CockpitMgr for OpenVMS

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Some history.
Why CockpitMgr?

1993: Digital announces Polycenter

- A marketing name for many point solutions
  - Problem management, performance management, storage management, automation, network management, and security management
- Existing management products got new names
- “Assists network and system managers in planning and managing an open and integrated distributed environment”

What can we say?

- Great point solutions
- Perfect for managing VMS environments in the early nineties
  - Standalone systems, and CI or DSSI clusters located in 1 datacenter
  - Locally attached storage or storage behind HSC/HSJ/HSD controllers
- The marketing umbrella did not trigger any product integration
  - Each product comes with its own configuration utility, notification mechanisms…etc.

Technology & customer demands evolve…

- Multi-site disaster-tolerant VMSclusters
  - Network is now part of the cluster
- SAN
  - Storage is drifting away from the systems
- Increased security demands
  - SSH
- Internet technologies
  - Web browser for event notification and reporting
  - XML to store information, XSLT for reporting
- Cell phones
  - SMS ideal for important/urgent event notification

Our motivation to develop CockpitMgr

- When Computer Associates acquired Polycenter products in 1996, we quickly realized there was no future, as the functionality of all products was frozen.

- We decided to re-engineer everything, in a fully integrated way, and deploying the latest technologies.

- Today CockpitMgr evolved to the most complete toolset in the industry, supporting VMS system managers in the daily operations.

Our starting points

- What information does a system manager of mission-critical VMS systems and clusters 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?
- Which modern technologies are the most appropriate to use and are demanded by our customers?

The cockpit concept

- The cockpit is a dedicated system that monitors the entire OpenVMS production environment
  - Consoles, systems, network, storage, security, log files, performance, configuration changes…etc.
- All information is consolidated on the cockpit and brought to the system manager in various ways
  - Event console, GUI, cell phone, web browser…etc.
- Runs on OpenVMS (Alpha or Integrity)
  - A VMS system manager works best on a VMS system

Console Manager

Console Management

Console OPA0

messages

Terminal Server

Console Connect

Store console output on disk

Search console output for specific text strings

Cockpit

Console Management

- CockpitMgr provides complete console management:
  - Connect to remote system console
  - Log console output for further reference
  - Search console output for specific text strings
- Many up-to-date scan profiles included:
  - OpenVMS, VMScluster, shadowing, LAN failover messages….
  - Layered products such as SLS, ABS, MDMS, RDB, DCPS …
  - VAX, AlphaServer and Integrity messages

Console Management (cont.)

- Terminal server support:
  - Classic DECservers/LANtronix
  - Cisco Access Server
  - Digi CM server
  - Marvel NAT box
- Direct connection to Integrity MP
- Connection to TCP/IP port for emulated hardware
- Communication protocols: LAT, Telnet, SSH

System Monitoring

System Monitor

- System Monitor on the cockpit communicates with an Agent running on each VMS production system
- What needs to be monitored is defined centrally on the cockpit
- Connection is made at regular time intervals
- Connection is only accepted from a “trusted” cockpit
- Implemented with non-transparent DECnet task-to-task and TCP/IP socket programming

What is monitored?

- System reachability
- Changes in the hardware error counts of CPU, memory, devices, buses, controllers…
- The system time difference between cockpit and managed system

What is monitored? (cont.)

- Processes
  - Does a process exist on one system or cluster-wide?
  - If process name contains wildcards, the minimum number of occurrences can be specified
  - Specification of a UIC is optional
- Disks
  - Disk free space
  - Disk states (e.g. mount verification, not mounted, write-locked,…etc.)

What is monitored? (cont.)

- Shadow sets
  - Is there a disk missing as shadow set member?
  - Are the shadow set members doing copy and merge operations?
  - Is a disk unexpected member of a shadow set?
- Status of batch and print queues, number of pending jobs.
- Checks whether a batch job has been submitted on a queue by a certain user
  - Supports generic queues

System Monitor key features

- Monitoring of every item can be restricted to certain periods of the week
- Items can be monitored per node or per cluster
- Wildcards can be used
- Fast configuration utility available
- Automatic repair actions can be defined
- The System Agent can easily be extended with your own specialized monitoring modules

Storage Monitoring

Storage today

- Storage is located in a SAN
- Local storage is configured behind a RAID controller
- Redundant storage configurations are built, and VMS operations continue after a single failure

Storage monitoring

- Configure the SAN Management Appliance (EVA, 3PAR…) to send SNMPtraps to the cockpit
  - An SNMPtrap Listener receives the SNMPtraps, analyses and interprets them

- Configure HSJ, HSZ and HSG controllers in Console Manager
  - Message instance codes are detected and interpreted

- New in V7.8: Monitoring of MSA and P2000 (controller status, cache and batteries, disks, RAID sets, copy operations…etc)

Storage Monitoring (cont.)

- Use SNMPgets to query MIB agents
  - Brocade Fibre Channel Switches, McData Enterprise Director, Cisco MDS, Network Storage Routers, Solid state disks, Wave Division Multiplexers, RAID controllers…etc.
  - Monitoring of the port states, error counters and device-specific diagnostic information
  - Performance data collection

Network Monitoring

Network Monitoring

- Network is used as cluster interconnect
- Any network issue may have immediate impact on the VMScluster
- Good working systems are useless in case of network problems

Network Monitoring

- Monitoring of selected network devices (SNMPgets):
  - Strong focus on Cisco Catalyst (includes support for monitoring of trunks, VLANs and etherchannels)
- Includes checking for the availability of each device, changes in the port states, and changes in the port error counters
- Listens for and interprets SNMPtraps sent by network devices
- Performance monitoring
  - graphs on throughput of Catalyst ports

Performance Monitoring

Performance Monitor

- The Performance Monitor looks for possible indications of system performance slowdowns
  - CPU utilisation (also per mode)
  - Memory utilisation
  - Page and swap file utilisation
  - Looping processes
  - Idle processes
  - Pool utilisation
  - Processes in special wait state (RWAST, RWMBX…)
  - Process quota utilization

Performance Monitoring

- CockpitMgr collects some performance metrics, and makes the information available in graphs
  - PNG files to display in web browser

More features

More features

- SNMP based monitoring of many devices
  - Printers, UPS, temperature & humidity sensors, …etc
- Real-time security event monitoring
- Log File browser: searches batch and application log files for errors
- Job scheduler (OpenVMS V7.2 or above)
- NETDCL
  - Execute one or more DCL commands on a remote system with output to the cockpit
  - Facilitates remote system management

Non-VMS systems

- Monitoring of Unix systems
  - Unix agent available for processes and file system space
  - Easy integration of existing monitoring procedures
  - Syslog messages can be sent to cockpit

