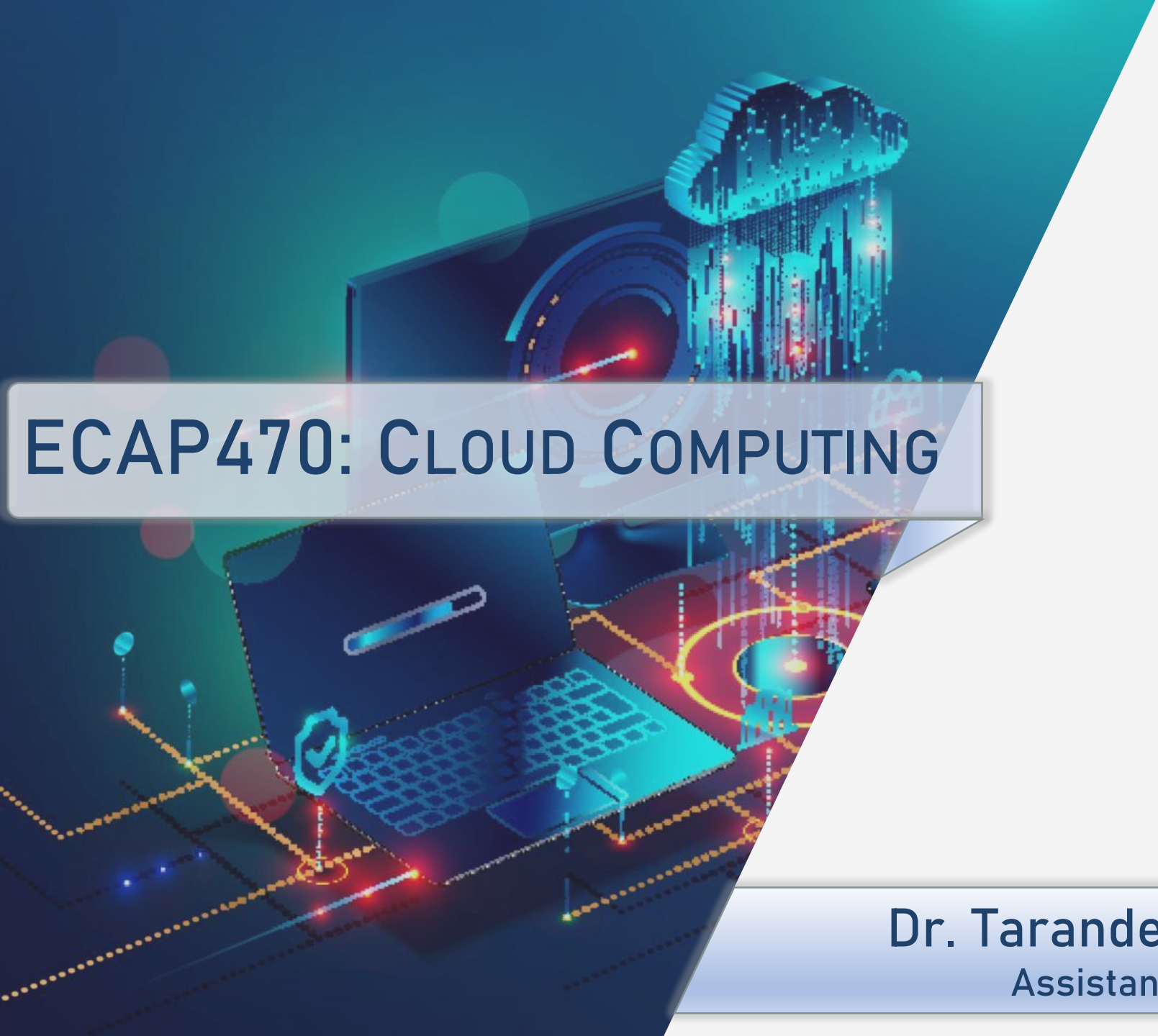


ECAP470: Cloud Computing

Dr. Tarandeep Kaur
Assistant Professor

Learning Outcomes

After this lecture, you will be able to,

- ✓ explore the concepts of edge computing, fog computing, and blockchain technologies.

