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[*Knowledge for Development*]

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**UNIVERSITY EXAMINATIONS
2017/2018 ACADEMIC YEAR**

**END OF SEMESTER EXAMINATIONS
YEAR THREE SEMESTER ONE EXAMINATIONS**

**BACHELOR OF SCIENCE IN INFORMATION
TECHNOLOGY**

COURSE CODE : BIT 313 [B]
COURSE TITLE : TRANSACTION PROCESSING SYSTEMS

DATE: 11/10/2018 **TIME: 3.00PM – 4.00PM**

INSTRUCTIONS TO CANDIDATES

Answer Questions ONE and ANY OTHER TWO.

QUESTION ONE [COMPULSORY] [30MARKS]

a. **What do you mean by transaction in DBMS?** [2 marks]

A transaction is a very small unit of a program and it may contain several low level tasks.

b. **Discuss the different types of Databases for transaction processing** [6 marks]

Databases for transaction processing may be constructed using hierarchical, network, or relational structures.

- Hierarchical structure: organizes data in a series of levels. Its top to bottom like structure consists of nodes and branches; each child node has branches and is only linked to one higher level parent node.
- Network structure: A network structure also organizes data using nodes and branches. But, unlike hierarchical, each child node can be linked to multiple, higher parent nodes.
- Relational structure: a relational database organizes its data in a series of related tables. This gives flexibility as relationships between the tables are built.

c. **State four benefits of TPS** [4marks]

- It allows sharing of computer resources among many users
- It shifts the time of job processing to when the computing resources are less busy
- It avoids idling the computing resources without minute-by-minute human interaction and supervision
- It is used on expensive classes of computers to help

d. **Explain what is data validity and its procedure** [6 marks]

Is used to check the entry of transaction data. Involves procedures to ensure transactions are correct and accurately stored in the database. Even though essential it is impossible to validate all data. Involves:

- TRANSACTION INITIATION- is used to acknowledge that the TP monitor is ready to receive the transaction data. Used in real-time to eliminate a number of possible errors. Some TPSs add entry data to transactions to trace if data is lost.
- FIELD CHECKING- occurs when transaction data is entered into database. Data validation is carried out using range check, type check, list check or check digit.

e. **What are the five types of TPS in business organizations? What functions do they perform? Give example of each.** [5 marks]

Five types of TPS with example:

- Sale/Marketing Systems (eg. Sale management, customer service...)
- Manufacturing/Production Systems (eg. Purchase order, scheduling,.....)
- Finance/Accounting Systems (eg. General ledger, payroll.....)
- Human Resources Systems (eg. Personnel records, training,.....)

- Other types of TPS that are unique to a particular industry. (eg. University: admissions, grade records,.....)
- f. **Two operations are said to be conflicting if which conditions satisfied** [3marks]
- They belong to different transaction
 - They operation on same data item
 - At Least one of them is a write operation
- g. **What is the main distinguishing feature of a batch processing system?** [4 marks]
- Transactions may be collected and processed as in batch processing.
 - Transactions will be collected and later updated as a batch when it's convenient or economical to process them.

QUESTION TWO [20 MARKS]

- a. **What is a Transaction Processing System?** [2 marks]

A Transaction Processing System (TPS) is an organized collection of people, procedures, databases, hardware and software to record completed business transactions.

- b. **Explain the terms below as used in equivalence schedule** [6marks]

I. Result Equivalence

If two schedules produce the same result after execution, they are said to be result equivalent. They may yield the same result for some value and different results for another set of values. That's why this equivalence is not generally considered significant.

II. View Equivalence

Two schedules would be view equivalence if the transactions in both the schedules perform similar actions in a similar manner.

- c. **TP systems serve the various levels of management in a business. Describe the characteristics of transaction processing systems (TPS) and the roles they play in a business.** [5 marks]

Transaction processing systems (TPS) are computerized systems that perform and record daily routine transactions necessary in conducting business; they serve the organization's operational level. The principal purpose of systems at this level is to answer routine questions and to track the flow of transactions through the organization.

At the operational level, tasks, resources, and goals are predefined and highly structured.

Managers need TPS to monitor the status of internal operations and the firm's relationship with its external environment.

