerByNetworkName

```
IDHCPServer IVirtualBox::findDHCPServerByNetworkName(
    [in] wstring name)
```

Searches a dhcp server settings to be used for the given internal network name. If this method fails, the following error codes may be reported:

- `E_INVALIDARG`: Host network interface `name` already exists.

9.52.9 findDVDImage

```
IDVDImage IVirtualBox::findDVDImage(
    [in] wstring location)
```

Returns a CD/DVD image with the given image location.

The image with the given UUID must be known to this VirtualBox installation, i.e. it must be previously opened by [openDVDImage\(\)](#), or mounted to some known virtual machine.

The search is done by comparing the value of the `location` argument to the [IMedium::location](#) attribute of each known CD/DVD image.

The requested location can be a path relative to the [VirtualBox home folder](#). If only a file name without any path is given, the [default hard disk folder](#) will be prepended to the file name before searching. Note that on case sensitive file systems, a case sensitive comparison is performed, otherwise the case in the file path is ignored.

If this method fails, the following error codes may be reported:

- `VBOX_E_FILE_ERROR`: Invalid image file location.
- `VBOX_E_OBJECT_NOT_FOUND`: No matching DVD image found in the media registry.

9.52.10 findFloppyImage

```
IFloppyImage IVirtualBox::findFloppyImage(
    [in] wstring location)
```

Returns a floppy image with the given image location.

The image with the given UUID must be known to this VirtualBox installation, i.e. it must be previously opened by [openFloppyImage\(\)](#), or mounted to some known virtual machine.

The search is done by comparing the value of the `location` argument to the [IMedium::location](#) attribute of each known floppy image.

The requested location can be a path relative to the [VirtualBox home folder](#). If only a file name without any path is given, the [default hard disk folder](#) will be prepended to the file name before searching. Note that on case sensitive file systems, a case sensitive comparison is performed, otherwise the case of symbols in the file path is ignored.

If this method fails, the following error codes may be reported:

- `VBOX_E_FILE_ERROR`: Invalid image file location.
- `VBOX_E_OBJECT_NOT_FOUND`: No matching floppy image found in the media registry.

9.52.11 findHardDisk

```
IMachine IVirtualBox::findHardDisk(
    [in] wstring location)
```

Returns a hard disk that uses the given location to store hard disk data.

The given hard disk must be known to this VirtualBox installation, i.e. it must be previously created by [createHardDisk\(\)](#) or opened by [openHardDisk\(\)](#), or attached to some known virtual machine.

The search is done by comparing the value of the `location` argument to the [IMachine::location](#) attribute of each known hard disk.

For locations represented by file names in the host's file system, the requested location can be a path relative to the [VirtualBox home folder](#). If only a file name without any path is given, the [default hard disk folder](#) will be prepended to the file name before searching. Note that on case sensitive file systems, a case sensitive comparison is performed, otherwise the case of symbols in the file path is ignored.

If this method fails, the following error codes may be reported:

- `VBOX_E_OBJECT_NOT_FOUND`: No hard disk object matching `location` found.

9.52.12 findMachine

```
IMachine IVirtualBox::findMachine(
    [in] wstring name)
```

Attempts to find a virtual machine given its name. To look up a machine by UUID, use [getMachine\(\)](#) instead.

If this method fails, the following error codes may be reported:

- `VBOX_E_OBJECT_NOT_FOUND`: Could not find registered machine matching name.

9.52.13 `getDVDImage`

```
IDVDImage IVirtualBox::getDVDImage(  
    [in] wstring id)
```

Returns a CD/DVD image with the given UUID.

The image with the given UUID must be known to this VirtualBox installation, i.e. it must be previously opened by `openDVDImage()`, or mounted to some known virtual machine.

If this method fails, the following error codes may be reported:

- `VBOX_E_OBJECT_NOT_FOUND`: No matching DVD image found in the media registry.

9.52.14 `getExtraData`

```
wstring IVirtualBox::getExtraData(  
    [in] wstring key)
```

Returns associated global extra data.

If the requested data `key` does not exist, this function will succeed and return an empty string in the `value` argument.

If this method fails, the following error codes may be reported:

- `VBOX_E_FILE_ERROR`: Settings file not accessible.
- `VBOX_E_XML_ERROR`: Could not parse the settings file.

9.52.15 `getFloppyImage`

```
IFloppyImage IVirtualBox::getFloppyImage(  
    [in] wstring id)
```

Returns a floppy image with the given UUID.

The image with the given UUID must be known to this VirtualBox installation, i.e. it must be previously opened by `openFloppyImage()`, or mounted to some known virtual machine.

If this method fails, the following error codes may be reported:

- `VBOX_E_OBJECT_NOT_FOUND`: No matching floppy image found in the media registry.

9.52.16 getGuestOSType

```
IGuestOSType IVirtualBox::getGuestOSType(
    [in] wstring id)
```

Returns an object describing the specified guest OS type.

The requested guest OS type is specified using a string which is a mnemonic identifier of the guest operating system, such as "win31" or "ubuntu". The guest OS type ID of a particular virtual machine can be read or set using the [IMachine::OSTypeId](#) attribute.

The [guestOSTypes\[\]](#) collection contains all available guest OS type objects. Each object has an [IGuestOSType::id](#) attribute which contains an identifier of the guest OS this object describes.

If this method fails, the following error codes may be reported:

- `E_INVALIDARG`: `id` is not a valid Guest OS type.

9.52.17 getHardDisk

```
IHardDisk IVirtualBox::getHardDisk(
    [in] wstring id)
```

Returns a hard disk with the given UUID.

The hard disk with the given UUID must be known to this VirtualBox installation, i.e. it must be previously created by [createHardDisk\(\)](#) or opened by [openHardDisk\(\)](#), or attached to some known virtual machine.

If this method fails, the following error codes may be reported:

- `VBOX_E_OBJECT_NOT_FOUND`: No hard disk object matching `id` found.

9.52.18 getMachine

```
IMachine IVirtualBox::getMachine(
    [in] wstring id)
```

Attempts to find a virtual machine given its UUID. To look up a machine by name, use [findMachine\(\)](#) instead.

If this method fails, the following error codes may be reported:

- `VBOX_E_OBJECT_NOT_FOUND`: Could not find registered machine matching `id`.

9.52.19 getNextExtraDataKey

```
void IVirtualBox::getNextExtraDataKey(
    [in] wstring key,
    [out] wstring nextKey,
    [out] wstring nextValue)
```

Returns the global extra data key name following the supplied key.

An error is returned if the supplied `key` does not exist. An empty string is returned in `nextKey` if the supplied key is the last key. When supplying `null` or an empty string for the key, the first key item is returned in `nextKey` (if there is any). `nextValue` is an optional parameter and if supplied, the next key's value is returned in it.

If this method fails, the following error codes may be reported:

- `VBOX_E_OBJECT_NOT_FOUND`: Extra data key not found.

9.52.20 openDVDImage

```
IDVDImage IVirtualBox::openDVDImage(
    [in] wstring location,
    [in] wstring id)
```

Opens a CD/DVD image contained in the specified file of the supported format and assigns it the given UUID.

After the image is successfully opened by this method, it gets remembered by (known to) this VirtualBox installation and will be accessible through `getDVDImage()` and `findDVDImage()` methods. Remembered images are also returned as part of the `DVDImages[]` array and can be mounted to virtual machines. See `IMedium` for more details.

See `IMedium::location` to get more details about the format of the location string.

Note: Currently only ISO 9960 CD/DVD images are supported by VirtualBox.

If this method fails, the following error codes may be reported:

- `VBOX_E_FILE_ERROR`: Invalid CD/DVD image file location or could not find the CD/DVD image at the specified location.
- `VBOX_E_INVALID_OBJECT_STATE`: CD/DVD image already exists in the media registry.

9.52.21 openExistingSession

```
void IVirtualBox::openExistingSession(
    [in] ISession session,
    [in] wstring machineId)
```

Opens a new remote session with the virtual machine for which a direct session is already open.

The remote session provides some level of control over the VM execution (using the `IConsole` interface) to the caller; however, within the remote session context, not all VM settings are available for modification.

As opposed to `openRemoteSession()`, the number of remote sessions opened this way is not limited by the API

Note: It is an error to open a remote session with the machine that doesn't have an open direct session.

See also: `openRemoteSession`

If this method fails, the following error codes may be reported:

- `E_UNEXPECTED`: Virtual machine not registered.
- `VBOX_E_OBJECT_NOT_FOUND`: No machine matching `machineId` found.
- `VBOX_E_INVALID_OBJECT_STATE`: Session already open or being opened.
- `VBOX_E_INVALID_SESSION_STATE`: Direct session state not Open.
- `VBOX_E_VM_ERROR`: Failed to get console object from direct session or assign machine to session.

9.52.22 openFloppyImage

```
IFloppyImage IVirtualBox::openFloppyImage(
    [in] wstring location,
    [in] wstring id)
```

Opens a floppy image contained in the specified file of the supported format and assigns it the given UUID.

After the image is successfully opened by this method, it gets remembered by (known to) this VirtualBox installation and will be accessible through `getFloppyImage()` and `findFloppyImage()` methods. Remembered images are also returned as part of the `floppyImages[]` array and can be mounted to virtual machines. See `IMedium` for more details.

