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GIST: Cloud Computing

SGA07_DATASCI

17th March 2020

Module Overview

- Overview of Cloud Computing
- Micro-Service Architecture for PaaS
- Servers, Database and AI SaaS
- Web Technologies

Book Keeping

- Group task: Reviews by 27th March 2020
- Review of effectiveness of last Thursday live session?

Supercomputing

- Breakthrough in personal computers
- Increasing demand for computation-intensive applications
- Architecture
  - Homogenous
  - Heterogenous
- Types
  - Cluster Computing
  - Grid Computing
  - Cloud Computing

Cloud Computing (Def.)

- Agility: Reuse and repurpose hardware resources rapidly
- Elasticity: Scalable resources to match on-going demand
- Speed: Quick delivery of applications from concept to production
- Utility: Cost-effectiveness with on-demand pricing

> Cloud Computing enables ubiquitous computing, where computing is made to appear anytime and everywhere, using any device, in any location and in any format.

Cloud Service Models

IaaS

IaaS cloud service models, a set of physical assets, such as servers, network devices and storage disks are offered as dedicated and privately accessible to consumers

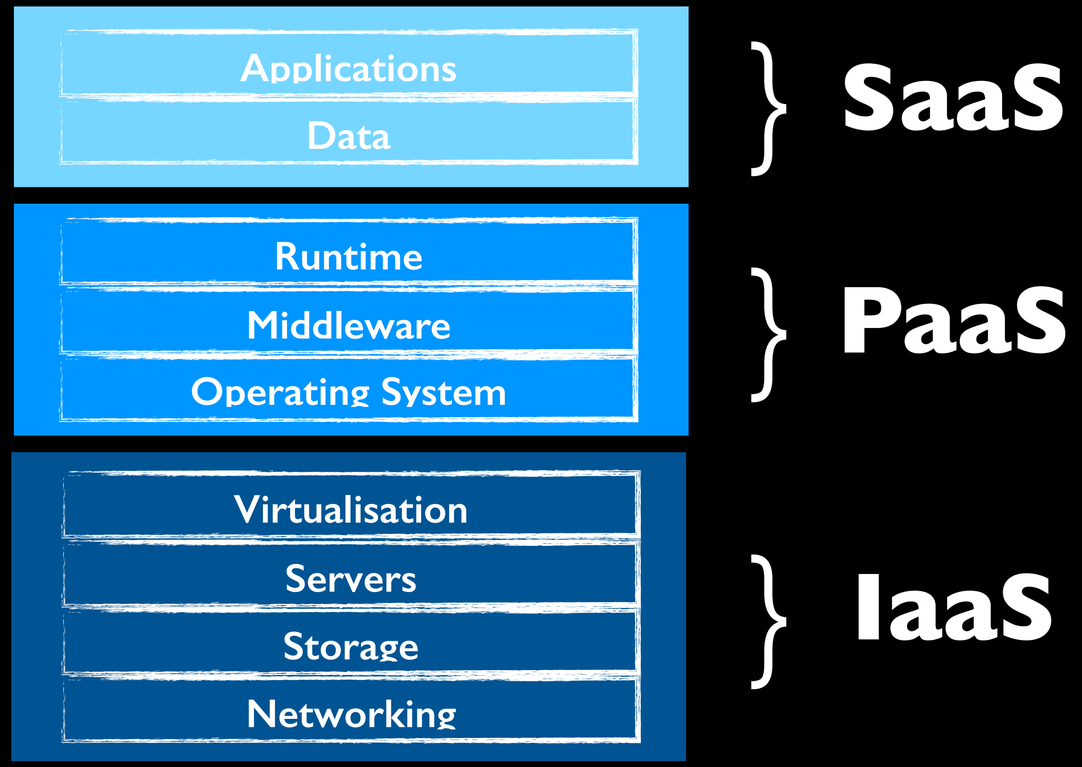
PaaS

PaaS cloud service models, in which application framework and runtime is a self-service, shared, virtualised entity with the goal to focus on agile application development

SaaS

SaaS cloud service models, on-demand software applications delivered to user over the internet as opposed to desktop applications. Ex: Google, Facebook & Uber

