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Different Models of Cloud Computing

- Each Model has its own security concerns.
    - The Security Principals for IT security are the same that exist for Cloud Services. The difference here is where is the demarcation between what is the Cloud provider's responsibility and what is the Users responsibility as far as security is concerned.
        - Cloud computing offers everything from on-demand self-service, storage and resource pooling, automation and management and network services.

Infrastructure as a Service (IaaS)

- Provides virtualization computing resources over the Internet
    - A Provider hosts infrastructure components, applications and services on behalf of subscribers, with a hypervisor such as (Vmware, Oracle Virtual Box, Xen or KVM) running the virtual machines as guests.
        - Collections of Hypervisors within the cloud exponentially increase the virtualized resources to subscribers.
        - This is equivalent to replacing all your onsite computer and networking hardware and putting it all in the cloud
            - IaaS subscribers typically pay on a per use basis or by the amount of virtual space used.
            - Typically the most expensive option for a user.

Platform as a Service (PaaS)

- Geared toward software development as it provides a development platform that allows subscribers to develop applications without building the infrastructure that it would normally take to develop and launch software
    - Hardware and Software is hosted by the provider on its own infrastructure so customers do not have to install and build homegrown hardware and software and software for development work.
        - PaaS doesn't usually replace an organizations actual infrastructure – instead it offers key services an organization may not have onsite.

Software as a Service (SaaS)

- This is simply a software distribution model. A good example of this is Salesforce and Adobe products like Photoshop.
    - This model offers software on demand to subscribers over the internet.
    - Why would anyone want to do this? It takes away all the headaches of Installation, updating, patch management and security the customer needs to worry about.
        - This takes a lot of Workload and need for Server hardware off the customers plate.

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        - For example if Salesforce was not in the Cloud, a company using it would need hardware and admins onsite to support it.

Defining Cloud Computing

- Industry Group Cloud Security Alliance
- The issues and opportunities surrounding cloud computing gained considerable notice in 2008 within the information security community. In November of 2008 at the ISSA CISO Forum in Las Vegas, the concept of the Cloud Security Alliance was born
    - https://cloudsecurityalliance.org/
    - Government Regulation
        - U.S. National Institute of Standards and Technology (NIST) (They Define Cloud Computing)
        - Current - (NIST 800-145)
        - NIST defines cloud computing by describing five essential characteristics, three cloud service models, and four cloud deployment models.

Nist Cloud Computing Model

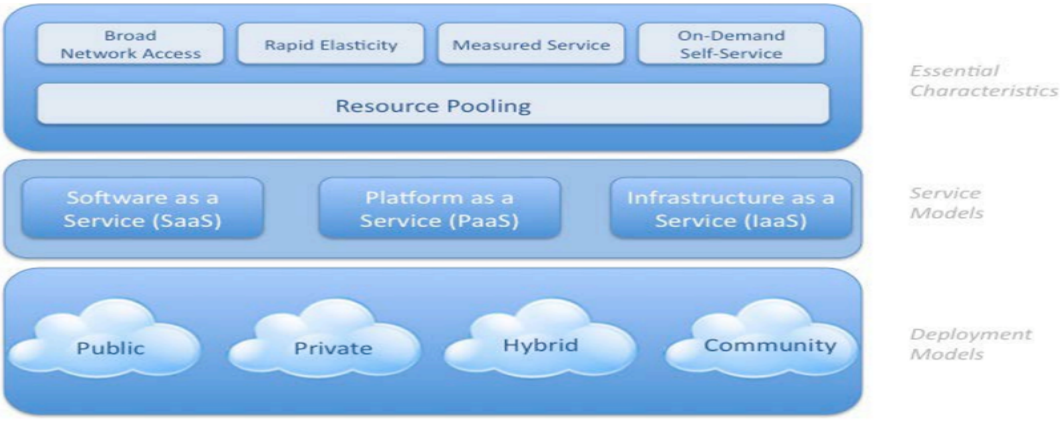

Figure 1—NIST Visual Model of Cloud Computing Definition[2]

Deployment Methods

- These are the Four main deployment Models:
    - Public
    - Private
    - Community
    - Hybrid

Public Cloud

- A public Cloud Model is one where services are provided over a network that is available for public use like the Internet.

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- Public Cloud is generally used when security and compliance requirements found in large organizations isn't a major issue

Private Cloud

- A private cloud is like its name suggests, private in nature.
- The cloud is operated solely for a single organization. And is usually not a pay as you go operation.
    - Private clouds are usually preferred by larger organizations because the hardware is dedicated, and security and compliance requirements can be easily met.
        - Major private cloud vendors:
        - Hewlett Packard Enterprise (HPE) -- offers the Helion Cloud Suite software, Helion CloudSystem hardware, Helion Managed Private Cloud and Managed Virtual Private Cloud services. ... Dell EMC-- offers virtual private cloud services, as well as cloud management and cloud security software.

Community Cloud Model

- A community cloud model is one where the infrastructure is shared by several organizations.
- **For example** many different state and local organizations may get together and take advantage of a community cloud for services they may require.
    - There would be some thread connecting these state and local organizations together that would make it logical that they would share the same Cloud services.
    - **Example**:
    - https://sf.gov/departments

Hybrid Cloud Model

- Hybrid cloud refers to a mixed computing, storage, and services environment made up of on-premises infrastructure, private cloud services, and a public cloud—such as Amazon Web Services (AWS) or Microsoft Azure—with orchestration among the various platforms. Using a combination of public clouds, on-premises computing, and private clouds in your data center means that you have a hybrid cloud infrastructure.