CSI3670
Advanced System Administration

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Overview

Course introduction
Concepts from CSI3660
Enterprise administration
Performance analysis
Virtualization
Homework and Course project
Server Environment(s)

Course Introduction

Welcome to *advanced* system administration!

Course Introduction -- Syllabus

CSI3660 Concepts

What did we learn last semester?

- Bash!
- Linux!
- Sysadmin topics!

CSI3670 Concepts

Advanced topics!

- Bash!
  - More likely PowerShell…
- Linux!
  - Yay!
- Sysadmin topics!
  - Advanced!

- But, more in-depth this time around
- Also with some Windows administration as well

So what are we doing here?

Linux **and** Windows

- With variable distribution
- We'll have more of a focus on Windows, but won't forget our Linux roots

- For instance, virtualization
  - We'll look at Xen (Linux) but focus on Hyper-V
    - (Hands-on not going to be feasible though)

Will this be any different?

Possibly!

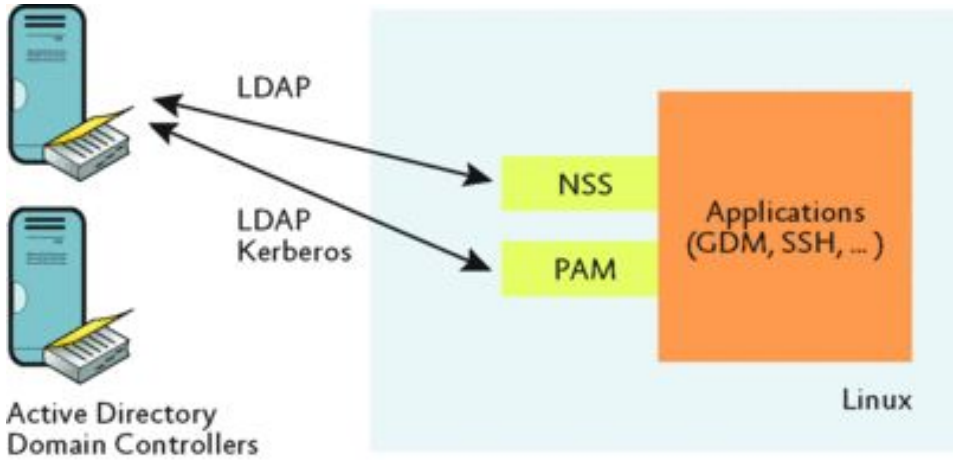
Traditional lectures with in-class lab assignments

Out-of-class lab assignments with in-class discussions

What google returned for me when I searched for ‘overview gif’

Enterprise Administration

- What is the difference between a single machine and an enterprise setup?
- Enterprise we need to worry about:
  - Workstations and servers
  - Services
  - Users
  - Etc
- How?
  - LDAP?
  - Active Directory?



