Introduction

Vimala Govindan (Bosch, Sr. Cloud DevOps Engineer)

- About Me…!

- About Work Experience
  - 20+ Years in IT Industry
  - Various Roles: Software Developer, Project Manager, DevOps Engineer

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Agenda

➢ Overview of Cloud Technology

➢ Bosch IoT Cloud

➢ Testing in Cloud

➢ Monitoring in Cloud - Smoke Test Framework
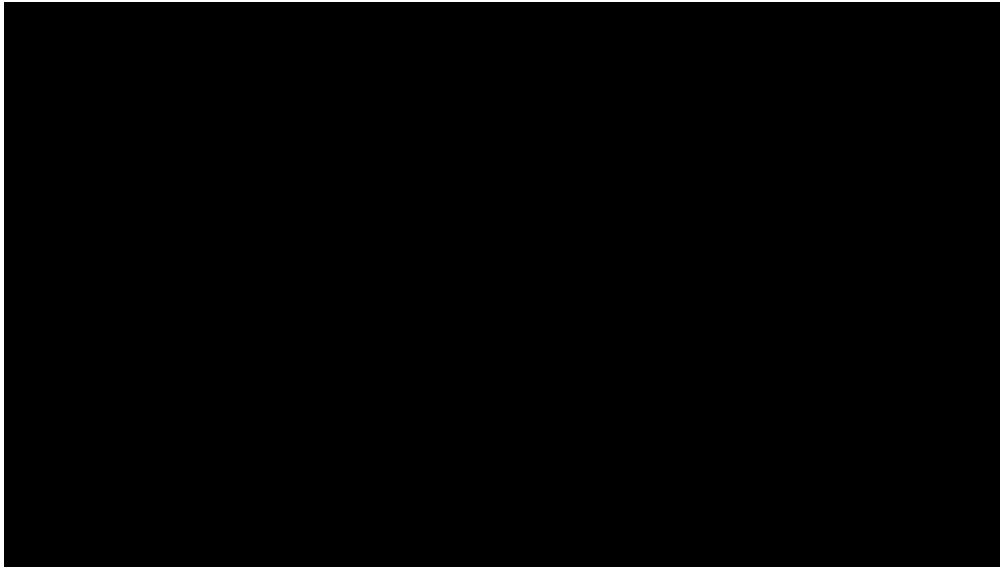
Cloud Technology

What is the "cloud" ?

- Definitions 25+
  - ➢ Delivery of hosted services over the internet
  - ➢ Enables access to shared pools of system resources and services
  - ➢ Network of remote servers hosted on the Internet to store, process and manage data
  - ➢ Storing and retrieving data (images, files etc.) and programs over the Internet instead of using one's own computer (iCloud, Dropbox)
  - ➢ A distinct IT environment that is designed for the purpose of remotely provisioning scalable and measurable IT resources

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Cloud Computing Explained

Video Link: https://www.youtube.com/watch?v=QJncFirhjPg

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Evolution of Cloud

- ➢ Year 2000 – 2005 : DOT-COM bubble forces companies to find effective ways to use IT resources
- ➢ Year 2006 : Amazon enters cloud market (S3 , AWS)
- ➢ Year 2007 – 2008 : It was not clear if the the cloud technology is the way to go or not (Google glass)
- ➢ Year 2008 – 2009 : There was movement toward Private cloud than Public
- ➢ Year 2009 – 2011 : The movement shifted toward public cloud
- ➢ Year 2011 is called "the year of cloud" with hybrid cloud movement

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Everyday use of Cloud by Individuals

- ➢ Apple iCloud
- ➢ Google Gmail
- ➢ Dropbox
- ➢ Google Drive
- ➢ Microsoft OneDrive

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Everyday use of Cloud by Corporations

- ➢ Netflix uses AWS
- ➢ Pinterest uses AWS
- ➢ Polycom uses Azure
- ➢ HP uses Azure
- ➢ Seattle Seahawks

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Major Players in Cloud

CLOUD WARS
Top 10 Rankings — Nov. 7, 2017

1. **Microsoft** — *Nadella on $20.4B run rate w/end-to-end customer-centric cloud*
2. **Amazon** -- *AWS needs software! 10 software companies Amazon might look at*
3. **IBM** — *Rometty strikes gold helping customers convert legacy IT to private cloud*
4. **Salesforce** — *Benioff must extend SFDC impact from SaaS deeply into PaaS*
5. **SAP** — *McDermott accelerating major product-line overhaul to HANA and cloud*
6. **Oracle** —*Ellison on cybercrime: 'Make no mistake, this is a war—and we're losing'*
7. **Google** — *Tons of potential but still unclear if/how it wants to play in enterprise*
8. **ServiceNow** —*Jumps ahead of Workday: revenue up 40%, new products boom*
9. **Workday** — *Q2 revenue surges 41% as Bhusri jumps into PaaS marketplace*
10. **VMware** — *revenue & stock jump on deals w/AMZN MSFT IBM GOOG for hybrid*

