SQL and Database Learning Path

Level 1: Fundamentals 🌱

Task 1: Database Basics

- Define a database in your own words
- Identify real-world database examples
- Create a list of why databases are important

Task 2: First SQL Commands

```
-- Practice these basic commands
SELECT * FROM table_name;
SELECT column1, column2 FROM table_name;
```

Task 3: Data Types

- Learn common SQL data types:
  - INTEGER
  - VARCHAR
  - DATE
  - DECIMAL
  - BOOLEAN

Task 4: Creating Tables

```
-- Practice creating a basic table
CREATE TABLE students (
    id INTEGER,
    name VARCHAR(50),
    age INTEGER
);
```

Level 2: Database Concepts 📚

Task 5: Database Management Systems

- Compare different types of DBMS
- List advantages of using a DBMS
- Understand client-server architecture

Task 6: Data Warehousing

- Define data warehouse
- Key differences from operational databases
- Basic data warehouse architecture
  - Staging area
  - Data storage
  - Data presentation

Task 7: Data Modeling

- Create basic entity diagrams
- Understand relationships:
  - One-to-One
  - One-to-Many
  - Many-to-Many
- Practice drawing simple schemas

Task 8: Relational Model Elements

1. Structure (Relations/Tables)
2. Integrity Rules
3. Manipulation Methods

Level 3: Intermediate Queries 💡

Task 9: Advanced SELECT Operations

```
-- Practice these queries
SELECT * FROM employees ORDER BY salary DESC;
```

```sql
SELECT * FROM products WHERE price > 100;
SELECT * FROM orders WHERE status = 'pending' AND total > 500;
```

Task 10: Table Constraints

```sql
CREATE TABLE products (
    id INTEGER PRIMARY KEY,
    name VARCHAR(100) NOT NULL,
    sku VARCHAR(20) UNIQUE,
    price DECIMAL(10,2) CHECK (price > 0)
);
```

Task 11: Data Modification

```sql
-- Practice these commands
UPDATE products SET price = price * 1.1;
DELETE FROM orders WHERE status = 'cancelled';
```

Level 4: Advanced Operations 🚀

Task 12: Database Design

- Create normalized tables
- Implement relationships
- Add appropriate indexes
- Design for performance

Task 13: Views

```sql
-- Create different types of views
CREATE VIEW active_customers AS
    SELECT * FROM customers
    WHERE last_order_date >= DATE_SUB(NOW(), INTERVAL 1 YEAR);
```

Task 14: Table Modifications

```sql
-- Practice ALTER TABLE commands
ALTER TABLE employees ADD COLUMN department VARCHAR(50);
ALTER TABLE products MODIFY price DECIMAL(12,2);
ALTER TABLE orders ADD CONSTRAINT fk_customer
    FOREIGN KEY (customer_id) REFERENCES customers(id);
```

Practice Projects 🎯

Project 1: Student Management System

Requirements:

- Student information
- Course enrollment
- Grades tracking
- Attendance records

Project 2: Inventory System

Requirements:

- Product management
- Stock levels
- Purchase orders
- Supplier information

Project 3: Library Database

Requirements:

- Book catalog
- Member management
- Borrowing system
- Fine calculation

Project 4: E-commerce Database

Requirements:

- Product catalog
- Customer accounts
- Order processing
- Shopping cart functionality

Learning Resources 📖

- Official SQL documentation
- Online SQL practice platforms
- Database design books
- Community forums

Progress Tracking ✅

- [ ] Completed Level 1
- [ ] Completed Level 2
- [ ] Completed Level 3
- [ ] Completed Level 4
- [ ] Completed at least one project