Edge Computing

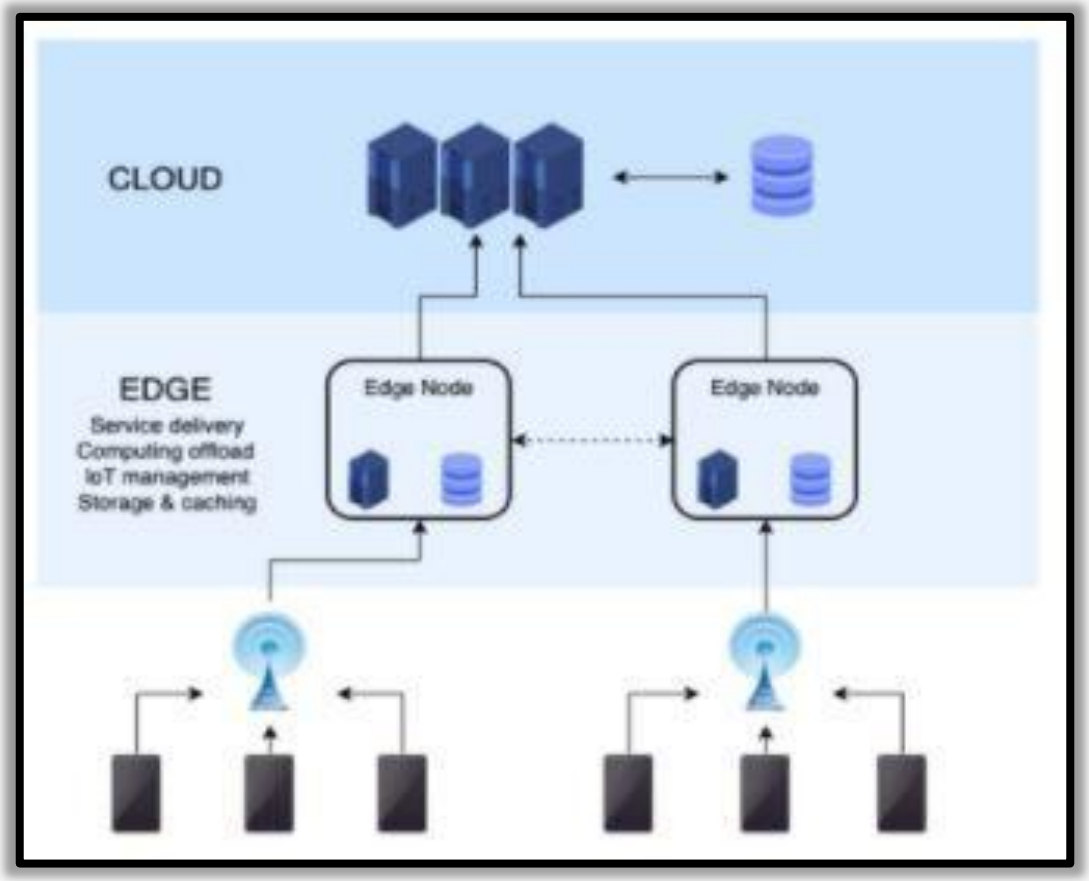
- Distributed computing framework that brings enterprise applications closer to data sources such as IoT devices or local edge servers.

Edge Computing

- Distributed computing framework that brings enterprise applications closer to data sources such as IoT devices or local edge servers.
- This proximity to data at its source can deliver strong business benefits, including faster insights, improved response times and better bandwidth availability.

Edge Computing

The “edge” is where the device communicates with the Internet



Edge Computing

“Edge” in Edge Computing-

- Edge can be the router, ISP, routing switches, integrated access devices (IADs), multiplexers, etc.

Edge Computing

Edge vs Traditional Computing Concept

Edge Computing brings the decentralization of networks.

Early computing	Applications run only on one isolated computer
Personal computing	Applications run locally either on the user's device on in a data center
Cloud computing	Applications run in data centers and processed via the cloud
Edge computing	Applications run close to the user; either on the user's device or on the network edge

Cloud Computing vs Edge Computing

Edge Computing	Cloud Computing
• Good to be used for those organizations that have a limited budget to invest in financial resources. So, mid-level organizations can use edge computing.	• Generally recommended for processing and managing a high volume of data that is complex and massive enough. Thus, such organizations that deal with huge data storage use cloud computing.
• Can use different programming languages on different platforms, each having different runtime.	• Works for one target platform using one programming language only.