See `IMedium::location` to get more details about the format of the location string.

Note: Currently, only raw floppy images are supported by VirtualBox.

If this method fails, the following error codes may be reported:

- `VBOX_E_FILE_ERROR`: Invalid floppy image file location or could not find the floppy image at the specified location.
- `VBOX_E_INVALID_OBJECT_STATE`: Floppy image already exists in the media registry.

9.52.23 openHardDisk

```
IHardDisk IVirtualBox::openHardDisk(
    [in] wstring location,
    [in] AccessMode accessMode,
    [in] boolean setImageId,
    [in] wstring imageId,
    [in] boolean setParentId,
    [in] wstring parentId)
```

Opens a hard disk from an existing location, optionally replacing the image UUID and/or parent UUID.

After the hard disk is successfully opened by this method, it gets remembered by (known to) this VirtualBox installation and will be accessible through [getHardDisk\(\)](#) and [findHardDisk\(\)](#) methods. Remembered root (base) hard disks are also returned as part of the [hardDisks\[\]](#) array and can be attached to virtual machines. See [IHardDisk](#) for more details.

If a differencing hard disk is to be opened by this method, the operation will succeed only if its parent hard disk and all ancestors, if any, are already known to this VirtualBox installation (for example, were opened by this method before).

This method tries to guess the storage format of the specified hard disk by reading hard disk data at the specified location.

If `write` is `ReadWrite` (which it should be), the image is opened for read/write access and must have according permissions, as VirtualBox may actually write status information into the disk's metadata sections.

Note that write access is required for all typical image usage in VirtualBox, since VirtualBox may need to write metadata such as a UUID into the image. The only exception is opening a source image temporarily for copying and cloning when the image will quickly be closed again.

Note that the format of the location string is storage format specific. See [IMedium::location](#), [IHardDisk](#) and [ISystemProperties::defaultHardDiskFolder](#) for more details.

If this method fails, the following error codes may be reported:

- `VBOX_E_FILE_ERROR`: Invalid hard disk storage file location or could not find the hard disk at the specified location.
- `VBOX_E_IPRT_ERROR`: Could not get hard disk storage format.
- `E_INVALIDARG`: Invalid hard disk storage format.

9.52.24 openMachine

```
IMachine IVirtualBox::openMachine(
    [in] wstring settingsFile)
```


Opens a virtual machine from the existing settings file. The opened machine remains unregistered until you call [registerMachine\(\)](#).

The specified settings file name can be absolute (full path) or relative to the [VirtualBox home directory](#). This file must exist and must be a valid machine settings file whose contents will be used to construct the machine object.

@deprecated Will be removed soon.

If this method fails, the following error codes may be reported:

- `VBOX_E_FILE_ERROR`: Settings file name invalid, not found or sharing violation.

9.52.25 openRemoteSession

```
IProgress IVirtualBox::openRemoteSession(
    [in] ISession session,
    [in] wstring machineId,
    [in] wstring type,
    [in] wstring environment)
```

Spawns a new process that executes a virtual machine (called a “remote session”).

Opening a remote session causes the VirtualBox server to start a new process that opens a direct session with the given VM. As a result, the VM is locked by that direct session in the new process, preventing conflicting changes from other processes. Since sessions act as locks that prevent conflicting changes, one cannot open a remote session for a VM that already has another open session (direct or remote), or is currently in the process of opening one (see [IMachine::sessionState](#)).

While the remote session still provides some level of control over the VM execution to the caller (using the [IConsole](#) interface), not all VM settings are available for modification within the remote session context.

This operation can take some time (a new VM is started in a new process, for which memory and other resources need to be set up). Because of this, an [IProgress](#) is returned to allow the caller to wait for this asynchronous operation to be completed. Until then, the remote session object remains in the closed state, and accessing the machine or its console through it is invalid. It is recommended to use [IProgress::waitForCompletion\(\)](#) or similar calls to wait for completion.

As with all [ISession](#) objects, it is recommended to call [ISession::close\(\)](#) on the local session object once `openRemoteSession()` has been called. However, the session’s state (see [ISession::state](#)) will not return to “Closed” until the remote session has also closed (i.e. until the VM is no longer running). In that case, however, the state of the session will automatically change back to “Closed”.

Currently supported session types (values of the `type` argument) are:

- `"gui"`: VirtualBox Qt GUI session
- `"vrdp"`: VirtualBox VRDP Server session
- `"sdl"`: VirtualBox SDL GUI session

The `environment` argument is a string containing definitions of environment variables in the following format: `@code NAME[=VALUE]\n NAME[=VALUE]\n ... @endcode` where `\\n` is the new line character. These environment variables will be appended to the environment of the VirtualBox server process. If an environment variable exists both in the server process and in this list, the value from this list takes precedence over the server's variable. If the value of the environment variable is omitted, this variable will be removed from the resulting environment. If the environment string is `null` or empty, the server environment is inherited by the started process as is.

See also: `openExistingSession`

If this method fails, the following error codes may be reported:

- `E_UNEXPECTED`: Virtual machine not registered.
- `E_INVALIDARG`: Invalid session type `type`.
- `VBOX_E_OBJECT_NOT_FOUND`: No machine matching `machineId` found.
- `VBOX_E_INVALID_OBJECT_STATE`: Session already open or being opened.
- `VBOX_E_IPRT_ERROR`: Launching process for machine failed.
- `VBOX_E_VM_ERROR`: Failed to assign machine to session.

9.52.26 `openSession`

```
void IVirtualBox::openSession(
    [in] ISession session,
    [in] wstring machineId)
```

Opens a new direct session with the given virtual machine.

A direct session acts as a local lock on the given VM. There can be only one direct session open at a time for every virtual machine, protecting the VM from being manipulated by conflicting actions from different processes. Only after a direct session has been opened, one can change all VM settings and execute the VM in the process space of the session object.

Sessions therefore can be compared to mutex semaphores that lock a given VM for modification and execution. See [ISession](#) for details.

Note: Unless you are writing a new VM frontend, you will not want to execute a VM in the current process. To spawn a new process that executes a VM, use [openRemoteSession\(\)](#) instead.

Upon successful return, the session object can be used to get access to the machine and to the VM console.

In VirtualBox terminology, the machine becomes “mutable” after a session has been opened. Note that the “mutable” machine object, on which you may invoke `IMachine`

methods to change its settings, will be a different object from the immutable `IMachine` objects returned by various `IVirtualBox` methods. To obtain a mutable `IMachine` object (upon which you can invoke settings methods), use the `ISession::machine` attribute.

One must always call `ISession::close()` to release the lock on the machine, or the machine's state will eventually be set to "Aborted".

In other words, to change settings on a machine, the following sequence is typically performed:

1. Call this method (`openSession`) to have a machine locked for the current session.
2. Obtain a mutable `IMachine` object from `ISession::machine`.
3. Change the settings of the machine.
4. Call `IMachine::saveSettings()`.
5. Close the session by calling `ISession::close()`.

If this method fails, the following error codes may be reported:

- `E_UNEXPECTED`: Virtual machine not registered.
- `E_ACCESSDENIED`: Process not started by `OpenRemoteSession`.
- `VBOX_E_OBJECT_NOT_FOUND`: No matching virtual machine found.
- `VBOX_E_INVALID_OBJECT_STATE`: Session already open or being opened.
- `VBOX_E_VM_ERROR`: Failed to assign machine to session.

9.52.27 registerCallback

```
void IVirtualBox::registerCallback(  
    [in] IVirtualBoxCallback callback)
```

Note: This method is not supported in the web service.

Registers a new global `VirtualBox` callback. The methods of the given callback object will be called by `VirtualBox` when an appropriate event occurs.

If this method fails, the following error codes may be reported:

- `E_INVALIDARG`: A `null` callback cannot be registered.

9.52.28 registerMachine

```
void IVirtualBox::registerMachine(
    [in] IMachine machine)
```

Registers the machine previously created using [createMachine\(\)](#) or opened using [openMachine\(\)](#) within this VirtualBox installation. After successful method invocation, the [IVirtualBoxCallback::onMachineRegistered\(\)](#) signal is sent to all registered callbacks.

Note: This method implicitly calls [IMachine::saveSettings\(\)](#) to save all current machine settings before registering it.

If this method fails, the following error codes may be reported:

- `VBOX_E_OBJECT_NOT_FOUND`: No matching virtual machine found.
- `VBOX_E_INVALID_OBJECT_STATE`: Virtual machine was not created within this VirtualBox instance.

9.52.29 removeDHCPServer

```
void IVirtualBox::removeDHCPServer(
    [in] IDHCPServer server)
```

Removes the dhcp server settings

If this method fails, the following error codes may be reported:

- `E_INVALIDARG`: Host network interface name already exists.

9.52.30 removeSharedFolder

```
void IVirtualBox::removeSharedFolder(
    [in] wstring name)
```

Removes the global shared folder with the given name previously created by [createSharedFolder\(\)](#) from the collection of shared folders and stops sharing it.

Note: In the current implementation, this operation is not implemented.

9.52.31 saveSettings

```
void IVirtualBox::saveSettings()
```

Saves the global settings to the global settings file ([settingsFilePath](#)).

