Xen Management API Draft

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Comments are welcome!

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Chapter 1

Introduction

This document contains a proposal for a Xen Management API—an interface for remotely configuring and controlling virtualised guests running on a Xen-enabled host.

This document is an early draft for discussion purposes only.

The API is presented here as a set of Remote Procedure Calls, with a wire format based upon XML-RPC. No specific language bindings are prescribed, although examples will be given in the python programming language.
Although we adopt some terminology from object-oriented programming, future client language bindings may or may not be object oriented. The API reference uses the terminology *classes* and *objects*. For our purposes a *class* is simply a hierarchical namespace; an *object* is an instance of a class with its fields set to specific values. Objects are persistent and exist on the server-side. Clients may obtain opaque references to these server-side objects and then access their fields via get/set RPCs.
For each class we specify a list of fields along with their *types* and *qualifiers*. A qualifier is one of:

- RO_{run}: the field is Read Only. Furthermore, its value is automatically computed at runtime. For example: current CPU load and disk IO throughput.
- RO_{ins}: the field must be manually set when a new object is created, but is then Read Only for the duration of the object's life. For example, the maximum memory addressable by a guest is set before the guest boots.
- RW: the field is Read/Write. For example, the name of a VM.

A full list of types is given in Chapter 2. However, there are three types that require explicit mention:

- $t\ Ref$: signifies a reference to an object of type t.
- $t\ Set$: signifies a set containing values of type t.
- $(t_1, t_2)\ Map$: signifies a mapping from values of type t_1 to values of type t_2.

Note that there are a number of cases where *Ref*s are *doubly linked*—e.g. a VM has a field called `groups` of type $(VMGroup\ Ref)\ Set$; this field lists the VMGroups that a particular VM is part of. Similarly, the VMGroups class has a field called `VMs` of type $(VM\ Ref)\ Set$ that contains the VMs that are part of a particular VMGroup. These two fields are *bound together*, in the sense that adding a new VMGroup to a VM causes the VMs field of the corresponding VMGroup object to be updated automatically.
The API reference explicitly lists the fields that are bound together in this way. It also contains a diagram that shows relationships between classes. In this diagram an edge signifies the existance of a pair of fields that are bound together, using standard crows-foot notation to signify the type of relationship (e.g. one-many, many-many).

1.1 RPCs associated with fields

Each field, `f`, has an RPC accessor associated with it that returns `f`'s value:

- "`get_f(Ref x)`": takes a `Ref` that refers to an object and returns the value of `f`.

Each field, `f`, with attribute *RW* and whose outermost type is *Set* has the following additional RPCs associated with it:

- an "`add_to_f(Ref x, v)`" RPC adds a new element v to the set[1];
- a "`remove_from_f(Ref x, v)`" RPC removes element `v` from the set;

Each field, `f`, with attribute *RW* and whose outermost type is *Map* has the following additional RPCs associated with it:

- an "`add_to_f(Ref x, k, v)`" RPC adds new pair `(k, v)` to the mapping stored in `f` in object `x`. Adding a new pair for duplicate key, `k`, overwrites any previous mapping for `k`.
- a "`remove_from_f(Ref x, k)`" RPC removes the pair with key `k` from the mapping stored in `f` in object `x`.

Each field whose outermost type is neither *Set* nor *Map*, but whose attribute is *RW* has an RPC acessor associated with it that sets its value:

- For *RW* (*R*ead/*W*rite), a "`set_f(Ref x, v)`" RPC function is also provided. This sets field `f` on object `x` to value `v`.

1.2 RPCs associated with classes

- Each class has a *constructor* RPC named "`create`" that takes as parameters all fields marked *RW* and RO_{ins}. The result of this RPC is that a new *persistent* object is created on the server-side with the specified field values.
- Each class has a `get_by_uuid(uuid)` RPC that returns the object of that class that has the specified `uuid`.
- Each class that has a `short_name` field has a "`get_by_short_name(name)`" RPC that returns a set of objects of that class that have the specified `name`.
- Each class has a "`to_XML()`" RPC that serialises the state of all fields as an XML string.
- Each class has a "`destroy(Ref x)`" RPC that explicitly deletes the persistent object specified by `x` from the system. This is a non-cascading delete – if the object being removed is referenced by another object then the `destroy` call will fail.

1.2.1 Additional RPCs

As well as the RPCs enumerated above, some classes have additional RPCs associated with them. For example, the `VM` class have RPCs for cloning, suspending, starting etc. Such additional RPCs are described explicitly in the API reference.

[1] Since sets cannot contain duplicate values this operation has no action in the case that `v` was already in the set.

1.3 Wire Protocol for Remote API Calls

API calls are sent over a network to a Xen-enabled host using the XML-RPC protocol. In this Section we describe how the higher-level types used in our API Reference are mapped to primitive XML-RPC types.
In our API Reference we specify the signatures of API functions in the following style:

```
(ref_vm Set)   Host.ListAllVMs()
```

This specifies that the function with name `Host.ListAllVMs` takes no parameters and returns a Set of `ref_vms`. These types are mapped onto XML-RPC types in a straight-forward manner:

- Floats, Bools, DateTimes and Strings map directly to the XML-RPC `double`, `boolean`, `dateTime.iso8601`, and `string` elements.
- all our "`ref_`" types (e.g. `ref_vm` in the above example) map to XML-RPC's `String` type. The string itself is the OSF DCE UUID presentation format (as output by `uuidgen`, etc).
- ints are all assumed to be 64-bit in our API and are encoded as a string of decimal digits (rather than using XML-RPC's built-in 32-bit `i4` type).
- values of enum types are encoded as strings. For example, a value of `destroy` of type `on_normal_exit`, would be conveyed as:

```
<value><string>destroy</string></value>
```

- for all our types, `t`, our type `t Set` simply maps to XML-RPC's `Array` type, so for example a value of type `cpu_feature Set` would be transmitted like this:

```
<array>
  <data>
    <value><string>CX8</string></value>
    <value><string>PSE36</string></value>
    <value><string>FPU</string></value>
  </data>
</array>
```

- for types `k` and `v`, our type `(k, v) Map` maps onto an XML-RPC struct, with the key as the name of the struct. Note that the `(k, v) Map` type is only valid when `k` is a `String`, `Ref`, or `Int`, and in each case the keys of the maps are stringified as above. For example, the `(String, double) Map` containing a the mappings Mike → 2.3 and John → 1.2 would be represented as:

```
<value>
  <struct>
    <member>
      <name>Mike</name>
      <value><double>2.3</double></value>
    </member>
    <member>
      <name>John</name>
      <value><double>1.2</double></value>
    </member>
  </struct>
</value>
```

- our `Void` type is transmitted as an empty string.

1.3.1 Return Values/Status Codes

The return value of an RPC call is an XML-RPC `Struct`.

- The first element of the struct is named `Status`; it contains a string value indicating whether the result of the call was a "`Success`" or a "`Failure`".

If `Status` was set to `Success` then the Struct contains a second element named `Value`:

- The element of the struct named `Value` contains the function's return value.

In the case where `Status` is set to `Failure` then the struct contains a second element named `ErrorDescription`:

- The element of the struct named `ErrorDescription` contains an array of string values. The first element of the array represents an error code; the remainder of the array represents error parameters relating to that code.

For example, an XML-RPC return value from the `Host.ListAllVMs` function above may look like this:

```
<struct>
   <member>
     <name>Status</name>
     <value>Success</value>
   </member>
   <member>
      <name>Value</name>
      <value>
        <array>
           <data>
             <value>vm-id-1</value>
             <value>vm-id-2</value>
             <value>vm-id-3</value>
           </data>
        </array>
     </value>
   </member>
</struct>
```

1.4 Making XML-RPC Calls

1.4.1 Transport Layer

We ought to support at least

- HTTP/S for remote administration
- HTTP over Unix domain sockets for local administration

1.4.2 Session Layer

The XML-RPC interface is session-based; before you can make arbitrary RPC calls you must login and initiate a session. For example:

```
session_id    Session.login_with_password(string uname, string pwd)
```

Where `uname` and `password` refer to your username and password respectively, as defined by the Xen administrator. The `session_id` returned by `Session.Login` is passed to subequent RPC calls as an authentication token.
A session can be terminated with the `Session.Logout` function:

```
void          Session.Logout(session_id session)
```

1.4.3 Synchronous and Asynchronous invocation

Each method call (apart from those on "Session" and "Task" objects) can be made either synchronously or asynchronously. A synchronous RPC call blocks until the return value is received; the return value of a synchronous RPC call is exactly as specified in Section 1.3.1.
Each of the methods specified in the API Reference is synchronous. However, although not listed explicitly in this document, each method call has an asynchronous analogue in the `Async` namespace. For example, synchronous call `VM.Install(...)` (described in Chapter 2) has an asynchronous counterpart, `Async.VM.Install(...)`, that is non-blocking.
Instead of returning its result directly, an asynchronous RPC call returns a `task-id`; this identifier is subsequently used to track the status of a running asynchronous RPC. Note that an asychronous call may fail immediately, before a `task-id` has even been created—to represent this eventuality, the returned `task-id` is wrapped in an XML-RPC struct with a `Status`, `ErrorDescription` and `Value` fields, exactly as specified in Section 1.3.1.
The `task-id` is provided in the `Value` field if `Status` is set to `Success`.
Two special RPC calls are provided to poll the status of asynchronous calls:

```
Array<task_id>  Async.Task.GetAllTasks (session_id s)
task_status     Async.Task.GetStatus   (session_id s, task_id t)
```

`Async.Task.GetAllTasks` returns a set of the currently executing asynchronous tasks belong to the current user[2].
`Async.Task.GetStatus` returns a `task_status` result. This is an XML-RPC struct with three elements:

- The first element is named `Progress` and contains an `Integer` between 0 and 100 representing the estimated percentage of the task currently completed.
- The second element is named `ETA` and contains a `DateTime` representing the estimated time the task will be complete.
- The third element is named `Result`. If `Progress` is not 100 then `Result` contains the empty string. If `Progress` *is* set to 100, then `Result` contains the function's return result (as specified in Section 1.3.1)[3].

1.5 Example interactive session

This section describes how an interactive session might look, using the python XML-RPC client library.
First, initialise python and import the library `xmlrpclib`:

```
\$ python2.4
...
>>> import xmlrpclib
```

Create a python object referencing the remote server:

[2]The current user is determined by the username that was provided to `Session.Login`.
[3]Recall that this itself is a struct potentially containing status, errorcode, value fields etc.

```
>>> xen = xmlrpclib.Server("http://test:4464")
```

Acquire a session token by logging in with a username and password (error-handling ommitted for brevity; the session token is pointed to by the key `'Value'` in the returned dictionary)

```
>>> session = xen.Session.do_login_with_password("user", "passwd")['Value']
```

When serialised, this call looks like the following:

```
<?xml version='1.0'?>
<methodCall>
  <methodName>Session.do_login_with_password</methodName>
  <params>
    <param>
      <value><string>user</string></value>
    </param>
    <param>
      <value><string>passwd</string></value>
    </param>
  </params>
</methodCall>
```

Next, the user may acquire a list of all the VMs known to the host: (Note the call takes the session token as the only parameter)

```
>>> all_vms = xen.VM.do_list(session)['Value']
>>> all_vms
['b7b92d9e-d442-4710-92a5-ab039fd7d89b', '23e1e837-abbf-4675-b077-d4007989b0cc', '2045dbc0-0734-4eea-9c
```

Note the VM references are internally UUIDs. Once a reference to a VM has been acquired a lifecycle operation may be invoked:

```
>>> xen.VM.do_start(session, all_vms[3], False)
{'Status': 'Failure', 'ErrorDescription': 'Operation not implemented'}
```

In this case the `start` message has not been implemented and an error response has been returned. Currently these high-level errors are returned as structured data (rather than as XMLRPC faults), allowing for internationalised errors in future. Finally, here are some examples of using accessors for object fields:

```
>>> xen.VM.getname_label(session, all_vms[3])['Value']
'SMP'
>>> xen.VM.getname_description(session, all_vms[3])['Value']
'Debian for Xen'
```

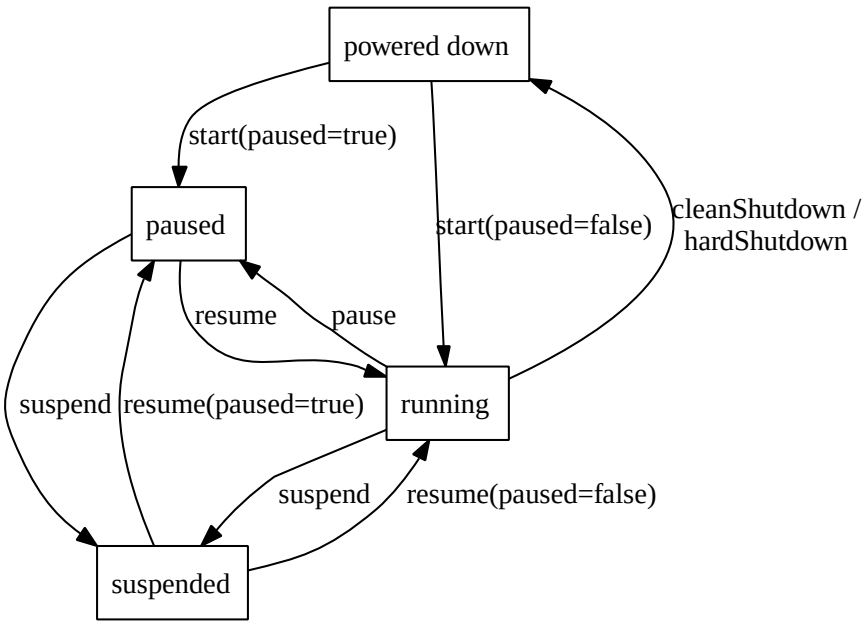


Figure 1.1: VM Lifecycle

1.6 VM Lifecycle

Figure 1.1 shows the states that a VM can be in and the API calls that can be used to move the VM between these states.

