Deep Dive into PowerHA, (formerly known as HACMP)

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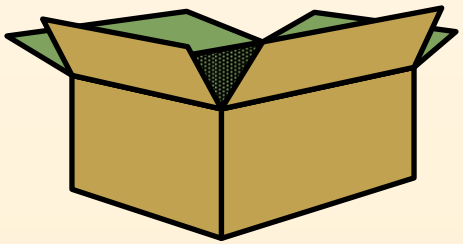
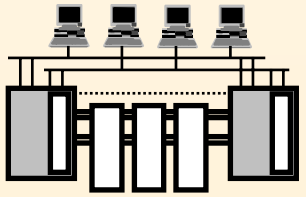
PowerHA – Is **NOT** the right solution if:

- Your environment is not secure
- Network security is not in place
- Change management procedures are not respected
- You do not have trained administrator
- Environment is prone to ‘user fiddle faddle’
- Application requires manual intervention

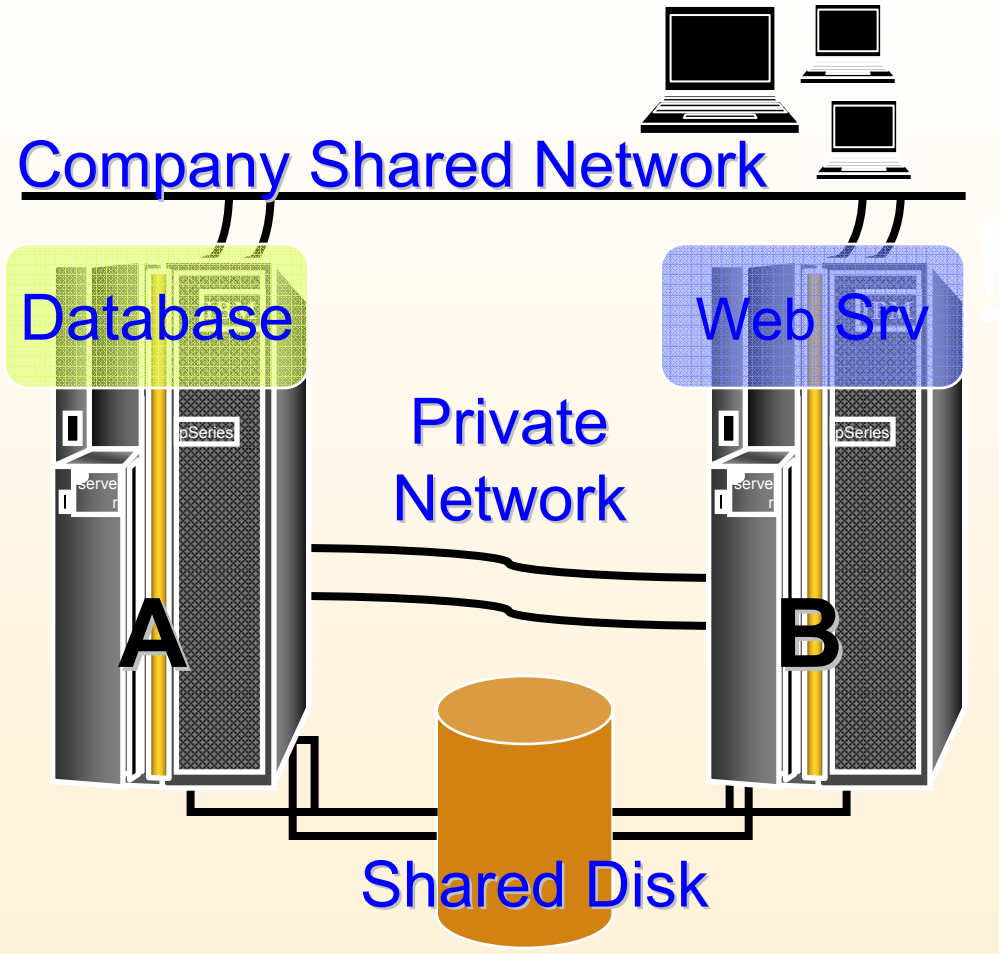


PowerHA will never be an out-of-the-box solution to availability. A certain degree of skill will be always be required.



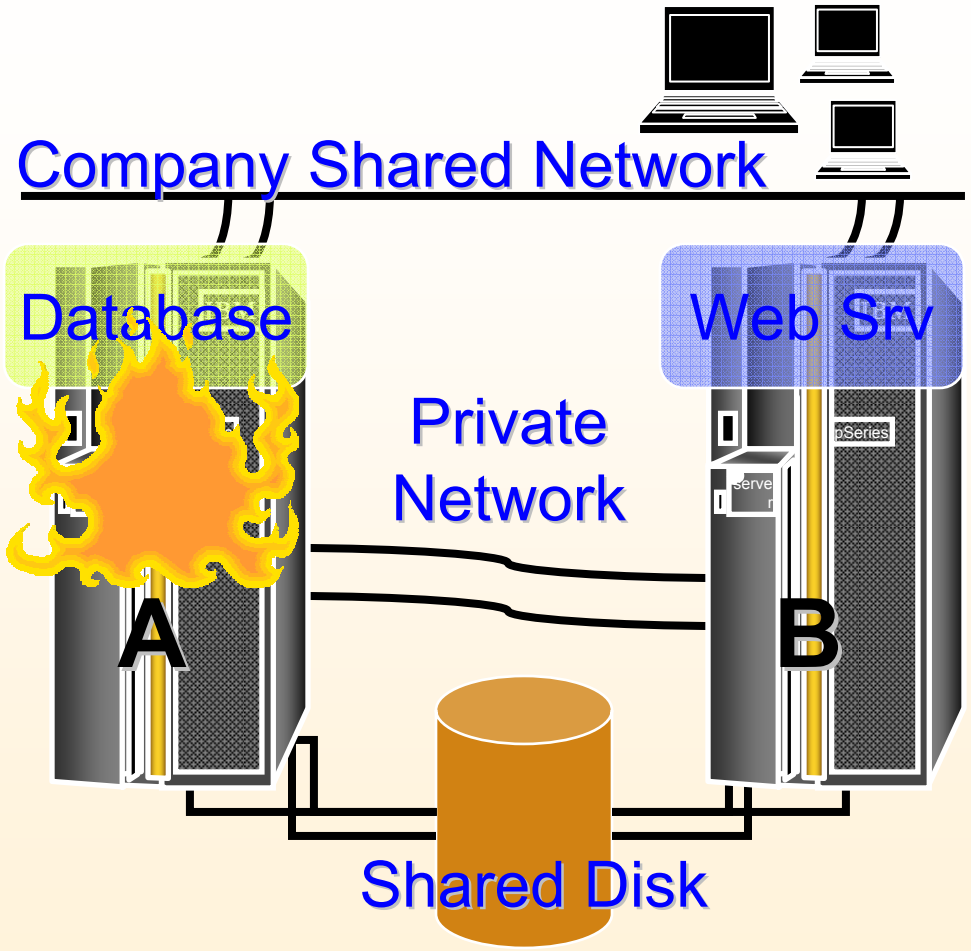
PowerHA™ protects against service outages by detecting problems and quickly “failing over” to backup hardware

- Two nodes (A and B)
- Two networks
  - Private (internal) network
  - Public (shared) network
- Shared disk
  - All data in shared storage available to both nodes
- Critical applications
  - Database server
  - Web server
    - Dependent on DB



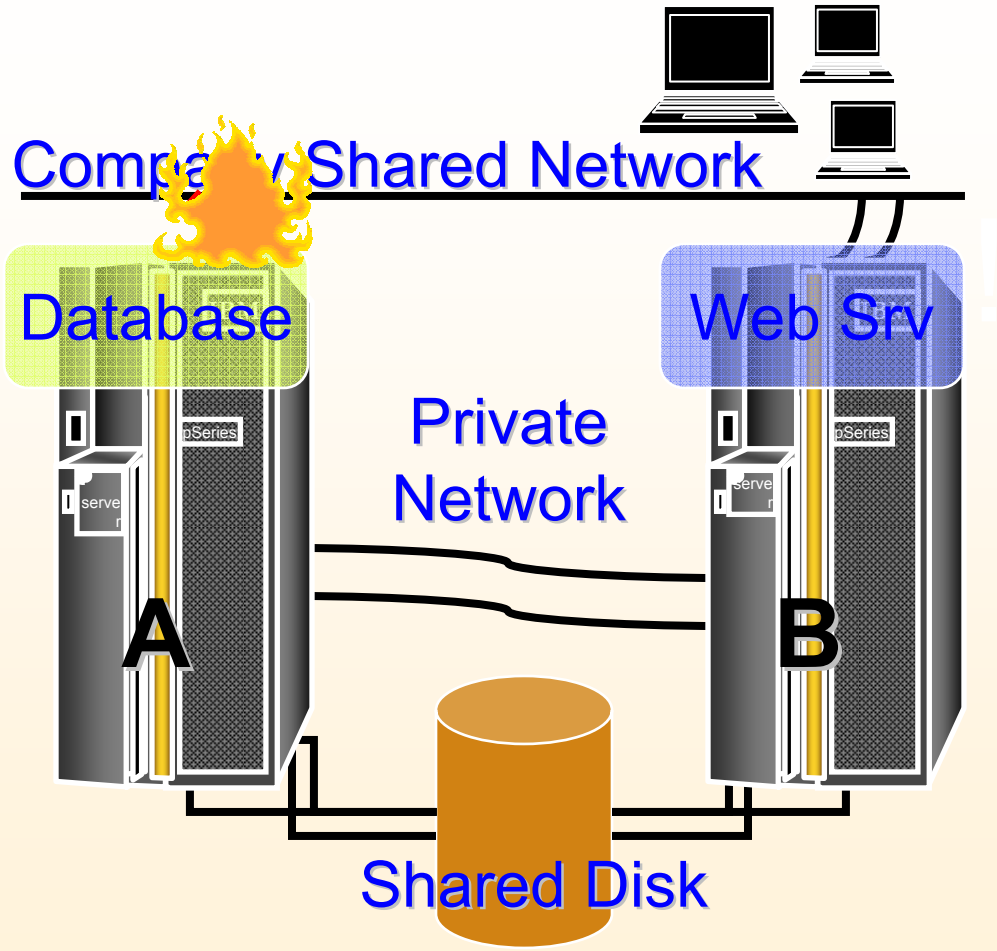
Example Failure #1: Node failure

- Node A fails completely
- Node B detects the loss of Node A
- Node B starts up its own instance of the Database.
- Database is temporarily taken-over by Node B until Node A is brought back online



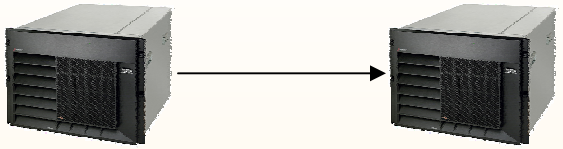
Example Failure #2: Loss of network connection

- Node A loses a NIC
- Because of NIC redundancy, the service IP swaps locally
- Operations continue normally while problem is resolved
- If total public network connectivity was lost a fallover could occur

