



Managing Mission-Critical
VMScusters
-
CockpitMgr Technical
Overview

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Presentation Scope



- What information does a system manager of a mission-critical VMScuster need to manage efficiently the entire VMS environment?
- Where can this information be found?
- How can all the available information be centralised, processed, and presented in an uniform way?

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The entire VMS environment



- System
- Console
- Storage
- Network
- Performance
- Security
- Batch jobs
- Applications

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Building a cockpit



- The cockpit is a dedicated VMS system which:
 - Monitors the entire VMS production environment.
 - Centralizes all events, and takes care of notification.
 - Is the platform on which many system management tasks are performed.
- Cockpit goals:
 - Pro-active management: 'Beat the phone call !'
 - Automate operations, reduce the operations cost.

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CockpitMgr for OpenVMS



- A product and service offering that helps you in building a cockpit system.
- Provides VMS system managers a fully integrated, VMS-based event management tool.
- History of 12 years.
- Entirely developed on customer needs.
- Bundles the experience of many VMS system managers into one product.

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CockpitMgr Event Notification System (ENS)



- The cockpit kernel: monitoring modules feed event messages into the ENS.
- ENS processes the event messages: correlation, translation, notification, forwarding...
- Rule based, easy to customise.
- Easy to integrate new monitoring modules:
 - DCL command to feed-in messages
 - API
- Integration modules for other products available

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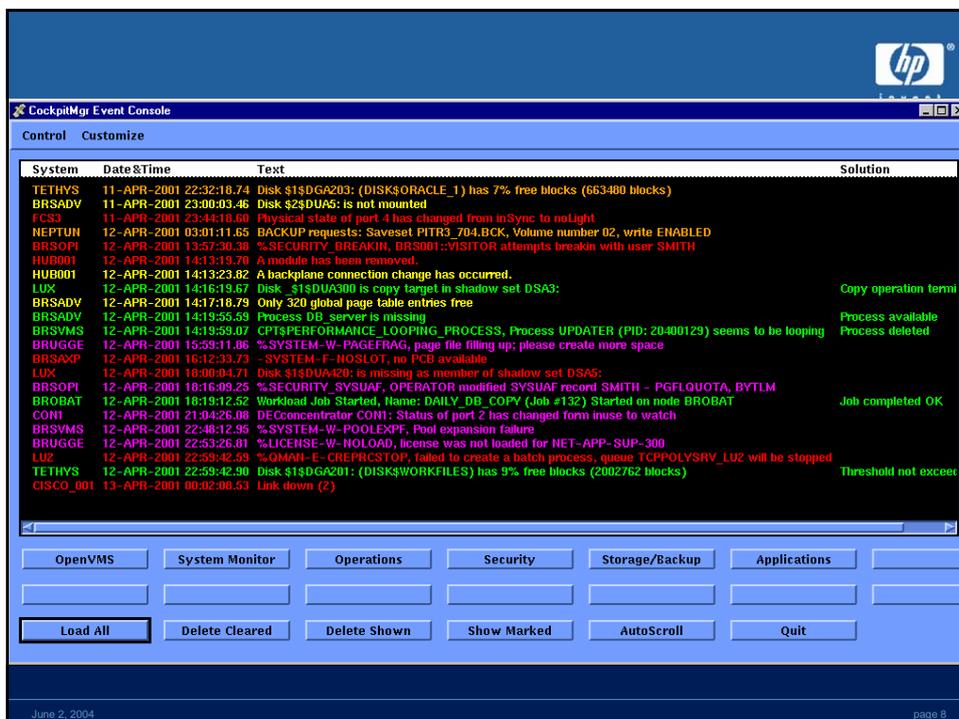
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CockpitMgr Event Console



- Motif-based event console that connects to the ENS.
- Displays all or selected events currently present in the ENS.
- Allows somebody to take ownership on events
- Allows somebody to delete events from the ENS
- Customisable push buttons are available to select quickly specific classes of events.

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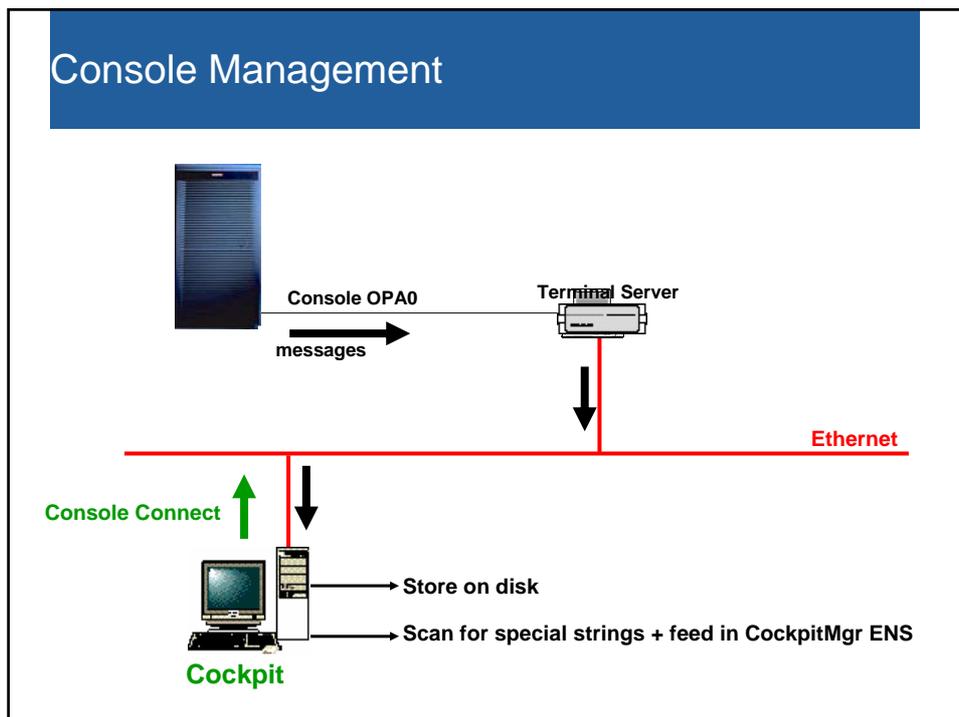


The screenshot shows the CockpitMgr Event Console window with a table of events and a control panel below.