This method is only useful for explicitly saving the global settings file after it has been auto-converted from the old format to the most recent format (see [settings-FileVersion](#) for details). Normally, the global settings file is implicitly saved when a global setting is changed.

If this method fails, the following error codes may be reported:

- `VBOX_E_FILE_ERROR`: Settings file not accessible.
- `VBOX_E_XML_ERROR`: Could not parse the settings file.

9.52.32 saveSettingsWithBackup

```
wstring IVirtualBox::saveSettingsWithBackup()
```

Creates a backup copy of the global settings file ([settingsFilePath](#)) in case of auto-conversion, and then calls [saveSettings\(\)](#).

Note that the backup copy is created **only** if the settings file auto-conversion took place (see [settingsFileVersion](#) for details). Otherwise, this call is fully equivalent to [saveSettings\(\)](#) and no backup copying is done.

The backup copy is created in the same directory where the original settings file is located. It is given the following file name:

```
original.xml.x.y-platform.bak
```

where `original.xml` is the original settings file name (excluding path), and `x.y-platform` is the version of the old format of the settings file (before auto-conversion).

If the given backup file already exists, this method will try to add the `.N` suffix to the backup file name (where `N` counts from 0 to 9) and copy it again until it succeeds. If all suffixes are occupied, or if any other copy error occurs, this method will return a failure.

If the copy operation succeeds, the `bakFileName` return argument will receive a full path to the created backup file (for informational purposes). Note that this will happen even if the subsequent [saveSettings\(\)](#) call performed by this method after the copy operation, fails.

Note: The VirtualBox API never calls this method. It is intended purely for the purposes of creating backup copies of the settings files by front-ends before saving the results of the automatically performed settings conversion to disk.

See also: `settingsFileVersion`

If this method fails, the following error codes may be reported:

- `VBOX_E_FILE_ERROR`: Settings file not accessible.
- `VBOX_E_XML_ERROR`: Could not parse the settings file.
- `VBOX_E_IPRT_ERROR`: Could not copy the settings file.

9.52.33 `setExtraData`

```
void IVirtualBox::setExtraData(  
    [in] wstring key,  
    [in] wstring value)
```

Sets associated global extra data.

If you pass `null` or empty string as a key value, the given key will be deleted.

Note: Before performing the actual data change, this method will ask all registered callbacks using the `IVirtualBoxCallback::onExtraDataCanChange()` notification for a permission. If one of the callbacks refuses the new value, the change will not be performed.

Note: On success, the `IVirtualBoxCallback::onExtraDataChange()` notification is called to inform all registered callbacks about a successful data change.

If this method fails, the following error codes may be reported:

- `VBOX_E_FILE_ERROR`: Settings file not accessible.
- `VBOX_E_XML_ERROR`: Could not parse the settings file.
- `E_ACCESSDENIED`: Modification request refused.

9.52.34 `unregisterCallback`

```
void IVirtualBox::unregisterCallback(  
    [in] IVirtualBoxCallback callback)
```

Note: This method is not supported in the web service.

Unregisters the previously registered global VirtualBox callback.

If this method fails, the following error codes may be reported:

- `E_INVALIDARG`: Specified `callback` not registered.

9.52.35 unregisterMachine

```
IMachine IVirtualBox::unregisterMachine(
    [in] wstring id)
```

Unregisters the machine previously registered using [registerMachine\(\)](#). After successful method invocation, the [IVirtualBoxCallback::onMachineRegistered\(\)](#) signal is sent to all registered callbacks.

Note: The specified machine must not be in the Saved state, have an open (or a spawning) direct session associated with it, have snapshots or have hard disks attached.

Note: This method implicitly calls [IMachine::saveSettings\(\)](#) to save all current machine settings before unregistering it.

Note: If the given machine is inaccessible (see [IMachine::accessible](#)), it will be unregistered and fully uninitialized right afterwards. As a result, the returned machine object will be unusable and an attempt to call **any** method will return the “Object not ready” error.

If this method fails, the following error codes may be reported:

- `VBOX_E_OBJECT_NOT_FOUND`: Could not find registered machine matching `id`.
- `VBOX_E_INVALID_VM_STATE`: Machine is in Saved state.
- `VBOX_E_INVALID_OBJECT_STATE`: Machine has snapshot or open session or hard disk attached.

9.52.36 waitForPropertyChange

```
void IVirtualBox::waitForPropertyChange(
    [in] wstring what,
    [in] unsigned long timeout,
    [out] wstring changed,
    [out] wstring values)
```

Blocks the caller until any of the properties represented by the `what` argument changes the value or until the given timeout interval expires.

The `what` argument is a comma separated list of property masks that describe properties the caller is interested in. The property mask is a string in the following format:

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```
[[group.] subgroup.] name
```

where `name` is the property name and `group`, `subgroup` are zero or more property group specifiers. Each element (`group` or `name`) in the property mask may be either a Latin string or an asterisk symbol (`@c ""`) which is used to match any string for the given element. A property mask that doesn't contain asterisk symbols represents a single fully qualified property name.

Groups in the fully qualified property name go from more generic (the left-most part) to more specific (the right-most part). The first element is usually a name of the object the property belongs to. The second element may be either a property name, or a child object name, or an index if the preceding element names an object which is one of many objects of the same type. This way, property names form a hierarchy of properties. Here are some examples of property names:

`VirtualBox.version` `version` property `Machine.<UUID>.name` `IMachine::name` property of the machine with the given `UUID`

Most property names directly correspond to the properties of objects (components) provided by the `VirtualBox` library and may be used to track changes to these properties. However, there may be pseudo-property names that don't correspond to any existing object's property directly, as well as there may be object properties that don't have a corresponding property name that is understood by this method, and therefore changes to such properties cannot be tracked. See individual object's property descriptions to get a fully qualified property name that can be used with this method (if any).

There is a special property mask `@c ""` (i.e. a string consisting of a single asterisk symbol) that can be used to match all properties. Below are more examples of property masks:

`VirtualBox.*` Track all properties of the `VirtualBox` object `Machine.*.name` Track changes to the `IMachine::name` property of all registered virtual machines

Note: This function is not implemented in the current version of the product.

9.53 IVirtualBoxCallback

Note: This interface is not supported in the web service.

9.53.1 onExtraDataCanChange

```
boolean IVirtualBoxCallback::onExtraDataCanChange(  
    [in] wstring machineId,
```


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```
[in] wstring key,  
[in] wstring value,  
[out] wstring error)
```

Notification when someone tries to change extra data for either the given machine or (if null) global extra data. This gives the chance to veto against changes.

9.53.2 onExtraDataChange

```
void IVirtualBoxCallback::onExtraDataChange(  
    [in] wstring machineId,  
    [in] wstring key,  
    [in] wstring value)
```

Notification when machine specific or global extra data has changed.

9.53.3 onGuestPropertyChange

```
void IVirtualBoxCallback::onGuestPropertyChange(  
    [in] wstring machineId,  
    [in] wstring name,  
    [in] wstring value,  
    [in] wstring flags)
```

Notification when a guest property has changed.

9.53.4 onMachineDataChange

```
void IVirtualBoxCallback::onMachineDataChange(  
    [in] wstring machineId)
```

Any of the settings of the given machine has changed.

9.53.5 onMachineRegistered

```
void IVirtualBoxCallback::onMachineRegistered(  
    [in] wstring machineId,  
    [in] boolean registered)
```

The given machine was registered or unregistered within this VirtualBox installation.

9.53.6 onMachineStateChange

```
void IVirtualBoxCallback::onMachineStateChange(  
    [in] wstring machineId,  
    [in] MachineState state)
```

The execution state of the given machine has changed. See also: `IMachine::state`

9.53.7 onMediaRegistered

```
void IVirtualBoxCallback::onMediaRegistered(  
    [in] wstring mediaId,  
    [in] DeviceType mediaType,  
    [in] boolean registered)
```

The given media was registered or unregistered within this VirtualBox installation. The `mediaType` parameter describes what type of media the specified `mediaId` refers to. Possible values are:

- **HardDisk**: the media is a hard disk that, if registered, can be obtained using the `IVirtualBox::getHardDisk()` call.
- **DVD**: the media is a CD/DVD image that, if registered, can be obtained using the `IVirtualBox::getDVDImage()` call.
- **Floppy**: the media is a Floppy image that, if registered, can be obtained using the `IVirtualBox::getFloppyImage()` call.

Note that if this is a deregistration notification, there is no way to access the object representing the unregistered media. It is supposed that the application will do required cleanup based on the `mediaId` value.

9.53.8 onSessionStateChange

```
void IVirtualBoxCallback::onSessionStateChange(  
    [in] wstring machineId,  
    [in] SessionState state)
```

The state of the session for the given machine was changed. See also: `IMachine::sessionState`

9.53.9 onSnapshotChange

```
void IVirtualBoxCallback::onSnapshotChange(  
    [in] wstring machineId,  
    [in] wstring snapshotId)
```

Snapshot properties (name and/or description) have been changed. See also: `ISnapshot`

9.53.10 onSnapshotDiscarded

```
void IVirtualBoxCallback::onSnapshotDiscarded(  
    [in] wstring machineId,  
    [in] wstring snapshotId)
```

Snapshot of the given machine has been discarded.

Note: This notification is delivered **after** the snapshot object has been uninitialized on the server (so that any attempt to call its methods will return an error).

