



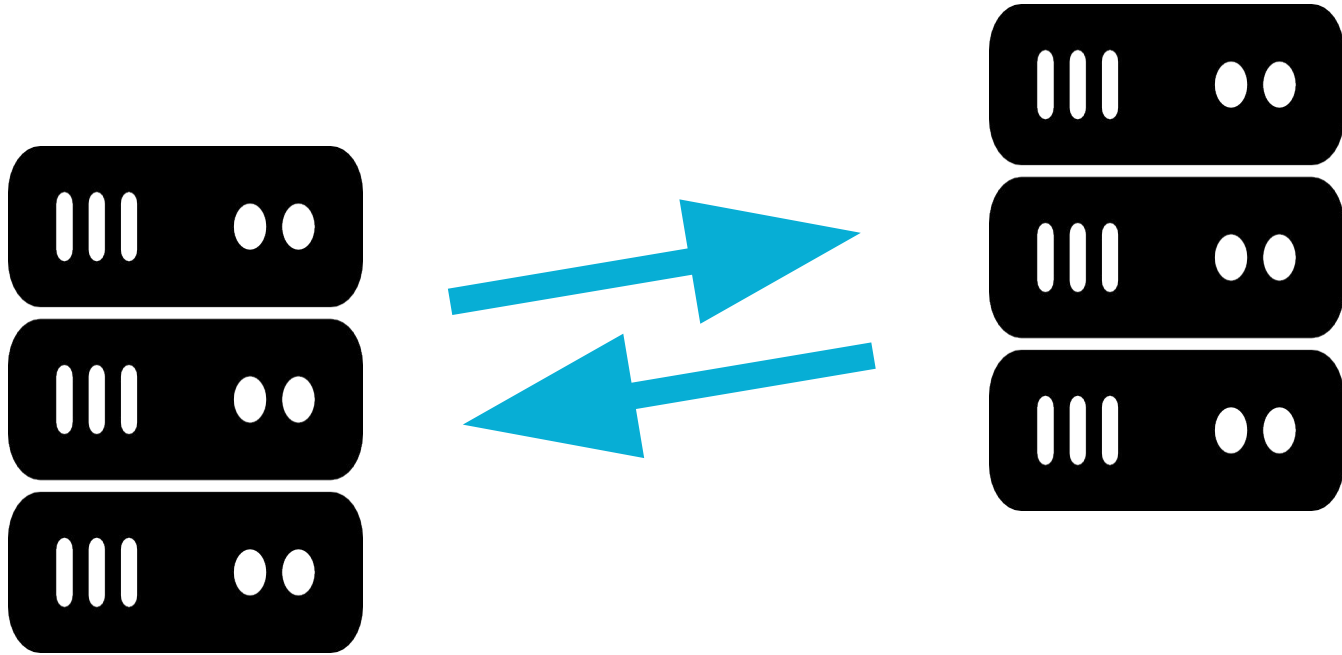
[github.com/VirtusLab/akka-serialization-helper](https://github.com/VirtusLab/akka-serialization-helper)

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# Why we created ASH?

# Serialization happens all the time



# Serializables

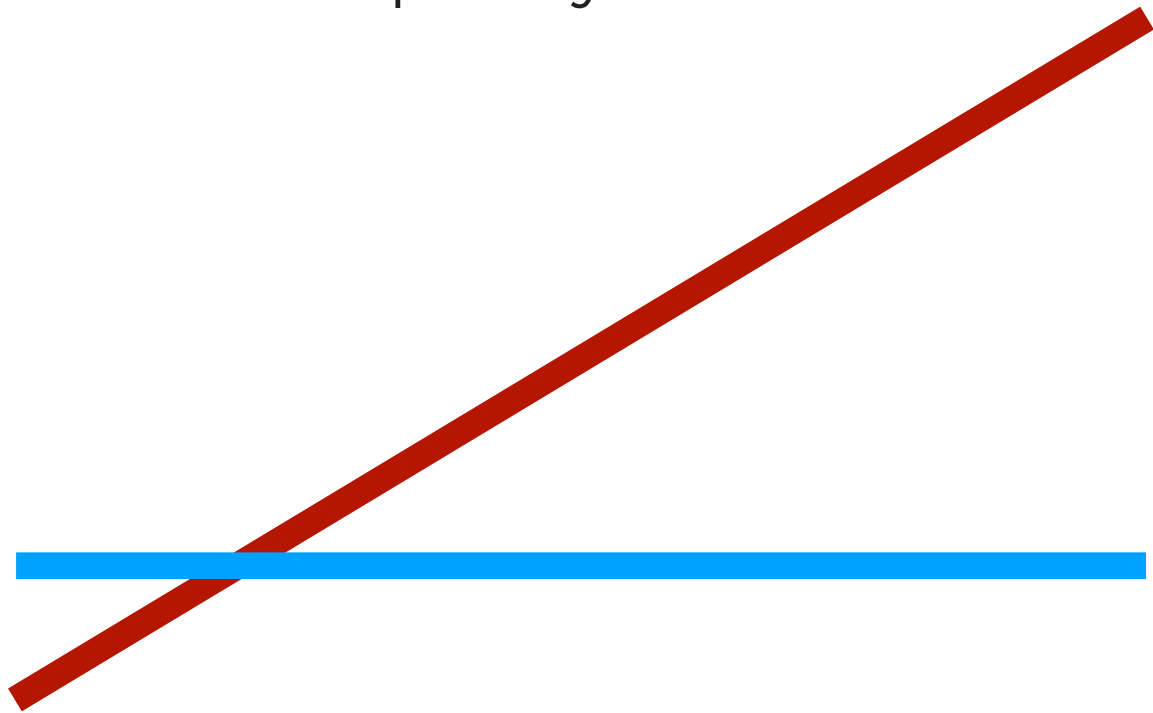
- Messages
- Events (akka-persistence) → journal
- States (akka-persistence) → snapshots