1.7 To-Do

Lots and lots! Including:

1.7.1 Clarity

- Roll constructors and get_by_uuid etc (section 1.2) into section 2 so that it is clearer that each class has these.
- Emphasise that enums are strings on the wire, and so are not restricted to a certain number of bits.
- Clarify return values, in particular that void means return a status code, potential error description, but otherwise no value.
- Talk about UUID generation.
- Clarify session behaviour wrt timeouts and disconnects.
- Clarify behaviour of progress field on asyncrhonous request polling when that request fails.

1.7.2 Content

Model

- Improve the set of available power_states and corresponding lifecycle semantics. Rename power_state, maybe.
- Specify the CPU scheduler configuration properly, inc CPU affinity, weights, etc.
- Add Vm.architecture and Host.compatible_architecture fields.
- Add migration calls, including the ability to test whether a migration will succeed, and authentication token exchange.
- Improve asynchronous task handling, with a registration call, a "blocking poll" call, and an explicit notification destination. Registration for "power_state" is useful.
- Specify that session keys outlive the HTTP session, and add a timeout for them (configurable in the tools).
- Add places for people to store extra data ("otherConfig" perhaps)
- Specify how hardware UUIDs are used / accessed.
- Marking VDIs as exclusive / shareable (locking?)
- Consider how to represent CDROMs (as VDIs?)
- Define lists of exceptions which may be thrown by each RPC, including error codes and parameters.
- Host characteristics: minimum amount of memory, TPM, network bandwidth, amount of host memory, amount consumed by VMs, max amount available for new VMs?
- Cooked resource monitoring interface.
- Network needs additional attributes that provide media characteristics of the NIC:
  - RO bandwidth integer Bandwidth in mbps
  - RO latency integer time in ms for an icmp roundtrip to a host on the same subnet.

- TPM
  - Would it not be better to have a class TPM and a member TPMs ((TPM ref) Set) containing an array of zero or one references to TPMs? I assume that an empty array would make it clear that no TPM is associated with the VM instead of encoding its existence into TPM/instance or TPM/backend somehow. The current members instance and backend could then be moved into the TPM class.
  - Also a Xen system can be running an access control policy where each VM's runtime access to resources is restricted by the label it has been given compared to those of the resources. Currently a VM's configuration file may contain a line like access_control[policy='<name of the system's policy>',label='<label given to VM>']. I think the identifiers 'policy' and 'label' should also be part of the VM class either directly in the form 'access_control/policy' or indirectly in an access_control class.
- Mike Day's Vm.profile field?
- Clone customisation?
- NIC teaming? The NIC field of the Network class should be a list (Set) so that we can signify NIC teaming. (Combining physical NICs in a single host interface to achieve greater bandwidth).

Transport

- Allow non-HTTP transports. Explicitly allow stdio transport, for SSH.

Authentication

- Delegation to the transport layer.
- Extend PAM exchange across the wire.
- Fine-grained access control.

Chapter 2

API Reference

2.1 Classes

The following classes are defined:

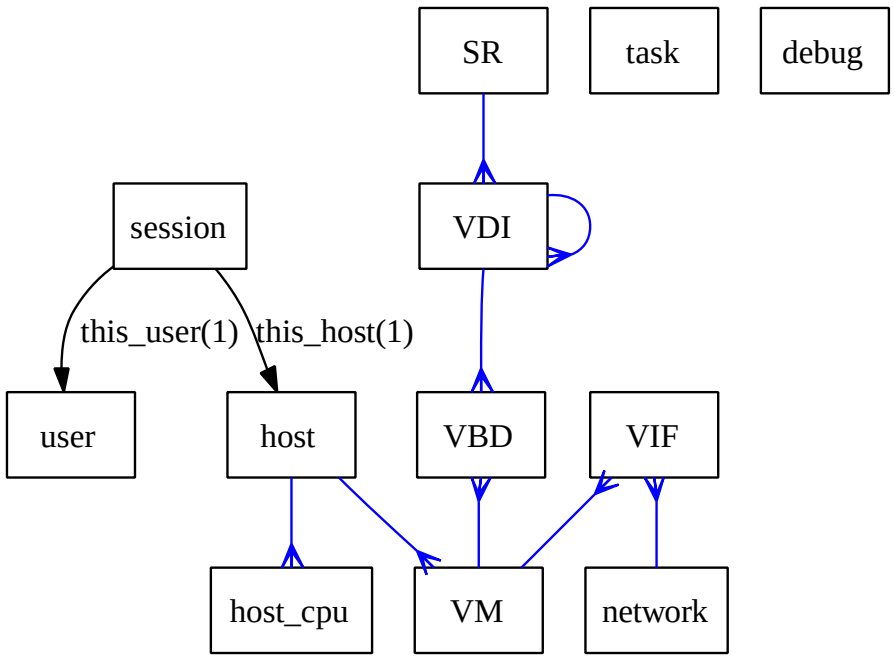
Name	Description
`session`	A session
`task`	A longrunning asynchronous task
`VM`	A virtual machine (or 'guest')
`host`	A physical host
`host_cpu`	A physical CPU
`network`	A virtual network
`VIF`	A virtual network interface
`SR`	A storage repository
`VDI`	A virtual disk image
`VBD`	A virtual block device
`user`	A user of the system
`debug`	A basic class for testing

2.2 Relationships Between Classes

Fields that are bound together are shown in the following table:

object.field	*object.field*	*relationship*
VDI.VBDs	VBD.VDI	many-to-one
VDI.parent	VDI.children	one-to-many
VBD.VM	VM.VBDs	one-to-many
VIF.VM	VM.VIFs	one-to-many
VIF.network	network.VIFs	one-to-many
SR.VDIs	VDI.SR	many-to-one
host.resident_VMs	VM.resident_on	many-to-one
host.host_CPUs	host_cpu.host	many-to-one

The following represents bound fields (as specified above) diagramatically, using crows-foot notation to specify one-to-one, one-to-many or many-to-many relationships:



2.2.1 List of bound fields

2.3 Types

2.3.1 Primitives

The following primitive types are used to specify methods and fields in the API Reference:

Type	Description
String	text strings
Int	64-bit integers
Float	IEEE double-precision floating-point numbers
Bool	boolean
DateTime	date and timestamp
Ref (object name)	reference to an object of class name

2.3.2 Higher order types

The following type constructors are used:

Type	Description
List (t)	an arbitrary-length list of elements of type t
Map (a → b)	a table mapping values of type a to values of type b

2.3.3 Enumeration types

The following enumeration types are used:

`enum vdi_type`	
`system`	a disk that may be replaced on upgrade
`user`	a disk that is always preserved on upgrade
`ephemeral`	a disk that may be reformatted on upgrade

enum vm_power_state	
Halted	Halted
Paused	Paused
Running	Running
Suspended	Suspended
ShuttingDown	Shutting Down
Unknown	Some other unknown state

enum cpu_feature	
FPU	Onboard FPU
VME	Virtual Mode Extensions
DE	Debugging Extensions
PSE	Page Size Extensions
TSC	Time Stamp Counter
MSR	Model-Specific Registers, RDMSR, WRMSR
PAE	Physical Address Extensions
MCE	Machine Check Architecture
CX8	CMPXCHG8 instruction
APIC	Onboard APIC
SEP	SYSENTER/SYSEXIT
MTRR	Memory Type Range Registers
PGE	Page Global Enable
MCA	Machine Check Architecture
CMOV	CMOV instruction (FCMOVCC and FCOMI too if FPU present)
PAT	Page Attribute Table
PSE36	36-bit PSEs
PN	Processor serial number
CLFLSH	Supports the CLFLUSH instruction
DTES	Debug Trace Store
ACPI	ACPI via MSR
MMX	Multimedia Extensions
FXSR	FXSAVE and FXRSTOR instructions (fast save and restore
XMM	Streaming SIMD Extensions
XMM2	Streaming SIMD Extensions-2
SELFSNOOP	CPU self snoop
HT	Hyper-Threading
ACC	Automatic clock control
IA64	IA-64 processor
SYSCALL	SYSCALL/SYSRET
MP	MP Capable.
NX	Execute Disable
MMXEXT	AMD MMX extensions
LM	Long Mode (x86-64)
3DNOWEXT	AMD 3DNow! extensions
3DNOW	3DNow!
RECOVERY	CPU in recovery mode
LONGRUN	Longrun power control
LRTI	LongRun table interface
CXMMX	Cyrix MMX extensions
K6_MTRR	AMD K6 nonstandard MTRRs
CYRIX_ARR	Cyrix ARRs (= MTRRs)

CENTAUR_MCR	Centaur MCRs (= MTRRs)
K8	Opteron, Athlon64
K7	Athlon
P3	P3
P4	P4
CONSTANT_TSC	TSC ticks at a constant rate
FXSAVE_LEAK	FXSAVE leaks FOP/FIP/FOP
XMM3	Streaming SIMD Extensions-3
MWAIT	Monitor/Mwait support
DSCPL	CPL Qualified Debug Store
EST	Enhanced SpeedStep
TM2	Thermal Monitor 2
CID	Context ID
CX16	CMPXCHG16B
XTPR	Send Task Priority Messages
XSTORE	on-CPU RNG present (xstore insn)
XSTORE_EN	on-CPU RNG enabled
XCRYPT	on-CPU crypto (xcrypt insn)
XCRYPT_EN	on-CPU crypto enabled
LAHF_LM	LAHF/SAHF in long mode
CMP_LEGACY	If yes HyperThreading not valid

enum on_normal_exit	
destroy	destroy the VM state
restart	restart the VM

enum on_crash_behaviour	
destroy	destroy the VM state
coredump_and_destroy	record a coredump and then destroy the VM state
restart	restart the VM
coredump_and_restart	record a coredump and then restart the VM
preserve	leave the crashed VM as-is
rename_restart	rename the crashed VM and start a new copy

enum boot_type	
bios	boot an HVM guest using an emulated BIOS
grub	boot from inside the machine using grub
kernel_external	boot from an external kernel
kernel_internal	boot from a kernel inside the guest filesystem

enum vbd_mode	
RO	disk is mounted read-only
RW	disk is mounted read-write

enum driver_type	
ioemu	use hardware emulation
paravirtualised	use paravirtualised driver

2.4 Class: session

2.4.1 Fields for class: session

Name	**session**		
Description	*A session*		
Quals	Field	Type	Description
RO_{ins}	`this_host`	host ref	Currently connected host
RO_{ins}	`this_user`	user ref	Currently connected user

2.4.2 Additional RPCs associated with class: session

RPC name: login_with_password

Overview: Attempt to authenticate the user, returning a session_id if successful
Signature:

```
(session ref) login_with_password (string uname, string pwd)
```

Arguments:

type	name	description
`string`	uname	Username for login.
`string`	pwd	Password for login.

Return Type: `session ref`
ID of newly created session

RPC name: logout

Overview: Log out of a session
Signature:

```
void logout (session_id s)
```

Return Type: `void`

RPC name: get_this_host

Overview: get accessor message derived from field this_host of object session
Signature:

```
(host ref) get_this_host (session_id s, session ref self)
```

Arguments:

type	name	description
`session ref`	self	object instance

Return Type: `host ref`
value of the field

RPC name: get_this_user

Overview: get accessor message derived from field this_user of object session
Signature:

```
(user ref) get_this_user (session_id s, session ref self)
```

Arguments:

type	name	description
`session ref`	self	object instance

Return Type: `user ref`
value of the field

RPC name: create

Overview: constructor for class session
Signature:

```
(session ref) create (session_id s, session record args)
```

Arguments:

type	name	description
`session record`	args	All constructor arguments

Return Type: `session ref`
reference to the newly created object

RPC name: destroy

Overview: destructor for class session
Signature:

```
void destroy (session_id s, session ref self)
```

Arguments:

type	name	description
`session ref`	self	object instance

Return Type: `void`

RPC name: get_by_uuid

Overview: returns the session instance with a particular uuid
Signature:

```
(session ref) get_by_uuid (session_id s, string uuid)
```

Arguments:

type	name	description
`string`	uuid	UUID of object to return

Return Type: `session ref`
reference to the object

RPC name: get_record

Overview: returns a record containing the state of an instance of class session
Signature:

```
(session record) get_record (session_id s, session ref self)
```

Arguments:

type	name	description
`session ref`	self	reference to the object

Return Type: `session record`
all fields from the object

RPC name: get_record_internal

Overview: returns a record containing the state of an instance of class session
Signature:

```
(session record) get_record_internal (session_id s, session ref self)
```

Arguments:

type	name	description
`session ref`	self	reference to the object

Return Type: `session record`
all fields from the object, including implementation-only ones

RPC name: get_all

Overview: returns a set of references to all objects
Signature:

```
((session ref) Set) get_all (session_id s)
```

Return Type: `(session ref) Set`
references to all objects

2.5 Class: task

2.5.1 Fields for class: task

Name	**task**		
Description	*A longrunning asynchronous task*		
Quals	Field	Type	Description
RO_{run}	`uuid`	string	unique identifier/object reference
RW	`name/label`	string	a human-readable name
RW	`name/description`	string	a notes field containg human-readable description

2.5.2 Additional RPCs associated with class: task

RPC name: get_status

Overview: Poll a running asynchronous RPC invocation and query its status
Signature:

```
(uuid ref) get_status (session_id s, task ref task)
```

Arguments:

type	name	description
`task ref`	task	The ID of the RPC call to poll

Return Type: `uuid ref`
String describing status of specified asynchronous RPC invocation, including estimated completion time

RPC name: get_all_tasks

Overview: List all asynchronous RPC calls currently executing
Signature:

```
((task ref) Set) get_all_tasks (session_id s)
```

Return Type: `(task ref) Set`
A list of tasks currently executing. Note that tasks are associated with users rather than sessions. Thus, if you logout and login again with a different session but the same user, this function will still return the user's running tasks.

