

**zEnterprise.**

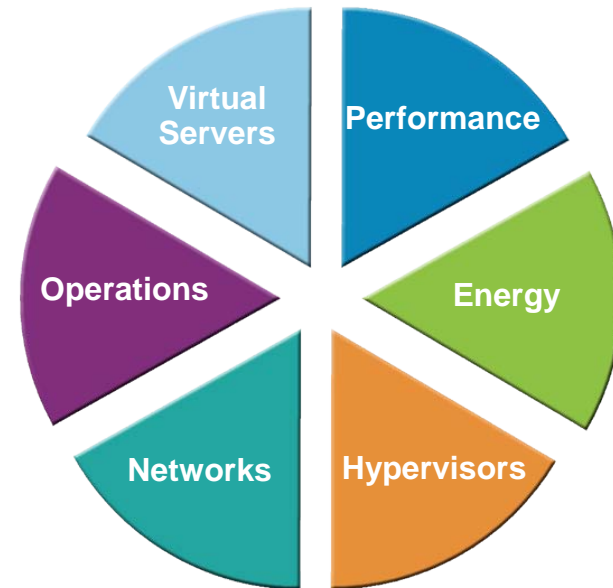
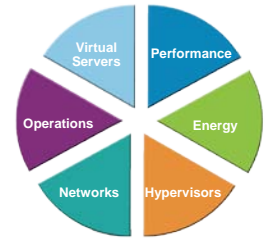
**Freedom by Design**

# IBM® zEnterprise™ System Unified Resource Manager Overview and Update

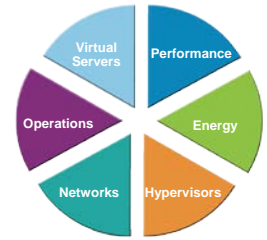


# Agenda

- Introduction
- Management Enablement Levels
- Use Case Scenario
  - **Operational Controls**
  - **Hypervisor Management**
  - **Virtual Server Lifecycle Management**
  - **Workload Context**
- **Platform Performance Management**
- **Network Management**
- **Energy Management**
- External Management Enablement
- Related Facilities

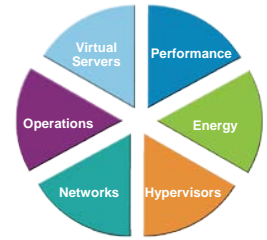


# Introduction



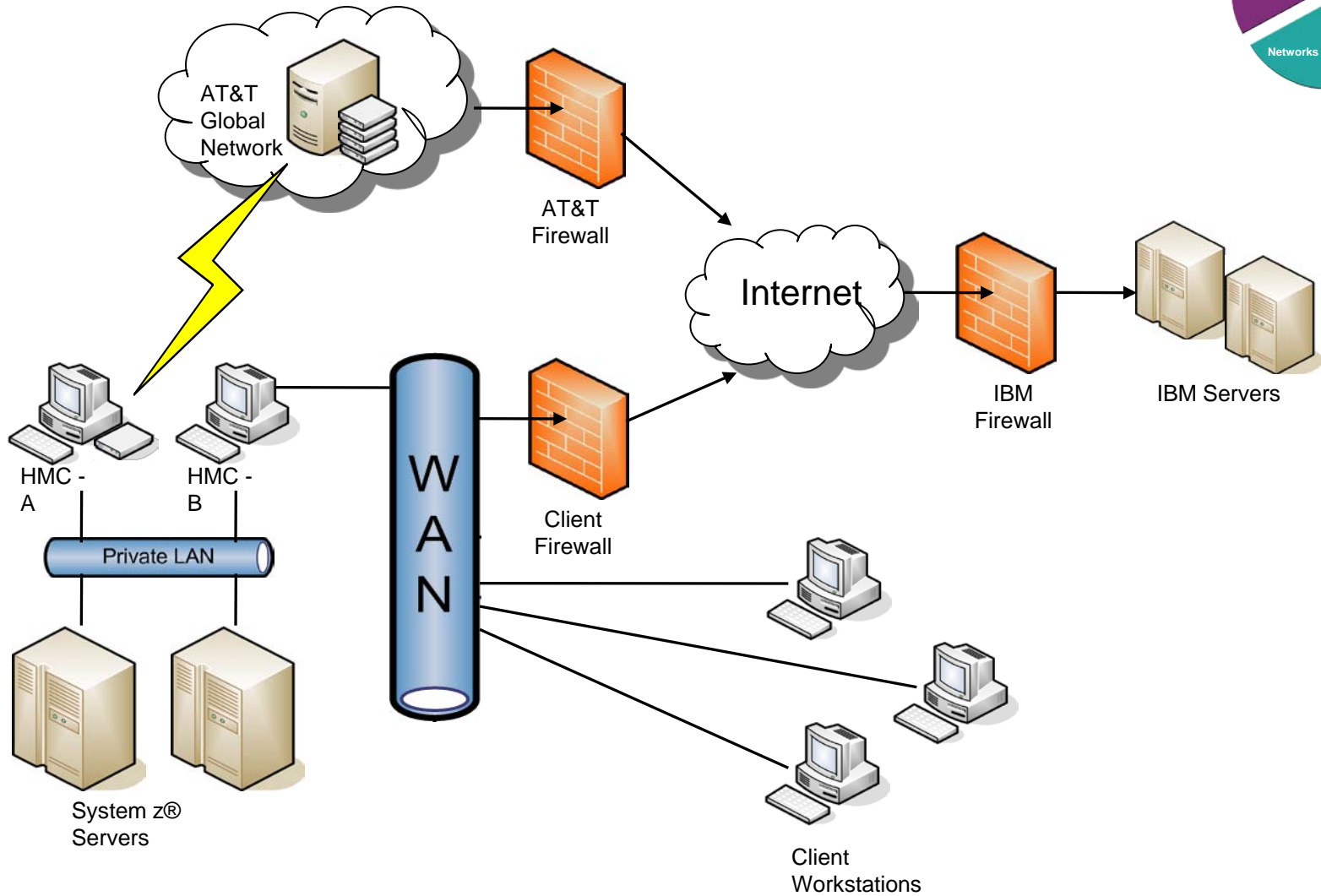
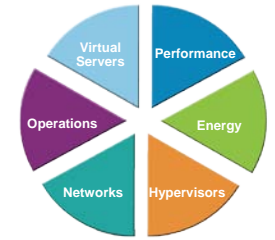
- Integrate optimizers and blades into the System z ecosystem
  - IBM Smart Analytics Optimizer
  - Power 7 Blade
  - System x Blade
  - DataPower XI50z
- Provide unified management of resources across different architectures through virtualization
  - z/VM and (Linux) virtual machines
  - PowerVM and (AIX) virtual servers
  - System x hypervisor and (Linux and Windows) virtual servers
- Support optional IBM® zEnterprise™ BladeCenter® Extension (zBX) housing racks of BladeCenters

## Introduction ...



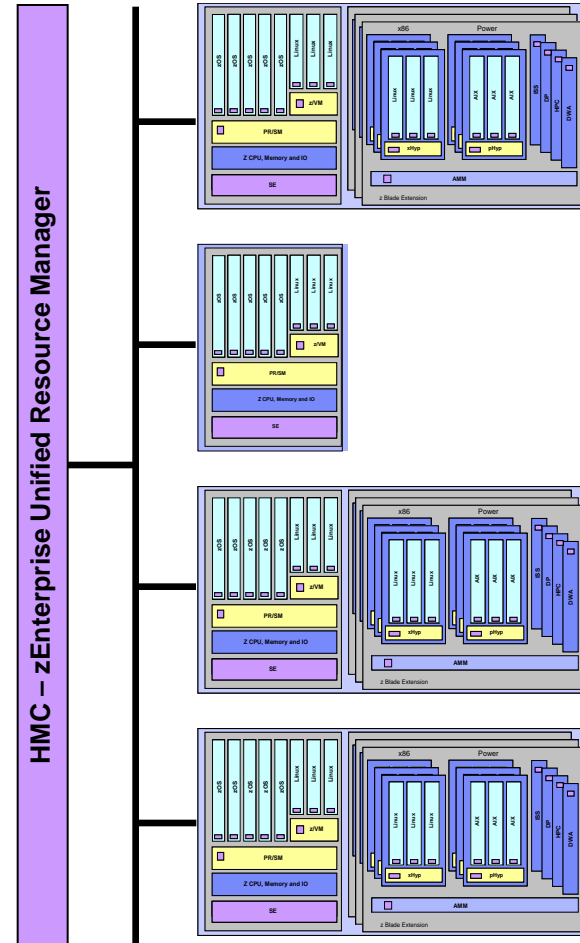
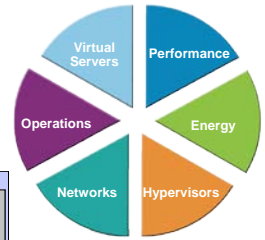
- Hardware Management Console (HMC) extended to provide System z values to zBX componentry
  - Secure SSL based remote access (optional)
  - Full complement of certificate management capabilities
  - Complete user management suite
  - Full function user definition
  - Highly flexible password rule definition
  - Centralized authentication using LDAP
  - Full access controls for tasks and resources allowed for each user (i.e., User Roles)
  - Automatic replication of configuration data
  - Full function embedded firewall

# HMC Connectivity

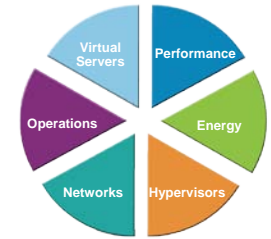


# zEnterprise Ensemble

- A zEnterprise Ensemble is a collection of 1..8 zEnterprise Nodes managed as a single virtualized pool of server resources
- A zEnterprise Node is a single zCEC with 0..4 racks with up to 1..2 blade centers per rack
- A zEnterprise node can be a member of only a single ensemble
- The ensemble is the management scope for the Unified Resource Manager
- A primary / alternate pair of HMCs provide the management console for the ensemble
  - The alternative HMC takes over in case the primary fails



# Management Function Suites



## ■ Manage

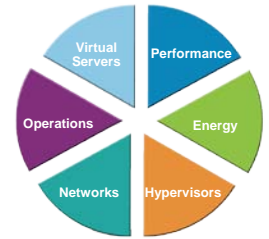
- Monitoring and trend reporting of CPU energy efficiency, simplifying energy management
- New monitor dashboard (augments System Activity Display), giving a broader view of system resource use
- Integrated hardware management across all elements of the system, simplifying resource management
- Automatic resource discovery and inventory for all elements of the system, easing configuration management
- Private and physically isolated internal service management network connecting all zEnterprise resources, enabling secure systems management
- Private and secure data network (IEDN) with strict access control across heterogeneous environments, simplifying interconnection and communications security
- Integrated PR/SM and PowerVM hypervisors, enabling management from a single point of control
- Virtual server lifecycle management, enabling directed and dynamic virtual server resource provisioning on all hypervisors (PR/SM, z/VM, PowerVM) and integrated storage, network, and ensemble configuration
- Maximum potential power, enabling power redistribution

## ■ Automate

- Workloads defined as representations of physical and virtual resources in the context of named business processes, providing insight into workload relationships and dependencies
- Performance service-level policy definition and performance monitoring, reporting, and resource optimization aligned with customer-defined workload service levels, allowing virtual CPU capacity to be adjusted across a hypervisor
- Static power savings and energy management, enabling cost savings

## Ensemble Management Users and Roles

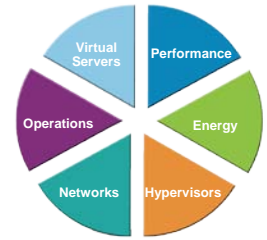
- New task and resource roles enable isolation across management disciplines
- New predefined users EnsOperator and EnsAdmin



Role	Description
Ensemble Administrator	Responsible for creating and managing the zGryphon ensemble Create Ensemble, Add Member...
Virtual Network Administrator	Responsible for Managing Virtual Networks, Hosts, and MAC Prefixes Manage Virtual Networks, Add Hosts to Virtual Networks, Create VLAN IDs...
Virtual Server Administrator	Responsible for managing virtual servers New /Modify Virtual Server, Add Virtual Disk, Migrate...
Virtual Server Operator	Responsible for performing and scheduling virtual server activation/deactivation, mounting virtual media Activate, Deactivate, Mount Virtual Media, Console session...
Storage Resource Administrator	Responsible for managing storage resources – Storage Access Lists, WWPNs, z/VM Storage Groups Export WWPN, Import SAL, Add Storage Resources...
Workload Administrator	Responsible for managing workloads New /Modify workload, Add / Remove Virtual Servers..
Performance Management Administrator	Responsible for managing performance policies New /Modify performance policy, Import policy
Performance Management Operator	Responsible for performing and scheduling policy activations and creating threshold notifications Activate, Export Policy, Monitor System Events
Energy Management Administrator	Responsible for managing power settings including power capping and power savings Set Power Cap, Set Power Savings Mode, Set zBX Power Policy

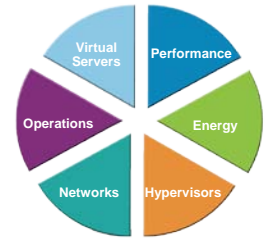


## Operational Controls (Manage Suite)



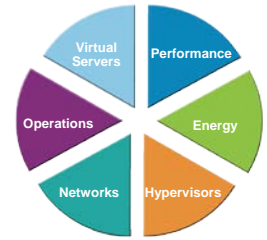
- **Change Management**
  - View Firmware Information (BladeCenters and Blades)
  - Retrieve Firmware Changes
  - Change Firmware Levels
  - Backup/Restore Critical Data (accelerator configuration data backed up as part of System z Support Element backup; restored on replacement of accelerator)
- **Problem Management**
  - Automatic Error Logging and FFDC Data Collection
  - Problem Analysis and Call Home Reporting
  - View Hardware Messages
  - View Open Problems
  - Manual Problem Reporting and Data Collection
- **Guided Repair and Verification**