Cloud Computing vs Edge Computing

Edge Computing	Cloud Computing
• Security in edge computing needs tight and robust plans such as advanced authentication methods, network security, etc.	• No high and advanced security methods needed.
• Processes time-sensitive data.	• Process that data that is not driven by time, i.e., not time-driven.
• Processes data at remote locations and uses the Decentralization approach.	• Processes and deals with data at centralized locations by using a centralized approach.

Why Edge Computing?

- Edge computing harnesses growing in-device computing capability to provide deep insights and predictive analysis in near-real time.

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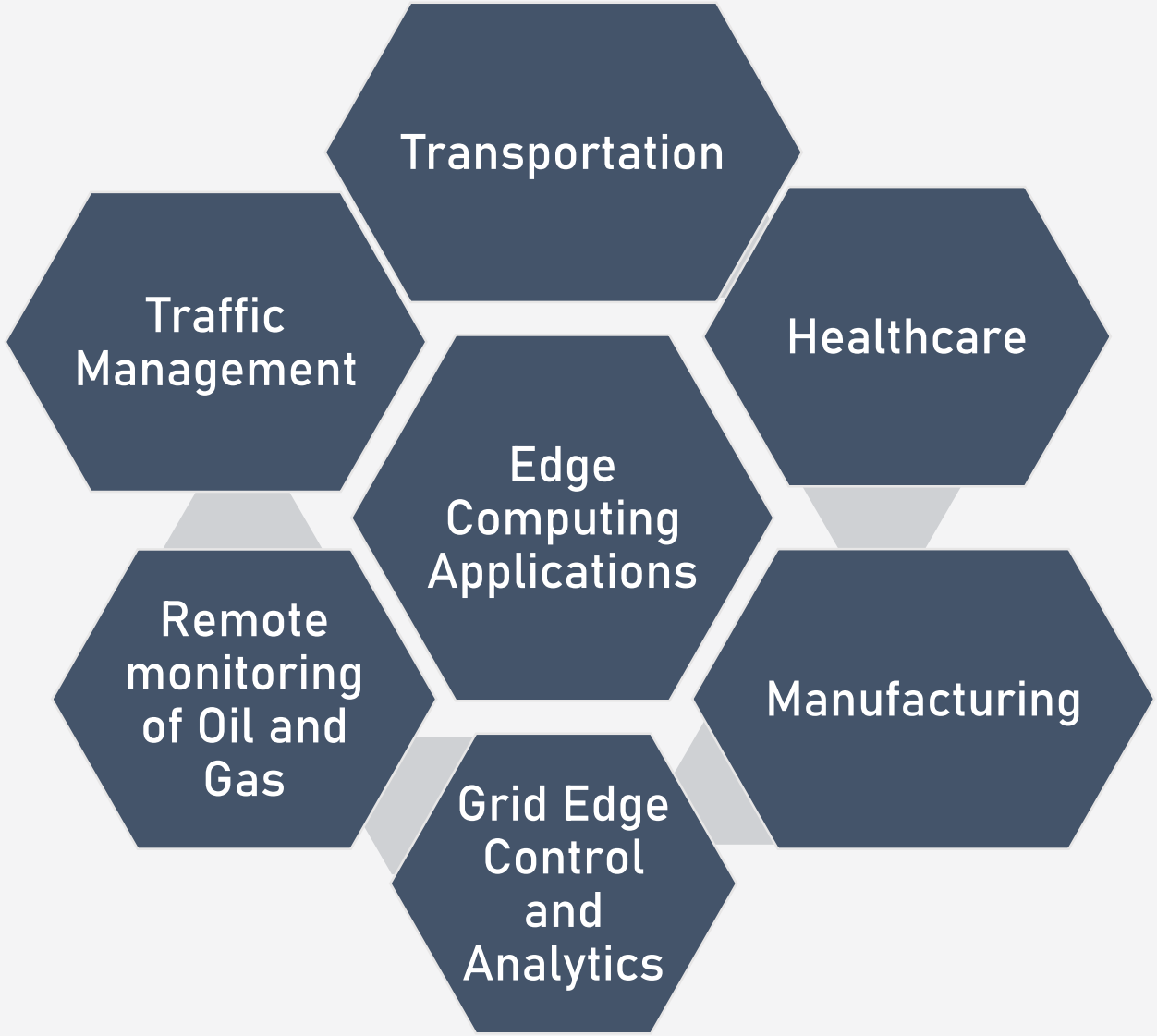
- Edge computing harnesses growing in-device computing capability to provide deep insights and predictive analysis in near-real time.
- Edge Computing is a new type of technology that not only saves time but also save the cost of servicing and other charges too.