RPC name: get_uuid

Overview: get accessor message derived from field uuid of object task
Signature:

```
string get_uuid (session_id s, task ref self)
```

Arguments:

type	name	description
`task ref`	self	object instance

Return Type: `string`
value of the field

RPC name: get_name_label

Overview: get accessor message derived from field name/label of object task
Signature:

```
string get_name_label (session_id s, task ref self)
```

Arguments:

type	name	description
`task ref`	self	object instance

Return Type: `string`
value of the field

RPC name: set_name_label

Overview: set accessor message derived from field name/label of object task
Signature:

```
void set_name_label (session_id s, task ref self, string value)
```

Arguments:

type	name	description
`task ref`	self	object instance
`string`	value	New value to set

Return Type: `void`

RPC name: get_name_description

Overview: get accessor message derived from field name/description of object task
Signature:

```
string get_name_description (session_id s, task ref self)
```

Arguments:

type	name	description
`task ref`	self	object instance

Return Type: `string`
value of the field

RPC name: set_name_description

Overview: set accessor message derived from field name/description of object task
Signature:

```
void set_name_description (session_id s, task ref self, string value)
```

Arguments:

type	name	description
`task ref`	self	object instance
`string`	value	New value to set

Return Type: `void`

RPC name: create

Overview: constructor for class task
Signature:

```
(task ref) create (session_id s, task record args)
```

Arguments:

type	name	description
`task record`	args	All constructor arguments

Return Type: `task ref`
reference to the newly created object

RPC name: destroy

Overview: destructor for class task
Signature:

```
void destroy (session_id s, task ref self)
```

Arguments:

type	name	description
`task ref`	self	object instance

Return Type: `void`

RPC name: get_by_uuid

Overview: returns the task instance with a particular uuid
Signature:

```
(task ref) get_by_uuid (session_id s, string uuid)
```

Arguments:

type	name	description
`string`	uuid	UUID of object to return

Return Type: `task ref`
reference to the object

RPC name: get_record

Overview: returns a record containing the state of an instance of class task
Signature:

```
(task record) get_record (session_id s, task ref self)
```

Arguments:

type	name	description
`task ref`	self	reference to the object

Return Type: `task record`
all fields from the object

RPC name: get_record_internal

Overview: returns a record containing the state of an instance of class task
Signature:

```
(task record) get_record_internal (session_id s, task ref self)
```

Arguments:

type	name	description
`task ref`	self	reference to the object

Return Type: `task record`
all fields from the object, including implementation-only ones

RPC name: get_all

Overview: returns a set of references to all objects
Signature:

```
((task ref) Set) get_all (session_id s)
```

Return Type: `(task ref) Set`
references to all objects

RPC name: get_by_label

Overview: returns the task instance with a particular name label
Signature:

```
((task ref) Set) get_by_label (session_id s, string label)
```

Arguments:

type	name	description
`string`	label	label of object to return

Return Type: `(task ref) Set`
references to objects with match names

2.6 Class: VM

2.6.1 Fields for class: VM

Name	**VM**		
Description	*A virtual machine (or 'guest')*		
Quals	Field	Type	Description
RO_{run}	`uuid`	string	unique identifier/object reference
RO_{run}	`power_state`	vm_power_state	Current power state of the machine
RW	`name/label`	string	a human-readable name
RW	`name/description`	string	a notes field containg human-readable description
RW	`user_version`	int	a user version number for this machine
RW	`is_a_template`	bool	true if this is a template. Template VMs can never be started, they are used only for cloning other VMs
RO_{run}	`resident_on`	host ref	the host the VM is currently resident on
RO_{ins}	`memory/static_max`	int	Statically-set (i.e. absolute) maximum
RW	`memory/dynamic_max`	int	Dynamic maximum
RO_{run}	`memory/actual`	int	Guest's actual usage
RW	`memory/dynamic_min`	int	Dynamic minimum
RO_{ins}	`memory/static_min`	int	Statically-set (i.e. absolute) mininum
RW	`VCPUs/policy`	string	the name of the VCPU scheduling policy to be applied
RW	`VCPUs/params`	string	string-encoded parameters passed to selected VCPU policy
RO_{run}	`VCPUs/number`	int	Current number of VCPUs
RO_{run}	`VCPUs/utilisation`	(int $\rightarrow$ float) Map	Utilisation for all of guest's current VCPUs
RO_{ins}	`VCPUs/features/required`	(cpu_feature) Set	CPU features the guest demands the host supports
RO_{ins}	`VCPUs/features/can_use`	(cpu_feature) Set	CPU features the guest can use if available
RW	`VCPUs/features/force_on`	(cpu_feature) Set	CPU features to expose to the guest above the bare minimum
RW	`VCPUs/features/force_off`	(cpu_feature) Set	CPU features to hide to the guest
RW	`actions/after_shutdown`	on_normal_exit	action to take after the guest has shutdown itself
RW	`actions/after_reboot`	on_normal_exit	action to take after the guest has rebooted itself
RW	`actions/after_suspend`	on_normal_exit	action to take after the guest has suspended itself
RW	`actions/after_crash`	on_crash_behaviour	action to take if the guest crashes
RO_{ins}	`VIFs`	(VIF ref) Set	virtual network interfaces
RO_{ins}	`VBDs`	(VBD ref) Set	virtual block devices
RO_{ins}	`TPM/instance`	int	included for TPM support
RO_{ins}	`TPM/backend`	int	included for TPM support
RW	`bios/boot`	string	device to boot the guest from
RW	`platform/std_VGA`	bool	emulate standard VGA instead of cirrus logic
RW	`platform/serial`	string	redirect serial port to pty

RW	platform/localtime	bool	set RTC to local time
RW	platform/clock_offset	bool	timeshift applied to guest's clock
RW	platform/enable_audio	bool	emulate audio
RW	builder	string	domain builder to use
RW	boot_method	boot_type	select how this machine should boot
RW	kernel/kernel	string	path to kernel e.g. /boot/vmlinuz
RW	kernel/initrd	string	path to the initrd e.g. /boot/initrd.img
RW	kernel/args	string	extra kernel command-line arguments
RW	grub/cmdline	string	grub command-line
RO_{ins}	PCI_bus	string	PCI bus path for pass-through devices
RO_{run}	tools_version	(string → string) Map	versions of installed paravirtualised drivers
RW	otherConfig	(string → string) Map	additional configuration

2.6.2 Additional RPCs associated with class: VM

RPC name: clone

Overview: Clones the specified VM, making a new VM. Clone automatically exploits the capabilities of the underlying storage repository in which the VM's disk images are stored (e.g. Copy on Write). This function can only be called when the VM is in the Halted State.
Signature:

```
(VM ref) clone (session_id s, VM ref vm, string new_name)
```

Arguments:

type	name	description
VM ref	vm	The VM to be cloned
string	new_name	The name of the cloned VM

Return Type: VM ref
The ID of the newly created VM.

RPC name: start

Overview: Start the specified VM. This function can only be called with the VM is in the Halted State.
Signature:

```
void start (session_id s, VM ref vm, bool start_paused)
```

Arguments:

type	name	description
VM ref	vm	The VM to start
bool	start_paused	Instantiate VM in paused state if set to true.

Return Type: void

RPC name: pause

Overview: Pause the specified VM. This can only be called when the specified VM is in the Running state.
Signature:

```
void pause (session_id s, VM ref vm)
```

Arguments:

type	name	description
VM ref	vm	The VM to pause

Return Type: `void`

RPC name: unpause

Overview: Resume the specified VM. This can only be called when the specified VM is in the Paused state.
Signature:

```
void unpause (session_id s, VM ref vm)
```

Arguments:

type	name	description
VM ref	vm	The VM to pause

Return Type: `void`

RPC name: clean_shutdown

Overview: Attempt to cleanly shutdown the specified VM. (Note: this may not be supported—e.g. if a guest agent is not installed).
Once shutdown has been completed perform poweroff action specified in guest configuration.
Signature:

```
void clean_shutdown (session_id s, VM ref vm)
```

Arguments:

type	name	description
VM ref	vm	The VM to shutdown

Return Type: `void`

RPC name: clean_reboot

Overview: Attempt to cleanly shutdown the specified VM (Note: this may not be supported—e.g. if a guest agent is not installed).
Once shutdown has been completed perform reboot action specified in guest configuration.
Signature:

```
void clean_reboot (session_id s, VM ref vm)
```

Arguments:

type	name	description
VM ref	vm	The VM to shutdown

Return Type: `void`

RPC name: hard_shutdown

Overview: Stop executing the specified VM without attempting a clean shutdown. Then perform poweroff action specified in VM configuration.
Signature:

```
void hard_shutdown (session_id s, VM ref vm)
```

Arguments:

type	name	description
VM ref	vm	The VM to destroy

Return Type: `void`

RPC name: hard_reboot

Overview: Stop executing the specified VM without attempting a clean shutdown. Then perform reboot action specified in VM configuration
Signature:

```
void hard_reboot (session_id s, VM ref vm)
```

Arguments:

type	name	description
VM ref	vm	The VM to reboot

Return Type: `void`

RPC name: suspend

Overview: Suspend the specified VM to disk.
Signature:

```
void suspend (session_id s, VM ref vm)
```

Arguments:

type	name	description
VM ref	vm	The VM to hibernate

Return Type: `void`

RPC name: resume

Overview: Awaken the specified VM and resume it.
Signature:

```
void resume (session_id s, VM ref vm, bool start_paused)
```

Arguments:

type	name	description
VM ref	vm	The VM to unhibernate
bool	start_paused	Unhibernate VM in paused state if set to true.

Return Type: `void`

RPC name: get_all

Overview: Return a list of all the VMs known to the system.
Signature:

```
((VM ref) Set) get_all (session_id s)
```

Return Type: `(VM ref) Set`
A list of all the IDs of all the VMs

RPC name: get_uuid

Overview: get accessor message derived from field uuid of object VM
Signature:

```
string get_uuid (session_id s, VM ref self)
```

Arguments:

type	name	description
VM ref	self	object instance

Return Type: `string`
value of the field

RPC name: get_power_state

Overview: get accessor message derived from field power_state of object VM
Signature:

```
(vm_power_state) get_power_state (session_id s, VM ref self)
```

Arguments:

type	name	description
VM ref	self	object instance

Return Type: `vm_power_state`

value of the field

RPC name: get_name_label

Overview: get accessor message derived from field name/label of object VM
Signature:

```
string get_name_label (session_id s, VM ref self)
```

Arguments:

type	name	description
VM ref	self	object instance

Return Type: `string`
value of the field

RPC name: set_name_label

Overview: set accessor message derived from field name/label of object VM
Signature:

```
void set_name_label (session_id s, VM ref self, string value)
```

Arguments:

type	name	description
VM ref	self	object instance
string	value	New value to set

Return Type: `void`

RPC name: get_name_description

Overview: get accessor message derived from field name/description of object VM
Signature:

```
string get_name_description (session_id s, VM ref self)
```

Arguments:

type	name	description
VM ref	self	object instance

Return Type: `string`
value of the field

RPC name: set_name_description

Overview: set accessor message derived from field name/description of object VM
Signature:

```
void set_name_description (session_id s, VM ref self, string value)
```

Arguments:

type	name	description
VM ref	self	object instance
string	value	New value to set

Return Type: void

RPC name: get_user_version

Overview: get accessor message derived from field user_version of object VM
Signature:

```
int get_user_version (session_id s, VM ref self)
```

Arguments:

type	name	description
VM ref	self	object instance

Return Type: int
value of the field

RPC name: set_user_version

Overview: set accessor message derived from field user_version of object VM
Signature:

```
void set_user_version (session_id s, VM ref self, int value)
```

Arguments:

type	name	description
VM ref	self	object instance
int	value	New value to set

Return Type: void

RPC name: get_is_a_template

Overview: get accessor message derived from field is_a_template of object VM
Signature:

```
bool get_is_a_template (session_id s, VM ref self)
```

Arguments:

type	name	description
`VM ref`	self	object instance

Return Type: `bool`
value of the field

RPC name: set_is_a_template

Overview: set accessor message derived from field is_a_template of object VM
Signature:

```
void set_is_a_template (session_id s, VM ref self, bool value)
```

Arguments:

type	name	description
`VM ref`	self	object instance
`bool`	value	New value to set

Return Type: `void`

RPC name: get_resident_on

Overview: get accessor message derived from field resident_on of object VM
Signature:

```
(host ref) get_resident_on (session_id s, VM ref self)
```

Arguments:

type	name	description
`VM ref`	self	object instance

Return Type: `host ref`
value of the field

RPC name: get_memory_static_max

Overview: get accessor message derived from field memory/static_max of object VM
Signature:

```
int get_memory_static_max (session_id s, VM ref self)
```

