Tanzu GemFire

Building Faster Cloud Native Applications at Scale with VMware Tanzu GemFire

Getting Started

Download Source Code

https://github.com/ggreen/spring-geode-showcase.git

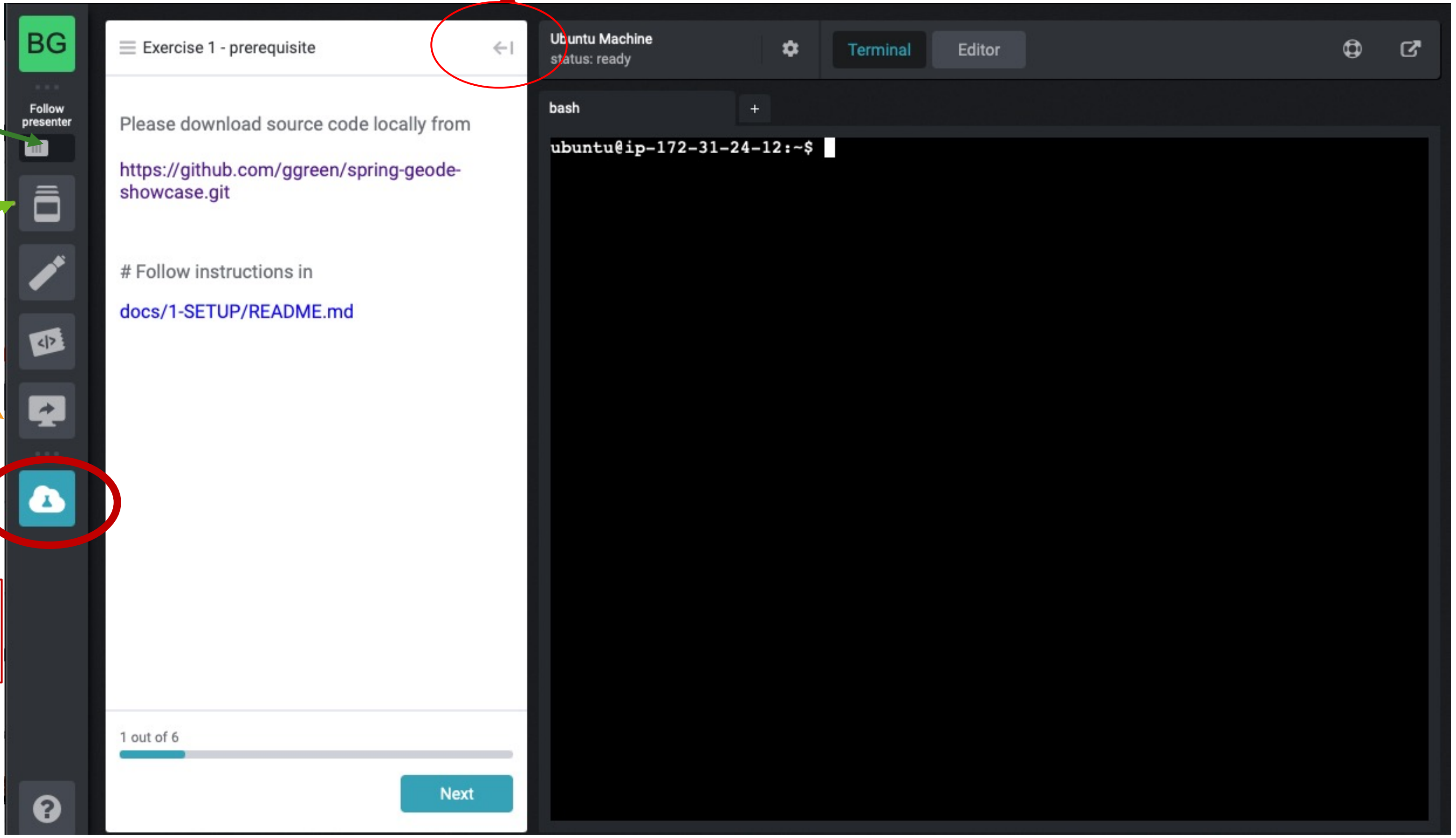
Click arrow If you do not see the exercises

Following presenter

See slides

See presenter screen

Click on My lab



Please download source code locally from

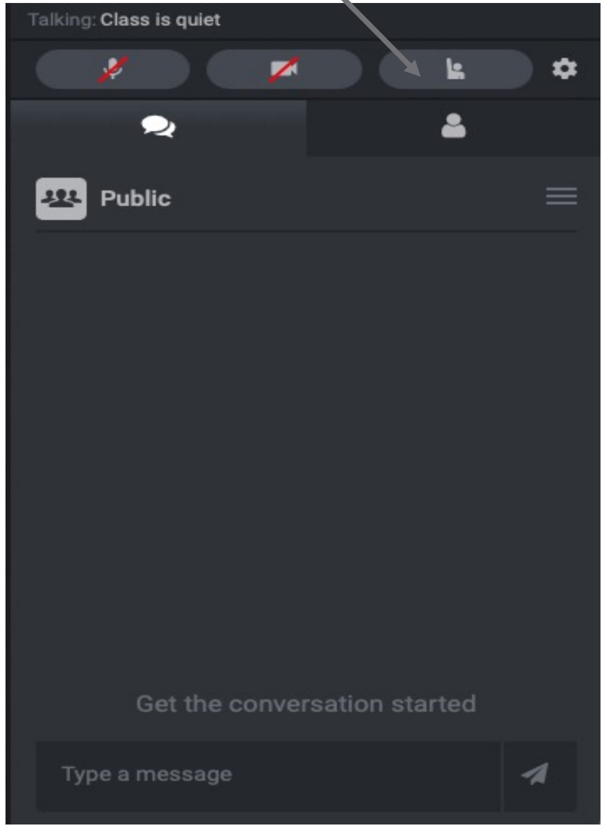
https://github.com/ggreen/spring-geode-showcase.git

Follow instructions in

docs/1-SETUP/README.md

```
ubuntu@ip-172-31-24-12:~$
```

If you need assistance



VMware Tanzu – Data Services

VMware Tanzu

Infrastructure for running modern apps and backing services with consistent, conformant Kubernetes everywhere.

