Information Systems & Databases

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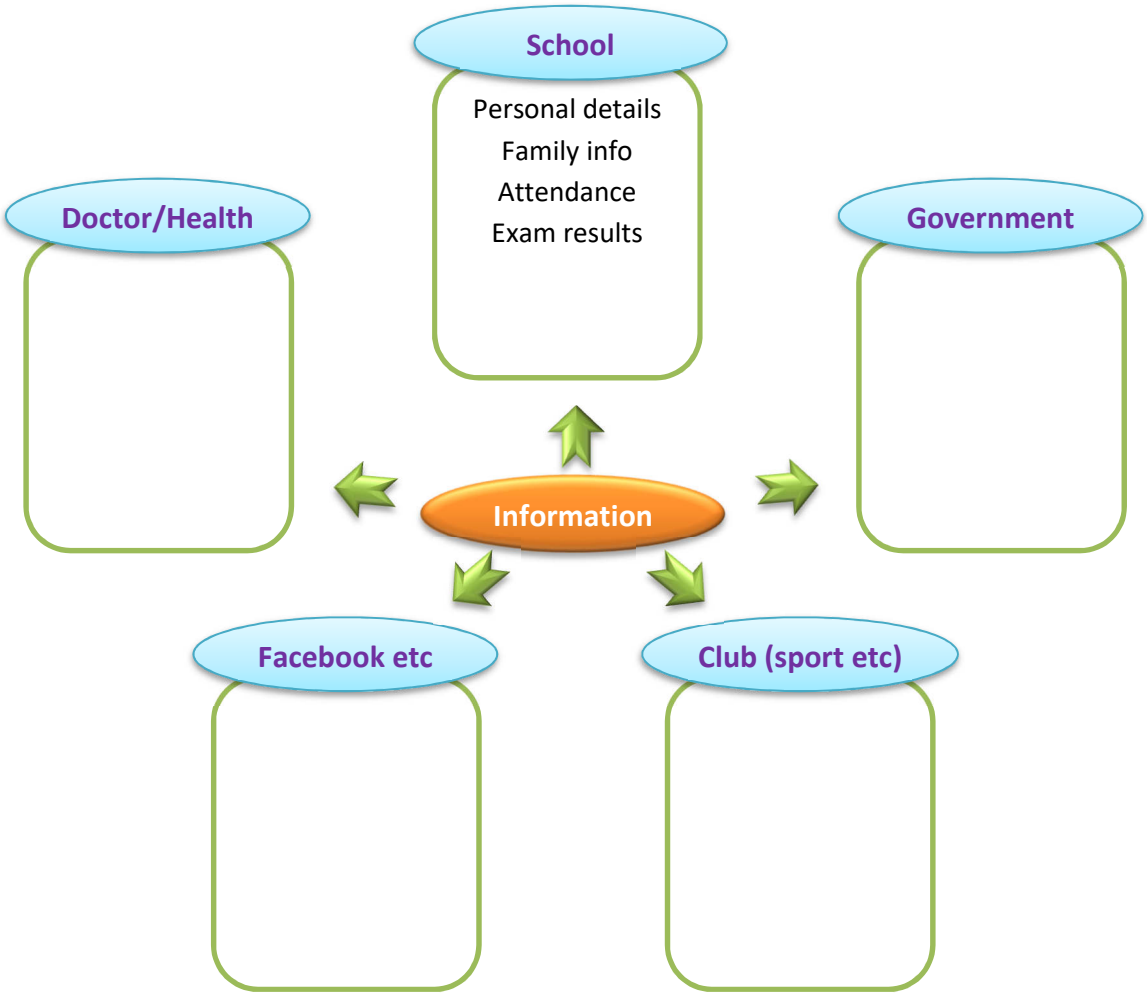
Task 1 – Digital Information

a. Information is stored everywhere. In groups, discuss the information different people hold about you and list your ideas below. We have got you started with a few ideas.



b. As well as information about people, there is a huge amount of other digital information stored in the world. Write down some of these areas below. Again, we have started you off.

Encyclopaedias/Wikipedia _____ _____

News and weather _____ _____

Texts/Emails/Tweets _____ _____

c. The amount of data being generated and stored is phenomenal. A single letter of the alphabet can be stored in one byte of data. Every day, quintillions of bytes are stored somewhere in the world (a quintillion is a billion billion).