# Operational Controls ...



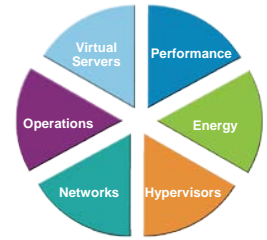
- Configuration Management
  - Vital Product Data
  - Edit Frame Layout
    - Frames, Switches, BladeCenters
    - MES Support (Add/Remove)
    - Management Enablement
  - Capacity on Demand
    - Permanent Customer-Initiated Upgrades
- Operations Management
  - Blade Power On and Power Off
  - Upstream SNMP/CIM API Automation Management
  - Event Notification (based on logged events or state changes)
  - Scheduled Operations (Firmware Update, Activate, Deactivate, ...)
  - Time Synchronization
  - Operational Network Settings (IP address, group name, role)
  - Launch Full Device Console

## Operational Controls ...



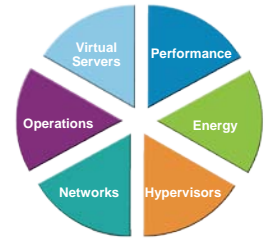
- **Performance Management**
  - System Activity Display (CPU, Memory, I/O, Network)
  - Energy Consumption and Temperature Monitoring
  - Transmit System Availability Data (TSAD)
- **Business Management**
  - User Management
  - Auditing
  - Device Status and Details
  - Automatic Service Network Configuration
  - Documentation
- **Ensemble Management**
  - Create Ensemble

# Hypervisor Management (Manage Suite)



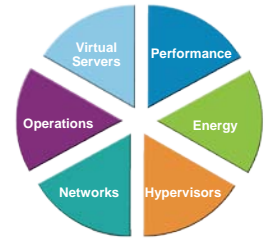
- Blades are virtualized
- Hypervisors managed as firmware
  - Automatically loaded
  - Managed through HMC
  - Not customer-accessible
- Basic hypervisor management tasks
  - Deploy and initialize hypervisor (Blade)
  - Start, stop, and query/list hypervisors
  - Update and repair hypervisor (Blade)
  - Monitor hypervisors and their resource use (System Activity Display)
    - CPU, Memory consumption
  - Manage ISO images (Blade)
  - Create virtual networks
  - Manage storage resources
  - Allow agents in virtual server operating systems to communicate with a manager running in the hypervisor or the hypervisor management stack

# Virtual Server Lifecycle Management (Manage Suite)



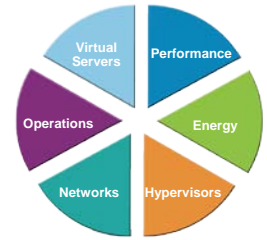
- Create
  - CPU – virtual, shared, dedicated; share (initial/minimum/maximum)
  - Memory – initial/defined
  - Network
  - Console – text/graphical
  - Storage
  - Virtual DVD
- List
- Start/Stop
- View/Modify configuration
- Migrate definition
- Delete

## Workload Context (Manage/Automate Suite)



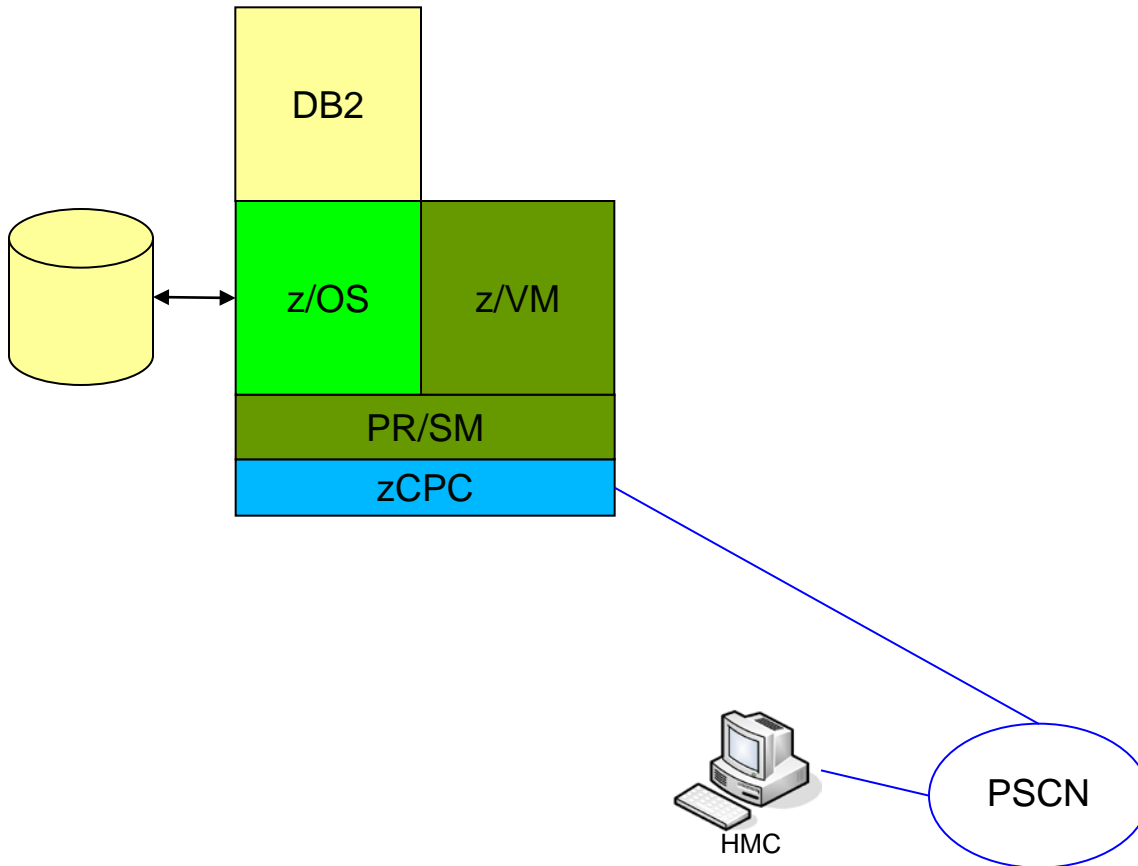
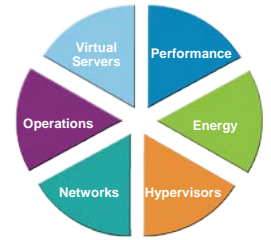
- Ensemble-scoped management
- Workload definition
- Workload-based performance policy definition

# Use Case Scenario



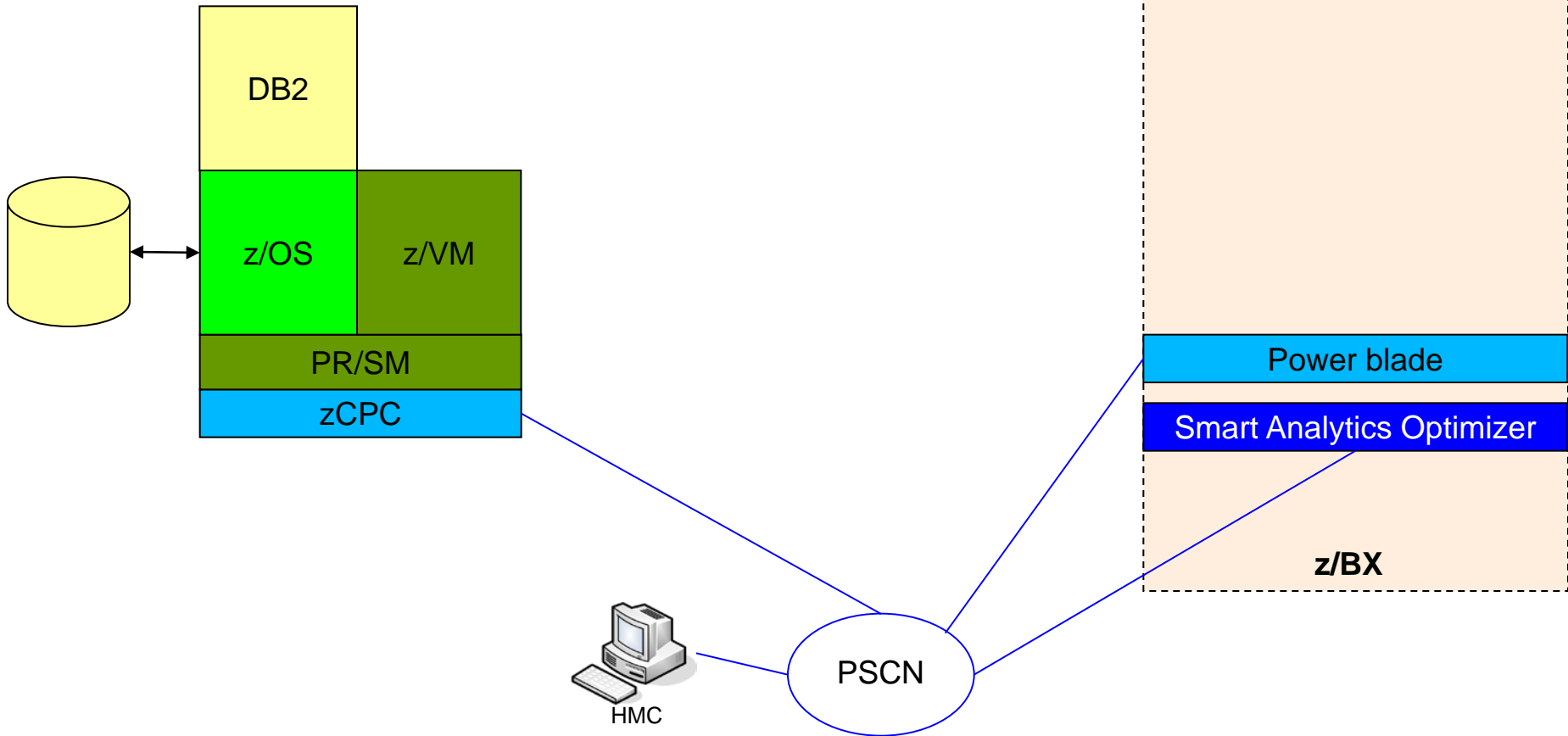
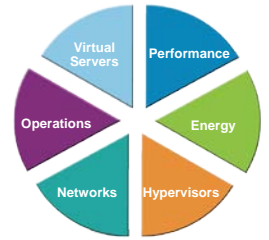
- Workload components
  - z/OS DB2
  - IBM Smart Analytics Optimizer
  - Linux on z with WAS on z/VM
  - AIX on Power Web server
- Existing infrastructure
  - System z CPC
  - z/OS LPAR with DB2
  - z/VM LPAR
- New infrastructure
  - INMN and IEDN
  - zBX Model 2
  - Smart Analytics Optimizer
  - Power Blade

# Existing Infrastructure

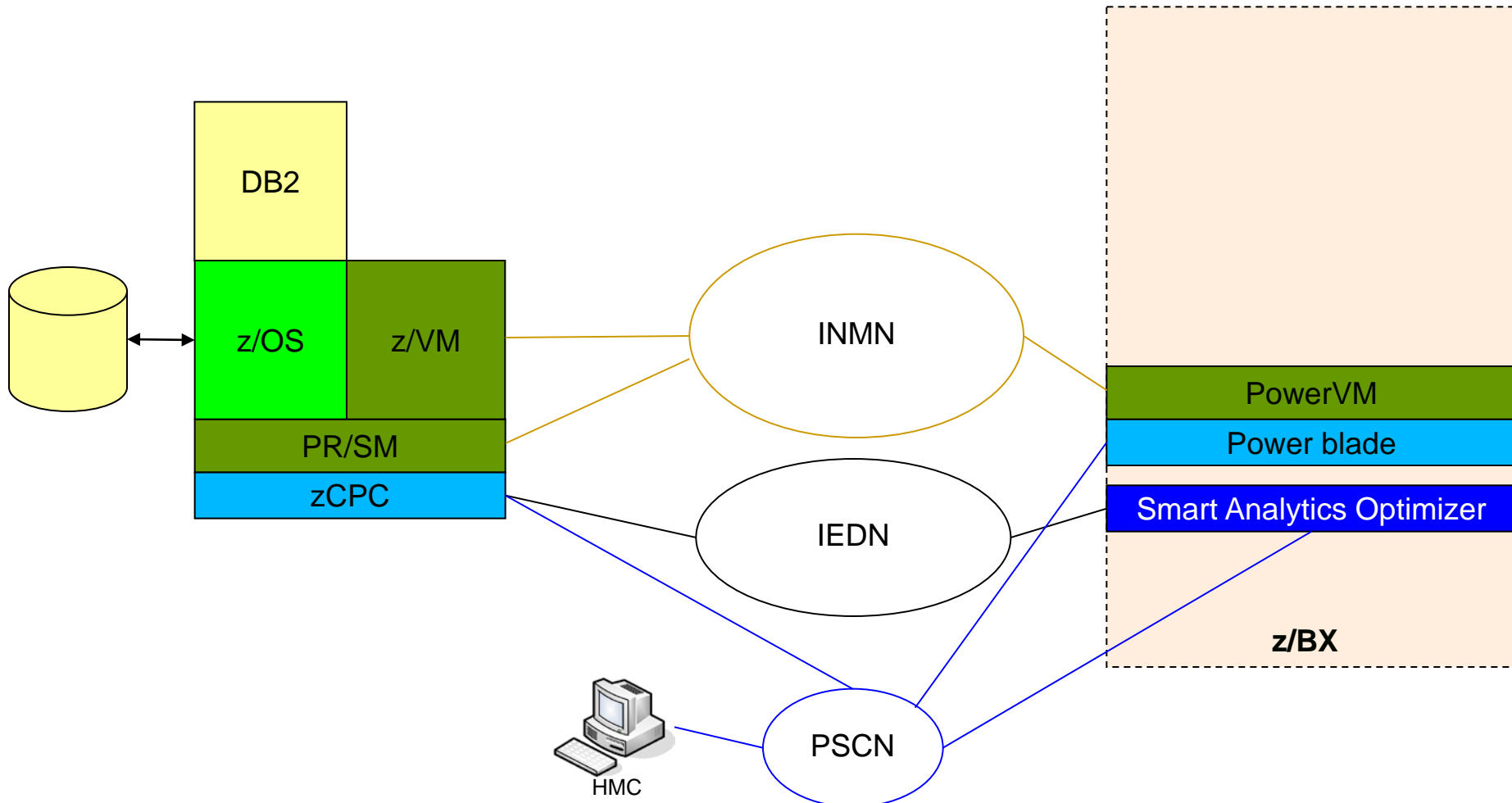
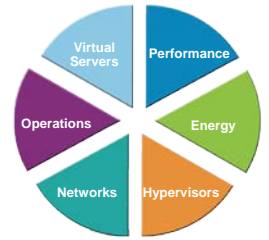