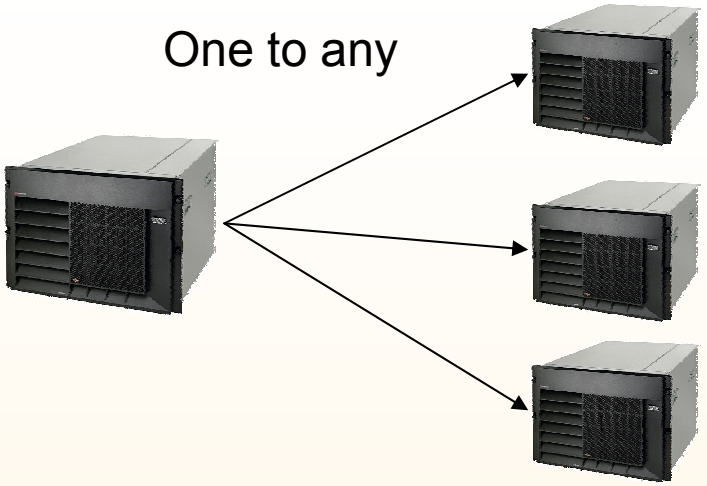


Failover possibilities

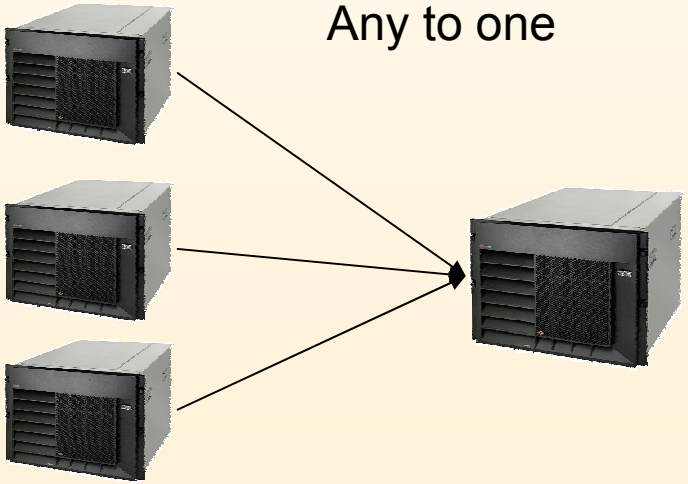
One to one



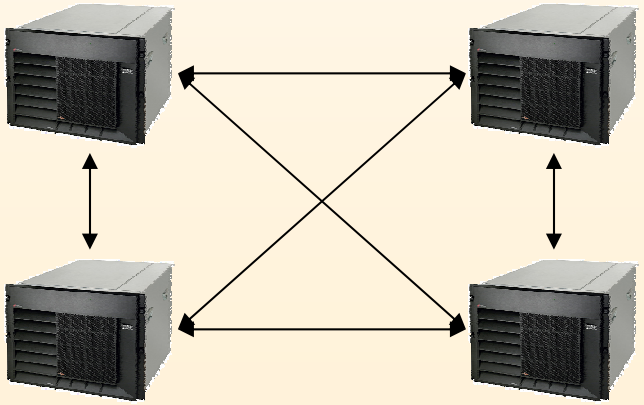
One to any



Any to one



Any to any



Custom Resource Groups

Startup Preferences

- Online On Home Node Only (cascading) - (OHNO)
- Online on First Available Node (rotating or cascading w/inactive takeover) - (OFAN)
- Online On All Available Nodes (concurrent) - (OAAN)
- Startup Distribution

Fallover Preferences

- Fallover To Next Priority Node In The List - (FOHP)
- Fallover Using Dynamic Node Priority - (FDNP)
- Bring Offline (On Error Node Only) - (BOEN)

Fallback Preferences

- Fallback To Higher Priority Node - (FBHP)
- Never Fallback - (NFB)

Common Resources

Service IP Address

- Highly available address(es) that users/apps/clients use for connectivity.

Application

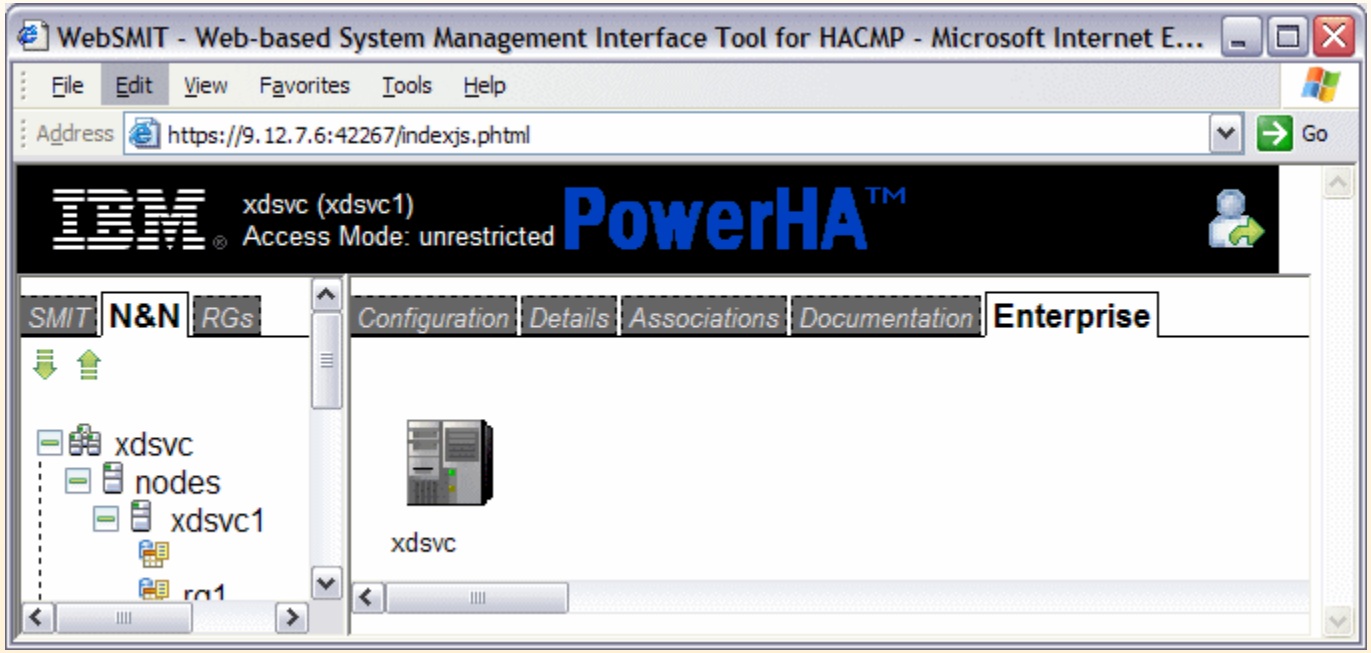
- Highly available application that PowerHA controls via:
  - Application Start Scripts
  - Application Stop Scripts
  - Application Monitoring

Volume Groups

- Shared Data Volume Groups
- Can be raw logical volumes or Filesystems
- Defaults to mount all filesystems (if applicable)

Recent POWERHA releases have greatly improved ease of use

- Enhancements include:
  - Configuration wizard for typical two-node cluster
  - Automatic detection and configuration of IP networks
  - “Online Planning Worksheet” guides you through configuration
  - Simplified Web-based interface for management and monitoring



Two-Node Configuration Assistant

- Two-Node Configuration Assistant uses existing PowerHA configuration discovery to further simplify configuration.
- Use it to set up high availability for a single-application cluster. (Hot Standby Configuration)
- SMIT and Java-GUI interfaces are provided.
- Uses File Collections and auto-corrective actions
- All done by answering 5 easy questions*

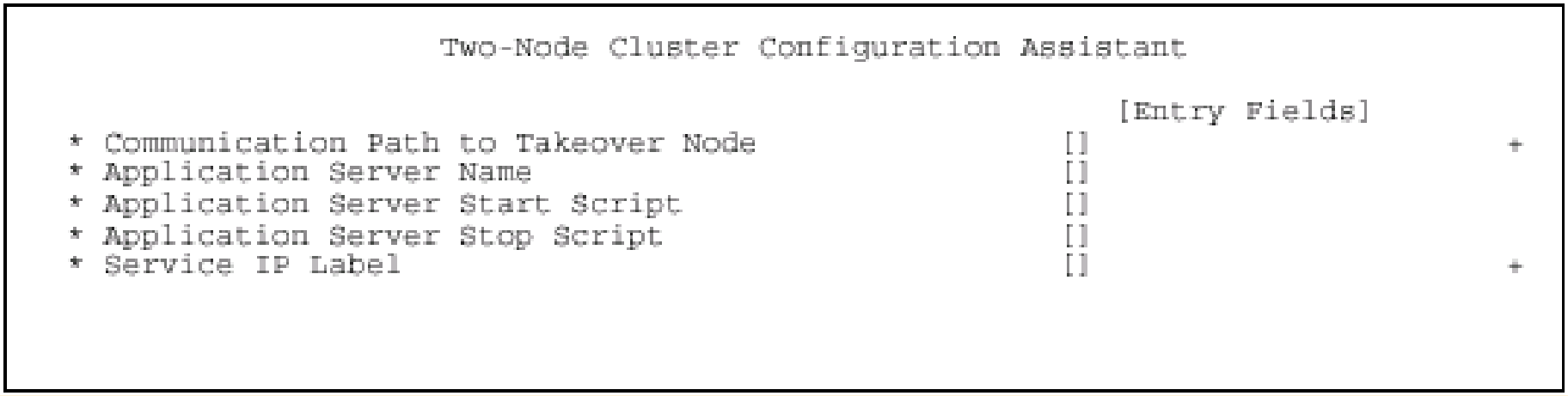
*Pre-reqs to use this feature are:

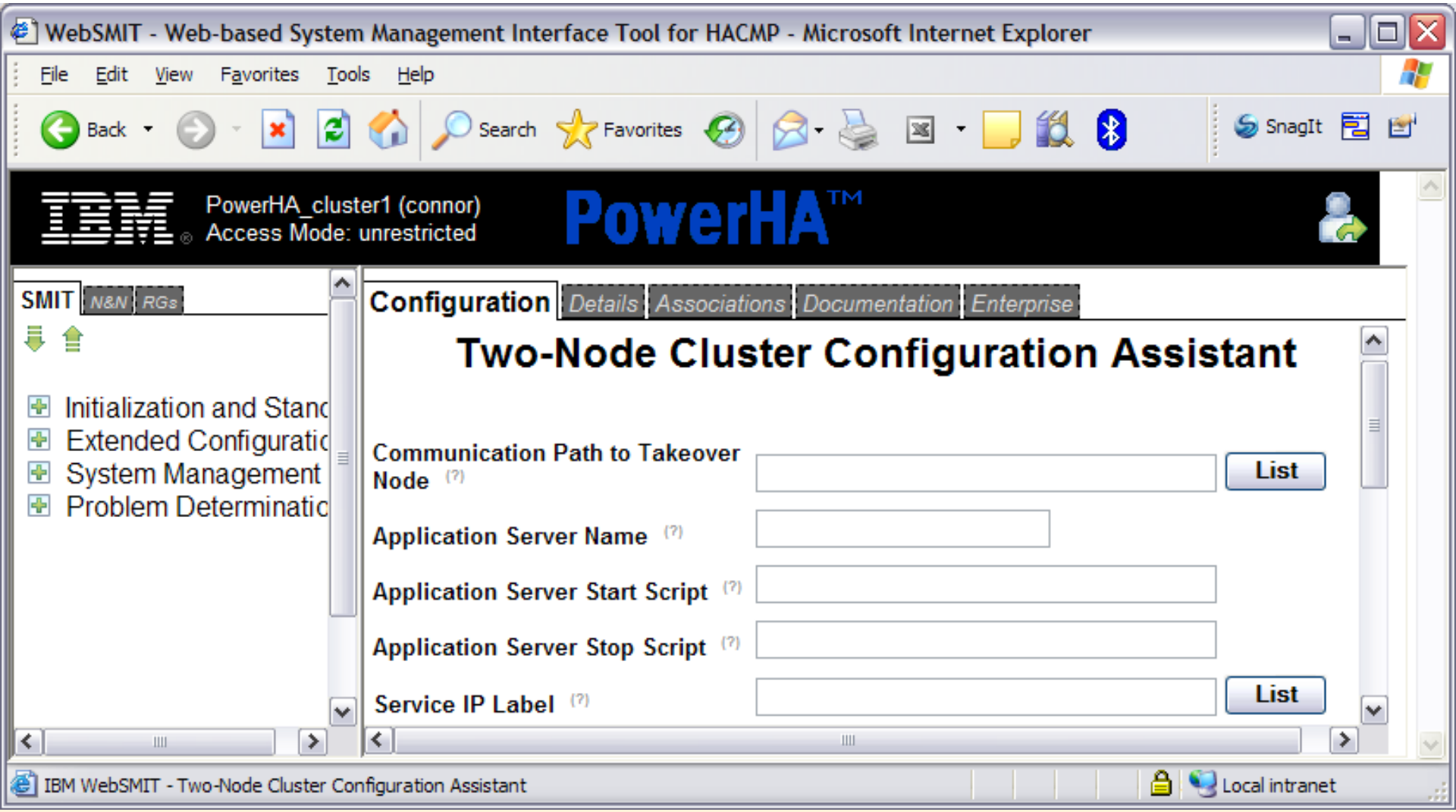
PowerHA must be installed and communication daemon running
IP addresses must be assigned to interfaces (and in /etc/hosts)
Shared storage must be available to both nodes
Volume Group must be defined to at least one of the two nodes
Application server scripts must exist on at least primary node

.

