# IBM zEnterprise: HMC



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## IBM zEnterprise Hardware Management Console/SE


- *How is the Role of the HMC Changing?*
- *What is new*
- *Models Supported*
- *Changes on Classic View*




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## How is the Role of the HMC Changing?

- **Prior to the ensemble management functions in z196, HMC availability was not a critical concern**
  - HMC was not the authoritative holder of any configuration or state information other than configuration info for the HMC itself
  - HMC was not involved in any flows supporting ongoing operation other than call-home, for which redundancy was provided
  - You could turn the HMC off and there would be no effect on operations of the managed systems
- **Addition of ensemble-related function in z196 changes this:**
  - The HMC will now be authoritative holder of some ensemble-scoped configuration not held by any of the Nodes in the ensemble
  - Some configuration actions will be available ONLY from the HMC managing the ensemble, not the SE
  - HMC will have a role in monitoring of Workload performance
- **This change in role drives a need to provide some additional redundancy in the HMC configuration to improve availability**

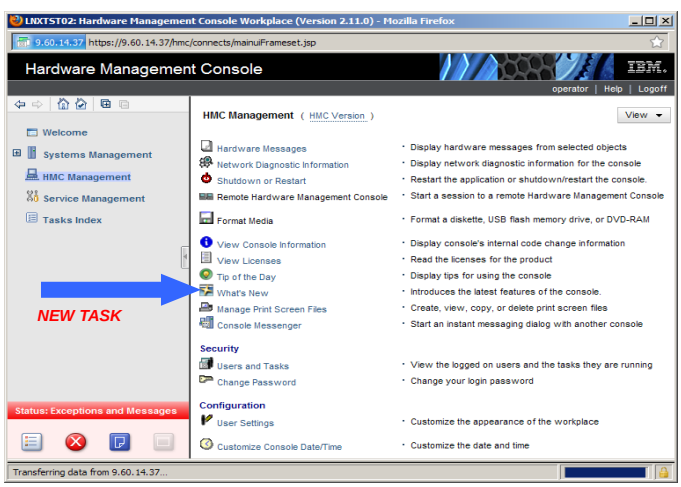
## What is new

- Backups to a USB key
- Updates to the Classic Console actions view
- Updates to the Tree view
- User Templates and Patterns that a allow a generic pattern to automatically generate a User Profile
- Updated SAD displays
- Environmental Efficiency statistics tasks
- Updates to the Change LPAR controls.
- The HMC can become part of an Ensemble (a pair of HMCs is required for this)



## What's New Wizard?

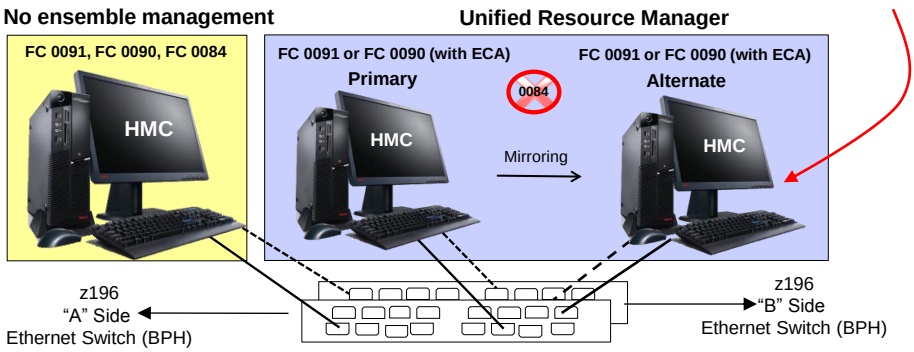
- **A simple wizard which describes new features available on the HMC for each release**



## z196 and HMC's

New HMC

- New HMC feature Code 0091, New Switch feature code 0070
- Additional HMC's required for Unified Resource Manager and z196 zBX (if installed)
- Alternate HMC used for Unified Resource Manager is allocated for backup purposes only, cannot be used for daily HMC activities. Consider the need for additional HMC's (command center, computer room, etc).




**New Switch FC 0070, multiple switches required for redundancy**

IBM Hardware Management Console Feature Codes 0084, 0090, and 0091 can all be used on the z196
See next slide for requirements



## z196 HMC Considerations

- **Ensemble creation**
  - Requires two installed z196 HMCs for Unified Resource Manager
    - One must be designated for the Primary Unified Resource Manager
    - The other must be designated as Alternate for the Unified Resource Manager
  - Adding z196 Nodes to the Ensemble does NOT increase this requirement
  - The HMC retains all base HMC capabilities
- **New Build HMC – FC #0091**
  - FC #0091 is capable of running the Unified Resource Manager as shipped
- **Carry Forward HMC – FC #0090** An ECA (Engineering Change Authorization) is available to upgrade the HMC application and HMC memory to 5 GB
    - ECA ships automatically if FC #0090 is carried forward from z9 or z10
    - ECA is orderable by IBM Service to upgrade FC #0090 still "owned" by a z10
  - Upgraded FC #0090 is capable of running the Unified Resource Manager
- **Carry Forward HMC – FC #0084**
  - An ECA is available to upgrade the HMC application and HMC memory to 5 GB
    - ECA ships automatically if FC #0084 is carried forward from z9 or z10
    - ECA is orderable by IBM Service to upgrade FC #0084 still "owned" by a z10
  - Upgraded FC #0084 is NOT capable of running the Unified Resource Manager

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## Support Element

- Support Element T510 ThinkPad
  - Pentium i5-540M (2.53GHz) Quad Core
  - 15.6" 1366x768 LCD Backlit Display
  - 160GB SATA DASD 7200RPM FUJITSU Extended Duty
  - 4GB Total Memory (2x 2GB DIMM)
  - 10/100/1000 Ethernet LOB
  - CD-RW/DVD-RAM Ultrabay Drive





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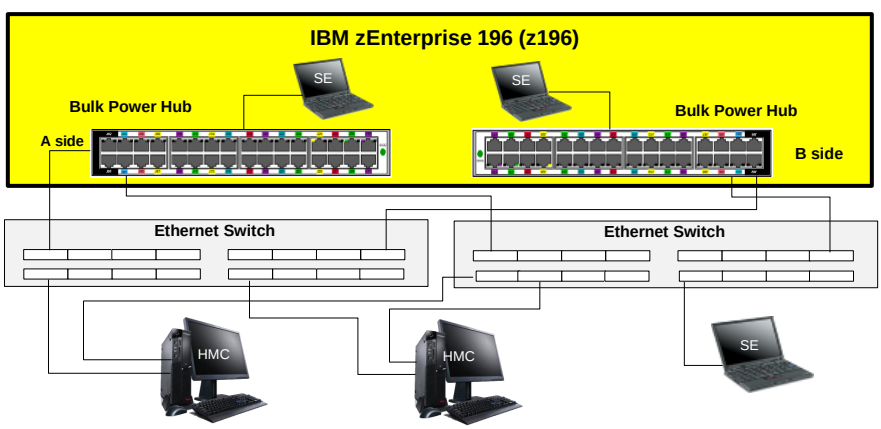
## SE and HMC Network Connections




- **z196 SE is always connected to the Bulk Power Hub**
- **Switches are connected to J01 and J02 on the Bulk Power Hubs (two switches recommended)**
- **Other Server's SEs (not the z196) may be connected to switches**

## Driver Levels

| Machine Family | Machine Type Number | Firmware Driver | SE Version Number |
|---|---|---|---|
| z11 EC | 2817 | 86 | 2.11.0 |
| z10 EC | 2098 | 79 | 2.10.2 |
| z10 EC | 2097 | 79 | 2.10.2 |
| z10 EC | 2098 | 76 | 2.10.1 |
| z10 EC | 2097 | 76 | 2.10.1 |
| z9 BC | 2096 | 67 | 2.9.2 |
| z9 EC | 2094 | 67 | 2.9.2 |
| z890 | 2086 | 55 | 1.8.2 |
| z990 | 2084 | 55 | 1.8.2 |
| z800 | 2066 | 3G | 1.7.3 |
| z900 | 2064 | 3G | 1.7.3 |
| 9672 G6 | 9672/9674 | 26 | 1.6.2 |
| 9672 G5 | 9672/9674 | 26 | 1.6.2 |




## New SMC Switch

- In the past 10/100 Mbps autosensing switch
- HMC and BPH customer network ports (J01 and J02) now support 1000Mbps
- New 16 port 1000 Mbps autosensing switch (SMC SG16) shipped when ordered

LED Indicators on the switch


## Port Status

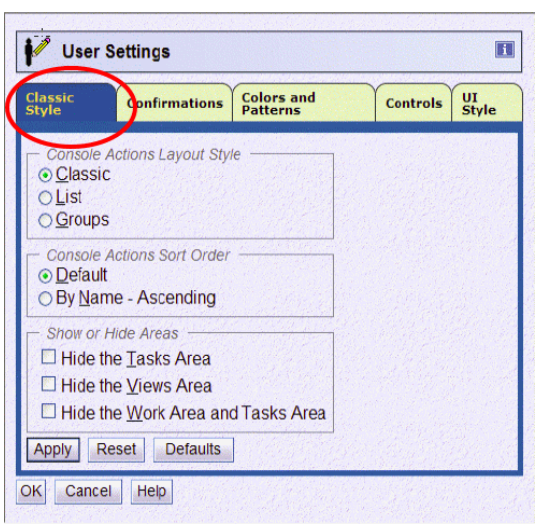
| Port status LEDs | | |
|---|---|---|
| **Link/Act** | **ON** | **The Port has established a valid network connection** |
| | **OFF** | **The Port has not established a valid network connection** |
| | **Flashing** | **Traffic is passing through the port.** |
| **100/1000M** | **On Green** | **operating at 1000 Mbps** |
| | **On Yellow** | **operating at 100 Mbps** |
| | **Off** | **operating at 10 Mbps** |

