Welcome to NextHop's First Tech Talks of the Fall 2016 Semester

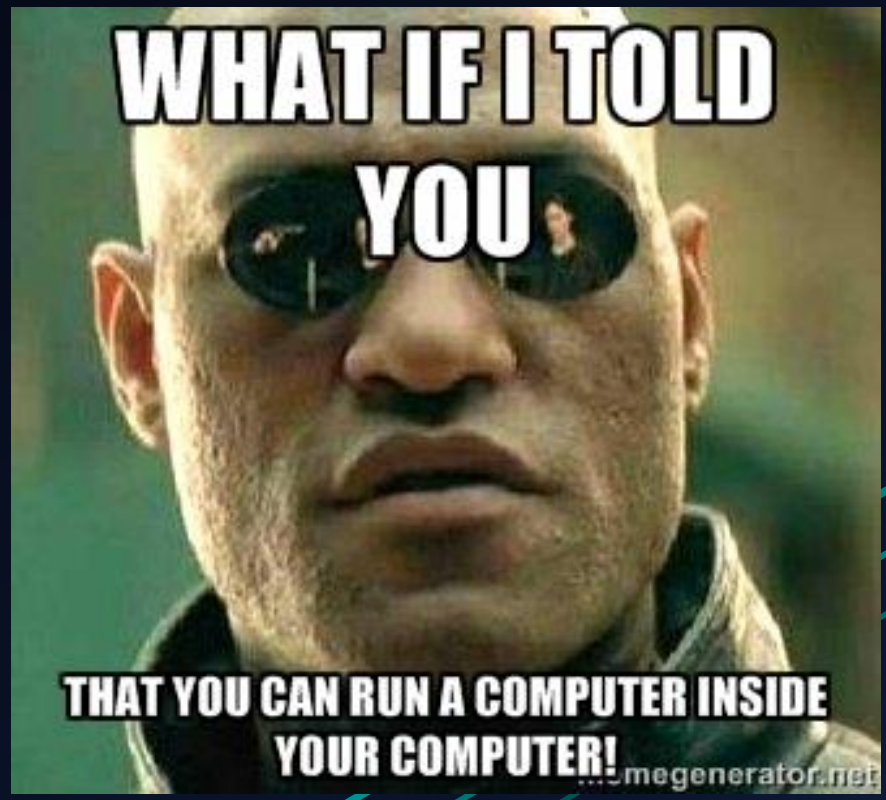
NextHop

NextHop Announcements

- Build-It-Night next Tuesday, October 25th
  - VoIP
- NSIC dates have been finalized
  - April 1st & 2nd 2017
  - Plan your teams and sign-up!
  - We also need volunteers to help out☺
  - https://nsic.nexthop.network
- Look for our updated website to go live
  - Please provide feedback
  - RIT Authentication is coming soon!
    - Keep track of your participation

Virtualization

BY: BRANDT WOOLF



Who am I?

