Extra Chapter
Cloud Computing and Databases

Slides, content, web links and end chapter questions are prepared from JB Learning Internet Security: How to defend against attackers on the web textbook and other Internet resources.

Learning Objective

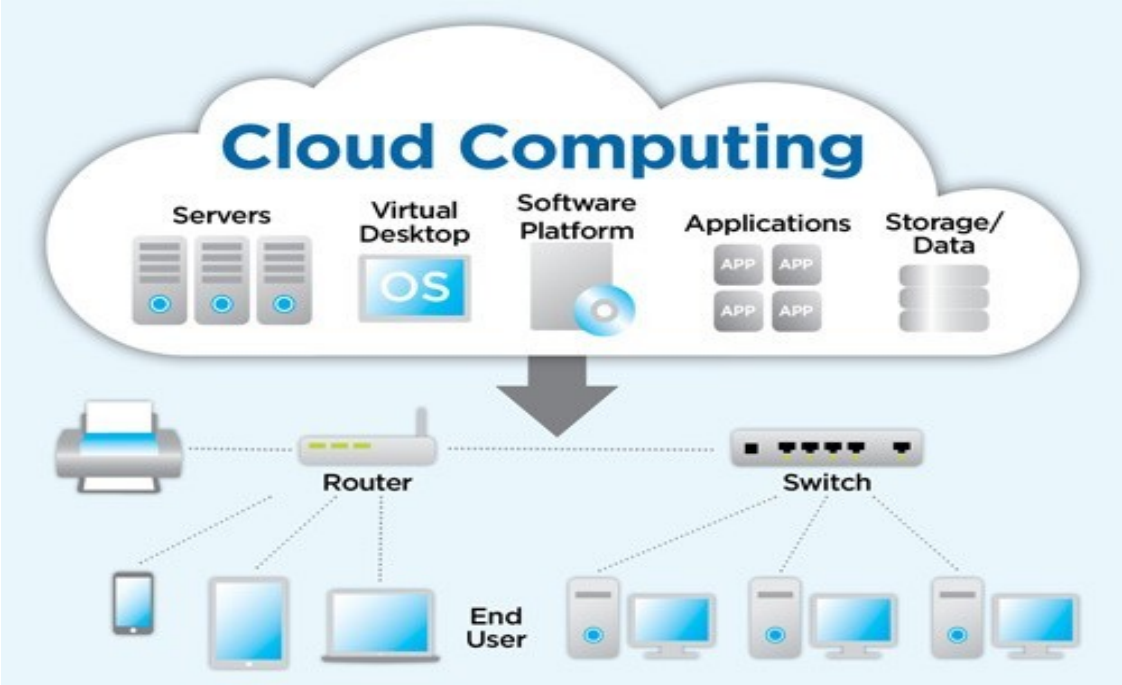
Analyze the impact of the Internet and Cloud Computing and Databases.

Topics of Discussion:

