

## **Block Chain**

- Blockchain was developed by a group of individuals under the pseudonym, **Satoshi Nakamoto in 2008,**
- to make a decentralized, publicly accessible ledger for recording digital transactions.
- Bitcoin is the first and most prevalent cryptocurrency launched, in view of the blockchain network.



## Block Chain

- **As each transaction occurs, it is recorded as a “block” of data**
  - The data block can record the information of your choice: who, what, when, where, how much and even the condition — such as the temperature of a food shipment.
- **Each block is connected to the ones before and after it**
  - These blocks form a chain of data
  - The blocks confirm the exact time and sequence of transactions, and the blocks link securely together to prevent any block from being altered or a block being inserted between two existing blocks.
- **Transactions are blocked together in an irreversible chain: a blockchain**



## **Block Chain**

- A blockchain network can track orders, payments, accounts, production and much more.
- members share a single view of the truth,



## **Block Chain**

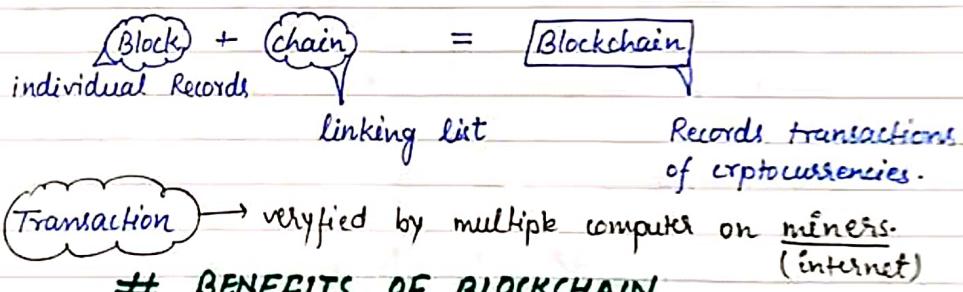
- a chain of records stored in the form of blocks, which are typically controlled by no single authority.
- makes it difficult or impossible to change, hack, or cheat the system.



## UNIT-3: BLOCKCHAIN

### # BLOCKCHAIN

A blockchain is peer-to-peer distributed ledger technology which is an immutable, decentralized, encrypted, distributed ledger technology.



### # BENEFITS OF BLOCKCHAIN

- ✓ Open
- ✓ Distributed
- ✓ Decentralized
- ✓ Efficient
- ✓ Permanent

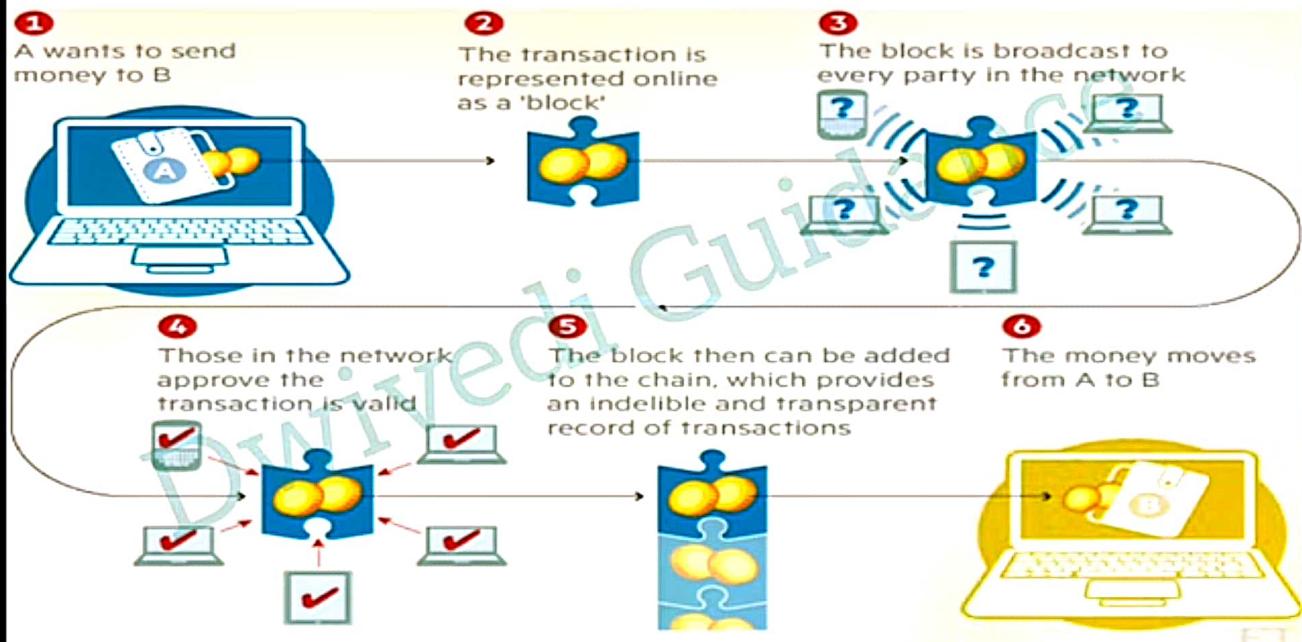


## **Blockchain Application**

- Digital Id
- Banking
- Voting
- Virtual currency Bitcoin
- Secure sharing of Medical Records
- Supply chain and logistic monitoring
- Original Content Creation



## Block Chain



### Advantage of Blockchain

- Time Saving
- No Limit
- No Need for 3<sup>rd</sup> Party veri.
- No central server 😊
  - ↳ No problem 😊
- Cost- Saving
- Cannot be tampered
- Decentralized.

