Relational databases

Relational databases use more than one table. The tables are linked together

Each table stores data abut a set of entities of the same kind (books, people, houses etc…)

Tables are linked using a **foreign key**. These are the primary key in another table, but appear in another tables to provide the link

Relational databases

Relational databases aim to only store a set of data about an entity in a single record

This reduces **data redundancy** – less data should end up being repeated

It also reduces **data inconsistency** – because we're only storing each piece of data once, there is less chance that the data ends up being inconsistent

Member

MemberID	FirstName	LastName	DateJoined
1	Zarah	Tariq	2020-01-05
2	Penny	Hill	2020-01-05
3	Peter	Boyes	
4	Reuben	Bailey	

Primary Key here

Foreign Key here

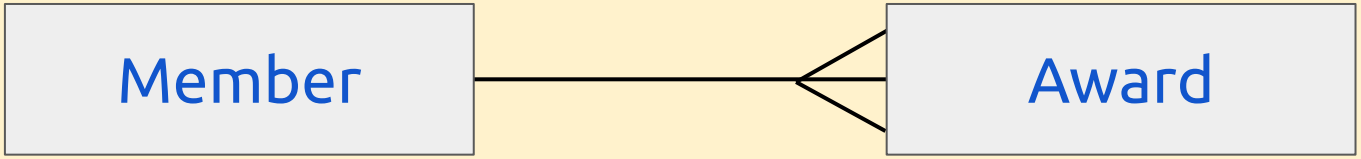
Award

AwardID	MemberID	DatePresented	AwardName
1	1	2020-09-10	Teamwork
2	1	2020-10-13	Outdoors
3	3	2020-06-19	Challenge
4	2	2020-11-11	Leader

The data tables are linked using the MemberID field

Relational databases

We show how data tables are linked using an **entity relationship diagram**



The two tables are linked in a **one to many relationship** – each member can have won many awards

Member

MemberID	FirstName	LastName	DateJoined
1	Zarah	Tariq	2020-01-05
2	Penny	Hill	2020-01-05
3	Peter	Boyes	2020-02-14
4	Reuben	Bailey	2020-10-20

Award

AwardID	MemberID	DatePresented	AwardName
1	1	2020-09-10	Teamwork
2	1	2020-10-13	Outdoors
3	3	2020-06-19	Challenge
4	2	2020-11-11	Leader

Which award did Peter win?

When did Penny win their award?

Who has won the most awards?

What date did the person who has won the fewest awards join?

Film

FilmID	Title	Year
100	Forrest Gump	1994
101	Toy Story 3	2019
102	Back to the Future	1985

Performance

PerformanceID	FilmID	ActorID
52	100	8
53	101	8
54	102	9

Actor

ActorID	Firstname	Lastname
8	Tom	Hanks
9	Lea	Thompson

The Performance table has three fields

One is a primary key (PerformanceID)

The other two are both foreign keys – they appear in other tables as the primary key

The Performance table might have fields added – such as the date of the performance

Relational databases

Databases can have more than two tables

Here's a database for use in a school:

Each class has many students in it

Each class can be taught by more than one teacher

What other tables could be added?

Relational databases

There are pros and cons to relational databases compared to flat-file databases:

Flat-file database	Relational database
+ simple to build and maintain	– more complex to design & build
+ can use spreadsheet software - easy and quick	+ data only needs to be stored once - reducing redundancy
– data is repeated which is a waste of space (**redundancy**)	+ easier to update - reduces data inconsistency
– updating repeated data takes longer and can lead to errors	– need specialist software and expertise
– this leads to **data inconsistency**	