Chapter 19

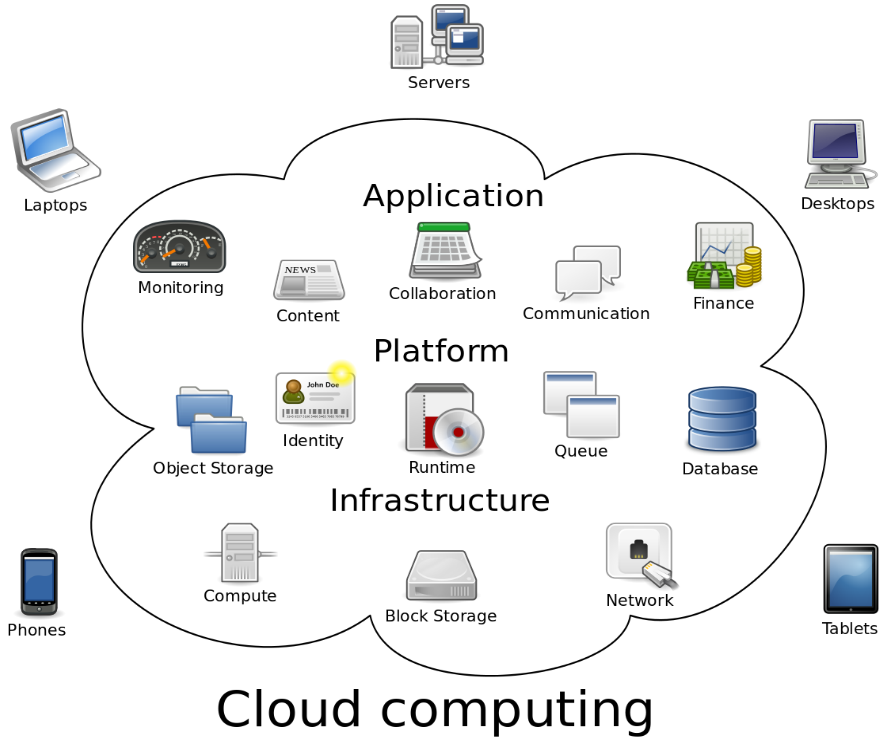
Cloud Computing

Theory

Ethical Hacking

Cloud Computing

Cloud Computing is the practice of using a network of remote servers hosted on the internet to store, manage, and process data, rather than a local server or a personal computer. The information being accessed is found in "the cloud" so the user need not to be in a specific place to gain access in which data is stored.

