



Business School  
UNIVERSITY OF COLORADO DENVER

Information Systems Program

# Module 2

## Introduction to Databases and DBMSs

### Lesson 4: Non-Procedural Access

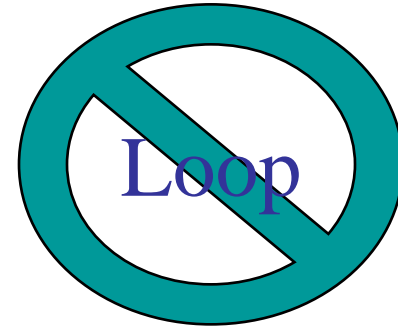


# Lesson Objectives

- Discuss importance of non-procedural access
- Explain features commonly found in client tools for database retrieval
- List reasons for using a database programming language



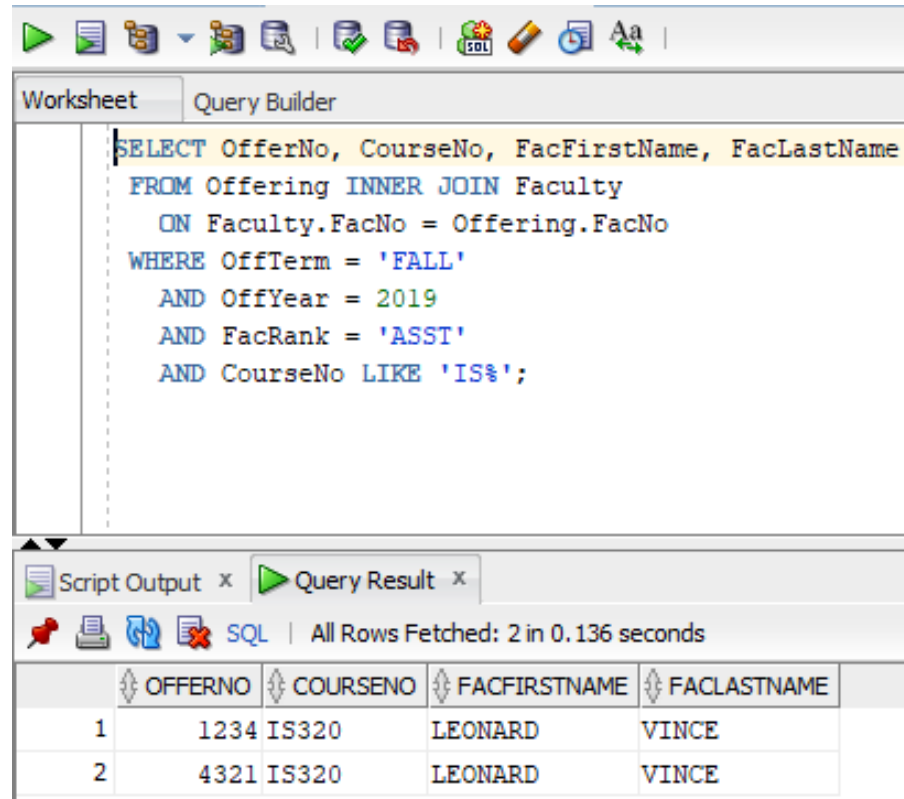
# Non-procedural Database Access



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



# Worksheet Tool in SQL Developer



The screenshot displays the SQL Developer interface. The top toolbar includes icons for running queries, saving, and other database functions. Below the toolbar, the 'Worksheet' tab is active, showing a SQL query. The 'Query Builder' tab is also visible. The query is as follows:

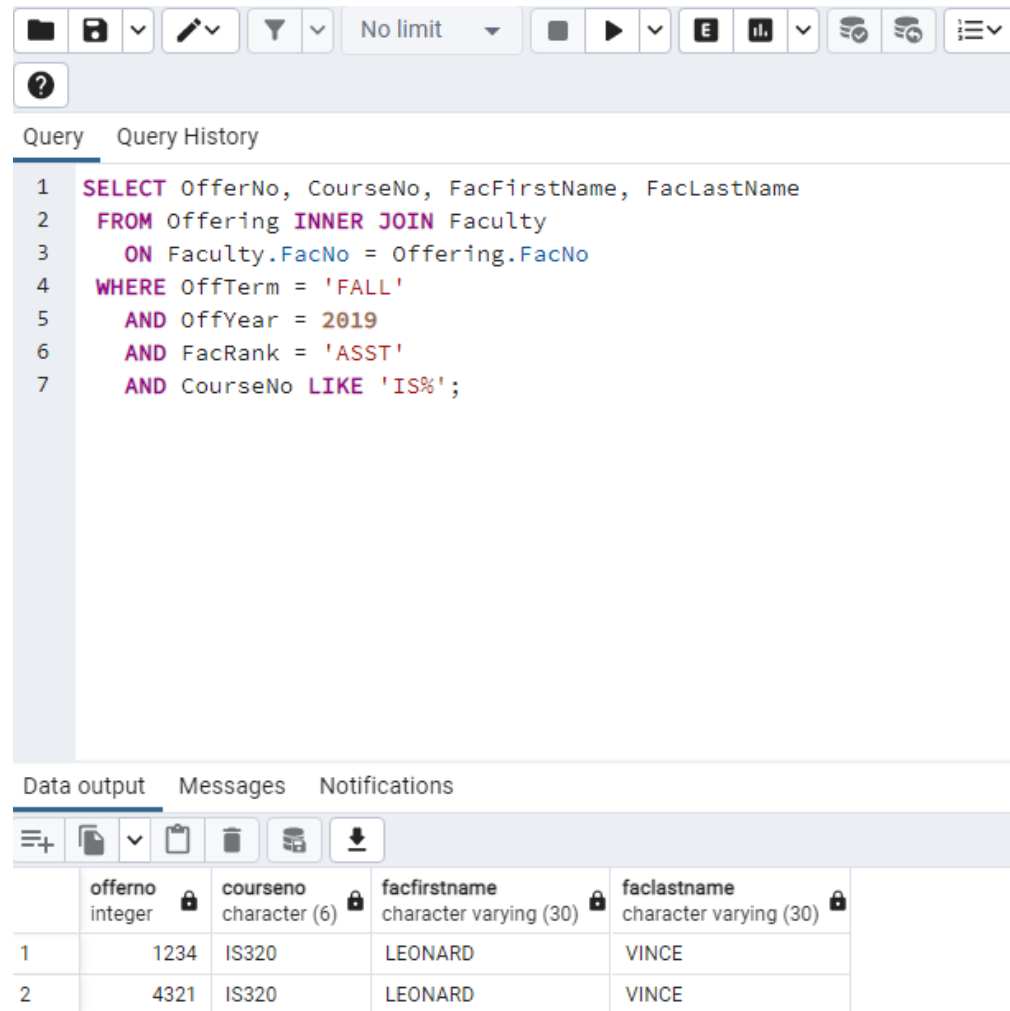
```
SELECT OfferNo, CourseNo, FacFirstName, FacLastName
FROM Offering INNER JOIN Faculty
ON Faculty.FacNo = Offering.FacNo
WHERE OffTerm = 'FALL'
AND OffYear = 2019
AND FacRank = 'ASST'
AND CourseNo LIKE 'IS%';
```

