

**Database Project (SWE3033) – Midterm, Fall 2021 (Instructor: Sang-Won Lee)**

**Student ID:** \_\_\_\_\_ **Name:** \_\_\_\_\_ **Score:** \_\_\_\_\_/100

*Please write the answer sheet in Korean or English*

1. List five transactions in TPC-C and briefly explain the business logic each transaction carries out. [10pt]

2. TPC-C paper shows that there is more page-level skewness in 4KB-size page than in 8KB-size page. Discuss why. [10pt]

3. Briefly explain **at least two** tools you can use to monitor system statistics (e.g., I/O, CPU, memory, etc.) and list what metrics you can get from each tool. [5pt each \* 2 = 10pt]

4. Interpret the meaning of each metric (trx, 95%, 99%, TpmC) in the TPC-C experimental result below. [2.5pt each \* 4 = 10pt]

10, trx: 493, 95%: 764.362, 99%: 1011.230, ... 20, ... <TpmC> 3634.300 TpmC

5. Describe how TPC-C throughput changes as the MySQL's buffer size increases from 10% to 50% of the DB size. Explain the expected result and why. [10pt]

6. Describe how TPC-C throughput varies with page sizes (i.e., 4KB, 8KB, 16KB) when running the benchmark on SSD. Explain the expected result and why. [10pt]

7. There is a table with no change in space utilization before/after the TPC-C benchmark. Write the name of the table and explain why there is no change. [10pt]

8. When you run TPC-C on MySQL, the average space utilization of B+tree nodes is somewhat low (e.g., 66%). Discuss the effect of low space utilization on buffer hit ratio. Suggest an idea on how to improve space utilization. [5pt each \* 2 = 10pt]

9. List **at least two differences** between *B+Tree* and *Log-Structured Merge Tree*. [5pt each \* 2 = 10pt]

10. List **at least two differences** between *Leveled Compaction* and *Universal Compaction*. [5pt each \* 2 = 10pt]

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