

Chapter 7: Design and Development and Evaluation of Systems

Processing Techniques

- The Processing Methods for a system can be divided into:
 - ◆ Online Processing
 - ◆ Real-time Processing
 - ◆ Batch Processing

Online Processing

- Online processing refers to a situation where devices called **Terminals** are connected directly to the computer so that input may be made at any time and the user is able to immediately and directly access data stored in the computer.
- Online processing is done on a multi-user basis.
- Interactive processing refers to a situation in which the user interacts with the computer.
- The term **Interactive Processing** is sometimes used to describe online and real-time processing collectively.

Real-time Processing

- Any data that is received must be immediately processed and updated into the database
- Actual status of events or records, transactions are dealt with as events occur
- Database mirrors reality
- Real-time system always online
- Online system not always real-time
- Many system today are both online-real-time systems. E.g. Banking ATM

Batch Processing

- Batch processing refers to a situation where transactions are “batched”, i.e. accumulated over a period of time and then processed in a single computer software run when output is needed.
- This is a method of collecting and processing data in which transactions are accumulated and stored until a specified time when it is convenient or necessary
- Batch processing is an economical method for processing large volumes of data on a routine basis. An example of batch processing is the processing of overtime claims in a payroll system.

Interface of Online Systems

- Commands
 - ◆ One method of interacting with the computer is for the user to key in commands.
 - ◆ This does not contribute to ease of use, since commands must be remembered and mistakes are easily made.
- Menus
 - ◆ Menus may list different applications, such as sales ledger, purchase ledger or stock control routines, from which the user is guided to sub-menus according to the option selected.

Configuration for Real-time System

- Support immediate telecommunications and interactive processing
- A powerful computer server, with terminals (e.g microcomputers) at each user site, connected by telecommunications equipment like modems and leased lines



Procedure for Batch Data Processing

- Prepare Batch Control Sheets
- Send batch data to Data Preparation
- Check Batch Control Sheets
- Enter Data
- Validate Data
- Process Data

Procedure for Batch Data Processing – Prepare Batch Control Sheets

- Before sending the batch to data preparation, the number of cards is counted and noted on a batch control sheet.
- The total number of hours worked for all the cards is added and also noted on the sheet.

Procedure for Batch Data Processing – Send Batch Data to Data Preparation

- The batch control sheet is sent with the batched data and a copy is retained in the initiating department.

Procedure for Batch Data Processing – Check Batch Control Sheets

- When the cards arrive at data preparation, the cards are counted and the total hours checked against the control sheet.
- Any discrepancies are checked with the initiating department.
- Based on the batch controls sheet, it will be possible to determine whether any cards have been mislaid or altered in transit.

Procedure for Batch Data Processing – Enter Data

- The data is keyed using a keyboard and stored on disk.
- This step is sometimes called key punching which is an old term from days when punch cards were the main medium for input data.
- When punch cards are used, the data is translated into a machine readable form by punching holes in the cards, which are later read by a reading machine.

Procedure for Batch Data Processing – Validate Data

- Validation of data is done to minimize inaccuracies.

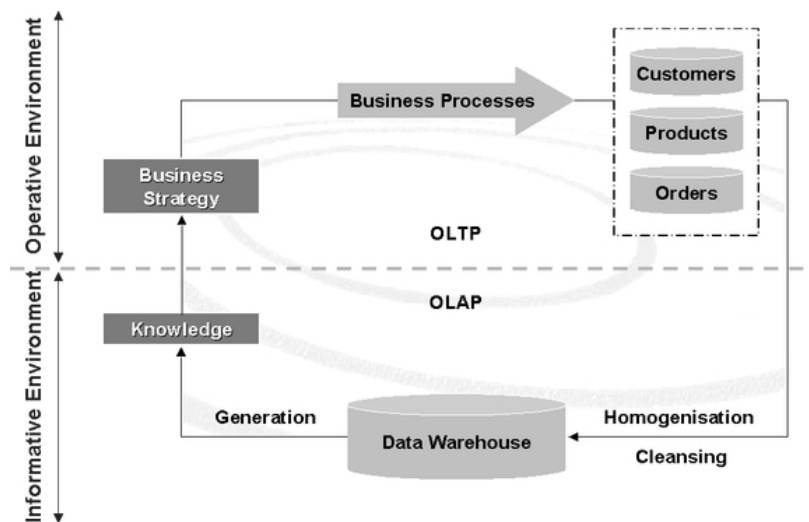


Procedure for Batch Data Processing – Process Data

- The data is now complete, validated and therefore ready for processing.



