Cloud Computing

**What is it?**

* Business model for enabling convenient network access to shared pool of configurable resources which can be rapidly supplied and released with minimal management effort or server provider interaction.
* Refers to both the applications delivered as services over internet, and the HW and systems.
* The Software is Saas, and datacenter with all the hw and sw called the Cloud
  + Ex: DropBox, Gmail
* Convenient, its just “there”, can be accessible from any platform
* High performance computation at low cost, hard and interesting new challenges.
* What enables cloud computing?
  + Virtualization
  + High Performance/Cluster Computing
  + High Speed Storage Network
* Cloud Service/ Deployment Model (How it is deployed)
  + SaaS
    - Software as a Service
      * Its like a restaurant, it prepares and serves entire meal, does dishes, etc
    - Example is a Cloud Provider (provides application, middleware, hardware)
    - Offers entire application
      * Ex: Word Processor, spreadsheet
      * Customer pay cloud provider and use service
      * Gmail (outsourcing e-mail software) where
        + Application is Gmail
        + Middleware is BigTable APIs
        + Hardware is BigTable
  + PaaS
    - Platform as a Service
      * + Like takeout food. Prepares meal, but does not wash dishes, serve the food, etc
    - Provides middleware and hardware
      * Ex: App provider pays cloud for platform
        + App provider provides application
        + Cloud platform provides middleware and hardware
        + In this way a Customer pays the app provider for the service, but app provider pays cloud for the platform
    - Facebook for example
      * An app provider will provide Facebook Games
      * The app provider uses Facebook APIs to allow access to social network properties (middleware)
      * Hardware could be the facebook clusters
  + IaaS
    - Infrastructure as a Service
      * + Like grocery store. Provides raw essentials .
    - Provides raw computing resources aka just the hardware
      * Example: App provider pays cloud for resources
      * Like AWS for example, Netflix relies heavily on AWS
* Amazon is a HUGE player in Cloud Providing but there are others:
  + Google Cloud Platform- offers programming interface, Hadoop, SaaS (gmail…)
  + Microsoft Azure- similar to Amazon with emphasis on .Net programming model
  + IBM, HP, Yahoo!: focus on enterprise scaling of cloud
* Technology of Cloud:
  + Made of Racks that consist of:
    - Network switches (connects nodes with each other and with other racks)
    - Many nodes
    - Storage Devices
  + This grouping called a cluster. If too big, can create building with lots of cooling and power called a Data Center (Google has one in Oregon)
    - A Data center can hold 10k racks with 100 cores each rack…