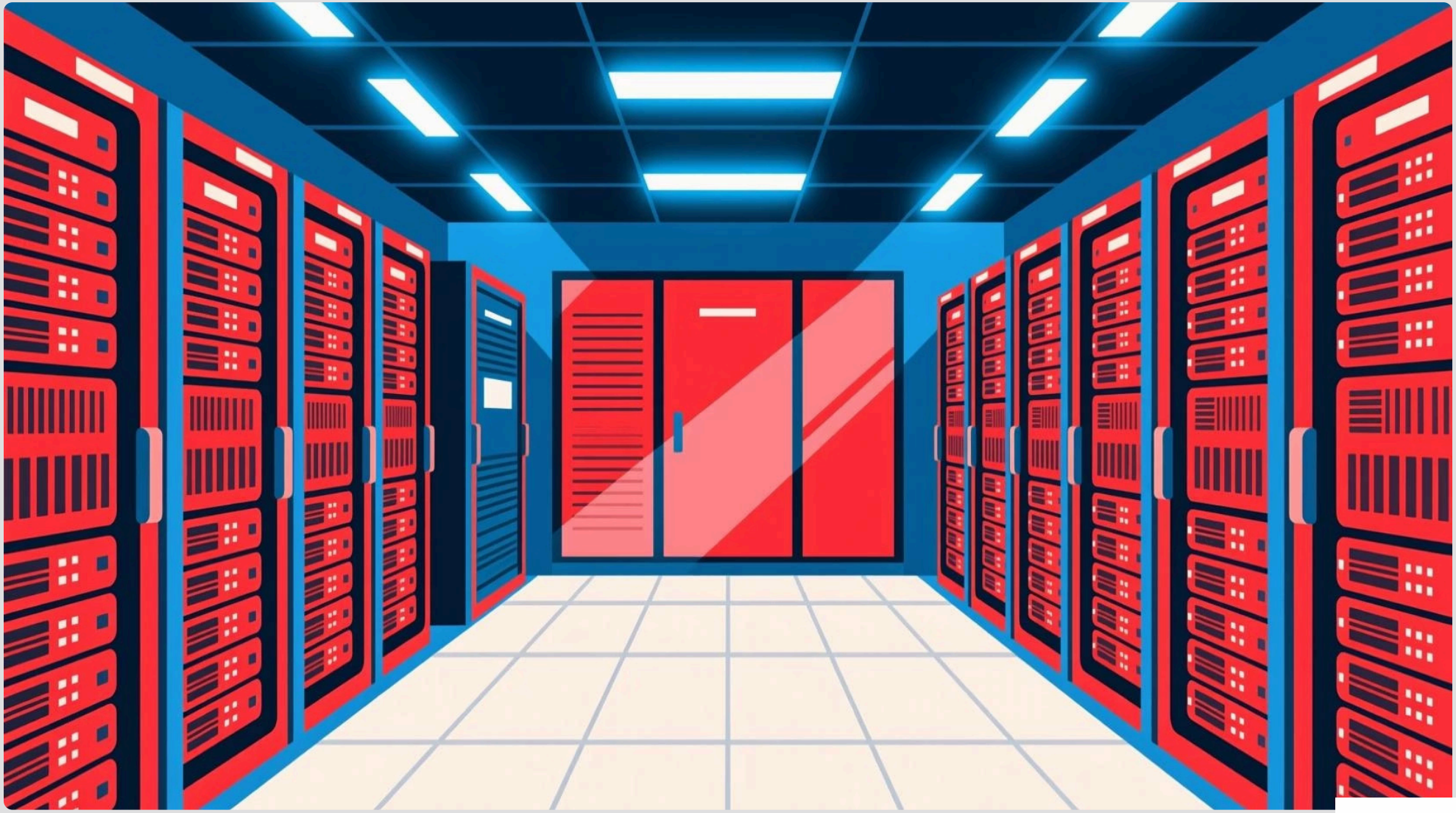
SQL Syllabus



Course Title: Introduction to SQL

Course Description: This course provides a comprehensive introduction to Structured Query Language (SQL), the standard language for managing and manipulating relational databases. Students will learn the fundamental concepts of relational databases, how to write SQL queries to retrieve and manipulate data, and how to design and create database schemas. The course emphasizes hands-on practice with real-world examples.

