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Partitioning Your Superdome System

Student Workbook

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Module 1 — Introduction

Objectives

Upon completion of this module, you will be able to do the following:

- Define “partition” as it relates to Superdome.
- List the components of a partition.
- Describe recommended partition configurations.
- Describe the role of the Guardian Service Processor in the creation of partitions.
- Explain the purpose and capabilities of the Genesis partition.
- Develop the procedure for creating the Genesis partition.

1-1. SLIDE: Module Objectives



Module Objectives

At the end of this module you will be able to:

- ✓ Define “partition” as it relates to Superdome.
- ✓ List the components of a partition.
- ✓ Describe recommended partition configurations.
- ✓ Describe the role of the Guardian Service Processor in the creation of partitions.
- ✓ Explain the purpose and capabilities of the Genesis partition.
- ✓ Develop the procedure for creating the Genesis partition.

Student Notes

1-2. SLIDE: What is a Partition?



What Is a Partition?

- Isolated, logically-related group of hardware
 - ◆ Dynamic configuration (iCOD)
 - ◆ ≥ 1 cell
 - ◆ ≥ 1 I/O chassis
 - ◆ 1 instance of the operating system
- Stand-alone system
- Division of a Superdome complex
- Configuration stored in the GSP
- Node partition vs virtual partition

Student Notes

A partition on a Superdome is similar in function to a stand-alone server. Like a stand-alone server, a partition's hardware belongs to it and it alone. The hardware of one partition is not accessible by other partitions, and a piece of hardware can be assigned to one and only one partition. As you'll see in future modules in this seminar, the hardware assigned to a partition is dynamic, allowing you to add and remove partition components to meet changing demands. This is called Instant Capacity on Demand, or iCOD. There are some exceptions, such as when a component is identified as a "critical resource".

A partition must have at least one cell¹ and at least one I/O chassis², although for high-availability, two of each are strongly recommended. The core I/O chassis is connected to the core cell and provides communications through a core I/O board to the boot devices. An I/O chassis reside in one of two I/O Bays in the Superdome cabinet, or in an I/O expansion chassis.

One cell within the partition is configured as the **core (root) cell**. This is the cell connected to the I/O chassis that controls the partition's boot media. One or more processors on the

¹ A cell has 4 processors and 2-16Gbytes of memory.

² An I/O chassis has 12 PCI slots for controllers/adapters. A 6-slot chassis is planned.

Module 1 Introduction

core cell will control the boot sequence. Whether or not a processor on the core cell is included in the boot process, or brought online after the kernel boots, is an attribute of the partition's profile.

Cell types are identified by their status and configuration. A **base cell** has been assigned to a partition. An **active cell** is a base cell that has power and is usable by the operating system. An **inactive cell** is assigned to a partition but was not activated, due to failure or configuration. An **unassigned cell** is not currently assigned to any partition.

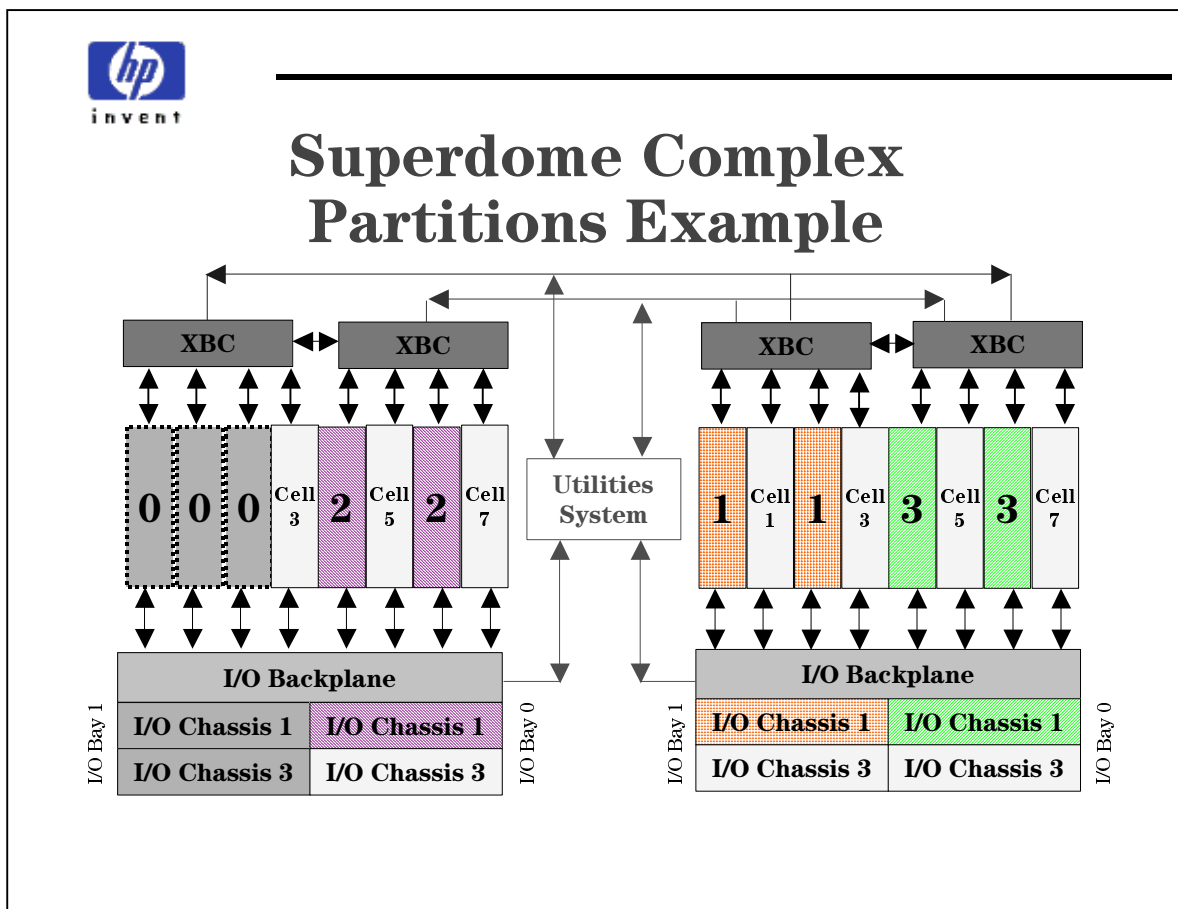
The partition's profile is stored in the Guardian Service Processor (GSP). The GSP downloads the partition's profile to each cell in the partition at boot time. Partition information can be viewed and modified via the GSP or operating system commands.

What we've described here is technically known as a Node Partition (nPartition), unique to the Superdome platform. In 11i, there is another type of partition defined, called a Virtual Partition (vPartition or vPar). Only Superdome can have nPartitions, currently 1-16 per complex. In the HP9000 server family, models L and N running HP-UX 11i can be similarly divided into vPartitions. A vPartition runs a unique instance of the operating system, allowing multiple kernels to run in the same "box", totally isolated from each other. An nPartition defines the hardware configuration of a partition on a Superdome, and the vPartition describes a group of hardware running an instance of the operating system. Superdome's partitions are a combination of nPartitions and vPartitions.³

The resource scheduler, Workload Manager (WLM) can be configured to take advantage of vPartitions as resources available to processes and users. At times of peak load on processor resources, WLM can dynamically balance CPU time by activating additional processors and dividing the additional CPU time based on configured user and application entitlements. WLM uses the Process Resource Manager's (PRM) configuration as a base, adding its own configuration for dynamic resource rationing. PRM and WLM are discussed in an other session focusing on 11i management tools.

³ In future models of Superdome, a Superdome nPartition will be able to support multiple vPartitions, which says there could be multiple kernels running in the same nPartition.

1-3. SLIDE: Superdome Complex Partitions Example



Student Notes

This diagram represents a dual-cabinet 64-way Superdome complex with 4 partitions. Partition 0 has the most cells, which is why it's the first partition the administrator created. Notice that all the cells are on the same crossbar controller (XBC) to allow faster memory access among cells within the partition. Also notice that the I/O chassis for Partition 0 are in I/O Bay 1, the back bay, for easier maintenance access.

The other 3 partitions each have 2 cells. The cells in any one partition are configured to minimize inter-cell latency. An XBC has 2 ports, with cells 0 and 2 sharing one, and cells 1 and 3 sharing the other. Installing the cells in the even ports, there is no memory access latency incurred at this level.

In the diagram, light-colored cells and I/O chassis are unassigned to any partition.

1–4. SLIDE: Recommended Partition Configurations



Recommended Partition Configurations

- Cells
 - ◆ Powers of 2 for memory interleaving
 - ◆ Partitions with largest numbers of cells first
 - ◆ Even or odd slots, same XBC
 - ◆ Add-ons
 - Empty quads first
 - Even slots, then odd
- I/O chassis
 - ◆ Same cabinet as cells in same partition
 - ◆ Back I/O bay first
 - ◆ Expansion cabinet last

Student Notes

Selection of hardware components for a partition can have a direct impact on performance. To maximize the efficiency of the Superdome's memory interleaving algorithms, as well as for high-availability, the number of cells assigned to a partition should be a power of 2, the maximum number of cells in a partition being model-dependent. Creating the largest partitions first (those with the most cells) allows the greatest flexibility in keeping cells in the same partition on the same XBC and in the same cabinet. To leave room for the future expansion of existing partitions, new cells that will be assigned to new partitions should be added to empty quads⁴ first. Cells on the same port of an XBC communicate faster. Cells 0 and 2 share one XBC port, with 1 and 3 sharing the other. Adding cells in alternating slots takes advantage of this connection.

I/O chassis in the back bay are physically easier to access for add-ons and maintenance, and accessing an I/O chassis in the same cabinet is faster than accessing I/O in another cabinet's chassis. Notice how these rules are applied on the previous diagram.

⁴ A quad is a group of 4 cells connected to the same XBC.

1-5. SLIDE: Complex Profiles



Complex Profiles

- Stable complex configuration
 - ◆ Complex-wide attributes & information
 - ◆ Cell assignments
 - ◆ XBC connections
- Dynamic complex configuration
 - ◆ Profile revision information
 - ◆ Available to partitions
- Partition configuration information
 - ◆ Name, number, IP address
 - ◆ Boot parameters
 - ◆ Processor activation control

Student Notes

An earlier slide mentioned the partition profile stored in the GSP. There are two other types of profiles held by the GSP as well. A profile defines a configuration related to an individual partition or the complex as a whole. Profiles are used by the Platform-Dependent Code (PDC), operating system and GSP.

The complex profile (stable storage in HP9000 servers) is divided into two parts – the stable profile and the dynamic profile. The **complex stable profile** holds complex-wide information such as the name of the complex, and complex model number, model string, product numbers and serial number. The **complex dynamic profile** includes which cells are assigned to which partitions (including unassigned cells), and can be modified via the GSP Boot Console Handler (BCH) or the partition manager commands in HP-UX. The complex profile is downloaded to every cell when it boots.

Each partition has its own profile, including the partition's name, number and IP address, boot parameters and cell control. Boot parameters include its three boot paths, boot timer that sets the maximum and boot actions, such as fast boot, auto search and auto boot. The Primary Boot Path identifies the partition's preferred boot device. The High Availability Alternate (HAA) is the partition's second choice, usually the root's mirror. The Alternate is

Module 1


Introduction

the partition's third choice of boot device. Boot parameters can be changed from the GSP and Boot Console Handler or HP-UX partition manager commands.

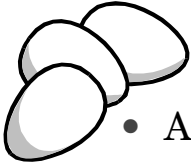
Cell control defines which processors on which cells within the partition are to be involved in the boot process, which processors may be activated by the operating system and which cells are considered viable core cells. All cells have 4 processors, but the number of them that can be activated is set by the model purchased and whether or not a processor has failed. Cells can be activated or deactivated using the GSP Boot Console Handler or HP-UX partition manager commands.

When a cell boots, the GSP holds the cell in status `BootIsBlocked` (BIB) until the complex and partition profiles are downloaded and verified good by the GSP. Once verified, the status is removed and the cell can join its partition. When a portion of the profile changes, the GSP determines which cells are out of date, sets the cells' status to BIB, downloads the updated profile(s) to them, verifies the download is good and resets the status.

1-6. SLIDE: What is the Genesis Partition?

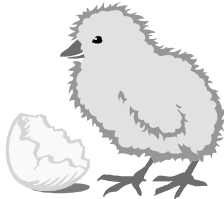


What Is the Genesis Partition?



- A partition is needed to load the operating system.
- A partition is created from the operating system.
- Solution:

the Genesis Partition



Student Notes

Partitions are created from the operating system, which runs on a partition, but to install the operating system requires a partition. To solve this “chicken or the egg” question, the Genesis partition is the only partition that can be created from the GSP.

