



## HP-UX Memory Instance Provider

### Provider overview

Memory Instance Provider provides information about System's Physical Memory.

### Description

The Memory Instance Provider provides information about system physical memory configuration. This provider instruments CIM and HP defined MOF classes, which are CIM 2.9 compliant. All the HP specific MOF classes are registered in root/cimv2 name space.

This provider instruments the following MOF classes

- HP\_PhysicalMemory  
This class describes DIMM/SIMM that are present in the system/partition.
- HP\_MemoryLocation  
This class describes all volatile memory module slots that are present in the system/partition.
- HP\_MemoryInLocation (Association)  
This association class associates a DIMM/SIMM described by an instance of "HP\_PhysicalMemory" that is present in a memory slot described by an instance of "HP\_MemoryLocation".
- HP\_MemoryCollection  
This class defines the memory collection. The status field of this collection represents the overall status of memory subsystem.
- HP\_HostedMemoryCollection (Association)  
This class defines the memory collection (HP\_MemoryCollection) in the context of scoping computer system. It represents a collection that only has the meaning in the context of computer system, and/or whose elements are restricted by the definition of the system.
- HP\_MemberOfMemoryCollection (Association)  
This is an aggregation class that establish the membership of a managed element with the corresponding collection class. HP\_MemberOfMemoryCollection class establish membership of HP\_PhysicalMemory with HP\_MemoryCollection.

Following intrinsic methods, of CIM instance provider, are supported by memory instance provider

- getInstance ()
- enumerateInstances ()
- enumerateInstanceNames ()

Following intrinsic methods, of CIM instance provider, are not supported by memory instance provider

- deleteInstance ()
- modifyInstance ()
- createInstance ()

Any extrinsic method of any of the supported MOF class is not supported.

Associations are instrumented using the instance provider framework.

The Provider requires

1. HP WBEM Services for hp-ux version A.02.05 or later.
2. OnlineDiag containing EMS V4.0 or later.

### Requirements

## Release history

This provider will be made available via 11.31 OS release.

## Supported managed resources

This provider provides information about Physical Memory Module (DIMM/SIMM) and Memory Module Slots.

Please note that the provider provides only the information about the above resources. They don't provide any managing or diagnostic or configuring capabilities for the above resources.

## Setting up this provider

### Installing this provider

The installation of the bundle SysFaultMgmt will set up this provider.

Ensure HPWBEM services A.02.05+ and OnlineDiag containing EMS V 4.0+ are already installed.

Use swinstall to install the product: "Swinstall -s *Fully\_Qualified\_Depot\_Name* SysFaultMgmt"

On installation, the shared-library files, executable binaries, configuration files and MOF definition and registration files will be available in the /opt/sfm/ directory, as follows:

- The provider library is libsfmproviders.1. This is available in /opt/sfm/lib/, along with all the other libraries it uses to implement the Memory Instance provider. A symbolic link is made in /opt/wbem/providers/lib/libsfmproviders.sl to link to the libsfmproviders.1 library in /opt/sfm/lib/.
- The CIM MOF files, containing the definitions of the HP-specific MOF classes, (namely HP\_MemoryPhysical28.mof) will be available in /opt/sfm/schemas/mof. This directory will also include the provider registration file, namely SFMProviderR.mof. Note: All the HP-specific MOF classes will be registered under the "root/cimv2" namespace.
- The /opt/sfm/bin/ directory will contain the binary executable files that are used by the Memory Instance Provider. This includes the "fmControl" utility that is used for sending notifications to the Memory Instance Provider (e.g. on updation to the configuration file).
- The /opt/sfm/conf/ directory will contain the (XML) configuration files of the Memory Instance Provider, and all the modules that this provider uses.
- The /opt/sfm/msgcat/ directory will contain the catalog files for all the supported locales. (This is used for the localization of the message strings in Memory Instance Provider).
- The /opt/sfm/log/ directory will contain log files generated during the execution of the CPU Instance Provider.