Arguments:

type	name	description
`VM ref`	self	object instance

Return Type: `int`
value of the field

RPC name: get_memory_dynamic_max

Overview: get accessor message derived from field memory/dynamic_max of object VM
Signature:

```
int get_memory_dynamic_max (session_id s, VM ref self)
```

Arguments:

type	name	description
VM ref	self	object instance

Return Type: int
value of the field

RPC name: set_memory_dynamic_max

Overview: set accessor message derived from field memory/dynamic_max of object VM
Signature:

```
void set_memory_dynamic_max (session_id s, VM ref self, int value)
```

Arguments:

type	name	description
VM ref	self	object instance
int	value	New value to set

Return Type: void

RPC name: get_memory_actual

Overview: get accessor message derived from field memory/actual of object VM
Signature:

```
int get_memory_actual (session_id s, VM ref self)
```

Arguments:

type	name	description
VM ref	self	object instance

Return Type: int
value of the field

RPC name: get_memory_dynamic_min

Overview: get accessor message derived from field memory/dynamic_min of object VM
Signature:

```
int get_memory_dynamic_min (session_id s, VM ref self)
```

Arguments:

type	name	description
VM ref	self	object instance

Return Type: int
value of the field

RPC name: set_memory_dynamic_min

Overview: set accessor message derived from field memory/dynamic_min of object VM
Signature:

```
void set_memory_dynamic_min (session_id s, VM ref self, int value)
```

Arguments:

type	name	description
VM ref	self	object instance
int	value	New value to set

Return Type: void

RPC name: get_memory_static_min

Overview: get accessor message derived from field memory/static_min of object VM
Signature:

```
int get_memory_static_min (session_id s, VM ref self)
```

Arguments:

type	name	description
VM ref	self	object instance

Return Type: int
value of the field

RPC name: get_VCPUs_policy

Overview: get accessor message derived from field VCPUs/policy of object VM
Signature:

```
string get_VCPUs_policy (session_id s, VM ref self)
```

Arguments:

type	name	description
VM ref	self	object instance

Return Type: string
value of the field

RPC name: set_VCPUs_policy

Overview: set accessor message derived from field VCPUs/policy of object VM
Signature:

```
void set_VCPUs_policy (session_id s, VM ref self, string value)
```

Arguments:

type	name	description
VM ref	self	object instance
string	value	New value to set

Return Type: void

RPC name: get_VCPUs_params

Overview: get accessor message derived from field VCPUs/params of object VM
Signature:

```
string get_VCPUs_params (session_id s, VM ref self)
```

Arguments:

type	name	description
VM ref	self	object instance

Return Type: string
value of the field

RPC name: set_VCPUs_params

Overview: set accessor message derived from field VCPUs/params of object VM
Signature:

```
void set_VCPUs_params (session_id s, VM ref self, string value)
```

Arguments:

type	name	description
VM ref	self	object instance
string	value	New value to set

Return Type: void

RPC name: get_VCPUs_number

Overview: get accessor message derived from field VCPUs/number of object VM
Signature:

```
int get_VCPUs_number (session_id s, VM ref self)
```

Arguments:

type	name	description
`VM ref`	self	object instance

Return Type: `int`
value of the field

RPC name: get_VCPUs_utilisation

Overview: get accessor message derived from field VCPUs/utilisation of object VM
Signature:

```
((int -> float) Map) get_VCPUs_utilisation (session_id s, VM ref self)
```

Arguments:

type	name	description
`VM ref`	self	object instance

Return Type: `(int → float) Map`
value of the field

RPC name: get_VCPUs_features_required

Overview: get accessor message derived from field VCPUs/features/required of object VM
Signature:

```
((cpu_feature) Set) get_VCPUs_features_required (session_id s, VM ref self)
```

Arguments:

type	name	description
`VM ref`	self	object instance

Return Type: `(cpu_feature) Set`
value of the field

RPC name: get_VCPUs_features_can_use

Overview: get accessor message derived from field VCPUs/features/can_use of object VM
Signature:

```
((cpu_feature) Set) get_VCPUs_features_can_use (session_id s, VM ref self)
```

Arguments:

type	name	description
`VM ref`	self	object instance

Return Type: `(cpu_feature) Set`
value of the field

RPC name: get_VCPUs_features_force_on

Overview: get accessor message derived from field VCPUs/features/force_on of object VM
Signature:

```
((cpu_feature) Set) get_VCPUs_features_force_on (session_id s, VM ref self)
```

Arguments:

type	name	description
VM ref	self	object instance

Return Type: (cpu_feature) Set
value of the field

RPC name: add_VCPUs_features_force_on

Overview: set add message derived from field VCPUs/features/force_on of object VM
Signature:

```
void add_VCPUs_features_force_on (session_id s, VM ref self, cpu_feature value)
```

Arguments:

type	name	description
VM ref	self	object instance
cpu_feature	value	New value to add

Return Type: void

RPC name: remove_VCPUs_features_force_on

Overview: set remove message derived from field VCPUs/features/force_on of object VM
Signature:

```
void remove_VCPUs_features_force_on (session_id s, VM ref self, cpu_feature value)
```

Arguments:

type	name	description
VM ref	self	object instance
cpu_feature	value	Value to remove

Return Type: void

RPC name: get_VCPUs_features_force_off

Overview: get accessor message derived from field VCPUs/features/force_off of object VM
Signature:

```
((cpu_feature) Set) get_VCPUs_features_force_off (session_id s, VM ref self)
```

Arguments:

type	name	description
VM ref	self	object instance

Return Type: (cpu_feature) Set
value of the field

RPC name: add_VCPUs_features_force_off

Overview: set add message derived from field VCPUs/features/force_off of object VM
Signature:

```
void add_VCPUs_features_force_off (session_id s, VM ref self, cpu_feature value)
```

Arguments:

type	name	description
VM ref	self	object instance
cpu_feature	value	New value to add

Return Type: void

RPC name: remove_VCPUs_features_force_off

Overview: set remove message derived from field VCPUs/features/force_off of object VM
Signature:

```
void remove_VCPUs_features_force_off (session_id s, VM ref self, cpu_feature value)
```

Arguments:

type	name	description
VM ref	self	object instance
cpu_feature	value	Value to remove

Return Type: void

RPC name: get_actions_after_shutdown

Overview: get accessor message derived from field actions/after_shutdown of object VM
Signature:

```
(on_normal_exit) get_actions_after_shutdown (session_id s, VM ref self)
```

Arguments:

type	name	description
VM ref	self	object instance

Return Type: on_normal_exit
value of the field

RPC name: set_actions_after_shutdown

Overview: set accessor message derived from field actions/after_shutdown of object VM
Signature:

```
void set_actions_after_shutdown (session_id s, VM ref self, on_normal_exit value)
```

Arguments:

type	name	description
VM ref	self	object instance
on_normal_exit	value	New value to set

Return Type: void

RPC name: get_actions_after_reboot

Overview: get accessor message derived from field actions/after_reboot of object VM
Signature:

```
(on_normal_exit) get_actions_after_reboot (session_id s, VM ref self)
```

Arguments:

type	name	description
VM ref	self	object instance

Return Type: on_normal_exit
value of the field

RPC name: set_actions_after_reboot

Overview: set accessor message derived from field actions/after_reboot of object VM
Signature:

```
void set_actions_after_reboot (session_id s, VM ref self, on_normal_exit value)
```

Arguments:

type	name	description
VM ref	self	object instance
on_normal_exit	value	New value to set

Return Type: void

RPC name: get_actions_after_suspend

Overview: get accessor message derived from field actions/after_suspend of object VM
Signature:

```
(on_normal_exit) get_actions_after_suspend (session_id s, VM ref self)
```

Arguments:

type	name	description
VM ref	self	object instance

Return Type: on_normal_exit
value of the field

RPC name: set_actions_after_suspend

Overview: set accessor message derived from field actions/after_suspend of object VM
Signature:

```
void set_actions_after_suspend (session_id s, VM ref self, on_normal_exit value)
```

Arguments:

type	name	description
VM ref	self	object instance
on_normal_exit	value	New value to set

Return Type: void

RPC name: get_actions_after_crash

Overview: get accessor message derived from field actions/after_crash of object VM
Signature:

```
(on_crash_behaviour) get_actions_after_crash (session_id s, VM ref self)
```

Arguments:

type	name	description
VM ref	self	object instance

Return Type: on_crash_behaviour
value of the field

RPC name: set_actions_after_crash

Overview: set accessor message derived from field actions/after_crash of object VM
Signature:

```
void set_actions_after_crash (session_id s, VM ref self, on_crash_behaviour value)
```

Arguments:

type	name	description
VM ref	self	object instance
on_crash_behaviour	value	New value to set

Return Type: void

RPC name: get_VIFs

Overview: get accessor message derived from field VIFs of object VM
Signature:

```
((VIF ref) Set) get_VIFs (session_id s, VM ref self)
```

Arguments:

type	name	description
VM ref	self	object instance

Return Type: `(VIF ref) Set`
value of the field

RPC name: get_VBDs

Overview: get accessor message derived from field VBDs of object VM
Signature:

```
((VBD ref) Set) get_VBDs (session_id s, VM ref self)
```

Arguments:

type	name	description
VM ref	self	object instance

Return Type: `(VBD ref) Set`
value of the field

RPC name: get_TPM_instance

Overview: get accessor message derived from field TPM/instance of object VM
Signature:

```
int get_TPM_instance (session_id s, VM ref self)
```

Arguments:

type	name	description
VM ref	self	object instance

Return Type: `int`
value of the field

RPC name: get_TPM_backend

Overview: get accessor message derived from field TPM/backend of object VM
Signature:

```
int get_TPM_backend (session_id s, VM ref self)
```

Arguments:

type	name	description
VM ref	self	object instance

Return Type: int
value of the field

RPC name: get_bios_boot

Overview: get accessor message derived from field bios/boot of object VM
Signature:

```
string get_bios_boot (session_id s, VM ref self)
```

Arguments:

type	name	description
VM ref	self	object instance

Return Type: string
value of the field

RPC name: set_bios_boot

Overview: set accessor message derived from field bios/boot of object VM
Signature:

```
void set_bios_boot (session_id s, VM ref self, string value)
```

Arguments:

type	name	description
VM ref	self	object instance
string	value	New value to set

Return Type: void

RPC name: get_platform_std_VGA

Overview: get accessor message derived from field platform/std_VGA of object VM
Signature:

```
bool get_platform_std_VGA (session_id s, VM ref self)
```

Arguments:

type	name	description
VM ref	self	object instance

Return Type: bool
value of the field

RPC name: set_platform_std_VGA

Overview: set accessor message derived from field platform/std_VGA of object VM
Signature:

```
void set_platform_std_VGA (session_id s, VM ref self, bool value)
```

Arguments:

type	name	description
VM ref	self	object instance
bool	value	New value to set

Return Type: void

RPC name: get_platform_serial

Overview: get accessor message derived from field platform/serial of object VM
Signature:

```
string get_platform_serial (session_id s, VM ref self)
```

Arguments:

type	name	description
VM ref	self	object instance

Return Type: string
value of the field

RPC name: set_platform_serial

Overview: set accessor message derived from field platform/serial of object VM
Signature:

```
void set_platform_serial (session_id s, VM ref self, string value)
```

Arguments:

type	name	description
VM ref	self	object instance
string	value	New value to set

Return Type: void

RPC name: get_platform_localtime

Overview: get accessor message derived from field platform/localtime of object VM
Signature:

```
bool get_platform_localtime (session_id s, VM ref self)
```

Arguments:

type	name	description
VM ref	self	object instance

Return Type: bool
value of the field

RPC name: set_platform_localtime

Overview: set accessor message derived from field platform/localtime of object VM
Signature:

```
void set_platform_localtime (session_id s, VM ref self, bool value)
```

Arguments:

type	name	description
VM ref	self	object instance
bool	value	New value to set

Return Type: void

RPC name: get_platform_clock_offset

Overview: get accessor message derived from field platform/clock_offset of object VM
Signature:

```
bool get_platform_clock_offset (session_id s, VM ref self)
```

Arguments:

type	name	description
VM ref	self	object instance

Return Type: bool
value of the field

RPC name: set_platform_clock_offset

Overview: set accessor message derived from field platform/clock_offset of object VM
Signature:

```
void set_platform_clock_offset (session_id s, VM ref self, bool value)
```

Arguments:

type	name	description
VM ref	self	object instance
bool	value	New value to set

Return Type: void

RPC name: get_platform_enable_audio

Overview: get accessor message derived from field platform/enable_audio of object VM
Signature:

```
bool get_platform_enable_audio (session_id s, VM ref self)
```

Arguments:

type	name	description
VM ref	self	object instance

Return Type: bool
value of the field

RPC name: set_platform_enable_audio

Overview: set accessor message derived from field platform/enable_audio of object VM
Signature:

```
void set_platform_enable_audio (session_id s, VM ref self, bool value)
```

Arguments:

type	name	description
VM ref	self	object instance
bool	value	New value to set

Return Type: void

RPC name: get_builder

Overview: get accessor message derived from field builder of object VM
Signature:

```
string get_builder (session_id s, VM ref self)
```

Arguments:

type	name	description
VM ref	self	object instance

Return Type: string
value of the field

RPC name: set_builder

Overview: set accessor message derived from field builder of object VM
Signature:

```
void set_builder (session_id s, VM ref self, string value)
```