A. Cloud Computing.
B. Cloud Computing and Databases
C. Hand-on labs using Azure and AWS.

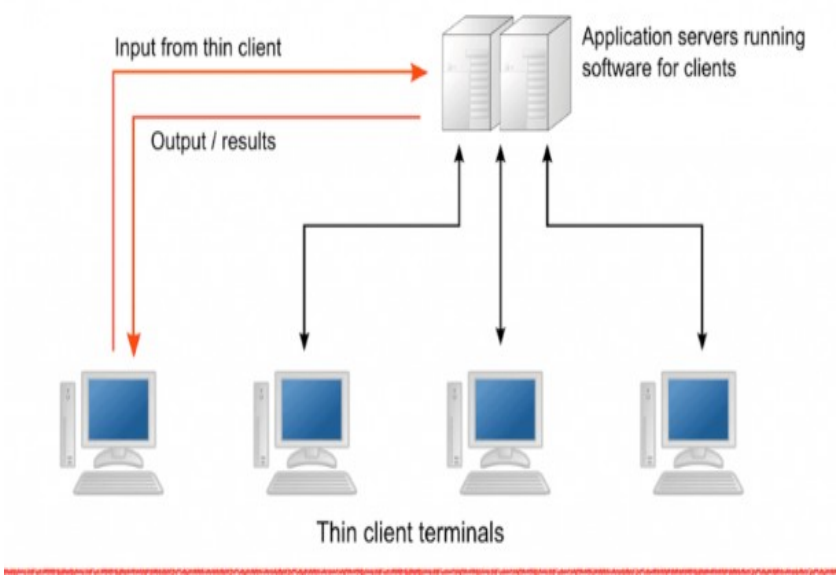
A. Cloud Computing

- **Cloud computing** means **1)** Distribution of applications or services from dedicated Internet-based virtual servers and thus **2)** accessing and processing resources outside the local firewalls of organization.
- Thus, the processing of applications and services from local server rooms, workstations, and LANs is shifted to Internet-based server farms that manage the distribution of network functions.



Cloud Computing

- **Cloud computing** build on idea of thin client, but on larger and more ambitious scale using internet**.**
- Thin client computing requires no local storage, no operating systems, or processing power. Rather, it is the job of the server to store files, run applications, and process all services and requests.
- Essentially, thin client PCs are dummy terminals. The advantages of a thin client architecture include simpler administration, reduced hardware costs for upgrading, and single point of administration for applications and backup procedures.

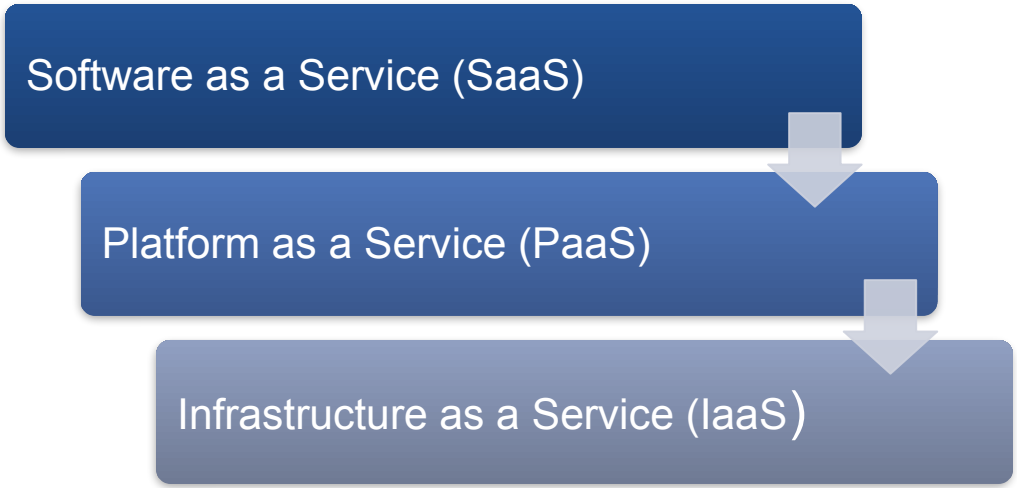


Cloud Computing

Simple examples of cloud services, that you use everyday.

- **e-mail accounts of** providers like Hotmail or Gmail require you to connect with a remote server that stores your email.
- Another is **Google Docs**, which provides users with word processing, spreadsheet, and presentation applications distributed through Google's cloud servers.

Types of Cloud Computing



Cloud Computing

- **SaaS**—A software delivery method in which the cloud servers distribute specific applications or services to the client, typically through the client's Web browser. Distributed to hundreds or even thousands of clients simultaneously. This enables clients to access applications with limited licensing considerations, servers, and other hardware requirements.
  - Ex : office 365 of Microsoft office 365
  - Ex : online CRM software https://www.agilecrm.com
- **PaaS**—A method of distributing operating systems or platform applications over the Internet.
  - These platforms are often used to run the SaaS.
  - Computing platforms which typically include OS, programming language execution environment, database server, web server, etc. Ex: Microsoft Azure, AWS, etc..