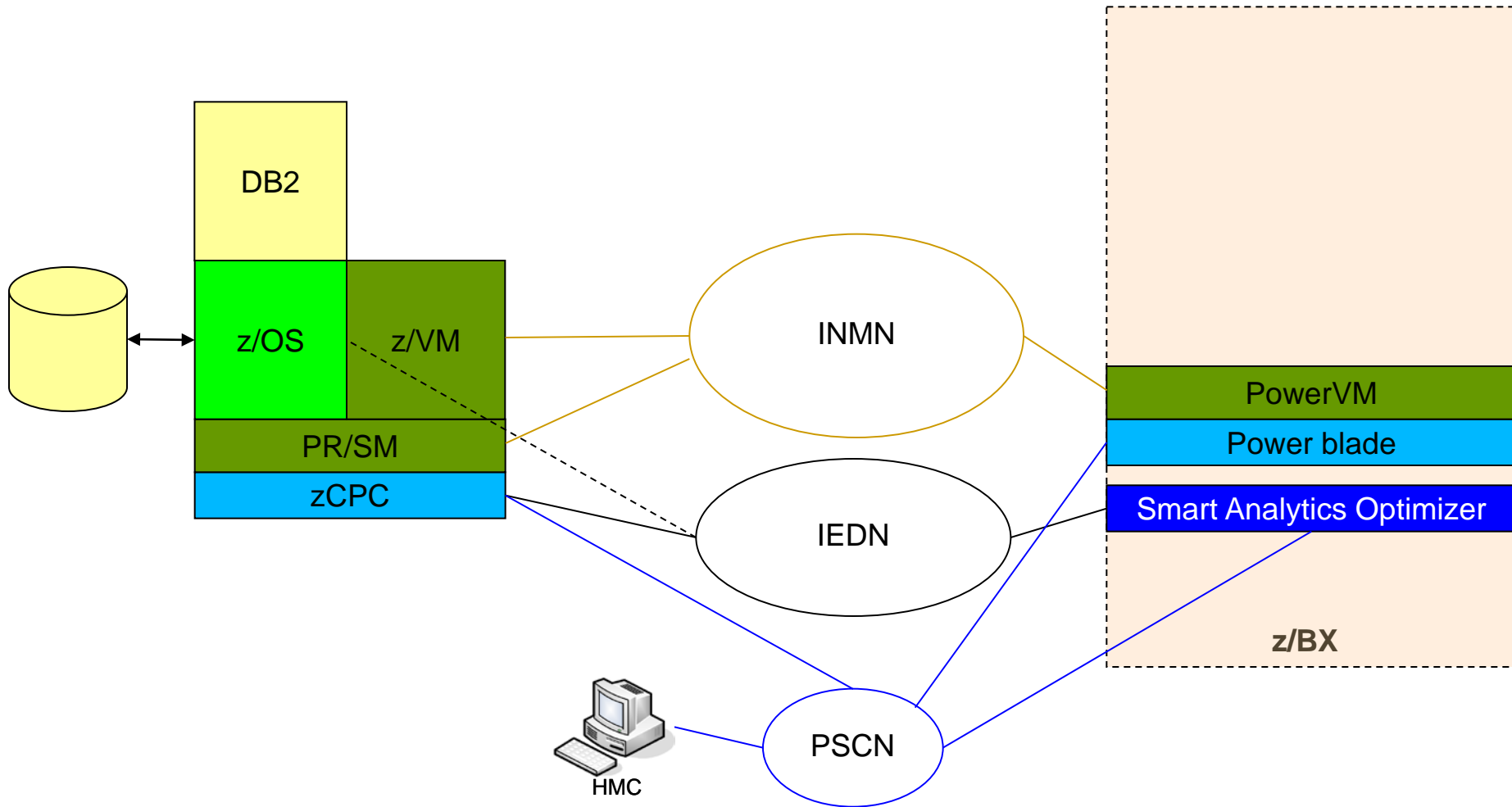
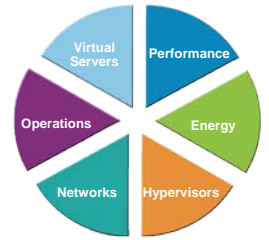
# New Infrastructure



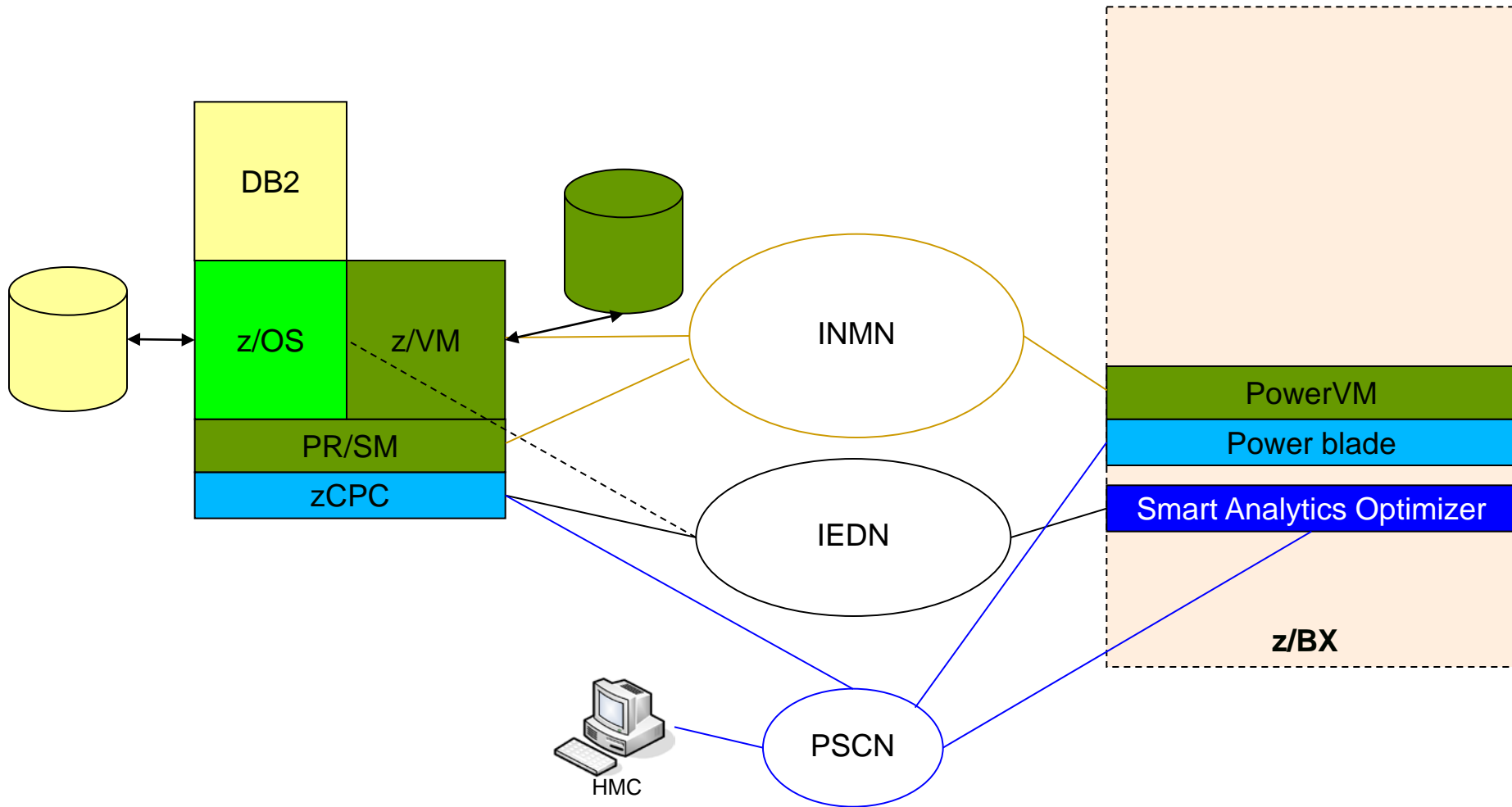
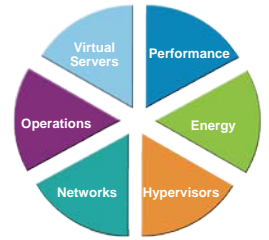
# Create Ensemble



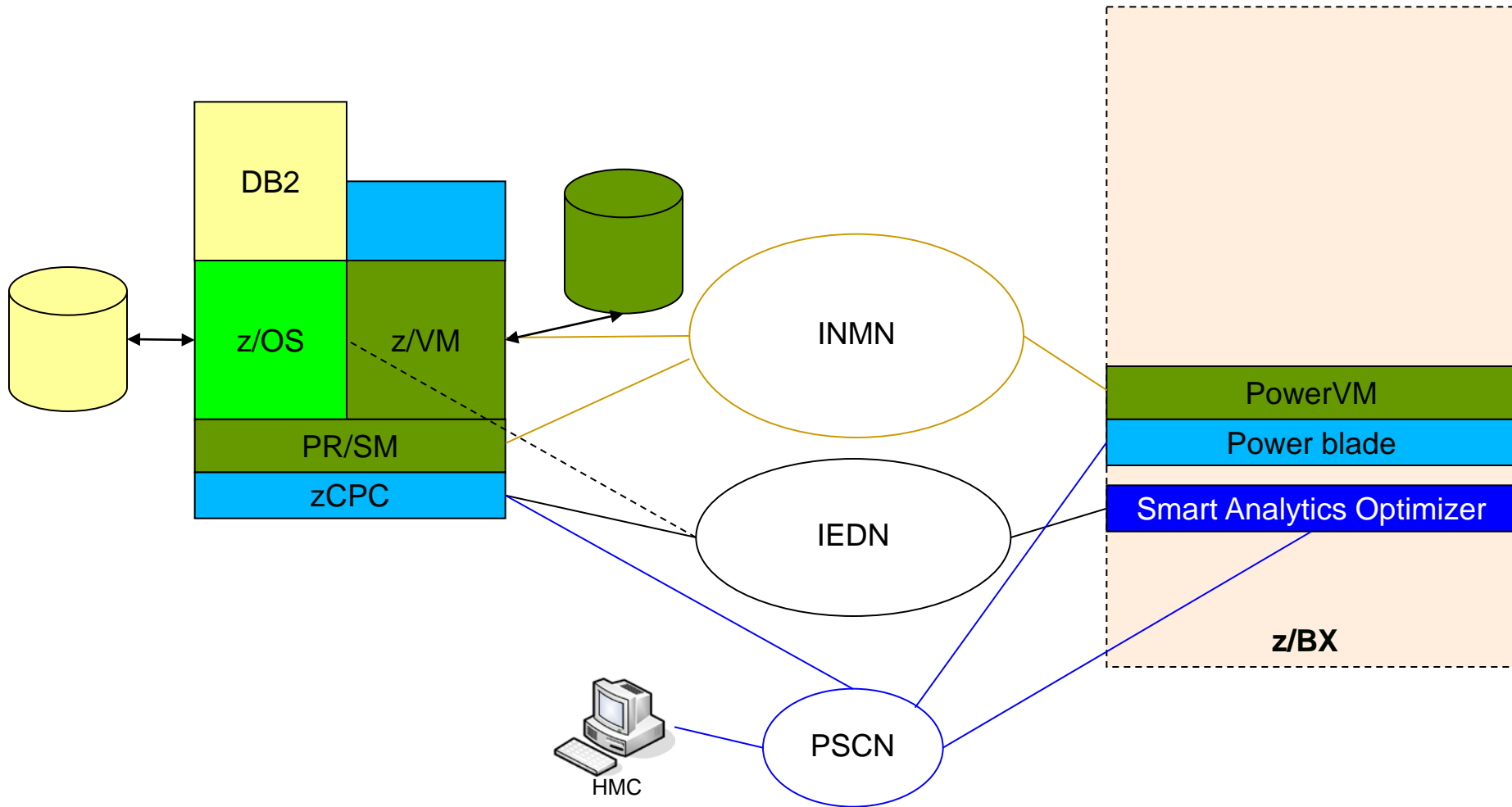
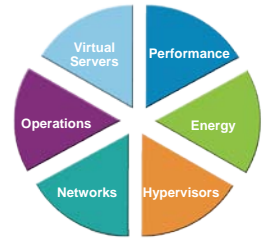
# Associate Smart Analytics Optimizer with z/OS LPAR



