

DATATYPES

Numeric Data

- Numeric data simply means **numbers**. But, numbers come in a variety of different **types**...

Integers

- An integer is a **whole number** - it has **no decimal or fractional parts**. Integers can be either **positive** or **negative**.

Examples

12

45

1274

1000000

-3

-5735

Real Numbers

- Any number that you could place on a number line is a real number.
- Real numbers include **whole numbers** (integers) and **numbers with decimal/fractional parts**.
- Real numbers can be **positive** or **negative**.

Examples

1

1.4534

946.5

-0.0003

3.142

Currency

- Currency refers to **real** numbers that are **formatted** in a specific way. Usually currency is shown with a **currency symbol** and (usually) **two decimal places**.

Examples

£12.45

-£0.01

€999.00

\$5500

Percentage

- Percentage refers to **fractional real** numbers that are formatted in a specific way - **out of 100**, with a **percent symbol**.

So, the real value **0.5** would be shown as **50%**, the value **0.01** would be shown as **1%** and the number **1.25** would be shown as **125%**

Examples

100%

25%

1200%

-5%

Alphanumeric (Text) Data

- Alphanumeric (often simply called 'text') data refers to data made up of **letters** (alphabet) and **numbers** (numeric).
- Usually **symbols** (\$%^+@, etc.) and spaces are also allowed.

Examples

DOG

“A little mouse”

ABC123

enquiries@bbc.co.uk

Date and Time Data

- Date (and time) data is usually **formatted** in a specific way. The format depends upon the **setup** of the computer, the software in use and the user's **preferences**.

Date Examples

25/10/2007

12 Mar 2008

10-06-08

Time Examples

11am

15:00

3:00pm

17:05:45

Boolean (Logical) Data

- Boolean data is sometimes called 'logical' data (or in some software, 'yes/no' data). Boolean data can only have two values: **TRUE** or **FALSE**

Examples

TRUE

FALSE

ON

OFF

YES

NO

Selecting Data Types

- When we are presented with data to be input into a computer system, we must analyse it and select **appropriate data types** for each value...

Data Name	Example Data	Data Type
• Name	• "Bob Gripper"	• Text
• Height	• 1.85	• Real
• Date of Birth	• 19 May 1980	• Date
• Phone No.	• 012 44565	• Alphanumeric
• Pay Rate	• £35.75	• Currency
• Tax Rate	• 15%	• Percentage

Data Organisation

- An **organised** set of **data** is usually referred to as a **database**.



ID No.: **356**
Name: **Jess**
D.o.B.: **3 Mar 1995**
Phone: **7564356**
Class: **5B**
Tutor: **Mr Noggin**
Room: **56**



ID No.: **412**
Name: **Hamad**
D.o.B.: **12 Nov 1994**
Phone: **7465846**
Class: **5B**
Tutor: **Mr Noggin**
Room: **56**



ID No.: **459**
Name: **Sita**
D.o.B.: **9 Jan 1994**
Phone: **8565634**
Class: **6Y**
Tutor: **Ms Take**
Room: **18**



ID No.: **502**
Name: **Hamad**
D.o.B.: **3 Mar 1995**
Phone: **6554546**
Class: **5B**
Tutor: **Mr Noggin**
Room: **56**

What is a Record?

- The **set of data** associated with a **single object or person** is known as a **record**

<i>ID No.</i>	<i>Name</i>	<i>D.o.B.</i>	<i>Phone</i>	<i>Class</i>	<i>Tutor</i>	<i>Room</i>
356	Jess	3 Mar 1995	7564356	5B	Mr Noggin	56
412	Hamad	12 Nov 1994	7465846	5B	Mr Noggin	56
459	Sita	9 Jan 1994	8565634	6Y	Ms Take	18
502	Hamad	3 Mar 1995	6554546	5B	Mr Noggin	56

- A row in a database table is called as record.