Reference: https://www.forbes.com/sites/bobevans1/2017/11/07/the-top-5-cloud-computing-vendors-1-microsoft-2-amazon-3-ibm-4-salesforce-5-sap/#cb5cc426f2eb

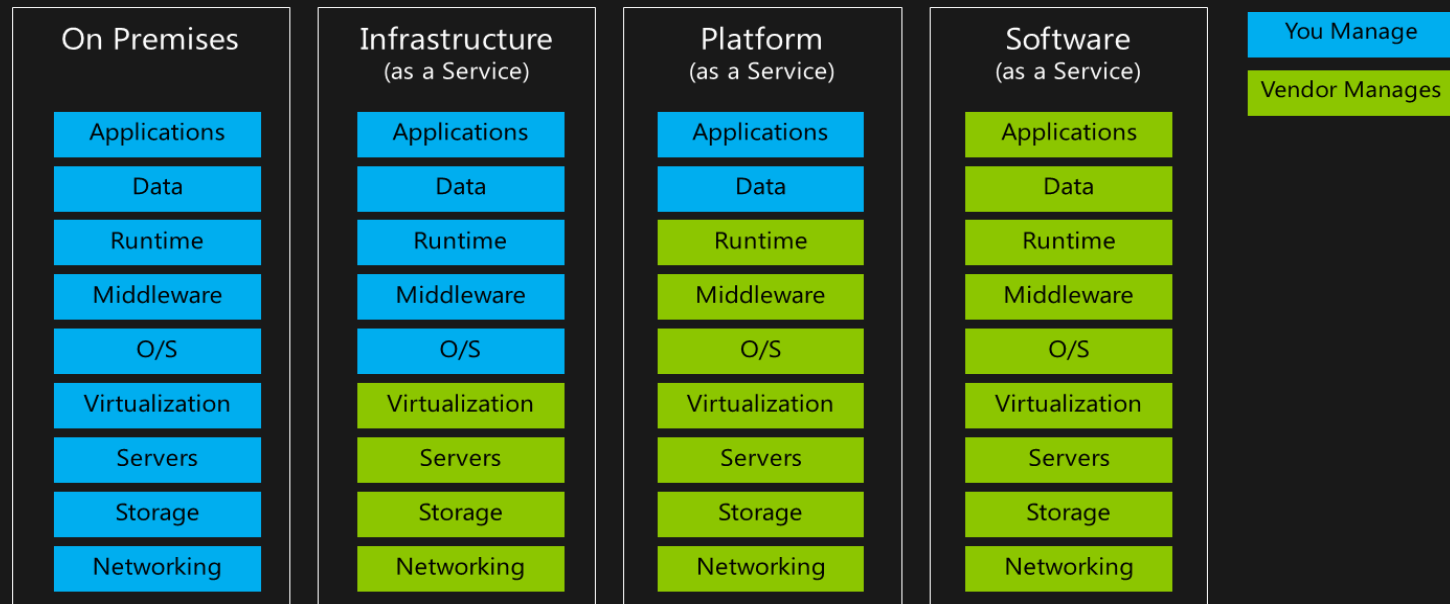# Cloud Technology

Benefits of Cloud

- ➢ Scalability (elasticity)
- ➢ Cost efficient
- ➢ Network access
- ➢ Measured consumption (pay per use)
- ➢ Self-service
- ➢ Shared resource pooling
- ➢ Ability to improve/increase time to market
- ➢ Quickly validate business model and make Go or no-go decision without spending too much on fixed assets or people
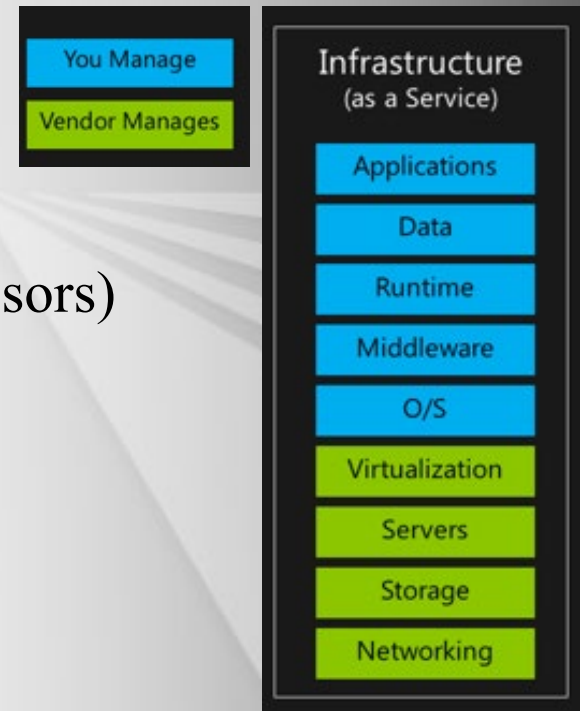
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Deep Dive

