



VFrame Data Center: Technology Overview



Ji Lim

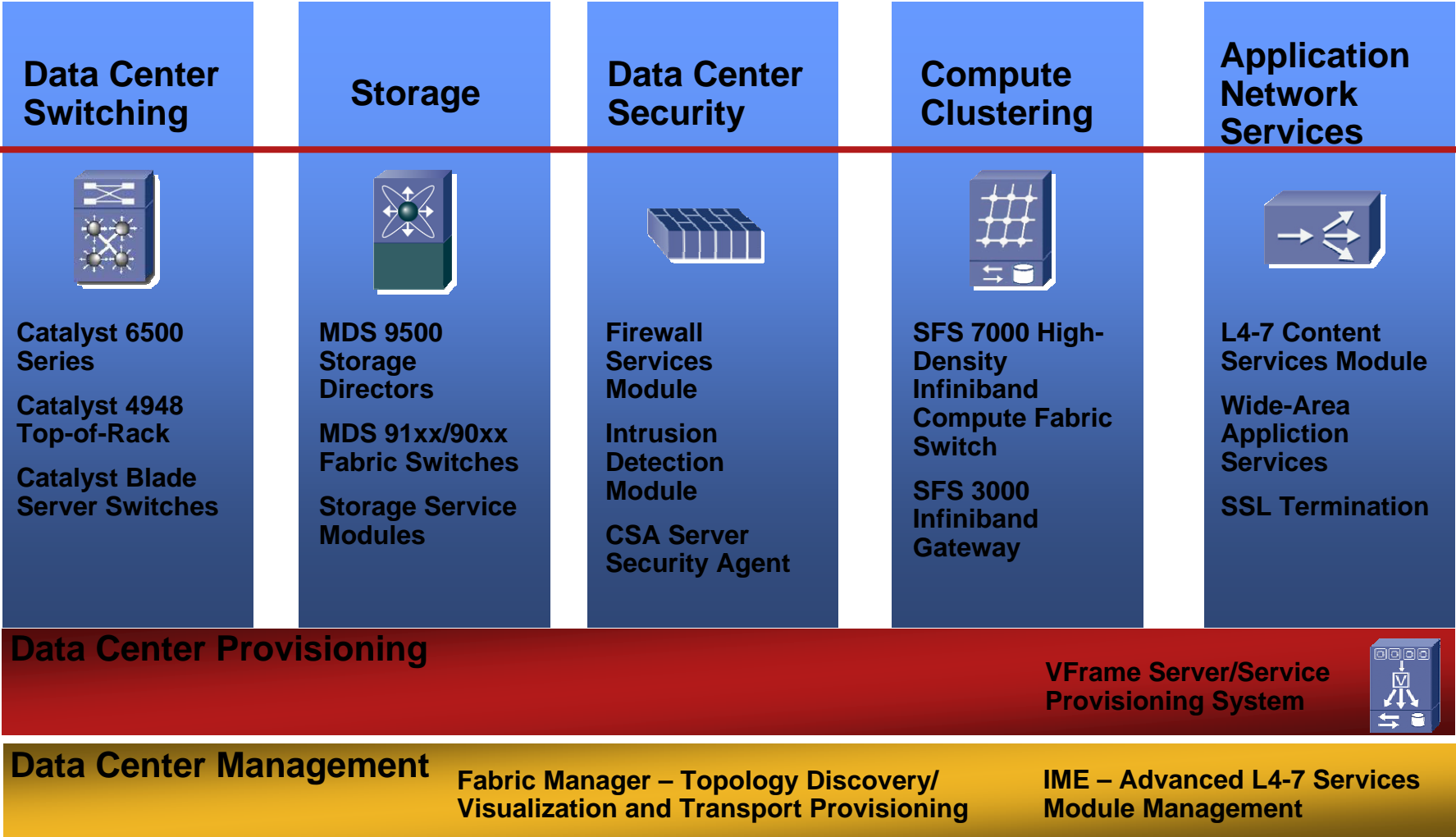
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Cisco Data Center Product Families



Data Center Virtualization

Network Virtualization

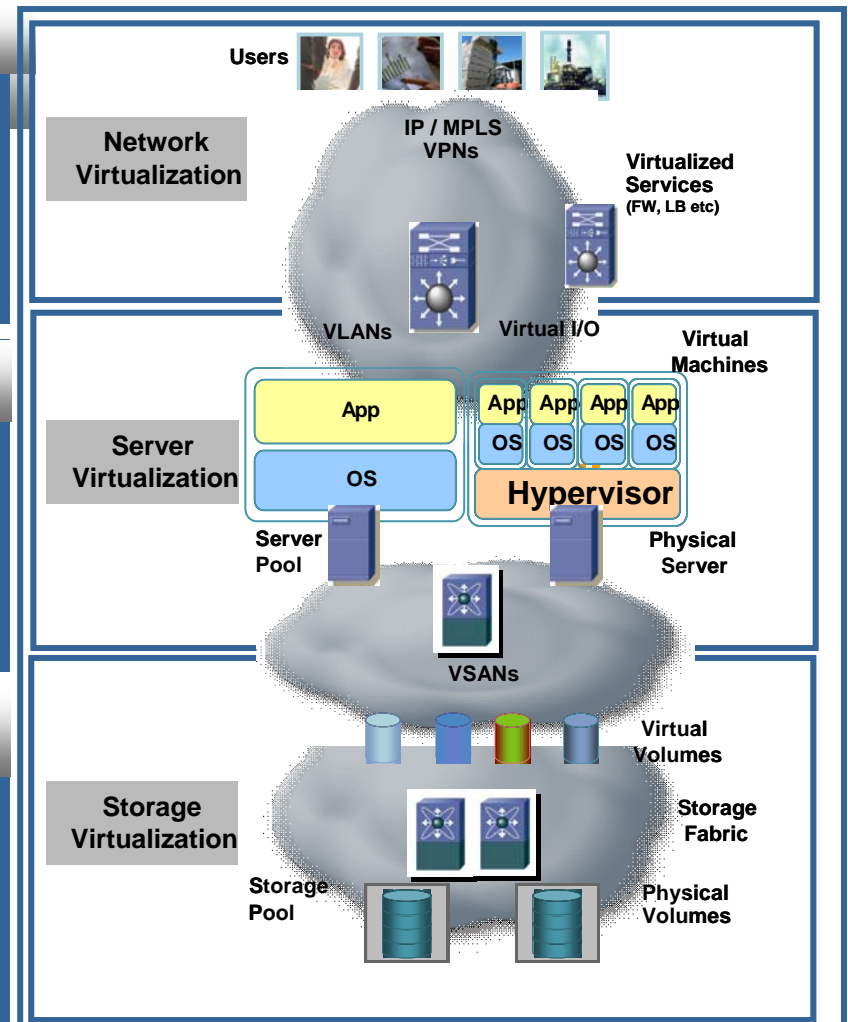
- Segmentation and security
- Higher resource flexibility
- Improved capacity utilization

Server Virtualization

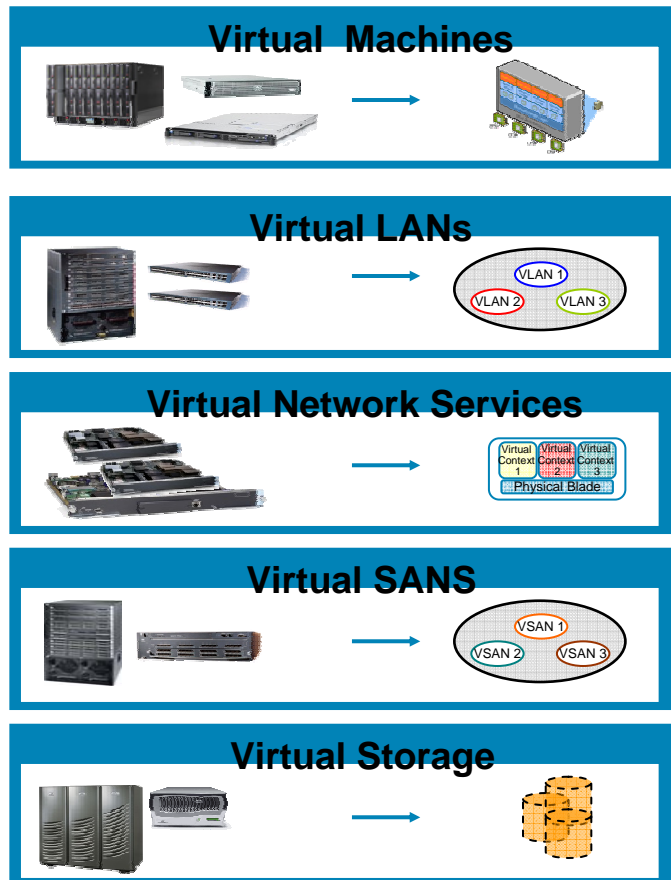
- Consolidation of physical servers
- Virtual Machine mobility
- Rapid application deployment with VMs