# Testing is never exhaustive...



coverage 96%

...and has linear complexity in dev work



# Static code analysis?

- Good for non-domain/technical issues
- Hard/impossible to test domain specific scenarios
- Constant dev work complexity with respect to codebase size...
- ...unlike testing, which has linear dev work complexity wrt. codebase size



# What can go wrong in serialization?



# 1. Missing serialization binding

# Why it exists?

```
package org  
trait MySer
```

```
akka.actor {  
  serializers {  
    jackson-json = "akka.serialization.jackson.JacksonJsonSerializer"  
  }  
  
  serialization-bindings {  
    "org.MySer" = jackson-json  
  }  
}
```

Easy to forget

```
trait MySer
```

```
case class MyMessage() //extends MySer
```



# Add ASH sbt plugin...

plugins.sbt:

```
addSbtPlugin("org.virtuslab.ash" % "sbt-akka-serialization-helper" % "0.4.4")
```

```
// (see the latest version in Github)
```

build.sbt:

```
lazy val app = (project in file("app"))  
  .enablePlugins(AkkaSerializationHelperPlugin)
```

Introducing magic annotation

```
import org.virtuslab.ash.annotation._  
  
@SerializabilityTrait  
trait MySer
```



Detects usages in compile time

```
case class MyMessage() //extends MySer  
// ...  
actorRef ! MyMessage()
```