- Ports on the SMC switch are Autonegotiate
- BPH and the HMC ports are also set to autonegotiate
  - Link will come up at 1000gbp Full duplex




## Classic View Update

- Action area updated
- New tab allows change from classic to traditional
- Traditional displayed when
  - Console Action Layout Style is Classic
  - Console Action Sort Order is Default
- Can be changed by right click in Console Work Area



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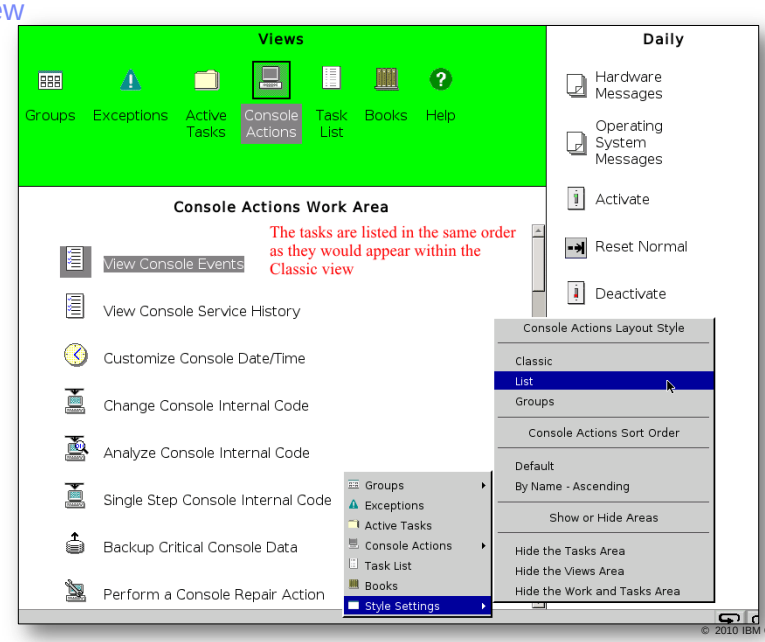
## List View





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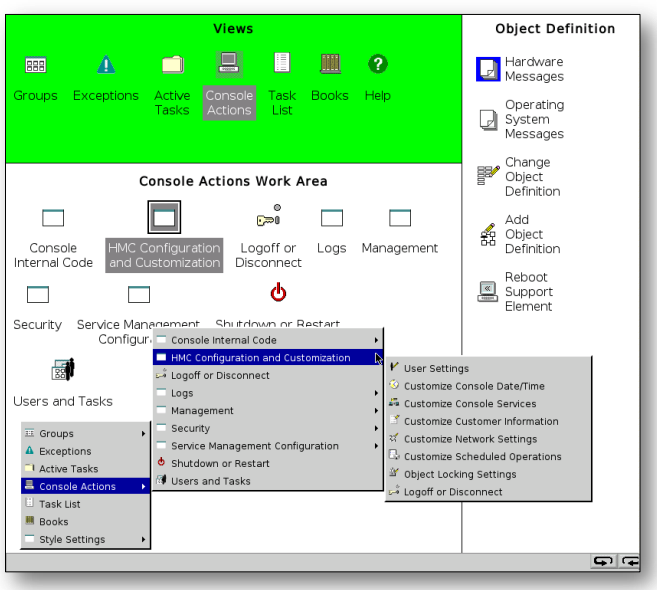
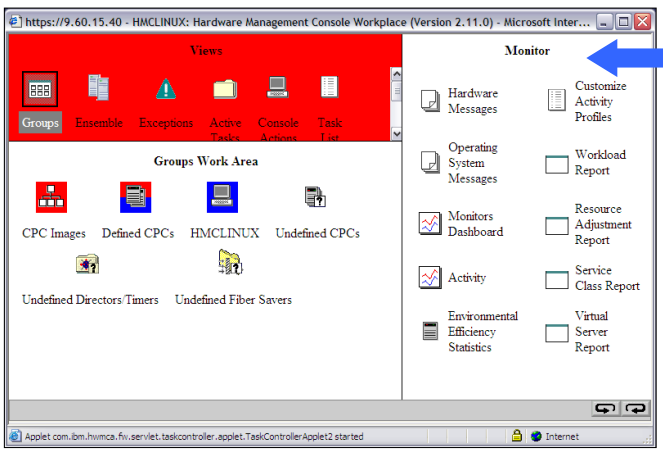
## Group View

- Creates a collection of tasks and group them
- Right click to list tasks in the group
- Console Action selected
  - Lists the groups
  - Lists the tasks



## New Task Group

- **New Task Group**
  - A new task group (“Monitor”) was created to hold “monitoring” related tasks. Some existing tasks (like Activity) have been moved to this group plus new tasks are being added. Added to both HMC and SE.



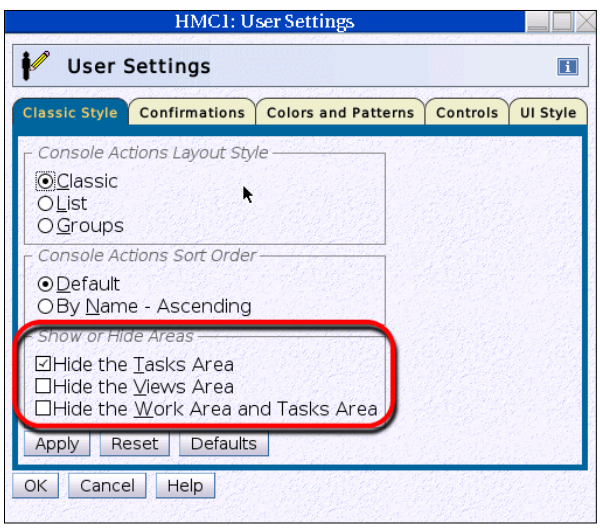

***NEW TASK GROUP***





## Hiding Views

- Three options to hide
  - Task Area
  - View Area
  - Work and Task Area



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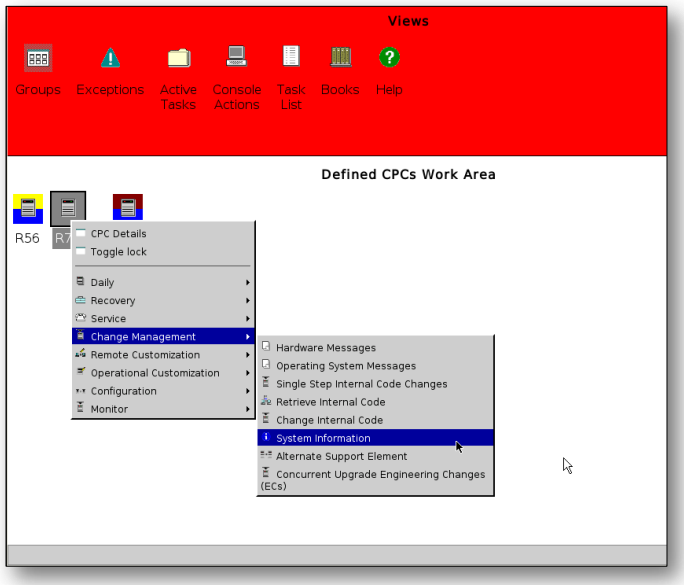
## HMC with the Tasks area hidden.





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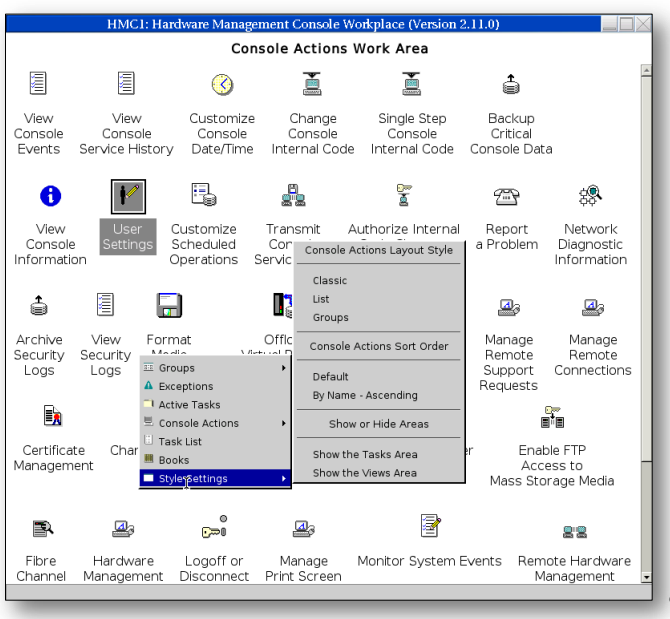
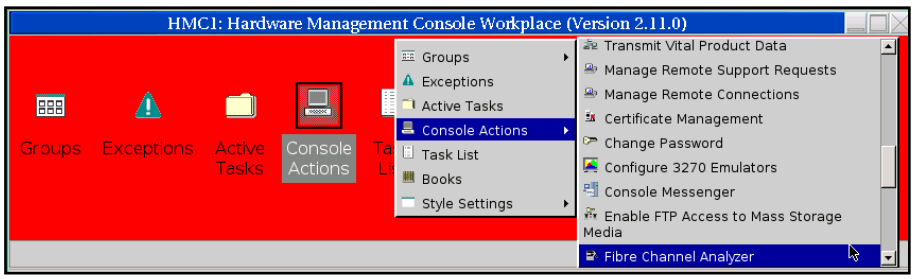
## HMC with the Views and Tasks area hidden