Storage Virtualization

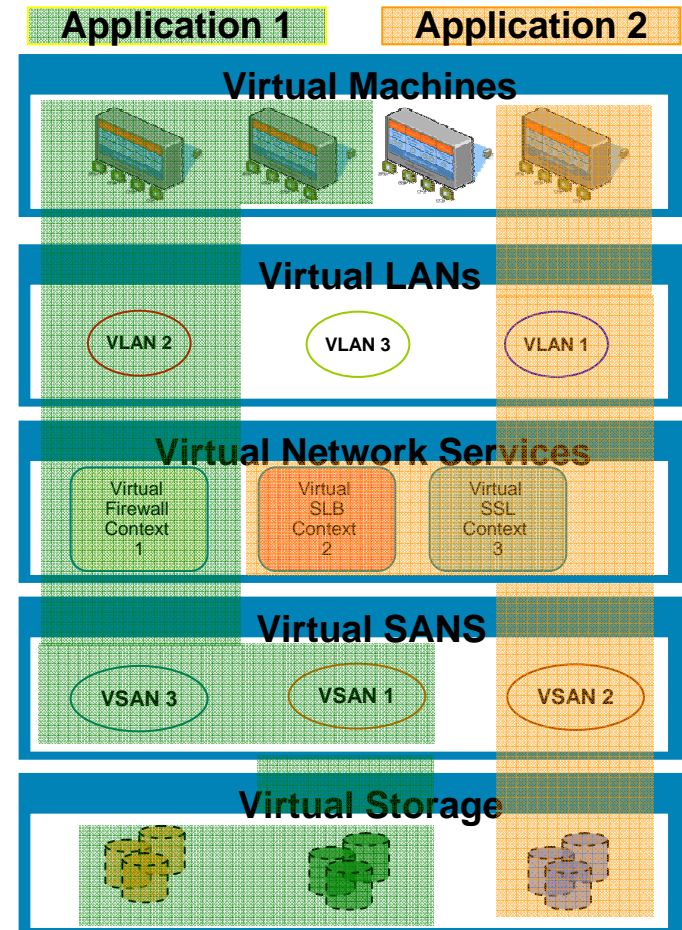
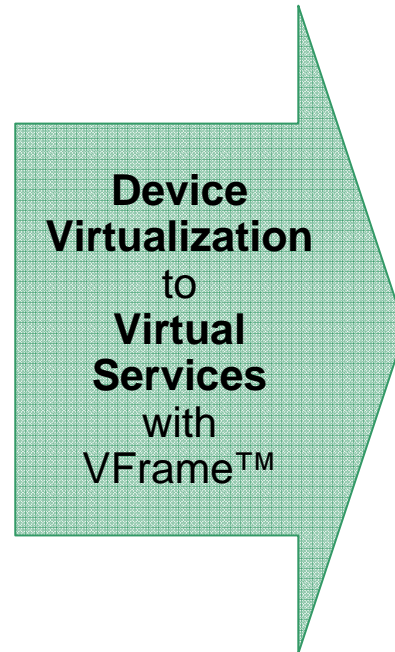
- Segmentation and security
- Improved data mgmt. & compliance
- Non-disruptive provisioning & migration



VFrame™ - Enabling service orchestration



Traditional Virtualization
Creating a virtual element



VFrame Enabled Service
Orchestration
Creating an End-to-End
Virtual Service

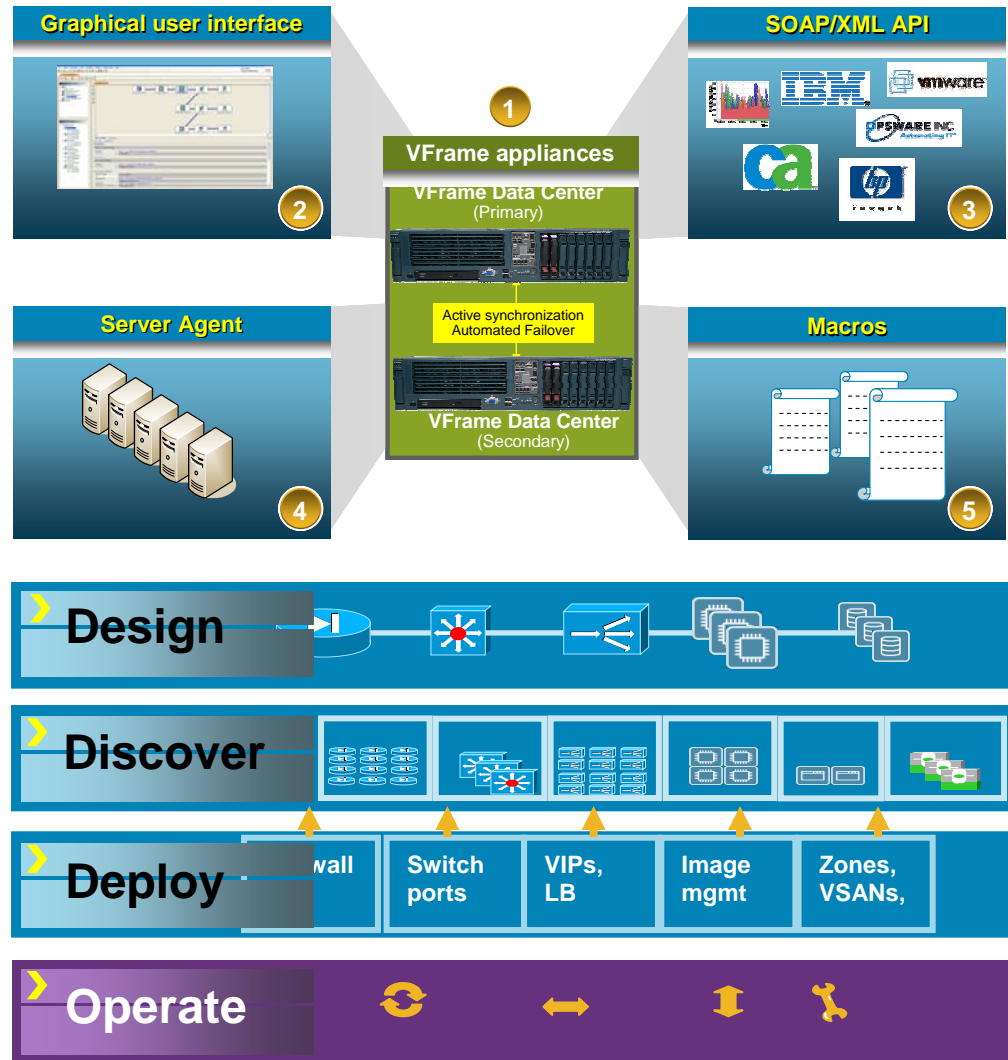
VFrame Data Center 1.1 Overview

- VFrame Components

- Appliances
- Java based GUI
- Web Services API
- Host Agent
- Extensible Macros