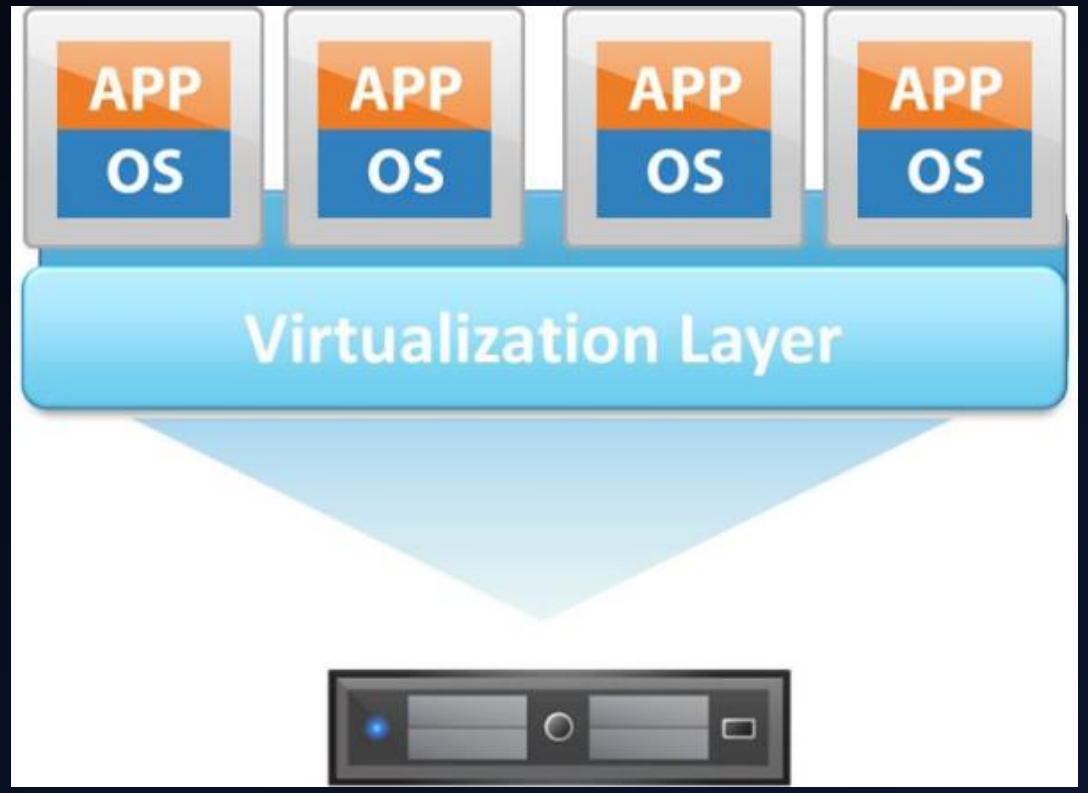
- 5th CSEC & NSSA student
  - Focus in network Secuirty
- President of NextHop
- Co-oped with Cisco, SMP, Coalfire, and Harris

Agenda

- What is virtualization?
- How does it work?
- Pros & cons
- Types of hypervisors
- VMware products
  - Features
  - Structure
  - Permissions
  - VSphere vs VCenter
  - Powercli

What is Virtualization?

- “Virtualization is the process of creating a software-based (or virtual) representation of something rather than a physical one.”
- In the realm of computing, virtualization is multiple operating systems running on top of the same physical hardware
  - Basically tricking the OSs into thinking they have access to real physical hardware where in reality it has access to the hardware they are allocated
- Its not cloud computing!



http://www.bcgsystems.com/hs-fs/hub/34007/file-13786151-jpg/images/virtualization_picture-resized-600.jpg

Why Use Virtualization?

NOT USING VIRTUALIZATION

- Many physical servers each performing a certain task (Web, DNS, Auth, etc.)
  - Majority of hardware resources are idle at any given time
- Physical Networking hardware required to connect the servers

USING VIRTUALIZATION

- Multiple OSs on one physical machine
  - If provisioned correctly, hardware resources can be utilized to their potential
- Less physical server to manage
- Virtual networking can reduce the amount of physical networking equipment needed

Pros vs. Cons of Virtualization

PROS

- Lower overall cost
- Automated tasks such as deployments
- Simple redundancy
- Simple backup & recovery
- Efficiency

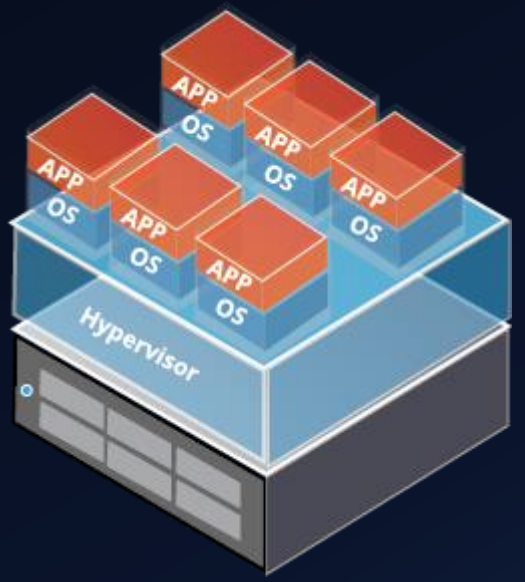
CONS

- Higher upfront cost
- Requires another expertise
- Not everything can be virtualized
- Server bloat

How Does it Work?

