Database

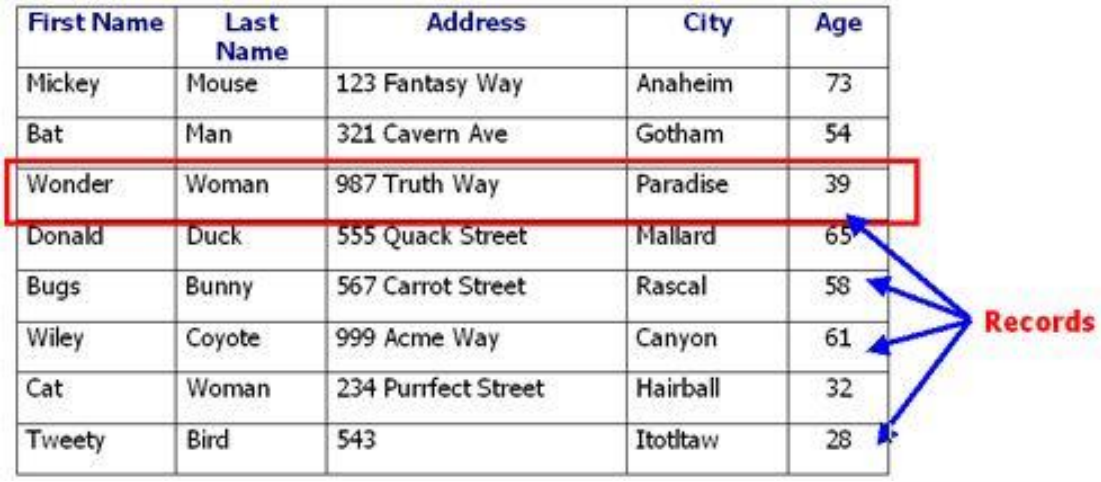
A database is a collection of data or information which is held together in an organised or logical way. Following are three main types of a database.

1. **A manual database** is a hard-file storage system that consists of paper records, folders and filing cabinets or storage boxes.
2. **Paper Based Database:** For example the Phone Book or Yellow Pages is a paper based database. It has one entry (record) for each person. That record has several parts (Fields) than give name, telephone number etc. So it has the main elements of a database.
3. **Computerized Database:** For example, Search engines, electronic registers, online database, electoral registers. A library stores details of all their books, in a **database**.

A table stores all of the records for a particular category, just like the one below:

First Name	Last Name	Address	City	Age
Mickey	Mouse	123 Fantasy Way	Anaheim	73
Bat	Man	321 Cavern Ave	Gotham	54
Wonder	Woman	987 Truth Way	Paradise	39
Donald	Duck	555 Quack Street	Mallard	65
Bugs	Bunny	567 Carrot Street	Rascal	58
Wiley	Coyote	999 Acme Way	Canyon	61
Cat	Woman	234 Purrfect Street	Hairball	32
Tweety	Bird	543	Itotltaw	28

A record is all of the data or information about one person or one thing in a database table.
In the table below, all of the information about each cartoon character is stored in a 'row' or 'record'.



A 'field' is one piece of data or information about all persons or things in a database table.

First Name	Last Name	Address	City	Age
Mickey	Mouse	123 Fantasy Way	Anaheim	73
Bat	Man	321 Cavern Ave	Gotham	54
Wonder	Woman	987 Truth Way	Paradise	39
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Data Types in Database

Each field in a database has some specific data type. Data type tells that what kind of data can be stored in a field of data base such as numeric, text etc.

Most common data types are:

1. Alphanumeric or Text
2. Number
3. Date/Time
4. Currency
5. Auto number
6. Logical, Boolean, Yes/No

Alphanumeric or Text Data Type allows you to type in text, numbers and symbols. For Example:

1. Forename: James
2. Surname: Smith
3. Address: 73, High Street
4. Postcode: CV34 5TR
5. Telephone Number: 01926 123456*

Field Length

Once you have chosen your datatypes, you need to think about the best **'field length'** for each field. Most databases will have a **default field length** set up, in this case it is 50. This means that each text field is able to store up to 50 letters, numbers or symbols.

What field size do you think would be sensible for the mobile number field?

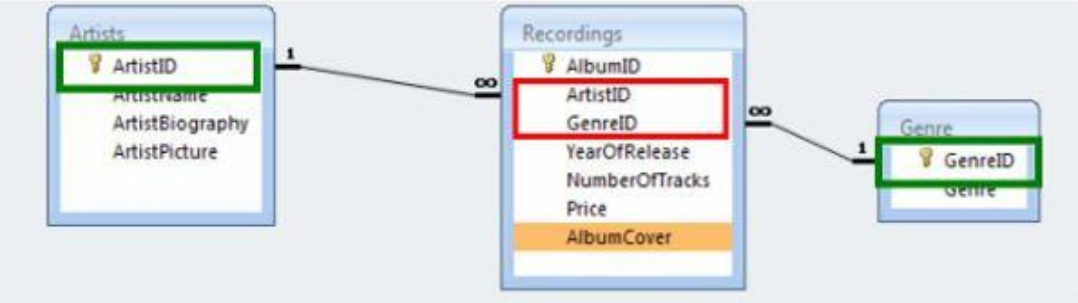
Primary Key & Foreign Key

'Primary Key' or sometimes the 'Key Field' is used to uniquely identify every single record in a database.

Examples:

1. When you started school, you were given a '**student ID**' or an 'office number' (primary key).
2. When patients go into hospital, they are given a **patient number** (primary key).
3. When bank customers want to deposit or withdraw money they have to provide their **bank account number** (primary key).

A foreign key is used to link tables together and create a relationship. It is a field in one table that is linked to the primary key in another table.