## Work and Task Area Hidden




Possible to launch task form context menu




## View Only USERIDs

- New option of creating a "view only" user ID
- Accomplished when creating a new role
  - Tasks assigned
    - Prompted for view mode
- Eligible tasks
  - Hardware Messages
  - Operating System Messages
  - Customize/Delete Activation Profiles
  - OSA Advanced Facilities
  - Configure Channel Path On/Off

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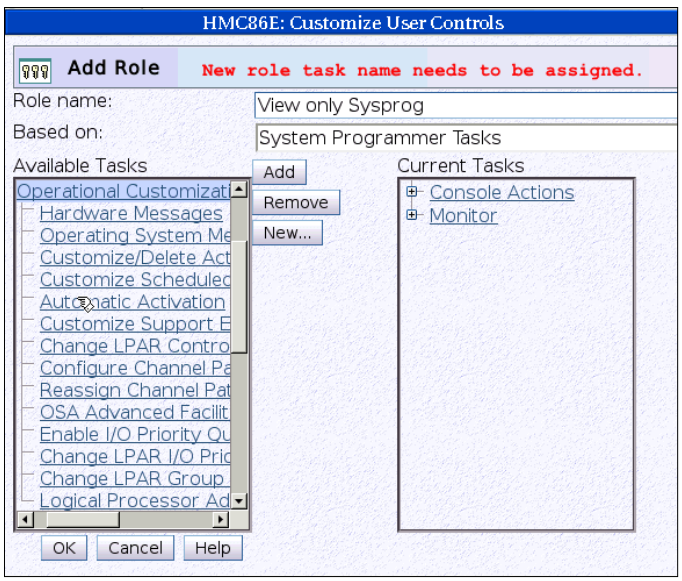
## Creating a view only task role based on Sysprog





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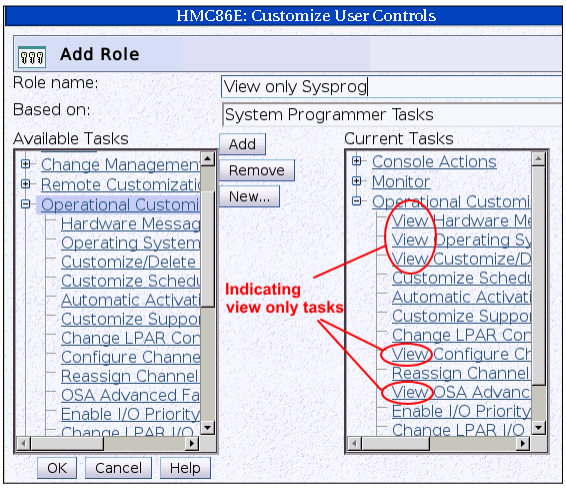
## Messages after Adding Tasks


- Operational Customization task list added
  - Prompts for each task that is eligible for view mode.

## Assigning View Only Roles

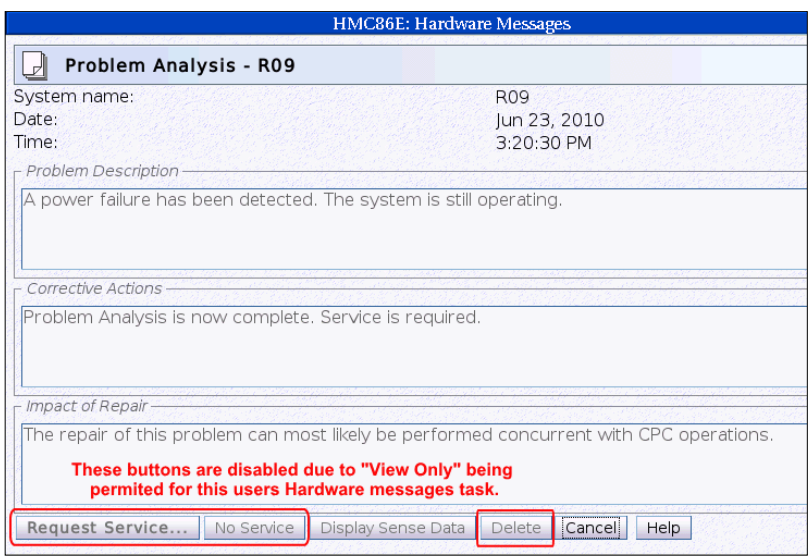
- View only task are prefixed with a "view“
- New user added pointing to this new role



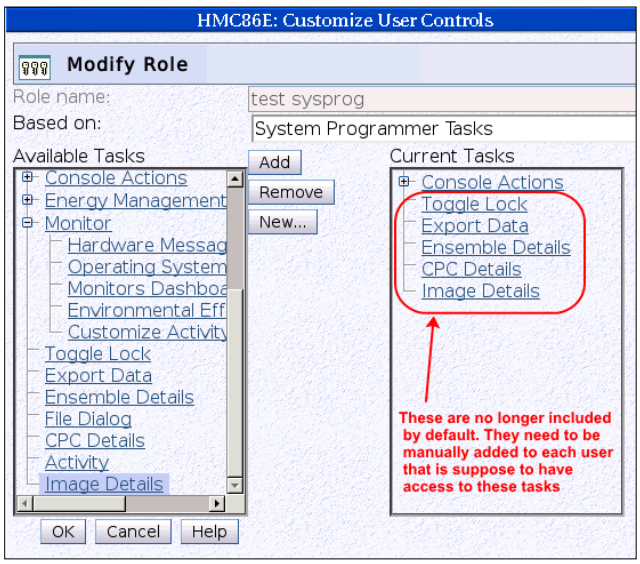





## Example of a view only Hardware message



## Control over Toggle Lock and Details Tasks








## HMC User ID Templates

- Customers have requested the ability to manage adding/removing HMC users utilizing their own corporate security environment. They prefer an approach where an LDAP server is the central authority for saying which users have access to an HMC.
- In z196 this ability was added using the LDAP User Authentication support and HMC User ID templates.
  - Each HMC User ID template defines the specific levels of authorization levels for the tasks/objects for the user mapped to that template.
  - The HMC User is mapped to a specific User ID template by
    - User ID pattern matching and/or
    - Obtaining the name of the User ID template from content in the LDAP Server schema data
- Enhancements to the HMC and SE included:
  - Add support for defining “userid patterns”. A userid pattern encapsulates all the information needed to deduce, when an “unknown” userid tries to log on that a temporary user definition should be created, and the information needed to create the temporary user definition.
  - Add support for defining user template definitions. A template definition is used to prime a temporary user definition when a userid that is logging on matches a userid pattern.
  - Enhance logon processing to use the userid pattern and template definitions

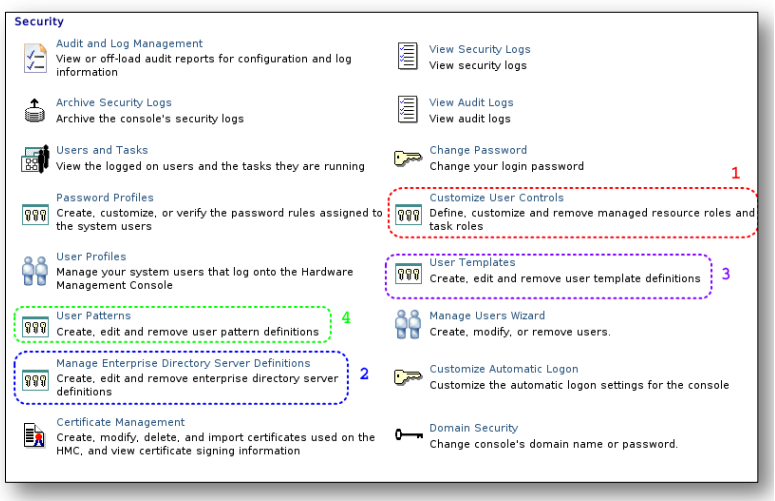
## User Patterns

- Need for increased security
- User's must be identified
- Difficult to manage from HMC
- Exploit User authentication
- Implemented using two task in HMC
  - User Template
    - Similar to User profiles
    - Used to define characteristics
    - If ID matches pattern template is used
  - User Pattern
  - User ID dynamically generated in HMC
- To define a customized user template
  - Create profiles using Customize User Controls
    - Limited access Managed Resource Role
    - Limited Task Role




## Steps to define

- Create a Customized User controls profile
  - Not a new task
  - Configured the same way as User profile
- Define access to at least 1 LDAP server
- Generate the User Template(s)
- Configure the User Pattern