System	Date&Time	Text	Solution
TETHYS	11-APR-2001 22:32:18.74	Disk \$1\$DGA203: (DISK\$ORACLE_1) has 7% free blocks (663400 blocks)	
BRSADV	11-APR-2001 23:00:03.46	Disk \$2\$DUA5: is not mounted	
FCS3	11-APR-2001 23:44:10.60	Physical state of port 4 has changed from InSync to noLight	
NEPTUN	12-APR-2001 03:01:11.65	BACKUP requests: Saveset PITR3 704.BCK, Volume number 02, write ENABLED	
BRSOPI	12-APR-2001 13:57:30.30	%SECURITY_BREAKIN, BRS001::VISITOR attempts breakin with user SMITH	
HUB001	12-APR-2001 14:13:19.70	A module has been removed.	
HUB001	12-APR-2001 14:13:23.82	A backplane connection change has occurred.	
LUX	12-APR-2001 14:16:19.67	Disk \$1\$DUA300 is copy target in shadow set DSAS:	Copy operation termi
BRSADV	12-APR-2001 14:17:18.79	Only 320 global page table entries free	
BRSADV	12-APR-2001 14:19:55.59	Process DB server is missing	Process available
BRSVMS	12-APR-2001 14:19:59.07	CPT\$PERFORMANCE_LOOPING_PROCESS, Process UPDATER (PID: 20400129) seems to be looping	Process deleted
BRUGGE	12-APR-2001 15:59:11.06	%SYSTEM-W-PAGEFRAG, page file filling up; please create more space	
BRSAXP	12-APR-2001 16:12:33.73	-SYSTEM-F-NOSLOT, no PCB available	
LUX	12-APR-2001 18:00:04.71	Disk \$1\$DUA420: is missing as member of shadow set DSAS:	
BRSOPI	12-APR-2001 18:16:09.25	%SECURITY_SYSUAF, OPERATOR modified SYSUAF record SMITH - PGFLQUOTA, BYTLM	
BROBAT	12-APR-2001 18:19:12.32	Workload Job Started, Name: DAILY_DB_COPY (Job #132) Started on node BROBAT	Job completed OK
COM1	12-APR-2001 21:04:26.08	DEConcentrator COM1: Status of port 2 has changed from Inuse to watch	
BRSVMS	12-APR-2001 22:48:12.95	%SYSTEM-W-POOLXPF, Pool expansion failure	
BRUGGE	12-APR-2001 22:53:26.81	%LICENSE-W-NOLOAD, license was not loaded for NET-APP-SUP-300	
LU2	12-APR-2001 22:59:42.59	%QMAN-E-CREPRCSTOP, failed to create a batch process, queue TCPOLYSRV_LU2 will be stopped	
TETHYS	12-APR-2001 22:59:42.90	Disk \$1\$DGA201: (DISK\$WORKFILES) has 9% free blocks (2002762 blocks)	Threshold not exceed
CISCO_001	13-APR-2001 00:02:08.53	Link down (2)	

Control Panel Buttons: OpenVMS, System Monitor, Operations, Security, Storage/Backup, Applications, Load All, Delete Cleared, Delete Shown, Show Marked, AutoScroll, Quit

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Console Management



- CockpitMgr provides complete console management:
 - Connect to remote system console
 - Log console output for further reference
 - Scan for specific text strings
- Many up-to-date scan profiles included
- CockpitMgr provides tools & tricks to reduce the amount of the systems console output
- Extra support provided for MARVEL systems (NAT box in stead of terminal server)

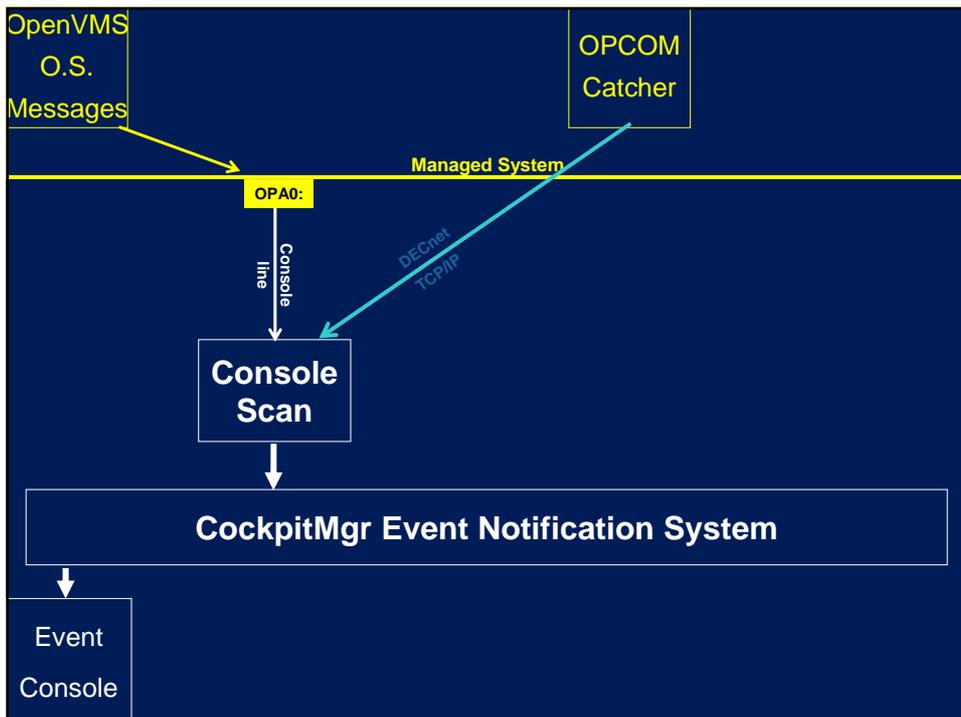
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OPCOM Catcher



- Partial replacement for console management if console line can not be plugged into a terminal server
- The OPCOM catcher sends all OPCOM messages via DECnet or TCP/IP to the cockpit
- The cockpit scans for important event messages
- Is not a replacement for managing the high-end VMSclusters.

