SNS COLLEGE OF TECHNOLOGY

Coimbatore-35

An Autonomous Institution

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Chennai

DEPARTMENT OF ELECTRONICS & COMMUNICATION ENGINEERING

19ECT213- IoT SYSTEM ARCHITECTURE

II ECE / IV SEMESTER

UNIT 4 – CLOUD PLATFORMS FOR IoT

TOPIC 2 –Virtualization Concepts and Cloud Architecture

WHAT IS CLOUD ARCHITECTURE

Cloud architecture is the way technology components combine to build a cloud, in which resources are pooled through virtualization technology and shared across a network. The components of a cloud architecture include:

- A front-end platform (the client or device used to access the cloud)
- A back-end platform (servers and storage)
- A cloud-based delivery model
- A network

Together, these technologies create a cloud computing architecture on which applications can run, providing end-users with the ability to leverage the power of cloud resources.

BENEFITS OF CLOUD ARCHITECTURE

Cloud computing architecture enables organizations to reduce or eliminate their reliance on an on-premises server, storage, and networking infrastructure.

Organizations adopting cloud architecture often shift IT resources to the public cloud, eliminating the need for on-premises servers and storage, reducing the need for IT data center real estate, cooling, and power, and replacing them with a monthly IT expenditure.

This shift from capital expenditure to operating expense is a major reason for the popularity of cloud computing today.

TYPES OF CLOUD SERVICES

- There are three major models of cloud architecture that are driving organizations to the cloud. Each of these has its own benefits and key features. They are SaaS, PaaS, IaaS

- **Software as a Service (SaaS)**

    SaaS architecture providers deliver and maintain applications and software to organizations over the Internet, thereby eliminating the need for end users to deploy the software locally. SaaS applications are typically accessed via a web interface available from a broad variety of devices and OSes.
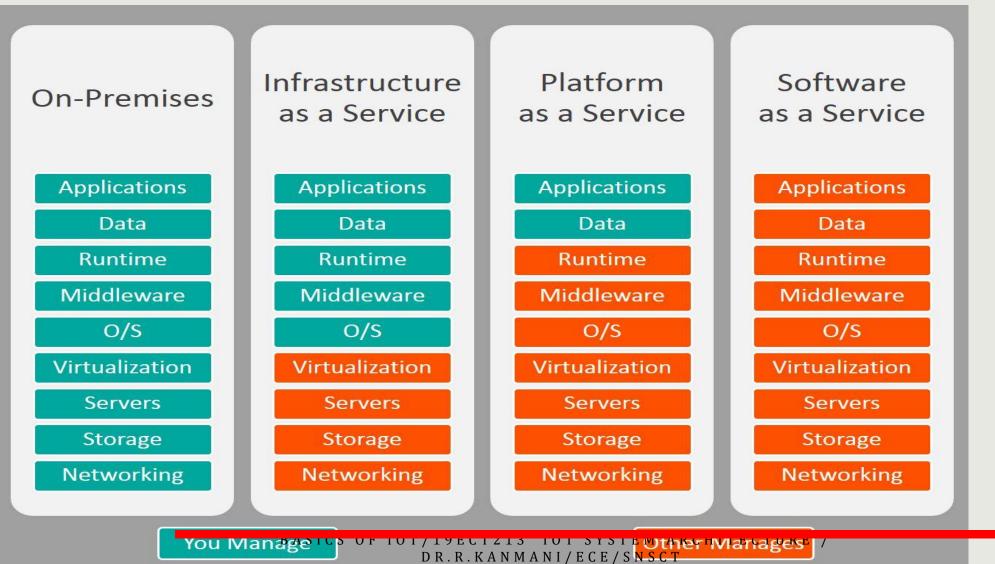
Platform as a Service (PaaS):

In this cloud model, the service provider offers a computing platform and solution stack, often including middleware, as a service. Organizations can build upon that platform to create an application or service. The cloud service provider delivers the networks, servers, and storage required to host an application while the end user oversees software deployment and configuration settings.

Infrastructure as a Service (IaaS):

In this, cloud at its simplest form, a third-party provider eliminates the need for organizations to purchase servers, networks, or storage devices by providing the necessary infrastructure. In turn, organizations manage their software and applications and only pay for the capacity they need at any given time.

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

You Manage

Other Manages

CLOUD ARCHITECTURE MODELS

- Although no two clouds are alike, there are a number of common cloud architecture models. These include public, private, hybrid, and multi-cloud architectures. Here is how they compare:

- **Public cloud architecture:**

  In a public cloud architecture, computing resources are owned and operated by a cloud services provider. These resources are shared and redistributed across multiple tenants via the Internet. Advantages of the public cloud include reduced operating costs, easy scalability, and little to no maintenance.

- **Private cloud architecture:**

  Private cloud refers to a cloud that is owned and managed privately, usually in a company's own on-premises data center. However, the private cloud can also span to include multiple server locations or leased space in geographically scattered colocation facilities. Although typically more expensive than public cloud solutions, private cloud architecture is more customizable and can offer stringent data security and compliance options.

- **Hybrid cloud architecture:**

  A hybrid cloud environment combines the operating efficiencies of the public cloud and the data security capabilities of the private cloud. By utilizing both public and private cloud architectures, hybrid clouds help consolidate IT resources while enabling organizations to migrate workloads between environments depending on their IT and data security requirements.

- **Multi-cloud architecture:**

  A multi-cloud architecture is one that uses multiple public cloud services. The advantages of a multi-cloud environment include greater flexibility to choose and deploy the cloud services that are most likely to satisfy varying organizational requirements. Another upside is reduced reliance on any single cloud services vendor for greater cost savings and a lower likelihood of vendor lock-in. Additionally, multi-cloud architecture may be required to support microservices-based containerized applications, where services exist on multiple clouds.

IoT CLOUD PLATFORM

- IoT cloud platforms bring together capabilities of IoT devices and cloud computing delivered as a end-to-end service

- There are several IoT Cloud Platforms in the market today provided by different service providers that host wide ranging applications. These can also be extended to services that use advanced machine learning algorithms for predictive analysis, especially in disaster prevention and recovering planning using data from the edge devices.

- An IoT cloud platform may be built on top of generic clouds such as those from Microsoft, Amazon, Google or IBM.

- In general, there are two kinds of IoT software architectures:

- **Cloud-centric:** Data from IoT devices such as sensors are streamed to a data centre where all the applications that do the analytics and decision making are executed, using real-time and past data from one or more sources. Servers in the cloud control the edge devices too.

- **Device-centric:** All the data is processed in the device (sensor nodes, mobile devices, edge gateways), with only some minimal interactions with the cloud for firmware updates or provisioning. Terms such Edge Computing and Fog Computing are used in this case.

THANK YOU