

8 Databases – Part 1

Name: _____ Class: _____ Date: _____

Vocabulary 词汇

Write each word three times. 把每个单词抄写三遍。

English	中文	Write it 3 times (English)
relational database	关系数据库	_____
table	表	_____
record	记录	_____
field	字段	_____
primary key	主键	_____
foreign key	外键	_____
referential integrity	参照完整性	_____
normalisation	规范化	_____
query	查询	_____
DBMS	数据库管理系统	_____

Recall

At IGCSE you stored data in a single table of rows and columns. Bring this with you:

- A table holds data in rows (one per item) and columns (one per piece of information).

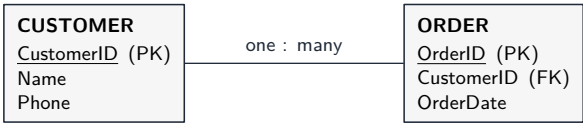
At AS we link several tables together (a relational database) and use a language to ask it questions.

New ideas

Read these first. Each idea has a short worked example. Then do the Practice.

■ 1 Why a relational database

Putting everything in one big flat file repeats the same data many times (wasteful and easy to get wrong). A **relational database** 关系数据库 splits the data into linked **table** 表 units. In a table, each row is a **record** 记录 and each column is a **field** 字段.

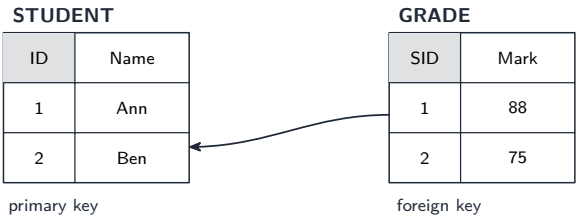


The **foreign key** CustomerID in ORDER refers to the **primary key** CustomerID in CUSTOMER, linking each order to its customer.

Worked example. If every borrowing record stored a member's full address, changing one address would mean editing dozens of rows; keeping members in their own table means you change it once.

■ 2 Keys

- the **primary key** 主键 is the field that gives each record a unique label;
- a **foreign key** 外键 is a primary key from another table, used to link the two tables;
- **referential integrity** 参照完整性 means every foreign key must point to a record that really exists.



Splitting the data neatly so nothing is repeated is called **normalisation** 规范化.

Worked example. In a **Loans** table, the **MemberID** foreign key matches the **MemberID** primary key in the **Members** table, so each loan links to exactly one member.

■ 3 Asking questions with SQL

A **query** 查询 asks the database for chosen data. The language is SQL, and a **DBMS** 数据库管理系统 (database management system) runs it. For example:

```
SELECT name, grade
FROM   students
WHERE  grade > 80;
```



The diagram shows a box containing the SQL query: `SELECT name, grade FROM students WHERE grade > 80;`. An arrow points from this box to a table labeled "result". The table has two columns: "name" and "grade". It contains two rows of data: one for "Ann" with a grade of 88, and one for "Cara" with a grade of 91.

result	
name	grade
Ann	88
Cara	91

Worked example. That query returns the **name** of only those students whose **grade** is above 80 — the **WHERE** line filters out the rest.

Watch out: `SELECT *` returns *every* column. List just the fields you need (e.g. `SELECT name, grade`) when you don't want them all.

Practice

8.1 State one problem with storing all data in a single flat file. [1]

8.2 Explain what a primary key is. [1]

8.3 State the difference between a record and a field. [2]

8.4 Explain what a foreign key is used for. [2]

8.5 Write a SQL query that selects **all** fields from a table called **Books**. [2]

8.6 Explain *why* splitting data into linked tables makes updating it safer than one big flat file. [2]

8.7 **Challenge.** Write a SQL query that selects the **title** and **author** of books from a **Books** table where the **year** is after 2000. [2]