



**IBM** Information Management software

# Simple SQL Queries



# Unit Objectives

After completing this unit, you should be able to:

- Describe four clauses of an SQL SELECT statement
- Use a SELECT statement to:
  - Retrieve all rows of a table
  - Retrieve specific columns
  - Retrieve rows based on comparisons to numeric or alphanumeric data
  - Retrieve rows based on specific columns containing NULL values
- Use the keywords BETWEEN, IN, LIKE, DISTINCT
- Order the resulting rows in a desired sequence

# EMPLOYEE Table - Part 1 (1 of 2)

EMPNO	FIRSTNME	MID INIT	LASTNAME	WORK DEPT	PHONE NO	HIREDATE
000010	CHRISTINE	I	HAAS	A00	3978	1965-01-01
000020	MICHAEL	L	THOMPSON	B01	3476	1973-10-10
000030	SALLY	A	KWAN	C01	4738	1975-04-05
000050	JOHN	B	GEYER	E01	6789	1949-08-17
000060	IRVING	F	STERN	D11	6423	1973-09-14
000070	EVA	D	PULASKI	D21	7831	1980-09-30
000090	EILEEN	W	HENDERSON	E11	5498	1970-08-15
000100	THEODORE	Q	SPENSER	E21	0972	1980-06-19
000110	VINCENZO	G	LUCCHESSI	A00	3490	1958-05-16
000120	SEAN		O'CONNELL	A00	2167	1963-12-05
000130	DOLORES	M	QUINTANA	C01	4578	1971-07-28
000140	HEATHER	A	NICHOLLS	C01	1793	1976-12-15
000150	BRUCE		ADAMSON	D11	4510	1972-02-12
000160	ELIZABETH	R	PIANKA	D11	3782	1977-10-11
000170	MASATOSHI	J	YOSHIMURA	D11	2890	1978-09-15

# EMPLOYEE Table - Part 1 (2 of 2)

ED							
EMPNO	JOB	LEVEL	SEX	BIRTHDATE	SALARY	BONUS	COMM
000010	PRES	18	F	1933-08-24	52750.00	1000.00	4220.00
000020	MANAGER	18	M	1948-02-02	41250.00	800.00	3300.00
000030	MANAGER	20	F	1941-05-11	38250.00	800.00	3060.00
000050	MANAGER	16	M	1925-09-15	40175.00	800.00	3214.00
000060	MANAGER	16	M	1945-07-07	32250.00	500.00	2580.00
000070	MANAGER	16	F	1953-05-26	36170.00	700.00	2893.00
000090	MANAGER	16	F	1941-05-15	29750.00	600.00	2380.00
000100	MANAGER	14	M	1956-12-18	26150.00	500.00	2092.00
000110	SALESREP	19	M	1929-11-05	46500.00	900.00	3720.00
000120	CLERK	14	M	1942-10-18	29250.00	600.00	2340.00
000130	ANALYST	16	F	1925-09-15	23800.00	500.00	1904.00
000140	ANALYST	18	F	1946-01-19	28420.00	600.00	2274.00
000150	DESIGNER	16	M	1947-05-17	25280.00	500.00	2022.00
000160	DESIGNER	17	F	1955-04-12	22250.00	400.00	1780.00
000170	DESIGNER	16	M	1951-01-05	24680.00	500.00	1974.00

# DEPARTMENT Table

DEPTNO	DEPTNAME	MGRNO	ADMRDEPT	LOCATION
A00	SPIFFY COMPUTER SERVICE DIV.	000010	A00	-
B01	PLANNING	000020	A00	-
C01	INFORMATION CENTER	000030	A00	-
D01	DEVELOPMENT CENTER	-	A00	-
D11	MANUFACTURING SYSTEMS	000060	D01	-
D21	ADMINISTRATION SYSTEMS	000070	D01	-
E01	SUPPORT SERVICES	000050	A00	-
E11	OPERATIONS	000090	E01	-
E21	SOFTWARE SUPPORT	000100	E01	-

