Introduction to Cloud Computing

20CST62-IoT & Cloud - Unit 4

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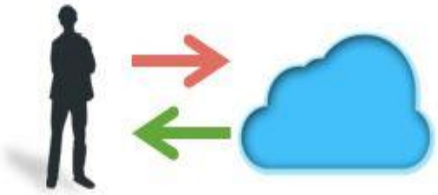
Learning Points

- What is Cloud Computing?
- Essential Characteristics of Cloud Computing
- Cloud Service Models
- Cloud Deployment Models
- Key Motivations for Cloud-Enabled Environments

Cloud Computing

- A new class of network based computing that takes place over the Internet
- Enables ubiquitous, convenient, on-demand network access to a shared pool of configurable computing resources
- Resources can be rapidly provisioned and released with minimal management effort
- A combination of thin client, grid computing and utility computing.
- Composed of five essential **characteristics,** three **service models**, and four **deployment models**.

Essential Characteristics



On-demand self-service

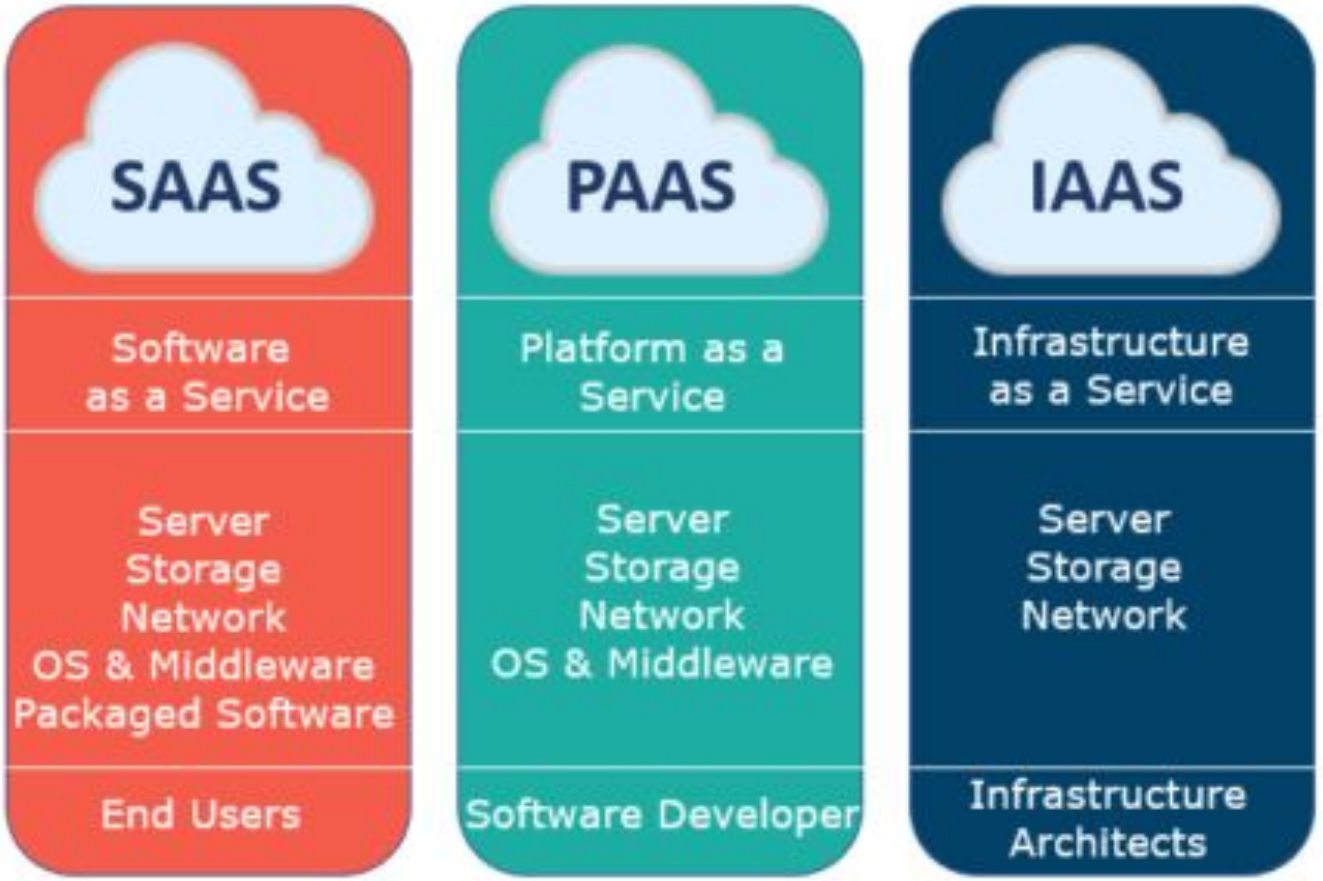
Broad network access

Resource pooling

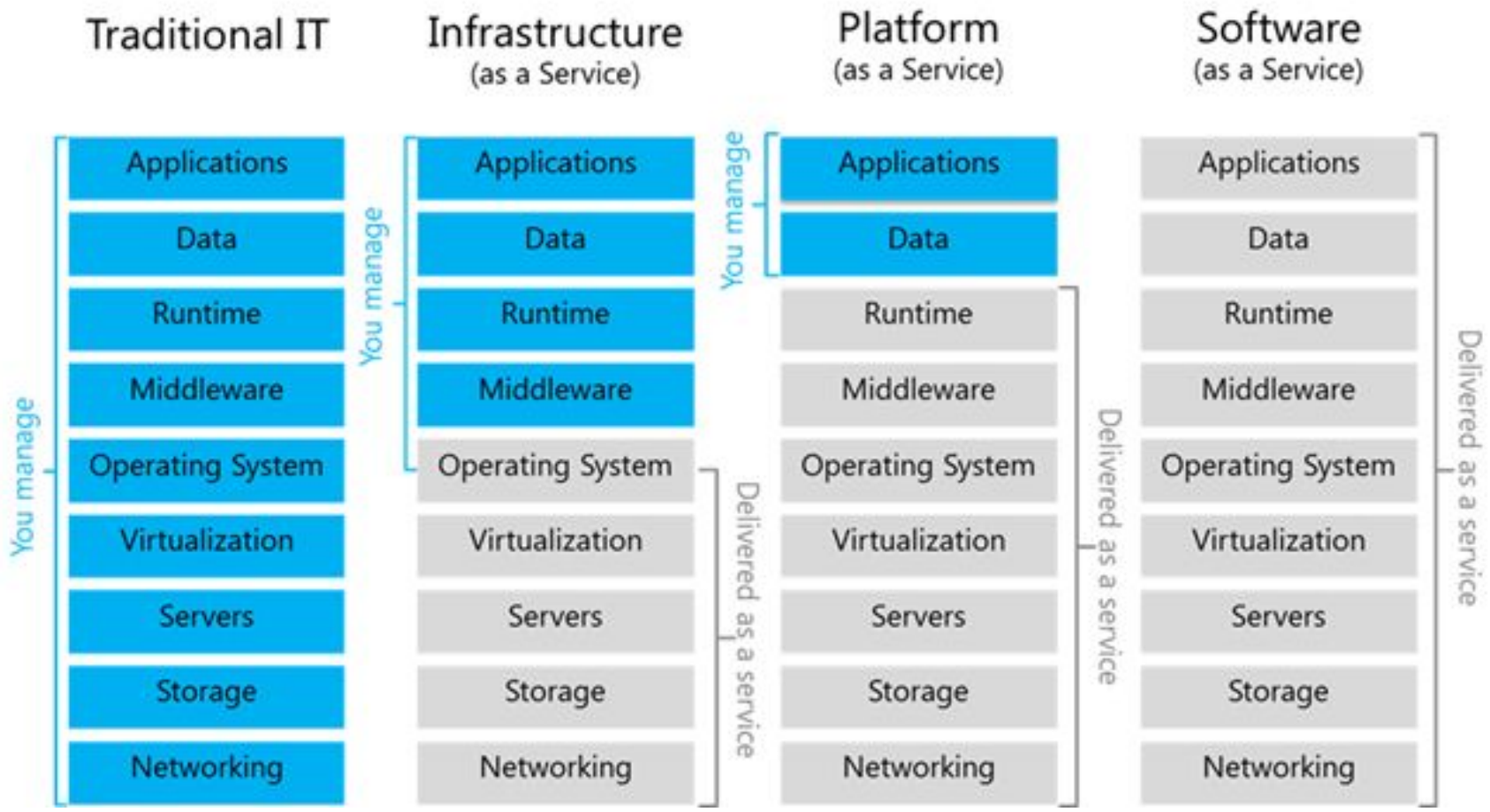
Rapid elasticity

Measured service

Cloud Service Models

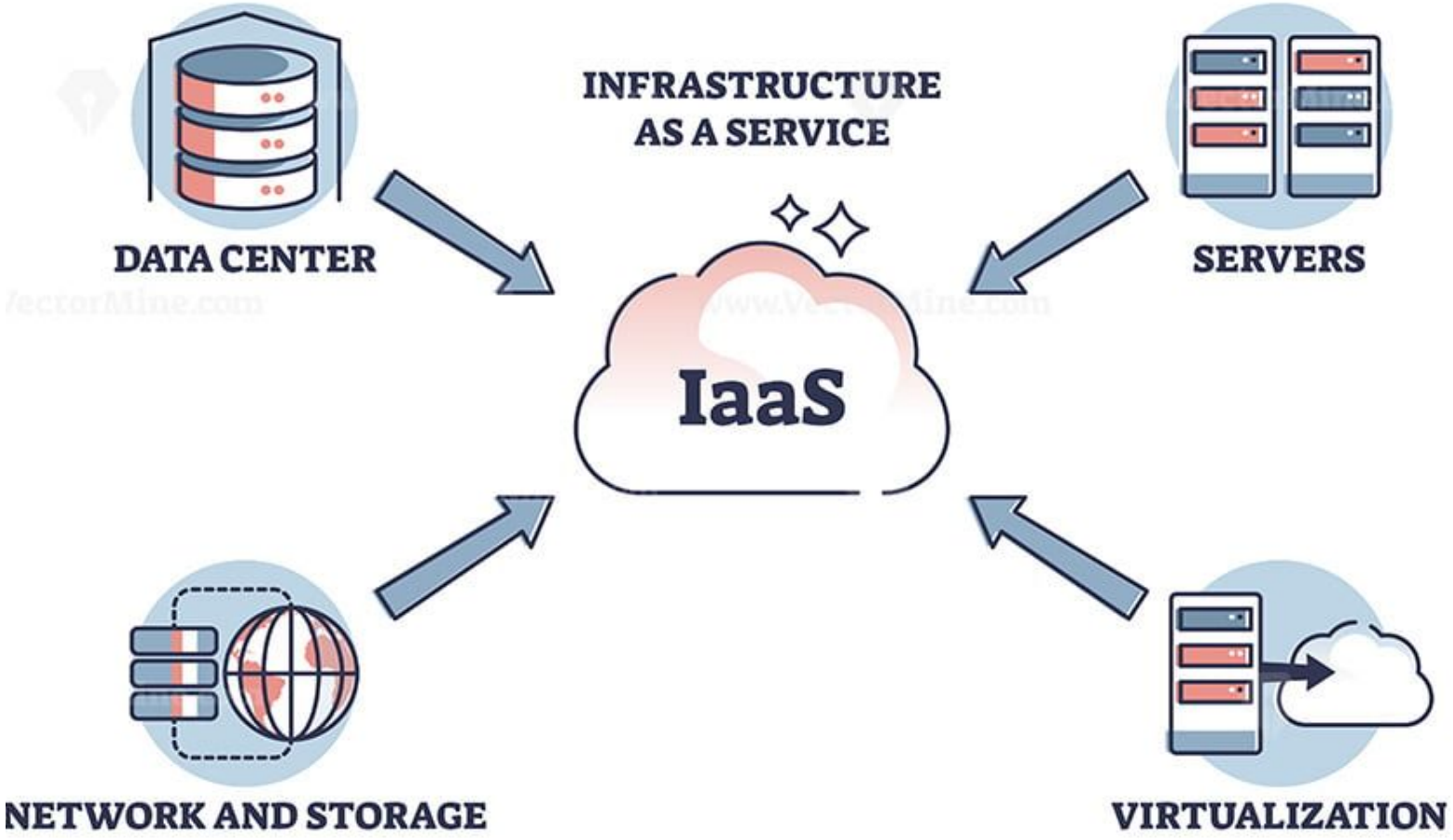


Cloud Service Models…



Cloud Service Models…

IaaS

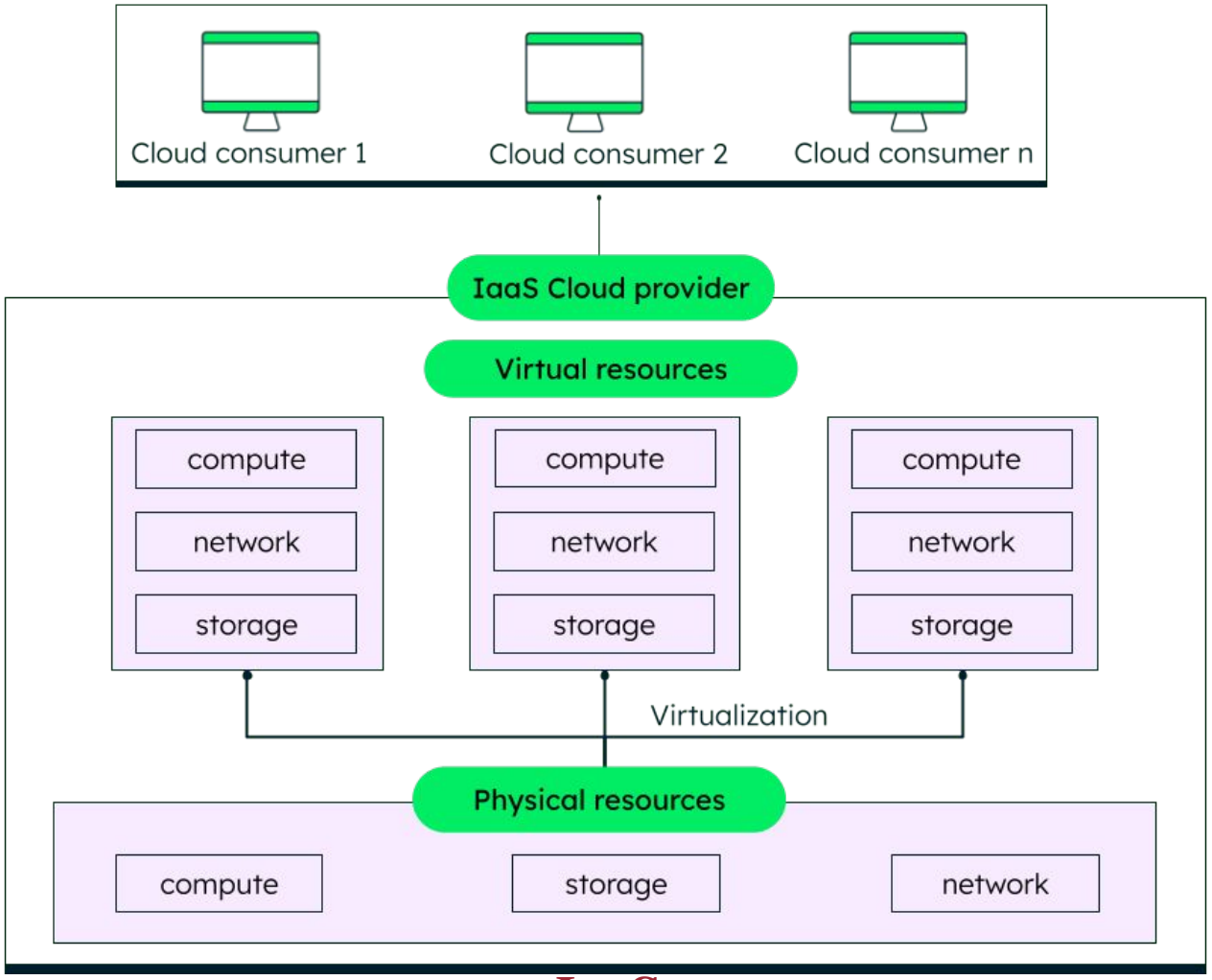


Cloud Service Models...

IaaS

- **Computing infrastructure** managed over the internet
- **Avoids the cost and overhead** involved in purchasing and managing the physical servers
- **Provides complete control over the hardware** that runs your application
- GUI and API-based access
- Ex: DigitalOcean, Linode, **Amazon Web Services (AWS)**, Microsoft Azure, Google Compute Engine (GCE), Rackspace, and Cisco Metacloud

Cloud Service Models...

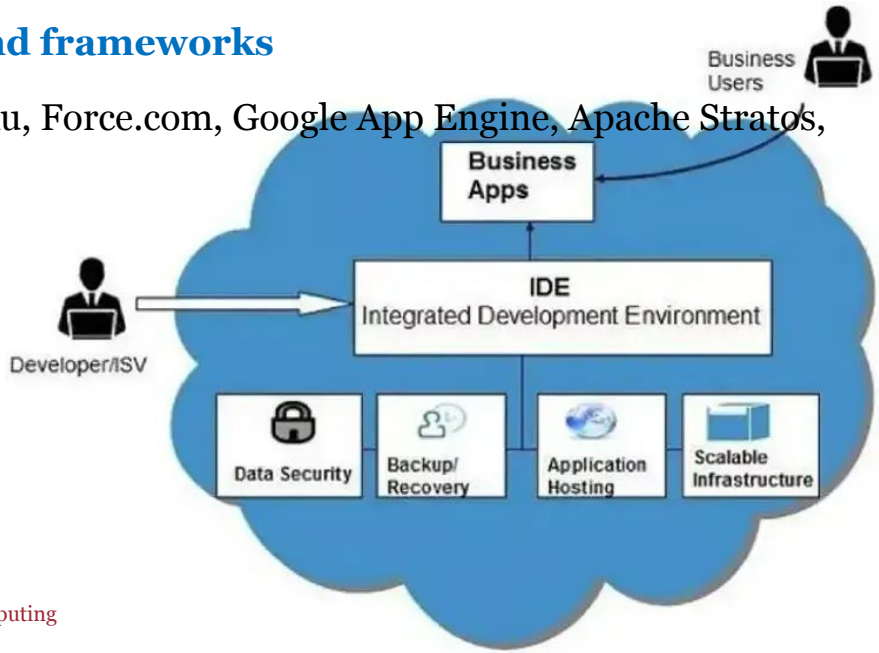


IaaS

Cloud Service Models…

PaaS

- **Application development platform** created for the programmer to develop, test, run, and manage the applications.
- The providers manage the servers, storage, and networking, while the developers manage only the application part
- Computing **resources can easily be scaled up (Auto-scale) or down**
- Support **multiple programming languages and frameworks**
- **AWS Elastic Beanstalk**, Windows Azure, Heroku, Force.com, Google App Engine, Apache Stratos, Magento Commerce Cloud, and OpenShift.