Technology Stack



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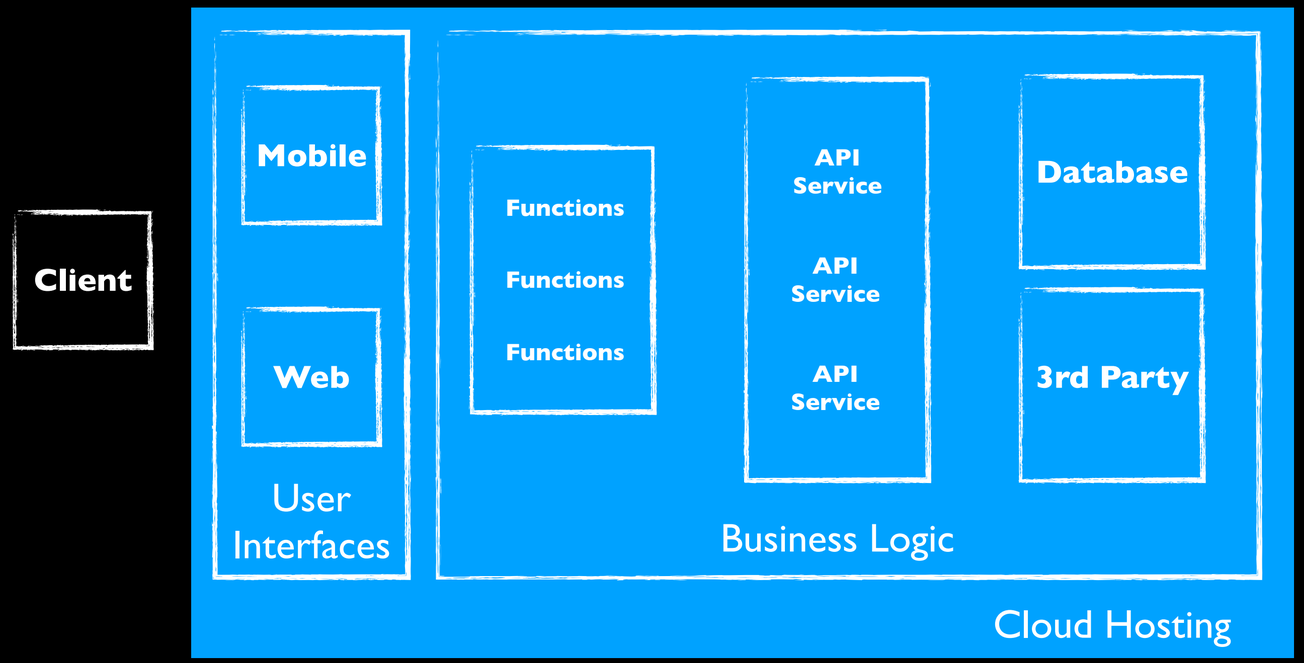
Micro-Service Architecture

- Scalability
- Availability
- Resiliency
- Flexibility
- Independence, autonomous
- Decentralised governance
- Failure isolation
- Auto-provisioning
- Continuous delivery through DevOps



Monolithic vs Micro-Service

	Monolithic	Micro-Service
Size	Single self-contained unit	Very small function-oriented independent services
Granularity	Tightly coupled with low cohesion	Loosely coupled with high cohesion
Ease of Deployment	Requires recreating and redeploying entire application	Each service can be built and deployed independently
Remote Call Overhead	Low/None	High communication overhead due to increase in remote calls
Speed of Deployment	Very slow deployment speeds	Rapid and continuous deployment
Persistence	All services in a monolithic application share data storage	Each service is free to choose its own data storage
Ease of Onboarding	Can be difficult to on-board new developers	Easy to on-board new developers
Polyglot Programming	Utilize a single technology stack	Can utilize a different technology stack per service
Communication Method	Language-level or procedure calls	Communicates via API layer with lightweight protocols like REST
Scalability	Horizontally scalable, can be very challenging to scale as application becomes larger	Vertically and horizontally scalable through use of containers and the cloud

IBM Cloud Catalogue


Cloud Foundry


Load Balancers


Watson Assistant


Cloud Functions


Cloudant


APP ID


Kubernetes Containers


Object Storage


Knowledge Catalogue


DB2


Blockchain


IoT Platform


Virtual Servers


Internet Services


Text to Speech


API Connect


Twilio

Web Technologies (Def.)

- Internet and WWW
- Client-server architecture
- Dynamic interactions
- Web & Mobile applications

> The Internet is a global system of interconnected computer networks that use the standard Internet protocol suite (TCP/IP) to link several billion devices worldwide.

HTML

- Hyper-Text Markup Language
- Prototyped by physicist Tim Berners-Lee
- The essence of HTML programming are tags
  - <head></head>
  - <h1></h1>
  - <hr>

CSS

- Cascading Style Sheet
- Presentation layer of the user interface
- Application on inheritance (parent-child relationship)
- Using style sheets
  - External
  - Embedded
  - Inline

JavaScript

- JS is a lightweight interpreted language
- Developed by Brendan Eich at Netcape in 1994
- Supports multiple programming styles
  - Object-oriented
  - Imperative
  - Functional
- Used for both client and server-side scripting

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Web Technologies Frameworks

NodeJS

Python
Flask

ReactJS

Bootstrap

D3JS

ExpressJS

MapBox

Practice Lab

Build a web application that collects new car data information, uses a proprietary model you have developed and provides visualisation on some key trends of the mtcar dataset.

Recap/Summary

At the end of this Module, you should understand;

- Evolution of cloud computing
- Various types of cloud service models
- Overview of IBM cloud catalogue
- Overview of web technologies

Suggested Material

- https://azure.microsoft.com/en-in/overview/what-is-cloud-computing/#benefits
- https://aws.amazon.com/what-is-cloud-computing/
- https://www.tiempodev.com/blog/monolithic-vs-microservices-architecture/
- https://en.wikibooks.org/wiki/Introduction_to_Information_Technology/Web_Technologies