Tutorials

- Any Issues about lab registration?
- Past exam questions
  - Total of 4 questions to answer ALL
  - Dr Gokop Goteng-Will set 2 questions from his part of the lectures
  - Dr Atm Alam-Will set 2 questions from his part of the lectures
  - Questions will be spread across lecture weeks

Tutorials

Question 1

a) The Amazon Elastic Block Store (EBS) automatically replicates data within the availability zones of the region in which it is created to provide a highly availability block storage service to users. It takes on an average 10 seconds for an EBS that is attached to an Amazon Elastic Compute Cloud (EC2) node to be restored in case of any failures. On the average, this fault occurs once every 360 days. Use this information to answer the following questions: **[15 marks]**

i) Give the mathematical formula for calculating High Availability (HA) for the EBS attached to the EC2 node as described in a). **(3 marks)**

ii) Use the formula you have provided in ai) to calculate the High Availability (HA) for the EBS attached to the EC2 node. **(3 marks)**

iii) 80% of the AWS EC2 nodes in a) are used for parallel processing and there is a total of 100 virtual Central Processing Units (vCPUs) being used for processing data. Use the **Fixed** workload and **Scaled** work load to calculate the **system efficiencies (fixed and scaled efficiencies)** of the AWS EC2 system.**(9 marks)**

Tutorials

Question 1

a) Alibaba Cloud has a compute cluster which consists of 100 Virtual Central Processing Units (VCPUs) and 40% of the VCPUs are dedicated for serial or sequential processing activities.**[15 marks]**

i) Calculate the TWO system efficiencies of this Alibaba Cloud cluster using "fixed workload" and then using "scaled workload" in TWO separate calculations. **(10 marks)**

ii) If the Alibaba Cloud cluster has a total Mean Time To Failure (MTTF) of 600 days and an average Mean Time To Repair (MTTR) of 2 days, calculate the High Availability (HA) of the cluster, showing all steps of your calculations.**(5 marks)**

b) Amazon Web Services (AWS) provides cloud services that are highly available, reliable and have disaster recovery and failover redundant systems. Describe the services and infrastructures that AWS uses to provide highly available and disaster recovery systems for its databases, elastic compute cloud (EC2) and data storage.**[4 marks]**

Question 1 (continued)

c) An Information Technology (IT) company maintains a physical computer cluster and wants to use VMWare virtualisation technology to create virtual servers for increased efficiency and performance. The company has sent its Systems Administrators to be trained on how to manage the VMWare and virtual cluster. Can you explain in at least FOUR ways the Systems Administrators will use VMWare technologies to manage both the physical and virtual machines in the newly created virtual cluster? **[4 marks]**

d) A cloud user has sent an un-encrypted data to another user via a public cloud network. Describe how to ensure that the data is not tampered with while in transit by another malicious user. **[2 marks]**

EBU7501 Class Test Timetable

Module	BUPT Teaching Week	Number of Students	Duration of Test	Date	Time	Class and Venue
Cloud Computing	16	180	2 hours	December 18th(Fri)	15:40 p.m.-17:40p.m	2017215117-2017215122 Xitucheng:3-411(class 17-19),3-539(class 20-22),3-535（back up),3-435(back up)