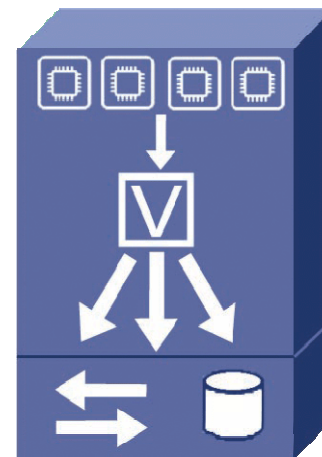
- VFrame Workflow

- Design
- Discover
- Deploy
- Operate



VFrame DC Current Status

- Product initial launch: Summer 2007.
- Status: Generally Available
- Current Support Matrix Summary:
 - Catalyst 6500, 4948, 3750 Switches and Cisco Ethernet Blade Switching in IBM BladeCenter H and HP c-Class
 - MDS and MDS Blade Switches
 - Cisco Firewall Service Module (FWSM)
 - Cisco Content Switching Module (CSM)
 - x86 Servers from HP, IBM , Dell (Modular addition for servers)
 - FC Storage – EMC, IBM (Modular addition for storage arrays)
 - NAS storage – NetApp
 - SNMPv3 support



VFrame DC: Service Template Design GUI

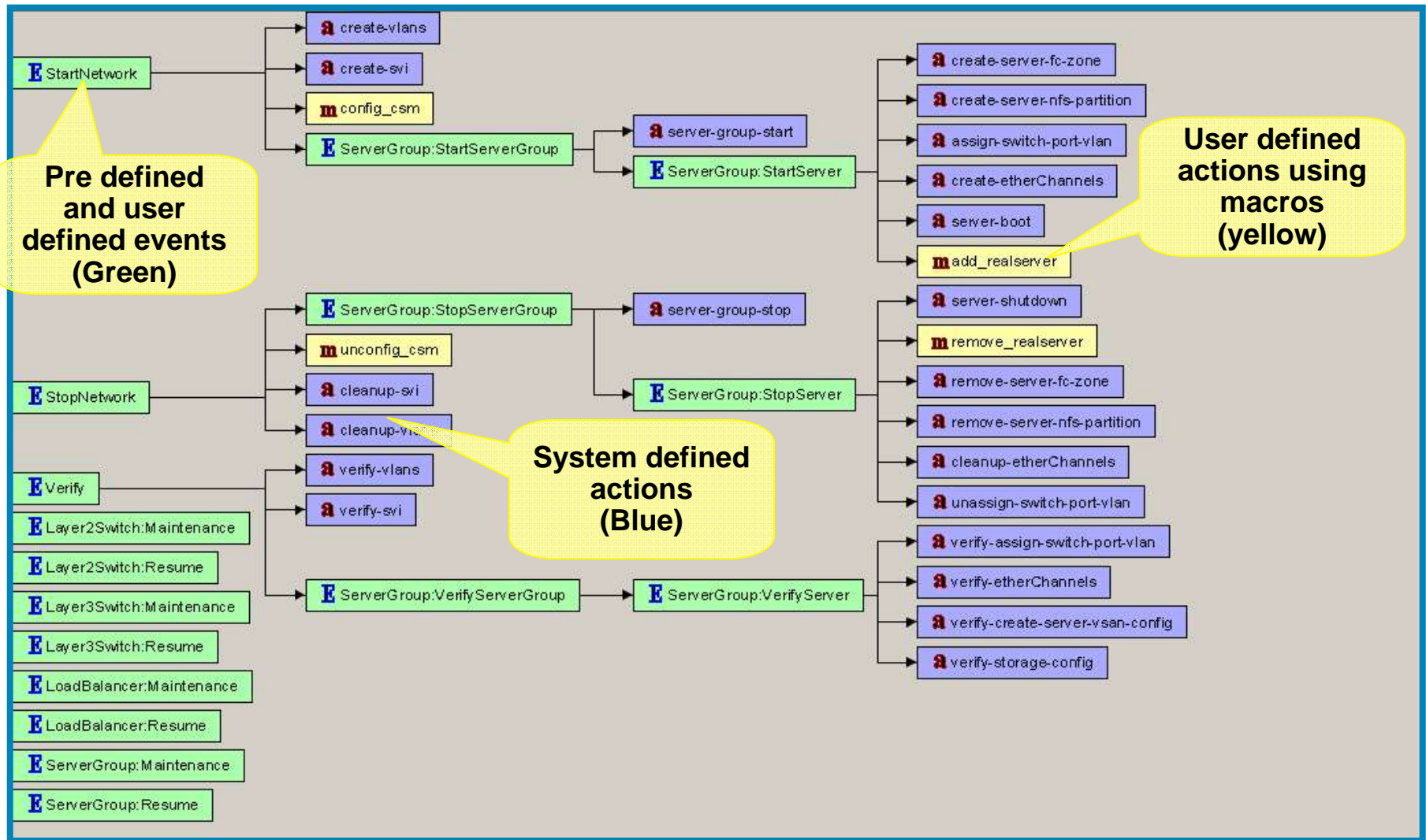
The screenshot displays the Cisco VFrame DC Service Template Design GUI. The main workspace is titled "Acme Web Hosting" and features a "Drag and Drop Canvas" at the top with icons for External Network, Web Hosting Firewall, Load Balancer VLAN, Server Load Balancer, Web Server VLAN, ServerGroup: vSwitch1, and Web Server Group. A "Logical Resource Palette" on the right lists various network and server components. Below the canvas is an "Event Map" showing a flow of operations: Undeploy Network (NETWORKWIDE) leads to remove-vlans-from-vlan-group, cleanup-vlans, and Stop Server Group; Deploy Network (NETWORKWIDE) leads to create-vlans, add-vlans-to-vlan-group, and Start Server Group. These actions then trigger server-group-stop, Stop Server, server-group-start, and Start Server, which in turn trigger a series of server-level actions like server-shutdown, remove-server-fo-zone, remove-server-nfs-partition, cleanup-etherChannels, unassign-switch-port-vlan, create-server-fo-zone, create-server-nfs-partition, assign-switch-port-vlan, create-etherChannels, and server-boot.

Drag and Drop Canvas

Logical Resource Palette

Event Map

VFrame DC: Service Template: Events & Actions



VFrame DC: Discovered Resources

Server

- Server discovery and inventory of CPU, Memory, Local hard disk
- Server to switch port binding for Ethernet and Fibre Channel
- LOM and server/LOM binding