- A hypervisor is required to provide virtualized systems access to the physical hardware
- The hypervisor is in charge of managing the VMs, specially their access to the physical hardware

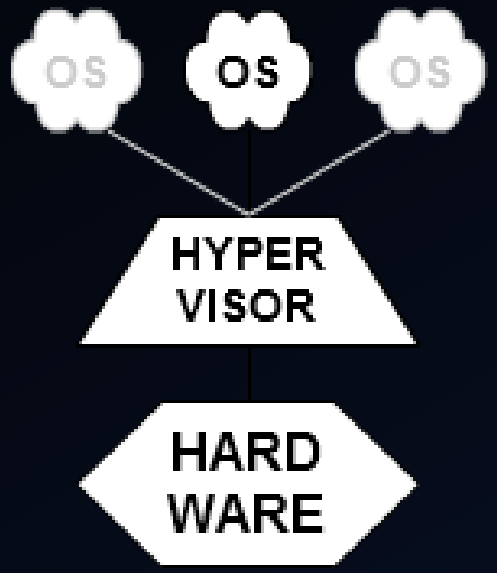
- Examples of hypervisors
  - ESXi, Hyper-V, VMware, Boxes, and Workstation



http://techilia.com/wp-content/uploads/2016/02/server-virtualization.png

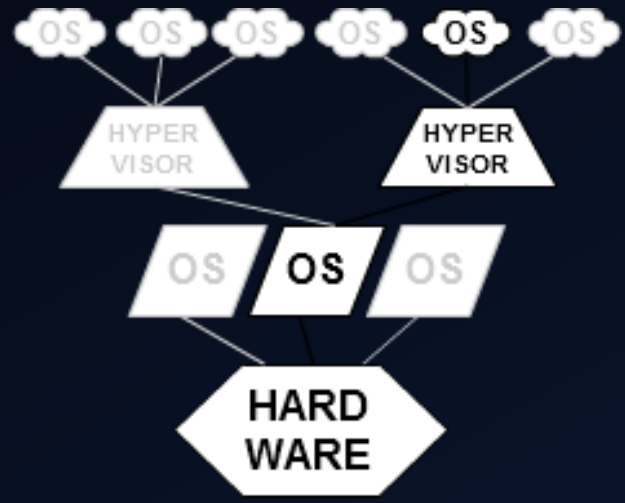
Types of Hypervisors

TYPE 1 – BARE-METAL



VMware ESXi

