



FACULTY OF SCIENCE

ACADEMY FOR COMPUTER SCIENCE AND SOFTWARE ENGINEERING

MODULE	IT08X31 - SERVICES COMPUTING
CAMPUS	APK
FINAL SUMMATIVE ASSESSMENT (EXAM)	JUNE 2021

DATE: 10JUNE 2021

SESSION 08:30 – 11:30

ASSESSOR(S)

PROF M COETZEE

EXTERNAL MODERATOR

PROF HS VENTER (UP)

DURATION: 3 HOURS

MARKS: 75

2.5 hours to write, 30 min to upload/download

NUMBER OF PAGES: 4 PAGES

INSTRUCTIONS:

- Answer all the questions.
- You may use Microsoft Word (or equivalent) and Microsoft Visio (or equivalent) to answer your questions.
- Type your name at the top of the document. Clearly number the questions, leaving spaces between questions. Include the diagrams directly in the document at the correct place.

- Once you are finished writing, please save the document as a PDF and upload a single document. Create a document using your student number and surname as the file name.
 - You only need Internet access to download the exam and then to upload your final submission. You do not need to be connected for the duration of the test.
 - Should load-shedding be implemented during the day, we will communicate with you.
 - While it is advised that you type the test, you may also write the test by hand, on paper. If you do this, please number the physical pages before scanning/taking the photos. After that, you must use CamScanner or take CLEAR photographs and upload them.
 - During the exam, if you have any queries, you can contact me via our Discord server channel or email me at marijkec@uj.ac.za
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QUESTION 1

HATEOAS promotes loose coupling.

Do you agree or disagree with this statement? Comprehensively motivate your answer. **[8]**

QUESTION 2

- Define when an HTTP command is considered to be *safe*. (1)
- Define when an HTTP command is considered to be *idempotent*. (1)
- You are given the following set of endpoints. **For each endpoint**, you need to:
 - Comment on the manner in which it is designed.
Propose a better design where required. (2)
 - Comment on how **idempotent** and **safe** the use of the HTTP command is. (2)

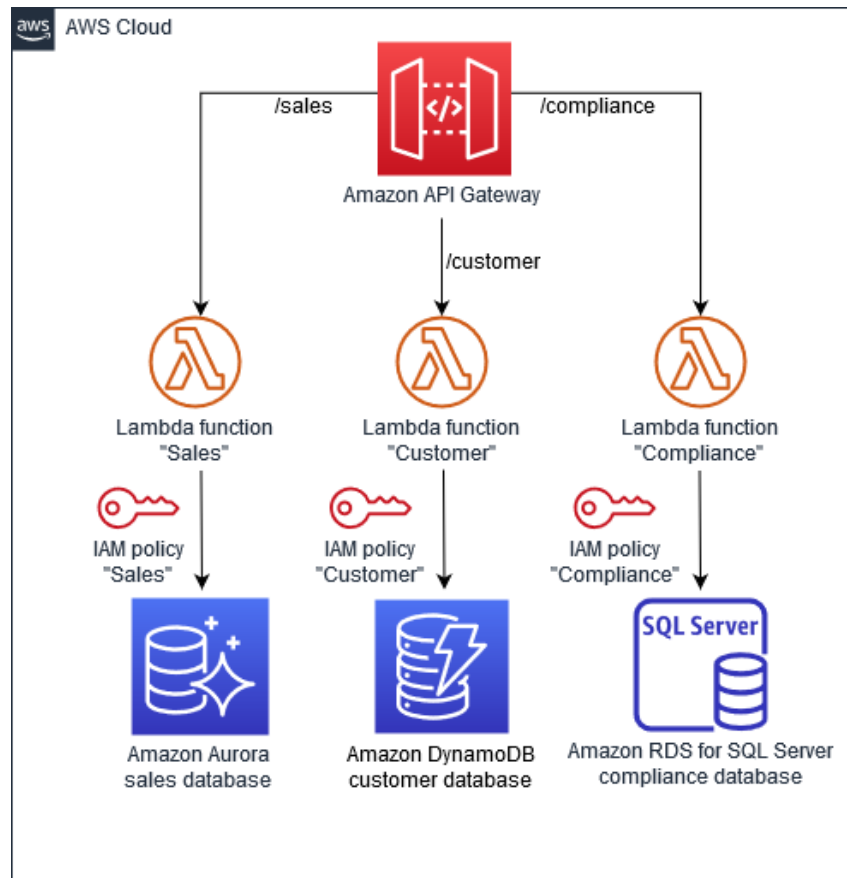
Answer your question by writing down the endpoint, and then answering i and ii for each endpoint. The answer for each endpoint therefore counts 4 marks.