1-7. SLIDE: The Genesis Partition



The Genesis Partition

- 1-cell partition with an I/O chassis
 - ◆ Core I/O board
 - ◆ Bootable disks (DVD-ROM & R/W disk)
- Destroys all other partitions!
- Initial installation only
- Procedure to create
 - ◆ Save current partition configuration
 - ◆ Identify Genesis partition cell
 - ◆ Shutdown current partitions
 - ◆ Log into the GSP
 - C M, c c

Student Notes


The Genesis Partition is a 1-cell partition (partition 0, cell 0 in cabinet 0, by default) used to install the first instance of the operating system. (Once HP-UX is installed, partition 0 can be modified.) The Genesis Partition's cell must be connected to an I/O chassis housing a core I/O board. The core I/O board must be connected to a bootable disk, usually a DVD-ROM, and usually includes a R/W disk where HP-UX will be installed.

WARNING: Creating the Genesis partition on a Superdome with other partitions created on it *destroys* all other partition information, therefore this task should not be taken lightly, regularly or without cause!

This overview of the procedure to create the Genesis Partition includes saving any current complex configuration information, shutting down all running partitions, logging into the GSP, accessing the Command Menu and running the "c c" command.

NOTE: Details on logging into the GSP and accessing its menus and commands are discussed in the next module.


1-8. SLIDE: Poll



Poll

Which is true of the Genesis partition?

- A. Creating it destroys all other partition definitions.
- B. It's created from the GSP.
- C. It's only needed for the first HP-UX installation.
- D. All of the above.



Polls are completely anonymous. When you see the Poll box, simply click once on the appropriate answer.

Student Notes

The Genesis Partition is only needed for the first installation of HP-UX in a complex. If there are other partitions defined, those partition definitions are destroyed when the Genesis partition is created from the GSP menu with the `c c` command. Therefore the answer is D.

1-9. SLIDE: Review Module Objectives



Review Module Objectives

Now you are able to:

- ✓ Define “partition” as it relates to Superdome.
- ✓ List the components of a partition.
- ✓ Describe recommended partition configurations.
- ✓ Describe the role of the Guardian Service Processor in the creation of partitions.
- ✓ Explain the purpose and capabilities of the Genesis partition.
- ✓ Develop the procedure for creating the Genesis partition.

Student Notes

Module 2 — Using the System Console and Service Interface

Objectives

Upon completion of this module, you will be able to do the following:

- Explain how the Guardian Service Processor (GSP) is used to monitor and control the entire Superdome complex and the partitions within it.
- Log into the GSP.
- Access a partition console through the GSP.
- View console logs.
- Monitor a partition's virtual front panel.

2-1. SLIDE: Module Objectives



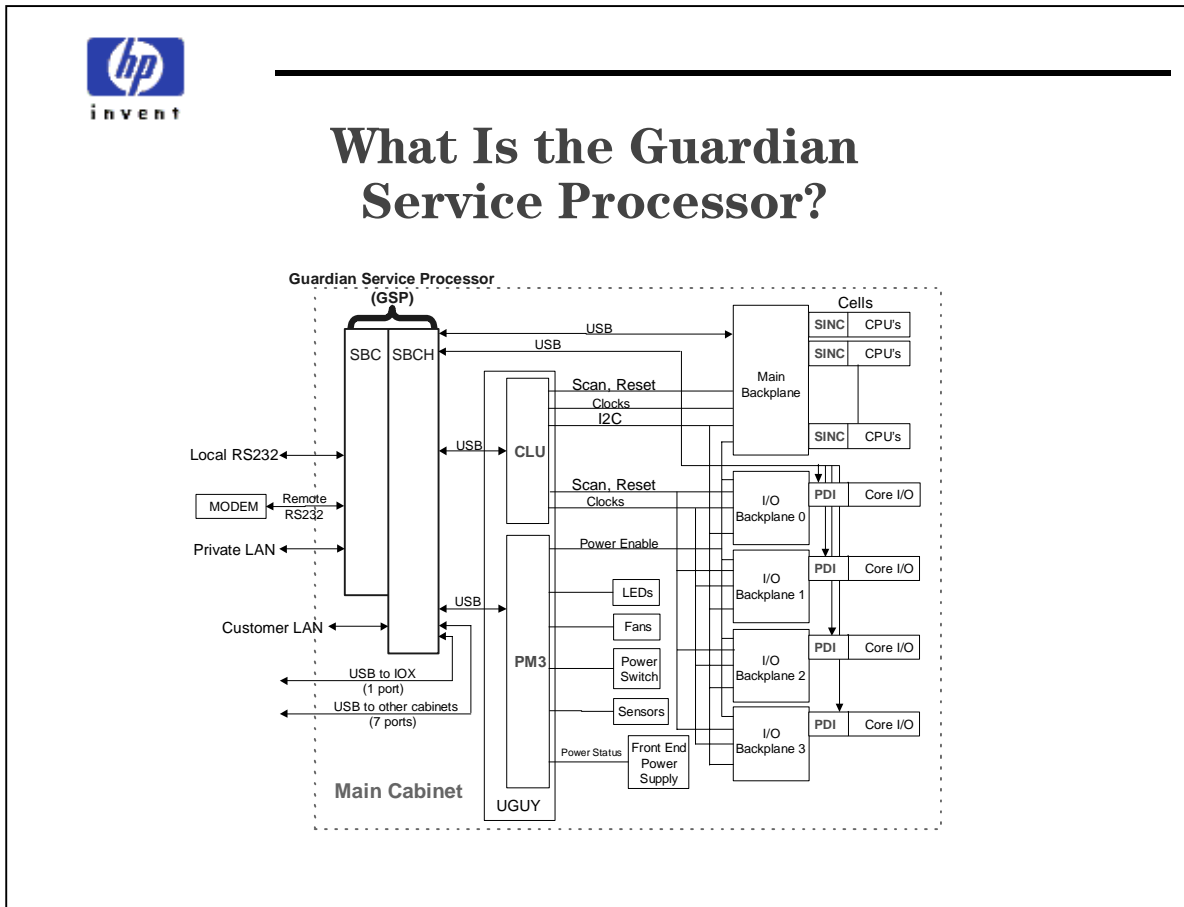
Module Objectives

At the end of this module you will be able to:

- ✓ Explain how the Guardian Service Processor (GSP) is used to monitor and control the entire Superdome complex and the partitions within it.
- ✓ Log into the GSP.
- ✓ Access a partition console through the GSP.
- ✓ View console logs.
- ✓ Monitor a partition's virtual front panel.

Student Notes

2-2. SLIDE: What is the Guardian Service Processor?



Student Notes

The Guardian Service Processor (GSP) provides the administrator access to complex and partition configuration and status, as well as console-specific tasks. In the diagram on the slide, the GSP is shown in blue on the left side of the diagram. Although there is only one GSP per complex (resident in cabinet 0 of a dual cabinet 64-way model Superdome), it is not a Single Point of Failure (SPoF) because it is hot-pluggable, and its failure, by design, won't compromise the availability of any partition. The GSP is needed for:

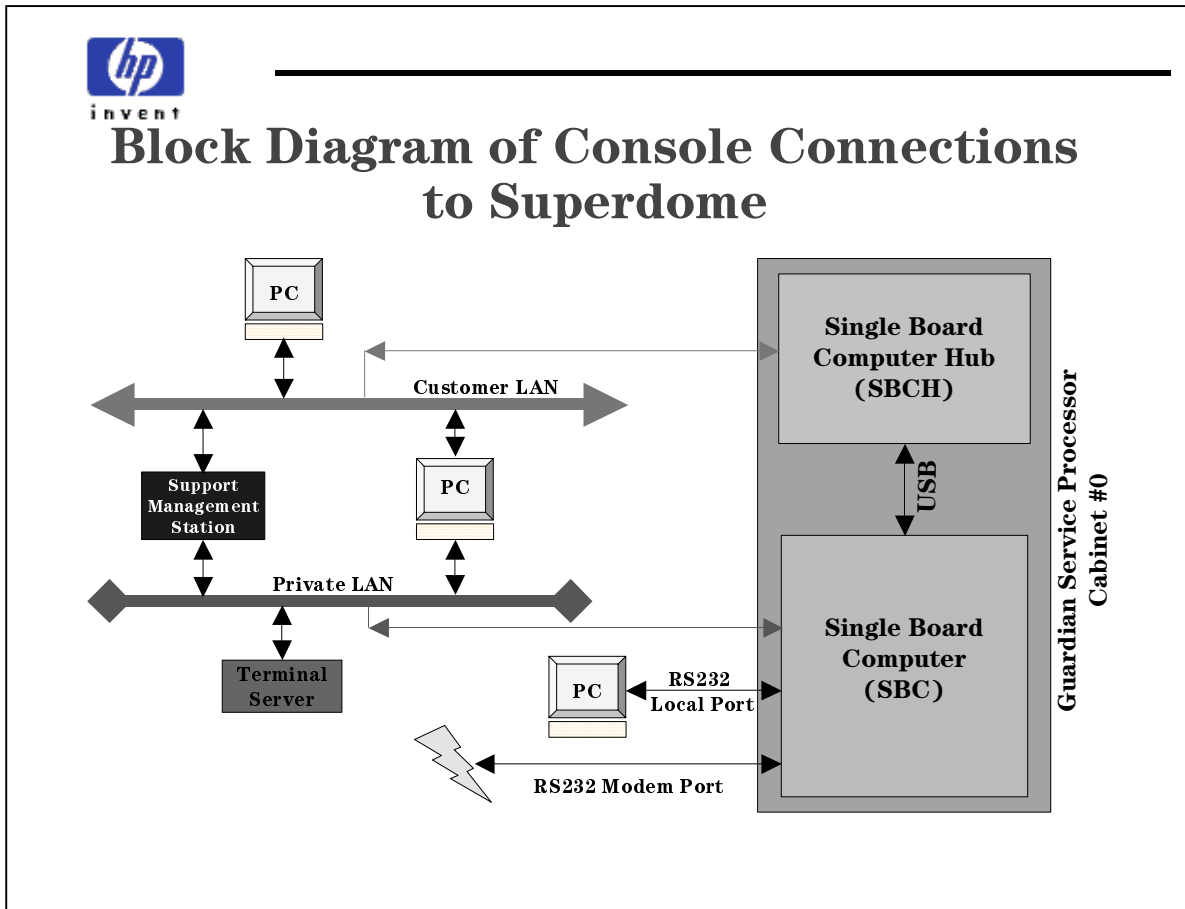
- Access to the complex and partition consoles,
- Displaying a partition's configuration,
- Changing partition or routing configuration,
- Displaying diagnostic chassis logs,
- Partition event notification.

Module 2

Using the System Console and Service Interface

Users access the GSP by connecting through one of two LAN connections, or one of two RS232 ports. The LAN connection on the Single Board Computer Hub (SBCH) is designed for standard administration access to console-specific tasks. The LAN and RS232 connections on the GSP's Single Board Computer (SBC) should be dedicated to support and diagnostic access only.

2-3. SLIDE: Block Diagram of Console Connections to Superdome



Student Notes

The SBCH LAN connection to the customer LAN at the top of the diagram allows network access for general administrative console-specific tasks. HP support personnel can also connect to the GSP through this port using the Support Management Station (SMS), usually an HP9000 site-resident A-server. HP also recommends that the SMS be connected through the private LAN connection of the SBC for running diagnostics and downloading firmware to the Superdome components. Since downloads and diagnostics can be network-intensive, using the private support LAN is preferred for transfer speed and security reasons. The GSP LAN configuration can be viewed and modified with the GSP command LC.

The PC connecting to both LAN connections represents web console. The terminal server on the private LAN connects to other HP servers for the same type of access. The local RS232 port on the SBC are designed to connect to any type of serial port with a null modem cable. The remote RS232 port is configured for modem access. Both RS232 ports default to 9600 baud, 8-bit, no parity and HP-TERM compatibility. These defaults can be changed through the GSP commands CA and PG.

2-4. SLIDE: GSP Accounts and Access Levels



GSP Accounts and Access Levels

- Single-partition user
 - ◆ Subset of GSP commands
 - ◆ One partition
- Operator
 - ◆ Subset of GSP commands
 - ◆ All partitions & VFPs
- Administrator
 - ◆ All GSP commands
 - ◆ All Partitions & VFPs
 - ◆ One per complex

Student Notes

Connecting to the GSP isn't enough. A user has to log into the GSP with a password-protected login name, separate from any operating system login authority. The first user, user 1 by default, is the administrator, with full access to all GSP menus and commands and all partitions. 19 restricted users can be customized as either operators who have a subset of commands but access to all partitions and virtual front panels (VFPs), or single-partition users who have the same subset of commands, but access to only one partition and its VFP.