Benefits of Edge Computing

- Edge computing has emerged as one of the most effective solutions to network problems associated with moving huge volumes of data generated in today's world. Some of the most important benefits of edge computing:
  - Eliminates Latency
  - Saves Bandwidth
  - Reduces Congestion

Applications of Edge Computing



Fog Computing

> a system-level horizontal architecture that distributes resources and services of computing, storage, control and networking anywhere along the cloud-to-things continuum. It supports industry verticals and application domains, enables services and applications to be distributed closer to the data-producing sources, and extends from the things, over the network edges, through the cloud and across multiple protocol layers.

– IEEE 1934

Fog Computing

- Fog Computing is the term coined by Cisco that refers to extending cloud computing to an edge of the enterprise's network.
- Also known as Edge Computing or Fogging.

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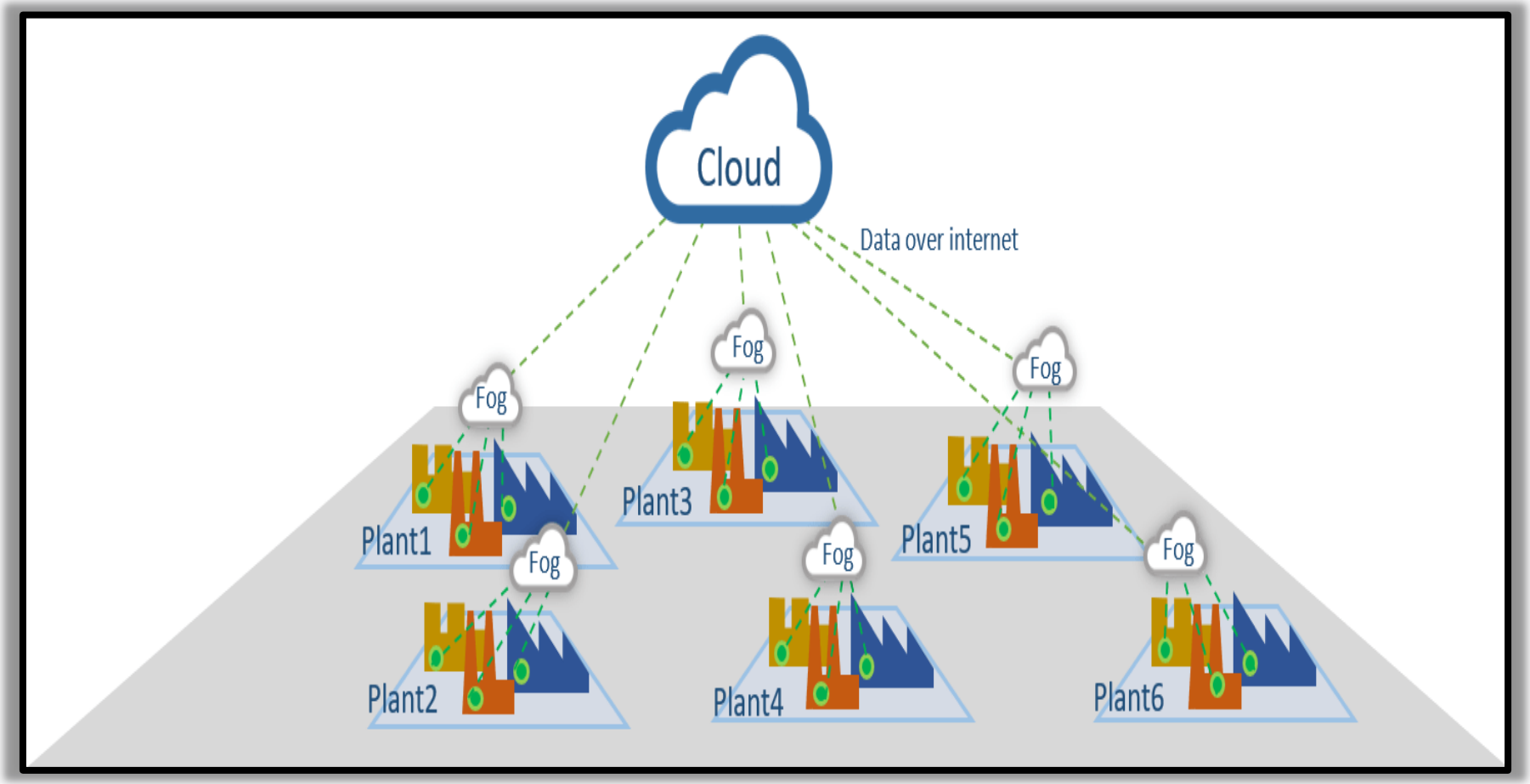
Architecture of Fog Computing



