



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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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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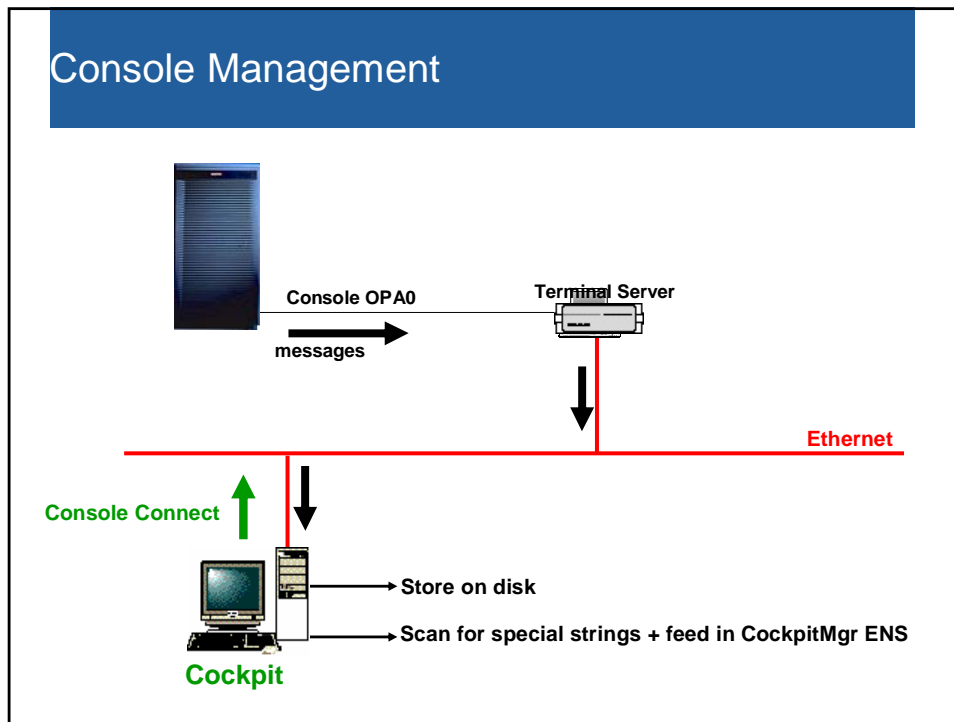
CockpitMgr Event Console
Control Customize

System	Date&Time	Text	Solution
TETHYS	11-APR-2001 22:32:18.74	Disk \$1\$DGA203: (DISK\$ORACLE_1) has 7% free blocks (663480 blocks)	
BRSADV	11-APR-2001 23:00:03.96	Disk \$2\$DUAS: 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 13:57:30.38	%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 14:16:13.67	Disk_ \$1\$DUAS300 is copy target in shadow set DSA3:	Copy operation termi
BRSADV	12-APR-2001 14:17:18.79	Only 320 global page table entries free	Process available
BRSADV	12-APR-2001 14:19:55.59	Process DB server is missing	Process deleted
BRSVMS	12-APR-2001 14:19:59.07	CPT\$PERFORMANCE_LOOPING_PROCESS, Process UPDATER (PID: 20400129) seems to be looping	
BRUGGE	12-APR-2001 15:59:11.86	%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\$DU420: is missing as member of shadow set DSA5:	
BRSOPI	12-APR-2001 18:16:09.26	%SECURITY_SVSUAF, OPERATOR modified SVSUAF record SMITH - PGFL0UOTA, BYTLM	
BROBAT	12-APR-2001 18:18:12.52	Workload Job Started, Name: DAILY_DB_COPY (Job #132) Started on node BROBAT	Job completed OK
CON1	12-APR-2001 21:04:26.08	DEConcentrator CON1: Status of port 2 has changed form inuse to watch	
BRSVMS	12-APR-2001 22:48:12.95	%SYSTEM-W-POOLEXP, 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 TCPPOLYSRV_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 exce
CISCO_001	13-APR-2001 00:02:08.53	Link down (2)	


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)