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CockpitMgr System Monitor



- A system monitor running on the cockpit communicates with the agent running on the VMS production system.
- Configuration is entirely made on the cockpit.
- Cluster concept fully present.
- Monitoring of each item (node, process, disk...) can be restricted to certain periods of time.
- Fast configuration utility available.

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CockpitMgr System Monitor

OpenVMS system reachability



- Connection is made at regular time intervals.
- Connection is only accepted if a proxy has been defined (security!).
- Implemented with non-transparent DECnet task-to-task programming and TCP/IP socket programming.
- Monitoring can be restricted to certain periods.
- Each time connection is made, we check if there are any changes in the error count on devices, busses, controllers, CPU and memory.

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CockpitMgr System Monitor

Process existence



- Does a process exist on one system or cluster-wide?
- Wildcards allowed in the process name.
- If wildcards are given, the minimum number of occurrences can be specified.
- Specification of a UIC is optional.
- Possibility to repair immediately the missing process.
- Monitoring can be restricted to specific periods.

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CockpitMgr Event Console

Control Customize

System	Date&Time	Owner	Text	Solution
BRSADV	15-MAY-2000 15:30:05.18	AutoPilot	Process DB_server is missing	Process available now
KETJE	15-MAY-2000 15:39:35.44		Process DB_supervisor is missing cluster-wide	
BRSOPI	15-MAY-2000 15:45:21.50		Process ADB* with UIC [50.1] is missing	
BRSMV6	15-MAY-2000 16:22:29.46		Process POLYSERV07 is missing	Monitoring ended
PLUTON	16-MAY-2000 02:00:03.43		Process ORA* with UIC ORACLE8 has only 4 occurrences	

OpenVMS System Monitor Operations Security Storage/Backup Applications

Process Disk Shadow set Batch Queue Hardware Autopilot

Load All Delete Cleared Delete Shown Show Marked AutoScroll Quit

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CockpitMgr System Monitor Storage



- Disk free space.
 - 4 thresholds can be defined (warning, minor, major, critical)
 - Cleanup/archive procedure can be automatically triggered when threshold is exceeded.
- Disk states (e.g. mount verification, not mounted, write-locked,...etc.)
- Disks to monitor can be defined per system or per cluster.

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CockpitMgr Event Console

Control Customize

System	Date&Time	Text	Solution
BRSADV	15-MAY-2000 13:59:12.21	Disk DISK\$USER_3: is not available	
KETJE	15-MAY-2000 14:10:11.85	Disk DSA10: (DISK\$USER_4) has 1% free blocks (27507 blocks)	
BRSAXP	15-MAY-2000 15:00:01.79	Disk _\$1SDUA320: is mount verification in progress	
BRSVMS	15-MAY-2000 17:20:11.71	Disk _\$1SDKA500: is write-locked	Disk writable
KETJE	15-MAY-2000 19:30:04.40	Disk DSA2: (DISK\$SYSTEM_1) has 10% free blocks (1292411 blocks)	Threshold not exceeded

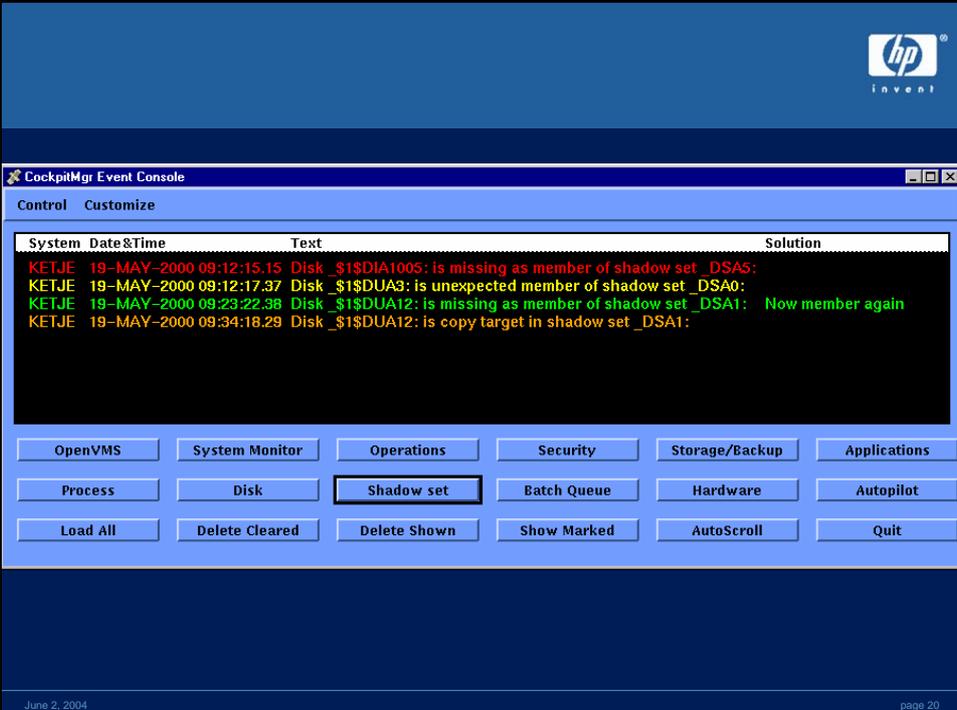
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CockpitMgr System Monitor Shadow Sets



- Is there a disk missing as shadow set member?
- Is a copy operation going on?
- Are the shadow set members merging?
- Is a disk unexpected member of a shadow set?
- State of shadow set members can be visualized in a graphical user interface.
- Mandatory for disaster-tolerant VMSclusters.
- Shadow sets to monitor can be defined per system or per cluster.

