Data Migration from Heroku PG to Snowflake - Testing and Validation SOP with Security Testing

Objective:

The objective of this Standard Operating Procedure (SOP) is to outline the steps to test and validate data migration from Heroku Postgres to Snowflake, ensuring the successful and accurate transfer of data, and to perform security testing to protect the data.

Scope:

This SOP covers the testing and validation process for data migration from Heroku PG to Snowflake, including security testing.

Responsibilities:

- Data Engineering Team
- Database Administrators
- QA Team
- Security Team
- Project Managers

Procedure:

1. **Initial Setup:**
   a. Prepare a test environment in Snowflake that replicates the target structure for the migrated data.
   b. Ensure that Snowflake credentials and access permissions are configured correctly.
2. **Data Validation and Reconciliation:**
   a. Compare data in Snowflake with the source Heroku PG database to identify discrepancies.
   b. Verify record/row counts, columns count, data types, and constraints.
   c. Use checksums or hash functions to validate data integrity.
   d. Validate that dbt-refactored views are producing correct results.
3. **Performance Testing:**
   a. Conduct performance tests on the migrated data to assess query performance and resource utilization.
   b. Optimize SQL queries and indexes as needed to ensure optimal performance.
4. **Quality Assurance:**
   a. Engage the QA team to perform thorough testing, including regression testing on the application relying on this data.
   b. Verify that the application works as expected with the migrated data.
5. **Security Testing:**
   a. Conduct security testing to identify vulnerabilities and protect the data:
      i. Perform penetration testing to identify potential vulnerabilities in Snowflake and its configurations.
      ii. Verify that data access controls are correctly configured to prevent unauthorized access.
      iii. Ensure encryption is enabled for data in transit and at rest.
      iv. Verify that user roles and privileges are correctly assigned in Snowflake.
      v. Test for SQL injection and other common security risks in dbt models and SQL queries.
      vi. Review audit logs to detect any suspicious activities.
   b. Remediate any security issues identified during testing.
6. **Data Migration Logs:**
   a. Maintain detailed migration logs that include information on data transfer, errors, and performance metrics, and security testing results.
   b. These logs will be invaluable for troubleshooting, auditing, and security compliance.
7. **User Acceptance Testing (UAT):**

a. If applicable, conduct User Acceptance Testing (UAT) with stakeholders to ensure the data meets their requirements and expectations.

8. **Documentation:**
   a. Document the entire migration process, including all steps, configurations, and any issues encountered.
   b. Create a rollback plan in case the migration fails or faces critical issues.
9. **Approval and Sign-off:**
   a. Obtain approval from relevant stakeholders, including project managers, data owners, QA teams, and security teams, based on successful testing and validation, including security.
10. **Deployment:**
    a. Schedule a maintenance window for the final data migration.
    b. Execute the migration process in the production environment.
    c. Monitor the migration in real-time and address any issues as they arise.
11. **Post-Migration Verification:**
    a. After the production migration, perform the same data validation, performance tests and security testing to ensure a successful transition.
    b. Confirm that the application is functioning as expected with the new data in Snowflake.
12. **Rollback Plan:**
    a. In the event of a critical issue during or after migration, be prepared to execute the rollback plan to revert to the previous state.
13. **Documentation and Knowledge Sharing:**
    a. Update documentation to reflect the final state of the migration, including security-related changes.
    b. Share knowledge with the team to ensure everyone is aware of the changes and can provide support.

Conclusion: This SOP provides a structured approach to test and validate data migration from Heroku PG to Snowflake while also ensuring data security. Following these steps, including security testing and obtaining the necessary approvals, will help ensure a successful and secure migration process. Always maintain thorough documentation and be prepared to address issues as they arise during the migration.