• Digital / virtual currency

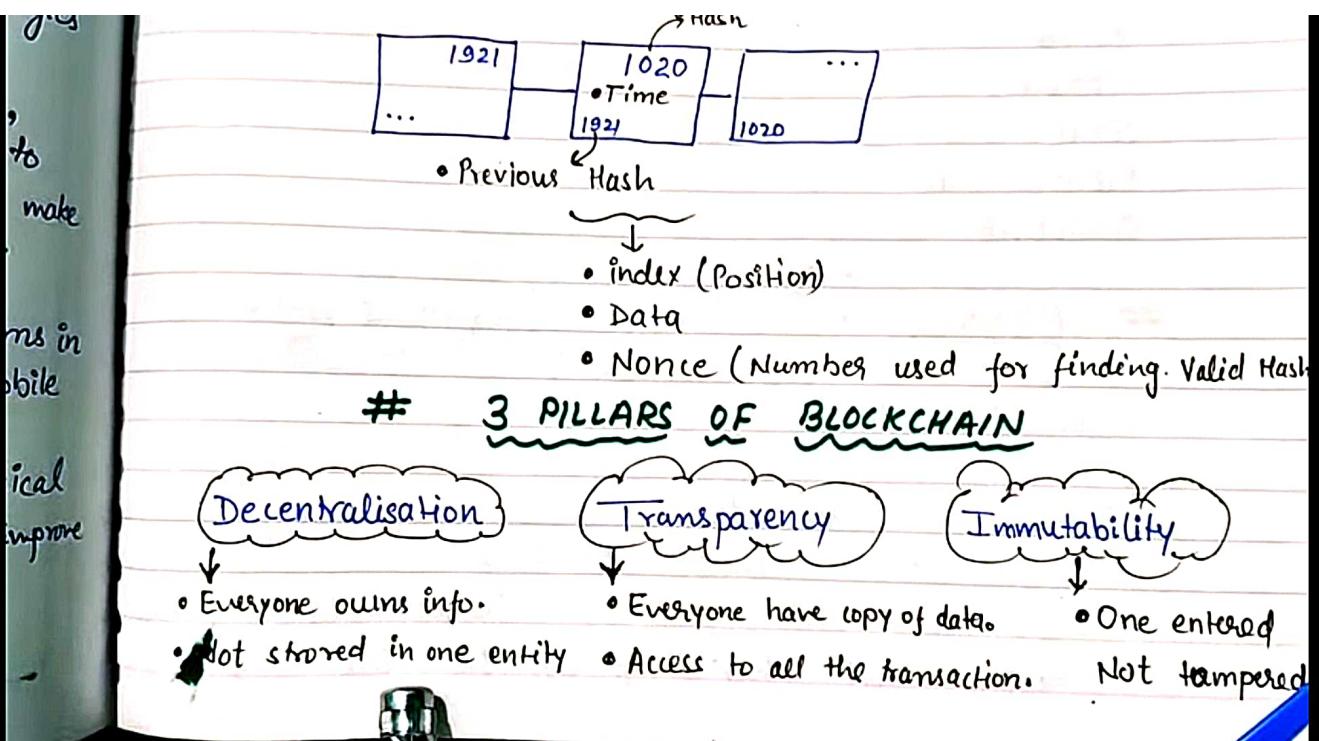
### Disadv. of current system

- Huge waiting time
- Cash used in low amount
- Need third party verification
- Central server 😞
  - ↳ participant 😞
- Expensive because of charges
- Can be tampered
- Centralized



# CRYPTOCURRENCY



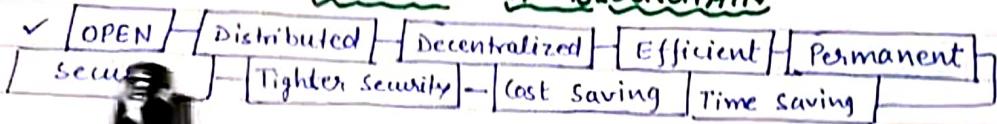


Block + chain = Blockchain

individual Records linking list Records transactions of cryptocurrencies.

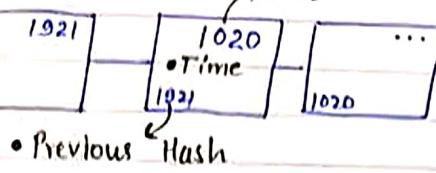
Transaction → verified by multiple computer on miners.  
(internet)

### # BENEFITS OF BLOCKCHAIN



### #

### CONTENTS OF BLOCK





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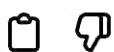
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they also come with challenges and regulatory considerations.

**You**

Cloud computing it's nature and benefits

**ChatGPT****Cloud Computing:**

Cloud computing is a technology that allows users to access and use computing resources (such as servers, storage, databases, networking, software) over the internet, often referred to as "the cloud."

Instead of owning and maintaining physical infrastructure, users can leverage these resources on a pay-as-you-go basis, scaling up or down based on their needs.