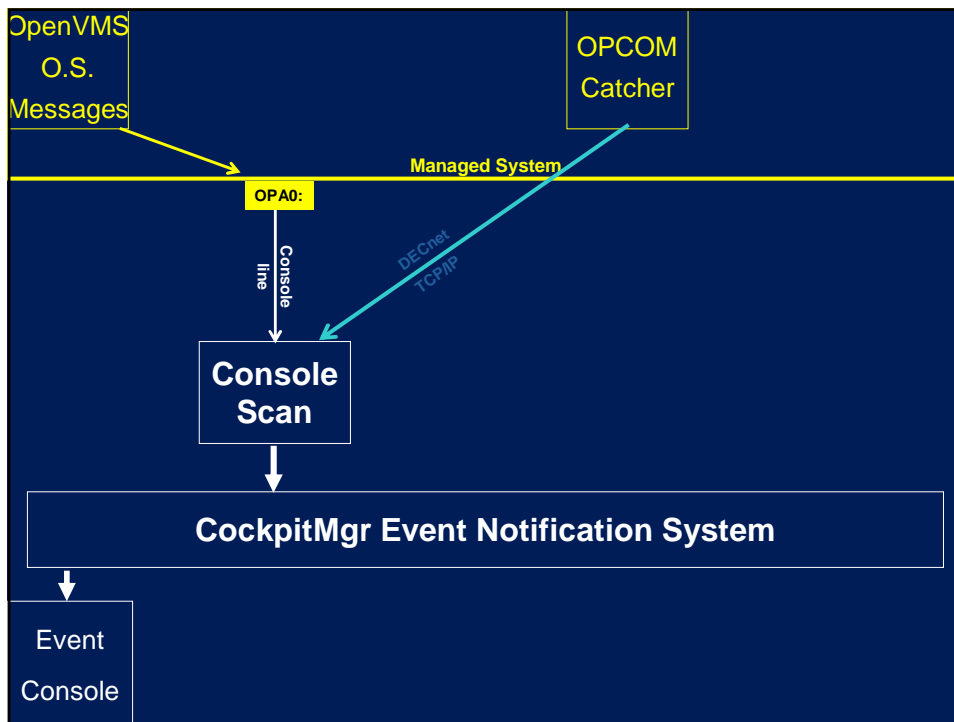
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OPCOM Catcher



- 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 _\$1DKA500: is write-locked	Disk writable
KETJE	15-MAY-2000 19:30:04.40	Disk DSA2: (DISK\$SYSTEM_1) has 10% free blocks (1232411 blocks)	Threshold not exceeded


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 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\$DUA9: 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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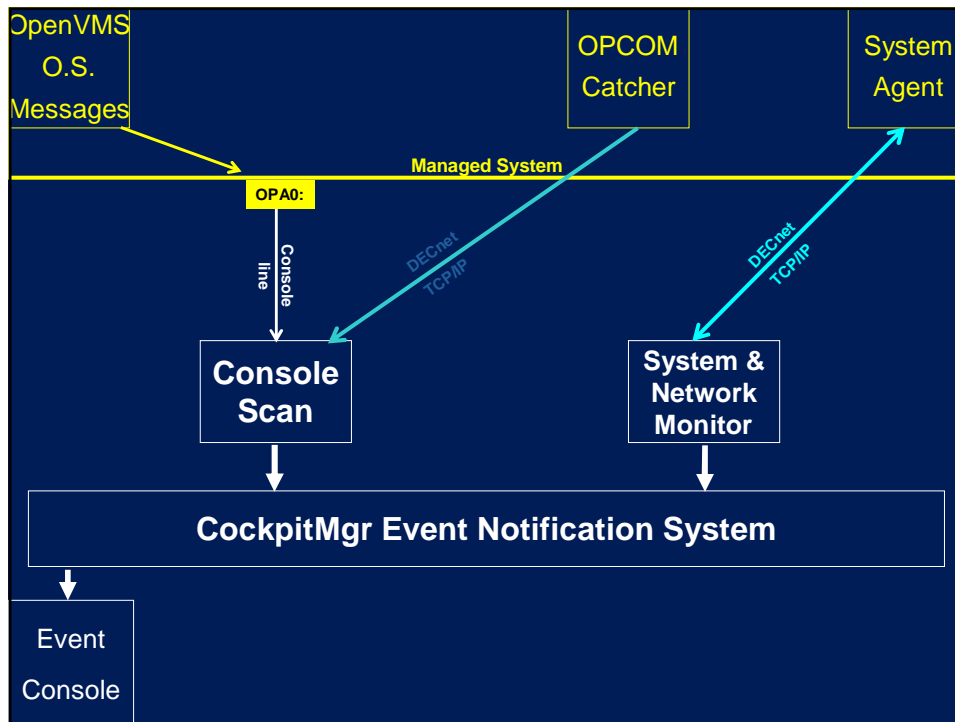
CockpitMgr System Monitor Checking system console settings