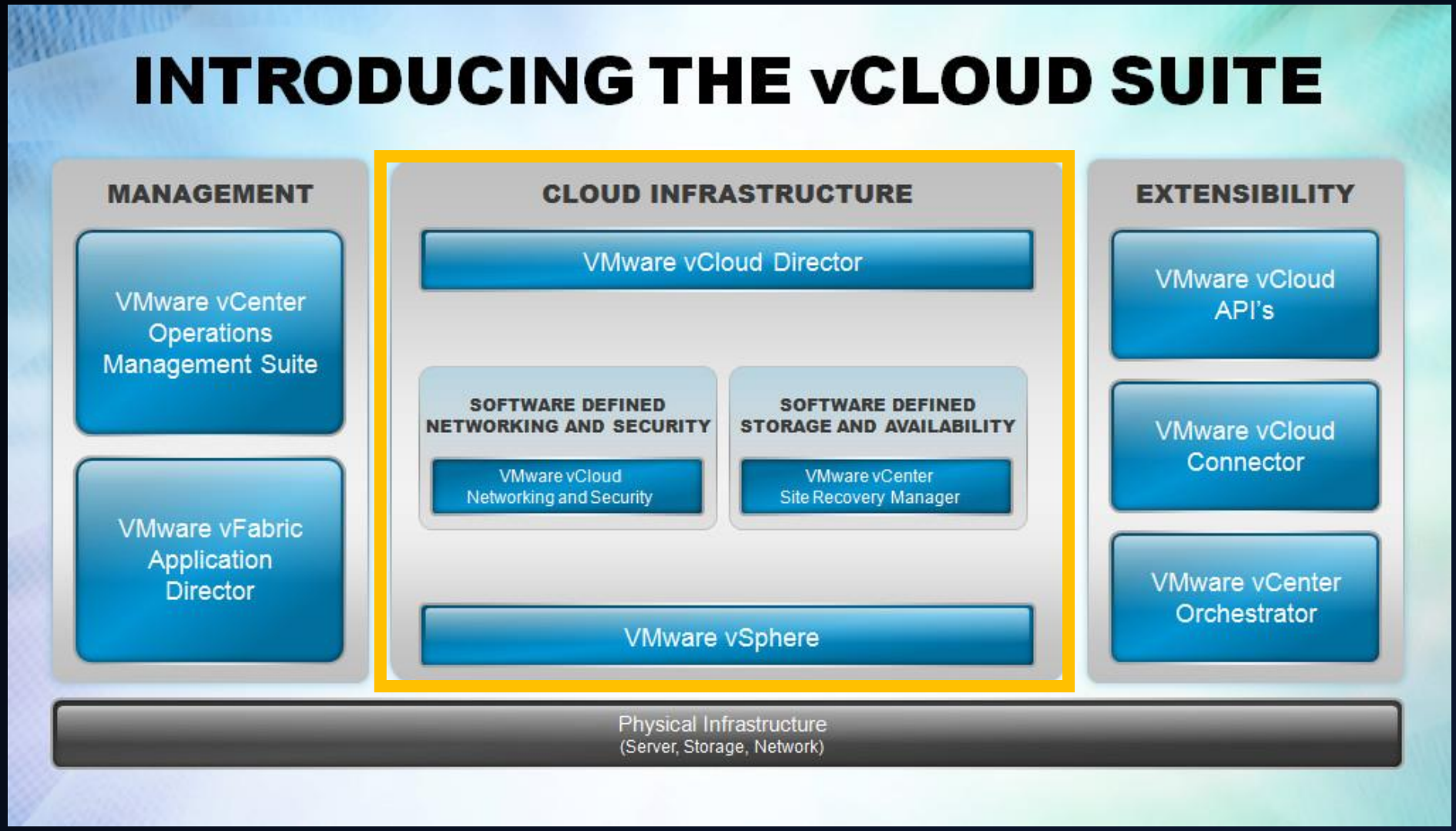
TYPE 2 - HOSTED



VMware Workstation

https://en.wikipedia.org/wiki/Hypervisor#/media/File:Hyperviseur.png

VMware



http://blogs.vmware.com/partner/files/2012/08/cloud1.jpg

VMware VCenter Features

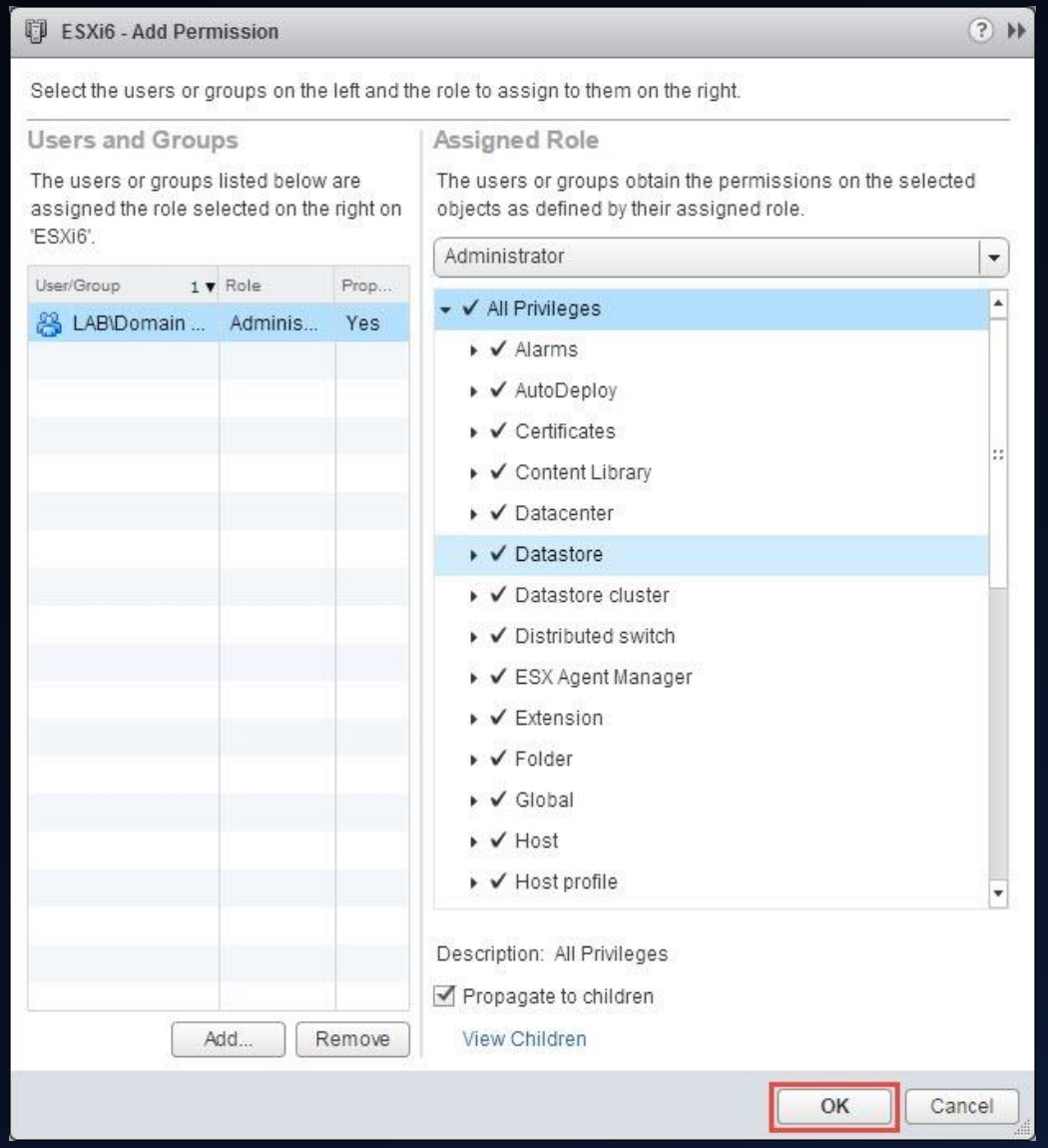
- Templates – “Golden Image”
- High Availability – Migrating VM to different host based on host resource utilization
- Fault Tolerance – Guest OS redundancy
- Storage Support – Host storage, iSCSI, Fiber Channel, NAS
- Resource Pools – Limiting set of VMs to a specific amount resources
- Active Directory Integration – Users and groups from AD can be accessed in VCenter permissions manager

VCenter Hierarchy

- Datacenter – Group of clusters
  - Cluster – group of hosts
    - Host – physical server running ESXi
      - Resource Pool – Group of VMs limited to a specific amount of compute resources
        - Container – Group or VMs or templates
          - VM
          - Template