**Benefits of Cloud Computing:**

- 1. Cost-Efficiency:** Users pay for the

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Cryptocurrencies have various applications, including:

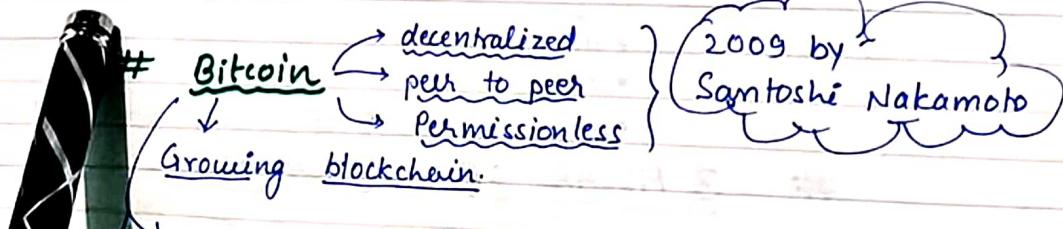
1. **Decentralized Finance (DeFi):** Facilitating financial services like lending, borrowing, and trading without traditional intermediaries.
2. **Cross-Border Transactions:** Enabling fast and cost-effective international money transfers without the need for traditional banking systems.
3. **Smart Contracts:** Executing self-executing contracts with predefined rules, reducing the need for intermediaries in various industries.
4. **Tokenization of Assets:** Representing real-world assets like real estate or art as digital tokens, making them more divisible and accessible.
5. **Privacy and Anonymity:** Offering enhanced privacy features transactions, appealing to those seeking more confidential financial

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## # CRYPTOCURRENCY

- Digital / virtual currency
  - Secured by cryptography
  - Not tampered
  - Electronic peer-to-peer currency
  - They don't have physical existence.
- like - Bitcoin  
Ripple  
Litecoin  
Libra  
Bitcoin Cash  
Chainlink



# CLOUD COMPUTING

refers to the "servers" that are accessed over the internet. (present at remote location).

In Simple Terms,  
It means storing, managing and accessing the data & programs on the remote servers that are hosted on Internet instead of computer's hard drive.

or

Cloud Computing is the on-demand availability of computer system resources, especially data storage / cloud storage & computing power) without direct payment by the user

In short,  
we store, manage & process data on remote servers.

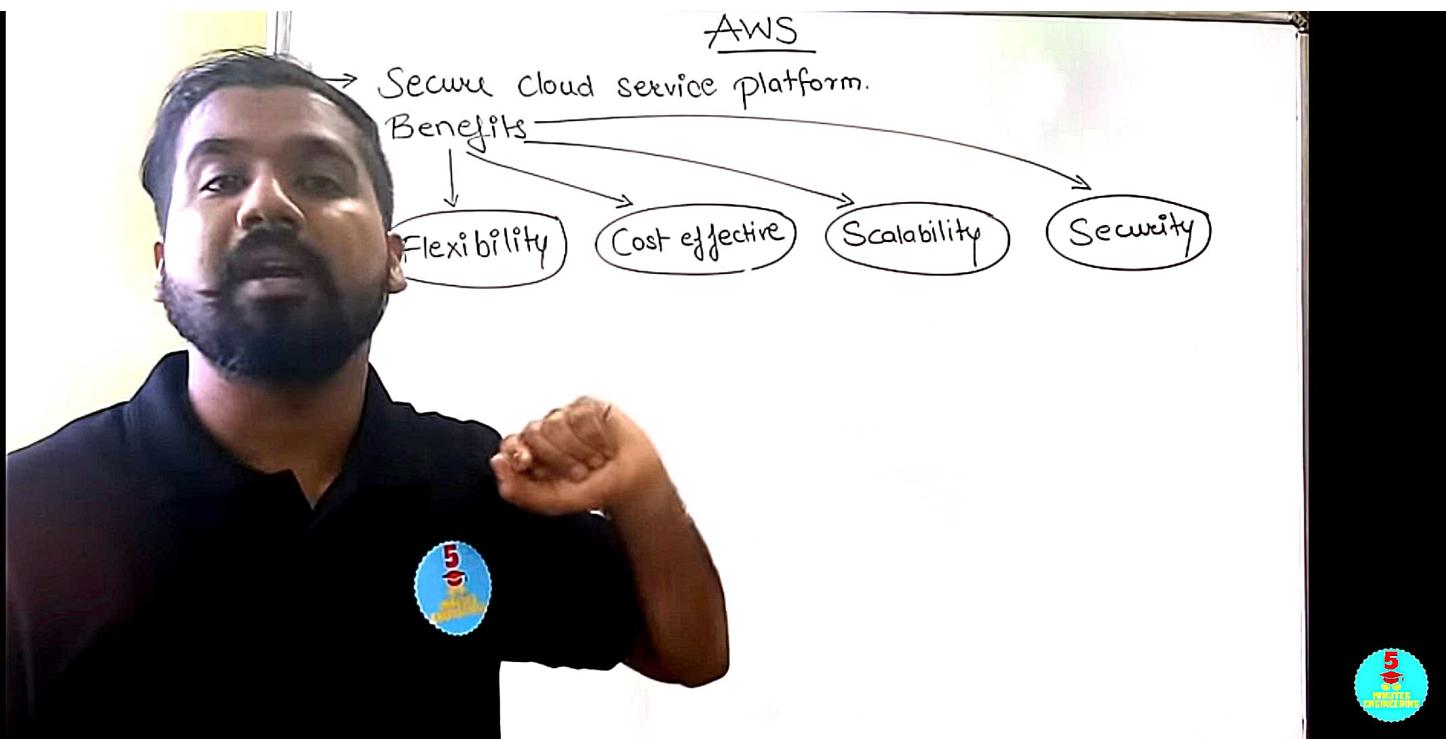
## Service providers

- Google Cloud
- AWS (Amazon Web Services)
- Microsoft Azure
- IBM Cloud
- Alibaba Cloud
- , etc.