With PowerHA V5.x, you can configure a cluster in just five questions

1. What is the address of the backup node?
2. What is the name of the application?
3. What script PowerHA should use to start it?
4. What script PowerHA should use to stop it?
5. What is the service IP label that clients will use to access the application?





Each POWERHA release greatly improves ease of use

- Enhancements include:
  - Configuration wizard for typical two-node cluster
  - Automatic detection and configuration of IP networks
  - “Online Planning Worksheet” guides you through configuration
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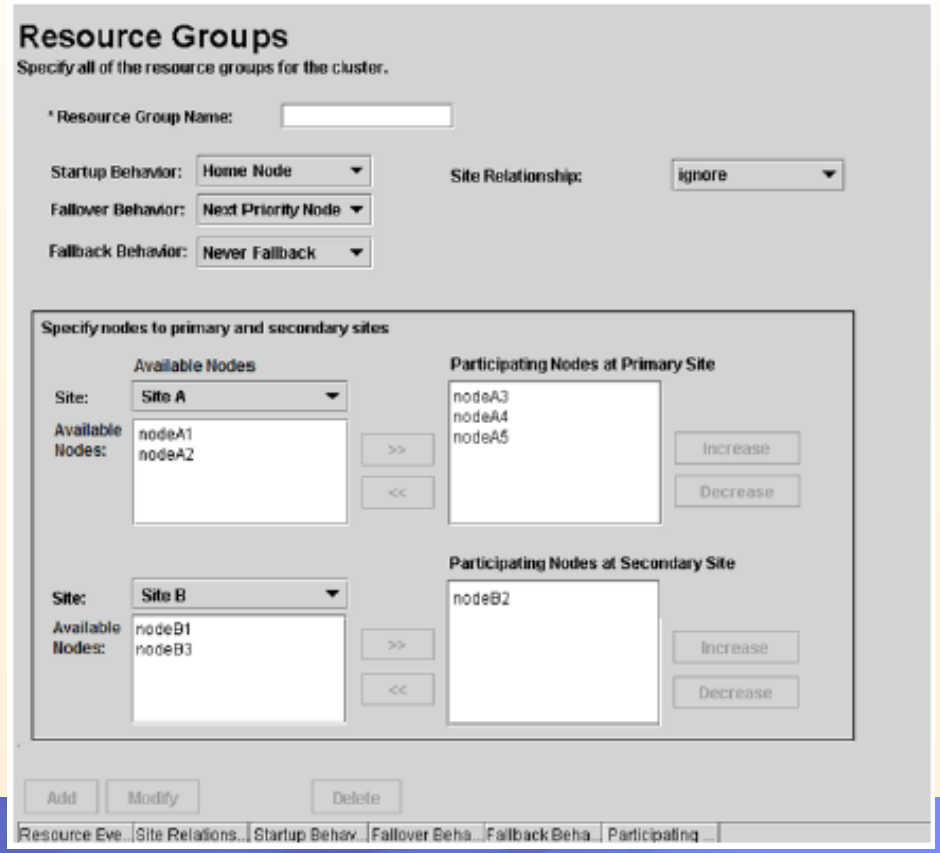


Online Planning Worksheets For Resource Groups Shown Here

IBM PowerHA Topology Considerations

- IPAT via Replacement vs. IPAT via Aliasing

  Considerations:

  - Max number service IPs within PowerHA network
  - Hardware Address Takeover (HWAT)
  - Speed of Takeover
  - Firewall Issues

IPAT via Replacement

	Node A	Node B
net_ether_0	en0 – 9.19.10.1 (boot)	en0 – 9.19.10.2 (boot)
	en0 - 9.19.10.28 (service IP)	en0 – 9.19.10.2 (boot)
	en1 – 192.168.11.1 (standby)	en1 – 192.168.11.2 (standby)

IBM PowerHA Topology Considerations

- Contrast between Replacement & Aliasing

  Considerations:

  - Max number service IPs within PowerHA network
  - Speed of swap
  - Hardware Address Takeover (HWAT)
  - Firewall Issues

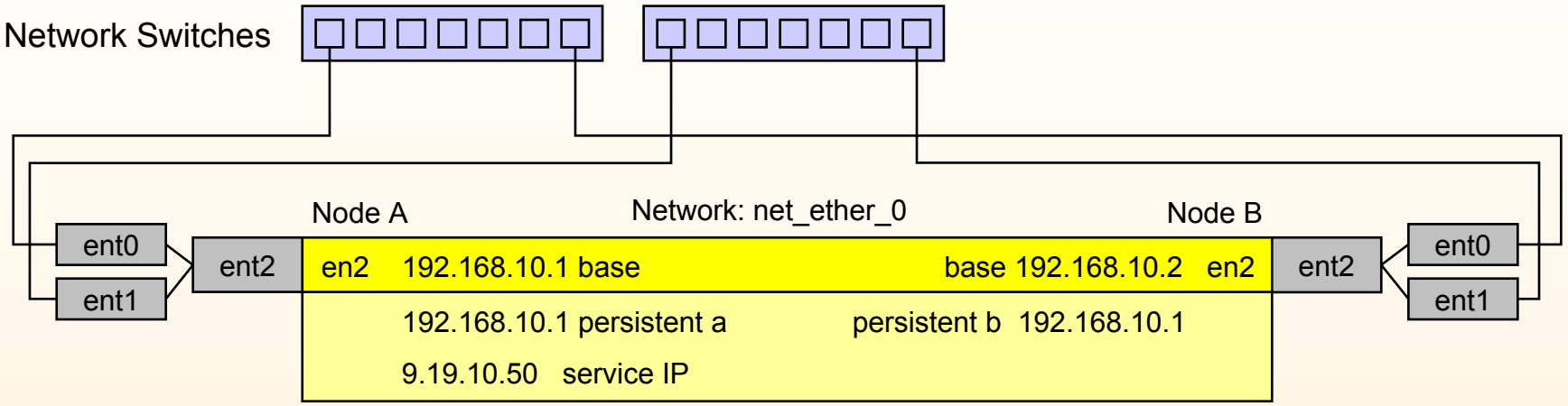
IPAT via Aliasing

net_ether_0

Node A	Node B
en0 – 192.168.10.1 (base1)	en0 – 192.168.10.2 (base1)
9.19.10.28 (persistent a)	9.19.10.29 (persistent b)
9.19.10.51 (service IP)	
en1 – 192.168.11.1 (base2)	en1 – 192.168.11.2 (base2)
9.19.10.50 (service IP)	

IBM PowerHA Topology Considerations

- EtherChannel & IBM PowerHA
  - Example of an EtherChannel (Network Interface Backup) Configuration



Verification Messages:

For nodes with a single Network Interface Card per logical network configured, it is recommended to include the file '/usr/es/sbin/cluster/netmon.cf' with a "pingable" IP address as described in the 'PowerHA Planning Guide'.

WARNING: File 'netmon.cf' is missing or empty on the following nodes: glvm1 glvm2

Tip:
* Single adapter networks can be just as redundant and require less IPs

Service Alias Distribution Policy Introduction

New *resource level location policy* have 4 total options including:

Collocation - all service labels will be on the same physical resource.

Collocation with Persistent Labels - all service labels will be on the same interface as the persistent IP.

Anti-collocation - all resources of this type will be allocated on the first physical resource which is not already serving (or serving the least number of) a resource of the same type.

- This is identical to the existing "distribution" of service labels done by default in previous versions.

Anti-collocation with Persistent Labels - service labels will almost never be on the same interface as the persistent IP, that is, service will occupy a different interface as long as one is available, but if no other is available then they will occupy the same interface

Examples - Collocation

```
en0    1500   link#2          0.6.29.dc.82.ca
en0    1500   192.9.201       ppstest3_enboot     ← BOOT
en0    1500   192.9.168       ppstest3_persist    ←PERSISTENT
en1    1500   link#3          0.6.29.b9.1f.71
en1    1500   192.9.201.1     ppstest3_enstby1    ← BOOT
en1    1500   1.1.1.1         service_1           ← SERVICE
en1    1500   1.1.1.2         service_2           ← SERVICE
en2    1500   link#4          0.6.29.dc.82.86
en2    1500   192.9.202       ppstest3_enstby2    ← BOOT
en2    1500   1.1.1.1         service_1           ← SERVICE
en2    1500   1.1.1.2         service_2           ← SERVICE
```

- Policy does not account for the location of the persistent label - it is possible for all addresses to be on one interface.
- Subsequent failures may cause the service labels to move to a different interface, but they will all be mapped to the same interface.

Examples - Collocation with Persistent

```
en0    1500   link#2          0.6.29.dc.82.ca
en0    1500   192.9.201       ppstest3_enboot      ← BOOT
en0    1500   192.9.168       ppstest3_persist     ← PERSISTENT
en0    1500   1.1.1.1         service_1            ← SERVICE
en0    1500   1.1.1.2         service_2            ← SERVICE
en1    1500   link#3          0.6.29.b9.1f.71
en1    1500   192.9.201.1     ppstest3_enstby1     ← BOOT
en1    1500   192.9.168       ppstest3_persist     ← PERSISTENT
en1    1500   1.1.1.1         service_1            ← SERVICE
en1    1500   1.1.1.2         service_2            ← SERVICE
```

- Failure of **en0** would cause all labels to move to **en1**.
- Mapping is maintained for all cluster events.

Examples - Anti-Collocation with Persistent

en0	1500	link#2	0.6.29.dc.82.ca	
en0	1500	192.9.201	ppstest3_enboot	← BOOT
en0	1500	192.9.168	ppstest3_persist	← PERSISTENT
en1	1500	link#3	0.6.29.b9.1f.71	
en1	1500	192.9.201.1	ppstest3_enstby1	← BOOT
en1	1500	1.1.1.1	service_1	← SERVICE
en1	1500	1.1.1.2	service_2	← SERVICE
en2	1500	link#4	0.6.29.dc.82.86	
en2	1500	192.9.202	ppstest3_enstby2	← BOOT
en2	1500	192.9.168	ppstest3_persist	← PERSISTENT
en2	1500	1.1.1.1	service_1	← SERVICE
en2	1500	1.1.1.2	service_2	← SERVICE

- Failure of **en0** would cause the persistent to move to **en2**
- Subsequent failure of **en1** would move all labels to **en2**
  - Availability is maintained though the preference is not exercised
- Restoration of another interface will not move any labels
  - Policy will be exercised on the next event

Configuration

Extended Configuration -> Extended Resource Configuration
HACMP Extended Resources Configuration
Configure Resource Distribution Preferences
Configure Service IP Labels/Address Distribution Preference

Select the Network to Change Service Label Distribution Preference

Move cursor to desired item and press Enter.

net_ether_01

Configure Service IP Labels/Address Distribution Preference

Type or select values in entry fields.
Press Enter AFTER making all desired changes.

