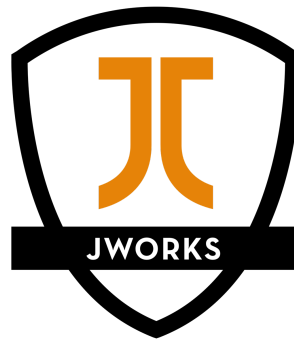


LAGOM IN PRACTICE

THE NEW JAVA MICROSERVICES FRAMEWORK



POWERED BY ORDINA

ABOUT ME



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BLOGPOST LAGOM

Lagom: First Impressions and Initial Comparison to Spring Cloud

TOPICS

Introduction

Writing microservices

Demo: writing a simple service

ES & CQRS

Demo: Lagom Shop

INTRODUCTION

MEET LAGOM

- Lightbend's microservices framework
- Focus on reactivity
- MVP version
- Java API available, Scala API coming soon

DESIGN PHILOSOPHY

- Opinionated
- Message-Driven and Asynchronous
- Streaming first-class concept
- Distributed persistent patterns using ES and CQRS
- Embraces Domain-Driven Design

DEVELOPER PRODUCTIVITY

- Hot code reloading
- Start up with `$ runAll`
- Intra-service communication is managed for you

ARCHITECTURE AND TECHNOLOGIES

- Scala
- Java
- Play Framework
- Akka Cluster & Akka Persistence
- sbt
- Cassandra
- Guice
- ConductR

WRITING MICROSERVICES

PROJECT STRUCTURE

helloworld-api	→ Microservice API submodule
└ src/main/java	→ Java source code interfaces with model objects
helloworld-impl	→ Microservice implementation submodule
└ logs	→ Logs of the microservice
└ src/main/java	→ Java source code implementation of the API submodule
└ src/main/resources	→ Contains the microservice application config
└ src/test/java	→ Java source code unit tests
logs	→ Logs of the Lagom system
project	→ Sbt configuration files
└ build.properties	→ Marker for sbt project
└ plugins.sbt	→ Sbt plugins including the declaration for Lagom itself
.gitignore	→ Git ignore file
build.sbt	→ Application build script

API INTERFACE

```
public interface HelloService extends Service {  
    ServiceCall<NotUsed, String> hello(String name);  
  
    ServiceCall<GreetingMessage, String> useGreeting(String id);  
  
    @Override  
    default Descriptor descriptor() {  
        return named("helloservice").with(  
            restCall(Method.GET, "/api/hello/:name", this::hello),  
            restCall(Method.POST, "/api/hello/:id", this::useGreeting)  
        ).withAutoAcl(true);  
    }  
}
```

API IMPLEMENTATION

```
public class HelloServiceImpl implements HelloService {
    List<String> savedGreetings = new ArrayList<>();

    @Override
    public ServiceCall<NotUsed, String> hello(String name) {
        return (request) -> {
            CompletableFuture.completedFuture("Hello, " + name);
        };
    }

    @Override
    public ServiceCall<GreetingMessage, String> useGreeting() {
        return (request) -> {
            String greeting = request.getGreeting();
            savedGreeting.add(greeting);
            CompletableFuture.completedFuture("Greeting '" + greeting + "' saved!");
        };
    }
}
```

API MODULE

```
public class HelloServiceModule extends AbstractModule
                                implements ServiceGuiceSupport {
    @Override
    protected void configure() {
        bindServices(serviceBinding(HelloService.class, HelloServiceImpl.class));
        bindClient(OtherService.class);
    }
}
```

API MODULE

The module is defined in the **application.config**

```
play.modules.enabled += sample.helloworld.impl.HelloServiceModule
```

REGISTERING THE MICROSERVICE

build.sbt

```
lazy val helloworldApi = project("helloworld-api")
  .settings(
    version := "1.0-SNAPSHOT",
    libraryDependencies += lagomJavadslApi
  )

lazy val helloworldImpl = project("helloworld-impl")
  .enablePlugins(LagomJava)
  .settings(
    version := "1.0-SNAPSHOT",
    libraryDependencies ++= Seq(
      lagomJavadslPersistence,
      lagomJavadslTestKit
    )
  )
  .settings(lagomForkedTestSettings: _*)
  .dependsOn(helloworldApi)
```


TESTING THE MICROSERVICE

```
$ curl localhost:24266/api/hello/World  
Hello, World!
```

```
$ curl -H "Content-Type: application/json" -X POST -d \  
    '{"message": "Hello "}' http://localhost:24266/api/hello/World  
Greeting 'Hello' was saved!
```

TESTING THE MICROSERVICE

```
public class HelloServiceTest {  
    private static ServiceTest.TestServer server;  
  
    @Test  
    public void shouldRespondHello() throws Exception {  
        withServer(defaultSetup(), server -> {  
            HelloService service = server.client(HelloService.class);  
            String hello = service.hello("Yannick")  
                .invoke(NotUsed.getInstance()).toCompletableFuture().get(5, SECONDS);  
            assertEquals("Hello, Yannick", hello);  
        });  
    }  
}
```

DEMO: WRITING A SIMPLE SERVICE

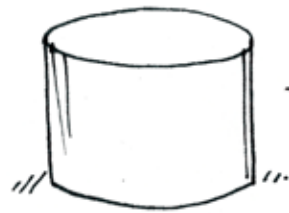
DEMO

- Implement a new service: capitalise
- Write a unit test
- Deploy it to ConductR

ES & CQRS

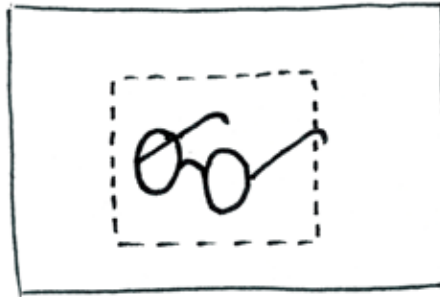
ES AND CQRS

Denormalized read store
Subscribes to events
on the Write side



Query

Read side



Query response

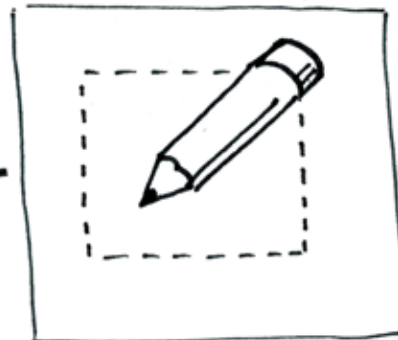


User views data
in the UI



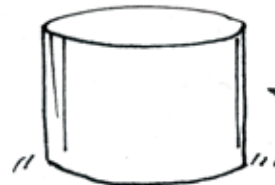
User makes a change
in the UI

Write side



Command

Append
events



Event store
Publishes events after
they have been saved

Events

EVENT SOURCING

- Capture all changes as domain events
- Aggregate Root
- Replies to queries for an identifier
- Cannot reply to queries spanning multiple aggregates

