

Redis – 100+ Lab Exercises (Basic, Intermediate, Advanced)

□ Basic Level (30+ Exercises)

Objective: Understand Redis fundamentals, installation, and core data structures.

□ Getting Started with Redis

- Install Redis on Linux/Windows/macOS.
- Start and stop Redis server and client.
- Understand Redis data types: Strings, Lists, Sets, Hashes, Sorted Sets.
- Perform basic CRUD operations on each data type.
- Explore simple commands: SET, GET, DEL, EXISTS.
- Use Redis CLI to interact with the server.
- Understand keys expiration and TTL commands (EXPIRE, TTL).
- Use INCR, DECR, and other atomic counters.
- Basic data structure operations: push/pop in lists, add/remove in sets.

□ Practice Exercises

- Store and retrieve user session data using Strings.
- Implement a simple leaderboard with Sorted Sets.
- Use Lists to create a task queue.
- Cache frequent API responses with expiration.
- Create a user profile using Hashes and update fields.

□ Intermediate Level (40+ Exercises)

Objective: Enhance Redis usage with transactions, pub/sub, and performance tuning.

□ Transactions and Lua Scripting

- Understand Redis transactions (MULTI, EXEC, DISCARD).
- Explore optimistic locking with WATCH.
- Write simple Lua scripts for atomic operations.



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- Use pipelines to batch commands and improve performance.

□ Pub/Sub Messaging

- Implement Pub/Sub pattern for messaging between apps.
- Subscribe and publish messages on channels.
- Use Redis streams for message queues and event sourcing.

□ Performance and Persistence

- Configure Redis persistence modes: RDB and AOF.
- Understand eviction policies and memory management.
- Monitor Redis performance with `INFO` command and logs.
- Use Redis Sentinel for high availability basics.

□ Practice Exercises

- Implement a stock price update system using Pub/Sub.
- Create an atomic counter with Lua script for concurrency safety.
- Build a chat application using Redis streams.
- Simulate cache eviction policies under memory constraints.
- Configure and test Redis persistence with RDB and AOF.

□ Advanced Level (40+ Exercises)

Objective: Master Redis clustering, advanced data structures, and real-world production scenarios.

□ Redis Clustering and High Availability

- Set up Redis Cluster for sharding data.
- Manage cluster nodes and slot rebalancing.
- Implement Redis Sentinel for failover and monitoring.
- Understand client-side sharding and proxy solutions.

□ Advanced Data Structures & Modules

- Use HyperLogLog for approximate counting.
- Implement Bitmaps and Geospatial indexes.
- Work with Redis modules like RedisJSON, RedisSearch, RedisGraph.



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- Optimize complex queries with Redis modules.

□ Security & Scaling

- Configure Redis authentication and access control lists (ACLs).
- Secure Redis communications with TLS.
- Perform backups and disaster recovery planning.
- Scale Redis for high throughput with sharding and pipelining.

□ Practice Exercises

- Deploy a Redis Cluster and test distributed key management.
- Build a real-time analytics dashboard using HyperLogLog and Bitmaps.
- Implement geospatial queries for location-based services.
- Secure a Redis instance with ACLs and TLS.
- Integrate RedisJSON for storing and querying JSON documents.

□ Capstone Projects

- Design and deploy a Redis-backed caching layer for a web app.
- Build a real-time chat system using Redis Pub/Sub and Streams.
- Create a scalable leaderboard using Sorted Sets and Redis Cluster.
- Implement a session store with failover using Redis Sentinel.
- Develop a geo-location tracking app with Redis Geospatial features.

□ Tools & Platforms

- Redis CLI and GUI clients (RedisInsight, Medis)
- Dockerized Redis for rapid environment setup
- Redis modules: RedisJSON, RediSearch, RedisGraph
- Monitoring tools: Redis Monitor, Prometheus exporters