Databases

What is a database?

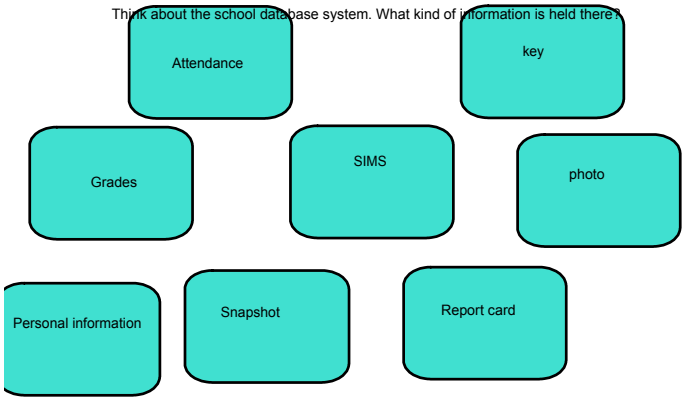
data – with a context
may have relationship with other data.

What is a database?

- A database in simply lots of facts and figures stored in one place and structured in such away that to retrieve data is pretty easy.
- A computerised database programme allows to store data efficiently without huge duplication.
- Linking tables within a database can allow data to be extracted from a number of tables for a number of reasons e.g. payroll, assigning jobs/ shifts etc.

Is a spreadsheet a database?

Think about the school database system. What kind of information is held there?

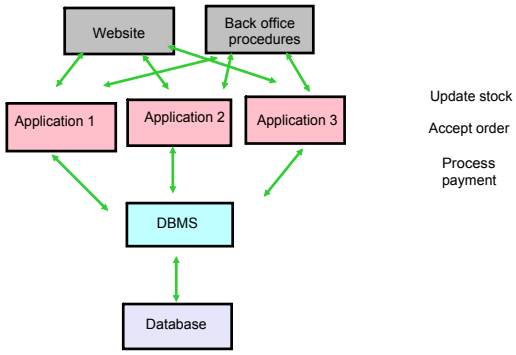


What is a Database Management System?

A DBMS is software that manages the data. A normal database will consist of many tables all storing different kinds of information (although all related). The DBMS enables the user to make sense of it all.

Examples: Access (Microsoft)
SIMS
Base (Open office)

The relationships between the database and the software on a transactional website