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CockpitMgr Event Console

Control Customize

System	Date&Time	Text	Solution
KETJE	19-MAY-2000 09:12:15.15	Disk_\$1\$DIA1005: is missing as member of shadow set _DSAS:	
KETJE	19-MAY-2000 09:12:17.37	Disk_\$1\$DUA3: is unexpected member of shadow set _DSA0:	
KETJE	19-MAY-2000 09:23:22.38	Disk_\$1\$DUA12: is missing as member of shadow set _DSA1: Now member again	
KETJE	19-MAY-2000 09:34:18.29	Disk_\$1\$DUA12: is copy target in shadow set _DSA1:	

OpenVMS System Monitor Operations Security Storage/Backup Applications
 Process Disk **Shadow set** Batch Queue Hardware Autopilot
 Load All Delete Cleared Delete Shown Show Marked AutoScroll Quit

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CockpitMgr System Monitor

Batch & Print Queues – Batch Jobs



- Is the status of a batch queue also the expected one?
 - Expected queue status is not always 'idle', 'available', or 'busy', but can also be 'stopped' during a certain period.
- Checks if a print queue is not stalled.
- Batch Jobs
 - Checks if a batch job has been submitted on a queue by a certain user.
 - Use generic queue names if possible.
 - Job names and queue names may contain wildcards.

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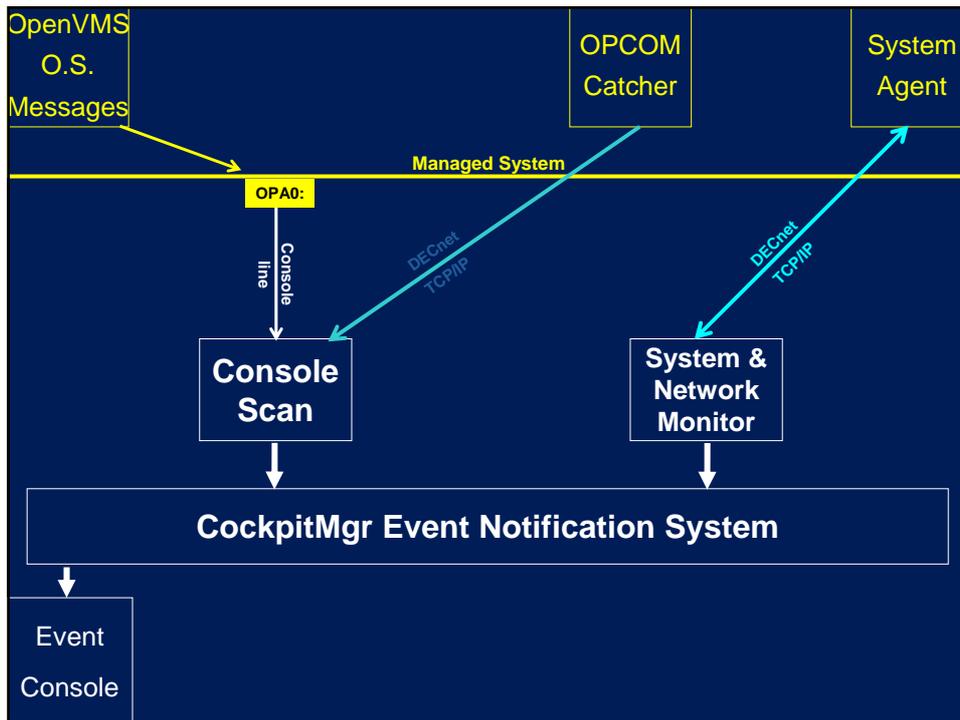
CockpitMgr System Monitor

Checking system console settings



- Console management is important, but works only if the console settings are OK.
 - Is the console broadcast enabled?
 - Is the terminal width OK?
 - Is OPCOM enabled on the console?
 - Is somebody logged in on the console?

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Storage Monitoring



- Storage controllers are getting more functionality: mirroring, striping, RAID, caching...
- Storage is located somewhere in a SAN
- OpenVMS does not always detect a problem with:
 - a disk behind a storage controller
 - a storage controller
 - a Fibre Channel Switch and cables

Storage Monitoring

Configure HSJ, HSZ and HSG controllers in Console Manager



- Every message block sent to the console of the storage controller starts with an 'Instance Code'.
- On the storage controller, use the FMU utility to obtain more information on this instance code.
- CockpitMgr ENS will receive the Instance Code from the Console Management product; it then translates the code and generates a message with a more understandable text.

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Storage Monitoring

Implement the SWCC Agent



- Alternative in case the storage controller can not be configured into the console management product.
- The StorageWorks Command Console Agent is to be installed on your OpenVMS system.
- It checks at regular time intervals the storage controllers and disks.
- Event notification can be made by sending an SNMPtrap to the cockpit system.

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Storage Monitoring

Install SAN Appliance



- Dedicated NT system used to configure and monitor SAN configurations.
- Can send SNMPtraps to the cockpit system, which are captured and interpreted by the SNMPtrap Listener.

