

# Servers and Clouds

## 3 Big Data

### What is Big Data?

contains greater variety arriving in increasing volumes and with ever-higher velocity.

known as the three Vs.

- Variety: Refers to the different data types i.e. various data formats like text, audios, videos, etc.
- Velocity: is the rate at which data grows. Social media contributes a major role in the velocity of growing data.
- Volume: represents the volume i.e. amount of data that is growing at a high rate i.e. data volume in Petabytes (1 Petabyte = 1024 Terabytes).

### three key actions

- Integrate: Big data brings together data from many different sources and applications.
- Manage: Big data requires storage. Your storage solution can be in the cloud, on-premises, or both
- Analyze: Your investment in big data pays off when you analyze and act on your data.

three V's of big data

### BIG DATA APPLICATION AREAS

- Banking & Securities
- Communications Media & Entertainment
- Healthcare
- Manufacturing & Natural Resources
- Transportation
- Education
- Retail & Wholesale
- Insurance

### Big Data application areas

Challenges

### Challenges of Big Data

- Quick Data Growth**: Data growing at such a quick rate is making it a challenge to find insights from it.
- Storage**: Such a large amount of data is difficult to store and manage by organizations without appropriate tools and technologies.
- Syncing Across Data Sources**: This implies that when organizations import data from different sources the data from one source might not be up to date as compared to the data from another source.
- Security**: A huge amount of data in organizations can easily become a target for advanced persistent threats, so here lies another challenge for organizations to keep their data secure by proper authentication, data encryption, etc.
- Unreliable Data**: We can't deny the fact that big data can't be 100 percent accurate. It might contain redundant or incomplete data, along with contradictions.

Summary

### Big Data Use Cases

- Product Development**: Companies like Netflix and P&G use big data to anticipate customer demand.
- Predictive Maintenance**: Factors that can predict mechanical failures may be deeply buried in structured data, such as the year, make, and model of equipment.
- Customer Experience**: Big data enables you to gather data from social media, web visits, call logs, and other sources to improve the interaction experience and maximize the value delivered.
- Fraud and Compliance**: Big data helps you identify patterns in data that indicate fraud and aggregate large volumes of information to make regulatory reporting much faster.
- Machine Learning**: You should have big data to train your machine learning models.
- Operational Efficiency**: With big data, you can analyze and assess production, customer feedback and returns, and other factors to reduce outages and anticipate future demands.
- Drive Innovation**: Big data can help you innovate by studying interdependencies among humans, institutions, entities, and processes and then determining new ways to use those insights.

## 2 Database

### Introduction

usually organized under a schema, and stored in a format that is efficient for storing and retrieving the data

- collections of data
- usually controlled by a Database Management System (DBMS)
- like MySQL or PostgreSQL
- Databases use tables for managing data
- we can reach specific information asking questions to tables
- These questions called query.

### Database Structure

SQL databases are based on around relational algebra

- Tables are the way we look at our relevant data.
- Columns are fields in the table.
- Rows define a relation between fields.
- A Primary key is a set of columns that uniquely identify rows in a table.
- A Foreign key is a column that matches the primary key of another table.

Student-ID (Primary Key)	Student Name (Column-2)	StudentMail Address (Column-3)
0001 (Row-1)	Albert Einstein	einstein@clarusway.com
0002 (Row-2)	Nikola Tesla	tesla@clarusway.com

Course Code (Primary key) (Foreign key to Table 1)	Course Name	Enrolled Student
CESN501	Computer Essentials and Networking	0002

### Types of Databases

- SQL**: Stores data in tables organized by column and field.
- NoSQL**: Stores data differently than an SQL database.
- SQL databases are primarily called Relational Databases (RDBMS)
- SQL**
  - classic databases
  - define and manipulate data based on structured query language (SQL)
  - are table-based
  - MySQL/MariaDB
  - ★ PostgreSQL
  - SQLite
- NoSQL**
  - has a dynamic schema for unstructured data.
  - are either key-value pairs, document-based, graph databases or wide-column stores.
  - offer more flexibility in storage options
  - MongoDB
  - ★ Apache Cassandra
  - Elasticsearch