Cloud Technology

Infrastructure as a Service(IaaS)

➢ Amazon AWS EC2

➢ Azure Virtual Machines

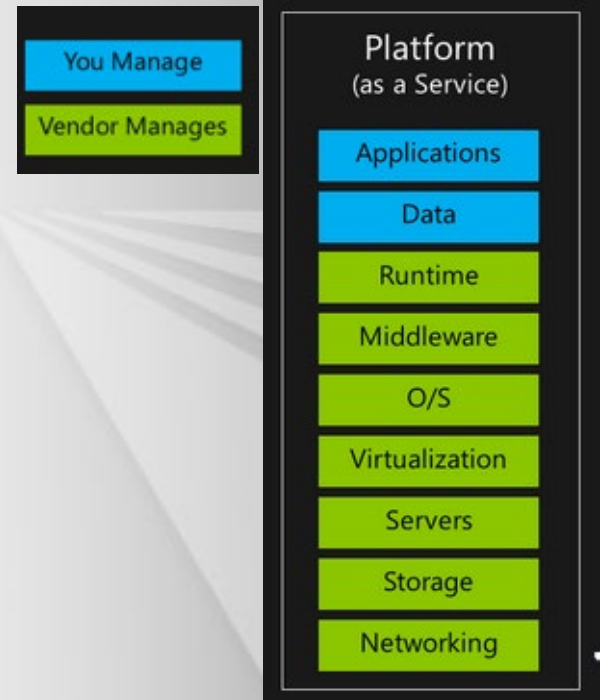➢ VMware vSphere (ESXi)

➢ OpenStack (can work with many hypervisors)

Image Reference - https://fundamentalcloud.wordpress.com/2015/08/21/how-would-you-explain-iaas-paas-saas-to-your-mom

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Platform as a Service(PaaS)
- ➢ Amazon AWS Elastic Beanstalk
- ➢ Azure Cloud Service
- ➢ Cloud Foundry
- ➢ Pivotal Cloud Foundry
- ➢ RedHat's OpenShift

Image Reference - https://fundamentalcloud.wordpress.com/2015/08/21/how-would-you-explain-iaas-paas-saas-to-your-mom

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Keywords
- IaaS (Infrastructure as a Service)
- PaaS (Platform as a Service)
- SaaS (Software as a Service)
- Elasticity
- Virtualization / Virtual Machines
- Private, Public and Hybrid cloud
- 12 Factor app / Cloud Native
- Tenant / Multi Tenant

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Quiz

➢ Name couple of top cloud service providers ?
➢ The 3 layer that make up cloud platform?
➢ Name some of the key benefits of cloud?
➢ What does IaaS, PaaS and SaaS stand for ?

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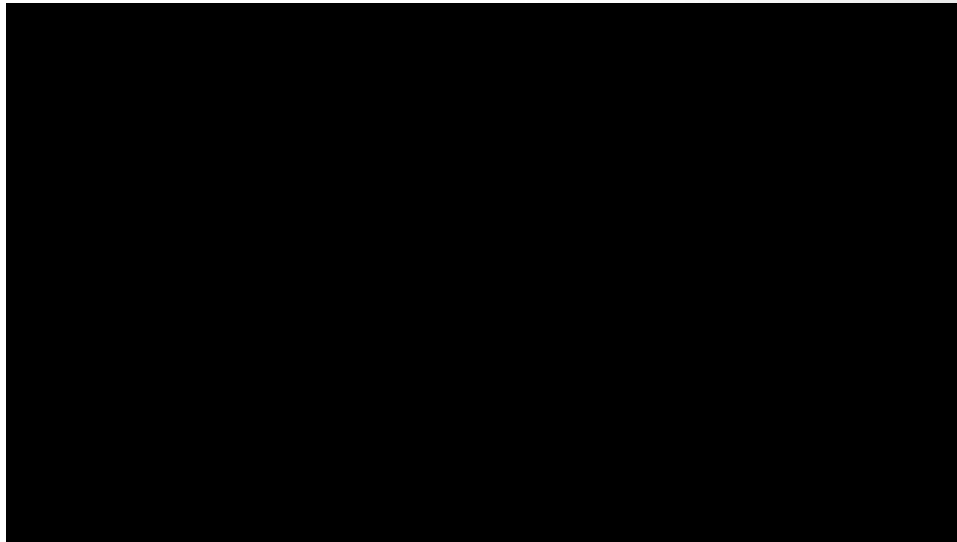
Bosch IoT Cloud

