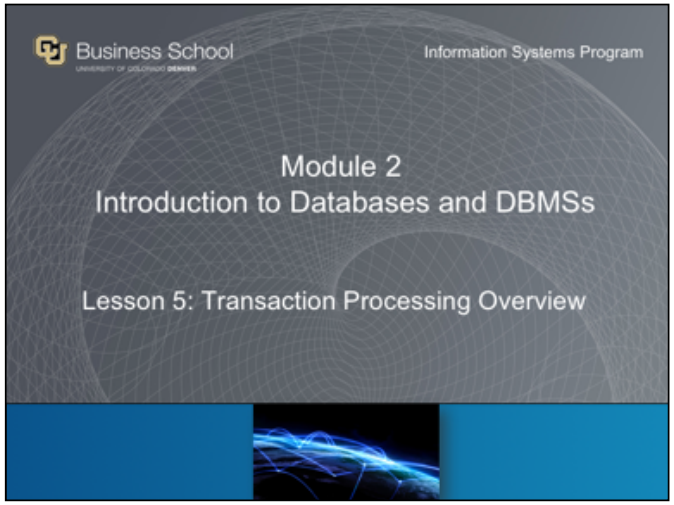
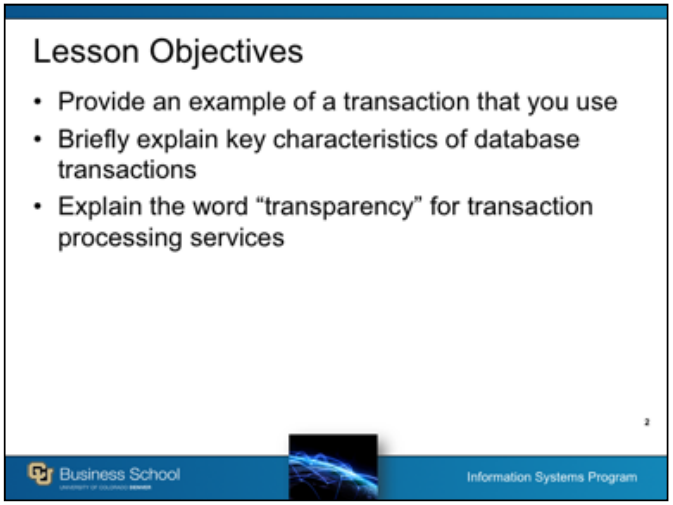


Welcome to Lesson 5 of Module 2 on Introduction to Databases and DBMSs
-This lesson covers basic transaction processing issues.
-Database management systems are vital technology to modern organizations
-This lecture provides an introduction into transaction processing.

What database transactions have you made today?



Key characteristics
- Unit of processing that may involve multiple database actions
- Reliably processed

Transaction Definition

- Supports daily operations of an organization
- Collection of database operations
- Reliably and efficiently processed as one unit of work
- No lost data
  - Interference among multiple users
  - Failures

3

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Transaction processing supports daily (routine, repetitive) operations

- Mundane but crucial
- Become even more important with the growth of the internet

Definition:

- Collection of read/write operations
- Processed as one unit
- Reliably and efficiently processed
- No data loss due to interference and failures (operating system, program, disk, …)

Airline Transaction Example

```
START TRANSACTION
    Display greeting
    Get reservation preferences from user
    SELECT departure and return flight records
    If reservation is acceptable then
        UPDATE seats remaining of departure flight record
        UPDATE seats remaining of return flight record
        INSERT reservation record
        Print ticket if requested
    End If
    On Error: ROLLBACK
COMMIT
```

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Pseudo code

Airline reservation:

- Common transaction: many simultaneous users
- Determine that departure and return are available and legal connections (maybe some complex rules if flight involves more than one leg)
- Update seats remaining in departure
- Update seats remaining in return
- Insert reservation record
- Multiple database reads and writes: all must be treated as one unit

Transaction details:

- Define in standalone or embedded SQL
- Example is pseudo code for an embedded SQL transaction
- Upper case: SQL statements
- Mixed case: statements of a programming language

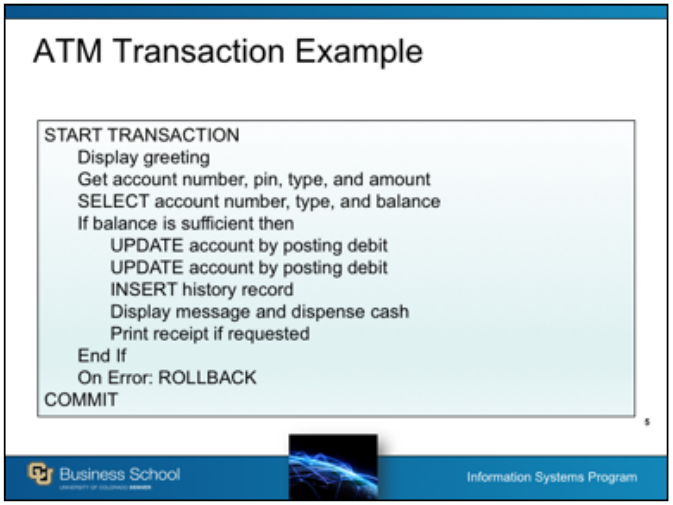
New SQL statements:

-START TRANSACTION: defines beginning of transaction statements (some DBMSs omit)

-COMMIT: end of transaction

-ROLLBACK:

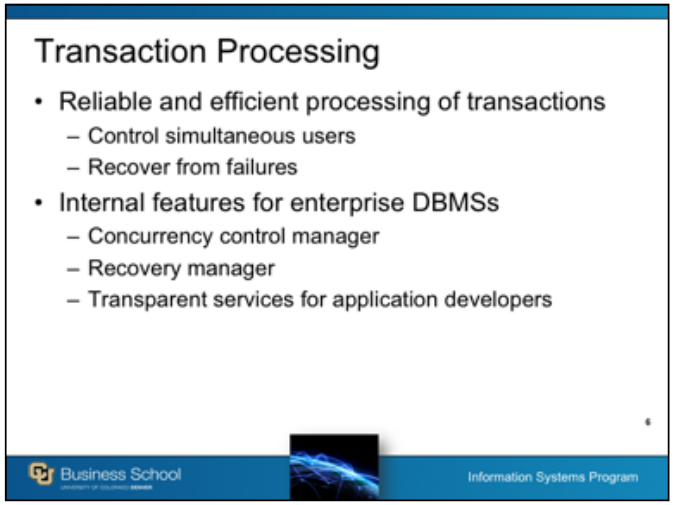
- Like a smart Undo command
- If any error occurs, all changes are deleted from the database
- On Error: part of exception handling



Pseudo code

ATM transaction:

- May shorten by moving user interaction outside of transaction
- Must keep manipulation statements in the same transaction



Process large volumes of transactions

- Critical for business success
- Major performance objective: transactions processed per unit of time

Major difference between enterprise and desktop DBMSs

- Transaction processing ability
- Major cost difference

DBMS features

- Concurrency control manager: overhead to monitor resource requests by transactions
- Recovery manager: provide redundancy and overhead processing to ensure that data cannot be lost and recovery is possible

Transparency

- See through an object rendering details invisible
- Improves productivity because application developers do not need to provide coding or understand details

6

This course focuses on databases for operations and skills fundamental to both types of processing.

Courses 2 and 3 cover data warehouses.