Learning Objectives

Upon successful completion of this course, students will be able to:

Database Fundamentals

Understand the core concepts of relational databases and database management systems (DBMS).

Query Writing

Write basic to advanced SQL queries to retrieve data from single and multiple tables.

Data Operations

Use various SQL clauses (WHERE, GROUP BY, ORDER BY, HAVING) for data filtering, aggregation, and sorting.

Table Joins

Understand and apply different types of SQL joins (INNER, LEFT, RIGHT, FULL) to combine data from multiple tables.

Data Manipulation

Perform data manipulation operations (INSERT, UPDATE, DELETE).

Database Objects

Create and modify database objects (tables, views, indexes).

Design Principles

Understand basic database design principles and normalization.

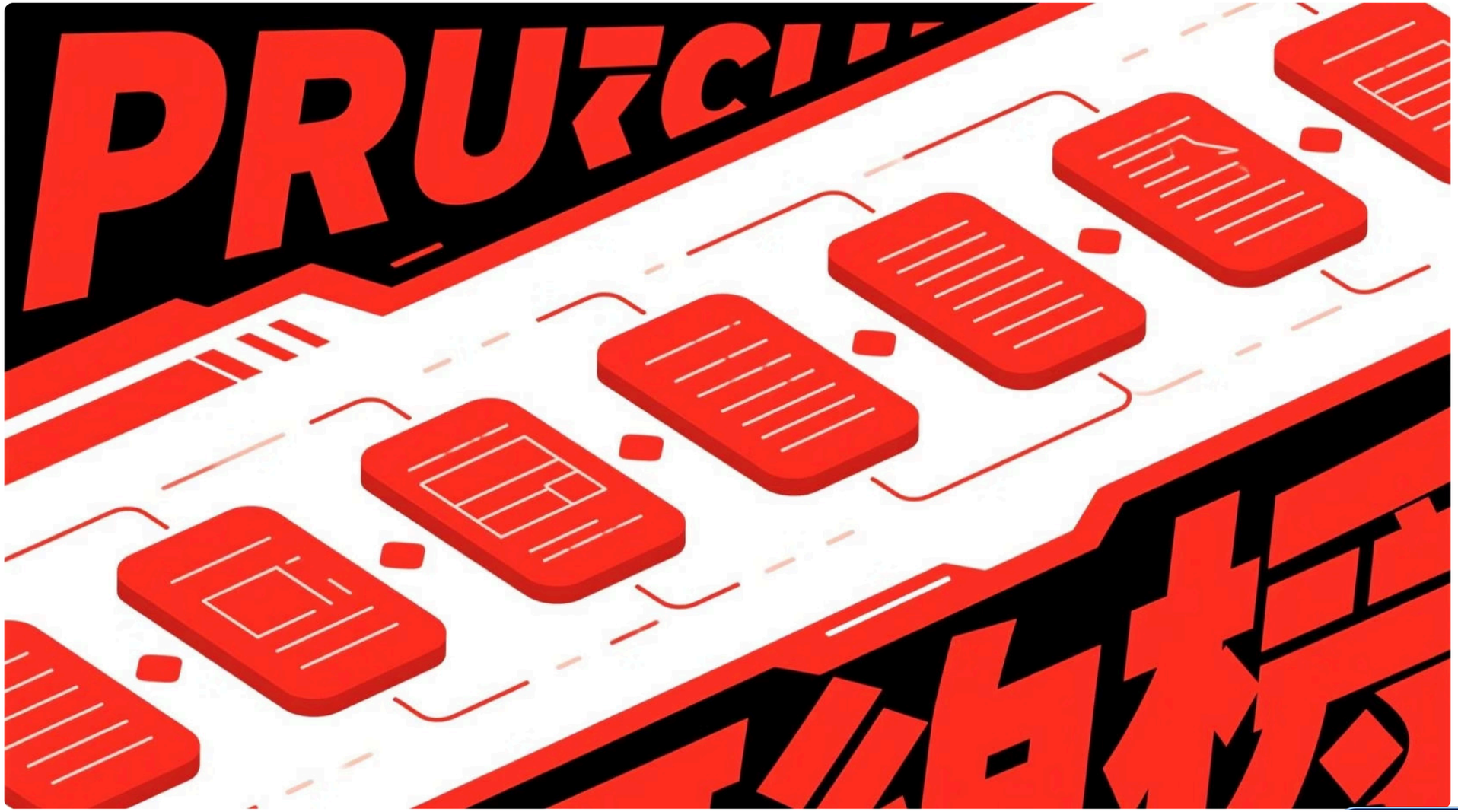
Prerequisites

Basic computer literacy is recommended.

No prior programming or database experience is required.

Course Outline

This comprehensive SQL course is structured into **eight modules** that progressively build your database skills from foundational concepts to advanced techniques.



Module 1: Introduction to Databases and SQL

01

What is a Database?

Understanding the fundamental purpose and structure of databases in modern computing.