2-5. SLIDE: Accessing the GSP with Default Configuration



Accessing the GSP with Default Configuration

- Connect to a LAN port on the GSP.
 - ◆ 192.168.1.1 - Customer LAN (SBCH)
 - ◆ 15.99.111.100 - Private support LAN (SBC)
 - Log in as the GSP administrator.
 - ◆ Login name: Admin
 - ◆ Password: Admin
- ☛ **Note:** Change defaults as soon as possible

Student Notes

The GSP is configured with factory defaults for initial access, but **MUST** be changed for security reasons as soon as possible. It can be returned to factory defaults if necessary using the GSP command DC. The DC command disables Remote access, removes all user definitions and sets the GSP LAN addresses back to the defaults shown on the slide.

The LAN connection on the SBCH is intended for connection to the customer's LAN, for normal administrative access to console-dedicated tasks. The default address for the customer LAN connection is 192.168.1.1.

The private LAN connection on the SBC is intended for support and diagnostic access only over a separate local network with limited access. The default address for the private LAN connection is 15.99.111.100.

The first GSP user is the administrator. This user has full access to all GSP menus and commands, and full access to all configured partitions. User names and passwords are case-sensitive. By default, the administrator's login name is Admin with password Admin.

Note: Defaults should be changed as soon as possible for security purposes.

2-6. SLIDE: Creating GSP Users



Creating GSP Users

- Connect to the GSP.
 - ◆ telnet to GSP LAN port
 - ◆ RS232 port
 - ◆ ^b when logged into HP-UX
- Log in as the GSP administrator.
 - ◆ Select Security Options and Access Control
 - ◆ Confirm GSP-wide access parameters
 - ◆ User 1 = administrator
 - ◆ Users 2-20 = restricted users/operators
 - Name
 - Access Level
 - Organization
 - Mode
 - Dial-back enable/disable
 - State enable/disable

Student Notes

GSP users are unique and separate from any operating system logins. Connection to the GSP requires a login name and password to access GSP functionality. When configuring any of the 20 GSP users (1 administrator and 19 restricted users), you will be prompted for the user's name, organization, login name and password.

To create or modify a GSP user with the following procedure:

- Connect to the GSP and login as the administrator, user 1 by default.
- From the GSP main menu, type so (Security Options and Access Control)
- The GSP will display 3 GSP-wide parameters:
 - Login Timeout: 1 minute (default)
 - Number of Password Faults Allowed: 3 (default)
 - Flow Control Timeout: 5 minutes (default)
- Type “y” to be prompted to change any of these parameters, “n” to continue on to user configuration, or “q” to return to the GSP main menu.


- The GSP will prompt you to change each user, in order. Type “**n**” to skip a user and move on to the next. When you enter “**y**”, you will be prompted to enter the user’s name, organization, login name and password.
- GSP users have other attributes that control how and what they can do once they login. If the user is dialing-in through the remote RS232 port, their phone number will be logged and the connection terminated by the GSP. The GSP will then return the call if **Dial-back** is enabled. **Access level** restricts the user to a pre-determined subset of GSP commands. An operator can access all partitions and VFPs. A partition-specific user can access only the assigned partition and its VFP. Only the first user can be an administrator. **Mode** can be either single or multiple, controlling whether or not the same login name can be concurrently logged into the GSP¹. Only users with the **State** attribute enabled is allowed to log into the GSP.
- Read prompts and type carefully, as errors can cause the user to be incorrectly configured. “**q**” at any user change prompt returns you to the GSP main menu.

To remove a GSP user, follow the procedure above, but set the user’s **State** attribute to disabled.. The user isn’t really removed, simply denied access to the GSP.

GSP security configuration is reset by using the GSP command DC. All users, including the administrator are removed, Remote is disabled and network configurations return to factory defaults. Remote is enabled using the GSP **ER** command, and networking must be configured using the GSP **LC** command.

¹ Up to 4 users can be concurrently logged into the GSP, but only one, the first one by default, has keyboard control. Keyboard control can be forcibly taken by any logged-in user between commands by pressing <ControlECF>.

2-7. SLIDE: GSP Menus



GSP Menus


Important: Close all console sessions before exiting the GSP

- Console
 - ◆ GSP> co
 - ◆ Specific partition
 - ◆ q or ^b to return
- Command
 - ◆ GSP> cm
 - ◆ CSP:CM> ma to return
- Console Log Viewer
 - ◆ GSP> cl
 - ◆ GSP:VW> q or ^b to return
- Chassis Log Viewer
 - ◆ GSP> sl
 - ◆ GSP:VW> q or ^b to return
- Virtual Front Panel
 - ◆ GSP> vfp
 - ◆ GSP:VFP> q or ^b to return

Student Notes

GSP commands are organized into 5 menus. GSP commands are not case-sensitive. With the exception of the Command menu, return to the GSP main menu by typing **Q** to quit or pressing **<ControlB>**. Each of these menus will be explored on later slides.

2-8. SLIDE: Categories of GSP Commands



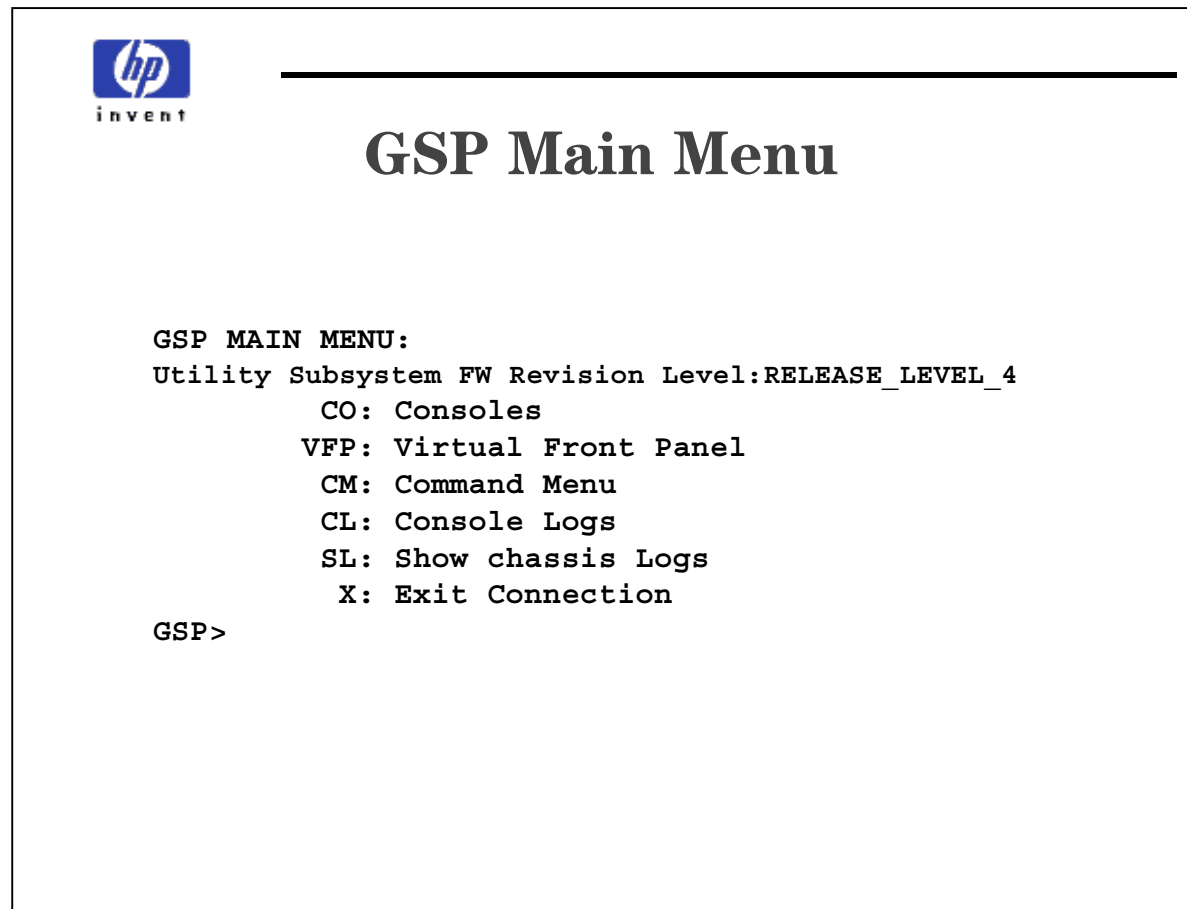
Categories of GSP Commands

- Status
 - ◆ Command help
 - ◆ System status
- System and access configuration
 - ◆ System security and access
 - ◆ Console settings
 - ◆ Diagnostic settings
- Service
 - ◆ Boot, reset, TOC
 - ◆ Manufacturing mode
- Manufacturing
 - ◆ HP service personnel only

Student Notes

GSP commands are divided into 4 categories. Many status, service and configuration commands are available to all GSP users. Other commands are available only to the administrator, or to the administrator and operator. HP strongly recommends that only trained HP support representatives use manufacturing commands.


2-9. SLIDE: GSP Main Menu



Student Notes

Once logged into the GSP, users are greeted with the GSP's Main Menu. Menu selection is not case-sensitive. Return to the GSP main menu from the Command menu using the command **MA**. From all other menus, either typing **Q** on a choice question or pressing **<ControlB>** will return to the GSP Main Menu. Before exiting, make sure to close all console sessions, for security purposes.

2-10. SLIDE: GSP Console Menu




GSP Console Menu

```
GSP> co
Partitions available:
#   Name
---  ---
0)  Partition 0
1)  Partition 1
2)  Partition 2
3)  Partition 3
Q)  Quit
Please select partition number: 1
Connecting to Console: Partition 1
      (Use ^B to return to main menu.)
      [A few lines of context from the console log:]
-----
MFG menu           Displays manufacturing commands
Display            Redisplay the current menu
HELP [<menu>|<command>]  Display help for menu or command
REBOOT            Restart PD
RECONFIGRESET     Reset to allow Reconfig Complex
Profile
-----
- You are now connected to the console
- ^ECF to gain control of the console
- ^B to escape back to the main menu
```

Student Notes

This is an excerpt sample of the GSP Console Menu. Administrators and Operators will be prompted to select a partition. Partition-defined users will not, as they are restricted to only one partition. Notice that to forcibly take control of the console keyboard, you press **<ControlECF>**. Concurrent logins are allowed on the GSP, but only one has keyboard control, by default, the first one. All others are in read-only mode, able to see all keyboard input and resulting output. These users are in “Spy Mode”. The GSP WHO command will display a list of currently logged-in GSP users, including which one has keyboard control.


2-11. SLIDE: Poll



Poll

After typing “co”, how many partitions will be displayed on your system?

- A. All of them.
- B. Only one.
- C. Depends on my access level.
- D. I don't know.




Polls are completely anonymous. When you see the Poll box, simply click once on the appropriate answer.

Student Notes

There are 19 restricted GSP users and 1 administrator. The restricted users are either Operators, with a subset of commands and access to all partitions, or Partition-Dependent users, with the same subset of commands, but confined to only one partition. The administrator has all GSP commands and access to all partitions. Therefore, the partitions a particular login can see depends on the **Access Level** of the user. The answer is C.

2-12. SLIDE: GSP Command Menu



GSP Command Menu

There are over 40 commands. The most frequently used ones are listed below.

- **RS** reset partition
- **TC** TOC partition
- **RR** reset partition for reconfiguration
- **BO** boot partition
- **ID** configure identity of SPU
- **CC** create genesis complex profile
- **LS** display LAN status
- **LC** set LAN configuration
- **ND** enable/disable network diagnostics
- **PE** power enable cabinet
- **PS** display power and configuration status

GSP> cm
Enter **HE** to get a list of available commands
GSP:CM>
q to quit out of parameter entry for a command
MA command goes back to the main menu

Student Notes

The GSP Command Menu has over 40 commands, some available to all users and other restricted based on the user's access level. Commands are not case-sensitive. The commands to accomplish some of the most common console-related tasks are listed on the slide. On the following pages are charts with the GSP Command Menu choices, descriptions and access levels to which the commands are available. In the charts, "entity" depends on what is currently selected and "protection domain" refers to a partition.