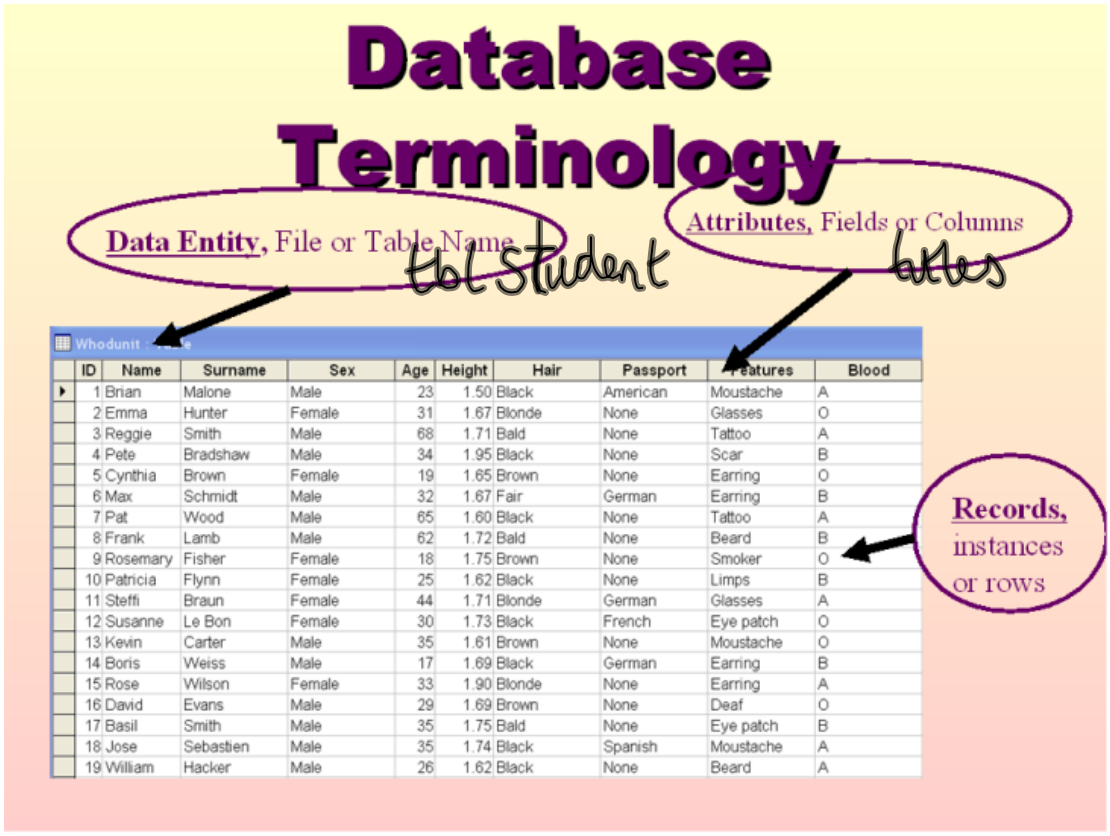
WYNTL 2.8

- You will need to learn how to:
- Select appropriate field type and formats
- Create simple validation rules
- Create 1:m relationships between tables
- Import data
- Use sorts to group and order data
- Use searches to extract data
- Produce reports to present information

For your portfolio you will produce:

- A database designed, built and tested to store data.
- Evidence of importing data.
- Evidence of extracting information
- A report identifying significant trends and making recommendations (20 marks)
- An evaluation of the database and your performance. (6 marks)
- **Show example**

Open a new folder called Unit 2: databases
Within that folder create another folder entitled Notes.
In here open a word document: "About databases"
This week's lesson notes will be here!



ID	Name	Surname	Sex	Age	Height	Hair	Passport	Features	Blood
1	Brian	Malone	Male	23	1.50	Black	American	Moustache	A
2	Emma	Hunter	Female	31	1.67	Blonde	None	Glasses	O
3	Reggie	Smith	Male	68	1.71	Bald	None	Tattoo	A
4	Pete	Bradshaw	Male	34	1.95	Black	None	Scar	B
5	Cynthia	Brown	Female	19	1.65	Brown	None	Earring	O
6	Max	Schmidt	Male	32	1.67	Fair	German	Earring	B
7	Pat	Wood	Male	65	1.60	Black	None	Tattoo	A
8	Frank	Lamb	Male	62	1.72	Bald	None	Beard	B
9	Rosemary	Fisher	Female	18	1.75	Brown	None	Smoker	O
10	Patricia	Flynn	Female	25	1.62	Black	None	Limps	B
11	Steffi	Braun	Female	44	1.71	Blonde	German	Glasses	A
12	Susanne	Le Bon	Female	30	1.73	Black	French	Eye patch	O
13	Kevin	Carter	Male	35	1.61	Brown	None	Moustache	O
14	Boris	Weiss	Male	17	1.69	Black	German	Earring	B
15	Rose	Wilson	Female	33	1.90	Blonde	None	Earring	A
16	David	Evans	Male	29	1.69	Brown	None	Deaf	O
17	Basil	Smith	Male	35	1.75	Bald	None	Eye patch	B
18	Jose	Sebastien	Male	35	1.74	Black	Spanish	Moustache	A
19	William	Hacker	Male	26	1.62	Black	None	Beard	A

Copy SIMs diagram here: label entities, attributes (tables and fields) and records .

Think about the school database system. What kind of information is held there?

