



COSC 3380

Design of Database Systems

Introduction

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Characteristics of the Database Approach

- **Sharing of data and multi-user transaction processing:**
 - Allowing a set of **concurrent users** to retrieve from and to update the database.
 - *Concurrency control* within the DBMS guarantees that each **transaction** is correctly executed or aborted
 - *Recovery* subsystem ensures each completed transaction has its effect permanently recorded in the database
 - **OLTP** (Online Transaction Processing) is a major part of database applications. This allows hundreds of concurrent transactions to execute per second.

Advantages of the Database Approach

- Controlling redundancy in data storage, in development and maintenance efforts
- Sharing of data among multiple users
- Restricting unauthorized access to data. Only the DBA staff uses privileged commands and facilities.
- Providing Storage Structures (e.g. indexes) for efficient Query Processing
- Persistent storage for program Objects
 - Object-oriented DBMSs make program objects persistent

Advantages of the Database Approach

- Optimization of queries for efficient processing
- Providing backup and recovery services
- Providing multiple interfaces to different classes of users
- Representing complex relationships among data
- Enforcing integrity constraints on the database
- Drawing inferences and actions from the stored data using deductive and active rules / triggers

Implications of the Database Approach

- Potential for enforcing standards
 - Very crucial for the success of database applications in large organizations
 - **Standards** refer to data item names, display formats, screens, report structures, meta-data, Web page layouts, etc.
- Reduced application development time
 - Incremental time to add each new application is reduced.

Implications of Database Approach

- Flexibility to change data structures
 - Database structure may evolve as new requirements are defined.
- Availability of current information
 - Extremely important for on-line transaction systems such as shopping, airline, hotel, car reservations.
- Economies of scale
 - Wasteful overlap of resources and personnel can be avoided by consolidating data and applications across departments.