Interactive Session Recorder
Monitoring Guide

Release 6.4
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Interactive Session Recorder Monitoring Guide, Release 6.4

F29535-01

Contents

A CIS SNMP Gets, Traps, and Agent MIBs

About This Guide

The Interactive Session Recorder (ISR) Monitor guide provides provisioning, configuration, and test instructions specifically to:

- Install and configure default monitoring coverage for each ISR component host using NET-SNMP
- Configure traps to alert listeners of environmental resource concerns and ISR application and third-party platform failures.
- Extend the NET-SNMP suite for more detailed monitoring
- Configuring MySQL database replication monitoring

This guide also provides specific test examples to retrieve information regarding application and host health.

Related Documentation

The following table describes the documentation set for this release.

Document Name	Document Description
ISR Release Notes	Contains information about new ISR features, fixes, and known issues.
ISR Installation Guide	Provides an overview of the ISR, hardware/software requirements and recommendations, storage considerations, pre-installation information, installation procedures, post-install verification procedures, making the first call, and additional advanced topics about the ISR.
ISR User Guide	Contains information about using the ISR Dashboard for all levels of users. Provides information about viewing, playing, deleting recordings, running reports, and managing user profiles.
ISR Administrator Guide	Contains information about using the ISR Dashboard for the Administrator level user (Super User, Account Administrator, Tenant Administrator). Provides information about creating and managing accounts, routes, and users. Also provides information about configuring the ISR, running reports, viewing active calls, and securing the ISR deployment.
ISR API Reference Guide	Contains information about ISR FACE, Recording File Types/Formats Supported, Return Codes, and Troubleshooting.
ISR Monitoring Guide	Provides provisioning, configuration and test instructions for the NET-SNMP implementation to monitor all ISR component hosts.
ISR Security Guide	Contains information about security considerations and best practices from a network and application security perspective for the ISR product.

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- Inability to restart a processor or the system
- Corruption of system databases that requires service affecting corrective actions
- Loss of access for maintenance or recovery operations
- Loss of the system ability to provide any required critical or major trouble notification

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Revision History

This section provides a revision history for this document.

Date	Description
March 2020	• Initial release of ISR 6.4 software.

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Configuring ISR NET-SNMP

The ISR uses the NET-SNMP suite, which includes libraries and tools for using the SNMP protocol, on Oracle Linux for monitoring purposes. Oracle Linux does not include the NET-SNMP suite by default, so to enable monitoring, you must obtain the NET-SNMP package, enable the package upon startup, and configure firewalld on each ISR host to listen to UDP on port 161 for SNMP.

> **Note:**
>
> The NET-SNMP suite is an established toolkit with extensive documentation and information resources.

Obtaining the NET-SNMP Configuration

Oracle Linux does not include the NET-SNMP suite by default. Oracle recommends adding the package on each ISR host.

> **Note:**
>
> For more information on adding the yum tool's Oracle public repository on an ISR, see the "Oracle Public Yum Repository Configuration File" appendix in the *Oracle Communications Interactive Session Recorder Installation Guide*.

Execute the following command on the ISR host:

```
$ sudo yum install net-snmp
```

> **Note:**
>
> You must acquire and install the "net-snmp-utils" NET-SNMP package for the "snmpget" example commands. Execute the **sudo yum install net-snmp-utils** command to install the NET-SNMP utilities.

Enabling the SNMPD Service at Startup

Execute the following commands on the ISR hsot to enable the NET-SNMP package upon startup.

```
$ systemctl start snmpd
$ systemctl enable snmpd
```

Configuring Firewalld For UDP Listening On an ISR Host

On each ISR host, you must configure firewalld for listening to UDP on port 161 for SNMP.