Attendance

key

Grades

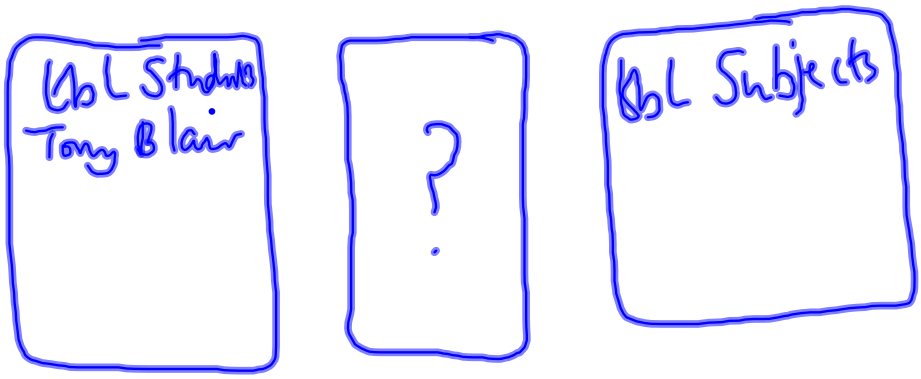
SIMS

photo

Personal information

Snapshot

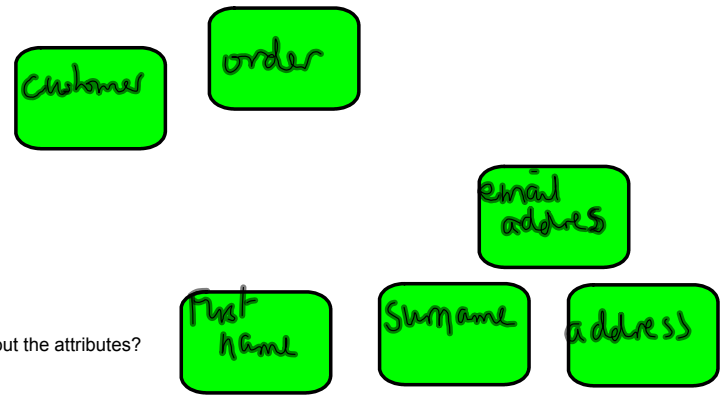
Report card


Obl Student
Tony Blair
?
Obl Subjects

Transactional websites

- The websites we have looked at will hold a variety of different information to aid the online purchase….
- Read through the Quick feet case study on pg182 of the disk
- What entities do you think it should have- justify your answers
- Now lets consider how we might link these together?

Qwik feet entities:



What about the attributes?

