

Definitions and Concepts for AQA Computer Science A-level

Topic 10: Fundamentals of Databases

10.1 Conceptual Data Models and Entity Relationship Modelling

Data Model: An abstract model for organising data and its relationship to real world entities.

Entity-Relationship Modelling: A method of abstractly describing the data tables and the relationships between them visually. They can be used to reduce redundancy and construct a relational database.

10.2 Relational Databases

Attribute: A characteristic specification that defines a property or feature about an entity stored in a database.

Composite Primary Key: A primary key made up from two or more other keys.

Foreign Key: A linking attribute that joins two tables in a relational database by being a primary key in one and a foreign key in the other.

Primary Key: A unique identifier that identifies each record in a table.

Relational Databases: A database where separate tables are made for each entity, and relationships between entities are represented by foreign keys.

10.3 Database Design and Normalization Techniques

First Normal Form (1NF): A table with no repeating attributes. The intersection of each record and attribute produces exactly one value.

Normalisation: The formal process of optimally designing data tables by reducing data redundancy and repetition by converting them into normal forms.

Second Normal Form (2NF): A table in 1NF that has data that repeats across multiple records removed and put into a new table with appropriate relationships (no partial dependencies).

Third Normal Form (3NF): A table in 2NF where all attributes that are not the primary key are fully dependent on the primary key (no non-key dependencies).

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10.4 Structure Query Language

SQL: A language for relational database management and manipulation.

10.5 Client Server Databases

Client Server Database: A system that provides simultaneous access to the database for multiple clients. †

Commitment Ordering: A type of timestamp ordering that also takes into consideration the precedence of each transaction over other simultaneous transactions.

Integrity: The idea of keeping a database consistent by ensuring that any changes made to data or relationships associated with a table are accounted for in all the linked tables.

Record Locks: A technique used to prevent simultaneous access to data in a database by locking a record when it is being edited or updated. Otherwise, inconsistencies may arise in the database

Serialisation: A technique used to preserve integrity by only allowing one transaction to be processed at a time on a client server database.

Timestamp Ordering: A technique to handle concurrent access by executing transactions from multiple users based on the value of their associated timestamp. Each transaction receives a timestamp whenever it begins.

Definitions with a '†' taken from [AQA AS and A-level Computer Science specification version 1.5](#)