> **Note:**
>
> If the Oracle Linux (OL) standard firewall process, firewalld, is active, configure the SNMPD process to listen to SNMP requests by opening the default SNMP port on the appropriate interface with firewalld. For more information on opening ports in firewalld, see *Oracle Communications Interactive Session Recorder Security* guide.

```
$ sudo vi /etc/firewalld/services/snmp.xml
```

Add the following:

```
<?xml version="1.0" encoding="utf-8"?>
<service>
  <short>SNMP</short>
  <description>SNMP protocol</description>
  <port protocol="udp" port="161"/>
</service>
$ sudo firewall-cmd --zone=public --add-service snmp --permanent
$ sudo firewall-cmd --reload
```

Default Configuration Test

The following is an example of an initial SNMP get.

```
$ snmpget -v 1 -c public <ISR_host_IP> .1.3.6.1.2.1.1.1.0
```

Configuring an SNMP v3 User

You must create the SNMPv3 user on each ISR host. The following example shows commands run as root to create an **isrsnmp** user with the password **n3wf0und**.

```
$ sudo systemctl stop snmpd.service
$ sudo net-snmp-create-v3-user -ro -A n3wf0und isrsnmp
```

Add the following line to /var/lib/net-snmp/snmpd.conf:

```
createUser isrsnmp MD5 "n3wf0und" DES
```

Add the following line to /etc/snmp/snmpd.conf:

```
rouser isrsnmp
$ sudo systemctl start snmpd
```

Test the user using the following command:

```
$ snmpwalk -v3 -u isrsnmp -A n3wf0und -a MD5 -l AuthnoPriv <ISR_host_IP> system
```

This action adds the following line at the bottom of the /etc/snmp/snmpd.conf file:

```
rouser isrsnmp
```

Recommended ISR SNMP Configurations

The following recommendations for each ISR component may be copied and added to an SNMPD configuration file as-is. However, the NET-SNMP suite is highly flexible and well-documented. For more information on the below configurations and to increase SNMP monitoring coverage of ISR and other Linux applications, see Manpage of SNMPD.CONF - Net-SNMP.

> **Note:**
>
> You must restart SNMPD ($ sudo systemctl restart snmpd) for these changes to take effect.

Recommended ISR RSS SNMP Configuration

For recommended RSS SNMP configurations, create a "/etc/snmp/snmpd.local.conf" file with the following configurations:

```
###############################################################################
# ISR RSS configs
# ISR read-only user
rouser isrsnmp auth .1
# ISR app processes
proc isrl.elf 1 1
proc converterl.elf 1 1
proc procmonl.elf
proc java 1 1
# RSS host root disk remaining < 100MB
disk / 100000
# cpu load
load 12 14 14
# RSS process restarts
logmatch recorderRestart /opt/isr/logs/recorder/recorder.log 120 VoIP Media
Gateway.*starting
logmatch converterRestart /opt/isr/logs/converter/converter.log 120 Converter
Version.*
```

Recommended ISR Index SNMP Configuration

For recommended Index SNMP configurations, create a "/etc/snmp/snmpd.local.conf" file with the following configurations:

```
###############################################################################
# ISR Index configs
rouser isrsnmp auth .1
proc mysqld 1 1
disk / 100000
load 12 14 14
```

Recommended ISR Dashboard SNMP Configuration

For recommended Dashboard SNMP configurations, create a "/etc/snmp/snmpd.local.conf" file with the following configurations:

```
###############################################################################
# ISR Dashboard configs
rouser isrsnmp auth .1
proc ruby 1 1
disk / 10000
load 12 14 14
```

Recommended ISR FACE SNMP Configuration

For recommended FACE SNMP configurations, create a "/etc/snmp/snmpd.local.conf" file with the following configurations:

```
###############################################################################
# ISR Dashboard configs
rouser isrsnmp auth .1
proc java 1 1
disk / 10000
load 12 14 14
```

Standard ISR SNMP GET Requests

When the recommended ISR SNMP configurations are properly available on the appropriate ISR hosts, you may execute the following list of SNMP GET requests from any host using the NET-SNMP suite.