Research on the internet and see if you can find out how many bytes of data are currently stored on earth.

Databases are used to store, organise and report on information. The information is generally stored as data in tables. Each table can be thought of as having rows and columns of data, similar to a simple spreadsheet or a table that you might create in maths or science. Databases become powerful when you have a number of tables, all linked together in some way.

Microsoft Access is a database application used by institutions all over the world, including many schools and offices. We are going to learn about this software and use it to build an information system.

Task 1 – Tables (Datasheet View)

The actual data in an Access database is stored in tables like the one below. The columns are called *fields*. Each column shows the *field name* at the top. Each row is called a *record*. This view of the information is called the *Datasheet View*.

Field Names are shown at the top of each column

The *Table Name* is shown in the *Title Bar*

Family and Friends

ID	First_Name	Last_Name	Relation	Age	Email	Contacted	Date
1	Richard	Collins	Brother	24	richard@one.net	☑	3/06/2017
2	Jane	Fullerton	Sister	22	jane@mail.com	☐	
3	Paul	Collins	Brother	21	paul@one.net	☑	11/05/2017
4	Lucy	Collins	Sister	15		☐	
5	Michael	Fullerton	Inlaw	25		☐	
6	Toby	Fullerton	Nephew	2		☐	
7	Mark	Collins	Father	48	mark@online.com	☐	
8	Rachel	Collins	Mother	46		☑	5/01/2017
9	Steve	Buchanan	Friend	18	steve@net.com	☐	
10	Chan	Michaels	Friend	18	chan@hotmail.com	☐	
11	Mohamed	Faiz	Friend	19	mf@fivenet.com	☐	
12	Jim	Makias	Friend	18	jim@hotmail.com	☐	
*	New)			0		■	

Record: 8 of 12 No Filter Search

Each row is called a *record*

You can add new records here

Information about the selected record

Each column is called a *field*

a. What field name is in the second column of data? _____

b. Who is the second record for? _____

c. How many people are under 20 years of age? _____

d. How many people has the database owner contacted? _____

e. Who is the database owner's father? _____

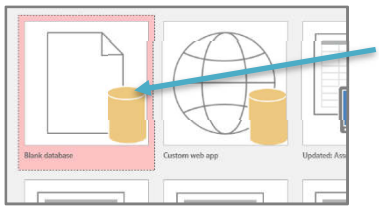
f. Which field could be a membership number? _____

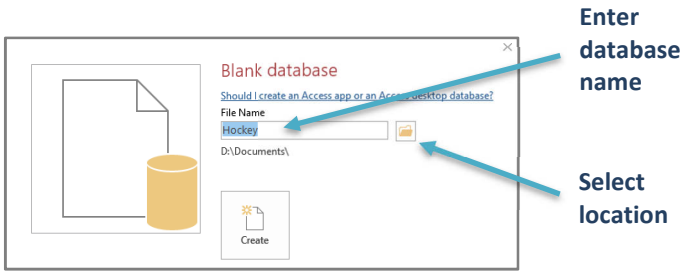
g. What is the name of the table? _____

Task 1 – The Database File

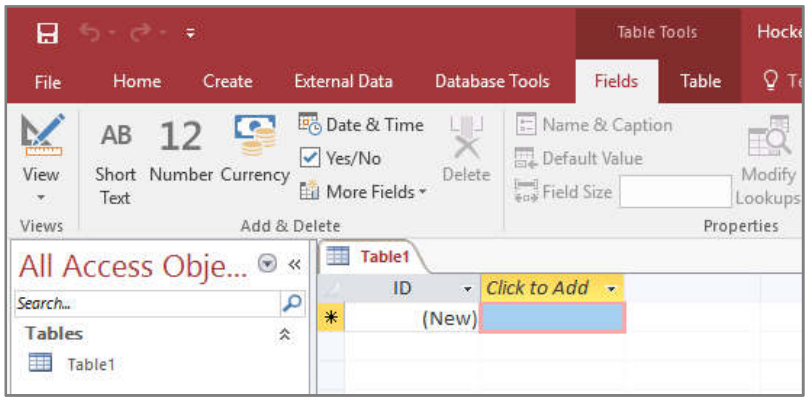
a. Open Microsoft Access and click on *Blank Database*.

b. Type an appropriate file name into the *File Name* box and click on the yellow folder icon to select a location for your new database.