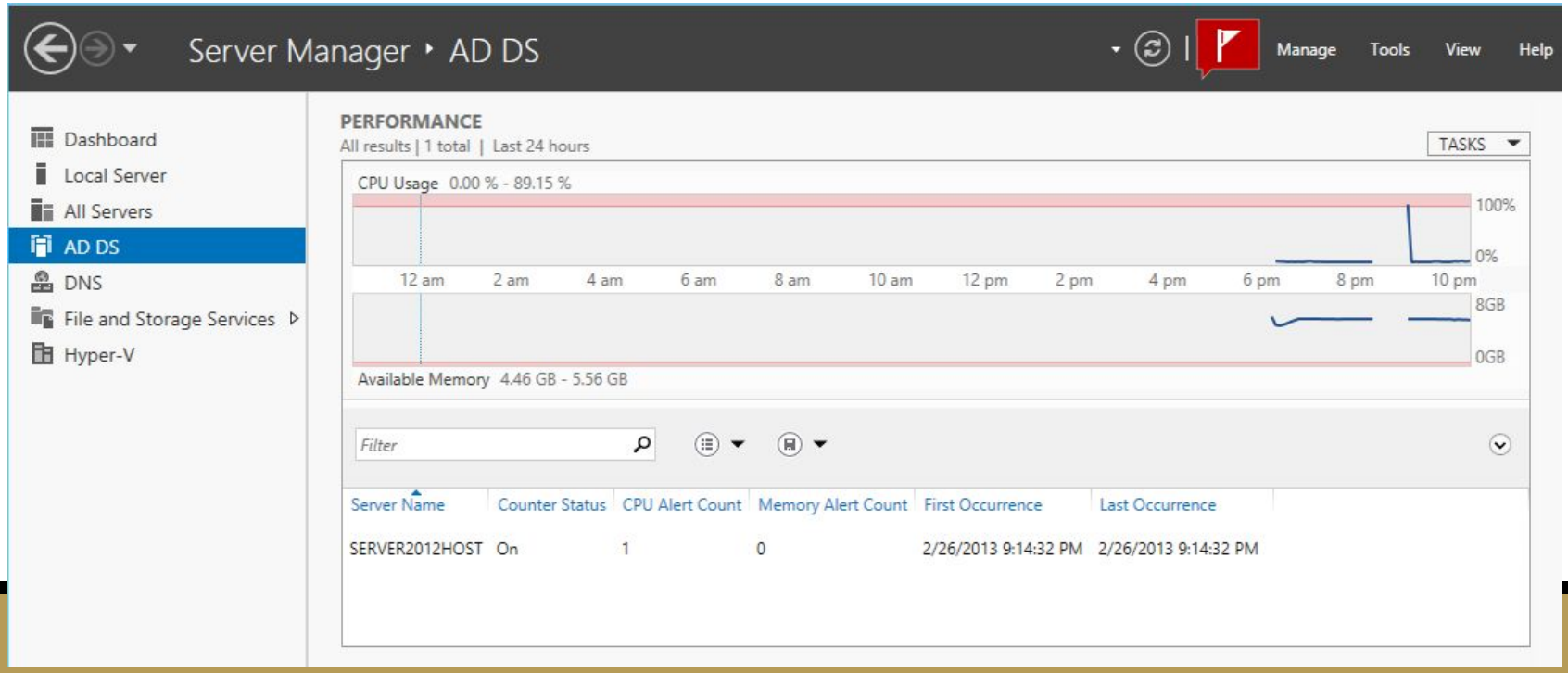
Performance Analysis

In Linux?

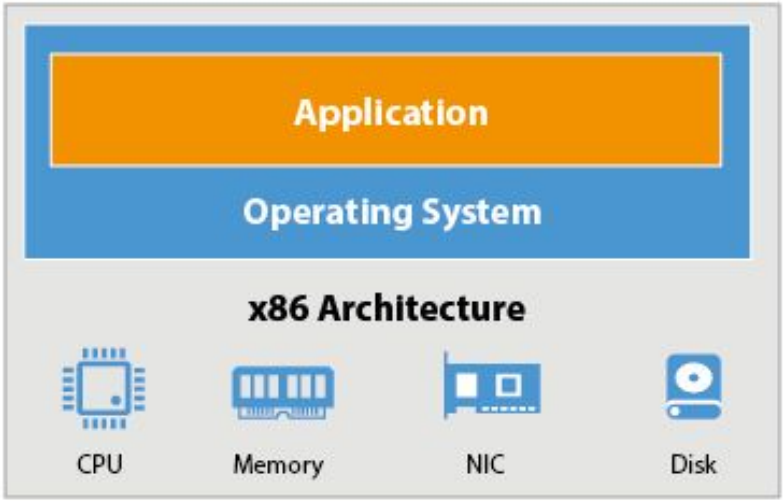
- htop, checking /proc, etc.

In Windows?