> **Note:**
>
> The following list contains the most commonly used SNMP GET requests and does not represent a complete list of all possible requests.

Disk SNMP GET Requests

- Has the "/" partition available space dipped below the specified threshold (OID and defaults: UCD-SNMP-MIB::dskPath.1 = STRING: /, UCD-SNMP-MIB::dskMinimum.1 = INTEGER: 10000 [i.e. 10MB]):

  ```
  snmpget -v3 -u <SNMP user name> -A <SNMP user password> -a MD5 -l AuthnoPriv
  <ISR host IP> UCD-SNMP-MIB::dskErrorFlag.1
  ```

- How much space is available on the "/" partition (UCD-SNMP-MIB::dskPath.1 = STRING: /,):

  ```
  snmpget -v3 -u <SNMP user name> -A <SNMP user password> -a MD5 -l AuthnoPriv
  <ISR host IP> UCD-SNMP-MIB::dskAvail.1
  ```

CPU SNMP GET Requests

- Has the CPU load exceeded the specified 1-minute, 5-minute or 15-minute thresholds (UCD-SNMP-MIB::laConfig.1 = STRING: 12.00, UCD-SNMP-MIB::laConfig.2 = STRING: 14.00, UCD-SNMP-MIB::laConfig.3 = STRING: 14.00):

  ```
  snmpget -v3 -u <SNMP user name> -A <SNMP user password> -a MD5 -l AuthnoPriv
  <ISR host IP> UCD-SNMP-MIB::laErrFlag.1
  snmpget -v3 -u <SNMP user name> -A <SNMP user password> -a MD5 -l AuthnoPriv
  <ISR host IP> UCD-SNMP-MIB::laErrFlag.2
  ```

```
snmpget -v3 -u <SNMP user name> -A <SNMP user password> -a MD5 -l AuthnoPriv
<ISR host IP> UCD-SNMP-MIB::laErrFlag.3
```

- What's the average load in the past 1-minute:

```
snmpget -v3 -u <SNMP user name> -A <SNMP user password> -a MD5 -l AuthnoPriv
<ISR host IP> UCD-SNMP-MIB::laLoad.1
```

Memory SNMP GET Requests

- Has the available swap space dipped below the specified threshold (UCD-SNMP-MIB::memMinimumSwap.0 = INTEGER: 16000 kB):

```
snmpget -v3 -u <SNMP user name> -A <SNMP user password> -a MD5 -l AuthnoPriv
<ISR host IP> UCD-SNMP-MIB::memSwapError.0
```

- How much RAM is available:

```
snmpget -v3 -u <SNMP user name> -A <SNMP user password> -a MD5 -l AuthnoPriv
<ISR host IP> UCD-SNMP-MIB::memAvailReal.0
```

- Have there been memory blocks swapped in:

```
snmpget -v3 -u <SNMP user name> -A <SNMP user password> -a MD5 -l AuthnoPriv
<ISR host IP> UCD-SNMP-MIB::ssRawSwapIn.0
```

- Have there been memory blocks swapped out:

```
snmpget -v3 -u <SNMP user name> -A <SNMP user password> -a MD5 -l AuthnoPriv
<ISR host IP> UCD-SNMP-MIB::ssRawSwapOut.0
```

Interfaces SNMP GET Requests

- What's the "up/down" status of the four network interfaces:

```
snmpget -v3 -u <SNMP user name> -A <SNMP user password> -a MD5 -l AuthnoPriv
<ISR host IP> IF-MIB::ifAdminStatus.2
snmpget -v3 -u <SNMP user name> -A <SNMP user password> -a MD5 -l AuthnoPriv
<ISR host IP> IF-MIB::ifAdminStatus.3
snmpget -v3 -u <SNMP user name> -A <SNMP user password> -a MD5 -l AuthnoPriv
<ISR host IP> IF-MIB::ifAdminStatus.4
snmpget -v3 -u <SNMP user name> -A <SNMP user password> -a MD5 -l AuthnoPriv
<ISR host IP> IF-MIB::ifAdminStatus.5
```