- 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

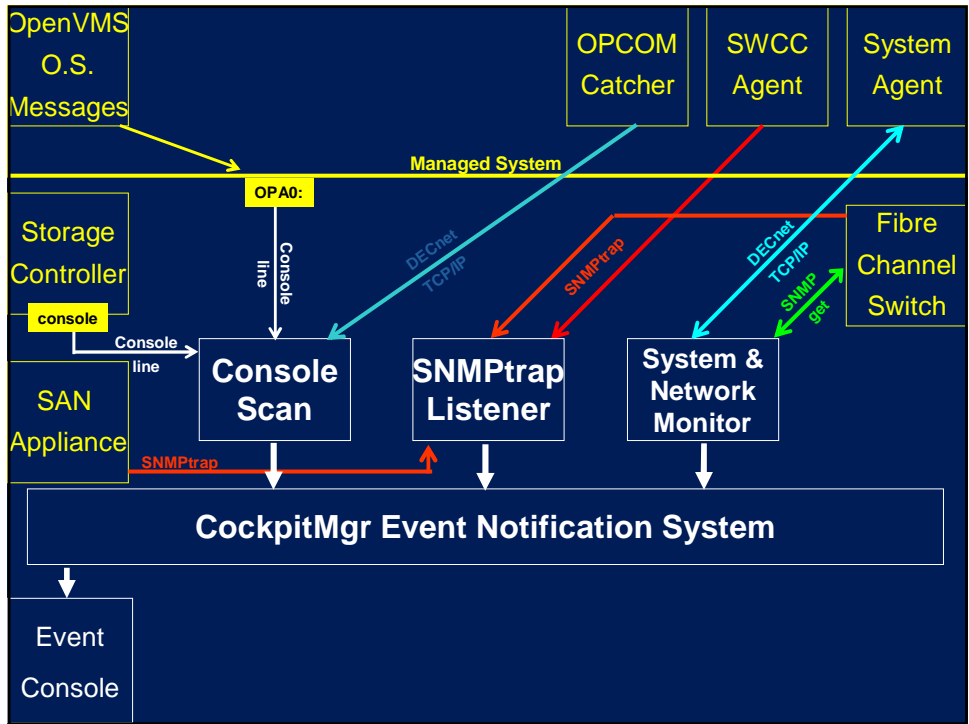
Monitor Fibre Channel Switches



- 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



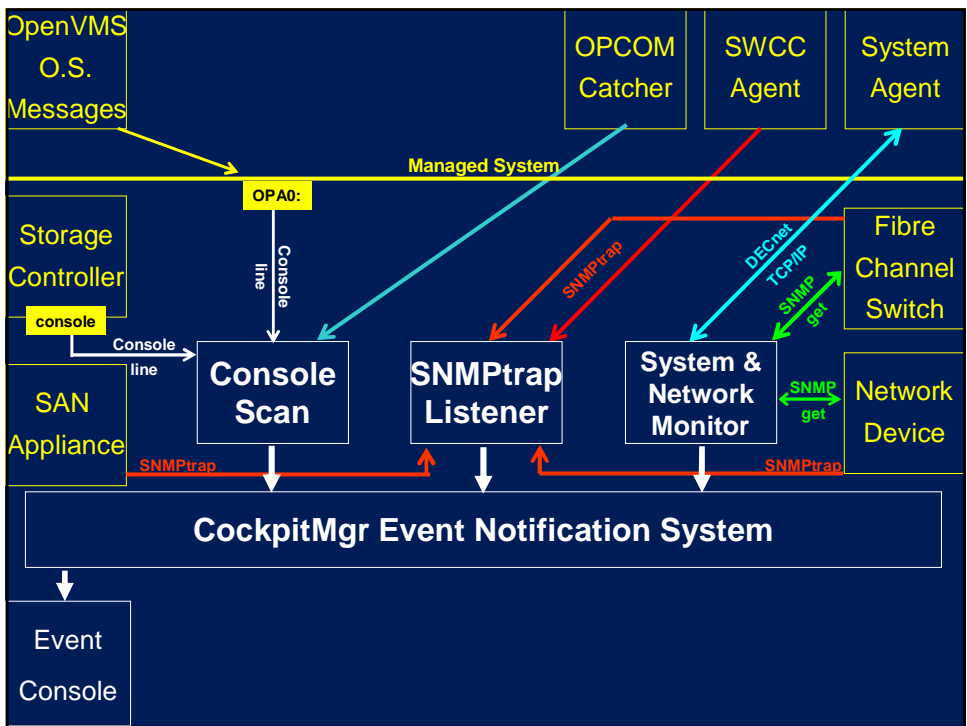
- Network is used as cluster interconnect.