Arguments:

type	name	description
VM ref	self	object instance
string	value	New value to set

Return Type: void

RPC name: get_boot_method

Overview: get accessor message derived from field boot_method of object VM
Signature:

```
(boot_type) get_boot_method (session_id s, VM ref self)
```

Arguments:

type	name	description
VM ref	self	object instance

Return Type: boot_type
value of the field

RPC name: set_boot_method

Overview: set accessor message derived from field boot_method of object VM
Signature:

```
void set_boot_method (session_id s, VM ref self, boot_type value)
```

Arguments:

type	name	description
VM ref	self	object instance
boot_type	value	New value to set

Return Type: void

RPC name: get_kernel_kernel

Overview: get accessor message derived from field kernel/kernel of object VM
Signature:

```
string get_kernel_kernel (session_id s, VM ref self)
```

Arguments:

type	name	description
VM ref	self	object instance

Return Type: string
value of the field

RPC name: set_kernel_kernel

Overview: set accessor message derived from field kernel/kernel of object VM
Signature:

```
void set_kernel_kernel (session_id s, VM ref self, string value)
```

Arguments:

type	name	description
VM ref	self	object instance
string	value	New value to set

Return Type: void

RPC name: get_kernel_initrd

Overview: get accessor message derived from field kernel/initrd of object VM
Signature:

```
string get_kernel_initrd (session_id s, VM ref self)
```

Arguments:

type	name	description
VM ref	self	object instance

Return Type: string
value of the field

RPC name: set_kernel_initrd

Overview: set accessor message derived from field kernel/initrd of object VM
Signature:

```
void set_kernel_initrd (session_id s, VM ref self, string value)
```

Arguments:

type	name	description
VM ref	self	object instance
string	value	New value to set

Return Type: void

RPC name: get_kernel_args

Overview: get accessor message derived from field kernel/args of object VM
Signature:

```
string get_kernel_args (session_id s, VM ref self)
```

Arguments:

type	name	description
VM ref	self	object instance

Return Type: string
value of the field

RPC name: set_kernel_args

Overview: set accessor message derived from field kernel/args of object VM
Signature:

```
void set_kernel_args (session_id s, VM ref self, string value)
```

Arguments:

type	name	description
VM ref	self	object instance
string	value	New value to set

Return Type: void

RPC name: get_grub_cmdline

Overview: get accessor message derived from field grub/cmdline of object VM
Signature:

```
string get_grub_cmdline (session_id s, VM ref self)
```

Arguments:

type	name	description
VM ref	self	object instance

Return Type: string
value of the field

RPC name: set_grub_cmdline

Overview: set accessor message derived from field grub/cmdline of object VM
Signature:

```
void set_grub_cmdline (session_id s, VM ref self, string value)
```

Arguments:

type	name	description
VM ref	self	object instance
string	value	New value to set

Return Type: void

RPC name: get_PCI_bus

Overview: get accessor message derived from field PCI_bus of object VM
Signature:

```
string get_PCI_bus (session_id s, VM ref self)
```

Arguments:

type	name	description
VM ref	self	object instance

Return Type: string
value of the field

RPC name: get_tools_version

Overview: get accessor message derived from field tools_version of object VM
Signature:

```
((string -> string) Map) get_tools_version (session_id s, VM ref self)
```

Arguments:

type	name	description
VM ref	self	object instance

Return Type: (string → string) Map
value of the field

RPC name: get_otherConfig

Overview: get accessor message derived from field otherConfig of object VM
Signature:

```
((string -> string) Map) get_otherConfig (session_id s, VM ref self)
```

Arguments:

type	name	description
VM ref	self	object instance

Return Type: (string → string) Map
value of the field

RPC name: add_to_otherConfig

Overview: map add message derived from field otherConfig of object VM
Signature:

```
void add_to_otherConfig (session_id s, VM ref self, string key, string value)
```

Arguments:

type	name	description
`VM ref`	self	object instance
`string`	key	Key to add
`string`	value	Value to add

Return Type: `void`

RPC name: remove_from_otherConfig

Overview: map remove message derived from field otherConfig of object VM
Signature:

```
void remove_from_otherConfig (session_id s, VM ref self, string key)
```

Arguments:

type	name	description
`VM ref`	self	object instance
`string`	key	Key to remove

Return Type: `void`

RPC name: create

Overview: constructor for class VM
Signature:

```
(VM ref) create (session_id s, VM record args)
```

Arguments:

type	name	description
`VM record`	args	All constructor arguments

Return Type: `VM ref`
reference to the newly created object

RPC name: destroy

Overview: destructor for class VM
Signature:

```
void destroy (session_id s, VM ref self)
```

Arguments:

type	name	description
`VM ref`	self	object instance

Return Type: `void`

RPC name: get_by_uuid

Overview: returns the VM instance with a particular uuid
Signature:

```
(VM ref) get_by_uuid (session_id s, string uuid)
```

Arguments:

type	name	description
`string`	uuid	UUID of object to return

Return Type: `VM ref`
reference to the object

RPC name: get_record

Overview: returns a record containing the state of an instance of class VM
Signature:

```
(VM record) get_record (session_id s, VM ref self)
```

Arguments:

type	name	description
`VM ref`	self	reference to the object

Return Type: `VM record`
all fields from the object

RPC name: get_record_internal

Overview: returns a record containing the state of an instance of class VM
Signature:

```
(VM record) get_record_internal (session_id s, VM ref self)
```

Arguments:

type	name	description
`VM ref`	self	reference to the object

Return Type: `VM record`
all fields from the object, including implementation-only ones

RPC name: get_all

Overview: returns a set of references to all objects
Signature:

```
((VM ref) Set) get_all (session_id s)
```

Return Type: `(VM ref) Set`
references to all objects

RPC name: get_by_label

Overview: returns the VM instance with a particular name label
Signature:

```
((VM ref) Set) get_by_label (session_id s, string label)
```

Arguments:

type	name	description
`string`	label	label of object to return

Return Type: `(VM ref) Set`
references to objects with match names

2.7 Class: host

2.7.1 Fields for class: host

Name	**host**		
Description	*A physical host*		
Quals	Field	Type	Description
RO_{run}	`uuid`	string	unique identifier/object reference
RW	`name/label`	string	a human-readable name
RW	`name/description`	string	a notes field containg human-readable description
RO_{run}	`software_version`	(string → string) Map	version strings
RO_{run}	`resident_VMs`	(VM ref) Set	list of VMs currently resident on host
RO_{run}	`host_CPUs`	(host_cpu ref) Set	The physical CPUs on this host

2.7.2 Additional RPCs associated with class: host

RPC name: disable

Overview: Puts the host into a state in which no new VMs can be started. Currently active VMs on the host continue to execute.
Signature:

```
void disable (session_id s, host ref host)
```

Arguments:

type	name	description
`host ref`	host	The Host to disable

Return Type: `void`

RPC name: enable

Overview: Puts the host into a state in which new VMs can be started.
Signature:

```
void enable (session_id s, host ref host)
```

Arguments:

type	name	description
`host ref`	host	The Host to enable

Return Type: `void`

RPC name: shutdown

Overview: Shutdown the host. (This function can only be called if there are no currently running VMs on the host and it is disabled.)
Signature:

```
void shutdown (session_id s, host ref host)
```

Arguments:

type	name	description
`host ref`	host	The Host to shutdown

Return Type: `void`

RPC name: reboot

Overview: Reboot the host. (This function can only be called if there are no currently running VMs on the host and it is disabled.)
Signature:

```
void reboot (session_id s, host ref host)
```

Arguments:

type	name	description
`host ref`	host	The Host to reboot

Return Type: `void`

RPC name: get_all

Overview: Return a list of all the hosts known to the system
Signature:

```
((host ref) Set) get_all (session_id s)
```

Return Type: `(host ref) Set`
A list of all the IDs of all the hosts

RPC name: get_uuid

Overview: get accessor message derived from field uuid of object host
Signature:

```
string get_uuid (session_id s, host ref self)
```

Arguments:

type	name	description
`host ref`	self	object instance

Return Type: `string`
value of the field

RPC name: get_name_label

Overview: get accessor message derived from field name/label of object host
Signature:

```
string get_name_label (session_id s, host ref self)
```

Arguments:

type	name	description
host ref	self	object instance

Return Type: string
value of the field

RPC name: set_name_label

Overview: set accessor message derived from field name/label of object host
Signature:

```
void set_name_label (session_id s, host ref self, string value)
```

Arguments:

type	name	description
host ref	self	object instance
string	value	New value to set

Return Type: void

RPC name: get_name_description

Overview: get accessor message derived from field name/description of object host
Signature:

```
string get_name_description (session_id s, host ref self)
```

Arguments:

type	name	description
host ref	self	object instance

Return Type: string
value of the field

RPC name: set_name_description

Overview: set accessor message derived from field name/description of object host
Signature:

```
void set_name_description (session_id s, host ref self, string value)
```

Arguments:

type	name	description
`host ref`	self	object instance
`string`	value	New value to set

Return Type: `void`

RPC name: get_software_version

Overview: get accessor message derived from field software_version of object host
Signature:

```
((string -> string) Map) get_software_version (session_id s, host ref self)
```

Arguments:

type	name	description
`host ref`	self	object instance

Return Type: `(string → string) Map`
value of the field

RPC name: get_resident_VMs

Overview: get accessor message derived from field resident_VMs of object host
Signature:

```
((VM ref) Set) get_resident_VMs (session_id s, host ref self)
```

Arguments:

type	name	description
`host ref`	self	object instance

Return Type: `(VM ref) Set`
value of the field

RPC name: get_host_CPUs

Overview: get accessor message derived from field host_CPUs of object host
Signature:

```
((host_cpu ref) Set) get_host_CPUs (session_id s, host ref self)
```

Arguments:

type	name	description
`host ref`	self	object instance

Return Type: `(host_cpu ref) Set`
value of the field

RPC name: create

Overview: constructor for class host
Signature:

```
(host ref) create (session_id s, host record args)
```

Arguments:

type	name	description
`host record`	args	All constructor arguments

Return Type: `host ref`
reference to the newly created object

RPC name: destroy

Overview: destructor for class host
Signature:

```
void destroy (session_id s, host ref self)
```

Arguments:

type	name	description
`host ref`	self	object instance

Return Type: `void`

RPC name: get_by_uuid

Overview: returns the host instance with a particular uuid
Signature:

```
(host ref) get_by_uuid (session_id s, string uuid)
```

Arguments:

type	name	description
`string`	uuid	UUID of object to return

Return Type: `host ref`
reference to the object

RPC name: get_record

Overview: returns a record containing the state of an instance of class host
Signature:

```
(host record) get_record (session_id s, host ref self)
```

Arguments:

type	name	description
`host ref`	self	reference to the object

Return Type: `host record`
all fields from the object

RPC name: get_record_internal

Overview: returns a record containing the state of an instance of class host
Signature:

```
(host record) get_record_internal (session_id s, host ref self)
```

Arguments:

type	name	description
`host ref`	self	reference to the object

Return Type: `host record`
all fields from the object, including implementation-only ones

RPC name: get_all

Overview: returns a set of references to all objects
Signature:

```
((host ref) Set) get_all (session_id s)
```

Return Type: `(host ref) Set`
references to all objects

RPC name: get_by_label

Overview: returns the host instance with a particular name label
Signature:

```
((host ref) Set) get_by_label (session_id s, string label)
```

Arguments:

type	name	description
`string`	label	label of object to return

Return Type: `(host ref) Set`
references to objects with match names

2.8 Class: host_cpu

2.8.1 Fields for class: host_cpu

Name	**host_cpu**		
Description	*A physical CPU*		
Quals	Field	Type	Description
RO_{run}	`uuid`	string	unique identifier/object reference
RO_{ins}	`host`	host ref	the host the CPU is in
RO_{ins}	`number`	int	the number of the physical CPU within the host
RO_{ins}	`features`	(cpu_feature) Set	the features supported by the CPU
RO_{run}	`utilisation`	float	the current CPU utilisation

2.8.2 Additional RPCs associated with class: host_cpu

RPC name: get_uuid

Overview: get accessor message derived from field uuid of object host_cpu
Signature:

```
string get_uuid (session_id s, host_cpu ref self)
```

Arguments:

type	name	description
`host_cpu ref`	self	object instance

Return Type: `string`
value of the field

RPC name: get_host

Overview: get accessor message derived from field host of object host_cpu
Signature:

```
(host ref) get_host (session_id s, host_cpu ref self)
```

Arguments:

type	name	description
`host_cpu ref`	self	object instance

Return Type: `host ref`
value of the field

RPC name: get_number

Overview: get accessor message derived from field number of object host_cpu
Signature:

```
int get_number (session_id s, host_cpu ref self)
```

Arguments:

type	name	description
`host_cpu ref`	self	object instance

Return Type: `int`
value of the field

RPC name: get_features

Overview: get accessor message derived from field features of object host_cpu
Signature:

```
((cpu_feature) Set) get_features (session_id s, host_cpu ref self)
```

Arguments:

type	name	description
`host_cpu ref`	self	object instance

Return Type: `(cpu_feature) Set`
value of the field

RPC name: get_utilisation

Overview: get accessor message derived from field utilisation of object host_cpu
Signature:

```
float get_utilisation (session_id s, host_cpu ref self)
```

Arguments:

type	name	description
`host_cpu ref`	self	object instance

Return Type: `float`
value of the field

RPC name: create

Overview: constructor for class host_cpu
Signature:

```
(host_cpu ref) create (session_id s, host_cpu record args)
```