Record

<i>ID No.</i>	<i>Name</i>	<i>D.o.B.</i>	<i>Phone</i>	<i>Class</i>	<i>Tutor</i>	<i>Room</i>
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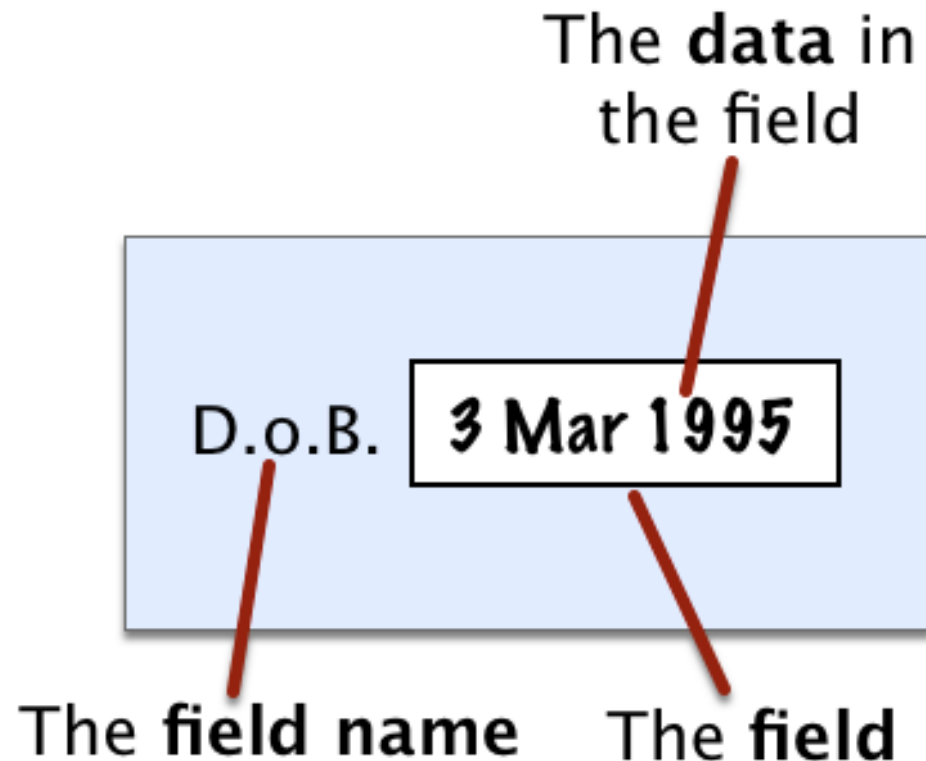
One Record

What is a Field?

- A column in a database table is called as **field**.
- A field will contain same type of data.

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Field and Field Name



- The **field** is the **box** that you would write in
- The **field name** is the **label** next to the box
- The **data** is what you would **write** in the box

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Field Names

What is a Key Field / Primary Key?



ID No.: 356
Name: Jess
D.o.B.: 3 Mar 1995
Phone: 7564356
Class: 5B
Tutor: Mr Noggin
Room: 56

Primary key is a field, which can uniquely identify a record.

Primary key should not have duplicate values.

