NAMIBIA UNIVERSITY
OF SCIENCE AND TECHNOLOGY

FACULTY OF COMPUTING AND INFORMATICS
DEPARTMENT OF COMPUTER SCIENCE

QUALIFICATION: BACHELOR OF COMPUTER SCIENCE, SYSTEMS ADMINISTRATION	
QUALIFICATION CODE: 07BACS	LEVEL: 6
COURSE NAME: DISTRIBUTED SYSTEMS	COURSE CODE: DTS620S
DATE: JANUARY 2023	PAPER: THEORY
DURATION: 2 HOURS	MARKS: 70 (100%)

SECOND OPPORTUNITY/SUPPLEMENTARY EXAMINATION QUESTION PAPER	
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MODERATOR	PROF. JOSE QUENUM

THIS QUESTION PAPER CONSISTS OF 3 PAGES (Including this front page)

INSTRUCTIONS

1) Answer ALL the questions on the answer scripts provided.
2) Be guided by the number of marks allocated when answering the questions.
3) Write clearly and neatly.
4) Show all your calculations.
5) Number your questions clearly.

Question 1:

1. With examples, explain what is meant by distributed transparency. (4)

2. Why is openness a major characteristic of distributed system design and what is it concerned with? (4)

3. List and explain 3 communication paradigms in distributed systems. (6)

4. Explain what the stub is in RMI in distributed applications and the tasks it performs. (6)

5. List and explain 4 main components/applications in RMI operation. (4)

[Total: 24]

Question 2

1. Outline 4 advantages of HDFS over traditional databases. (4)

2. Big Data Analytics is mainly used to monitor past data patterns and predict the future for better service delivery and maximized profits in organizations. Explain how data analytics can be applied to benefit the following industries: (6)

a) Education:
b) Retail:
c) Banking

3. Explain Lamport's logical clocks algorithm and how its key ideas are applied in distributed systems. (4)
4. Explain the importance of scalability in distributed systems and explain concepts of hardware and software scalability. (6)

5. Explain the concept of synchronization amongst processes in distributed file systems during message passing. (4)
6. How would you use the 3 security mechanisms to implement security policies in distributed systems? (4)
7. Differentiate between Concurrency and Location transparency (4)

8. List any ***three (3)*** characteristics of early distributed system devices. (3)

[Total:25]

Question 3

1. Three **processes *P1, P2,*** and ***P3*** have formed a multicast group, sending three messages ***M1, M2***, and ***M3***. Applying unordered reliable multicast demonstrates the possible variations these messages will arrive at the receiver. (6)

2. A story is told of hotel XYZ which was serving a popular breakfast on its ground floor. Due to increased publicity the hotel guests become more and that forced the hotel to expand its hotel floors by 5 more floors each with a capacity of 20 rooms from the initial 7 floors. Subsequently, 2 more floors were added too. That extended the strain on the hotel kitchen resources and their elevators were always congested during breakfast times mostly. Figure 1 is a representation of the hotel story and what each component of the hotel could represent in terms of distributed systems

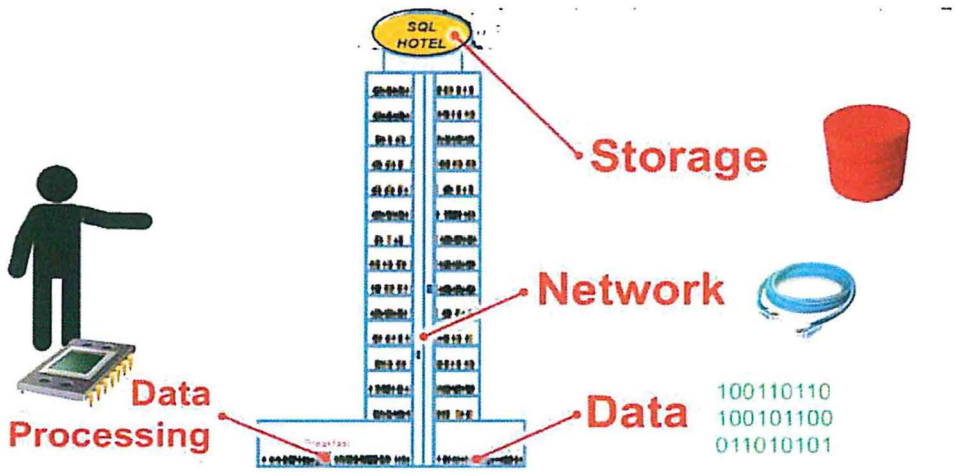

Figure 1

3. Select appropriate techniques in isolation or in combination to achieve a scalable the solution to the given challenge in Figure 1.

a) Select appropriate techniques in isolation or in combination to achieve a scalable the solution to the given challenge in Figure 1. (8)

b) Explain the concept of a distributed file system and what such a system aims to achieve when compared to local file systems. (6)

c) Identify any key threats to security as faced in modern distributed systems. (1)

[Total: 21]

Exam Ends

Total 70 Marks