Database Design and Development

What is a database?

A database is used to store information. Data is often a company's best commodity, which is why so much of our information is being harvested and sold.

Companies and organisations use databases because:

- they can be searched and sorted efficiently
- a number of people can access and use the same information simultaneously

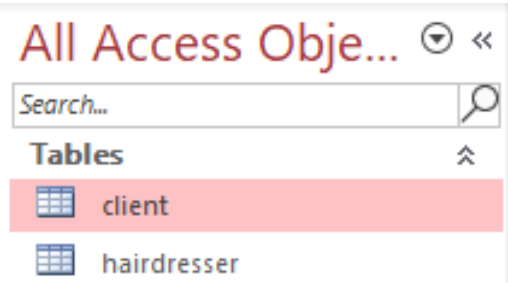
A well-designed, efficient database allows companies to use our data as effectively as possible.

Database Structure

A database contains **entities** – each entity contain records

One **record** is all data stored about one person or thing

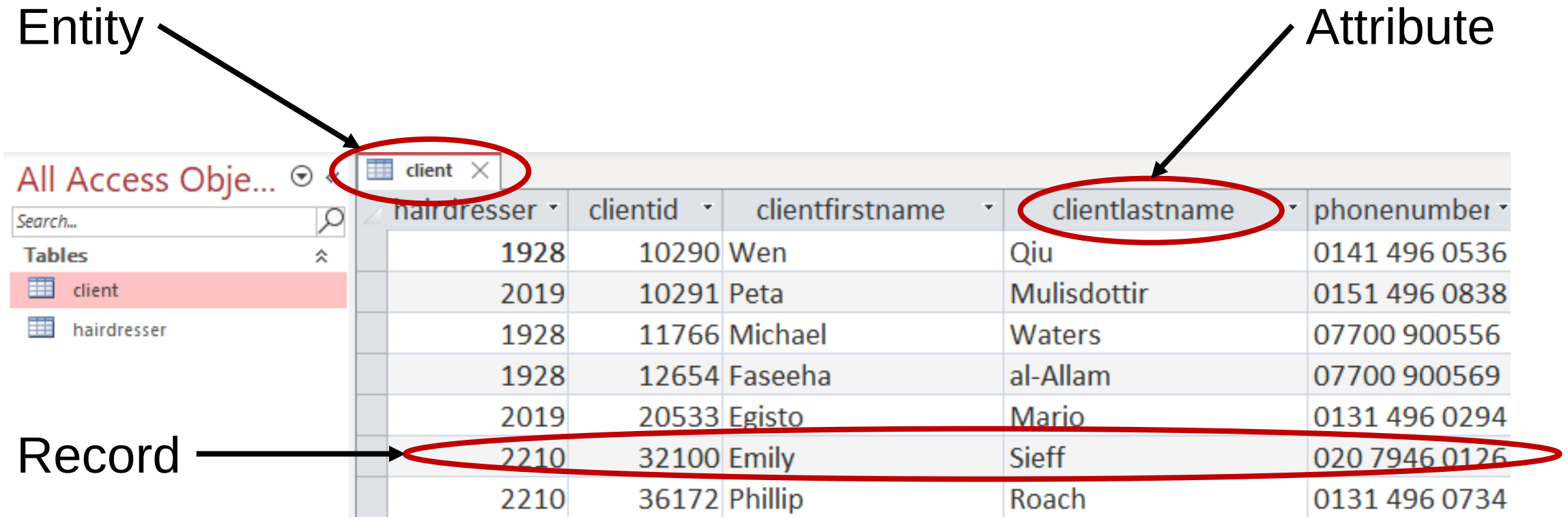
The records contains **attributes** – an attribute is a single piece of information.



client

hairdresser	clientid	clientfirstname	clientlastname	phonenumber
1928	10290	Wen	Qiu	0141 496 0536
2019	10291	Peta	Mulisdottir	0151 496 0838
1928	11766	Michael	Waters	07700 900556
1928	12654	Faseeha	al-Allam	07700 900569
2019	20533	Egisto	Mario	0131 496 0294
2210	32100	Emily	Sieff	020 7946 0126
2210	36172	Phillip	Roach	0131 496 0734