 - Fast Ethernet
 - Gigabit Ethernet
 - FDDI
- Any network issue may have immediate impact on the VMScluster.

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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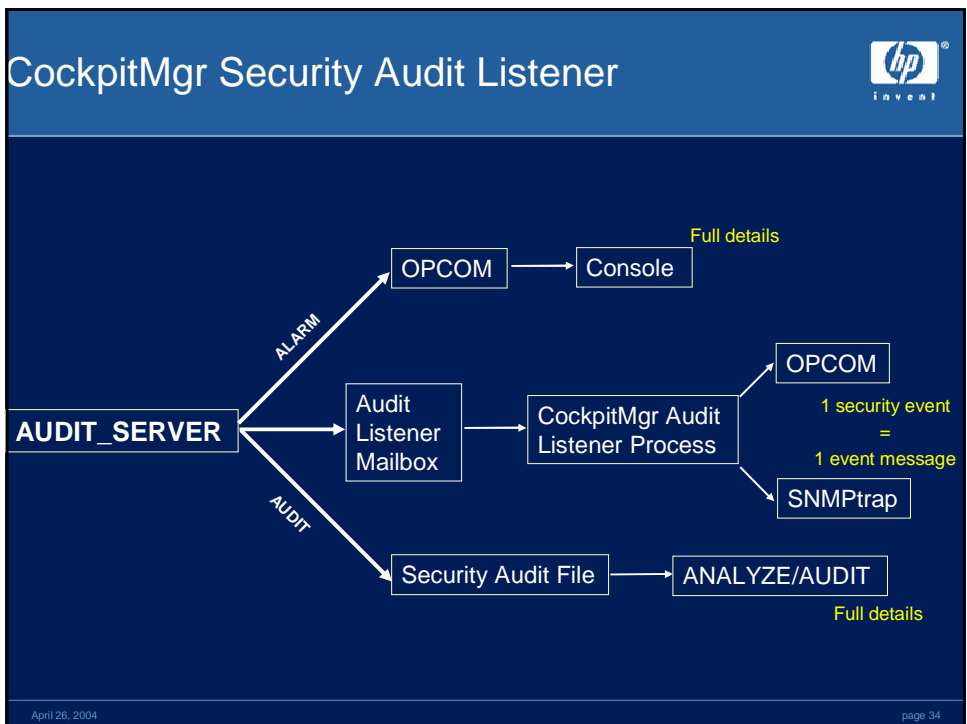