The Memory Instance Provider will support the platforms listed, running HPUX 11i V3:

<http://docs.hp.com/en/diag>

## Configuring this provider

Memory Provider uses a common configuration file along with CPU Instance Provider and EMSWrapper Indication Provider. So editing the configuration file will affect the other two providers as well. The configuration file can be found in - /opt/sfm/conf/FMLoggerConfig.xml

The file specifies the logging threshold severity, and the location of the log-file. The contents of the file are as follows:

```
<SFMConfig>
  <LoggerConfig>
    <Severity> WARNING </Severity>
    <Target> /opt/sfm/log/sfm.log </Target>
    <FileSize> 20480 </FileSize>
    <NBackupFiles>2</NBackupFiles>
  </LoggerConfig>
</SFMConfig>
```

In order to change the logging configuration, the following steps are to be followed:

1. Edit the configuration file /opt/sfm/conf/FMLoggerConfig.xml to change the threshold logging level and/or target.

a) **Threshold:** Possible values are (in increasing severity)

INFORMATIONAL

WARNING

ERROR

CRITICAL

**NOTE** The INFORMATIONAL logging severity will generate a lot of information. It is advisable not to use it for a long time as it may use a lot of disk space. The recommended threshold in the running environment will be WARNING. The default logging level is WARNING.

b) **Target:** Possible values include:

(i) STDOUT: All log messages are delivered to console.

(ii) The complete path to the file where the log messages are to be written

c) **FileSize:** This field defines the maximum size of the logging file to the logging subsystem.

d) **NBackupFiles:** When the logging file reaches the maximum file size defined by "FileSize" tag, the logging subsystem takes the backup of the current log file and then truncate it. This variable defines how many backup files will be preserved by logging subsystem.

2. Run /opt/sfm/bin/fmControl program, to specify the changed configuration file. For example

```
$ /opt/sfm/bin/fmControl /opt/sfm/conf/FMLoggerConfig.xml
```

Note that the complete path of the configuration file must be provided to the fmControl program.

## Using this provider

### Schema supported by this provider

Any HP WBEM services 2.5 compliant client will be able to use the MOF classes supported by the Memory Instance Provider.

The description section provides the brief description of the supported MOF classes. The following tables provide the information about the supported properties of these MOF classes or their base classes.

Note: All supported properties may not be available on all the supported platforms mentioned in the installation section.

**Table 1: HP\_PhysicalMemory supported properties. (Properties that are not supported are not mentioned.)**

Property name	Property inheritance	Property value (and data source)
String Description, String Caption	CIM_ManagedElement	The description provides the following information about a DIMM <ul style="list-style-type: none"><li>Memory Chip Type (Not Mandatory)</li><li>Location description</li></ul>
String ElementName	CIM_ManagedElement	Same as Name
uint16 OperationalStatus[]	CIM_ManagedSystemElement	The Value-Map associated with this property (as per the CIM 2.9 Schema Specification) is as follows: ValueMap {"0", "1", "2", "3", "4", "5", "6", "7", "8", "9", "10", "11", "12", "13", "14", "15", "16", "17"}, Values {"Unknown", "Other", "OK", "Degraded", "Stressed", "Predictive Failure", "Error", "Non-Recoverable Error", "Starting", "Stopping", "Stopped", "In Service", "No Contact", "Lost Communication", "Aborted", "Dormant", "Supporting Entity in Error", "Completed"} The following status information and its conversion to CIM operational status is mentioned below <ol style="list-style-type: none"><li>Configured : "Ok" status</li><li>HW De-Configured: "Stopped" status.</li><li>SW De-configured: "Stopped" status.</li><li>De-Configured (if on a server the firmware doesn't precisely tells weather the DIMM is de-configured by HW or SW. : "Stopped"</li></ol>