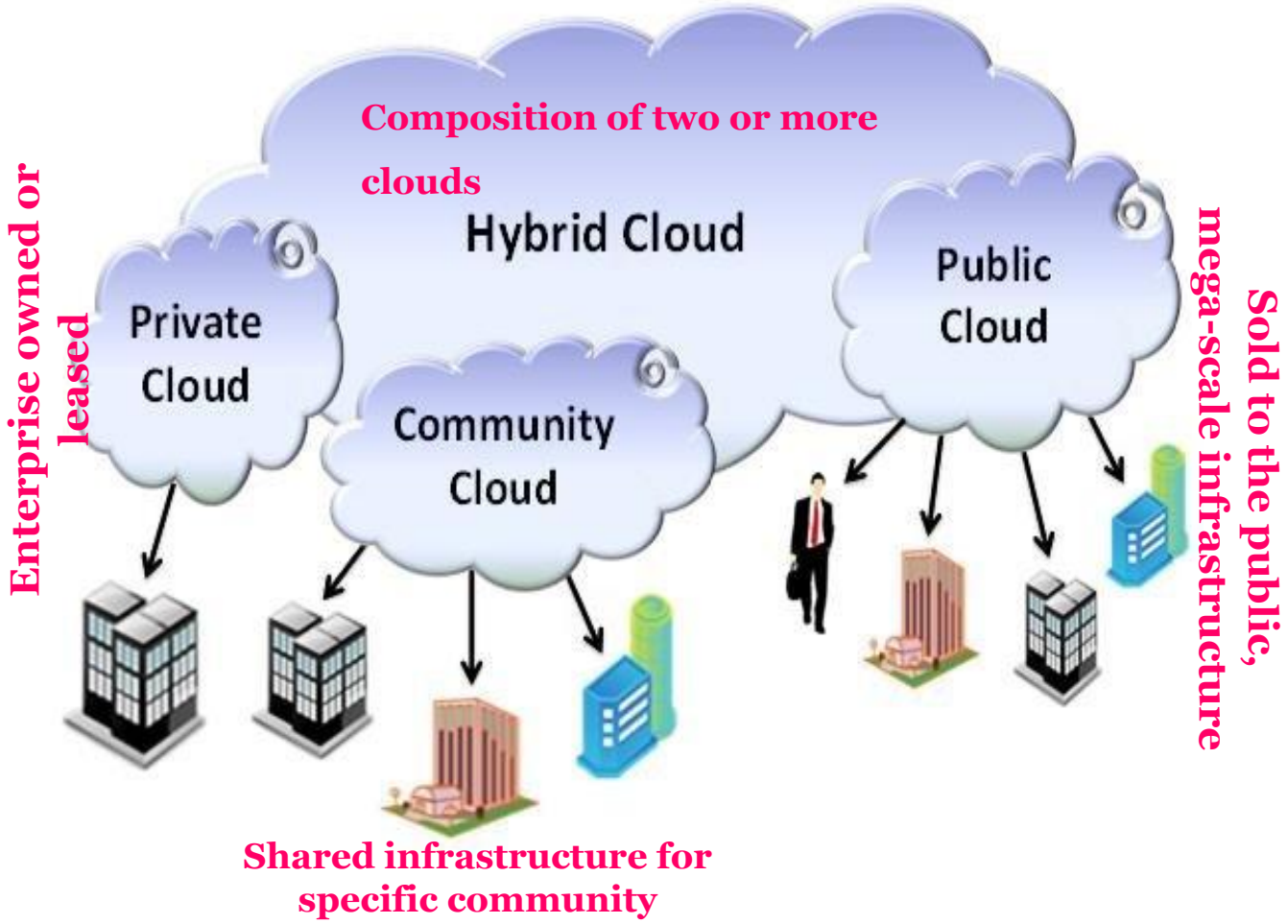


Cloud Service Models…

SaaS

- **Web-based deployment model** that makes the software accessible through a web browser
- **Accessible from any device** with an internet connection
- **Users are not responsible for hardware and software updates**
- Ex: BigCommerce, **Google Apps**, Salesforce, Dropbox, ZenDesk, Cisco WebEx, ZenDesk, Slack, and GoToMeeting

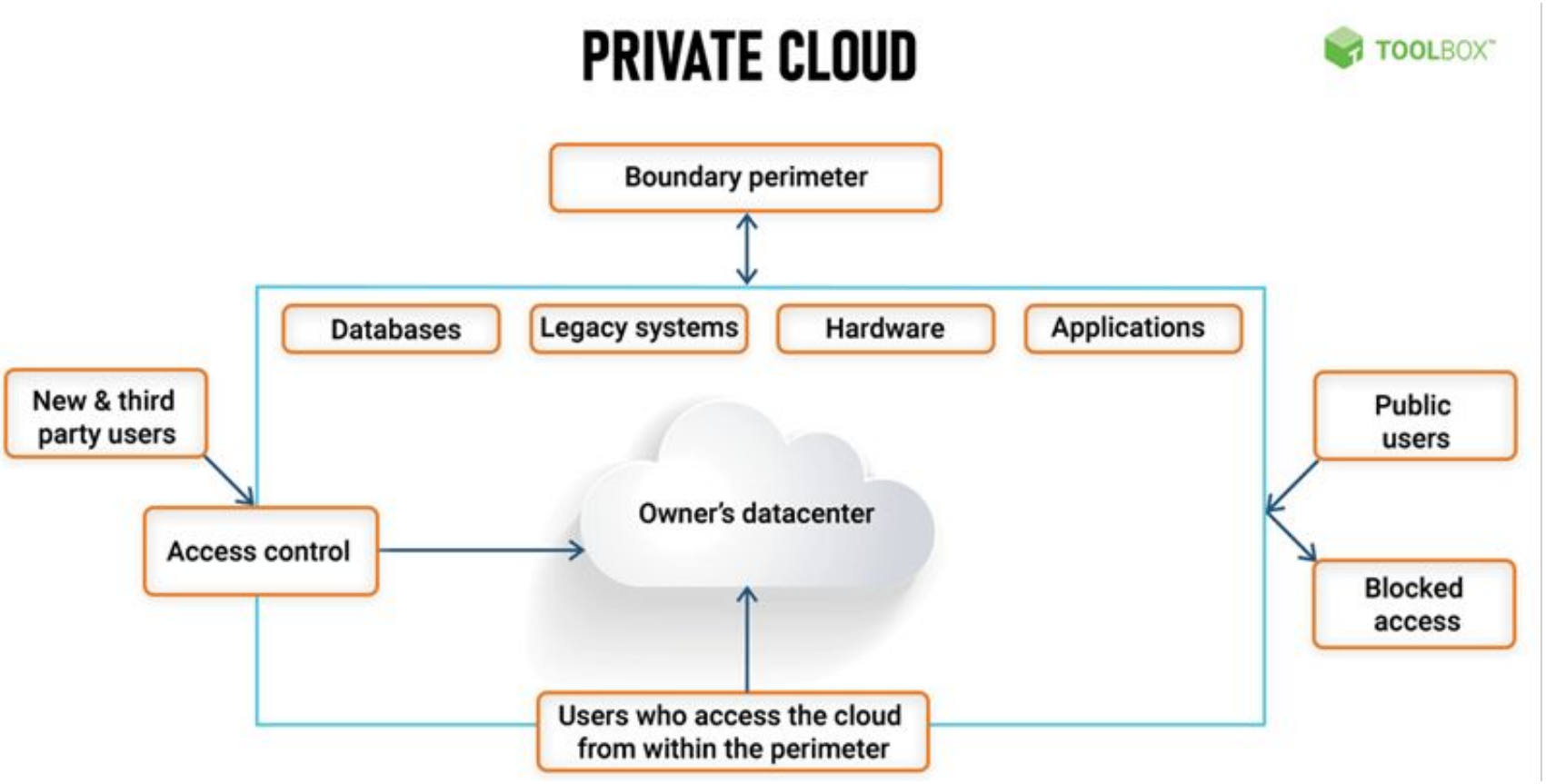
Cloud Deployment Models



Cloud Deployment Models…

Public Cloud: Examples

Cloud Deployment Models…



Key Motivations for Cloud-Enabled Environments

- **Enhance the utilization** of all kinds of underutilized as well as unutilized IT infrastructures
  - Through **resource pooling and sharing**
- **Need for programmability** of IT infrastructures
  - resources need to be **aware of their workloads and their expected service qualities**
  - resource discoverability and accessibility, maneuverability, consumability, and so on need to be **easily accomplished through softwares**
  - achieved through **software-defined environments (SDEs)** such as software-defined storage (SDS), SDN, software-defined computing (SDC), etc

Cloud-Inspired Enterprise Transformations

- Emergence of Cloud Environments
- Energy Optimization

Cloud-Inspired Enterprise Transformations

Emergence of Cloud Environments

- To focus mainly on the following tasks:
  1. Infrastructure optimization
  2. Process excellence
  3. Architectural assimilation
  4. Technology adoption
  5. Insights-driven decision-making and execution through data analytics

Cloud-Inspired Enterprise Transformations

Emergence of Cloud Environments…

1. Infrastructure optimization
   - Through infrastructure rationalization, consolidation, and optimization procedures
   - Lean infrastructure significantly reduces the tightly aligned infrastructural complexity and cost
   - Incorporate self-diagnosing, self-healing, self-configuring, self-defending, and self-managing capabilities through autonomic computing

consolidation is **a reduction in the number of physical servers**
rationalization is the **reduction of the variety of different server types**

Cloud-Inspired Enterprise Transformations

Emergence of Cloud Environments...

2. Process excellence
   - Done for enterprise automation, acceleration, and augmentation.
   - Make use of process reengineering, integration, orchestration, management, and governance techniques

Cloud-Inspired Enterprise Transformations

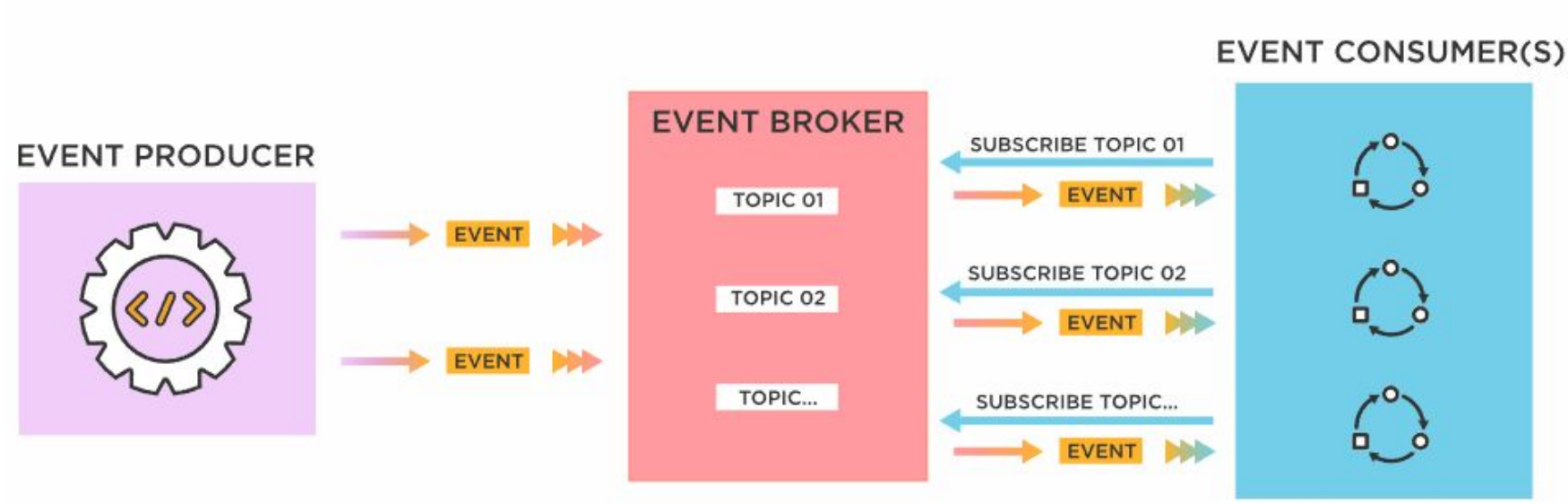
Emergence of Cloud Environments

3. Architectural assimilation
   - Enterprise-scale and business-critical SOA
   - Event-driven architecture (EDA)
   - Model-driven architecture (MDA)
   - Web oriented architecture (WOA)
   - Resource-oriented architecture (ROA)

Cloud-Inspired Enterprise Transformations

Emergence of Cloud Environments

3. Architectural assimilation - **Event-driven architecture (EDA)**



Cloud-Inspired Enterprise Transformations

Emergence of Cloud Environments

3. Architectural assimilation - **Event-driven architecture (EDA)**

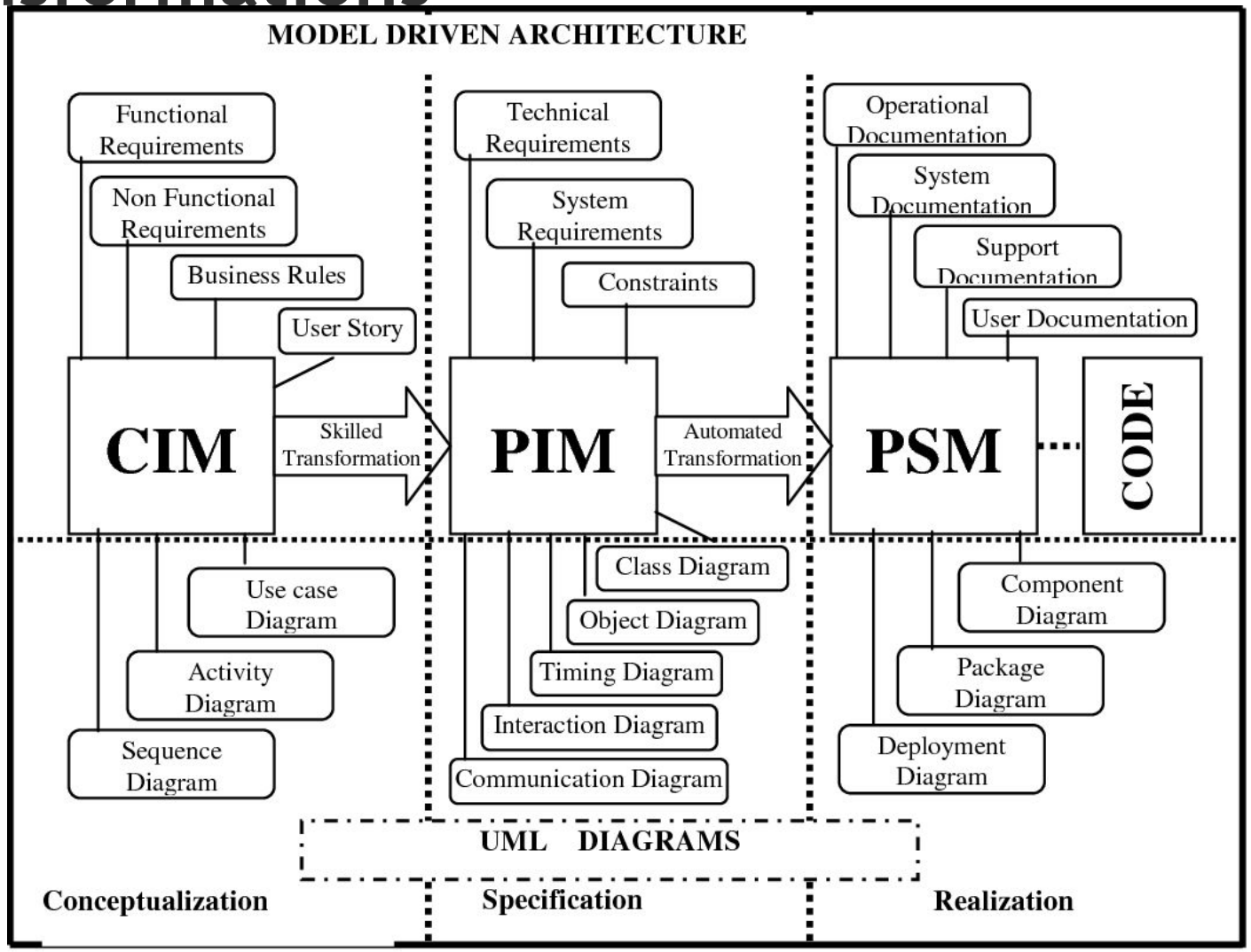
Events	Response
Request to reset a password	An email to reset the password is sent to the customer
A package arrived was delivered to its destination	The sales ticket is closed
A grocery warehouse updates its inventory	An order for more lettuce (product) is placed
An unauthorized access attempt was denied	An account is locked and security personnel are notified

Cloud-Inspired Enterprise Transformations

Emergence of Cloud Environments

3. Architectural assimilation – **Model-driven architecture (MDA)**
   - approach to software design, development and implementation
   - uses models as a set of guidelines used in structuring design specifications
   - **separates business and application logic from underlying platform technology**
   - Three Models:
     - CIM (Computation-Independent Model): models the system's interaction with its environment
     - PIM (Platform-Independent Model): describes the internal structure of the model independent of the hosting platform
     - PSM (Platform-Specific Model): implementation model

Cloud-Inspired Enterprise Transformations



Cloud-Inspired Enterprise Transformations

Emergence of Cloud Environments

3. Architectural assimilation - **Web oriented architecture (WOA)**
   - develops applications for the internet and is a "substyle" of service-oriented architecture (SOA).
   - WOA develops applications in the following ways:
     - identifies resources
     - manipulates resources through representations. (WOA can use HTTP to retrieve communication data.)
     - use Multipurpose Internet Messaging Extensions, or MIME, to make messages "self-descriptive" so the client can find data.
     - use hyperlinks to separate a client from a URI structure.
     - keeps applications neutral