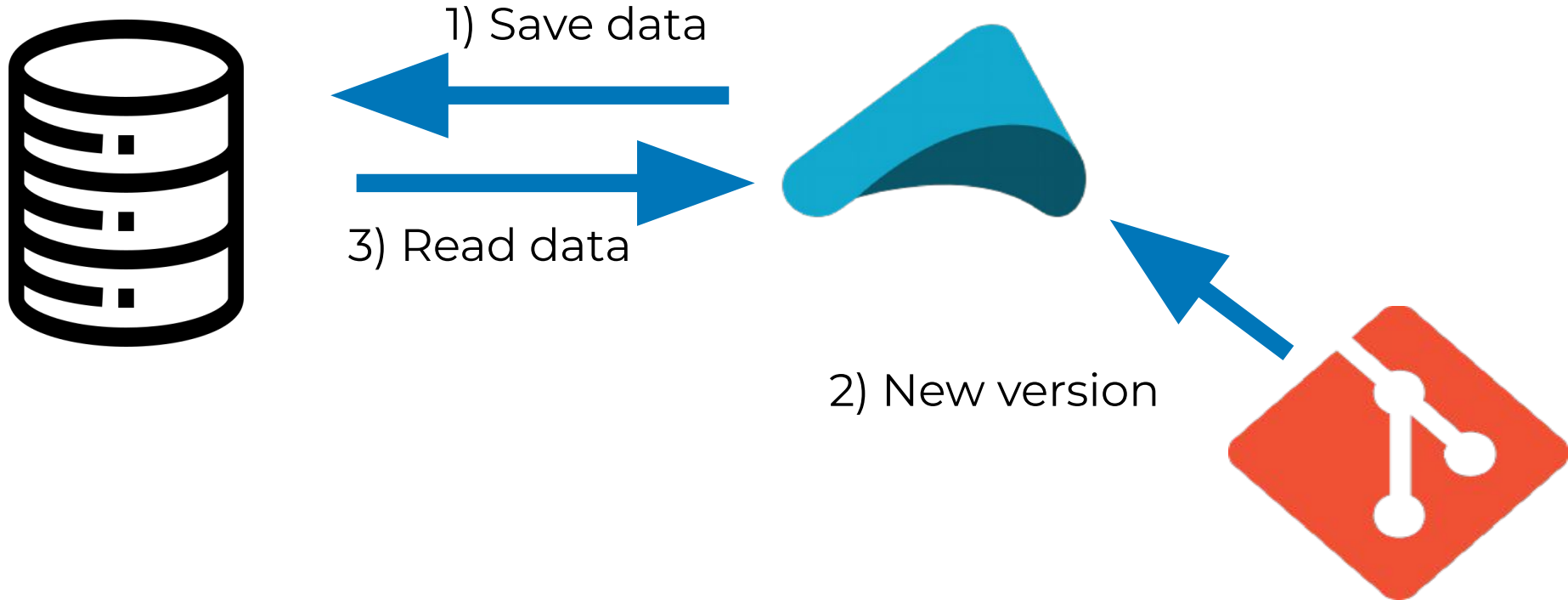


## 2. Inconsistent persistent data

# What is persisted?

- Events (to the **journal**)
- Actor states (to the **snapshots**)

# Typical tragic story



# Schema definitions in Scala

```
class ActorEvent(foo: AnotherClass) //is this persisted?
```

```
class ClassYouSeeForTheFirstTime() //maybe this is?
```



If only there was an easy  
way to check this...

So we made one!

```
› sbt ashDumpPersistenceSchema  
[...]  
› ls target/  
<project>-dump-persistence-schema-<version>.yaml  
[...]
```

# Schema of all things persisted!

- `name`: `org.Event`  
`typeSymbol`: `trait`
- `name`: `org.Event.SomeInternals`  
`typeSymbol`: `class`  
`fields`:
  - `name`: `a`  
`typeName`: `java.lang.String`
  - `name`: `b`  
`typeName`: `scala.Int`
  - `name`: `c`  
`typeName`: `scala.Double``parents`:
  - `org.Data`

## Easy to diff

```
> diff old.yaml new.yaml
8,9c8,9
<     - name: b
<       typeName: scala.Int
---
>     - name: c
>       typeName: scala.Double
```

# 3. Jackson Akka Serializer

# Dangerous code for Jackson

```
case class Message(animal: Animal) extends MySer  
  
sealed trait Animal  
case class Lion(name: String) extends Animal  
case class Tiger(name: String) extends Animal
```





Correct code: a lot of Jackson annotations required :/

```
case class Message(animal: Animal) extends MySer

@JsonTypeInfo(use = JsonTypeInfo.Id.NAME, property = "type")
@JsonSubTypes(
  Array(
    new JsonSubTypes.Type(value = classOf[Lion], name = "lion"),
    new JsonSubTypes.Type(value = classOf[Tiger], name = "tiger")))
sealed trait Animal
case class Lion(name: String) extends Animal
case class Tiger(name: String) extends Animal
```

Dangerous code

```
case object Tick
```

**No Exception during serialization**

...but deserialization ends up very bad

Instead of restoring the singleton (`Tick$.MODULE$`),  
Jackson will create **another instance** of `Tick$` class!

```
actorRef ! Tick
```

```
// Inside the actor:  
def receive = {  
    case Tick => // this won't get matched  
} // message will be unhandled
```

Corrected code

```
case class Tick()
```



Dangerous code

```
sealed trait Heartbeat
```

```
object Heartbeat {  
  case object Tick extends Heartbeat  
  case object Tock extends Heartbeat  
}
```

# Universal solution - custom serializer/deserializer

```
@JsonSerialize(using = classOf[HeartbeatJsonSerializer])
@JsonDeserialize(using = classOf[HeartbeatJsonDeserializer])
sealed trait Heartbeat

object Heartbeat {
  case object Tick extends Heartbeat
  case object Tock extends Heartbeat
}
```

# This is just glorified manual serialization/deserialization

```
class HeartbeatJsonSerializer extends StdSerializer[Heartbeat](classOf[Heartbeat]) {
  import Heartbeat._

  override def serialize(value: Heartbeat, gen: JsonGenerator, provider: SerializerProvider): Unit = {
    val strValue = value match {
      case Tick => "Tick"
      case Tock => "Tock"
    }
    gen.writeString(strValue)
  }
}

class HeartbeatJsonDeserializer extends StdDeserializer[Heartbeat](classOf[Heartbeat]) {
  import Heartbeat._

  override def deserialize(p: JsonParser, ctxt: DeserializationContext): Heartbeat = {
    p.getText match {
      case "Tick" => Tick
      case "Tock" => Tock
    }
  }
}
```

# Change the serializer!

# Introducing Circe

- Derives Codecs in compile time
- Full support for Scala types, including objects
- Requires mentioning serializable types (in code)

## Serializer implementation with codec registration

```
class MySerializer extends CirceAkkaSerializer[MySer] {  
  // ...  
  override lazy val codecs =  
    Seq(  
      Register[CommandOne],  
      Register[CommandTwo]  
    )  
  // whoops what if I forget to register a codec?  
}
```

# Another magic annotation and compiler plugin!

```
import org.virtuslab.ash.annotation._  
  
@Serializer(classOf[MySer])  
class MySerializer extends ...
```





# sphere.it tech talks #5

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