02

Relational Database Concepts

Tables, Rows, Columns, Keys

03

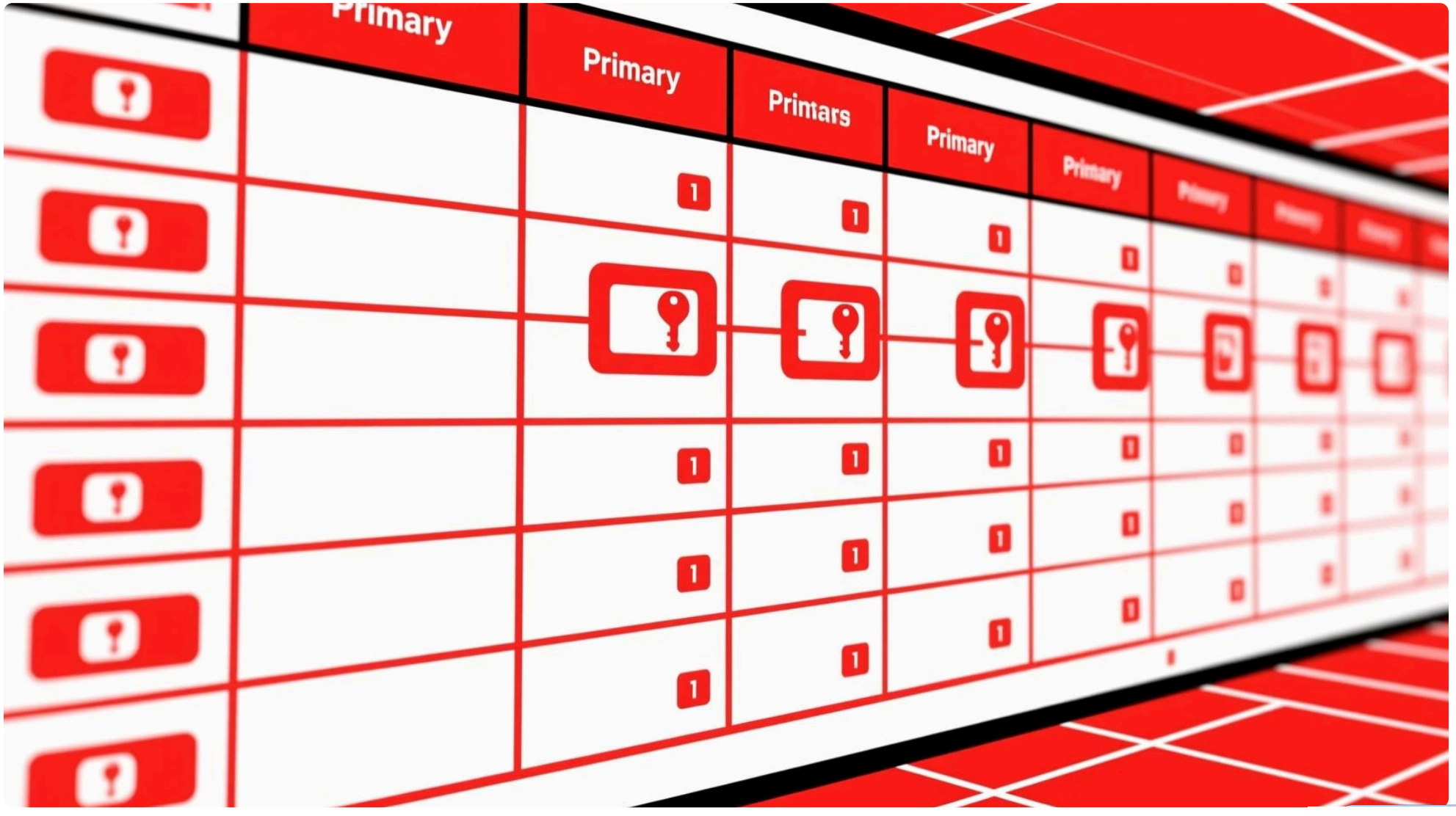
Introduction to SQL and its Purpose

Learning why SQL is the standard language for database management.

04

Setting Up Your Environment

e.g., SQLite, MySQL, PostgreSQL



Module 2: Retrieving Data with SELECT

The SELECT Statement

Foundation of all SQL queries

Column Selection

Selecting All Columns vs. Specific Columns

Limiting Results

DISTINCT, LIMIT/TOP

Aliases

Aliases for Columns and Tables

Basic Filtering

WHERE Clause (Comparison Operators, Logical Operators)

Key Focus: Mastering the SELECT statement is essential as it forms the basis for all data retrieval operations in SQL.

Module 3: Sorting, Aggregating, and Grouping Data

Sorting & Organization

- Sorting Data with ORDER BY (ASC, DESC)

Aggregate Functions

- COUNT
- SUM
- AVG
- MIN
- MAX

Grouping Operations

- Grouping Data with GROUP BY Clause
- Filtering Grouped Data with HAVING Clause

Modules 4–8: Advanced Topics

Module 4: Working with Multiple Tables (Joins)

- Understanding Relationships between Tables
- INNER JOIN
