30-Day SQL Roadmap to help you learn SQL from Scratch and Progress to an Advanced level

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This roadmap covers a mix of theory, practical exercises, and additional resources for deeper understanding. Note that the resources provided are examples, and you can explore other resources as needed.

Day 1: Installation and Setup
- Goal: Install a SQL environment on your local machine.
- Install a relational database management system (RDBMS). Popular choices are:
- [MySQL](https://dev.mysql.com/downloads/installer/)
- [PostgreSQL](https://www.postgresql.org/download/)
- [SQLite](https://www.sqlite.org/download.html)
- Install a SQL client tool (e.g., [MySQL [Workbench](https://www.mysql.com/products/workbench/), [pgAdmin](https://www.pgadmin.org/) or use the command line.
- Ensure everything is installed and set up correctly.

Day 2: Basic SQL Concepts
- Goal: Understand the fundamental concepts of SQL and relational databases.
- Learn the basics of:
- Tables, rows, columns, and primary keys.
- Relationships between tables (one-to-one, one-to-many, many-to-many).
- Read an introductory tutorial on SQL:
- [W3Schools SQL Tutorial](https://www.w3schools.com/sql/)

Day 3: Basic SQL Queries
- Goal: Write simple SQL queries to retrieve data.
- Learn about SELECT statements, filtering with WHERE, and using ORDER BY.
- Practice simple queries:
- Select specific columns from a table.
- Use WHERE to filter results.
- Order results with ORDER BY.

Day 4: SQL Functions and Aggregate Queries
- Goal: Use SQL functions and aggregate queries.
- Learn about SQL functions (e.g., COUNT, SUM, AVG, MIN, MAX).
- Practice with aggregate queries:
- Use GROUP BY to group results.
- Use HAVING to filter groups.
- Apply aggregate functions.

Day 5: Basic Data Manipulation
- Goal: Understand data manipulation with INSERT, UPDATE, and DELETE.
- Learn how to:
- Insert new rows into a table.
- Update existing rows.
- Delete rows.

- Practice data manipulation on a sample table.

Day 6: Joins and Relationships
- Goal: Learn about SQL joins and relationships between tables.
- Understand different types of joins:
  - INNER JOIN, LEFT JOIN, RIGHT JOIN, FULL OUTER JOIN.
- Practice joining tables with different join types.
- Read more about joins:
  - [SQL Joins Tutorial by W3Schools](https://www.w3schools.com/sql/sql_joins.asp)

Day 7: Subqueries and Nested Queries
- Goal: Learn how to write subqueries and nested queries.
- Understand the concept of subqueries.
- Practice writing subqueries in SELECT, WHERE, and FROM clauses.
- Explore use cases for subqueries.

Day 8: Advanced Data Manipulation
- Goal: Learn more advanced data manipulation techniques.
- Understand the use of transactions, COMMIT, and ROLLBACK.
- Learn about multi-table operations (e.g., UPDATE with JOIN).
- Practice with complex data manipulation scenarios.

Day 9: SQL Constraints and Data Integrity
- Goal: Learn about SQL constraints and data integrity.
- Understand different types of constraints:
  - PRIMARY KEY, FOREIGN KEY, UNIQUE, NOT NULL, CHECK.
- Practice creating and modifying constraints on tables.
- Read about data integrity:
  - [SQL Constraints Tutorial](https://www.w3schools.com/sql/sql_constraints.asp)

Day 10: Data Definition Language (DDL)
- Goal: Understand SQL DDL statements and schema management.
- Learn about DDL statements:
  - CREATE, ALTER, DROP.
- Practice creating, altering, and dropping tables and indexes.
- Explore schema design and normalization.

Day 11: Views and Derived Tables
- Goal: Learn about views and derived tables.
- Understand the purpose of views and how to create them.
- Practice creating views to encapsulate complex queries.
- Explore use cases for views.

Day 12: Indexes and Performance Optimization
- Goal: Understand the importance of indexes for performance.
- Learn about creating and using indexes.
- Understand the impact of indexes on query performance.
- Practice creating and using indexes.
- Read about SQL performance optimization:
  - [Indexing in SQL](https://www.geeksforgeeks.org/sql-indexes/)

Day 13: SQL Functions and Stored Procedures
- Goal: Learn about SQL functions and stored procedures.
- Understand the concept of stored procedures and their use cases.
- Learn how to create and use stored procedures and functions.
- Practice writing simple stored procedures.

Day 14: Triggers and Advanced SQL
- Goal: Understand SQL triggers and advanced concepts.
- Learn about SQL triggers and their use cases.
- Practice creating triggers for automated operations.
- Explore advanced SQL topics like common table expressions (CTEs) and recursive queries.

Day 15: Data Import and Export
- Goal: Learn about importing and exporting data in SQL.
- Understand how to import data from CSV, Excel, or other formats.
- Learn how to export data to different formats.
- Practice importing and exporting data in your SQL environment.

Day 16: Backup and Recovery
- Goal: Understand SQL backup and recovery strategies.
- Learn about creating and restoring database backups.
- Explore different backup strategies and their use cases.
- Practice creating and restoring backups in your RDBMS.

Day 17: SQL Security
- Goal: Learn about SQL security and access control.
- Understand different SQL security concepts:
  - User roles, permissions, and privileges.
- Learn how to manage user access and roles.
- Practice setting up user roles and permissions.