	[Entry Fields]
* Network Name	net_ether_01
* Distribution Preference	Anti-Collocation +

End Day One With

- Demo of Two Node Configuration Assistant
  - Remove existing cluster configuration
  - Remove app scripts from backup node
  - Exportvg from production node
  - Show autocorrective actions
  - Review cluster configuration

Disk Heartbeating vs. RS232 Links

- **Reasons to use:**
  - Distance limitations with RS232 cables
  - Lack of integrated serial ports
  - Some models have serial port restrictions for heartbeating on integrated ports
  - Clusters with more than two nodes may require an async adapter with a RAND

Requires:

- Installation of *bos.clvm.enh*
- An Enhanced Concurrent Mode VG

  (It can but does not need to be defined to the resource group)

Best Practice:
Although more redundant networks are better if you had to choose - disk heartbeating is tried and tested and should replace if not coexist with RS232 networks as long as there is a shared SAN infrastructure in place.

Resources Group & Resources

```
                Change/Show All Resources and Attributes for a Resource Group

Type or select values in entry fields.
Press Enter AFTER making all desired changes.

[TOP]                                                   [Entry Fields]
  Resource Group Name                                  jordan_rg
  Participating Nodes (Default Node Priority)          jordan jessica

  Startup Policy                                       Online On Home Node O>
  Fallover Policy                                      Fallover To Next Prio>
  Fallback Policy                                      Never Fallback

  Service IP Labels/Addresses                         [loki_svc1]              +
  Application Servers                                 []                       +

  Volume Groups                                       []                       +
  Use forced varyon of volume groups, if necessary    false                    +
  Automatically Import Volume Groups                  false                    +
  Filesystems (empty is ALL for VGs specified)        []                       +
  Filesystems Consistency Check                        fsck                    +
  Filesystems Recovery Method                          sequential              +
  Filesystems mounted before IP configured             false                   +
  Filesystems/Directories to Export                   []                       +
                                                                               +
  Filesystems/Directories to NFS Mount                []
  Network For NFS Mount                               []                       +

  Tape Resources                                      []                       +
  Raw Disk PVIDs                                      []                       +
```

Resource Group Dependencies

- ***Parent Resource Group:***
  - A resource group that provides some type of service (e.g., application) on which another resource group depends
- ***Child Resource Group****:*
  - A resource group that depends on services (such as an application) of one or more other resource groups to be functional
- ***Dependency***
  - A logical relationship between two resource groups, or between any two or more resources thereof
- ***Online Anywhere Dependency****:*
  - At least one instance of the parent resource group has to be online for the child resource group to be online

Additional Granular Options

Dynamic Node Priority – DNP

- Fallover candidate node chosen by available resources
  - Free CPU
  - Paging Space
  - Disk I/O

Workload Manager Integration

- Guaranteed system resources for multiple applications

Resource Group Dependencies

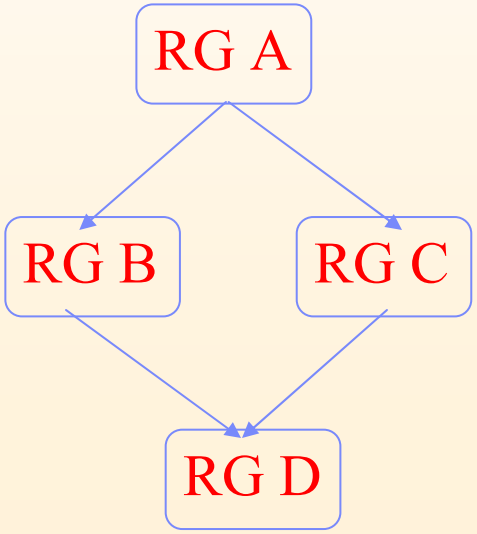
- Parent/Child Relationships
  - Great for Multi-Tier environments

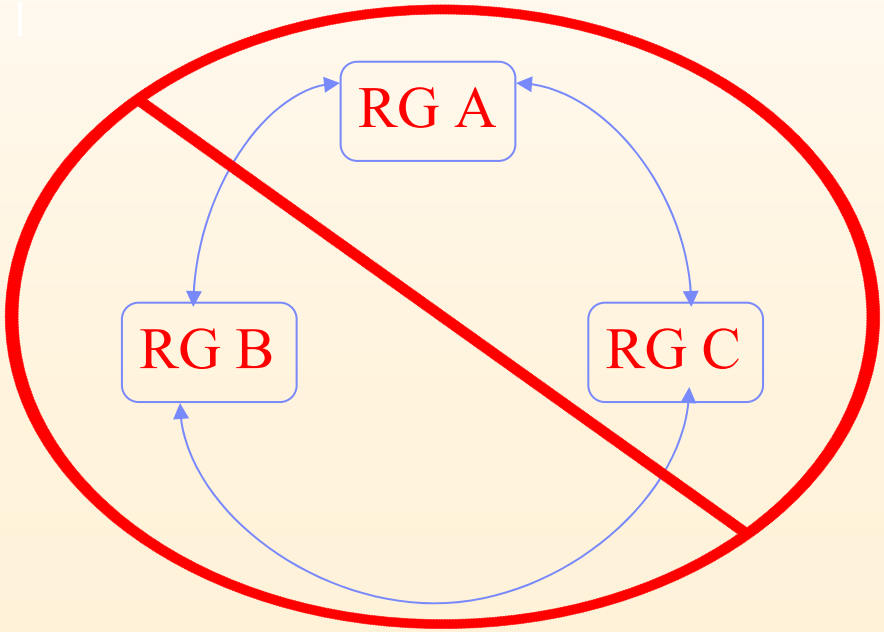
Define Resource Group Priorities

- Low
- Intermediate
- High

Resource Group Dependencies

- The maximum depth of the dependency tree is three levels, but any resource group can be in a dependency relationship with any number of other resource groups
- Circular dependencies are not supported, and are prevented during configuration time





Resource Group Location Dependencies

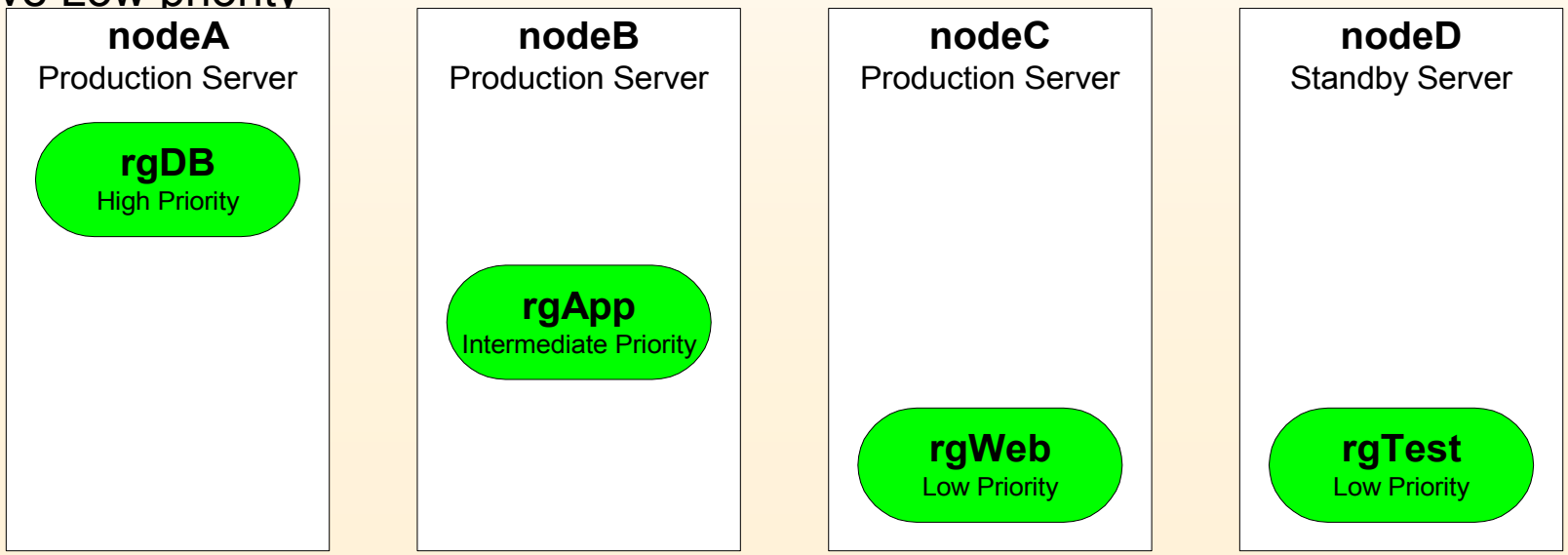
- There are three categories of location dependencies:
  - **Online on Same Node**
    - All resource groups must be online on the same node
  - **Online on Different Nodes**
    - All resource groups must be online on different nodes
  - **Online on Same Site**
    - All resource groups must be online on the same site

Online on Different Node Priorities

- You can assign High, Intermediate, and Low priority to each resource group
- Higher priority resource groups take precedence over lower priority groups at startup, fallover, and fallback
- **High** priority groups can force **Intermediate** and **Low** priority groups to move or go offline
- **Intermediate** priority groups can force **Low** priority groups to move or go offline
- **Low** priority groups cannot force any other groups to move or go offline
- Groups of the same priority cannot force each other to move or go offline
- RGs with the same priority cannot come ONLINE (startup) on the same node
- RGs with the same priority do not cause one another to be moved from the node after a fallover or fallback

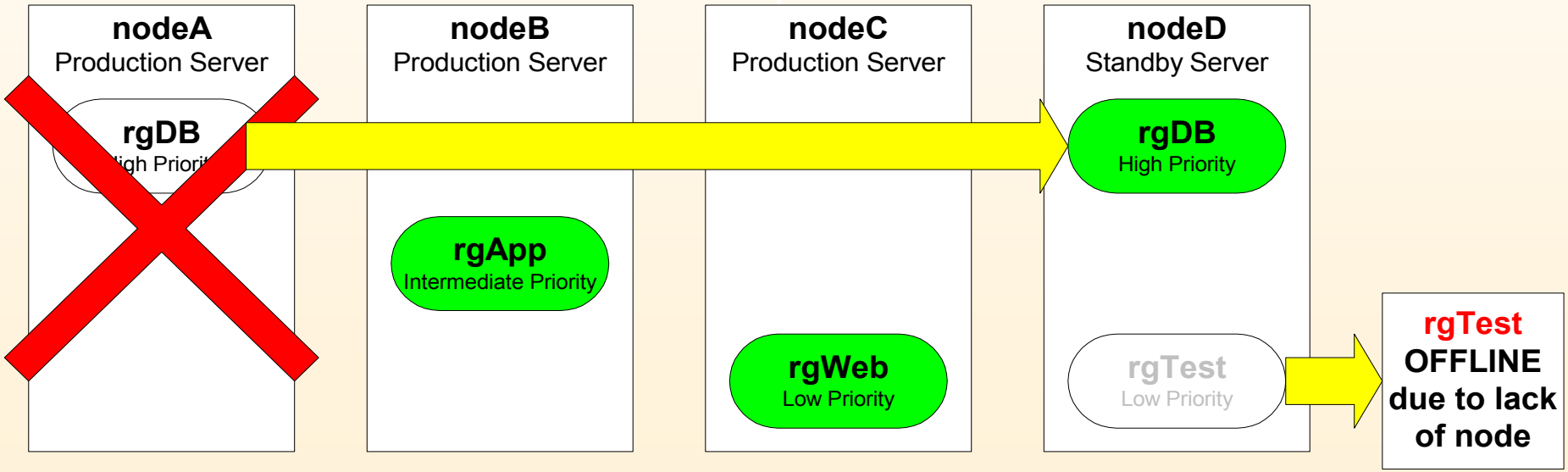
Example: Online on Different Nodes

- rgDB, rgApp, rgWeb, rgTest
  - Non-concurrent
  - rgDB nodelist: nodeA, nodeD, nodeC, nodeB
  - rgApp nodelist: nodeA, nodeB, nodeD, nodeC
  - rgWeb nodelist: nodeA, nodeB, nodeC, nodeD
  - rgTest nodelist: nodeD, nodeC, nodeB, nodeA
- rgDB has High priority, rgApp has Intermediate priority, rgWeb and rgTest have Low priority