Storage

- Storage LUN Discovery
- NAS Volume Discovery

SAN

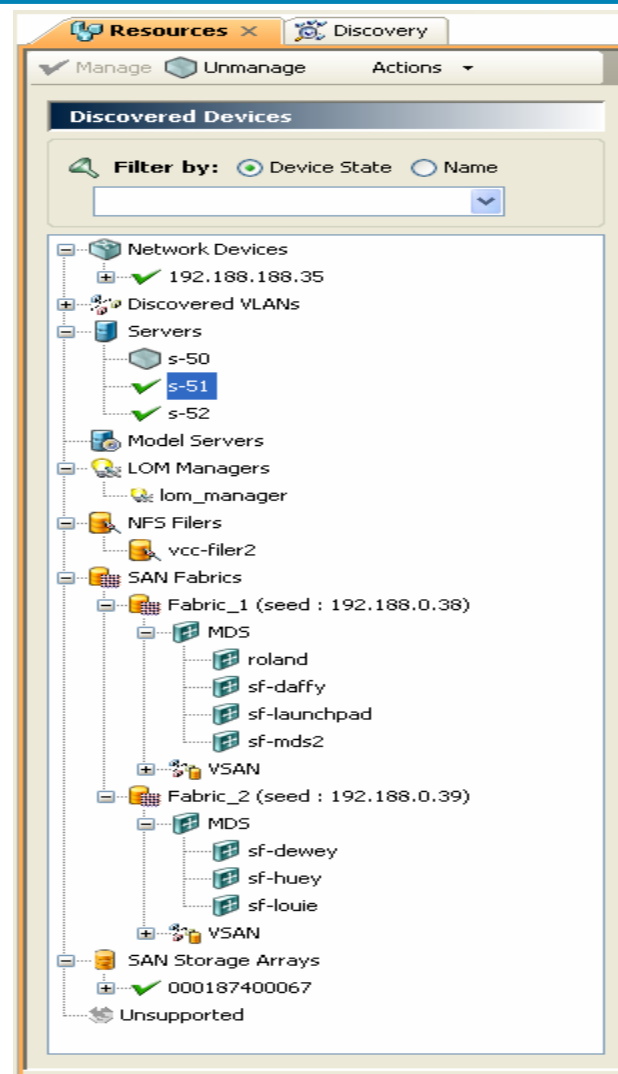
- MDS Switches, VSANs, Zones and IVR

Network

- Cat6k chassis, L2/L3 connectivity and L2 topology
- VLANs, SVIs

Network Services

- Service modules (FWSM, CSM), pre-created contexts and HA pairs



VFrame DC: Resource Pooling

Pool Types

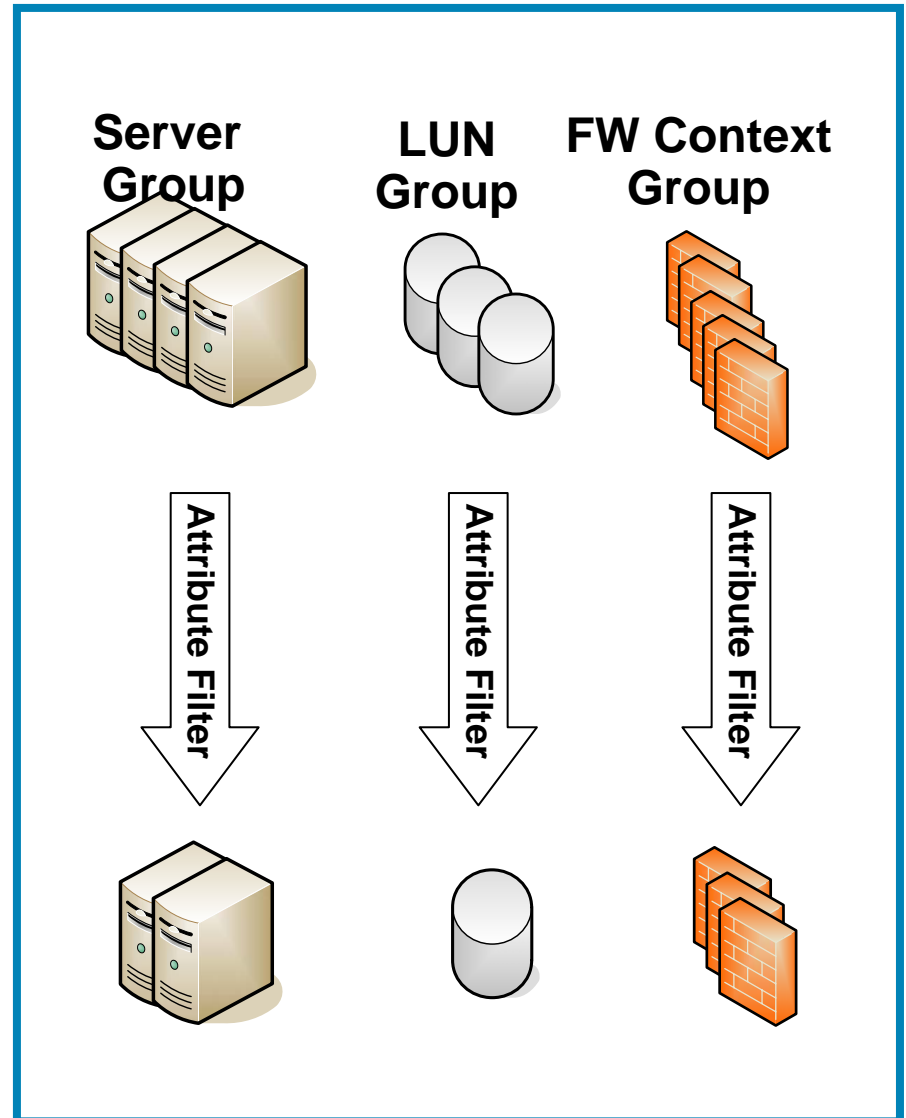
- Static and Dynamic Resource Pools
- Grouping based on resource attribute
- Attributes can follow Boolean logic
e.g. Servers with 2 CPUs AND 4GB memory
e.g. Switch port with IOS version xx

Resource Types

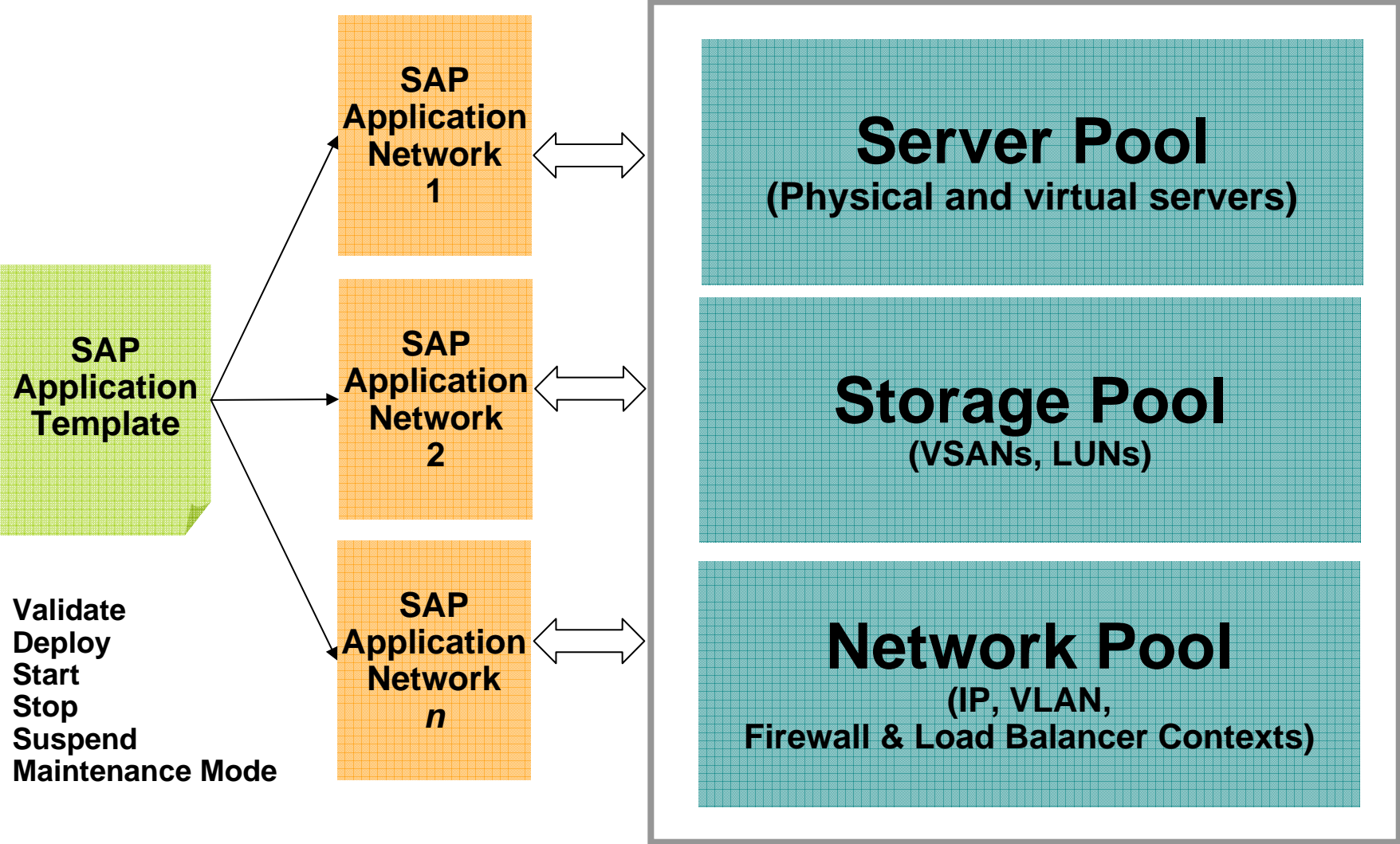
- Resources can be physical or logical
e.g. physical server, storage, IP addresses, VLANs

Pool Association

- Service levels of the service networks can be controlled through the assignment of appropriate resources
- Example: High powered servers for high priority application



VFrame DC: Service Templates and Networks



VFrame DC: Server Operations

■ Boot methods

- PXE over NFS (Linux only)
- PXE boot , SAN root (Linux Only)
- SAN Boot (Linux and Windows)