Cloud Computing

- **IaaS—**
  - A method of delivering an infrastructure, which includes servers, storage, and networking components, over the Internet.
  - The owner of the cloud computing hardware is responsible for updating and maintaining that equipment to ensure the delivery of applications over the cloud.
    - Some of the IaaS Providers:
      - Amazon AWS. (ex: Amazon S3 for purchasing storage per use)
      - (Demo: bucket patel-mongo-s3-bucket 20 GB)
      - DigitalOcean.
      - Google Compute Engine.
      - HP Enterprise Converged Infrastructure.
      - IBM SmartCloud Enterprise.
      - Microsoft Azure

Cloud Computing

- **BaaS — mBassS** (not a new category but a new service?)
  - **Backend-as-a-Service (BaaS) –** Backend as a service (BaaS), or mobile backend as a service (mBaaS) is a model of cloud computing in which the vendor provides web and mobile application developers with tools and services to create a cloud backend for their applications.
  - BaaS vendors typically use custom SDKs and APIs to give developers the ability to connect their applications to backend cloud storage and features such as user management, push notifications, and social network integration.

Cloud Computing Major 3 players

- **Amazon Web Services (AWS)**
- The first major cloud computing provider, Amazon Web Services was made available in 2006 with the release of 3 cloud services: Simple Storage Service (S3), Simple Queue Service (SQS), and Elastic Compute Cloud (EC2). Over the years, Amazon released more services through AWS over 100 services.
- AWS focuses heavily on infrastructure-as-a-service (IaaS) and platform-as-a-service (PaaS) offerings, with an emphasis on providing virtual infrastructures and development tools, including storage, computing, database, mobility, and management services.
- AWS makes use of virtual machines, which Amazon calls instances, that support a variety of different operating systems. Each instance can be specifically configured in regard to computing, storage, and memory needed for the applications developed on it. Users can make use of a single instance or purchase a “cluster” of them based on their needs.