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About Bosch

- ➢ Bosch is a Germany company headquartered in Gerlingen, near Stuttgart, Germany
- ➢ About 400K employees
- ➢ Focus Areas: Mobility Solutions, Consumer Goods, Industrial Technology and Energy and Building Technology

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Bosch Launches Its Own IoT Cloud

Video   https://youtu.be/mm85yY70uCk

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**Bosch Enters into Cloud Business**

- ➢ Bosch manufactures many types of devices and appliances: medical devices, power tools, dish washer and cooktops and many type of sensors
- ➢ Bosch in Sensors: motion, environmental and optical
- ➢ Motion Sensors example – eCompass high precision sensors for compass applications in smart phones and navigation system
- ➢ Environmental – to measure gas, pressure, humidity and temperature used in IoT and Wearable application
- ➢ Optical – Microscanner (like pico-projector) used in robotics and IoT applications

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Bosch Enters into Cloud Business

➢ Optical – Microscanner (like pico-projector) used in robotics and IoT applications
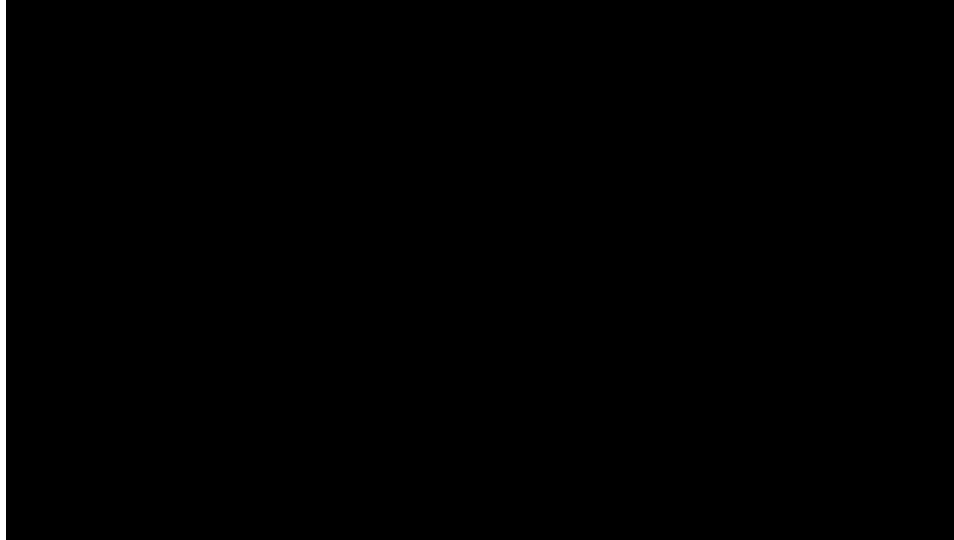
➢ Video https://youtu.be/_8zq1JoI_eY