- Monitoring of Windows systems
  - SNMP-based checking of processes, services, disk space, high CPU and memory utilization
  - Event log can be sent to cockpit Syslog server

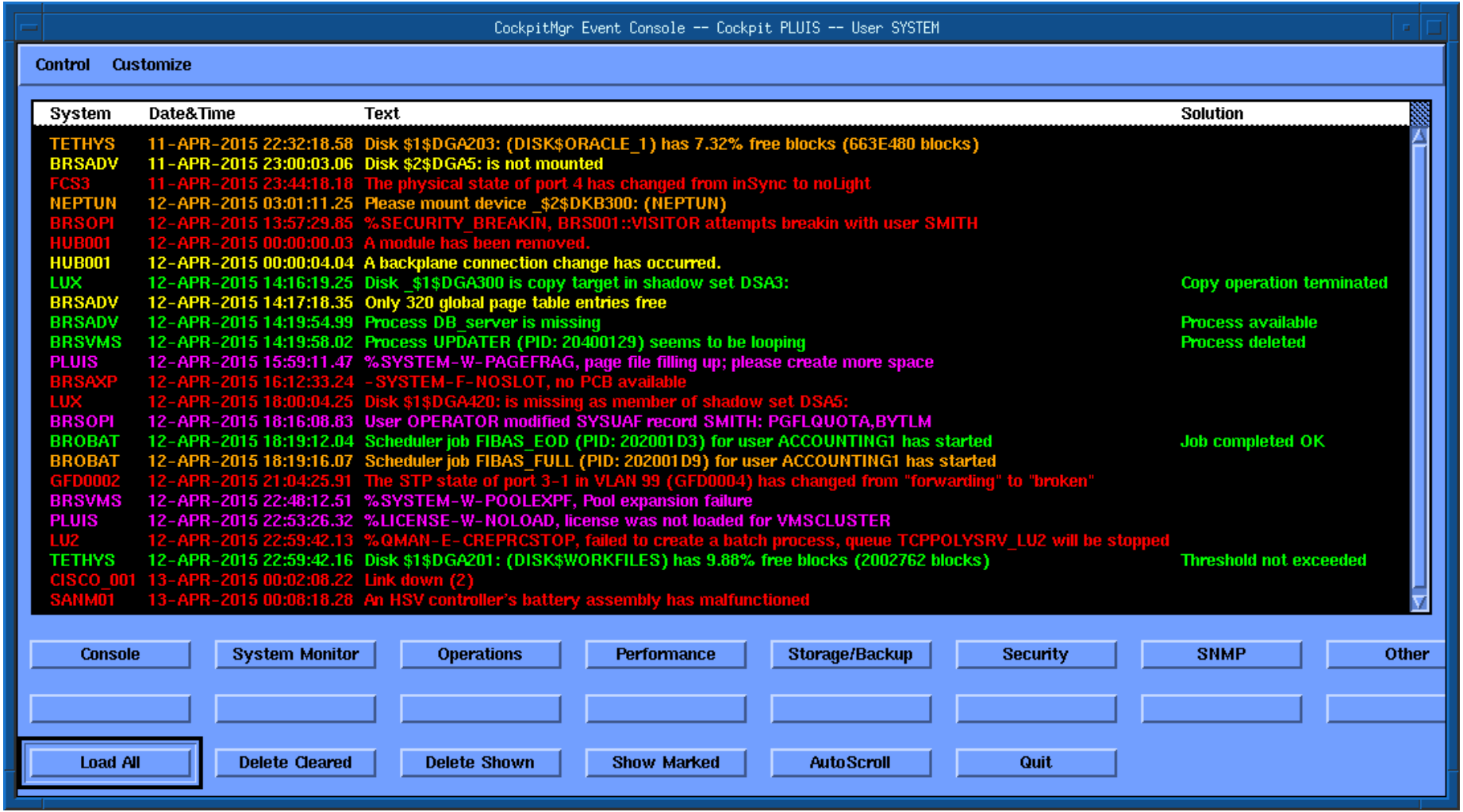
Standby cockpit

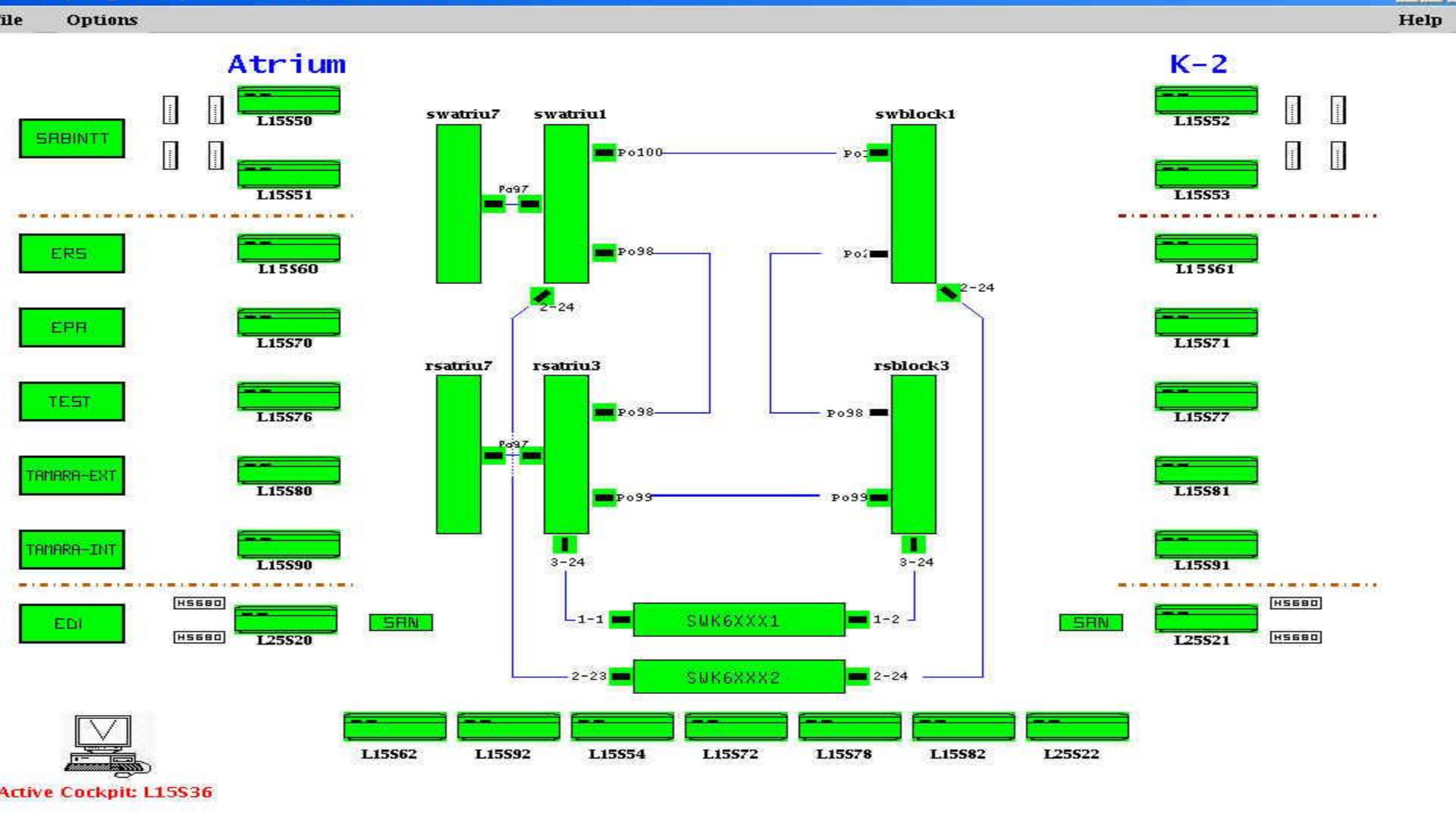
- In a disaster-tolerant environment, you can not depend on anything that is only at either site
- Your cockpit is key in the operations. After loss of the cockpit, you need to be able to activate the cockpit in the other site
- Standby cockpit will automatically become active
  - if primary fails
  - network connection between the 2 sites is broken
- Manual switch between the active and standby cockpit is possible
- Events detected by primary cockpit are sent to standby cockpit to have all historical information available in both sites.

