

DATA MODELLING

Data modelling is the process of creating a data model for an information system by applying certain formal techniques

APPROACHES TO DATA MODEL

The three approaches to data model are:

1. Conceptual data model
2. Logical data model
3. Physical data model

Conceptual data model: This is the first stage of database design. A conceptual data model identifies the highest-level relationships between different entities. In a conceptual data model, the following steps are taken:

1. Specify the important entities and the relationships among them
2. No attribute is specified
3. No primary key is specified

Logical data model: This is the second stage in database design. A logical data model describes the data in as much details as possible, without regard to how they will be physically implemented in the database. In a logical data model, the following steps are taken:

1. Specify primary keys for all entities
2. Find the relationships among different entities
3. Find all attributes for each entity
4. Resolve many-to-many relationships
5. Normalization

Physical data model: Physical data model is the transformation of the logical database into the actual database. Physical data model represents how the model will be built in the database. A physical database model shows all table structures, including column name, column data type, column constraints, primary key, foreign key and relationships between tables. The steps for physical data model design are as follows:

1. Convert entities into tables
2. Convert relationships into foreign keys
3. Convert attribute into columns
4. Modify the physical data model based on physical constraints/requirements.

CREATING LIBRARY DATABASE

The following table information will be used to create a Library database:

- Author (AuID, AuName, AuPhone, Address,)
- Book (ISBN, title, PubName, Category, AuID, Price)
- Publisher (PubID, PubName, PubPhone, AuID, ISBN)

To create the “library” database, follow the following steps:

- Click on the Start button on the Taskbar
- Point to All Programs
- Select Microsoft Office
- Click Microsoft Access 2010
- Click on Microsoft Office button/File tab
- Click New
- Click the New Blank Database icon
- Type “Library” as the database name in the File Name box
- Click Create. Microsoft Access window will be displayed.

Table

A table is the first and the most important object to be added to a database. It stores data about a particular subject such as Authors or Books. It consists of records and fields. Each record contains data about one instance of the table subject, such as a particular author. Each field contains data about one aspect of the table subject, such as AuthorName, AuthorPhoneNumber, etc. A field is also commonly called a column or an attribute. A record consists of field values.

Field property

Field property applies to a particular field in a table and defines one of the field’s characteristics or an aspect of the field’s behavior.

Data types

A field data type indicates the kind of data that field stores or accepts. If the field name holds numeric value, the data type will be Number. Some of the data types include text, autonumber, number, memo, date/time, currency, Yes/No, Attachment, etc. **Refer to your SS1 3rd term note for the explanation.**

Table relationships

Although each table stores data about a different subject, tables in a database store data about subjects that are related to each other. Before storing data about different subjects in separate tables, you need a way to link them together so that you can easily combine related data from those separate tables. To connect the data stored in different tables, you create relationships. A relationship is a logical connection between two tables that specify fields that the tables have in common.

Key : A key is a minimal set of attributes whose values uniquely identify an entity in the set. A key consists of one field, but may consist of more than one field (i.e. Composite key).

Primary key: A primary key consist of one or more fields that uniquely identify each record that you store in the table. Consider the Student table; the AdmissionNumber field is the primary key of the Student table.

Foreign key: A foreign key contains values that correspond to values in the primary field of another table. For example, consider the table information below:

- **Author** (AuID, AuName, AuPhone, Address,)
- **Book** (ISBN, title, PubName, Category, AuID, Price)

In the Author's table information above, AuID field is the primary key but a look at the Book's table information, AuID field is also part of its attributes. Here AuID field is a foreign key of the Books table. The similarity of values between key fields forms the basis of a table relationship.

Differences between primary and foreign key

Primary key	Foreign key
The field used for primary key cannot be empty (null)	Field can contain a null value
A table cannot have more than one primary key value	A table can have more than one foreign key value
Primary key uniquely identify rows in a table	Foreign key create relationship between two tables
The primary key for each table is stored in an index	Index is not automatically created for a foreign key

Creating Book table

When already on the Microsoft Access window

1. Click the Create tab, then click Table.
2. Click View, then select Design View.
3. In the window that shows, type Books in the Table name box and click ok.
4. On the first row of the Field Name title, type ISBN for the first field name of the Books table to replace the highlighted ID, click inside Data type and select Text for the ISBN field
5. Click the second row, type Title for the second field name and select Text for its data type.
6. Click the third row, type AuID for the third field name, and select Text as the data type.
7. Click the fourth row, type Price for the fourth field name, and select Text as the data type.
8. Save your work, select View and choose Datasheet View to take you to the datasheet view where you can insert your records.

Creating the Authors and Publishers Tables

To add other tables, do the following:

1. Click the **Create** tab on the menu bar, select **Table**, another table will be added to the database.
2. Follow step 4 to 8 above to define the table fields and the data type.
3. Follow the process to create the Authors and Publishers tables.

Forms

A form is another database object that provides a convenient way to enter and view records in a table.

Queries

A query is a database object that enables you to locate records that match specified criteria by providing a way for you to ask a question about the information stored in a database table.

Report

A report is a database object that allows you to organize, summarize, and print all or a portion of the data in a database.