# PROJECT Table

PROJNO	PROJNAME	DEPT NO	RESP EMP	PR STAFF	PRSTDATE	PRENDATE	MAJ PROJ
AD3100	ADMIN SERVICES	D01	000010	6.50	1982-01-01	1983-02-01	-
AD3110	GENERAL ADMIN SYSTEMS	D21	000070	6.00	1982-01-01	1983-02-01	AD3100
AD3111	PAYROLL PROGRAMMING	D21	000230	2.00	1982-01-01	1983-02-01	AD3110
AD3112	PERSONNEL PROGRAMMING	D21	000250	1.00	1982-01-01	1983-02-01	AD3110
AD3113	ACCOUNT PROGRAMMING	D21	000270	2.00	1982-01-01	1983-02-01	AD3110
IF1000	QUERY SERVICES	C01	000030	2.00	1982-01-01	1983-02-01	-
IF2000	USER EDUCATION	C01	000030	1.00	1982-01-01	1983-02-01	-
MA2100	WELD LINE AUTOMATION	D01	000010	12.00	1982-01-01	1983-02-01	-
MA2110	W L PROGRAMMING	D11	000060	9.00	1982-01-01	1983-02-01	MA2100
MA2111	W L PROGRAM DESIGN	D11	000220	2.00	1982-01-01	1982-12-01	MA2110
MA2112	W L ROBOT DESIGN	D11	000150	3.00	1982-01-01	1982-12-01	MA2110
MA2113	W L PROD CONT PROGS	D11	000160	3.00	1982-02-15	1982-12-01	MA2110
OP1000	OPERATION SUPPORT	E01	000050	6.00	1982-01-01	1983-02-01	-
OP1010	OPERATION	E11	000090	5.00	1982-01-01	1983-02-01	OP1000
OP2000	GEN SYSTEMS SERVICES	E01	000050	5.00	1982-01-01	1983-02-01	-
OP2010	SYSTEMS SUPPORT	E21	000100	4.00	1982-01-01	1983-02-01	OP2000
OP2011	SCP SYSTEMS SUPPORT	E21	000320	1.00	1982-01-01	1983-02-01	OP2010
OP2012	APPLICATIONS SUPPORT	E21	000330	1.00	1982-01-01	1983-02-01	OP2010
OP2013	DB/DC SUPPORT	E21	000340	1.00	1982-01-01	1983-02-01	OP2010
PL2100	WELD LINE PLANNING	B01	000020	1.00	1982-01-01	1982-09-15	MA2100

# Structure of an SQL Query



**SELECT**

- **Defines result columns**

**Column names**

**Arithmetic expressions**

**Literals (text or numeric)**

**Scalar functions**

**Column functions**

**Concatenation**

**FROM**

- **Table or view names**

**WHERE**

- **Conditions (qualifies rows)**

**ORDER BY**

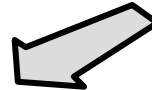
- **Sorts result rows**

# Retrieving All Columns, All Rows

I need a listing of all department data




```
SELECT *  
FROM DEPARTMENT
```



DEPTNO	DEPTNAME	MGRNO	ADMRDEPT	LOCATION
A00	SPIFFY COMPUTER SERVICE DIV.	000010	A00	-
B01	PLANNING	000020	A00	-
C01	INFORMATION CENTER	000030	A00	-
D01	DEVELOPMENT CENTER	-	A00	-
D11	MANUFACTURING SYSTEMS	000060	D01	-
D21	ADMINISTRATION SYSTEMS	000070	D01	-
E01	SUPPORT SERVICES	000050	A00	-
E11	OPERATIONS	000090	E01	-
E21	SOFTWARE SUPPORT	000100	E01	-



# Retrieving All Columns, Limited Rows



What does the data look like in the Department table?

```
SELECT * FROM DEPARTMENT  
FETCH FIRST 5 ROWS ONLY
```