Arguments:

type	name	description
`host_cpu record`	args	All constructor arguments

Return Type: `host_cpu ref`
reference to the newly created object

RPC name: destroy

Overview: destructor for class host_cpu
Signature:

```
void destroy (session_id s, host_cpu ref self)
```

Arguments:

type	name	description
host_cpu ref	self	object instance

Return Type: void

RPC name: get_by_uuid

Overview: returns the host_cpu instance with a particular uuid
Signature:

```
(host_cpu ref) get_by_uuid (session_id s, string uuid)
```

Arguments:

type	name	description
string	uuid	UUID of object to return

Return Type: host_cpu ref
reference to the object

RPC name: get_record

Overview: returns a record containing the state of an instance of class host_cpu
Signature:

```
(host_cpu record) get_record (session_id s, host_cpu ref self)
```

Arguments:

type	name	description
host_cpu ref	self	reference to the object

Return Type: host_cpu record
all fields from the object

RPC name: get_record_internal

Overview: returns a record containing the state of an instance of class host_cpu
Signature:

```
(host_cpu record) get_record_internal (session_id s, host_cpu ref self)
```

Arguments:

type	name	description
`host_cpu ref`	self	reference to the object

Return Type: `host_cpu record`
all fields from the object, including implementation-only ones

RPC name: get_all

Overview: returns a set of references to all objects
Signature:

```
((host_cpu ref) Set) get_all (session_id s)
```

Return Type: `(host_cpu ref) Set`
references to all objects

2.9 Class: network

2.9.1 Fields for class: network

Name	**network**		
Description	*A virtual network*		
Quals	Field	Type	Description
RO_{run}	`uuid`	string	unique identifier/object reference
RW	`name/label`	string	a human-readable name
RW	`name/description`	string	a notes field containg human-readable description
RO_{ins}	`VIFs`	(VIF ref) Set	list of connected vifs
RW	`NIC`	string	ethernet device to use to access this network. Note: in this revision of the API all hosts will use the specified NIC to access this network
RW	`VLAN`	string	VLAN tag to use to access this network. Note: in this revision of the API all hosts will use the specified VLAN tag to access this network
RW	`default_gateway`	string	default gateway IP address. Used for auto-configuring guests with fixed IP setting
RW	`default_netmask`	string	default netmask. Used for auto-configuring guests with fixed IP setting

2.9.2 Additional RPCs associated with class: network

RPC name: get_all

Overview: Return a list of all the networks known to the system
Signature:

```
((network ref) Set) get_all (session_id s)
```

Return Type: `(network ref) Set`
A list of all the IDs of all the networks

RPC name: get_uuid

Overview: get accessor message derived from field uuid of object network
Signature:

```
string get_uuid (session_id s, network ref self)
```

Arguments:

type	name	description
`network ref`	self	object instance

Return Type: `string`
value of the field

RPC name: get_name_label

Overview: get accessor message derived from field name/label of object network
Signature:

```
string get_name_label (session_id s, network ref self)
```

Arguments:

type	name	description
network ref	self	object instance

Return Type: string
value of the field

RPC name: set_name_label

Overview: set accessor message derived from field name/label of object network
Signature:

```
void set_name_label (session_id s, network ref self, string value)
```

Arguments:

type	name	description
network ref	self	object instance
string	value	New value to set

Return Type: void

RPC name: get_name_description

Overview: get accessor message derived from field name/description of object network
Signature:

```
string get_name_description (session_id s, network ref self)
```

Arguments:

type	name	description
network ref	self	object instance

Return Type: string
value of the field

RPC name: set_name_description

Overview: set accessor message derived from field name/description of object network
Signature:

```
void set_name_description (session_id s, network ref self, string value)
```

Arguments:

type	name	description
network ref	self	object instance
string	value	New value to set

Return Type: void

RPC name: get_VIFs

Overview: get accessor message derived from field VIFs of object network
Signature:

```
((VIF ref) Set) get_VIFs (session_id s, network ref self)
```

Arguments:

type	name	description
network ref	self	object instance

Return Type: (VIF ref) Set
value of the field

RPC name: get_NIC

Overview: get accessor message derived from field NIC of object network
Signature:

```
string get_NIC (session_id s, network ref self)
```

Arguments:

type	name	description
network ref	self	object instance

Return Type: string
value of the field

RPC name: set_NIC

Overview: set accessor message derived from field NIC of object network
Signature:

```
void set_NIC (session_id s, network ref self, string value)
```

Arguments:

type	name	description
network ref	self	object instance
string	value	New value to set

Return Type: void

RPC name: get_VLAN

Overview: get accessor message derived from field VLAN of object network
Signature:

```
string get_VLAN (session_id s, network ref self)
```

Arguments:

type	name	description
network ref	self	object instance

Return Type: string
value of the field

RPC name: set_VLAN

Overview: set accessor message derived from field VLAN of object network
Signature:

```
void set_VLAN (session_id s, network ref self, string value)
```

Arguments:

type	name	description
network ref	self	object instance
string	value	New value to set

Return Type: void

RPC name: get_default_gateway

Overview: get accessor message derived from field default_gateway of object network
Signature:

```
string get_default_gateway (session_id s, network ref self)
```

Arguments:

type	name	description
network ref	self	object instance

Return Type: string
value of the field

RPC name: set_default_gateway

Overview: set accessor message derived from field default_gateway of object network
Signature:

```
void set_default_gateway (session_id s, network ref self, string value)
```

Arguments:

type	name	description
network ref	self	object instance
string	value	New value to set

Return Type: void

RPC name: get_default_netmask

Overview: get accessor message derived from field default_netmask of object network
Signature:

```
string get_default_netmask (session_id s, network ref self)
```

Arguments:

type	name	description
network ref	self	object instance

Return Type: string
value of the field

RPC name: set_default_netmask

Overview: set accessor message derived from field default_netmask of object network
Signature:

```
void set_default_netmask (session_id s, network ref self, string value)
```

Arguments:

type	name	description
network ref	self	object instance
string	value	New value to set

Return Type: void

RPC name: create

Overview: constructor for class network
Signature:

```
(network ref) create (session_id s, network record args)
```

Arguments:

type	name	description
network record	args	All constructor arguments

Return Type: network ref
reference to the newly created object

RPC name: destroy

Overview: destructor for class network
Signature:

```
void destroy (session_id s, network ref self)
```

Arguments:

type	name	description
`network ref`	self	object instance

Return Type: `void`

RPC name: get_by_uuid

Overview: returns the network instance with a particular uuid
Signature:

```
(network ref) get_by_uuid (session_id s, string uuid)
```

Arguments:

type	name	description
`string`	uuid	UUID of object to return

Return Type: `network ref`
reference to the object

RPC name: get_record

Overview: returns a record containing the state of an instance of class network
Signature:

```
(network record) get_record (session_id s, network ref self)
```

Arguments:

type	name	description
`network ref`	self	reference to the object

Return Type: `network record`
all fields from the object

RPC name: get_record_internal

Overview: returns a record containing the state of an instance of class network
Signature:

```
(network record) get_record_internal (session_id s, network ref self)
```

Arguments:

type	name	description
`network ref`	self	reference to the object

Return Type: `network record`
all fields from the object, including implementation-only ones

RPC name: get_all

Overview: returns a set of references to all objects
Signature:

```
((network ref) Set) get_all (session_id s)
```

Return Type: `(network ref) Set`
references to all objects

RPC name: get_by_label

Overview: returns the network instance with a particular name label
Signature:

```
((network ref) Set) get_by_label (session_id s, string label)
```

Arguments:

type	name	description
`string`	label	label of object to return

Return Type: `(network ref) Set`
references to objects with match names

2.10 Class: VIF

2.10.1 Fields for class: VIF

Name	**VIF**		
Description	*A virtual network interface*		
Quals	Field	Type	Description
RO_{run}	`uuid`	string	unique identifier/object reference
RW	`name`	string	human-readable name of the interface
RW	`type`	driver_type	interface type
RW	`device`	string	name of network device as exposed to guest e.g. eth0
RW	`network`	network ref	virtual network to which this vif is connected
RW	`VM`	VM ref	virtual machine to which this vif is connected
RW	`MAC`	string	ethernet MAC address of virtual interface, as exposed to guest
RW	`MTU`	int	MTU in octets
RO_{run}	`network_read_kbs`	float	Incoming network bandwidth
RO_{run}	`network_write_kbs`	float	Outgoing network bandwidth
RO_{run}	`IO_bandwidth/incoming_kbs`	float	Read bandwidth (Kb/s)
RO_{run}	`IO_bandwidth/outgoing_kbs`	float	Write bandwidth (Kb/s)

2.10.2 Additional RPCs associated with class: VIF

RPC name: get_uuid

Overview: get accessor message derived from field uuid of object VIF
Signature:

```
string get_uuid (session_id s, VIF ref self)
```

Arguments:

type	name	description
`VIF ref`	self	object instance

Return Type: `string`
value of the field

RPC name: get_name

Overview: get accessor message derived from field name of object VIF
Signature:

```
string get_name (session_id s, VIF ref self)
```

Arguments:

type	name	description
`VIF ref`	self	object instance

Return Type: `string`
value of the field

RPC name: set_name

Overview: set accessor message derived from field name of object VIF
Signature:

```
void set_name (session_id s, VIF ref self, string value)
```

Arguments:

type	name	description
VIF ref	self	object instance
string	value	New value to set

Return Type: void

RPC name: get_type

Overview: get accessor message derived from field type of object VIF
Signature:

```
(driver_type) get_type (session_id s, VIF ref self)
```

Arguments:

type	name	description
VIF ref	self	object instance

Return Type: driver_type
value of the field

RPC name: set_type

Overview: set accessor message derived from field type of object VIF
Signature:

```
void set_type (session_id s, VIF ref self, driver_type value)
```

Arguments:

type	name	description
VIF ref	self	object instance
driver_type	value	New value to set

Return Type: void

RPC name: get_device

Overview: get accessor message derived from field device of object VIF
Signature:

```
string get_device (session_id s, VIF ref self)
```

Arguments:

type	name	description
VIF ref	self	object instance

Return Type: string
value of the field

RPC name: set_device

Overview: set accessor message derived from field device of object VIF
Signature:

```
void set_device (session_id s, VIF ref self, string value)
```

Arguments:

type	name	description
VIF ref	self	object instance
string	value	New value to set

Return Type: void

RPC name: get_network

Overview: get accessor message derived from field network of object VIF
Signature:

```
(network ref) get_network (session_id s, VIF ref self)
```

Arguments:

type	name	description
VIF ref	self	object instance

Return Type: network ref
value of the field

RPC name: set_network

Overview: set accessor message derived from field network of object VIF
Signature:

```
void set_network (session_id s, VIF ref self, network ref value)
```

Arguments:

type	name	description
VIF ref	self	object instance
network ref	value	New value to set

Return Type: void

RPC name: get_VM

Overview: get accessor message derived from field VM of object VIF
Signature:

```
(VM ref) get_VM (session_id s, VIF ref self)
```

Arguments:

type	name	description
VIF ref	self	object instance

Return Type: VM ref
value of the field

RPC name: set_VM

Overview: set accessor message derived from field VM of object VIF
Signature:

```
void set_VM (session_id s, VIF ref self, VM ref value)
```

Arguments:

type	name	description
VIF ref	self	object instance
VM ref	value	New value to set

Return Type: void

RPC name: get_MAC

Overview: get accessor message derived from field MAC of object VIF
Signature:

```
string get_MAC (session_id s, VIF ref self)
```

Arguments:

type	name	description
VIF ref	self	object instance

Return Type: string
value of the field

RPC name: set_MAC

Overview: set accessor message derived from field MAC of object VIF
Signature:

```
void set_MAC (session_id s, VIF ref self, string value)
```

Arguments:

type	name	description
VIF ref	self	object instance
string	value	New value to set

Return Type: void

RPC name: get_MTU

Overview: get accessor message derived from field MTU of object VIF
Signature:

```
int get_MTU (session_id s, VIF ref self)
```

Arguments:

type	name	description
VIF ref	self	object instance

Return Type: int
value of the field

RPC name: set_MTU

Overview: set accessor message derived from field MTU of object VIF
Signature:

```
void set_MTU (session_id s, VIF ref self, int value)
```

Arguments:

type	name	description
VIF ref	self	object instance
int	value	New value to set

Return Type: void

RPC name: get_network_read_kbs

Overview: get accessor message derived from field network_read_kbs of object VIF
Signature:

```
float get_network_read_kbs (session_id s, VIF ref self)
```

Arguments:

type	name	description
VIF ref	self	object instance

Return Type: float
value of the field

RPC name: get_network_write_kbs

Overview: get accessor message derived from field network_write_kbs of object VIF
Signature:

```
float get_network_write_kbs (session_id s, VIF ref self)
```

Arguments:

type	name	description
VIF ref	self	object instance

Return Type: `float`
value of the field

RPC name: get_IO_bandwidth_incoming_kbs

Overview: get accessor message derived from field IO_bandwidth/incoming_kbs of object VIF
Signature:

```
float get_IO_bandwidth_incoming_kbs (session_id s, VIF ref self)
```

Arguments:

type	name	description
VIF ref	self	object instance

Return Type: `float`
value of the field

RPC name: get_IO_bandwidth_outgoing_kbs

Overview: get accessor message derived from field IO_bandwidth/outgoing_kbs of object VIF
Signature:

```
float get_IO_bandwidth_outgoing_kbs (session_id s, VIF ref self)
```