Event Notification

Several notification utilities

- Event console
- GUI
- SMS to cell phone
- Web browser
- Integration with enterprise manager


CockpitMgr Event Console -- Cockpit PLUIS -- User SYSTEM
Control
Customize
System
Date&Time
Text
Solution
TETHYS 11-APR-2015 22:32:18.58 Disk 1DGA203: (DISK$ORACLE_1) has 7.32% free blocks (663E480 blocks)
BRSADV 11-APR-2015 23:00:03.06 Disk 2DGA5: is not mounted
FCS3 11-APR-2015 23:44:18.18 The physical state of port 4 has changed from inSync to noLight
NEPTUN 12-APR-2015 03:01:11.25 Please mount device _2DKB300: (NEPTUN)
BRSOPI 12-APR-2015 13:57:29.85 %SECURITY_BREAKIN, BRS001::VISITOR attempts breakin with user SMITH
HUB001 12-APR-2015 00:00:00.03 A module has been removed.
HUB001 12-APR-2015 00:00:04.04 A backplane connection change has occurred.
LUX 12-APR-2015 14:16:19.25 Disk _1DGA300 is copy target in shadow set DSA3: Copy operation terminated
BRSADV 12-APR-2015 14:17:18.35 Only 320 global page table entries free
BRSADV 12-APR-2015 14:19:54.99 Process DB_server is missing Process available
BRSVMS 12-APR-2015 14:19:58.02 Process UPDATER (PID: 20400129) seems to be looping Process deleted
PLUIS 12-APR-2015 15:59:11.47 %SYSTEM-W-PAGEFRAG, page file filling up; please create more space
BRSAXP 12-APR-2015 16:12:33.24 -SYSTEM-F-NOSLOT, no PCB available
LUX 12-APR-2015 18:00:04.25 Disk 1DGA420: is missing as member of shadow set DSA5:
BRSOPI 12-APR-2015 18:16:08.83 User OPERATOR modified SYSUAF record SMITH: PGFLQUOTA,BYTLM
BROBAT 12-APR-2015 18:19:12.04 Scheduler job FIBAS_EOD (PID: 202001D3) for user ACCOUNTING1 has started Job completed OK
BROBAT 12-APR-2015 18:19:16.07 Scheduler job FIBAS_FULL (PID: 202001D9) for user ACCOUNTING1 has started