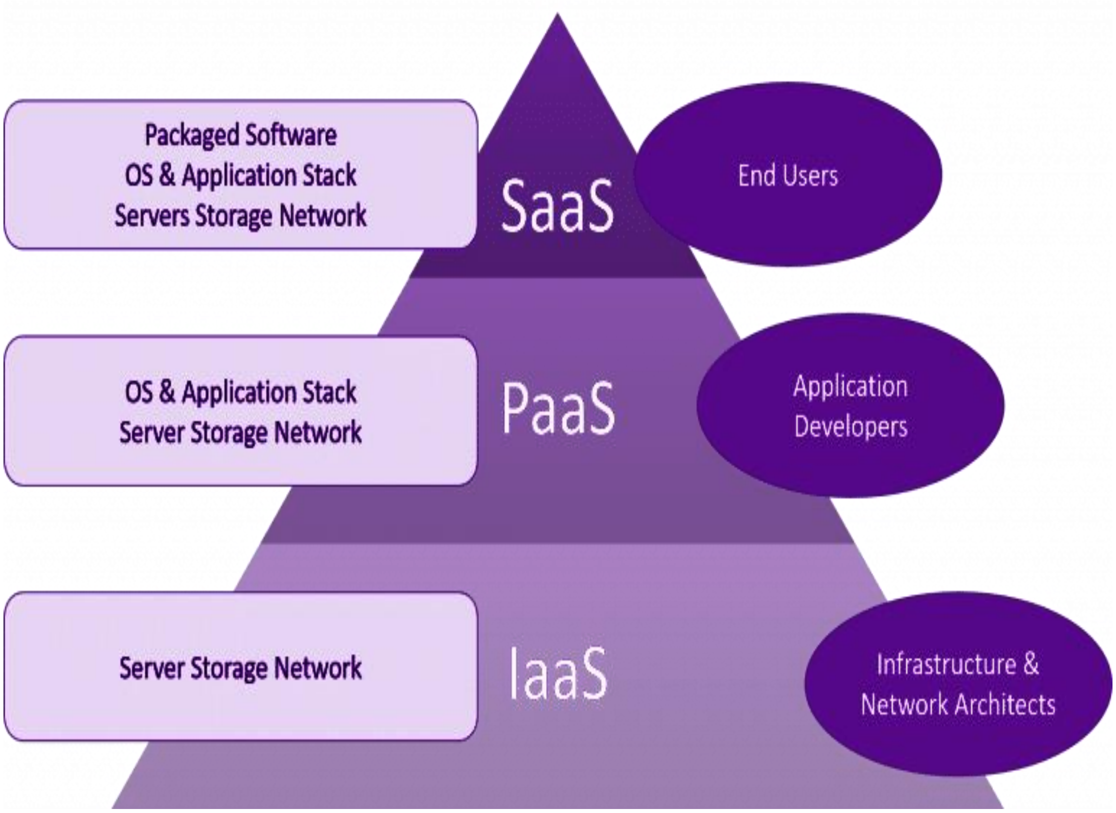


Characteristics of cloud computing

- On-demand self-service
- Distributed storage
- Rapid elasticity
- Automated management
- Broad network access
- Resource pooling
- Measured service
- Virtualization technology
- Pay per use

Cloud Computing Services

1. Infrastructure as a Service (IaaS)
2. Platform as a service (PaaS)
3. Software as a service (SaaS)



Infrastructure as a Service (IaaS)

Infrastructure-as-a-Service (IaaS) provides virtual machines and other abstracted hardware and operating systems which may be controlled through service API. In these services, cloud service providers install operating system images, and application software's on the cloud infrastructure based on user's requirement. The cloud service provider is responsible for patching and maintains the operating systems and the application software.

Examples: Amazon EC2, SkyDrive, etc.

Platform-as-a-Service (PaaS)

Platform-as-a-Service (PaaS) offers development tools, configuration management, and development platforms on-demand that can be used by subscribers to develop custom applications; typically it includes a framework that satisfies the requirement of a developer. The Application developers can take advantage of using the licensed software without worrying about the cost and complexity involved in maintaining the underlying hardware and software layers.

Examples: Google App Engine, Microsoft Azure, etc.

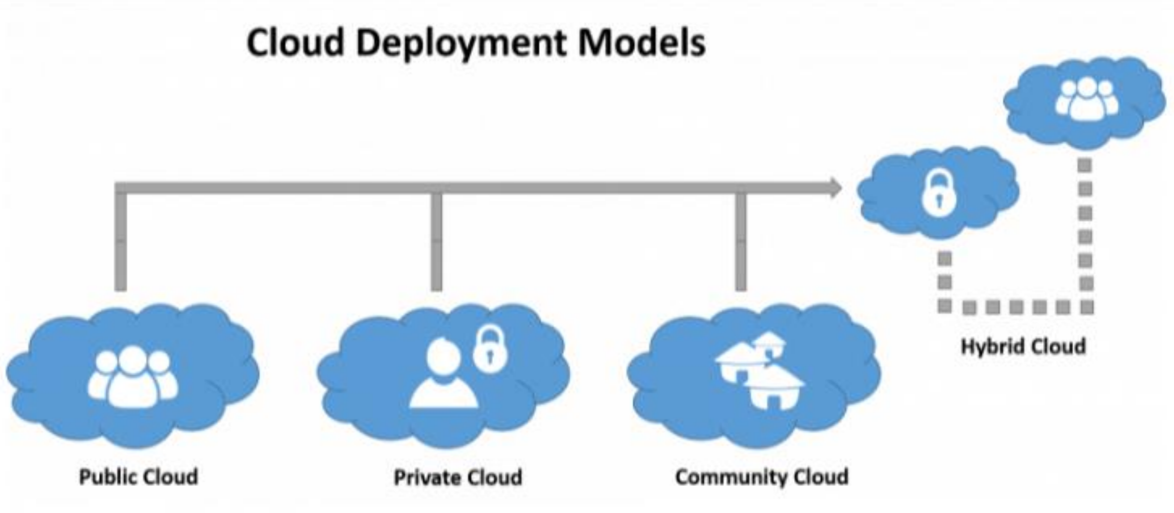
Software as a Service (SaaS)

Software-as-a-Service (SaaS) offers software to subscribers on-demand over the Internet. CSP (Cloud service provider) manages the infrastructure and platforms that run these applications. This service eliminates the need for installing and running the applications on the user's computers.

Examples: Google Docs, Calendar, Web-based office applications, etc.

Cloud deployment models

- Public cloud
- Private cloud
- Community cloud
- Hybrid Cloud



Public cloud

In the public cloud model, The cloud service provider delivers the cloud service over the internet to users. Where users no need to worry about the infrastructure. The cost is shared by all users, for free or in the form of a license policy like pay per user.