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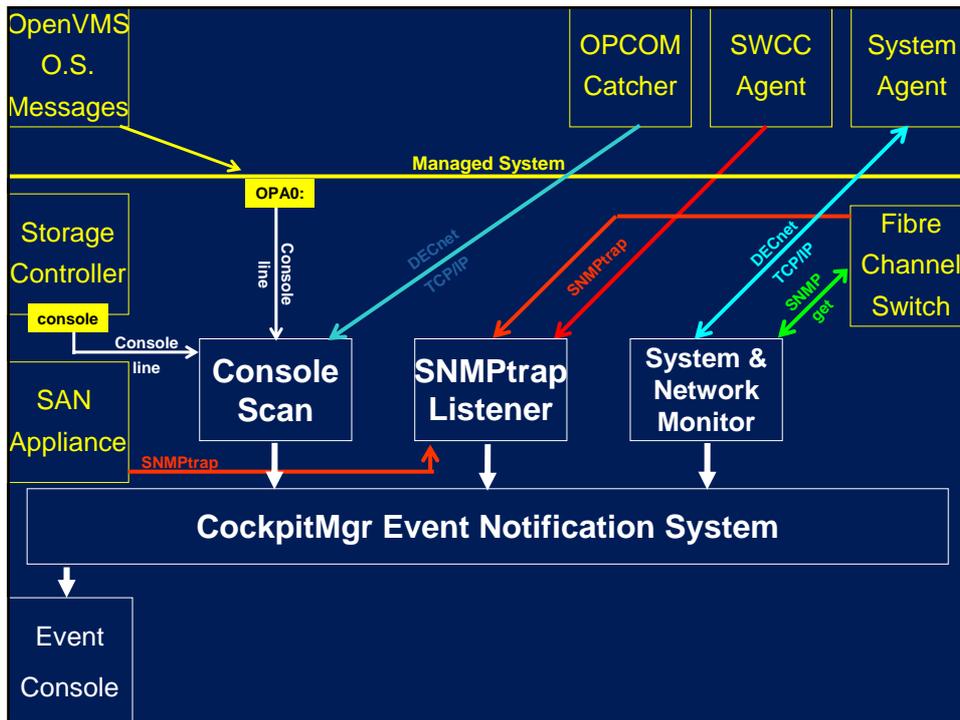
Storage Monitoring

Monitor Fibre Channel Switches



- CockpitMgr System & Network Monitor polls at regular time intervals the availability and operational state of a FC Switch.
- It checks also for changes in port states and sensor states in the FC Switch.
- FC Switch also sends SNMPtraps to the cockpit system, which are captured and interpreted by the SNMPtrap Listener.

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Network Monitoring



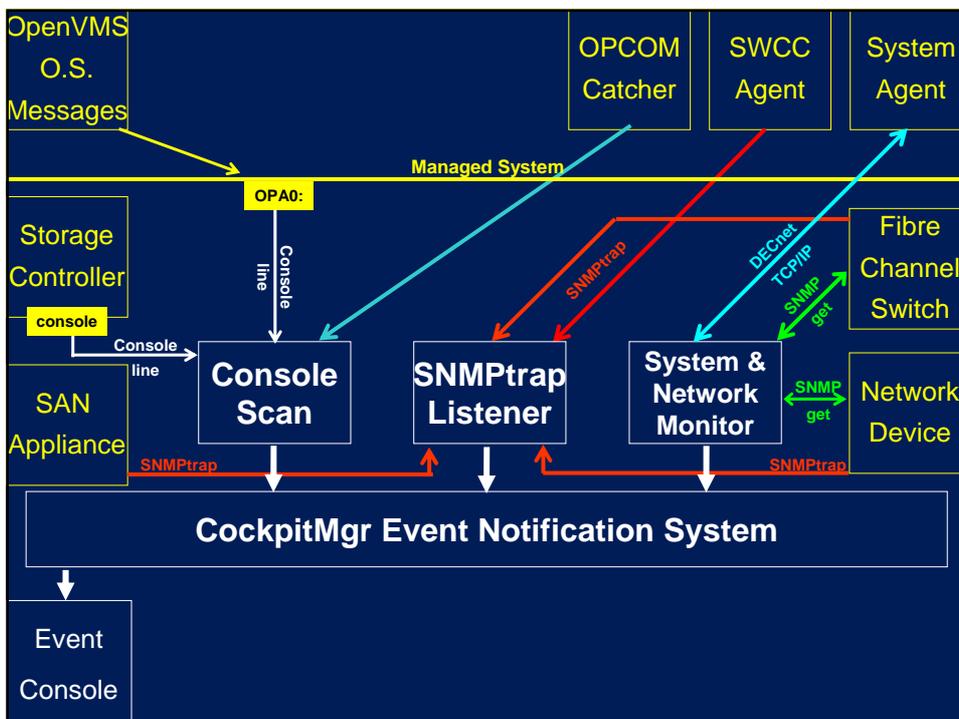
- Network is used as cluster interconnect.
 - Fast Ethernet
 - Gigabit Ethernet
 - FDDI
- Any network issue may have immediate impact on the VMScluster.

Network Monitoring



- CockpitMgr monitors selected network devices:
 - VNswitches
 - Cisco Catalyst
 - GIGAswitch
- CockpitMgr checks for the availability of each device, and for changes in the port states.
- CockpitMgr interprets SNMPtraps sent by network devices.