GFD0002 12-APR-2015 21:04:25.91 The STP state of port 3-1 in VLAN 99 (GFD0004) has changed from "forwarding" to "broken"
BRSVMS 12-APR-2015 22:48:12.51 %SYSTEM-W-POOLEXPF, Pool expansion failure
PLUIS 12-APR-2015 22:53:26.32 %LICENSE-W-NOLOAD, license was not loaded for VMSCLUSTER
LU2 12-APR-2015 22:59:42.13 %QMAN-E-CREPRCSTOP, failed to create a batch process, queue TCPPOLYSRV_LU2 will be stopped
TETHYS 12-APR-2015 22:59:42.16 Disk 1DGA201: (DISK$WORKFILES) has 9.88% free blocks (2002762 blocks) Threshold not exceeded
CISCO_001 13-APR-2015 00:02:08.22 Link down (2)
SANM01 13-APR-2015 00:08:18.28 An HSV controller's battery assembly has malfunctioned
Console
System Monitor
Operations
Performance
Storage/Backup
Security
SNMP
Other
Load All
Delete Cleared
Delete Shown
Show Marked
AutoScroll
Quit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TAMARA-EXT
TAMARA-INT
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SWK6XXX1
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L15S62
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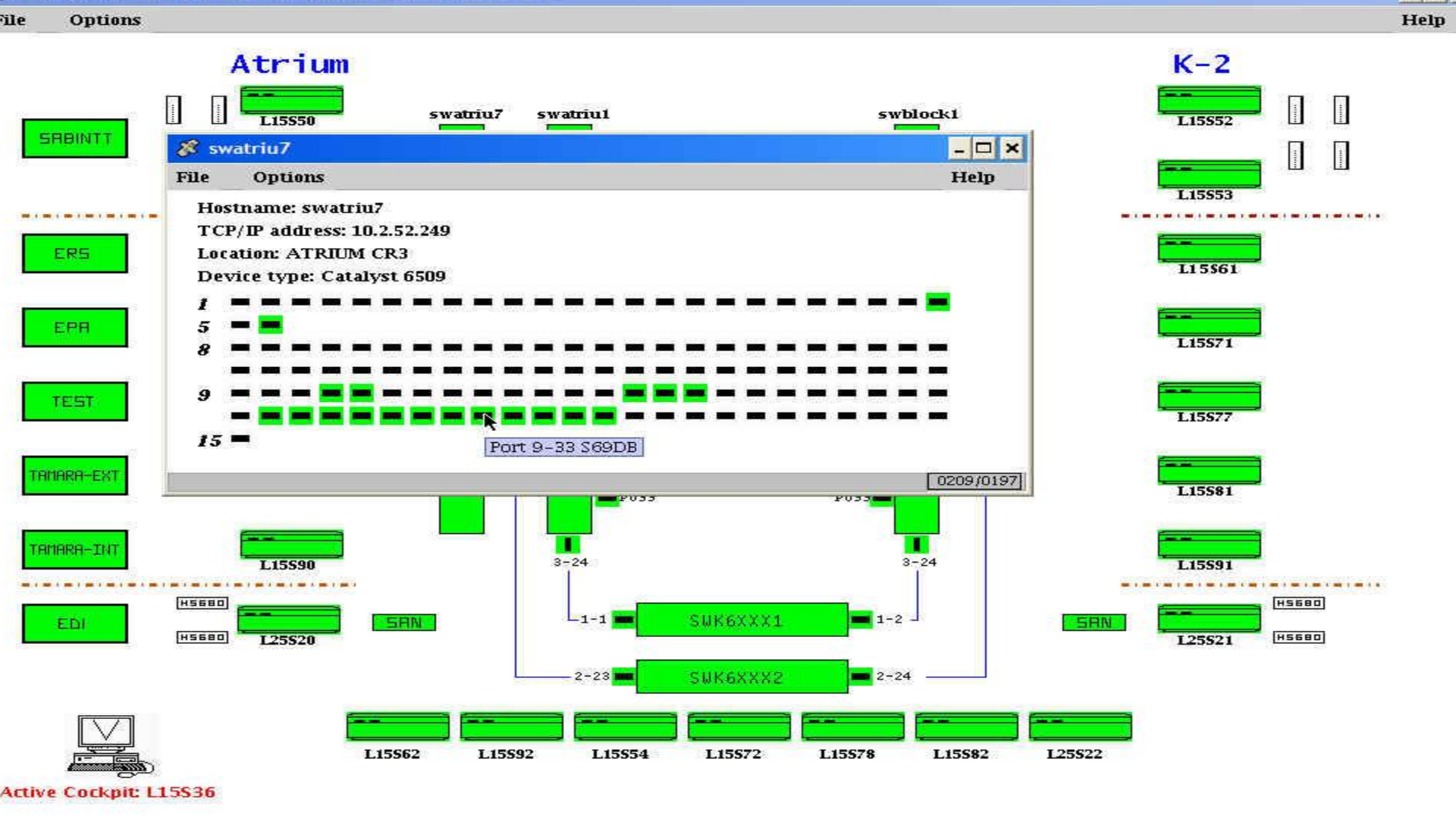
L25S22
Active Cockpit: L15S36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L15S81
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swatriu7
File
Options
Help
Hostname: swatriu7
TCP/IP address: 10.2.52.249
Location: ATRIUM CR3
Device type: Catalyst 6509
1
5
8
9
15
Port 9-33 S69DB
0209/0197
L15S90
3-24
3-24
1-1
SWK6XXX1
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SWK6XXX2
2-24
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HS680
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SAN
HS680
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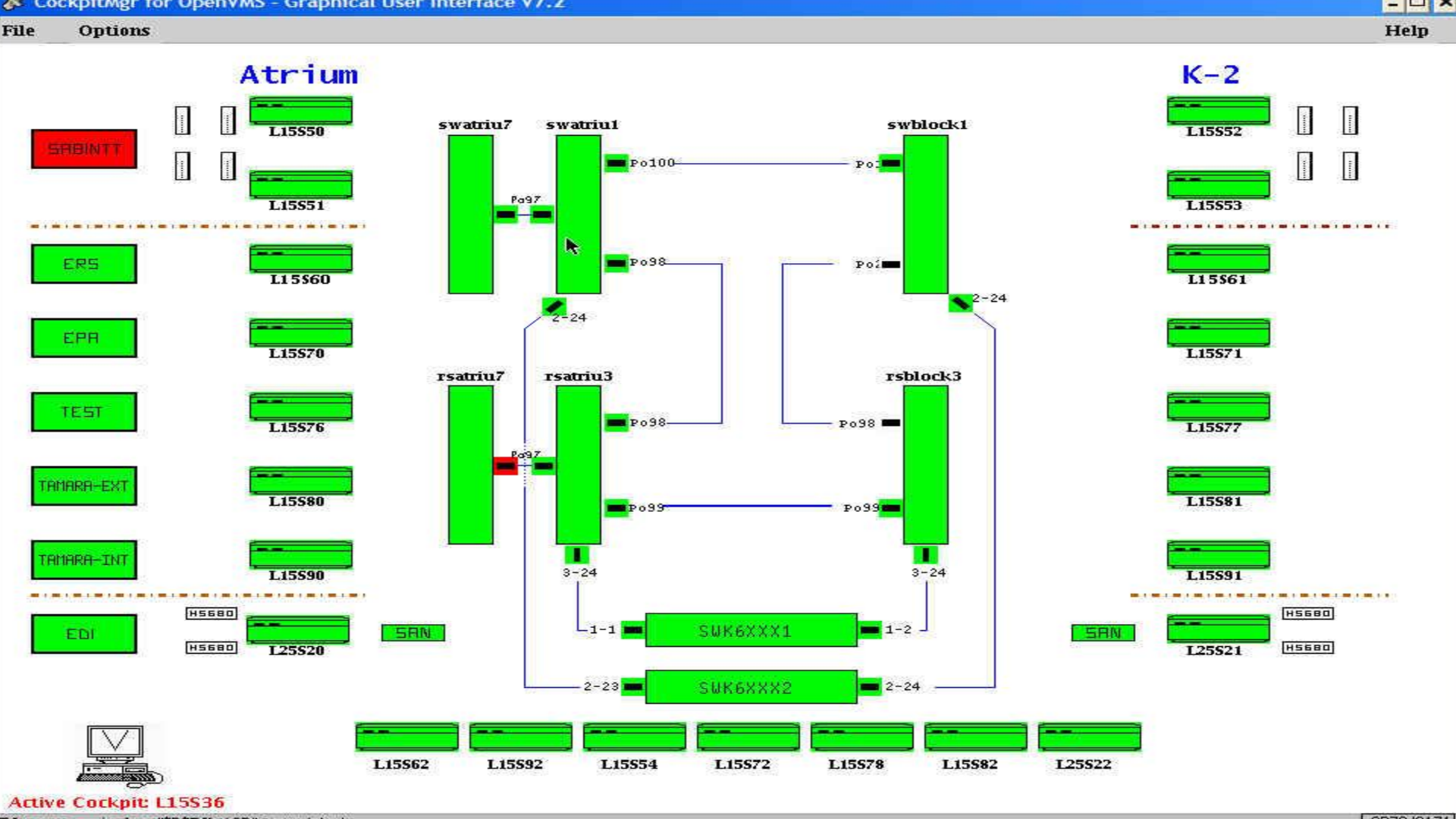
Active Cockpit: L15S36