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Bosch Cloud Implementation
- ➢ In 4 countries
- ➢ 5 instances/setup
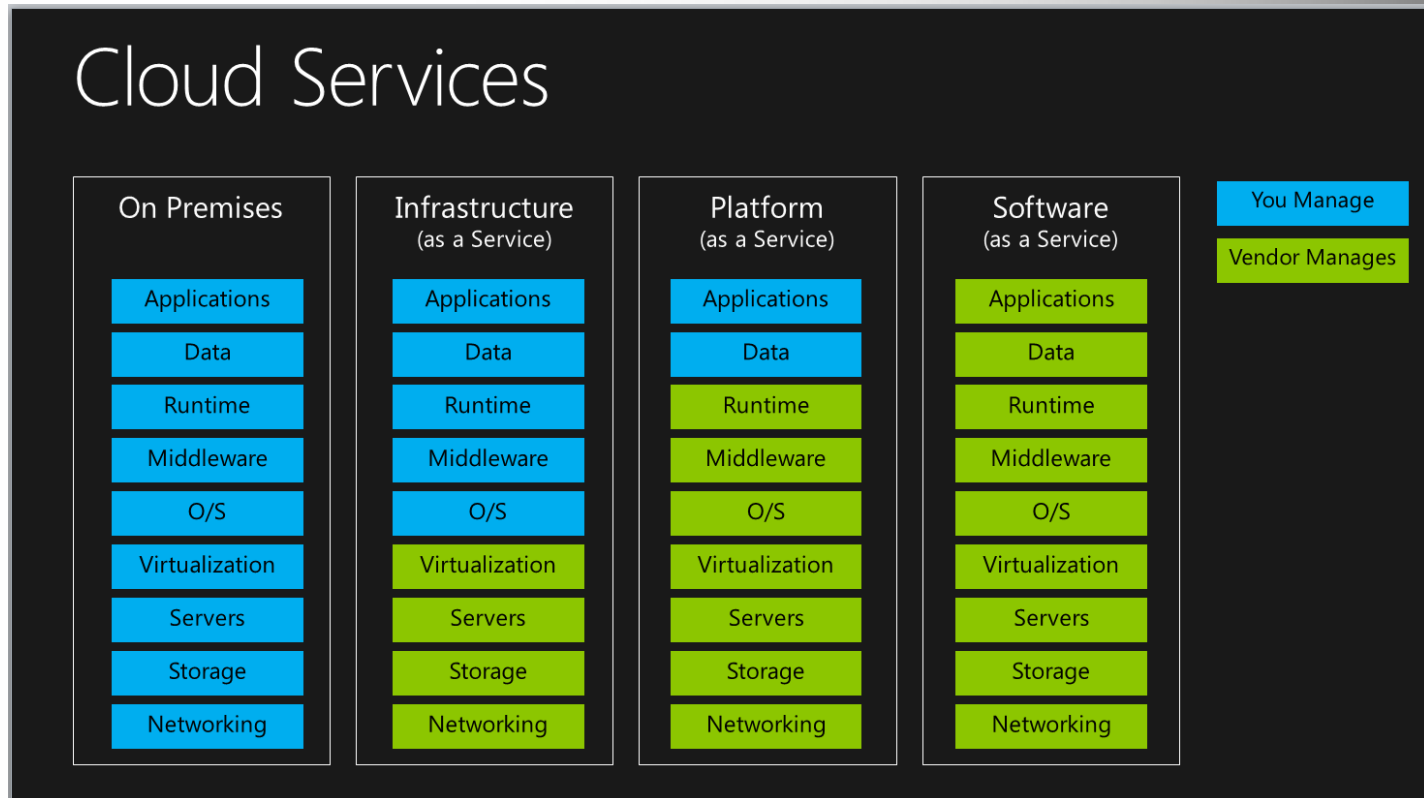- ➢ Global Architecture

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Bosch IoT Cloud

➢ **IoT (Internet of Things) Cloud:**
  ➢ Provides services to interface with various sensors (connected devices)
  ➢ Can handle very high volumes of data generated by devices, sensors, websites and applications
  ➢ Initiate actions for real-time responses
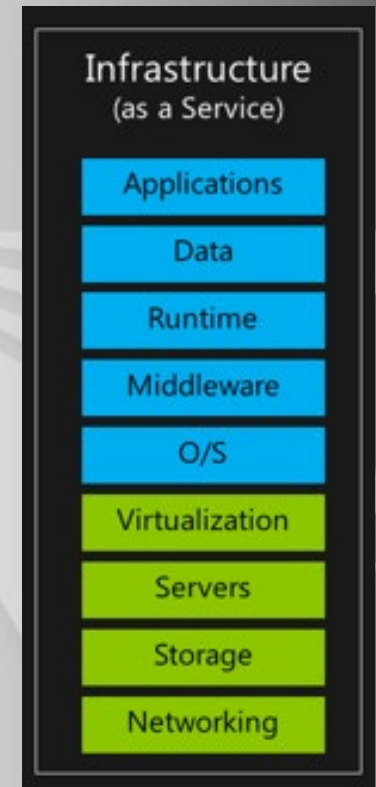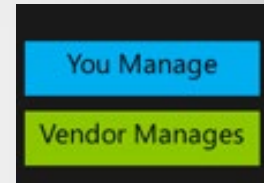
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Products used by Bosch

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Infrastructure as a Service (IaaS)