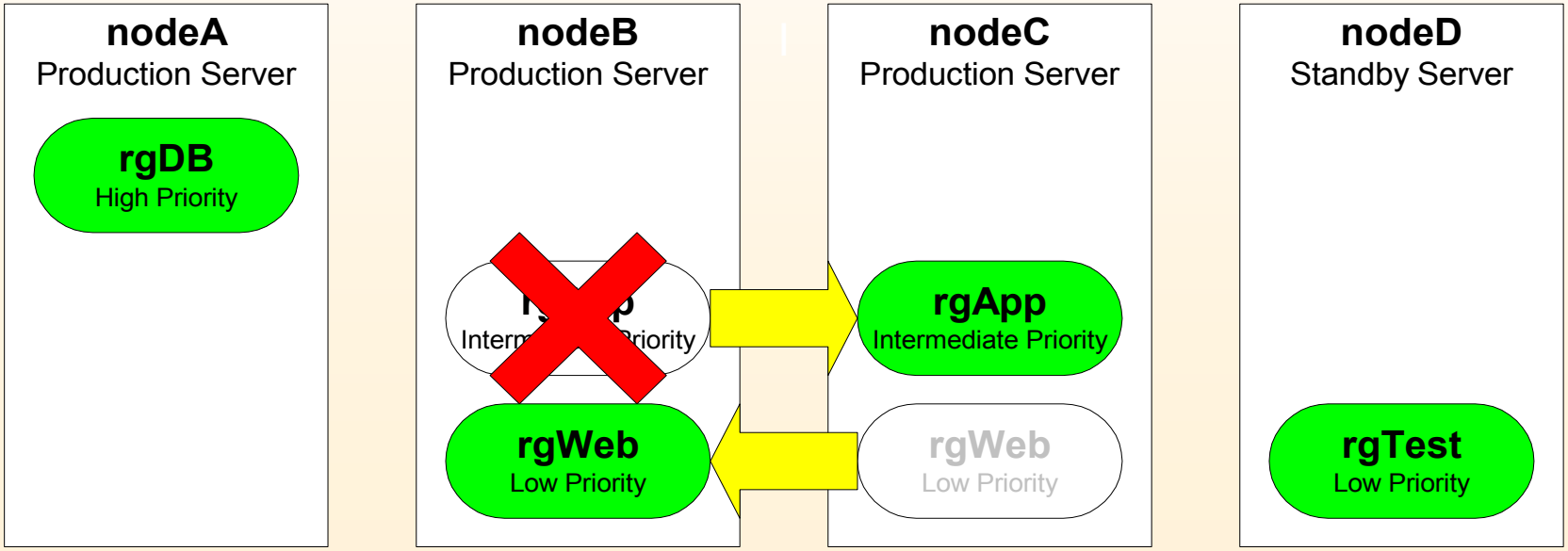
Example: Online on Different Nodes (Cont)

- nodeA fails
  - rgDB will move to nodeD, forcing rgWeb OFFLINE due to lack of node



Example: Online on Different Nodes (Cont)

- rgApp fails on nodeB
  - rgApp moves to nodeC
  - rgWeb moves to nodeB (recall rgWeb's nodelist)



SMIT Configuration

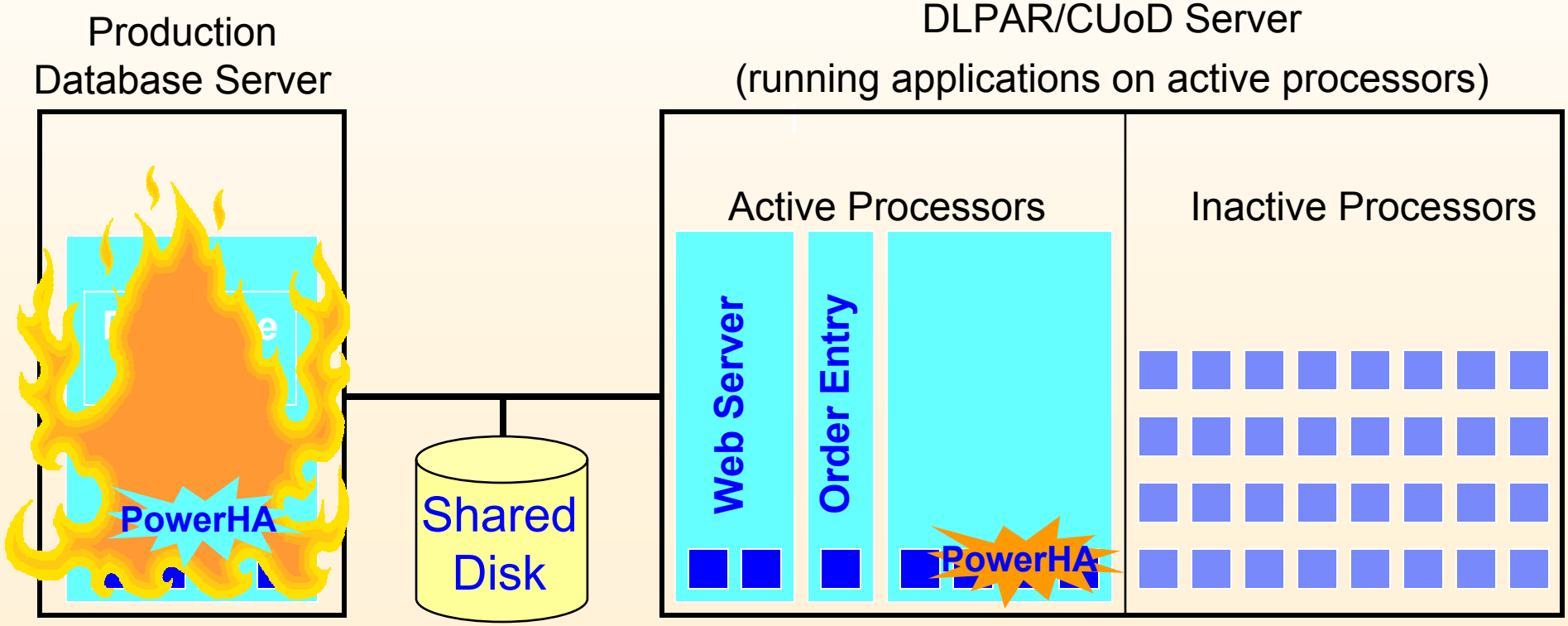
- smit cm_rg_dependencies_menu

->Extended Configuration
->Extended Resource Configuration
->Configure Resource Group Run-Time Policies
->Configure Dependencies between Resource Groups

```
            Configure Dependencies between Resource Groups

Move cursor to desired item and press Enter.

  Configure Parent/Child Dependency
  Configure Online on the same node Dependency
  Configure Online on different nodes Dependency
  Configure Online on the same site Dependency
```

DLPAR/CUoD configuration

- PowerHA on the primary machine detects the failure
- Running in a partition on another server, PowerHA grows the backup partition, activates the required inactive processors and restarts application



Application Monitoring

PowerHA can monitor applications in one of two ways:

- *Process Monitor* – determines the death of a process
- *Custom Monitor* – monitors health of the application using a monitor method you provide

Decisions upon failure

- Restart – Can establish a number of restarts to restart locally. After a specified restart count, if app continues to fail you can escalate to a fallover.
  - Notifiy – Send email notificaiton
  - Fallover – Move application and associated resource group to next candidate node.

Suspend/Resume Application Monitoring at anytime.

Application Monitoring

```
                    Add a Custom Application Monitor

Type or select values in entry fields.
Press Enter AFTER making all desired changes.

                                                      [Entry Fields]
* Monitor Name                                       [testmon]
* Application Server(s) to Monitor                                +
* Monitor Mode                                      [Long-running monitori> +
* Monitor Method                                    [/usr/lpp/custom/testapp]
  Monitor Interval                                  [300]                    #
  Hung Monitor Signal                               []                       #
* Stabilization Interval                            [600]                    #
* Restart Count                                     [3]                      #
  Restart Interval                                  [600]                    #
* Action on Application Failure                     [notify]                 +
  Notify Method                                     []
  Cleanup Method                                    [/usr/lpp/custom/appclean]
  Restart Method                                    [/usr/lpp/custom/appstart]
```

PowerHA File Collections

- **Management feature to simplify keeping common files consistent among cluster nodes.**
- **Allows one or more files to be kept in sync throughout the cluster.**
- **Completely automatic and supports all regular files.**
- **Meant for typical configuration files.**
- **Files can be synchronized in three ways:**
  - Manually - using SMIT
  - During cluster Verification and Synchronization
  - Automatically - upon a change in the file.
- **PowerHA provides two default File Collections**
  - Configuration_Files
  - HACMP_Files

PowerHA File Collections

- **Manual Propagation:**
  - Can selectively propagate individual File Collections.
  - SMIT screens provided.
- **Verify/Sync time propagation:**
  - If selected, the file on the local node will be propagated.
  - Ability to selectively propagate individual File Collections.
- **Automatic Propagation:**
  - Periodically checks for the changed files. Default is 10 min.
  - Propagate the changed file to the remaining cluster nodes.

- **clcomd must be running all cluster nodes**
- **The owner/group and permission of the files are maintained on the remote nodes.**
- **HACMP_Files is an exception, the owner execute bit is set.**
- **The original files are backed up under /var/hacmp/filebackup, just one backup copy is maintained, with full path and name.**

Automatic Cluster Verification

- Cluster Verification *(clver)* runs every 24 hours on selected cluster node, if the defined node is available.
- The feature is active by default after the first cluster synchronization
- Active Cluster Manager is not required.
- User can change feature settings via SMIT interface.
- Cluster verification results are reported in a log file on all accessible cluster nodes.
- Additional reports are generated in case of detected errors.

Automatic Cluster Verification

- Enable/Disable the feature:
  - Effective after the cluster synchronization.
  - All settings reset to default.

- Dedicated node:
  - Strictly defined physical AIX node.
  - Adding/removing/renaming other nodes does not matter.
  - Renaming user-defined node does not matter.
  - Deleting user-defined node changes node setting to default.
- Time of the day
  - Hour (00-23).
  - Minutes or seconds cannot be specified.
  - Unsynchronized time throughout the cluster and time zones - independent run for each node.