See also: ISnapshot

9.53.11 onSnapshotTaken

```
void IVirtualBoxCallback::onSnapshotTaken(  
    [in] wstring machineId,  
    [in] wstring snapshotId)
```

A new snapshot of the machine has been taken. See also: ISnapshot

9.54 IVirtualBoxCallback

9.55 IVirtualBoxErrorInfo

The IVirtualBoxErrorInfo interface represents extended error information.

Extended error information can be set by VirtualBox components after unsuccessful or partially successful method invocation. This information can be retrieved by the calling party as an IVirtualBoxErrorInfo object and then shown to the client in addition to the plain 32-bit result code.

In MS COM, this interface extends the IErrorInfo interface, in XPCOM, it extends the nsIException interface. In both cases, it provides a set of common attributes to retrieve error information.

Sometimes invocation of some component's method may involve methods of other components that may also fail (independently of this method's failure), or a series of non-fatal errors may precede a fatal error that causes method failure. In cases like that, it may be desirable to preserve information about all errors happened during method invocation and deliver it to the caller. The [next](#) attribute is intended specifically for this purpose and allows to represent a chain of errors through a single IVirtualBoxErrorInfo object set after method invocation.

Note that errors are stored to a chain in the reverse order, i.e. the initial error object you query right after method invocation is the last error set by the callee, the object it points to in the [next](#) attribute is the previous error and so on, up to the first error (which is the last in the chain).

9.55.1 Attributes

9.55.1.1 resultCode (read-only)

`long IVirtualBoxErrorInfo::resultCode`

Result code of the error. Usually, it will be the same as the result code returned by the method that provided this error information, but not always. For example, on Win32, `CoCreateInstance()` will most likely return `E_NOINTERFACE` upon unsuccessful component instantiation attempt, but not the value the component factory returned. Value is typed 'long', not 'result', to make interface usable from scripting languages.

Note: In MS COM, there is no equivalent. In XPCOM, it is the same as `nsIException::result`.

9.55.1.2 interfaceID (read-only)

`uuid IVirtualBoxErrorInfo::interfaceID`

UUID of the interface that defined the error.

Note: In MS COM, it is the same as `IErrorInfo::GetGUID`. In XPCOM, there is no equivalent.

9.55.1.3 component (read-only)

`wstring IVirtualBoxErrorInfo::component`

Name of the component that generated the error.

Note: In MS COM, it is the same as `IErrorInfo::GetSource`. In XPCOM, there is no equivalent.

9.55.1.4 text (read-only)

`wstring IVirtualBoxErrorInfo::text`

Text description of the error.

Note: In MS COM, it is the same as `IErrorInfo::GetDescription`. In XPCOM, it is the same as `nsIException::message`.

9.55.1.5 next (read-only)

`IVirtualBoxErrorInfo` `IVirtualBoxErrorInfo::next`

Next error object if there is any, or `null` otherwise.

Note: In MS COM, there is no equivalent. In XPCOM, it is the same as `nsIException::inner`.

9.56 IVirtualSystemDescription

This interface is used in the `IAppliance::virtualSystemDescriptions[]` array. After `IAppliance::interpret()` has been called, that array contains information about how the virtual systems described in the OVF should best be imported into VirtualBox virtual machines. See [IAppliance](#) for the steps required to import an OVF into VirtualBox.

9.56.1 Attributes

9.56.1.1 count (read-only)

`unsigned long` `IVirtualSystemDescription::count`

Return the number of virtual system description entries.

9.56.2 addDescription

```
void IVirtualSystemDescription::addDescription(
    [in] VirtualSystemDescriptionType aType,
    [in] wstring aVBoxValue,
    [in] wstring aExtraConfigValue)
```

This method adds an additional description entry to the stack of already available descriptions for this virtual system. This is handy for writing values which aren't directly supported by VirtualBox. One example would be the License type of `VirtualSystemDescriptionType`.

9.56.3 getDescription

```
void IVirtualSystemDescription::getDescription(
    [out] VirtualSystemDescriptionType aTypes[],
    [out] wstring aRefs[],
    [out] wstring aOvfValues[],
    [out] wstring aVBoxValues[],
    [out] wstring aExtraConfigValues[])
```

Returns information about the virtual system as arrays of instruction items. In each array, the items with the same indices correspond and jointly represent an import instruction for VirtualBox.

The list below identifies the value sets that are possible depending on the [VirtualSystemDescriptionType](#) enum value in the array item in `aTypes[]`. In each case, the array item with the same index in `aOvfValues[]` will contain the original value as contained in the OVF file (just for informational purposes), and the corresponding item in `aVBoxValues[]` will contain a suggested value to be used for VirtualBox. Depending on the description type, the `aExtraConfigValues[]` array item may also be used.

- “OS”: the guest operating system type. There must be exactly one such array item on import. The corresponding item in `aVBoxValues[]` contains the suggested guest operating system for VirtualBox. This will be one of the values listed in [IVirtualBox::guestOSTypes\[\]](#). The corresponding item in `aOvfValues[]` will contain a numerical value that described the operating system in the OVF (see [CIMOSType](#)).
- “Name”: the name to give to the new virtual machine. There can be at most one such array item; if none is present on import, then an automatic name will be created from the operating system type. The corresponding item in `aOvfValues[]` will contain the suggested virtual machine name from the OVF file, and `aVBoxValues[]` will contain a suggestion for a unique VirtualBox [IMachine](#) name that does not exist yet.
- “Description”: an arbitrary description.
- “License”: the EULA section from the OVF, if present. It is the responsibility of the calling code to display such a license for agreement; the Main API does not enforce any such policy.
- Miscellaneous: reserved for future use.
- “CPU”: the number of CPUs. There can be at most one such item, which will presently be ignored.
- “Memory”: the amount of guest RAM, in bytes. There can be at most one such array item; if none is present on import, then VirtualBox will set a meaningful default based on the operating system type.
- “HarddiskControllerIDE”: an IDE hard disk controller. There can be at most one such item. This has no value in `aOvfValues[]` or `aVBoxValues[]`. The matching item in the `aRefs[]` array will contain an integer that items of the “Harddisk” type can use to specify which hard disk controller a virtual disk should be connected to.
- “HarddiskControllerSATA”: an SATA hard disk controller. There can be at most one such item. This has no value in `aOvfValues[]` or `aVBoxValues[]`. The matching item in the `aRefs[]` array will be used as with IDE controllers (see above).

- “HarddiskControllerSCSI”: a SCSI hard disk controller. There can be at most one such item. The items in `aOvfValues[]` and `aVBoxValues[]` will either be “LsiLogic” or “BusLogic”. The matching item in the `aRefs[]` array will be used as with IDE controllers (see above).
- “HardDiskImage”: a virtual hard disk, most probably as a reference to an image file. There can be an arbitrary number of these items, one for each virtual disk image that accompanies the OVF.

The array item in `aOvfValues[]` will contain the file specification from the OVF file (without a path since the image file should be in the same location as the OVF file itself), whereas the item in `aVBoxValues[]` will contain a qualified path specification to where VirtualBox uses the hard disk image. This means that on import the image will be copied and converted from the “ovf” location to the “vbox” location; on export, this will be handled the other way round. On import, the target image will also be registered with VirtualBox.

The matching item in the `aExtraConfigValues[]` array must contain a string of the following format: “controller=<index>;channel=<c>” In this string, <index> must be an integer specifying the hard disk controller to connect the image to. That number must be the index of an array item with one of the hard disk controller types (HarddiskControllerSCSI, HarddiskControllerSATA, HarddiskControllerIDE). In addition, <c> must specify the channel to use on that controller. For IDE controllers, this can range from 0-2 (which VirtualBox will interpret as primary master, primary slave, secondary slave; VirtualBox reserves the secondary master for the CD-ROM drive). For SATA and SCSI controllers, the channel can range from 0-29.

- “NetworkAdapter”: a network adapter. The array item in `aVBoxValues[]` will specify the hardware for the network adapter, whereas the array item in `aExtraConfigValues[]` will have a string of the “type=<X>” format, where <X> must be either “NAT” or “Bridged”.
- “USBController”: a USB controller. There can be at most one such item. If and only if such an item is present, USB support will be enabled for the new virtual machine.
- “SoundCard”: a sound card. There can be at most one such item. If and only if such an item is present, sound support will be enabled for the new virtual machine. Note that the virtual machine in VirtualBox will always be presented with the standard VirtualBox soundcard, which may be different from the virtual soundcard expected by the appliance.

9.56.4 getDescriptionByType

```
void IVirtualSystemDescription::getDescriptionByType(
    [in] VirtualSystemDescriptionType aType,
    [out] VirtualSystemDescriptionType aTypes[],
```

9 Classes (interfaces)

```
[out] wstring aRefs[],  
[out] wstring aOvfValues[],  
[out] wstring aVBoxValues[],  
[out] wstring aExtraConfigValues[])
```

This is the same as [getDescription\(\)](#) except that you can specify which types should be returned.

9.56.5 getValuesByType

```
wstring[] IVirtualSystemDescription::getValuesByType(  
    [in] VirtualSystemDescriptionType aType,  
    [in] VirtualSystemDescriptionValueType aWhich)
```

This is the same as [getDescriptionByType\(\)](#) except that you can specify which value types should be returned. See [VirtualSystemDescriptionValueType](#) for possible values.