CockpitMgr for OpenVMS - Graphical User Interface V7.2
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EPA
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TAMARA-EXT
TAMARA-INT
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rsatriu3
rsblock3
Po97
Po100
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2-23
SWK6XXX1
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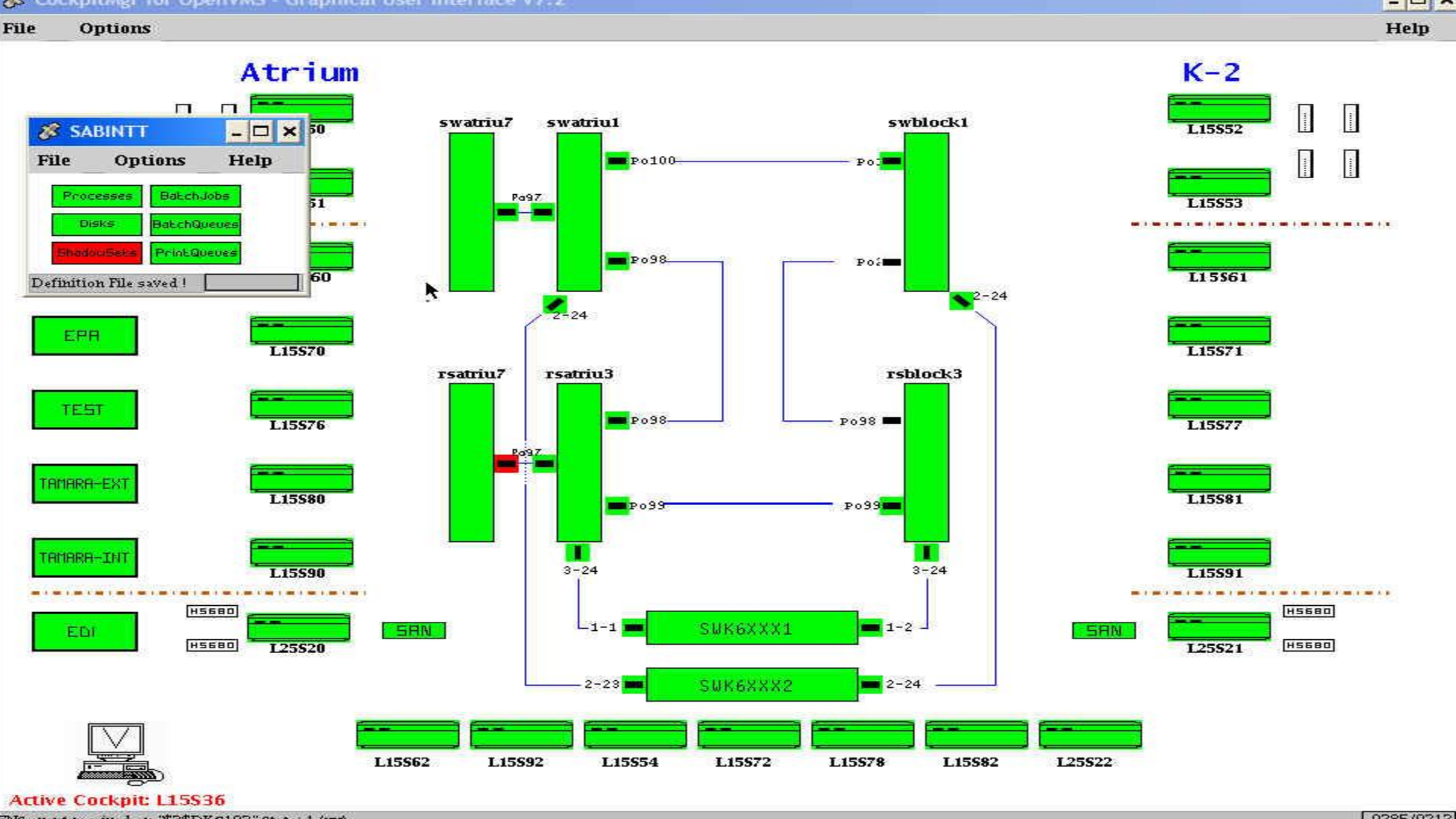
Active Cockpit: L15S36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K-2
SABINTT
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Options
Help
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Disks
BatchQueues
ShadocoSets
PrintQueues
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swatriu1
swblock1
Po100
Po97
Po98
2-24
rsatriu7
rsatriu3
rsblock3
Po98
Po97
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3-24
EPA
TEST
TAMARA-EXT
TAMARA-INT
EDI
L15S70
L15S76
L15S80
L15S90
L25S20
HS680
SAN
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SWK6XXX1
1-2
2-23
SWK6XXX2
L15S52
L15S53
L15S61
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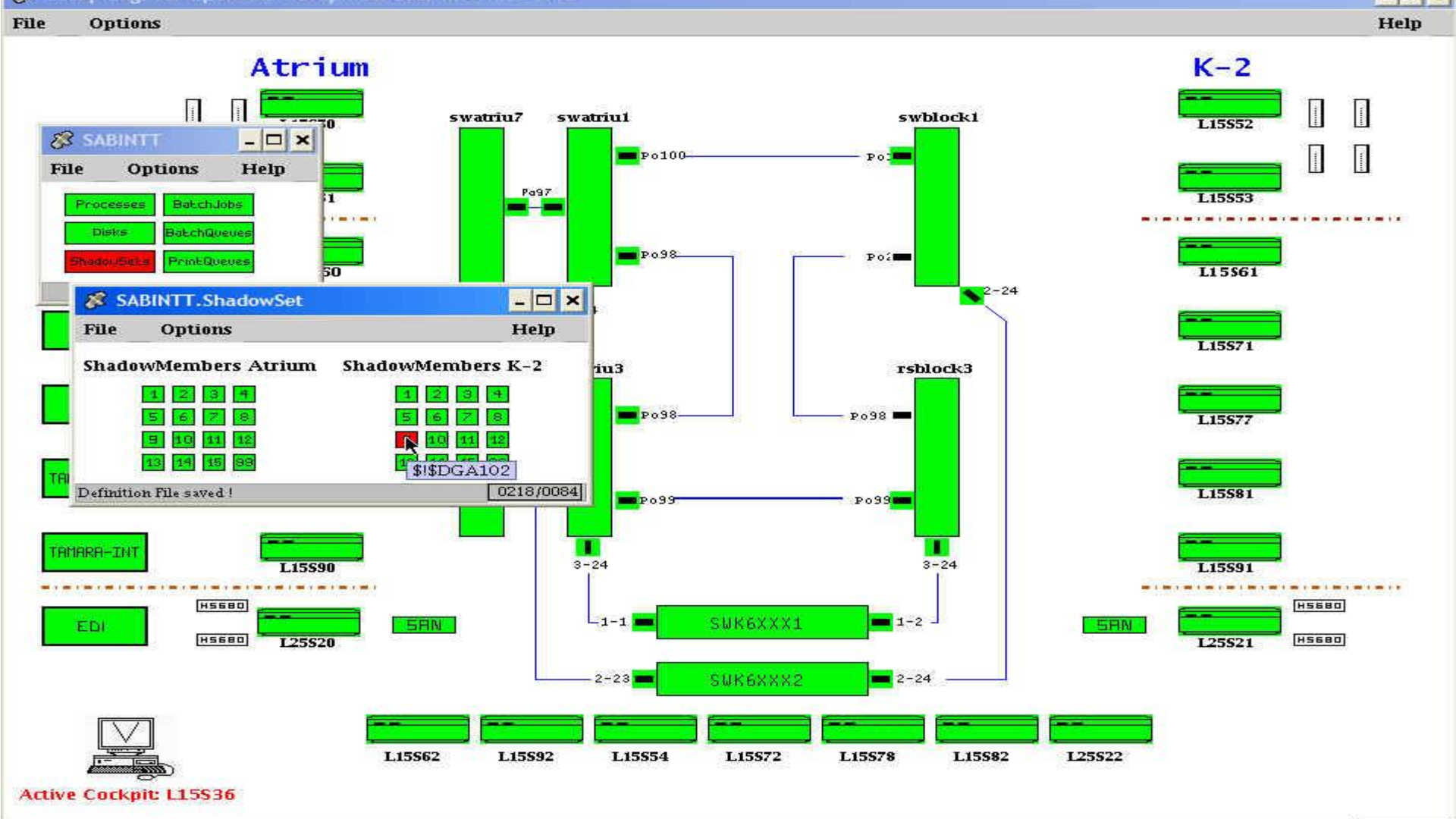
Active Cockpit: L15S36