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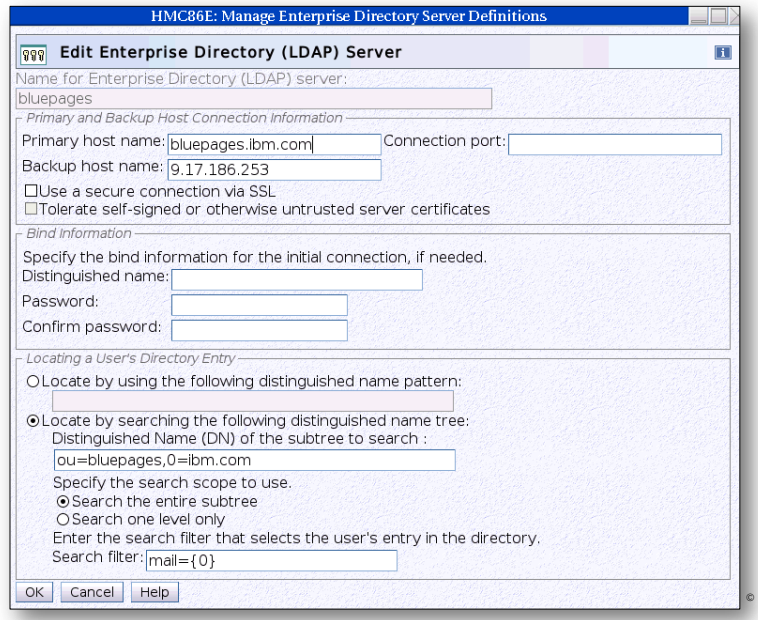
## Defining LDAP server





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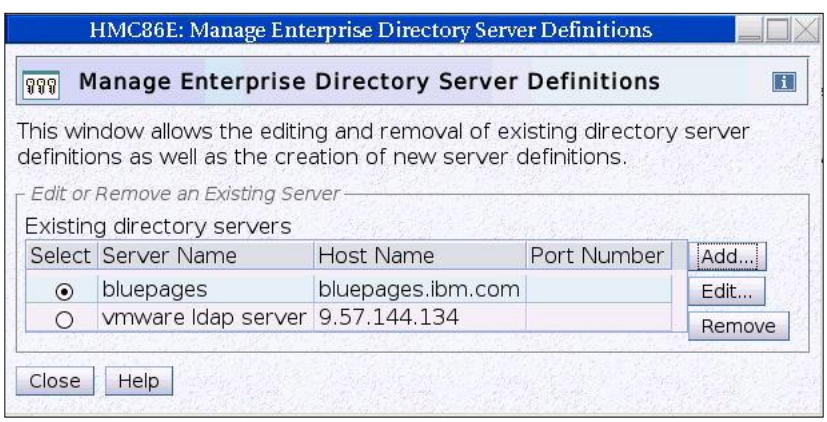
## Manage LDAP Definition



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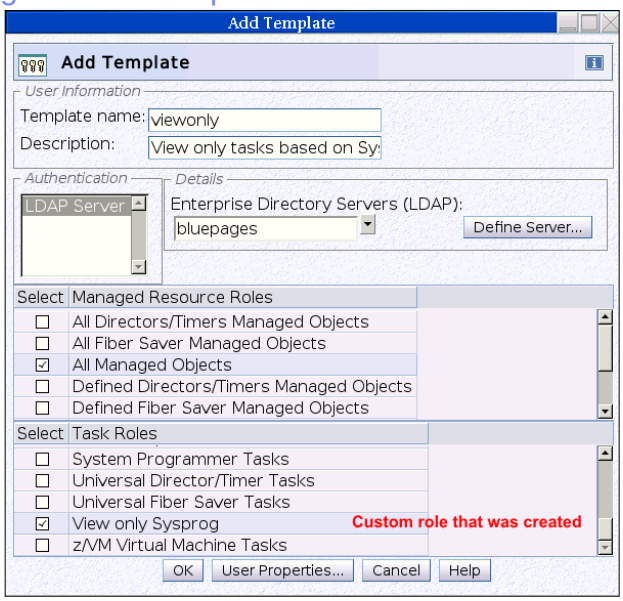
## Generating the User templates





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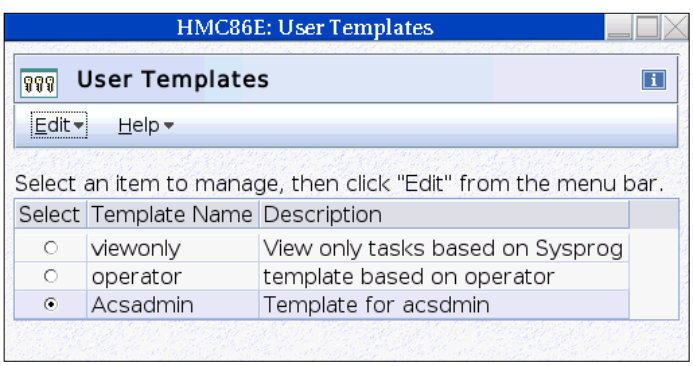
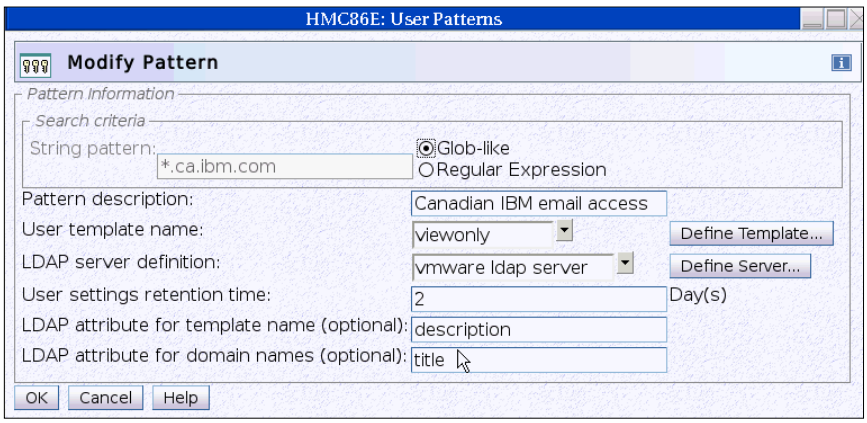
## User Templates




At least one template is required

## Generate a User Pattern



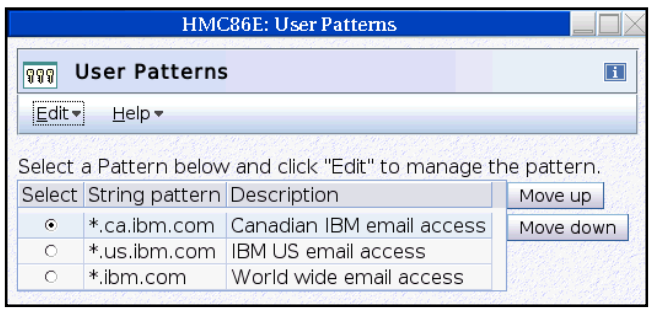





## String Pattern

- Two formats can be used
  - Glob-like
    - Refer to an instance of pattern matching behavior
    - Used in file name matching
    - Simpler to use
  - Regular Expression
    - Concise  means for matching strings of text
    - Widely used in programming
    - Allows for complex patter matching
  - Main difference is ‘Any Single Character’
    - ?  Glob-like
    - .  Regular Expression

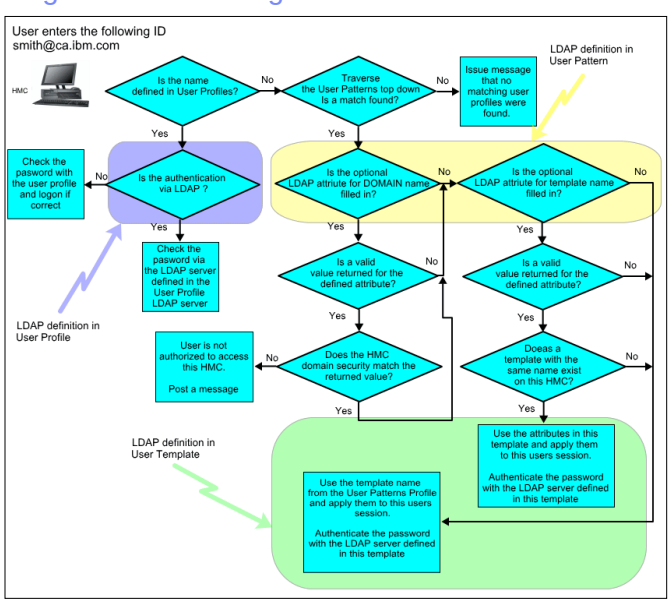
## User Patterns



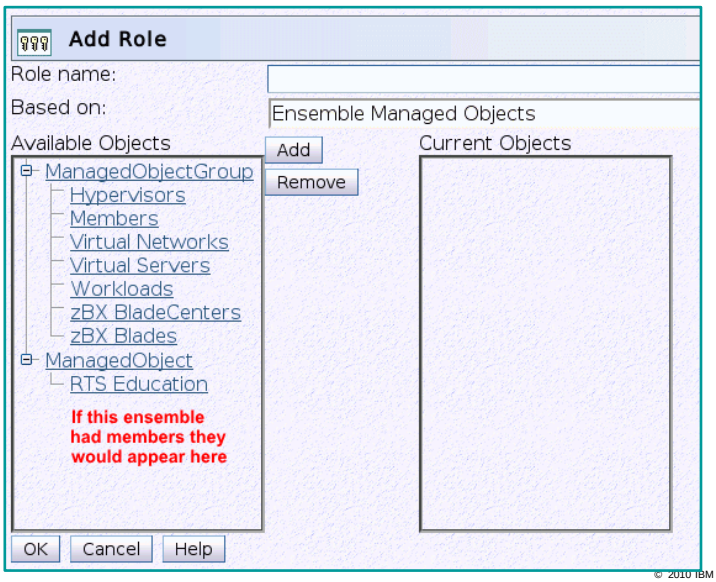

- At logon ID checked against defined User Profiles
- If no match User Pattern checked in order
  - Order is important
  - First match used