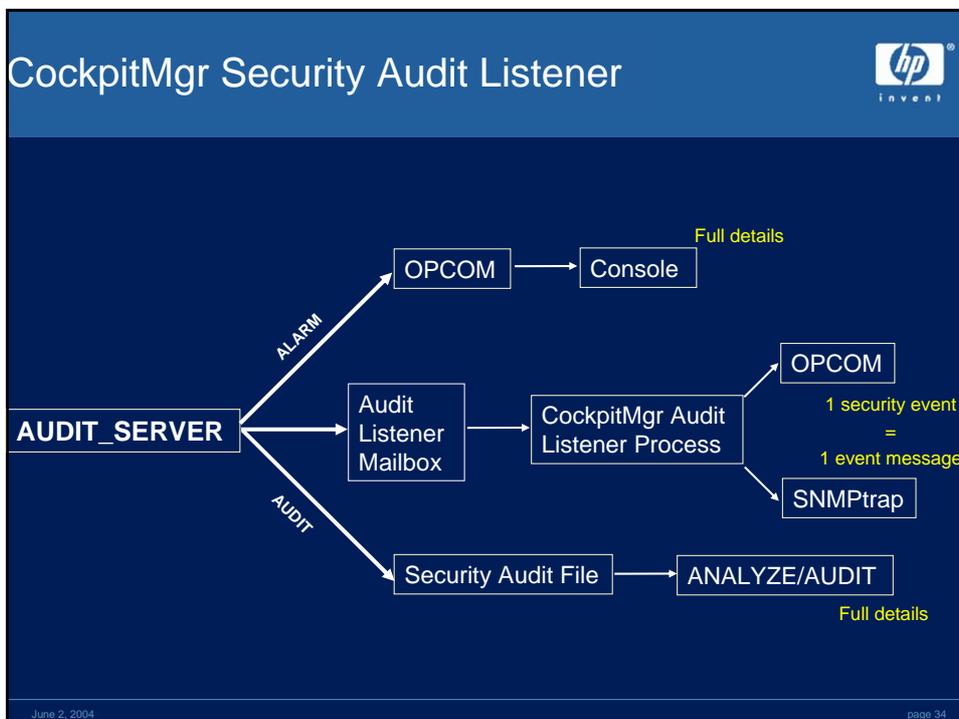
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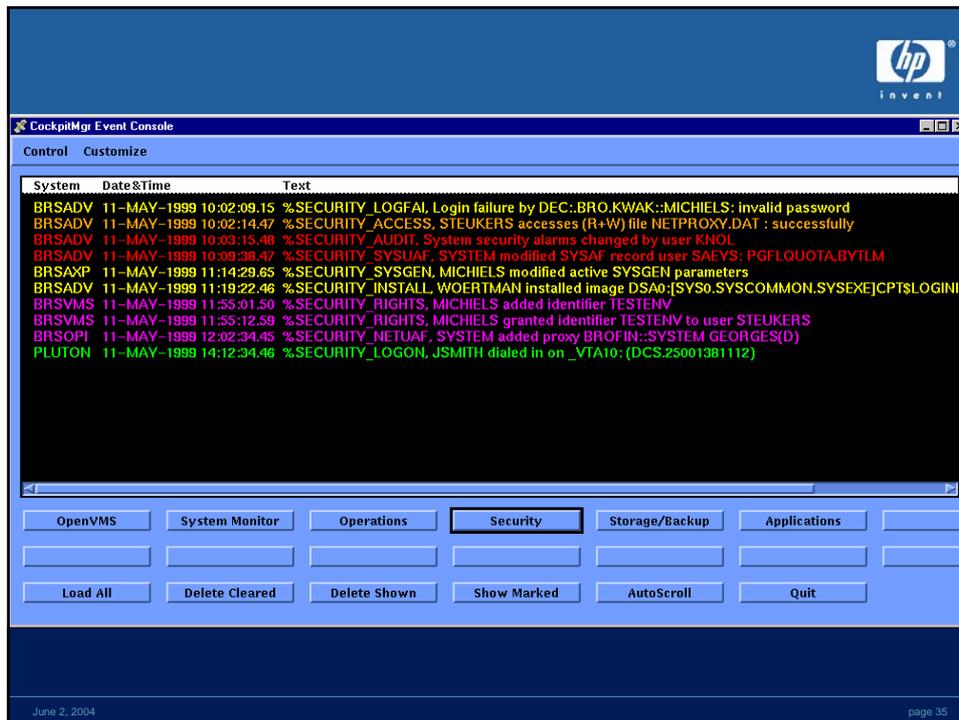


Performance Monitor

- The Performance Monitor looks for possible causes of system performance slowdowns.
 - CPU utilisation (also per mode)
 - Memory utilisation
 - Page and swap file utilisation
 - Big CPU eaters
 - Idle processes
 - Looping processes
 - Pool utilisation
 - Processes in special wait state (RWAST, RWMBX...)

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hp invent

CockpitMgr Event Console

Control Customize

System	Date&Time	Text
BRSADV	11-MAY-1999 10:02:09.15	%SECURITY_LOGFAL, Login failure by DEC:.BRO.KWAK::MICHIELS: invalid password
BRSADV	11-MAY-1999 10:02:14.47	%SECURITY_ACCESS, STEUKERS accesses (R+W) file NETPROXY.DAT : successfully
BRSADV	11-MAY-1999 10:03:15.48	%SECURITY_AUDIT, System security alarms changed by user KNOL
BRSADV	11-MAY-1999 10:09:38.47	%SECURITY_SYSAF, SYSTEM modified SYSAF record user SAEYS: PGFLQUOTA,BYTM
BRSAXP	11-MAY-1999 11:14:29.65	%SECURITY_SYSGEN, MICHIELS modified active SYSGEN parameters
BRSADV	11-MAY-1999 11:19:22.46	%SECURITY_INSTALL, WOERTMAN installed image DSA0:[SYS0.SYSCOMMON.SYSEX]CPT\$LOGINI
BRSVMS	11-MAY-1999 11:55:01.50	%SECURITY_RIGHTS, MICHIELS added identifier TESTENV
BRSVMS	11-MAY-1999 11:55:12.59	%SECURITY_RIGHTS, MICHIELS granted identifier TESTENV to user STEUKERS
BRSOPI	11-MAY-1999 12:02:34.45	%SECURITY_NETUAF, SYSTEM added proxy BROFIN::SYSTEM GEORGES(D)
PLUTON	11-MAY-1999 14:12:34.46	%SECURITY_LOGON, JSMITH dialed in on _VTA10: (DCS.25001381112)