File
Options
Help
Atrium
K-2
SABINTT
File
Options
Help
Processes
BatchJobs
Disks
BatchQueues
ShadowSets
PrintQueues
SABINTT.ShadowSet
File
Options
Help
ShadowMembers Atrium
ShadowMembers K-2
$!$DGA102
Definition File saved !
0218/0084
swatriu7
swatriu1
swblock1
rsblock3
Po100
Po97
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SWK6XXX1
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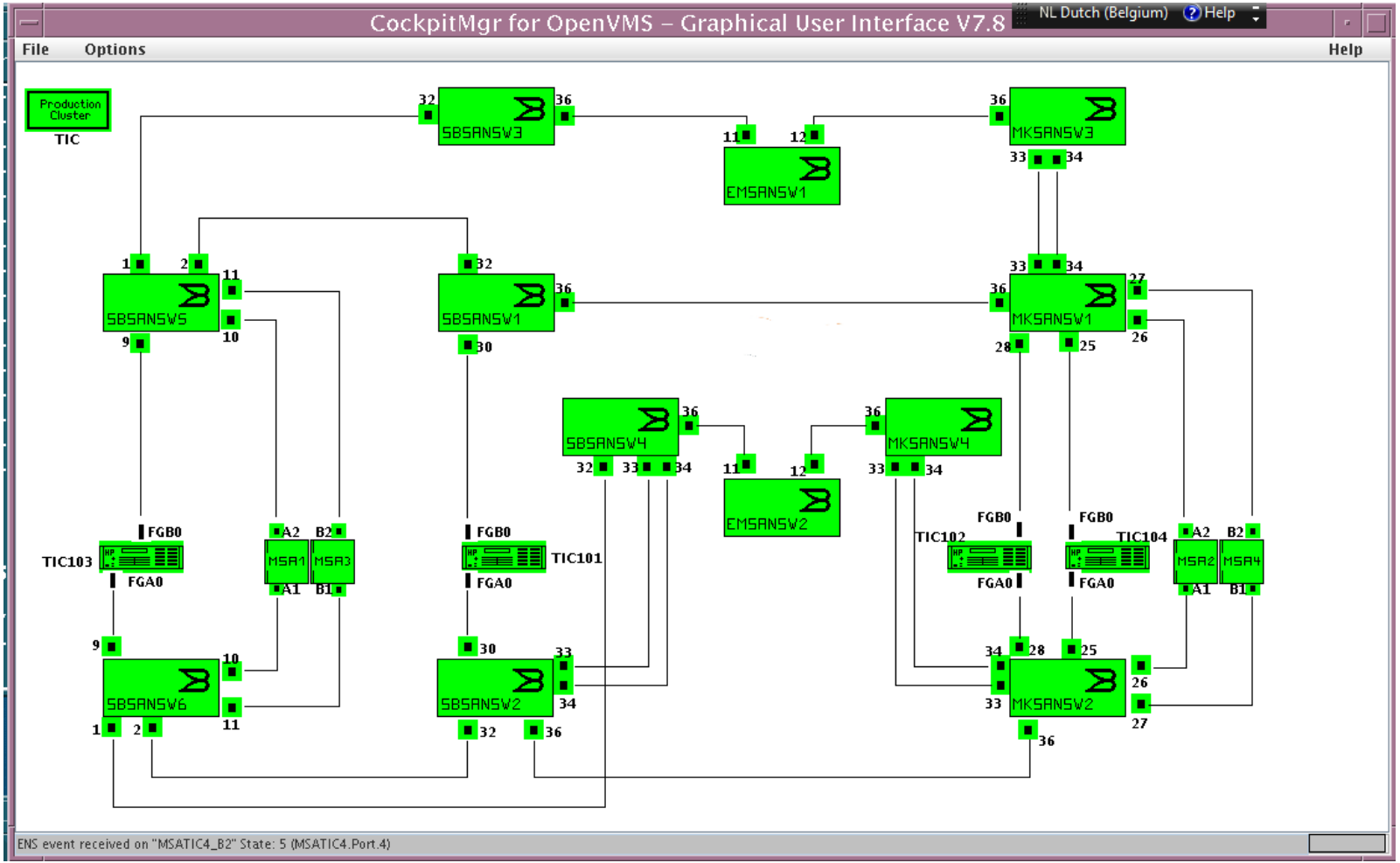
TAMARA-INT
EDI
SAN
HS680
Active Cockpit: L15S36


