



SOLUTION DESIGN

SYSTEM INTEGRATION

APPLICATION MANAGEMENT

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# Using Private Cloud Techniques with AdvancedTCA Platforms

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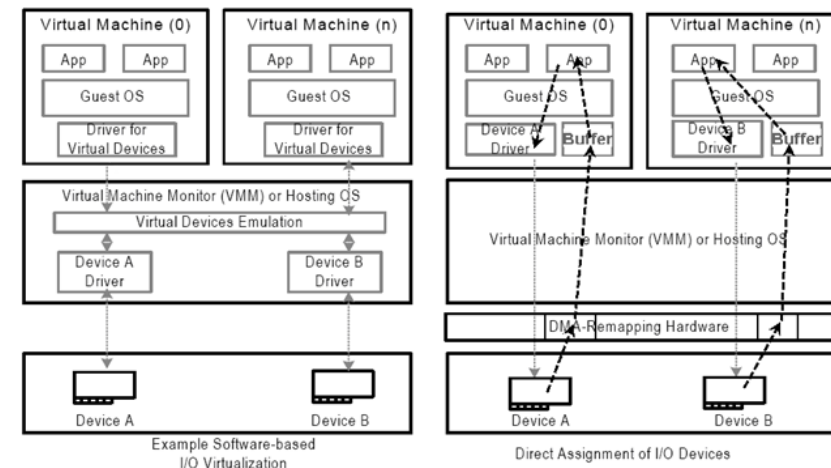
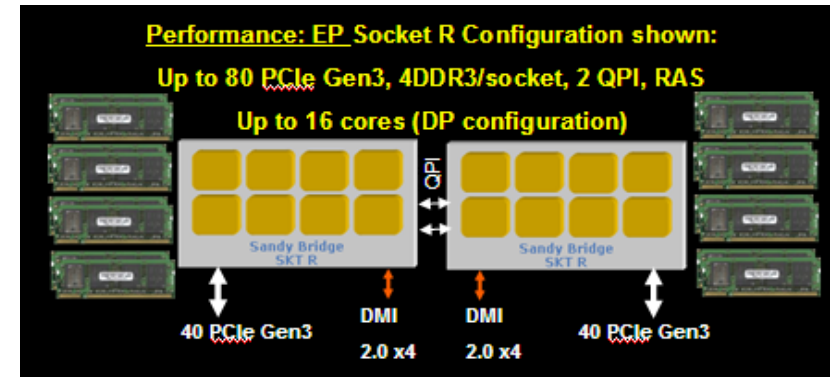
# Agenda

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- **Driving Factors**
  - Hardware Advances
  - Software Efficiency
  - Design Flexibility
  - Power Efficiency
- **Required Elements**
  - Hardware
  - Software
- **Managed Private Cloud vs. Hypervisors**
- **Example**
- **Next Steps**

# Driving Factors – Hardware Advances

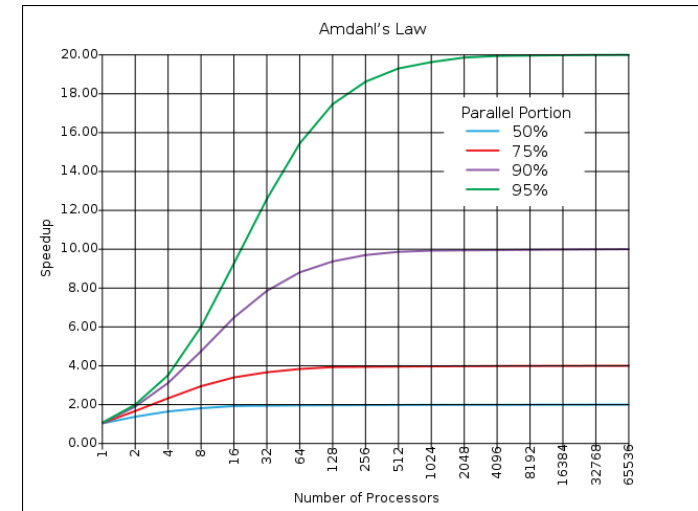
- **Multicore processors and dense memory configurations**
  - 16 physical CPU cores w/ 128GB+ RAM in ATCA blades by early 2012
- **High network bandwidth per compute node**
  - 10GE prevalent
  - 40GE emerging
- **System-level acceleration of VM function allows for direct access-level performance of shared hardware resources**
  - Intel VT-x
  - AMD-V



# Driving Factors – Software Efficiency

## ■ Plateau Effect

- Most control plane and data plane applications do not scale linearly across multiple CPU cores
- Many applications plateau between 2 – 6 CPU cores
- Some applications are more I/O-intensive rather than CPU-intensive
- Non-Uniform Memory Access (NUMA) effects come into play on modern systems