Types of Database

- **Flat-file** database
- **Relational** database

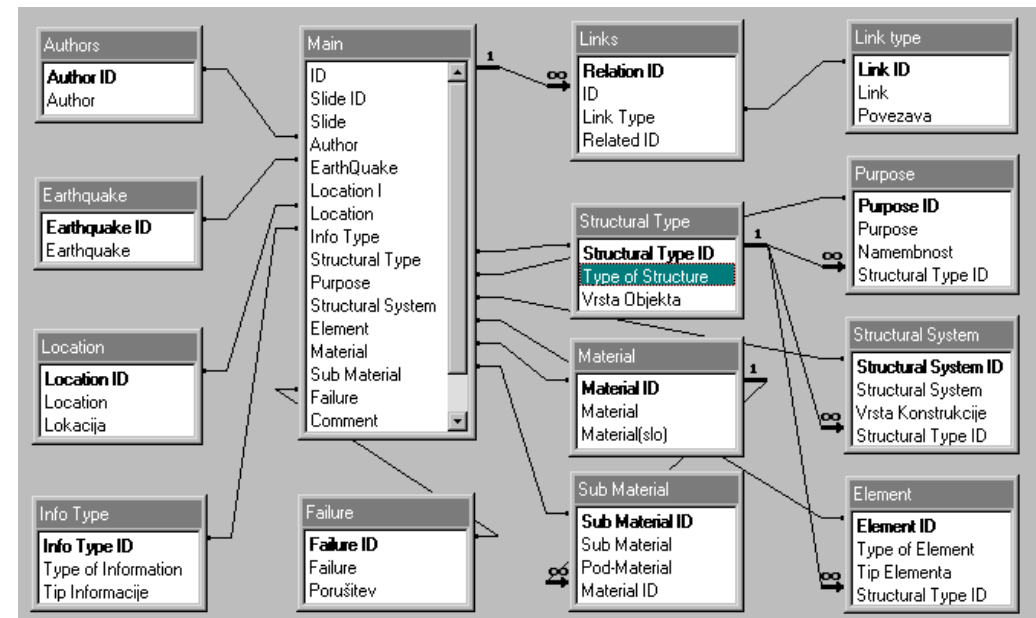
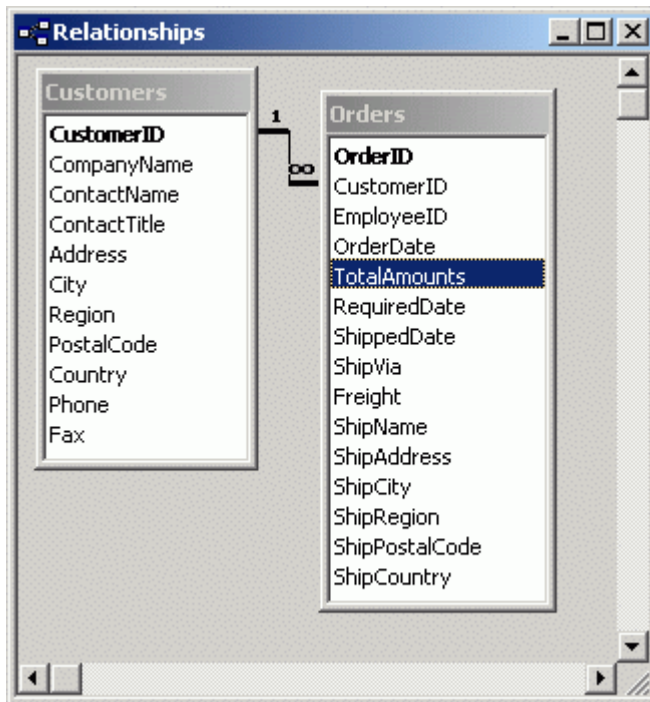
1. Flat-File Databases

- A flat-file database is one that only contains a single table of data
- All of the data in the database is stored in this one place.

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2. Relational Databases

- A 'relational' database is one that contains **two or more tables** of data, connected by **links** called **relationships**.



Redundant Data



Redundancy is a situation in which same piece of information occurs at more than one place.

This table contains several items of data that are **repeated** over and over again.

ID No.	Name	D.o.B.	Phone	Class	Tutor	Room
356	Jess	3 Mar 1995	7564356	5B	Mr Noggin	56
412	Hamad	12 Nov 1994	7465846	5B	Mr Noggin	56
459	Sita	9 Jan 1994	8565634	6Y	Ms Take	18
502	Hamad	3 Mar 1995	6554546	5B	Mr Noggin	56


	Class	Tutor	Room
356	5B	Mr Noggin	56
846	5B	Mr Noggin	56
634	6Y	Ms Take	18
546	5B	Mr Noggin	56

Repeated data in a database is generally considered a **bad** thing:


- It **wastes space** in the database
- It takes **time to input**: typing the same data over and over (and mistakes may be made)
- It is a pain to **update**: (if class 5B gets a new tutor, we have to find every 'Mr. Noggin' and change it to the new name)

Multiple Table

Student Table

 <i>ID No.</i>	<i>Name</i>	<i>D.o.B.</i>	<i>Phone</i>	<i>Class</i>
356	Jess	3 Mar 1995	7564356	5B
412	Hamad	12 Nov 1994	7465846	5B
459	Sita	9 Jan 1994	8565634	6Y
502	Hamad	3 Mar 1995	6554546	5B


Class Table

 <i>Class</i>	<i>Tutor</i>	<i>Room</i>
5B	Mr Noggin	56
6Y	Ms Take	18


Multiple Table

- Here *Class* field act as a **relationship**
- **Relationship = Link**

Student Table

 ID No.	Name	D.o.B.	Phone	Class
356	Jess	3 Mar 1995	7564356	5B
412	Hamad	12 Nov 1994	7465846	5B
459	Sita	9 Jan 1994	8565634	6Y
502	Hamad	3 Mar 1995	6554546	5B

Class Table


 Class	Tutor	Room
5B	Mr Noggin	56
6Y	Ms Take	18

The Class field acts as a **relationship** (link) between the tables


Primary key & Foreign key

- **Class** is a *Primary key* in **Class table** and a *foreign key* in **Student table**

Student Table

 ID No.	Name	D.o.B.	Phone	Class
356	Jess	3 Mar 1995	7564356	5B
412	Hamad	12 Nov 1994	7465846	5B
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502	Hamad	3 Mar 1995	6554546	5B