## Types of cloud

- 1) Public - accessible to all
- 2) Private -
- 3) Hybrid - services accessible within an org. → public + private cloud features
- 4) Community -







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## Benefits of Cloud Computing:

1. **Cost-Efficiency:** Users pay for the resources they use, avoiding the need for significant upfront investments in hardware and infrastructure.
2. **Scalability:** Easily scale resources up or down based on demand, providing flexibility to accommodate changing workloads.
3. **Accessibility:** Users can access cloud services from anywhere with an internet connection, promoting remote collaboration and flexibility.
4. **Reliability and Redundancy:** Cloud providers often have multiple data centers, ensuring high availability and data redundancy. This reduces the risk of data loss or service interruptions.
5. **Security:** Reputable cloud providers invest heavily in security measures, including encryption, authentication, and compliance.

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## **Virtual Reality**

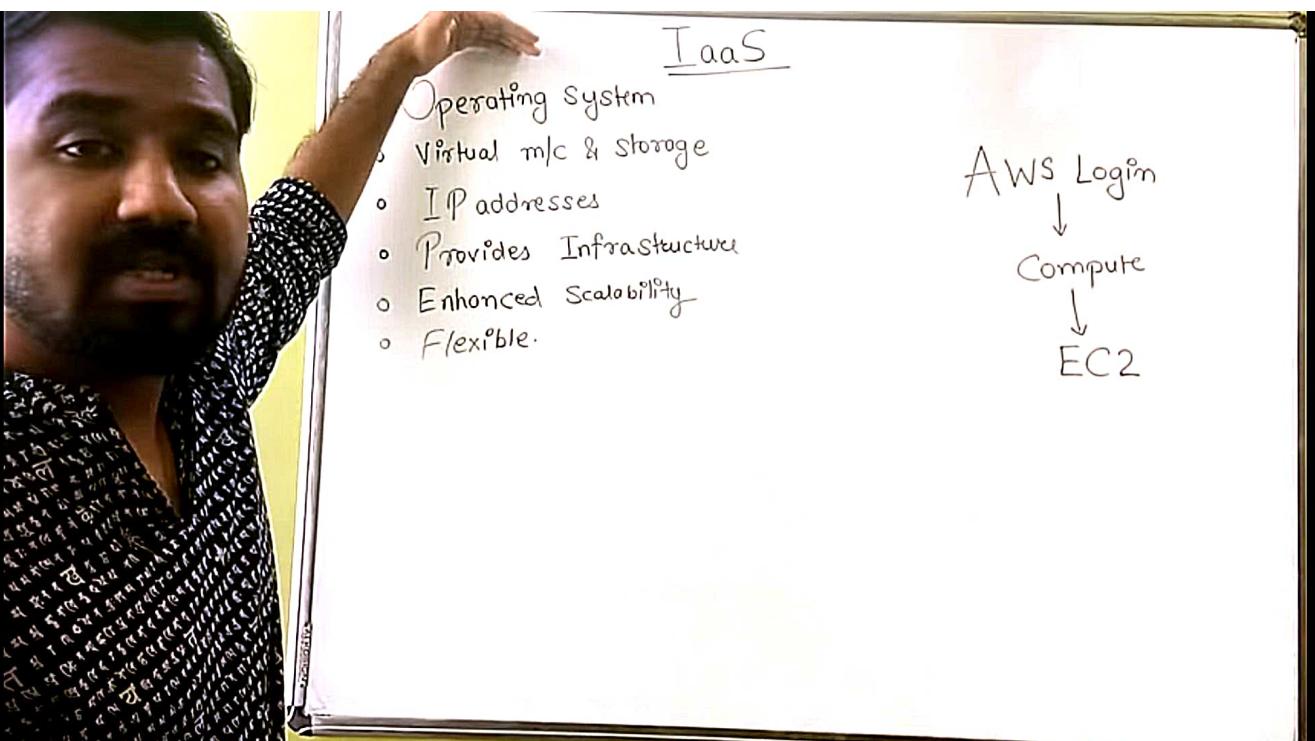
- This environment is perceived through a device known as a Virtual Reality headset or helmet.
- It is a computer-generated simulation of an environment or 3-dimensional image where people can interact in a seemingly real or physical way.
- Coined by Jaron Lanier (1987)



## **Virtual Reality**

- a technology that creates a virtual environment.
- a computer-generated environment with scenes and objects that appear to be real, making the user feel they are immersed in their surroundings.





## IaaS

### Operating System

- Virtual m/c & Storage
- IP addresses
- Provides Infrastructure
- Enhanced Scalability
- Flexible.

AWS Login

↓  
Compute

↓  
EC2

# **Augmented Reality**

## **Examples of Augmented Reality**

- Snapchat.
- Photography and Editing.
- Hololens.
- Google ARCore.
- Pokemon Go.
- Interior Decoration Apps.
- AR Maintenance.
- Google Glass.



