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UNIT-5

Introduction to Emerging Trends

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ARTIFICIAL INTELLIGENCE

Artificial Intelligence AI is the ability of a machine or computer system to copy human intelligence process, learn experiences and adapt to new information, perform human-like activities. Using these technologies, computers can be trained to accomplish specific tasks by processing large amounts of data and recognizing patterns in the data.

Or we can say that Artificial intelligence (AI) refers to the simulation of human intelligence in machines that are programmed to think like humans and mimic their actions.

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Examples of Artificial Intelligence-

- spam filters
- voice to text features
- smart personal assistants, such as Siri and Google Now
- automated responders and online customer support

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Machine Learning

Machine learning is an application of artificial intelligence (AI) that provides systems the ability to automatically learn and improve from experience without being explicitly programmed. Machine learning focuses on the development of computer programs that can access data and use it learn for themselves.

The process of learning begins with observations or data, such as examples, direct experience, or instruction, in order to look for patterns in data and make better decisions in the future based on the examples that we provide. The primary aim is to allow the computers learn automatically without human intervention or assistance and adjust actions accordingly.

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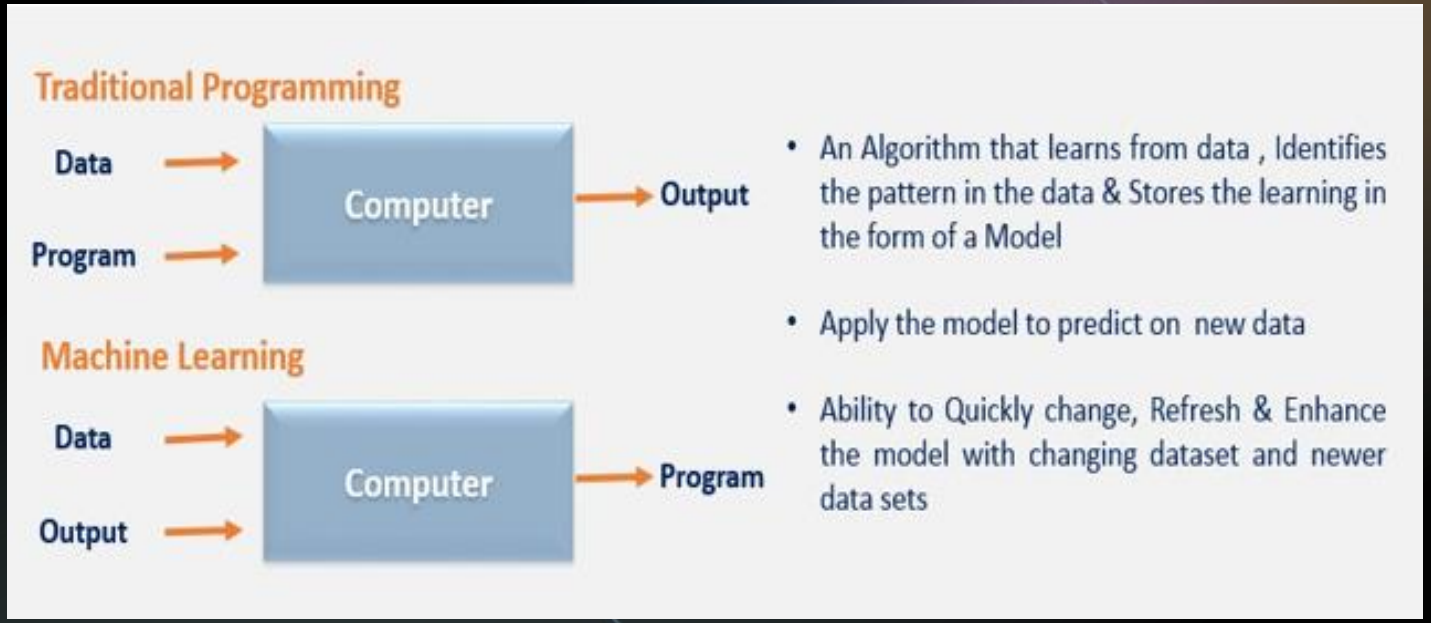
Machine learning algorithms build a mathematical model based on sample data, known as "training data", in order to make predictions or decisions without being explicitly programmed to do so.



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Natural Language Processing

Natural Language Processing is the technology used to aid computers to understand the human's natural language. It's not an easy task teaching machines to understand how we communicate.

Now you can say, "Alexa, play this song," and a device start playing that music. The complete interaction was made possible by NLP, along with other AI elements such as machine learning and deep learning. NLP makes it possible for computers to read text, hear speech, interpret it, measure sentiment and determine which parts are important.

Natural Language Processing is the driving force behind the following common applications:

- Language translation applications such as Google Translate
- Word Processors such as Microsoft Word and Grammatically that employ NLP to check grammatical accuracy of texts.
- Interactive Voice Response (IVR) applications used in call centers to respond to certain users' requests.
- Personal assistant applications such as OK Google, Siri and Alexa.