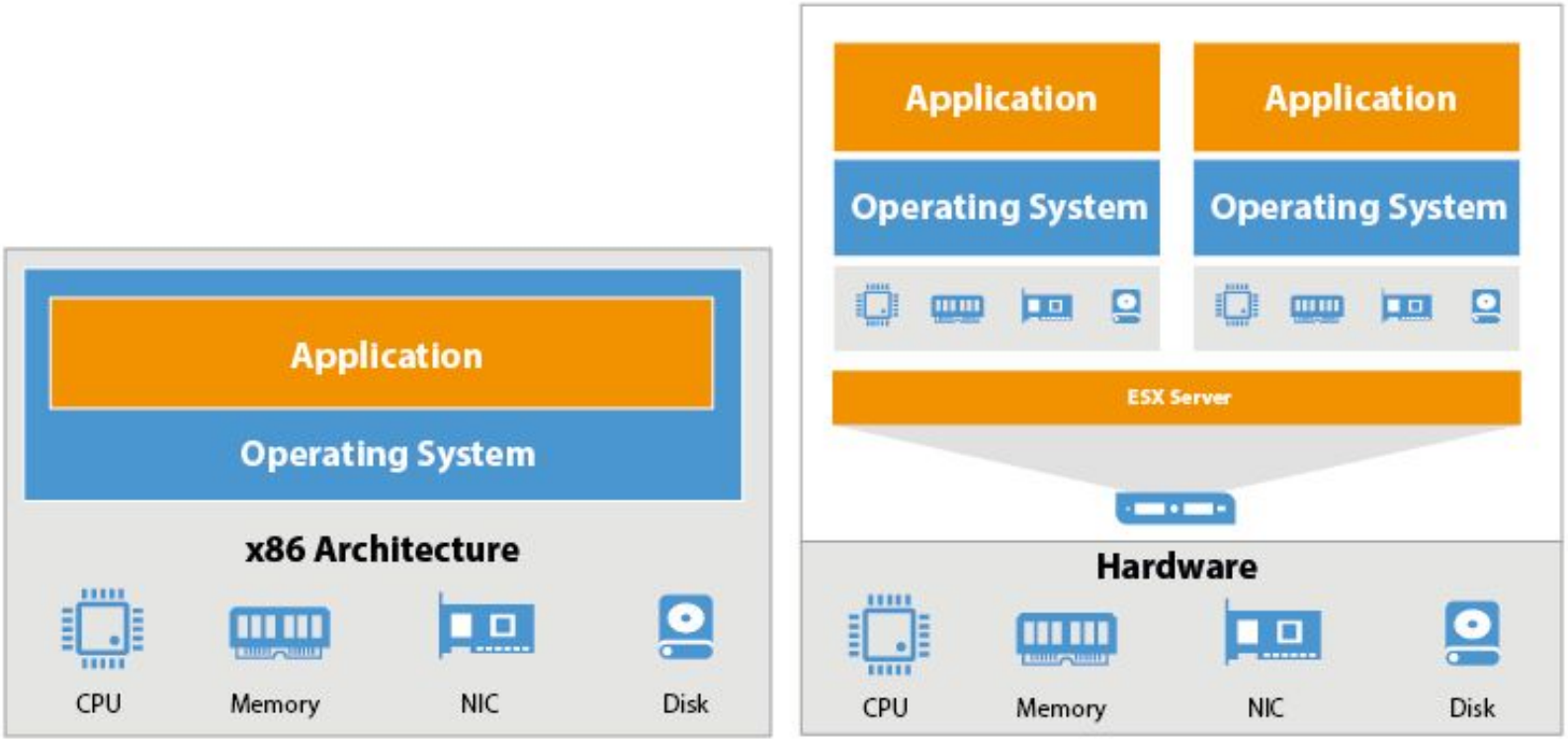
- Check Task Manager / Server Performance Advisor



