SIT706
Cloud Computing Technology

Week 11

Lecture

Cloud Computing Technology

- Flowing topics we going to cover today:
  1. NIST Essential Characteristics of Cloud Computing
  2. Azure data storage services
  3. eValue Teaching Feedback
  4. Exam Outline /Format
  5. Reading Guide for Exam Preparation

NIST Essential Characteristics of Cloud Computing

- There are NIST five essential characteristics of Cloud Computing:

1. On Demand Self service
2. Broad Network Access
3. Resource pooling
4. Rapid elasticity
5. Measured service

NIST Essential Characteristics of Cloud Computing

- On Demand Self service:
  - Computer services such as Email, Application Network, or Server service can be provided without requiring interaction with each service provider.
  - Self-service means that the consumer performs all the actions needed to acquire the service himself, instead of going through an IT department.
  - For example – The consumer's request is then automatically processed by the cloud infrastructure, without human intervention on the provider's side.

NIST Essential Characteristics of Cloud Computing

- Broad Network Access:
  Cloud capabilities are available over the network and accessed through standard mechanism that promote use by heterogeneous client such as mobile phone, laptop.

NIST Essential Characteristics of Cloud Computing

- Resource pooling:
  -The Cloud service providers resources are pooled together to serve multiple customers, with different physical and virtual resources dynamically assigned and reassigned according to the customers demand.
  – Here location is independent. Customer has no control or knowledge over the exact location of the provided resources but may be able to specify location at a higher level of abstraction (e.g. country, state, or datacentre).
  – Example of resources include storage, processing, memory, and network bandwidth.

NIST Essential Characteristics of Cloud Computing

- Rapid elasticity:
  – Rapid Elasticity aims at matching the amount of resource allocated to a service with the amount of resource it actually requires, avoiding over- or under-provisioning.
  – **Over-provisioning**, i.e., allocating more resources than required, should be avoided as the service provider often has to pay for the resources that are allocated to the service.

NIST Essential Characteristics of Cloud Computing

- Measured service:
  – Cloud systems automatically control and optimize resource use by controlling a metering capability at some level of abstraction appropriate to the type of service (e.g. storage, processing, bandwidth, and use of active account).

  – Resource usage can be monitored, controlled, and reported, providing transparency for both the provider and consumer of the utilized service.

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MICROSOFT AZURE STORAGE SERVICES

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- What is Azure?
  – Microsoft Azure is a cloud computing service created by Microsoft for building, testing, deploying, and managing applications and services through Microsoft-managed data centres.

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- Azure Storage Services
  – Azure Storage offers a massively scalable object store for data objects, a file system service for the cloud, a messaging store for reliable messaging, and a NoSQL store.
  – Azure Storage is:
    Durable and highly available
    Secure
    Managed
    Accessible

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- Azure Storage includes following types of data storage services:
  1. Blob storage
  2. Azure Files
  3. Queue storage
  4. Table storage

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- Blob storage:
  - Azure Blob storage is Microsoft's object storage solution for the cloud.
  - Blob storage is optimized for storing massive amounts of unstructured data, such as text or binary data.
- Blob storage is best for:
  - Serving images or documents directly to a browser.
  - Storing files for distributed access.
  - Streaming video and audio.
  - Storing data for backup and restore, disaster recovery, and archiving.
  - Storing data for analysis by an on-premises or Azure-hosted service.

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- Blob storage is best for (Cont.):
  - Objects in Blob storage can be accessed from anywhere in the world via HTTP or HTTPS.
  - Users or client applications can access blobs via URLs, the Azure Storage REST API, Azure Power Shell, Azure CLI, or an Azure Storage client library.
  - The storage client libraries are available for multiple languages, including .NET, Java, Node.js, Python, PHP, and Ruby

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- Azure Files:

– It enables user to set up highly available network file shares that can be accessed by using the standard Server Message Block (SMB) protocol.
– That means that multiple VMs can share the same files with both read and write access.
– User can also read the files using the REST interface or the storage client libraries. Also can access the files from anywhere in the world using a URL that points to the file and includes a shared access signature (SAS) token.
– User can generate SAS tokens; they allow specific access to a private asset for a specific amount of time.