EVENT SOURCING BENEFITS

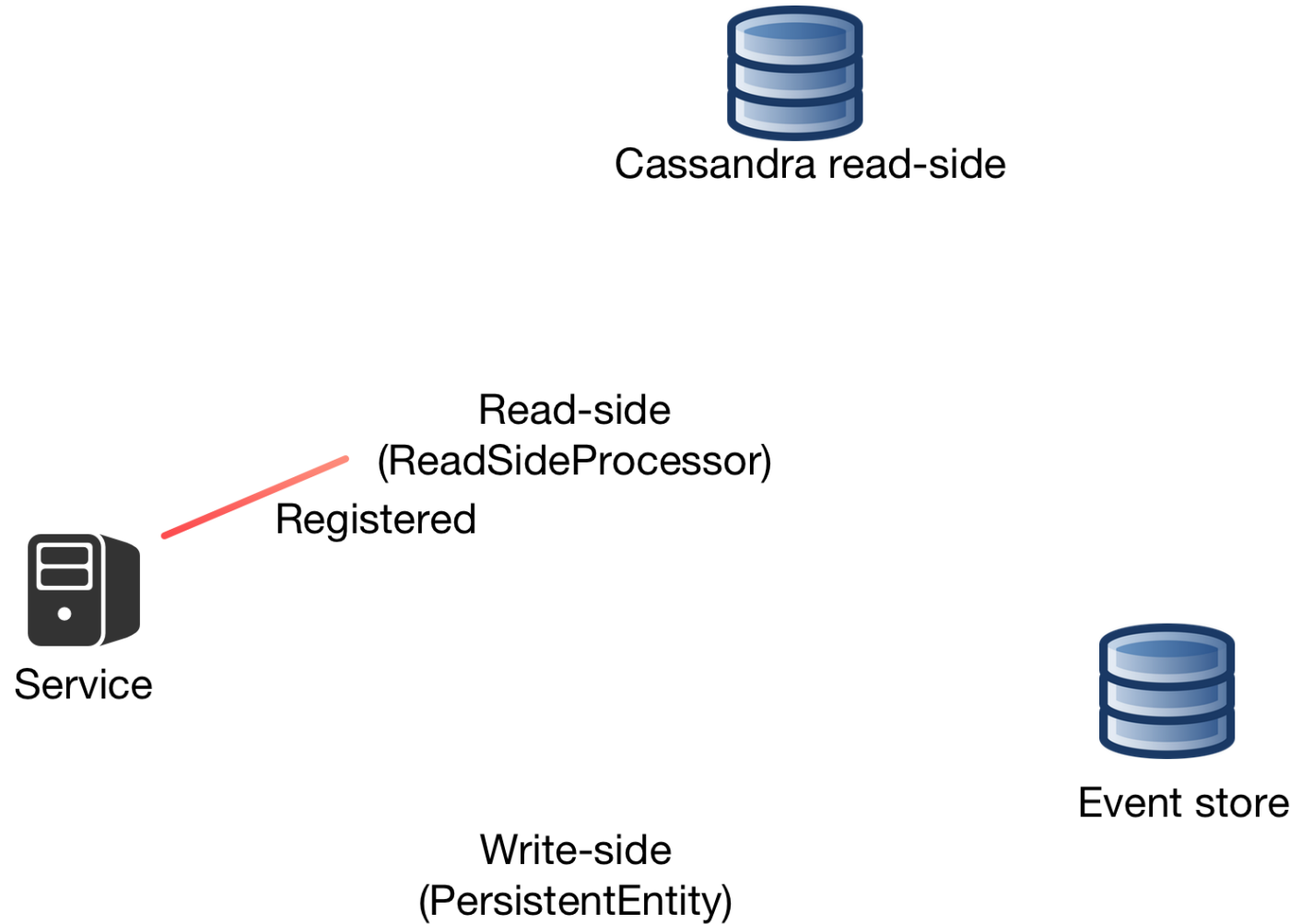
- All events are stored in an event store
- No object-relational impedance mismatch
- Built-in audit mechanism and historical tracing
- Performance, simplification and scalability
- Testability
- Debugging by replaying the event log

CQRS

- Separation of write- and read-side
- Scalability
- Different models for write- and read-side
- Eventual consistency

ES AND CQRS IN LAGOM

ES AND CQRS IN LAGOM



ES AND CQRS IN LAGOM



Cassandra read-side

Read-side
(ReadSideProcessor)