Virtualization



Virtualization



Advantages

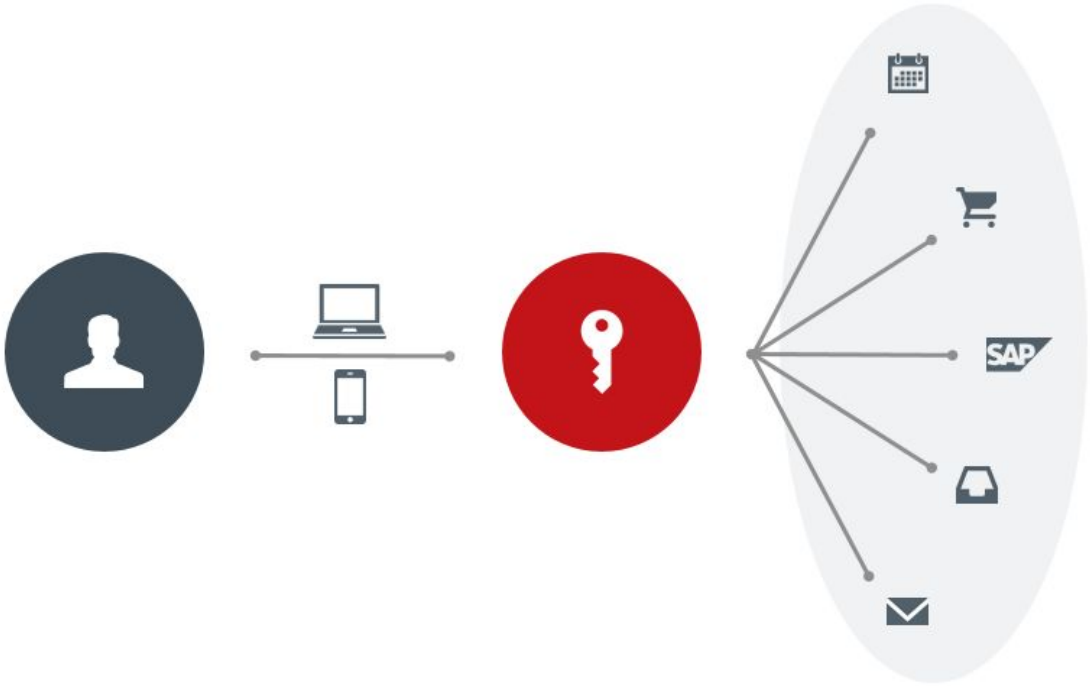
Not tied to any hardware

Can quickly spin up development/test environments

Disadvantages?

- Any?
  - Large upfront costs
  - Licensing (VMWare, Hyper-V)
  - Learning curve

Single Sign-On



Homework and Course Project

Will there be homework assignments?

- Yes!

Will there be lab assignments masquerading as homework assignments?

- Yes!

Course Project

There will be a team-based course project

Depending on final enrollment, we will have teams of ~3 people

Each team will provide a **software-as-a-service**

- Provide a service of your choice
  - Support that service with:
    - Single sign-on
    - Enterprise management
    - Failover
    - Etc.

Course Project

SaaS examples:

- Dropbox
- Google Drive / Google Cloud
- Microsoft Azure / Office 365
  - Amazon Web Services
- Slack
  - Office communication

IBM’s definition

“Software as a service (SaaS) is an alternative to the standard software installation in the business environment (traditional model) where a user has to build the server, install the application and configure it.

In SaaS, the user does not pay for the software itself. Instead, it works like a rental. They have the authorization to use it for a period of time and pay for the software that they are using.”

(Generally, SaaS can be thought of as **cloud applications**)

https://www.ibm.com/blogs/cloud-computing/2013/09/top-five-advantages-of-software-as-a-service-saas/

Course Project

How is this different?

- Well, you'll be on a team for one
- Also, you'll need to leverage multiple machines

- ...you'll also be graded a lot harder on this
  - It is *advanced* after all

Course VM

The VM makes a triumphant return

- With:
  - Windows Server
  - Linux Server

New Linux Server Environment

As promised, we're moving away from Scientific..