GSP Command Menu
Service and Status Commands

Commands	Admin	Oper	User	Description
BO	X	X	X	Boot a protection domain
CP	X	X	X	Display partition cell assignments
DF	X	X	X	Display FRU information of an entity
HE	X	X	X	Display list of available commands
LS	X	X	X	Display LAN connected console status
MA	X	X	X	Return to GSP main menu
MFG	X			Enter manufacturing mode
MR	X	X	X	Modem reset
MS	X	X	X	Display modem status
PE	X	X		Power entities on or off
PD	X	X	X	Set default partition for the current GSP session
PS	X	X	X	Display detailed power & hardware configuration status
RE	X	X		Reset entity
RR	X	X	X	Reset protection domain for reconfiguration
RS	X	X	X	Reset protection domain
TC	X	X	X	Send TOC to protection domain
TE	X	X	X	Broadcast message to logged-in GSP users
VM	X			Margin cabinet voltage
WHO	X	X	X	Display list of GSP-logged-in users

GSP Command Menu System and Access Configuration Commands

Commands	Admin	Oper	User	Description
AR	X			Configure automatic system restart
CA	X	X		Configure asynchronous and modem parameters
CC	X	X		Create Genesis Partition
DATE	X			set time and date
DC	X			Reset parameters to defaults
DI	X	X		Disconnect remote or LAN console
DL	X			Disable LAN console access
EL	X			Enable LAN console access
ER	X	X	X	Configure remote/modem port access options
ID	X	X	X	Change complex profile
IT	X	X		Change command interface inactivity time-out
LC	X			Configure LAN connections
LS	X	X	X	Display LAN connected console status
ND	X			Enable/disable network diagnostics
PD	X	X		Modify default partition for this login session
RL	X	X		Rekey complex profile lock
SO	X			Configure security options and access control
XD	X	X		SUB diagnostics and reset

2-13. SLIDE: GSP Chassis Log Viewer Menu



GSP Chassis Log Viewer Menu

```
GSP> sl
Chassis Logs available:
(A)ctivity
(E)rror
(Q)uit


GSP:VW> e
To Select Entry:
(<CR> or <space>) View next or previous block
(+) View next block (forwards in time)
(-) View previous block (backwards in time)
(F)irst entry
(L)ast entry
(J)ump to entry number
(V)iew Mode Select
(H)elp to repeat this menu
^B to exit
Press any key to continue
```

The slide shows the HP InvenT logo at the top left. Below it is the title "GSP Chassis Log Viewer Menu". The main content is a terminal-style menu. It starts with "GSP> sl" followed by "Chassis Logs available:" and a list of options: "(A)ctivity", "(E)rror", and "(Q)uit". An arrow points from "(E)rror" to the next prompt "GSP:VW> e". Below this is "To Select Entry:" followed by a list of navigation options: "(<CR> or <space>) View next or previous block", "(+) View next block (forwards in time)", "(-) View previous block (backwards in time)", "(F)irst entry", "(L)ast entry", "(J)ump to entry number", "(V)iew Mode Select", "(H)elp to repeat this menu", and "^B to exit". The final line is "Press any key to continue".

Student Notes

The GSP Chassis Log View gives the administrator access to status messages posted by or on behalf of I/O chassis anywhere in the complex. You have a choice of Activity or Error logs. Typing Q on any prompt or pressing <ControlB> at any time returns to the GSP Main Menu.

2-14. SLIDE: GSP Virtual Front Panel Menu



```

GSP> vfp

Partition VFP's available:
#   Name
---  -----
0)  Partition 0
1)  Partition 1
2)  Partition 2
3)  Partition 3
S)  System (all chassis codes)
Q)  Quit
GSP:VFP> 0
          Connecting to VFP: Partition 0
          (Use ^B to return to main menu.)
          Entering Virtual Front Panel
- Enters screen mode display
E indicates error since last boot
#   Partition state          Activity
-   -----
0   Cell(s) Booting:        961 Logs
#   Cell state              Activity
-   -----
E 0  At Boot Console Handler (BCH) Partition firmware          774 Logs
E 1  Boot Is Blocked (BIB)   Processor firmware slave rendez 402 Logs

```

Student Notes

On other models of servers in the HP9000 family, each server is stand-alone and has a physical front panel where status and operational messages and codes are posted. On the Superdome, a partition is a stand-alone server. Since there are a variable number of partitions possible in a Superdome, a physical front panel for each partition could be cumbersome at best and confusing at least. The GSP holds the complex and partition configuration, so it makes sense that the GSP would be the best source of information expected from a front panel display. This is called the Virtual Front Panel (VFP). The administrator and operators will have access to the VFP of any partition, but the Partition-Dependent user is restricted only to the front panel of the assigned partition. Information displayed on the VFP is dynamic and real-time for the selected partition(s).

2-15. SLIDE: Review Module Objectives



Review Module Objectives

Now you are able to:

- ✓ Explain how the Guardian Service Processor (GSP) is used to monitor and control the entire Superdome complex and the partitions within it.
- ✓ Log into the GSP.
- ✓ Access a partition console through the GSP.
- ✓ View console logs.
- ✓ Monitor a partition's virtual front panel.

Student Notes

Module 3 — Configuring System Partitions

Objectives

Upon completion of this module, you will be able to do the following:

- Identify performance requirements that may effect partition configuration choices.
- Using the **parmgr** GUI, create and configure a Superdome node partition.
- Using the **parmgr** GUI, add, move and remove cells, memory and I/O chassis from Superdome node partitions.
- Using the **parmgr** GUI, delete a partition.
- List the command line commands to create, configuration and remove Superdome node partitions.
- List the command line commands to add, move and remove cells, memory and I/O chassis from a Superdome node partition.

3-1. SLIDE: Module Objectives




Module Objectives

At the end of this module you will be able to:

- ✓ Identify performance requirements that may effect partition configuration choices.
- ✓ Using the parmgr GUI, create and configure a Superdome node partition.
- ✓ Using the parmgr GUI, add, move and remove cells, memory and I/O chassis from Superdome partitions.
- ✓ Using the parmgr GUI, delete a partition.
- ✓ List the command line commands to create, configure and remove Superdome partitions
- ✓ List the command line commands to add, move and remove cells, memory and I/O chassis from a Superdome partition.

Student Notes

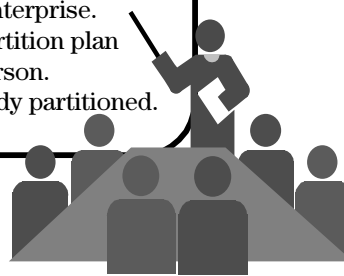
3-2. SLIDE: Poll



Poll

What is the status of your partition planning?

- A. I am evaluating the appropriate configuration for our enterprise.
- B. I have worked out a partition plan with my HP support person.
- C. My Superdome is already partitioned.
- D. I am not sure.




Polls are completely anonymous. When you see the Poll box, simply click once on the appropriate answer.

Student Notes

Partitioning a Superdome complex must be pre-planned to ensure that the complex configuration meets your service expectations. Planning with a trained, experienced HP technical consultant is crucial to both efficiency and effectiveness.

Your part in the planning process is to provide as much information as possible about how your applications run. What CPU and memory resources are required? How much disk space is needed for executables, data and logs? Armed with your expectations, you and HP can plan your partitioning.

3-3. SLIDE: Supported Superdome Partition Configurations



Supported Superdome Configurations

65535 possible permutations of partition configurations. Of these, 54 are supported.

Size of Partition (Cells)	CABINET 0								Size	CABINET 1								Configuration Shown	Qty
	0	1	2	3	4	5	6	7		0	1	2	3	4	5	6	7		
1	0	8	4	12	2	10	6	14	1	1	9	5	13	3	11	7	15	16x1	16
2	0	4	0	4	2	6	2	6	2	1	5	1	5	3	7	3	7	8x2	8
2									2						8	8		1x2	1
2					9				2							9		1x2	1
3	0	0	0		2	2	2		3	1	1	1		3	3	3		4x3	4
3									3						4	4	4	1x3	1
4	0	0	0	0	2	2	2	2	4	1	1	1	1	3	3	3	3	4x4	4
4					4		4		4						4		4	1x4	1
5	0	0	0	0				0	5	1	1	1	1				1	2x5	2
6	0	0	0	0		0		0	6	1	1	1	1		1		1	2x6	2
7	0	0	0	0		0	0	0	7									1x7	1
7	0	0	0	0		0	1	0	7	1	1	1	1	0	1		1	2x7	2
8	0	0	0	0	0	0	0	0	8									1x8	1
8	0	0	0	0	1	0	1	0	8	1	1	1	1	0	1	0	1	2x8	2
9	0	0	0	0	0	0		0	9					0		0		1x9	1
10	0	0	0	0	0	0	0	0	10					0		0		1x10	1
11	0	0	0	0	0	0	0	0	11					0	0	0		1x11	1
12	0	0	0	0	0	0	0	0	12					0	0	0	0	1x12	1
13	0	0	0	0	0	0	0	0	13					0	0	0	0	1x13	1
14	0	0	0	0	0	0	0	0	14		0			0	0	0	0	1x14	1
15	0	0	0	0	0	0	0	0	15			0	0	0	0	0	0	1x15	1
16	0	0	0	0	0	0	0	0	16					0	0	0	0	1x16	1
																		Total	54

Student Notes

There are thousands of possible cell configurations for partitioning in a Superdome complex. The actual maximum is model-dependent. That said, there are currently only 54 of the possible thousands supported by HP. In the chart on the slide, there are two cabinets represented by 8 cell slots each. The numbers given in the individually-colored cells represent the partition to which they are assigned. In the column labeled “Configuration Shown” the first number is the number of partitions, the second the number of cells in each partition, for example 4x3 means there are 4 partitions with 3 cells in each partition. In some cases, there is more than one supported configuration, for example 1x2. These configurations adhere to the cell installation and selection recommendations reviewed on the next slide. These recommendations are made to avoid hardware-induced latencies when communicating between or among cells within a partition.

3-4. SLIDE: Partition Planning



Partition Planning

- Set software performance and resource requirements.
- Identify hardware requirements.
- Select cells for maximum hardware performance.
- Verify partition plan with HP.

Student Notes

The first step in partition planning is always the service requirements of the customer and users. Applications have availability standards to meet. These standards are met, in part, by the availability of resources within the partition, such as memory, processor time and I/O. All applications that is to run within a partition must be taken into account, including operating system requirements.

Hardware considerations are now the controlling factor as to which cells will perform best when assigned to work together in a partition. Some of the major considerations are reviewed here.

Cells

There are 4 cells on a crossbar controller (XBC). Cells 0 and 2 share an XBC port, cells 1 and 3 share the other XBC port. Cells connected to the same port communicate faster with each other. There are 2 XBCs in a cabinet. Cells on the same XBC communicate with each other faster than cells communicating across XBCs. In the same vein, cells communicate faster within the same cabinet than they do with cells in another cabinet. Therefore, for best performance at the hardware level, cells in the same cabinet, on the same port of the same XBC will avoid the most bus-related latencies. One more note: cells in the same partition need to have the same clock speeds.

Module 3

Configuring System Partitions


Memory

A cell can have 2-16Gbytes of memory. Cells within a partition should have the same amount of memory to maximize the efficiency of the memory interleaving algorithms. 4Gbytes is the minimum suggested by HP because memory is installed in packages of 2Gbytes each, 4 DIMMs in a package. When a member of a package fails, the package is disabled until the failure is replaced. Therefore, with only one package (2Gbytes), the cell would be disabled and unable to boot, whereas with 2 packages (4Gbytes), the cell could still function with the remaining 2Gbytes after a memory package failure.

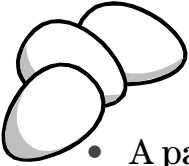
I/O Chassis

There must be at least one cell in each partition connected to an I/O chassis. When there is only one I/O chassis required, it must be configured with a core I/O board. This is the board controlling the boot device. The cell connected to the I/O chassis from which the partition boots is referred to as the core cell, and the chassis is referred to as the core I/O chassis. There may be additional I/O chassis assigned to the partition. A cell can connect to at most one I/O chassis, and an I/O chassis can be connected to only one cell. All cells within a partition have access to all I/O components in all I/O chassis assigned to the partition.

3-5. SLIDE: What Is the Genesis Partition?

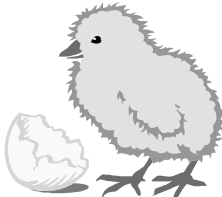


What Is the Genesis Partition?



- A partition is needed to load the operating system.
- A partition is created from the operating system.
- Solution:

the Genesis Partition



Student Notes

A partition is like a stand-alone system, running its own copy of the operating system. Partitions are created by partition management tools provided with the operating system. This seems like an endless loop. Which comes first – the partition or the operating system? The answer is a special partition, created using the GSP, the Genesis Partition.

3-6. SLIDE: The Genesis Partition




The Genesis Partition

- 1-cell partition with an I/O chassis
 - ◆ Core I/O board
 - ◆ Bootable disks (DVD-ROM & R/W disk)
- Destroys all other partitions!
- Initial installation only
- Procedure to create
 - ◆ Save current partition configuration
 - ◆ Identify Genesis partition cell
 - ◆ Shutdown current partitions
 - ◆ Log into the GSP
 - CM, cc

Student Notes

The Genesis Partition is a 1-cell partition used **only during initial installation** of a Superdome complex. It uses cell 0 in cabinet 0 by default, although you may specify changes when creating the partition from the GSP. It destroys any and all other partition configurations, so configurations must be saved for restoration after the Genesis Partition has served its purpose. `/usr/sbin/parstatus -vp#` redirected to a file (where # is a partition number) provides detailed information about the specified partition (`parstatus(1M)`). Any active partitions must be shutdown before creating the Genesis Partition. Logged in as either the Administrator or an Operator, select the Command Menu and enter the CC command. This should be done only under direct supervision of HP support personnel.