■ Server OS Image Management

- Golden Master Image is snapshot from server and copied over to SAN or NAS storage
- New copy of OS image is created in SAN or NAS for each virtual server

■ Server counts and start/stop

- Automated server failover with network and storage config
- Server group can have its own count of target, max and min servers
- Servers can be started and stopped manually or through the API

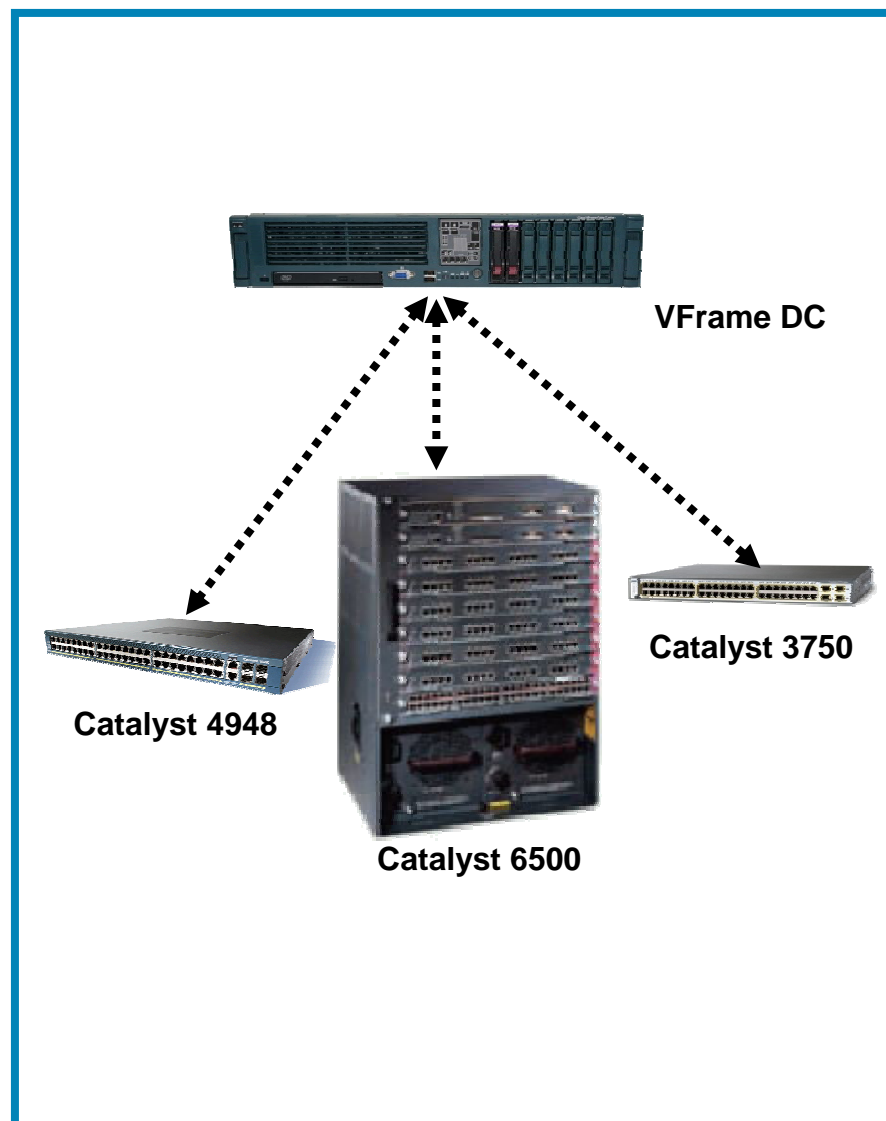
The image displays two screenshots from the Cisco VFrame administration interface. The top screenshot shows the 'Server Images' configuration page, which includes a tree view of the repository, a 'Kernel Version' field set to '2.6.32-43-ELmp', and a 'Mount Server Info' section with details like 'Hostname: modf001-33.rbr.cisco.com', 'Vendor: HP', 'Model: ProLiant DL380 G4', 'CPU: (2x) Intel(R) Xeon(TM) CPU 3.00GHz', 'Type: i86', 'Serial: 3002 113', 'Gauge: 1', and 'TBA'. The bottom screenshot shows the 'Server Group Definition' window for a 'ServerGroup' element. It displays a diagram of a 'Layer2Switch' connected to a 'ServerGroup' and a table of properties.

Name	Value
Server Group Category	
Server Group Properties	
Golden Image Properties	
Image:	rh3u7_feb16
Root Storage Type:	NAS
Memory Swap:	0
Memory Size:	512
Storage Properties	
SAN Fabric Type:	No_Fabric
Server Ports per Fabric:	0
NAS Root Storage:	AdminContext: All NFS Volume
NAS Shared Storage:	Not Selected
Interface Properties	
Interface(To_Layer2Switch)	
Number of Links:	1
Ethernet Speed:	100
PXE Boot Interface:	true
Requires port fast:	true
NIC HA:	False
Switch HA:	False
Teaming Mode:	Not Selected
Teaming Parameters:	None

VFrame DC: Network Operations

Network Operations:

- L2 Topology Discovery
- VLAN creation and configuration
- Macro based FWSM, CSM configurations
- Server NIC Teaming
- IP addressing
- SVI Creation
- HSRP configuration



VFrame DC: Storage Operations

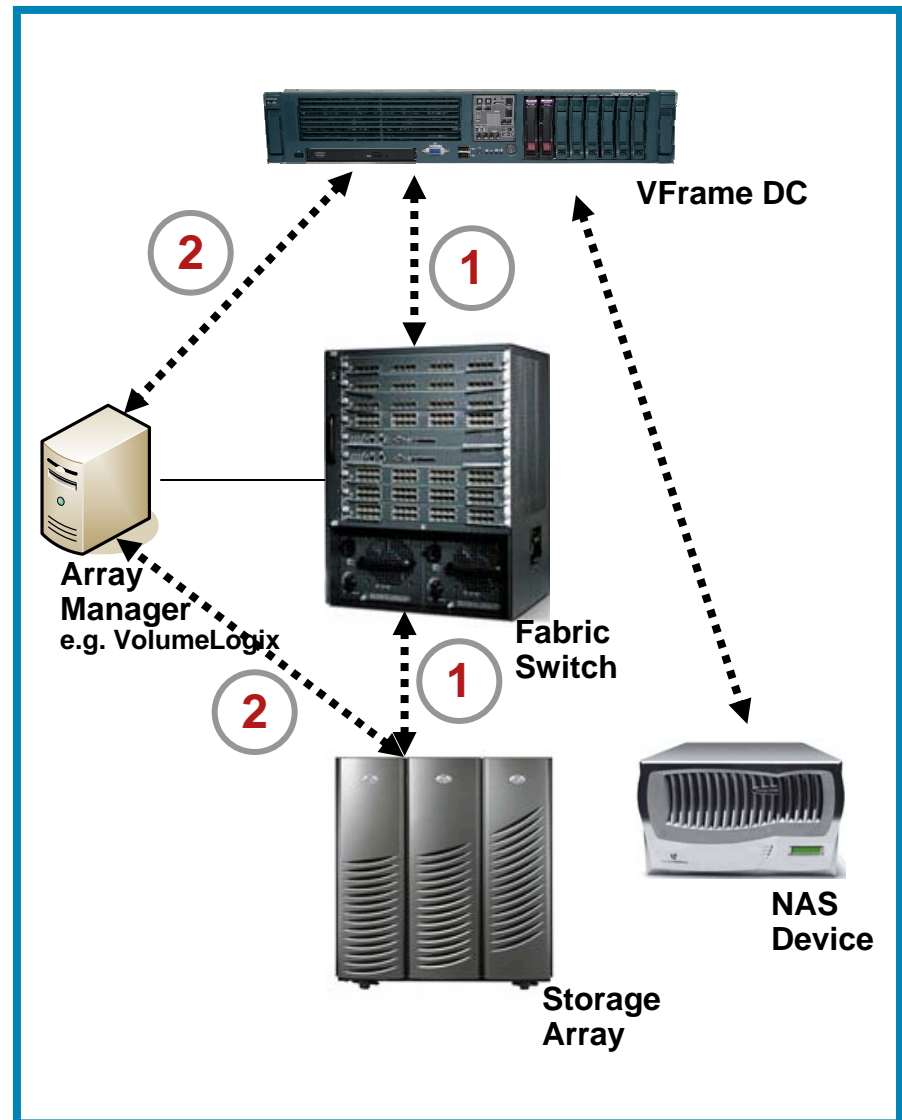
Two modes of storage operations

1. Fabric mode

- Arrays are open
- LUN zoning is done in the fabric
- Change to existing operations that involves buy-in from storage vendor