Data Management
Management for Tanzu Data Services instances

GemFire
Fast In-Memory data store for Caching, Transactional and NoSQL support powered by Apache Geode

I need a fast data store

SQL
Relational MySQL or Postgres database for Transactional or Analytic data processing

I need to replatform a relational database

Greenplum
Massively Parallel Processing (MPP) Postgres for Big Data store for analytics, Machine Learning and Artificial Intelligence

I need to drive analytic value of out tons of existing data

RabbitMQ

Rabbit MQ
High throughput broker for reliable messaging delivery

I need reliable messaging delivery

Spring Cloud Data Flow
Data integration orchestration service for dynamically building data pipelines

I need flexible and manageable data integrations

Features

- ✓ Cloud deployed backing-services
- ✓ On-Premise and Multi-Cloud
- ✓ Based on open source
- ✓ Scaling
- ✓ HA - Fault Tolerant
- ✓ Secured access
- ✓ World Class Support

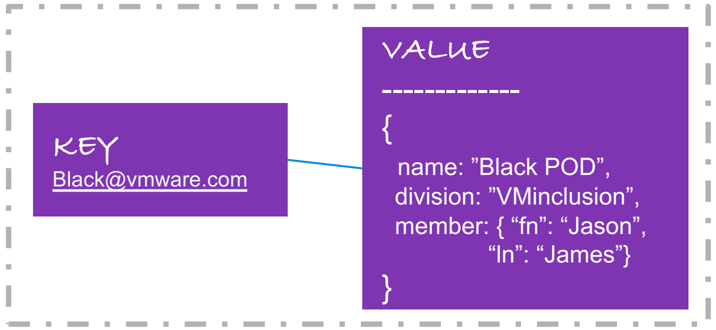
Tanzu GemFire

Use Cases

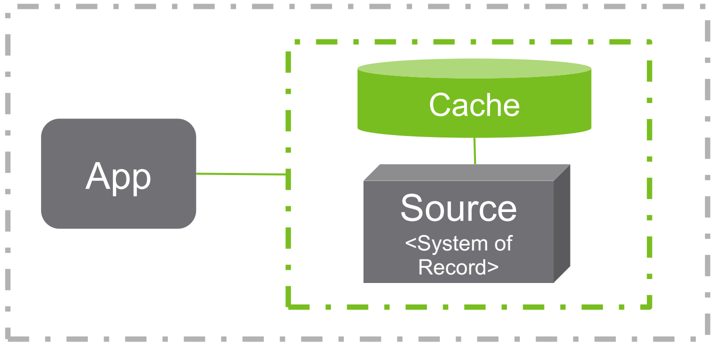
I need a fast data store?

- **NO SQL** data store
  - Fast lookup by key identifiers In-Memory
  - SQL like query (Object Query Language - OQL)
  - Full text-search access
  - Horizontal scalability support
  - High-Availability & Fault Tolerance support
  - WAN replication
  - Triggers/Event notations
  - Stored procedure data processing need
- **Cache** data store
  - API exposed to user interfaces with a real-time interface
  - < 1 second response times
  - Expire cached entries as needed
- Transactional **Operational** data store
  - Persistent with STRONG Consistency – ACID compliance
  - System of record

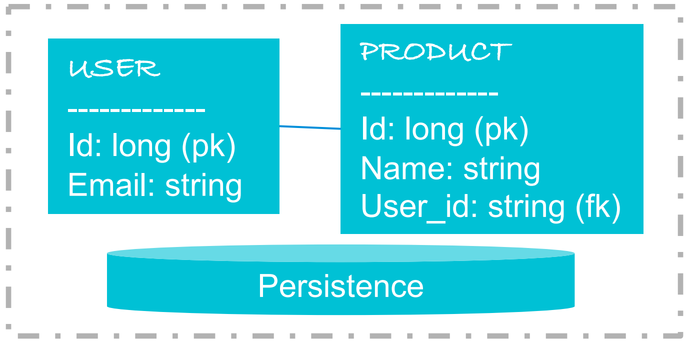
NoSQL Data Store



Cache Data Store



Operational Data Store



GemFire

Fundamentals

Core components

- Data Node – Cache Server – In-memory data storage
- Locator – clients and data nodes controller

Add Data Nodes as needed

- Handle data growth
- Increased processing demands of clients
- Supports resiliency

GemFire cluster

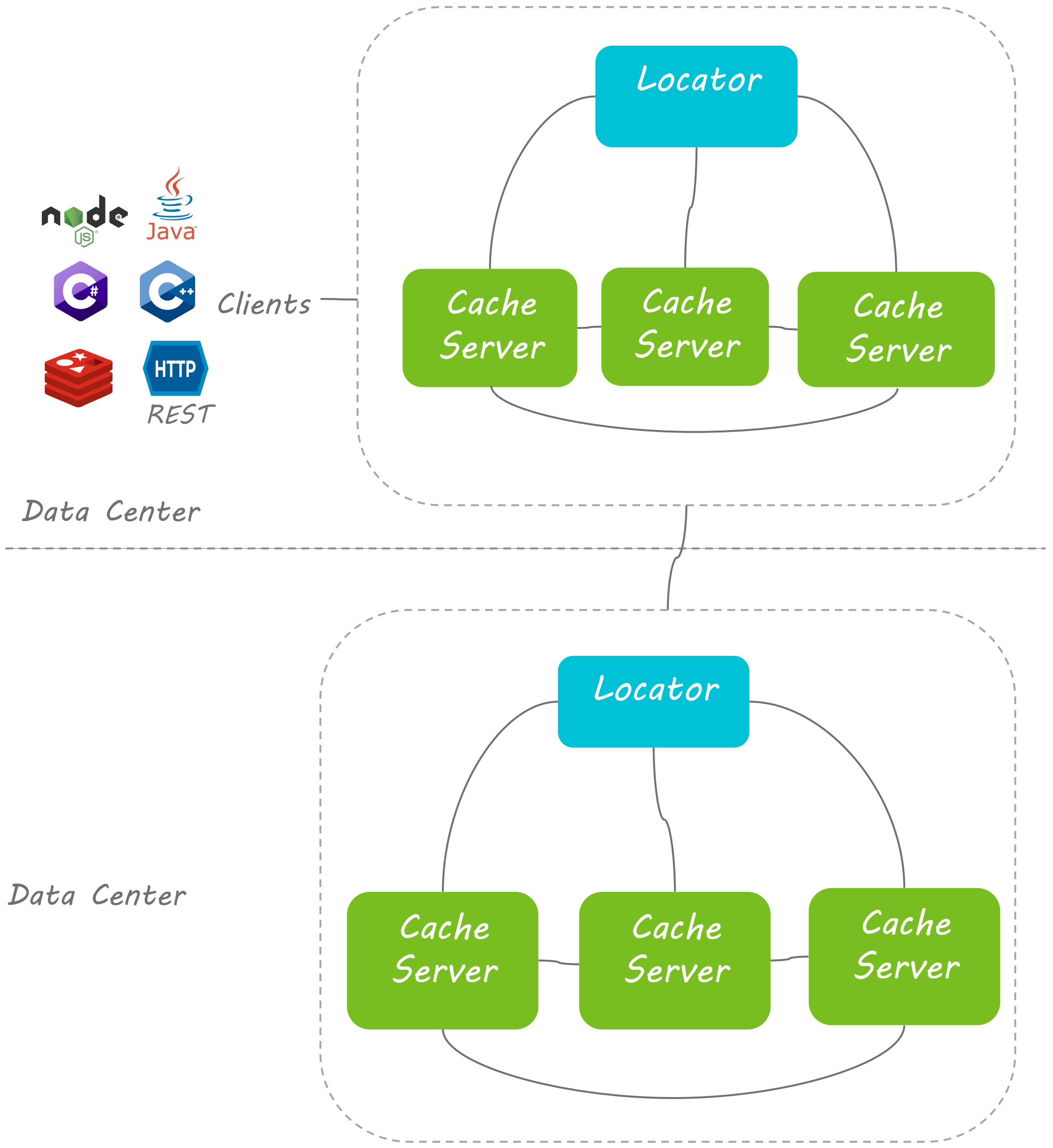
- Connected locators and data nodes

Clients

- Various supported client libraries

WAN Replication

- Replication data across data centers for disaster recovery (DR)
- Active-Active or Active-Passive