9.56.6 setFinalValues

```
void IVirtualSystemDescription::setFinalValues(  
    [in] boolean aEnabled[],  
    [in] wstring aVBoxValues[],  
    [in] wstring aExtraConfigValues[])
```

This method allows the appliance's user to change the configuration for the virtual system descriptions. For each array item returned from [getDescription\(\)](#), you must pass in one boolean value and one configuration value.

Each item in the boolean array determines whether the particular configuration item should be enabled. You can only disable items of the types `HardDiskControllerIDE`, `HardDiskControllerSATA`, `HardDiskControllerSCSI`, `HardDiskImage`, `CDROM`, `Floppy`, `NetworkAdapter`, `USBController` and `SoundCard`.

For the “vbox” and “extra configuration” values, if you pass in the same arrays as returned in the `aVBoxValues` and `aExtraConfigValues` arrays from [getDescription\(\)](#), the configuration remains unchanged. Please see the documentation for [getDescription\(\)](#) for valid configuration values for the individual array item types. If the corresponding item in the `aEnabled` array is `false`, the configuration value is ignored.

9.57 IWebSessionManager

Note: This interface is supported in the web service only, not in COM/XPCOM.

Web session manager. This provides essential services to webservice clients.

9.57.1 getSessionObject

```
ISession IWebSessionManager::getSessionObject(  
    [in] IVirtualBox refIVirtualBox)
```

Returns a managed object reference to the internal ISession object that was created for this web service session when the client logged on.

See also: ISession

9.57.2 logoff

```
void IWebSessionManager::logoff(  
    [in] IVirtualBox refIVirtualBox)
```

Logs off the client who has previously logged on with [logoff\(\)](#) and destroys all resources associated with the session (most importantly, all managed objects created in the server while the session was active).

9.57.3 logon

```
IVirtualBox IWebSessionManager::logon(  
    [in] wstring username,  
    [in] wstring password)
```

Logs a new client onto the webservice and returns a managed object reference to the IVirtualBox instance, which the client can then use as a basis to further queries, since all calls to the VirtualBox API are based on the IVirtualBox interface, in one way or the other.

10 Enumerations (enums)

10.1 AccessMode

Access mode for opening files.

ReadOnly

ReadWrite

10.2 AudioControllerType

Virtual audio controller type.

AC97

SB16

10.3 AudioDriverType

Host audio driver type.

Null Null value, also means “dummy audio driver”.

WinMM

OSS

ALSA

DirectSound

CoreAudio

MMPM

Pulse

SolAudio

10.4 BIOSBootMenuMode

BIOS boot menu mode.

Disabled

MenuOnly

MessageAndMenu

10.5 CIMOSType

OVF operating system values according to CIM V2.20 (as of Nov 2008); <http://www.dmtf.org/standards/cim/cim>

CIMOS_Unknown

CIMOS_Other

CIMOS_MACOS

CIMOS_ATTUNIX

CIMOS_DGUX

CIMOS_DECNT

CIMOS_True64UNIX

CIMOS_OpenVMS

CIMOS_HPUX

CIMOS_AIX

CIMOS_MVS

CIMOS_OS400

CIMOS_OS2

CIMOS_JavaVM

CIMOS_MSDOS

CIMOS_WIN3x

CIMOS_WIN95

CIMOS_WIN98

CIMOS_WINNT

CIMOS_WINCE
CIMOS_NCR3000
CIMOS_NetWare
CIMOS_OSF
CIMOS_DCOS
CIMOS_ReliantUNIX
CIMOS_SCOUnixWare
CIMOS_SCOOpenServer
CIMOS_Sequent
CIMOS_IRIX
CIMOS_Solaris
CIMOS_SunOS
CIMOS_U6000
CIMOS_ASERIES
CIMOS_HPNonStopOS
CIMOS_HPNonStopOSS
CIMOS_BS2000
CIMOS_LINUX
CIMOS_Lynx
CIMOS_XENIX
CIMOS_VM
CIMOS_InteractiveUNIX
CIMOS_BSDUNIX
CIMOS_FreeBSD
CIMOS_NetBSD
CIMOS_GNUHurd
CIMOS_OS9

CIMOS_MACHKernel
CIMOS_Inferno
CIMOS_QNX
CIMOS_EPOC
CIMOS_IxWorks
CIMOS_VxWorks
CIMOS_MiNT
CIMOS_BeOS
CIMOS_HPMPE
CIMOS_NextStep
CIMOS_PalmPilot
CIMOS_Rhapsody
CIMOS_Windows2000
CIMOS_Dedicated
CIMOS_OS390
CIMOS_VSE
CIMOS_TPF
CIMOS_WindowsMe
CIMOS_CalderaOpenUNIX
CIMOS_OpenBSD
CIMOS_NotApplicable
CIMOS_WindowsXP
CIMOS_zOS
CIMOS_MicrosoftWindowsServer2003
CIMOS_MicrosoftWindowsServer2003_64
CIMOS_WindowsXP_64
CIMOS_WindowsXPEmbedded

CIMOS_WindowsVista
CIMOS_WindowsVista_64
CIMOS_WindowsEmbeddedforPointofService
CIMOS_MicrosoftWindowsServer2008
CIMOS_MicrosoftWindowsServer2008_64
CIMOS_FreeBSD_64
CIMOS_RedHatEnterpriseLinux
CIMOS_RedHatEnterpriseLinux_64
CIMOS_Solaris_64
CIMOS_SUSE
CIMOS_SUSE_64
CIMOS_SLES
CIMOS_SLES_64
CIMOS_NovellOES
CIMOS_NovellLinuxDesktop
CIMOS_SunJavaDesktopSystem
CIMOS_Mandriva
CIMOS_Mandriva_64
CIMOS_TurboLinux
CIMOS_TurboLinux_64
CIMOS_Ubuntu
CIMOS_Ubuntu_64
CIMOS_Debian
CIMOS_Debian_64
CIMOS_Linux_2_4_x
CIMOS_Linux_2_4_x_64
CIMOS_Linux_2_6_x
CIMOS_Linux_2_6_x_64
CIMOS_Linux_64
CIMOS_Other_64

10.6 ClipboardMode

Host-Guest clipboard interchange mode.

Disabled

HostToGuest

GuestToHost

Bidirectional

10.7 DataFlags

None

Mandatory

Expert

Array

FlagMask

10.8 DataType

Int32

Int8

String

10.9 DeviceActivity

Device activity for [IConsole::getDeviceActivity\(\)](#).

Null

Idle

Reading

Writing

10.10 DeviceType

Device type.

Null Null value, may also mean “no device” (not allowed for [IConsole::getDeviceActivity\(\)](#)).

Floppy Floppy device.

DVD CD/DVD-ROM device.

HardDisk Hard disk device.

Network Network device.

USB USB device.

SharedFolder Shared folder device.

10.11 DriveState

Null Null value (never used by the API).

NotMounted

ImageMounted

HostDriveCaptured

10.12 FramebufferPixelFormat

Format of the video memory buffer. Constants represented by this enum can be used to test for particular values of [IFramebuffer::pixelFormat](#). See also [IFramebuffer::requestResize\(\)](#).

See also www.fourcc.org for more information about FOURCC pixel formats.

Opaque Unknown buffer format (the user may not assume any particular format of the buffer).

FOURCC_RGB Basic RGB format ([IFramebuffer::bitsPerPixel](#) determines the bit layout).

10.13 GuestStatisticType

Statistics type for [IGuest::getStatistic\(\)](#).

CPU_Load_Idle Idle CPU load (0-100%) for last interval.

CPU_Load_Kernel Kernel CPU load (0-100%) for last interval.

CPU_Load_User User CPU load (0-100%) for last interval.

Threads Total number of threads in the system.

Processes Total number of processes in the system.

Handles Total number of handles in the system.

MemoryLoad Memory load (0-100%).

PhysMemTotal Total physical memory in megabytes.

PhysMemAvailable Free physical memory in megabytes.

PhysMemBalloon Ballooned physical memory in megabytes.

MemCommitTotal Total amount of memory in the committed state in megabytes.

MemKernelTotal Total amount of memory used by the guest OS's kernel in megabytes.

MemKernelPaged Total amount of paged memory used by the guest OS's kernel in megabytes.

MemKernelNonpaged Total amount of non-paged memory used by the guest OS's kernel in megabytes.

MemSystemCache Total amount of memory used by the guest OS's system cache in megabytes.

PageFileSize Pagefile size in megabytes.

SampleNumber Statistics sample number

MaxVal

10.14 HardDiskFormatCapabilities

Hard disk format capability flags.

Uuid Supports UUIDs as expected by VirtualBox code.

CreateFixed Supports creating fixed size images, allocating all space instantly.

CreateDynamic Supports creating dynamically growing images, allocating space on demand.

CreateSplit2G Supports creating images split in chunks of a bit less than 2 GBytes.

Differencing Supports being used as a format for differencing hard disks (see [IHardDisk::createDiffStorage\(\)](#)).

Asynchronous Supports asynchronous I/O operations for at least some configurations.

File The format backend operates on files (the [IMedium::location](#) attribute of the hard disk specifies a file used to store hard disk data; for a list of supported file extensions see [IHardDiskFormat::fileExtensions\(\)](#)).