Benefits of Fog Computing

Fog computing helps in:

- Reduce network latency and data traffic
- Increase the effective network bandwidth
- Vertically isolate the network
- Scale up the deployment easily and efficiently
- Control privacy and data security

Blockchain

Technology that permits transactions to be gathered into blocks and recorded; allows the resulting ledger to be accessed by different servers.

Three complementary definitions of blockchain

Blockchain has technical, business & legal definitions.

Technically

Legally

Three complementary definitions of blockchain

Blockchain has technical, business & legal definitions.

Technically

Business-Wise

Legally

Three complementary definitions of blockchain

Blockchain has technical, business & legal definitions.

- Technically
- Business-Wise
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Blockchain

No banks!, no government!, no intermediaries of any kind!

Blockchain is a potentially revolutionary technology that promises to dramatically change the world.

Blockchain

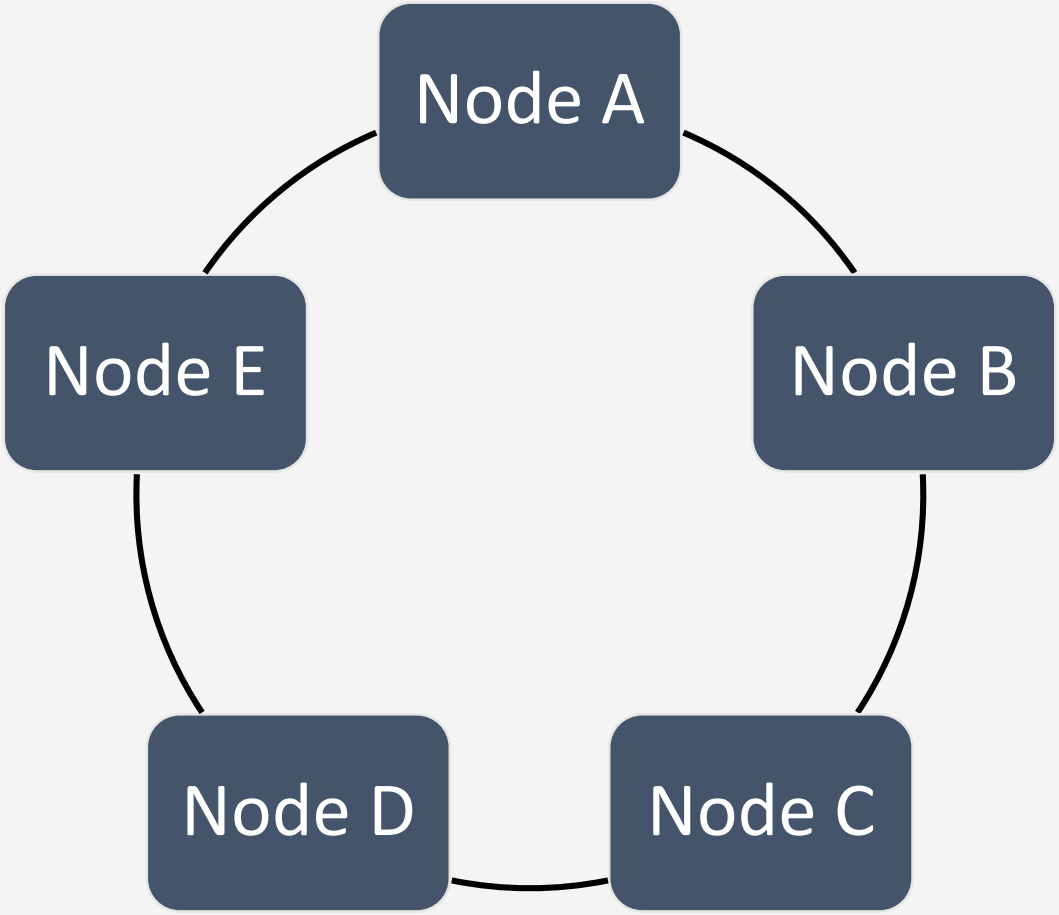
Blockchain is a meta technology because it affects other technologies, and it is made up of several technologies itself it is comprised of several pieces: a database, a software application, a number of computers connected to each other, clients to access it, a software environment to develop on it, tools to monitor it, and other pieces.