- LEFT JOIN (LEFT OUTER JOIN)
- RIGHT JOIN (RIGHT OUTER JOIN)
- FULL JOIN (FULL OUTER JOIN)
- Self-Joins

Module 5: Data Manipulation Language (DML)

- Inserting Data into Tables (INSERT INTO)
- Updating Existing Data (UPDATE)
- Deleting Data from Tables (DELETE FROM)

Module 6: Data Definition Language (DDL)

- Creating Tables (CREATE TABLE)
- Data Types in SQL
- Modifying Table Structure (ALTER TABLE)
- Dropping Tables (DROP TABLE)
- Creating and Dropping Databases

Module 7: Advanced SQL Concepts

- Subqueries (Nested Queries)
- Views
- Indexes
- Understanding Transactions (COMMIT, ROLLBACK)
- Introduction to Stored Procedures and Functions (Database-specific)

Module 8: Database Design Principles (Optional/Introduction)

- Introduction to Normalization (1NF, 2NF, 3NF)
- Entity-Relationship Diagrams (ERDs)

Assessment

Quizzes/Assignments

Regular assessments to reinforce learning and track progress throughout the course.

Practical Exercises

Hands-on practice with real-world database scenarios to build practical SQL skills.

Final Project/Exam

Comprehensive evaluation demonstrating mastery of SQL concepts and techniques.