Day 18: Data Analytics and Reporting
- Goal: Explore SQL's role in data analytics and reporting.
- Understand how SQL is used for data analysis.
- Practice creating reports and summarizing data.
- Explore advanced reporting features like window functions.

Day 19: Data Visualization with SQL Tools
- Goal: Learn about data visualization tools with SQL integration.
- Explore SQL-based data visualization tools (e.g., [Tableau](https://www.tableau.com/), [Power BI](https://powerbi.microsoft.com/)).
- Practice creating simple data visualizations using SQL queries.
- Learn how to connect SQL databases to data visualization tools.

Day 20: Advanced SQL Techniques and Optimization
- Goal: Understand advanced SQL optimization techniques.
- Learn about query optimization strategies:
  - Using execution plans and query explain.
  - Index optimization and table partitioning.
- Explore advanced query optimization topics.

Day 21: Case Studies and Real-World Applications
- **Goal: Explore real-world SQL applications and case studies.**
- **Study examples of SQL in real-world scenarios (e.g., business intelligence, web applications).**
- **Practice building SQL queries for specific business use cases.**
- **Explore more complex SQL examples.**

Day 22-30: Projects and Additional Learning
- **Goal: Consolidate SQL knowledge with projects and additional learning.**
- **Develop a small project that involves SQL and a relational database.**
- **Examples include:**
  - **Building a simple CRUD application.**
  - **Creating a small business intelligence report with SQL.**
  - **Designing a simple database schema and implementing it.**
- **Explore additional SQL resources and certifications:**
  - **[SQLZoo](https://sqlzoo.net/)**
  - **[LeetCode SQL](https://leetcode.com/problemset/database/)**
  - **[HackerRank SQL Challenges](https://www.hackerrank.com/domains/sql)**
  - **[Codecademy SQL](https://www.codecademy.com/learn/learn-sql)**

Additional Resources and YouTube channels Link with Free Certification

- **Learn about basic, below are additional resources**
- **Install the database environment**

SQL is used with a Database Management System (DBMS) like MySQL, PostgreSQL, Oracle, or SQLite. Install it on your machine by following the instructions: How to Install SQL Server 2022 + SQL Server Management Studio

- **Learn about data types, primary & foreign keys and constraints as they are important for creating accurate and efficient databases.**

Get started with learning basic SQL here:
- **MySQL Tutorial for Beginners [Full Course]**
- **SQL Tutorial**

- **Advanced SQL resources**

Learn advanced SQL techniques like joining tables, combining results, using subqueries, and more with recommended tutorials for practical skills improvement.
- **Joins: Helps to merge data from different tables based on a common condition resulting in creation of new columns.**
- **Union : Used to merge the outcome of two or more SELECT statements.**
- **Subquery: It is a query inside another query. Used to get data from two tables.**
- **Window functions : Gives access to features like advanced analytics and data manipulation without the need to write complex queries.**
- **Common table expressions: It's a temporary result set with a name, generated from a basic SELECT statement, and can be utilized in a following SELECT statement.**

Learning Resources:

Here are some widely accessible resources that cover a variety of SQL topics, from beginner to advanced.

General SQL Resources:

1. **W3Schools SQL Tutorial**
   - **A comprehensive online tutorial that covers SQL basics to advanced topics.**
   - **W3Schools SQL**
2. **GeeksforGeeks SQL Tutorial**
   - **Offers a detailed SQL tutorial, including examples and exercises.**
   - **GeeksforGeeks SQL**
3. **Khan Academy SQL Course**
   - **Provides a well-structured SQL course with interactive exercises.**
   - **Khan Academy SQL**
4. **SQLZoo**
   - **Interactive SQL tutorials and exercises that cover various SQL concepts.**
   - **SQLZoo**
5. **LeetCode SQL Problems**
   - **Contains SQL problem sets of varying difficulty levels, useful for practice.**
   - **LeetCode SQL**

1. **Advanced SQL Tutorial 2023 | SQL Training | SQL Database Tutorial | Simplilearn**
2. **Learn Advanced SQL | Kaggle**
3. **Practice SQL here: Problems - LeetCode**

Build Some Real time Project.

Practicing with a sample database is an effective way to learn SQL. Here are some free sample databases to practice and improve your SQL skills:

- **SQLite Sakila Sample Database | Kaggle: fictitious database designed to represent a DVD rental store.**
- **Chinook Sample Database| Kaggle: sample database for a digital media store.**
- **Bike store relational database| Kaggle: sample database for bike store customer analysis and trends.**

Websites:

1. **Intro to SQL: Querying and managing data | Khan Academy**
2. **SQLZoo**

Best YouTube Channels:

1. Freecodecamp.org | 8.62 M Subscribers

SQL Tutorial - Full Database Course for Beginners

2. edureka!| 3.88 M Subscribers

SQL Full Course In 10 Hours | SQL Tutorial | Complete SQL Course For Beginners | Edureka

Certification

Get professional certifications to increase credibility and advance your career. Here are some of the best certifications to go for:

1. **IBM Databases and SQL for Data Science with Python Free - https://drive.google.com/drive/folders/1ulh3HT0qSIgqVY6IkityHRwFQGd40kQJ?usp=drive_link**