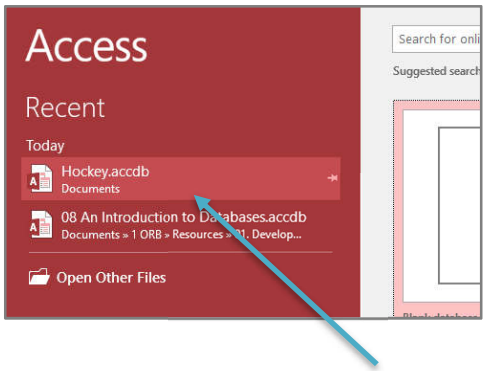




c. Click on the *Create* button. Your database will open with a new table presented in *Datasheet View*.



d. Close the application by clicking on the cross in the top-right of the screen. Your database has already been saved, so you won't be prompted about this.



e. Open Access again. Your database should be in the list on the left. Click on the name to open it. If it is not in the list, then click *Open* and locate your database file.

f. At times, you may notice a yellow security warning under the ribbon. Databases can hold damaging computer code, so you should be careful when using them. If you are sure that your database is from a safe source, then you may *Enable Content*.

Creating the Database (page 2)

Task 2 – Data Types Recap

Before we create our first database table, we will look again at some of the words we will be using.
State the meaning of each of the terms below:

a. Data _____

b. Database _____

c. AutoNumber _____

d. Short Text _____

e. Number _____

f. Currency _____

g. Date/Time _____

h. Yes/No _____

i. Table _____

j. Field _____

k. Record _____

l. Form _____

m. Report _____

Task 3 – Entering the Field Information

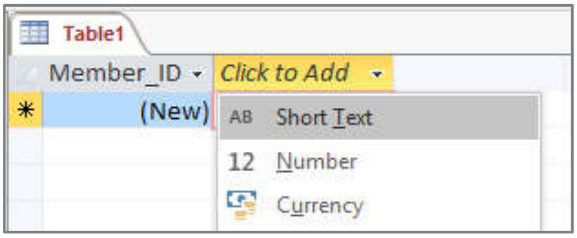
For this task, you will need the list of field names that you intend to use in your database.

a. Open your database in Access. Select the *Create* tab in the ribbon then click on the *Table* icon (we'll use the shorthand '**Create / Table**' for this type of instruction in future).

b. The new table will be displayed in *Datasheet View*. We can use this view to enter our field names and select the field types. The first field will be set up automatically, named 'ID' and set as *AutoNumber*.

c. Double-click on the field name 'ID' and change it to the AutoNumber field you planned (we've used 'Member_ID'). If you didn't plan any kind of AutoNumber field, simply leave it as 'ID'.

d. Our next field will be called 'Last_Name' with a field type of *Short Text*. Yours may be different. Click on the *Click to Add* heading above the second column and select your data type from the list. Name the field as planned.



Note: *With up to 255 characters, 'Short Text' provides enough space for most text fields. You may select 'Long Text' if you need more.*

e. Repeat this procedure until you have added all the fields from your list. See the instructions on the next page if you make a mistake.

Access allows you to sort your data so that it appears in a different order. For example, you may want to list people alphabetically, or by age starting with the oldest. When you are sorting data, you can choose to order it in one of the following ways:

Sort Ascending	1, 2, 3	a, b, c	20/7/05, 20/7/06, 4/3/08
Sort Descending	3, 2, 1	c, b, a	4/3/08, 20/7/06, 20/7/05

Task 1 - Sorting

Write out the following data in the order shown:

a.	4, 2, 7, 1, 5	Ascending	_____
b.	a, f, d, t, b	Descending	_____
c.	Paul, June, Jane, Pete	Ascending	_____
d.	424, 242, 244, 224, 442	Descending	_____
e.	20/6/13, 22/6/12, 24/6/13	Ascending	_____

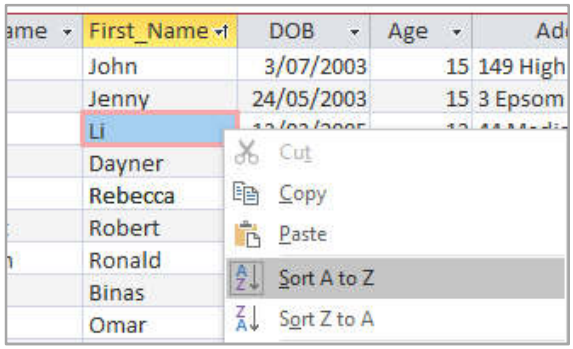
Task 2 – Sorting in Access

g. Open the table you created for your information system (or use our test database if you haven't one).

h. Place the cursor anywhere in a text field and click on the *Ascending* icon under the *Home* tab. The records will be organised in alphabetical order. Alternatively, right-click in the field and select 'Sort A to Z' as shown.

i. Try sorting in descending order.

j. Sort some other types of data, such as dates or *Yes/No* fields. Do they work as you would expect?