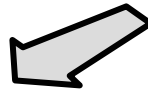
<u>DEPTNO</u>	<u>DEPTNAME</u>	<u>MGRNO</u>	<u>ADMRDEPT</u>	<u>LOCATION</u>
A00	SPIFFY COMPUTER SERVICE DIV.	000010	A00	-
B01	PLANNING	000020	A00	-
C01	INFORMATION CENTER	000030	A00	-
D01	DEVELOPMENT CENTER	-	A00	-
D11	MANUFACTURING SYSTEMS	000060	D01	-

# Selecting Specific Columns

For each department, I need its number, its name and the department to which it reports.



```
SELECT DEPTNO, DEPTNAME, ADMRDEPT  
FROM DEPARTMENT
```



<u>DEPTNO</u>	<u>DEPTNAME</u>	<u>ADMRDEPT</u>
A00	SPIFFY COMPUTER SERVICE DIV.	A00
B01	PLANNING	A00
C01	INFORMATION CENTER	A00
D01	DEVELOPMENT CENTER	A00
D11	MANUFACTURING SYSTEMS	D01
D21	ADMINISTRATION SYSTEMS	D01
E01	SUPPORT SERVICES	A00
E11	OPERATIONS	E01
E21	SOFTWARE SUPPORT	E01

# Select with Ordered Output (1 of 2)

By the way, the listing should be sorted by the department reported to

```
SELECT  DEPTNO, DEPTNAME, ADMRDEPT
FROM    DEPARTMENT
ORDER BY ADMRDEPT ASC
```



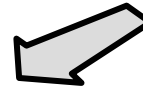
DEPTNO	DEPTNAME	ADMRDEPT
A00	SPIFFY COMPUTER SERVICE DIV	A00
C01	INFORMATION CENTER	A00
B01	PLANNING	A00
E01	SUPPORT SERVICES	A00
D01	DEVELOPMENT CENTER	A00
D11	MANUFACTURING SYSTEMS	D01
D21	ADMINISTRATION SYSTEMS	D01
E21	SOFTWARE SUPPORT	E01
E11	OPERATIONS	E01

# Select with Ordered Output (2 of 2)

I need the previous listing ordered first according to the number to which the department reports and within that sequence sorted by descending department numbers.



```
SELECT  DEPTNO, DEPTNAME, ADMRDEPT
FROM    DEPARTMENT
ORDER BY ADMRDEPT ASC, DEPTNO DESC
```



<u>DEPTNO</u>	<u>DEPTNAME</u>	<u>ADMRDEPT</u>
E01	SUPPORT SERVICES	A00
D01	DEVELOPMENT CENTER	A00
C01	INFORMATION CENTER	A00
B01	PLANNING	A00
A00	SPIFFY COMPUTER SERVICE DIV.	A00
D21	ADMINISTRATION SYSTEMS	D01
D11	MANUFACTURING SYSTEMS	D01
E21	SOFTWARE SUPPORT	E01
E11	OPERATIONS	E01

# Alternate ORDER BY Specifications

```
SELECT  LASTNAME, FIRSTNME, WORKDEPT, JOB, SEX
FROM    EMPLOYEE
ORDER BY WORKDEPT DESC, JOB, LASTNAME, SEX DESC
```

## Equivalent ORDER BY clauses:

```
ORDER BY WORKDEPT DESC, JOB ASC, LASTNAME ASC,
        SEX DESC
```

```
ORDER BY 3 DESC, 4, 1, 5 DESC
```

```
ORDER BY 3 DESC, 4 ASC, 1 ASC, 5 DESC
```

```
ORDER BY 3 DESC, JOB, LASTNAME, 5 DESC
```

```
ORDER BY WORKDEPT DESC, 4 ASC, 1 ASC, SEX DESC
```

# Suppressing Duplicate Output Rows (1 of 2)

Now, I want to know  
the different jobs  
performed  
by the employees.



```
SELECT JOB  
FROM EMPLOYEE  
ORDER BY JOB
```

```
JOB  
ANALYST  
ANALYST  
CLERK  
CLERK  
CLERK  
CLERK  
.  
.
```

```
SELECT DISTINCT JOB  
FROM EMPLOYEE
```

```
JOB  
ANALYST  
CLERK  
DESIGNER  
FIELDREP  
MANAGER  
OPERATOR  
PRES  
SALESREP
```