Registered



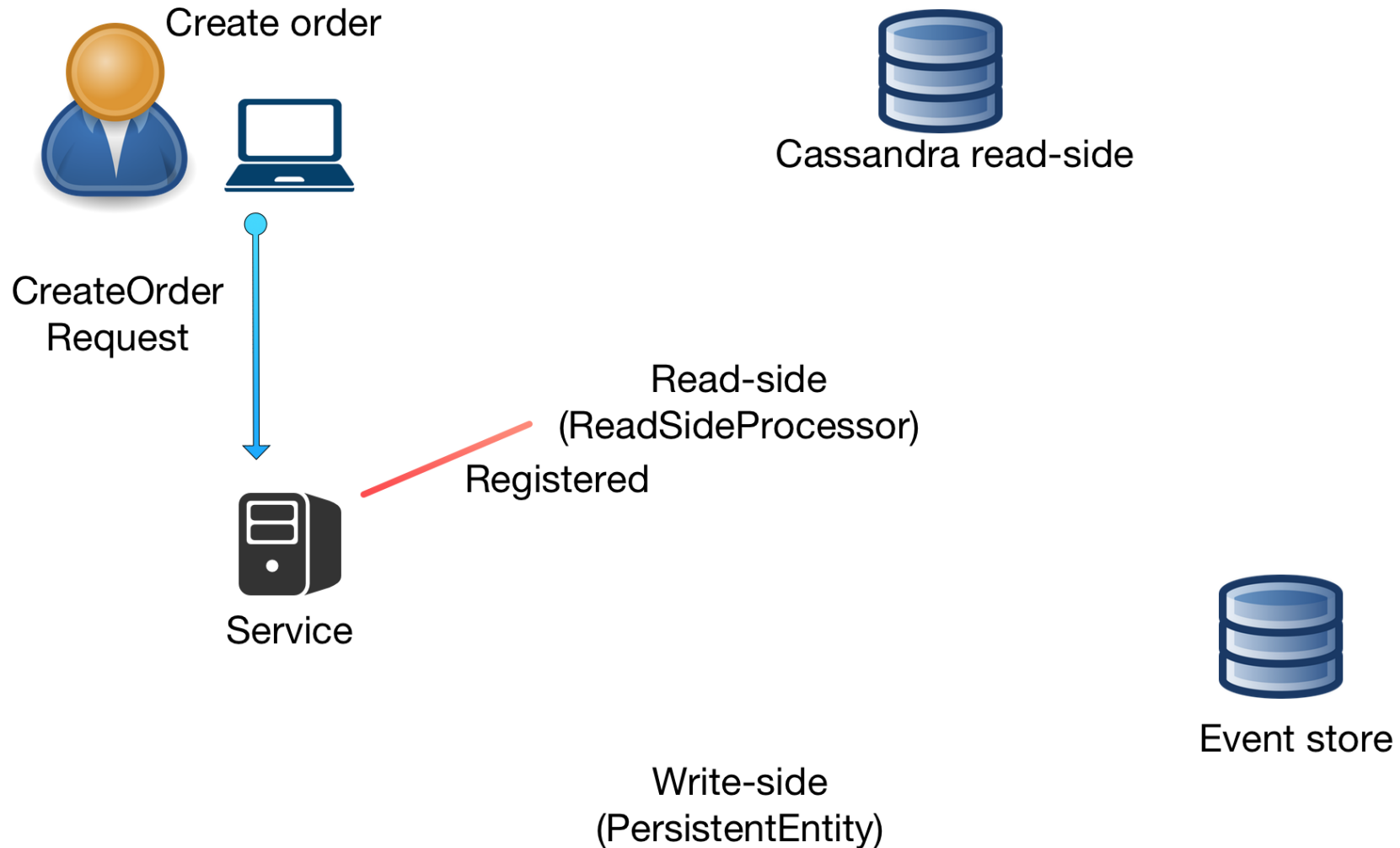
Service



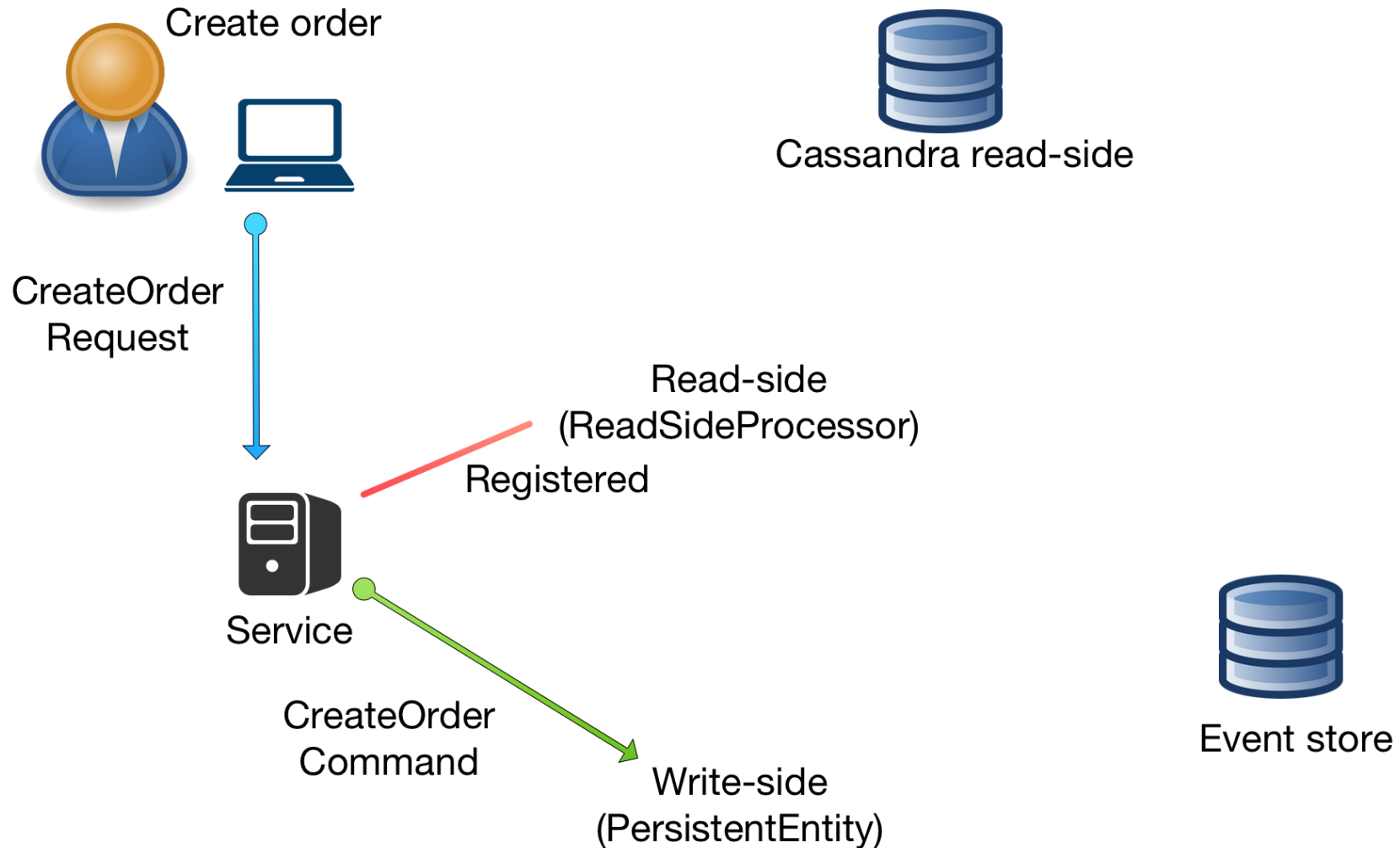
Event store

Write-side
(PersistentEntity)