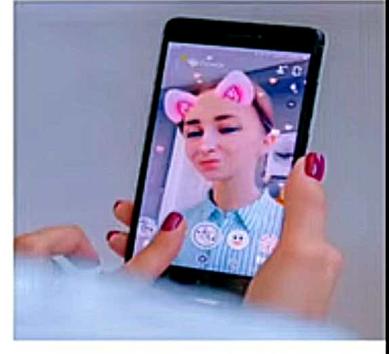
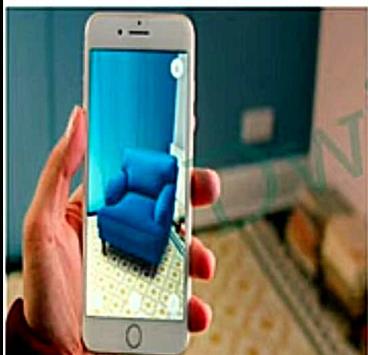
## **Augmented Reality**

- Advanced version of Virtual Reality
- an enhanced version of the real physical world that is achieved through the use of digital visual elements, sound, or other sensory stimuli delivered via technology.
- Add Virtual things in real world



## **Augmented Reality**

- Advanced version of Virtual Reality
- an enhanced version of the real physical world that is achieved through the use of digital visual elements, sound, or other sensory stimuli delivered via technology.



## Applications of VR



Education



Automotive Industry



Healthcare



Defence



Entertainment



Digital Marketing

# Immersive Technology

## Applications

- In Education
- Medical Training (Simulated operation, hospital environment etc.)
- In Entertainment (3D Gamings, Movies, Snapchat, Instagram)
- Military for training
- Automotive (Understanding road scenario etc.)
- Architecture
- Digital marketing (showing customer how products look in their home)
- Tourism (Virtual tour)



## **Mixed Reality (AR 2.0)**

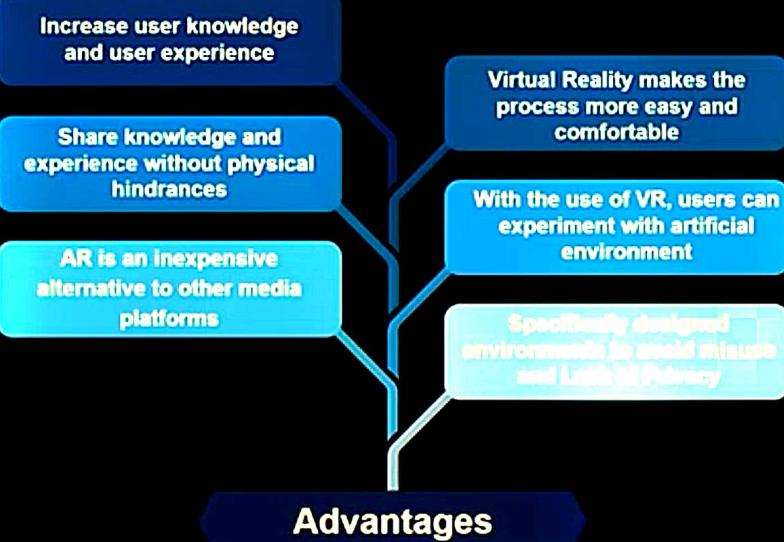
- MR is a kind of immersive AR,
- Users can interact with virtual reality
- One can interact with and manipulate both physical and virtual items and environments, using next-generation sensing and imaging technologies.
- It provides the ability to have one foot (or hand) in the real world, and the other in an imaginary place,
- For example, you can take a virtual box from your real bedside table, open it, and see what's inside.



## Advantages of AR and VR

AR

VR



## VR vs AR

Mode	VR	AR
 <b>Virtuality</b>	VR is completely virtual	AR uses real-world entities enhancing digital content
 <b>Control</b>	VR users are controlled by the system	AR users can control their presence in real world
 <b>Compatibility</b>	VR requires compatible devices like a headset device	AR needs no specific device
 <b>Environment</b>	VR only enhances a fictional reality	AR enhances both the virtual and real world

## Applications of AR



AR Glasses



Medical Imaging



Entertainment



Tourism



Education



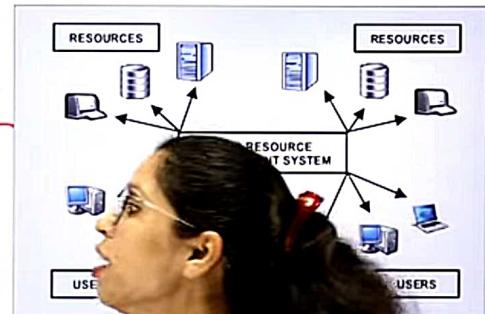
Design and Modelling:

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### Grid Computing:

(Code - 065)

- Nowadays, ~~countless~~ computational nodes ranging from hand-held mobile devices to personal computers and workstations are connected to Local Area Network (LAN) or Internet.
- Therefore, it is economically feasible to reuse or utilise their resources like memory as well as processing power.
- The grid provides an opportunity to solve computationally intense scientific and research problems without actually procuring a costly hardware.



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### Grid Computing:

(Code - 065)

- A grid is a computer network of geographically dispersed and heterogeneous computational resources.
- Unlike cloud, whose primary focus is to provide services, a grid is more application specific and creates a sense of a virtual supercomputer with an enormous processing power and storage.
- The constituent resources are called nodes. These different nodes temporarily come together to solve a single large task and to reach a common goal.