Blockchain

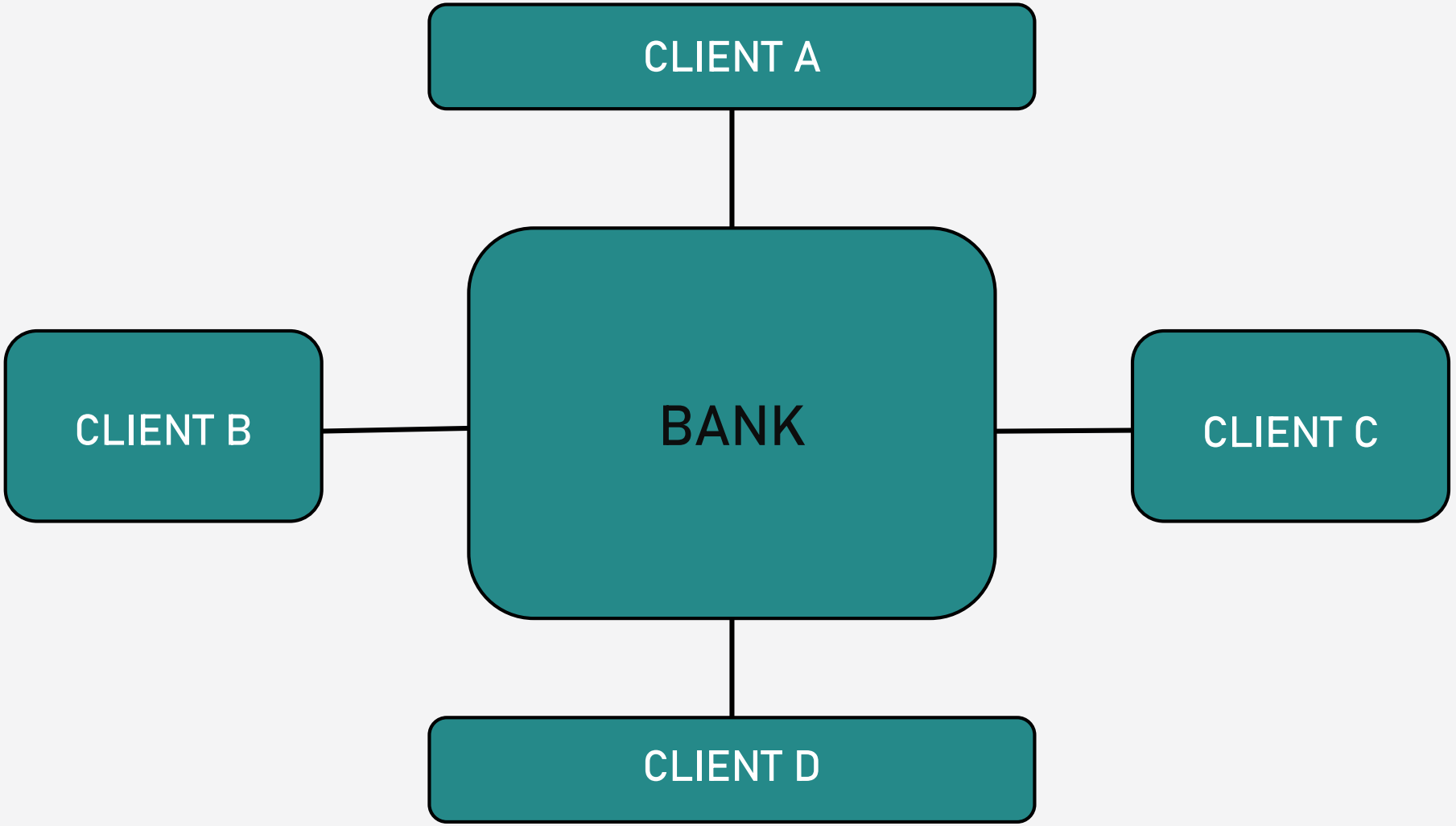
Blockchain is a Data Structure

Blockchain is a Decentralized Ledger

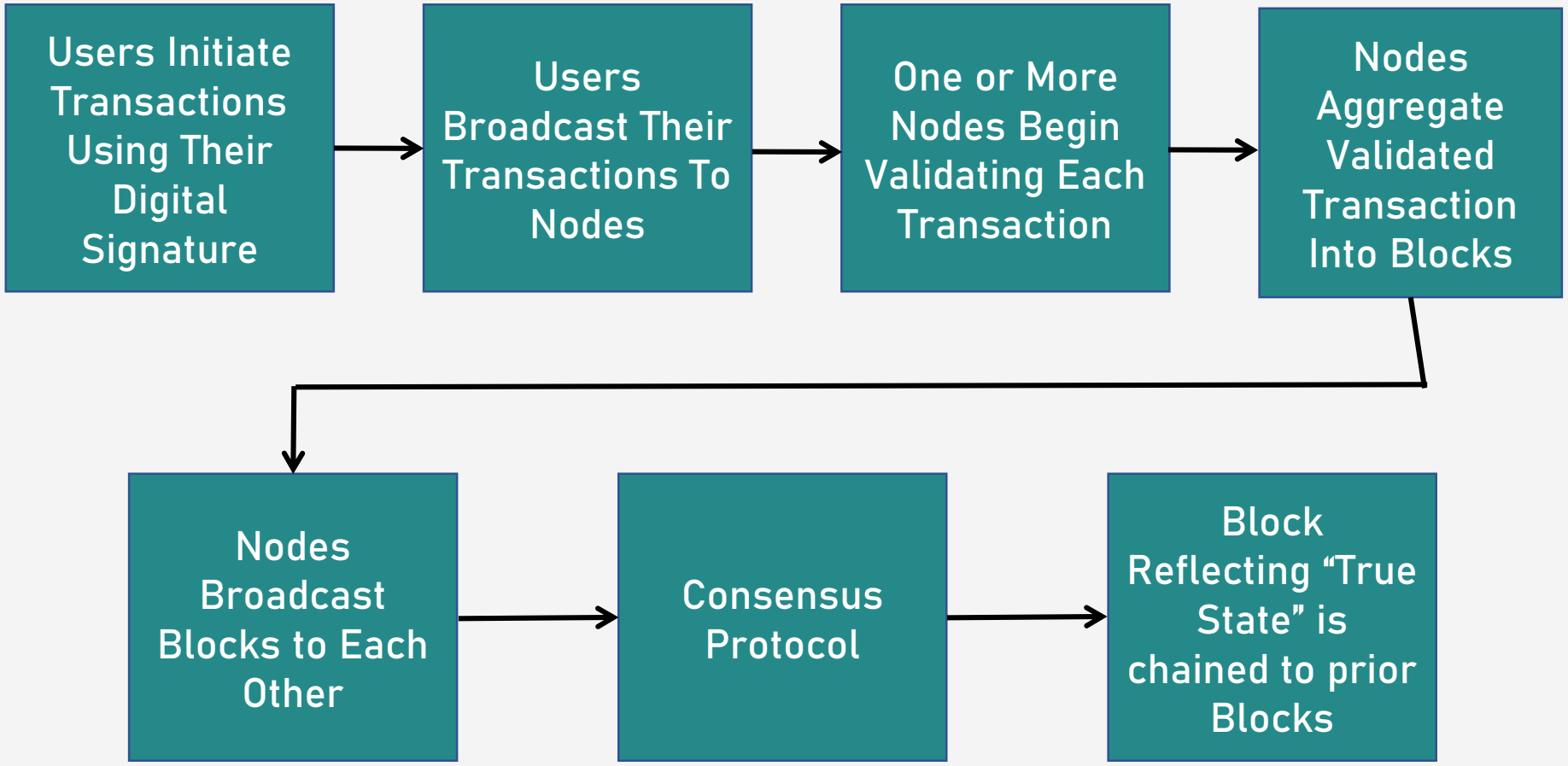
Distributed Ledger



Centralized Ledger



Working of Distributed Ledger



Blockchain- Features

Public blockchain has some characteristic features:

- Write-only, immutable, transparent data storage.
- Decentralized, no need for intermediaries.
- Consistent state across all participants.
- Resistant against malicious participants.
- Open to everyone.
- Similar to World Wide Web (WWW).

