JGi JAIN
DEEMED-TO-BE UNIVERSITY

SCHOOL OF
COMPUTER
SCIENCE AND IT

DEPARTMENT OF INFORMATION TECHNOLOGY

PROGRAM: MASTER OF SCIENCE IN COMPUTER SCIENCE & INFORMATION TECHNOLOGY

[MSc-CS&IT]

Subject Name: Cloud Computing Web Services

Activity: 1

Subject Code: 23MCSIT4033

Semester: IV

Academic Year: 2023-2025

Submitted By: Timir Bhingradiya

Submitted To: Prof. Raghavendra R

JAIN DEEMED-TO-BE UNIVERSITY | SCHOOL OF COMPUTER SCIENCE AND IT

Department of Computer Science & Information Technology

Programme: **Master of Science in Computer Science & Information Technology [MSc-CS&IT]**

Certificate

This is to certify that Mr **Timir Bhingradiya** satisfactorily completed the course of **Activity-1** prescribed by the JAIN(Deemed-to-be-University) for the semester **IV** M.Sc-CS&IT degree course in the year 2023 - 2025 .

USN : 23MSRCI007

Date : 14/02/2025

Signature of Student | Head of the Department | Signature of Faculty Incharge

IBM

COURSE CERTIFICATE

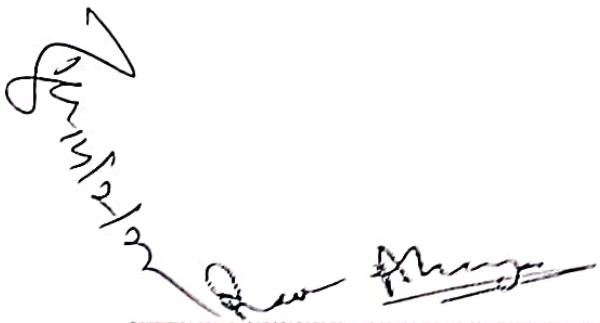
Oct 25, 2023

Timir Bhingradiya

has successfully completed

Introduction to Cloud Computing

an online non-credit course authorized by IBM and offered through Coursera



Ravi Ahuja
Global Program Director,
Skills Network

Verify at:
https://coursera.org/verify/[illegible]
Coursera has confirmed the identity of this individual and their participation in the course.

Name :- Timir Bhingradia

Course :- Intro to cloud.

Duration :- 16+ hrs.

* Introduction :-

- Cloud computing is transforming the way business & individuals manage their data, applications & service. The cloud provides scalable, flexible, and cost-effective solutions that support various tech

=> Key concepts :-

1). Cloud computing overview :-

- As defined by the national institute of standards and technology, Cloud computing is a model that enables on-demand access to shared resources such as storage, networks & processing powers.

- The evolution of cloud computing has been driven by advances in internet infrastructure, virtualization, & the development of service models.

2). Benefits & Challenges :-

- one of the key advantage of the cloud computing is the pay-as-you-go model, which allows businesses to reduce upfront costs & pay only for what they use

- Despite its advantage, cloud computing presents challenges such as data security, privacy concern & dependency on 3rd party providers.

3). Cloud Adoption :-

-it has become critical for business to remain competitive. Companies can reduce costs, improve agility, and enhance collaboration by leveraging cloud services.

4). Count-min sketching using Hashing :-

- Count-min sketching is a probabilistic data structure used for estimating the frequency of events in a data stream.

- Count-min sketch allow for approximate answers to frequency queries while ensuring a small memory & footprint. This approach is particularly beneficial ~~is~~ in scenarios where exact counts are unneccessary

5). String matching using Hashing :-

- Hash based technique, such as Rabin-Karp utilize hasing to compare substring hashes rather than individual characters, significantly speeding up the search process

* Cloud Service models :-

1). Infrastructure-as-a-Service :-

- Iass Provides business with access to computing infrastructure like a virtual machines, storage & networking this service model offers flexible, allowing to scale resources.

2). Platform-as-aservice :-

- Paas delievers a platform allowing customers to develop, run, and manage applications without worrying about the underlying infrastructure.

3). Software-as-a service :-

- Saas Provides fully managed a software applications over the cloud, where users access software on a subscribe basis.

2) Cloud deployment models :-

A) Public cloud :-

- is a cloud infrastructure shared by multiple organizations, operated by a cloud service provider. This model is highly scalable, cost-effective, & accessible from anywhere.

b) Private cloud :-

- is a dedicated cloud infrastructure for a single organization. it can be hosted either on-premises or by a third-party providers.

c) Hybrid cloud :-

- it combines both clouds, allowing data & applications to be shared between them.

d) Community cloud :-

- is shared by multiple organizations that have similar interests, such as the compliance or security needs.

Module :- 2 (Heaps & Hashtable)

1). Dynamic arrays :-

- dynamic array focused a flexible alternative to static array by automatically resizing as elements are added. unlike fixed arrays, dynamic arrays provide the capability to handle varying amounts of data without having to allocate memory upfront.