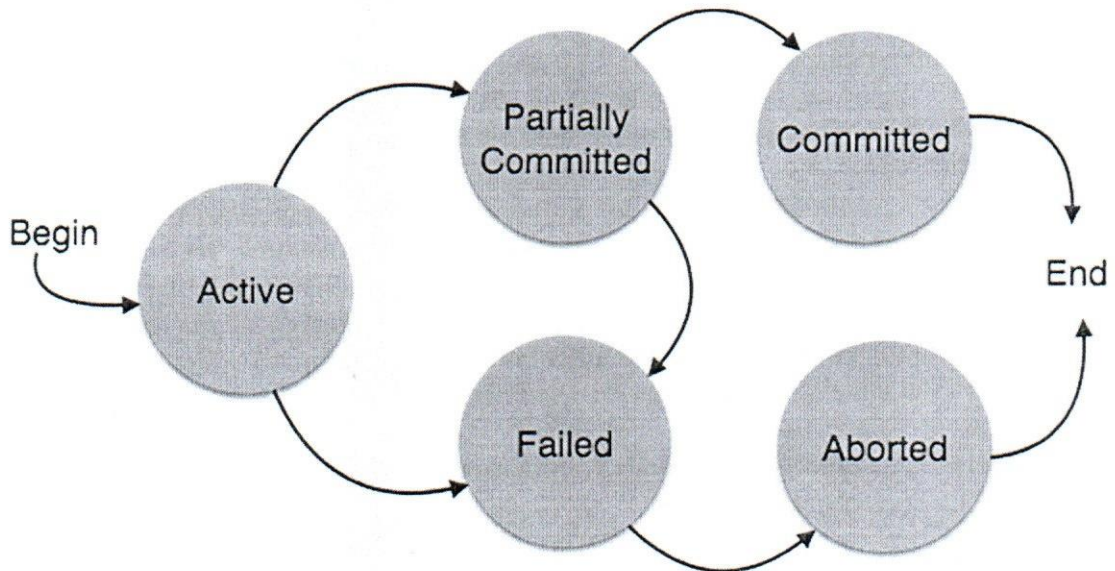
TPS are major producers of information for other types of systems.

Transaction processing systems are often so central to a business that TPS failure for a few hours can lead to a firm's demise and perhaps that of other firms linked to it.

d. Using a diagram, discuss the different States of Transactions

[7 marks]

A transaction in a database can be in one of the following states –



- **Active** – In this state, the transaction is being executed. This is the initial state of every transaction.
- **Partially Committed** – When a transaction executes its final operation, it is said to be in a partially committed state.
- **Failed** – A transaction is said to be in a failed state if any of the checks made by the database recovery system fails. A failed transaction can no longer proceed further.
- **Aborted** – If any of the checks fails and the transaction has reached a failed state, then the recovery manager rolls back all its write operations on the database to bring the database back to its original state where it was prior to the execution of the transaction. Transactions in this state are called aborted. The database recovery module can select one of the two operations after a transaction aborts –
 - o Re-start the transaction
 - o Kill the transaction
- **Committed** – If a transaction executes all its operations successfully, it is said to be committed. All its effects are now permanently established on the database system.

QUESTION THREE [20 MARKS]

- a. **What is real-time processing system** [2 marks]
Transactions are processed immediately as they occur without any delay to accumulate transactions. Real-time processing is also referred to as online transaction processing
- b. **Differences between real-time and batch processing** [8 marks]
- Each transaction in **real-time** is unique. Transaction are stand-alone both in the entry to the system and also in the handling of output.
 - Real-time processing requires the master file to be available more often than **batch processing**
 - The DB is not accessible all of the time for **batch processing**.
 - **Real-time processing** has fewer errors than **batch processing**: data is validated and entered immediately. With **batch**, data is organized and stored before the master file is updated. Errors can stop processing
 - Infrequent errors may occur in **real-time processing**. Errors are tolerated.
 - More operators required in **real-time processing**-operators are not centralized.
- c. **Discuss the typical activity of a Transaction Processing System.** [10 marks]
- Data entry and input
(raw data) Processing Documents and reports
Data Files
 - Data collection: The process of capturing and gathering the needed data to complete transactions. Data collection can be manual process or automated process. The usage of automated data collection devices have made data collection faster, more efficient and reliable and allow firms to use the collected data in much more flexible ways. For example, retail stores use scanners to read the bar code from product packages and automatically enter the price item to TPS. Once the price data is entered, the computer will determine customer's bill.
 - Data manipulation: The process of performing calculation and other data transformation related to business transactions and store data and information in organization's database for further processing. For example, in a payroll TPS, managers multiply employee's hours worked times the hourly pay rate.
 - Data storage: Data storage involves placing transaction data or information in database. The stored data can be further processed and manipulated by other information system. In other words, the data appears to be the source of data for other information systems
 - Data production: The process of outputting records and reports. The documents may be in the form of hard copy paper reports or soft copy where documents are displayed on computer screens.