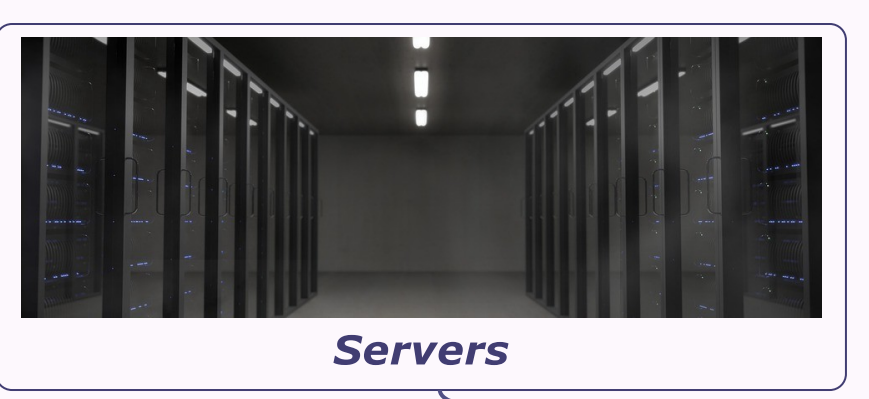
### Database and Query Example

ID	Student Name	Enrolled Courses	Age
0001	Alberto Einstein	SQL	24
0002	Nikola Tesla	Introduction to Testing	32

```
SELECT Student Name FROM Students  
WHERE Enrolled Courses= Java AND Age < 25 ;
```

### Database and tables

## 1 Servers



### What is Server?

Servers are computers that provide data to other computers

- serve to data for LAN and WAN
- including web servers, mail servers, and file servers

### Web Server

- Every web site work on servers
- hosts websites
- such as Apache or Microsoft IIS (Internet Information Services)
- can take thousands of requests in a second
- generally host multiple websites
- two types of web servers
  - Web servers that host websites for multiple users are called shared hosts.
  - Web servers that only host websites for a single person or company are called dedicated hosts.
- holds Web documents and makes them available for viewing by remote browsers

### Mail Server

A mail server is a server that handles and delivers e-mails over a network, usually over the Internet.

A client is normally a computer or phone where you read and/or send your e-mails.

- SMTP**: When you press the "Send" button in your e-mail application (e-mail client) the program will connect to a server on the network / Internet that is called an SMTP (Simple Mail Transfer Protocol) server
- POP3**: When you download e-mails to your mail program the program will connect to a server on the network / Internet that is known as a POP3 (Post Office Protocol version 3) server.
- IMAP**: (Internet Message Access Protocol) is a method of accessing and storing mail on a mail server. IMAP allows you to access your email wherever you are, from any device. When you read an email message using IMAP, you aren't actually downloading or storing it on your computer; instead, you're reading it from the email service.

### File Server

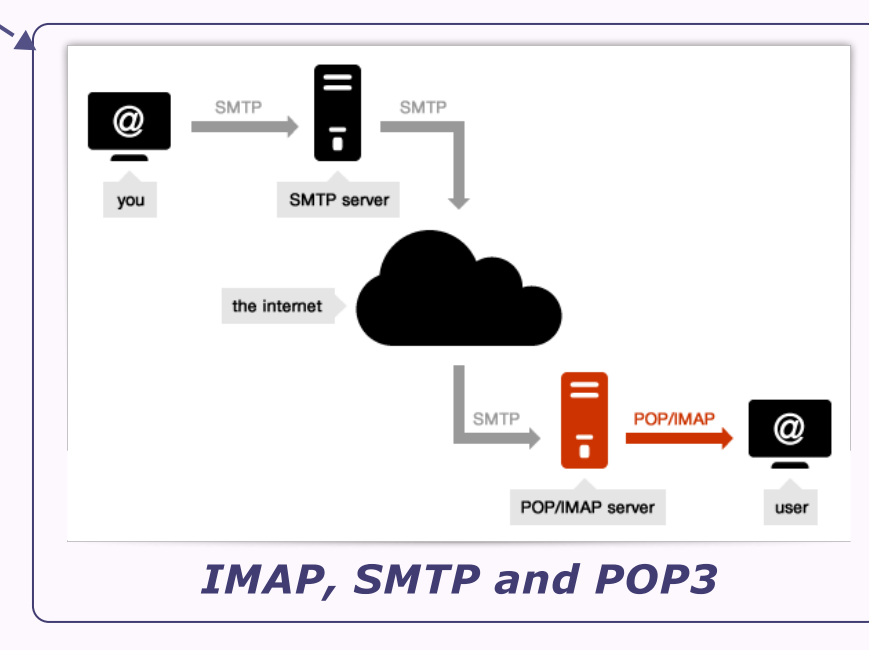
- provides a location for shared disk access
- shares the access through a computer network.
- designed primarily to enable the storage and fast retrieval of data