CockpitMgr for OpenVMS – Graphical User Interface V7.8
NL Dutch (Belgium)
Help
File
Options
Help
Production Cluster
TIC
SBSANSW3
EMSANSW1
MKSANSW3
SBSANSW5
SBSANSW1
MKSANSW1
SBSANSW4
MKSANSW4
EMSANSW2
TIC103
TIC101
TIC102
TIC104
FGB0
FGA0
MSA1
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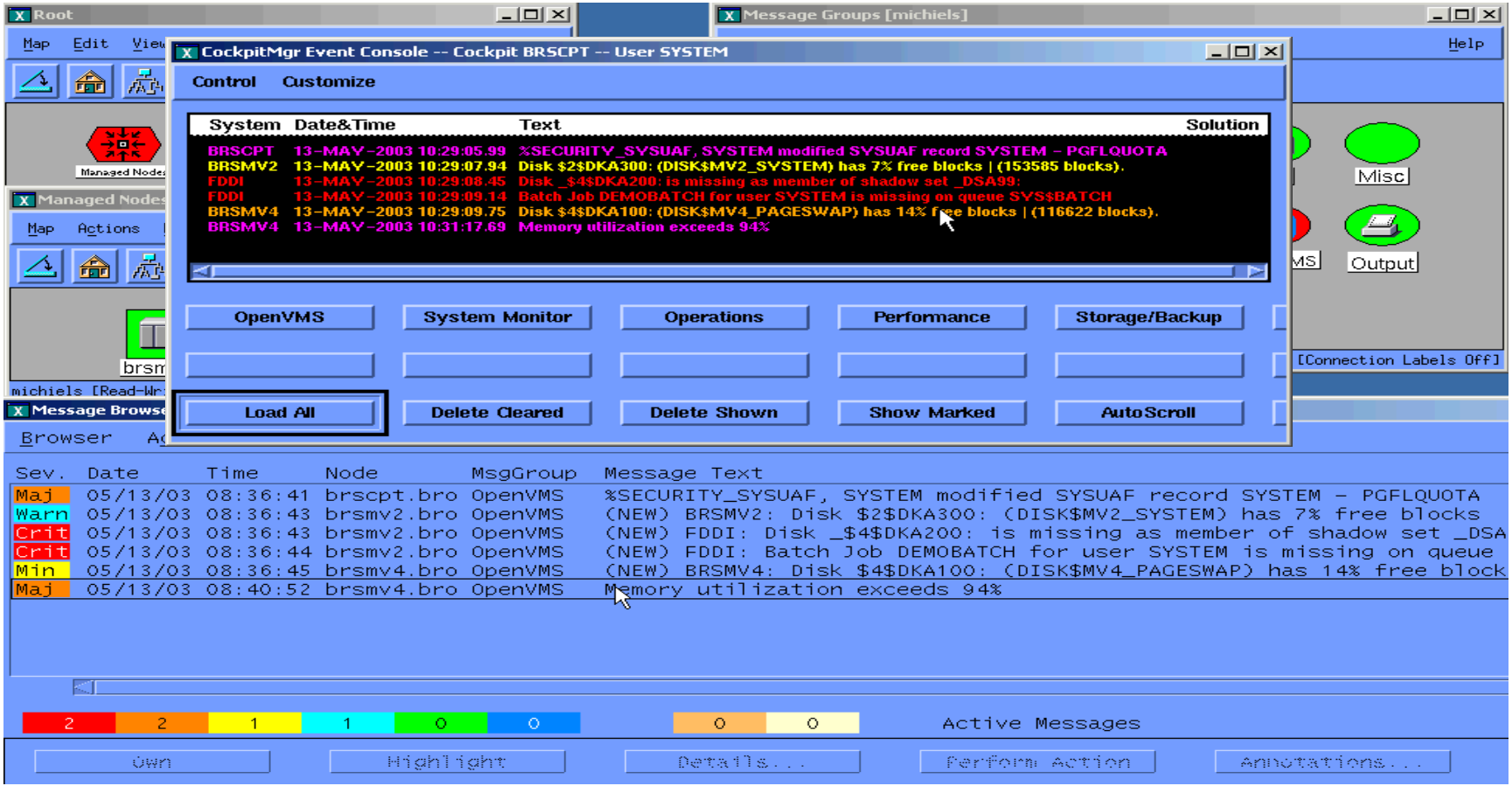
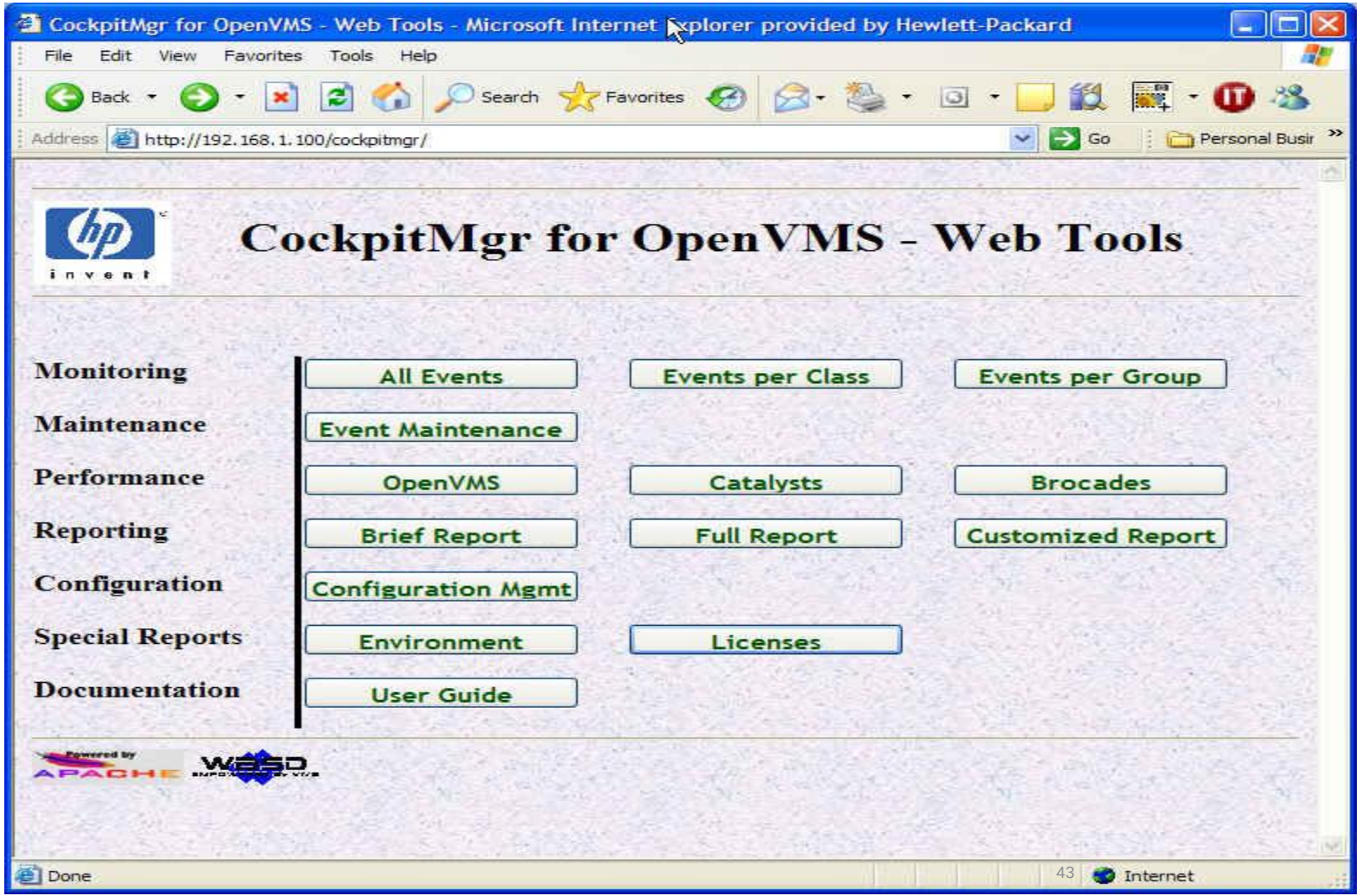
MSA2
MSA4
SBSANSW6
SBSANSW2
MKSANSW2
ENS event received on "MSATIC4_B2" State: 5 (MSATIC4.Port.4)


