Migration Spark to Beam with hexagonal architecture and DDD

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BEAM SUMMIT

About me

Mazlum TOSUN

- Head of data and co founder at Group Bees
- Tech lead GCP and data
- Passionate about Google Cloud, data, craft and functional programming
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Context

- ❑ My previous customer worked on GCP and had Spark/Dataproc batch jobs
- ❑ There was some issues with Spark jobs (Spark streaming on bucket and memory usage)
- ❑ Have the need to develop custom code connectors for GCP resources
- ❑ Our customer wanted to change batch jobs to streaming

Context

- ❏ The strategy was to be cloud native
- ❏ Spark structured streaming was not compatible with Pub Sub
- ❏ The team wanted to do a POC on Apache Beam and Dataflow
- ❏ The team used to work with JVM languages (Scala, Java)

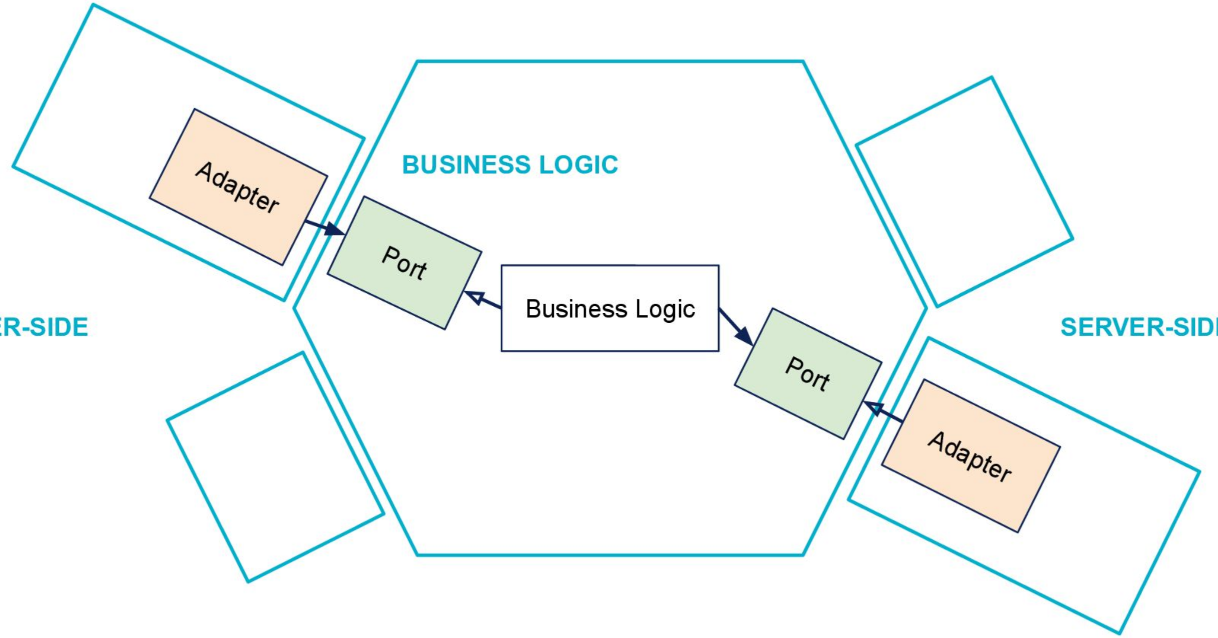
POC

- Firstly I did a POC for a datamart with SCIO (Scala wrapper on Beam by Spotify)
- Why ?
  - Because the team used to work with Spark Scala
- Interesting choice and it produced good code but finally the team decided using native Beam with Java sdk
- The goal was to be near to the native SDK to be more confident, learn native code and have more documentation on the Web
- Beam Java instead of Python

Architecture

- ❑ I was in charge to propose a Beam boilerplate code and architecture to the team
- ❑ The Spark code was mostly oriented with inheritance design and without code decoupling
- ❑ Our use cases had many transformations and business rules
- ❑ I proposed an hexagonal architecture and domain driven design

Architecture



https://blog.octo.com/hexagonal-architecture-three-principles-and-an-implementation-example/

Architecture

- ❑ Advantages of hexagonal architecture and DDD
  - ❑ Isolation of business domain part
  - ❑ Isolation of infrastructure and technical part
  - ❑ Better handling of code complexity (domain and infra layers separated)
  - ❑ Code decoupling between domain and infrastructure part
  - ❑ If technical part evolves, there is no impact on domain part
  - ❑ The responsibilities are clear and the code can evolve easily
  - ❑ Domain part can be easily tested separately with mocks on infra part
  - ❑ Tests can be done with domain + infra

Dependency injection

- ❑ The dependency injection is a concept allowing the code decoupling with contracts and interfaces
- ❑ The IOC meaning delegation of object instantiation to a dedicated framework
- ❑ The concern of instantiation is not in the applicative code but separated to the framework (connection between interface and implementations)

Dependency injection

- There are many popular libraries or frameworks in the Java community :
  - Spring
  - CDI
  - Giuce
  - Dagger 2

- Some explanations for each of them

Dependency injection

- The choice was Dagger 2 :
  - Dependency injection done at compile time
  - Existing Maven plugin for Dagger 2
  - Better performance
  - Maintained by Google
  - Flexible system with modules and components

Feedback after the migration

- ❑ Feedback for developers used to work with Spark/Scala

Pros

- ❑ Beam is simple for JVM devs : only PCollections and transformations
- ❑ Can easily separate a composition of transformations with PTransforms
- ❑ Better support for streaming and same code between batch and streaming
- ❑ The compatibility with GCP is full, native IO, cloud logging…
- ❑ Dataflow runner autoscaling, metrics and monitoring allows devs to be more focus on the code logic
- ❑ Serveless and no cluster to manage

Feedback after the migration

Cons

- ❏ Beam Java is more verbose than Spark Scala
- ❏ With a bad use of lambda expression, the code can be less readable

Beam DDD code demo real application

Links to example projects

https://github.com/tosun-si/teams-league-java-ddd-beam-summit

https://github.com/tosun-si/teams-league-python-ddd-beam-summit

Thank you :)

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