Cloud-Inspired Enterprise Transformations

Emergence of Cloud Environments

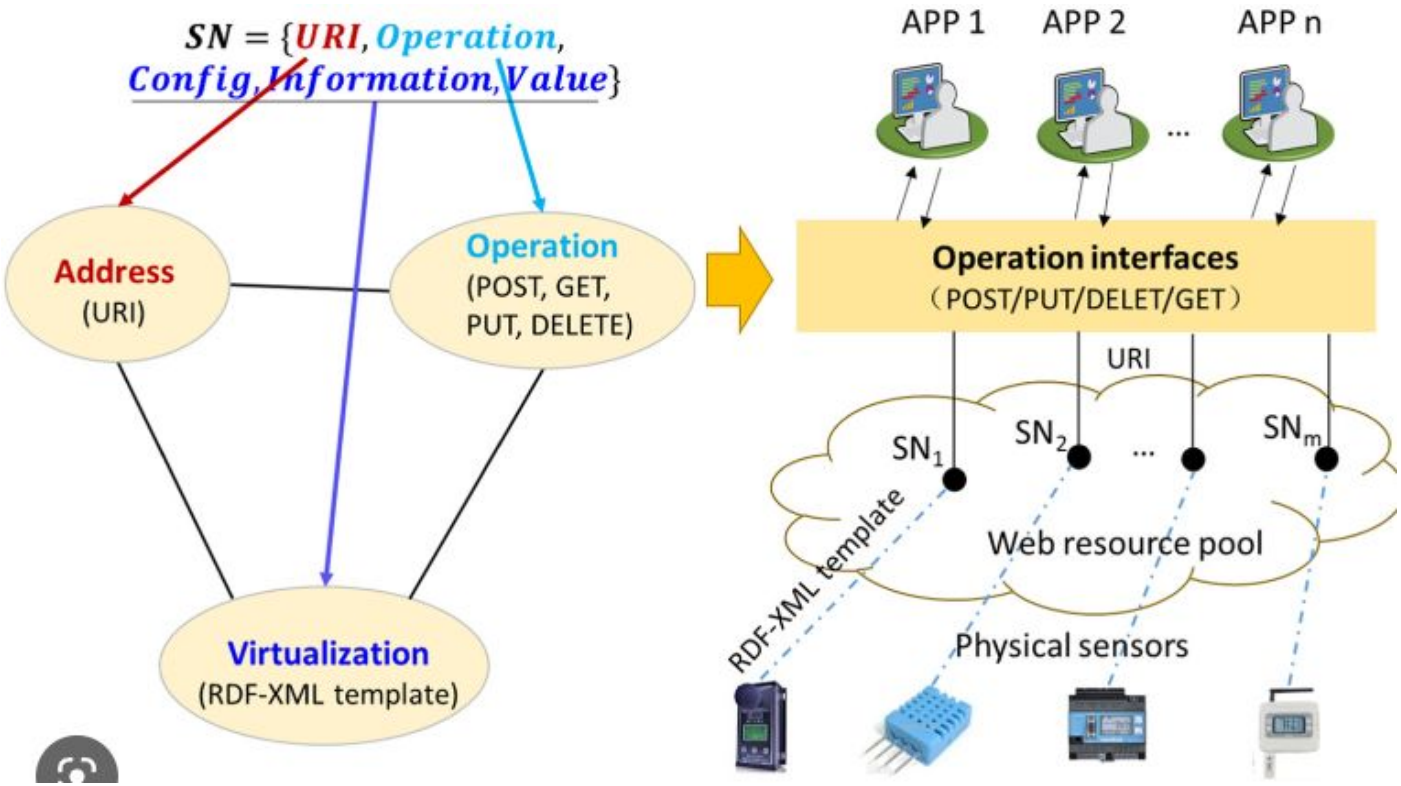
3. Architectural assimilation - **Resource-oriented architecture (ROA)**

- architecture that extends the REST architectural style
- transport-independent architecture
- built on the concept of a resource.
- A resource is a self-contained, identifiable entity having a state that can be assigned a uniform resource locator (URI)

Cloud-Inspired Enterprise Transformations

Emergence of Cloud Environments

3. Architectural assimilation - **Resource-oriented architecture (ROA)**



Cloud-Inspired Enterprise Transformations

Emergence of Cloud Environments

4. Technology adoption
   - disruptive, transformative, and inventive technologies are emerging and evolving fast
   - Need to verify and validate these technologies to be fit for the purpose
   - Technologies used:
     - Miniaturization, connectivity, service orientation, virtualization, mobility, cloud, analytics, and visualization

Cloud-Inspired Enterprise Transformations

Emergence of Cloud Environments

5. Insights-driven decision-making and execution through data analytics
   - Data capture, storage, processing, mining, and analysis for getting out actionable insights

Energy Optimization

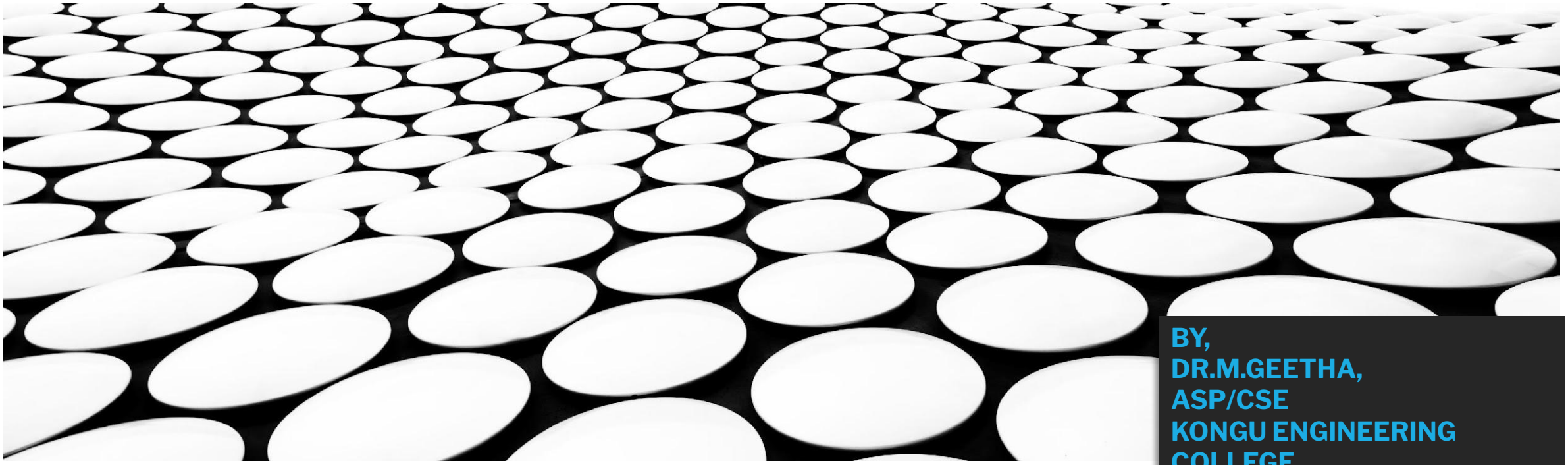
- **Energy security and environmental sustainability** are the top two global concerns
- Microsoft engaged with Accenture and WSP Environment and Energy to compare the energy use and carbon footprint of Microsoft cloud offerings with Microsoft on-premise deployment
- Analysis focused on three of the Microsoft's mainstream business applications (Microsoft Exchange, Microsoft SharePoint, and Microsoft Dynamics CRM)
  - considered three different deployment sizes—small (100 users), medium (1,000 users), and large (10,000 users).
  - for large deployments, Microsoft's cloud solutions can reduce energy use and carbon emissions by more than 30%
  - for small deployments: energy use and emissions can be reduced by more than 90%

References

- Pethuru Raj and Anupama C. Raman, “The Internet of Things: Enabling Technologies, Platforms, and Use Cases”, CRC Press, 2017
- https://www.educba.com/public-cloud-providers/
- https://www.guru99.com/private-cloud.html
- https://www.omg.org/mda/
- http://www.cs.sjsu.edu/~pearce/modules/lectures/se/mda.htm
- https://www.techopedia.com/definition/28057/model-driven-architecture-mda
- https://www.gartner.com/en/information-technology/glossary/web-oriented-architecture-woa

IOT & CLOUD-INSPIRED SMARTER ENVIRONMENTS

20CST62 – IOT & CLOUD: UNIT 4



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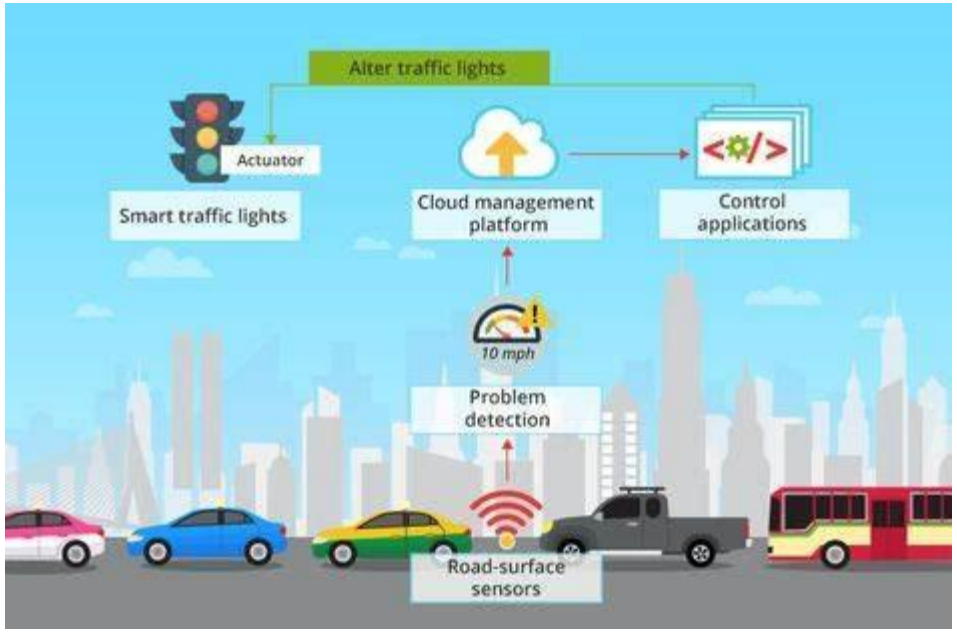
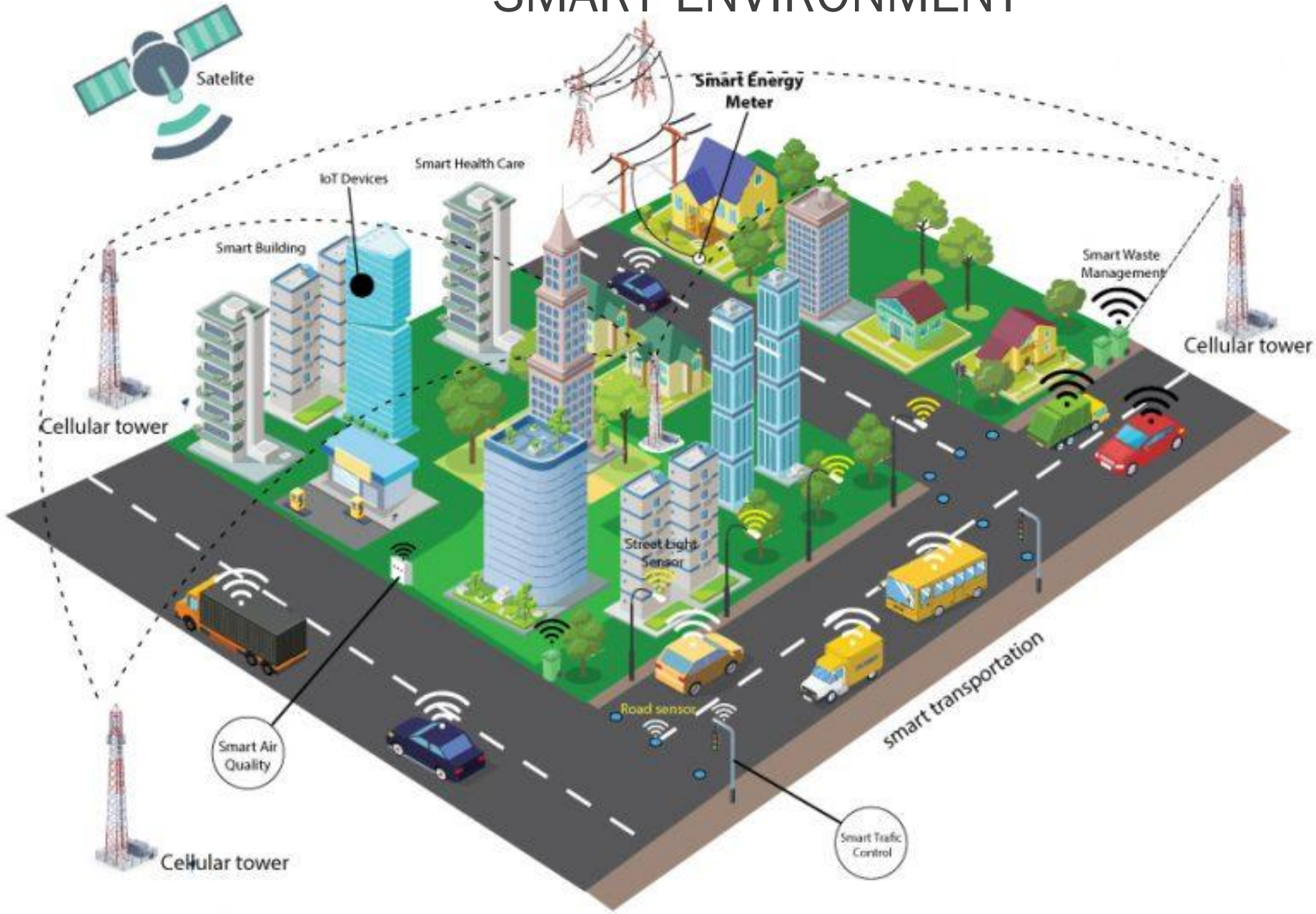
SMART ENVIRONMENT

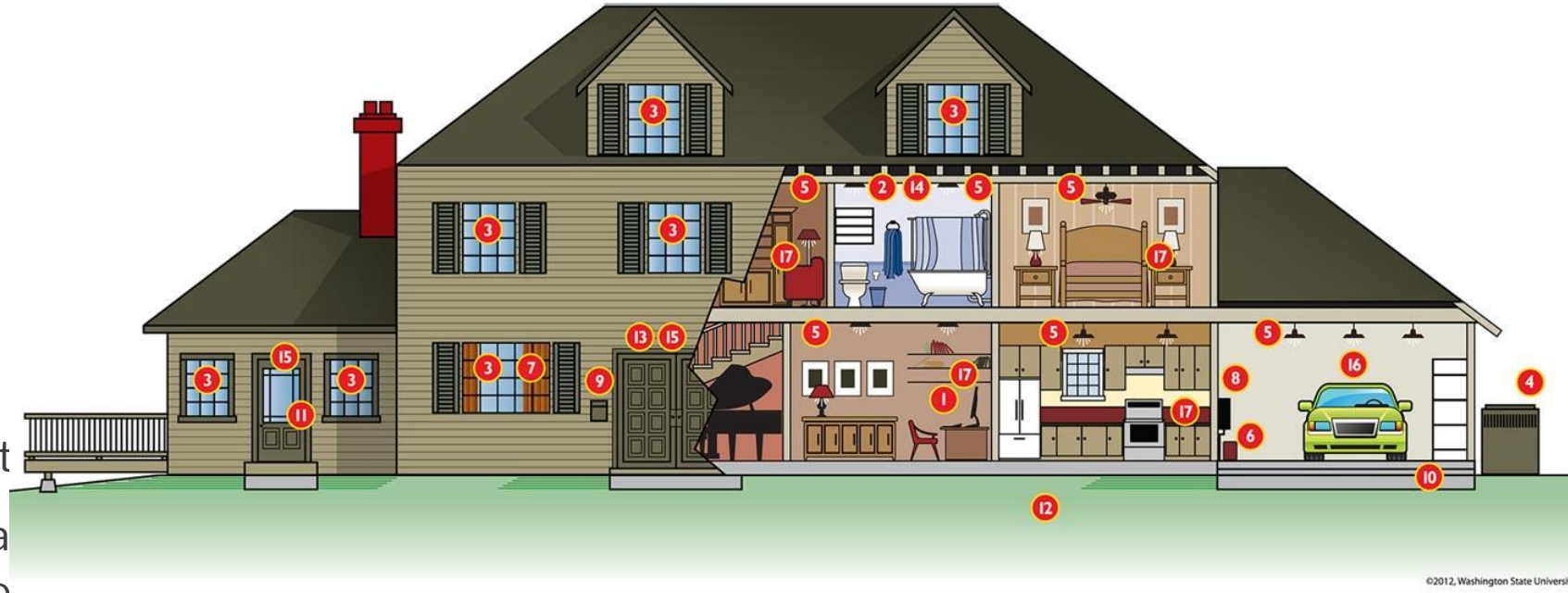


SMART ENVIRONMENT



SMART HOME

- effective approach is to connect
- reduces the complexity of mana devices and simplifies the intero
  - bridging the services throughout th the different device protocols to a c devices through the network cloud

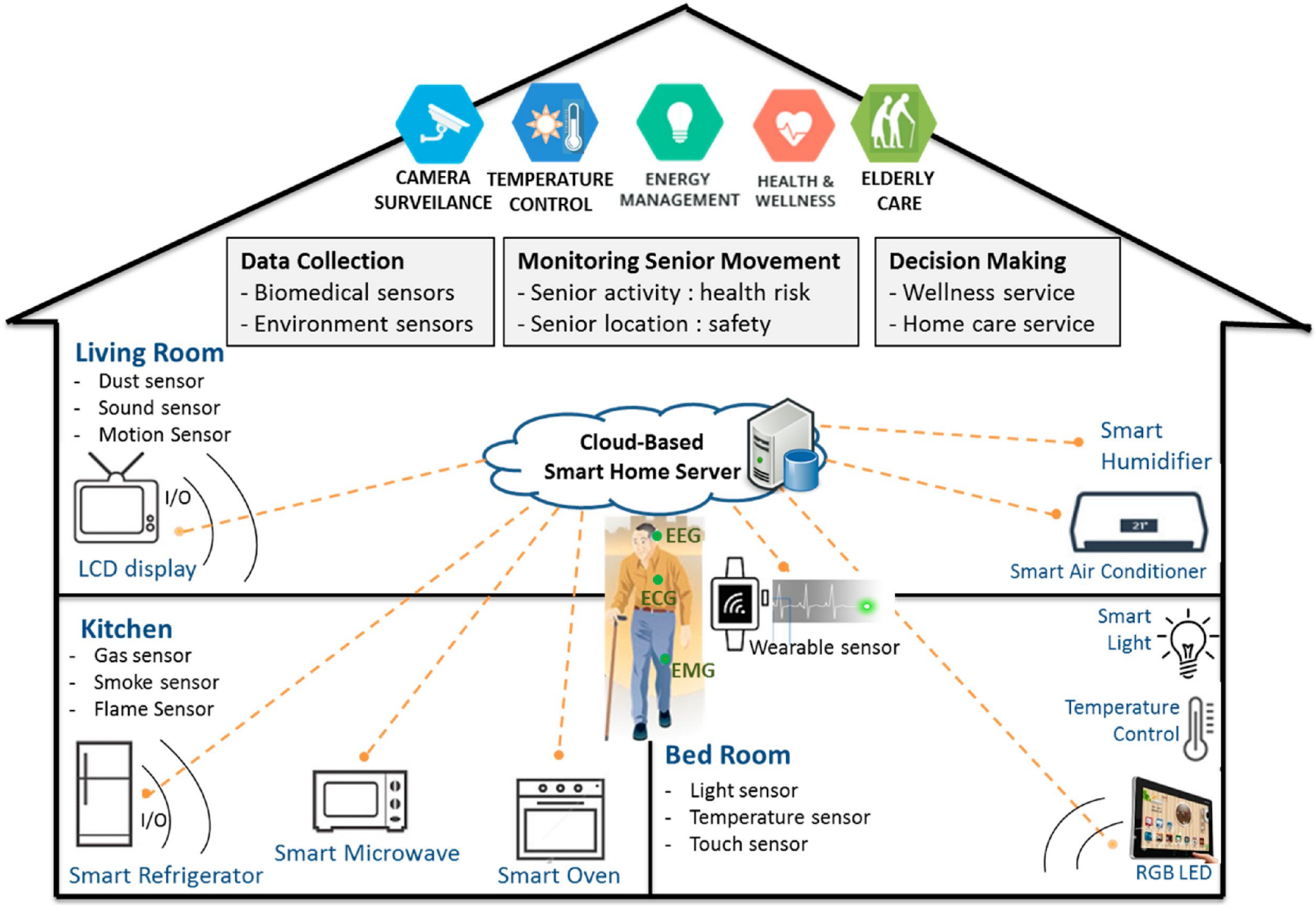


1	Ambient Intelligence Agent (AmI) Control	6	Automatic Pet Feeder	12	Lawn Moisture Sensor
2	Light Sensor	7	Motorized Drapes	13	Face Recognition Sensor
3	Windows and Door Control	8	Automatic Watering	14	Motion Sensors
4	HVAC Control	9	Mailbox Sensor	15	Door Sensors
5	Lighting Control	10	Driveway Sensor	16	AmI Interface with Car
		11	Security System	17	AmI Interface with Smart Phone