Class Table

 Class	Tutor	Room
5B	Mr Noggin	56
6Y	Ms Take	18

Foreign key is a field, that is a normal field in one table and primary key in another table

Analogue Signals and Digital Data

- An analogue signal is one which has a value that varies smoothly. It is easiest to understand this by looking at an example:

Digital signal



Analog signal



- The sound waves that your mouth produces when you speak are analogue - the waves vary in a smooth way. These waves can be converted into an electrical signal by a microphone. This electrical signal is also analogue:

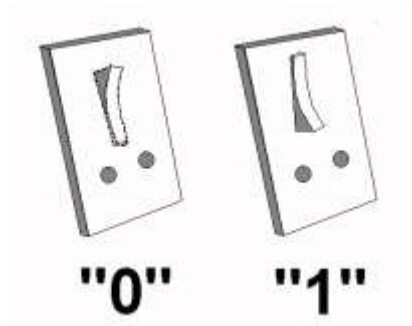


Analogue pressure waves through air

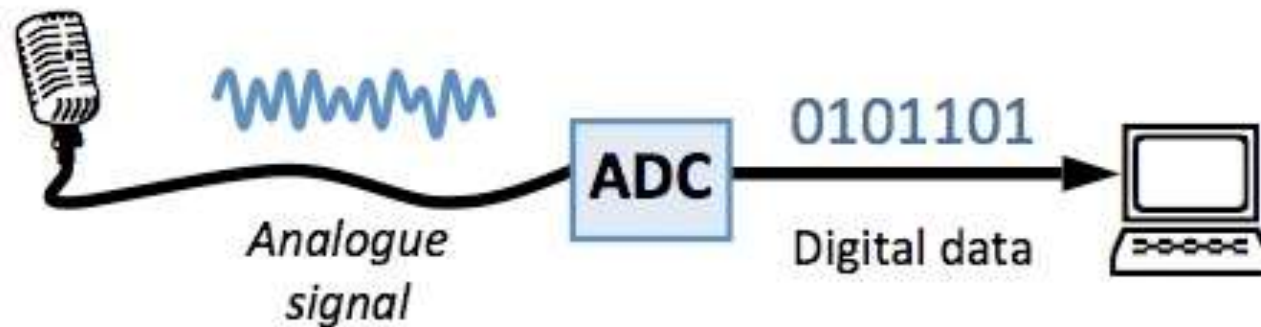


Analogue electrical signal along wire

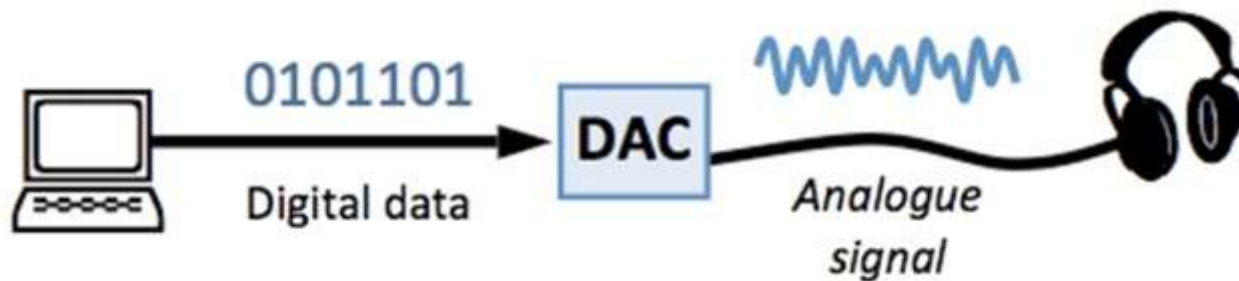
- Everything stored and processed inside a computer is a **number** (digital).



Analogue to Digital Convertor (ADC)



Digital to Analogue Convertor (DAC)



- Computers (and most other modern electronic devices such as cameras, mobile phones, etc.) are “digital” devices because they process data in the form of **numbers** (digits).
- Computer **software** is a collection of **numeric codes** which tell the computer what to do
- **Text** that you type into a computer is stored as **numeric codes**
- **Images** inside a computer are stored as **numeric values**(different values for different coloured pixels)

DAC – Digital to Analogue Converter

- Another device that contains a **DAC** is an **MP3 player**. The music data stored in the player is all digital, but the player produces analogue signals which the headphones convert into sound.