# Suppressing Duplicate Output Rows (2 of 2)

Also, I need a listing of the job distribution by department

```
SELECT WORKDEPT, JOB  
FROM EMPLOYEE  
ORDER BY WORKDEPT, JOB
```

<u>WORKDEPT</u>	<u>JOB</u>
A00	CLERK
A00	PRES
A00	SALESREP
B01	MANAGER
C01	ANALYST
C01	ANALYST
C01	MANAGER
D11	DESIGNER
D11	DESIGNER
D11	DESIGNER
D11	DESIGNER
D11	DESIGNER
D11	DESIGNER

.  
.

.  
.



```
SELECT DISTINCT WORKDEPT, JOB  
FROM EMPLOYEE  
ORDER BY WORKDEPT, JOB
```

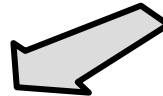
<u>WORKDEPT</u>	<u>JOB</u>
A00	CLERK
A00	PRES
A00	SALESREP
B01	MANAGER
C01	ANALYST
C01	MANAGER
D11	DESIGNER
D11	MANAGER
D21	CLERK
D21	MANAGER
E01	MANAGER
E11	MANAGER
E11	OPERATOR
E21	FIELDREP
E21	MANAGER

# Retrieving Rows by Character Comparison

I need a list of the departments reporting to department A00



```
SELECT  DEPTNO, ADMRDEPT
FROM    DEPARTMENT
WHERE   ADMRDEPT = 'A00'
```



<u>DEPTNO</u>	<u>ADMRDEPT</u>
A00	A00
B01	A00
C01	A00
D01	A00
E01	A00

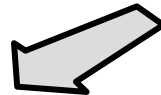


# Retrieving Rows by Numerical Comparison

I want the last name and education level of all employees with an education level greater than or equal to 19



```
SELECT  LASTNAME, EDLEVEL
FROM    EMPLOYEE
WHERE   EDLEVEL >= 19
```