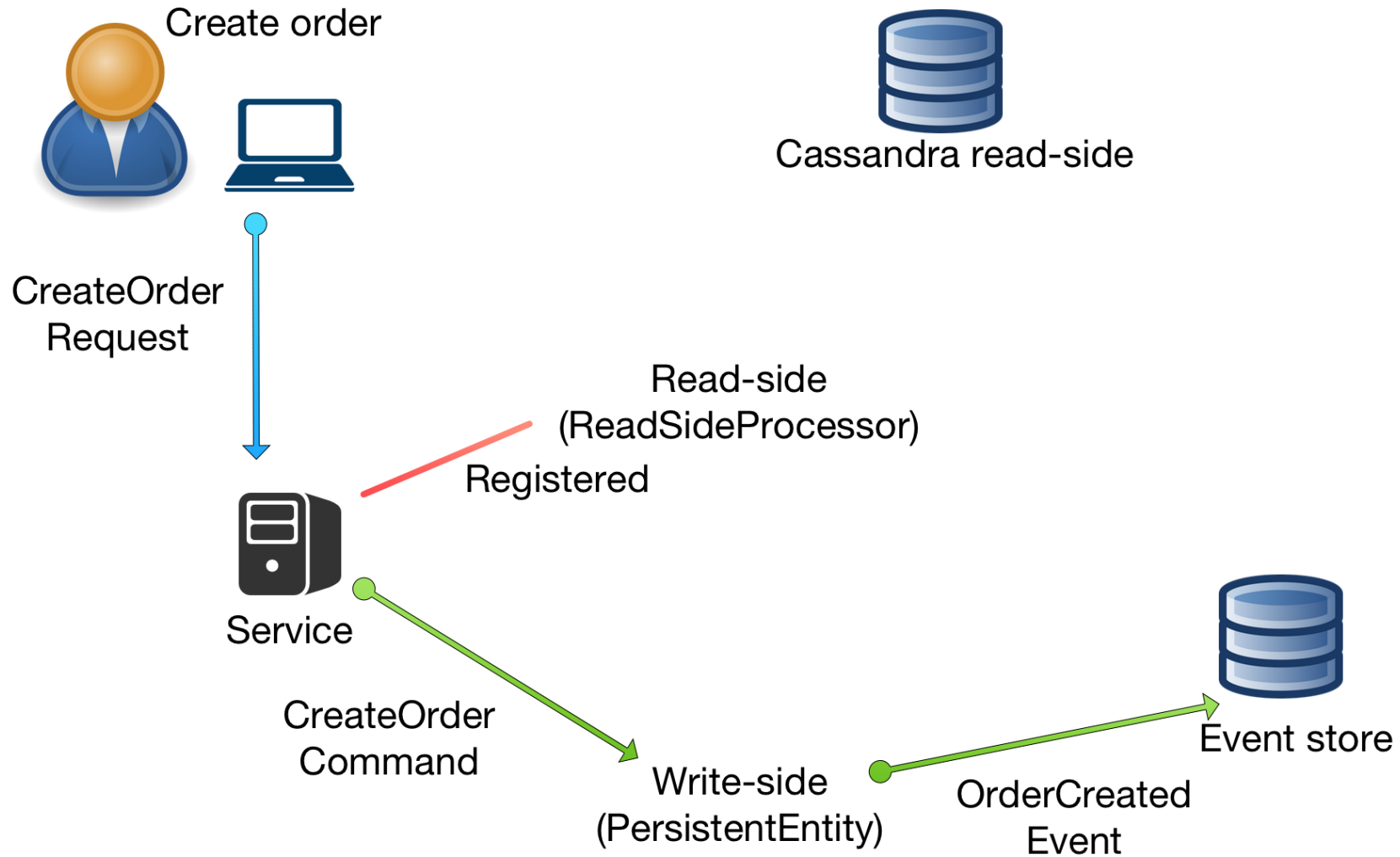
ES AND CQRS IN LAGOM



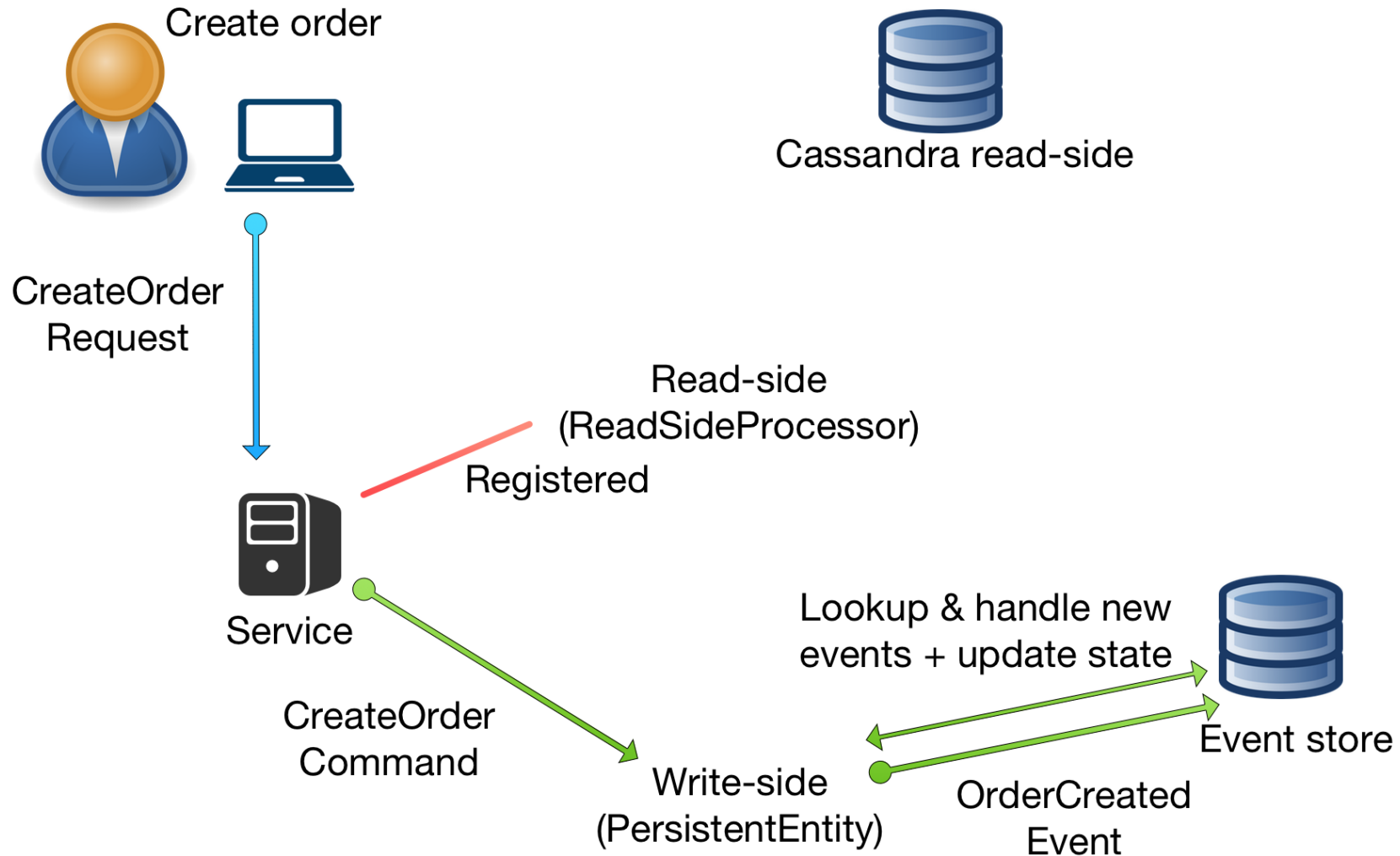
ES AND CQRS IN LAGOM



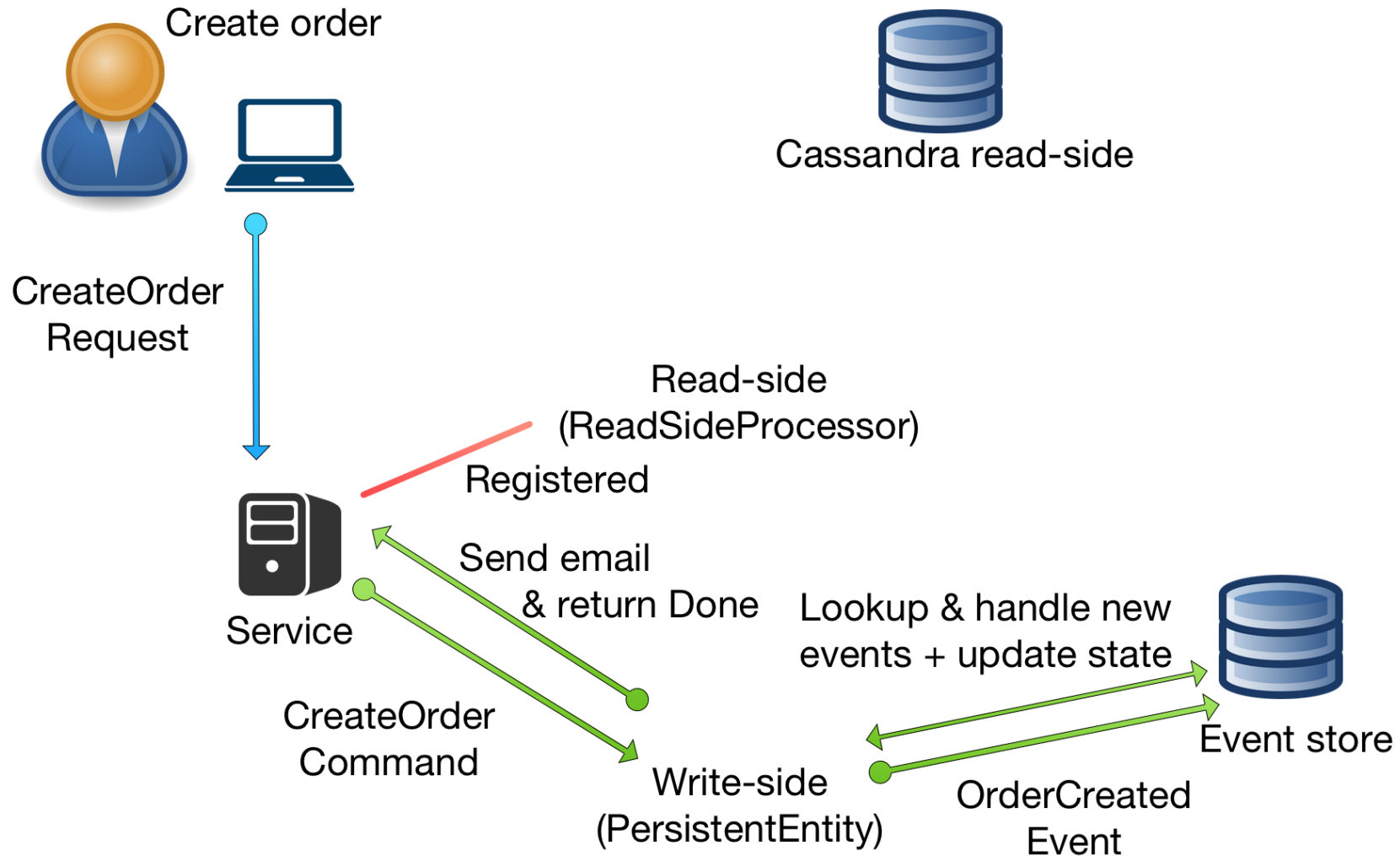
ES AND CQRS IN LAGOM



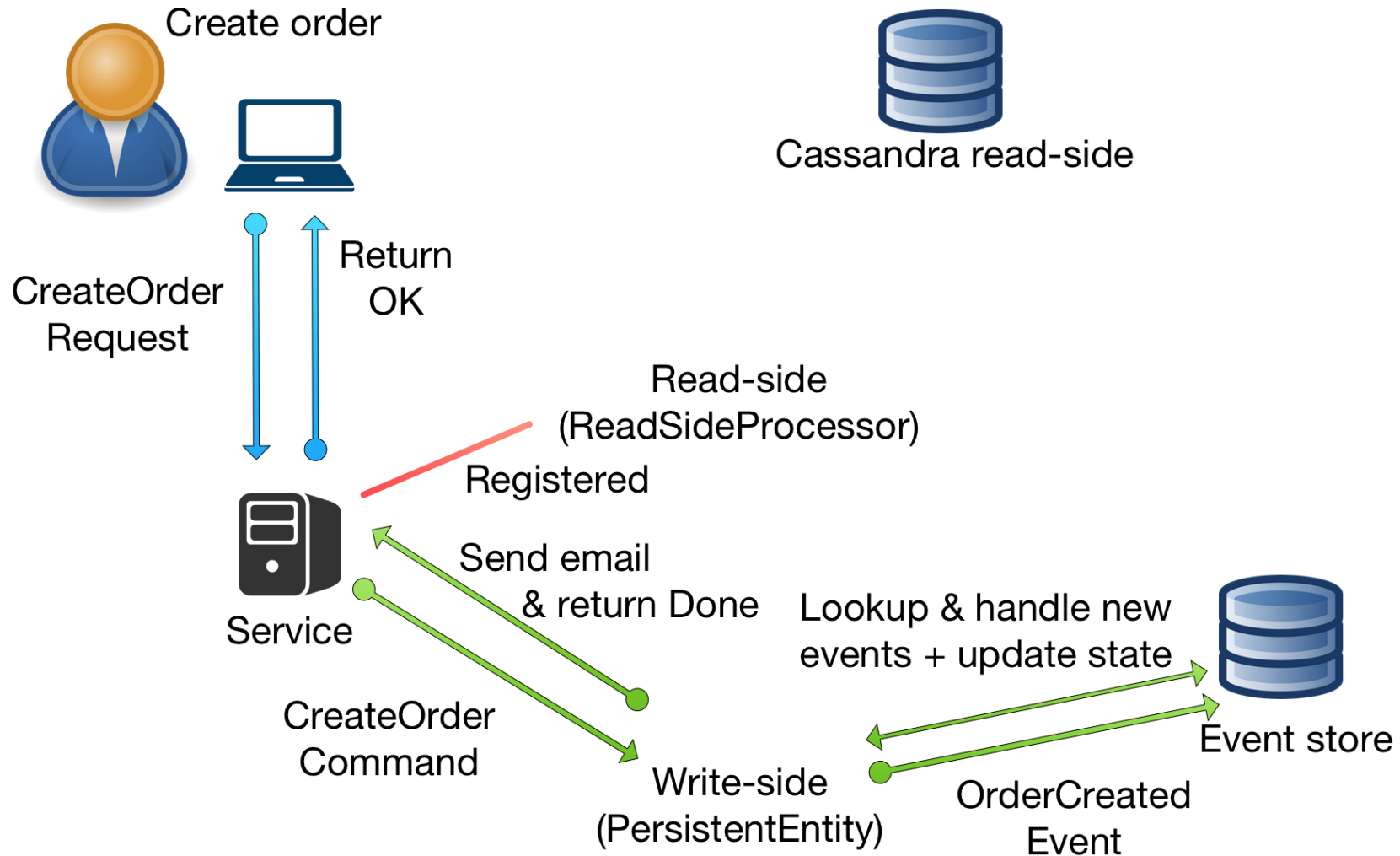
ES AND CQRS IN LAGOM



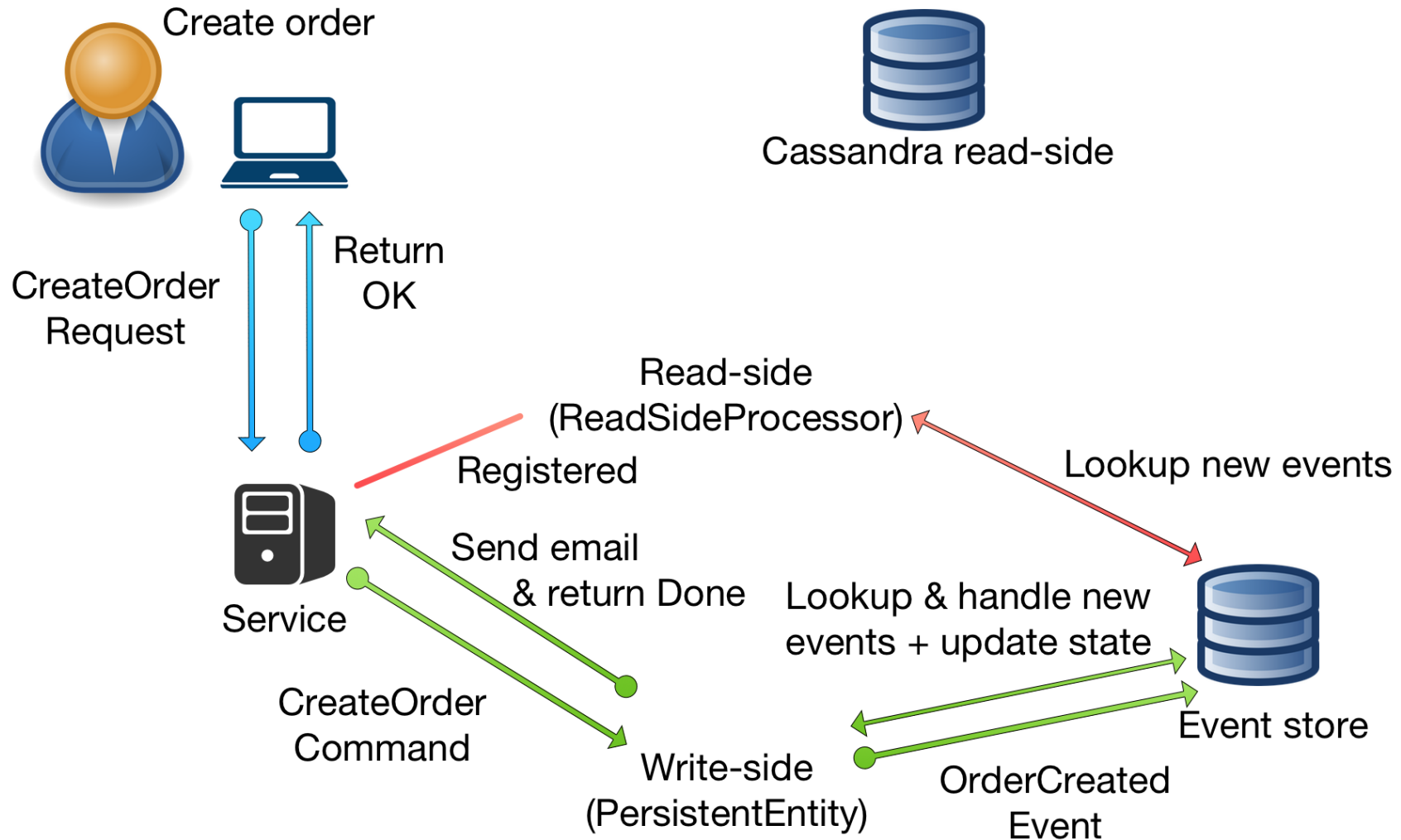
ES AND CQRS IN LAGOM



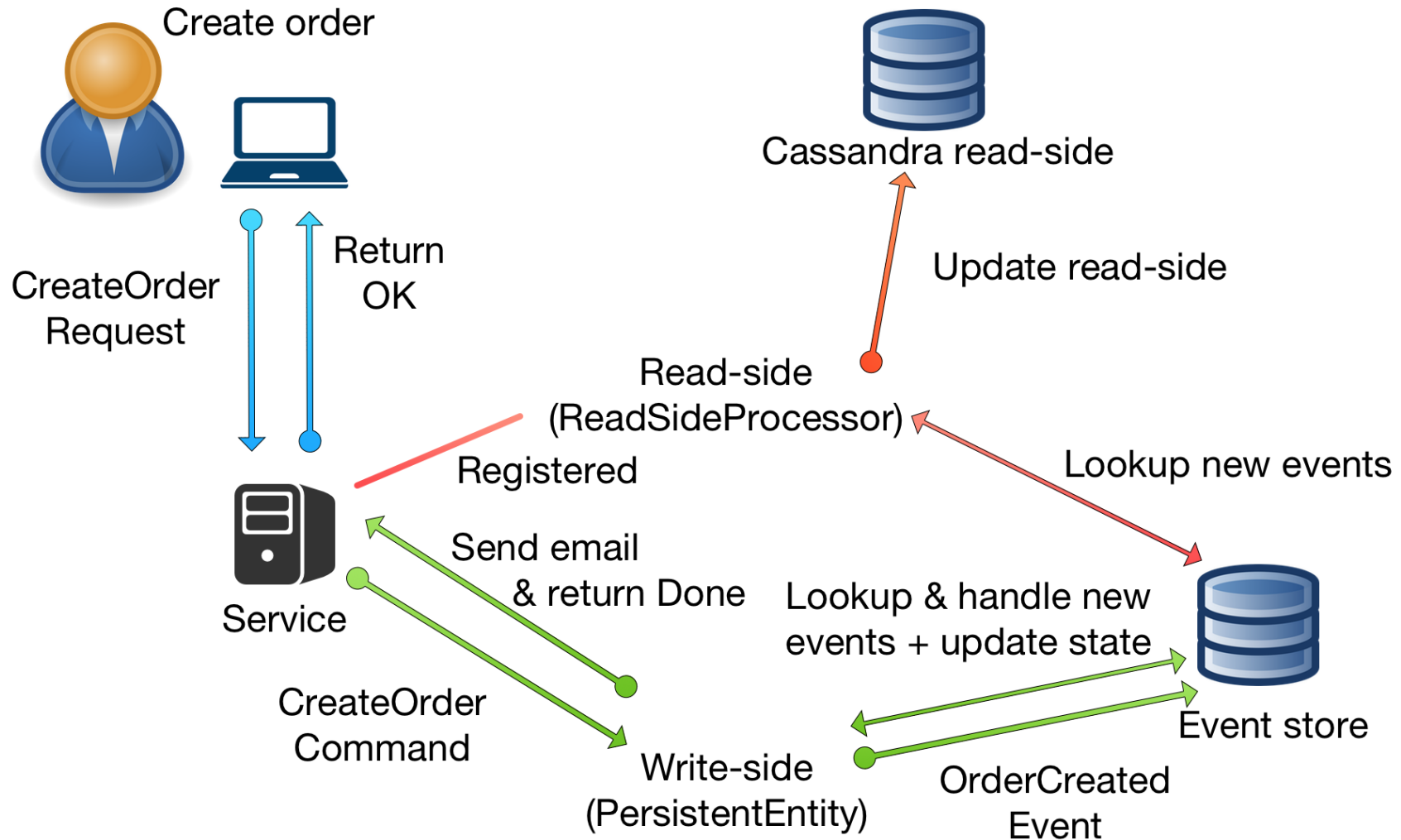
ES AND CQRS IN LAGOM



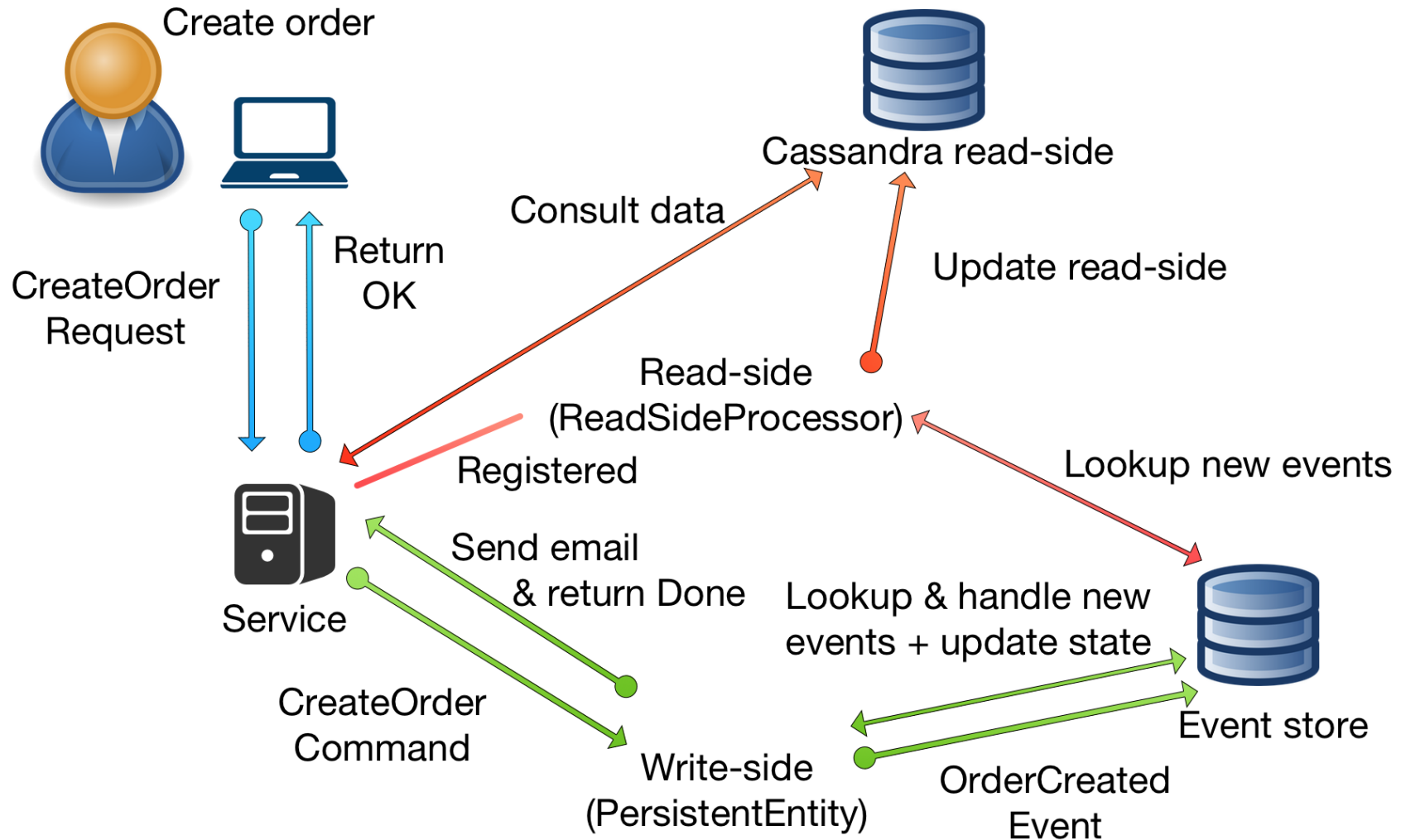
ES AND CQRS IN LAGOM



ES AND CQRS IN LAGOM



ES AND CQRS IN LAGOM



CQRS AND ES INTRODUCTION

- <https://msdn.microsoft.com/en-us/library/jj591573.aspx>

ES AND CQRS - PERSISTENT ENTITY

```
public class HelloWorld extends PersistentEntity {
    @Override