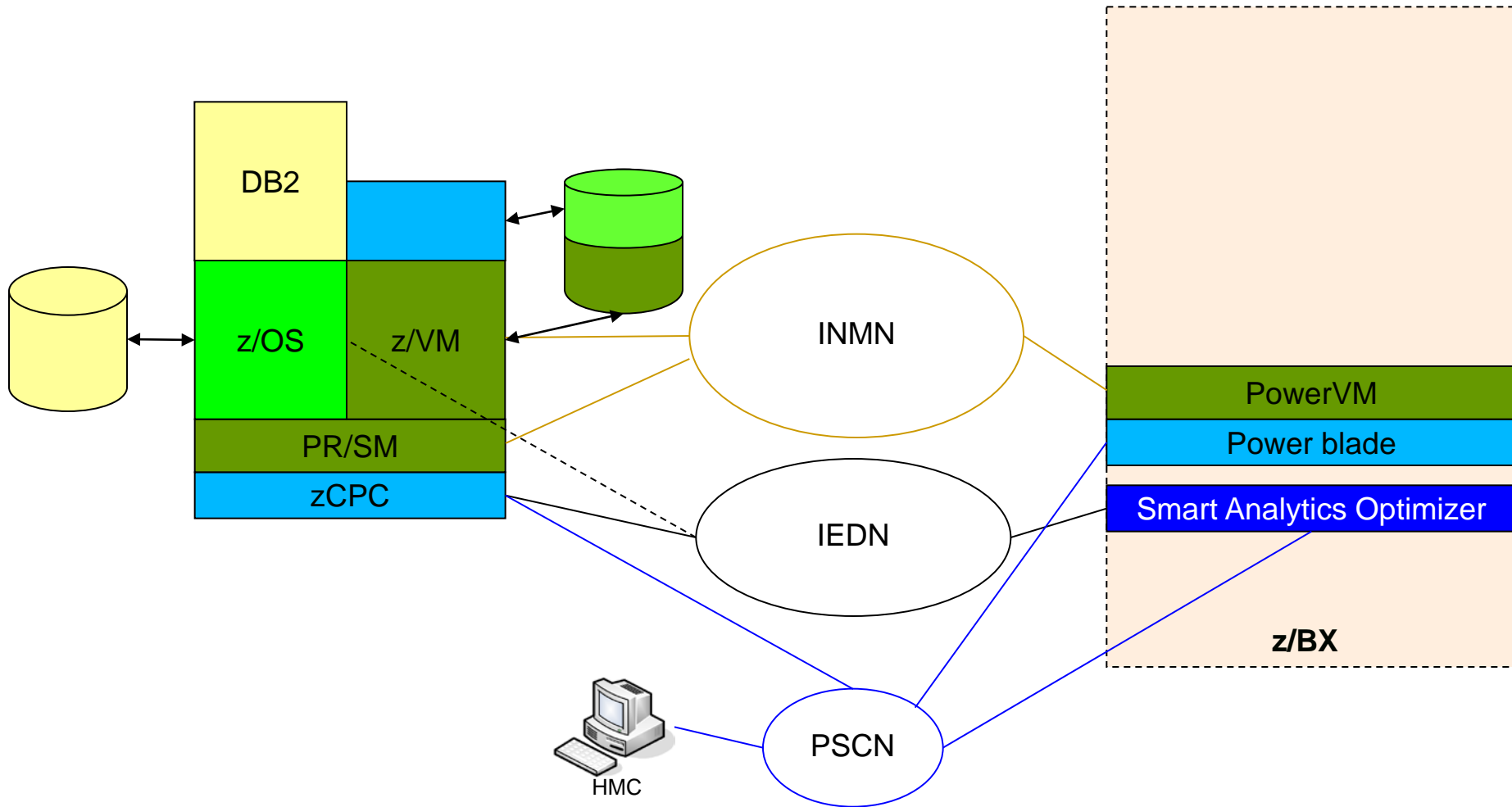
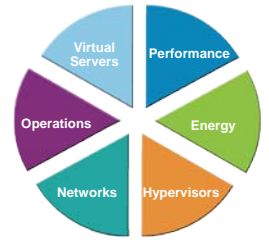
# Associate Storage Resources with z/VM LPAR



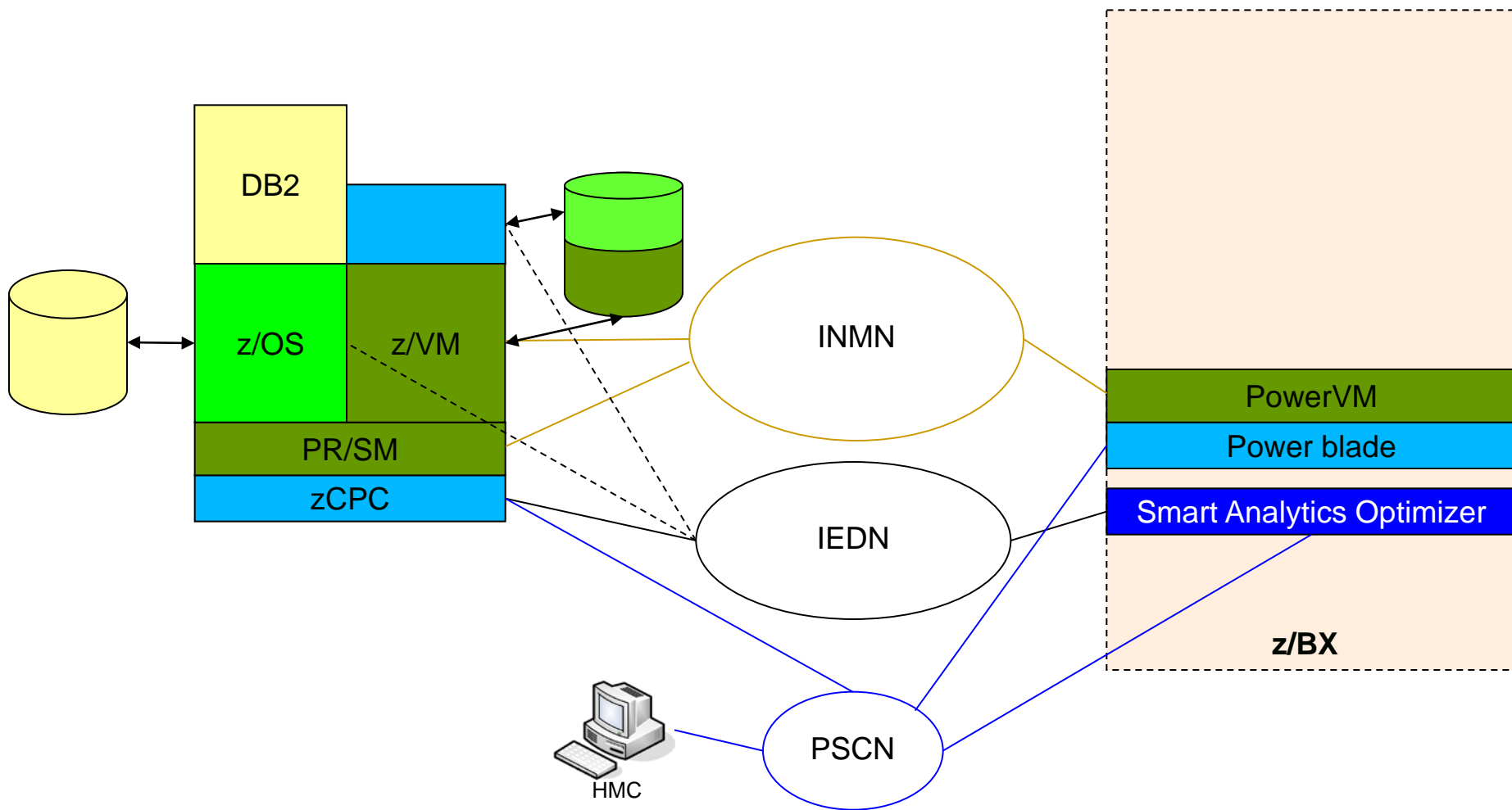
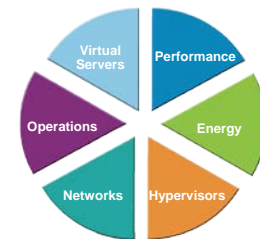
# Create Virtual Server on z/VM



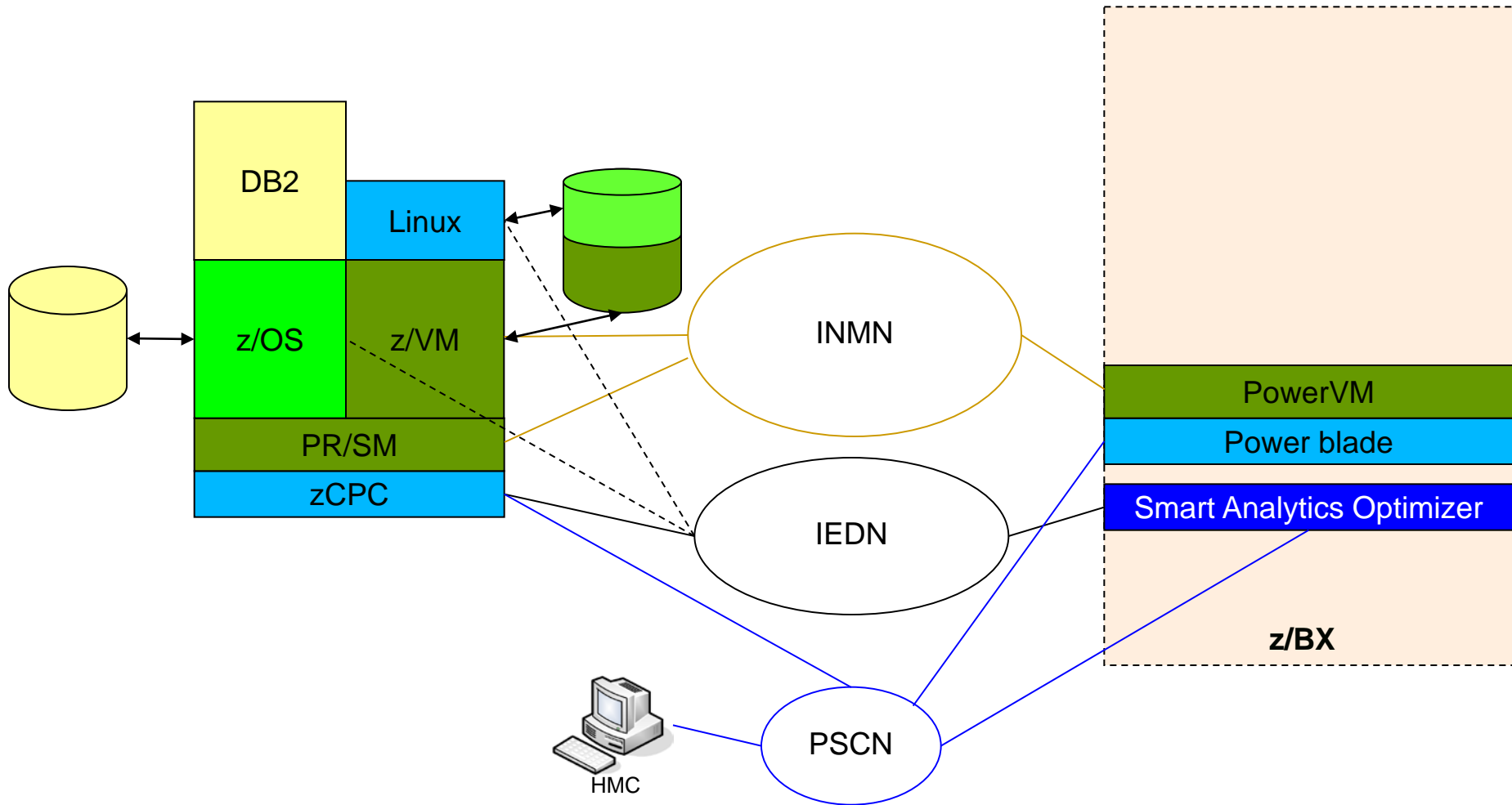
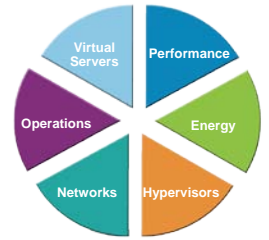
# Define New Virtual Server Storage Requirements



# Connect New Virtual Server to IEDN

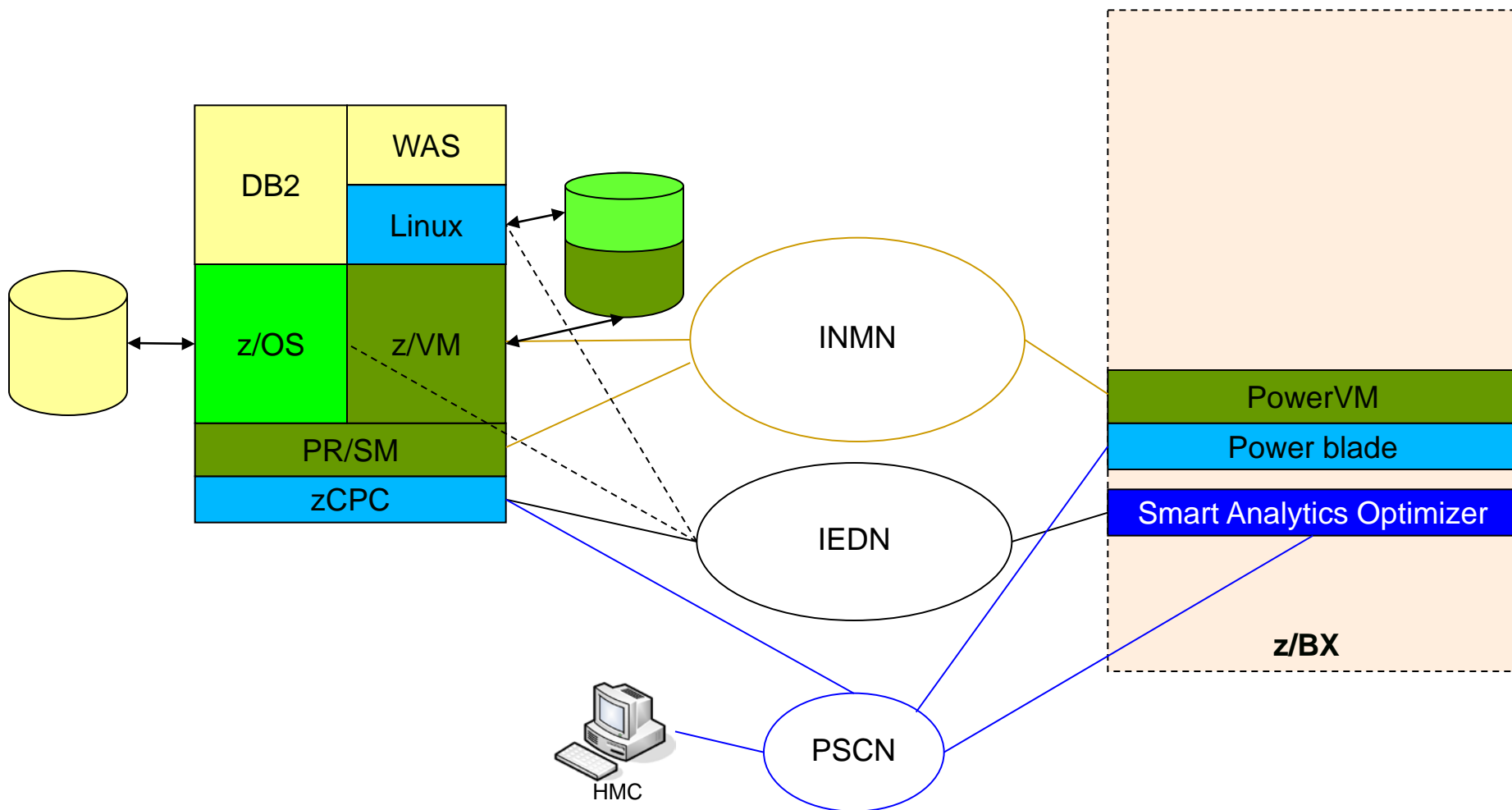
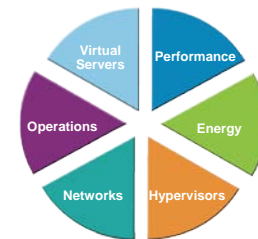