Performance Monitor



- 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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The screenshot shows the 'CockpitMgr Event Console' window. At the top right is the HP Invert logo. Below the title bar, there are 'Control' and 'Customize' buttons. The main area is a table with the following data:

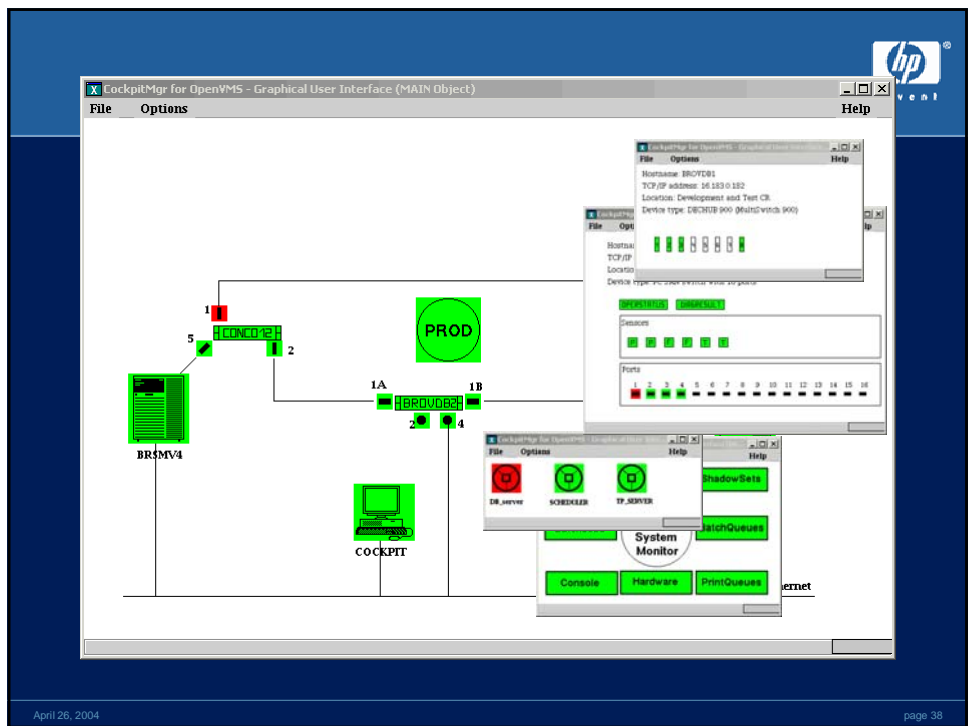
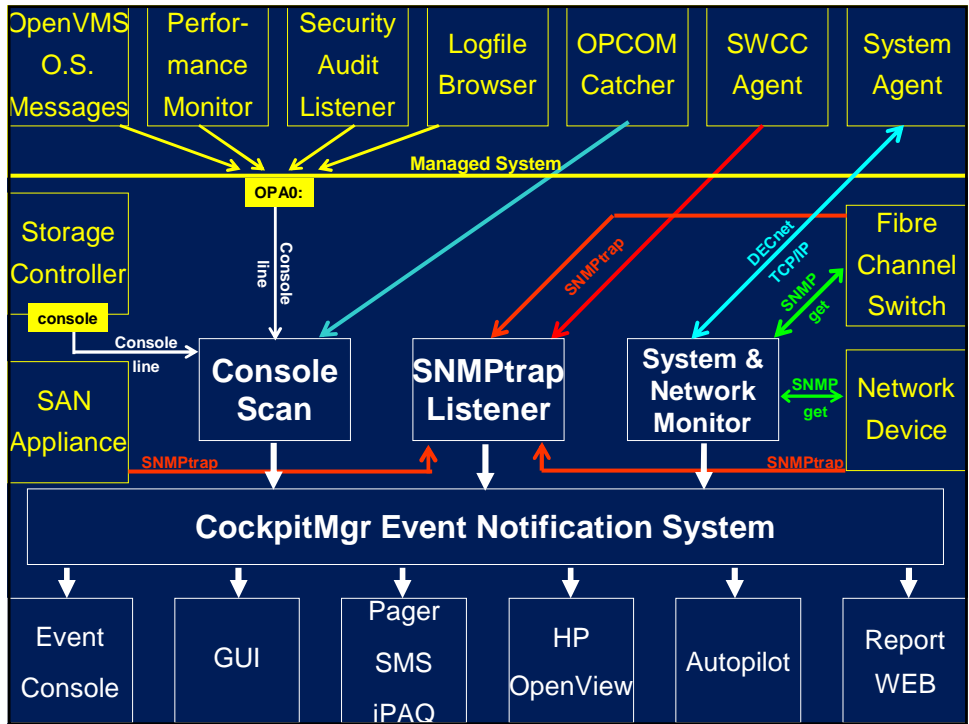
System	Date & Time	Text
BRSADV	11-MAY-1999 10:02:09.15	%SECURITY_LOGFAL, Login failure by DEC::BRO.KWAK::MICHIELS: invalid password
BRSADV	11-MAY-1999 10:02:14.47	%SECURITY_ACCESS, STEUKERS accesses (R+W) file NETPROXY.DAT : successfully
BRSADV	11-MAY-1999 10:03:15.48	%SECURITY_AUDIT, System security alarms changed by user KNOL
BRSADV	11-MAY-1999 10:09:38.47	%SECURITY_SYSAF, SYSTEM modified SYSAF record user SAEYS: PGFLQUOTA,BYTLM
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.SYSEXE]CPTSLOGINI
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_INETUAF, SYSTEM added proxy BROFIN::SYSTEM GEORGES(D)
PLUTON	11-MAY-1999 14:12:34.46	%SECURITY_LOGON, JSMITH dialed in on _VIA10: (DCS.25001381112)