OpenVMS System Monitor Operations **Security** Storage/Backup Applications

Load All Delete Cleared Delete Shown Show Marked AutoScroll Quit

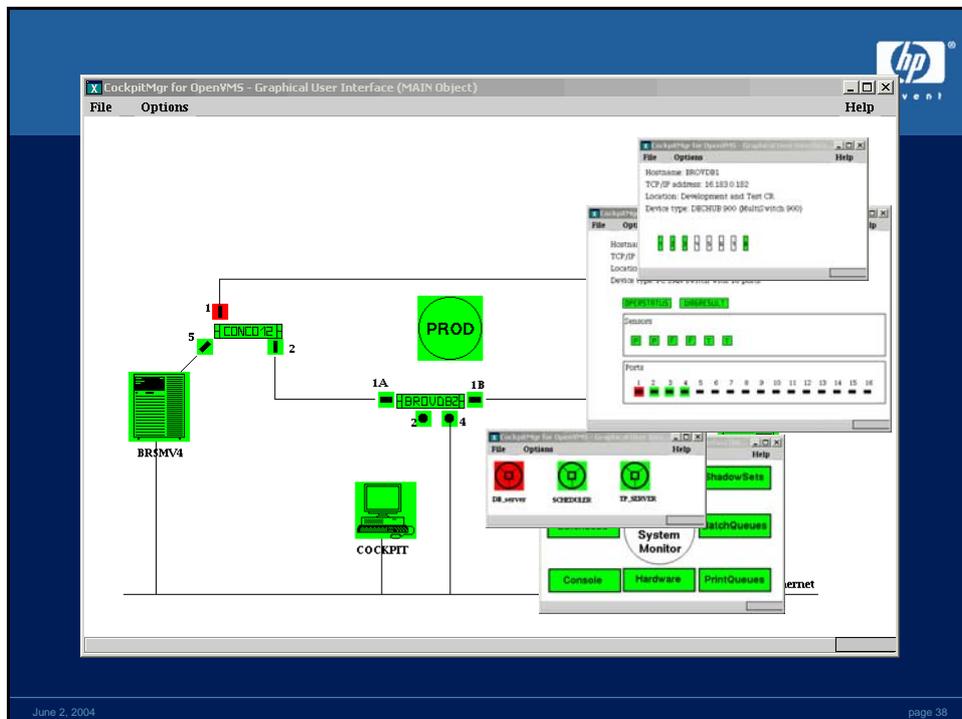
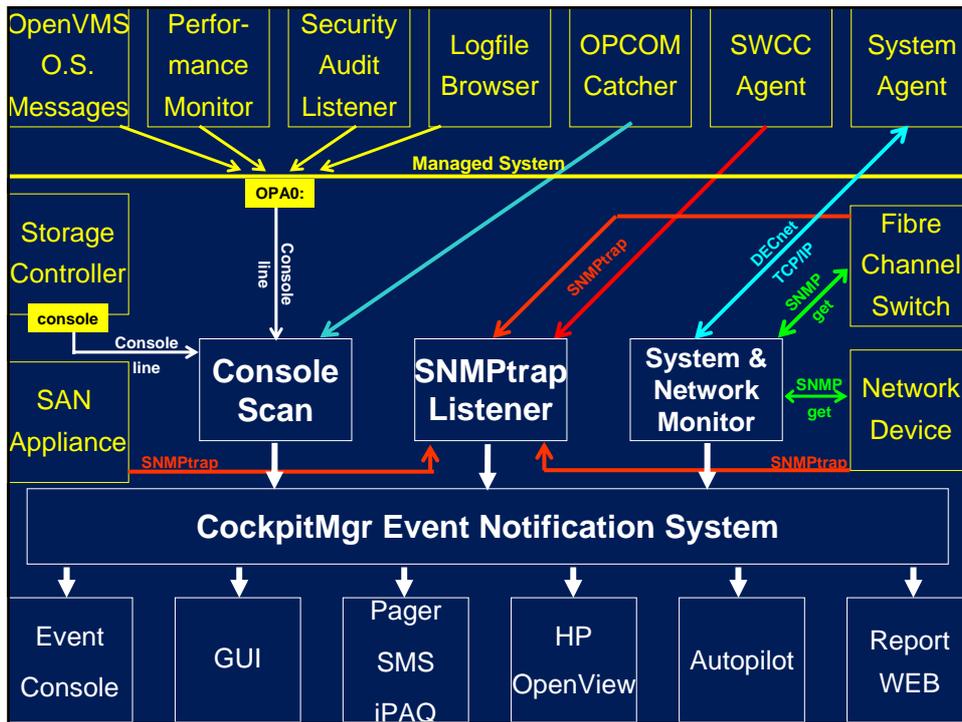
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CockpitMgr Logfile Browser



- The CockpitMgr Logfile Browser looks for error messages in batch logfiles.
- Guarantees early notification of problems during a job stream.
- Notification through OPCOM or SNMPtrap.

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CockpitMgr Pager Engine



- A Pager Engine takes care of sending event messages to pagers or cellular phones (SMS).
- A pager message can be triggered with a delay. If the problem gets solved in the mean time, the pager message is canceled.
- Pagers can be disabled during certain periods.
- Upon failure, the pager engine will retry sending.

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Event Notification on iPAQ Pocket PC



S.	X	System	SubSys...	Name
STOP		BRSMV6	DB_server	Process...
STOP		BRSMV6	TEST2	Process...
STOP		BRSCPT	X SYST...	BatchJo...
		BRSCPT	\$1\$DKA0:	FreeSpace
!	*	BRSCPT	D5A2:	DiskNotA...

Details	Minor	4-MAY-2003 00:00:05.08
NXT	BRSCPT	FreeSpace
RQU	\$1\$DKA0:	Storage
Disk \$1\$DKA0: (DISK\$ALPHA\MS072) has 5% free blocks (246624 blocks).		

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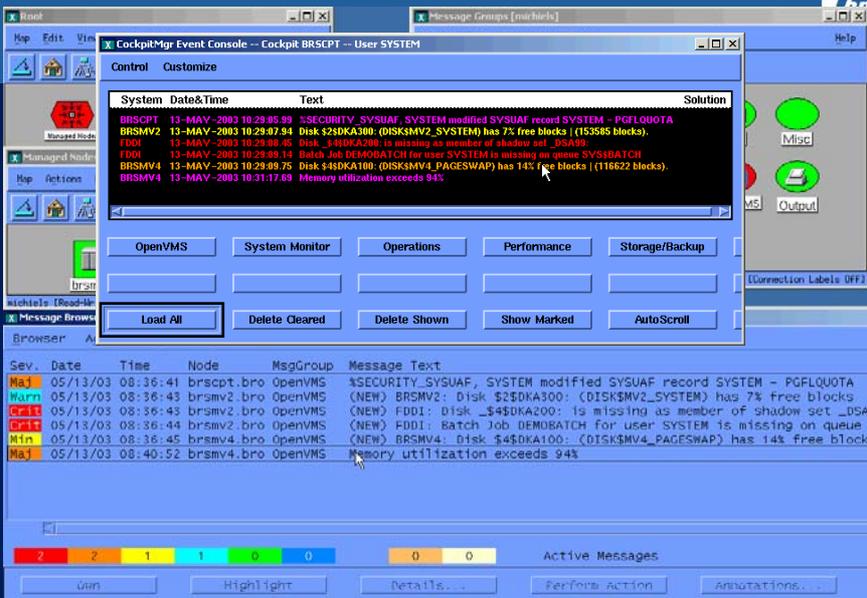
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Integration with HP OpenView



- CockpitMgr is a point solution for the VMS system manager.
- It might be useful to upload certain events from the cockpit to the Enterprise Manager.
- First level of integration is today possible by sending SNMPtraps.