Properties The format backend uses the property interface to configure the storage location and properties (the [IHardDiskFormat::describeProperties\(\)](#) method is used to get access to properties supported by the given hard disk format).

CapabilityMask

10.15 HardDiskType

Virtual hard disk type. See also: [IHardDisk](#)

Normal Normal hard disk (attached directly or indirectly, preserved when taking snapshots).

Immutable Immutable hard disk (attached indirectly, changes are wiped out after powering off the virtual machine).

Writethrough Write through hard disk (attached directly, ignored when taking snapshots).

10.16 HardDiskVariant

Virtual hard disk image variant. More than one flag may be set. See also: [IHardDisk](#)

Standard No particular variant requested, results in using the backend default.

VmdkSplit2G VMDK image split in chunks of less than 2GByte.

VmdkStreamOptimized VMDK streamOptimized image. Special import/export format which is read-only/append-only.

VmdkESX VMDK format variant used on ESX products.

Fixed Fixed image. Only allowed for base images.

Diff Fixed image. Only allowed for base images.

10.17 HostNetworkInterfaceMediumType

Type of encapsulation. Ethernet encapsulation includes both wired and wireless Ethernet connections. See also: IHostNetworkInterface

Unknown The type of interface cannot be determined.

Ethernet Ethernet frame encapsulation.

PPP Point-to-point protocol encapsulation.

SLIP Serial line IP encapsulation.

10.18 HostNetworkInterfaceStatus

Current status of the interface. See also: IHostNetworkInterface

Unknown The state of interface cannot be determined.

Up The interface is fully operational.

Down The interface is not functioning.

10.19 HostNetworkInterfaceType

Network interface type.

Bridged

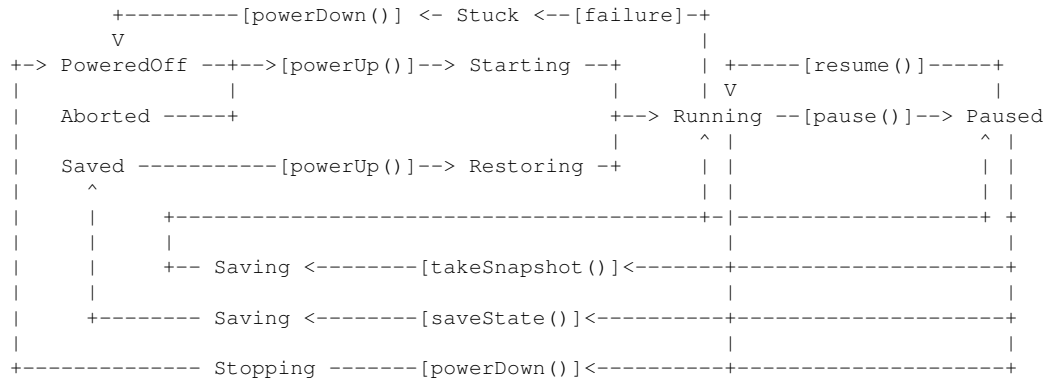
HostOnly

10.20 MachineState

Virtual machine execution state.

This enumeration represents possible values of the `IMachine::state` attribute.

Below is the basic virtual machine state diagram. It shows how the state changes during virtual machine execution. The text in square braces shows a method of the `IConsole` interface that performs the given state transition.



Note that states to the right from `PoweredOff`, `Aborted` and `Saved` in the above diagram are called *online VM states*. These states represent the virtual machine which is being executed in a dedicated process (usually with a GUI window attached to it where you can see the activity of the virtual machine and interact with it). There are two special pseudo-states, `FirstOnline` and `LastOnline`, that can be used in relational expressions to detect if the given machine state is online or not:

```

if (machine.GetState() >= MachineState_FirstOnline &&
    machine.GetState() <= MachineState_LastOnline)
{
    ...the machine is being executed...
}

```

When the virtual machine is in one of the online VM states (that is, being executed), only a few machine settings can be modified. Methods working with such settings contain an explicit note about that. An attempt to change any other setting or perform a modifying operation during this time will result in the `error`.

All online states except `Running`, `Paused` and `Stuck` are transitional: they represent temporary conditions of the virtual machine that will last as long as the operation that initiated such a condition.

The `Stuck` state is a special case. It means that execution of the machine has reached the “Guru Meditation” condition. This condition indicates an internal VMM (virtual

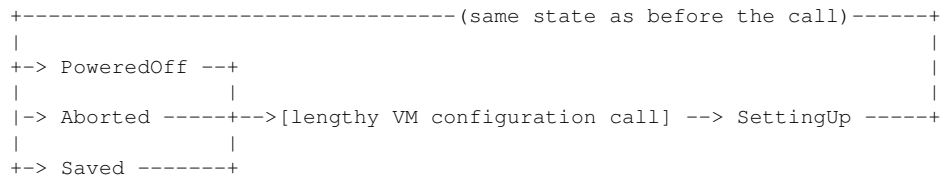
10 Enumerations (enums)

machine manager) failure which may happen as a result of either an unhandled low-level virtual hardware exception or one of the recompiler exceptions (such as the *too-many-traps* condition).

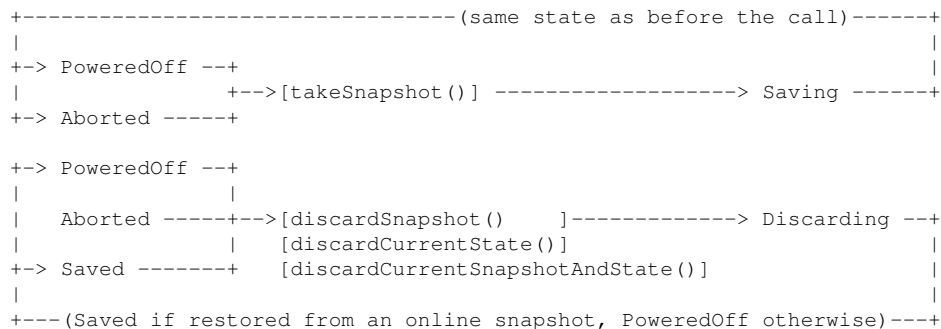
Note also that any online VM state may transit to the Aborted state. This happens if the process that is executing the virtual machine terminates unexpectedly (for example, crashes). Other than that, the Aborted state is equivalent to PoweredOff.

There are also a few additional state diagrams that do not deal with virtual machine execution and therefore are shown separately. The states shown on these diagrams are called *offline VM states* (this includes PoweredOff, Aborted and Saved too).

The first diagram shows what happens when a lengthy setup operation is being executed (such as `IMachine::attachHardDisk()`).



The next two diagrams demonstrate the process of taking a snapshot of a powered off virtual machine and performing one of the “discard...” operations, respectively.



Note that the Saving state is present in both the offline state group and online state group. Currently, the only way to determine what group is assumed in a particular case is to remember the previous machine state: if it was Running or Paused, then Saving is an online state, otherwise it is an offline state. This inconsistency may be removed in one of the future versions of VirtualBox by adding a new state.

Null Null value (never used by the API).

PoweredOff The machine is not running.

10 Enumerations (enums)

Saved The machine is not currently running, but the execution state of the machine has been saved to an external file when it was running.

Aborted The process running the machine has terminated abnormally.

Running The machine is currently being executed.

Paused Execution of the machine has been paused.

Stuck Execution of the machine has reached the “Guru Meditation” condition.

Starting Machine is being started after powering it on from a zero execution state.

Stopping Machine is being normally stopped powering it off, or after the guest OS has initiated a shutdown sequence.

Saving Machine is saving its execution state to a file or an online snapshot of the machine is being taken.

Restoring Execution state of the machine is being restored from a file after powering it on from the saved execution state.

Discarding Snapshot of the machine is being discarded.

SettingUp Lengthy setup operation is in progress.

FirstOnline Pseudo-state: first online state (for use in relational expressions).

LastOnline Pseudo-state: last online state (for use in relational expressions).

FirstTransient Pseudo-state: first transient state (for use in relational expressions).

LastTransient Pseudo-state: last transient state (for use in relational expressions).

10.21 MediaState

Virtual media state. See also: IMedia

NotCreated Associated media storage does not exist (either was not created yet or was deleted).

Created Associated storage exists and accessible.

LockedRead Media is locked for reading, no data modification is possible.

LockedWrite Media is locked for writing, no concurrent data reading or modification is possible.

Inaccessible Associated media storage is not accessible.

Creating Associated media storage is being created.

Deleting Associated media storage is being deleted.

10.22 MouseButtonState

Mouse button state.

LeftButton

RightButton

MiddleButton

WheelUp

WheelDown

MouseStateMask

10.23 NetworkAdapterType

Network adapter type.

Null Null value (never used by the API).

Am79C970A AMD PCNet-PCI II network card (Am79C970A).

Am79C973 AMD PCNet-FAST III network card (Am79C973).

I82540EM Intel PRO/1000 MT Desktop network card (82540EM).

I82543GC Intel PRO/1000 T Server network card (82543GC).

I82545EM Intel PRO/1000 MT Server network card (82545EM).

10.24 NetworkAttachmentType

Network attachment type.

Null Null value, also means “not attached”.