Below the table is a navigation bar with buttons: OpenVMS, System Monitor, Operations, Security (highlighted), Storage/Backup, Applications. At the bottom of the console are buttons: Load All, Delete Cleared, Delete Shown, Show Marked, AutoScroll, Quit. The footer shows 'April 26, 2004' and 'page 35'.

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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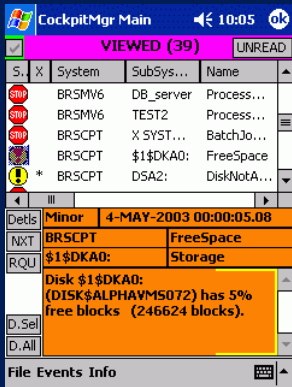


CockpitMgr Pager Engine

- 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




The screenshot shows the 'CockpitMgr Main' application on an iPAQ Pocket PC. The interface displays a list of events with columns for System, SubSystem, and Name. A detailed view of a 'FreeSpace' event is shown below the list, indicating a minor issue on 4-MAY-2003 at 00:00:05.08. The event details include the request type 'FreeSpace' and the specific disk '\$1\$DKA0:'. A yellow warning box highlights that the disk has 5% free blocks (246624 blocks).

S.	X	System	SubSys...	Name
STOP		BR5MW6	DB_server	Process...
STOP		BR5MW6	TEST2	Process...
STOP		BR5CPT	X SYST...	BatchJo...
		BR5CPT	\$1\$DKA0:	FreeSpace
		* BR5CPT	D5A2:	DiskNotA...

Minor 4-MAY-2003 00:00:05.08
INXT BR5CPT FreeSpace
RQU \$1\$DKA0: Storage
Disk \$1\$DKA0:
(DISK\$ALPHA\MS072) has 5%
free blocks (246624 blocks).

