



Australian  
National  
University

程序代写代做 CS编程辅导



# Introduction to Database Systems – Part 1

WeChat: cstutorcs

## General Concepts

Assignment Project Exam Help

Email: [tutorcs@163.com](mailto:tutorcs@163.com)

QQ: 749389476

<https://tutorcs.com>



程序代写代做 CS编程辅导  
**What is a Database?**



**WeChat: cstutorcs**

- Have you designed a database?

**Assignment Project Exam Help**

**Email: tutorcs@163.com**

- Have you worked with a database?

**QQ: 749389476**

**<https://tutorcs.com>**



## 程序代写代做 CS编程辅导 Definition of Databases



- A **database** is a collection of **related** data.
- Implicit properties:
  - represents some **aspects of the real world**;
  - a **logically coherent collection** of data;
  - designed and built for a **specific purpose**.

Email: [tutorcs@163.com](mailto:tutorcs@163.com)

### Examples (Huge):

**Amazon**: – It has 244 million active customers, over 60 million items occupying many terabytes of data (clothing, sports, videos, office products).

**YouTube**: – Over 1.3 billion users, 300 hours of videos added every minute, average of one billion mobile YouTube views per day



程序代写代做 CS编程辅导

## What is a Database Management System?



- A **database management system** (DBMS) is a collection of programs that enable users to create and maintain a database.
- It is a general-purpose software system that facilitates the process of
  - **defining**: specifying data types, structures and constraints;
  - **constructing**: storing data on some storage medium;
  - **manipulating**: retrieving and manipulating data;
  - **sharing**: using data by multiple users/programs simultaneously.
- Well-known relational DBMSs include Oracle, IBM DB2, Microsoft's Access, Microsoft's SQL Server, MySQL, postgresQL, etc.

WeChat: tutormcs

Assignment Project Exam Help

Email: [tutorcs@163.com](mailto:tutorcs@163.com)

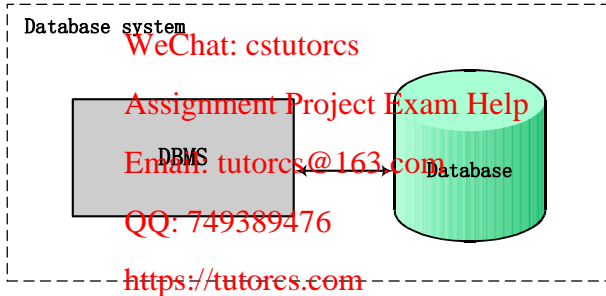
QQ: 749389476

<https://tutorcs.com>



## 程序代写代做 CS编程辅导 What is a Database System?

- A **database system** is a collection of information systems dealing with data retrieval and manipulation.
- It often refers to a DBMS (Database Management System) database.



- Main services a database system provides:
  - answer queries efficiently;
  - execute updates efficiently.

## Why is a Database System Needed?

程序代写代做 CS编程辅导

- Database system: a collection of logically related data
- File system: many so unrelated files





程序代写代做 CS编程辅导

## Why is a Database System Needed?



- Advantages of using a database system

- Data redundancy:** Redundancy is controlled to ensure consistency and save the storage space.
- Data integrity:** Some integrity constraints can be enforced automatically by the DBMS.
- Data security:** Since the data is managed centrally, the DBMS ensures that the database access is through an authorized channel.

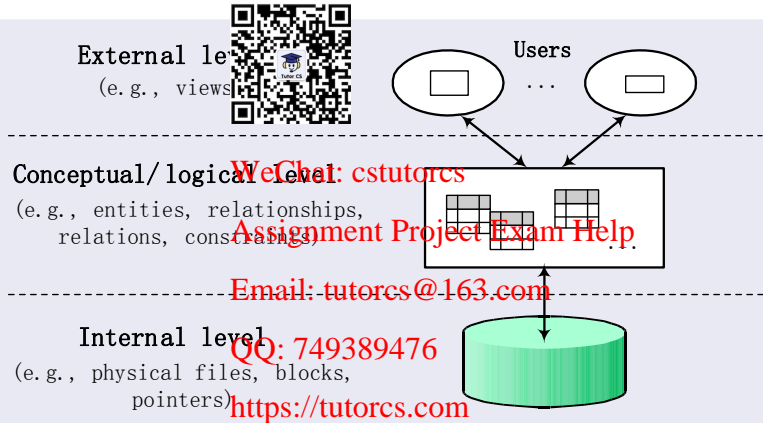
In addition to the above, the database system also facilitates the following:

Concurrent transactions; backup and recovery services; data independence; etc.



程序代写代做 CS编程辅导

## Three-level ANSI/SPARC Architecture



- **Note:** schemas at the three levels are *descriptions* of data; the stored data *actually* exists at the internal level (i.e., physical level) only.





程序代写代做 CS编程辅导

## Three-level ANSI/SPARC Architecture



### ● External Schema

- perspective of the application
- describes restructured parts of the database used in applications

WeChat: cstutorcs

### ● Conceptual or Logical Schema

- perspective of a community of users
- describes what data is stored in the database and relationships among data (independent from their physical storage structures).

Assignment Project Exam Help

Email: [tutorcs@163.com](mailto:tutorcs@163.com)

### ● Internal Schema

QQ: 749389476

- perspective of the implementation / system realization
- describes how data is stored in the database (e.g., physical storage structures).

<https://tutorcs.com>



程序代写代做 CS编程辅导

## Derived Principles – Data Independence



- **Logical data independence**: change the conceptual/logical schemas without having to change external schemas or application programs

WeChat: cstutorcs

**Example:** If adding or removing entities, external schemas that refer only to the remaining data should not be affected.

Assignment Project Exam Help

- **Physical data independence**: change the internal schemas without having to change the conceptual/logical schemas

Email: tutors@163.com

QQ: 749389476

**Example:** If physical files were reorganised, we should not have to change the conceptual/logical schemas.

<https://tutors.com>



## 程序代写代做 CS编程辅导 Derived Principles – Data Independence



- **Key idea:** When the **schema** at one level is changed at some level,
  - the schema at another level remains unchanged;
  - only the *mapping* between two levels is changed.

WeChat: cstutorcs





## 程序代写代做 CS编程辅导 Historical Remarks I/II



### ● Hierarchical Databases

- Oldest data model;
- SABRE, a collaboration between IBM and American Airlines;

### ● Network Databases

- Extension of hierarchical databases, from tree to network (late 1960s);

### ● Relational Databases

- Edgar F. Codd,  
A Relational Model of Data for Large Shared Data Banks
- System R and SQL



## 程序代写代做 CS编程辅导 Historical Remarks II/II



### ● Object-Oriented Databases

- Driven by object-oriented programming languages (1980s);
- Designed to store and share complex, structured objects.

WeChat: [cstutorcs](#)

### ● XML Databases

Assignment Project Exam Help

- XML is emerged as the standard for Web data exchange (1990s);
- Suitable to sparse data, deeply nested data and mixed content.

Email: [tutorcs@163.com](mailto:tutorcs@163.com)

### ● NoSQL Databases

QQ: 749389476

- Recent development in industry (since 2009);
- We will discuss NoSQL databases at the end of this course.

<https://tutorcs.com>