Administering the Event Monitoring Service on HP-UX

Martin Burnett

Customer Service/Support

Service/Support Off-Site Eng V

HP WORLD 2003
Solutions and Technology Conference & Expo

Event Monitoring Service Introduction

- A framework for monitoring HPUX system resources.
- Provides a common interface for monitor configuration and event notification.
- EMS monitors provide help primarily with fault and resource management.
- Designed for use in high availability environments

EMS consists of three components

- Framework - Registrar, Dictionary, EMS API
- Standard API - provides a way to plug in new monitors as they become available or to write your own monitors.
- Configuration interface - Runs under Monconfig (TUI) or SAM (System Administration Manager).

Event Monitoring Service

EMS – Supported Products

HP WORLD 2003 Solutions and Technology Conference & Expo

- B7609BA – Event Monitoring Service

  Free bundle supported on HPUX 10.20, 11.00 and 11.11 HP 9000 Series 700/800, 11.22 HP IA64

- B5736BA/CA/DA – HA Monitors

  Purchasable bundle supported on HPUX 10.20, 11.00, 11.11 HP 9000 Series 800 only, HPUX 11.22 IA64

- B7611BA – EMS Developers' Kit

  Free bundle supported on HPUX 10.20 and 11.00 HP 9000 Series 700/800

http://www.software.hp.com/products/EMS/index.html

Event Monitoring Service

EMS HW Monitor Benefits

HP WORLD 2003 Solutions and Technology Conference & Expo

- Reduce system downtime
- Reduce time to repair
- Default monitoring configuration
- Common tool for monitoring HW resources
- Various notification methods
- Integrate into other applications
- Minimal maintenance

Monitors utilizing EMS

- AutoRAID Disk Array (armmon)
- Chassis Monitor (dm_chassis, June 2001)
- CMC Monitor (cmc_em, June 2001)
- Core Hardware (dm_core_hw)
- CPU Monitor (formerly the LPMC Monitor) (lpmc_em)
- Disk (disk_em)
- Disk Array FC60 (fc60mon)
- Fast Wide SCSI Disk Array (fw_disk_array)
- Fibre Channel Adapter (dm_FCMS_adapter)
- Fibre Channel Adapter (dm_TL_adapter)
- Fibre Channel Arbitrated Loop Hub (dm_fc_hub)
- Fibre Channel SCSI Multiplexer (dm_fc_scsi_mux)
- Fibre Channel Switch (dm_fc_sw)

Monitors utilizing EMS

- High Availability Disk Array (ha_disk_array)
- High Availability Storage System (See SES Enclosure Monitor)
- Itanium Core Hardware Monitor (ia64_corehw, June 2001)
- Kernel Resource (krmond)
- LPMC (now CPU) (lpmc_em)
- Itanium Memory Monitor (memory_ia64)
- Memory (dm_memory)
- Memory Monitor Model rx9610 (dm_memory_azusa)
- Remote (RemoteMonitor)
- SCSI Card (scsi123_em)
- SCSI Tape Devices (dm_stape)
- SES Enclosure Monitor (ses_enclosure)
- System Status (sysstat_em)
- UPS (dm_ups)

EMS HA Monitors - Differences

EMS HW MONITORS	EMS HA MONITORS
Monitor HW resources such as I/O devices, interface cards, and memory	Monitor LVM, network, and database resources
All HP 9000 systems running HP-UX 10.20 or 11.x	Only HP 9000/800 systems running HP-UX 10.20 or 11.x
Distributed “free” on the Support Plus Media	Available from HP at extra cost

EMS HA Monitors - Differences

EMS HW MONITORS	EMS HA MONITORS
	Works best in a high availability environment
Event monitoring via Monitoring Request Manager (monconfig)	
Status Monitoring via a SAM GUI	Status Monitoring via SAM GUI

EMS Components

- monconfig - /etc/opt/resmon/lbin/monconfig
- diagmond - keeps track of the system hardware configuration that includes the list of tools available for each device. It also keeps track of which tools are currently executing or have been executed on each device.
- diaglogd - logging daemon reads diagnostic events from the kernel via diag2 (diagnostic pseudo driver) and logs them in the system log files.

EMS Kernel Components

- diag0 - Is a diagnostic driver. Diag0 should be in the kernel for S800 systems.
- diag1 - is for the old Sherlock diagnostics. Sherlock was the older style diagnostics.
- diag2 - The diag2 pseudo driver is used with diagnostics.