- Have inbound packets on any of the four network interfaces contained errors preventing them from being deliverable to a higher-layer protocol:

```
snmpget -v3 -u <SNMP user name> -A <SNMP user password> -a MD5 -l AuthnoPriv
<ISR host IP> IF-MIB::ifInErrors.2
snmpget -v3 -u <SNMP user name> -A <SNMP user password> -a MD5 -l AuthnoPriv
<ISR host IP> IF-MIB::ifInErrors.3
snmpget -v3 -u <SNMP user name> -A <SNMP user password> -a MD5 -l AuthnoPriv
<ISR host IP> IF-MIB::ifInErrors.4
snmpget -v3 -u <SNMP user name> -A <SNMP user password> -a MD5 -l AuthnoPriv
<ISR host IP> IF-MIB::ifInErrors.5
```

- Have outbound packets on any of the four network interfaces not been transmitted because of errors:

```
snmpget -v3 -u <SNMP user name> -A <SNMP user password> -a MD5 -l AuthnoPriv
<ISR host IP> IF-MIB::ifOutErrors.2
snmpget -v3 -u <SNMP user name> -A <SNMP user password> -a MD5 -l AuthnoPriv
<ISR host IP> IF-MIB::ifOutErrors.3
snmpget -v3 -u <SNMP user name> -A <SNMP user password> -a MD5 -l AuthnoPriv
```

```
<ISR host IP> IF-MIB::ifOutErrors.4
snmpget -v3 -u <SNMP user name> -A <SNMP user password> -a MD5 -l AuthnoPriv
<ISR host IP> IF-MIB::ifOutErrors.5
```

RSS Processes SNMP GET Requests

- Are the RSS application processes running (Recorder, Converter, Process Monitor, API/ Archival, respectively):

  ```
  snmpget -v3 -u <SNMP user name> -A <SNMP user password> -a MD5 -l AuthnoPriv
  <ISR host IP> UCD-SNMP-MIB::prErrorFlag.1
  snmpget -v3 -u <SNMP user name> -A <SNMP user password> -a MD5 -l AuthnoPriv
  <ISR host IP> UCD-SNMP-MIB::prErrorFlag.2
  snmpget -v3 -u <SNMP user name> -A <SNMP user password> -a MD5 -l AuthnoPriv
  <ISR host IP> UCD-SNMP-MIB::prErrorFlag.3
  snmpget -v3 -u <SNMP user name> -A <SNMP user password> -a MD5 -l AuthnoPriv
  <ISR host IP> UCD-SNMP-MIB::prErrorFlag.4
  ```

- How many times has the Recorder Process restarted since the last SNMPD read and logged the matching regexp "VoIP Media Gateway.*starting":

  ```
  snmpget -v3 -u <SNMP user name> -A <SNMP user password> -a MD5 -l AuthnoPriv
  <ISR host IP> UCD-SNMP-MIB::logMatchCounter.1
  ```

- How many times has the Converter Process restarted since the last SNMPD read and logged the matching regexp "Converter Version.*":

  ```
  snmpget -v3 -u <SNMP user name> -A <SNMP user password> -a MD5 -l AuthnoPriv
  <ISR host IP> UCD-SNMP-MIB::logMatchCounter.2
  ```

Index Processes SNMP GET Requests

- Is the MySQL database process running:

  ```
  snmpget -v3 -u <SNMP user name> -A <SNMP user password> -a MD5 -l AuthnoPriv
  <ISR host IP> UCD-SNMP-MIB::prErrorFlag.1
  ```

Dashboard Processes SNMP GET Requests

- Is the Dashboard webserver process running:

  ```
  snmpget -v3 -u <SNMP user name> -A <SNMP user password> -a MD5 -l AuthnoPriv
  <ISR host IP> UCD-SNMP-MIB::prErrorFlag.1
  ```

FACE Processes SNMP GET Requests

- Is the FACE API webserver running:

  ```
  snmpget -v3 -u <SNMP user name> -A <SNMP user password> -a MD5 -l AuthnoPriv
  <ISR host IP> UCD-SNMP-MIB::prErrorFlag.1
  ```

Mapping NET-SNMP Configurations to Pre-5.2 ISR Monitor Tests

The following table maps the legacy, pre-5.2 Monitoring tests to the current NET-SNMP configurations.