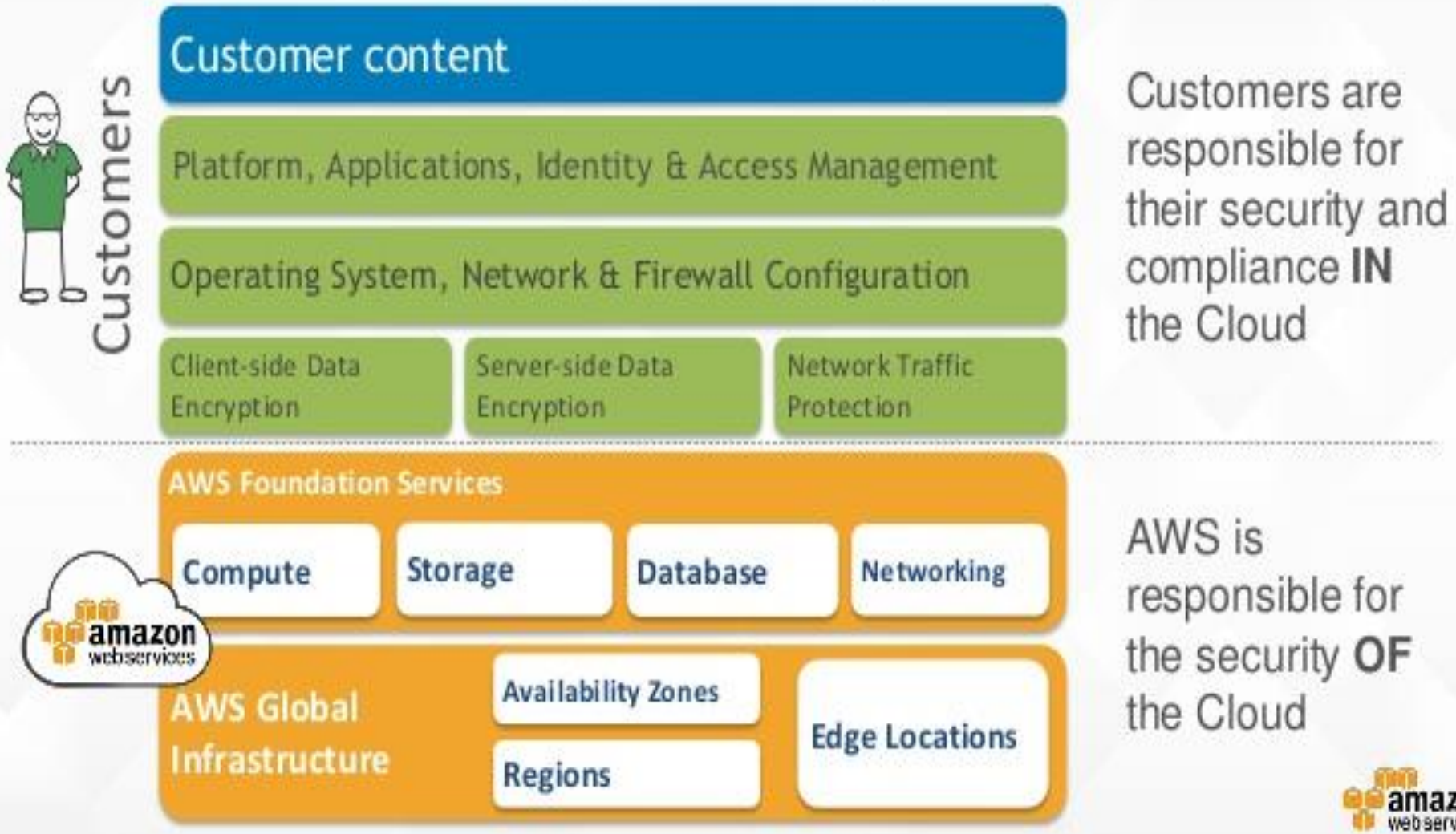
Data Integrity and Confidentiality

- Data integrity
  - The process of ensuring that the data sent across networks and cloud systems are not tampered with or changed along the way
  - Data sent should be the same data that are received
- Data Confidentiality
  - This is the process of ensuring that only people and organisations that are supposed to see or use data can see it
  - Data should be received by the right persons and not to find its way in the wrong hands

Security Configuration in Servlet

- Servlet security is used in web and cloud applications that use servlet and JSP
- The main security implementations in servlet is to address the following four concerns
  - Authentication
  - Authorisation
  - Confidentiality
  - Data integrity

AWS Shared Responsibility Model



Source: Amazon AWS

AWS IAM Multi-Factor Authentication (MFA)

- AWS IAM Multi-Factor Authentication (MFA) adds extra security because it requires users to provide unique authentication from an AWS supported MFA mechanism in addition to their regular sign-in credentials when they access AWS websites or services, eg:
  - SMS text message-based MFA: A type of MFA in which the IAM user settings include the phone number of the user's SMS-compatible mobile device.
  - When the user signs in, AWS sends a six-digit numeric code by SMS text message to the user's mobile device.
  - The user is required to type that code on a second webpage during sign-in.