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The screenshot shows the HP OpenView CockpitMgr Event Console interface. A window titled "CockpitMgr Event Console -- Cockpit BRSEPT -- User SYSTEM" is open, displaying a list of system events. Below the list, there are buttons for "OpenVMS", "System Monitor", "Operations", "Performance", and "Storage/Backup". At the bottom, there are buttons for "Load All", "Delete Cleared", "Delete Shown", "Show Marked", and "AutoScroll".

System	Date&Time	Text	Solution
BRSCPT	13-MAY-2003 10:29:05.88	%SECURITY_SYSUAF, SYSTEM modified SYSUAF record SYSTEM - PGFLQUOTA	
BRSMV2	13-MAY-2003 10:29:07.94	Disk \$2\$DKA300: (DISK\$MV2_SYSTEM) has 7% free blocks (153985 blocks).	
FDD1	13-MAY-2003 10:29:08.45	Disk _\$4\$DKA200: is missing as member of shadow set _DSA99.	
FDD1	13-MAY-2003 10:29:08.14	Batch Job DEMOBATCH for user SYSTEM is missing on queue SYS\$BATCH	
BRSMV4	13-MAY-2003 10:29:09.75	Disk \$4\$DKA100: (DISK\$MV4_PAGESWAP) has 14% free blocks (116822 blocks).	
BRSMV4	13-MAY-2003 10:31:17.69	Memory utilization exceeds 94%	

Sev.	Date	Time	Node	MsgGroup	Message Text
Inf	05/13/03	08:36:41	brscpt.bro	OpenVMS	%SECURITY_SYSUAF, SYSTEM modified SYSUAF record SYSTEM - PGFLQUOTA
Warn	05/13/03	08:36:43	brsmv2.bro	OpenVMS	(NEW) BRSMV2: Disk \$2\$DKA300: (DISK\$MV2_SYSTEM) has 7% free blocks
Crit	05/13/03	08:36:44	brsmv2.bro	OpenVMS	(NEW) FDD1: Disk _\$4\$DKA200: is missing as member of shadow set _DSA
Crit	05/13/03	08:36:44	brsmv2.bro	OpenVMS	(NEW) FDD1: Batch Job DEMOBATCH for user SYSTEM is missing on queue
Warn	05/13/03	08:36:45	brsmv4.bro	OpenVMS	(NEW) BRSMV4: Disk \$4\$DKA100: (DISK\$MV4_PAGESWAP) has 14% free block
Inf	05/13/03	08:40:52	brsmv4.bro	OpenVMS	Memory utilization exceeds 94%

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CockpitMgr AutoPilot



- Repair actions can be automatically triggered on the VMS production system.
- Key element to implement automated operations.

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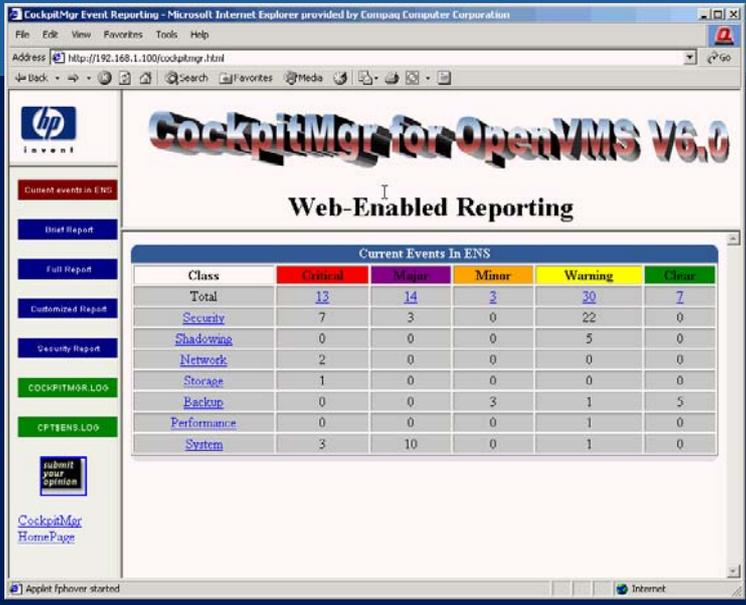
Event reporting



- Customized reports can be made on all or selected events.
- Web interface can be used for reporting
- Requires Compaq Secure Web Server for OpenVMS on the cockpit.

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CockpitMgr for OpenVMS V6.0
Web-Enabled Reporting

Current Events In ENS

Class	Critical	Major	Minor	Warning	Clear
Total	13	14	3	30	7
Security	7	3	0	22	0
Shadowing	0	0	0	5	0
Network	2	0	0	0	0
Storage	1	0	0	0	0
Backup	0	0	3	1	5
Performance	0	0	0	1	0
System	3	10	0	1	0

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CockpitMgr for OpenVMS:

Built by VMS System Managers ...

... for VMS System Managers
managing a business-critical VMS environment

and it runs on OpenVMS

More Information 

CockpitMgr web site:
www.hp.be/CockpitMgr

OpenVMS Technical Journal:
<http://h71000.www7.hp.com/openvms/journal/v1/index.html>

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