

SQLAlchemy Practice Set

(MySQL • MS SQL Server • BigQuery)

SECTION 1: Engine & Connection Management

1. Create SQLAlchemy engines for MySQL, MS SQL Server, and BigQuery.
2. Configure pooling, timeout, and secure credentials.
3. Implement retry-safe engine creation with logging.
4. Verify connectivity using test queries.

SECTION 2: Schema Inspection & Metadata

5. Inspect schemas, datasets, and tables.
6. Identify primary keys, foreign keys, and indexes.
7. Compare metadata differences across databases.
8. Detect table existence and partitioning (BigQuery).

SECTION 3: ORM Modeling (Hybrid)

9. Create ORM models for MySQL and SQL Server tables.
10. Add server defaults, indexes, and schemas.
11. Reflect existing tables into ORM models.
12. Explain ORM limitations for BigQuery.

SECTION 4: Analytics Querying

13. Write joins and filters.
14. Perform revenue and performance aggregations.
15. Use GROUP BY and HAVING.
16. Apply window functions.
17. Convert results to Pandas DataFrames.

SECTION 5: BigQuery Analytics

18. Write partition-optimized Core queries.
19. Handle nested fields and UNNEST.
20. Validate cost-efficient queries.

SECTION 6: Performance & Scaling

21. Optimize queries using indexes and partitions.
22. Stream large datasets.
23. Compare ORM, Core, and raw SQL.

24. Log execution metrics.

SECTION 7: Automation Pipelines

25. Build reusable multi-DB analytics functions.

26. Parameterize queries.

27. Create schedule-ready pipelines.

28. Add retry logic.

SECTION 8: Testing & Reliability

29. Create test environments.

30. Write engine and query tests.

31. Mock failures.

32. Validate SQL per backend.