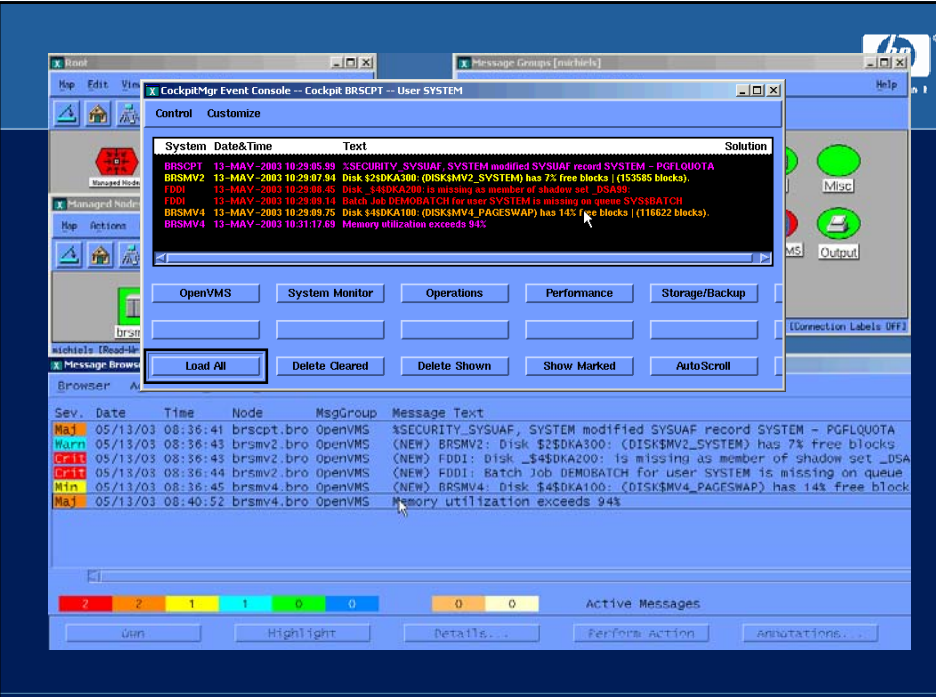
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Integration with HP OpenView



- 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 displays the HP OpenView CockpitMgr Event Console interface. A central window titled "CockpitMgr Event Console -- Cockpit BRSCPT -- User SYSTEM" is open, showing a list of system messages. A detailed view of a message is shown, indicating a disk space issue on BRSMV2.

System	Date&Time	Text	Solution
BRSCPT	13-MAY-2003 10:29:05.98	%SECURITY_SYSUAF, SYSTEM modified SYSUAF record SYSTEM - PGFLQUOTA	
BRSMV2	13-MAY-2003 10:29:07.94	Disk \$2SDKA300: (DISK\$MV2_SYSTEM) has 7% free blocks (153585 blocks).	
FDDI	13-MAY-2003 10:29:08.45	Disk \$4SDKA200 is missing as member of shadow set _DSA98	
TDR	13-MAY-2003 10:29:08.18	Batch Job DEMORATCH for user SYSTEM is missing on queue SVSRATCH	
BRSMV4	13-MAY-2003 10:29:09.75	Disk \$4SDKA100: (DISK\$MV4_PAGESWAP) has 14% free blocks (116622 blocks).	
BRSMV4	13-MAY-2003 10:31:17.69	Memory utilization exceeds 94%	

Below the message list, there are several control buttons: OpenVMS, System Monitor, Operations, Performance, Storage/Backup, Load All, Delete Cleared, Delete Shown, Show Marked, and AutoScroll.

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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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The screenshot shows a web browser window titled "CockpitMgr Event Reporting - Microsoft Internet Explorer provided by Compaq Computer Corporation". The address bar shows "http://192.168.1.100/cockpitmgr.html". The page features the HP logo and "invent" text in the top right. The main heading is "CockpitMgr for OpenVMS V6.0" with "Web-Enabled Reporting" below it. A table titled "Current Events In ENS" displays event counts categorized by severity and class. A sidebar on the left contains navigation links for reports and logs. The footer of the browser window shows "April 26, 2004" and "page 45".

Class	Critical	Minor	Warning	Clean
Total	13	14	20	7
Security	7	3	0	0
Shadowing	0	0	5	0
Network	2	0	0	0
Storage	1	0	0	0
Backup	0	0	3	1
Performance	0	0	0	1
System	3	10	0	0

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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World-Wide Reseller



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