Arguments:

type	name	description
VIF ref	self	object instance

Return Type: `float`
value of the field

RPC name: create

Overview: constructor for class VIF
Signature:

```
(VIF ref) create (session_id s, VIF record args)
```

Arguments:

type	name	description
`VIF record`	args	All constructor arguments

Return Type: `VIF ref`
reference to the newly created object

RPC name: destroy

Overview: destructor for class VIF
Signature:

```
void destroy (session_id s, VIF ref self)
```

Arguments:

type	name	description
`VIF ref`	self	object instance

Return Type: `void`

RPC name: get_by_uuid

Overview: returns the VIF instance with a particular uuid
Signature:

```
(VIF ref) get_by_uuid (session_id s, string uuid)
```

Arguments:

type	name	description
`string`	uuid	UUID of object to return

Return Type: `VIF ref`
reference to the object

RPC name: get_record

Overview: returns a record containing the state of an instance of class VIF
Signature:

```
(VIF record) get_record (session_id s, VIF ref self)
```

Arguments:

type	name	description
`VIF ref`	self	reference to the object

Return Type: `VIF record`
all fields from the object

RPC name: get_record_internal

Overview: returns a record containing the state of an instance of class VIF
Signature:

```
(VIF record) get_record_internal (session_id s, VIF ref self)
```

Arguments:

type	name	description
`VIF ref`	self	reference to the object

Return Type: `VIF record`
all fields from the object, including implementation-only ones

RPC name: get_all

Overview: returns a set of references to all objects
Signature:

```
((VIF ref) Set) get_all (session_id s)
```

Return Type: `(VIF ref) Set`
references to all objects

2.11 Class: SR

2.11.1 Fields for class: SR

Name	**SR**		
Description	*A storage repository*		
Quals	Field	Type	Description
RO_{run}	`uuid`	string	unique identifier/object reference
RW	`name/label`	string	a human-readable name
RW	`name/description`	string	a notes field containg human-readable description
RO_{run}	`VDIs`	(VDI ref) Set	managed virtual disks
RO_{run}	`virtual_allocation`	int	sum of virtual_sizes of all VDIs in this storage repository (in bytes)
RO_{run}	`physical_utilisation`	int	physical space currently utilised on this storage repository (in bytes). Note that for sparse disk formats, physical_utilisation may be less than virtual_allocation
RO_{ins}	`physical_size`	int	total physical size of the repository (in bytes)
RO_{ins}	`type`	string	type of the storage repository
RO_{ins}	`location`	string	a string that uniquely determines the location of the storage repository; the format of this string depends on the repository's type

2.11.2 Additional RPCs associated with class: SR

RPC name: clone

Overview: Take an exact copy of the Storage Repository; the cloned storage repository has the same type as its parent
Signature:

```
(SR ref) clone (session_id s, SR ref sr, string loc, string name)
```

Arguments:

type	name	description
`SR ref`	sr	The Storage Repository to clone
`string`	loc	The location string that defines where the new storage repository will be located
`string`	name	The name of the new storage repository

Return Type: `SR ref`
The ID of the newly created Storage Repository.

RPC name: get_all

Overview: Return a list of all the Storage Repositories known to the system
Signature:

```
((SR ref) Set) get_all (session_id s)
```

Return Type: `(SR ref) Set`
A list of all the IDs of all the Storage Repositories

RPC name: get_uuid

Overview: get accessor message derived from field uuid of object SR
Signature:

```
string get_uuid (session_id s, SR ref self)
```

Arguments:

type	name	description
`SR ref`	self	object instance

Return Type: `string`
value of the field

RPC name: get_name_label

Overview: get accessor message derived from field name/label of object SR
Signature:

```
string get_name_label (session_id s, SR ref self)
```

Arguments:

type	name	description
`SR ref`	self	object instance

Return Type: `string`
value of the field

RPC name: set_name_label

Overview: set accessor message derived from field name/label of object SR
Signature:

```
void set_name_label (session_id s, SR ref self, string value)
```

Arguments:

type	name	description
`SR ref`	self	object instance
`string`	value	New value to set

Return Type: `void`

RPC name: get_name_description

Overview: get accessor message derived from field name/description of object SR
Signature:

```
string get_name_description (session_id s, SR ref self)
```

Arguments:

type	name	description
SR ref	self	object instance

Return Type: `string`
value of the field

RPC name: set_name_description

Overview: set accessor message derived from field name/description of object SR
Signature:

```
void set_name_description (session_id s, SR ref self, string value)
```

Arguments:

type	name	description
SR ref	self	object instance
string	value	New value to set

Return Type: `void`

RPC name: get_VDIs

Overview: get accessor message derived from field VDIs of object SR
Signature:

```
((VDI ref) Set) get_VDIs (session_id s, SR ref self)
```

Arguments:

type	name	description
SR ref	self	object instance

Return Type: `(VDI ref) Set`
value of the field

RPC name: get_virtual_allocation

Overview: get accessor message derived from field virtual_allocation of object SR
Signature:

```
int get_virtual_allocation (session_id s, SR ref self)
```

Arguments:

type	name	description
`SR ref`	self	object instance

Return Type: `int`
value of the field

RPC name: get_physical_utilisation

Overview: get accessor message derived from field physical_utilisation of object SR
Signature:

```
int get_physical_utilisation (session_id s, SR ref self)
```

Arguments:

type	name	description
`SR ref`	self	object instance

Return Type: `int`
value of the field

RPC name: get_physical_size

Overview: get accessor message derived from field physical_size of object SR
Signature:

```
int get_physical_size (session_id s, SR ref self)
```

Arguments:

type	name	description
`SR ref`	self	object instance

Return Type: `int`
value of the field

RPC name: get_type

Overview: get accessor message derived from field type of object SR
Signature:

```
string get_type (session_id s, SR ref self)
```

Arguments:

type	name	description
`SR ref`	self	object instance

Return Type: `string`
value of the field

RPC name: get_location

Overview: get accessor message derived from field location of object SR
Signature:

```
string get_location (session_id s, SR ref self)
```

Arguments:

type	name	description
SR ref	self	object instance

Return Type: `string`
value of the field

RPC name: create

Overview: constructor for class SR
Signature:

```
(SR ref) create (session_id s, SR record args)
```

Arguments:

type	name	description
SR record	args	All constructor arguments

Return Type: `SR ref`
reference to the newly created object

RPC name: destroy

Overview: destructor for class SR
Signature:

```
void destroy (session_id s, SR ref self)
```

Arguments:

type	name	description
SR ref	self	object instance

Return Type: `void`

RPC name: get_by_uuid

Overview: returns the SR instance with a particular uuid
Signature:

```
(SR ref) get_by_uuid (session_id s, string uuid)
```

Arguments:

type	name	description
`string`	uuid	UUID of object to return

Return Type: `SR ref`
reference to the object

RPC name: get_record

Overview: returns a record containing the state of an instance of class SR
Signature:

```
(SR record) get_record (session_id s, SR ref self)
```

Arguments:

type	name	description
`SR ref`	self	reference to the object

Return Type: `SR record`
all fields from the object

RPC name: get_record_internal

Overview: returns a record containing the state of an instance of class SR
Signature:

```
(SR record) get_record_internal (session_id s, SR ref self)
```

Arguments:

type	name	description
`SR ref`	self	reference to the object

Return Type: `SR record`
all fields from the object, including implementation-only ones

RPC name: get_all

Overview: returns a set of references to all objects
Signature:

```
((SR ref) Set) get_all (session_id s)
```

Return Type: `(SR ref) Set`
references to all objects

RPC name: get_by_label

Overview: returns the SR instance with a particular name label
Signature:

```
((SR ref) Set) get_by_label (session_id s, string label)
```

Arguments:

type	name	description
`string`	label	label of object to return

Return Type: `(SR ref) Set`
references to objects with match names

2.12 Class: VDI

2.12.1 Fields for class: VDI

Name	**VDI**		
Description	*A virtual disk image*		
Quals	Field	Type	Description
RO_{run}	`uuid`	string	unique identifier/object reference
RW	`name/label`	string	a human-readable name
RW	`name/description`	string	a notes field containg human-readable description
RW	`SR`	SR ref	storage repository in which the VDI resides
RO_{ins}	`VBDs`	(VBD ref) Set	list of vbds that refer to this disk
RW	`virtual_size`	int	size of disk as presented to the guest (in multiples of sector_size field)
RO_{run}	`physical_utilisation`	int	amount of physical space that the disk image is currently taking up on the storage repository (in bytes)
RO_{ins}	`sector_size`	int	sector size of VDI (in bytes)
RO_{ins}	`type`	vdi_type	type of the VDI
RO_{ins}	`parent`	VDI ref	parent disk (e.g. in the case of copy on write)
RO_{ins}	`children`	(VDI ref) Set	child disks (e.g. in the case of copy on write)
RW	`sharable`	bool	true if this disk may be shared
RW	`read_only`	bool	true if this disk may ONLY be mounted read-only

2.12.2 Additional RPCs associated with class: VDI

RPC name: snapshot

Overview: Take an exact copy of the VDI; the snapshot lives in the same Storage Repository as its parent.
Signature:

```
(VDI ref) snapshot (session_id s, VDI ref vdi)
```

Arguments:

type	name	description
`VDI ref`	vdi	The VDI to snapshot

Return Type: `VDI ref`
The ID of the newly created VDI.

RPC name: get_uuid

Overview: get accessor message derived from field uuid of object VDI
Signature:

```
string get_uuid (session_id s, VDI ref self)
```

Arguments:

type	name	description
`VDI ref`	self	object instance

Return Type: `string`
value of the field

RPC name: get_name_label

Overview: get accessor message derived from field name/label of object VDI
Signature:

```
string get_name_label (session_id s, VDI ref self)
```

Arguments:

type	name	description
`VDI ref`	self	object instance

Return Type: `string`
value of the field

RPC name: set_name_label

Overview: set accessor message derived from field name/label of object VDI
Signature:

```
void set_name_label (session_id s, VDI ref self, string value)
```

Arguments:

type	name	description
`VDI ref`	self	object instance
`string`	value	New value to set

Return Type: `void`

RPC name: get_name_description

Overview: get accessor message derived from field name/description of object VDI
Signature:

```
string get_name_description (session_id s, VDI ref self)
```

Arguments:

type	name	description
`VDI ref`	self	object instance

Return Type: `string`
value of the field

RPC name: set_name_description

Overview: set accessor message derived from field name/description of object VDI
Signature:

```
void set_name_description (session_id s, VDI ref self, string value)
```

Arguments:

type	name	description
VDI ref	self	object instance
string	value	New value to set

Return Type: `void`

RPC name: get_SR

Overview: get accessor message derived from field SR of object VDI
Signature:

```
(SR ref) get_SR (session_id s, VDI ref self)
```

Arguments:

type	name	description
VDI ref	self	object instance

Return Type: `SR ref`
value of the field

RPC name: set_SR

Overview: set accessor message derived from field SR of object VDI
Signature:

```
void set_SR (session_id s, VDI ref self, SR ref value)
```

Arguments:

type	name	description
VDI ref	self	object instance
SR ref	value	New value to set

Return Type: `void`

RPC name: get_VBDs

Overview: get accessor message derived from field VBDs of object VDI
Signature:

```
((VBD ref) Set) get_VBDs (session_id s, VDI ref self)
```

Arguments:

type	name	description
`VDI ref`	self	object instance

Return Type: `(VBD ref) Set`
value of the field

RPC name: get_virtual_size

Overview: get accessor message derived from field virtual_size of object VDI
Signature:

```
int get_virtual_size (session_id s, VDI ref self)
```

Arguments:

type	name	description
`VDI ref`	self	object instance

Return Type: `int`
value of the field

RPC name: set_virtual_size

Overview: set accessor message derived from field virtual_size of object VDI
Signature:

```
void set_virtual_size (session_id s, VDI ref self, int value)
```

Arguments:

type	name	description
`VDI ref`	self	object instance
`int`	value	New value to set

Return Type: `void`

RPC name: get_physical_utilisation

Overview: get accessor message derived from field physical_utilisation of object VDI
Signature:

```
int get_physical_utilisation (session_id s, VDI ref self)
```

Arguments:

type	name	description
`VDI ref`	self	object instance

Return Type: `int`
value of the field

RPC name: get_sector_size

Overview: get accessor message derived from field sector_size of object VDI
Signature:

```
int get_sector_size (session_id s, VDI ref self)
```

Arguments:

type	name	description
VDI ref	self	object instance

Return Type: `int`
value of the field

RPC name: get_type

Overview: get accessor message derived from field type of object VDI
Signature:

```
(vdi_type) get_type (session_id s, VDI ref self)
```

Arguments:

type	name	description
VDI ref	self	object instance

Return Type: `vdi_type`
value of the field

RPC name: get_parent

Overview: get accessor message derived from field parent of object VDI
Signature:

```
(VDI ref) get_parent (session_id s, VDI ref self)
```

Arguments:

type	name	description
VDI ref	self	object instance

Return Type: `VDI ref`
value of the field

RPC name: get_children

Overview: get accessor message derived from field children of object VDI
Signature:

```
((VDI ref) Set) get_children (session_id s, VDI ref self)
```

Arguments:

type	name	description
`VDI ref`	self	object instance

Return Type: `(VDI ref) Set`
value of the field

RPC name: get_sharable

Overview: get accessor message derived from field sharable of object VDI
Signature:

```
bool get_sharable (session_id s, VDI ref self)
```