		status.
		<ol style="list-style-type: none"> <li>5. SPD Error: "Error" status</li> <li>6. Extended SPD error: "Error" status</li> <li>7. DIMM type mismatch: "Error Status".</li> <li>8. Unsupported DIMM: "Error Status"</li> <li>9. SBE ( indicating excessive Single Bit Error has occurred on this memory module) : "Degraded"/"Other" Status depending upon the severity of the SBE event generated by memory monitor (dm_memory/ia64_memory monitor):</li> </ol>
		It is possible that a DIMM/SIMM may have more than one status code for e.g. if the DIMM/SIMM is de-configured due to DIMM type mismatch than we will have "Error" and "Stopped" status.
		The OperationalStatus[0] will have the most important status of the DIMM. Other elements of the array will give more detailed information about the status.
String StatusDescriptions[]	CIM_ManagedSystemElement	Derived from operation status.
string Name	CIM_ManagedSystemElement	<p>Obtained from the FRU name. The example name will be DIMM_1024.</p> <p>If the FRU information is not present than memory instance provider tries to form the name in the format using the memory chip form factor and its size in MB.</p> <p>Thus a derived name will be</p> <p>&lt;Chip Form factor&gt;_&lt;module size in MB&gt;</p>
String PartNumber	CIM_PhysicalElement	DIMM/SIMM Part number.
String SerialNumber	CIM_PhysicalElement	DIMM/SIMM Serial Number.
<b>String CreationClassName [Key]</b>	CIM_PhysicalElement	Hard coded to "HP_PhysicalMemory"
<b>String Tag [Key]</b>	CIM_PhysicalElement	<p>This field will be derived from memory slot location and form factor.</p> <p>The form will be as follows</p> <p>&lt;location attrib 1&gt; - &lt;location attrib 2&gt; - ... ::&lt;location attrib n&gt;</p> <p>For e.g., the tag for a DIMM present in cellular system at cabinet 0, cell slot 01 and dimm slot 0b will be</p> <p>00-ff-ff-01-ff-0b-ff-74</p>
UInt64 Capacity	CIM_PhysicalMemory	Capacity of DIMM/SIMM in number of Bytes.
UInt16 MemoryType	CIM_PhysicalMemory	Defines the memory chip type as per the CIM specification defined enumeration.
UInt16 FormFactor	CIM_PhysicalMemory	Defines the form factor of memory chip as per the CIM specification defined enumeration.
UInt16 MemoryChipStatus[]	HP_PhysicalMemory	<p>The Value-Map associated with this property (as is defined in HP_PhysicalMemory mof class) is as follows:</p> <p>ValueMap {"0", "1", "2", "3", "4", "5", "6", "7", "8",</p>

"9","10"]

Values {"Other", "Unknown", "Configured", "Deconfigured By Hardware", "Deconfigured By Software", "DIMM Type Mismatch", "Unsupported DIMM", "SPD Error", "Extended SPD CheckSum Error", "Degraded", "SBE"}}

Returns the status of the memory module in this array.

Following status types are provides (the enum values are mentioned along with the status type)

1. Configured : 2
2. De-Configured : 3
3. HW De-Configured : 3
4. SW De-Configured : 4
5. Degraded : 9 ( This status type is not used in this release.)
6. DIMM Type Mismatch : 5
7. Unsupported DIMM : 6
8. SPD Error : 7
9. XSPD Error : 8
10. SBE : 10

String MemoryChipStatusDescription[] HP\_PhysicalMemory

Describes the memory module status.

Table 2: HP\_MemoryLocation supported properties. (Properties that are not supported are not mentioned.)

Property name	Property inheritance	Property value (and data source)
String Description	CIM_ManagedElement	Describes the slot according to type of slot. It also describes the location attributes of the memory slot.
String ElementName	CIM_ManagedElement	Hardcoded to "Volatile Memory Module Slot".
<b>String Name [Key]</b>	CIM_Location	<location name> = <location value>, ..., <location name> = <location value>  This parameter defines the location in terms of name value pairs.
<b>String PhysicalPosition [Key]</b>	CIM_Location	This field will be derived from "form factor" of one of the memory module controlled by associated memory controller (It is assumed that all the modules controlled by a memory controller are of same form factor.) and slot location attribute.  The format will be  <location attrib 1> - ..... <location attrib n>  for e.g.  00- ff - ff - 01 - ff - 0b - ff - 74
Uint8 PhysicalLocationLevels[]	HP_PhysicalLocationInComplex	The uint arrays PhysicalLocationLevles and PhysicalLocationValues keeps the location levels, as is defined by HP_PhysicalLocation class, and location value pair at corresponding indices. Each successive index in