Installation

- EMS is part of the OnLineDiag software bundle product B6191AAE, Support Tools for the HP 9000. It can be found on the SupportPlus CD in the Diagnostics directory or downloaded from the HP Software Depot web site.

NOTE: on HP-UX 11i: The Support Tools are automatically installed when the OS is installed on HP-UX 11i. The only reason for using the process described here is to update the Support Tools to a more current version.

Installation

- Read the latest DIAGNOSTIC.readme file for the release
- Obtain and install any required patches
- Login as root
- swinstall
- If any patches need to be loaded AFTER the diagnostics are installed, install them now

EMS Monitoring

- Monitoring is enabled by default
- Opening screen indicates if monitoring is currently enabled or disabled
- Must be logged on as *root*
- Type ***/etc/opt/resmon/lbin/monconfig***

Event Monitoring Service

EMS Notification Methods

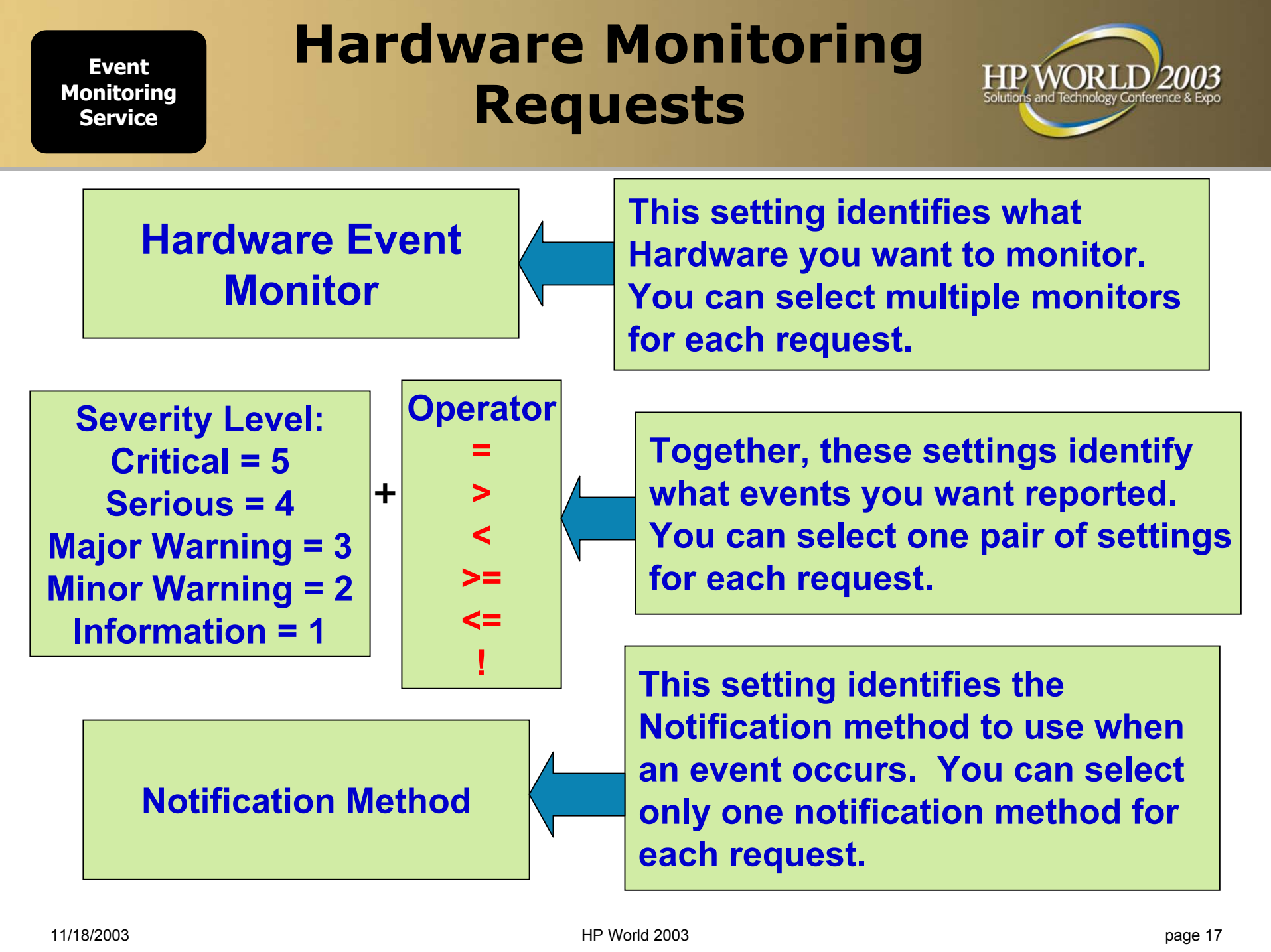
- Messages written to the system:
  - SYSLOG
  - TEXTLOG
  - CONSOLE
  - ISEE/Predictive*
- Messages sent via various protocols:
  - EMAIL
  - TCP
  - UDP
  - SNMP
  - OPC (Open View Messaging)