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IMMERSIVE EXPERIENCE (AR, VR)

An immersive experience is the perception of being in one place when you are actually in another. It is essentially the suspension of reality, even if just for a few moments. People always want the most immersive experience possible, especially when it comes to entertainment.

Augmented reality (AR) adds digital elements to a live view often by using the camera on a smartphone. Examples of augmented reality experiences include Snapchat lenses and the game Pokémon Go.

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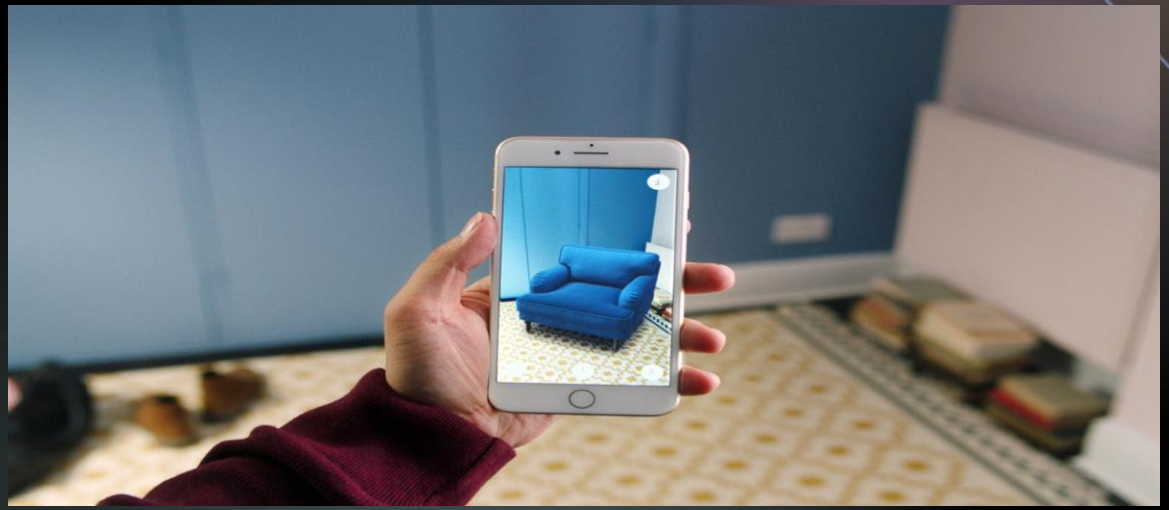
In other words, if you see the real world supplemented with digital objects, that' s AR. Imagine you want to buy a piece of furniture – a chair, for example. Augmented reality technology can help you check how different chairs will look in your room and pick the one that fits best.



Virtual reality (VR) implies a complete immersion experience that shuts out the physical world. Property agents can use virtual reality for this purpose. Unlike photos, VR is immersive, so potential buyers can take three-dimensional walkthroughs and better understand what each property has to offer before visiting in person.

Application of Immersive experience:-

- Retail and e-commerce
- Art
- Entertainment and
- Videogames and
- Interactive storytelling
- Military
- Education

Robotics

Robotics is an interdisciplinary branch of engineering and research area for information engineering, computer engineering, computer science, mechanical engineering, electronic engineering and others. Robotics involves design, construction, operation, and use of robots. The goal of robotics is to design intelligent machines that can help and assist humans in their day-to-day lives and keep everyone safe.