    public Behavior initialBehavior(Optional snapshotState) {
        BehaviorBuilder b = newBehaviorBuilder(
            snapshotState.orElse(new WorldState("Hello", LocalDateTime.now().toString()))

        b.setCommandHandler(UseGreetingMessage.class, (cmd, ctx) ->
            ctx.thenPersist(new GreetingMessageChanged(cmd.message),
                evt -> ctx.reply(Done.getInstance()))
        );

        b.setEventHandler(GreetingMessageChanged.class,
            evt -> new WorldState(evt.message, LocalDateTime.now().toString()));

        b.setReadOnlyCommandHandler>Hello.class,
            (cmd, ctx) -> ctx.reply(state().message + ", " + cmd.name + "!")
        );
    }
}
```


ES AND CQRS - STATE

```
@Immutable
@JsonDeserialize
public final class WorldState implements CompressedJsonable {

    public final String message;
    public final String timestamp;

    @JsonCreator
    public WorldState(String message, String timestamp) {
        this.message = Preconditions.checkNotNull(message, "message");
        this.timestamp = Preconditions.checkNotNull(timestamp, "timestamp");
    }

    // equals, hashCode, toString, ...
}
```

ES AND CQRS - COMMAND

```
public interface HelloCommand extends Jsonable {
    @Immutable
    @JsonDeserialize
    public final class UseGreetingMessage implements HelloCommand,
        CompressedJsonable, PersistentEntity.ReplyType {
        public final String message;

        @JsonCreator