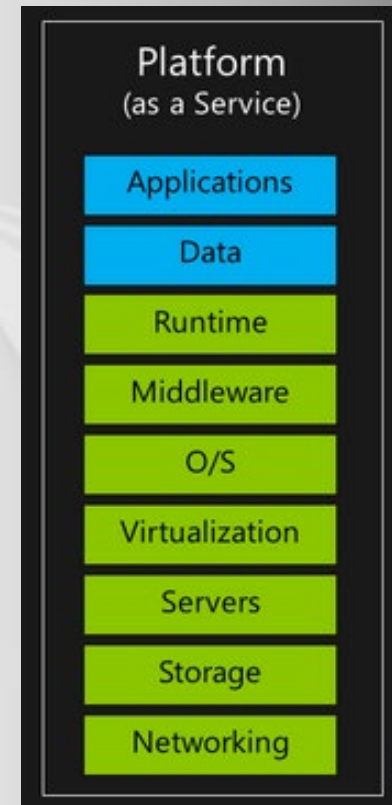➢ VMware vSphere Product Suite
➢ VMware vRealize Product Suite

Image Reference - https://fundamentalcloud.wordpress.com/2015/08/21/how-would-you-explain-iaas-paas-saas-to-your-mom

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Platform as a Service (PaaS)
➢ Pivotal Cloud Service

You Manage
Vendor Manages

Platform
(as a Service)

Applications
Data
Runtime
Middleware
O/S
Virtualization
Servers
Storage
Networking

Image Reference - https://fundamentalcloud.wordpress.com/2015/08/21/how-would-you-explain-iaas-paas-saas-to-your-mom
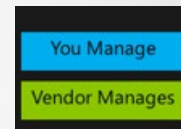
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Bosch IoT Suite

➢ Using the Bosch IoT Suite services, developers can quickly build, implement, and operate cloud-based and highly scalable IoT applications. The Bosch IoT Suite provides core functionality for the most common IoT scenarios:

- reliably managing devices, machines, and gateways
- providing secure access management
- executing software rollout processes
- connecting third-party systems and services
- and analyzing data

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Bosch IoT Suite
- ➢ Bosch IoT Analytics
- ➢ Bosch IoT Gateway Software
- ➢ Bosch IoT Hub
- ➢ Bosch IoT Permissions
- ➢ Bosch IoT Remote manager
- ➢ Bosch IoT Rollouts
- ➢ Bosch IoT Things

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Bosch IoT Suite

- ➢ Bosch IoT Gateway Software(Indirect Connection)
  - ➢ Supports indirect connection of devices via gateways (I.e., for data privacy reasons and many other use cases)

- ➢ Bosch IoT Hub (Connectivity)
  - ➢ Easy and secure device connectivity for the IoT

- ➢ Bosch IoT Remote manager
  - ➢ Responsible for device configuration, monitoring, and remote maintenance(both directly connected and through gateway)

- ➢ Bosch IoT Permissions (user and permission management)
  - ➢ Authentication and Authorization management for IoT applications

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Bosch IoT Suite

- ➢ Bosch IoT Analytics (Data Analytics)
  - ➢ Provides a set of services that greatly simplifies the analysis and use of field/device data.

- ➢ Bosch IoT Rollouts
  - ➢ Provides functionality to reliably provision and update software on IoT gateways and devices