Task 3 – Filtering by Form

Sometimes, you may want to view only a few of the records in your table. For example, you may need a list of people who are aged 15 years old (as shown) or a list of people who have not paid their fees. Rather than displaying the whole table of information, Access allows you to *filter* the data first.

Member_ID	Last_Name	First_Name	DOB	Age
1	Collins	John	3/07/2003	15
2	See	Jenny	24/05/2003	15
4	Lester	Dayner	12/12/2003	15
6	Stewart	Robert	31/03/2003	15
10	Alcott	Lisa	28/11/2003	15
(New)				0

Note: *Filtered data isn't removed from the table. It is simply hidden from view.*

Queries are used to fetch and organise data from database tables. At this stage, we will only be using something called a SELECT query, which is really a filter that you can edit. Data can be retrieved based on things such as:

Tables and Fields	*You can decide on the fields that are displayed from a certain table.*
Records	*Records can be filtered by date, the text they contain, numbers over a set amount etc.*
Order	*The records can be placed in a particular order.*

When a query is executed, the results appear in a datasheet. This is a filtered display of data – the actual tables have not been changed in any way. The tasks below use a query builder to produce some queries.

Note: *We will practice queries in some simple practice databases created for these tasks. Once you have learned the skills, you should try to apply them to your own information system.*

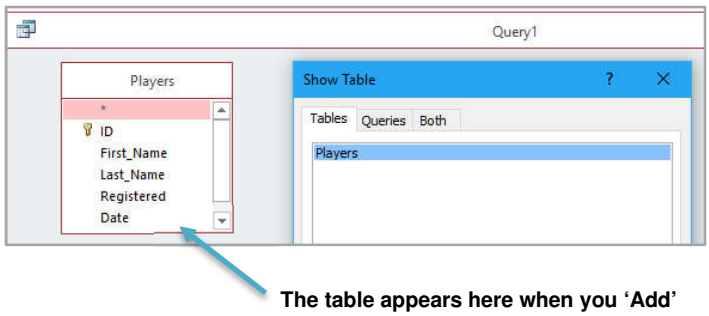
Task 1 – Building a Query

a. Create a database with a table called Players. Use the field names and data shown below.

ID	First_Name	Last_Name	Registered	Date	Played
1	Sarah	Johns	✓	01-Mar-17	5
2	Charles	Collins			4
3	Richard	Chew	✓	01-Mar-17	5
4	Paul	Logan	✓	05-Apr-17	5
5	Gareth	Jones			4
6	Amelia	McDermott	✓	01-Mar-17	3
7	Lisa	Holmes	✓	05-Apr-17	5
8	Mark	Collins	✓	08-Mar-17	4

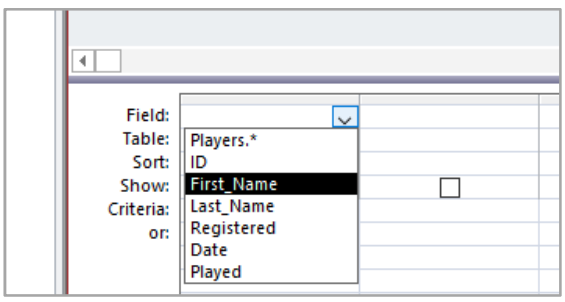
b. *Click* on the '**Create / Query Design**'.

c. Make sure that the *Players* table is selected in the *Show Table* window and click *Add* (or double-click on the table name). A small box showing the fields in your table will appear in the query builder window. Close the *Show Table* box.



d. *Working* in the lower half of the display, select *First_Name* from the drop-down list in the first column. This field will be displayed first in your results.

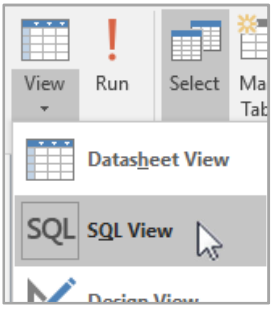
e. *Select Last_Name* in the second column. Click on the *Sort* box underneath and select *Ascending* from the choices (see the picture on the next page).