Regions

GemFire Region is a database table like data store represented in key/value java.util.Map structure

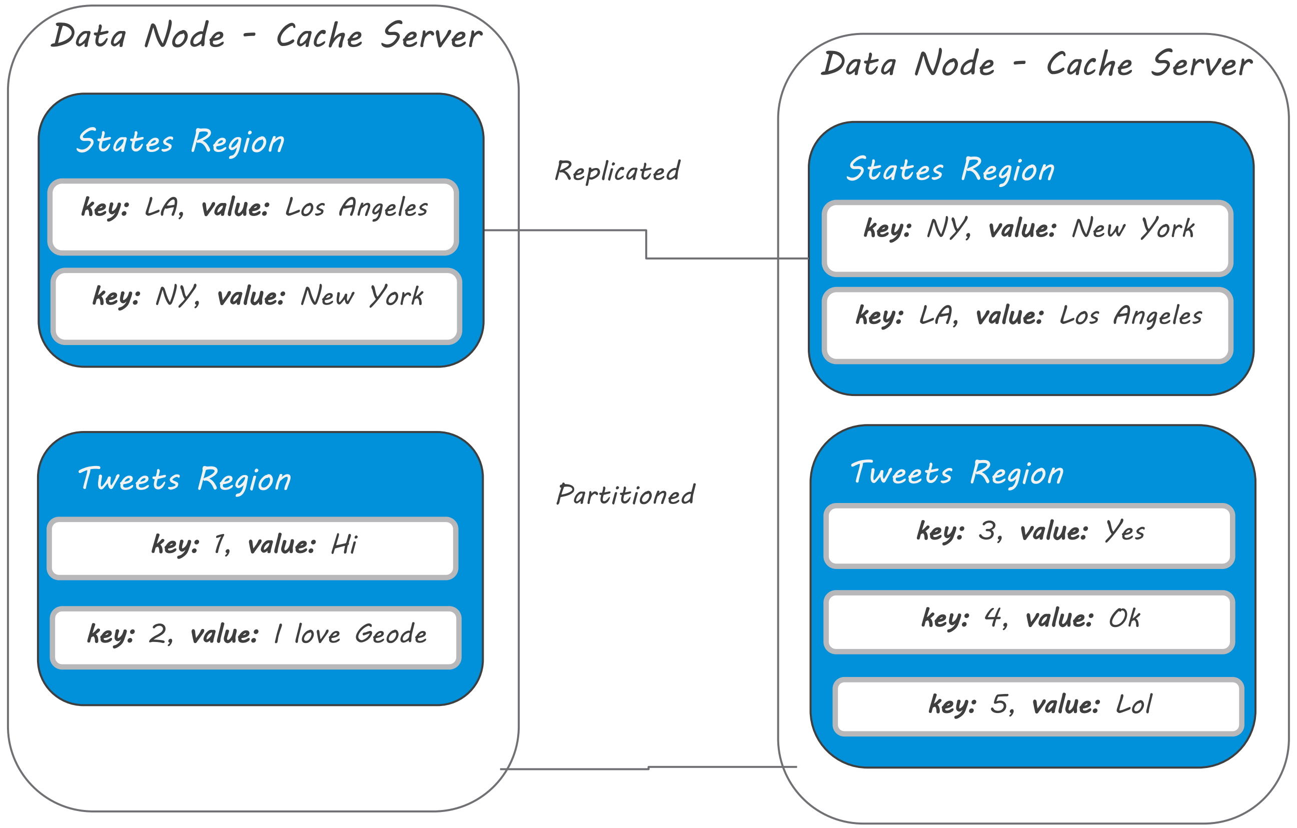
- Region supports querying
  - Ex: select * from /states where code in (‘NY’, ‘LA’)
  - Ex: lucene search --regionName=/tweet -queryStrings=”*Spring*" --defaultField=tweet
- Events
  - Listeners – triggers data events to client or server-side code
  - Continuous Query – client-side code alerting based on select statements
    - Ex: select * from /tweet where …
- Transaction support

```
//Java Code
Region<String,State> region;

region.put(state.code, state);
```

Cluster Data Policies

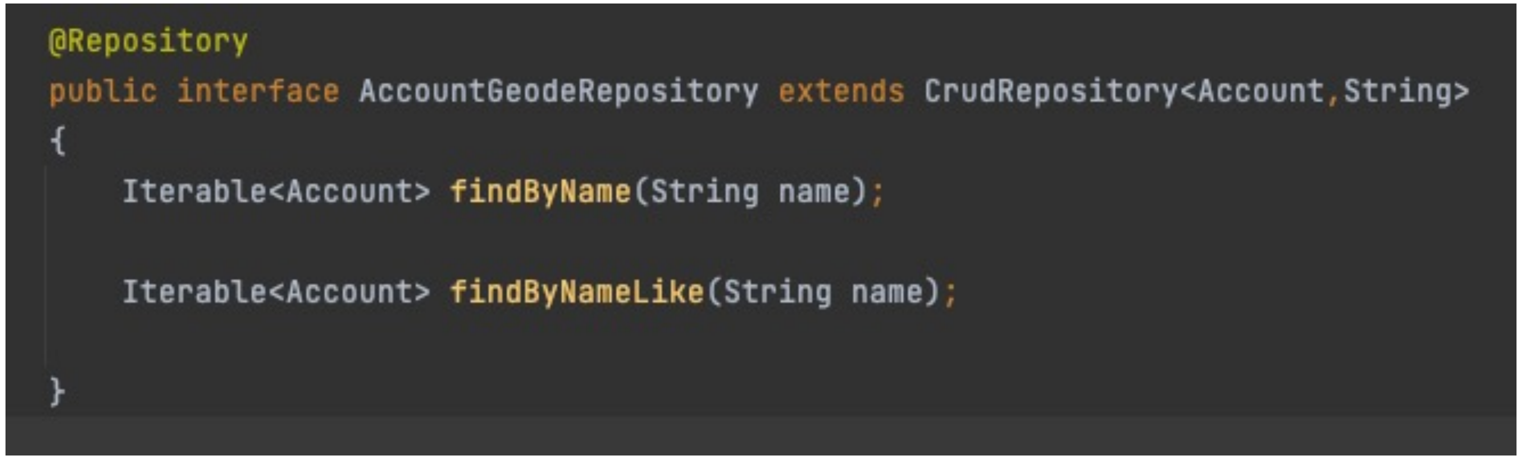
- Replicated Region
  - Full copy on each JVM peer
- Partitioned Region
  - Each peer only stores parts of the region contents