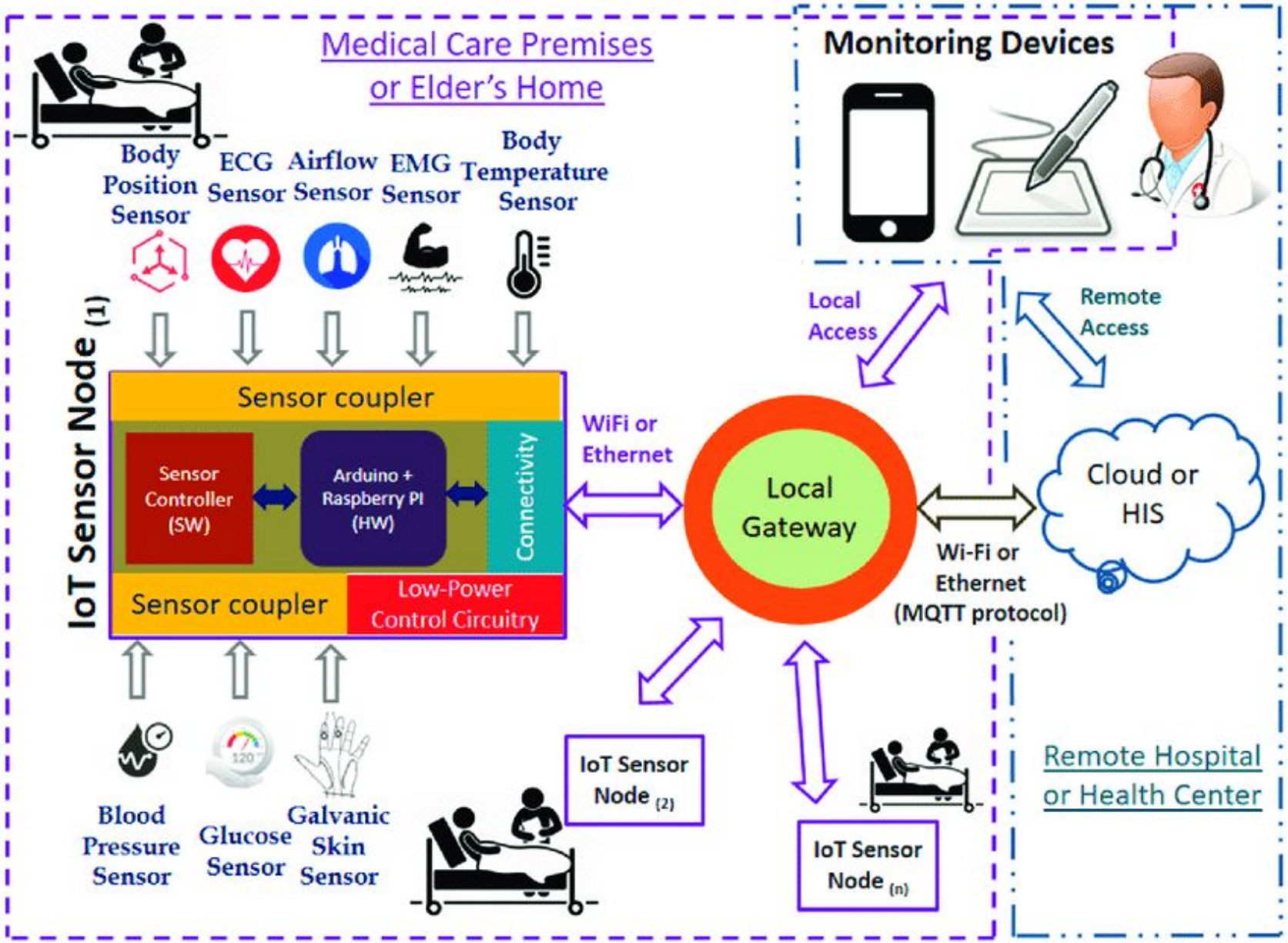
SMART HOME

- Effective approach is to connect the devices to services in the cloud
- Reduces the complexity of managing software in the home-bound devices and simplifies the interoperability of devices
  - bridging the services throughout the network through services interfaces
  - translating the different device protocols to a common platform
  - connecting the devices through the network cloud
- Consumers consume the services through their connected devices
- home automation elements, industry-strength and open standards, trendy electronics, application development platforms, dynamic, virtualized, and converged infrastructures and proven processes
- futuristic home environments constitutes the following:
  - Wireless broadband communication, ambient, agile and adaptive sensors and actuators, smart heating, lighting, ventilation, and air control systems, sophisticated, energy-efficient and connectable edutainment, and infotainment electronics, home security appliances, kitchen utensils, and

SMART HOME

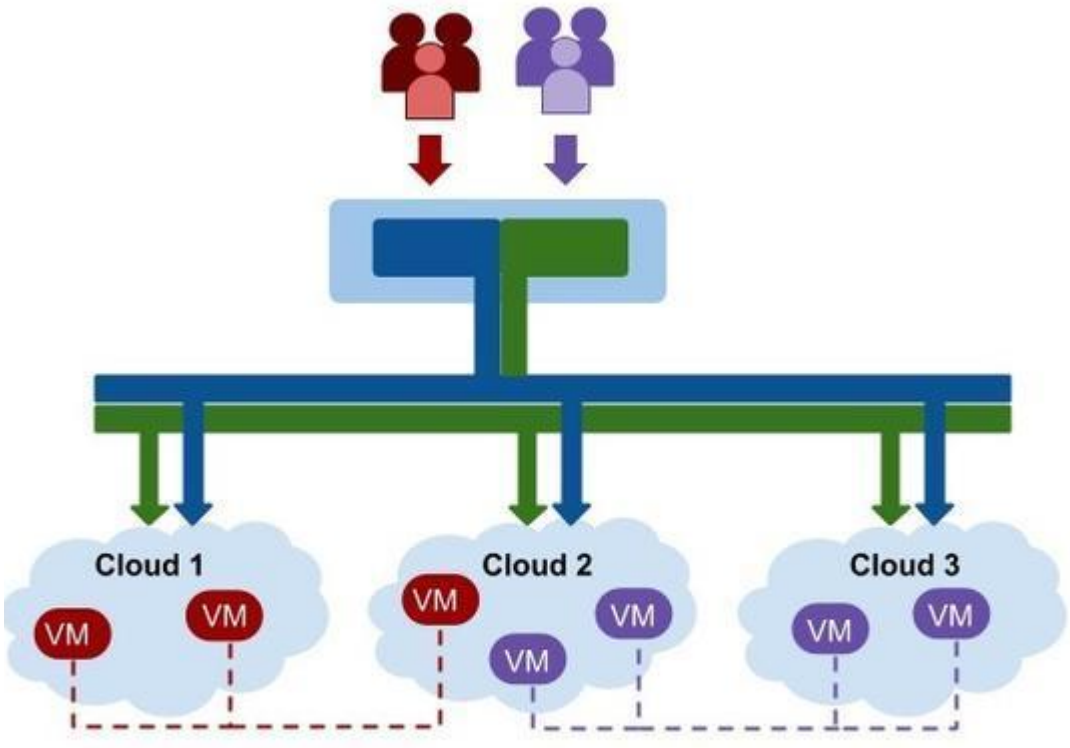

CAMERA SURVEILANCE
TEMPERATURE CONTROL
ENERGY MANAGEMENT
HEALTH & WELLNESS
ELDERLY CARE
Data Collection
- Biomedical sensors
- Environment sensors
Monitoring Senior Movement
- Senior activity : health risk
- Senior location : safety
Decision Making
- Wellness service
- Home care service
Living Room
- Dust sensor
- Sound sensor
- Motion Sensor
I/O
LCD display
Cloud-Based
Smart Home Server
Smart Humidifier
Smart Air Conditioner
EEG
ECG
EMG
Wearable sensor
Kitchen
- Gas sensor
- Smoke sensor
- Flame Sensor
I/O
Smart Refrigerator
Smart Microwave
Smart Oven
Smart Light
Temperature Control
Bed Room
- Light sensor
- Temperature sensor
- Touch sensor
RGB LED

SMART HEALTHCARE



FEDERATED CLOUD

- Created by connecting the cloud environment of different cloud providers using a common standard
- Integrates heterogeneous cloud environment such as community cloud, public cloud, and private cloud in order to scale up the resources and services for the users
- Internet is the primary communication infrastructure for users to access the federated applications and resources
- It is an extension of hybrid cloud to accommodate newer demands

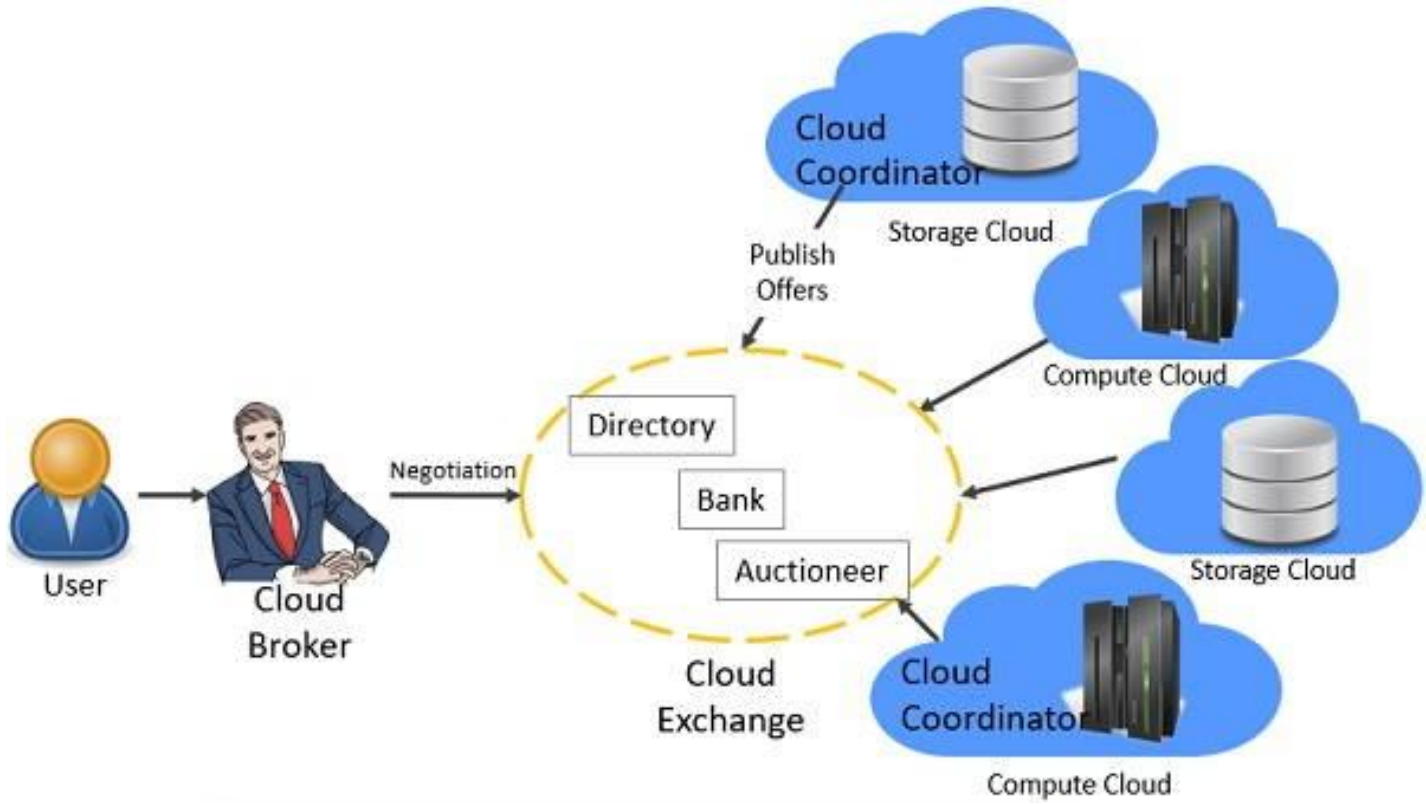


FEDERATED CLOUD - ADVANTAGES

- IT service delivery is greatly optimized and organized
- Allows to select a cloud service provider for a particular workload in terms of affordability, availability, and amenability
- Enlarged utilization of cloud resources
- Simplified disaster and data recovery tasks
- Enforces fault-tolerance toward business continuity

FEDERATED CLOUD ARCHITECTURE

- The architecture has three basic components:
  1. **Cloud Exchange**
  2. **Cloud Coordinator**
  3. **Cloud Broker**



FEDERATED CLOUD ARCHITECTURE

The architecture has three basic components:

1. **Cloud Exchange**
   - Mediator between cloud coordinator and cloud broker
   - Maps the demands put forth by the cloud brokers to the available services provided by the cloud coordinator
   - Maintains and updates the information about the present cost of cloud service, demand patterns, and a list of available cloud providers
2. **Cloud Coordinator**
   - Assigns cloud resources to the remote users based on the quality of service they demand and the credits they have in the cloud bank
   - Manages the cloud enterprises and their membership
3. **Cloud Broker**
   - Interacts with the cloud coordinator, analyzes the Service-level agreement and the resources offered by several cloud providers through cloud exchange
   - Finalizes the requested cloud services from most suitable provider for their client

FEDERATED CLOUD ARCHITECTURE

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  1. **Cloud Exchange**
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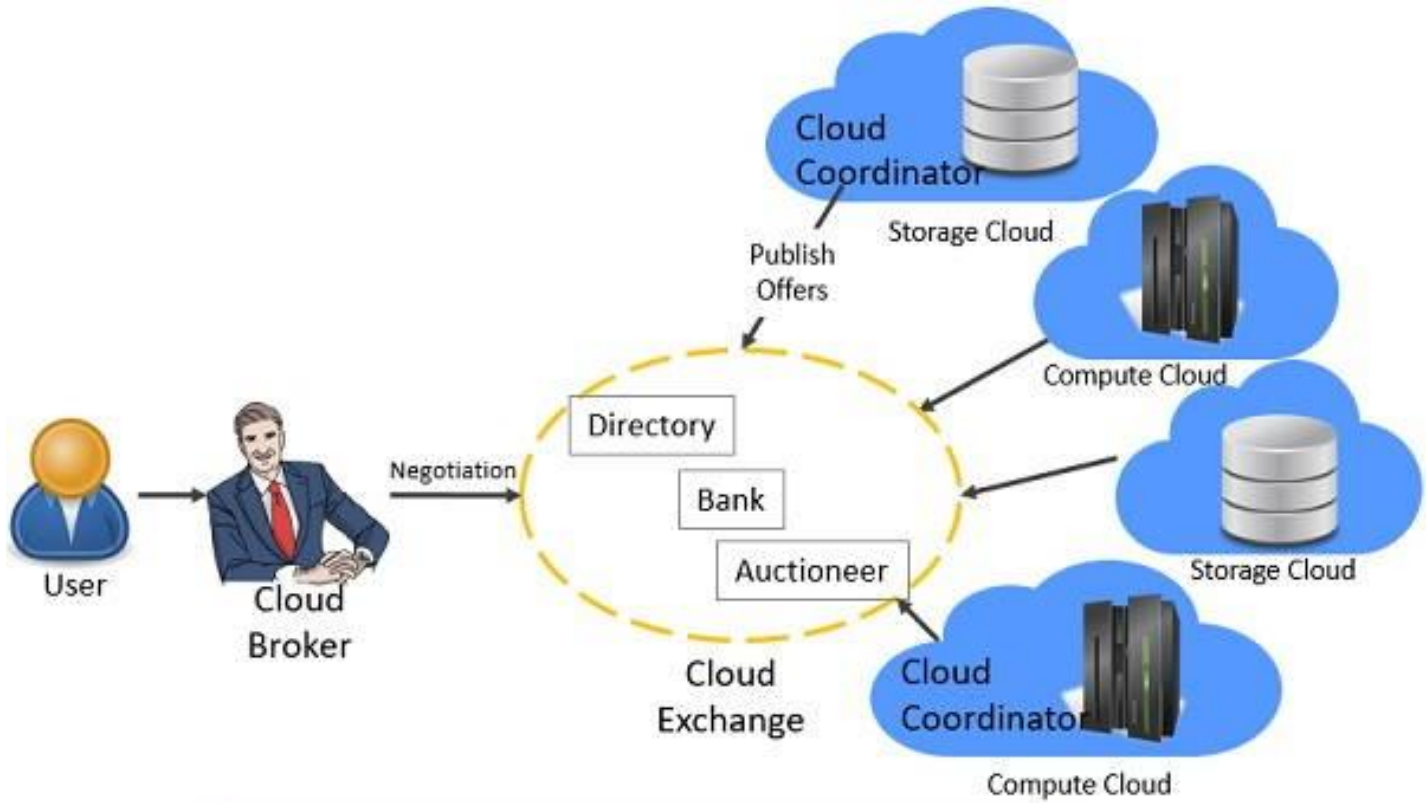
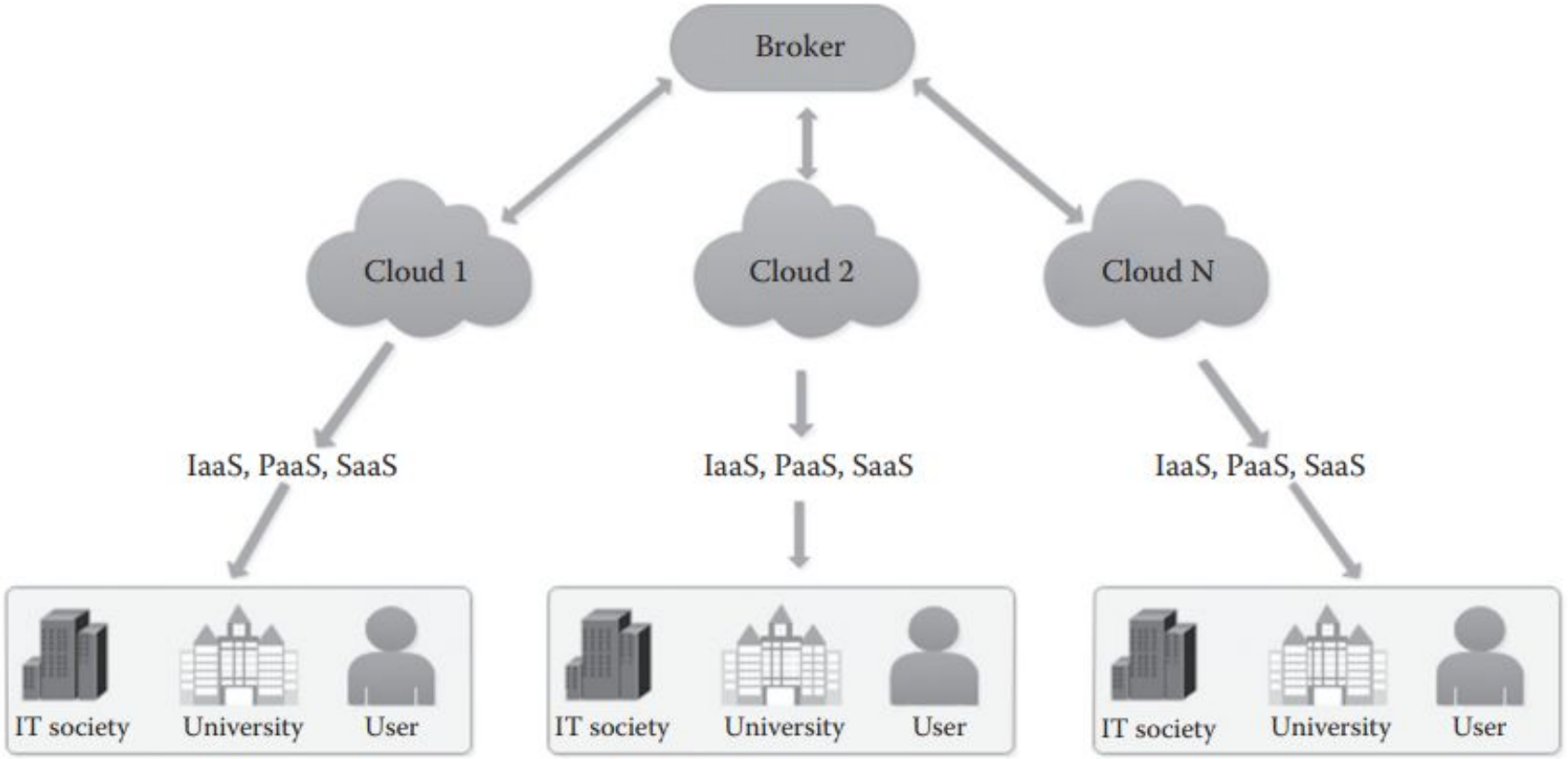