Default Monitoring Requests

SEVERITY LEVELS	NOTIFICATION METHOD
All (>= INFORMATION)	TEXTLOG file: ***/var/opt/resmon/log/event.log***
Major Warning, Serious, Critical	SYSLOG: ***/var/adm/syslog/syslog.log***
Major Warning, Serious, Critical	EMAIL, address: root

Event Monitoring Service

Hardware Monitoring Requests



Hardware Event Monitor

This setting identifies what Hardware you want to monitor. You can select multiple monitors for each request.

Severity Level:
Critical = 5
Serious = 4
Major Warning = 3
Minor Warning = 2
Information = 1

+

Operator
=
>
<
>=
<=
!

Together, these settings identify what events you want reported. You can select one pair of settings for each request.

Notification Method

This setting identifies the Notification method to use when an event occurs. You can select only one notification method for each request.

Event Severity Levels & Interaction with MC/SG

Critical	An event that will or has already caused data loss, system down time, or other loss of service. System operation will be impacted and normal use of the HW should not continue until the problem is corrected. Immediate action is required to correct the problem.	If MC/ServiceGuard is installed and this is a critical component, a package fail-over WILL occur.

Event Monitoring Service

Event Severity Levels & Interaction with MC/SG

Serious	An event that may cause data loss, system down time, or other loss of service if left uncorrected. System operation and normal use of the HW may be impacted. The problem should be repaired as soon as possible	If MC/ServiceGuard is installed and this is a critical component, a package fail-over WILL occur
Major Warning	An event that could escalate to a Serious condition if not corrected. System operation should not be impacted and normal use of the HW can continue. The problem should be repaired at a convenient time.	If MC/ServiceGuard is installed and this is a critical component, a package fail-over WILL NOT occur.

Event Monitoring Service

Event Severity Levels & Interaction with MC/SG

HP WORLD 2003 Solutions and Technology Conference & Expo

Minor Warning	An event that will not likely escalate to a more severe condition if left uncorrected. System operation will not be interrupted and normal use of the hardware can continue. The problem can be repaired at a convenient time.	If MC/ServiceGuard is installed and this is a critical component, a package fail-over WILL NOT occur.
Information	An event that occurs as part of the normal operation of the hardware. No action is required.	If MC/ServiceGuard is installed and this is a critical component, a package fail-over WILL NOT occur.

Event Monitoring Service

Monitoring Request Manager: Screen

HP WORLD 2003 Solutions and Technology Conference & Expo

Terminal

Window Edit Options Help

```
================================================================================
====================       Event Monitoring Service       ====================
====================     Monitoring Request Manager       ====================
================================================================================

  EVENT MONITORING IS CURRENTLY ENABLED.


================================================================================
==============      Monitoring Request Manager Main Menu      ==============
================================================================================

Select:
   (S)how monitoring requests configured via monconfig
   (C)heck detailed monitoring status
   (L)ist descriptions of available monitors
   (A)dd a monitoring request
   (D)elete a monitoring request
   (M)odify an existing monitoring request
   (E)nable Monitoring
   (K)ill (disable) monitoring
   (H)elp
   (Q)uit
   Enter selection: [s]
```

Event Monitoring Service

Example: Adding a Monitoring Request

HP WORLD 2003 Solutions and Technology Conference & Expo

Terminal

Window Edit Options Help

```
  - A severity range (A relational expression and a severity.  For example,
    < "MAJOR WARNING" means events with severity "INFORMATION" and
    "MINOR WARNING")
  - A notification mechanism.
Please answer the following questions to specify a monitoring request.

Monitors to which this configuration can apply:
   1) /storage/events/disk_arrays/AutoRAID
   2) /storage/events/disks/default
   3) /adapters/events/FC_adapter
   4) /system/events/core_hw
   5) /connectivity/events/hubs/FC_hub
   6) /connectivity/events/multiplexors/FC_SCSI_mux
   7) /connectivity/events/switches/FC_switch
   8) /system/events/memory
   9) /storage/events/enclosures/ses_enclosure
  10) /storage/events/tapes/SCSI_tape
  11) /storage/events/disk_arrays/FC60
  12) /storage/events/disk_arrays/FW_SCSI
  13) /storage/events/disk_arrays/High_Availability
  14) /system/cpu/lpmc
  15) /adapters/events/scsi123_em
   Enter monitor numbers separated by commas
      {or (A)ll monitors, (Q)uit, (H)elp} [a] 1
```

