Chapter13—Cloud Computing

Section 13.1 Basic Concepts

+**Cloud Computing**: A model for enabling ubiquitous, convenient, on-demand network access to a shared pool of configurable computing resources that can be rapidly provisioned and released with minimal management effort or service provider interaction

++ Essential Characteristics of Cloud Computing:
- Broad Network Access
- Rapid Elasticity
- Measured Service
- On-Demand Self-Service
- Resource Pooling

++ Service Models of Cloud Computing:
- **Software as a Service (SaaS)**—provides service to customer in form of software, similar to web services (cPanel)
  - Enables user to use cloud providers application running providers infrastructure
    - Doesn't require obtaining licenses for servers / desktop / user
  - Google Drive/ Microsoft 365
- **Platform as a Service (PaaS)**—provides service to customer in form of a platform, an operating system in the cloud
  - Useful to develop new or tailored applications while paying for needed computing resources only as needed and only for as long as needed
  - Ex. Services for the analysis of a large or complex data sets that require high scalability
- **Infrastructure as a Service (IaaS)**—provides access to the resources of the underlying cloud infrastructure
  - Basically like a VPS, provides other abstract hardware and operating systems also
  - Users are able to self-provision this infrastructure, using a web gui for management
    - Ex. Amazon Elastic Computer Cloud (Amazon EC2)
    - Good for Backup and Recovery; CDN, Storage

++ Deployment Models:
- Public
- Private
- Hybrid
- Community

+Cloud Networking is the networks and network management functionality that must be in place to enable cloud computer.
- The collection of network capabilities required to access a cloud, making use of specialized services over the Internet, linking enterprise data centers to a cloud, and using firewalls and other network security devices to enforce access security policies

+Cloud Storage is a subset of cloud computing, it consists of database storage and database applications hosted remotely.
- Enables business and individual users to take advantage of data storage that scales with their needs
- Takes advantage of a variety of data applications without having to buy, maintain, and manage storage assets

+ Other Cloud Services:
- Communications as a Service (CaaS)—Real-time interaction and collaboration // VoIP
- Compute as a Service (CompaaS)—Simplified IaaS, focus on providing computer capacity
- Data Storage as a service (DSaaS)—Backup services and data transfers
- Network as a Service (Naas)—Optimization of resource allocation by considering network and computing resources as a unified whole.

+13.2 XaaS—the latest development in the provisioning of cloud services
- Stands for any of the three that are basically the same:
    - Anything as a Service—any service other than the three traditional services
    - Everything as a Service—can be misleading, just means that provider is providing wire range of services
    - X as a Service—X represents any possible cloud configuration

++ XaaS providers go beyond the traditional three:
1. Providers package together SaaS, PaaS, and IaaS so that the customer can do one-stop shopping for cloud services
2. Providers can increasingly displace a wider range of services that IT dep. Typically offer internal users
    a. This reduces the burden on the IT dep to acquire, maintain, path, and upgrade a variety of common apps.
3. The XaaS model typically involves an ongoing relationship between user and provider, involving regular status updates and a genuine two-way, real-time exchange of information

++ XaaS is becoming increasingly attractive to users because it offer these benefits:
- Total costs are controlled and lowered
- Risks are lowered
- Innovation is accelerated

+13.3 Cloud Deployment Models—a trend to move all IT operation to enterprise cloud computing

++ Public Cloud—infrastructure made available to the general public or a large industry group and is owned by an organization selling cloud services
- The provider is responsible for both the cloud infrastructure and the control of data operations within the cloud
- All major components are outside the enterprise firewall, located in a multitenant infrastructure
    - Applications and Storage are made available over Internet via Secured IP, free or pay-per-usage
- Advantage:
    - Cost; pay only for the service and resource it needs
    - Management; it's good to go, managed by provider
- Disadvantage:
    - Security; although, it's probably not that bad… who knows.

++ Private Cloud—implemented within the internal IT environment of an organization; can be managed in house or outsourced
- Can deliver IaaS to employees or business units through an intranet or the Internet via a VPN
- Advantage:
    - Security; offers tighter controls over geographic locations
    - Easy resource sharing and rapid deployment to organizational entities

++ Community Cloud—shares characteristics of private and public clouds; best for data exchange between entities
- Like a private cloud, it has restricted access
- Like a public cloud, the resources are shared among a number of independent organizations
- Organizations that share the community cloud have similar requirements and typically need to exchange data
    - Ex. Healthcare Industry—participants can exchange data in a controlled fashion
- The costs are spread over fewer users than a public cloud, but more so than a private cloud, only some savings realized

++ Hybrid Cloud—a composition of two or more clouds that remain separate but are bound by technologies that enable data and application portability
- Ex. Sensitive information can be placed within a private area of the cloud, and less sensitive data can be placed in the public area of the cloud
- Hybrid public/private cloud solutions can be particularly attractive for smaller businesses; security and costs