NAT

Bridged

Internal

HostOnly

10.25 OVFResourceType

OVF resource type (as listed with CIM_ResourceAllocationSettingData; see for example [http://msdn.microsoft.com/en-us/library/cc136877\(VS.85\).aspx](http://msdn.microsoft.com/en-us/library/cc136877(VS.85).aspx)).

Other

ComputerSystem

Processor

Memory

IDEController

ParallelSCSIHBA

FCHBA

iSCSIHBA

IBHCA

EthernetAdapter

OtherNetworkAdapter

IOSlot

IODevice

FloppyDrive

CDDrive

DVDDrive

HardDisk

OtherStorageDevice

USBController

SoundCard

10.26 PortMode

The PortMode enumeration represents possible communication modes for the virtual serial port device.

Disconnected Virtual device is not attached to any real host device.

HostPipe Virtual device is attached to a host pipe.

HostDevice Virtual device is attached to a host device.

RawFile Virtual device is attached to a raw file.

10.27 ProcessorFeature

CPU features.

HWVirtEx

PAE

LongMode

10.28 Scope

Scope of the operation.

A generic enumeration used in various methods to define the action or argument scope.

Global

Machine

Session

10.29 SessionState

Session state. This enumeration represents possible values of [IMachine::sessionState](#) and [ISession::state](#) attributes. See individual enumerator descriptions for the meaning for every value.

Null Null value (never used by the API).

Closed The machine has no open sessions ([IMachine::sessionState](#)); the session is closed ([ISession::state](#))

Open The machine has an open direct session ([IMachine::sessionState](#)); the session is open ([ISession::state](#))

Spawning A new (direct) session is being opened for the machine as a result of [IVirtualBox::openRemoteSession\(\)](#) call ([IMachine::sessionState](#)); the session is currently being opened as a result of [IVirtualBox::openRemoteSession\(\)](#) call ([ISession::state](#))

Closing The direct session is being closed ([IMachine::sessionState](#)); the session is being closed ([ISession::state](#))

10.30 SessionType

Session type. This enumeration represents possible values of the [ISession::type](#) attribute.

Null Null value (never used by the API).

Direct Direct session (opened by [IVirtualBox::openSession\(\)](#))

Remote Remote session (opened by [IVirtualBox::openRemoteSession\(\)](#))

Existing Existing session (opened by [IVirtualBox::openExistingSession\(\)](#))

10.31 StorageBus

The connection type of the storage controller.

Null `null` value. Never used by the API.

IDE

SATA

SCSI

10.32 StorageControllerType

Storage controller type.

Null `null` value. Never used by the API.

LsiLogic

BusLogic

IntelAhci

PIIX3

PIIX4

ICH6

10.33 USBDeviceFilterAction

Actions for host USB device filters. See also: `IHostUSBDeviceFilter`, `USBDeviceState`

Null Null value (never used by the API).

Ignore Ignore the matched USB device.

Hold Hold the matched USB device.

10.34 USBDeviceState

USB device state. This enumeration represents all possible states of the USB device physically attached to the host computer regarding its state on the host computer and availability to guest computers (all currently running virtual machines).

Once a supported USB device is attached to the host, global USB filters (`IHost::USBDeviceFilters[]`) are activated. They can either ignore the device, or put it to `USBDeviceState_Held` state, or do nothing. Unless the device is ignored by global filters, filters of all currently running guests (`IUSBController::deviceFilters[]`) are activated that can put it to `USBDeviceState_Captured` state.

If the device was ignored by global filters, or didn't match any filters at all (including guest ones), it is handled by the host in a normal way. In this case, the device state is determined by the host and can be one of `USBDeviceState_Unavailable`, `USBDeviceState_Busy` or `USBDeviceState_Available`, depending on the current device usage.

Besides auto-capturing based on filters, the device can be manually captured by guests (`IConsole::attachUSBDevice()`) if its state is `USBDeviceState_Busy`, `USBDeviceState_Available` or `USBDeviceState_Held`.

Note: Due to differences in USB stack implementations in Linux and Win32, states `USBDeviceState_Busy` and `USBDeviceState_vailable` are applicable only to the Linux version of the product. This also means that (`IConsole::attachUSBDevice()`) can only succeed on Win32 if the device state is `USBDeviceState_Held`.

See also: `IHostUSBDevice`, `IHostUSBDeviceFilter`

NotSupported Not supported by the VirtualBox server, not available to guests.

Unavailable Being used by the host computer exclusively, not available to guests.

10 Enumerations (enums)

Busy Being used by the host computer, potentially available to guests.

Available Not used by the host computer, available to guests (the host computer can also start using the device at any time).

Held Held by the VirtualBox server (ignored by the host computer), available to guests.

Captured Captured by one of the guest computers, not available to anybody else.

10.35 VFSFileType

File types known by VFSExplorer.

Unknown

Fifo

DevChar

Directory

DevBlock

File

SymLink

Socket

WhiteOut

10.36 VFSType

Virtual file systems supported by VFSExplorer.

File

Cloud

S3

WebDav

10.37 VRDPAuthType

VRDP authentication type.

Null Null value, also means “no authentication”.

External

Guest

10.38 VirtualSystemDescriptionType

Used with [IVirtualSystemDescription](#) to describe the type of a configuration value.

Ignore

OS

Name

Product

Vendor

Version

ProductUrl

VendorUrl

Description

License

Miscellaneous

CPU

Memory

HardDiskControllerIDE

HardDiskControllerSATA

HardDiskControllerSCSI

HardDiskImage

Floppy

CDROM

NetworkAdapter

USBController

SoundCard

10.39 VirtualSystemDescriptionValueType

Used with [IVirtualSystemDescription::getValuesByType\(\)](#) to describe the value type to fetch.

Reference

Original

Auto

ExtraConfig

11 Host-Guest Communication Manager

The VirtualBox Host-Guest Communication Manager (HGCM) allows a guest application or a guest driver to call a host shared library. The following features of VirtualBox are implemented using HGCM:

- Shared Folders
- Shared Clipboard
- Guest configuration interface

The shared library contains a so called HGCM service. The guest HGCM clients establish connections to the service to call it. When calling a HGCM service the client supplies a function code and a number of parameters for the function.

11.1 Virtual Hardware Implementation

HGCM uses the VMM virtual PCI device to exchange data between the guest and the host. The guest always acts as an initiator of requests. A request is constructed in the guest physical memory, which must be locked by the guest. The physical address is passed to the VMM device using a 32 bit `out edx, eax` instruction. The physical memory must be allocated below 4GB by 64 bit guests.

The host parses the request header and data and queues the request for a host HGCM service. The guest continues execution and usually waits on a HGCM event semaphore.

When the request has been processed by the HGCM service, the VMM device sets the completion flag in the request header, sets the HGCM event and raises an IRQ for the guest. The IRQ handler signals the HGCM event semaphore and all HGCM callers check the completion flag in the corresponding request header. If the flag is set, the request is considered completed.

11.2 Protocol Specification

The HGCM protocol definitions are contained in the `VBox/VBoxGuest.h`

11.2.1 Request Header

HGCM request structures contains a generic header (VMMDevHGCMRequestHeader):

Name	Description
size	Size of the entire request.
version	Version of the header, must be set to 0x10001.
type	Type of the request.
rc	HGCM return code, which will be set by the VMM device.
reserved1	A reserved field 1.
reserved2	A reserved field 2.
flags	HGCM flags, set by the VMM device.
result	The HGCM result code, set by the VMM device.

Note:

- All fields are 32 bit.
- Fields from `size` to `reserved2` are a standard VMM device request header, which is used for other interfaces as well.

The **type** field indicates the type of the HGCM request:

Name (decimal value)	Description
VMMDe-vReq_HGCMConnect (60)	Connect to a HGCM service.
VMMDe-vReq_HGCMDisconnect (61)	Disconnect from the service.
VMMDe-vReq_HGCMCall32 (62)	Call a HGCM function using the 32 bit interface.
VMMDe-vReq_HGCMCall64 (63)	Call a HGCM function using the 64 bit interface.
VMMDe-vReq_HGCMCancel (64)	Cancel a HGCM request currently being processed by a host HGCM service.

The **flags** field may contain:

Name (hexadecimal value)	Description
VBOX_HGCM_REQ_DONE (0x00000001)	The request has been processed by the host service.
VBOX_HGCM_REQ_CANCELLED (0x00000002)	This request was cancelled.

11.2.2 Connect

The connection request must be issued by the guest HGCM client before it can call the HGCM service (VMMDevHGCMConnect):

Name	Description
header	The generic HGCM request header with type equal to VMMDevReq_HGCMConnect (60).
type	The type of the service location information (32 bit).
location	The service location information (128 bytes).
clientid	The client identifier assigned to the connecting client by the HGCM subsystem (32 bit).

The **type** field tells the HGCM how to look for the requested service:

Name (hexadecimal value)	Description
VMMDevHGCM-Loc_LocalHost (0x1)	The requested service is a shared library located on the host and the location information contains the library name.
VMMDevHGCM-Loc_LocalHost_Existing (0x2)	The requested service is a preloaded one and the location information contains the service name.

