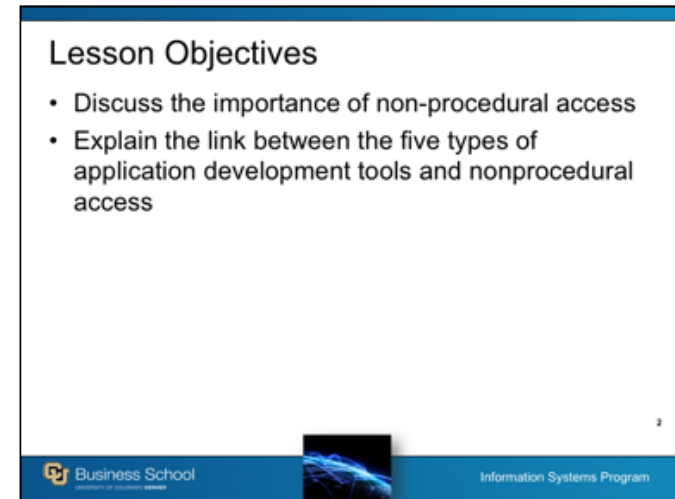


Welcome to Lesson 4 of Module 2 on the Introduction to Databases and DBMSs

- Covers non-procedural access, the most important feature of a DBMS
- Database management systems are vital technology to modern organizations

Opening question:

- What is the most labor intensive part of software development? Coding loops
- How many orders of magnitude improvement of development time from non procedural access?




## Lesson Objectives

- Discuss the importance of non-procedural access
- Explain the link between the five types of application development tools and nonprocedural access

Tools

- Database language
- Visual query tool
- Form development tool
- Report development tool
- Embedded database language inside a host programming language

## Nonprocedural Database Access



- Query: request for data to answer a question
- Indicate what parts of database to retrieve not the procedural details
- Improve productivity and improve accessibility
- SQL SELECT statement and graphical tools

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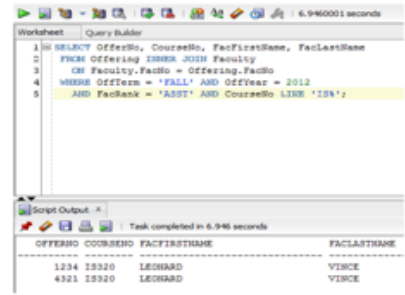
Specify what not how

Loop buster: no loops; major difference between procedural and nonprocedural language

Trip planning analogy: specify features of trip (destination, quality of accommodations, dates, ...) but not details (route, hotel research, flight research, ...)

Productivity improvement: 100 times fewer lines of code

## SELECT Statement Execution



6.9460001 seconds

```

1 SELECT OfferingID, CourseID, FacFirstName, FacLastName
2 FROM Offering INNER JOIN Faculty
3 ON Faculty.FacID = Offering.FacID
4 WHERE OfferTerm = 'FALL' AND OfferYear = 2012
5 AND FacRank = 'ASST' AND CourseID LIKE 'ISK%';