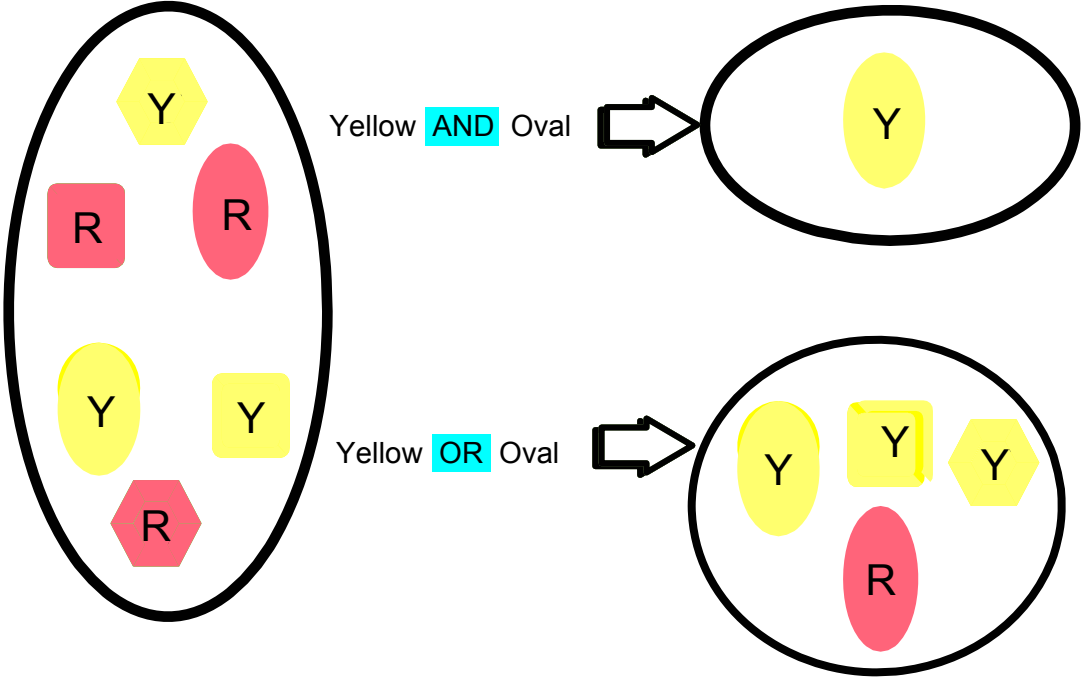


<u>LASTNAME</u>	<u>EDLEVEL</u>
KWAN	20
LUCCHESI	19

# Comparison Operators

```
SELECT *
FROM EMPLOYEE
WHERE SALARY = 20000 -- equal to
OR SALARY <> 20000 -- not equal to
OR SALARY > 20000 -- greater than
OR SALARY >= 20000 -- greater than or equal to
OR SALARY < 20000 -- less than
OR SALARY <= 20000 -- less than or equal to
```

# AND and OR - Principle



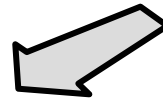
# Multiple Conditions - AND

List employee number, job, and education level for analysts with an education level of 16



```
SELECT  
FROM  
WHERE  
    AND
```

```
EMPNO, JOB, EDLEVEL  
EMPLOYEE  
JOB = 'ANALYST'  
EDLEVEL = 16
```



<u>EMPNO</u>
000130

<u>JOB</u>
ANALYST

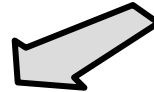
<u>EDLEVEL</u>
16

# Multiple Conditions - OR

List the columns below for all analysts and all employees with an education level of 20. Sort the list by job and employee number.



```
SELECT EMPNO, JOB, EDLEVEL
FROM EMPLOYEE
WHERE JOB = 'ANALYST'
      OR EDLEVEL = 20
ORDER BY JOB, EMPNO
```



<u>EMPNO</u>	<u>JOB</u>	<u>EDLEVEL</u>
000130	ANALYST	16
000140	ANALYST	18
000030	MANAGER	20

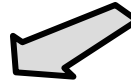
# Multiple Conditions - AND/OR

List the columns below for all analysts with an ed-level of 16. Include employees with an ed-level of 18. Sort the list by job and employee number.



```
SELECT      EMPNO, JOB, EDLEVEL
FROM        EMPLOYEE
WHERE       JOB = 'ANALYST'
           AND
           EDLEVEL = 16
           OR
           EDLEVEL = 18
ORDER BY    JOB, EMPNO
```

<u>EMPNO</u>	<u>JOB</u>	<u>EDLEVEL</u>
000130	ANALYST	16
000140	ANALYST	18
000220	DESIGNER	18
000020	MANAGER	18
000010	PRES	18



# Multiple Conditions - Parentheses

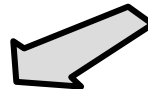
List the columns below  
for all analysts with an  
ed-level of 16 or 18.



```
SELECT EMPNO, JOB, EDLEVEL
FROM EMPLOYEE
WHERE JOB = 'ANALYST'
AND (EDLEVEL = 16
OR EDLEVEL = 18)
```

<u>EMPNO</u>
000130
000140

<u>JOB</u>	<u>EDLEVEL</u>
ANALYST	16
ANALYST	18



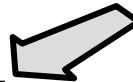
# SELECT with IN

List last name and ed-level for all employees with an ed-level of 14, 19 or 20. Sort the listing by ed-level and last name.



```
SELECT  LASTNAME, EDLEVEL
FROM    EMPLOYEE
WHERE   EDLEVEL IN (14,19,20)
ORDER BY EDLEVEL, LASTNAME
```