## User Logon Flowchart Logic



## New Ensemble Role and Task








## HMC/SE Security Improvements

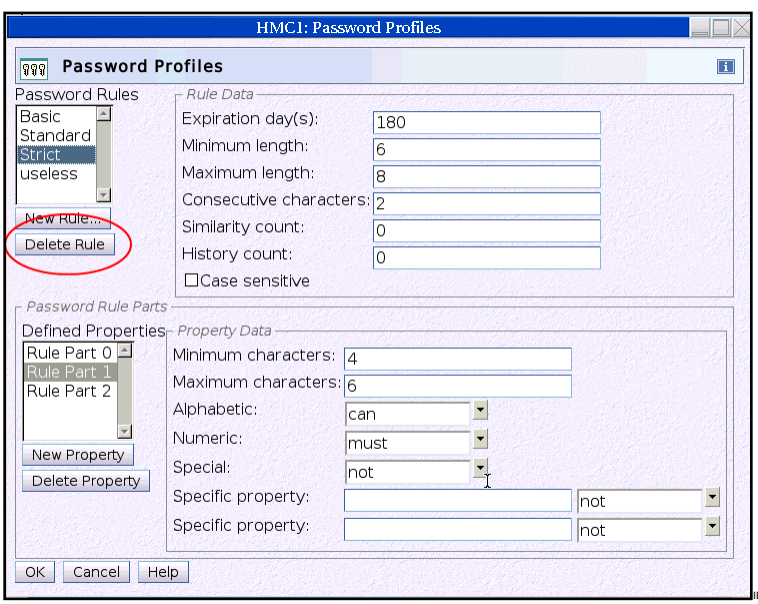
- **HMC/SE Security Improvements**
  - Customers are increasingly required to be able to demonstrate the security and auditability of IBM products. IBM products already provide all of the necessary security controls and audit trails, but there is no easy way for our users to be able to quickly view and/or offload all of this information.
  - In z196 the customer will see the following enhancements:
    - A new Audit & Log Management task was added to the access administrator to allow for audit reports to be generated, viewed, saved, and offloaded.
    - The Customize Scheduled Operations task was enhanced to allow for scheduling of audit report generation, saving, and offloading.
    - The Monitor System Events task was enhanced to allow for Security Logs to result in email notifications using the same type of filters and rules that are used for both hardware and operating system messages.
    - The Password Profiles task was altered to allow for the removal of pre-defined password rules by the access administrator.
    - The SNMP and CIM APIs was enhanced to allow user ID audit reports to be generated and retrieved.

## History Logs for Customer Audits

- **Offload Support for Customer Audit**
  - In z196 the ability to offload the following HMC and SE log files was added:
    - Console Event Log
    - Console Service History
    - Tasks Performed Log
    - Security Logs
    - System Log
  - Full log offload as well as delta log offload (since last offload request) is provided.
  - Offloading to removable media as well as to remote locations via FTP is available.
  - The offloading can be manually initiated via the new Audit & Log Management task or scheduled via the Scheduled Operations task.
  - The offloaded data is available in two forms:
    - human (HTML) readable
    - machine (XML) readable
  - The existing Format Security Logs to DVD-RAM task is redundant with these enhancements and was removed from the HMC.



## Password Profiles



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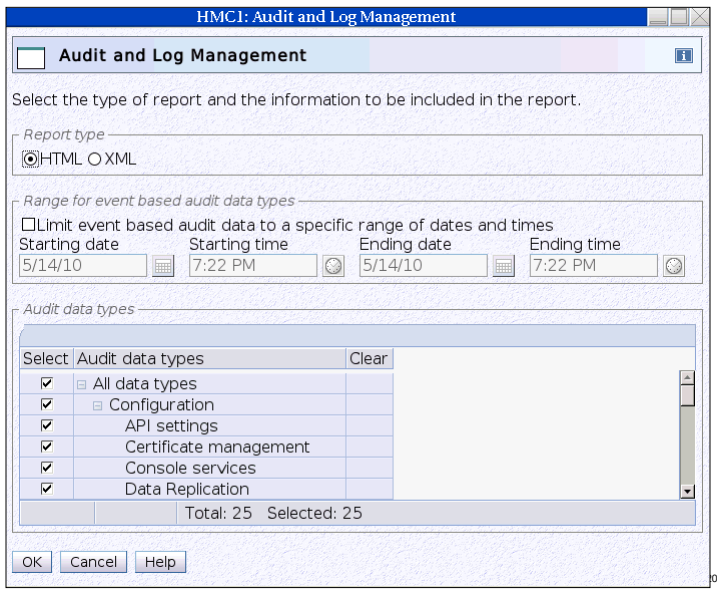
## Audit and Log Management





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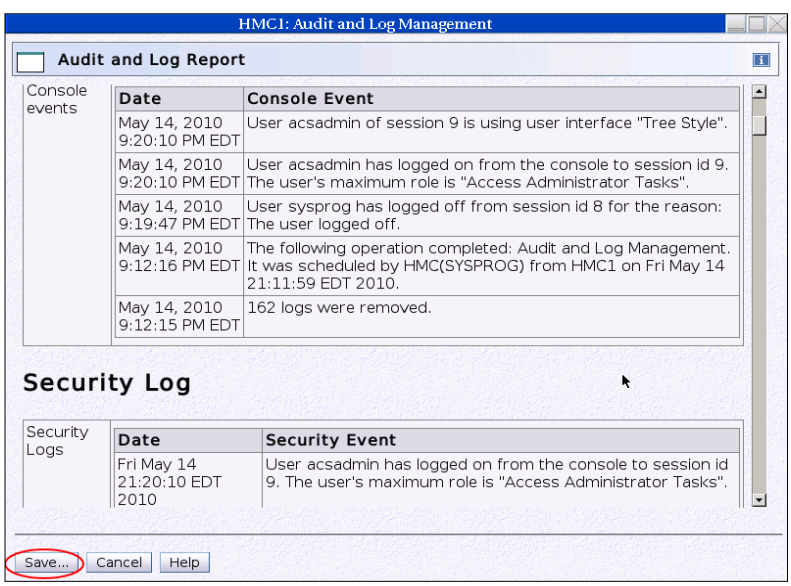
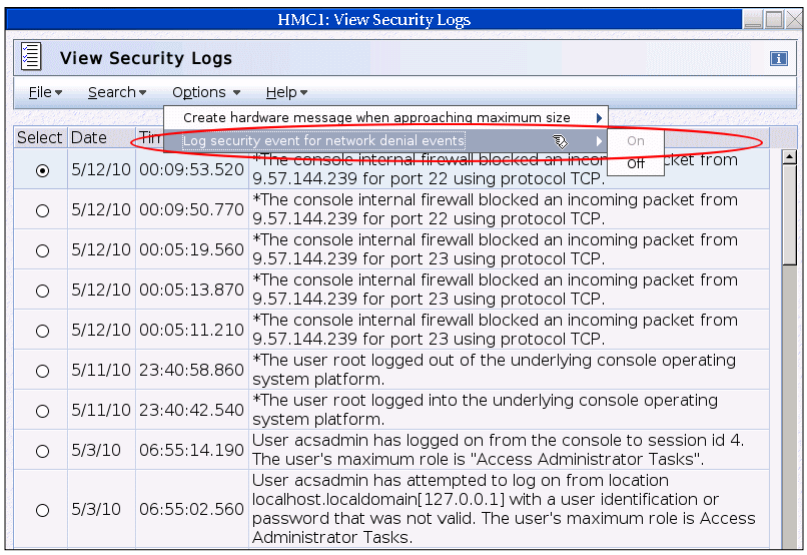
## Audit and Log Report



## View Security Logs







## z196 Environmental Efficiency Statistic Task

- **Environmental Efficiency Statistic Task**
  - Part of a new “Monitor” task group
  - Today the Active Energy Manager (AEM) plugin for the IBM Director includes the ability to show historical power consumption and thermal information. Customers have requested similar capability on the HMC. This task will provide similar data along with a historical summary of processor and channel utilization.
  - The data will be presented in table form, graphical (“histogram”) form and it can also be exported to a Comma Separated Value (CSV) file so that it can be imported into customer tools like Microsoft® Excel or Lotus 1-2-3.
  - The New Task is only usable with z196 GA1 and higher CPCs
  - Data is kept on the SE and should be large enough to store at least one-two years worth of data.
  - The maximum time period that can be shown at one time is one week; however the user can go forward and backward

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## z196 SAD Enhancements

- **SAD Re-Engineering**
  - In z196 a new “Monitors Dashboard” task was added to the Monitor task group.
    - It provides a tree-based view of resources in the IBM System z
    - Allows a user to view aggregated activity when looking at large configurations
    - Also allows for more detail for objects with smaller scope
    - Supports new graphical ways of displaying data such as history charts
    - Incorporates data from other sources such as eWLM



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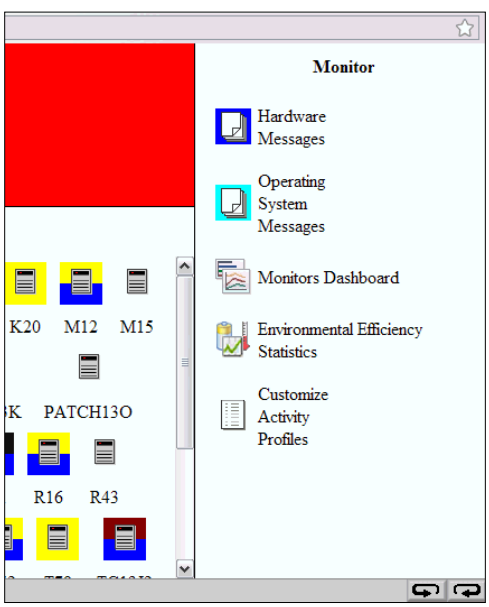
## Monitor Task List