Spring Data Geode

Spring based abstraction layer

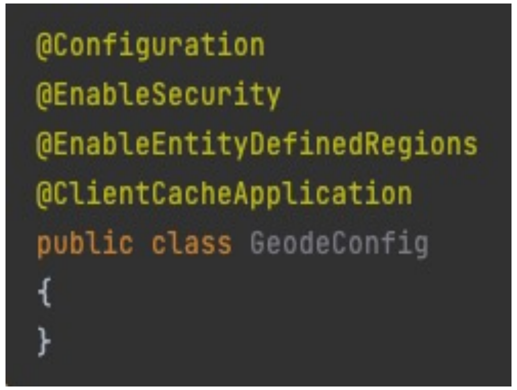
- Bootstrapping Apache Geode
- Spring Data template-based CRUD POJO access, exception translation, transaction management, and query operations.
- Incorporate best practice serialization of managed objects.
- Event driven abstraction using Continuous Query (CQ) to process a stream of events based on interest defined thru the OQL (Object Query Language).



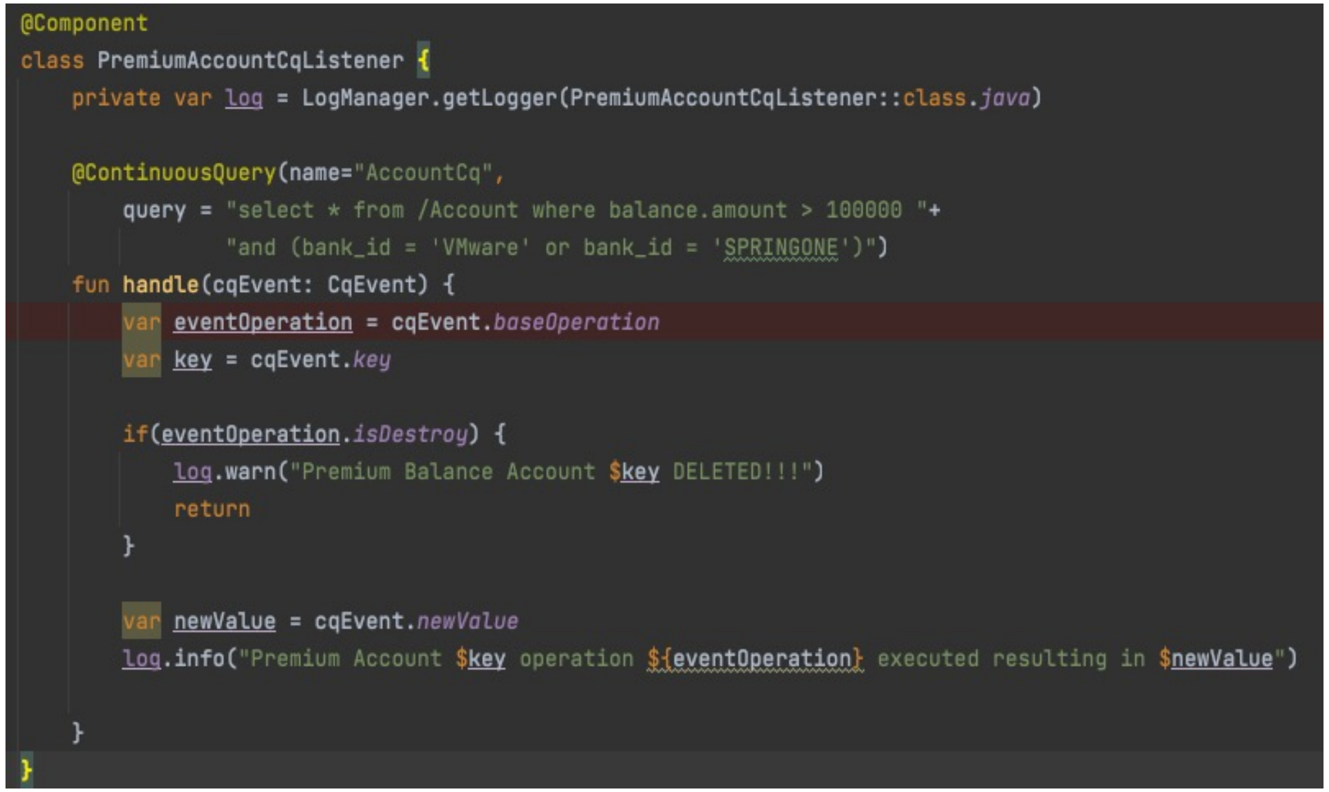
```
@Repository
public interface AccountGeodeRepository extends CrudRepository<Account,String>
{
    Iterable<Account> findByName(String name);

    Iterable<Account> findByNameLike(String name);

}
```



```
@Configuration
@EnableSecurity
@EnableEntityDefinedRegions
@ClientCacheApplication
public class GeodeConfig
{
}
```



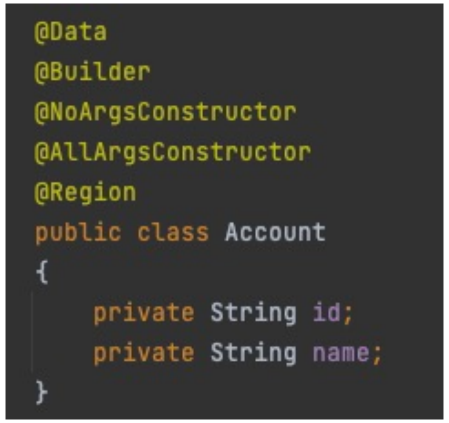
```
@Component
class PremiumAccountCqListener {
    private var log = LogManager.getLogger(PremiumAccountCqListener::class.java)

    @ContinuousQuery(name="AccountCq",
        query = "select * from /Account where balance.amount > 100000 "+
                "and (bank_id = 'VMware' or bank_id = 'SPRINGONE')")
    fun handle(cqEvent: CqEvent) {
        var eventOperation = cqEvent.baseOperation
        var key = cqEvent.key

        if(eventOperation.isDestroy) {
            log.warn("Premium Balance Account $key DELETED!!!")
            return
        }

        var newValue = cqEvent.newValue
        log.info("Premium Account $key operation ${eventOperation} executed resulting in $newValue")

    }
}
```



```
@Data
@Builder
@NoArgsConstructor
@AllArgsConstructor
@Region
public class Account
{
    private String id;
    private String name;
}
```