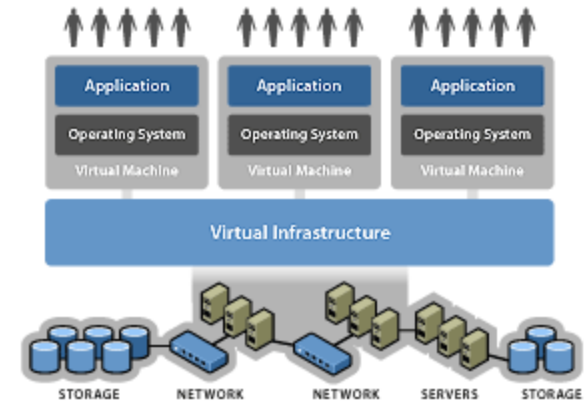


## ■ Development Environment Commonality

- VMs provide a uniform development and testing environment
- A range of tested hardware platforms can be used with little or no additional application development required

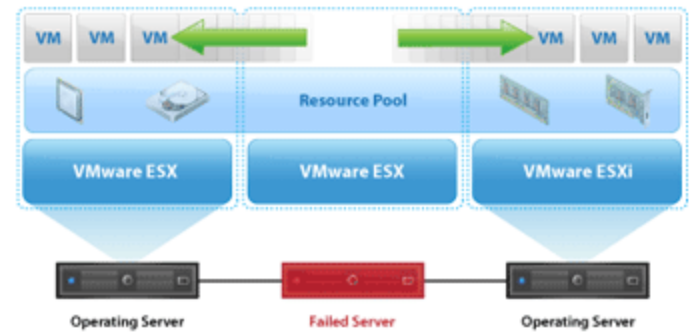
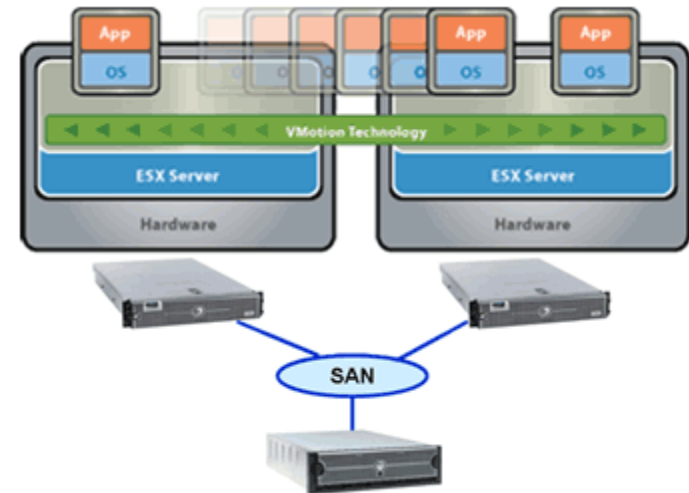
# Driving Factors - Design Flexibility

- **Utilizes a pool of resources**
  - Control plane, data plane, and networking can run on common shared hardware
  - Shared storage allows for greater efficiency
- **Ease of upgrading**
  - Resources can be dynamically added to pool
  - Migrating any instances between compute node can be non-disruptive
- **Multiple guest operating systems supported**
- **Running instances can be tailored to workload requirements**
  - Dedicated service level can be assigned to each instance
  - VM can migrate to other physical resources to maintain service level



# Driving Factors - Power Efficiency

- **Telecom service providers are requiring higher levels of power efficiency**
  - Led by Verizon Telecommunications Equipment Energy Efficiency Ratings (TEEER)
- **VMs allow for more efficient use of hardware resources**
- **VMs allow for 1+1 or N+1 redundancy with less hardware**



# Required Elements - Hardware

## ■ Compute Resources

- Blade Servers (ATCA)
  - *Simplified cabling, installation, and upgrades*
  - *Smaller design (per node)*
  - *Most power efficient (per node)*

## ■ Network Switches

- Integrated (Blade)
  - *Less space required*
  - *Integrated management*

## ■ Storage

- SAN
  - *Best performance*
- NAS
  - *Most flexibility*
- Shared Local Storage
  - *Lowest Cost*



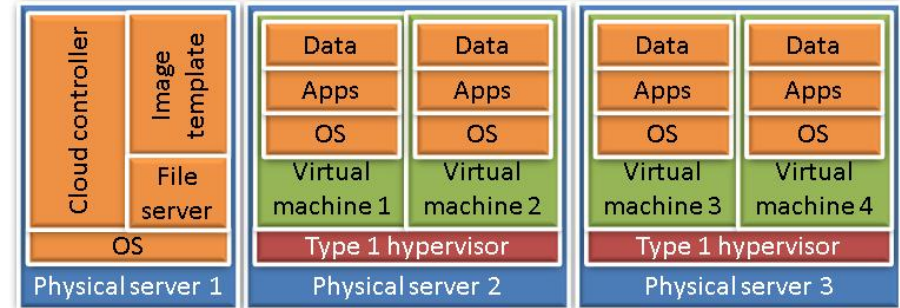
# Required Elements – Software

## ■ Hypervisors

- Underlying framework for running VMs
- Many to choose from with different strengths

## ■ Hypervisor Manager

- Cluster-aware, multi-hypervisor manager
- Allows VM environments to migrate across physical hardware
- Provides hypervisor monitoring functions