CLOUD FEDERATION - APPROACHES

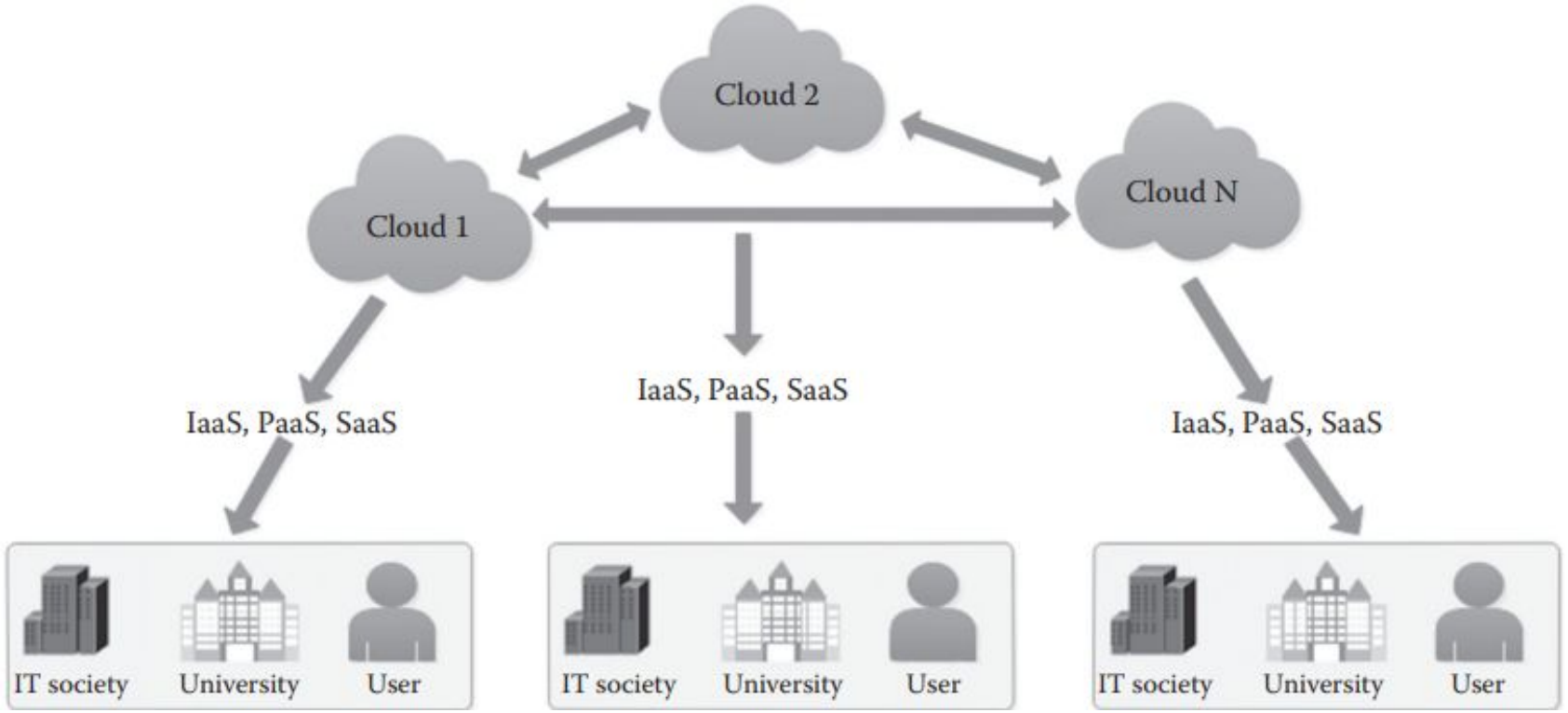
- Three architectural styles
  1. Centralized
  2. Decentralized
  3. Hierarchical

CLOUD FEDERATION – APPROACHES…

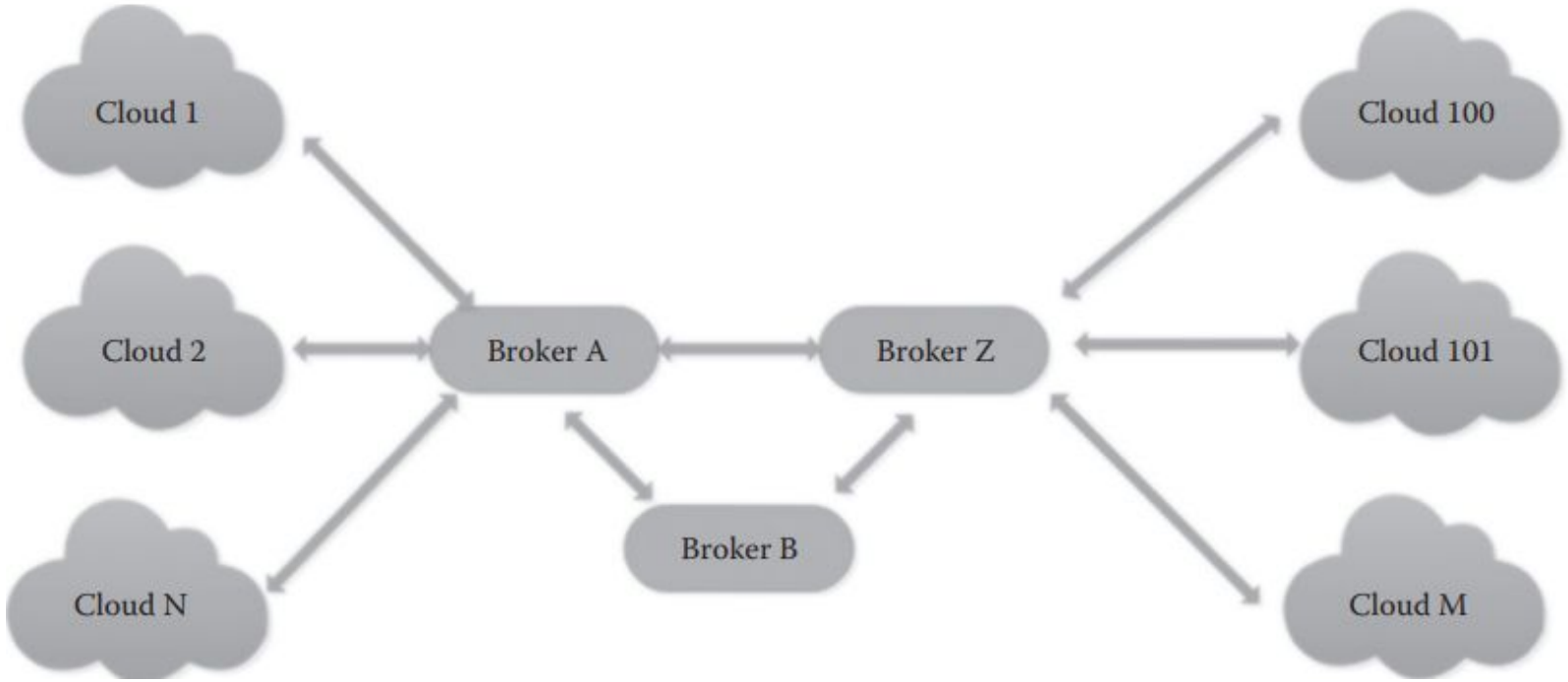
- Centralized Approach



- Decentralized Approach



- Hybrid Approach



SPECIAL PURPOSE CLOUDS

- mobile backup clouds – to backup all kinds of mobile messages, videos, audio clips, photos, e-mails, etc.
  - iCloud - Apple's cloud environment connects the user and his/her Apple devices
  - Dropbox – for Android phones
- Other clouds: science, knowledge, sensor, storage, and data clouds

SPECIAL PURPOSE CLOUDS – DEVICES CLOUDS

- In almost every place we can find a number of sensing, monitoring, measuring, managing, and actuation devices
- Devices are multifaceted and hence capable of producing a lot of data every second
- Device and environment data are shared with cloud-based analytics databases and platforms

SPECIAL PURPOSE CLOUDS– DEVICES CLOUDS…

- All kinds of devices in our every environment are connected to faraway clouds and empowered by cloud-based services and data
- Device and environment data are shared with cloud-based analytics databases and platforms
- Device clouds are being formed in public clouds wherein all kinds of device data gets accumulated and subjected to a variety of investigations

SPECIAL PURPOSE CLOUDS– DEVICES CLOUDS…

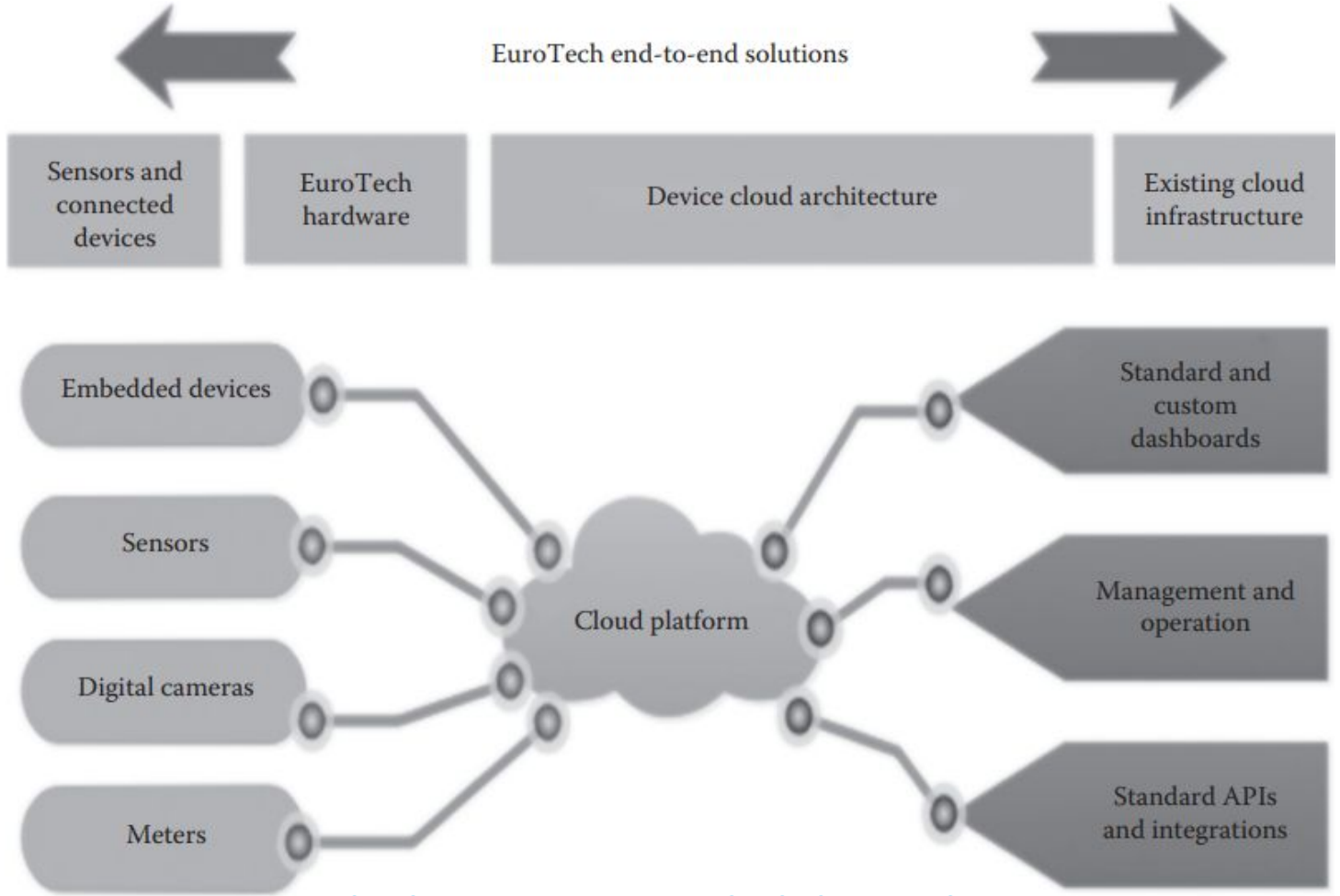
Use cases of device clouds:

- A mobile testing environment that enables developers to remotely evaluate the performance of applications on a wide range of smart devices
- Gives organizations access to modern and legacy devices so that they need not expend on buying, installing, configuring, and operating a variety of devices
- Ex: AWS Device Farm, Firebase Test Lab for Android, Xamarin Test Cloud, Kobiton

SPECIAL PURPOSE CLOUDS– DEVICES CLOUDS…

Eurotech Software Framework – an end-to-end solution includes

- Purpose-built hardware, connectivity, and embedded device management
- Solution provided through the, the Everyware Device Cloud Client, and machine-to-machine (M2M) cloud-based services



EUROTECH EVERYWARE DEVICE CLOUD (EDC)

SPECIAL PURPOSE CLOUDS– DEVICES CLOUDS…

Eurotech Software Framework:

- The **cloud platform** allows dynamically controlled, configured, and evolved application that runs on the field device
- **Applications are managed** through a fully integrated feature-rich **device management layer**.
- Cloud **automatically stores device data into a database**, which is fault-tolerant and elastically scalable.
  - stores any data in any format and enables access to real-time data, for use by the application.
- The platform **enables business decisions to be instantly triggered** based on real-time rules applied to collected data

REFERENCE(S)

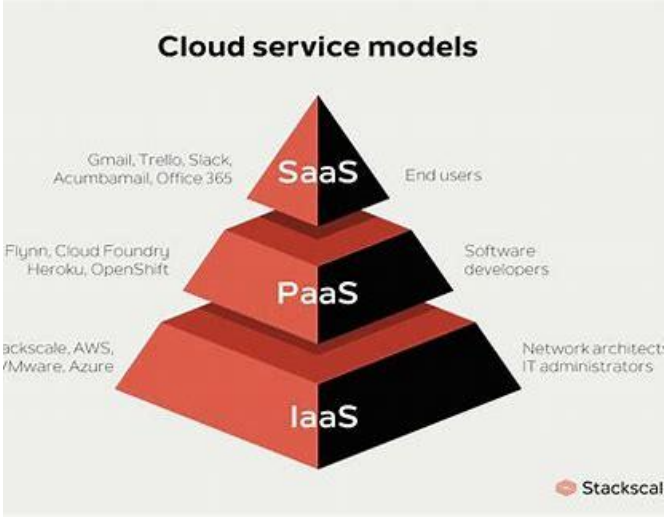
- Pethuru Raj and Anupama C. Raman, “The Internet of Things: Enabling Technologies, Platforms, and Use Cases”, CRC Press, 2017
- https://www.geeksforgeeks.org/what-is-cloud-federation/
- https://binaryterms.com/federated-cloud.html