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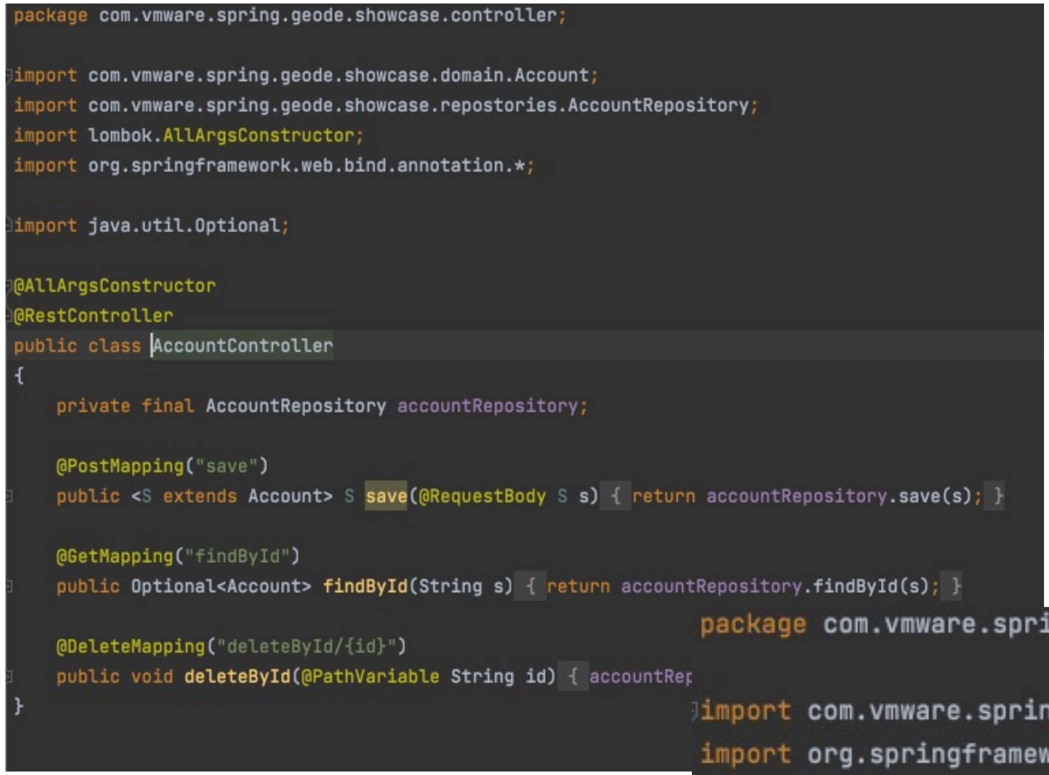
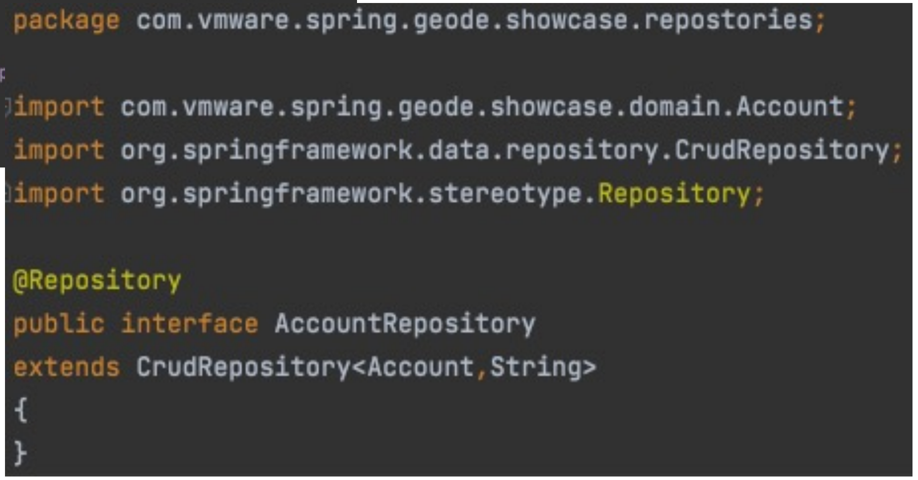
Exercise

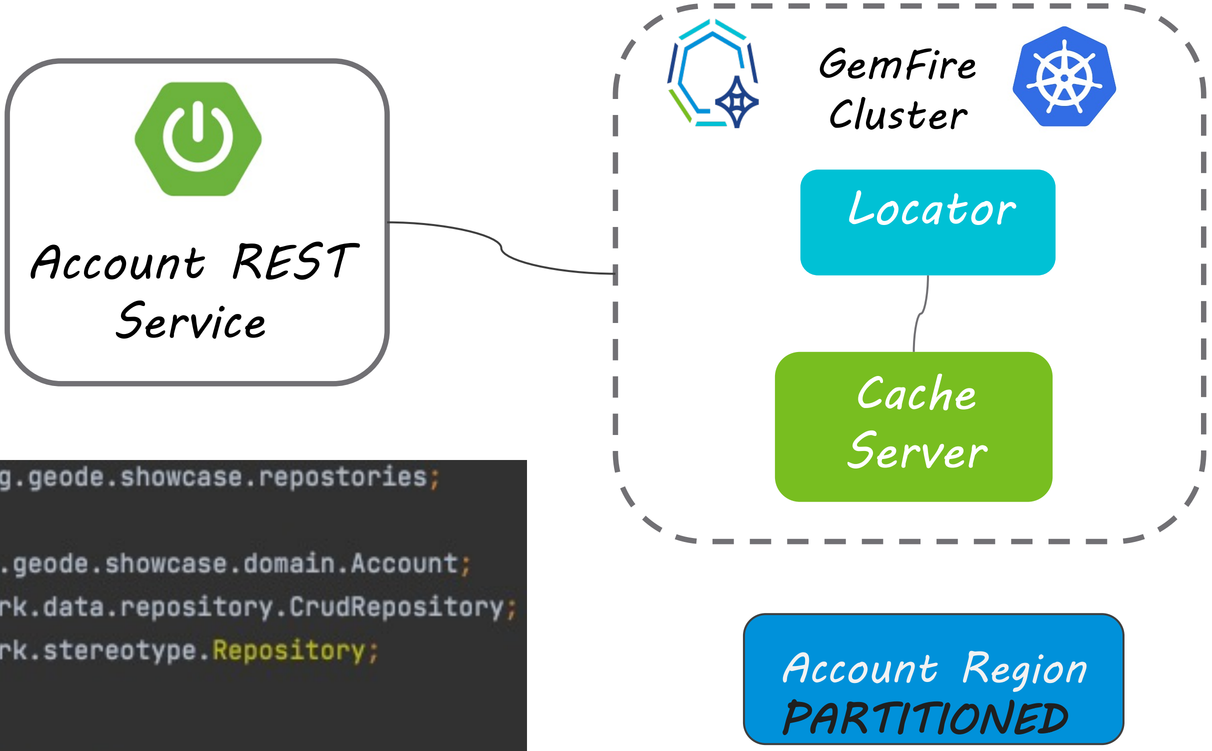
GemFire Cluster - Setup



```
package com.vmware.spring.geode.showcase.controller;

import com.vmware.spring.geode.showcase.domain.Account;
import com.vmware.spring.geode.showcase.repostories.AccountRepository;
import lombok.AllArgsConstructor;
import org.springframework.web.bind.annotation.*;

import java.util.Optional;

@AllArgsConstructor
@RestController
public class AccountController
{
    private final AccountRepository accountRepository;

    @PostMapping("save")
    public <S extends Account> S save(@RequestBody S s) { return accountRepository.save(s); }

    @GetMapping("findById")
    public Optional<Account> findById(String s) { return accountRepository.findById(s); }

    @DeleteMapping("deleteById/{id}")
    public void deleteById(@PathVariable String id) { accountRep
}
```



```
package com.vmware.spring.geode.showcase.repostories;

import com.vmware.spring.geode.showcase.domain.Account;
import org.springframework.data.repository.CrudRepository;
import org.springframework.stereotype.Repository;

@Repository
public interface AccountRepository
extends CrudRepository<Account,String>
{
}
```