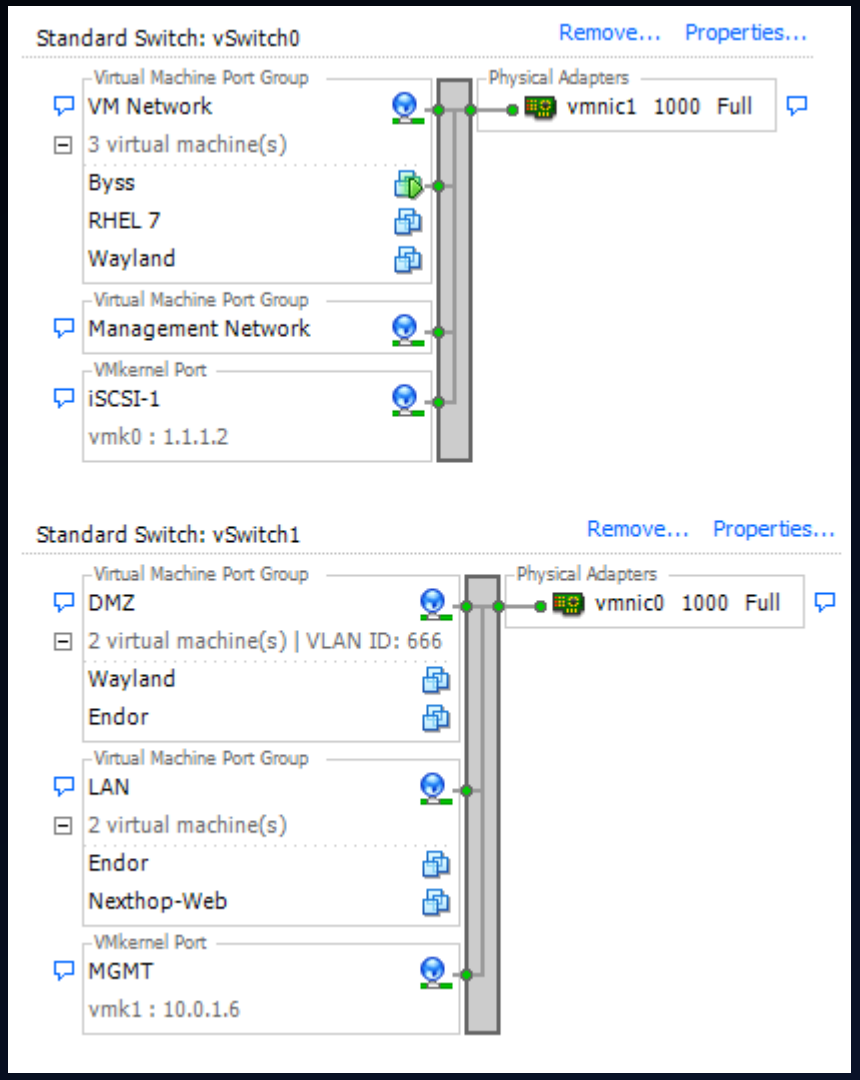
Permissions

- Define a role
  - Defines actions that role can perform
- Roles can be applied to local or LDAP users and groups
- Assign users or groups to a datacenter, cluster, host, resource pool, container or VM