```

Script Output: 4 Task completed in 6.946 seconds

OFFERINGID	COURSEID	FACFIRSTNAME	FACLASTNAME
1234	IS320	LEONARD	VANCE
4321	IS320	LEONARD	VANCE

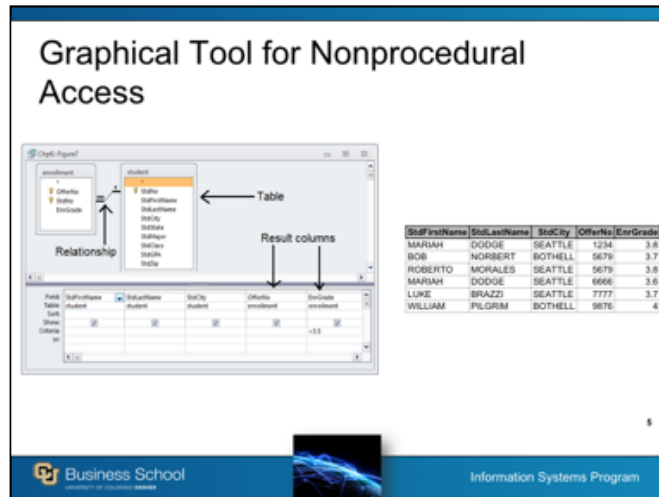
4

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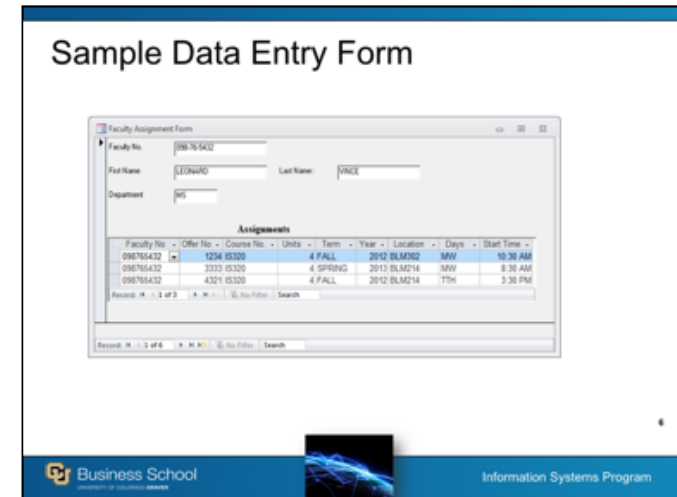
Execution of SELECT statement in the SQL Developer

Combining the Offering and Faculty tables



#### Query Design (Access)

- specify tables and columns
- Access determines connections among tables



#### Faculty assignment form

The form can be used to add new course assignments for a professor and to change existing assignments.

### Sample Report

Faculty Work Load Report for the 2012-2013 Academic Year							
Department Name	Term	Office Number	Credit Limit	Enrollment	Percent Full	Low Enrollment	
FIN							
JULIA MILLS							
	WINTER	3075	4	20	1	5.00%	<input checked="" type="checkbox"/>
Summary for Term = WINTER (1 detail record)							
	Sum		4		1	5.00%	
	Avg					5.00%	
Summary for JULIA MILLS							
	Sum		4		1	5.00%	
	Avg					5.00%	
Summary for Department = FIN (1 detail record)							

May need revision

The report uses indentation to show courses taught by faculty in various departments. The indentation style can be easier to view than the tabular style shown as default output style.

### Procedural Language Interface

- Combine procedural language with nonprocedural access
- Why
  - Batch processing
  - Customization (especially for ecommerce) and automation
  - Performance improvement

Combine external languages (COBOL, Java, C, C++, ...) with SQL

New DBMS specific languages: PL/SQL (Oracle), Transact-SQL (SQL Server)

Batch processing: much business processing is batch (collect loan applications and process together); online processing is becoming more prevalent because of the web;

Customization: customize the behavior of a data entry form

Automation: rule processing; check qoh when an order is placed

Performance: more control with a procedural language

## Summary

- Database technology vital to modern organizations
- Crucial DBMS feature: nonprocedural access
- Query language, visual tool, form tool, report tool, and embedding
- Fundamental skill: query formulation

DBMS are very complex products  
Devote many years to understand a particular product  
Learn fundamental skill of query formulation  
Detailed skill that requires lots of practice  
Use standard database language (SQL) in week 2

## Sample SELECT Statement and Result

### SELECT statement

```
SELECT OfferNo, CourseNo, FacFirstName, FacLastName  
FROM Offering INNER JOIN Faculty  
ON Faculty.FacNo = Offering.FacNo  
WHERE OffTerm = 'FALL' AND OffYear = 2012  
AND FacRank = 'ASST' AND CourseNo LIKE 'IS*';
```

### Execution result

OFFERNO	COURSENO	FACFIRSTNAME	FACLASTNAME
1234	IS320	LEONARD	VINCE
4321	IS320	LEONARD	VINCE

Combining the Offering and Faculty tables