3-7. SLIDE: Booting the Genesis Partition



Booting the Genesis Partition

```
GSP:CM> BO
# Name
--- ----
0) Partition 0
Select a Partition number : 0
Do you want to boot Partition number 0,
named Partition 0 ? (Y/[N]) Y

-> The selected Partition will be booted.
```

Student Notes

Once the Genesis Partition has been created, it can be altered once the operating system is booted and the partition management tools are available. All partitions boot through the GSP and additional boot parameters will be discussed in the next module. If you're installing HP-UX on the Genesis Partition, you will need to point the boot to the device where the installation medium is mounted. This is a boot parameter and will be discussed in the next module. Logged in as the GSP Administrator, select the Command Menu and enter the boot command BO. The partition to boot will be 0, confirm by typing "Y" and booting will begin.

3-8. SLIDE: HP-UX Partition Management Tools



HP-UX Partition Management Tools

- Partition manager
 - ◆ GUI
 - ◆ `/opt/parmgr/bin/parmgr`
- Command-line utilities
 - ◆ `/usr/sbin/parcreate`
 - ◆ `/usr/sbin/parstatus`
 - ◆ `/usr/sbin/parmodify`
 - ◆ `/usr/sbin/pardelete`

Student Notes

There are two partition management toolsets available with HP-UX 11i. The Partition Manager is a GUI tool with full partition management capabilities. Since it takes advantage of partition and complex locks not available to the command line utilities, HP strongly recommends its use for all partition management tasks. Command line utilities are also available for those times when the command line is required or preferred, based on connection method or administrator choice.

NOTE: When modifying a partition, `/opt/parmgr/bin/parmgr` must be run on the partition to be modified.

3-9. SLIDE: The Partition Manager /opt/parmgr/bin/parmgr



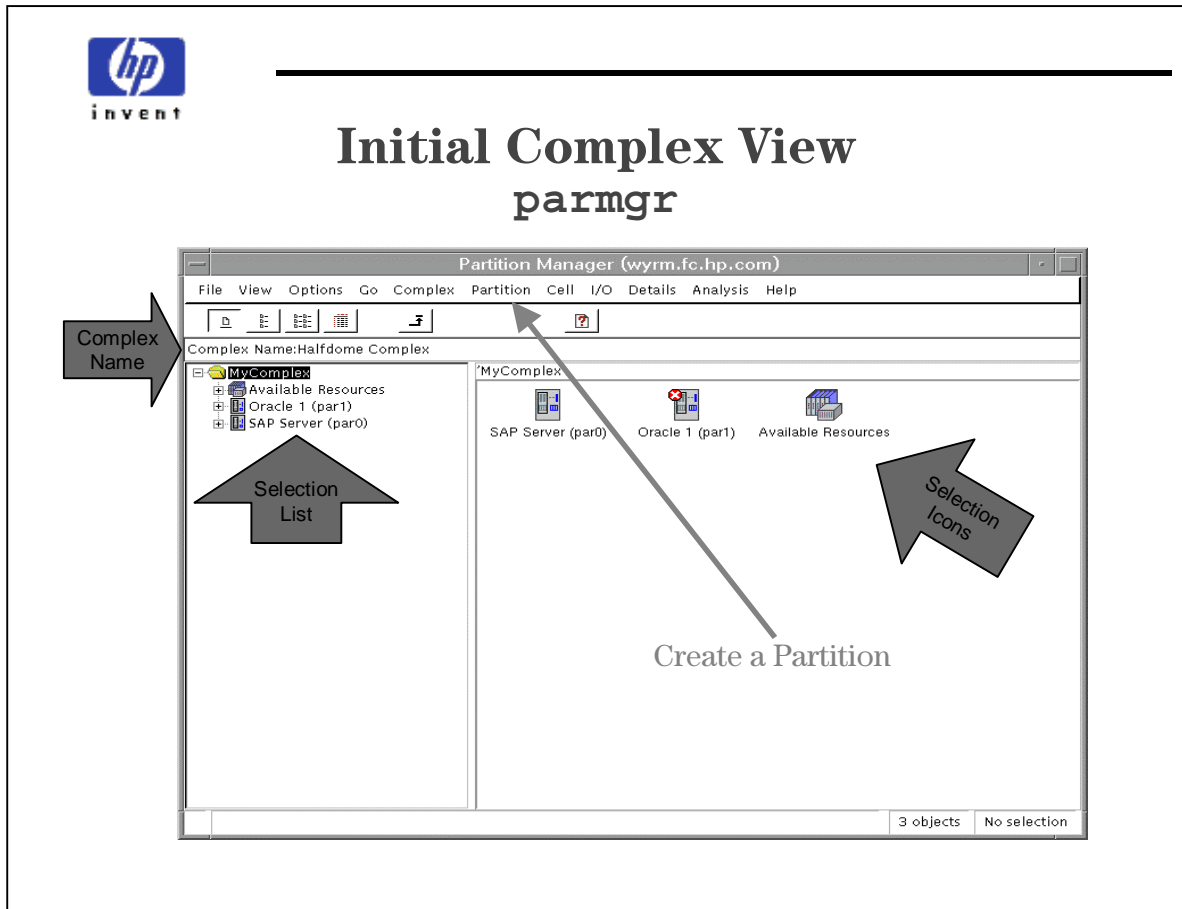
The Partition Manager **parmgr**

- Graphical user interface (GUI)
- Complex status
- Partition management
 - ◆ Configuration
 - ◆ Power control
 - ◆ Component management
 - Cells
 - I/O chassis
 - I/O cards
- OLA/R

Student Notes

The **parmgr** GUI provides the HP-UX superuser the tools to manage Superdome complex partitions. **parmgr** can display Superdome complex status, create and modify partitions, and control and monitor I/O down to the card level. On-Line Addition and Replacement (OLA/R) tasks can be accomplished through the **parmgr** GUI as well. Since these tasks are not unique to the Superdome, they are discussed as part of the 11i courses.

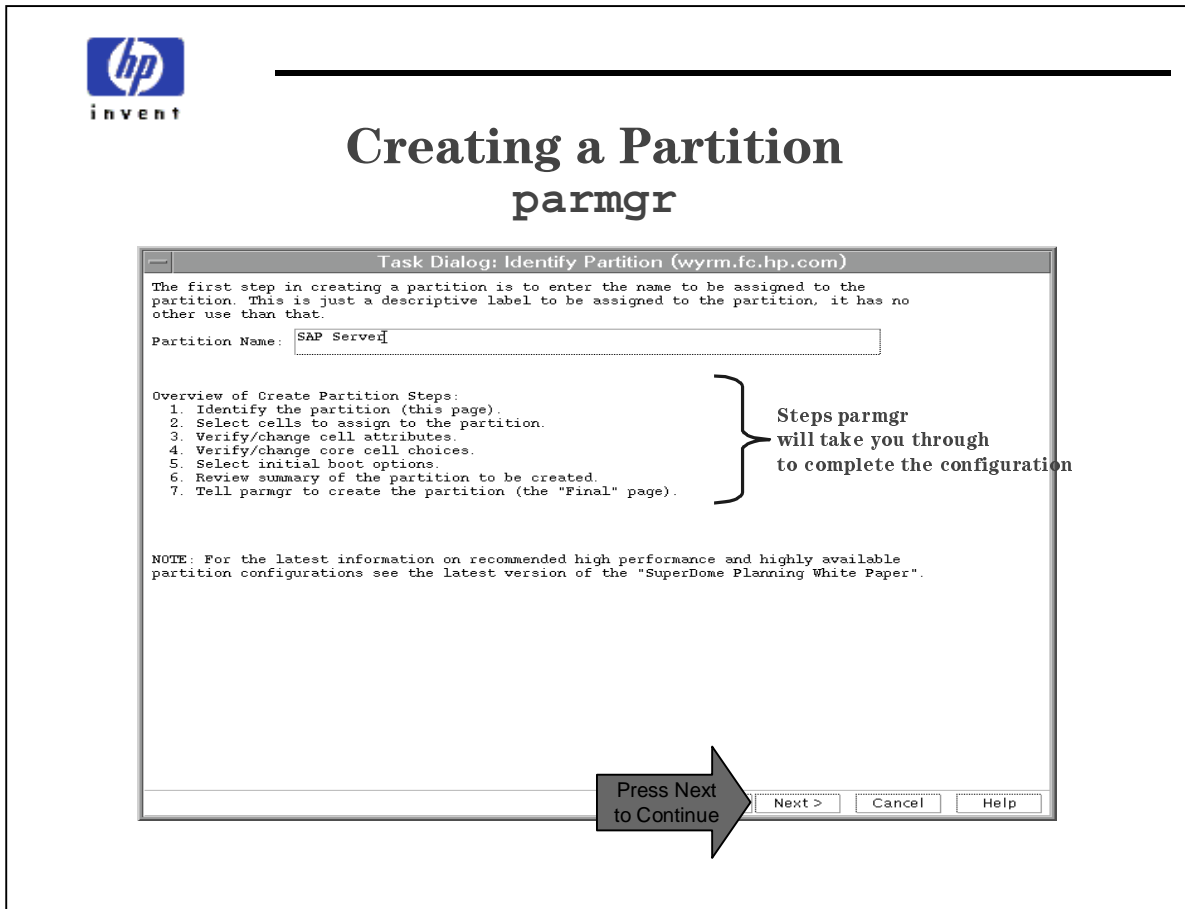
3-10. SLIDE: Initial Complex View /opt/parmgr/bin/parmgr



Student Notes

When parmgr first comes up, you are given a high-level view of the Superdome complex. You can select a particular partition or available resources either from the icon display area on the right or the list on the left. To create a new partition, select the Partition pull-down menu.

3-11. SLIDE: Creating a Partition /opt/parmgr/bin/parmgr



Student Notes

Each partition may have a customized name, which may include spaces. With it, the partition may be referenced by name or number (the first partition is 0). Below the name typing area is a list of steps **parmgr** will take you through to complete the configuration. Continue to through the steps by pressing the [Next] button at the lower right corner of the screen. Make sure to refer to your partition plan when selecting the cells to be assigned to the new partition. Partitions can also be modified from the command line, although profile locking mechanisms can not be manipulated. The command line procedure will be discussed later in this module.

3-12. SLIDE: Modifying a Partition /opt/parmgr/bin/parmgr



Modifying a Partition

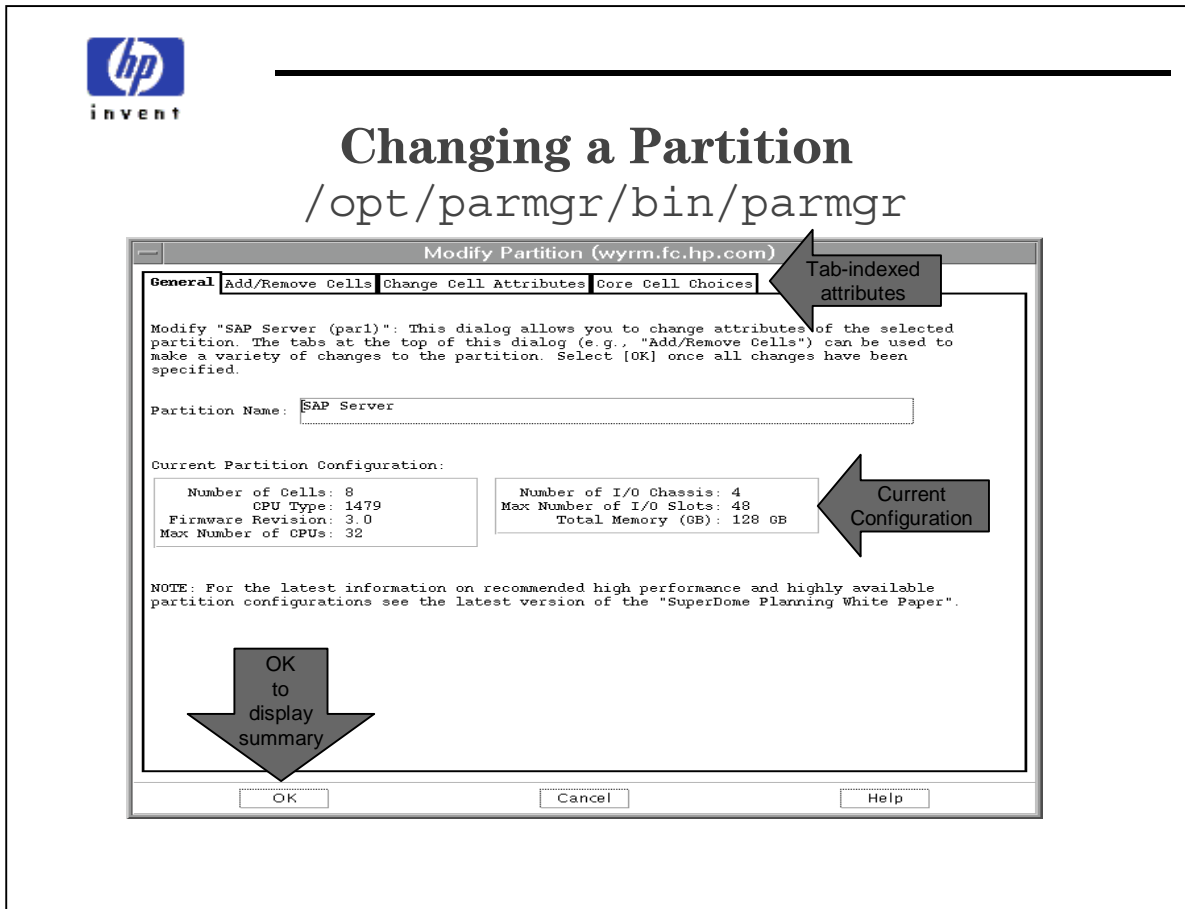
/opt/parmgr/bin/parmgr

- Standard dialog
- One or more changes
- Tab dialog
 - ◆ General
 - ◆ Add/Remove Cells
 - ◆ Change Cell Attributes
 - ◆ Core Cell Choices
- Summary for verification.