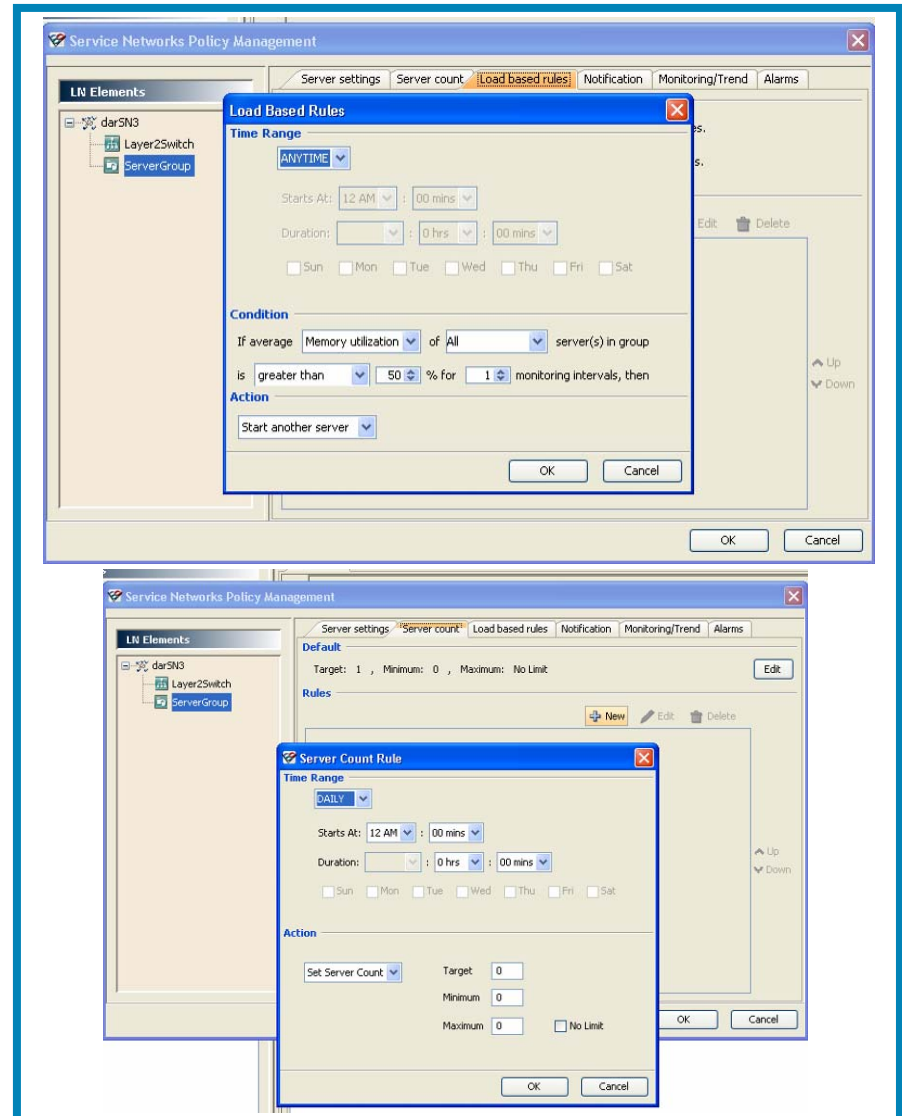
2. Array mode

- Storage Macro interfaces with Storage Array Manager
- LUN masking and mapping done on the array
- No change to existing operations
- **Support for NAS volumes through API to NetApp filers**
- **Support for QLogic and Emulex HBAs**



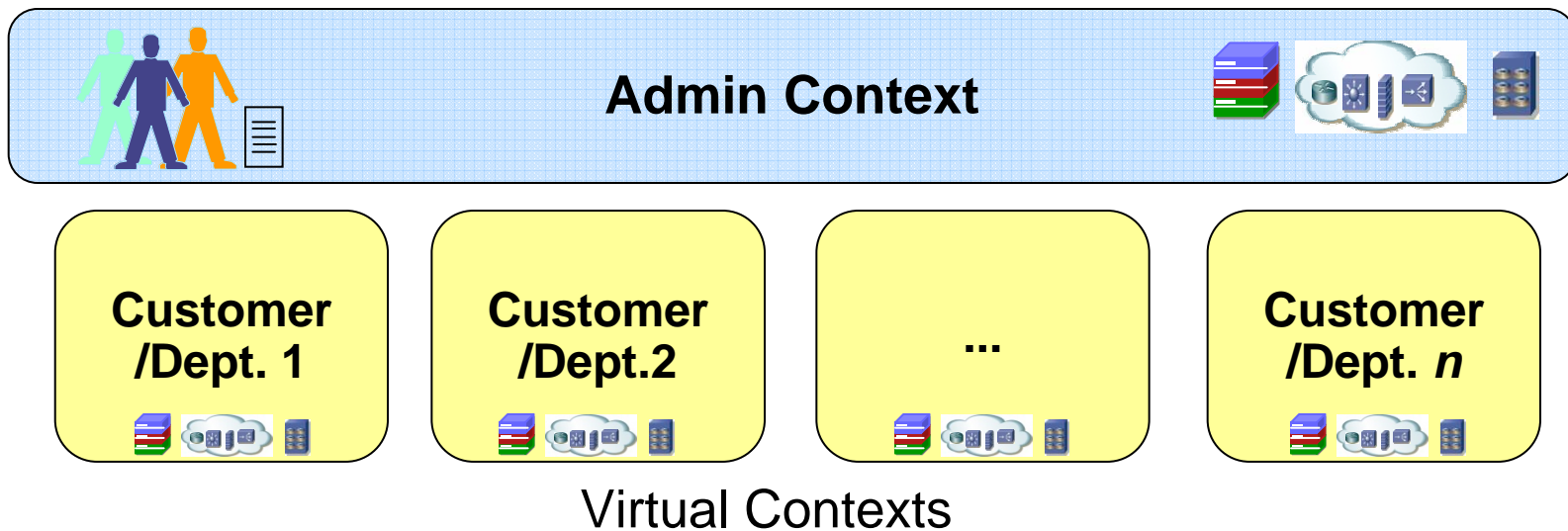
VFrame DC: Policy Framework

- **Policies are trigger – action pairs**
 - Uses monitored variables
 - Thresholds defined according to business rules
 - When thresholds are met or exceeded for pre defined time intervals, alert is generated
 - Built in policies for time based start/stop of networks and servers
 - Load based policies for server addition and deletion
 - Server Host Agent monitors CPU and memory utilization
 - These can be used as triggers for server add/delete
- **Service networks can be associated with one or more policies depending on business requirements**
- **Policy triggers can be external through the API**