- ➢ Bosch IoT Things(Digital Twin)
  - ➢ Enables the creation of an abstract representation of a real-world asset/device (any "thing") in the cloud.
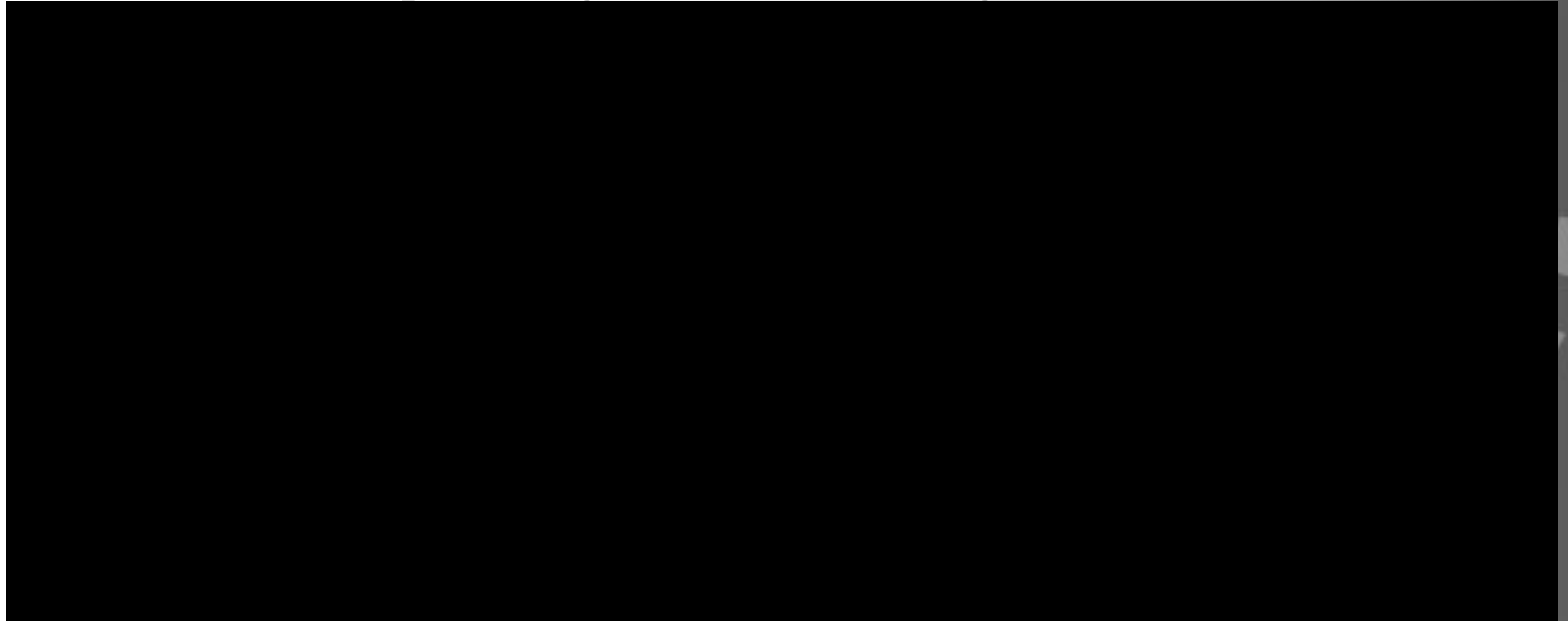
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Use Cases

➢ Connected Vehicles: HUK-COBURG smart driver program

➢ Smart Home : The Bosch Smart Home System

➢ Smart Agriculture: Harvest optimization (asparagus, oyster strawberry farms)

➢ Learn more about oyster farming http://bit.ly/2Epor7f

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Bosch IoT Cloud – Use Case (Greenhouse Farming)

➤ Smart solution to optimize greenhouse farming

➤ Video - https://youtu.be/15AoWrCJOSo

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Testing in Cloud

- ➤ QA setup
- ➤ T1 - Infrastructure hardware and environment update and configuration testing
- ➤ T2 – PaaS/Runtime Development and Testing
- ➤ T3 – Runtime and platform service integration and validation
- ➤ T4 – Platform Patching (keep the system close to prod)

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Quiz

- ➢ What does the IoT stands for ?
- ➢ What is Bosch cloud system called?
- ➢ What product does Bosch use to support their IaaS layer?
- ➢ What product does Bosch use to support their PaaS layer?
- ➢ What does Bosch do to do their testing in Cloud?
- ➢ Name one use case that we discussed that uses Bosch IoT cloud?

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Smoke Test Framework

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Smoke Test Framework

> The Smoke Test Framework is a monitoring concept for checking and reporting the availability of a service and/or a service plan

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Smoke Test Framework

➢ The primary goal of a monitoring smoke test is to answer the following questions:

  ➢ Are existing services up and running from a customer perspective?

  ➢ Can the customer request a new service and/or remove existing ones?