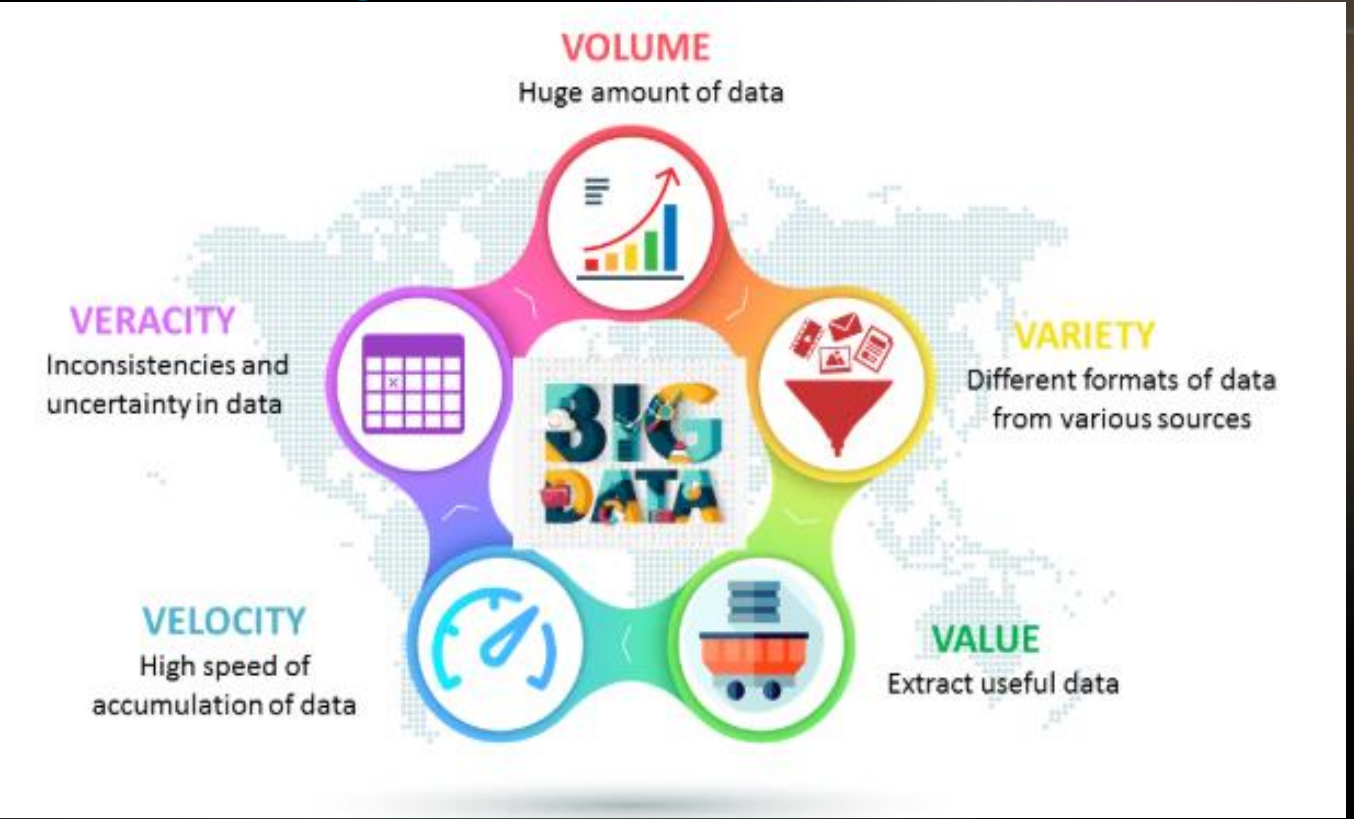
Robotics develops machines that can substitute for humans and replicate human actions. Robots can be used in many situations and for lots of purposes, but today many are used in dangerous environments (including inspection of radioactive materials, bomb detection and deactivation), manufacturing processes, or where humans cannot survive (e.g. in space, underwater, in high temperature).

Robots can take on any form but some are made to resemble humans in appearance.

Big Data and its characteristics

The term Big Data refers to a huge volume of data that cannot be stored processed by any traditional data storage or processing units. Big Data is generated at a very large scale and it is being used by many multinational companies to process and analyze in order to uncover insights and improve the business of many organizations.

Big Data characteristics



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1. Volume: It refers to the unimaginable amounts of information generated every second from social media, cell phones, cars, credit cards, M2M sensors, images, video, and whatnot. We are currently using distributed systems, to store data in several locations and brought together by a software Framework like Hadoop.

Facebook alone can generate about billion messages, 4.5 billion times that the “like” button is recorded, and over 350 million new posts are uploaded each day. Such a huge amount of data can only be handled by Big Data Technologies.

2. Variety: Variety of Big Data refers to structured, unstructured, and semi structured data that is gathered from multiple sources. While in the past, data could only be collected from spreadsheets and databases, today data comes in an array of forms such as emails, PDFs, photos, videos, audios, SM posts, and so much more.

3. Value: Value is the major issue that we need to concentrate on. It is not just the amount of data that we store or process. It is actually the amount of valuable, reliable and trustworthy data that needs to be stored, processed, and analyzed to find insights.

4. Velocity: Velocity plays a major role compared to the others, there is no point in investing so much to end up waiting for the data. So, the major aspect of Big Data is to provide data on demand and at a faster pace.

Example: 72 hours of video are uploaded to YouTube every minute this is the velocity. Extremely high velocity of data is another major big data characteristics

5. Veracity or Variability: It refers to the inconsistency which can be shown by the data many times, thus hampering the process to handle and manage the data effectively.

Department	Year	Minimum sales	Maximum sales
1	2010	?	1500
2	2011	10000	?

You can see that few values are missing in the below table

Data available can sometimes get messy and maybe difficult to trust. With wide variety in big data types generated, quality and accuracy are difficult to control.

