



# Hibernate & Spring Data JPA

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Beginner to Guru

Introduction to Liquibase



## What is a Migration?

- Migrations are the process of moving programming code from one system to another
  - This is fairly large and complex topic of maintaining computer applications
- Database Migrations typically need to occur prior to, or in conjunction with application code
  - Can lead to run time errors if database does not match what is expected
- Database migrations are a very important part of the process of moving your application code to production
- Keep in mind, in larger organizations, you as the developer will NOT be doing the migration





## Why Use a Migration Tool?

- Hibernate can manage my schema fine, why use a migration tool?
- Managing many environments and databases:
  - Dev (H2), CI/CD, QA, UAT, Production
- Development and CI/CD databases are easy, just rebuild each time
- QA, UAT, Production are permanent databases
  - What state are they in?
  - Has a script been applied?
  - How to create a new database to a release?





## Why Use a Migration Tool?

- Database Migration tools can:
  - Create a new database
  - Hold history of migrations
  - Have a reproducible state of the database
  - Help manage changes being applied to numerous database instances
- Popular Open Source Database Migration Tools (Not a complete list):
  - Liquibase
  - Flyway





## Liquibase and Flyway

- Common Features:
  - Command Line Tools
  - Integration with Maven and Gradle
  - Spring Boot Integration
  - Use script files which can be versioned and tracked
  - Use database table to track changes
  - Have commercial support







## Liquibase / Flyway - Spring Boot Integration

- Spring Boot offers support for both Liquibase and Flyway
- Fundamentally Spring Boot will apply change sets
- Spring Boot's support is narrow in scope
- Both tools have additional capabilities available from the command line or build tool plugins
- The Spring Boot integration is convenient for migrations
  - Both tools may be used independently of Spring Boot



## Liquibase vs Flyway

- Liquibase and Flyway are very similar in terms of functionality
- Share same concepts, slightly different terminology
- Liquibase supports change scripts in SQL, XML, YAML, and JSON
  - XML, YAML and JSON abstract SQL, which may be beneficial for different DB technologies
- Flyway supports SQL and Java only
- Liquibase is a larger and more robust product
- Flyway seems to have more popularity
- Both are mature and widely used



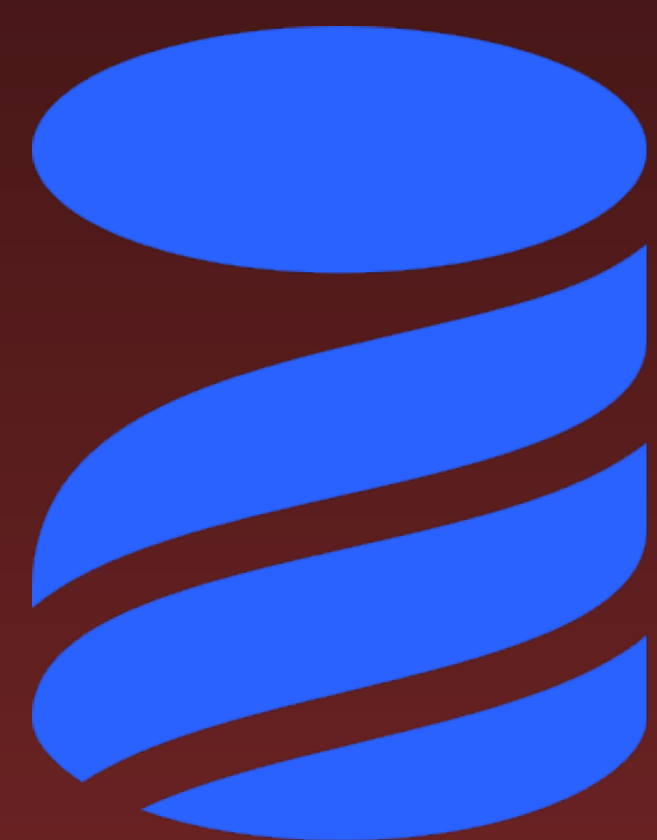


## Liquibase vs Flyway - Which to Use?

- Liquibase is probably a better solution for large enterprises with complex environments
- Flyway is good for 90% of applications which don't need the additional capabilities
- Recommendation:
  - If one or the other is being used in the organization, use it
  - If in doubt, do your own research on each option
  - John's preference is Flyway - simple and easy to use







**Liquibase**



## Liquibase Terminology

- ChangeSet - A set of changes to be applied to the database
- Change - A single change to be applied to the database
- Changelog - A file which has a list of changeSet's to be applied
- Preconditions - Conditions which control the execution
- Context - An expression to help control if the script should or should not run
- ChangeLog Parameters - Placeholders which can be replaced at run time



## Liquibase Best Practices

- Organizing Change Logs - Create a master change log to organize Change Sets
- One Change Per Change Set - Allows for easier rollback if there is a failure
- Never Modify a Change Set - Changes should be additive
- Use Meaningful Change Set Ids - some use a sequence number, others use a descriptive name



## Running Liquibase

- Command Line (CLI) - CLI available for Windows, MacOS, and Linux
  - Not covered in this course
- Maven / Gradle Plugins
  - We will be looking at Maven only
- Spring Boot - Will run Liquibase on startup to update configured database to latest changeset.





## Our Next Steps

- Configure Maven Plugin
- Use Maven / Liquibase to generate change set for existing database
  - Saves us from creating manually
  - Great way to migrate an existing database to using Liquibase
- Configure Spring Boot Support for Liquibase
- Alter existing table with Liquibase
- Add a new table with Liquibase