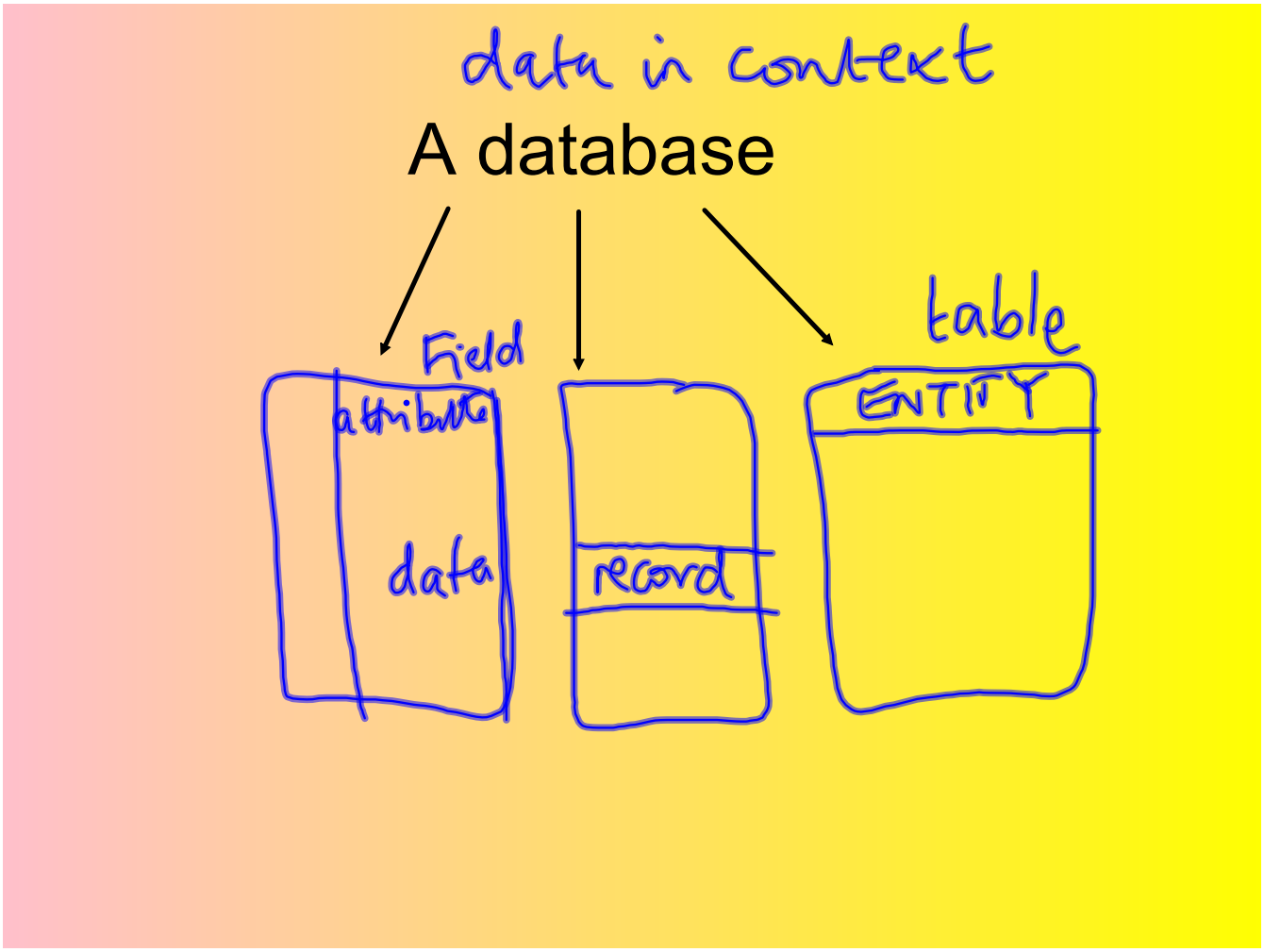
Criteria for Entities

For an entity to be part of a database it must meet the following criteria:

- The Entity must be of interest or of use to the database.
- There must be more than one record within the entity.
- An entity must have a number of attributes.
- Each Instance or record of an entity must be uniquely identifiable.
- The data should be permanent

•It is unusual for a database to consist of one entity.

•Most databases will consist of entities that have 'relationships' with each other.