http://www.virtuallanger.com/wp-content/uploads/2015/05/Add_Permissions.jpg

Virtual Networking



Virtual Switch Types

VIRTUAL SWITCH

- Local to a single host

VIRTUAL DISTRIBUTED SWITCH

- Same switch across multiple host
- Allows for Netflow

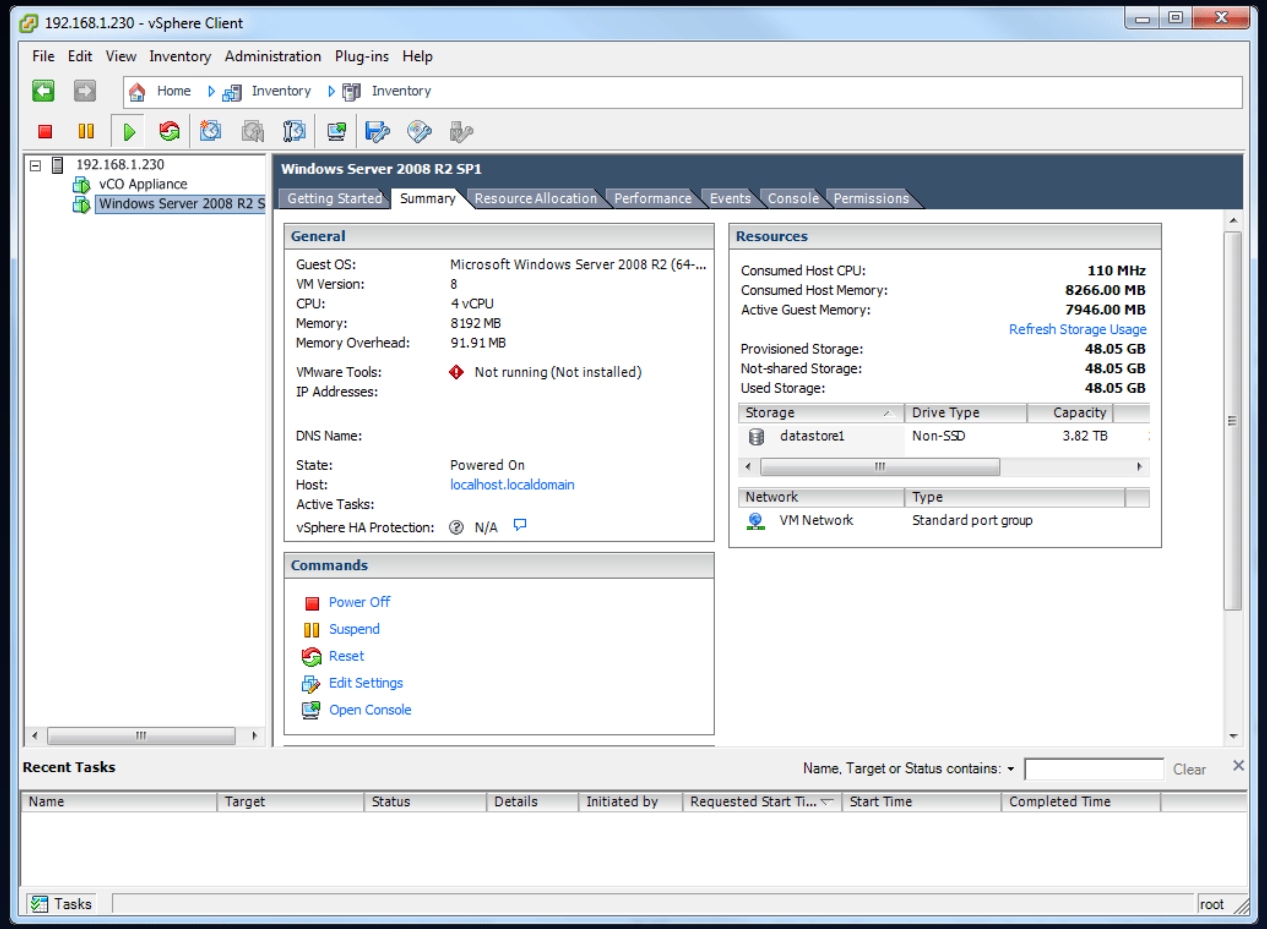
ESXi

- Hypervisor

https://vcdx133.files.wordpress.com/2015/02/esxi_6-0_3.jpg

VSphere

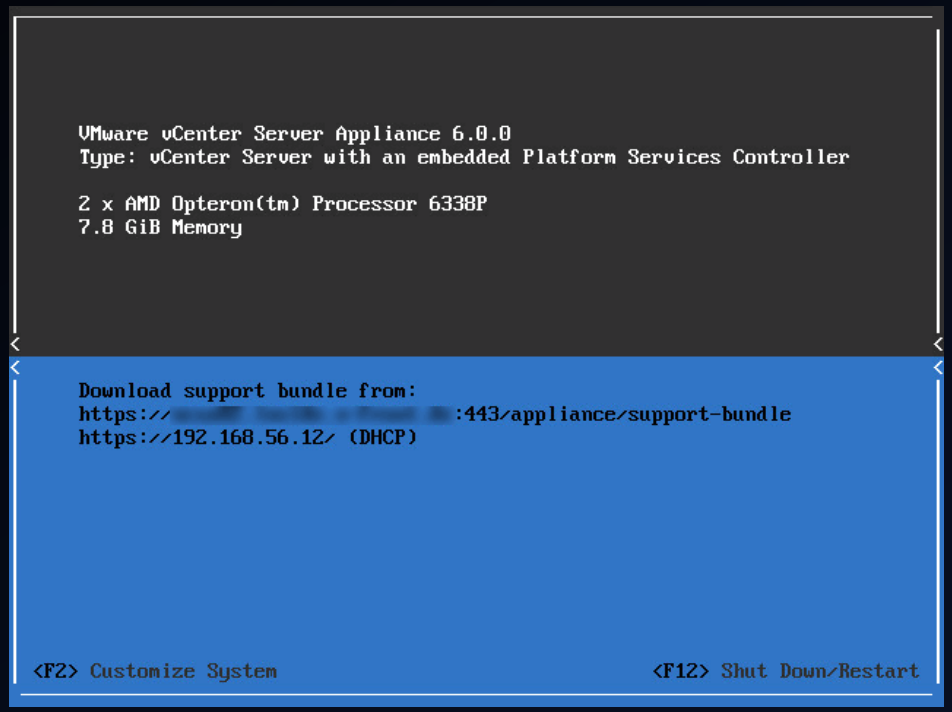
- Used to manage a single ESXi host or connect to VCenter server