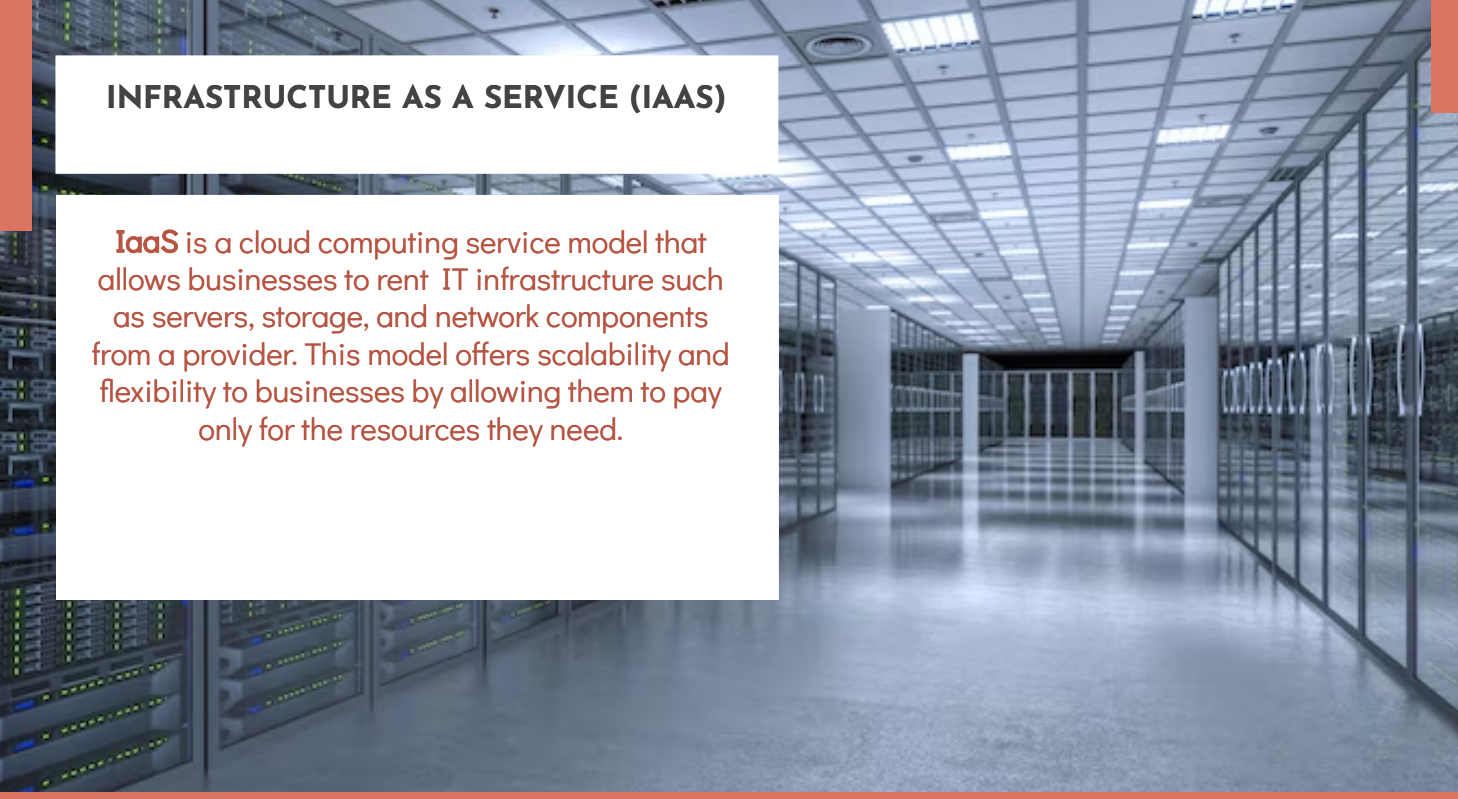
CLOUD COMPUTING SERVICE MODELS


SaaS
facebook
Google Docs
Gmail
PaaS
amazon web services
Google
IaaS
Windows Live Hotmail
Windows Azure
Amazon EC2
THE UNIVERSITY OF AUCKLAND

INTRODUCTION

Cloud computing is a technology that has revolutionized the IT industry. It offers a range of **service models** that cater to the unique needs of businesses. This presentation will explore the three primary service models of cloud computing - IaaS, PaaS, and SaaS.

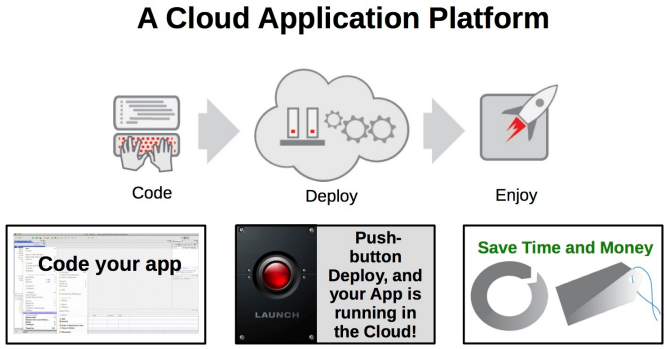




INFRASTRUCTURE AS A SERVICE (IAAS)

IaaS is a cloud computing service model that allows businesses to rent IT infrastructure such as servers, storage, and network components from a provider. This model offers scalability and flexibility to businesses by allowing them to pay only for the resources they need.

PaaS = Platform as a Service



PLATFORM AS A SERVICE (PAAS)

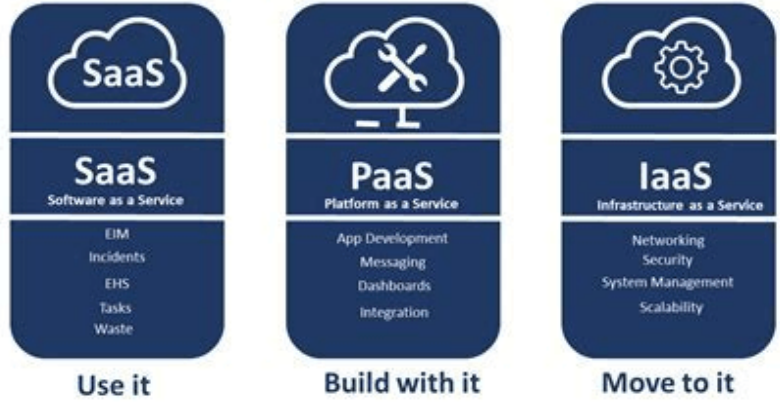
PaaS is a cloud computing service model that provides a platform for developing, testing, and deploying applications. This model offers businesses the ability to focus on application development without the need to worry about infrastructure management.

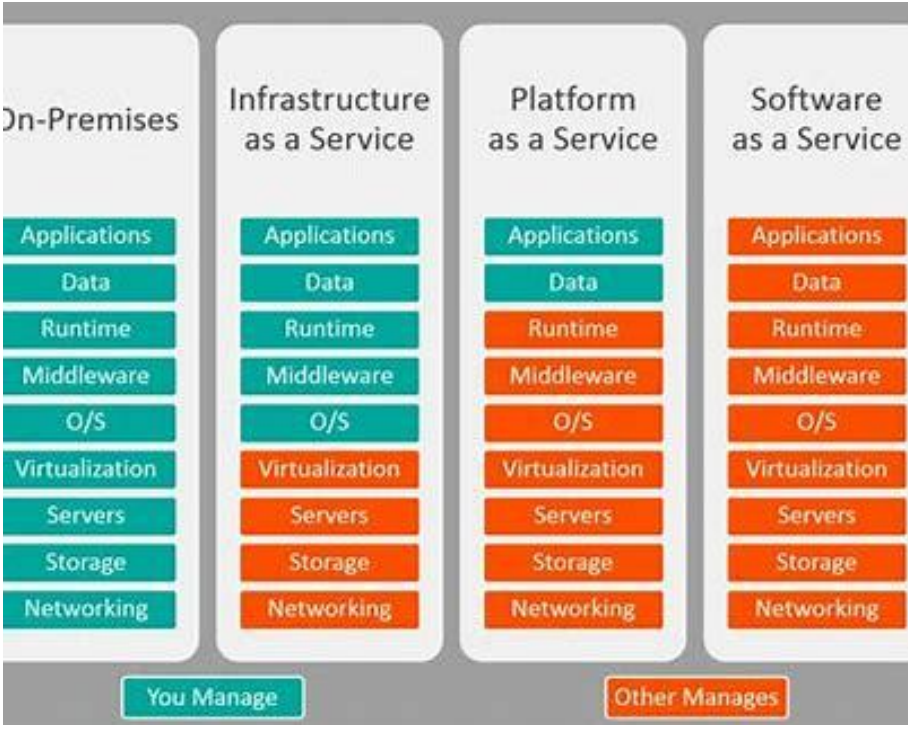
SOFTWARE AS A SERVICE (SAAS)

SaaS is a cloud computing service model that provides businesses with access to software applications over the internet. This model eliminates the need for businesses to install and maintain software on their own machines and allows for easy scalability.

COMPARISON OF SERVICE MODELS

All three cloud computing **service models** offer unique benefits to businesses. **IaaS** offers scalability and flexibility, **PaaS** simplifies application development, and **SaaS** eliminates the need for software installation and maintenance. Choosing the right service model depends on the specific needs of a business.




On-Premises
Applications
Data
Runtime
Middleware
O/S
Virtualization
Servers
Storage
Networking
Infrastructure as a Service
Applications
Data
Runtime
Middleware
O/S
Virtualization
Servers
Storage
Networking
Platform as a Service
Applications
Data
Runtime
Middleware
O/S
Virtualization
Servers
Storage
Networking
Software as a Service
Applications
Data
Runtime
Middleware
O/S
Virtualization
Servers
Storage
Networking
You Manage
Other Manages


Cloud computing

CONCLUSION

Cloud computing **service models** have changed the way businesses operate. With the ability to rent IT infrastructure, access software applications, and develop applications without worrying about infrastructure management, businesses can focus on their core competencies. Choosing the right service model depends on the unique needs of each business.

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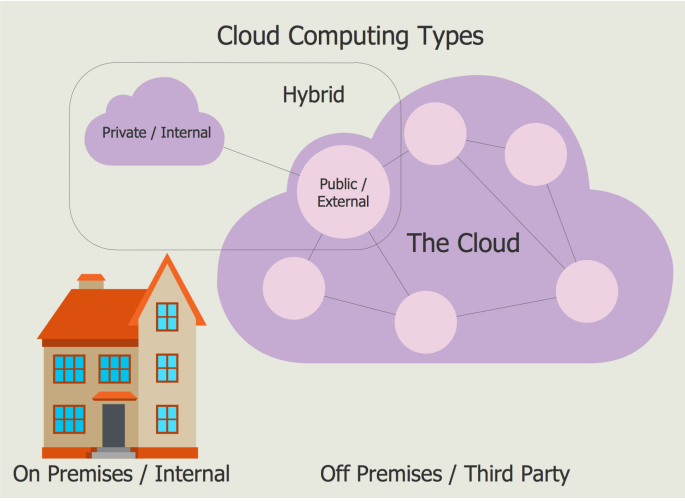


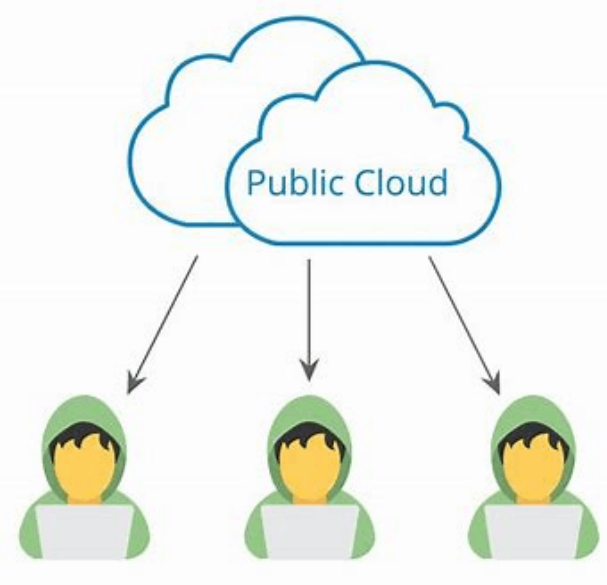
TYPES OF CLOUD

INTRODUCTION

Cloud computing refers to the delivery of computing services—servers, storage, databases, networking, software, analytics, and intelligence—over the Internet ("the cloud") to offer faster innovation, flexible resources, and economies of scale. There are different types of cloud depending on the deployment model and the level of service offered.

PUBLIC CLOUD

Public Cloud is a deployment model where the cloud services are offered over the Internet to the general public. The cloud provider owns, manages, and maintains the infrastructure, and the customers share the same resources. Public cloud services are usually cheaper and more flexible than private cloud services.



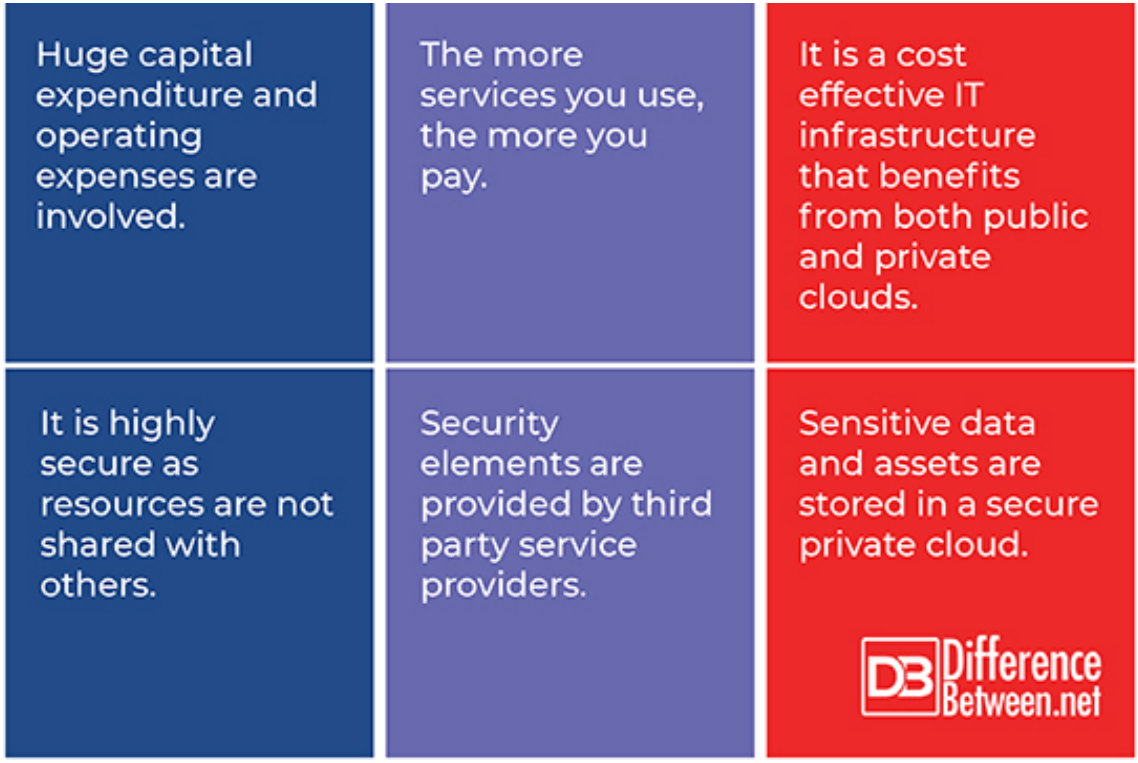
PRIVATE CLOUD

Private Cloud is a deployment model where the cloud services are offered exclusively to a single organization. The cloud infrastructure can be located on-premises or hosted by a third-party provider. Private cloud services are usually more secure and customizable than public cloud services.

HYBRID CLOUD

Hybrid Cloud is a deployment model where the cloud services are a combination of public and private cloud. The two clouds are connected by a technology that allows applications and data to be shared between them. Hybrid cloud services are usually used when an organization wants to take advantage of the benefits of both public and private cloud.

Private Cloud	Public Cloud	Hybrid Cloud
The cloud infrastructure is owned and managed by a single entity or organization.	The cloud computing resources are shared across multiple organizations.	A flexible infrastructure is created using the best of both the worlds – private and public.
The computing resources remain behind organization's firewalls.	The infrastructure is managed by a third party service provider.	Provides a mixed-services environment using both private and public cloud services.


Huge capital expenditure and operating expenses are involved.
The more services you use, the more you pay.
It is a cost effective IT infrastructure that benefits from both public and private clouds.
It is highly secure as resources are not shared with others.
Security elements are provided by third party service providers.
Sensitive data and assets are stored in a secure private cloud.
DB Difference Between.net

CONCLUSION

In conclusion, cloud computing has revolutionized the way organizations manage their computing resources. There are different types of cloud depending on the deployment model and the level of service offered. Public cloud is cheaper and more flexible, private cloud is more secure and customizable, and hybrid cloud combines the benefits of both. Infrastructure as a Service offers virtualized computing resources over the Internet.

THANK YOU

CLOUD TECHNOLOGY AND CLOUD ECOSYSTEM

- Cloud computing technology gives users access to storage, files, software, and servers through their internet-connected devices: computers, smartphones, tablets, and wearables.

- Essentially, cloud computing means having the ability to store and access data and programs over the internet instead of on a hard drive.

- This means businesses of any size can harness powerful software and IT infrastructure to become bigger, leaner, and more agile, as well as compete with much larger companies.

Types Of Cloud Computing

- Software as a Service (SaaS)
- Platform as a Service (PaaS)
- Infrastructure as a Service (IaaS).

Software as a Service (SaaS)

- SaaS is a form of cloud computing in which users can access software applications without needing to download, install, or store that software and its various components on their devices or hard drive.
- Most cloud computing software of this kind is subscription-based with an annual or monthly fee.
- In return, users get seamless solutions and features without needing hardware, being bogged down by installing updates, or other maintenance tasks.
- When it was founded, Salesforce was one of the first cloud computing and SaaS companies. Its Sales Cloud, Marketing Cloud, and Service Cloud are all cloud-based software applications.

Platform as a Service (PaaS)

- Platform as a Service (PaaS) is a cloud computing solution that provides developers with an easy-to-use platform to create their own software, web applications, or other programming projects.
- Businesses use PaaS to create proprietary apps and programs without the need for servers or special testing environments.
- Salesforce has been in the PaaS market for over a decade and is the leader in enterprise PaaS.
- The Salesforce Platform gives companies the power to build apps and services with Heroku Enterprise, Private Spaces, Salesforce Lightning, and Trailhead.
- The platform's versatility allows developers to write code in the language of their choice, and it integrates with other cloud computing products that use customer data, which allows companies to track an app's performance.

Infrastructure as a Service (IaaS).

- Infrastructure as a Service (IaaS) provides companies with access to servers, firewalls, virtual machines, storage, and other infrastructure. It’s ideal for companies that create highly specialized or unique proprietary applications, but don’t want to spend time or other resources buying, storing, setting up, or maintaining the necessary equipment. Instead, they access ready-to-use infrastructure over the internet.

CLOUD ECOSYSTEM

What is a cloud ecosystem?

- A cloud ecosystem is a complex system of interdependent components that all work together to enable cloud services.
- In nature, an ecosystem is composed of living and nonliving things that are connected and work together.
- In cloud computing, the ecosystem consists of hardware and software as well as cloud customers, cloud engineers, consultants, integrators and partners.

