Introduction to Cloud computing

Agenda

- What is cloud computing?

- A comparison of existing cloud systems

- Microsoft Azure

- Useful design patterns

- Pointers to literature

- Q&A

What is cloud computing?

Cloud computing gain access to hardware and software resources, based on software architecture needs.

The main benefits are

- Global scale
  - Vertical scaling
  - Horizontal scaling
  - Geographic redundancy

- Cost
  - Pay as you go plans
  - Elastic management of resource

What is cloud computing?

Cloud computing services are defined as follow

- Infrastructure as a Service (IaaS)
  - Provide storage, virtual machines, network

- Platform as a Service (PaaS)
  - Provide middleware to host and deploy application

- Software as a Service (SaaS)
  - Usually is the goal
  - Our software, or third-party software developed on top of a cloud infrastructure

END USERS — SaaS

APPLICATION DEVELOPERS — PaaS

NETWORK ARCHITECTS — IaaS

LESS CONTROL

MORE CONTROL
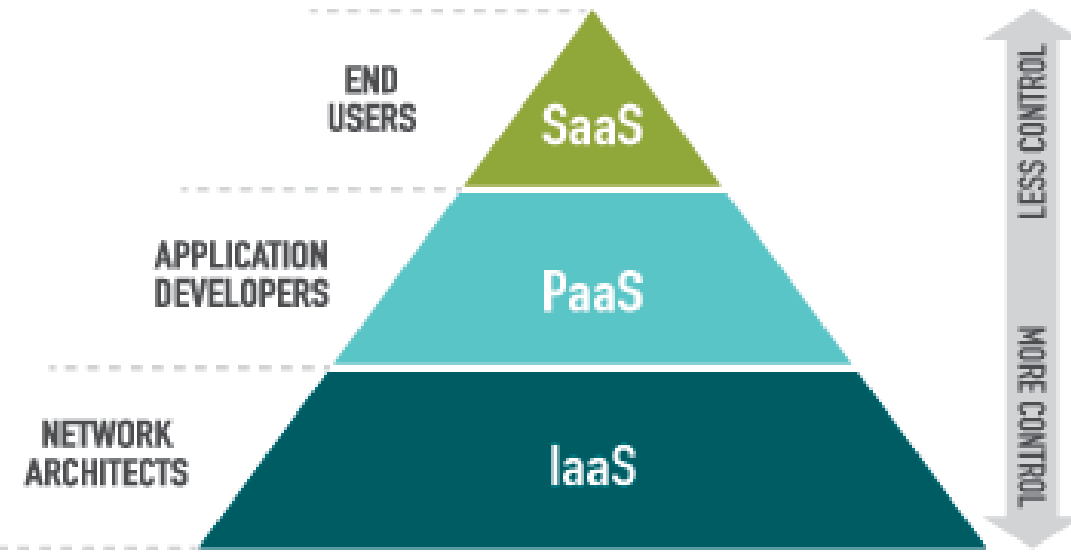
What is cloud computing?

Different types of cloud deployments

- Public cloud
  - Owned and operated by a third-party service provider. Aws, Azure, Google CP are example of public cloud
  - Different customer can access the services
  - Some services can be shared

- Private cloud
  - A cloud infrastructure used exclusively by a single organization.
  - Can be hosted on premise, or by a third party vendor behind a private network

- Hybrid cloud
  - Combine public and private cloud using techonology

Battle of the cloud - A brief comparison of competitors

On business public cloud the main competitors are:

- Amazon Web Services (Aws)

- Google Cloud Platform (GCP)

- Microsoft Azure

Amazon Web Services

- AWS started on 2006

- Offers several services for cloud computing

- EC2 (Elastic cloud compute) handle all the compute services

- S3 (Simple Storage Service) , considered the best service for storage, but...

- RDS (Relational Database Service) offers different support for major databases like Oracle, PostgreSql and others

- https://aws.amazon.com/ec2/pricing

Google Cloud computing

- Started on October 2011, at the beginnings done as private cloud for services like youtube and gmail.