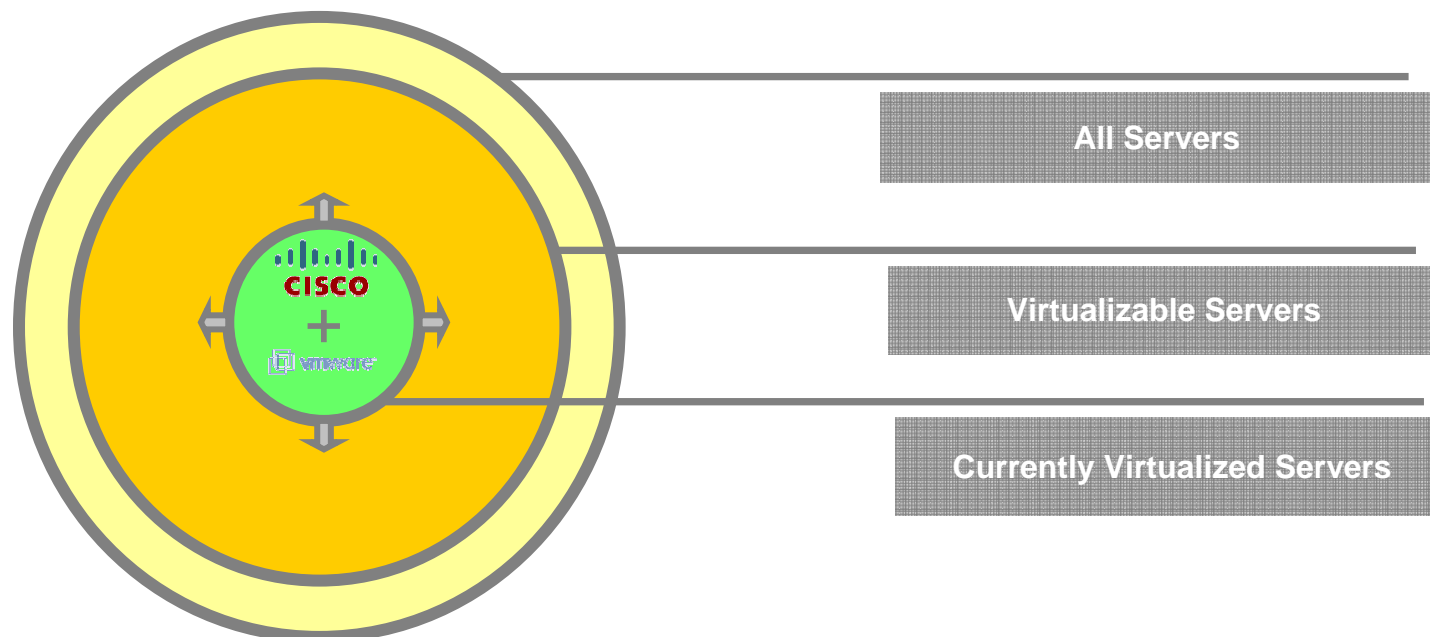


VFrame DC: Roles and Virtual Contexts

- Delegate resources to a particular customer or department
- Securely share global templates
- Control access to specific users based on role
sysadmins, storage admins, network admins
- Specify the role for the user
Designer, Operator