SQL stands for **Structured Query Language**. It is a form of computer code used to interact with a database. When using MS Access, you do not need to think about the SQL that is being used; you can create a query easily using either the *Query Wizard* or *Design View* tools. However, it is actually the SQL doing the work behind the scenes. The tools in Access are SQL builders; they help produce the SQL that communicates with the database.

If, for example, you open the query *T1_Played5* from the *Queries* resource, a list of members who have played 5 games is retrieved. Clicking on the arrow below the *View* icon and selecting *SQL View* displays the code shown below-centre. The image below-right shows a simplified version of the same SQL. This also works well.

Field:	First_Name	Last_Name	Played
Table:	Players	Players	Players
Sort:		Ascending	
Show:	☑	☑	☐
Criteria:			5



T1_Played5

```
SELECT Members.First_Name, Members.Last_Name
FROM Members
WHERE (((Members.Played)=5))
ORDER BY Members.Last_Name;
```

Code generated by MS Access

T1_Played5

```
SELECT First_Name, Last_Name
FROM Members
WHERE Played=5
ORDER BY Last_Name
```

Simplified version of the same code

The SQL code shown can be broken down into the four parts below.

1.	**SELECT**	some columns	*e.g. display First_Name and Last_Name, in that order*
2.	**FROM**	a table	*e.g. from the Members table*
3.	**WHERE**	some criteria is matched	*e.g. only if Played = 5*
4.	**ORDER BY**	some columns	*e.g. sort by Last_Name*

Task 1 – Simple SELECT SQL

SELECT SQL is code that selects data for display. There are also commands for database functions such as UPDATE and DELETE, but we will only consider SELECT statements at this point. Consider the examples below and answer the questions on the next page.

Example 1	Example 2
SELECT First_Name	**SELECT** First_Name, Last_Name, DoB
FROM Personals	**FROM** Personals
WHERE Sport = 'Netball'	**WHERE** Vegetarian = Yes
ORDER BY First_Name	**ORDER BY** DoB DESC

Note: Order by 'DESC' means *Descending*, or starting with the largest. Normally, 'ASC' is used by default.

Select SQL (page 2)

Task 1 (cont.) – Simple SELECT SQL

a. In *Example 1*, which field will be displayed? _____

b. In which table does this field belong? _____

c. What criteria must be matched? _____

d. How will the data be sorted? _____

e. Describe what *Example 2* will display (remember that 'DESC' means starting with the highest or most recent.

Task 2 – Typing SELECT SQL

a. Open the database with the *Personals* table from either the *Query Criteria* or *Wildcards* tasks. Click '**Create / Query Design**'.

b. Close the *Show Table* window without adding any tables. Click on the *SQL* icon in the top-left. Type the SQL from *Example 1* on the previous page. The formatting (e.g. bold) has no effect.

c. Switch to *Datasheet View* and check that the results show only the netball players. Close and save the query as '18SQL Example 1'.

d. Repeat this process for Example 2, saving as '18SQL Example 2'.

Note: *If you are searching for a piece of text, then it must be placed in single quotes (e.g. 'Netball'). If you are searching for a number, date or a Yes/No, then it should not be placed in quotes.*

Task 3 – Creating SELECT SQL

Create SELECT queries to return the data below. Try and type it from scratch. If you find this too difficult, then use the query builder to start with and strip away any code that isn't needed from the automatically generated SQL.

a. **Query name: 18SQL Example 3**

First_Name	Last_Name	Fave_Number
Lola	Collins	11
Liz	Ginty	9
Sarah	Chan	3
Nishma	Ali	3
Paula	Collins	1

Display all records and sort by Fave_Number, descending. You can miss out the SQL line beginning with 'WHERE'.

b. **Query name: 18SQL Example 4**

First_Name	Fave_Cc	Sport
Liz	Red	Netball
Lola	Red	Swimming
Nishma	Blue	Netball
Sarah	Yellow	Netball

*People who like netball **or** the colour red, from the 'Personals' table. You will need to use the 'OR' logical operator.*

```
WHERE Fave_Col = 'Red' OR Sport='Netball'
```

Task 4 – Your Information System

Create some SQL Select queries in your own information system.