- Customize Activity Profile moved from Operational Customization task to Monitor List task
- Activity task removed from Daily task
- Monitor Dashboard used to launch classic SAD or new dashboard



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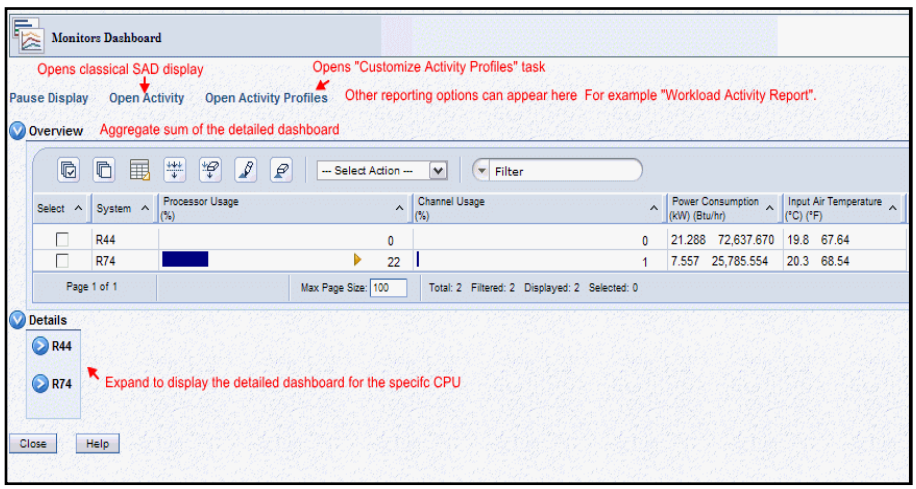
## Monitor Dashboard





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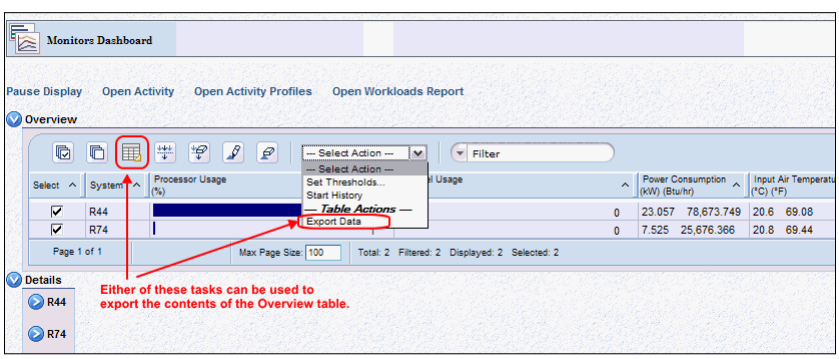
## Export Data



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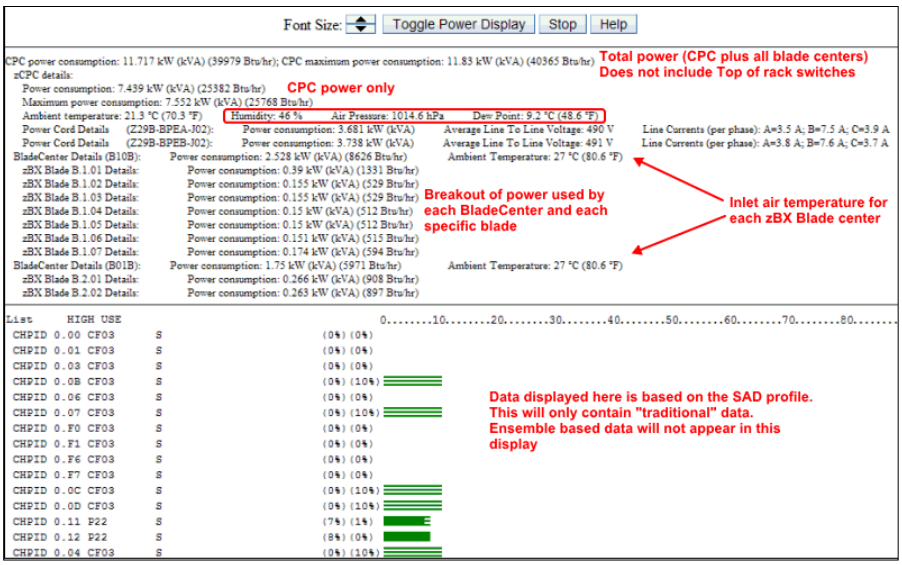
## Classic SAD Display – Service Logon







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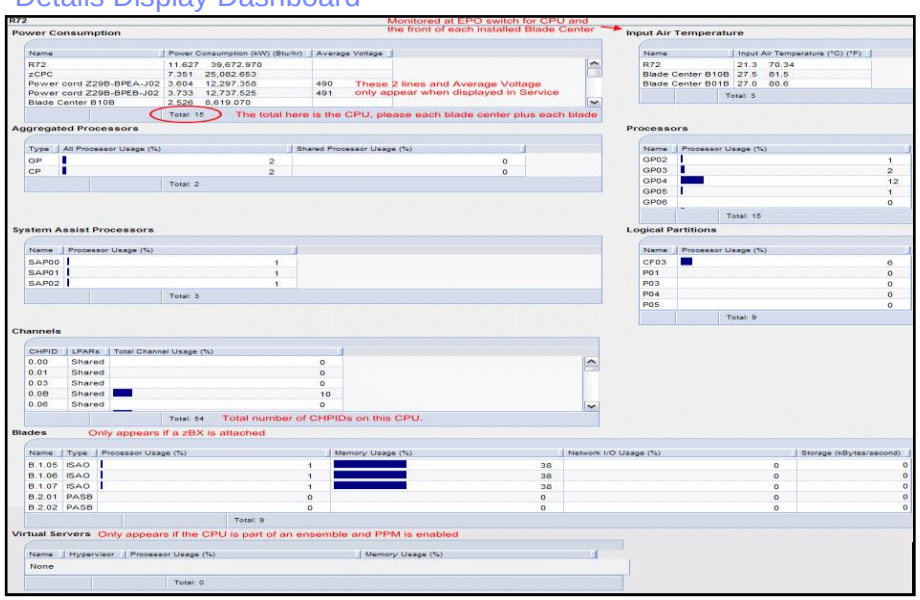
## Details Display Dashboard



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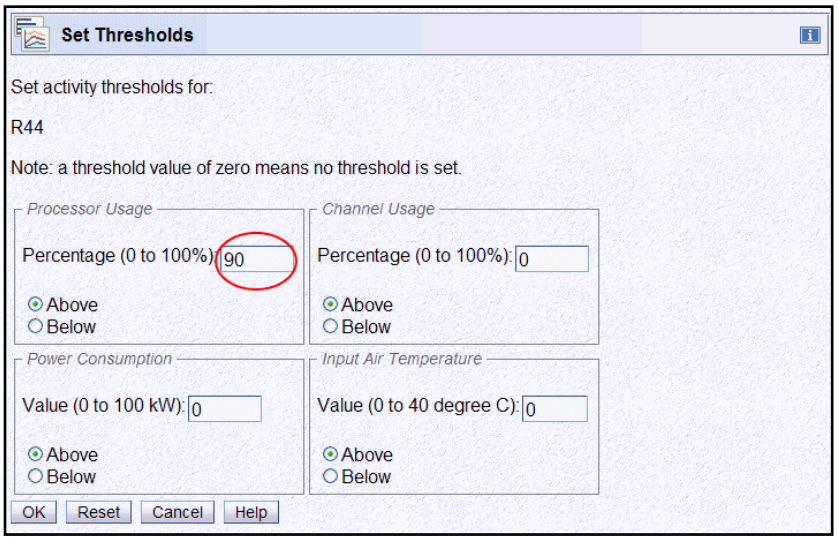
## Setting Dashboard Thresholds





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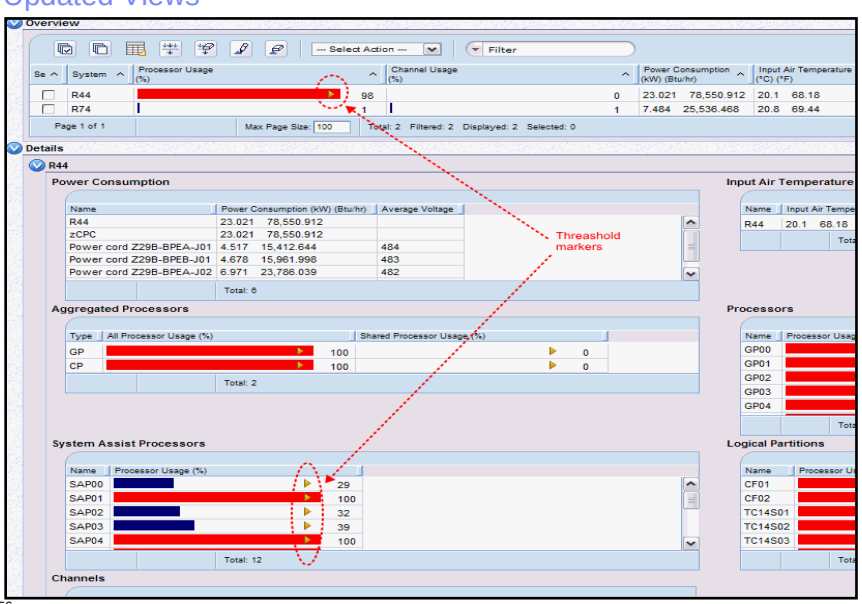
## Updated Views