Corrective Action Settings

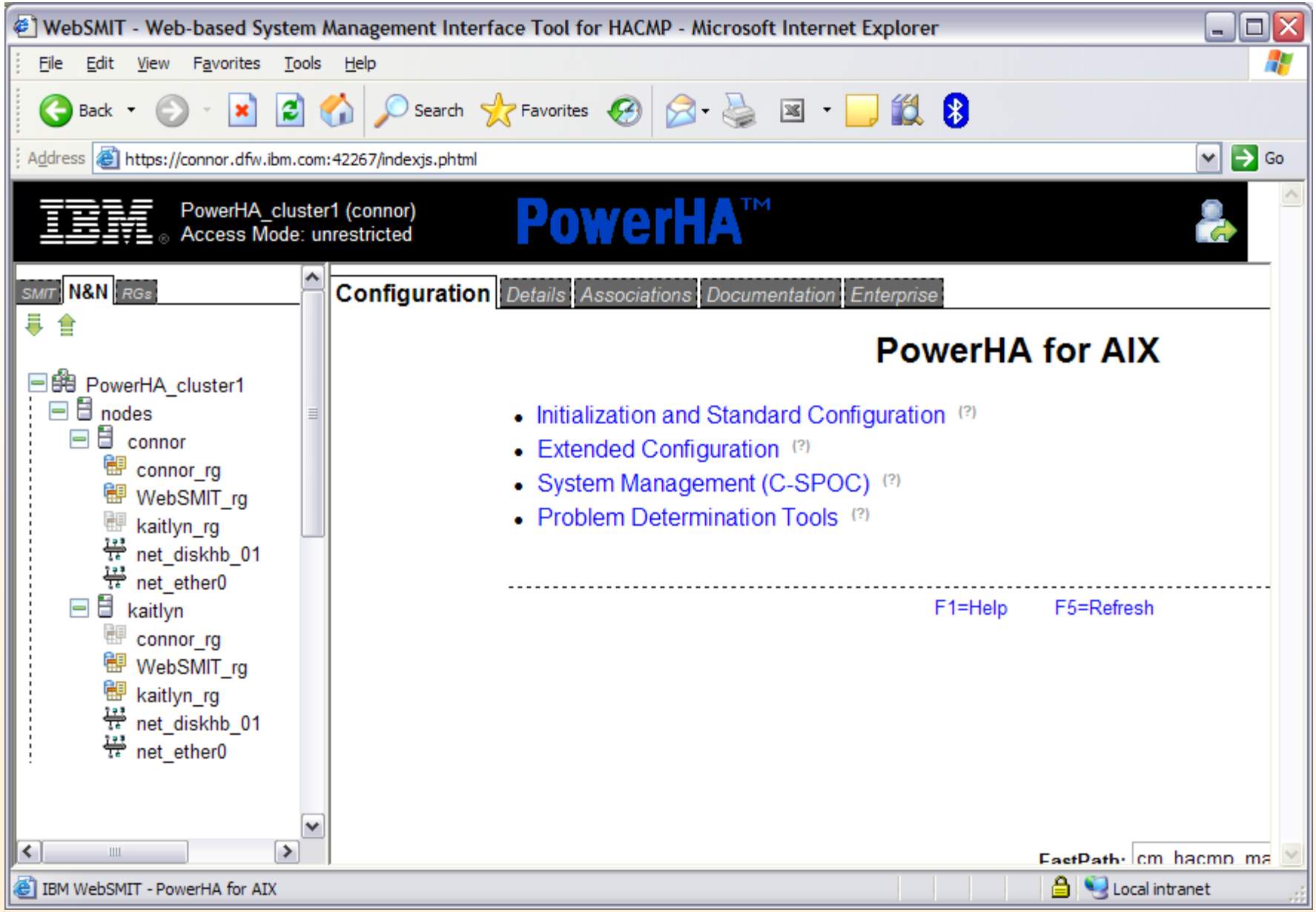
- Corrective actions will not be performed for synchronization without cluster verification.
- There are three corrective modes available during cluster verification with synchronization:
  - **"No"**: no corrective actions will be performed.
  - **"Yes"**: corrective actions will be performed automatically.
  - **"Interactively"**: user is prompted to correct certain detected errors.
- Sample output:

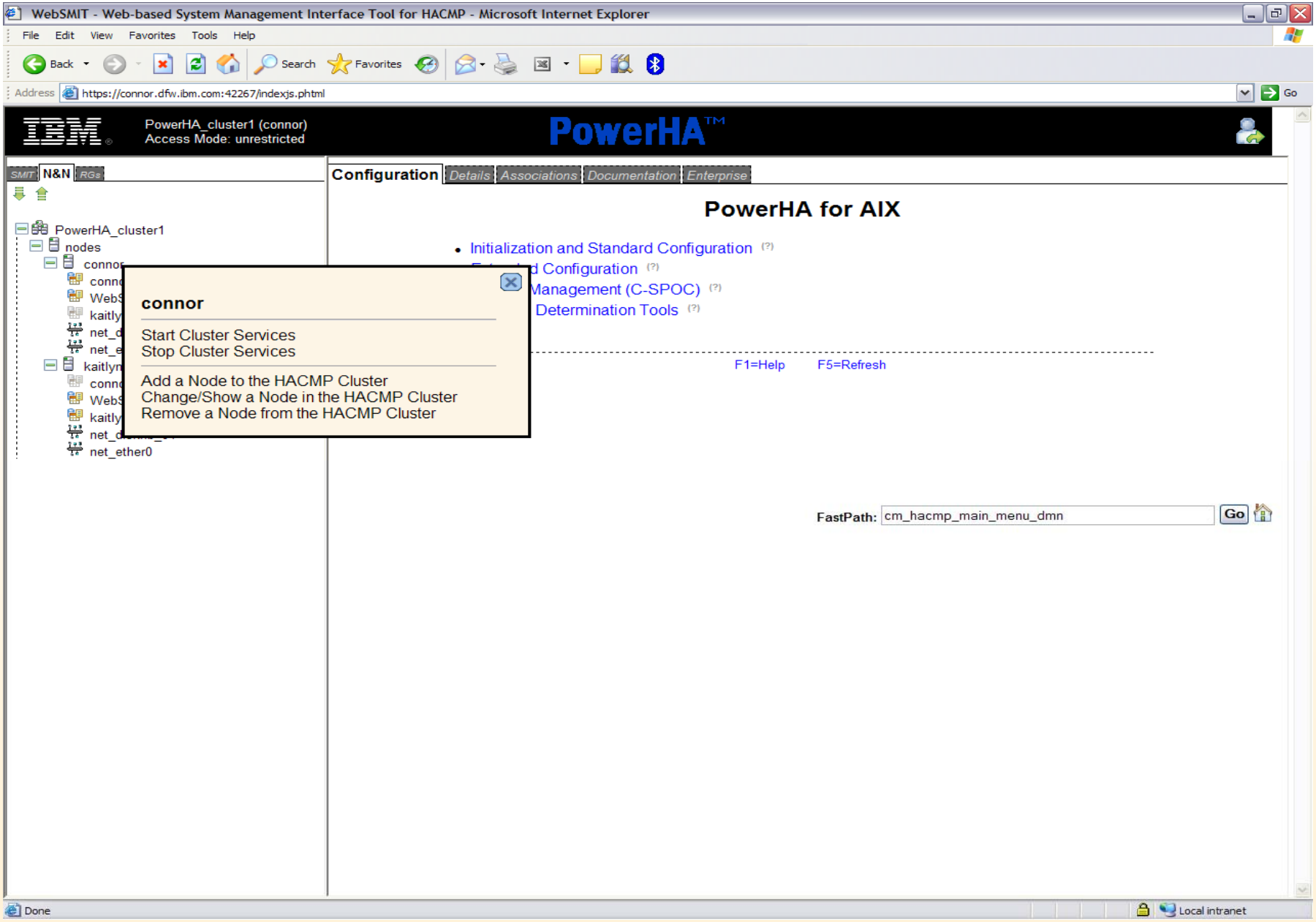
ERROR: Node: water is missing entry '10.70.27.51 water' in the /etc/hosts configuration file.
Starting Corrective Action: cl_topology_modify_etc_hosts_entry.
01 Backing up /etc/hosts on node water to file /etc/hosts.06_01_2004: PASS
02 Adding entry 'water 10.70.27.51' to /etc/hosts on node water: PASS

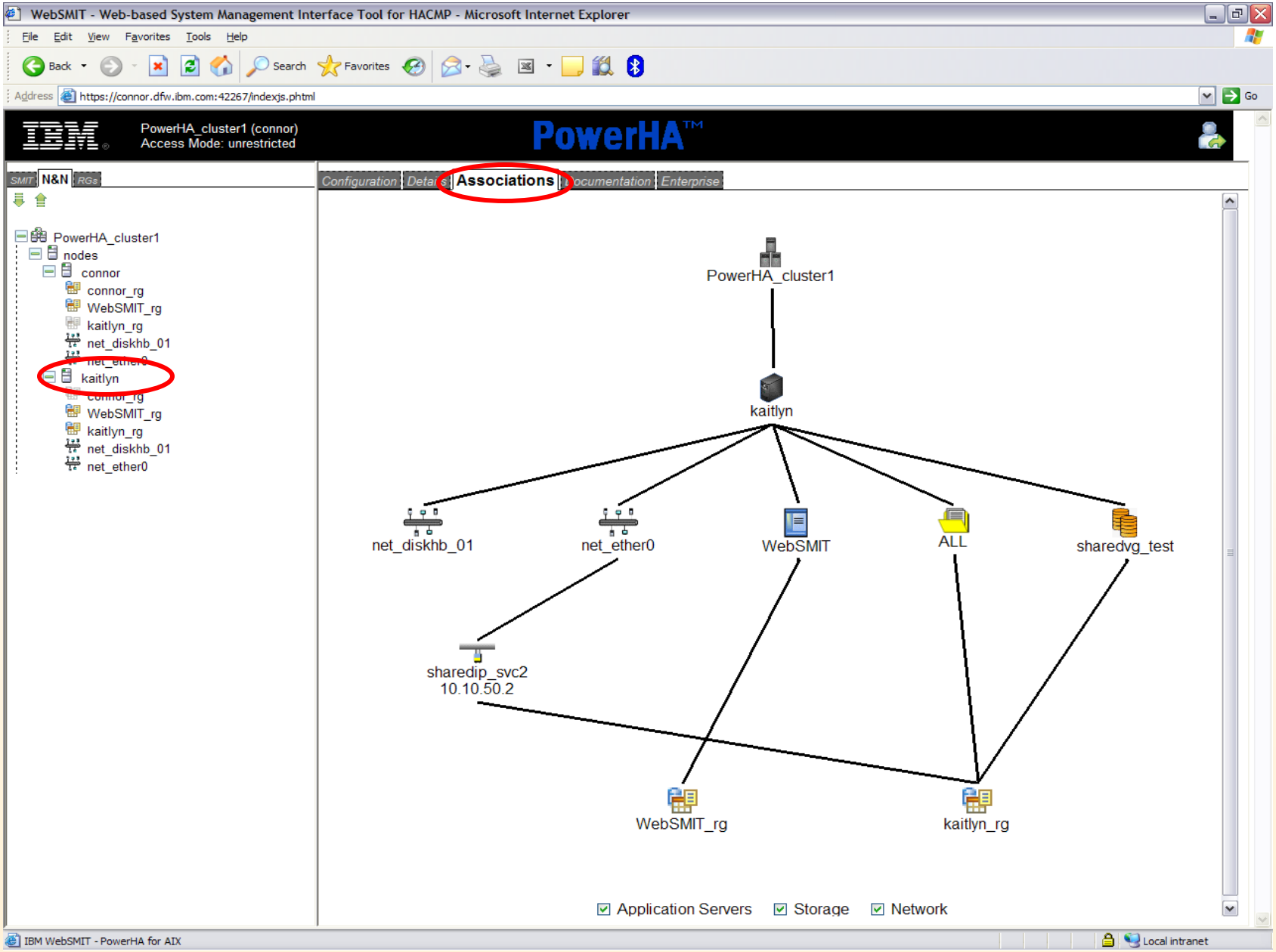
A corrective action has taken place, restarting data collection and verification checks.