# Install Operating System

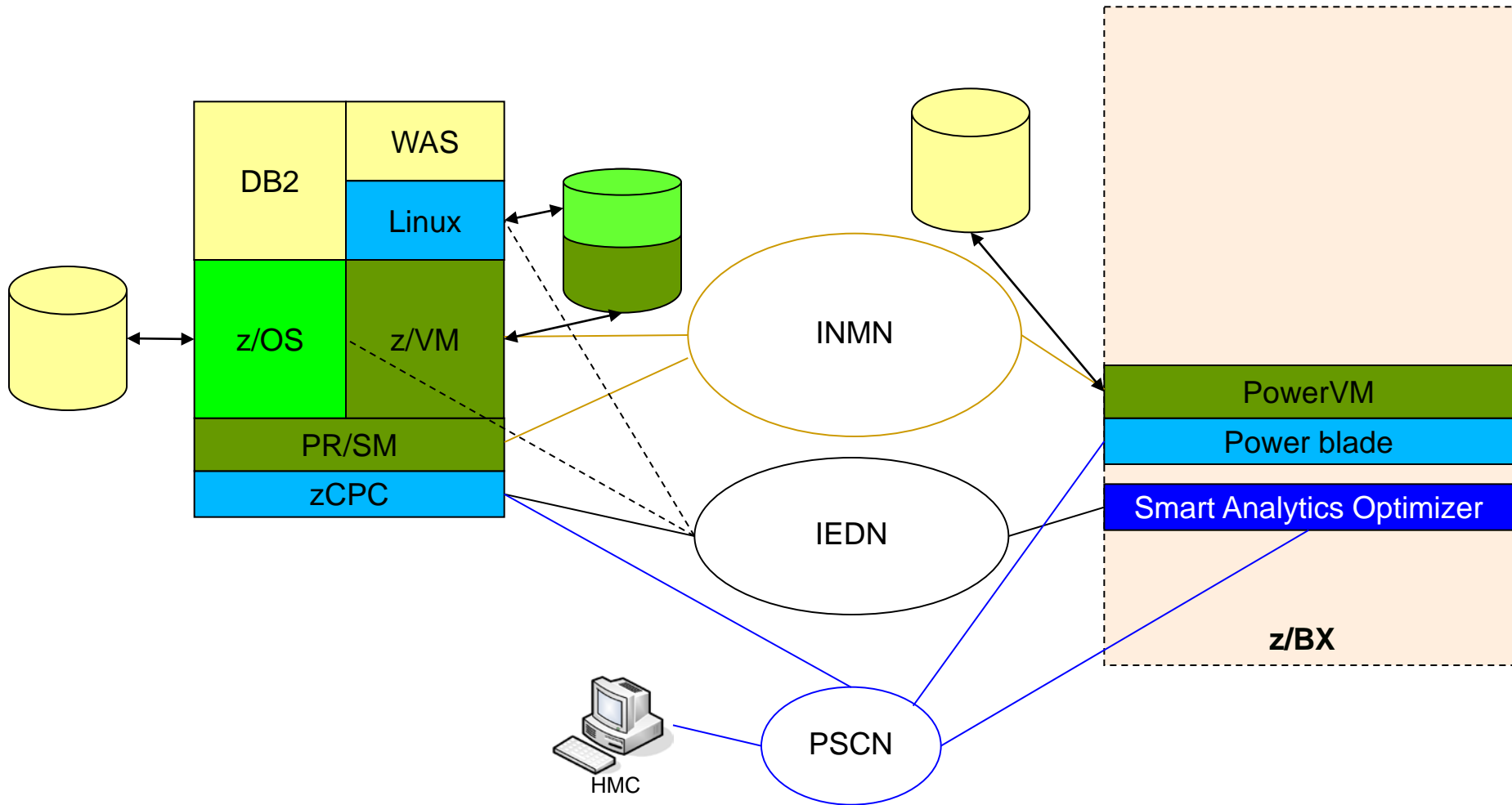
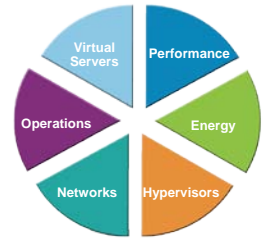




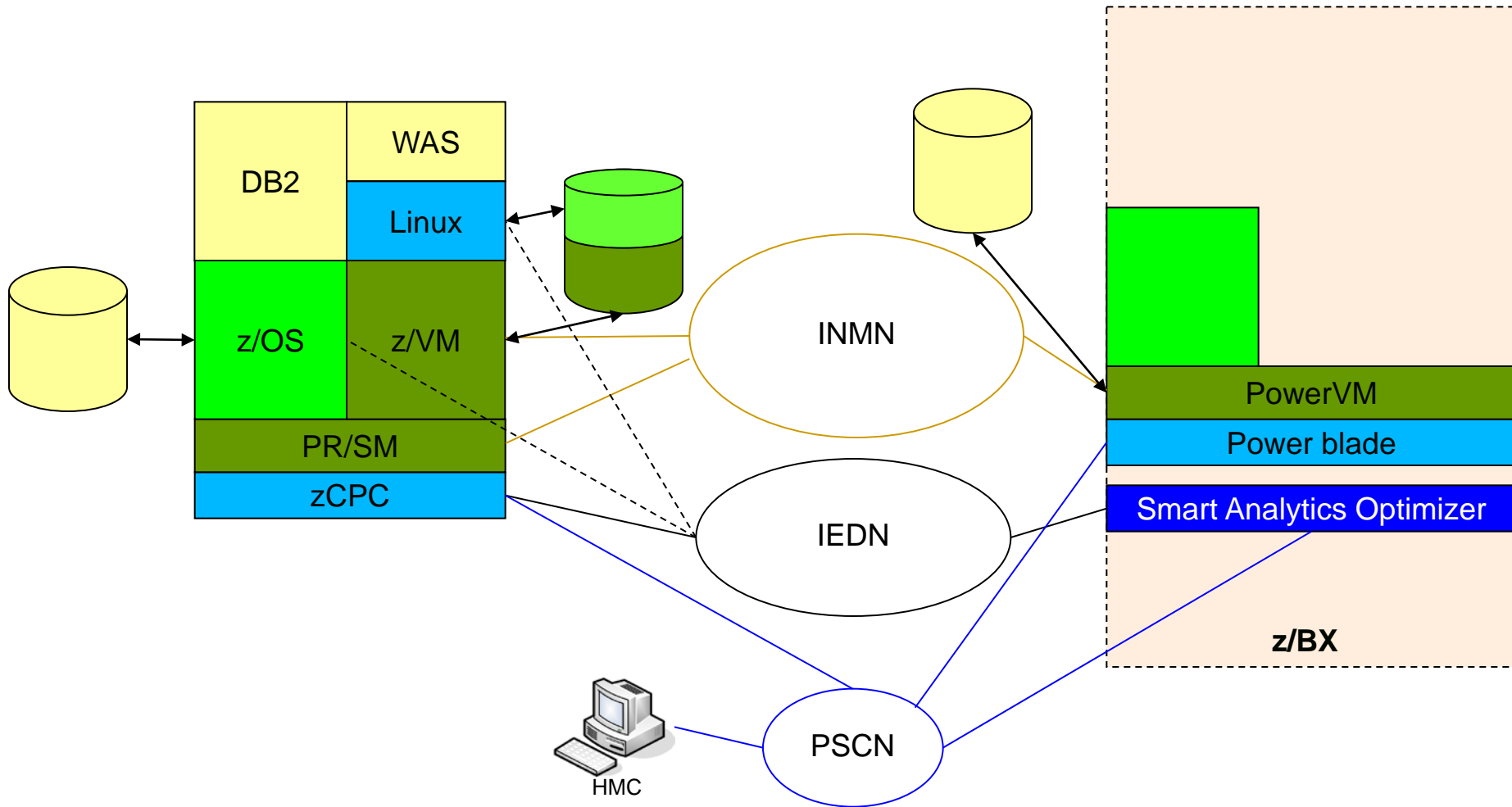
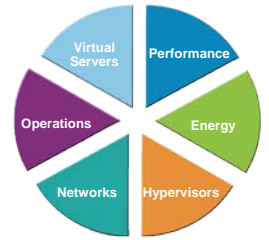
# Install WAS



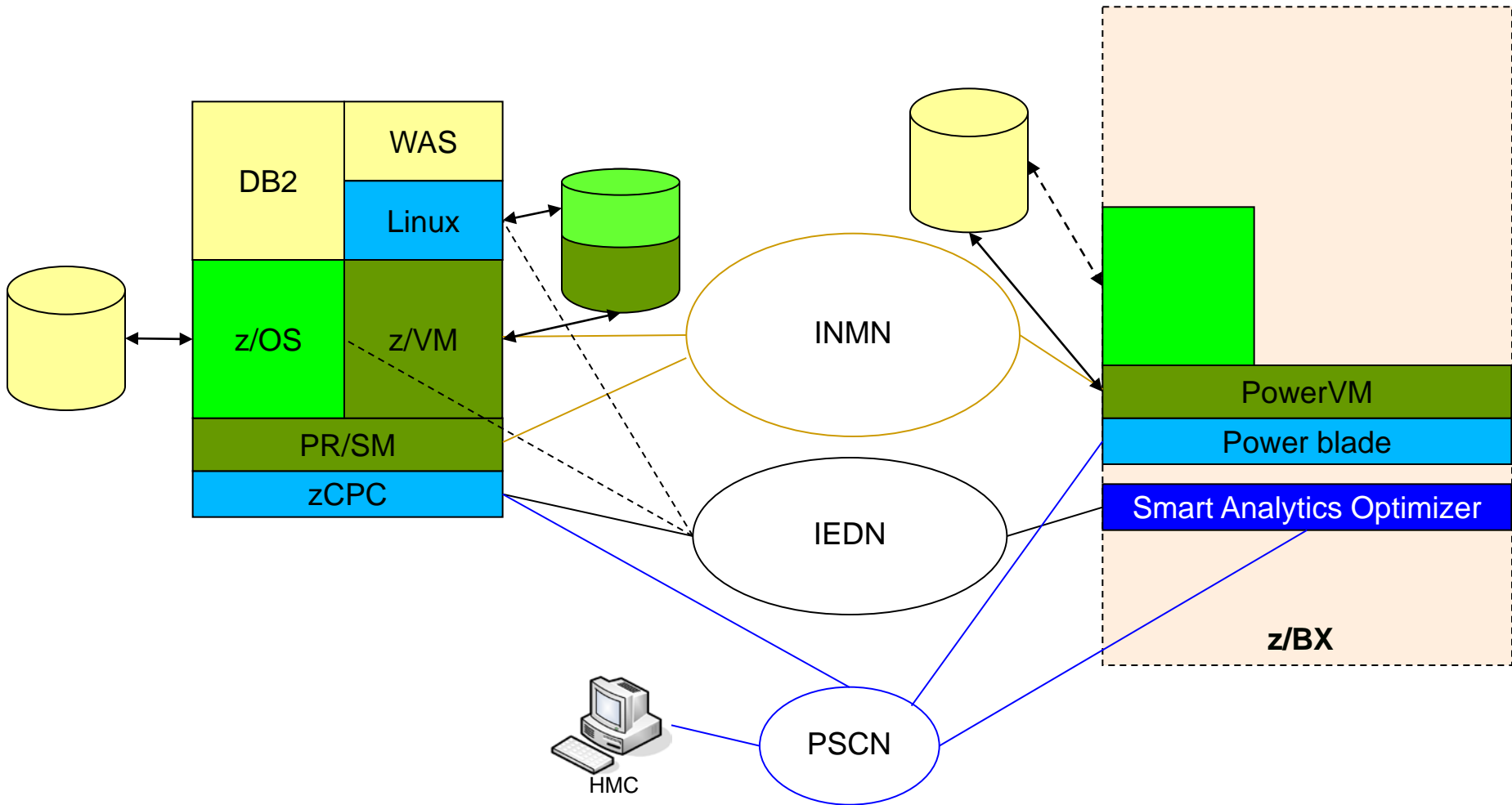
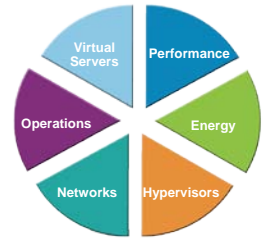
# Associate Storage Resources with Power Blade