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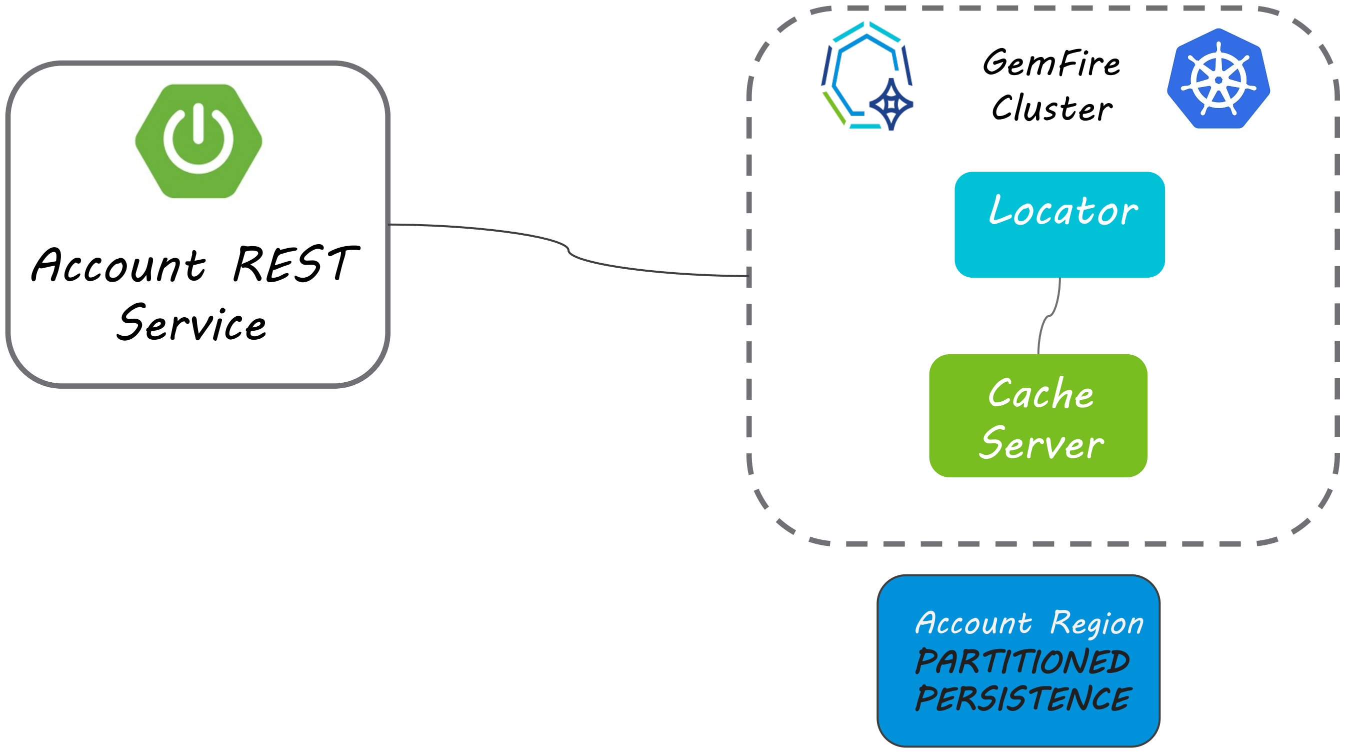
Exercise

Persistence



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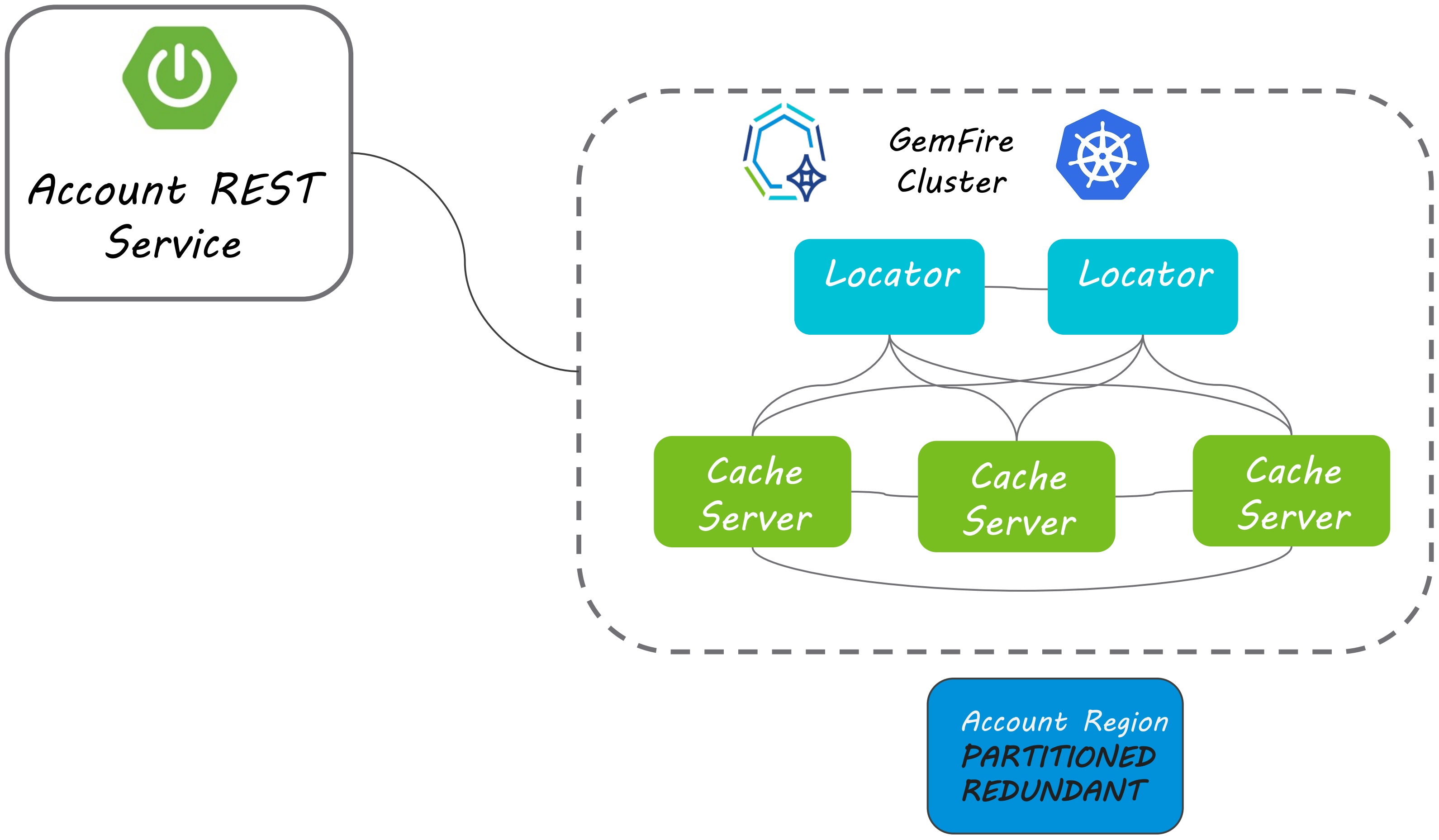
Exercise