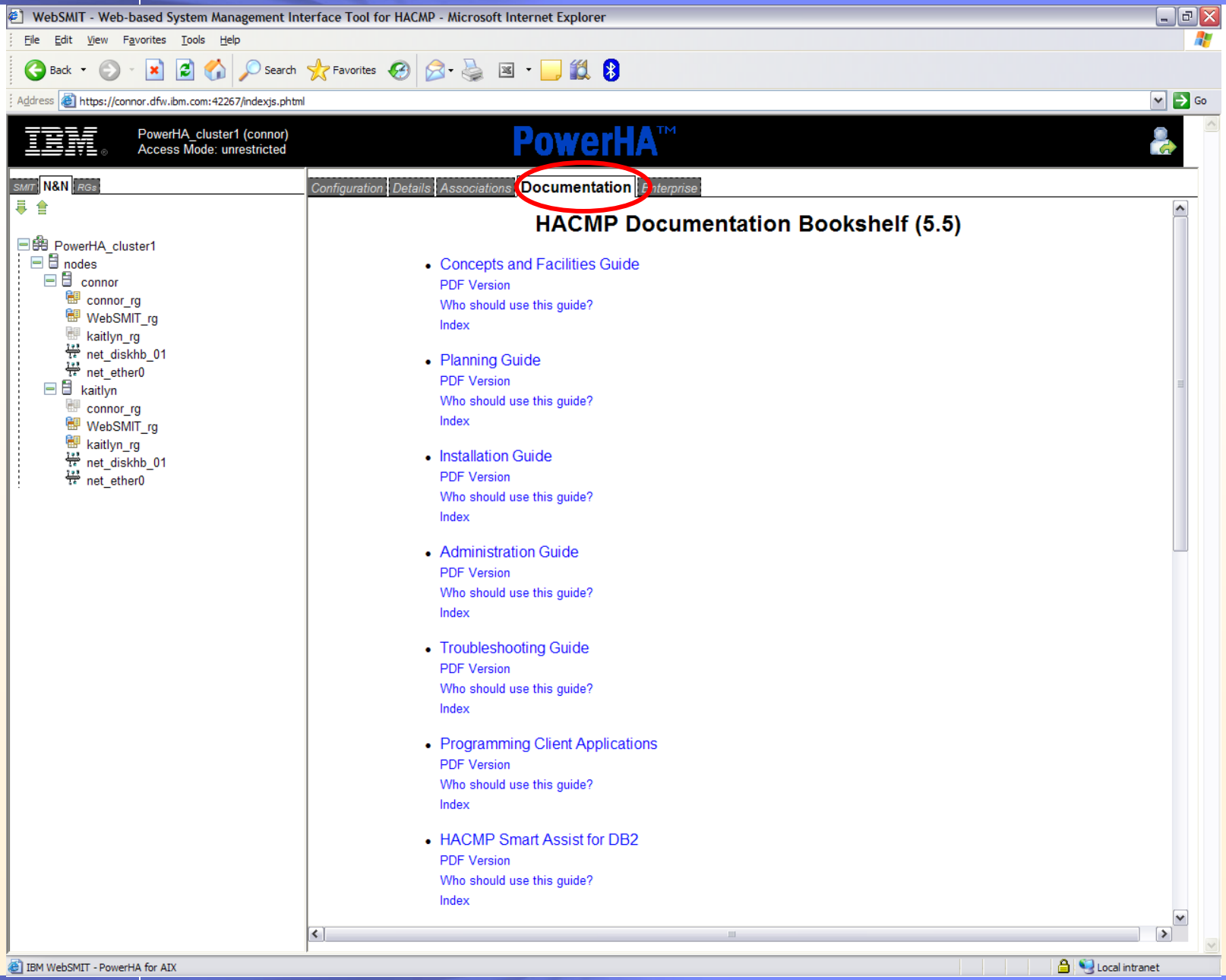
End Day Two With

- WebSMIT demo
  - Add new cluster to existing WebSMIT server
  - Connect to cluster
  - Start Cluster services
  - Show additional WebSMIT features



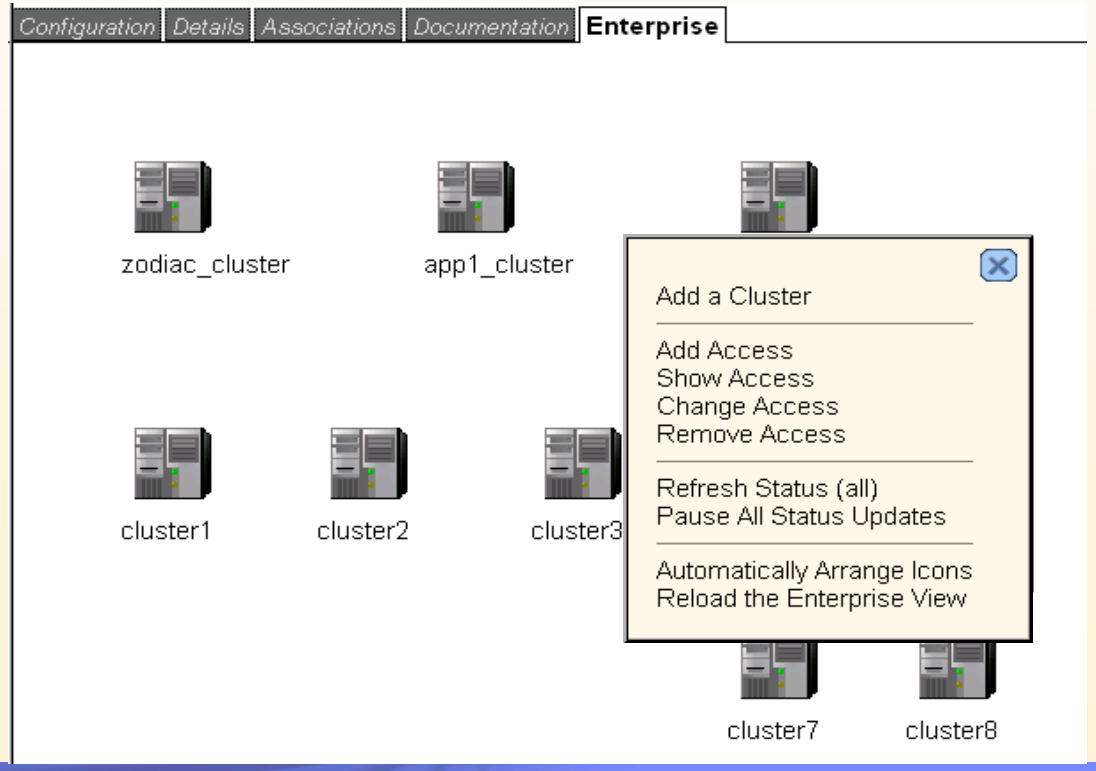






WebSMIT Capability: Enterprise View

- Provides a view of all available clusters (security restrictions allowing)
  - All registered clusters may *potentially* be viewed
  - Tantamount to single sign-on; only one login needed to manage multiple clusters
  - Per-user restrictions can be put in place to restrict access
  - Global operations are available via a right-click over any blank space



PowerHA Cluster Test Tool

- The Cluster Test Tool reduces implementation costs by simplifying validation of cluster functionality.
- It reduces support costs by automating testing of an PowerHA cluster to ensure correct behavior in the event of a real cluster failure.
- The Cluster Test Tool executes a *test plan*, which consists of a series of individual tests.
- Tests are carried out in sequence and the results are analyzed by the test tool.
- Administrators may define a custom test plan or use the automated test procedure.
- Test results and other important data are collected in the test tool's log file.

PowerHA Cluster Test Tool

- **Following is the most common events used by the test tool:**
  - NODE_UP: start one or more nodes
  - NODE_DOWN_FORCED: stop a node forced
  - NODE_DOWN_GRACEFUL: stop one or more nodes
  - NODE_DOWN_TAKEOVER: stop a node with takeover
  - CLSTRMGR_KILL: catastrophic failure
  - NETWORK_DOWN_LOCAL: stop a network on a node
  - NETWORK_UP_LOCAL: restart a network on a node
  - SERVER_DOWN: stop an application server
  - WAIT: pause testing

PowerHA Cluster Test Tool - Automated

- The Automated Test Procedure will run a predefined set of tests on any cluster.
- A series of NODE_UP and NODE_DOWN tests will be run with random target nodes.
- For each RG in the cluster, tests will be run to show the cluster's handling of selective fallover.
- The Cluster Manager on a random node will be killed.
- The set of tests run with this option are considered generally useful.
- For more control and more complete coverage, use a custom test plan.

PowerHA Cluster Test Tool - Custom

- In cases where the Automated Test Procedure does not meet a user's needs, the Custom Test Procedure may be used.
- Use of the Custom Test Procedure requires the user to provide a *test plan*.
- The test plan is a flat text file that specifies the tests to be run.
- The user may optionally specify a *variables file*.
- The variables file can be used to override parameter values for the tests that are specified in the test plan.
- A Cluster Test Tool Test Plan is a flat text file with one line for each desired test.
- Each line in the test plan specifies a test to be run and the parameters that are required.
- The last field on each line is an optional test description. It will be included in the output and the log file if it is present.
- The tests will be executed in the order in which they appear in the test plan
- If the first character on the line is a '#', the line is a comment and will be ignored. Blank lines are also ignored.

PowerHA Administration

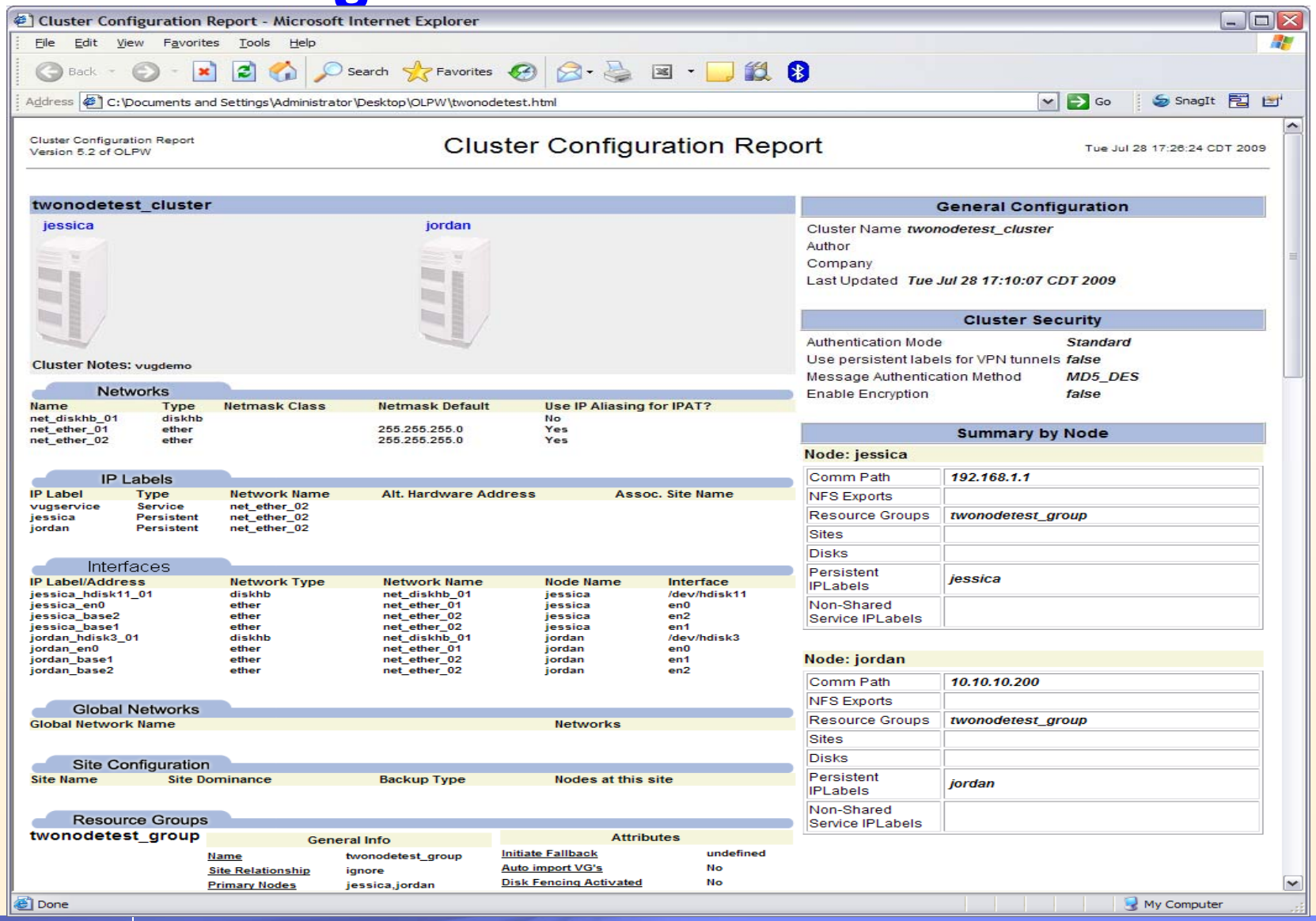
- Most common tasks performed via C-SPOC
  - C-SPOC – Cluster Single Point of Control
  - Allows cluster procedures from any node
- Most common task include
  - LVM Management – volume group, filesystem, and logical volume changes
  - User, Group and Passwords
  - Dynamic cluster configuration changes

