DATABASE SYSTEMS (DS) Spring, 2024
ASSIGNMENT # 3

Due Date: 10th May 2024

1. Failure to submit according to the above format would result in a deduction of 10% marks. Submissions other than the Google Classroom (e.g., email, etc.) will not be accepted.

2. **Deadline:** The deadline for submitting the assignment is 10th May 2024**.** No late submission will be accepted. Correct and timely submission of the assignment is the responsibility of every student; hence no relaxation will be given to anyone.

3. **Grading Policy:** A rubric is on the last page; you may refer to it for the grading criteria.

4. **Honor Policy:** This assignment is a learning opportunity that will be evaluated based on your ability. Plagiarism cases will be dealt with strictly. If found plagiarized, both the involved parties will be awarded zero marks in this assignment, all the remaining assignments, or even an F grade in the course.

Question 1 [30 Marks]

Consider the following relations:

- Systems(System_ID, CPU_ID, RAM1_ID, RAM2_ID, GPU_ID, MotherBoard_ID, PSU_ID, Storage_ID)
- CPU(CPU_ID, Name, Core_Count, Clock_Speed, Threads_Per_Core, Manufacturer, Price, Power_Draw)
- RAM(RAM_ID, Size, Type, Clock_Speed, Manufacturer, Price, Power_Draw)
- GPU(GPU_ID, Name, Clock_Speed, Core_Count, Manufacturer, Price, Power_Draw)
- MotherBoard(MotherBoard_ID, Name, RAM_Slots, Manufacturer, Price, Power_Draw)
- PSU(PSU_ID, Name, Manufacturer, Power Rating, Price)
- Storage(Storage_ID, Type, Size, Manufacturer, Price, Power_Draw)

Write Queries to find the following using relational algebra:

(1 marks each)

1. ID of all CPUs manufactured by Intel.
2. ID of all Systems with empty RAM slots. (Empty Ram slots have id=0)
3. Price of all storage with Size over 500gb and Price less than 10,000.
4. Power draw of all RAM of type ‘DDR4’ and size of 8 or more gb.
5. Price of all PSUs with a power rating of 500W.

(2 marks each)

6. ID of systems with CPUs of 4 or more **total** threads.
7. ID of systems with 16 gb of total RAM.
8. CPU name of all systems with Storage type = ‘SSD’.
9. MotherBoardID of all Systems with a PSU of rating greater than 600W.
10. ID of all systems with the 2 Ram slots in the motherboard.

(3 marks each)

11. ID of all systems with a processor and gpu that have the same core count and clock speed.
12. ID of all systems which cost more than 500,000.
13. ID of all systems which have sufficient PSUs (Power rating is less than total power draw).
14. ID of all systems which have the same GPU and CPU Manufacturers.
15. Name of all Manufacturers who make every computer part.

Question 2 [20 Marks]

Provided along with this assignment is an excel file containing a table of hospital patient admittance records.

a) Normalize this table into a database into 1NF, then 2NF and finally 3NF. [15 Marks]
b) Explain why it is not preferable to always convert tables into 4NF and 5NF. [5 Marks]