Legacy Monitor Test Component Name	Current Test Coverage
<RSS_name>	Recorder process (including RSS host memory, disk, CPU, and network interfaces)
<RSS_name>'s API	API webserver process (including RSS host memory, disk, CPU, and network interfaces)
<Location_name_and_IP> - Disk	RSS host disk
<Location_name_and_IP> - Web Access	Recorded file webserver process (including RSS host memory, disk, CPU, and network interfaces)
ISR Dashboard	Dashboard webserver process (including RSS host memory, disk, CPU, and network interfaces)
ISR Index	Primary Index host MySQL database process (including RSS host memory, disk, CPU, and network interfaces)
ISR Secondary Index	Secondary Index host MySQL database process (including RSS host memory, disk, CPU, and network interfaces)

Configuring Traps

The following sections describe configuring traps via NET-SNMP.

Configuring Traps for Recommended OIDs

To configure sending traps for recommended OIDs, you must install the NET-SNMP utilities package.

```
$ sudo yum install net-snmp-utils
```

SNMPv2 Traps

For SNMPv2 traps to be sent from the ISR host, edit the "/etc/snmp/snmpd.local.conf" file and add the following configuration settings for the default NET-SNMP network interface and host resource notifications. Then restart the snmpd service.

```
# default NET-SNMP trap configs
# receiving IP address
trap2sink <NMS_IP_address>
# SNMPv3 user for internal queries
iquerySecName isrsnmp
agentSecName isrsnmp
# enable default monitoring
defaultMonitors yes
linkUpDownNotifications yes
```

> **Note:**
>
> For more information on the default network and resource coverage with NET-SNMP, execute the **man snmpd.conf** command and read "DisMan Event MIB".

SNMPv3 Traps

SNMPv3 traps require a slight change in the `/etc/snmp/snmpd.local.conf` file only and the remaining configuration values remain unchanged.

> **Note:**
>
> When you enable SNMPv3 traps, you must restart the snmpd service.

```
# default NET-SNMP trap configs
# receiving IP address
trapsess -l authPriv -u isrsnmp -a MD5 -A <authPassword> -x DES -X
<PrivPassword><NMS_IP_address>
# SNMPv3 user for internal queries
iquerySecName isrsnmp
agentSecName isrsnmp
# enable default monitoring
defaultMonitors yes
linkUpDownNotifications yes
```

Monitoring MySQL Database Replication On the Index Hosts

The following sections offer examples to configure NET-SNMP for monitoring the MySQL Server error log and sending traps for certain slave database events. Specifically, slave IO errors such as a lost connection with master and slave SQL errors from failed statements are rolled into a trap with a "MySQL replication error" description along with the "/var/log/mysqld.log" file that posted the error.

Configuring NET-SNMP For Monitoring MySQL Server Error Logs

Add the following lines to the "snmpd.local.conf file on the Index hosts:

```
logmatch mysqlReplicationNoSlave /var/log/mysqld.log 60 Error reading relay log
event for channel
logmatch mysqlReplicationNoServer /var/log/mysqld.log 60 \[ERROR\] Slave I\/O
for channel
logmatch mysqlReplicationSqlError /var/log/mysqld.log 60 \[ERROR\] Slave SQL for
channel
monitor -r 60 -o logMatchFileName "MySQL replication error" !=
logMatchCurrentCount -u isrsnmp
```

Restart the snmpd process.

```
$ systemctl restart snmpd
```

Configuring SNMPD to Read MySQL Server Error Log

By default, SELinux does not allow NET-SNMP's "snmpd" process to read the MySQL Server default "/var/log/mysqld.log" file. There are some tools available with snmpd to add the proper configuration, specifically the "audit2allow" command-line tool. This tool adds an SELinux "allow" rule based on the logged event for the "snmpd" process being refused "read" and "open" access.