HOW A CLOUD ECOSYSTEM WORKS

- The center of a cloud ecosystem is a public cloud provider.
- It might be an IaaS provider such as Amazon Web Services (AWS) or a SaaS vendor such as Salesforce.
- Radiating out from the center of the cloud are software companies that use the provider's anchor platform, as well as consultants and companies that have formed strategic alliances with the anchor provider.
- There is no vendor lock-in because these companies overlap, making the ecosystem more complex.
- For example, AWS is the center of its own ecosystem, but it's also a part of the Salesforce ecosystem.
- Salesforce runs a number of its services on AWS's infrastructure, and Salesforce customers can gain access, through devices called connectors, to pieces of AWS, such as its Simple Storage Service (S3).

THE BENEFITS OF A CLOUD ECOSYSTEM

- Companies can use a cloud ecosystem to build new business models.
- It becomes relatively easy for a medical device manufacturer, for example, to launch a heart-monitoring service on its cloud service provider's cloud infrastructure and then sell the service alongside its main business of manufacturing heart monitors for hospitals.
- In a cloud ecosystem, it is also easier to aggregate data and analyze how each part of the system affects the other parts.
- For example, if an ecosystem consists of patient records, smart device logs and healthcare provider records, it becomes possible to analyze patterns across an entire patient population.

THANK YOU

CLOUD INSPIRED ENTERPRISE TRANSFORMATIONS

INTRODUCTION

Cloud Inspired Enterprise Transformations refer to the process of utilizing cloud technology to improve business operations and outcomes. This transformation is not just about moving to the cloud, but also involves rethinking and redesigning business processes to take full advantage of cloud capabilities. Cloud transformations can lead to increased efficiency, agility, scalability, and cost savings for organizations.

BENEFITS OF CLOUD TRANSFORMATIONS

Cloud transformations offer numerous benefits, including **increased agility** through faster deployment of applications, **improved scalability** to handle changing business needs, **reduced costs** through pay-as-you-go models, and **enhanced security** through centralized management and monitoring.

CLOUD MIGRATION STRATEGIES

There are several strategies organizations can use to migrate to the cloud, including **rehosting** (lift and shift), **refactoring** (re-architecting), **replatforming** (lift, tinker, and shift), and **repurchasing** (adopting SaaS solutions). Each strategy has its own advantages and disadvantages, and organizations should choose the one that best fits their needs.

CLOUD GOVERNANCE

Cloud governance is the process of managing cloud resources to ensure compliance, security, and cost optimization. It involves establishing policies, procedures, and controls to manage cloud services, applications, and infrastructure. Effective cloud governance can help organizations maximize the benefits of cloud technology while minimizing risk.

CLOUD NATIVE DEVELOPMENT

Cloud native development is an approach to software development that leverages cloud technology to build scalable, resilient, and efficient applications. It involves using cloud-native tools and technologies, such as microservices, containers, and serverless functions, to build applications that can run anywhere in the cloud. Cloud native development can help organizations build and deploy applications faster and more efficiently.

CONCLUSION

Cloud Inspired Enterprise Transformations are a powerful way for organizations to improve their business operations and outcomes. By leveraging cloud technology, organizations can increase efficiency, agility, scalability, and cost savings. However, successful cloud transformations require careful planning, execution, and governance. With the right approach, organizations can reap the benefits of cloud technology and transform their business for the better.

THANK YOU


HYBRID
CLOUD

Advantages of Private Cloud

- deeper visibility of the total IT environment,
- the end-to-end controllability,
- the guaranteed performance and dependability with nil network latency,
- all, impenetrable, and fool-proof security,

Advantages of Public Cloud

- web-scale, cost-effective,
- being manned by trained, experienced and skilled experts,
- being continuously standardized toward open, interoperable, connected, and federated clouds.

Hybrid Cloud Adoption

- In order to attain the combined benefit of both public and private clouds.
- rolled out by establishing a linkage between traditional IT infrastructures, private and public clouds, and third-party services.
- vendor lock-in issue is being attended through hybrid cloud strategy

Strategies for Cloud Adoption

- data locality and security, workload performance and
- throughput, and network latency,

FEDERATED CLOUD

Cloud Federation

- refers to the runtime synchronization of software, platform, and infrastructure services from geographically distributed and disparate cloud toward fulfilling specific business demands.
- Brokers and network gateways – most important gluing and fusing mechanisms for federating multiple clouds.
- Selecting a cloud service provider for a particular workload in terms of affordability, availability, and amenability.

Benefits of cloud federation

- Enlarged utilization of cloud resources
- The real value of distributed computing through an integrated and centralized dashboard
- Composite and process-aware services
- disaster and data recovery tasks – simplified
- Fault-tolerance toward business continuity, resource clusters and grids,
- scale-out or horizontal scalability,
- policy-based activation

Cloud Federation approach 1

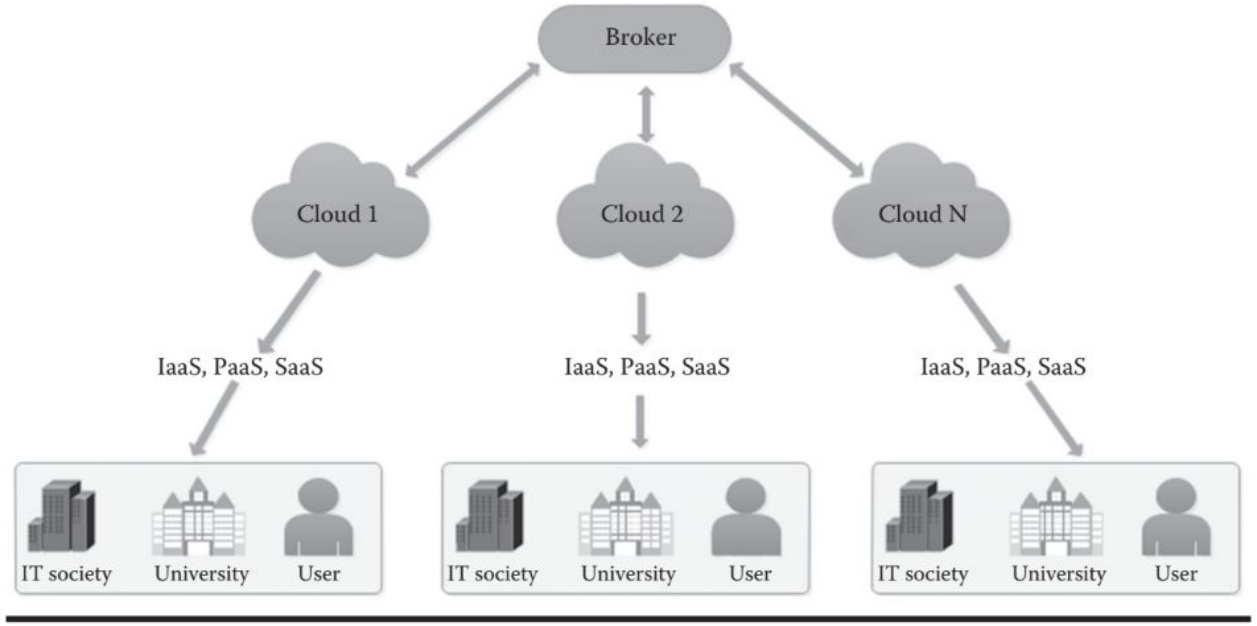


Figure 6.2 The centralized approach.

cloud brokers find to bind and create a cloud federation out of multiple clouds to fulfill the requirement.

Cloud Federation approach 2

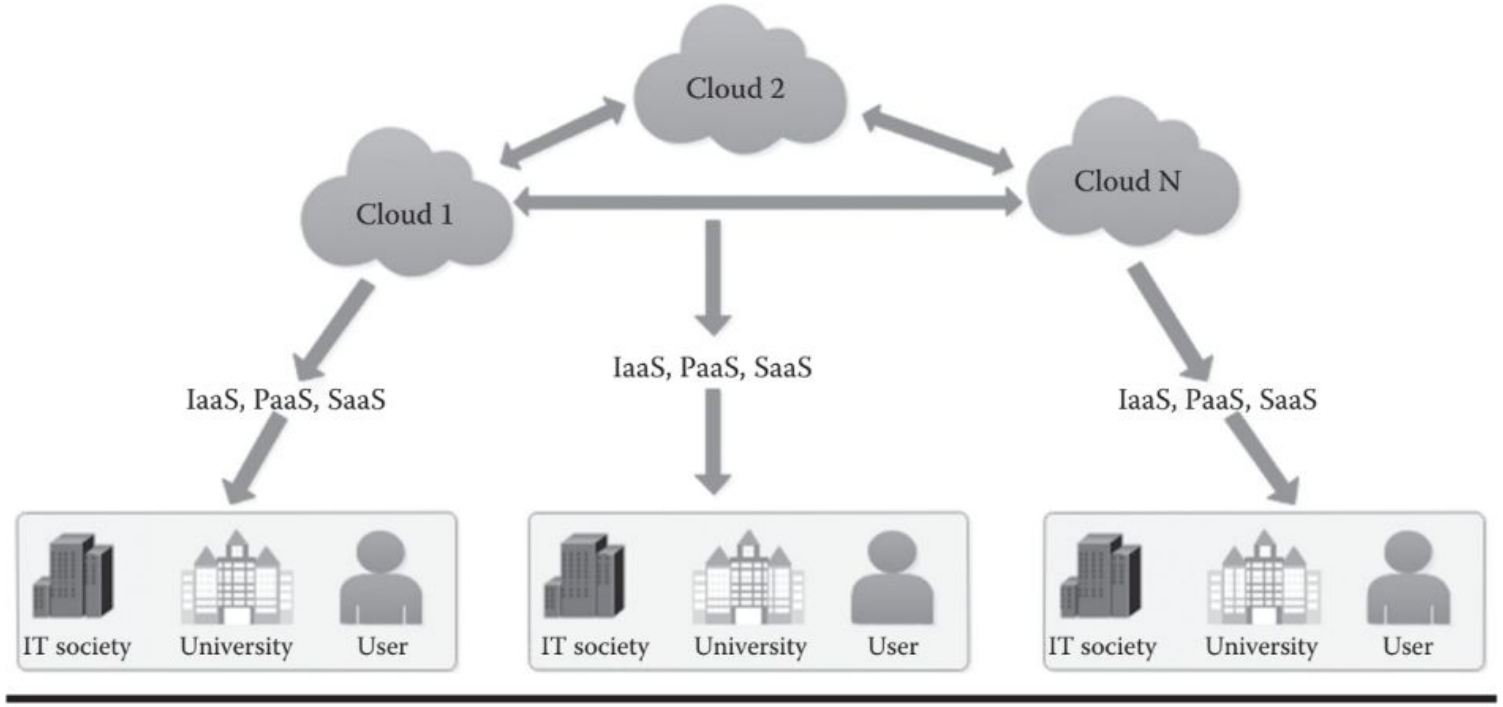


Figure 6.3 The decentralized approach.

clouds, in a peer–to–peer manner, negotiate themselves to establish the required partnership to have a cloud federation.

Cloud Federation approach 3

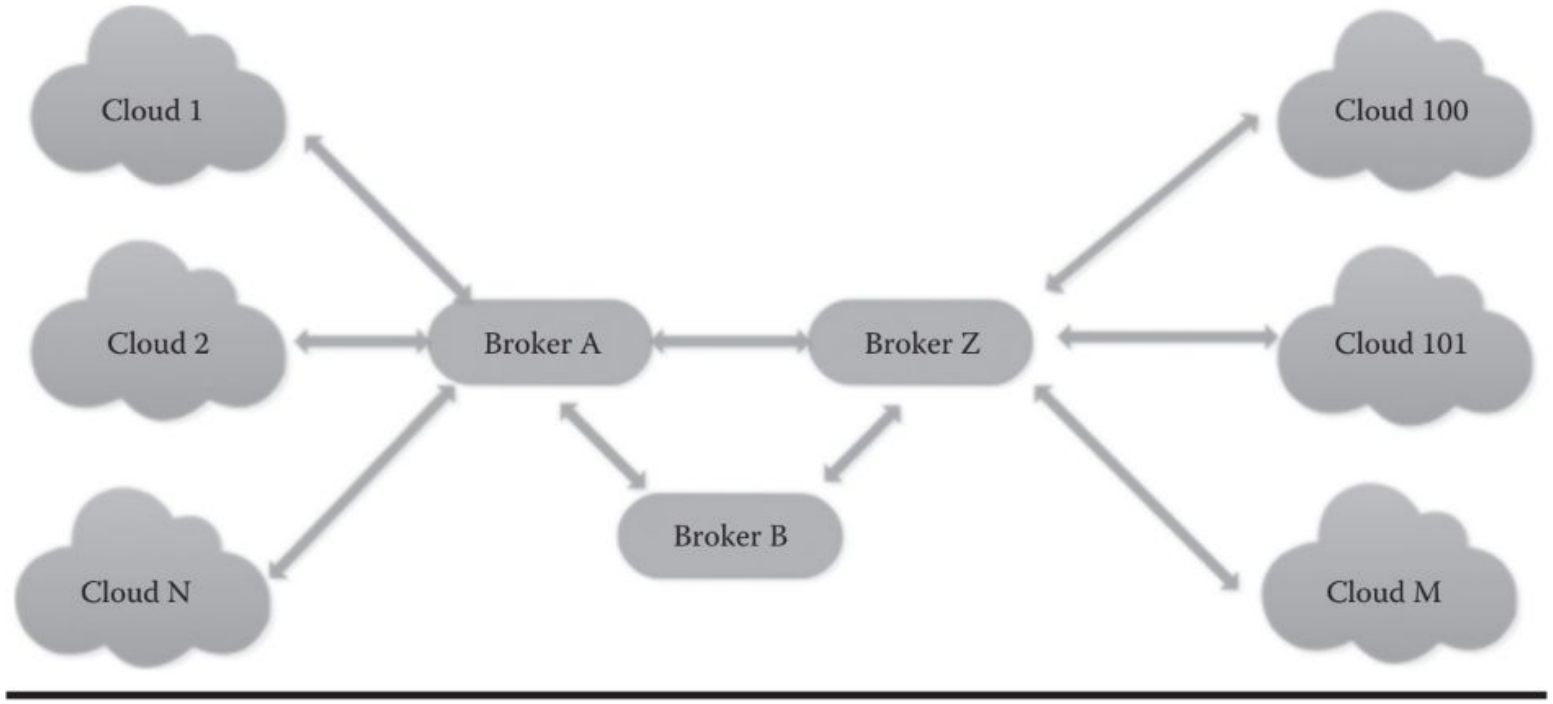


Figure 6.4 The hierarchical approach.

Clouds are connected to a broker and each broker can also interact with other brokers in order to look for fitting clouds for realizing the cloud federation.

SPECIAL PURPOSE CLOUD

Examples

- mobile backup clouds for stocking up all kinds of mobile messages, videos, audio clips, photos,e-mails, and so on.
- Dropbox for storing all kinds of files of Android

phones.

- iCloud for connecting to Apple devices in amazing ways.
- iCloud photo library and iCloud drive keep photos, videos, and documents stored securely

- All kinds of devices in our every environment are getting hooked to faraway clouds to be accordingly empowered by cloud-based services and data.
- Device data – shared with cloud-based analytics databases and platforms(cost-effective and elastic)

Use Case of Device clouds

- can be a mobile testing environment that enables developers to remotely evaluate the performance of applications on a wide range of smart devices.
- The device cloud gives organizations access to modern and legacy devices so that they need not expend on buying, installing, configuring, and operating a variety of devices in their own backyards.
- Eg:Wind River Helix Device Cloud

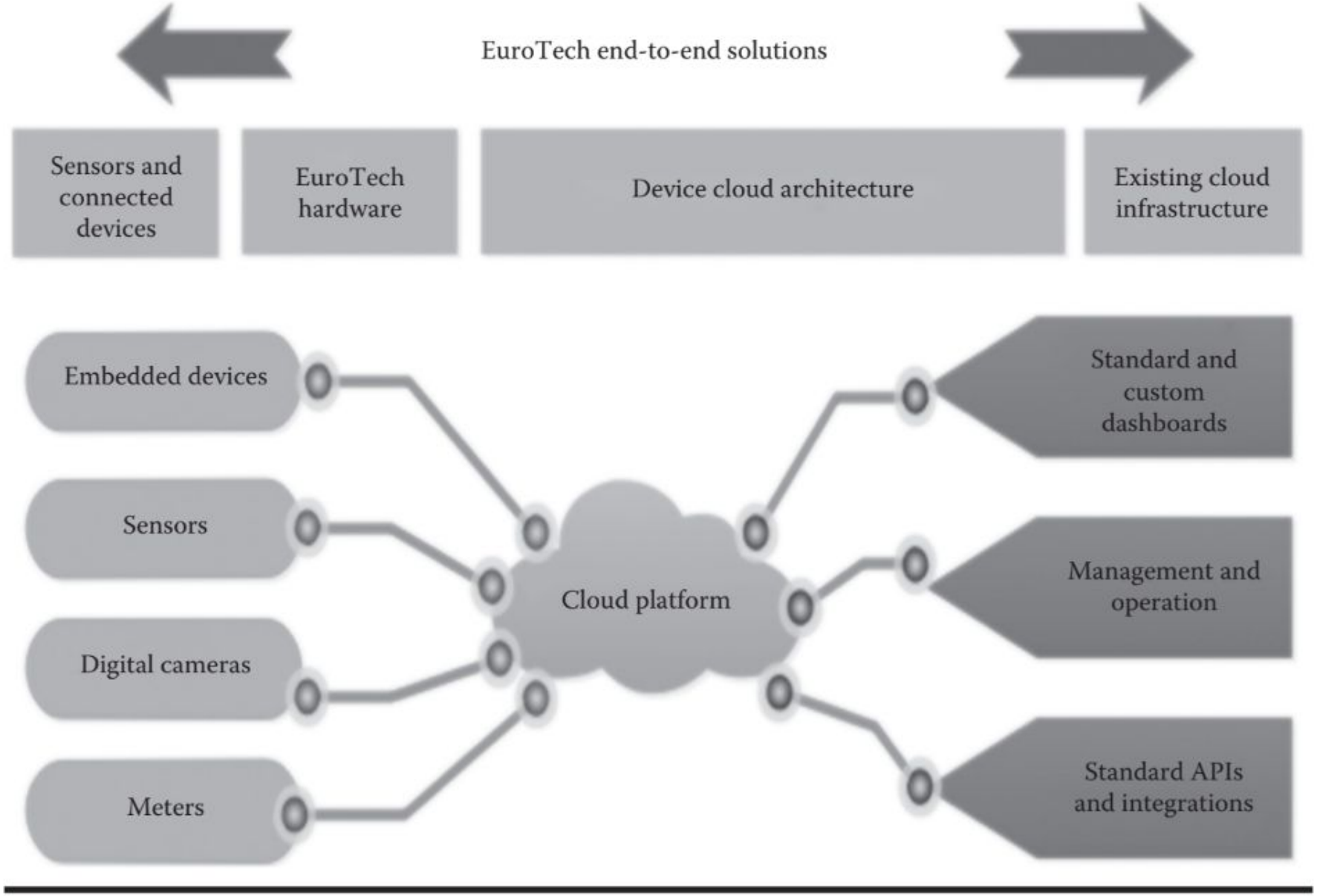


Figure 6.5 Cloud-based device management platform.