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## Disadvantages of AR and VR

AR

VR

Quite expensive and less accessible

Can lead to use in inappropriate situations causing harm

AR technology is not equipped with security policies

Programmers sometimes find it difficult to interact with it

Maximum use of VR makes addicted live in virtual world instead of real one

VR take up a lot of space and require a lot of computing power

### Disadvantages



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What is green computing?



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**Green Computing:**

Green computing, also known as sustainable computing or eco-friendly computing, refers to the practice of designing, using, and disposing of computer systems and technologies in an environmentally responsible manner. The goal is to minimize the environmental impact of computing activities, reduce energy consumption, and promote sustainability throughout the entire lifecycle of IT equipment.

Key principles and strategies of green computing include:

- 1. Energy Efficiency:** Designing and using hardware and software that consume less energy, promoting energy-efficient computing devices and data centers.



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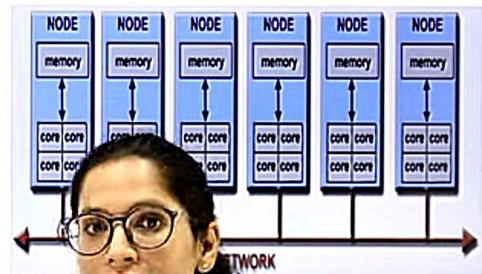
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### Grid Computing:

- Grid computing is different from IaaS cloud service. In case of IaaS cloud service, there is a service provider who rents the required infrastructure to the users.
- Whereas in grid computing, multiple computing nodes join together to solve a common computational problem.

(Code - 065)



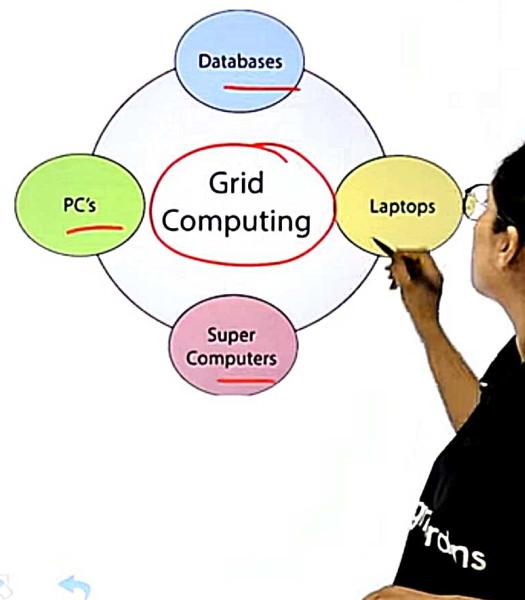
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### Grid Computing:

(Code - 065)

**Grid can be of two types—**

- (i) **Data grid**, used to manage large and distributed data having the required multi-user access, and
- (ii) **CPU or Processor grid**, where processing is moved from one PC to another as needed or a large task is divided into subtasks, and allotted to various nodes for parallel processing.



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Big Data:

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### (A) Volume / Scale of Data

- The most prominent characteristic of big data is its enormous size. If a particular data set is of such large size that it is difficult to process it with traditional DBMS tools, it can be termed as big data.

class	size	manage with	how it fits	examples
<b>small</b>	< 10 GB	Excel, R	fits in one machine's memory	thousands of sales figures
<b>medium</b>	10GB-1TB	indexed files, monolithic DB	fits on one machine's disk	millions of web pages
<b>Big</b>	> 1TB	Hadoop, distributed DBs	stored across many machines	billions of web clicks



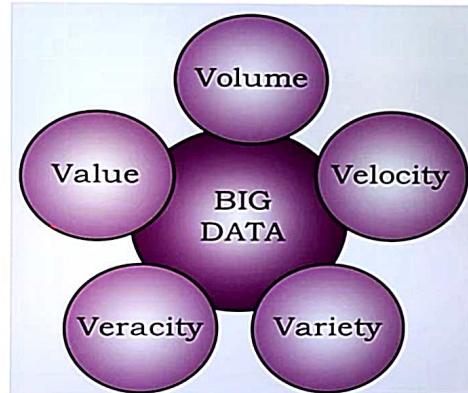
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Big Data:

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### Characteristics of Big Data:

Big data exhibits following five characteristics that distinguish it from traditional data.



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### Big Data:

(Code - 065)

- This results in the generation of data sets of enormous volume and complexity called Big Data.
- Such data cannot be processed and analysed using traditional data processing tools as the data is not only voluminous, but also unstructured like our posts, instant messages and chats, photographs that we share through various sites, our tweets, blog articles, news items, opinion polls and their comments, audio/video chats, etc.

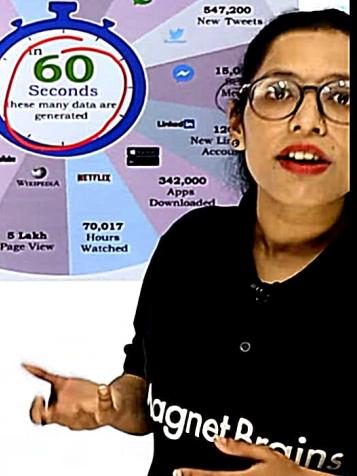
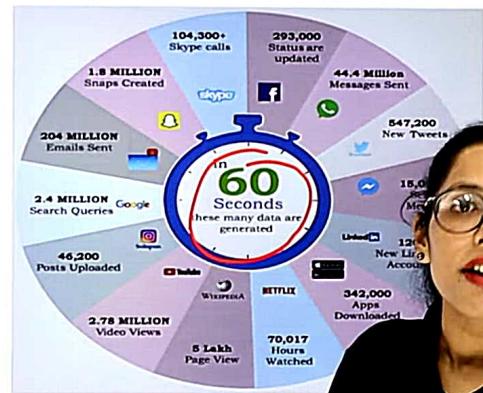


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### Big Data:

(Code - 065)

- With technology making an inroad into almost every sphere of our lives, data is being produced at a colossal rate. Today, there are over a billion Internet users, and a majority of the world's web traffic is coming from smartphones.
- Figure shows that at the current pace, around 2.5 quintillion bytes of data are created each day, and the pace is increasing with the continuous evolution of the Internet of Things (IoT).