= primary key

= foreign key

Practice Questions

Question 1: (May/June 2013, P11, Q12)

A database was set up to compare oil companies. A section of the database is shown below:

Code	Name of company	No of employees	No of countries	Head office	Profits (billion $)	Share price ($)
AR	Arrows	60 000	30	Americas	8.0	39.00
GZ	Gazjeti	35 000	4	Asia	5.0	44.50
KO	Konoco	40 000	22	Americas	10.0	18.55
OS	Oilbras	56 000	11	Americas	4.0	59.60
SD	Sand Oil	102 000	51	Europe	12.0	15.30
SN	Southern Oil	50 000	15	Americas	11.0	10.90
ST	Static Oil	80 000	31	Americas	10.0	52.05
SU	Summation	70 000	40	Europe	9.0	30.40
WP	Wasp Petrol	90 000	44	Europe	15.0	92.80

(a) How many fields are there in **each** record?

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(b) The following search condition was entered:

(**No of countries** < 30) AND (**Head office** = "Americas")

Using **Code** only, which records would be output?

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(c) What search condition is needed to find out which oil companies have a share price less than $50 or whose profits were greater than 8 billion dollars?

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Question 2: (May/June 2013, P12, Q11)

A survey of motorways was carried out and a database was produced. A section of the database is shown below.

Motorway ID	Length (km)	Cars per day	Toll charge per km ($)	Number of lanes
M1	100	50000	0.60	2
M2	210	75000	0.40	3
M3	180	60000	0.50	4
M4	40	20000	0.30	3
M5	25	15000	0.10	2
M6	100	40000	0.70	4
M7	30	10000	0.40	2
M8	150	60000	0.60	4

(a) How many fields and how many records are shown?

(i) number of fields .....

(ii) number of records .....

(b) Using **Motorway ID** only, what would be output if the following search condition was used?

(**Length (km)** > 100) AND (**Number of lanes** > 3)

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(c) What search condition is needed to find the motorways where the number of cars per day exceeds 50000 or the toll charge per kilometre is greater than $0.50?

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Question 3: (May/June 2014, P11, Q14)

A database was set up showing statistics for some states in the USA. Part of the database is shown below.

Ref	Name of state	Population (millions)	Number of houses (millions)	Area (sq miles)	Density	Travel time to work (min)
OR	Oregon	3.8	1.6	96000	39.6	22.3
CO	Colorado	4.9	2.1	104000	47.1	24.3
NJ	New Jersey	8.7	3.5	7400	1175.7	30.0
TX	Texas	24.3	9.4	262000	92.7	25.4
CA	California	36.8	13.3	156000	235.9	27.7
FL	Florida	18.3	8.7	53900	339.5	26.2
AK	Alaska	0.7	0.3	572000	1.2	19.6
NV	Nevada	2.6	1.1	110000	23.6	23.3
NY	New York	19.5	7.9	47000	414.9	31.7

(a) (i) How many records are in this section of the database?

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(ii) How many fields are in each record?

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(b) The following search condition was entered:

(**Population (millions)** < 4.0) OR (**Number of houses (millions)** < 4.0)

Using **Ref** only, write down which records will be found.

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(c) Write down the search condition to find out which states have an area over 100000 square miles and where it takes less than 25 minutes to get to work.

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(d) (i) What should be the key field in this database?

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(ii) Give a reason for your choice.

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Question 4: (Oct/Nov 2013, P13, Q3)

A motor car manufacturer offers various combinations of

- seat colours
- seat materials
- car paint colours

A database was set up to help customers choose which seat and paint combinations were possible.

	seat material			car paint colours						
code	**cloth**	**leather**	**seat colour**	***white***	***red***	***black***	***blue***	***green***	***silver***	***grey***
CB	Y	N	black	Y	Y	Y	Y	Y	Y	Y
LB	N	Y	black	N	Y	N	N	N	Y	Y
CC	Y	N	cream	N	Y	Y	Y	N	N	N
LC	N	Y	cream	N	Y	Y	Y	N	N	Y
CG	Y	N	grey	N	Y	Y	Y	Y	Y	N
LG	N	Y	grey	N	Y	N	Y	N	Y	Y
CR	Y	N	red	Y	N	Y	N	N	Y	Y
LR	N	Y	red	Y	N	Y	N	N	Y	Y
CL	Y	N	lime	N	N	N	Y	N	N	N
LL	N	Y	lime	N	N	Y	Y	Y	N	N

(NOTE: N = no, not a possible combination, Y = yes, combination is possible)

(a) How many records are shown in the database?

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(b) The following search condition was entered:

(**cloth** = "Y") AND (**blue** = "Y")

Using **code** only, which records will be found?

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(c) A customer wanted to know the possible combinations for a car with leather seats and either silver or grey paint colour.

What search condition would need to be input?

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Question 5:

A database was set up to keep track of goods in a shop. A section of the database is shown below.

Item code	Number in stock	Re-order level	Price of item ($)	Value of stock ($)	Items ordered
1113	155	200	1.50	232.50	Yes
1124	84	50	2.50	210.00	No
1200	30	60	5.00	150.00	Yes
1422	600	500	1.00	600.00	No
1515	90	100	2.00	180.00	No
1668	58	50	4.00	232.00	No
1801	60	100	8.00	480.00	No
1844	195	200	1.50	292.50	Yes

(a) How many records are shown in this section of database?

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(b) (i) Using **Item code** only, what would be output if the following search was carried out:

(**Number in stock** < **Re-order level**) AND (**Items ordered** = "No")

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(ii) What useful information does this search produce?

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(c) Write a search condition to locate items costing more than $2.00 or have a stock value exceeding $300.00.