### Shared Hosting VS Dedicated Hosting

**Shared Hosting** (Condominium): Multiple users share the same server resources.

**Dedicated Hosting** (Single house): A single user has exclusive access to the entire server.

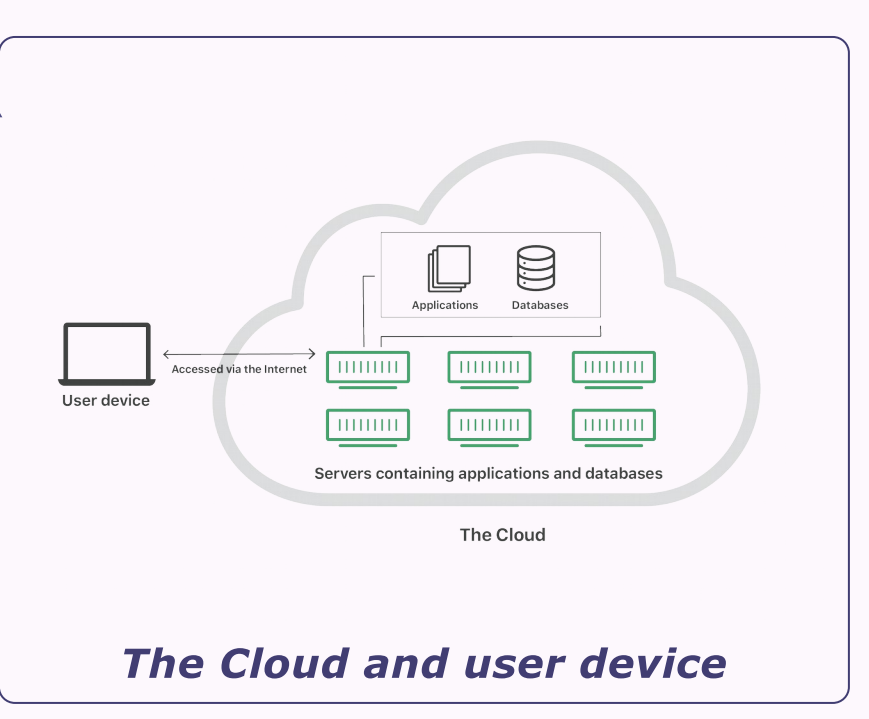
### Dedicated and shared web hosting



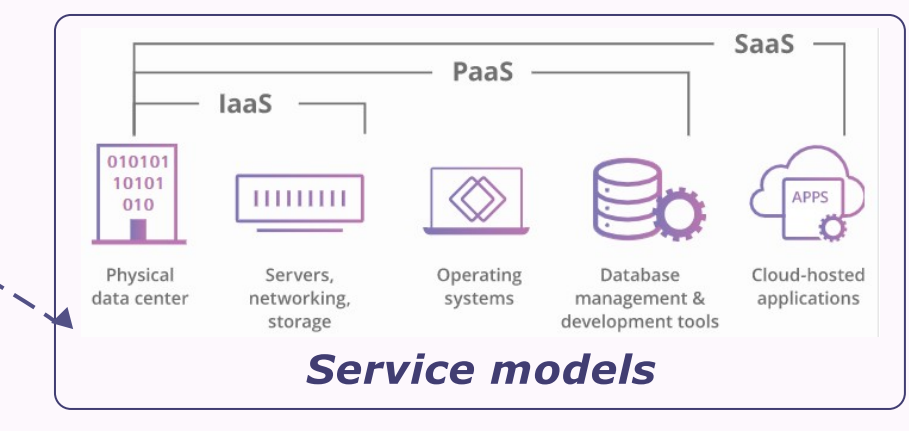
## Cloud and Cloud Computing

### Service models of cloud computing

- Software-as-a-Service (SaaS)**: Instead of users installing an application on their device, SaaS applications are hosted on cloud servers, and users access them over the Internet. Examples of SaaS applications include Salesforce, MailChimp, and Slack.
- Platform-as-a-Service (PaaS)**: In this model, companies don't pay for hosted applications; instead they pay for the things they need to build their own applications. PaaS examples include Heroku and Microsoft Azure.
- Infrastructure-as-a-Service (IaaS)**: In this model, a company rents the servers and storage they need from a cloud provider. IaaS providers include DigitalOcean, Google Compute Engine, and OpenStack.
- Function-as-a-Service (FaaS)**: FaaS, also known as serverless computing, breaks cloud applications down into even smaller components that only run when they're needed. FaaS or serverless applications still run on servers, as do all these models of cloud computing.



The Cloud and user device



Service models

### Types of Cloud Deployments

- Private cloud**: A private cloud is a server, data center, or distributed network wholly dedicated to one organization.
- Public cloud**: A public cloud is a service run by an external vendor that may include servers in one or multiple data centers. Unlike a private cloud, public clouds are shared by multiple organizations.
- Hybrid cloud**: Hybrid cloud deployments combine public and private clouds, and may even include on-premises legacy servers.
- Multicloud**: Multicloud is a type of cloud deployment that involves using multiple public clouds.

Summary