data in context
A database
Field
attribute
data
record
table
ENTITY

Sorting Tables

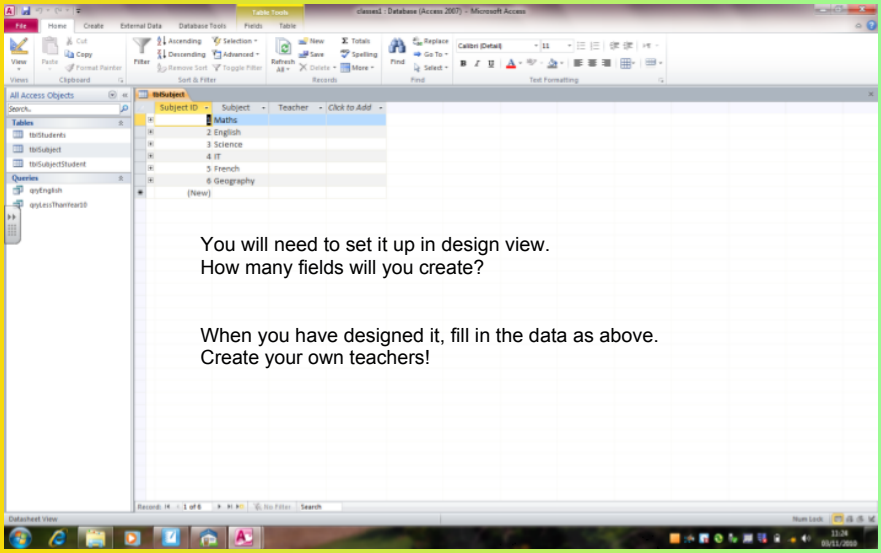
Today you will

- create tables
- sort data
- find and replace data
- set and test validation rules
- create queries

1. Open up this document on my website and the database "classes" in the shared area.

a) Enter a new record
b) Estimate ages and fill in the field.
c) Add a new field - Phone number - and fill in
d) Sort the data - alphabetically, numerically, as you wish.
e) Use the binoculars to find, and then to find and replace.

2. Set up a new table tblSubjects that looks like this:



You will need to set it up in design view.
How many fields will you create?

When you have designed it, fill in the data as above.
Create your own teachers!

3. Creating queries

This is an area where you can extend yourself!
There are lots of different, fancy, complicated queries as well as straight forward ones.
Use F1 for extra help!

a) Close any open tables, making sure you save them.
b) Go to Create and Query design (you can try using the wizard later)
c) Set up a query for tblStudents.
d) Include first name, surname, year and age.
e) Have your criterion as year 11, then try others eg <10.
Try other criterion for other fields.

Extension:
Add a field to one table with a date. Set some validation rules for the date.
Investigate the different ways of querying data using dates (F1 will help).

Investigate different criterion for querying data - count, sum, average etc.
Make notes of what you find, otherwise you will probably forget them!

Today we look at:

- Reports
- Forming relationships
- Keys

Go to your classes database and create a report to show students names and ages.

Try some more reports.

Add a footer that counts the number of entries in your report.

To do this, add a a text box in the footer (Report Design Tools, Design, Text box)

Highlight it and click the properties button (Report Design Tools, Design, Tools)

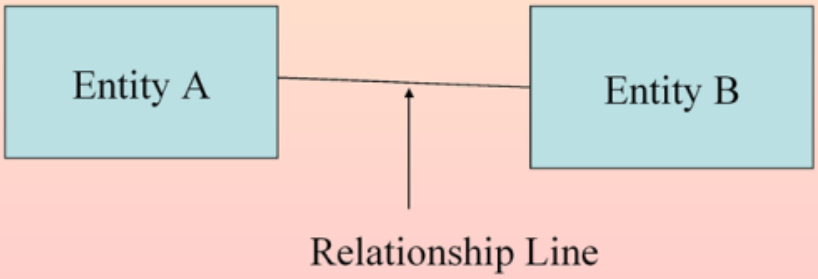
Change the name to Count
In the control source property enter =count(*)

Change the nearby text box to say Total, and drag to where you want them.

Use print preview to look at the results.
Save it when you are happy with it.

Relationships

- Entity relationship modelling looks at how different contents within the database are related.
- An Entity relationship diagram (ERD) shows how the entities which define the table they are within are linked.
- This can be shown via a simple diagram



Relationships

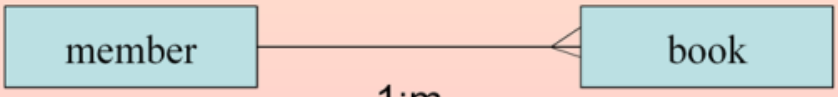
- The relationship is determined by the degree of the relationship.
- There are 3 ways in which this can occur

One to One		1:1
One to Many		1:m
Many to Many		m:n

Relationships

Consider a library database.