Scalability/High Availability



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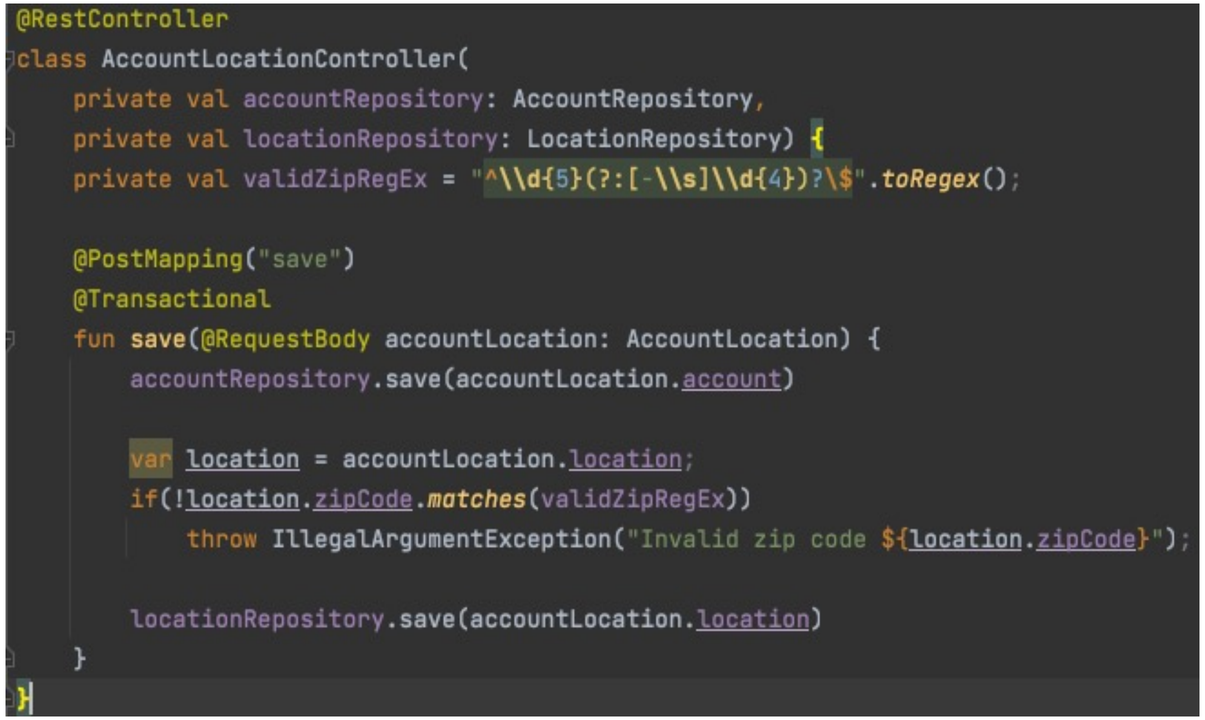
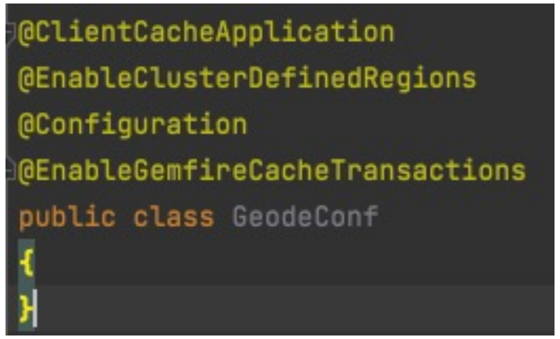
Exercise