<u>LASTNAME</u>	<u>EDLEVEL</u>
JEFFERSON	14
LEE	14
O'CONNELL	14
SMITH	14
SPENSER	14
LUCCHESSI	19
KWAN	20





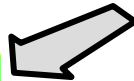
# SELECT with BETWEEN

List employee number and ed-level for all employees with an ed-level from 12 through 15. Sort by ed-level.



```
SELECT EMPNO, EDLEVEL
FROM EMPLOYEE
WHERE EDLEVEL BETWEEN 12 AND 15
ORDER BY EDLEVEL
```

<u>EMPNO</u>	<u>EDLEVEL</u>
000290	12
000310	12
000100	14
000120	14
000230	14
000300	14
000330	14
000250	15
000270	15

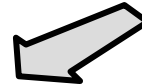


# Retrieving Rows - Null Comparison

List number and name of all departments whose manager is unknown



```
SELECT  DEPTNO, DEPTNAME, MGRNO
FROM    DEPARTMENT
WHERE   MGRNO IS NULL
```



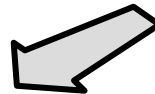
<u>DEPTNO</u>	<u>DEPTNAME</u>	<u>MGRNO</u>
D01	DEVELOPMENT CENTER	-

# Partial String Search - LIKE

List the last name for all employees whose last name starts with the letter G



```
SELECT  LASTNAME
FROM    EMPLOYEE
WHERE   LASTNAME LIKE 'G%'
```



```
LASTNAME
GEYER
GOUNOT
```

# Partial String Search - Examples with '%'

```
SELECT  LASTNAME
FROM    EMPLOYEE
WHERE   LASTNAME LIKE '%SON'
```

LASTNAME  
THOMPSON  
HENDERSON  
ADAMSON  
JEFFERSON  
JOHNSON

```
SELECT  LASTNAME
FROM    EMPLOYEE
WHERE   LASTNAME LIKE '%M%N%'
```

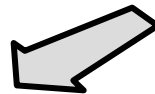
LASTNAME  
THOMPSON  
ADAMSON  
MARINO

# Partial String Search - Example with '\_'

I need a listing of all employee  
last names whose  
second character is the letter  
'C'



```
SELECT  LASTNAME
FROM    EMPLOYEE
WHERE   LASTNAME LIKE '_C%'
```



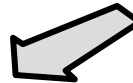
LASTNAME  
SCOUTTEN  
SCHNEIDER

# Negation

I need a listing of all departments  
**except** those with a department  
number starting with 'D'



```
SELECT  DEPTNO, DEPTNAME
FROM    DEPARTMENT
WHERE   DEPTNO NOT LIKE 'D%'
```



DEPTNO

A00

B01

C01

E01

E11

E21

DEPTNAME

SPIFFY COMPUTER SERVICE DIV.

PLANNING

INFORMATION CENTER

SUPPORT SERVICES

OPERATIONS

SOFTWARE SUPPORT

# Checkpoint



1. True or False? The sequence in which clauses are coded in a SELECT statement is arbitrary.
2. BETWEEN causes the rows of the result table to be
  - a. Sorted in ascending order
  - b. Sorted in descending order
  - c. Not sorted at all
3. Which clauses in a SELECT statement are required?
4. Within a WHERE clause, character data, dates, times and timestamps must always be enclosed within what?
5. When doing patterned character string searches, what gives the underscore and the percent symbol their masking abilities?
6. True or False? WHERE clause predicates must be separated from each other by commas.

# Checkpoint Solutions



1. False
2. c
3. SELECT, FROM
4. Apostrophes (or single quotes)
5. The keyword LIKE
6. False  
They are joined by AND or OR.



# Unit Summary

Having completed this unit, you should be able to:

- Describe four clauses of an SQL SELECT statement
- Use a SELECT statement to:
  - Retrieve all rows of a table
  - Retrieve specific columns
  - Retrieve rows based on comparisons to numeric or alphanumeric data
  - Retrieve rows based on specific columns containing NULL values
- Use the keywords BETWEEN, IN, LIKE, DISTINCT
- Order the resulting rows in a desired sequence