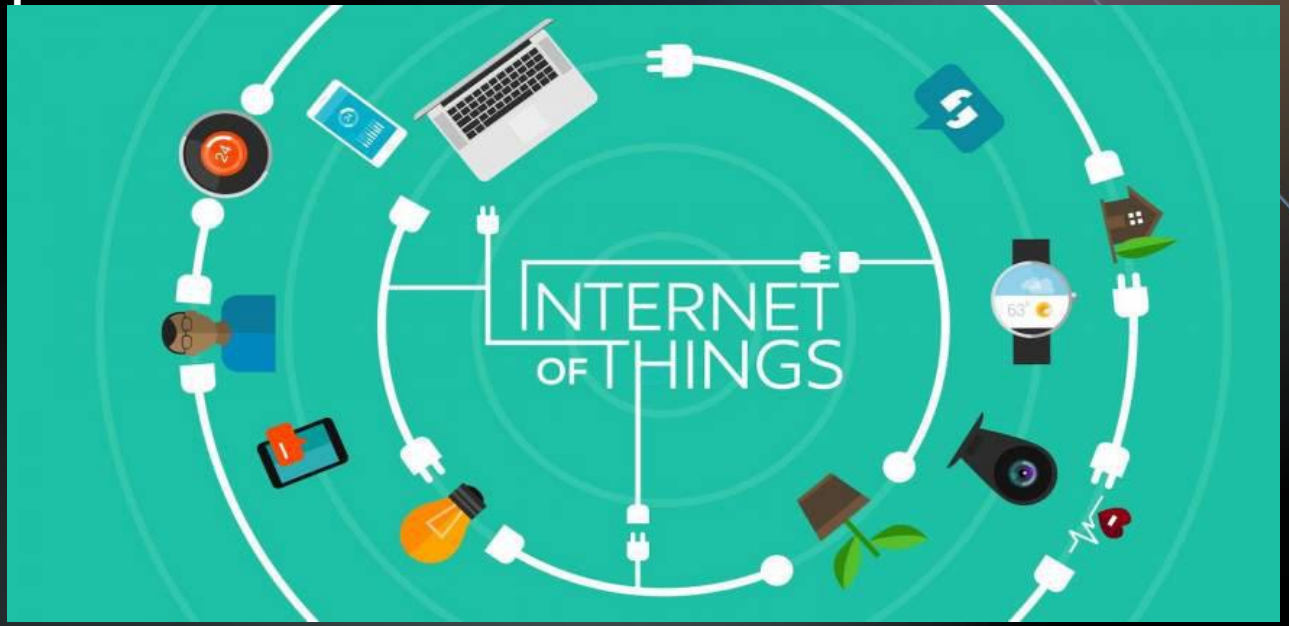
Example: A Twitter post has hashtags and abbreviations.

Internet of Things (IoT)

The internet of things, or IoT, is a system of interrelated computing devices, mechanical and digital machines, objects, people that are provided with unique identifiers (UIDs) and the ability to transfer data over a network without requiring human-to-human or human-to-computer interaction.

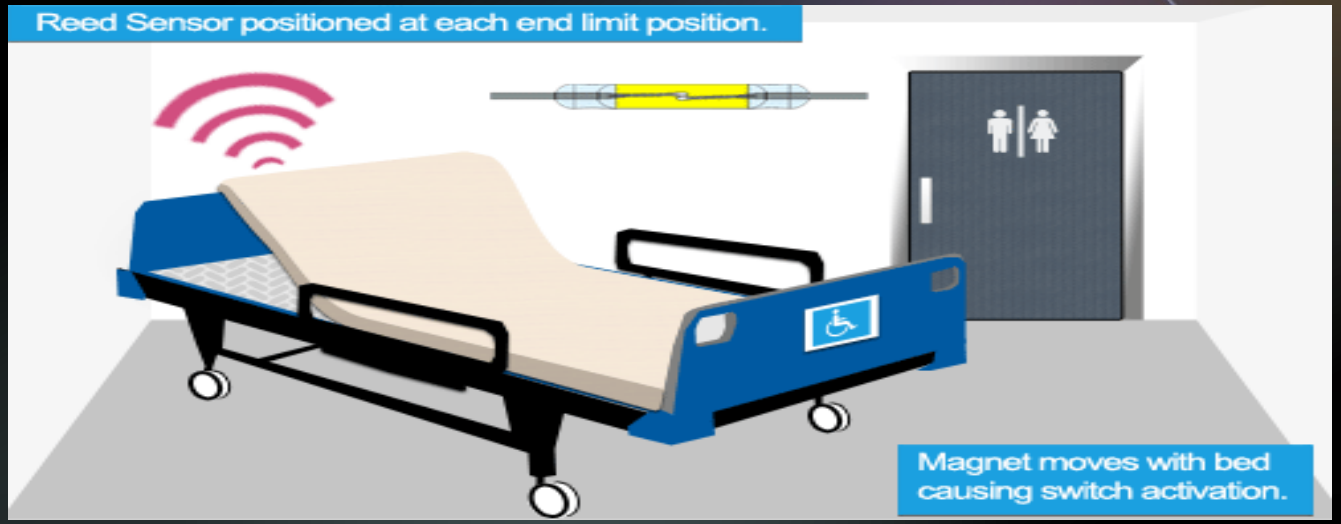
IoT makes once "dumb" devices "smarter" by giving them the ability to send data over the internet, allowing the device to communicate with people and other IoT-enabled things.