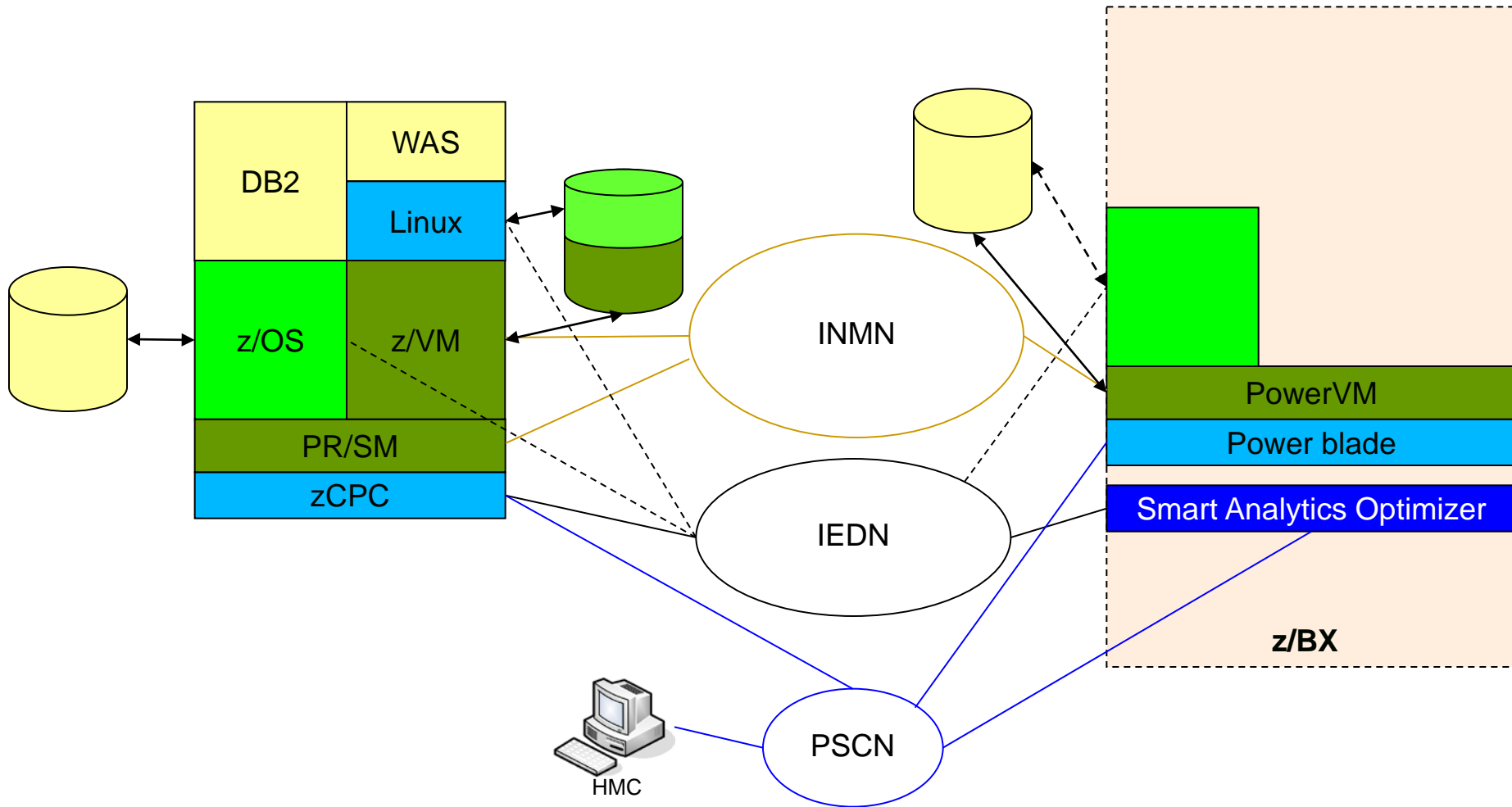
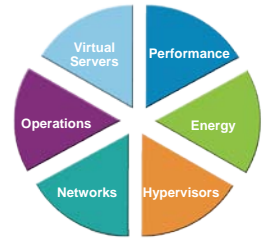
# Create Virtual Server on Power Blade



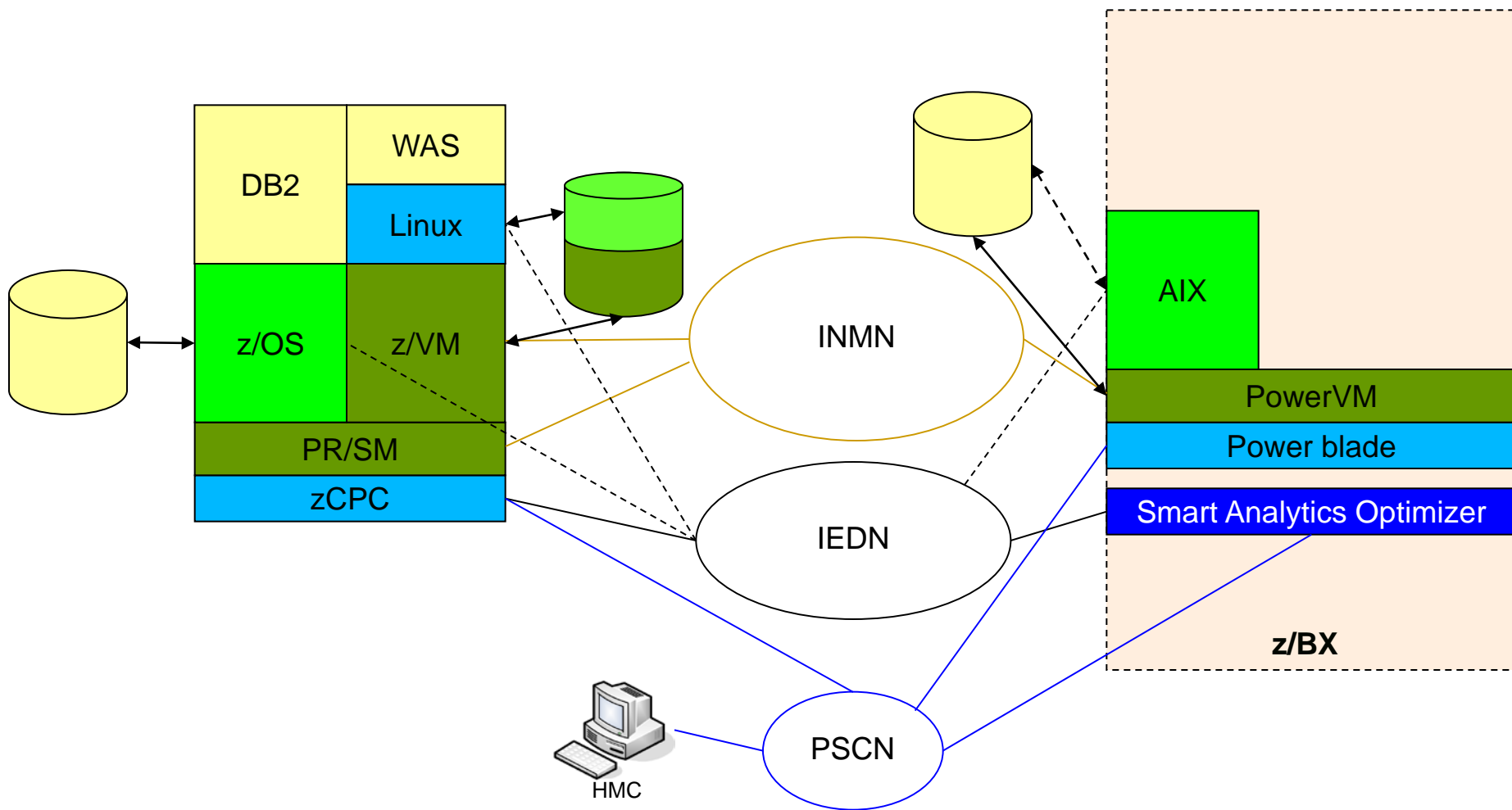
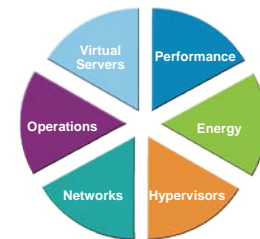
# Define New Virtual Server Storage Requirements



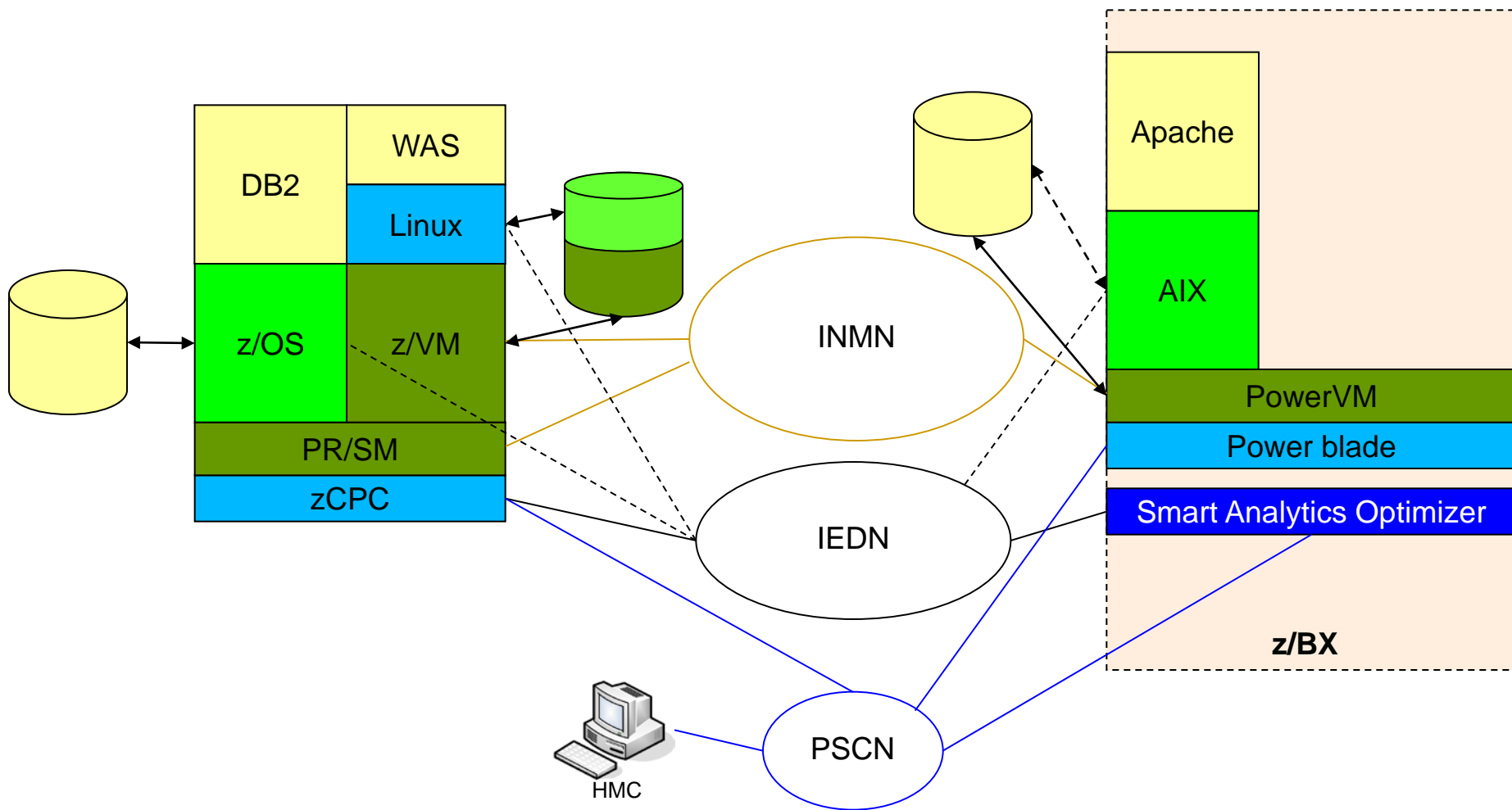
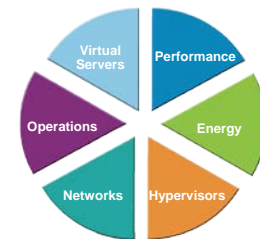
# Connect New Virtual Server to IEDN