Student Notes

When a partition needs to be modified, **parmgr** is again the recommendation. When you select the partition to be modified, a tab dialog box controls what can be changed. Multiple changes are allowed. One of the nicest features of **parmgr** is the summary of the new configuration, giving you a chance to verify changes before they take effect. There is a command procedure as well, that will be discussed later in this module.

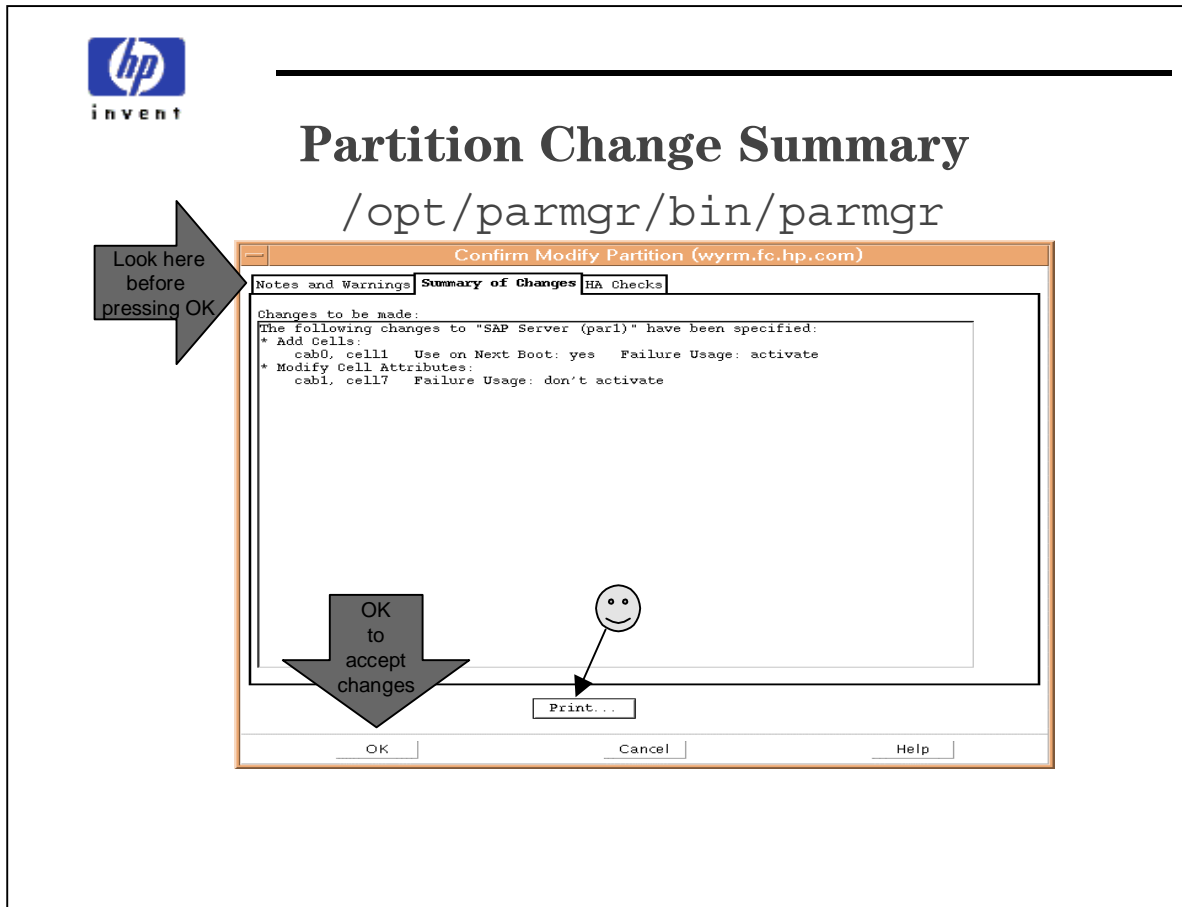
3-13. SLIDE: Changing a Partition /opt/parmgr/bin/parmgr



Student Notes

The partition's attributes are indexed under tabs at the top of the window. Change the partition's name in the typing area directly above the current configuration display. Make as many changes as needed by selecting the appropriate tabs. Press the [OK] button when change requests are complete to display the summary.


3-14. SLIDE: Partition Change Summary /opt/parmgr/bin/parmgr



Student Notes

Your changes are displayed on the summary page. HP strongly recommends viewing the contents of the Notes and Warnings tab before accepting changes by pressing [OK]. If you are configuring the partition for high availability applications, HP recommends you check the contents of the HA Checks tab as well, before accepting your changes.

3-15. SLIDE: Creating a Partition /usr/sbin/parcreate



Creating a Partition

/usr/sbin/parcreate

Synopsis:

```
parcreate [-P PartitionName] [-I IPaddress]
          -c cell:[cellType]:[use_on_next_boot]:[failure_usage] [-c...]
          [-b path] [-t path] [-s path]
          [-r cell] [-r...] [-B]
```

Example:

```
parcreate -P testing -c 1:base:y:ri -B
```

↑ Partition name

↑ Global Cell #1
(cabinet 0, cell slot 1)

↑ Use to boot

↑ Boot when created

Student Notes

To finish the discussion on partition management, we'll discuss the command line alternatives to **parmgr**. All reside in **/usr/sbin** and are available to the superuser only. A list of the partition-related commands is available through the HP-UX manpages using **man 1 partition**.

There are many command line options available to the **parcreate** command. Only the **-c** and its argument, the global cell number, is required, as a partition must have at least one cell. (Cell slot 0 in cabinet 0 is global cell 0. Cell slot 0 in cabinet 1 is global cell 8.) Multiple cells can be assigned to the partition with multiple **-c** options. If the partition name is to contain spaces, enclose the name in "quotation marks".

Attributes of the global cell number are position-dependent and separated by colons. The only valid cell type is **base** at this time. It will be used to identify PA-RISC 8600 cells from IA-64 cells in future releases. If a cell's processors are to participate in the next boot, set the use-on-next-boot attribute to **y**; this is the default. The default (and only) value for the failure-usage attribute is **ri**, which reactivates interleaving.


The hardware paths of the partition's primary (**-b**), HAA (**-t**) and alternate/secondary (**-s**) boot devices are optional. This is the physical hardware path to the device. One or more

Module 3 Configuring System Partitions

root cells may be specified using the **-r** option. This identifies which cells within the partition are connected to core I/O chassis, and therefore are candidates to be the core cell. The first cell given is the preferred, with other cells viable in the order given. When the primary boot path is given and available, the **-B** option boots the partition upon creation. The default is not to boot the partition.

In the example on the slide, the new partition's name is "**testing**", a 1-cell partition configured with global cell number 1 (cabinet 0, 2nd cell slot). Since it is the only cell in the partition, the use-on-next-boot must be set to **y**, and the partition is to boot upon creation.

3-16. SLIDE: Modifying a Partition /usr/sbin/parmodify



Modifying a Partition

/usr/sbin/parmodify

Synopsis:

```
parmodify -p partitionNumber
{
  -a cell:[cellType]:[use_on_next_boot]:[failure_usage]
  -m cell:[cellType]:[use_on_next_boot]:[failure_usage]
OR {
  -I IPaddress | -r cell [-r...] | -d cell [-d...]
  -b path | -t path | -s path | -P PartitionName | -B}
```

Example:

```
parmodify -p 1 -a 2:base:n:ri
```

↑ ↑ ↑
 Partition # Not used in reboot
 Add global cell #2
 (cabinet 0, slot 2)

Student Notes

With **parmodify**, you can change the partition's name (**-P**) and IP address (**-I**), add (**-a**), delete (**-d**) or modify (**-m**) cells, and add or change the partition's boot paths (**-b**, **-t**, **-s**). One or more changes are allowed. Only the partition number is required. To boot the partition after making the changes, include **-B**. If the new name includes spaces, enclose the name in "quotations". The IP address of the partition is used by management tools to address the partition and must be consistent with the IP address configured in HP-UX standard networking. When adding, deleting or modifying cells, the global cell number is required, and all other fields in the argument are the same as discussed with **parcreate**. If root cells are specified, it overrides the order of preference, so all root cells should be given. The boot paths are hardware paths to the boot devices.

In the example, global cell number 2 (cabinet 0, 3rd cell slot) is being added to partition number 1 and will not be involved when booting.

3-17. SLIDE: Displaying Complex Information /usr/sbin/parstatus



Displaying Complex Information

/usr/sbin/parstatus

Synopsis:

```
parstatus [-X]
parstatus [-A] [-M] -C|-I
parstatus [-M] -B|-P
parstatus [-M] -I I/Ochassis [-I...]
parstatus [-V|-M] -c cell [-c...]
parstatus [-V|-M] -b cabinet [-b...]
parstatus [-V|-M] -p PartitionNumber [-p...]
parstatus [-V|-M] -i I/Ochassis [-i...]
```

Example:

```
parstatus -P
```

Student Notes

To display information about the superdome complex from the command line, use **parstatus**. Without options, status of all major components is given. **-X** displays complex attributes. The **-s** option succeeds if the command is being run in a Superdome partition. The **-w** option displays the local partition number. **parstatus** can also show you available cells (**-A C**), or I/O chassis (**-A I**), or all resources not assigned to partitions (**-A**). The display can be confined to cells (**-C, -c**), I/O chassis (**-I, -i**), cabinets (**-B, -b**) or partitions (**-P, -p**), where uppercase options display ALL, and lowercase options require a component identifier. When requesting status of a particular cell, I/O chassis, cabinet or partition, a more verbose output displays with the addition of the **-V** option. Parsing output within a shell script or pipe is easier by including the **-M** option, as fields are separated by “:” rather than aligned into columns.

In the example, status of all partitions is being requested.

3-18. SLIDE: Deleting a Partition /usr/sbin/parremove



Deleting a Partition /usr/sbin/parremove

Synopsis:

```
parremove -p PartitionNumber [ -F ]
```

Example:

```
parremove -p 1
```

Student Notes

Removing a partition removes its configuration from the GSP, making all cells and I/O chassis unassigned/available. It destroys the entire partition definition. The partition number (**-p**) is the only required option. Unless forced (**-F**) the partition must be shutdown with status ready-for-reconfiguration for parremove to complete successfully.

Forcing (**-F**) a partition to be removed will fail if a remote partition¹ is specified and active. If the partition specified inactive, or the local/current partition is specified, the partition is removed.

In the example, partition 1 is being destroyed.

¹ A remote partition is a partition within the complex other than the one where the command is being executed. The partition where the command is being executed is referred to as the local or current partition.

3-19. SLIDE: Review Module Objectives



Review Module Objectives

You are now able to:

- ✓ Identify performance requirements that may effect partition configuration choices.
- ✓ Using the parmgr GUI, create and configure a Superdome node partition.
- ✓ Using the parmgr GUI, add, move and remove cells, memory and I/O chassis from Superdome partitions.
- ✓ Using the parmgr GUI, delete a partition.
- ✓ List the command line commands to create, configure and remove Superdome partitions
- ✓ List the command line commands to add, move and remove cells, memory and I/O chassis from a Superdome partition.