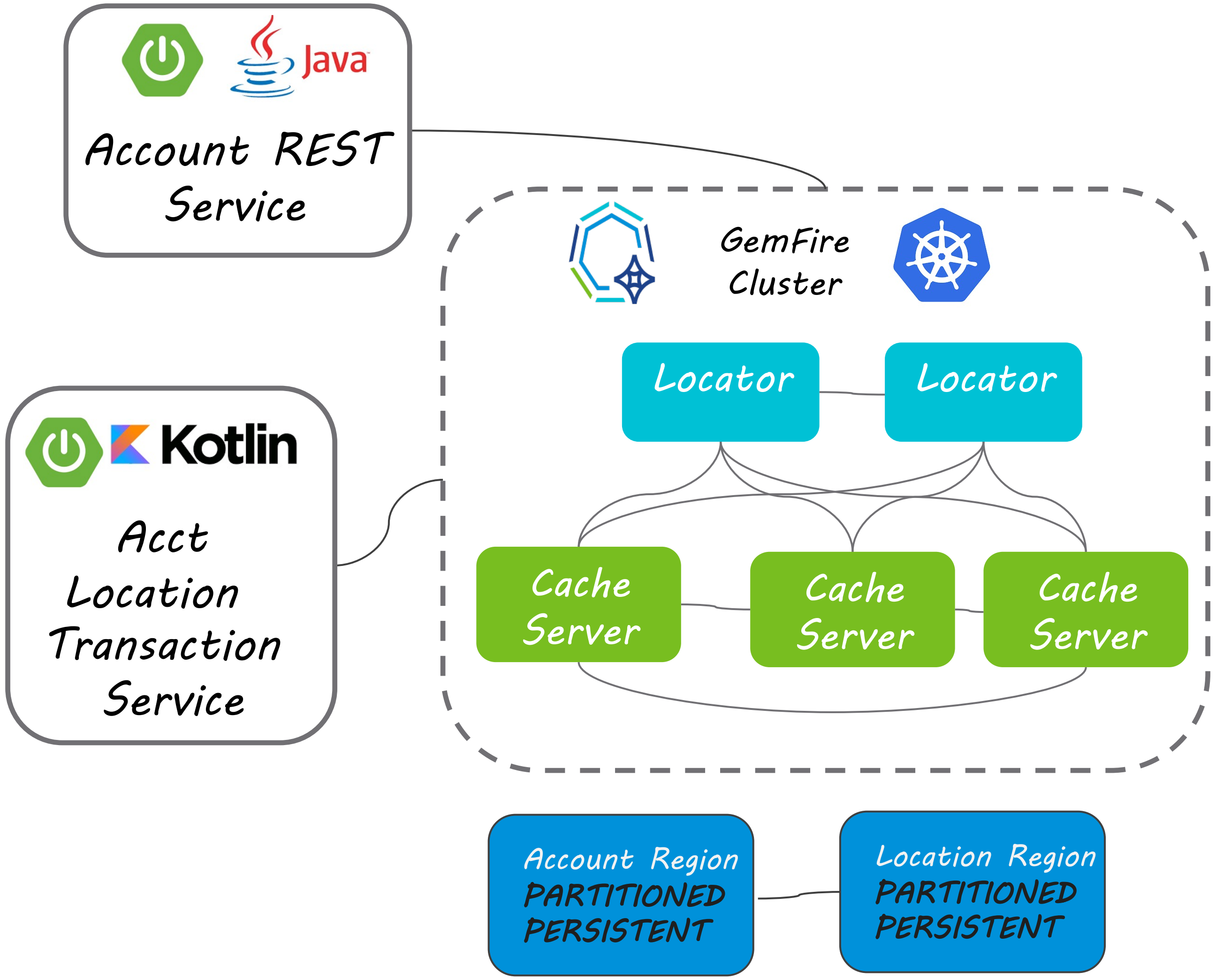
Transaction



```
@RestController
class AccountLocationController(
    private val accountRepository: AccountRepository,
    private val locationRepository: LocationRepository) {
    private val validZipRegEx = "^\\d{5}(?:[-\\s]\\d{4})?\$".toRegex();

    @PostMapping("save")
    @Transactional
    fun save(@RequestBody accountLocation: AccountLocation) {
        accountRepository.save(accountLocation.account)

        var location = accountLocation.location;
        if(!location.zipCode.matches(validZipRegEx))
            throw IllegalArgumentException("Invalid zip code ${location.zipCode}");

        locationRepository.save(accountLocation.location)
    }
}
```



```
@ClientCacheApplication
@EnableClusterDefinedRegions
@Configuration
@EnableGemfireCacheTransactions
public class GeodeConf
{
}
```



Java
Account REST Service
Kotlin
Acct Location Transaction Service
GemFire Cluster
Locator
Locator
Cache Server
Cache Server
Cache Server
Account Region PARTITIONED PERSISTENT
Location Region PARTITIONED PERSISTENT

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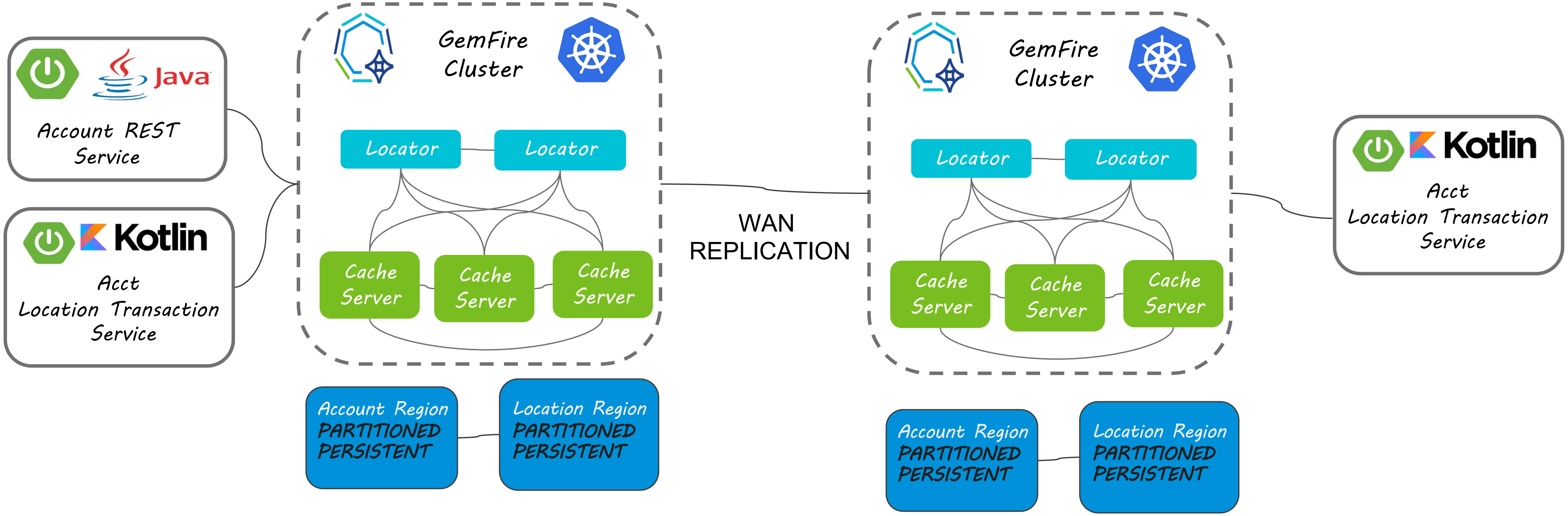
Exercise

WAN Replication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Locator
Cache Server
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Account Region PARTITIONED PERSISTENT
Location Region PARTITIONED PERSISTENT
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Cache Server
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Cache Server
Account Region PARTITIONED PERSISTENT
Location Region PARTITIONED PERSISTENT
Kotlin
Acct Location Transaction Service

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GemFire Development Links

- Core Java/Apache Blog
  - https://www.baeldung.com/apache-geode
- Spring Data Geode Blog
  - https://www.baeldung.com/spring-data-geode
- Tanzu GemFire Developer Center
  - https://tanzu.vmware.com/developer/data/tanzu-gemfire/

Thank You