QUESTION FOUR [20 MARKS]

- a. **What is a transaction processor?** [2marks]
- Transaction processing is information processing that is divided into individual, indivisible operations called transactions.
 - Each transaction must succeed or fail as a complete unit; it can never be only partially complete.
- b. **Web-Ticket allows customers to purchase tickets for major theatre and sporting events over the internet. When customers visit the company's website they can choose an event, view the seating arrangements, see what seats are available, choose their seats and purchase tickets. For the business to run successfully it is essential that the seating details supplied to any customers at any time in any location, are correct and up-to-date. There is no margin for error or system failure. Describe and analyze the ticketing system in terms of the information processes of**
- I. collecting
 - II. storage and retrieval
 - III. processing
- c. **Discuss the characteristics of transaction processing system** [8 marks]
[10 marks]

There are 4 characteristics in every single transaction processing systems.

- **Rapid response:** In order to shorten the waiting time of the users, TPSs are modified to process transactions instantly to ensure the data will be available in the shortest waiting time.
- **Reliability:** Due to the involvement of cash, the reliability of TPS has to be in place. TPSs have to be designed in a way to avoid the transactions slip past the net in the same time remain themselves operating permanently. Also the failure rate has to be remained within the tolerance levels. With that comprehensive safeguards and disaster recovery systems have to be incorporated by the designed TPSs.
- **Inflexibility:** Mistakes or errors can occur once the steps alter. To maximize the efficiency of the TPS, transactions have to be processed in the same order. With that, TPS interfaces have to be designed so that the identical data for each transaction can be acquired.
- **Controlled Processing:** Transaction processing monitor is found at every end of the computer to ensure that the transactions are correctly inputted. Still it requires human controls on it. TPSs can be used even in modify the data and fraudulent the transactions. With that the user of the system has to be restricted only for people who have the authority.

QUESTION FIVE [20 MARKS]

- a. Discuss the ACID Properties in TPS [8 marks]
- **Atomicity** – This property states that a transaction must be treated as an atomic unit, that is, either all of its operations are executed or none. There must be no state in a database where a transaction is left partially completed. States should be defined either before the execution of the transaction or after the execution/abortion/failure of the transaction.
 - **Consistency** – The database must remain in a consistent state after any transaction. No transaction should have any adverse effect on the data residing in the database. If the database was in a consistent state before the execution of a transaction, it must remain consistent after the execution of the transaction as well.
 - **Durability** – The database should be durable enough to hold all its latest updates even if the system fails or restarts. If a transaction updates a chunk of data in a database and commits, then the database will hold the modified data. If a transaction commits but the system fails before the data could be written on to the disk, then that data will be updated once the system springs back into action.
 - **Isolation** – In a database system where more than one transaction are being executed simultaneously and in parallel, the property of isolation states that all the transactions will be carried out and executed as if it is the only transaction in the system. No transaction will affect the existence of any other transaction.
- b. Outline six features that are desirable in a database system used in transaction processing systems [6marks]
- **Good data placement:** The database should be designed to access patterns of data from many simultaneous users.
 - **Short transactions:** Short transactions enables quick processing. This avoids concurrency and paces the systems.
 - **Real-time backup:** Backup should be scheduled between low times of activity to prevent lag of the server.
 - **High normalization:** This lowers redundant information to increase the speed and improve concurrency, this also improves backups.
 - **Archiving of historical data:** Uncommonly used data are moved into other databases or backed up tables. This keeps tables small and also improves backup times.
 - **Good hardware configuration:** Hardware must be able to handle many users and provide quick response times.
 - **amortize the cost** by keeping high rates of utilization of those expensive resources
- c. Discuss the types of Transaction Processing Systems, how they work and give an example in each [6 marks]

- On-line real time (reservation system phone based)
- Web-based (reservation system - web based)
- Non web-based (point of sale system or library loans system)
- Batch(chèque clearance OR Bill Generation)