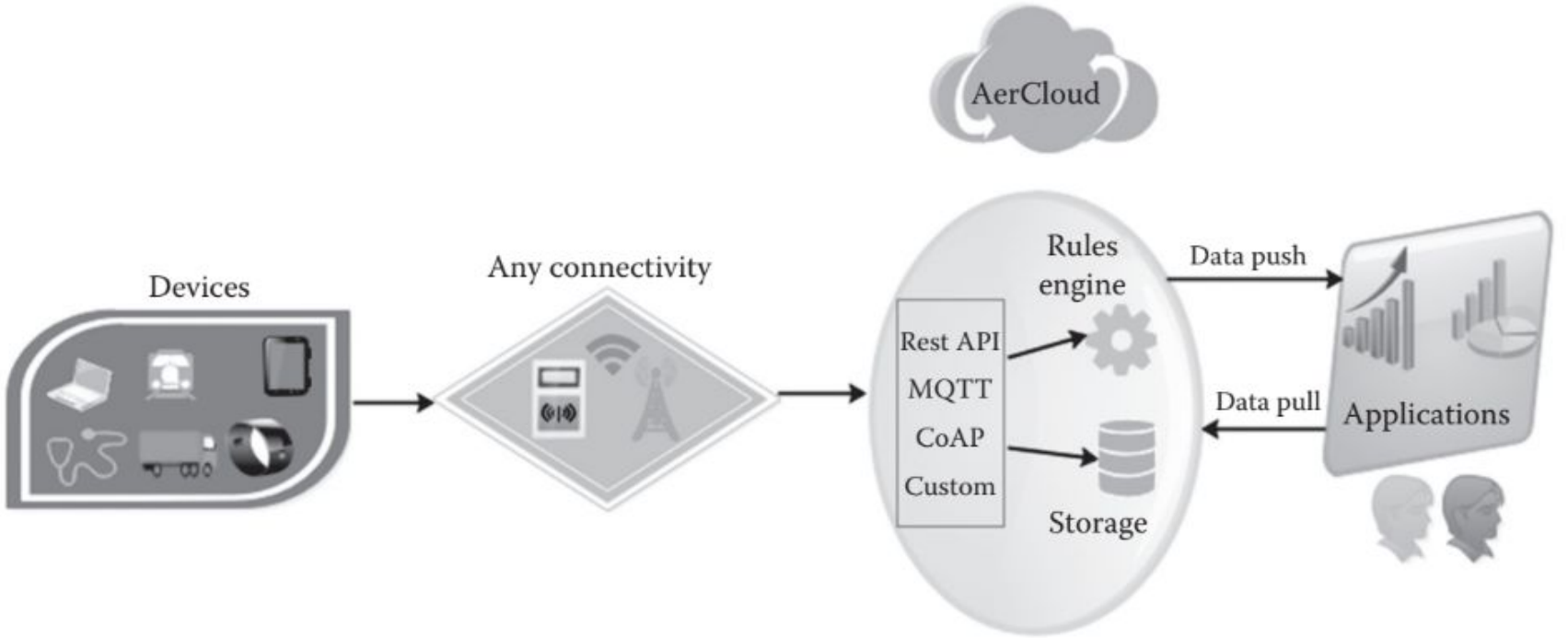
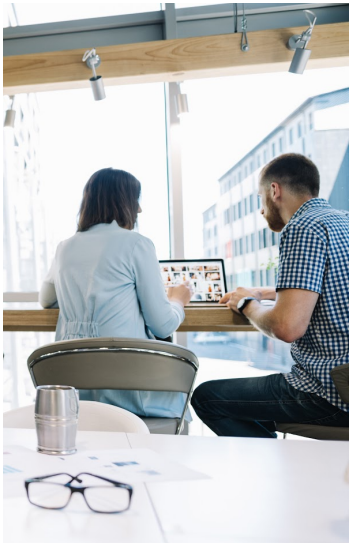


Figure 6.6 Empowering device applications.

- integrates that data with other systems and data sources, which it then uses to automate control of IoT devices and machines.
- with device cloud, organizations can easily update hundreds or thousands of devices through remote software updates.

- The Eurotech Everyware Device Cloud (EDC) is an end-to-end solution (Figure 6.5) that includes purpose-built hardware, connectivity, and embedded device management through the Eurotech Software Framework, the Everyware Device Cloud Client, and machine-to-machine (M2M) cloud-based services to deliver actionable insights from the field to downstream applications and business processes, dashboards, and reports.
- Cloud database – fault-tolerant and elastically scalable.
- data filtering, continuous queries, aggregation and correlation between devices, and event pattern recognition to ensure rapid reaction to business-critical situation scenarios
- The Health Suite digital platform [http://www.usa.philips.com/healthcare] represents a new era in connected health care for both patients and providers, as health care continues to move outside the hospital walls, and into our homes and everyday lives.(supported by salesforce.com)


Thank you



The Emergence of Edge/Fog Clouds

Introduction

Edge/Fog Clouds emerged as a solution to handle the increasing amount of data generated by IoT devices. These architectures allow processing and storage closer to the source, reducing latency and bandwidth usage.

Edge Computing

Edge Computing refers to the processing of data closer to its source, typically at the edge of the network. It allows for faster response times and lower bandwidth usage, making it ideal for latency-sensitive applications.

Fog Computing

Fog Computing refers to the extension of cloud computing to the edge of the network. It allows for distributed computing and storage resources, enabling data processing closer to the source while leveraging cloud capabilities.

Architecture

Edge/Fog Clouds are composed of three layers: **edge devices**, **edge servers**, and **cloud servers**. Edge devices collect data and perform basic processing, edge servers perform more complex processing, and cloud servers provide storage and additional processing capabilities.

Challenges

Edge/Fog Clouds face several challenges, including the need for **security** measures to protect data at the edge, **scalability** to handle increasing amounts of data, and **interoperability** to ensure compatibility between different devices and platforms.

Conclusion

Edge/Fog Clouds offer a promising solution to the challenges presented by IoT, enabling faster response times, lower bandwidth usage, and distributed computing and storage resources. However, further research and development is needed to ensure the scalability, security, and interoperability of these architectures.

Thanks!

The Architectural components of the Smarter Traffic System

The Architectural components of the Smarter Traffic System

- As far as physical components are concerned, a smarter traffic system has to include traffic lights, sensors, and actuators within its jurisdictional region so that the reaction time is on the order of <10 milliseconds.
- A miniaturized orchestration platform is an overseeing software solution, which has to be a part and parcel of the system.
- This module is greatly obligated to orchestrate and manage all the other software modules of the system effectively.
- It has to be policy-aware.
- That is, well-intended policies can be established easily and enforced accordingly toward effective governance.

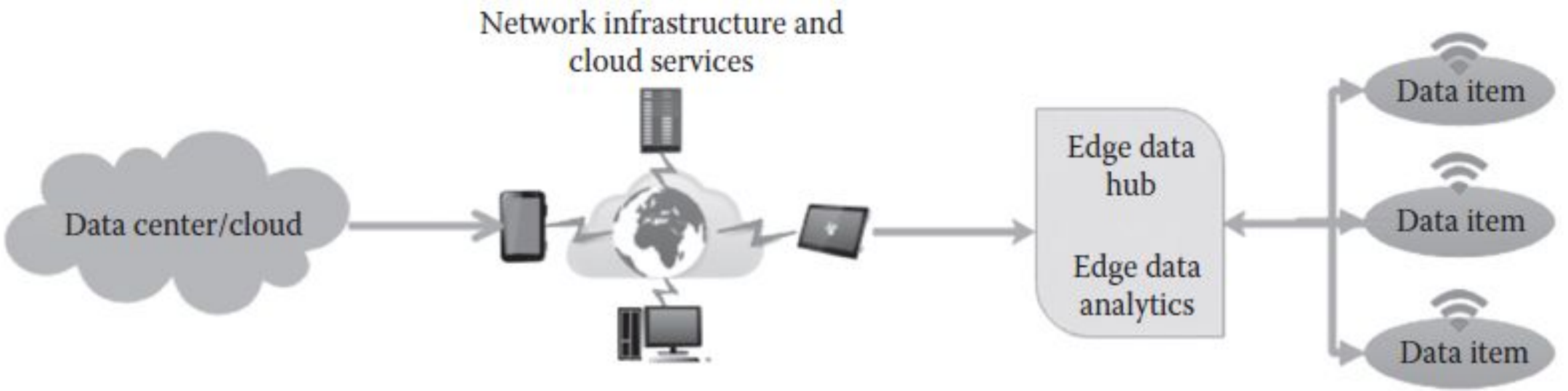


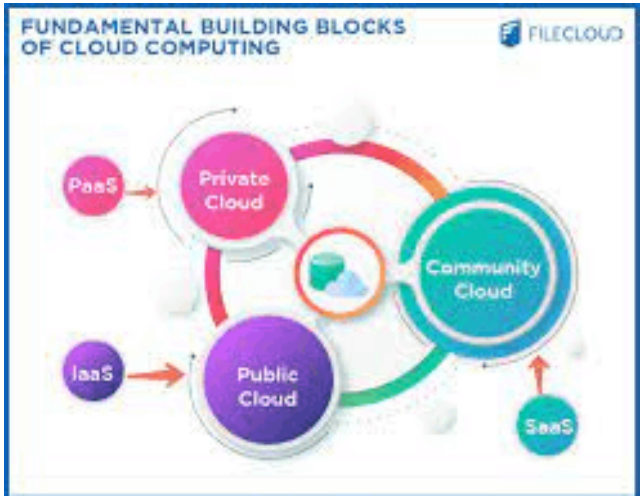
Figure 6.7 A hybrid version of local and remote clouds.

The Architectural components of the Smarter Traffic System

- A centralized decision-enabling module is another noteworthy one for garnering data from all the deployed traffic lights and pushing the decisions to individual traffic lights through a messaging bus, which is another mandatory software solution for enabling data transmission on both directions.
- There can be multiple smarter traffic systems from different providers tied up with different networking and communication service providers.
- All these deviations and deficiencies need to be addressed systematically in order to accomplish edge analytics.
- Thus, any edge analytics software solution has to take multiple scenarios and factors into consideration in order to be right and relevant for realizing real-time applications such as smarter traffic.

The Architectural components of the Smarter Traffic System

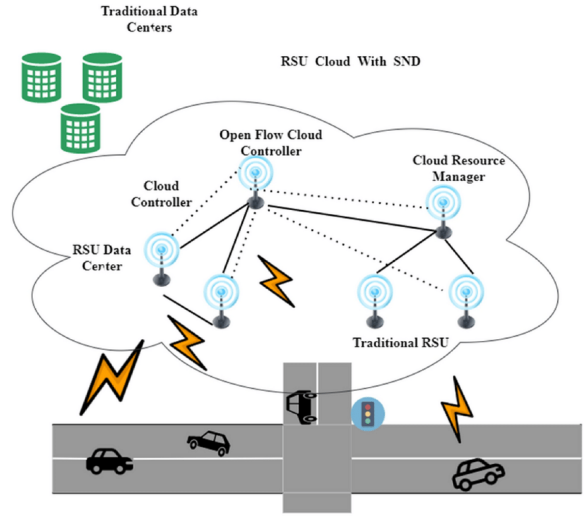
- Systems are capable of taking lightning-fast yet correct decisions, which are turning out to be essential for the projected smarter world.

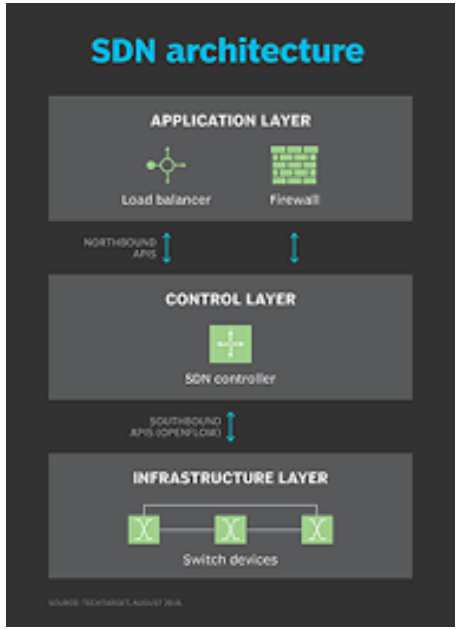


THE BUILDING BLOKS OF SOFTWARE DEFINED CLOUD

INTRODUCTION

Software Defined Cloud is a modern IT infrastructure that enables organizations to deploy applications and services faster, more efficiently, and with greater flexibility. This type of cloud infrastructure is based on the principles of software-defined networking (SDN) and virtualization, which allows for improved resource utilization and automation.





SOFTWARE-DEFINED NETWORKING (SDN)

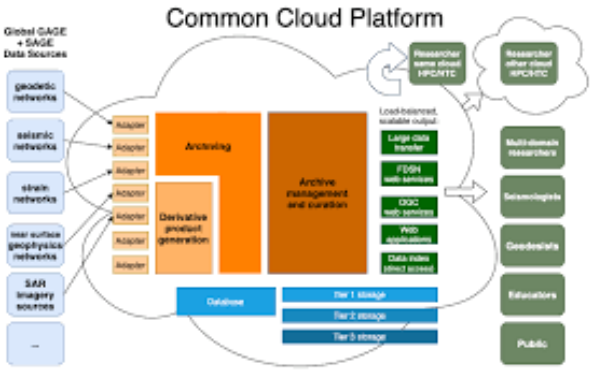
SDN is a network architecture that separates the control plane from the data plane, enabling network administrators to manage network services through software applications. This approach provides greater flexibility and agility, allowing for the creation of dynamic and programmable networks that can be customized to meet specific business needs.

VIRTUALIZATION

Virtualization is the process of creating a virtual version of something, such as operating systems, servers, storage, or network resources. This technology allows multiple workloads to share a single physical resource, which improves utilization and reduces costs. It also enables greater flexibility and scalability, as resources can be quickly provisioned and deprovisioned as needed.

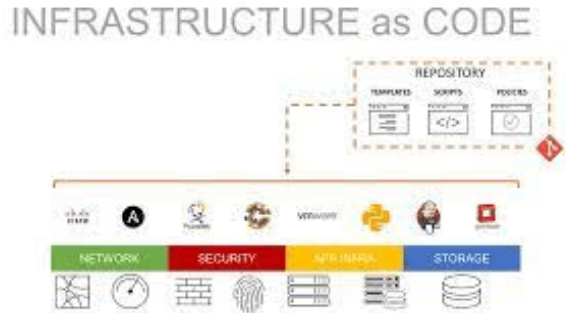
CLOUD MANAGEMENT PLATFORMS

Cloud Management Platforms (CMPs) are software tools that enable organizations to manage their cloud resources more efficiently. These platforms provide a central interface for managing multiple cloud environments, including public, private, and hybrid clouds. CMPs can automate tasks such as resource provisioning, workload management, and cost optimization, which can help reduce operational complexity and improve productivity.



INFRASTRUCTURE AS CODE (IAC)

Infrastructure as Code (IaC) is an approach to managing IT infrastructure that uses machine-readable files to describe infrastructure configurations. This approach enables IT teams to automate the deployment and management of infrastructure resources, which can improve efficiency and reduce errors. IaC also provides greater visibility and control over infrastructure configurations, which can help ensure consistency and compliance.



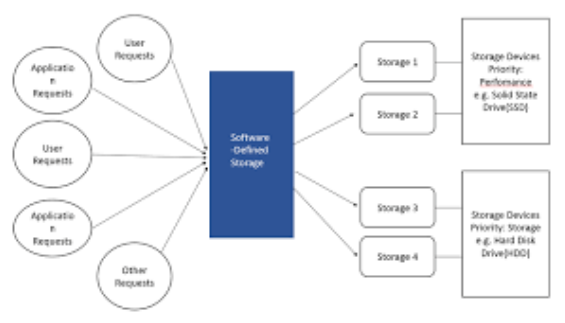
CONCLUSION

In conclusion, **Software Defined Cloud** is a modern IT infrastructure that enables organizations to deploy applications and services faster, more efficiently, and with greater flexibility. By leveraging technologies such as SDN, virtualization, CMPs, and IaC, organizations can create dynamic and programmable cloud environments that can be customized to meet specific business needs. This approach can help organizations reduce costs, improve agility, and stay competitive in a rapidly changing market.

SOFTWARE DEFINED STORAGE

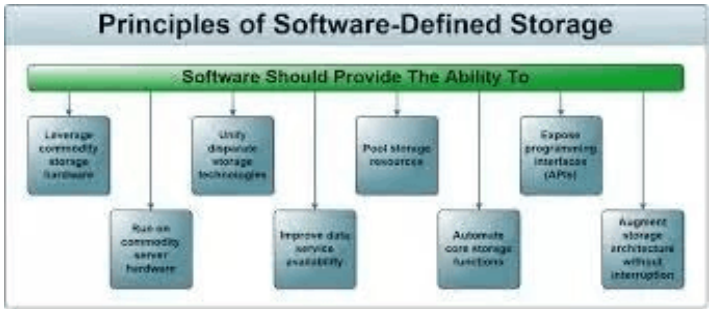
INTRODUCTION

Software Defined Storage (SDS) is an approach to data management that separates storage hardware from the software that manages it. With SDS, the software layer controls the storage infrastructure, allowing for greater flexibility and scalability.



BENEFITS OF SDS

SDS offers several benefits, including **lower costs**, **simplified management**, and **greater scalability**. By decoupling hardware from software, organizations can use commodity hardware and avoid vendor lock-in. SDS solutions also provide a unified view of storage resources, making it easier to manage and scale the storage infrastructure as needed.



KEY COMPONENTS OF SDS

The key components of SDS include **software-defined storage controllers**, **virtualization technology**, and **data services**. Software-defined storage controllers act as the brain of the SDS system, while virtualization technology separates the storage hardware from the software. Data services provide advanced functionality such as data deduplication, compression, and encryption.

USE CASES FOR SDS

SDS is ideal for a variety of use cases, including **private cloud storage**, **data backup and recovery**, and **big data analytics**. SDS solutions can be deployed on-premises or in the cloud, and can be easily scaled to meet changing storage needs.

CHALLENGES OF SDS

While SDS offers many benefits, it also presents some challenges. **Integration with legacy systems** and **security concerns** are two major challenges faced by organizations adopting SDS. It's important to carefully plan and execute an SDS deployment to ensure a smooth transition.

CONCLUSION

Software-defined storage is a powerful tool for organizations looking to improve storage flexibility, scalability, and cost-effectiveness. By decoupling hardware from software, organizations can take advantage of commodity hardware and avoid vendor lock-in. While SDS presents some challenges, careful planning and execution can help organizations successfully deploy and manage an SDS solution.