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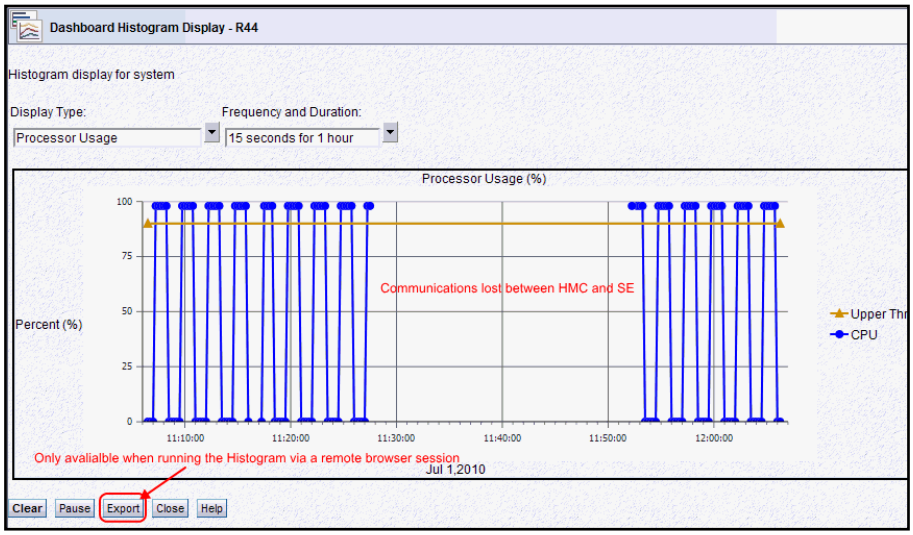
## Histogram Display





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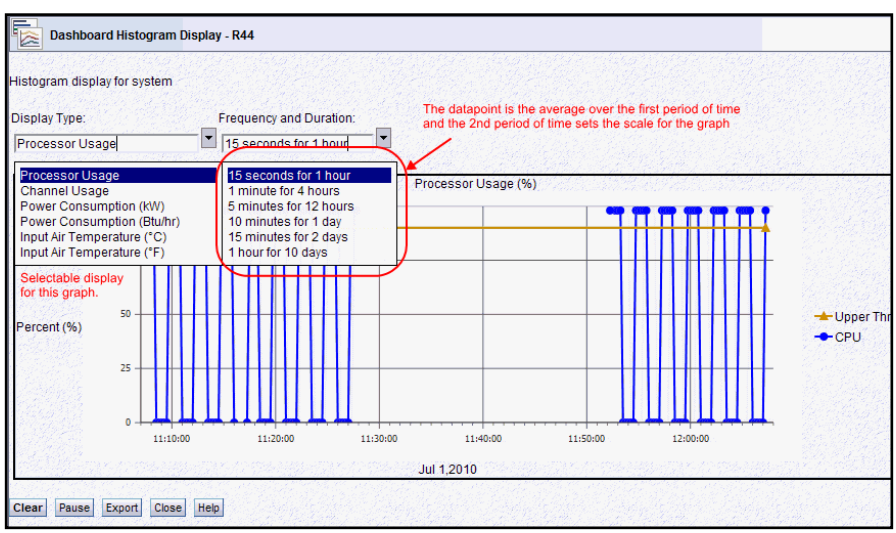
## Histogram Display Options



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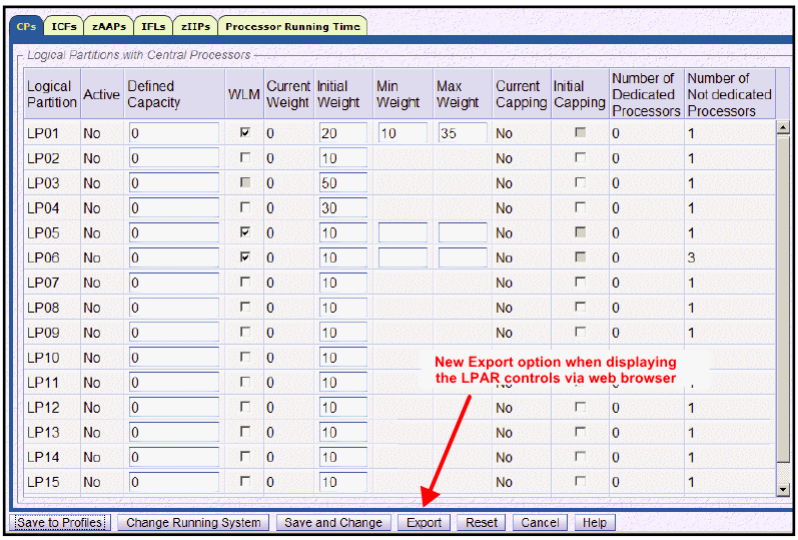
## Miscellaneous Updates to HMC/SE

- Update to Change LPAR Control





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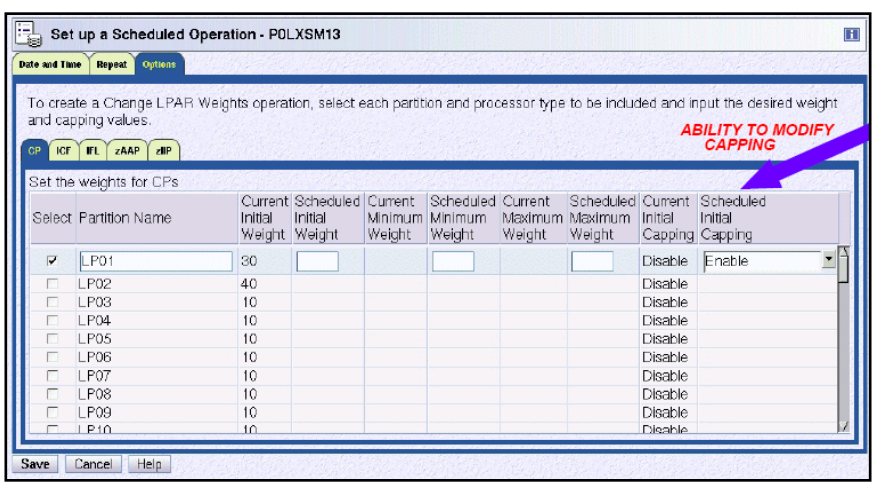
## Miscellaneous Updates to HMC/SE ….

- Initial Capping Schedule (SE only)



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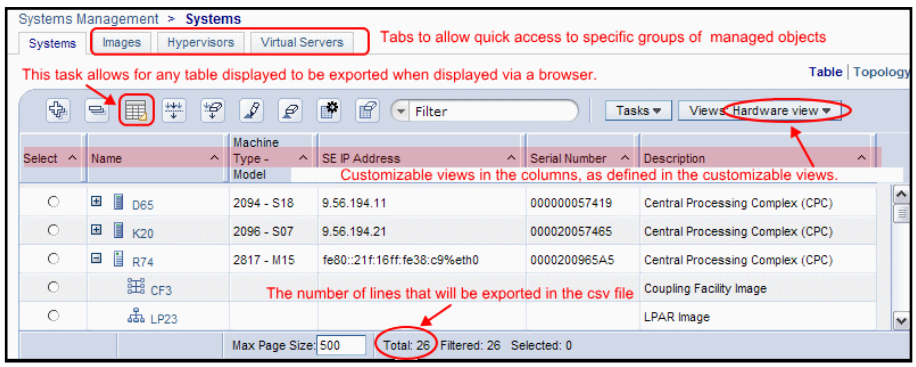
## Miscellaneous Updates to HMC/SE ….

- Improvements to the Tree Style Display





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Miscellaneous Updates to HMC/SE ….

- **ETR Function Removal and Pulse per Second Diagnostic Support**
  - z196 relies solely on STP for time synchronization. It contains a Starlight card which does not have a fiber optic connector to attach to a Sysplex Timer, but continues to provide support of a Pulse per Second (PPS) port.
  - The System (Sysplex) Time task was updated to:
    - Remove the ETR Status and ETR Configuration tabs when the target is a z196.
    - Allow an ETR ID to be entered on the STP Configuration tab when system is a z196 to support participation in a Mixed CTN.
    - Support display of PPS port state.
    - Provide support to reset an individual fenced PPS port.
    - Invoke a PPS test mode function via a new Test pushbutton (PE/CE mode only)

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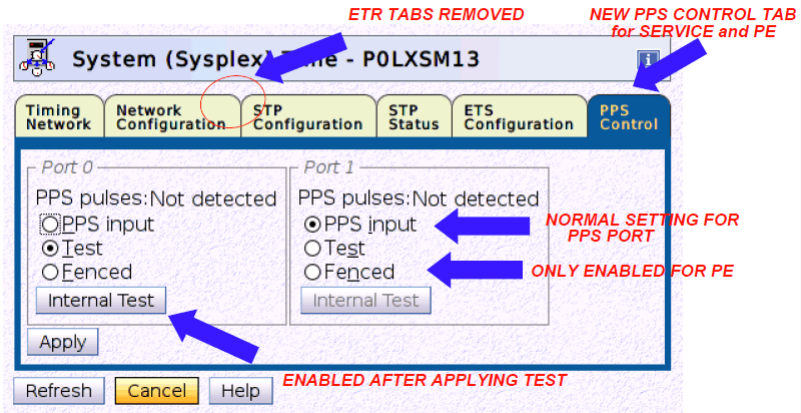
## Miscellaneous Updates to HMC/SE ….