The connected "smart home" is a good example of IoT in action. Internet-enabled thermostats, doorbells, smoke detectors and security alarms create a connected hub where data is shared between physical devices and users can remotely control the "things" in that hub (i.e., adjusting temperature settings, unlocking doors, etc.) via a mobile app or website.



SENSORS

Sensors **are sophisticated devices that are frequently used to detect and respond to electrical or optical signals. A *Sensor* converts the physical parameter (for example: temperature, blood pressure, humidity, speed, etc.) into a signal which can be measured electrically.**



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SMART CITIES

A Smart city is an urban area that uses different types of electronic Internet of Things (IoT) sensors to collect data and then use insights gained from that data to manage assets, resources and services efficiently. It includes data collected from citizens, devices, and assets that is processed and analyzed to monitor and manage traffic and transportation systems, power plants, utilities, water supply networks, waste management, crime detection, information systems, schools, libraries, hospitals, and other community services.

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The Smart city concept integrates information and communication technology (ICT), and various physical devices connected to the IoT network to optimize the efficiency of city operations and services and connect to citizens. Smart city technology allows city officials to interact directly with both community and city infrastructure and to monitor what is happening in the city and how the city is evolving.

CLOUD COMPUTING

Cloud computing is the on-demand delivery of IT resources over the Internet with pay-as-you-go pricing . Companies that provide cloud services enable users to store files and applications on remote servers and then access all the data via the Internet. This means the user is not required to be in a specific place to gain access to it, allowing the user to work remotely.

Cloud computing is the delivery of different services through the Internet. These resources include tools and applications like data storage, servers, databases, networking, and software.

Rather than keeping files on a proprietary hard drive or local storage device, cloud-based storage makes it possible to save them to a remote database. As long as an electronic device has access to the web, it has access to the data and the software.

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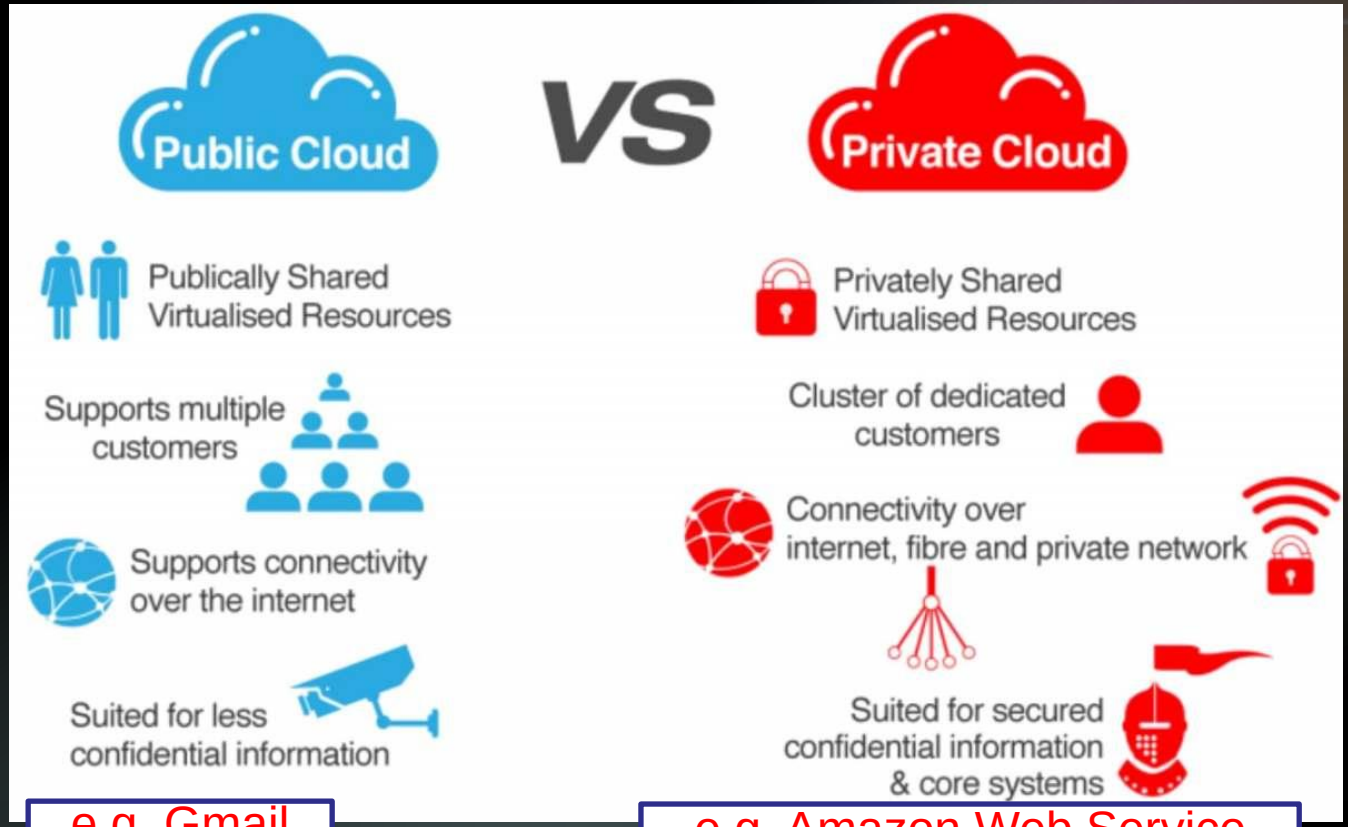
TYPES OF CLOUD