- A member could borrow up to 20 books from the library at one time.
- But each book could only be borrowed once at any one time.
- The relationship would therefore be….



1:m

One to many

Relationships

- Now imagine that the library database also has an author entity as well as member and book.
- In this case an author may have written several books and a book may be written by more than one author.
- So the relationship would be…

m:n

Many to many

Relationships

Problems

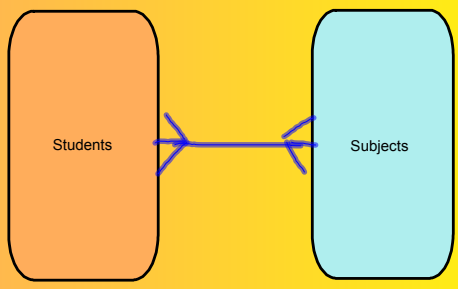
- On the whole 1:m is the most desirable relationship to have.
- This is due to problems associated with 1:1 and m:n.
- m:n - this causes problems by the amount of data you wish to store within it.

1:1 – In some cases the question can be raised why the entities are separate at all

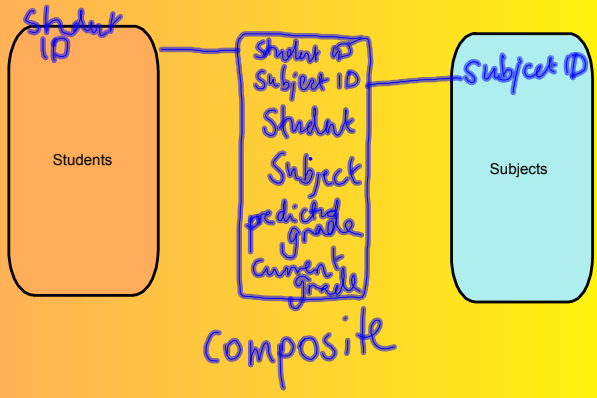
Keys

- Keys used to make records ‘uniquely identifiable’.
- Primary key is used to make each record identifiable.
- The primary key has to be chosen carefully so there is no duplication.
- Primary key is often a unique alphanumeric ID.
- When 2 entities are related the primary key of one entity needs to appear as an attribute on another table.
- On the second entity it is called the ‘foreign key’

Establishing the structure



A many:many relationship requires a third table to link the two tables.



This table will contain the primary key from each of the other tables, forming a **composite** key.

Set up the table.
The two keys will be the two fields.

Are there any extra fields we would like to add that are unique to student and subject?

Run some queries and reports to check it has worked

Could we add a fourth table?

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Data Types

Data Type	*Usage*	*Comments*
Text	Alphanumeric data	Can be 255 characters long
Number	Numeric data	Can be integer or real number.
Date/Time	Dates and Times	Access can calculate between dates
Currency	Monetary Data	Ensures accuracy
Yes/No (Logical)	True/false	
AutoNumber	Key field	Unique value

Data verification

This is the process of double-checking that data entry is correct.

Data validation

Validation is done by a computer program, and checks as far as possible that the data is accurate.

Data Validation

- This is the process of checking that the data entry is correct.
- This is important to a database system.
- Text – certain characters not permitted e.g. %$ or a number. This would ensure fewer mistakes are made when inputting
- Numeric – To avoid mistakes the numbers could have to fall between certain values .E.g. entering a bank account number

Review databases

- There is much more detail on this in the online book.
- Pgs179-194
- Now its time to build the database- please turn to Pg195 in the e-book to begin.

Query	What will it do?	Tables to use
Customer query	Multi table query to look up a customers order (parameter)	Not supplier
Stock query on	Multi table with criteria size 3 shoes- how many left	Product and supplier
Show all orders between query	All orders that fall in March	Order and customer