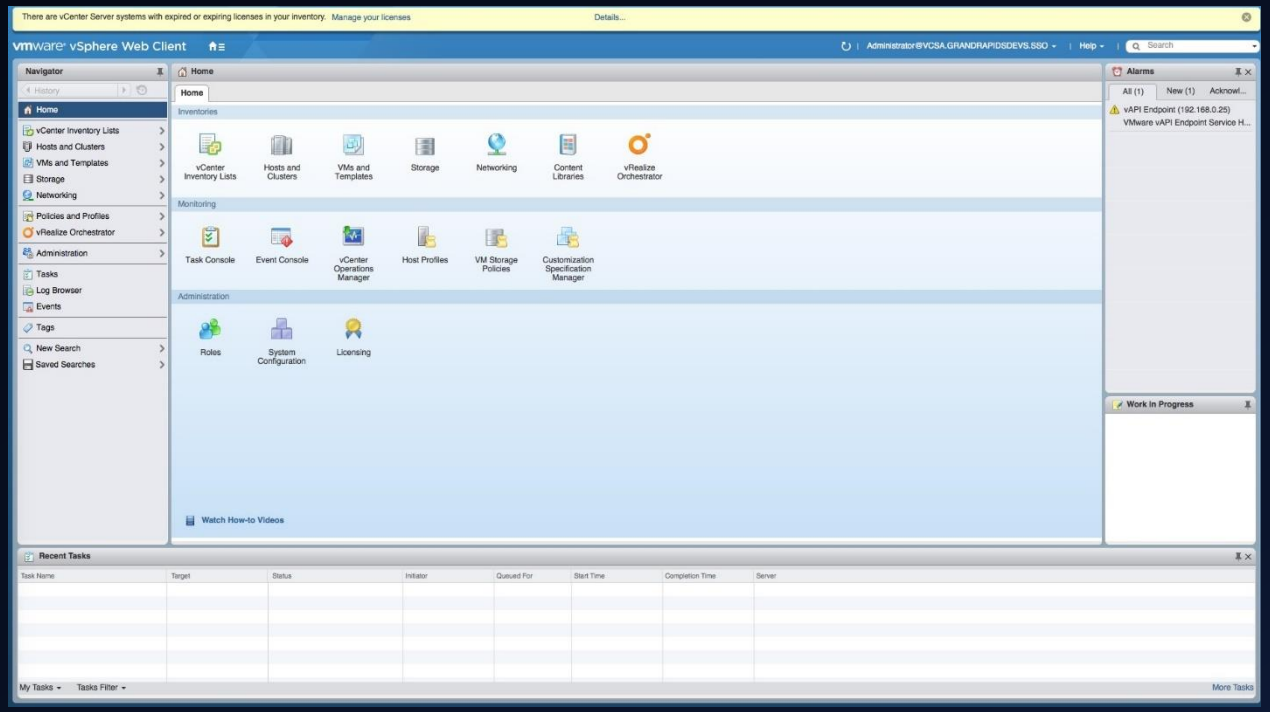


http://www.serverwatch.com/imagesvr_ce/7034/vsphere-figure1.gif

VCenter

- Used to manage multiple ESXi through web interface





http://2.bp.blogspot.com/-rIcY8zAJmzY/VQqc2eP-vNI/AAAAAAAAByE/LNTH9Sd3RWU/s1600/vCSA6-Console.png

http://www.grandrapidsdevs.com/wp-content/uploads/2015/07/14-vCenter-Server-Home-Menu.jpg

PowerCLI

- A PowerShell interface that allows you to manage ESXi host and VCenter servers through a command line
- Numerous Cmdlets ranging from powering on/off VMs to defining permissions and roles
- Documentation for all Cmdlets here:
  - http://pubs.vmware.com/vsphere-60/index.jsp#com.vmware.vsphere.scripting.doc/GUID-3C87E067-CF9B-4348-8F27-C278439A71EF.html

Wrapping Up

- Virtualization is a very powerful tool in the systems administration world
- I am bias towards VMware

Questions?

Sources

- http://www.vmware.com/solutions/virtualization.html
- http://www.unitiv.com/it-solutions-blog/bid/103228/Pros-and-Cons-of-Virtualization