Student Notes

Module 4 — Booting a Superdome Node Partition

Objectives

Upon completion of this module, you will be able to do the following:

- List booting issues on Superdome servers.
- List the steps in the Superdome boot process.
- Configure boot-related settings.
- Boot a partition
- TOC a partition.
- Reset a partition.

4-1. SLIDE: Module Objectives




Module Objectives

At the end of this module you will be able to:

- ✓ List the booting issues on Superdome servers
- ✓ List the steps in the Superdome boot process.
- ✓ Configure boot-related settings.
- ✓ Boot a partition.
- ✓ TOC a partition.
- ✓ Reset a partition.

Student Notes

4-2. SLIDE: Superdome Partition Booting Features



Superdome Partition Booting Features

- Partitions boot, reboot, reset individually
- Cells, I/O chassis powered on and active
- Power cycling
 - ◆ Reset and power cycle remotely
 - ◆ Cell or I/O chassis
 - Unassigned
 - Inactive
 - Partition down
- No cabinet/complex TOC switch
- Boot from GSP from halt

Student Notes

A Superdome partition is an independent, stand-alone server, capable of running an isolated instance of HP-UX 11i. Therefore, it is the partition that boots, not the complex, and multiple partitions can be booting concurrently without interfering with each other, or other running partitions. All components, including cells and I/O chassis assigned to the partition, must be powered up prior to booting. Resets and power on/off signals can be sent safely to cells or I/O only if the cell or I/O is 1.) unassigned to any partition, 2.) currently inactive in a running partition, or 3.) its partition is down (halted or reset-for-reconfig).

The Transfer-of-Control (TOC) signal is sent to a specific partition. There is no complex-wide TOC, since each partition is autonomous. Sending a TOC to a partition causes its operating system to create a crash dump if configured to do so.

Booting a down partition (power up, rebooting after reconfiguration) is done via commands to the GSP.

4-3. SLIDE: Partition Boot Requirements



Partition Boot Requirements


- All partitions in supported configuration.
- All “use-on-next-boot” cells powered on.
- All I/O powered on.
- Coherent partition profile in all cells.

Student Notes

For a partition to boot, the configurations of **all** the partitions in the complex must conform to currently-supported specifications. The partition must have at least one cell enabled to participate in the boot by setting its **use-on-next-boot** flag set to “y”, and all I/O assigned to the partitions must be powered on.

When the partition boots, each cell in the partition receives a copy of the partition’s profile from the GSP. The GSP then verifies that the profiles received and stored by the cells is correct. If a cell’s partition profile cannot be verified, the cell will not proceed with the boot process, and will stay Blocked-In-Boot.

4-4. SLIDE: Partition Boot Types



Partition Boot Types

- Boot
- Reset
 - ◆ Reset partition
 - ◆ Reset for reconfiguration
- Reboots
 - ◆ Reboot
 - ◆ Reboot for reconfiguration
- TOC
- Halt

Student Notes

The Superdome partitions have some boot types you recognize from other HP-UX platforms and some new ones. A partition that has just been powered up, has been halted or has been reset-for-reconfig can be booted. Booting is done from the GSP.

Resetting a partition affects only a partition's active cells. It reboots the formerly active cells past the partition rendezvous phase and on to the Boot Console Handler (BCH) and/or HP-UX. A reset can be issued from the GSP or BCH.

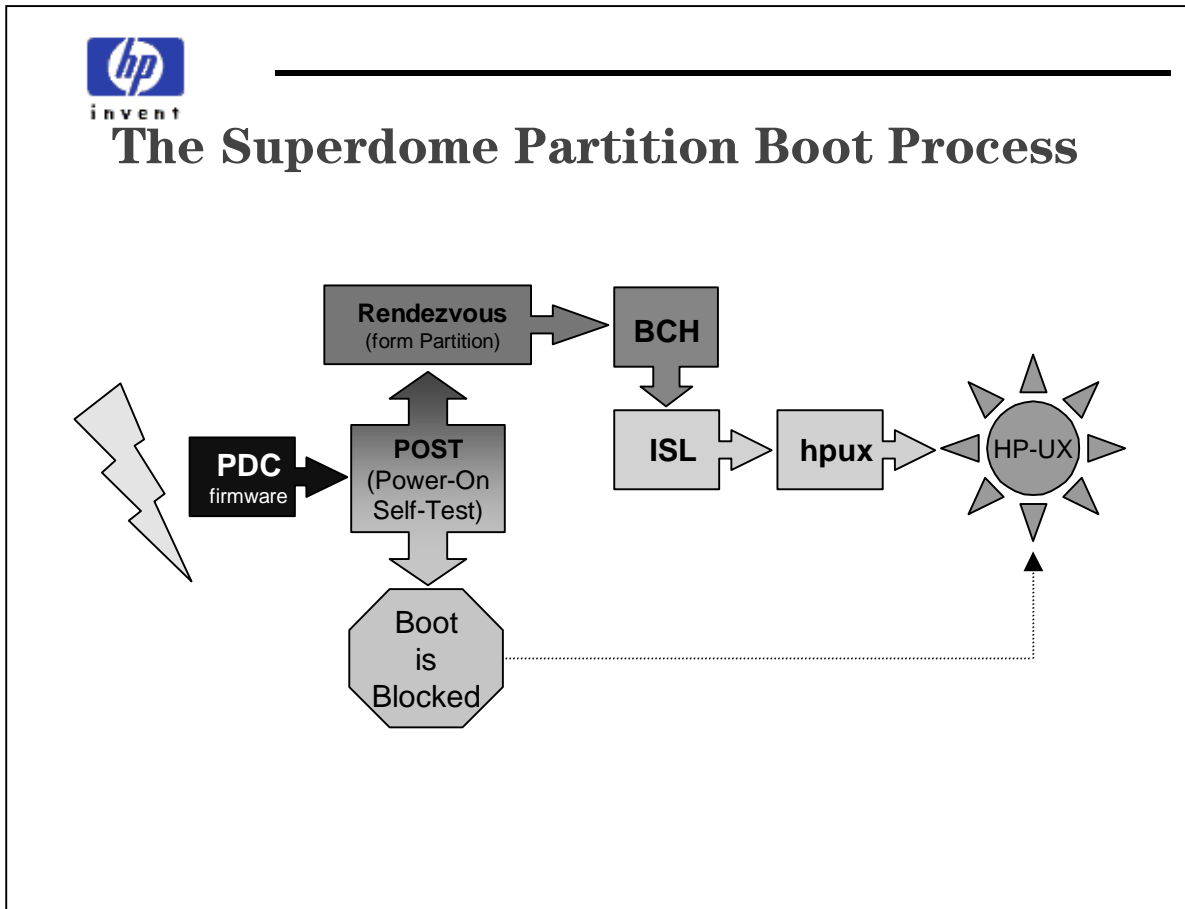
Reset-for-reconfig brings down the operating system, sets the partitions state to ready-to-reconfig, and reboots the partition with the newly-modified configuration. This includes all cells in the partition, regardless of their state of activity. Each cell receives a new copy of the partition's profile. This is the proper way to affect partition configuration changes made using **parmgr** or **parmodify**. A partition enters ready-to-reconfig by including the **-R** option on either shutdown or reboot, or using the appropriate GSP or BCH commands.

A Transfer of Control (TOC) will cause the operating system to shutdown and create a crash dump, if configured to do so, and reboot. The TOC signal is sent to the partition using a GSP command.

Module 4
Booting a Superdome Partition

Halting causes the operating system to come down gracefully, but does not reboot. Halting a partition is done from the operating system running on the partition to be halted. A halted partition can be rebooted by cycling power, or via the GSP.

4-5. SLIDE: The Superdome Partition Boot Process



Student Notes

When the Superdome partition is powered on, booted from halt, reset or rebooted, it enters the boot process, starting with the Processor (or Platform) Dependent Code. This is firmware in the cells that establishes basic functionality. If successful, control is passed to the Power-On Self-Test (POST) firmware that continues cell component testing and downloads the partition profile to the cell. The POST puts the cell in Blocked-On-Boot until testing completes. What happens next depends on the success of the testing, and the cell's use-on-next-boot flag. If testing was successful and the cell's use-on-next-boot flag is set to "y", the cell attempts to rendezvous with other cells with the same criteria. Ten minutes is allowed for all cells in the partition enabled to participate in the boot (`use-on-next-boot = y`) to report for rendezvous. The partition forms when the rendezvous completes or the ten-minute timer expires.

The partition enters the Boot Console Handler (BCH) to find the boot devices (primary, HAA, alternate). Each boot path has boot actions associated with it, and these actions will be followed until the partition can find the Initial System Loader (ISL) or nothing bootable is found. Once the ISL is loaded, its command `hpux` locates the kernel on the boot device and brings in HP-UX. You may choose to interact with either the BCH or ISL for more detailed booting instructions.

Module 4
Booting a Superdome Partition

Cells that either fail self-testing or have their use-on-next-boot set to “n” remain in Boot-Is-Blocked status until the operating system boots and activates them.

4-6. SLIDE: Boot-Related Settings



Boot-Related Settings

- Cell “use-on-next-boot”
- Core cell
 - ◆ Preferred
 - ◆ Up to 3 alternates
- Boot device paths
 - ◆ Primary
 - ◆ HAA
 - ◆ Alternate
- Boot actions
 - ◆ PathFlags
 - ◆ AutoStart
 - ◆ FastBoot
 - ◆ BootTimer

Student Notes

Each partition has three boot paths, as opposed to two in HP9000 servers and workstations. It's search order is Primary, HAA, then ALT. The primary (PRI) boot path is the hardware path to the device, usually a R/W disk or volume, from which the partition prefers to boot. The High-Availability Alternate (HAA) boot path is designed to point to the root mirror disk or volume. The Alternate (ALT) boot path is intended to point to an alternate medium, such as tape or DVD-ROM for disaster recovery.

Boot Paths

Each boot path has a path flag associated with it that controls boot actions. The possible states of the path flag are:

- 0 - Go to BCH: if this path is accepted, stop at the Boot Console Handler.
- 1 - Boot from this path; if unsuccessful, go to BCH.
- 2 - Boot from this path; if unsuccessful, go to the next path.
- 3 - Skip this path and go to the next path.

The boot flag is set using the BCH command PATHFLAGS.

Module 4 Booting a Superdome Partition

Examples:

Main Menu:> PATHFLAGS PRI 2 If the primary path is unbootable, go to the HAA.

Main Menu:> PATHFLAGS HAA 1 If the HAA path is unbootable, go the BCH

Boot Actions

Similar to the HP9000 servers, Superdome partitions have boot action settings. By default, **AutoStart** is **OFF**, causing the partition to stop at the BCH when a processor or DIMM fails self-test. When set to **ON**, the partition continues to boot, if any core cell's processor is available and can access at least 2Gbytes of memory. Use the BCH to control AutoStart.

Example:

Main Menu:> AU ON

Set in the BCH, **FastBoot** controls self-testing at boot time. HP recommends this action remain **ON**, but other options are **OFF** to run all testing, or a particular test (**PDH**, **EARLY**, **LATE**) can be set to **RUN** or **SKIP**. Use the BCH to control FastBoot, as modifying it from the ISL has no effect on partition self-tests.

Examples:

Main Menu:> HELP FASTBOOT Display option definitions.

Main Menu:> FASTBOOT ON Run all PDH self-tests.

Main Menu:> FASTBOOT RUN Run all partition self-tests.

Main Menu:> FB LATE SKIP Skip late self-tests.

The **BootTimer** sets the number of seconds a partition will wait for a boot device before timing out. Use the BCH to set the **BootTimer**.

Examples:

Main Menu:> BOOTTIMER 30 Timeout when the boot device doesn't respond in 30 seconds.

Core Cell

The core cell (sometimes referred to as the root cell) can boot the partition. This means it should be connected to an I/O chassis containing a core I/O board controlling a bootable device. A partition may have up to 4 core cells, identified in order of preference. Cells are given as global cell addresses. Core cells can be specified using either in the BCH or the HP-UX command **parmodify**.

Examples:

Main Menu:> CORECELL 0 Cabinet 0, cell slot 0.

HP-UX # parmodify -p1 -r 0 Cabinet 0, cell slot 0.

Any cell with the “**use-on-next-boot**” set to y may participate in the boot procedure. This is a cell attribute. Set the attribute using the HP-UX command **parcreate** or **parmodify**.

Examples:

HP-UX # parcreate -P “RDBMS Partition” -c 2:base:y:ri

Create a partition named “RDBMS Partition”; assign cell 2, the “y” setting use-on-next-boot.

HP-UX # parmodify -p1 -c 3:base:n:ri

In partition 1, set use-on-next-boot to “n”.