  ➢ Basically fulfills the requirement for SLA and SLR

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SLA and SLR concepts

- ➢ SLA (Service Level Availability)
  A SLA is a formal negotiated agreement between the servicer provider and the customer. It can cover many aspects of the service like service availability, performance, customer service, billing etc.
- ➢ SLR (Service Level Reporting)
  SLR is a service running on PCF ERT which determines the downtime events and send it to 'Usage Server'
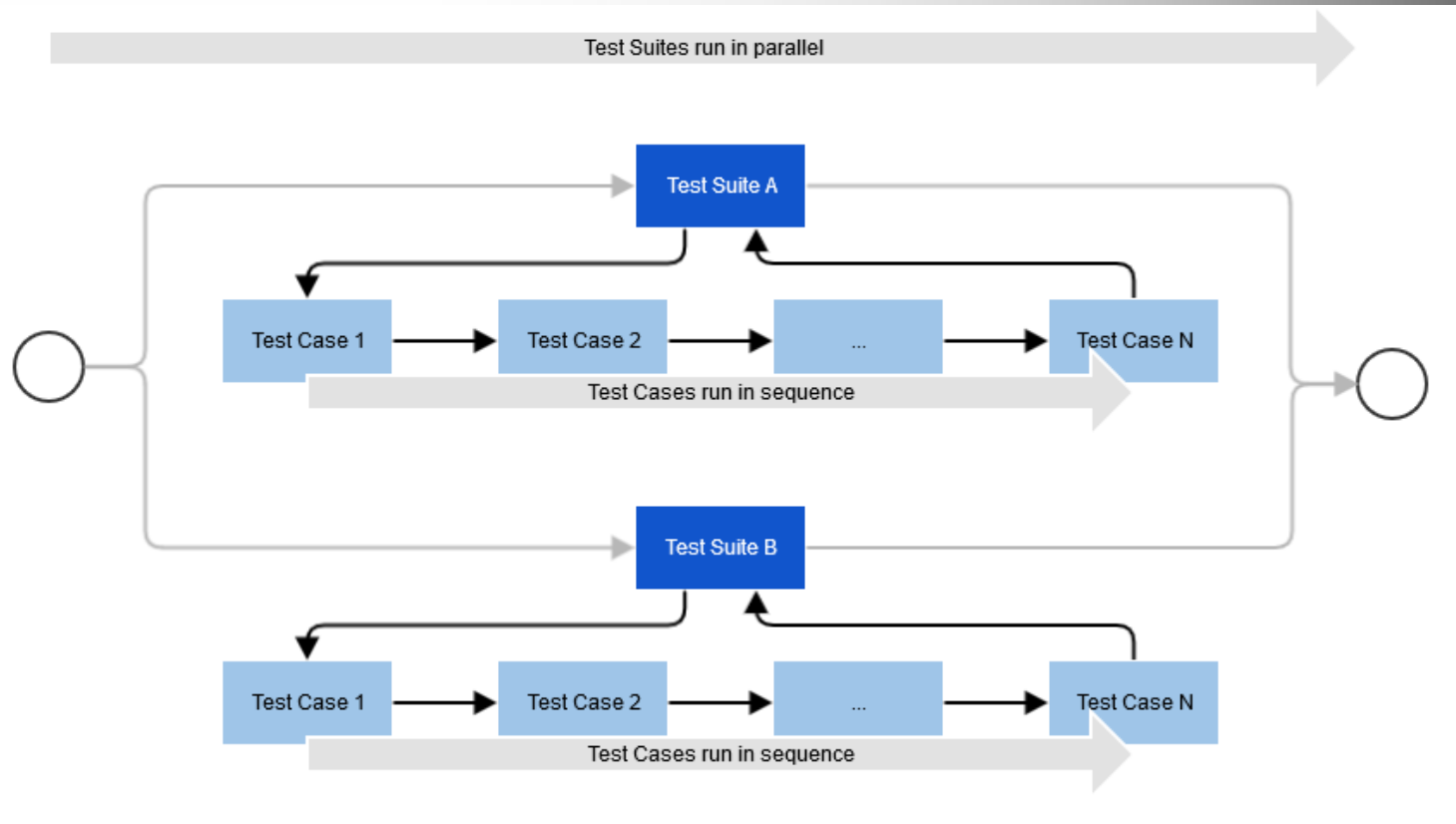
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Main Components

- ➤ vRealize Orchestrator(VRO)
- ➤ vRealize Operations Manager(vROPs)
- ➤ VRealize Log Insight(vRLI)
- ➤ Pivotal Cloud Foundry(PCF)

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Test Suite and Test Case

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Service Availability

It covers two aspects of availability:

- ➢ Static Test: Availability of a running service instance:
    - ➢ Periodically call the deployed test app in order to perform few basic functionalities
- ➢ Dynamic Test: Availability of a service life cycle (manageability)
    - ➢ Order a new instance of a service from the marketplace and do the testing

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References and Citations

➢ Cloud Wars
➢ *Cloud Wars*
➢ Cloud Fundamentals

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Videos Links

1. Cloud Computing Explained - https://www.youtube.com/watch?v=QJncFirhjPg
2. Bosch Sensor(Optical Projector) - https://youtu.be/_8zq1JoI_eY
3. Bosch IoT Cloud Launch - https://youtu.be/mm85yY70uCk
4. Use Case – Greenhouse Farming - https://youtu.be/15AoWrCJOSo