# Install Operating System

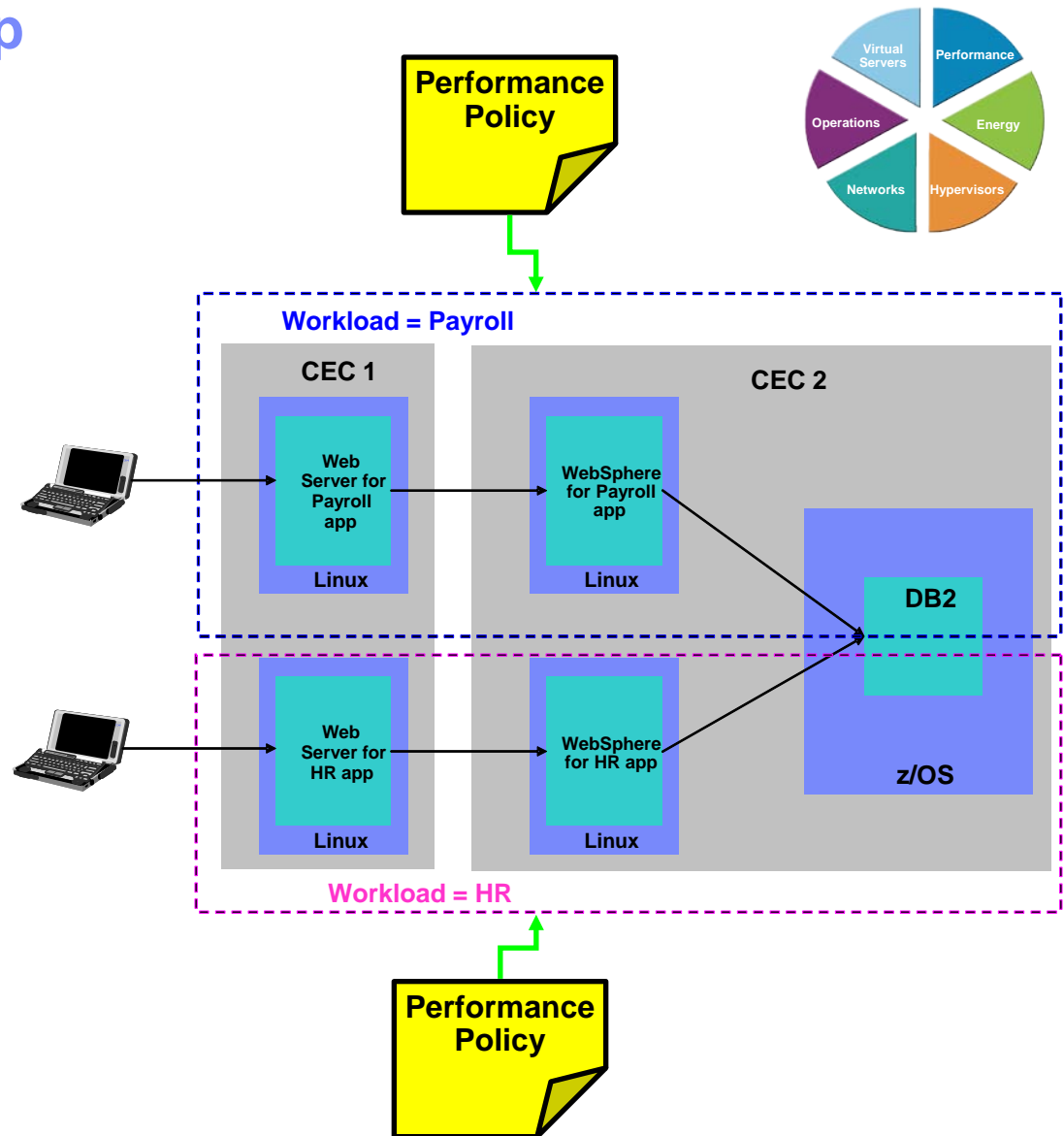


# Install Apache



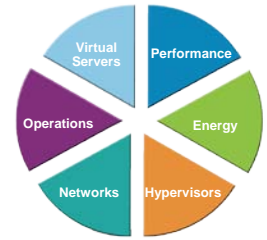
# Workload Resource Group

- Workload Resource Group is grouping mechanism and “management view” of virtual servers supporting a business application
- Provides context within which associated platform resources are presented, monitored, reported, and managed
- Performance policy is associated with Workload



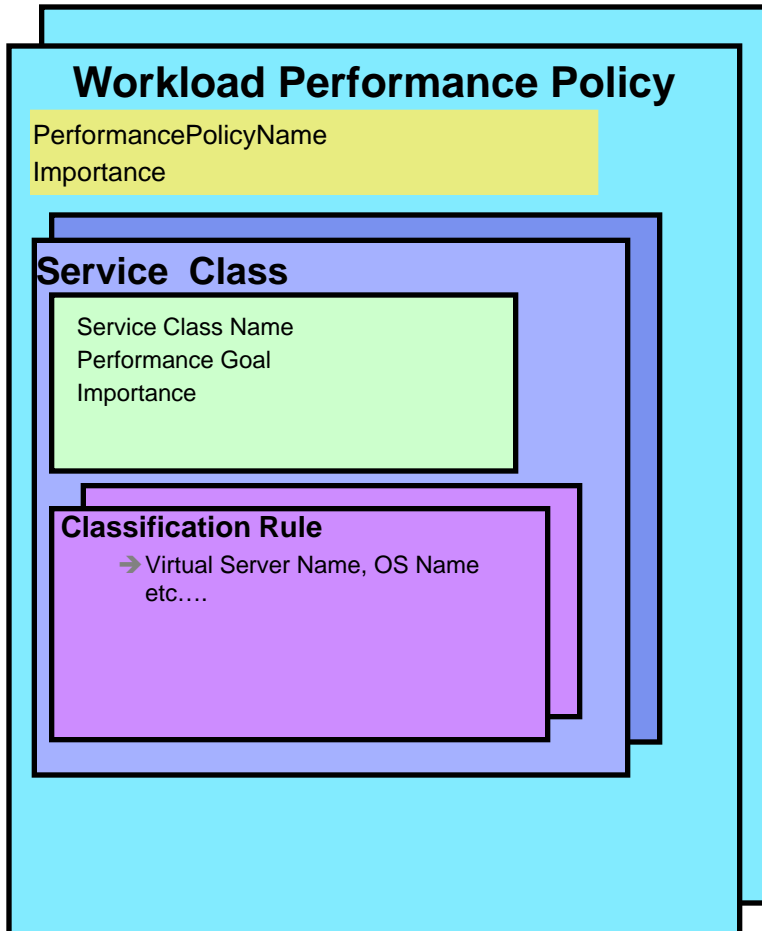
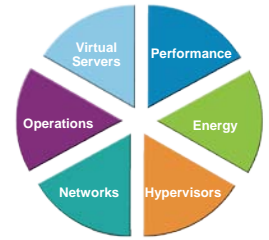


# Workload Performance Policy



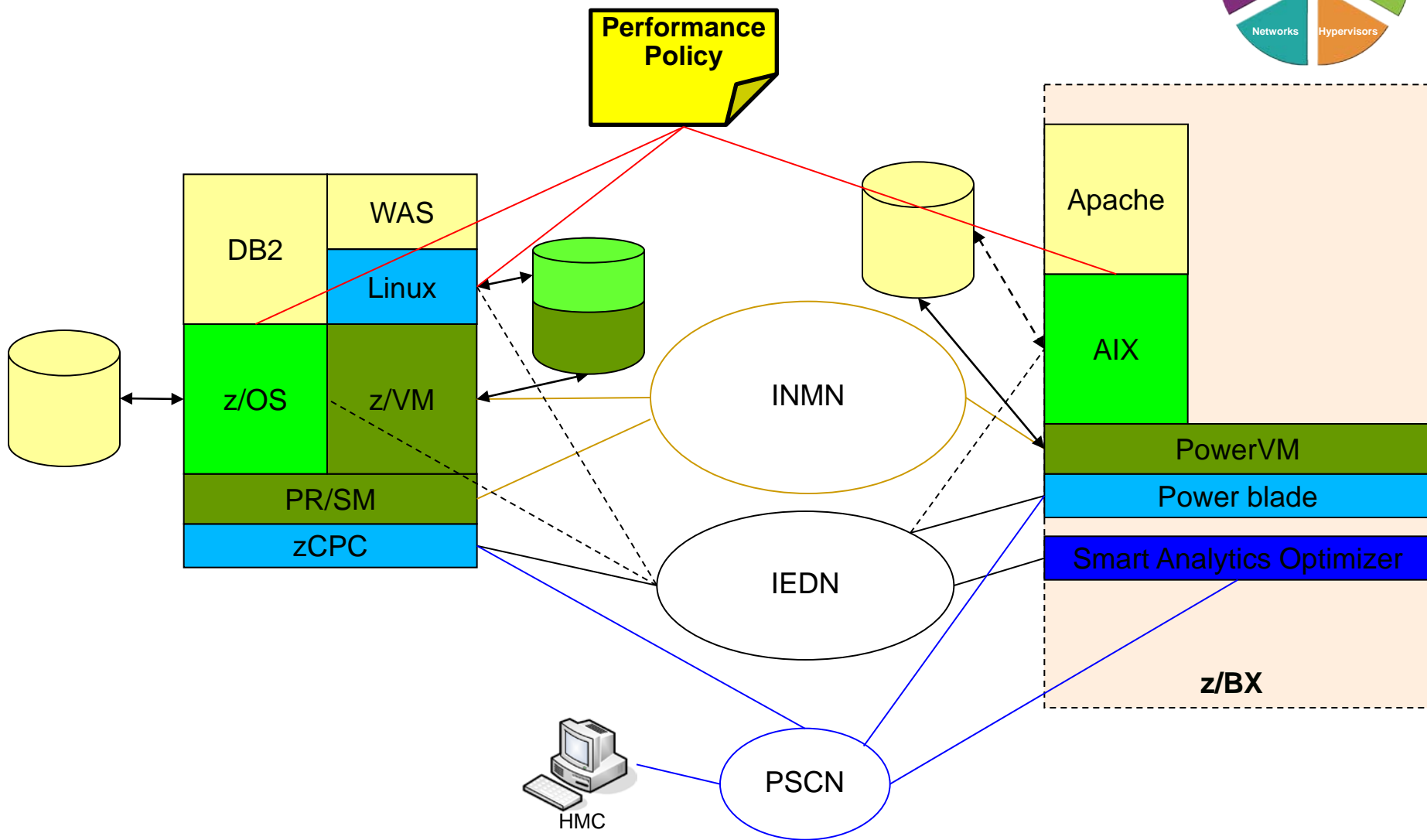
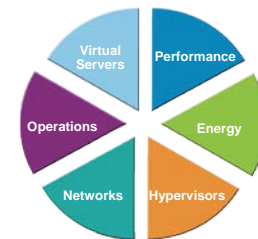
- Defines performance goals for virtual servers in a Workload Resource Group
  - Conceptually similar to simplified z/OS WLM Policy
- Provides basis for monitoring and management of platform resources used by virtual servers in a Workload Resource Group
- Workload Resource Group to performance policy relationship:
  - Multiple performance policies associated with a workload
  - Single policy active at a given time
  - Can dynamically change which policy is active
    - Through the UI
    - Through a time-based schedule
    - Through the API
    - Example: Day shift / night shift policy

# Workload Performance Policy...

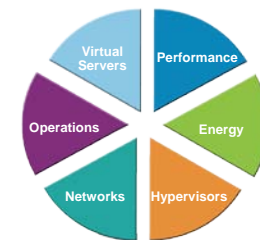


- Policy structure:
  - Policy contains set of service classes
  - Classification rules map each virtual server within the workload to a service class
  - Service class assigns a performance goal and importance
  
- HMC UI supports policy creation and editing
  - Wizard for policy creation
  - Repository for policies under development and saved policies
  - Links to Workload-based performance reporting

# Define Workload and Performance Policy

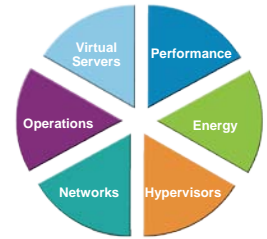


## Platform Performance Management (Automate Suite)



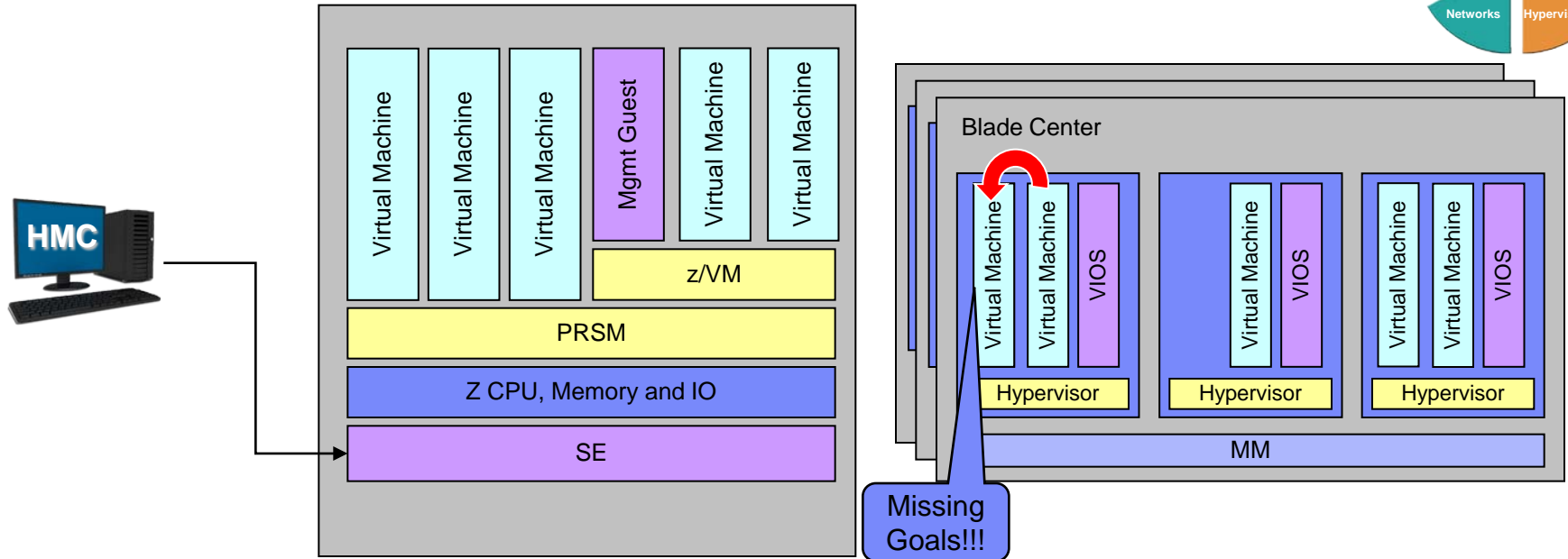
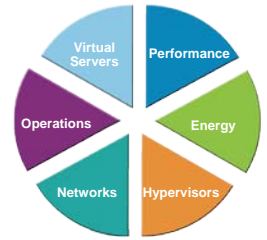
- Platform resource monitoring based on performance policy
  - Ensemble
  - Workload
  - Virtual Server
- Dynamic, goal-oriented resource management
  - Manage CPU across virtual servers within a hypervisor instance