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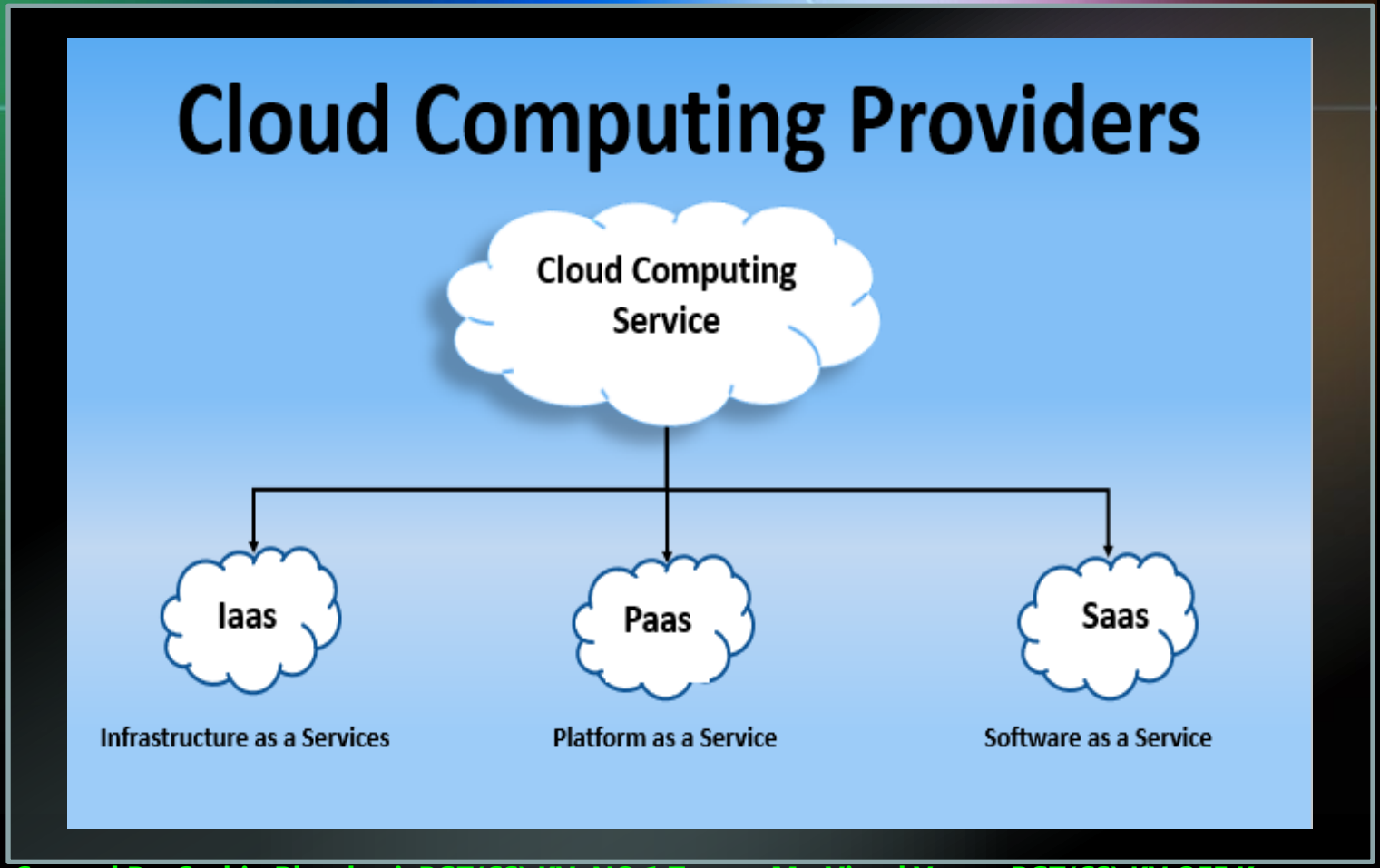

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Types of Cloud Computing

Cloud computing is not a single piece of technology like a microchip or a cellphone. Rather, it's a system primarily comprised of three services: software-as-a-service (SaaS), infrastructure-as-a-service (IaaS), and platform-as-a-service (PaaS).