Event Monitoring Service

Example: Adding a Monitoring Request

HP WORLD 2003 Solutions and Technology Conference & Expo

Terminal

Window Edit Options Help

```
Monitors to which this configuration can apply:
   1) /storage/events/disk_arrays/AutoRAID
   2) /storage/events/disks/default
   3) /adapters/events/FC_adapter
   4) /system/events/core_hw
   5) /connectivity/events/hubs/FC_hub
   6) /connectivity/events/multiplexors/FC_SCSI_mux
   7) /connectivity/events/switches/FC_switch
   8) /system/events/memory
   9) /storage/events/enclosures/ses_enclosure
  10) /storage/events/tapes/SCSI_tape
  11) /storage/events/disk_arrays/FC60
  12) /storage/events/disk_arrays/FW_SCSI
  13) /storage/events/disk_arrays/High_Availability
  14) /system/cpu/lpmc
  15) /adapters/events/scsi123_em
   Enter monitor numbers separated by commas
      {or (A)ll monitors, (Q)uit, (H)elp} [a] 1

Criteria Thresholds:
   1) INFORMATION     2) MINOR WARNING     3) MAJOR WARNING
   4) SERIOUS         5) CRITICAL
   Enter selection {or (Q)uit,(H)elp} [4] 5
```

Event Monitoring Service

Example: Adding a Monitoring Request

HP WORLD 2003 Solutions and Technology Conference & Expo

Terminal

Window Edit Options Help

```
   3) /adapters/events/FC_adapter
   4) /system/events/core_hw
   5) /connectivity/events/hubs/FC_hub
   6) /connectivity/events/multiplexors/FC_SCSI_mux
   7) /connectivity/events/switches/FC_switch
   8) /system/events/memory
   9) /storage/events/enclosures/ses_enclosure
  10) /storage/events/tapes/SCSI_tape
  11) /storage/events/disk_arrays/FC60
  12) /storage/events/disk_arrays/FW_SCSI
  13) /storage/events/disk_arrays/High_Availability
  14) /system/cpu/lpmc
  15) /adapters/events/scsi123_em
   Enter monitor numbers separated by commas
      {or (A)ll monitors, (Q)uit, (H)elp} [a] 1

Criteria Thresholds:
   1) INFORMATION    2) MINOR WARNING    3) MAJOR WARNING
   4) SERIOUS        5) CRITICAL
   Enter selection {or (Q)uit,(H)elp} [4] 5

Criteria Operator:
   1) <      2) <=      3) >      4) >=      5) =      6) !=
   Enter selection {or (Q)uit,(H)elp} [4] 5
```

Event Monitoring Service

Example: Adding a Monitoring Request

HP WORLD 2003 Solutions and Technology Conference & Expo

Terminal

Window Edit Options Help

```
    8) /system/events/memory
    9) /storage/events/enclosures/ses_enclosure
   10) /storage/events/tapes/SCSI_tape
   11) /storage/events/disk_arrays/FC60
   12) /storage/events/disk_arrays/FW_SCSI
   13) /storage/events/disk_arrays/High_Availability
   14) /system/cpu/lpmc
   15) /adapters/events/scsi123_em
    Enter monitor numbers separated by commas
       {or (A)ll monitors, (Q)uit, (H)elp} [a] 1

Criteria Thresholds:
    1) INFORMATION    2) MINOR WARNING    3) MAJOR WARNING
    4) SERIOUS        5) CRITICAL
    Enter selection {or (Q)uit,(H)elp} [4] 5

Criteria Operator:
    1) <      2) <=      3) >      4) >=      5) =      6) !=
    Enter selection {or (Q)uit,(H)elp} [4] 5

Notification Method:
    1) UDP        2) TCP        3) SNMP       4) TEXTLOG
    5) SYSLOG     6) EMAIL      7) CONSOLE
    Enter selection {or (Q)uit,(H)elp} [6] 6
```