- GCE (Google Compute Engine) handle all the compute resources like vm's and containers

- GCS (Google Cloud Storage) handle all storage services, is not good as AWS

- Cloud SQL is a fully-managed database based on MySql provided by Google

- https://cloud.google.com/pricing/

Microsoft Azure

- Started in GA 6 years ago

- Offers Virtual Machine, Scale Sets and other services for virtualization and containers

- Sql Azure is the reference for DB on Azure

- Storage is provided as containers, can support table, queue and blob

- https://azure.microsoft.com/en-us/pricing/

Azure services for computing

- Virtual machines are just the beginnings of the cloud journey in Azure

- There are different kind of VM family specialized by
  - Cpus
  - Ram
  - Disk type

- The basic family is the A Family (V2) , there are also family for high performance computing like F family or N family for Cuda computation provisioning Nvidia hardware

- https://docs.microsoft.com/en-us/azure/virtual-machines/virtual-machines-windows-sizes

Containers on Azure

- Container services enable access to microservice infrastructure

- Azure Service Fabric is a distribuited platform for deploy, package and manage scalable microservice architecture (https://docs.microsoft.com/en-us/azure/service-fabric/service-fabric-overview)

- Azure also support Docker containers and Kubernetes for orchestration

Cloud Services

One of the first services on the PaaS layer of Azure was Cloud Services

Offers different runtime to host different application type

Horizontal scalability is provided by software packaging

App service

In 2012 / 2013 Azure provided two interesting services

- Azure Web app

- Mobile services

These service were extendend later, and also new services for mobile and web were added.

Now these services co-exist as «App-Service»

Sql Azure

Sql Azure is part of the PaaS Family

Works with the concept of DTU

Handling costs is different from other PaaS or IaaS

Offers Elastic Pool to share DTU's across different databases

About Sql Azure difference with Sql Server

https://docs.microsoft.com/en-us/azure/sql-database/sql-database-transact-sql-information

Sql Azure vs Sql on premise

Configuring Sql on a Vm require

- Configuration of the VM

- Maintenance of the VM

- Configuration of Sql Server

- Maintenance of Sql Server

Sql Azure: No configuration - No maintenance – Easy to scale – Support SSMS

Event Hub & IoT Hubs

Event hub and IoT hub are two similar service able to handle high data from IP Capable devices

A full detail of Event Hub and IoT Hubs difference is available here https://docs.microsoft.com/en-us/azure/iot-hub/iot-hub-compare-event-hubs

Some of them:

- IoT Hub is bidirectional, Event Hub is not.
- IoT Hub can handle Device informatin (in json format)
- Security is per device in IoT Hub, while is not in Event Hub. Event Hub offers a share access policy
- IoT Hub support device to cloud update of blobs

Hybrid Cloud

Hybrid Cloud concept is simple: connect OnPremises solutions to Public Cloud

Different solutions are available

- Vpn
  - Simple to configure
  - Offers a 99.9Sla on VPN endpoint, not network connectivity, with a max of 200 Mbps bandwith

- ExpressRoute
  - Bandwith up to 10Gbps, with dynamic scale
  - 99.9 sla on Service and connection
  - Need a third-party connectivity provider

useful desing patterns

- Competing Consumer Pattern

- Retry pattern

https://msdn.microsoft.com/en-us/library/dn568099.aspx

Competing Consumer Pattern

A cloud applicaton can receive information and request from an huge amount of clients