Two Conditions for Trust to Exist

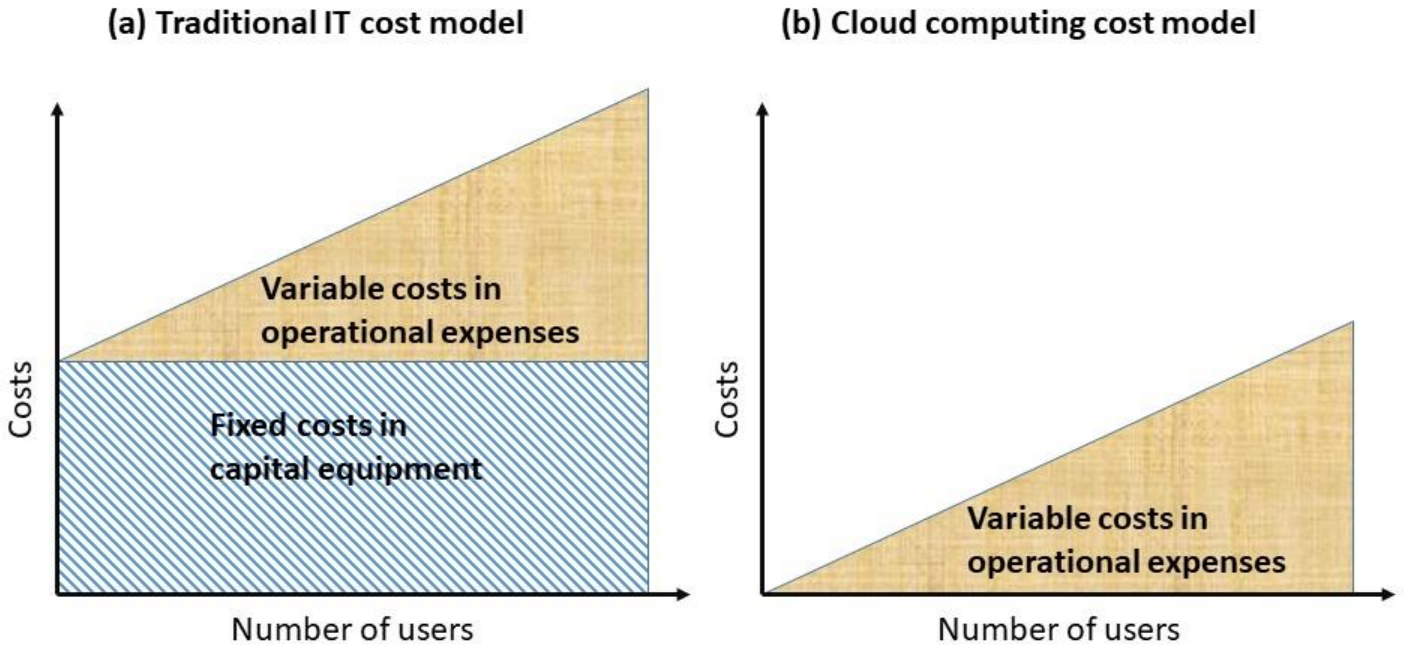
- Risk
  - Probability of loss
  - Trust will not exist if there is no risk
- Interdependence
  - The interest of one party cannot be achieved without the other party

Serverless Applications

- Serverless applications are applications that run without you having to provision servers to run and manage them.
- It does not mean that the application is not using servers, it uses servers that are automatically provisioned and managed when the application needs them without you doing anything.
- Examples of AWS Serverless services are Lambda, AWS API Gateway, AWS SQS and AWS SNS

The Economics of Cloud Computing

Cloud Cost Model



Traditional IT Cost = Upfront Capital Costs + Variable Costs

Cloud Computing Cost = Variable Costs (No any upfront capital costs)
OR

Cloud Computing Cost= Traditional IT Cost - Upfront Capital Costs

Fixed and Scaled Workloads

- Fixed speed up = Amdahl's law

  $= 1/(\alpha + ((1 - \alpha)/n))$

- Fixed Efficiency = $1/[\alpha n + 1- \alpha]$

- Scaled speed up = Gustafson's law

  $= \alpha + (1- \alpha)n$

- Scaled Efficiency = $\alpha/n + (1- \alpha)$

System Availability

- A system is said to be highly available if it has a long ***mean time to failure*** (MTTF) and a short ***mean time to repair*** (MTTR)

- System availability is given as:

  System availability = SA = MTTF/(MTTF + MTTR)