1. Software-as-a-service (SaaS): involves the licensure of a software application to customers. Licenses are typically provided through a pay-as-you-go model or on-demand. SaaS utilizes the internet to deliver applications, which are managed by a third-party vendor, to its users. A majority of SaaS applications run directly through your web browser, which means they do not require any downloads or installations on the client side. This type of system can be found in Microsoft Office's 365, Google Apps, Dropbox, Cisco WebEx.

2. Infrastructure-as-a-service (IaaS): involves a method for delivering everything from operating systems to servers and storage through IP-based connectivity as part of an on-demand service. Clients can avoid the need to purchase software or servers, and instead procure these resources in an outsourced, on-demand service- from a cloud provider. Popular examples of the IaaS system include IBM Cloud and Microsoft Azure, Amazon Web Services (AWS) etc.

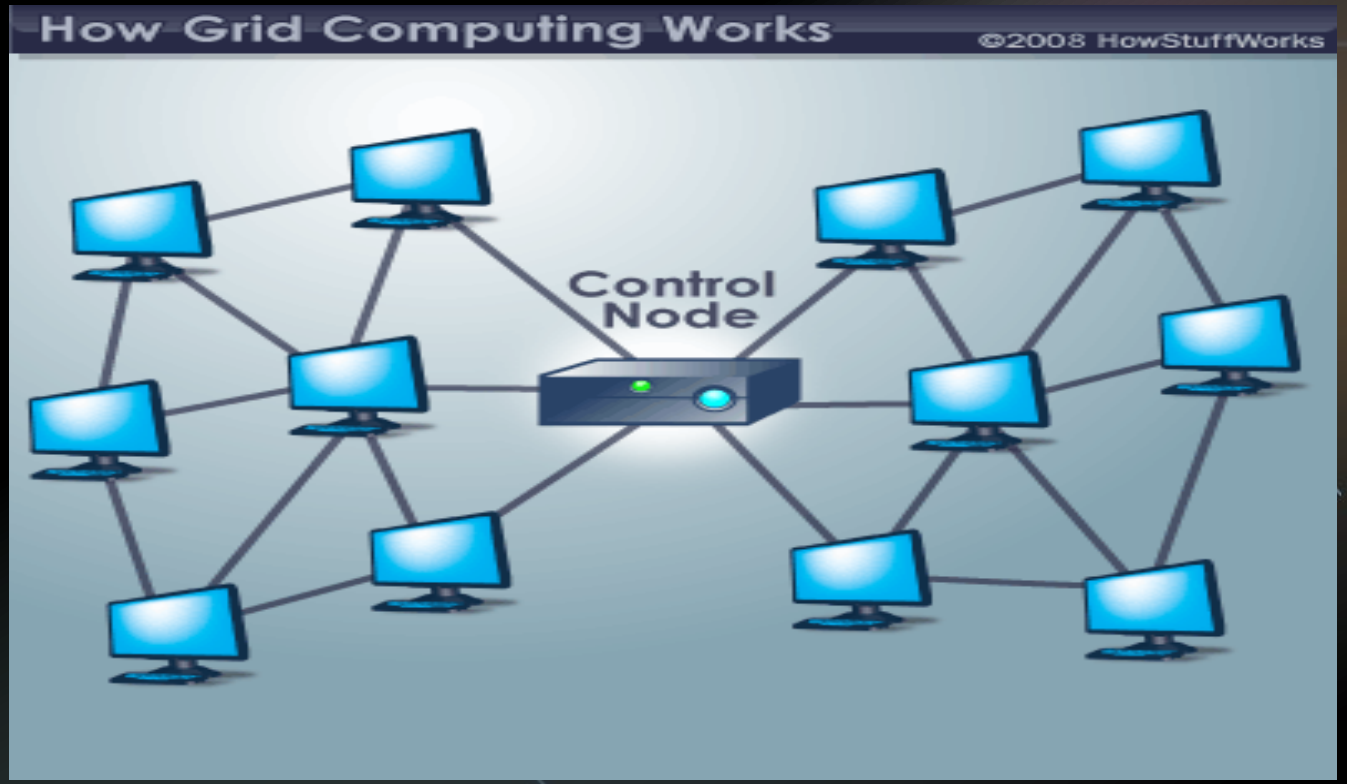
3. Platform-as-a-service (PaaS): It is considered as the most complex of the three layers of cloud-based computing. PaaS shares some similarities with SaaS, the primary difference being that instead of delivering software online, it is actually a platform for creating software that is delivered via the Internet.

PaaS can streamline workflows when multiple developers are working on the same development project. If other vendors must be included, PaaS can provide great speed and flexibility to the entire process. PaaS is particularly beneficial if you need to create customized applications. This cloud service also can greatly reduce costs and it can simplify some challenges that come up if you are rapidly developing or deploying an app.This model includes platforms like Force.com and Heroku, Google App Engine, Apache Stratos, OpenShift.