Rather than process each request synchronously, a common technique is for the application to pass them through a messaging system to another service
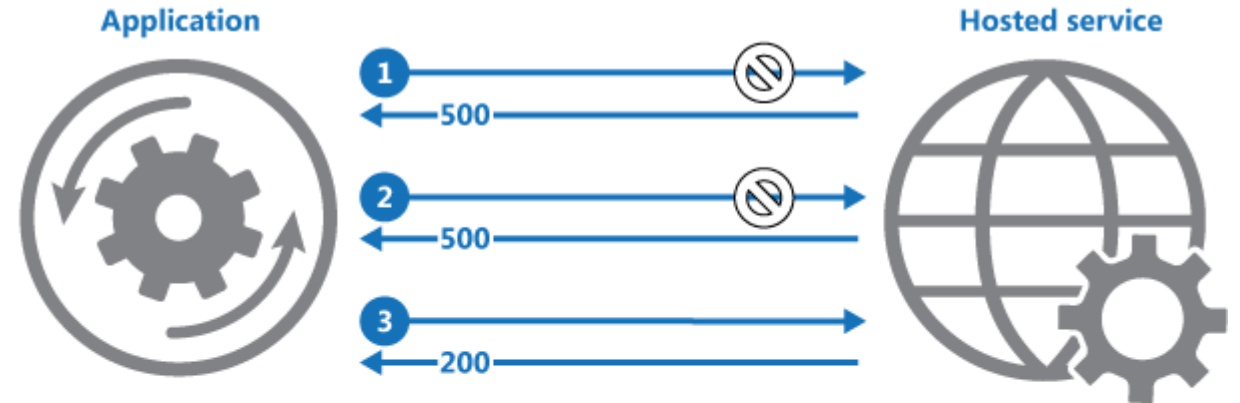
The consumer service can be a single service or a pool of service to handle high requests
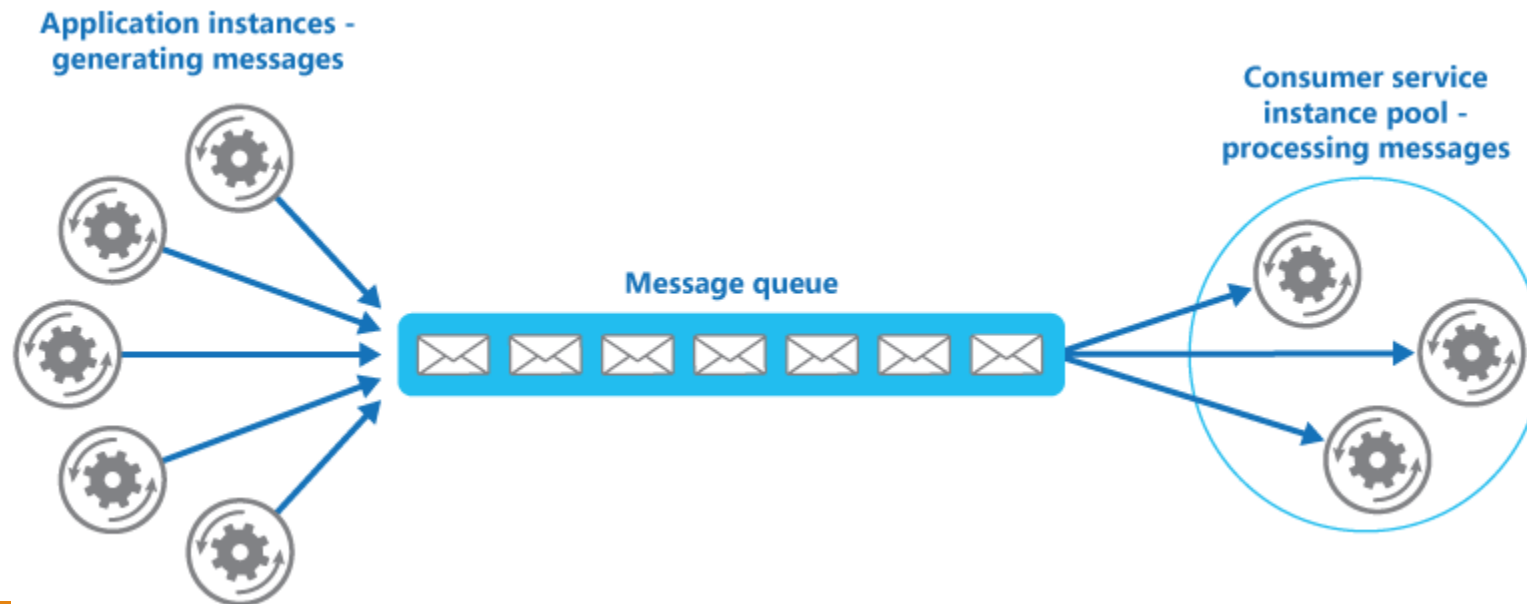
Retry Pattern

Retry Pattern is really simple. Even on a cloud infrastructure some resources cannot be accessible.