Private vs Public Blockchain

- Public blockchain is open and interoperable, like the internet, and a private blockchain is closed & limits the people who are granted access, like an intranet.

Advantages of Private Blockchain

Advantages of Public Blockchain

Blockchain Companies

Public Blockchain Companies

Private Blockchain Companies

Overall Advantages of Blockchain

- Transparency
- Reduced transaction costs
- Faster transaction settlements
- Decentralization
- User-controlled networks

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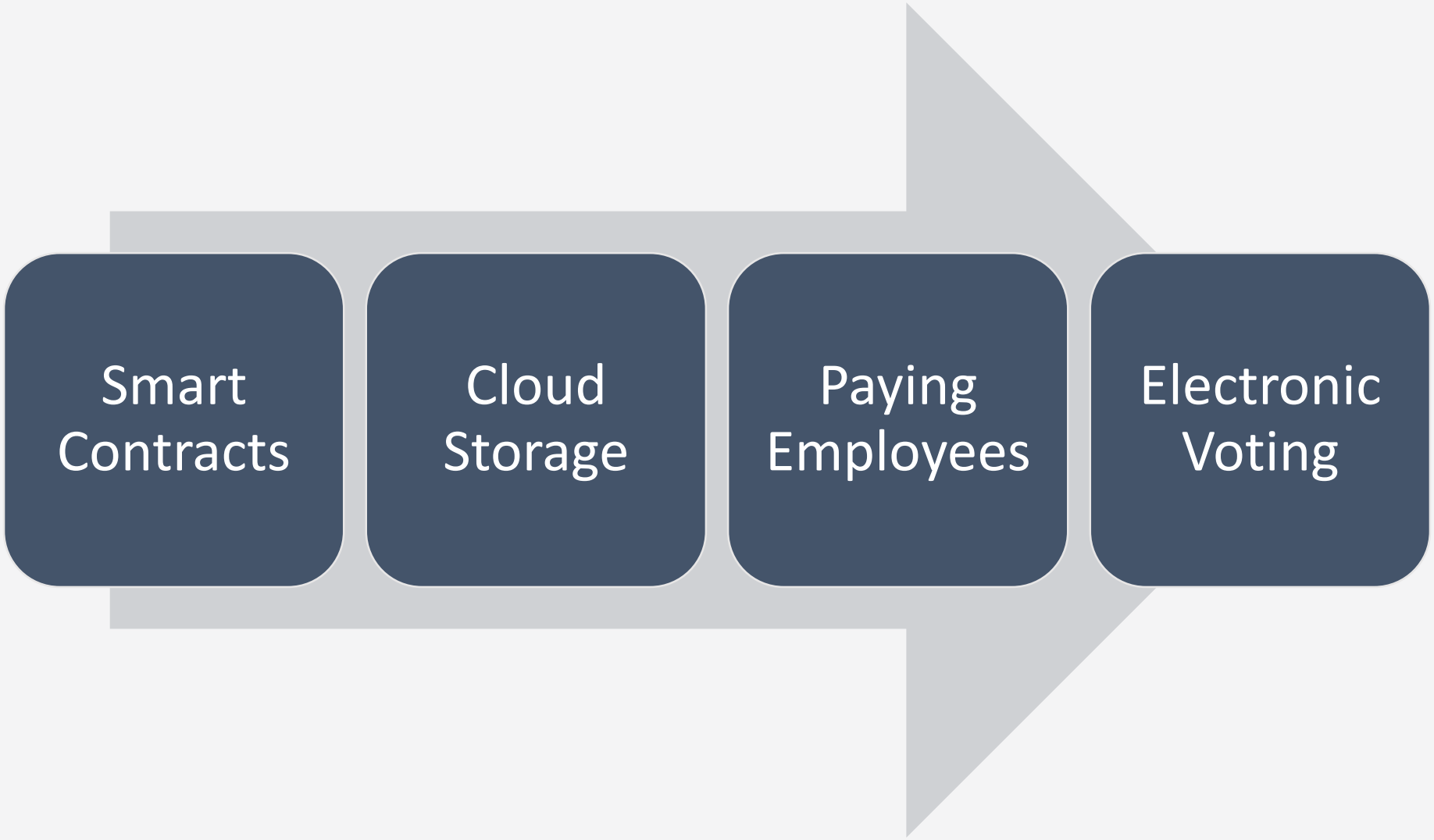
Applications of Blockchain



That's all for now...