

Part 1: Understanding SQL

- 1.1 In an online store, SQL is used to store data such as tables for products, customers, orders, and inventory as database management. SQL queries are also used to insert, update, and retrieve product data, such as pricing, product description, and categorization. SQL is also used to ensure security of sensitive detail and only grant access to authorized personnel. SQL databases are used for back-up and recovery, providing mechanisms for storage restoring data to ensure safety from potential data loss.
- 1.2 For web applications, SQL is used to store data such as user accounts, content and transactions. SQL is used to query the database and retrieve data to present to the user. Web applications also use SQL to store user credentials such as passwords and usernames, whilst managing access levels and permissions. Real-time data updates for some web applications can be quickly updated and retrieved using SQL.
- 1.3 3 Benefits of using SQL for web applications include;
 - I. Scalability- SQL has the ability to hold large amounts of data which is critical for supporting growing user bases and data volumes.
 - II. Structure- Structured data management ensures a well-defined approach to organizing information for a web application.
 - III. Security- SQL provides security features for web applications, such as authentication and access control, which helps in observing privacy regulations.
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 - I. Efficiency- SQL ensures easy access and management of data for various functions.
 - II. Data Organization- SQL gives developers a way to store data in a structured manner to ensure it is well-organized and thus accessible and manageable.
 - III. Data Retrieval-SQL queries can be used to retrieve data from the database whilst also ensuring that data integrity is observed.
- 1.5 3 Database Management Systems:
 - I. MYSQL
 - II. Oracle
 - III. PostgreSQL

Part 2: Database Fundamentals

2.1 A database table is a set of rows and columns used to organize data in a database. It is similar to a spreadsheet in that it contains data in a structured way that makes it easy to retrieve, manipulate and collect. They also both follow a tabular form.

2.2 Columns are vertical components of a database table that help define the type of data that can be stored in each field. Data types are formats or classifications of data that can be stored in each column. Three types of data types are;

-Text(VARCHAR): Used to store text of varying length.

-Integer(INT): Used to store whole numb

-Date: Used to store calendar dates without any time information.
(YYYY-MM-DD)

2.3 Data types ensure integrity of data by making sure only valid data is added to the database, thus preventing errors. Using the appropriate data type for each column can help optimize the storage for data. When storing Integers, tinyint can be used to save up on space, especially in tables with large rows or columns. Using VarChar with a specified maximum of characters can help prevent the entry of unnecessarily long text, and maintain the consistency of text-based data. The date data type is used to ensure only valid calendar dates are entered into the column to prevent accidental entry of invalid date formats.

Part 3: Expense Tracker Database Design

3.1 For an expense tracker application, we would need to track;

- I. Expense amount- the monetary value of every expense.
- II. Expense category- the date the expense was incurred.
- III. Payment method- type of method used to pay for the incurred expense.
- IV. Description- brief information on the expense.

3.2 This schema captures a basic structure to track and analyze expenses:

Column Name	Data Type
expense-id	INT PRIMARY KEY
amount	DECIMAL (10,2)
date	DATE
category	TEXT
description	TEXT
vendor	TEXT

- I. expense-id- a unique identifier for each expense record.
- II. amount- the amount of money spent on an expense, recorded with a decimal value of upto ten digits and two decimal places.
- III. date- the date of the expense, stored in a date format.
- IV. category- a field that stores the type of expense in text, e.g. groceries.
- V. description- a text field to store brief information on the expense.
- VI. vendor- a text field that stores the name of the vendor or company where the expense was incurred.