- **ETR Function Removal, Pulse Per Second Diagnostic Support, Thresholds**





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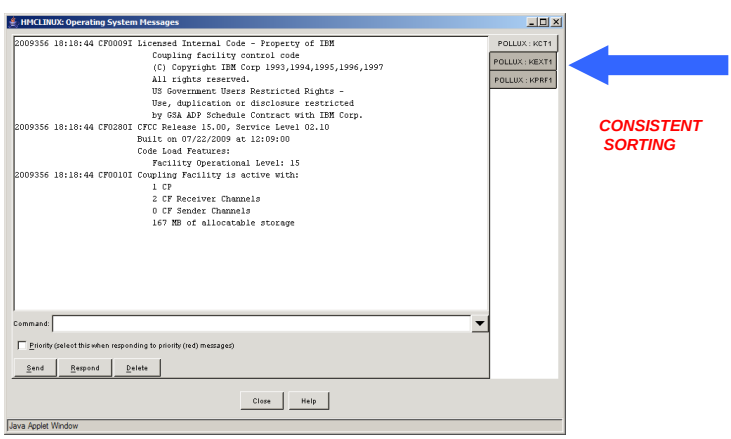
## Consistent Sorting for Operating System Messages

- Consistent Sorting for Operating System Messages
  - In the OS/2® based HMC/SE the Operating System Messages Task arranged the CPC:LPAR name tabs in ascending alphabetical order
  - In the MCP based HMC/SE this fixed sort order was lost and the tabs were arranged in a random order.
  - In z196 the ascending alphabetical order sort order in the Operating System Messages Task was restored



## Controlling Group Capacity

- **Controlling Group Capacity with HMC SNMP API**
  - The Change LPAR Group Controls task provides the ability to modify the group members and group capacity setting. These updates can be applied dynamically to the running system or saved to the Group and corresponding Image profiles.
  - In z10 the SNMP API provides support for updating the Group Profile capacity value but does not allow the group capacity setting to be applied dynamically to the running system.
  - In z196 the SNMP and CIM API are enhanced to allow dynamic changes to both the group members and group capacity setting.



## Replacement of HMC DVD-RAM

- **New Removable Writeable Media to Replace HMC DVD-RAM**
  - A new removable writeable media is being introduced in z196 as an alternate to the HMC DVD-RAM.
  - The new media selected is the USB Flash Memory Drive (UFD).
  - Initially the z196 HMC will ship with both a DVD-RAM drive as well as a UFD, but over time the DVD-RAM drive will be phased out.
  - All tasks on a z196 HMC as well as any SEs that can be managed by a z196 HMC and that currently support only the DVD-RAM must now add support for the UFD. MCFs will be necessary for pre-zEnterprise SEs in order to allow tasks to interact with UFD.
  - The UFD is the first media device for which there can be more than one present in the console. This is due to the fact that the Backup task requires a UFD in the console. Other non-Backup tasks that access a UFD must now be aware that more than one UFD can be present in the console and ensure the correct one is accessed.
  - Due to the size and portability of the UFD the same drive can be used across multiple tasks and across multiple consoles. Tasks must uniquely name files they write/read so the user does not have to manually rename files and so that a file saved from one console is not replaced by the same task from a different console.

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## Static Power Save Mode

- **The power saving function is built upon an existing mechanism for cycle and voltage steering. This mode reduces processor cycle time for all System z processors in the system. Memory and IO cycle times are not affected**
  - Static power save mode is designed to reduce power consumption on z196 when full performance is not required. It can be switched on and off during runtime with no disruption to currently running workloads, aside from the change in performance
  - On air-cooled models, Static power save mode can be entered once in a calendar day.
  - Using the Hardware Management Console (HMC), as well as the Active Energy Manager (AEM), you can use static power save mode for:
    - Periods of lower utilization - weekends, third shift
    - Capacity backup systems - systems used for emergency backup; keep them "running" but reduce energy consumption. Systems can quickly be brought back to full performance.
  - This could result in a 20% - 30% reduction in power consumption (depending on system configuration). If you have also implemented dynamic control of cooling (for example, through the integration of Active Energy Manager with facility management applications) the air conditioning for the cooling zone can be turned down and additional energy can be saved.
  - Static power save mode is supported by z/OS and z/VM



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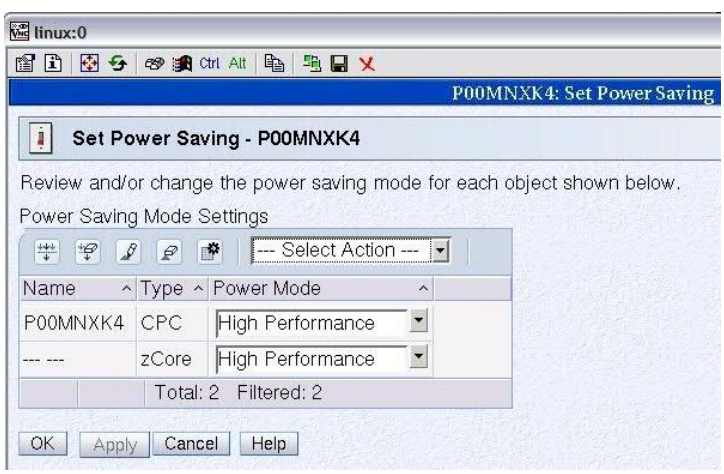
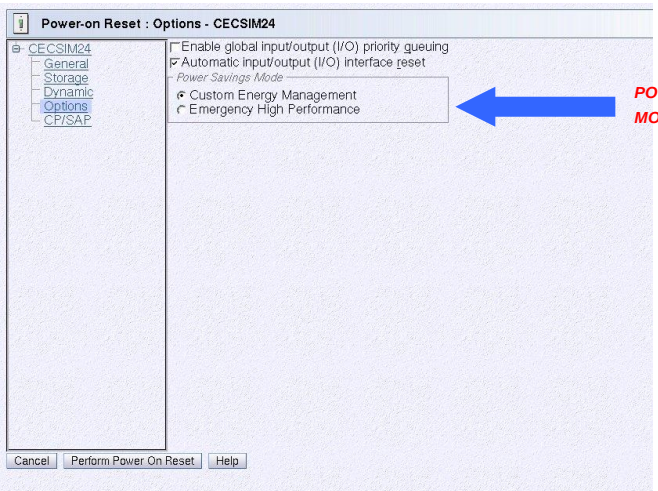
## Power Save Mode



## Power Save Mode






## Energy Monitoring and Controls

- **Power and thermal monitoring functions**
  - Avg. and max power consumption for Ensemble, System, CPC, BladeCenters and individual blades
  - Query max potential power for CPC
  - Input and exhaust air temperature for CPC and BladeCenters
  - For systems using **Water Conditioning Unit** (WCU) and **Exhaust Air Heat Exchanger** information on the amount of heat load covered by water cooling will be reported. Also report chilled water supply and return temperatures.
  - Humidity
  - Air Pressure
- **Energy Controls**
  - Power Save Mode
    - Blade
    - BladeCenter
    - CPC
    - System
  - Power Capping
    - Blade
    - BladeCenter
    - System

## Query maximum potential power

- **Main use cases**
  - Allows reducing power allocation for system since you know the maximum power system can draw even with faults and hot room
  - Allows facility and system people without knowledge of System z configuration and use details to query max possible power of system
  - Looks like power management to higher level management tools
- **Base mechanism**
  - Calculation component on SE to calculate max potential power based on
    - System configuration
    - Altitude (absolute pressure sensors in bulk power subsystem)
    - Hot room environment
    - Highest single fault service scenario power condition for this configuration
    - Reasonable tolerances
- **Customer Controls**
  - Controls to be implemented in HMC, SE and Active Energy Manager.
- **Capping enforcement:**
  - No capping enforcement through dynamic performance reduction is required
- **Power management should be used in conjunction with the System z Power Estimation Tool which allows pre-planning for power and cooling needs**



## Broadband RSF/Media Only Firmware Component Updates

- **Firmware Updates on System z can be obtained via**
  - RSF (Remote Support Facility) IBM Support Center using a
    - Broadband connection or a
    - Modem connection
  - Media
- **Firmware for zBX components have a tendency to be much larger than current System z firmware**
- **z196 will limit some firmware components such they can only be updated via Broadband RSF or Media, not Modem RSF**
  - Even in some of those cases, if the size of the FW update is too large, it may be decided to not even put fixes into RSF (RETAIN) and would only be available via media.
- **Service team has been working with customers to migrate to Broadband RSF**
  - Security concerns of using Broadband versus modem have been addressed.
  - Broadband RSF Tech Note is available in IBM Resource Link to aid customers in understanding the security infrastructure of Broadband RSF.
- **The zEnterprise is planned to be the last high-end server to support dial-up modems for use with the Remote Support Facility (RSF), and the External Time Source (ETS) option of Server Time Protocol (STP). The currently available Network Time Protocol (NTP) server option for ETS as well as Internet time services available using broadband connections can be used to provide the same degree of accuracy as dial-up time services. Enterprises should begin migrating from dial-up modems to Broadband for RSF connections**