1. Confirm the following log is entered in the "/var/log/audit.log" log files of each Index host:

```
type=AVC msg=audit(1502798331.404:75558): avc: denied { read } for pid=6060
comm="snmpd" name="mysqld.log" dev="dm-0" ino=17655111
scontext=system_u:system_r:snmpd_t:s0
tcontext=system_u:object_r:mysqld_log_t:s0 tclass=file
```

2. Execute the following commands on each Index host:

```
sudo grep mysqld_log_t /var/log/audit/audit.log | audit2allow -M mymysqldlog
sudo semodule -i mymysqldlog.pp
```

3. Restart "snmpd".

```
$ systemctl restart snmpd
```

4. Confirm the following new log entry has been entered in the "audit.log" files:

```
type=AVC msg=audit(1502800379.221:75814): avc: denied { open } for pid=6134
comm="snmpd" path="/var/log/mysqld.log" dev="dm-0" ino=17655111
scontext=system_u:system_r:snmpd_t:s0
tcontext=system_u:object_r:mysqld_log_t:s0 tclass=file
```

5. Execute the following commands on each Index host:

```
$ sudo grep mysqld_log_t /var/log/audit/audit.log | audit2allow -M
mymysqldlogopen
$ sudo semodule -i mymysqldlogopen.pp
```

6. Confirm traps are received during a (very invasive) stop of one of the MySQL Servers:

```
$ systemctl stop mysqld
```

> **Note:**
>
> Stopping the MySQL Server service brings down the database used by ISR applications during this testing window.

7. Confirm the trap is received. You may also issue an **snmpwalk** command from a Linux host with the "net-snmp-utils RPM package. Following the above SNMP example user and password, execute the following command:

```
$ snmpwalk -v3 -u isrsnmp -A n3wf0und -a MD5 -l AuthnoPriv <Index_IP>
logMatchTable
```

to highlight certain lines from the result:

```
...
UCD-SNMP-MIB::logMatchFilename.1 = STRING: /var/log/mysqld.log
...
UCD-SNMP-MIB::logMatchRegEx.1 = STRING: Error reading relay log event for
channel - first string to match
UCD-SNMP-MIB::logMatchRegEx.2 = STRING: \\[ERROR\\] Slave I\\/O for channel
UCD-SNMP-MIB::logMatchRegEx.3 = STRING: \\[ERROR\\] Slave SQL for channel
UCD-SNMP-MIB::logMatchGlobalCounter.1 = Counter32: 6 - total matches
...
UCD-SNMP-MIB::logMatchCurrentCounter.1 = Counter32: 5 - matches on current
log file
...
UCD-SNMP-MIB::logMatchCounter.1 = Counter32: 0 - matches on current read
...
```

For more information, see the NET-SNMP online documentation.

Monitoring the ISR with Recording Capacity Exceeded

To configure monitoring when the ISR's recording capacity has been exceeded, add the following lines to the "snmpd.local.conf" file on the RSS hosts:

```
logmatch recorderCapacityExceeded /opt/isr/logs/recorder/recorder.log 120 no
channels available to take this call
logmatch systemCapacityExceeded /opt/isr/logs/recorder/recorder.log 120 no
channels available to take this call
monitor -r 60 -o logMatchName -o logMatchFileName "RSS application error" !=
logMatchCurrentCount -u isrsnmp
```

> **Note:**
>
> Add the last line specifically to send a trap when the ISR exceeds capacity, or the Recorder and Converter processes have restarted. For more information, see *Recommended ISR RSS SNMP Configuration*.