Database Structure



Flat File Databases

If a database only has one entity then it can be referred to as a **flat-file database**.

client

clientid	clientfirstname	clientlastname	phonenumber	firstname	lastname	contactnumber	salon
10290	Wen	Qiu	0141 496 0536	Phillip	Christie	07700 900142	Cuts & Co
11766	Michael	Waters	07700 900556	Phillip	Christie	07700 900142	Cuts & Co
12654	Faseeha	al-Allam	07700 900569	Phillip	Christie	07700 900142	Cuts & Co
10291	Peta	Mulisdottir	0151 496 0838	Sharon	Watt	07700 900582	On The Corner
20533	Egisto	Mario	0131 496 0294	Sharon	Watt	07700 900582	On The Corner
36172	Phillip	Roach	0131 496 0734	Huda	Quhshi	07700 900477	West Style
32100	Emily	Sieff	0207 946 0126	Huda	Quhshi	07700 900477	West Style

Disadvantages of Flat File Databases

In flat file databases, some information is stored more than once (e.g. the same phone number for multiple members of staff). This results in an increased file size for the database.

Using flat file databases can lead to three very specific problems called anomalies. These anomalies compromise the **integrity** of the data stored.

As a result, **relational databases** are used instead of flat file databases.

Insert Anomaly

Insert anomaly: you cannot add a new department without also adding a member of staff at the same time – there is no way to add a new hairdresser without also adding a client.

client

clientid	clientfirstname	clientlastname	phonenumber	firstname	lastname	contactnumber	salon
10290	Wen	Qiu	0141 496 0536	Phillip	Christie	07700 900142	Cuts & Co
11766	Michael	Waters	07700 900556	Phillip	Christie	07700 900142	Cuts & Co
12654	Faseeha	al-Allam	07700 900569	Phillip	Christie	07700 900142	Cuts & Co
10291	Peta	Mulisdottir	0151 496 0838	Sharon	Watt	07700 900582	On The Corner
20533	Egisto	Mario	0131 496 0294	Sharon	Watt	07700 900582	On The Corner
36172	Phillip	Roach	0131 496 0734	Huda	Quhshi	07700 900477	West Style
32100	Emily	Sieff	0207 946 0126	Huda	Quhshi	07700 900477	West Style

Delete Anomaly

Delete anomaly: you cannot delete data from the table without having to delete the entire record, e.g. if we remove Sharon Watt from the table, we would lose all data about her two clients too, meaning we lose data unnecessarily.

client

clientid	clientfirstname	clientlastname	phonenumber	firstname	lastname	contactnumber	salon
10290	Wen	Qiu	0141 496 0536	Phillip	Christie	07700 900142	Cuts & Co
11766	Michael	Waters	07700 900556	Phillip	Christie	07700 900142	Cuts & Co
12654	Faseeha	al-Allam	07700 900569	Phillip	Christie	07700 900142	Cuts & Co
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Update Anomaly

Update anomaly: if data for a salon changed, it would need to be updated in multiple records. If the change only happened in one of the two records, then an update anomaly would have taken place.

client

clientid	clientfirstname	clientlastname	phonenumber	firstname	lastname	contactnumber	salon
10290	Wen	Qiu	0141 496 0536	Phillip	Christie	07700 900142	Cuts & Co
11766	Michael	Waters	07700 900556	Phillip	Christie	07700 900142	Cuts & Co
12654	Faseeha	al-Allam	07700 900569	Phillip	Christie	07700 900142	Cuts & Co
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Relational Databases

A **relational database** is a database which contains more than one entity. The entities are linked together using **relationships**.

hairdresser

hairdresserid	firstname	lastname	contactnumber	salon
2210	Huda	Quhshi	07700 900477	West Style
2019	Sharon	Watt	07700 900582	On The Corner
1928	Phillip	Christie	07700 900142	Cuts & Co

client

hairdresserid	clientid	clientfirstname	clientlastname	phonenumber
1928	10290	Wen	Qiu	0141 496 0536
1928	11766	Michael	Waters	07700 900556
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