Below the query editor, the 'Script Output' and 'Query Result' tabs are shown. The 'Query Result' tab is active, displaying the results of the query. The status bar indicates 'All Rows Fetched: 2 in 0.136 seconds'. The results are shown in a table with the following columns: OFFERNO, COURSENO, FACFIRSTNAME, and FACLASTNAME.

	OFFERNO	COURSENO	FACFIRSTNAME	FACLASTNAME
1	1234	IS320	LEONARD	VINCE
2	4321	IS320	LEONARD	VINCE



# Query Tool in pgAdmin



The screenshot displays the pgAdmin Query Tool interface. At the top is a toolbar with icons for file operations, editing, filtering, and execution. Below the toolbar is a search bar with a question mark icon. The main area is divided into two tabs: 'Query' and 'Query History'. The 'Query' tab is active, showing a SQL query with line numbers 1 through 7. The query is a SELECT statement that joins the 'Offering' and 'Faculty' tables, filtering for 'FALL' 2019 with an Assistant rank and a course number starting with 'IS'. Below the query editor are three tabs: 'Data output', 'Messages', and 'Notifications'. The 'Data output' tab is active, showing a table with two rows of data. The table has five columns: 'offereno' (integer), 'courseno' (character (6)), 'facfirstname' (character varying (30)), and 'faclastname' (character varying (30)). The first row shows offereno 1234, courseno IS320, facfirstname LEONARD, and faclastname VINCE. The second row shows offereno 4321, courseno IS320, facfirstname LEONARD, and faclastname VINCE.

```
1 SELECT OfferNo, CourseNo, FacFirstName, FacLastName
2 FROM Offering INNER JOIN Faculty
3     ON Faculty.FacNo = Offering.FacNo
4 WHERE OffTerm = 'FALL'
5     AND OffYear = 2019
6     AND FacRank = 'ASST'
7     AND CourseNo LIKE 'IS%';
```

	offereno integer	courseno character (6)	facfirstname character varying (30)	faclastname character varying (30)
1	1234	IS320	LEONARD	VINCE
2	4321	IS320	LEONARD	VINCE

# Query Builder Tool in SQL Developer

The screenshot displays the SQL Developer Query Builder interface. It shows a join between the **OFFERING** and **FACULTY** tables. The **OFFERING** table has columns: OFFERNO, COURSENO, OFFTERM, OFFYEAR, OFFLOCATION, OFFTIME, FACNO, and OFFDAYS. The **FACULTY** table has columns: FACNO, FACFIRSTNAME, FACLASTNAME, FACCTY, FACSTATE, FACZIPCODE, FACRANK, FACHIREDATE, FACSALARY, FACSUPERVISOR, and FACDEPT. The query criteria include: OFFERING.OFFERNO, OFFERING.COURSENO, FACULTY.FACFIRSTNAME, FACULTY.FACLASTNAME, OFFERING.OFFTERM = 'FALL', OFFERING.OFFYEAR = 2019, and FACULTY.FACRANK = 'ASST'. The query result shows two rows of data:

	OFFERNO	COURSENO	FACFIRSTNAME	FACLASTNAME
1	1234	IS320	LEONARD	VINCE
2	4321	IS320	LEONARD	VINCE

# Database Programming Languages

- Combine procedural language with non-procedural access
- Why
  - Batch processing especially big data tasks
  - Customization especially for ecommerce and automation
  - Modularization



# Summary

- Database technology vital to modern organizations
- Non-procedural access as crucial DBMS feature
- Database retrieval using SQL and database client tool
- Database programming languages for big data tasks and customization of applications
- Query formulation as a fundamental skill for information technology professionals