A

CIS SNMP Gets, Traps, and Agent MIBs

The following sections describe the CIS SNMP Gets, Traps, and Agent MIBs.

ISR SNMP Get List

The table below includes SNMP Gets for host resources of CPU, disk, and memory. The first two columns, Name and OID, may be used as the final field in the following SNMPv3 example query:

```
# snmpget -v 3 -u <user> -| authNoPriv -A <password> <agent IP> <OID/Name>
```

These SNMP requests are defined within the UCD-SNMP-MIB MIB document as . 1.3.6.1.4.1.2021 and may be executed from any compatible NMS.

Note: For hardware-specific SNMP variables available for Gets, please refer to the documentation for the VM Hypervisor supporting the ISR.

Name	OID	Description
laLoad.1	.1.3.6.1.4.1.2021.10.1.3.1	CPU Load: 1 minute average
laLoad.2	.1.3.6.1.4.1.2021.10.1.3.2	CPU Load: 5 minute average
laLoad.3	.1.3.6.1.4.1.2021.10.1.3.3	CPU Load: 15 minute average
laErrorFlag.1	.1.3.6.1.4.1.2021.10.1.100.1	CPU Load: set to 1 if CPU load average exceeds threshold, otherwise 0 (1min)
laErrorFlag.2	.1.3.6.1.4.1.2021.10.1.100.2	CPU Load: set to 1 if CPU load average exceeds threshold, otherwise 0 (5 mins)
laErrorFlag.3	.1.3.6.1.4.1.2021.10.1.100.3	CPU Load: set to 1 if CPU load average exceeds threshold, otherwise 0 (15 mins)
laErrMessage.1	.1.3.6.1.4.1.2021.10.1.101.1	CPU Load: message describing error (1 min)
laErrMessage.2	.1.3.6.1.4.1.2021.10.1.101.2	CPU Load: message describing error (5 mins)
laErrMessage.3	.1.3.6.1.4.1.2021.10.1.101.3	CPU Load: message describing error (15 mins)
laConfig.1	.1.3.6.1.4.1.2021.10.1.4.1	CPU Load: threshold setting (1 min=20)
laConfig.2	.1.3.6.1.4.1.2021.10.1.4.2	CPU Load: threshold setting (5 mins=20)
laConfig.3	.1.3.6.1.4.1.2021.10.1.101.3	CPU Load threshold setting (15 mins=20)
ssCpuRawUser.0	.1.3.6.1.4.1.2021.11.50.1	CPU: The number of ticks (1/100s) spent processing user-level code
ssCpuRawSystem.0	.1.3.6.1.4.1.2021.11.52.0	CPU: The number of ticks (1/100s) spent waiting for IO

