Determine the output displayed from procedures

- Lab sheet 10.4

Database Management (Continue)

Relational Databases and SQL

- Primary and Foreign Keys
- SQL
- Four SQL Requests

Primary Keys

- A **primary key** is used to uniquely identify each record.
  - Databases of student enrollments in a college usually use a field of Social Security numbers as the primary key.
  - Why wouldn't names be a good choice as a primary key?

Two or More Tables

- When a database contains two or more tables, the tables are usually related.
- For instance, the two tables Cities and Countries are related by their country field.
- Notice that every entry in Cities.country appears uniquely in Countries.country and Countries.country is a primary key.
- We say that Cities.country is a **foreign key** of Countries.country.

Foreign Keys

- Foreign keys can be specified when a table is first created. Visual Basic will insist on the **Rule of Referential Integrity.**
- This Rule says that each value in the foreign key must also appear in the primary key of the other table.

Join

- A foreign key allows Visual Basic to link (or **join**) together two tables from a relational database
- Example (MEGACITIES.MDB)
  - Join Cities and Countries by the foreign key Cities.country.
  - The record is expanded to show its country's population and its monetary unit.

A Join of two tables

Cities. city	Cities. country	Cities. pop2005	Cities. pop2015	Countries. country	Countries. pop2005	Countries. monetaryUnit
Bombay	India	18.2	22.6	India	1103.4	rupee
Calcutta	India	14.3	16.8	India	1103.4	rupee
Delhi	India	15.1	20.9	India	1103.4	rupee
Dhaka	Bangladesh	12.4	17.9	Bangladesh	141.8	taka
Jakarta	Indonesia	13.0	17.5	Indonesia	222.8	rupiah
Lagos	Nigeria	11.0	17.0	Nigeria	131.5	naira
Mexico City	Mexico	19.0	20.6	Mexico	107	peso
New York	USA	18.5	19.7	USA	298.2	dollar
Sao Paulo	Brazil	18.2	20.0	Brazil	186.4	real
Tokyo	Japan	35.2	36.2	Japan	128.1	yen

SQL

- **Structured Query Language** developed for use with relational databases
- Allows for the request of specified information from a database
- Allows displaying information from database in a specific format

Four SQL Requests

- Show the records of a table in a specified order

```
SELECT * FROM Table1 ORDER BY field1 ASC
```

- or

```
SELECT * FROM Table1 ORDER BY field1 DESC
```

Specifies
ASCending
Or
DESCending

Show just the records that meet certain criteria

* means
"all the fields"

Specified
Criteria

```
SELECT * FROM Table1 WHERE criteria
```

Name of the
Table where the
Records may be found

Join the tables together

- connected by a foreign key, and present the records as in previous requests

```
SELECT * FROM Table1 INNER JOIN Table2 ON foreign
   field = primary field WHERE criteria
```

Make available just some of the fields

- of either the basic tables or the joined table.

```
SELECT field1, field2, . . ., fieldN FROM
       Table1 WHERE criteria
```

Criteria Clause

- A string containing a condition of the type used with If blocks.
- Uses the standard operators <, >, and =
- Also can use the operator Like.
- Like uses the wildcard characters “_” and “%” to compare a string to a pattern.

Examples using Like

- An underscore character stands for a single character in the same position as the underscore character.
- The pattern “B_d” is matched by “Bid”, “Bud”, and “Bad”.
- A percent sign stands for any number of characters in the same position as the asterisk.
- The pattern “C%r” is matched by “Computer”, “Chair”, and “Car”.

SELECT clause

- **SELECT *fields* FROM *clause***
- *fields* is either * (to indicate all fields) or a sequence of the fields to be available (separated by commas)
- *clause* is either a single table or a join of two tables

Join clause

- A join of two tables is indicated by a clause of the form

table1* INNER JOIN *table2* ON *foreign key of table1=primary key of table2

- Appending **WHERE *criteria***
  to the end of the sentence restricts the records to those satisfying criteria.
- Appending **ORDER BY *field(s)* ASC (or DESC)**
  presents the records ordered by the specified field or fields.

General SQL statements

SELECT *www* FROM *xxx* WHERE *yyy* ORDER BY *zzz*

- SELECT *www* FROM *xxx* is always present
- May be accompanied by one or both of WHERE *yyy* and ORDER BY *zzz*.
- The *xxx* portion might contain an INNER JOIN phrase.

More on SQL statements

- The single quote, rather than the normal double quote, is used to surround strings.
- Fields may be specified with the table they come from by *tableName.FieldName*