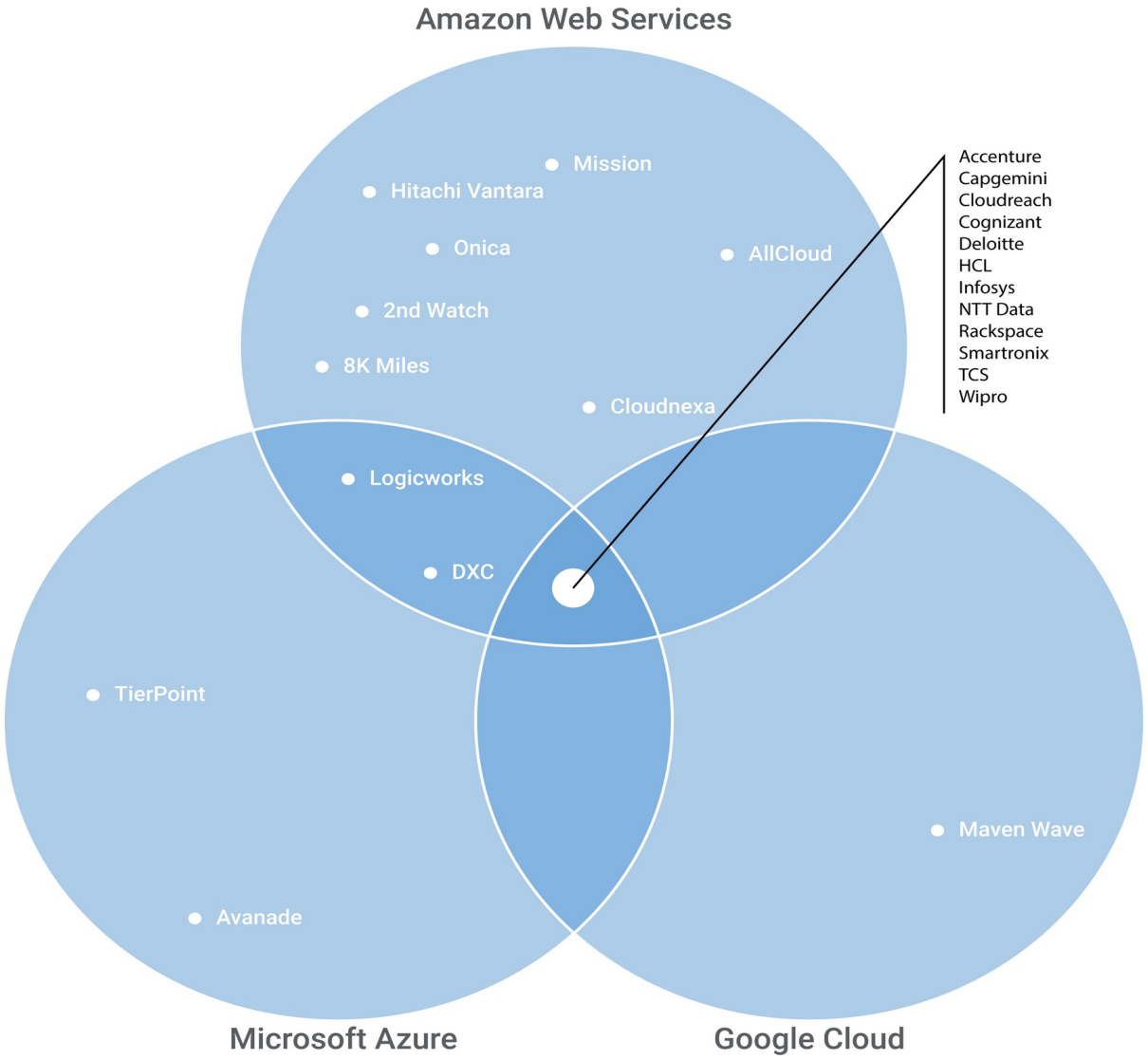
Cloud Computing Major 3 players

- **Microsoft Azure**
- Publicly released in 2010, Microsoft's cloud computing. Azure, offers tools and frameworks for businesses to develop, manage, and deploy applications on a global network. It offers a variety of SaaS and PaaS services on their public cloud environment.
- Microsoft also extends its offerings hybrid cloud service Azure Stack, which allows on-premise or on hybrid infrastructure.
- Azure Logic Apps connectors let developers easily share and connect their applications with other services, including Salesforce, Twitter, Dropbox, and Microsoft's own Office 365.
- For hybrid cloud users, Azure offers services that can be deployed in both a cloud and on-premise environment. Microsoft also provides machine learning and AI-driven services and allow users to create AI-powered applications and custom AI models.

Cloud Computing Major 3 players

- **Google Cloud**
- Google Cloud began its publicly in 2011 with release of App Engine, a web application development and hosting platform that utilizes Google's own data centers. Google Cloud is a combination of two Google service suites: Google Cloud Platform (GCP) and G-Suite.
  - GCP comprises Google Cloud's IaaS and PaaS offerings, including security, storage, management, data analytics, AI and machine learning, IoT, and databases.
  - G-Suite includes enterprise versions of their popular cloud applications, including Gmail, Google Drive, Google Calendar, and Google Hangouts.
- Google offers hybrid cloud migration services to help enterprises determine what data and workflows belong in the cloud. It also supports companies that want to go serverless by providing full environment management to allow developers to focus more on app development.

Cloud Computing venders for 3 major players – at a glace



Chapter Questions –Brief explanation type questions

Q- 1. What are the main types of Cloud Computing? Briefly describe each one.

Q- 2. Write on Virtualization v/s Cloud Computing with at least 2-2 examples of each.

Chapter Questions (Note for exam-2 – Just to understand)

1. You have been asked to reduce the number of applications you host on your internal network. You decide to use an online version of the company's accounting software. This may be an example of which of the following?

   A. Virtualization and SaaS
   B. Cloud computing and IaaS
   C. Cloud computing and SaaS
   D. Virtualization and IaaS

2. What is NOT an example of cloud computing?

A. Google Docs
B. Online e-mail services
C. Online data storage services
D. A static Web page

Chapter Questions

3. Which of the following provides operating systems or platform applications over the Internet?

A. SaaS
B. PaaS
C. IaaS
D. IoT

4. Which of the following provides specific applications or services to a client over the Internet?

A. SaaS
B. PaaS
C. IaaS
D. IoT

5. Which of the following delivers an infrastructure, including servers, storage, and networking components, over the Internet?

A. SaaS
B. PaaS
C. IaaS
D. IoT