        public UseGreetingMessage(String message) {
            this.message = Preconditions.checkNotNull(message, "message");
        }

        // equals, hashCode, toString,...
    }
}
```

ES AND CQRS - EVENT

```
public interface HelloEvent extends Jsonable {  
  
    @Immutable  
    @JsonDeserialize  
    public final class GreetingMessageChanged implements HelloEvent {  
        public final String message;  
  
        @JsonCreator  
        public GreetingMessageChanged(String message) {  
            this.message = Preconditions.checkNotNull(message, "message");  
        }  
  
        // equals, hashCode, toString  
    }  
}
```

ES AND CQRS - SERVICEIMPL

```
@Override
public ServiceCall useGreeting(String id) {
    return (request) -> {
        PersistentEntityRef ref =
            persistentEntityRegistry.refFor>HelloWorld.class, id);
        return ref.ask(new UseGreetingMessage(request.message));
    };
}
```

DEMO: LAGOM SHOP

LAGOM SHOP

- Item Service: Create and lookup items
- Order Service: Create and lookup orders for items
- Play front-end

QUESTIONS?

Lagom Shop & Presentation:

<https://github.com/yannickdeturck/lagom-shop>

Blogpost Lagom: First Impressions and Initial Comparison to Spring Cloud <http://bit.ly/1sClupt>

Podcast Lightbend Podcast Ep. 09: Andreas Evers test drives Lagom in comparison with Spring Cloud: <http://bit.ly/25XVT8w>

THANKS FOR WATCHING!