2). Basic of Data Structure :-

- Emphasizing how they store & organize data efficiently. Common data structure like stacks, queues, linked lists and arrays, which helped appreciate the trade-offs between different methods of storing data

4). Heap Primitive :

i). Bubble up

ii). Bubble Down.

-> introduced heap operations like bubble up & bubble down, which ensure that the heap property is maintained after insertion and deletion. After inserting an element the bubble up operation is used to move it to the correct position. while bubble down is used after deletion

✱ Module 4 (Applications of Hashtables)

1). Overview of open Address Hashing:-

- A technique for resolving collisions in hash table, unlike seperate chaining, where collisions are handled by maintaining a list of entries for each bucket, open addressing stores all entries directly within the hash table.

2) Perfect Hashing & Cuckoo Hashing:-

- Perfect hasing allows for collision-free access, where a fixed set of keys can be mapped to uniqueslots in a hash table without any collisions.

- Cuckoo hasing on the other hand, employs a different approach to collision resolution by using two hash functions.

3). Bloom filters & their analysis:-

- A Bloom filter is a space-efficient probabilistic data structure that can determine whether an element is a member of a set, allowing for false positive but no false negative.

to restore the heap's order. these operations are fundamental to maintaining the structure of heap during dynamic operations.

5). Priority Queues & HeapSort:-

→ Priority queues use heaps to efficiently manage tasks with varying priorities, while heapsort leverages the heap structure to sort elements in O(n log n) time. this was one of the most interesting sections, as I saw how heaps have practical applications in real-world problems.

6). Hash tables:-

- A data structure that enables constant-time lookups using hash functions. Hash tables map keys to values using a hash function and how to handle collisions through techniques like

  i). Chaining

  ii). open addressing

→ Hash tables are crucial for scenarios where quick retrival of data is needed

☆ Module:-7 (Intro to Data model)

1). Types of Data Relationship:-

- These define how documents are related in MongoDB. The main types including one-to-one, one-to-many and many-to-many relationships, which dictate how data is stored and referenced in documents.

2). Modeling Data Relationship:-

- MongoDB supports flexible schema, allowing you to model relationship in documents either through embedding or refesencing.

3). Embedding and Refesencing Data:-

- This involves storing related Data directly within a document. It's useful for one-to-few relationships or when data is frequently accessed together.

4). - This method stores ~~for~~ relationships by linking documents via refe sences. It's idea for many-to-many or one-to-many relationship, especialy when the related data is large or changes frequently.

4). Scaling a Data model :-

- As databases grow, data modelling becomes crucial for performance. MongoDB allows for horizontal scaling through sharding, and the data model should accommodate future growth while balancing read and write efficiency

☆ Module :- 5 (ACID Transaction)

1). ACID Transactions in MongoDB :-

- MongoDB supports ACID transactions across multiple documents and collections, ensuring operating are executed completely or not at all, maintaining the consistency of your data.
  - Atomicity :- All changes within transaction are applied or none of them are.
  - Consistency :- Ensure that the database is in a valid state before and after a transaction.
  - Isolation :- Transactions are isolated from each other, preventing conflicting o.p.
  - Durability :- once a transaction is commited, its changes are permanent.

2). Using Transaction in mongoDB:-

- Transactions are used to group multiple operations together, ensuring that they are executed as a single unit. They are beneficial when modifying multiple documents in a collection or across collections.

3). Multi-Document ~~transp~~ transaction:-

- These are supported by mongoDB to allow updates to multiple documents across collections. By wrapping operations in a transaction, mongoDB ensures that either all operations succeed or none, preventing partial updates.

Cloud infrastructure :-

1). Components :-

i). Virtualization :-

- is a key technology in cloud computing that allows multiple virtual instance to run on a single physical machine

ii). virtual machine :-

- are software-based environments that run on a physical server, whereas base metal servers are dedicated to physical machines without virtulization

iii): Secure networking :-

- Building a secure cloud network presence involves implementing secure connections between cloud resources, configuration firewalls, utilize encryption.

2). Storage TYPES :-

i). File storage :-

- file storage data into files and directories, allowing for the easy sharing & access.

ii). Block storage :-

- Block storage data in fixed-size blocks, offering high performance and low latency.

iii). Object storage :-

- object storage stores data as objects, making it highly scalable and cost effective. it is commonly used for storing unstructured data.

4). Cloud services :-

1). Hybrid multi-cloud :-

- it refers to the use of the multiple cloud environments from different cloud providers, working together seamlessly.

2). microservices :-

- it breaks downs applications into small, loosely coupled services, each responsible for a specific business function.

3). Serverless computing :-

- it abstracts the underlying infrastructure from developers. in the serverless model, developers write code that is executed in response to event.

4). DevOps in cloud computing :-

- is a set of practices that combine software development & it operations to shorten development cycles, improve Collab & automate processes

5). Cloud native applications :-

- are designed specifically for cloud environments, utilizing cloud services & resources to achieve scalability, resilience & flexibility