4-7. SLIDE: Boot Management Tools




Boot Management Tools

- Guardian Service Processor (GSP)
 - ◆ Partition reset
 - ◆ Ready-for-reconfig
 - ◆ TOC
 - ◆ power on/off
- Boot Console Handler (BCH)
 - ◆ Boot
 - ◆ Reboot
 - ◆ Boot parameters
 - ◆ Ready-for-reconfig
 - ◆ Configuration status
- HP-UX System Loaders
 - ◆ `isl - isl(1M)`
 - ◆ `hpux - hpux(1M)`
- HP-UX utilities
 - ◆ Boot options
 - ◆ Shutdown

Student Notes

The Guardian Service Processor (GSP) has commands available to reset, boot, reset-for-reconfig, TOC and cycle power on components of a partition. From the GSP, you can enter the Boot Console Handler (BCH) to boot or reboot a partition, set partition boot parameters, identify boot paths and flags, reset a partition for reconfiguration and display configuration status. Once the operating system is up, manpages are available in section 1M detailing commands and syntax in the **ISL** and **hpux**. HP-UX commands and utilities are available to the superuser for halting, rebooting and changing boot options in a partition.

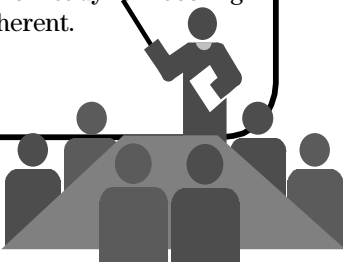
4-8. SLIDE: Poll



Poll

At boottime, a cell will remain in Boot-Is-Blocked state if:

- A. its use-on-next-boot is "n".
- B. its partition state is "ready-for-reconfig".
- C. its profile is incoherent.
- D. all of the above.




Polls are completely anonymous. When you see the Poll box, simply click once on the appropriate answer.

Student Notes

A cell stays blocked if it is not enabled to participate in the boot sequence. All cells in a partition stay blocked if the partition status is reset-for-reconfig. The cell is initially blocked during self-testing, which includes downloading the partition's profile from the GSP. If the GSP can't verify that a cell's partition profile is correct, the cell remains blocked from further booting. Therefore, the answer is D.

4-9. SLIDE: Boot and Reset Tasks



Boot and Reset Tasks

Task	GSP	BCH	HP-UX
Monitor Partition Boot	X		
Access Console and BCH	X		
Find Bootable Devices		X	
Boot beyond Boot-Is-Blocked	X		
Boot HP-UX		X	
Boot HP-UX Single-User		X	
Boot from Installation Medium		X	
Boot Partition to ISL		X	
Shutdown an HP-UX partition			X
Reboot or Reset a Partition	X	X	X
Reboot-for-Reconfig a Partition			X
Reset for Ready-to-Reconfig	X	X	X
TOC a Partition	X		
List Partition Settings		X	X
Set Partition Boot Paths		X	X
Set Partition Boot Options		X	

Student Notes

The chart on this slide lists the most common boot tasks and where those tasks can be accomplished. Following are some examples of each of these tasks using GSP commands, BCH commands and HP-UX commands, as appropriate.

Monitor a Partition Boot

GSP

Login to the GSP; administrators and operators have access to any VFP; users have access to only the VFP of the partition to which they are restricted.

GSP> VFP

Login to the GSP; administrators and operators have access to any partition's console; users have access to only the console of the partition to which they are restricted.

GSP> CO

Access Console and BCH

GSP

Login to the GSP; administrators and operators have access to any partition's console; users have access to only the console of the partition to which they are restricted.

GSP> CO

Find Bootable Devices

BCH

Login to the GSP; administrators and operators have access to any partition's console; users have access to only the console of the partition to which they are restricted.

GSP> CO

Main Menu:> SEARCH

Boot beyond Boot-Is-Blocked

GSP

Login to the GSP; administrators and operators have access to any partition's console; users have access to only the console of the partition to which they are restricted.

GSP> CM

GSP:CM> BO

Boot HP-UX

BCH

Login to the GSP; administrators and operators have access to any partition's console; users have access to only the console of the partition to which they are restricted.

GSP> CO

Main Menu:> BOOT PRI

Boot HP-UX to Single-User

BCH

Login to the GSP; administrators and operators have access to any partition's console; users have access to only the console of the partition to which they are restricted.

GSP> CO

Main Menu:> BOOT PRI

Do you wish to stop at the ISL prompt prior to booting? (y/n) >> Y

ISL> hpux -is /stand/vmunix # Boot to single user vg00 active

ISL> hpux -lm /stand/vmunix # Boot to single user vg00 NOT active

Module 4 Booting a Superdome Partition

Boot from Installation Medium

BCH

Login to the GSP; administrators and operators have access to any partition's console; users have access to only the console of the partition to which they are restricted.

```
GSP> CO  
Main Menu:> BOOT 0/0/2/0/0.13  
Do you wish to stop at the ISL prompt prior to booting? (y/n) >> n
```

Boot Partition to ISL

BCH

Login to the GSP; administrators and operators have access to any partition's console; users have access to only the console of the partition to which they are restricted.

```
GSP> CO  
Main Menu:> BOOT PRI  
Do you wish to stop at the ISL prompt prior to booting? (y/n) >> y  
ISL>
```

Shutdown an HP-UX Partition

HP-UX

Login to HP-UX as the superuser.

```
# shutdown -h now           # Halt immediately, no reboot  
# shutdown -r now          # Reboot immediately  
# shutdown -R now         # Reboot to ready-to-reconfig, reboot with new partition configuration  
# shutdown -R -H now      # Halt to ready-to-reconfig, no reboot
```

Reboot or Reset a Partition

GSP

Login to the GSP; administrators and operators have access to any partition's console; users have access to only the console of the partition to which they are restricted.

```
GSP> CM  
GSP:CM> RS
```

BCH

Login to the GSP; administrators and operators have access to any partition's console; users have access to only the console of the partition to which they are restricted.

```
GSP> CO  
Main Menu:> REBOOT
```

HP-UX

Login to HP-UX as the superuser.

```
# shutdown -r now           # Reboot immediately
```

Reboot-to-Reconfig a Partition

HP-UX

Login to HP-UX as the superuser.

```
# shutdown -R now # Reboot to ready-to-reconfig, reboot with new partition configuration  
# shutdown -R -H now # Halt to ready-to-reconfig, no reboot
```

Reset to Ready-to-Reconfig

GSP

Login to the GSP; administrators and operators have access to any partition's console; users have access to only the console of the partition to which they are restricted.

```
GSP> CM  
GSP:CM> RR
```

BCH

Login to the GSP; administrators and operators have access to any partition's console; users have access to only the console of the partition to which they are restricted.

```
GSP> CO  
Main Menu:> RECONFIGRESET
```

HP-UX

Login to HP-UX as the superuser.

```
# shutdown -R -H now # Halt immediately to ready-to-reconfig, no reboot
```

TOC a Partition

GSP

Login to the GSP; administrators and operators have access to any partition's console; users have access to only the console of the partition to which they are restricted.

```
GSP> CM  
GSP:CM> TC
```

List Partition Settings

BCH

Login to the GSP; administrators and operators have access to any partition's console; users have access to only the console of the partition to which they are restricted.

```
GSP> CO  
Main Menu:> PATH # Boot paths  
Main Menu:> CO # BCH configuration menu  
Configuration Menu:> AU # AutoStart flag  
Configuration Menu:> BOOTTIMER # Boottimer  
Configuration Menu:> CELLCONFIG # Cell config/deconfig  
Configuration Menu:> CORECELL # Core cell(s)  
Configuration Menu:> FASTBOOT # Self-test settings  
Configuration Menu:> PATHFLAGS # Boot actions for boot paths  
Configuration Menu:> MA # Return to BCH main menu  
Main Menu:> IN # BCH information menu  
Information Menu:> BOOTINFO # Boot configuration
```

HP-UX

Login to HP-UX as the superuser.

Module 4

Booting a Superdome Partition

```
# parstatus -V -p 1 # Verbose status of partition 1
```

Set Partition Boot Paths

BCH

Login to the GSP; administrators and operators have access to any partition's console; users have access to only the console of the partition to which they are restricted.

```
GSP> CO  
Main Menu:> PATH PRI 4/0/2/0/0.10.0 # Set the primary boot path  
Main Menu:> PATH HAA 4/0/2/0/0.9.0 # Set the HAA boot path
```

HP-UX

Login to HP-UX as the superuser.

```
# parmodify -p 1 -b 0/0/4/0/0.8.0 -s 0/0/4/0/0.9.0  
# Set the primary and HAA boot paths
```

Set Partition Boot Options

BCH

Login to the GSP; administrators and operators have access to any partition's console; users have access to only the console of the partition to which they are restricted.

```
GSP> CO  
Main Menu:> PATHFLAGS PRI 2 # If boot from primary unsuccessful  
# try HAA boot path  
Main Menu:> PATHFLAGS HAA 1 # If boot from HAA unsuccessful  
# go to BCH
```

4-10. SLIDE: Rebooting a Partition after Partition Reconfiguration



Rebooting a Partition after Partition Reconfiguration

- HP-UX commands

```
# /sbin/shutdown -R now
    • reboot to ready-to-reconfig

# /sbin/shutdown -R -H now
    • halt to ready-to-reconfig

# /sbin/reboot -R now
    • reboot to ready-to-reconfig
    • reboot doesn't run kill scripts
```


Student Notes

A partition's configuration is called its profile. Along with the complex profile, partition profiles are stored in the GSP. At boot time, the partition's profile is downloaded to each cell in the partition and verified as coherent by the GSP before the cell can proceed beyond Boot-Is-Blocked status. To make a partition change take effect, the partition must be rebooted with a unique status – ready-to-reconfig. This is only required for the Superdome, as it's the only platform to support hardware partitions (nPartitions).

The HP-UX commands `/sbin/shutdown` and `/sbin/reboot` have new options (`-R`, `-H`) in 11i. The `-R` option on either command brings down HP-UX and sets the partition to ready-to-reconfig, allowing the new configuration to take effect, and reboots the operating system. When used in conjunction with `-H`, the operating system does not reboot. The `-H` can't be used without the `-R`.

Note: `/sbin/reboot` does not run the shutdown kill scripts.

4-11. SLIDE: Resetting a Partition



Resetting a Partition

- GSP

```
GSP> CM
GSP:CM> RS
```

- BCH

```
GSP> CO
Main Menu:> RESET
```

- HP-UX

```
# /sbin/shutdown -r now
# /sbin/reboot -r now
```

Student Notes

Resetting a partition means to reset all active cells and reboot past partition rendezvous. Partition rendezvous happens during the boot process, after self-test. All cells enabled to participate in the boot process (use-on-next-boot = y) synchronize to form the partition. The partition forms when all these cells report to the rendezvous, or ten minutes elapses, whichever comes first.

Resetting can be done from the GSP, BCH or by a standard reboot from the operating system running on the partition.

4-12. SLIDE: Resetting a Partition to Ready-to-Reconfig



Resetting a Partition to Ready-to-Reconfig

- GSP

```
GSP> CM  
GSP:CM> RR
```

- BCH

```
GSP> CO  
GSP:CM> RECONFIGRESET
```

- HP-UX

```
# /sbin/shutdown -R now  
# /sbin/shutdown -R -H now  
# /sbin/reboot -R now  
# /sbin/reboot -R -H now
```

Student Notes

Resetting a partition to ready-to-reconfig status means the operating system is brought down, all cells in the partition are reset (active or inactive), the partition changes are recorded in the GSP, and all cells are set to Boot-Is-Blocked and inactivated. This enables the new partition configuration to take effect at the next reboot.

In addition to the HP-UX commands discussed earlier, a Reset to ready-to-reconfig can be done from either the GSP or the BCH.

4-13. SLIDE: Sending a TOC to a Partition



Sending a TOC to a Partition

- Partition, not complex
 - ◆ GSP:CM> TC
- Crash dump
 - ◆ HP-UX configuration
 - ◆ Type selection
- Progress status from console

Student Notes

Sending a Transfer of Control (TOC) signal to HP-UX causes it to immediately shutdown, reboot and create a crash dump as configured. A TOC is sent to the selected partition, not to the complex. In HP9000 servers and workstations, this can be done from the console or by pressing a hardware switch. Since there is no physical TOC on a Superdome, sending a TOC to a partition is done through the GSP. Access the partition's console through the GSP and BCH to monitor progress of the crash creation and reboot.

4-14. SLIDE: Review Module Objectives



Review Module Objectives

Now you are able to:

- ✓ List the booting issues on Superdome servers
- ✓ List the steps in the Superdome boot process.
- ✓ Configure boot-related settings.
- ✓ Boot a partition.
- ✓ TOC a partition.
- ✓ Reset a partition.

Student Notes

Module 4
Booting a Superdome Partition