Name	OID	Description
ssCpuRawWait.0	.1.3.6.1.4.1.2021.11.54.0	CPU: The number of ticks (1/100s) spent waiting for IO Note: This counter is cumulative over all CPUs, so the value is typically multiplied by 4*100 (the standard four processors on an ISR host multiplied by 100 ticks/second).
dskTotal.1	.1.3.6.1.4.1.2021.9.1.6.1	Disk: Total disk size of the / partition in kB
dskAvail.1	.1.3.6.1.4.1.2021.9.1.7.1	Disk: Available space on the partition in kB
dskUsed.1	.1.3.6.1.4.1.2021.9.1.8.1	Disk: Used space on the partition in kB
dskPercent.1	.1.3.6.1.4.1.2021.9.1.9.1	Disk: Percentage of used space on the partition
dskErrorFlag.1	.1.3.6.1.4.1.2021.9.1.100.1	Disk: Error flag set to 1 if disk is under configured minimum space; otherwise 0
dskErrorMsg.1	.1.3.6.1.4.1.2021.9.1.101.1	Disk: Descriptive error message
dskMinimum.1	.1.3.6.1.4.1.2021.9.1.4.1	Disk: Threshold setting for minimum (set to 500000 kB)
memTotalReal.0	.1.3.6.1.4.1.2021.4.5.0	Memory: Total RAM in machine
memAvailReal.0	.1.3.6.1.4.1.2021.4.6.0	Memory: Total RAM unused
memTotalFree.0	.1.3.6.1.4.1.2021.4.11.0	Memory: Total memory free (covers RAM and swap)
memTotalSwap.0	.1.3.6.1.4.1.2021.4.3.0	Swap: Total swap space configured for host
memAvailSwap.0	.1.3.6.1.4.1.2021.4.4.0	Swap: Available swap
memMinimumSwap.0	.1.3.6.1.4.1.2021.4.12.0	Swap: memSwapError set to 1 if memAvailSwap falls below this threshold
memSwapError	.1.3.6.1.4.1.2021.4.100	Swap: Error flag set to 1 if memAvailSwap value falls below memMinimumSwap
memSwapErrorMsg	.1.3.6.1.4.1.2021.4.101	Swap: Error message if memAvailSwap value falls below memMinimumSwap
ifIndex	.1.3.6.1.2.1.2.2.1.1	Index ID of every network interface available on the VM.
ifDescr	.1.3.6.1.2.1.2.2.1.2	Description of every network interface available on the VM (for example, eth0)
ifOperStatus	.1.3.6.1.2.1.2.2.1.8	The current state of each interface (up or down)
ifOutOctets	.1.3.6.1.2.1.2.2.1.16	The total number of octets transmitted out of the interface, including framing packets
ifInOctets	.1.3.6.1.2.1.2.2.1.10	The total number of octets received on each interface, including framing characters
ifSpeed	.1.3.6.1.2.1.2.2.1.5	The interface's current bandwidth in bits per second

Name	OID	Description
ifInErrors	.1.3.6.1.2.1.2.2.1.14	The number of inbound packets that contained errors, per interface
ifOutErrors	.1.3.6.1.2.1.2.2.1.20	The number of outbound packets that could not be transmitted because of errors, per interface

SNMP Trap List

The table below includes SNMP Traps for host resources of CPU, disk, memory, and swap space.

Name	Condition	Trap Message Example
memSwapErrorMsg	memSwapError ! =0	CPU Load: 5 minute average
memSwapErrorMsg	memSwapError !0 = >0	(swap error cleared) Memory occupancy alarm cleared
dskErrorMsg	dskErrorFlat ! = 0	(default behavior space < 500MB) /: less than 500000 free (=414622)
dskErrorMsg	dskErrorFlat !0 = >0	(disk error cleared) Disk occupancy alarm cleared
IaErrMessage	IaErrorFlat ! = 0	(default behavior load > 20%) 1 min Load Average too high (=1.26)
IaErrMessage	IaErrorFlat !0 = >0	(load error cleared) CPU Load alarm cleared

SNMP Agent MIBs

The UCD-SNMP-MIB defines the tables to store status and monitor values of the recommended ISR SNMP variables. The traps configured and enabled on an ISR host SNMP agent using the recommended configuration are defined with in NET-SNMP-MIB and NET-SNMP-AGENT-MIB. These related MIBs are accessible at the following URLs:

UCD-SNMP-MIB:

http://www.net-snmp.org/docs/mibs/ucdavis.html

and

http://www.net-snmp.org/docs/mibs/UCD-SNMP-MIB.txt

NET-SNMP-MIB:

http://www.net-snmp.org/docs/mibs/NET-SNMP-MIB.txt

and

http://www.net-snmp.org/docs/mibs/netSnmp.html

NET-SNMP-AGENT-MIB:

http://www.net-snmp.org/docs/mibs/netSnmpAgentMIB.html

and

http://www.net-snmp.org/docs/mibs/NET-SNMP-AGENT-MIB.txt

Also, all MIBs included as part of net-snmp are found at the following URL:

http://www.net-snmp.org/docs/mibs/