# Workload Resource Group Monitoring and Reporting



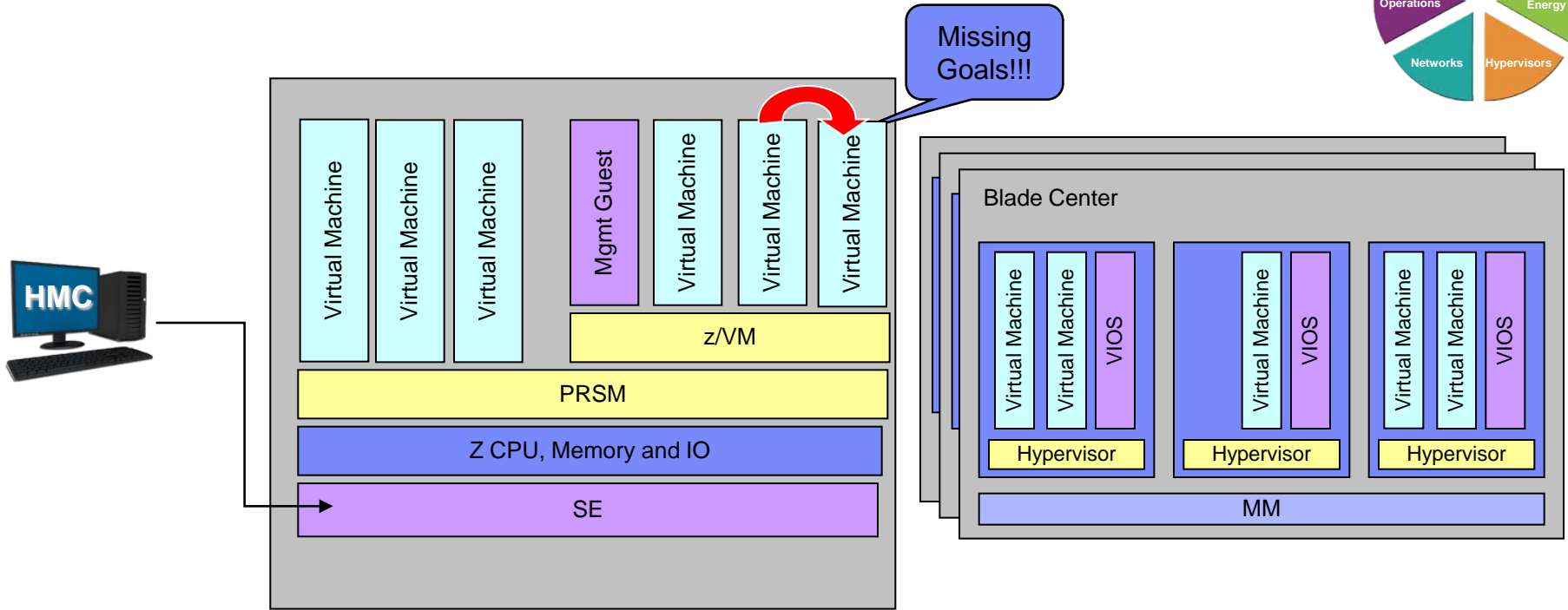
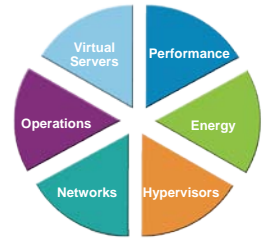
- Provide monitoring on the HMC based on a Workload Resource Group context
- Display of current data and fairly recent history
  - Up to 36 hours of history is kept
  - Interval of data displayed is user selectable
  - Granularity of data kept changes over time
    - 1 minute granularity kept for most recent hour
    - 15 minute interval data kept after first hour
- Workload Resource Group Report
  - Display high level view of “performance health” of each Workload Resource Group
  - Indication if a Workload Resource Group contains service class missing goals
  - Worst performing service class / performance index
  - Details of specific Workloads
    - Graph of PI of worst performing service class
      - Option to graph other service classes
    - Bar graph of virtual server utilization distribution
      - Visualize view of workload overall load

# Managing Resources across Virtual Servers



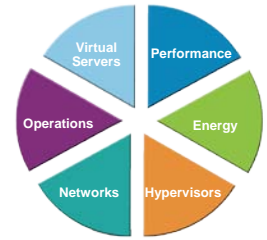
- Manage CPU resources across virtual servers to achieve workload goals
  - Detect that a virtual server is part of a workload not achieving its goals
  - Determine that virtual server performance can be improved with additional resources
  - Project effect on all relevant workloads of moving resources to virtual server
  - If good trade-off based on policy, redistribute resources

# Managing Resources across z/VM Virtual Machines



- Manage CPU resources across z/VM virtual machines
  - Detect that a virtual machine is part of a workload not achieving its goals
  - Determine that virtual machine performance can be improved with additional resources
  - Project effect on all relevant Workloads of moving resources to virtual machine
  - If good trade-off based on policy, redistribute resources

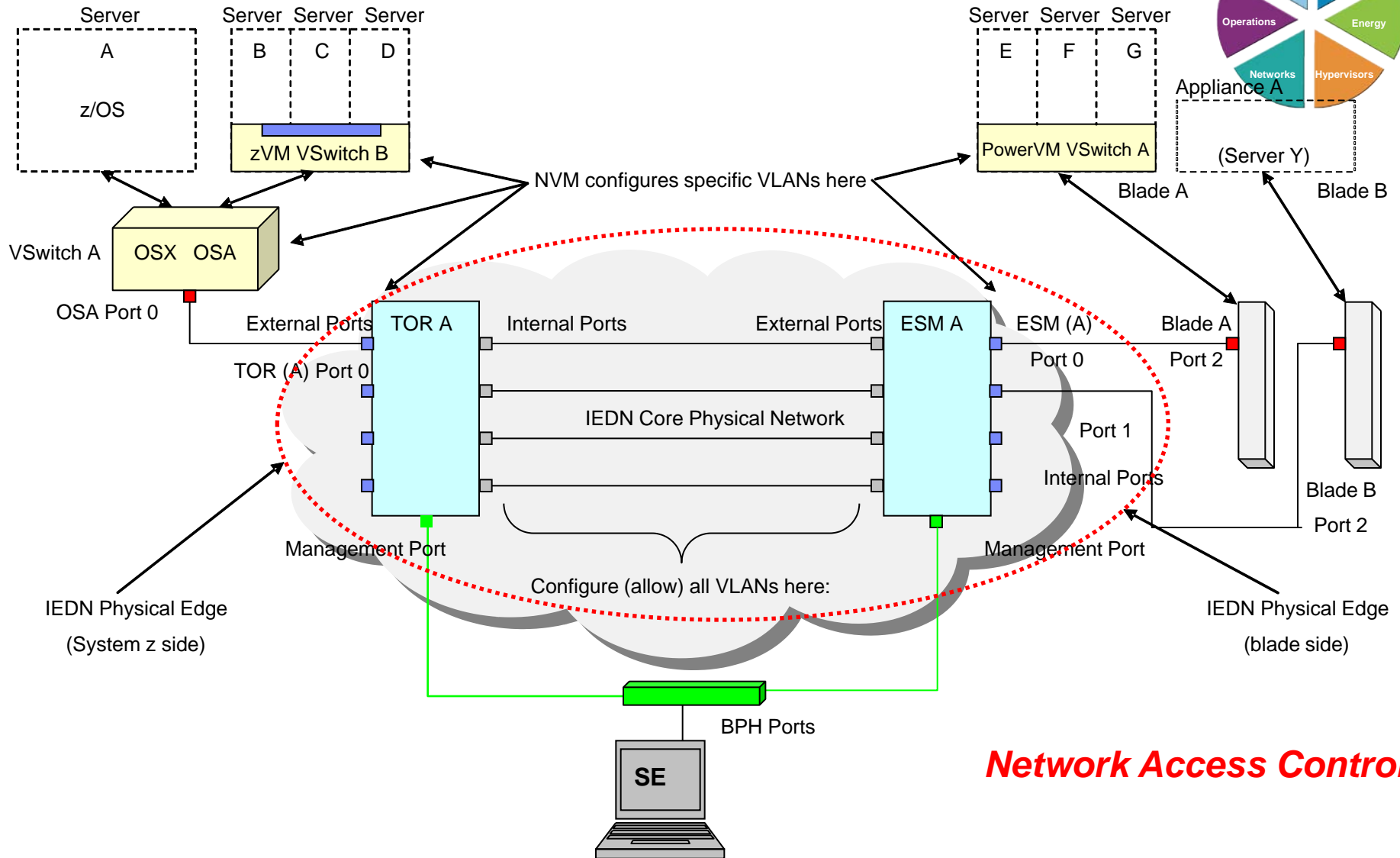
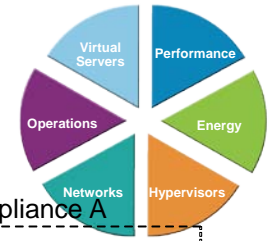
## Network Management (Manage Suite)



- Create Virtual Connection Object (VCO)
  - Name
  - VLAN identifier
  - List of authorized servers
- Connect virtual server to VCO via vNIC with assigned vMAC

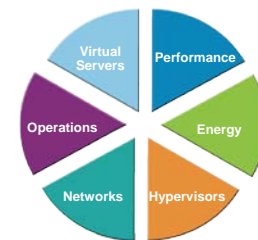


# Virtual Networks and Access Controls



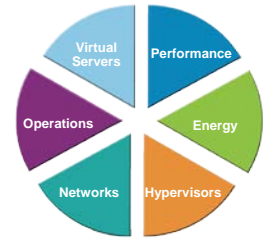
**Network Access Control**

## Energy Management

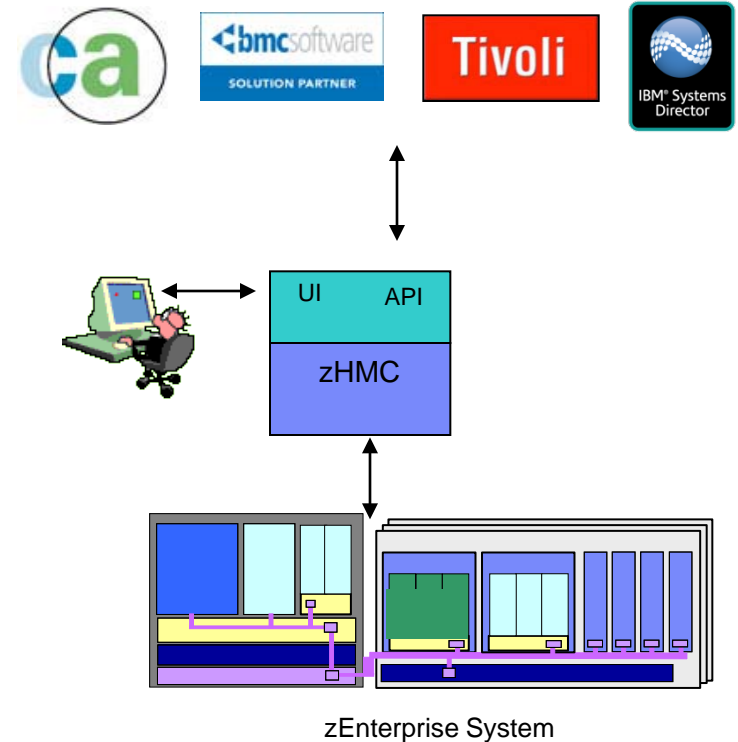


- Power saving controls (Automate Suite)
- Maximum potential power controls (Manage Suite)

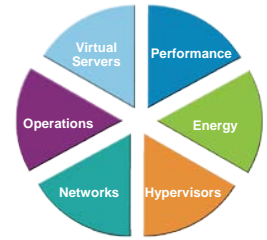
# External Management Enablement



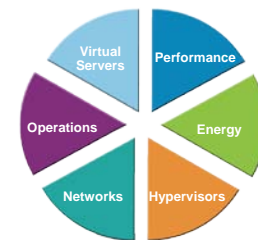
- Objective: Provide API access to zManager functions
- API will allow programmatic access to the underlying Unified Resource Manager functions exploited by the User Interface
  - Same resource types, instances and policies
  - API functions correspond to views and tasks in the UI
    - Listing resource instances
    - Creating, changing, deleting resource instances
    - Operational control of resource instances
- Goal: Enable management of Unified Resource Manager from external (to HMC) tools
- Priority scenarios: Discovery, Monitoring, and Provisioning use cases



## Related Facilities



- **Scheduled Operations**
  - Allows functions to be performed at designated times on designated days
- **Grouping**
  - Allows resources (e.g., virtual servers) to be aggregated so that functions can be performed on them with a single action (e.g., activation)
- **Event Monitoring**
  - Sends e-mail notifications to designated users when particular circumstances arise (e.g., virtual server failure)



# Questions?

**Dank u**

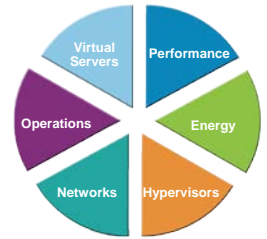
Dutch

**Merci**

French

**Спасибо**

Russian



شكراً

Arabic

**Tack så mycket**

Swedish

Korean

धन्यवाद

Hindi

תודה רבה

Hebrew

**Gracias**

Spanish

**Obrigado**

Brazilian  
Portuguese

**Dankon**

Esperanto

**Thank You**

谢谢

Chinese

ありがとうございます

Japanese

**Trugarez**

Breton

**Danke**

German

**Tak**

Danish

**Grazie**

Italian

நன்றி

Tamil

**děkuji**

Czech

ขอบคุณ

Thai

**go raibh maith agat**

Gaelic