Private Cloud

Private Cloud infrastructure is operated solely by a single organization. The services are delivered from an organizational data center to internal users of the organization. This model preserves the management, control, and security to organizational data centers. Internal users may not be billed for services. Private clouds are great for organizations that have high-security demands, high management demands and uptime requirements.

Community cloud

Community Cloud infrastructure is mutually shared between organizations that belong to a specific community with common concerns (security, compliance, etc.). The community members generally share similar privacy, performance and security concerns. A community cloud can be managed by hosting it internally or by a third-party provider. A community cloud is good for organizations that work on joint ventures that need centralized cloud computing ability for managing, building and executing their projects. The best example for community cloud is a cloud for the bank or trading firm.

Hybrid Cloud

Hybrid cloud computing uses a combination of two or more cloud deployment models, like private cloud and public cloud services. This service allows workloads to be shared between private and public clouds. Companies can run mission-critical workloads or sensitive applications on the private cloud and use the public cloud to handle workload bursts or spikes in demand. An organization can use the public cloud to interact with their customers while keeping their data secured through a private cloud.

Cloud Computing Benefits:

Security

- Less investment in security
- Better disaster recovery
- Effective patch management and implementation of security updates

Economic

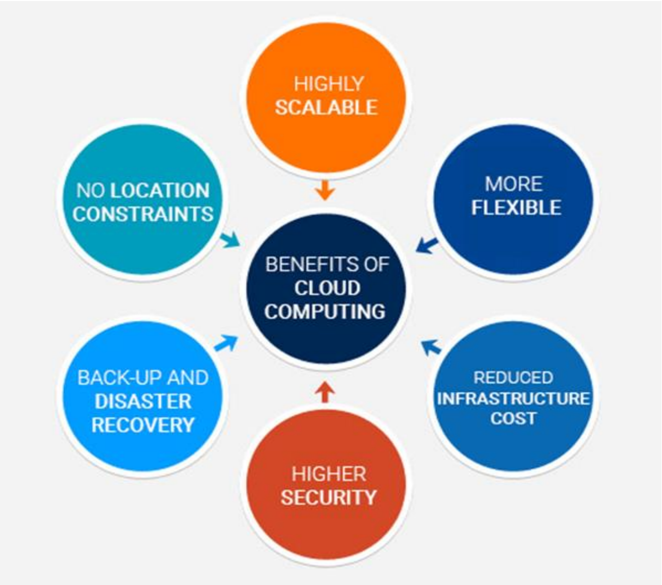
- Environment-friendly
- Less maintenance
- Less power consumption

Operational

- Deploy applications quickly
- Scale as needed

Staffing

- Less IT staff
- Well usage of resources
- Less personnel training


HIGHLY SCALABLE
NO LOCATION CONSTRAINTS
MORE FLEXIBLE
BENEFITS OF CLOUD COMPUTING
BACK-UP AND DISASTER RECOVERY
REDUCED INFRASTRUCTURE COST
HIGHER SECURITY

Cloud Computing Threats

- Illegal access to the Cloud
- Privilege Escalation.
- Hardware Failure.
- VM-Level attacks.
- Cryptanalysis Attacks.
- SQL Injection Attacks.
- DoS and DDoS Attacks.
- Session Hijacking using XSS Attacks.
- Loss of Business Reputation due to Co-tenant Activity

Cloud Security tools:

Applications	Web App Firewalls, Scanners, Transactional Security
Information	Strong Encryption, Database Activity Monitoring, DLP
Management	Patch Management, Configuration Management
Network	NIDS/NIPS, Firewalls, Deep Packet Inspection, Anti-DDoS
Trusted Computing	Hardware & Software API’s
Computer and Storage	Host-based Firewall, HIDS/HIPS, Integrity & File/Log Management
Physical	Physical Plant Security, CCTV, Guards

Countermeasures

- Enforce data protection, backup and retention mechanisms.
- Disclose relevant logs and data to customers.
- Prevent unauthorized server access using security checkpoint.
- Monitor the client’s traffic for any malicious activity.
- Implement strong key generation, stronger authentication management, and destruction practices.
- Check for data protection at both design and runtime.

- Enforce legal contracts in employee behavior policy.
- Prohibit users from sharing application and services credentials.
- Ensure that physical security is a 24 x 7
- Leverage strong two-factor authentication techniques where possible.

References:

1. Cloud Services Image Reference: 7 Different Types of Cloud Computing Structures. (2018, May 08). Retrieved from https://www.uniprint.net/en/7-types-cloud-computing-structures/