GRID COMPUTING

Grid computing is a group of computers physically connected (over a network or with Internet) to perform a dedicated tasks together, such as analyzing e-commerce data and solve a complex problem. Grids are a form of "super virtual computer" that solve a particular application.

It leviate multiple computers, often geographically distributed but connected by networks, to work together to accomplish joint tasks. It is typically run on a “data grid” a set of computers that directly interact with each other to coordinate jobs.


How Grid Computing Works
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Control Node

BLOCK CHAIN TECHNOLOGY

A simple analogy for understanding block chain technology is a Google Doc. When we create a document and share it with a group of people, the document is distributed instead of copied or transferred. This creates a decentralized distribution chain that gives everyone access to the document at the same time. No one is locked out awaiting changes from another party, while all modifications to the doc are being recorded in real-time, making changes completely transparent.

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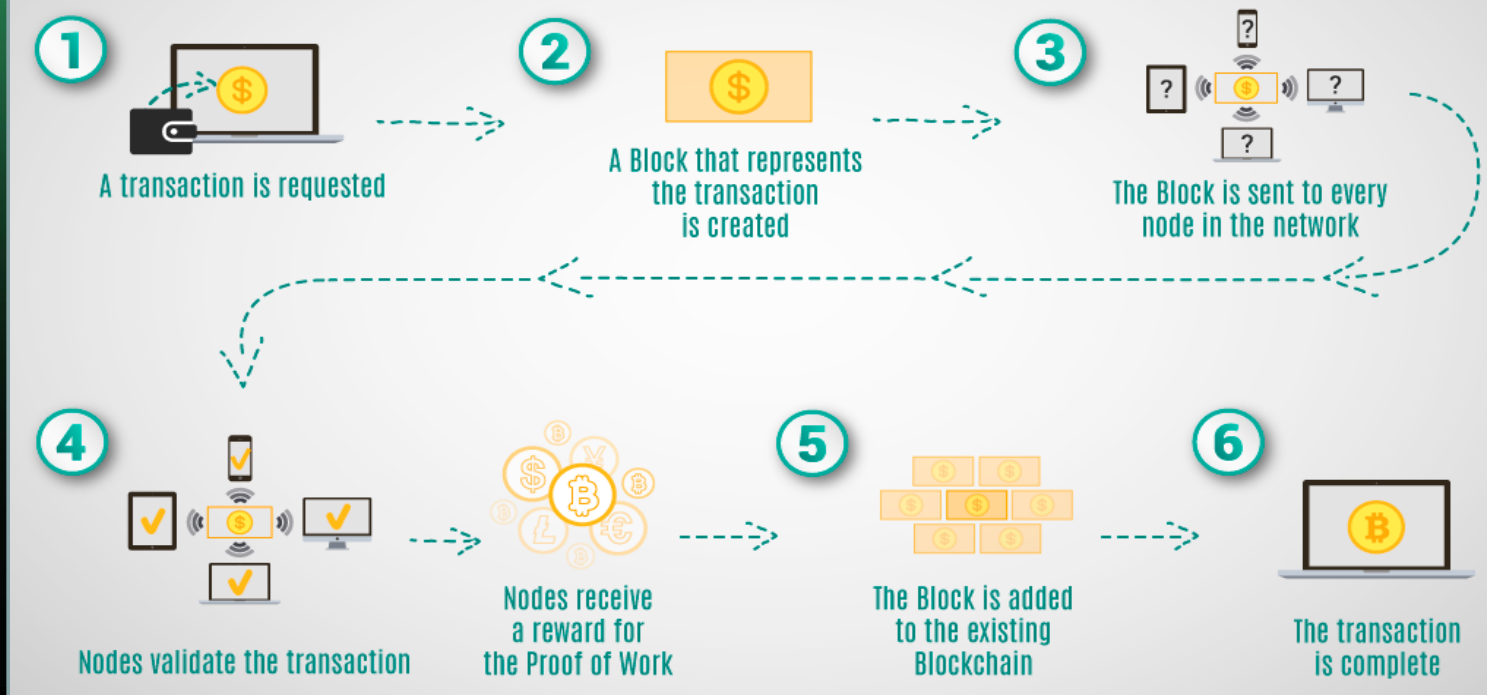
Block chain technology is most simply defined as a decentralized, distributed ledger that records the provenance(origination) of a digital asset. . Block chain is most simply defined as a decentralized, distributed ledger technology that records the provenance of a digital asset.

Copyright and ownership laws on music, videos, blogs, and other online content are a must in today’ s day and age. These laws can be made secure through block chain technology. Digital content downloads would be a good option as it ensures that the artist or the creator of the content also gets their fair share. Block chain would also provide real-time and authentic royalty distribution data to content creators and musicians.

HOW BLOCKCHAIN WORKS



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