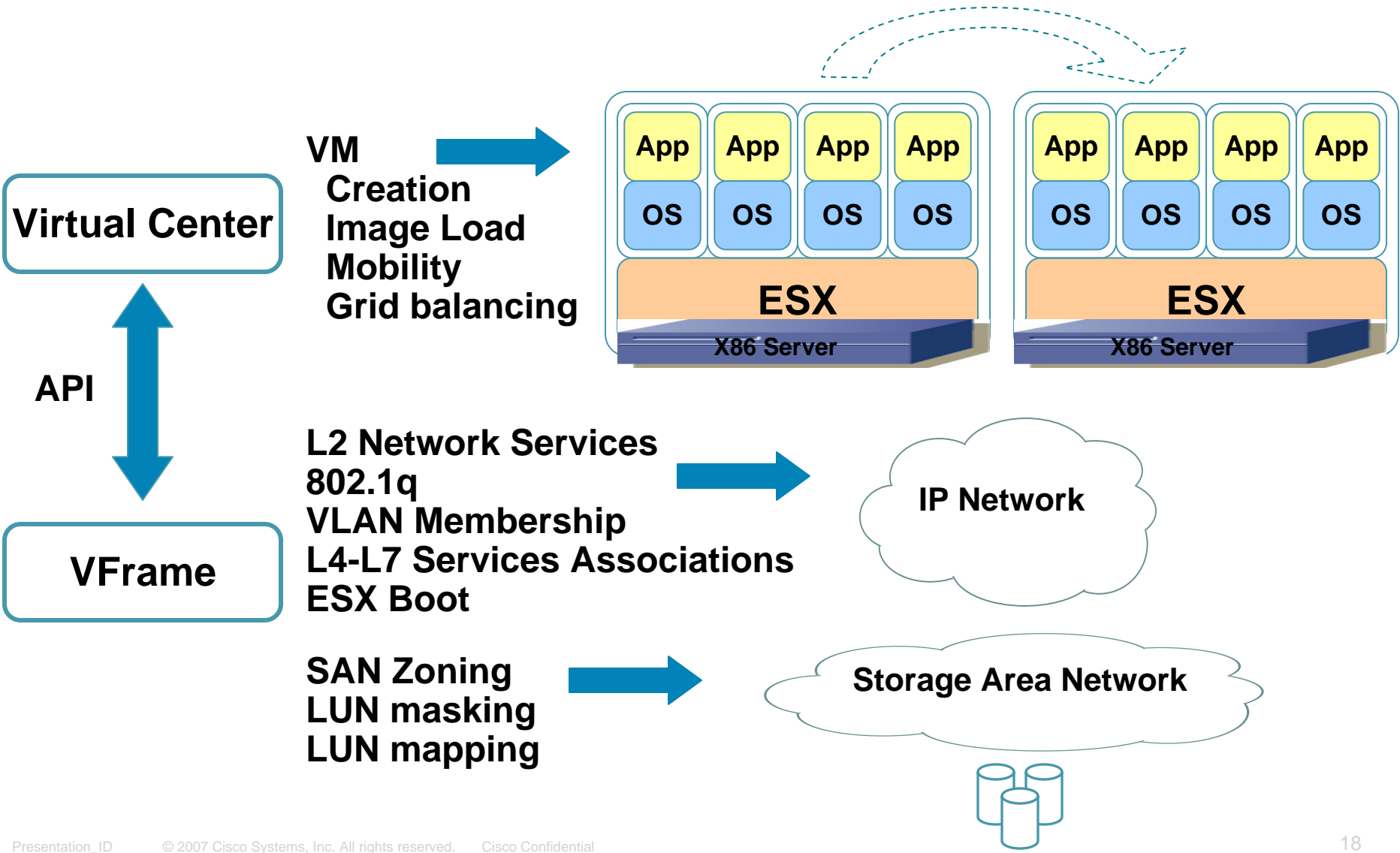


Unlocking the Benefits of Virtualization

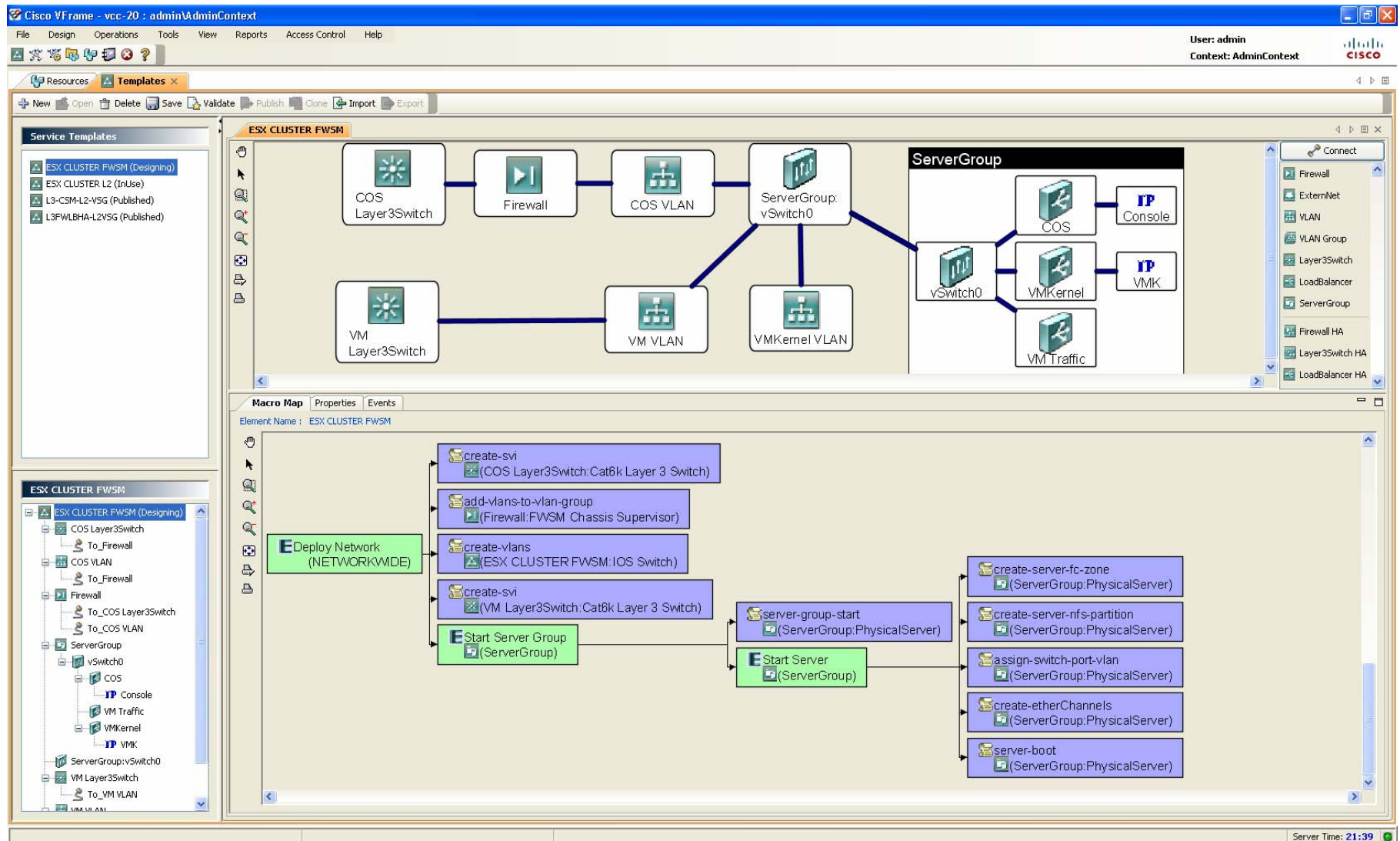


- Kickstarting/Ghost Imaging the ESX software is the easy part
- Configuring the network and storage for the ESX is the hard part
- Repeatability, compliant provisioning of network and storage is key
- VFrame DC provides automated, requirements based provisioning for VMware ESX

VFrame Services with ESX Deployments



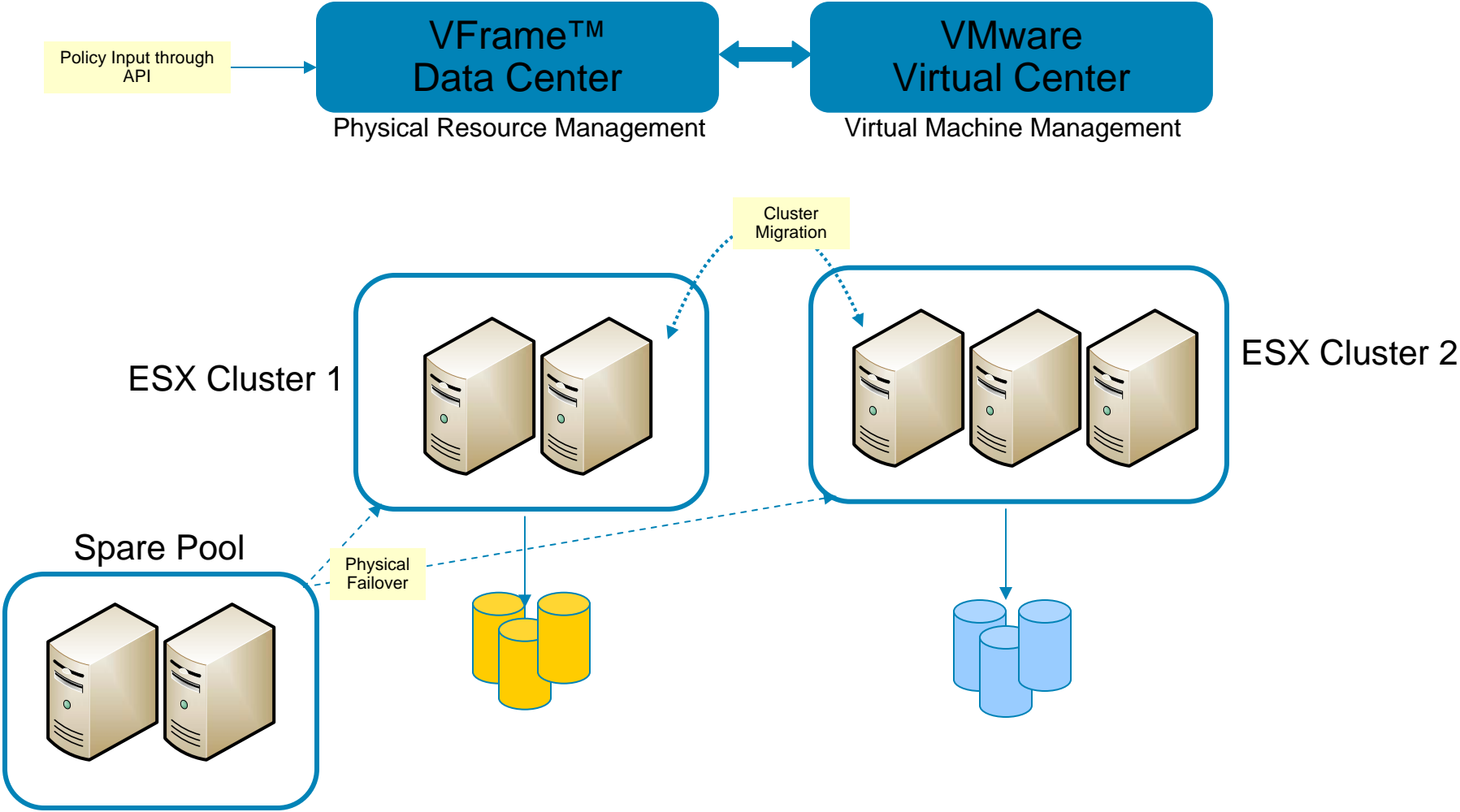
ESX Cluster design in VFrame



Repeatable, compliant deployments

The screenshot displays the Cisco VFrame interface for managing service networks. The main workspace shows a network diagram for 'ESX CLUSTER 1'. On the left, a 'Service Networks' tree lists several clusters, with 'ESX CLUSTER 1' circled in red. The diagram shows three VLANs (VLAN COS, VLAN VMKernel, and VLAN VMs) connected to a 'ServerGroup: vSwitch0'. This vSwitch0 is connected to a 'vswitch0' box, which in turn connects to three components: 'COS', 'VMs', and 'VMKernel'. 'COS' and 'VMKernel' are further connected to IP addresses 'ip_0' and 'ip_1' respectively. Below the diagram, the 'Network Settings' panel for 'ESX CLUSTER 1' is visible, showing 'Enable Root Bridge Setting' checked and a 'Service Network Description' field containing the text 'This is the ESX Cluster for HR Applications'. A yellow box with a red border at the bottom right contains the text 'Multiple clusters derived from the same template', with a red line pointing from the circled 'ESX CLUSTER 1' in the tree to this box.

Policy based physical server add/delete



New features in support of VMware integration

- Shared LUN support
- LUN path selection
- 802.1q VLAN trunking
- Template representation of ESX cluster, SAN and Storage
- New Server Configuration Wizard for
 - VLANs, Port Groups and Teaming
- ESX as a SAN boot image
 - Snapshot
 - Replication
 - Image fixups
- Virtual Center API – Discovery, ESX Registration

Upcoming release updates

- Release 1.2 VMware ESX integration beta – December 2007
- Release 1.2 – Q2CY08
 - VMware ESX Integration
 - Flexible SAN provisioning (WWN)
 - ACE/ANM integration (eng scoping in progress)
 - DC3/DCNM integration (eng scoping in progress)



VFrame Data Center Resources

- VFrame Data Center Introduction
 - <http://www.cisco.com/go/vframe>
- VFrame Data Center Product Literature
 - http://www.cisco.com/en/US/products/ps8463/prod_literature.html
- Training (future)
 - <http://www.fireflycom.net/classes/schedules.asp>