Ubuntu 18.04

Ubuntu

Differences from RHEL-based distributions:

- Debian-based!
  - **systemd** for init instead of **Upstart**
    - ...is this correct?
  - **`apt-get`** instead of **`yum`**
  - Many other differences that will become clear as we go

Also,

- You can use the GUI this semester!

Ubuntu Server vs. Ubuntu Desktop

Server

- No GUI
- Minimal packages – no non-server
  - e.g., X windows, Gnome
- Install different (no GUI)
- No difference in kernel to desktop
-

Support (LTS)

- Server – 5 years
- Desktop – 3 years

Windows Server (2012)

Different editions for different tasks

- What roles will server perform?
- Virtualization strategy?
- Licensing concerns?

Why not 2016?

- ….we have group licensing for 2012

Windows Server (2012) Versions

Windows Server 2012

- Datacenter
- Standard
- Essentials
- Foundation

Datacenter

Large/powerful servers

Supports (up to) 64 processors

Can add/remove processors (hot swapping)

ONLY available via:

- Microsoft volume licensing program
- Bundled with OEM server

Unlimited licenses virtual machines

Standard

Full set of Windows Server features

Only difference from Datacenter version

- Number of virtual machine licenses permitted
  - 2 VMs

Essentials

Similar to Datacenter and Standard, but missing:

- Server Core (no Windows Explorer shell)
  - CLI or MMC (Microsoft Management Console)
- Hyper-V (virtualization)

One physical or virtual server instance

- Not both at same time

Maximum 25 users supported

- (Unlimited in prior 2)

Foundation

Only basic server features

- File/print services
- Application support

No virtualization

15 concurrent users

Intended for small businesses

Pricing

Datacenter	Standard	Essentials	Foundation
$6,155*	$882*	$501*	OEM only

* Processor only, plus client access license, per user

Don’t forget that volume licensing is available

- Cheaper to buy more

Server Roles

Role: what the server “does”

Three basic categories

- **Directory services**
  - Store/organize/supply information on network resources
- **Infrastructure services**
  - Network client support
- **Application services**
  - Communications, programming interfaces, etc.

Role Examples

Directory

- Active Directory
  - Certificate services
  - Federation services (single sign-on)
  - Rights management services

Infrastructure

- DHCP / DNS
- Hyper-V
- Windows Deployment Services

Role Examples

Application

- Fax server
- Application host
- Print server
- Web server (IIS)

Roles

How should you plan out your network hardware?

- Depends on your environment
  - Large environment – may want (at least) one server per role
  - Small environment – may want to have one server host multiple roles

What are **features?**

- Additional functionality supported by roles
  - Some features may require a particular role
  - E.g., Windows Server Backup tools are a **feature** installed on a basic Windows Server 2008 **role**

Licensing

Or, things we didn't necessarily worry about as much in the Linux world…

Licenses must be purchased for **both** server **and** client!

- And any virtualized machines as well!

	Retail	***Volume Licensing***	***Original Equipment Manufacturer***
Datacenter	No	Yes	Yes
Standard	Yes	Yes	Yes
Foundation	No	No	Yes
Essentials	No	Yes	Yes

Logical vs. Dedicated Servers

A server is a server is a server

If you are running Windows…

- Run > services.msc
- You'll note that 'Server' exists!

- Logically, your machine can be a server

A dedicated server is a machine that is **strictly** a server

- Doesn't share client tasks (e.g., word processing)

Demo – Dual Machines

Windows Server 2012
Ubuntu 18.04

- We will be focusing more on Windows Server
- But will still do stuff in Ubuntu!
  - How *advanced* of us
- These ratios *can* change if your project will be more Linux focused

First In-Class Assignment!

Select your project groups

Requirements: 2-4 people

Deliver at end of day, via Moodle:

1) Your team members
2) Your team name
    - Must be safe for work

Your First Assignment!

Install Ubuntu and Windows Server on your VM