

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

SWE 4537: Server Programming**Programmable calculators are not allowed.**

Figures in the right margin indicate marks. You need to answer all three questions.

Write Student ID and Name top of the first page and write studentID and page no in every page of the answer script.

Submission pdf should be named as Full Student ID<space>Course Code<dot>pdf

1. a) You want to build an online video-sharing platform like YouTube but for gamers, GameTube. Users will upload their prerecorded gameplay on your platform. Suppose, you have 250 million daily active users. Among these users, the viewer to uploader ratio is 500:1. The average upload duration is **10 + StudentID % 10** (e.g., For StudentID 154407, avg. upload duration is $10 + 154407 \text{ modulo } 10 = 10 + 7 = 17$) minutes per day. Based on this scenario estimate the following. **15**
(CO2,PO2,PO4)
 - i. Storage requirements for a year
 - ii. Cache requirements
 - iii. Server Requirements (For processing)

Assume suitable values for additional required information.
- b) Twitter has 330 million monthly active users. 50% of these users use Twitter every day. On average Twitter receives **5000+Last_Two_Digits_of_Your_StudentID * 100** (e.g., For StudentID 154407, tweets per second - 5700) tweets every second. Each tweet is 200 bytes. Every user has 500 tweets in its cache. Each node should not be occupied more than 70% with cached data. If each cache node has 32GB memory, how many nodes will be required if Twitter has 3 cache replicas? What will be the storage requirements for 30 days (only for the tweets)? **10**
(CO2,PO2,PO4)
2. a) Your GameTube platform is attracting potential users. Within a year your server (currently you have just one) receives 0.6 requests/second on average. The Number of daily active users is increasing rapidly and your current server is not capable of handling such a larger number of requests. Now you asked your system design engineer to upgrade your system. He suggested that you should switch from monolithic to microservice architecture. Justify your system design engineer's decision. **6**
(CO3,PO3)
- b) Explain the working mechanism of consistent hashing in terms of load balancing. What are the limitations of traditional hashing and how does consistent hashing overcome these limitations? **6+3**
(CO3,PO3)
- c) Why do popular social networking sites use different notification/newsfeed update mechanism for celebrity posts? Explain these approaches for both general and celebrity posts. **5**
(CO3,PO3)
- d) Write short description about the following terms- **2.5+2.5**
(CO3,PO3)
 - I. Netflix Zuul
 - II. Netflix Hystrix

3. a) What do you understand by isolation levels in terms of Transactions? How can you implement snapshot isolation with multi-version objects? Explain with necessary diagrams and examples. 3+7
(CO1,PO1,PO5)
- b) Explain *Write Skew* with an example. 5
(CO1,PO1,PO5)
- c) Explain the working mechanism of *Push Notifications*. 10
(CO1,PO1,PO5)