Event Monitoring Service

Example: Adding a Monitoring Request

Terminal

Window Edit Options Help

```
  10) /storage/events/tapes/SCSI_tape
  11) /storage/events/disk_arrays/FC60
  12) /storage/events/disk_arrays/FW_SCSI
  13) /storage/events/disk_arrays/High_Availability
  14) /system/cpu/lpmc
  15) /adapters/events/scsi123_em
   Enter monitor numbers separated by commas
      {or (A)ll monitors, (Q)uit, (H)elp} [a] 1

Criteria Thresholds:
   1) INFORMATION    2) MINOR WARNING    3) MAJOR WARNING
   4) SERIOUS        5) CRITICAL
   Enter selection {or (Q)uit,(H)elp} [4] 5

Criteria Operator:
   1) <      2) <=      3) >      4) >=      5) =      6) !=
   Enter selection {or (Q)uit,(H)elp} [4] 5

Notification Method:
   1) UDP        2) TCP        3) SNMP       4) TEXTLOG
   5) SYSLOG     6) EMAIL      7) CONSOLE
   Enter selection {or (Q)uit,(H)elp} [6] 6

   Enter email address: [root] admin@hp.com
```

Configuration Files

- Global configuration file:
  /var/stm/config/tools/monitor/Global.cfg
- Monitor specific configuration file:
  /var/stm/config/tools/monitor/monitor_name.cfg
- Client Configuration File:
  /var/stm/config/tools/monitor/default_*monitorname*.clcfg
- Monitor Startup Configuration file:
  /var/stm/config/tools/monitor/monitorname.sapcfg
- Peripheral Status Monitor Configuration File:
  /var/stm/config/tools/monitor/monitorname.psmcfg

Event Monitoring Service

EMS Logging and Tracing

- Log files exist in /etc/opt/resmon/log/
  - Clients write to client.log
  - Monitors write to api.log
  - Registrar writes to registrar.log
- Log files also exist in /var/opt/resmon/log/
  - Archived events are written to the event.log
- ISEE/Predictive
  - /var/opt/pred/emslog
  - /var/opt/resmon/log/rst.log

EMS Registrar

- The registrar handles passing monitoring requests to the correct monitors, and sending qualified events out in the correct protocol format
  - Finds appropriate monitor to handle request
  - Forwards client request to appropriate monitor
  - Sends reply from monitor back to requesting client
  - Tell client all resources currently being monitored
  - Accepts or rejects the request
  - Writes to persistence file (/etc/opt/resmon/persistence/m.689820697)
  - Gets queried for value for a specific request
  - Upon event (polled or async) determines if conditions match configured criteria and sends notification to target.

EMS Utilities

- /opt/resmon/bin/
  - set_fixed - used to get a list of all the Peripheral Status Monitor, psmmon(1m), resources which are in the DOWN state or to get a list of all the resources
  - resls - used to view resources that are configured on host according to the Registrar on that system
  - send_test_event - is used to cause a monitor to generate one or more test events.
  - resdata - used to view information about active monitor requests corresponding to a resource or to view the restarted resource list.
  - /etc/opt/resmon/lbin/moncheck – used to list all monitors available to the host

Troubleshooting EMS Gather Information

- Determine the version of EMS installed on the system
  swlist –l bundle |grep –i diag
- /var/opt/resmon/log/event.log
- /var/opt/resmon/log/api.log
- /var/opt/resmon/log/client.log
- /var/opt/resmon/log/registrar.log
- ioscan –fn

Troubleshooting EMS Gather Information

- /var/adm/syslog/syslog.log
- set_fixed –L
- grep diag /stand/system
- ps –ef |grep –i diag
- ps –ef | grep –i stm
- Patches up to date

Disable Instances

The startmon_client now reads the file ***/var/stm/data/tools/monitor/disabled_instances*** (disabled_instances is supported as of A.22.00 September 2000 release)

Text file with each fully qualified instances listed, one instance per line.

Wildcards can be used in the instance names:
/storage/events/disks/default/* (disable all instances)
/storage/events/disks/default/52_8.5.0 (only disable this instance)

Disable Instances

As user root:

1. execute monconfig (K)ill monitoring
2. Add/Delete/Modify instances in disabled_instances file
3. Execute monconfig (E)nable Monitoring
4. Select (C)heck detailed monitoring status

Disable A Specific Event

- cd /var/stm/config/tools/monitor/
- vi default_dm_core_hw.clcfg
  - Copy the original event lines you want to change and paste them at the top of the events portion of the clcfg file. Edit the lines appropriately. There should be no spaces between the colons ":“