UInt8 PhysicalLocationValues[]	HP_PhysicalLocationInComplex	LocationIdentifiers and LocationNames array will narrow down the location of the memory slot in the system.
Boolean isEmpty	HP_PhysicalLocationInComplex	Description is given in PhysicalLocationLevles.
String CreationClassName	HP_PhysicalLocationInComplex	Tells whether the slot have some DIMM or not.
String LocationIdentifiers	HP_MemoryLocation	Creation class name.
String LocationNames	HP_MemoryLocation	The string arrays LocationIdentifiers and LocationNames" , which keeps the location name and location value pair at corresponding indices. Each successive index in LocationIdentifiers and LocationNames array will narrow down the location of the memory slot in the system. For e.g. if at index n we have LocationNames [n] = "cell" "LocationIdentifiers [n]="5" then at index n+1 we will have the LocationNames[n+1] = "extender", LocationIdentifiers[n+1]="1" and at index n+2 we will have LocationNames[n+2] = "slot", LocationIdentifiers [n+2]="4". It means this instance of MOF class represent the 4'th slot on 1'st extender in 5'th cell. Not all the LocationIdentifiers will be valid on all the platforms. If a location attribute is not valid on a given platform than corresponding LocationIdentifiers array entry will have "0xFF".

**Table 3: HP\_MemoryInLocation supported properties. (Properties that are not supported are not mentioned.)**

This class associates the DIMM/SIMM with corresponding slots. A memory module (DIMM/SIMM) will always be associated with a memory slot. But a memory slot may not be associated with a memory module as it may be empty.

The getInstance() method is not supported for this association class.

Property name	Property inheritance	Property value (and data source)
<b>HP_PhysicalMemory REF Element</b>	Overridden by HP_MemoryInLocation	The reference to the memory module. See HP_PhysicalMemory keys for further information.
<b>HP_MemoryLocation REF PhysicalLocation</b>	Overridden by HP_MemoryInLocation	The reference to the memory slot. See HP_MemoryLocation keys for further information.

**Table 4: HP\_MemoryCollection supported properties. (Properties that are not supported are not mentioned.)**

This class represents the memory subsystem, which is collection of memory modules, in the computer system.

The getInstance() method is not supported for this association class.

<i>Property name</i>	<i>Property inheritance</i>	<i>Property value (and data source)</i>
<b>String InstanceID (Key)</b>	Inherited from CIM_SystemSpecificCollection	Hewlett-Packard:diags.sfm:<CreationClassName>:<LocalID>  CreationClassName reflects the collection class name. LocalID is always 0, as we are creating only 1 instance of collection class.
String Caption	Inherited from HP_GroupSystemSpecificCollection	"HP_CoolingCollection" or "HP_PowerCollection"
UInt16[] GroupOperationalStatus	Inherited from HP_GroupSystemSpecificCollection	ValueMap {"0", "1", "2", "3", "4", "5", "6", "7", "8", "9", "10", "11", "12", "13", "14", "15", "16", "17"},  Values {"Unknown", "Other", "OK", "Degraded", "Stressed", "Predictive Failure", "Error", "Non-Recoverable Error", "Starting", "Stopping", "Stopped", "In Service", "No Contact", "Lost Communication", "Aborted", "Dormant", "Supporting Entity in Error", "Completed"},
String[] GroupStatusDescriptions	Inherited from HP_GroupSystemSpecificCollection	

**Table 5: HP\_HostedMemoryCollection supported properties. (Properties that are not supported are not mentioned.)**

This class associates the Memory Collection with scoping computer system.

The getInstance() method is not supported for this association class.

<i>Property name</i>	<i>Property inheritance</i>	<i>Property value (and data source)</i>
<b>CIM_ComputerSystem ref Antecedent</b>	Overridden by HP_GroupHostedCollection	The reference to the CIM_ComputerSystem.
<b>HP_MemoryCollection ref Dependent</b>	Overridden by HP_HostedMemoryCollection	The reference to memory collection that is managed by the system.

**Table 6: HP\_MemberOfMemoryCollection supported properties. (Properties that are not supported are not mentioned.)**

This class associates the DIMM/SIMM(HP\_PhysicalMemory) with corresponding memory collection(HP\_MemoryCollection).

<i>Property name</i>	<i>Property inheritance</i>	<i>Property value (and data source)</i>
<b>HP_MemoryCollection REF Collection</b>	Overridden by HP_MemberOfMemoryCollection	Object path of HP_MemoryCollection.
<b>HP_PhysicalMemory REF Member</b>	Overridden by HP_MemberOfMemoryCollection	Object path of HP_PhysicalMemory.

**indications generated by this provider** This Provider does not currently generate any indications.

**links to more information**

- **WBEM information**

For a CIM tutorial, go to <http://www.wbemsolutions.com/tutorials/CIM/>.

For additional information on HP products and services, visit us at <http://www.hp.com>.

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