Retry pattern require to implement a strategy to check if requested resources are available, if not the scenario should retry.

Application

Hosted service

1: Application invokes operation on hosted service. The request fails, and the service host responds with HTTP response code 500 (internal server error).
2: Application waits for a short interval and tries again. The request still fails with HTTP response code 500.
3: Application waits for a longer interval and tries again. The request succeeds with HTTP response code 200 (OK).

Some references

- Channel 9
  - Different videos, and «shows» like Azure Friday

- Microsoft Virtual Academy

- https://scotch.io/

- Msdn
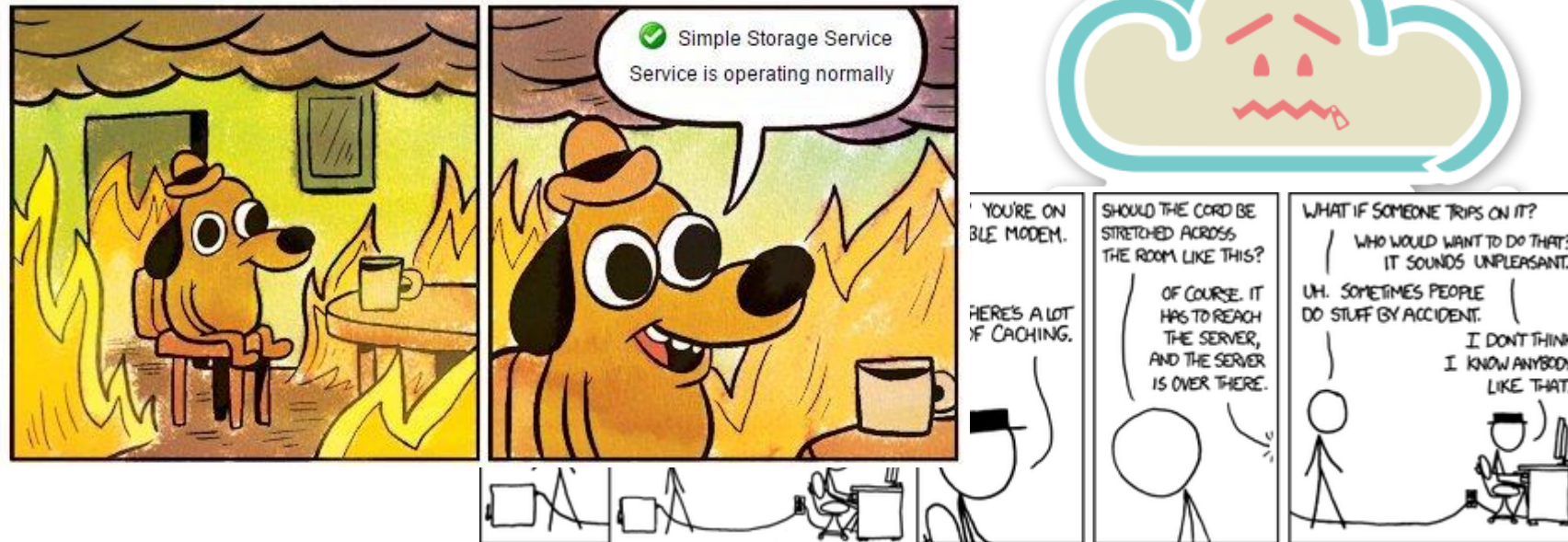
- Communities

- Slack

- http://microservices.io

How to test it?

You can require a trial on: https://azure.microsoft.com/it-it/free/

Please also download azure sdk from web platform

https://azure.microsoft.com/it-it/downloads/

Cloud can fail too

Q&A