OLTP vs. OLAP



On Line Transaction Processing

- On Line Transaction Processing (OLTP)
 - Maintains a database that is an accurate model of some real-world enterprise.
 - Supports day-to-day operations.
 - Characteristics:
 - Short simple transactions
 - Relatively frequent updates
 - Transactions access only a small fraction of the database

On Line Analytic Processing

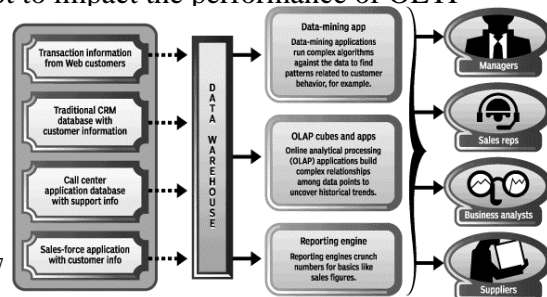
- On Line Analytic Processing (OLAP)
 - ◆ Uses information in database to guide strategic decisions.
 - ◆ Characteristics:
 - ◆ Complex queries
 - ◆ Infrequent updates
 - ◆ Transactions access a large fraction of the database
 - ◆ Data need not be up-to-date

Data Warehouses

- A **Data Warehouse** is a database geared towards the Business Intelligence requirements of an organization.
- The data warehouse integrates data from the various operational systems and is typically loaded from these systems at regular intervals.
- Data warehouses contain historical information that enables analysis of business performance over time.

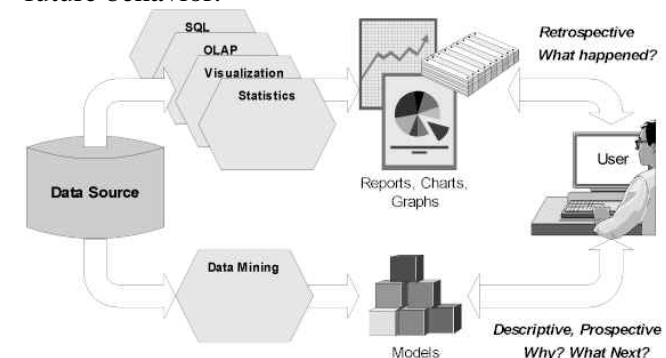
Data Warehouses

- OLAP and Data Mining databases are frequently stored on special servers called **Data Warehouses**:
 - ◆ Can accommodate the huge amount of data generated by OLTP systems
 - ◆ Allow OLAP queries and data mining to be run off-line so as not to impact the performance of OLTP



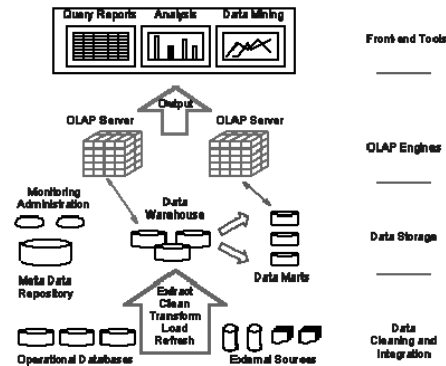
Data Mining

- Analysis of large pools of data to find patterns and rules that can be used to guide decision-making and predict future behavior.



OLAP vs. Data Mining

- OLAP tools are front-end tools used by users to *analyze data* that are stored usually in a data warehouse.
- Data Mining is an example of an OLAP that enables *detection of patterns and trends* in large databases.



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Validation

- Before data can be updated into the database, it must be checked for errors.
- This validation can be done in both online and batch processing.
 - ◆ Presence Checks
 - ◆ Format Checks
 - ◆ Range Checks
 - ◆ Reasonableness Checks
 - ◆ Check Digits

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Validation – Presence Checks

- In this instance, the input data is examined to ensure that all the necessary data items, or fields, are present.
- In the payroll example, a presence check would ensure that fields such as the date of the period-end, the employee number and the hours worked, are present.
- Any set of data failing this test would be rejected.

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Validation – Format Checks

- This check ensures that the format of the data in a field is correct, i.e. the correct number of letters and numbers, in the correct order.
- If a field is numeric, then any alphabetic data would be rejected.

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Validation – Range Checks

- This is a check that numbers or codes are within an accepted range.
- Employee payroll numbers, for example, could be subjected to this sort of check.
- Any employee number which does not fall into the accepted range could be assumed to be either a mistake or a deliberate falsehood.

Validation – Reasonableness Checks

- These are a form of range check which would reject items which are unreasonable.
- A claim that an employee has worked 25 hours in a day, for example, would fail this test.

Validation – Check Digits

- One of the most common type of mistakes is to transpose the figures in a number.
- The check digits validation check is a method of minimizing the occurrence of transposition.
- It is a mathematical technique in which the digits form the number are used in a mathematical process, the result of which is appended to the original number as the check digit.
- The number can then be tested using the same mathematical process.
- If the result is the same check digit, then the likelihood of transposition is minimal.
- If it is different then the number has been transposed.