- GET /v1/all-offices
- DELETE /v1/remove-offices/{office_id}
- POST /v1/offices/delete/{office_id}

[14]

QUESTION 3

In the following illustration, different AWS databases are used by the "Sales," "Customer," and "Compliance" microservices. These microservices are deployed as AWS Lambda functions and accessed through an Amazon API Gateway API. Each microservice uses a database type that meets its individual requirements; for example, "Sales" uses Amazon Aurora, "Customer" uses Amazon DynamoDB, and "Compliance" uses Amazon Relational Database Service (Amazon RDS) for SQL Server.



- Name and describe the pattern used by this application to manage data. (5)
 - What is the main reason why organisation would implement this pattern? Motivate your answer well. (4)
 - Describe two solution that can be implemented when queries are run that need to integrate data from the Sales and Customer databases. (6)
- [15]**

QUESTION 4

Describe the role of the API Gateway in securing microservices transactions. **[8]**

QUESTION 5

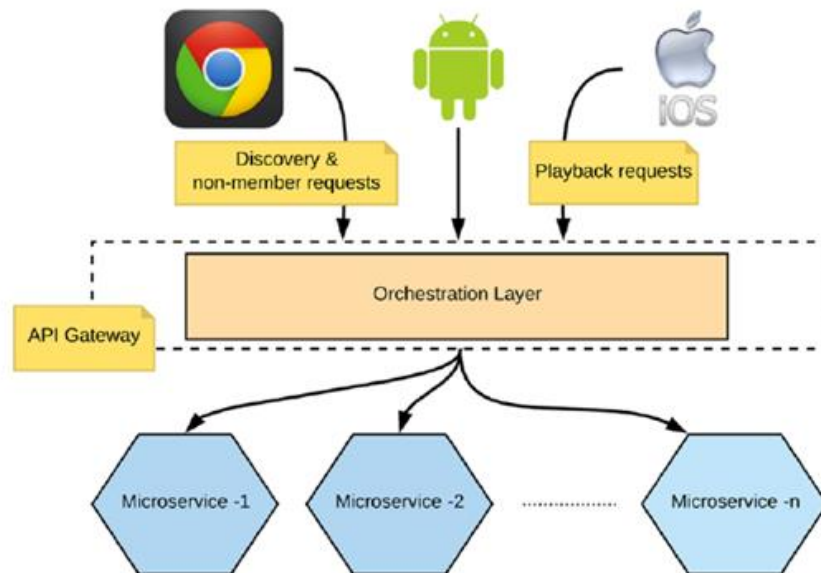
A Delivery microservice is in charge of delivering customer orders. The Delivery microservice calls the Order microservice to update order data, but a delay is experienced, causing a backlog. It is difficult to understand what is causing the delay. There is speculation that it may be the Delivery microservice that is overloaded and runs slowly. The Delivery microservice may have a bug, or the network has firewalls that are purposely slowing traffic. There could be many more

reasons for the delay to occur. It was clear that the system was not capable of running in partially failed conditions.

- a) Give three patterns that could be used to attempt to solve this problem. Motivate why they could be helpful. (3)
 - b) Describe a solution that could assist in supporting service to service communication to solve these problems. (8)
 - c) Why would an API Gateway not be the ideal solution to this problem? (4)
- [15]**

QUESTION 6

Given the following historical Netflix integration approach:



- a) Explain how Netflix implemented service integration and what their problems were with this approach. (4)
- b) Explain what active and reactive service compositions are. (6)
- c) To solve their integration problems, Netflix implemented a new solution. Explain what the solution was. Classify the solution very clearly according to one of the two patterns listed in question (b). (5)

[15]