ISLAMIC UNIVERSITY OF TECHNOLOGY (IUT)
ORGANISATION OF ISLAMIC COOPERATION (OIC)
Department of Computer Science and Engineering (CSE)

SEMESTER FINAL EXAMINATION   **WINTER SEMESTER, 2020-2021**
DURATION: 1 Hour 30 Minutes   **FULL MARKS: 75**

CSE 4749/ CSE 4559: Introduction to Cloud Computing

There are **3 (three)** questions. Answer **all** of them. Figures in the right margin indicate marks. The examination is **Online and Close Book**. Marks of each question and corresponding CO/PO are written in the brackets.

Write **Student ID** and **Name** top of the first page and write **student ID** and **page no** in every page of the answer script. Submission pdf of the answer script should be named as **Full_Student_ID<space>CourseCode<space>Final.pdf**

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1. a) Mark often says "in order to experience elastic cloud computing, there needs to be many users who each have small computing needs and have unrelated and different workloads."   7 (CO2, PO2)
   i.   Explain why these three features are important to enabling elastic cloud computing.
   ii. Give a counter example cloud usage scenario that does not enjoy elasticity and explain why elasticity is not achieved.

   b) A new face recognition solution is becoming popular on a variety of mobile devices that are continually connected to the cloud. The application consists of the following steps: 8 (CO3, PO3)
   1. Video capture
   2. Face detection,
   3. Face recognition using a large face database

   Propose where (Local or Cloud) and why each of the above three steps of this application should execute on behalf of users of each of these two devices.
   i.   Google Glass
   ii. Samsung Galaxy S21 Mobile Phone

   c) With the help of diagrams, explain the steps required to perform write operations on the Google File System with the following architecture assumptions: 10 (CO3, PO3)
   -   There is one GFS Master and one shadow master
   -   The cluster is made of 6 chuck servers.
   -   The architecture uses a replica of (2) two.

   You can assume any other information that might be required.

2. a) MovieStream Inc. is a streaming service that is based in Asia. MovieStream Inc. keeps track of every movie that is being streamed on its platform. MovieStream Inc is trying to find the most watched movie in Asia in 2021. The streaming service has servers that are located all over Asia. With the help of diagrams, explain why and how **map-reduce** can be used in this scenario to find the most watched movie of 2021 in Asia. Assume that the cloud architecture and GFS of MovieStream Inc. is the same as the architecture in question **1(c).**   14 (CO3, CO4, PO2, PO4)

   b) In light of the big data technologies, briefly explain the meaning of the statement: "Move code to data!"   4 (CO3, PO3)

c) Carnegie Health Inc. (CH) has many departments that run different types of analytics applications on large patient data sets. Regulations do not permit CH's data to be hosted externally. CH's CIO projects significant savings if CH were to adopt the cloud model.　5+2 (CO4, PO4)
  i.　Which deployment model would you suggest for CH to adopt and why?
  ii.　Discuss two reasons that could dissuade a company from the adoption of the cloud model.

3. a) Define Load Balancing?　3 (CO1, PO1)

  b) Elaborate on the following type of VM migration. Discuss their downtime and migration duration.　10 (CO3, PO3)
    i.　Stop-and-copy (S-C)
    ii.　Demand-migration (D-M)
    iii.　Iterative precopy (I-P)

  c) Imagine BD Tel. is a new telecommunication company that provides mobile voice and telecommunication services across Bangladesh. The company generates billions of Call Detail Records (CDR). Traditional database systems were unable to scale up to the vast volumes of data and provide a cost-efficient solution. Storing and Real-time analysis of billions of records was a problem.　12 (CO1, CO4, PO4)
    i.　Define the five Vs of Big Data in context of the above problem.
    ii.　How would you solve the mentioned Big Data problem?