Root
Message Groups [michiels]
CockpitMgr Event Console -- Cockpit BRSCPT -- User SYSTEM
Control
Customize
System Date&Time Text Solution
BRSCPT 13-MAY-2003 10:29:05.99 %SECURITY_SYSUAF, SYSTEM modified SYSUAF record SYSTEM - PGFLQUOTA
BRSMV2 13-MAY-2003 10:29:07.94 Disk 2DKA300: (DISK$MV2_SYSTEM) has 7% free blocks | (153585 blocks).
FDDI 13-MAY-2003 10:29:08.45 Disk _4DKA200: is missing as member of shadow set _DSA99:
FDDI 13-MAY-2003 10:29:09.14 Batch Job DEMOBATCH for user SYSTEM is missing on queue SYS$BATCH
BRSMV4 13-MAY-2003 10:29:09.75 Disk 4DKA100: (DISK$MV4_PAGESWAP) has 14% free blocks | (116622 blocks).
BRSMV4 13-MAY-2003 10:31:17.69 Memory utilization exceeds 94%
OpenVMS
System Monitor
Operations
Performance
Storage/Backup
Load All
Delete Cleared
Delete Shown
Show Marked
AutoScroll
Sev. Date Time Node MsgGroup Message Text
Maj 05/13/03 08:36:41 brscpt.bro OpenVMS %SECURITY_SYSUAF, SYSTEM modified SYSUAF record SYSTEM - PGFLQUOTA
Warn 05/13/03 08:36:43 brsmv2.bro OpenVMS (NEW) BRSMV2: Disk 2DKA300: (DISK$MV2_SYSTEM) has 7% free blocks
Crit 05/13/03 08:36:43 brsmv2.bro OpenVMS (NEW) FDDI: Disk _4DKA200: is missing as member of shadow set _DSA
Crit 05/13/03 08:36:44 brsmv2.bro OpenVMS (NEW) FDDI: Batch Job DEMOBATCH for user SYSTEM is missing on queue
Min 05/13/03 08:36:45 brsmv4.bro OpenVMS (NEW) BRSMV4: Disk 4DKA100: (DISK$MV4_PAGESWAP) has 14% free block
Maj 05/13/03 08:40:52 brsmv4.bro OpenVMS Memory utilization exceeds 94%
2 2 1 1 0 0 0 0 Active Messages
Own
Highlight
Details...
Perform Action
Annotations...


CockpitMgr for OpenVMS - Web Tools - Microsoft Internet Explorer provided by Hewlett-Packard
File Edit View Favorites Tools Help
Back Search Favorites
Address http://192.168.1.100/cockpitmgr/
Go
Personal Busir
CockpitMgr for OpenVMS - Web Tools
Monitoring
All Events
Events per Class
Events per Group
Maintenance
Event Maintenance
Performance
OpenVMS
Catalysts
Brocades
Reporting
Brief Report
Full Report
Customized Report
Configuration
Configuration Mgmt
Special Reports
Environment
Licenses
Documentation
User Guide
Done
43
Internet

Notification to cell phone

- Requires cellular engine, antenna, power cable, cable to connect to COM port and SIM card
- CockpitMgr makes it easy to define which messages should be sent to who and when.

Configuration & Change Management

Census: Configuration & Change management

- Configuration details are collected:
  - OpenVMS systems
  - Brocade Fibre Channel switches and routers
  - Cisco Catalyst switches
  - EVA storage
  - Blade enclosures
- Different information sources are correlated
  - Link a HBA to a FC switch/port
  - Link a NIC to a catalyst/port
- Data is stored in XML format
  - Allows comparison of current with older configurations
  - Data is displayed in web browser using XSL

Alpha Servers

Integrity Servers

Blades

Logfile Browser

Security Agent

Perf Agent

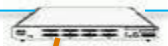
Network switches

Storage

Emulated HW

IP port

System Agent



Terminal server

MP

DECnet
TCP/IP

SNMPget

SNMPtrap

SNMPtrap

Console Manager

System Monitor

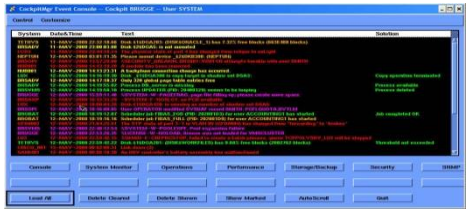
SNMPtrap Listener

SNMPget

Census

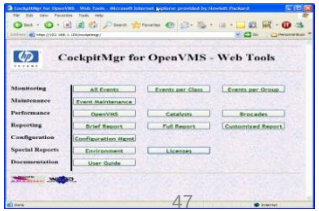
Cockpit

SYSLOG Server



Event Console

GUI



Web browser

Cell Phone

More information?

OpenVMS Technical Journal

http://h71000.www7.hp.com/openvms/journal/v1/index.html

CockpitMgr Product Manager

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