Note: Currently preloaded HGCM services are hard-coded in VirtualBox:

- VBoxSharedFolders
- VBoxSharedClipboard
- VBoxGuestPropSvc
- VBoxSharedOpenGL

There is no difference between both types of HGCM services, only the location mechanism is different.

The client identifier is returned by the host and must be used in all subsequent requests by the client.

11.2.3 Disconnect

This request disconnects the client and makes the client identifier invalid (VMMDevHGCMDisconnect):

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Name	Description
header	The generic HGCM request header with type equal to VMMDevReq_HGCMDisconnect (61).
clientId	The client identifier previously returned by the connect request (32 bit).

11.2.4 Call32 and Call64

Calls the HGCM service entry point (VMMDevHGCMCall) using 32 bit or 64 bit addresses:

Name	Description
header	The generic HGCM request header with type equal to either VMMDevReq_HGCMCall32 (62) or VMMDevReq_HGCMCall64 (63).
clientId	The client identifier previously returned by the connect request (32 bit).
function	The function code to be processed by the service (32 bit).
cParms	The number of following parameters (32 bit). This value is 0 if the function requires no parameters.
parms	An array of parameter description structures (HGCMFunctionParameter32 or HGCMFunctionParameter64).

The 32 bit parameter description (HGCMFunctionParameter32) consists of 32 bit type field and 8 bytes of an opaque value, so 12 bytes in total. The 64 bit variant (HGCMFunctionParameter64) consists of the type and 12 bytes of a value, so 16 bytes in total.

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Type	Format of the value
VMMDevHGCM-ParmType_32bit (1)	A 32 bit value.
VMMDevHGCM-ParmType_64bit (2)	A 64 bit value.
VMMDevHGCM-Parm-Type_PhysAddr (3)	A 32 bit size followed by a 32 bit or 64 bit guest physical address.
VMMDevHGCM-ParmType_LinAddr (4)	A 32 bit size followed by a 32 bit or 64 bit guest linear address. The buffer is used both for guest to host and for host to guest data.
VMMDevHGCM-Parm-Type_LinAddr_In (5)	Same as VMMDevHGCMParmType_LinAddr but the buffer is used only for host to guest data.
VMMDevHGCM-Parm-Type_LinAddr_Out (6)	Same as VMMDevHGCMParmType_LinAddr but the buffer is used only for guest to host data.
VMMDevHGCM-Parm-Type_LinAddr_Locked (7)	Same as VMMDevHGCMParmType_LinAddr but the buffer is already locked by the guest.
VMMDevHGCM-Parm-Type_LinAddr_Locked_In (1)	Same as VMMDevHGCMParmType_LinAddr_In but the buffer is already locked by the guest.
VMMDevHGCM-Parm-Type_LinAddr_Locked_Out (1)	Same as VMMDevHGCMParmType_LinAddr_Out but the buffer is already locked by the guest.

The

11.2.5 Cancel

This request cancels a call request (VMMDevHGCMCancel):

Name	Description
header	The generic HGCM request header with type equal to VMMDevReq_HGCMCancel (64).

11.3 Guest Software Interface

The guest HGCM clients can call HGCM services from both drivers and applications.

11.3.1 The Guest Driver Interface

The driver interface is implemented in the VirtualBox guest additions driver (VBoxGuest), which works with the VMM virtual device. Drivers must use the VBox Guest Library (VBGL), which provides an API for HGCM clients (VBox/VBoxGuestLib.h and VBox/VBoxGuest.h).

```
DECLVBGL(int) VbglHGCMConnect (VBGLHGCMHANDLE *pHandle, VBoxGuestHGCMConnectInfo *pData);
```

Connects to the service:

```
VBoxGuestHGCMConnectInfo data;

memset (&data, sizeof (VBoxGuestHGCMConnectInfo));

data.result    = VINF_SUCCESS;
data.Loc.type  = VMMDevHGCMLoc_LocalHost_Existing;
strcpy (data.Loc.u.host.achName, "VBoxSharedFolders");

rc = VbglHGCMConnect (&handle, &data);

if (VBOX_SUCCESS (rc))
{
    rc = data.result;
}

if (VBOX_SUCCESS (rc))
{
    /* Get the assigned client identifier. */
    ulClientID = data.u32ClientID;
}
```

```
DECLVBGL(int) VbglHGCMDisconnect (VBGLHGCMHANDLE handle, VBoxGuestHGCMDisconnectInfo *pData);
```

Disconnects from the service.

```
VBoxGuestHGCMDisconnectInfo data;

RtlZeroMemory (&data, sizeof (VBoxGuestHGCMDisconnectInfo));

data.result      = VINF_SUCCESS;
data.u32ClientID = ulClientID;
```

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```
rc = VbglHGCMDisconnect (handle, &data);
```

```
DECLVBGL(int) VbglHGCMCall (VBGLHGCMHANDLE handle, VBoxGuestHGCMCallInfo *pData, uint32_t cbData);
```

Calls a function in the service.

```
typedef struct _VBoxSFRead
{
    VBoxGuestHGCMCallInfo callInfo;

    /** pointer, in: SHFLROOT
     * Root handle of the mapping which name is queried.
     */
    HGCMFunctionParameter root;

    /** value64, in:
     * SHFLHANDLE of object to read from.
     */
    HGCMFunctionParameter handle;

    /** value64, in:
     * Offset to read from.
     */
    HGCMFunctionParameter offset;

    /** value64, in/out:
     * Bytes to read/How many were read.
     */
    HGCMFunctionParameter cb;

    /** pointer, out:
     * Buffer to place data to.
     */
    HGCMFunctionParameter buffer;
} VBoxSFRead;

/** Number of parameters */
#define SHFL_CPARGS_READ (5)

...

VBoxSFRead data;

/* The call information. */
data.callInfo.result = VINF_SUCCESS; /* Will be returned by HGCM. */
data.callInfo.u32ClientID = ulClientID; /* Client identifier. */
data.callInfo.u32Function = SHFL_FN_READ; /* The function code. */
data.callInfo.cParms = SHFL_CPARGS_READ; /* Number of parameters. */

/* Initialize parameters. */
```

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```
data.root.type           = VMMDevHGCMParamType_32bit;
data.root.u.value32      = pMap->root;

data.handle.type         = VMMDevHGCMParamType_64bit;
data.handle.u.value64    = hFile;

data.offset.type         = VMMDevHGCMParamType_64bit;
data.offset.u.value64    = offset;

data.cb.type             = VMMDevHGCMParamType_32bit;
data.cb.u.value32        = *pcbBuffer;

data.buffer.type         = VMMDevHGCMParamType_LinAddr_Out;
data.buffer.u.Pointer.size = *pcbBuffer;
data.buffer.u.Pointer.u.linearAddr = (uintptr_t)pBuffer;

rc = VbglHGCMCall (handle, &data.callInfo, sizeof (data));

if (VBOX_SUCCESS (rc))
{
    rc = data.callInfo.result;
    *pcbBuffer = data.cb.u.value32; /* This is returned by the HGCM service. */
}
```

11.3.2 Guest Application Interface

Applications call the VirtualBox guest additions driver to utilize the HGCM interface. There are IOCTL's which correspond to the Vbgl* functions:

- VBOXGUEST_IOCTL_HGCM_CONNECT
- VBOXGUEST_IOCTL_HGCM_DISCONNECT
- VBOXGUEST_IOCTL_HGCM_CALL

These IOCTL's get the same input buffer as VbglHGCM* functions and the output buffer has the same format as the input buffer. The same address can be used as the input and output buffers.

For example see the guest part of shared clipboard, which runs as an application and uses the HGCM interface.

11.4 HGCM Service Implementation

The HGCM service is a shared library with a specific set of entry points. The library must export the VBoxHGCMSvcLoad entry point:

```
extern "C" DECLCALLBACK (DECL_EXPORT(int)) VBoxHGCMSvcLoad (VBOXHGCMSCVFNTABLE *ptable)
```

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The service must check the `ptable->cbSize` and `ptable->u32Version` fields of the input structure and fill the remaining fields with function pointers of entry points and the size of the required client buffer size.

The HGCM service gets a dedicated thread, which calls service entry points synchronously, that is the service will be called again only when a previous call has returned. However the guest calls can be processed asynchronously. The service must call a completion callback when the operation is actually completed. The callback can be issued from another thread as well.

Service entry points are listed in the `VBox/hgcmSvc.h` in the `VBOXHGCMSCVCFNTABLE` structure.

Entry	Description
<code>pfnUnload</code>	The service is being unloaded.
<code>pfnConnect</code>	A client <code>u32ClientID</code> is connected to the service. The <code>pvClient</code> parameter points to an allocated memory buffer which can be used by the service to store the client information.
<code>pfnDisconnect</code>	A client is being disconnected.
<code>pfnCall</code>	A guest client calls a service function. The <code>callHandle</code> must be used in the <code>VBOXHGCMSCVCHelpers::pfnCallComplete</code> callback when the call has been processed.
<code>pfnHostCall</code>	Called by the VirtualBox host components to perform functions which should be not accessible by the guest. Usually this entry point is used by VirtualBox to configure the service.
<code>pfnSaveState</code>	The VM state is being saved and the service must save relevant information using the SSM API (<code>VBox/ssm.h</code>).
<code>pfnLoadState</code>	The VM is being restored from the saved state and the service must load the saved information and be able to continue operations from the saved state.