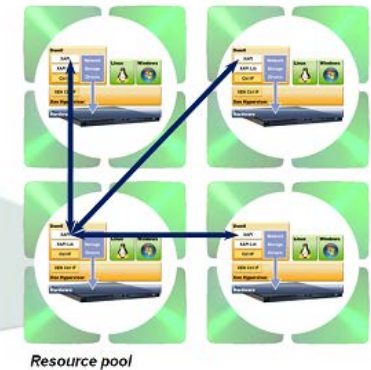
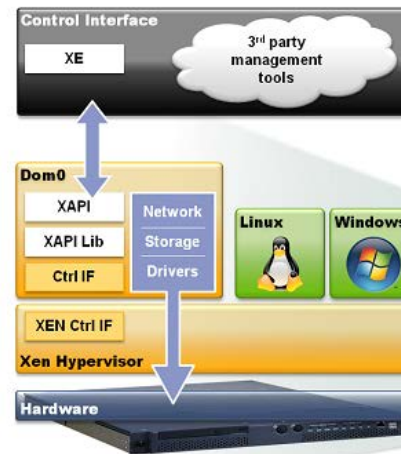


## ■ Operating Systems

- Multiple OS's can be used
- Eases migration

## ■ Shelf Management

- Physical management of hardware
- Manages alarming



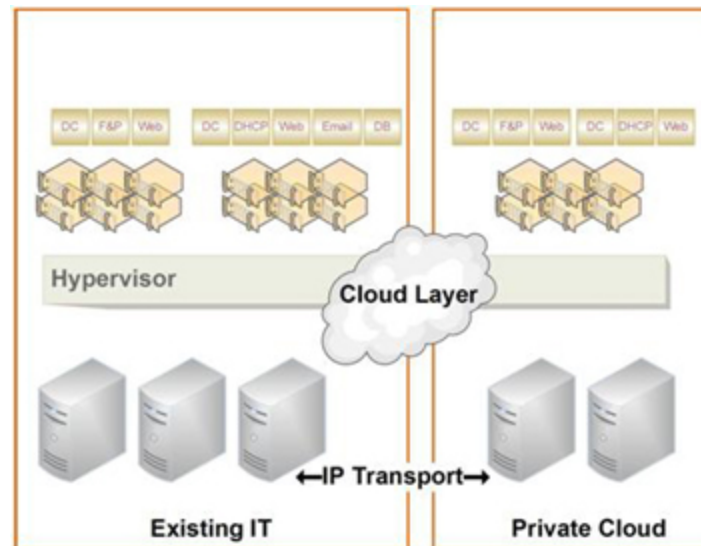
# Managed Private Cloud vs. Hypervisors

## ■ Private Cloud

- Dynamic provisioning of VMs
- Resources managed as a pool
- Automatic migration of VMs based on workload
- High availability

## ■ Hypervisors

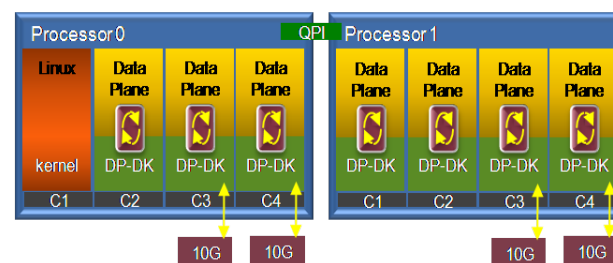
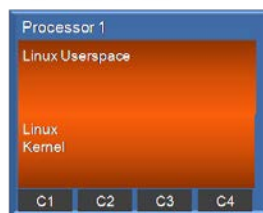
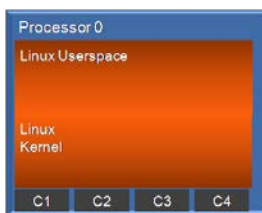
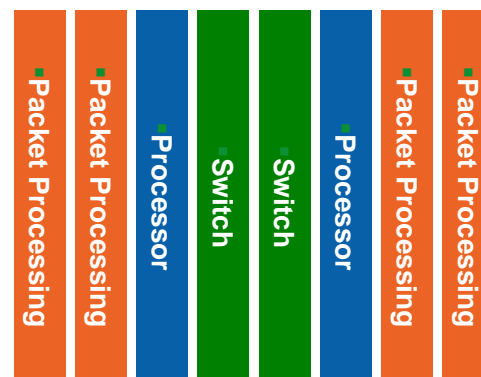
- Manual provisioning of VMs
- Multiple independently managed nodes
- Manual migration of VMs
- Fast service recovery



# ATCA Platform Example

## Multi-use Blades

- SBCs become “generic”
- Same SBC can run packet processor or control plane applications
- Intelligent monitoring and elastic provisioning can optimize active blade configuration for existing workload
- Compute, switching, and storage combined into one chassis



- Processor Blade
- Control Plane

- Packet Processing Blade
- Data Plane

# Next Steps (Improvements)

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- **Integration of shelf management and hypervisor management**
  - Allow shutdown and startup of physical resources based on workload
- **Tighter integration of switch configuration with shelf management**
  - Dynamic allocation of VPNs and QoS channels

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# Questions?

# Thank you!

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