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5. **Power Management:** Implementing power-saving features on computers and servers, such as sleep modes and dynamic voltage and frequency scaling.
6. **Lifecycle Management:** Considering the environmental impact at every stage of a product's lifecycle, from design and manufacturing to use and end-of-life disposal.
7. **Cloud Computing:** Leveraging cloud services, which can often lead to more efficient resource utilization and reduced energy consumption compared to traditional on-premises infrastructure.
8. **Thin Client Computing:** Using thin client devices that rely on a centralized server for processing, reducing the energy consumption of individual client devices.

Green computing aims to address the environmental challenges associated with the rapid growth of IT by promoting

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Key principles and strategies of green computing include:

1. **Energy Efficiency:** Designing and using hardware and software that consume less energy, promoting energy-efficient computing devices and data centers.
2. **Renewable Energy:** Utilizing renewable energy sources, such as solar or wind power, to run data centers and IT infrastructure, reducing reliance on non-renewable energy.
3. **Recycling and E-Waste Management:** Proper disposal and recycling of electronic waste (e-waste) to minimize the environmental impact of discarded hardware and components.
4. **Virtualization:** Consolidating multiple physical servers into virtual machines to optimize resource utilization and reduce the number of physical servers needed.
5. **Power Management:** Implementing power-

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Big Data:

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### (D) Veracity (Uncertainty of Data)

- Big data can be sometimes inconsistent, biased, noisy or there can be abnormality in the data or issues with the data collection methods.
- Veracity refers to the trustworthiness of the data because processing such incorrect data can give wrong results or mislead the interpretations.



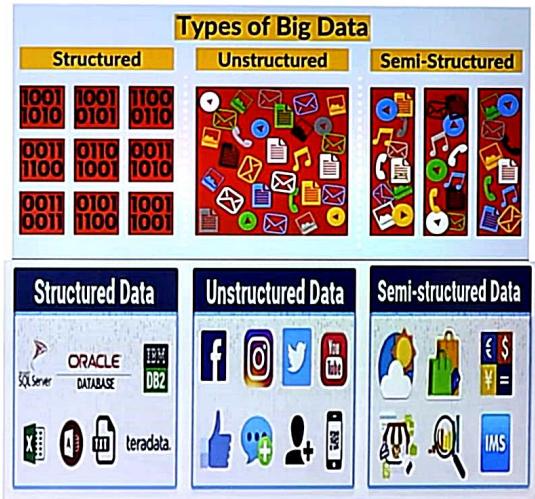
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Big Data:

(Code - 065)

### **(C) Variety (Different Forms of Data)**

- It asserts that a data set has varied data, such as structured, semi-structured and unstructured data. Some examples are text, images, videos, web pages and so on.



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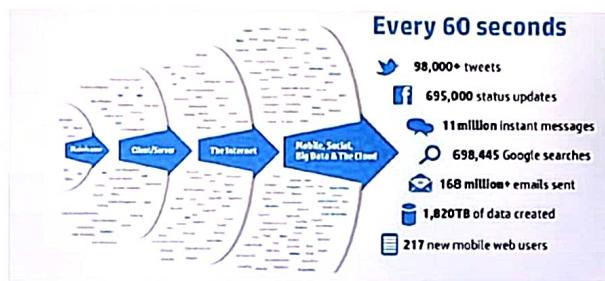
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Big Data:

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### (B) Velocity (Analysis of Streaming Data)

- It represents the rate at which the data under consideration is being generated and stored. Big data has an exponentially higher rate of generation than traditional data sets.



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Big Data:

(Code - 065)

- In the field of science and technology, it can be useful for researchers to verify or disprove scientific models, theories and hypotheses.
- Pandas is a library of the programming language Python that can be used as a tool to make data analysis much simpler.



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Big Data:

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### Data Analytics

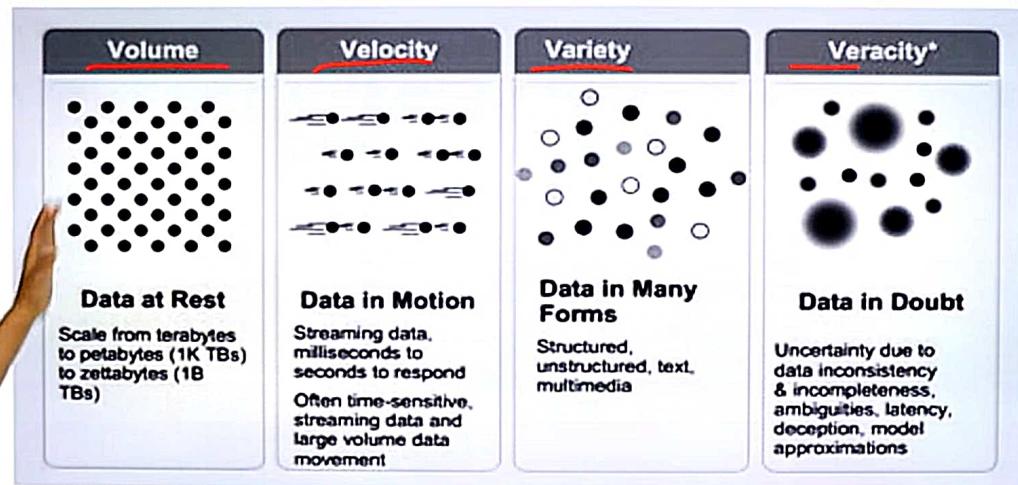
- Data analytics is the process of examining data sets in order to draw conclusions about the information they contain, with the aid of specialised systems and software.
- Data analytics technologies and techniques are becoming popular day-by-day.
- They are used in commercial industries to enable organisations to make more informed business decisions.

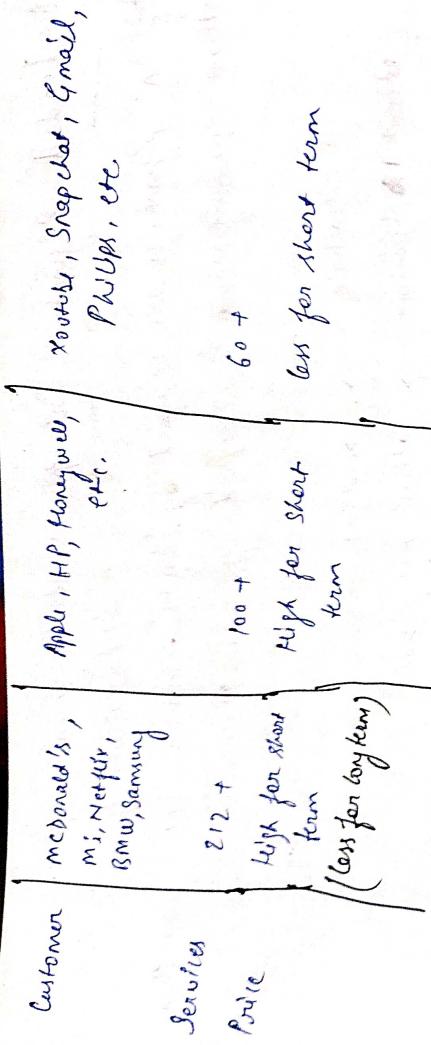


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Big Data:

(Code - 065)





Unit - 5

Grid computing used for high computational problems

Provider node: Can be an or more node in network

User node: The one which is providing its resource to others.

Ex - of Grid computing - automobile company  
Tyres, Body, Light and made at diff places

DM

Find the min no. of students in a class to be sure that none of them are born in the same month.

12 months - 12 month

per year - ?

$$so \min = 25$$

$$\left\lceil \frac{24}{12} \right\rceil = 3$$

$$\left\lceil \frac{24+1}{12} \right\rceil = 3$$

## Difference b/w IaaS, PaaS, SaaS

### FLET

On Premises	IaaS	PaaS	SaaS
Stand for	Infrastructure as a Service	Platform as a Service	Software as a Service
User	Used by network architecture	Used by developer	Used by user
Application	Client	Client	Service Provider
Data	Client	Client	S.P.
Run Time	Client	Client	S.P.
Middleware	Client	Client S.P.	S.P.
OS	Client	S.P.	S.P.
Virtualization	S.P.	SP	SP
Server	S.P.	SP	SP
Storage	S.P.	SP	SP
Networking	S.P.	SP	SP

## Difference b/w AWS, Azure, GCP

Parameter	AWS (Amazon)	Microsoft Azure (Microsoft)	Google Cloud Platform (Google)
Year	Market - 2002 Official - 2006	Market - 2008 Official - 2010	Market - 2008 Official - 2011
Market Share	47%	10%	4%
Availability	AZ = 76 Region = 24 Countries = 235	AZ = 52 Region = 60+ Countries = 140+	AZ = 61 Region = 22 Countries = 100+



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35 minutes ago



Q8. Algorithm to calculate and print the percentage marks obtained by each student along with his/her roll number and name.

```
1 Start
2 Define a structure named Student with the following members:
   rollNumber, name, marksObtained, percentage
3 Declare an array of Student structures named students with a maximum capacity of MAX_STUDENTS.
4 Declare variables numStudents (integer) to store the number of students.
5 Take Input to enter the number of students and read the input into numStudents.
6 Iterate over each student from 0 to numStudents - 1:
7. Take Input to enter details for the current student.
   Read the roll number, name, and marks obtained of the current student and
   store them in the corresponding members of the Student structure.
8 Calculate the percentage marks for the current student using the formula:
   (marksObtained / 100) * 100 and store it in the percentage member.
9 Display the header for the output table containing "Roll Number", "Name", and "Percentage".
10 Iterate over each student from 0 to numStudents - 1:
11.Display the roll number, name, and percentage marks of the current student.
12 End.
```

Q. 8



programming language

8. Draw a flowchart for the algorithm to calculate and print the percentage marks obtained by each student along with his/her roll number and name.

- HOME WORK FOR YOU