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- Azure Files (Cont.):

– File shares can be used for many common scenarios:
  ✓ Many on-premises applications use file shares.
  ✓ This feature makes it easier to migrate those applications that share data to Azure.
  ✓ If you mount the file share to the same drive letter that the on-premises application uses, the part of your application that accesses the file share should work with minimal, if any, changes.

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- Azure Files (Cont.):

– File shares can be used for many common scenarios:
  - ✓ Configuration files can be stored on a file share and accessed from multiple VMs.
  - ✓ Tools and utilities used by multiple developers in a group can be stored on a file share, ensuring that everybody can find them, and that they use the same version.
  - ✓ Diagnostic logs, metrics, and crash dumps are just three examples of data that can be written to a file share and processed or analysed later.

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- Azure Queue service:

– IT is used to store and retrieve messages.
– Queue messages can be up to 64 KB in size, and a queue can contain millions of messages.
– Queues are generally used to store lists of messages to be processed asynchronously.

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- Azure Queue service (Cont.):

✓ For example:

- Say you want your customers to be able to upload pictures, and you want to create thumbnails for each picture.
- You could have your customer wait for you to create the thumbnails while uploading the pictures.
- An alternative would be to use a queue. When the customer finishes his upload, write a message to the queue.

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- Azure Queue service (Cont.):

✓ For example (Cont.):

- Then have an Azure Function retrieve the message from the queue and create the thumbnails.
- Each of the parts of this processing can be scaled separately, giving you more control when tuning it for your usage.

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- Table storage

- ✓ A NoSQL store for schema less storage of structured data.
- ✓ Azure Table storage is now part of Azure Cosmos DB.
- ✓ In addition to the existing Azure Table storage service, there is a new Azure Cosmos DB Table API offering that provides throughput-optimized tables, global distribution, and automatic secondary indexes

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"Education is not the learning of facts, but the training of the mind to think" ~ Albert Einstein

eValue Teaching Feedback

- We have put together a teaching and learning program in this unit which we have designed to align with current industry best practice.
- We hope that each of you can appreciate the practical approach taken to teaching Cloud Computing Technology and have enjoyed the practical assessment tasks.
- YOUR FEEDBACK IS APPRECIATED AND WE WILL KEEP WORKING HARD TO IMPROVE THE POINTS YOU MENTION.

eValue Teaching Feedback

- The Trimester-1 eVALUate online survey now opens
- We read you responses and feedback, and we act on that.
- The feedback is confidential
- Respond at any time, from anywhere, on any device.
- Please provide any positive comments to reinforce what we are doing well and provide any constructive comments to suggest improvements

What is constructive feedback?

- Constructive feedback is providing useful comments and suggestions that contribute to a positive outcome, a better process or improved behaviours.
- It provides encouragement, support, corrective measures and direction to the person receiving it. Knowing how to give constructive feedback is a valuable skill.
- Constructive feedback can be positive (letting someone know they're doing well), negative (letting people know about ways in which things could be improved), or neutral (just an objective observation).

Examples of Positive and Negative Constructive Feedback

Positive Constructive Feedback	Negative Constructive Feedback
The practical work tied in really well with lecture content.	I would like some more explanation of what is required in assignments.
The lecturer taught this unit in a way that made it easier for me to understand. I particularly liked the way that they made clear links between the theory and application in the workplace.	Consider revising the textbook as I found it too basic for the content being covered.
I like the use of illustrations/diagrams in lectures	I felt that the lecture slides were disorganised and didn't explain the content very thoroughly. Would be good if the lectures could be recorded.
The unit was well organised and structured.	I felt that [name] could have engaged the students' more by interacting with us rather than just describing off the lecture slide.

Exam Outline

- Students must confirm the:
  - venue
  - exam time
  - date
- This examination is a **2 hour** examination.
- An additional **15 minutes** for reading the exam paper is provided immediately before this 2 hour period.