PowerHA Administration

- C-SPOC Menu (smitty cl_admin)

```
                        System Management (C-SPOC)

Move cursor to desired item and press Enter.

  Manage HACMP Services
  HACMP Communication Interface Management
  HACMP Resource Group and Application Management
  HACMP Log Viewing and Management
  HACMP File Collection Management
  HACMP Security and Users Management
  HACMP Logical Volume Management
  HACMP Concurrent Logical Volume Management
  HACMP Physical Volume Management

  Open a SMIT Session on a Node


F1=Help              F2=Refresh           F3=Cancel            F8=Image
F9=Shell             F10=Exit             Enter=Do
```

Cluster Configuration Documentation - OLPW



Cluster Configuration Report - Microsoft Internet Explorer

File Edit View Favorites Tools Help

Back Search Favorites

Address C:\Documents and Settings\Administrator\Desktop\OLPW\twonodetest.html Go SnagIt

Cluster Configuration Report
Version 5.2 of OLPW

Cluster Configuration Report

Tue Jul 28 17:26:24 CDT 2009

twonodetest_cluster

jessica jordan

Cluster Notes: vugdemo

Networks

Name	Type	Netmask Class	Netmask Default	Use IP Aliasing for IPAT?
net_diskhb_01	diskhb			No
net_ether_01	ether		255.255.255.0	Yes
net_ether_02	ether		255.255.255.0	Yes

IP Labels

IP Label	Type	Network Name	Alt. Hardware Address	Assoc. Site Name
vugservice	Service	net_ether_02		
jessica	Persistent	net_ether_02		
jordan	Persistent	net_ether_02		

Interfaces

IP Label/Address	Network Type	Network Name	Node Name	Interface
jessica_hdisk11_01	diskhb	net_diskhb_01	jessica	/dev/hdisk11
jessica_en0	ether	net_ether_01	jessica	en0
jessica_base2	ether	net_ether_02	jessica	en2
jessica_base1	ether	net_ether_02	jessica	en1
jordan_hdisk3_01	diskhb	net_diskhb_01	jordan	/dev/hdisk3
jordan_en0	ether	net_ether_01	jordan	en0
jordan_base1	ether	net_ether_02	jordan	en1
jordan_base2	ether	net_ether_02	jordan	en2

Global Networks

Global Network Name	Networks

Site Configuration

Site Name	Site Dominance	Backup Type	Nodes at this site

Resource Groups

twonodetest_group

General Info		Attributes	
Name	twonodetest_group	Initiate Fallback	undefined
Site Relationship	ignore	Auto import VG's	No
Primary Nodes	jessica,jordan	Disk Fencing Activated	No

General Configuration

Cluster Name *twonodetest_cluster*
Author
Company
Last Updated *Tue Jul 28 17:10:07 CDT 2009*

Cluster Security

Authentication Mode	*Standard*
Use persistent labels for VPN tunnels	*false*
Message Authentication Method	*MD5_DES*
Enable Encryption	*false*

Summary by Node

Node: jessica

Comm Path	*192.168.1.1*
NFS Exports	
Resource Groups	*twonodetest_group*
Sites	
Disks	
Persistent IPLabels	*jessica*
Non-Shared Service IPLabels	

Node: jordan

Comm Path	*10.10.10.200*
NFS Exports	
Resource Groups	*twonodetest_group*
Sites	
Disks	
Persistent IPLabels	*jordan*
Non-Shared Service IPLabels	

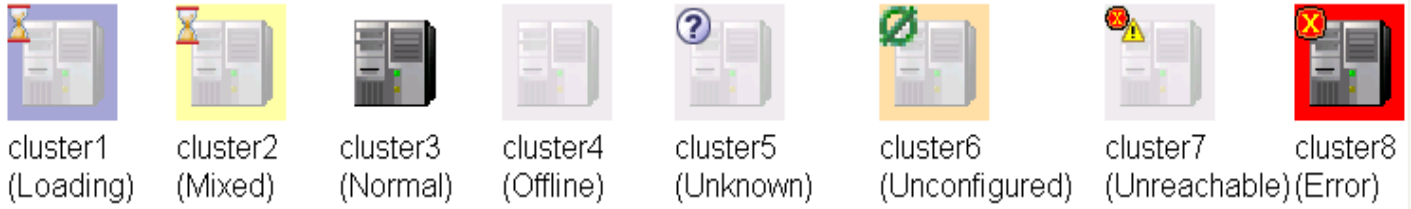
Done My Computer

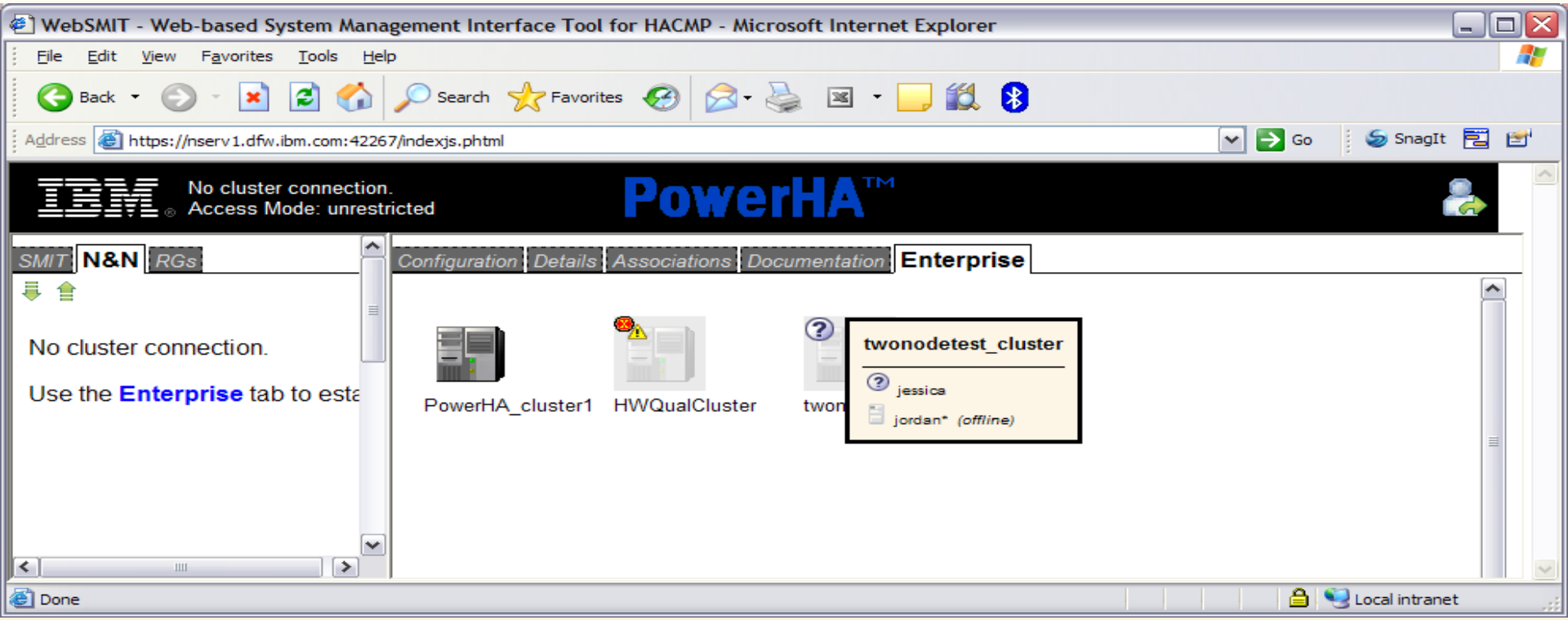
Trouble Shooting

- Generally involves:
  - Problem/error discovery and/or notification
  - Determining the source of the problem
  - Correcting the problem
  - Test/prove problem no longer persists

- Becoming aware a problem exists
  - WebSMIT status display
  - Application monitoring notification
  - Mail notification (via error/event notification)
  - Pager or SMS text notification (via error/even notification)
  - Error displayed on system console
  - Third party enterprise monitoring (Tivoli, BMC Patrol, etc)
  - End users complaint

Trouble Shooting – WebSMIT Status





Trouble Shooting

- Determining problem source:

  Both PowerHA and AIX offer many diagnostic tools. Common PowerHA tools include:

  - clstat
  - cldump
  - clRGinfo
  - SMIT Problem Determination Tools
  - RAS Support (via SMITTY HACMP menus)
    - View PowerHA logs
    - Trace Facility
    - Recover from script failure
  - Collect PowerHA snapshot via snap -e

Trouble Shooting

- From a support perspective it is common to start by reviewing the logs in search of the error cause. The following is the most common logs used. Complete list can be found in Chapter 2 of the HACMP Trouble Shooting Guide.
- Cluster log files:
  - **/usr/es/adm/cluster.log** – high level overview of cluster event processing and a good starting point
  - **/var/hacmp/log/hacmp.out*** – Verbose, time stamped, formatted messages of cluster event processing. Primary trouble shooting source log.
  - **/var/hacmp/log/clstrmgr.debug*** - Mainly used by IBM support for debugging.
  - **/var/hacmp/log/cspoc.log *** - Used for trouble shooting failed tasks performed via C-SPOC.
  - AIX System Error Log (errpt)

* These logs default to /var/hacmp/log in v5.4.1 and above.

New features in PowerHA V5.3

- Automatic detection and correction of common cluster configuration problems
- Enhanced support for complex multi-tier applications, relationships and dependencies
- Clusters can be configured with simple ASCII files
- Parallel resource processing recovers applications faster
- Simpler, more flexible configuration and management
- New “Smart-Assists” simplify PowerHA implementation in DB2®, Oracle and WebSphere® environments
  - Inexpensive option includes all three Smart-Assists

New features in PowerHA V5.4.1

- Cluster verification progress indicator
- Non-disruptive install, startup and upgrades.
- Unmanage Resource Groups option
- Multi-node disk heartbeat
- Fast Failure Detection
- Cluster Test Tool Enhancements
- WebSMIT Enhancements
- Heartbeat metrics provided via *cltopinfo –m*
- WPAR Support
- LPM Support

New features in PowerHA V5.5

- SMIT Panel Improvements
- WebSMIT Enhancements
  - New Gateway design
  - Enterprise Cluster View and Management for multiple clusters.
- POWER 6 DLPAR Support
- IPv6 Support
- First version to utilize non-disruptive upgrades
- “Smart-Assists” updated for currency

End Day Three with

- Cluster fallover demo
  - Fail node through the HMC
  - Monitor WebSMIT status
  - Show event processing as it happens
  - Show resources both before and after

Thank You

- Questions?????