 # EVENT_SYSTEM_BUS_ERROR:

EQ:1:INFORMATION:FALSE:1440:ANY:1:NONE:NO_OP:NO_OP:NONE

#EQ:1:INFORMATION:TRUE:1440:ANY:1:NONE:NO_OP:NO_OP:NONE

- /opt/resmon/bin/set_fixed -n *

How to Test Online Diagnostics

1. Hardware monitoring requires that 3 daemons be running on the system: diagmond, diaglogd and memlogd. Check with ***ps -ef*** command.
2. List all currently active HW monitors:
   ps -ef | grep stm
3. Run ***/etc/opt/resmon/lbin/monconfig*** to (C)heck detailed monitoring status. The initial screen should show event monitoring enabled.
4. Use the send_test_event command to send a test event through the EMS framework:
   /opt/resmon/bin/send_test_event –v –a monitor_name

How to completely disable EMS

- Run the command /etc/opt/resmon/lbin/monconfig
- Select (K)ill (disable) monitoring
  - When monconfig asks “Are sure you wish to disable event monitoring?” enter (Y)es. A message is displayed “This may take a while ….”. Eventually, you will be returned to the monconfig interface. In the top portion of the interface a message should now display: “**EMS IS CURRENTLY DISABLED**”.
- Select (Q)uit to get out of monconfig
- Using vi, modify /etc/inittab:
  - Using the # symbol, comment out the four lines which initialize the EMS processes. They are labeled ems1, ems2, ems3 and ems4.

How to completely disable EMS (Cont.)

- Re-initialize the inittab file by running “init q”
- Using vi, modify /etc/rc.config.d/ems:
  - Change the value of EMS_ENABLED=1 to EMS_ENABLED=0
- Using vi, modify /etc/rc.config.d/emsagtconf:
  - Change the value of AUTOSTART_EMSAGT=1 to AUTOSTART_EMSAGT=0
- Run ps -ef | grep ems. Using kill, manually kill emsagent process.
- Run ps -ef | grep p_client. Using kill, manually kill p_client process.

NOTE: The command init q will usually already have terminated p_client.

How to completely disable EMS (Cont.)

- Run ps -ef | grep stm | grep monitor. No monitor process should be running. Use kill to remove any running monitors
- Following these steps should prevent any unwanted EMS related processes from starting after a reboot.

How Do I Replicate My EMS Configuration

- Make sure all of the systems have the same version of OnlineDiag software installed (swlist –l bundle)
- Setup EMS configuration as required on “master system” and test
- On the replicated systems shutdown EMS/Diagnostics
  - /etc/opt/resmon/lbin/monconfig (K)ill
  - /sbin/init.d/emsa stop
  - /sbin/init.d/diagnostic stop
- Copy the entire /var/stm/config/tools/monitor/* directory from the “master system” to the replicated systems (ftp, rcp, etc.)

How Do I Replicate My EMS Configuration

- Restart the EMS/Diagnostics
  - /sbin/init.d/diagnostic start (give this several minutes for diagmond to map the system before proceeding)
  - /sbin/init.d/emsa start
  - /etc/opt/resmon/lbin/monconfig (E)nable

Web Addresses

- EMS Hardware Monitors: Overview

http://docs.hp.com/hpux/onlinedocs/diag/ems/emo_summ.htm

- Support Tools: Overview
  (high-level, semi-marketing, features & benefits)
  http://docs.hp.com/hpux/onlinedocs/diag/st/st_prod.htm

Web Addresses

- Support Tools: What Tools to Use (high-level, explains when to use offline/online/monitors) *http://docs.hp.com/hpux/onlinedocs/diag/st/st_use.htm*

- For more detailed information consult the “EMS Hardware Monitors User's Guide" and "Support Plus: Diagnostics User’s Guide" available from our Web site: *http://docs.hp.com/hpux/diag/index.html*

Web Addresses

- For info on common problems and workarounds, see the EMS HW "FAQ" page:
  http://docs.hp.com/hpux/onlinedocs/diag/ems/ems_faq.htm

- For info on problems fixed or new products supported in each release, see EMS HW Release Notes pages at:
  http://docs.hp.com/hpux/onlinedocs/diag/ems/ems_rel.htm

Web Addresses

- To see what monitor supports a given product, see the "EMS HW Supported Products" page: ***http://docs.hp.com/hpux/onlinedocs/diag/ems/ems_prod.htm***

- For detailed information on the EMS framework incompatibility problem, see "EMS Incompatibility Problem" ***http://docs.hp.com/hpux/onlinedocs/diag/st/st_ems.htm***