Exam Outline

- Students must confirm the:
  - venue
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Exam Outline

- This is a closed book examination.
- You should take pens and pencils.
- Calculators are not allowed.
- The maximum number of marks is 60.
- Do not write your name anywhere on the paper.

Examination Outline

- There are two sets of questions
- I do not know which set will provide you during exam day.
- Both sets consist of Short Answers Questions.
- Each set has five questions to be answered.
- When asked to "describe briefly" or "explain", ensure that you provide sufficient specific detail to convey a clear understanding of the concept or issue.

Exam Questions: Set-1

- Question 1. Fundamental Cloud Computing
  - Marks: a) [2+3+6=11 Marks]
    b) [5+9=14 Marks] and c) [1+3+8=12 Marks]
- Question 2. Cloud Computing Mechanisms
  - Marks: a) [1+3=4 Marks]
- Question 3. Cloud Storage
  Marks: a) [1+4=5 Marks]; b) [8 Marks]
- Question 4. Working with Clouds
  - Marks: a) [1+5=6 Marks]

Exam Questions: Set-2

- Question 1. Fundamental Cloud Computing
  - Marks: a) [5+9=14 Marks]; and b) [2+3+5=10 Marks]
- Question 2. Cloud Computing Mechanisms
  - Marks: a) [1+3+1=5 Marks]
- Question 3. Cloud Storage
  Marks: a) [1+4=5 Marks]; b) [8 Marks]
- Question 4. Working with Clouds
  Marks: a) [1+5=6 Marks]
- Question 5. Topic on Cloud Computing Technology
  Marks: [4+4+4=12 Marks]

Reading Guide for Exam Preparation

- Most of the questions are from Text Book
- Read the following chapters from your text book:
- Chapters – 3: Understanding Cloud Computing
- Chapter – 4: Fundamental Concepts and Models
- Chapter – 5: Cloud-Enabling Technology
- Chapter – 7: Cloud Infrastructure Mechanisms
- Chapter – 8: Specialized Cloud Mechanisms
- Chapter – 9:Cloud Management Mechanisms
- Chapter – 16: Service Quality Metrics and SLAs

Reading Guide for Exam Preparation

- Chapters – 3: Understanding Cloud Computing
  - Sections:
    - 3.1 Origins and Influences
    - 3.2 Basic Concepts and Terminology
    - 3.3 Goals and Benefits
- Chapter – 4: Fundamental Concepts and Models
  Sections:
  - 4.1 Roles and Boundaries
  - 4.2 Cloud Characteristics
  - 4.3 Cloud Delivery Models
  - 4.4 Cloud Deployment Models

Reading Guide for Exam Preparation

- Chapter – 5: Cloud-Enabling Technology
- Sections:
  - 5.2 Data Centre Technology
  - 5.3 Virtualization Technology
  - 5.5 Multitenant Technology
- Chapter – 7: Cloud Infrastructure Mechanisms
- Sections:
  - 7.2 Virtual server
  - 7.3 Cloud Storage Devices
  - 7.5 Resources Replication
  - 7.6 Ready-Made Environment

Reading Guide for Exam Preparation

- Chapter – 8: Specialized Cloud Mechanisms
- Sections:
  - 8.1 Automated Scaling Listener
  - 8.2 Load Balancer
  - 8.3 SLA Monitor
  - 8.6 Failover System
  - 8.7 Hypervisor
  - 8.8 Resources Cluster
  - 8.9 Multi-Device Broker

Reading Guide for Exam Preparation

- Chapter – 9:Cloud Management Mechanisms
- Sections:
  - 9.2 Resource Management System
  - 9.3 SLA Management System
  - 9.4 Billing Management System

- Chapter – 11: Fundamental Cloud Architectures
- Sections:
  - 11.2 Resources Pooling Architecture
  - 11.3 Dynamic Scalability Architecture
  - 11.8 Redundant Storage Architecture

Reading Guide for Exam Preparation

- Chapter – 16: Service Quality Metrics and SLAs
- Sections:
  - 16.1 Service Quality Metrics
  - 16.3 SLA Guidelines

In addition to the above Chapters from Text book you should read the lectures slides from week-1 to week-11.

The End