Arguments:

type	name	description
`VDI ref`	self	object instance

Return Type: `bool`
value of the field

RPC name: set_sharable

Overview: set accessor message derived from field sharable of object VDI
Signature:

```
void set_sharable (session_id s, VDI ref self, bool value)
```

Arguments:

type	name	description
`VDI ref`	self	object instance
`bool`	value	New value to set

Return Type: `void`

RPC name: get_read_only

Overview: get accessor message derived from field read_only of object VDI
Signature:

```
bool get_read_only (session_id s, VDI ref self)
```

Arguments:

type	name	description
`VDI ref`	self	object instance

Return Type: `bool`
value of the field

RPC name: set_read_only

Overview: set accessor message derived from field read_only of object VDI
Signature:

```
void set_read_only (session_id s, VDI ref self, bool value)
```

Arguments:

type	name	description
VDI ref	self	object instance
bool	value	New value to set

Return Type: `void`

RPC name: create

Overview: constructor for class VDI
Signature:

```
(VDI ref) create (session_id s, VDI record args)
```

Arguments:

type	name	description
VDI record	args	All constructor arguments

Return Type: `VDI ref`
reference to the newly created object

RPC name: destroy

Overview: destructor for class VDI
Signature:

```
void destroy (session_id s, VDI ref self)
```

Arguments:

type	name	description
VDI ref	self	object instance

Return Type: `void`

RPC name: get_by_uuid

Overview: returns the VDI instance with a particular uuid
Signature:

```
(VDI ref) get_by_uuid (session_id s, string uuid)
```

Arguments:

type	name	description
`string`	uuid	UUID of object to return

Return Type: `VDI ref`
reference to the object

RPC name: get_record

Overview: returns a record containing the state of an instance of class VDI
Signature:

```
(VDI record) get_record (session_id s, VDI ref self)
```

Arguments:

type	name	description
`VDI ref`	self	reference to the object

Return Type: `VDI record`
all fields from the object

RPC name: get_record_internal

Overview: returns a record containing the state of an instance of class VDI
Signature:

```
(VDI record) get_record_internal (session_id s, VDI ref self)
```

Arguments:

type	name	description
`VDI ref`	self	reference to the object

Return Type: `VDI record`
all fields from the object, including implementation-only ones

RPC name: get_all

Overview: returns a set of references to all objects
Signature:

```
((VDI ref) Set) get_all (session_id s)
```

Return Type: `(VDI ref) Set`
references to all objects

RPC name: get_by_label

Overview: returns the VDI instance with a particular name label
Signature:

```
((VDI ref) Set) get_by_label (session_id s, string label)
```

Arguments:

type	name	description
`string`	label	label of object to return

Return Type: `(VDI ref) Set`
references to objects with match names

2.13 Class: VBD

2.13.1 Fields for class: VBD

Name	**VBD**		
Description	*A virtual block device*		
Quals	Field	Type	Description
RO_{run}	`uuid`	string	unique identifier/object reference
RW	`VM`	VM ref	the virtual machine
RW	`VDI`	VDI ref	the virtual disk
RW	`device`	string	device seen by the guest e.g. hda1
RW	`mode`	vbd_mode	the mode the disk should be mounted with
RW	`driver`	driver_type	the style of driver
RO_{run}	`IO_bandwidth/incoming_kbs`	float	Read bandwidth (Kb/s)
RO_{run}	`IO_bandwidth/outgoing_kbs`	float	Write bandwidth (Kb/s)

2.13.2 Additional RPCs associated with class: VBD

RPC name: get_uuid

Overview: get accessor message derived from field uuid of object VBD
Signature:

```
string get_uuid (session_id s, VBD ref self)
```

Arguments:

type	name	description
`VBD ref`	self	object instance

Return Type: `string`
value of the field

RPC name: get_VM

Overview: get accessor message derived from field VM of object VBD
Signature:

```
(VM ref) get_VM (session_id s, VBD ref self)
```

Arguments:

type	name	description
`VBD ref`	self	object instance

Return Type: `VM ref`
value of the field

RPC name: set_VM

Overview: set accessor message derived from field VM of object VBD
Signature:

```
void set_VM (session_id s, VBD ref self, VM ref value)
```

Arguments:

type	name	description
VBD ref	self	object instance
VM ref	value	New value to set

Return Type: `void`

RPC name: get_VDI

Overview: get accessor message derived from field VDI of object VBD
Signature:

```
(VDI ref) get_VDI (session_id s, VBD ref self)
```

Arguments:

type	name	description
VBD ref	self	object instance

Return Type: `VDI ref`
value of the field

RPC name: set_VDI

Overview: set accessor message derived from field VDI of object VBD
Signature:

```
void set_VDI (session_id s, VBD ref self, VDI ref value)
```

Arguments:

type	name	description
VBD ref	self	object instance
VDI ref	value	New value to set

Return Type: `void`

RPC name: get_device

Overview: get accessor message derived from field device of object VBD
Signature:

```
string get_device (session_id s, VBD ref self)
```

Arguments:

type	name	description
VBD ref	self	object instance

Return Type: `string`

value of the field

RPC name: set_device

Overview: set accessor message derived from field device of object VBD
Signature:

```
void set_device (session_id s, VBD ref self, string value)
```

Arguments:

type	name	description
VBD ref	self	object instance
string	value	New value to set

Return Type: void

RPC name: get_mode

Overview: get accessor message derived from field mode of object VBD
Signature:

```
(vbd_mode) get_mode (session_id s, VBD ref self)
```

Arguments:

type	name	description
VBD ref	self	object instance

Return Type: vbd_mode
value of the field

RPC name: set_mode

Overview: set accessor message derived from field mode of object VBD
Signature:

```
void set_mode (session_id s, VBD ref self, vbd_mode value)
```

Arguments:

type	name	description
VBD ref	self	object instance
vbd_mode	value	New value to set

Return Type: void

RPC name: get_driver

Overview: get accessor message derived from field driver of object VBD
Signature:

```
(driver_type) get_driver (session_id s, VBD ref self)
```

Arguments:

type	name	description
VBD ref	self	object instance

Return Type: `driver_type`
value of the field

RPC name: set_driver

Overview: set accessor message derived from field driver of object VBD
Signature:

```
void set_driver (session_id s, VBD ref self, driver_type value)
```

Arguments:

type	name	description
VBD ref	self	object instance
driver_type	value	New value to set

Return Type: `void`

RPC name: get_IO_bandwidth_incoming_kbs

Overview: get accessor message derived from field IO_bandwidth/incoming_kbs of object VBD
Signature:

```
float get_IO_bandwidth_incoming_kbs (session_id s, VBD ref self)
```

Arguments:

type	name	description
VBD ref	self	object instance

Return Type: `float`
value of the field

RPC name: get_IO_bandwidth_outgoing_kbs

Overview: get accessor message derived from field IO_bandwidth/outgoing_kbs of object VBD
Signature:

```
float get_IO_bandwidth_outgoing_kbs (session_id s, VBD ref self)
```

Arguments:

type	name	description
`VBD ref`	self	object instance

Return Type: `float`
value of the field

RPC name: create

Overview: constructor for class VBD
Signature:

```
(VBD ref) create (session_id s, VBD record args)
```

Arguments:

type	name	description
`VBD record`	args	All constructor arguments

Return Type: `VBD ref`
reference to the newly created object

RPC name: destroy

Overview: destructor for class VBD
Signature:

```
void destroy (session_id s, VBD ref self)
```

Arguments:

type	name	description
`VBD ref`	self	object instance

Return Type: `void`

RPC name: get_by_uuid

Overview: returns the VBD instance with a particular uuid
Signature:

```
(VBD ref) get_by_uuid (session_id s, string uuid)
```

Arguments:

type	name	description
`string`	uuid	UUID of object to return

Return Type: `VBD ref`
reference to the object

RPC name: get_record

Overview: returns a record containing the state of an instance of class VBD
Signature:

```
(VBD record) get_record (session_id s, VBD ref self)
```

Arguments:

type	name	description
`VBD ref`	self	reference to the object

Return Type: `VBD record`
all fields from the object

RPC name: get_record_internal

Overview: returns a record containing the state of an instance of class VBD
Signature:

```
(VBD record) get_record_internal (session_id s, VBD ref self)
```

Arguments:

type	name	description
`VBD ref`	self	reference to the object

Return Type: `VBD record`
all fields from the object, including implementation-only ones

RPC name: get_all

Overview: returns a set of references to all objects
Signature:

```
((VBD ref) Set) get_all (session_id s)
```

Return Type: `(VBD ref) Set`
references to all objects

2.14 Class: user

2.14.1 Fields for class: user

Name	**user**		
Description	*A user of the system*		
Quals	Field	Type	Description
RO_{run}	`uuid`	string	unique identifier/object reference
RO_{ins}	`short_name`	string	short name (e.g. userid)
RW	`fullname`	string	full name

2.14.2 Additional RPCs associated with class: user

RPC name: get_uuid

Overview: get accessor message derived from field uuid of object user
Signature:

```
string get_uuid (session_id s, user ref self)
```

Arguments:

type	name	description
`user ref`	self	object instance

Return Type: `string`
value of the field

RPC name: get_short_name

Overview: get accessor message derived from field short_name of object user
Signature:

```
string get_short_name (session_id s, user ref self)
```

Arguments:

type	name	description
`user ref`	self	object instance

Return Type: `string`
value of the field

RPC name: get_fullname

Overview: get accessor message derived from field fullname of object user
Signature:

```
string get_fullname (session_id s, user ref self)
```

Arguments:

type	name	description
`user ref`	self	object instance

Return Type: `string`
value of the field

RPC name: set_fullname

Overview: set accessor message derived from field fullname of object user
Signature:

```
void set_fullname (session_id s, user ref self, string value)
```

Arguments:

type	name	description
`user ref`	self	object instance
`string`	value	New value to set

Return Type: `void`

RPC name: create

Overview: constructor for class user
Signature:

```
(user ref) create (session_id s, user record args)
```

Arguments:

type	name	description
`user record`	args	All constructor arguments

Return Type: `user ref`
reference to the newly created object

RPC name: destroy

Overview: destructor for class user
Signature:

```
void destroy (session_id s, user ref self)
```

Arguments:

type	name	description
`user ref`	self	object instance

Return Type: `void`

RPC name: get_by_uuid

Overview: returns the user instance with a particular uuid
Signature:

```
(user ref) get_by_uuid (session_id s, string uuid)
```

Arguments:

type	name	description
`string`	uuid	UUID of object to return

Return Type: `user ref`
reference to the object

RPC name: get_record

Overview: returns a record containing the state of an instance of class user
Signature:

```
(user record) get_record (session_id s, user ref self)
```

Arguments:

type	name	description
`user ref`	self	reference to the object

Return Type: `user record`
all fields from the object

RPC name: get_record_internal

Overview: returns a record containing the state of an instance of class user
Signature:

```
(user record) get_record_internal (session_id s, user ref self)
```

Arguments:

type	name	description
`user ref`	self	reference to the object

Return Type: `user record`
all fields from the object, including implementation-only ones

RPC name: get_all

Overview: returns a set of references to all objects
Signature:

```
((user ref) Set) get_all (session_id s)
```

Return Type: `(user ref) Set`
references to all objects

2.15 Class: debug

2.15.1 Fields for class: debug

Class debug has no fields.

2.15.2 Additional RPCs associated with class: debug

RPC name: get_all

Overview: Return a list of all the debug records known to the system
Signature:

```
((debug ref) Set) get_all (session_id s)
```

Return Type: `(debug ref) Set`
A list of all the IDs of all the debug records

RPC name: return_failure

Overview: Return an API 'successful' failure
Signature:

```
void return_failure (session_id s)
```

Return Type: `void`

RPC name: create

Overview: constructor for class debug
Signature:

```
(debug ref) create (session_id s, debug record args)
```

Arguments:

type	name	description
`debug record`	args	All constructor arguments

Return Type: `debug ref`
reference to the newly created object

RPC name: destroy

Overview: destructor for class debug
Signature:

```
void destroy (session_id s, debug ref self)
```

Arguments:

type	name	description
`debug ref`	self	object instance

Return Type: `void`

RPC name: get_by_uuid

Overview: returns the debug instance with a particular uuid
Signature:

```
(debug ref) get_by_uuid (session_id s, string uuid)
```

Arguments:

type	name	description
`string`	uuid	UUID of object to return

Return Type: `debug ref`
reference to the object

RPC name: get_record

Overview: returns a record containing the state of an instance of class debug
Signature:

```
(debug record) get_record (session_id s, debug ref self)
```

Arguments:

type	name	description
`debug ref`	self	reference to the object

Return Type: `debug record`
all fields from the object

RPC name: get_record_internal

Overview: returns a record containing the state of an instance of class debug
Signature:

```
(debug record) get_record_internal (session_id s, debug ref self)
```

Arguments:

type	name	description
`debug ref`	self	reference to the object

Return Type: `debug record`
all fields from the object, including implementation-only ones

RPC name: get_all

Overview: returns a set of references to all objects
Signature:

```
((debug ref) Set) get_all (session_id s)
```

Return Type: `(debug ref) Set`
references to all objects

2.16 DTD

General notes:

- Values of primitive types (int, bool, etc) and higher-order types (Sets, Maps) are encoded as simple strings, rather than being expanded into XML fragments. For example “5”, “true”, “1, 2, 3, 4”, “(1, 2), (2, 3), (3, 4)”
- Values of enumeration types are represented as strings (e.g. “PAE”, “3DNow!”)
- Object References are represented as UUIDs, written in string form

Chapter 3

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