Spring and Coherence Recipes

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Outline

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Benefits of IoC Frameworks

- “Pluggability”
- Testability
- Configurability

SpringAwareCacheFactory, Coherence Spring Integration

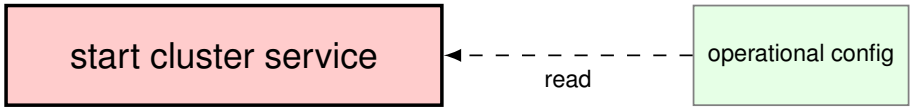
	SpringAware-CacheFactory	Spring Integration project
Version	to 3.7	12.1.2
Uses incubator	? Yes/No/Maybe	× No
Inject beans in cache-config	✓ Yes	✓ Yes
Set placeholders as bean properties	✓ Yes	✓ Yes
Pre-instantiate ApplicationContext	✓ Yes	× No

Outline

Static Initialisation

- Coherence cluster startup conditions ill-defined
- Unit testing is harder
- No way to access <class-scheme> objects

Coherence Node Startup



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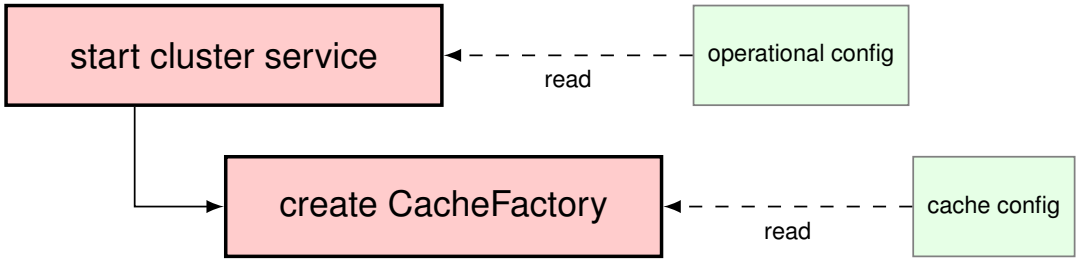

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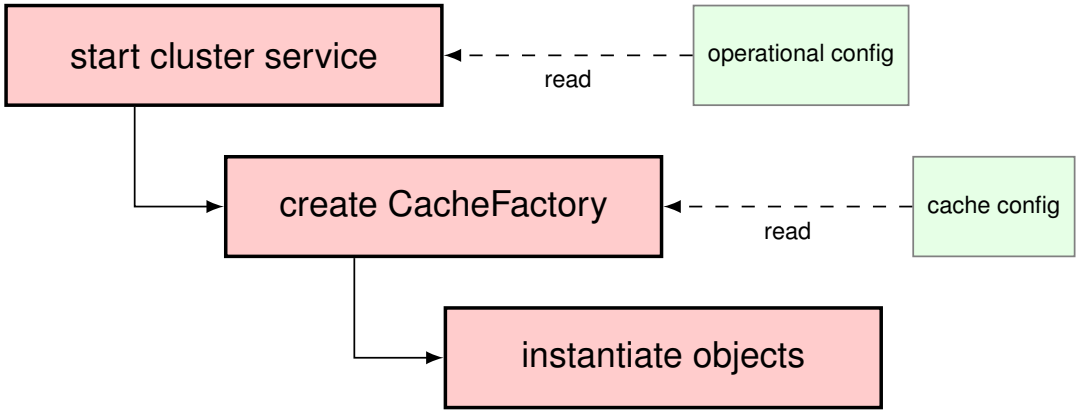

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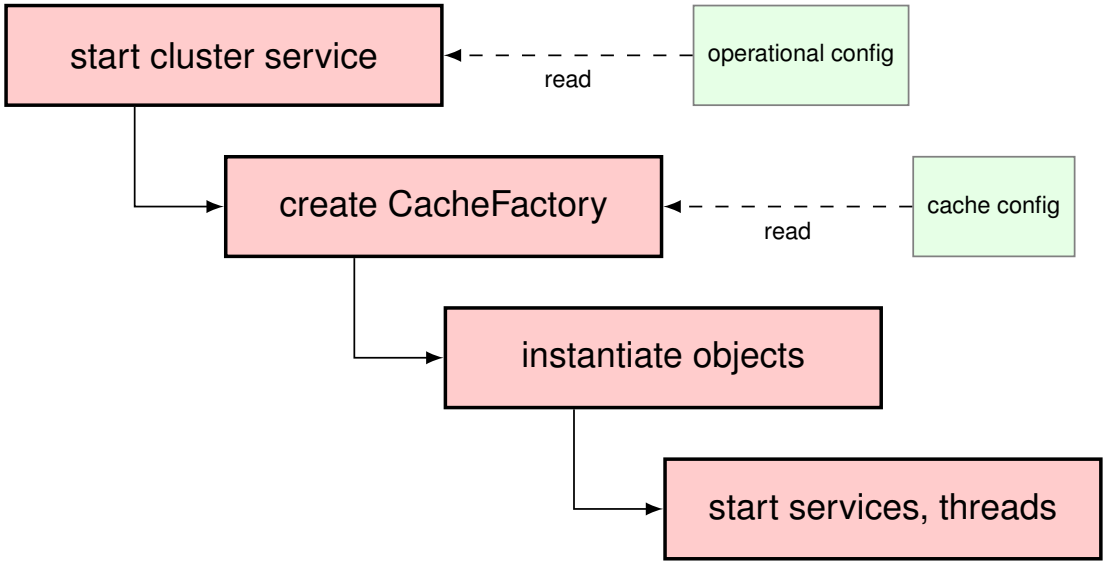
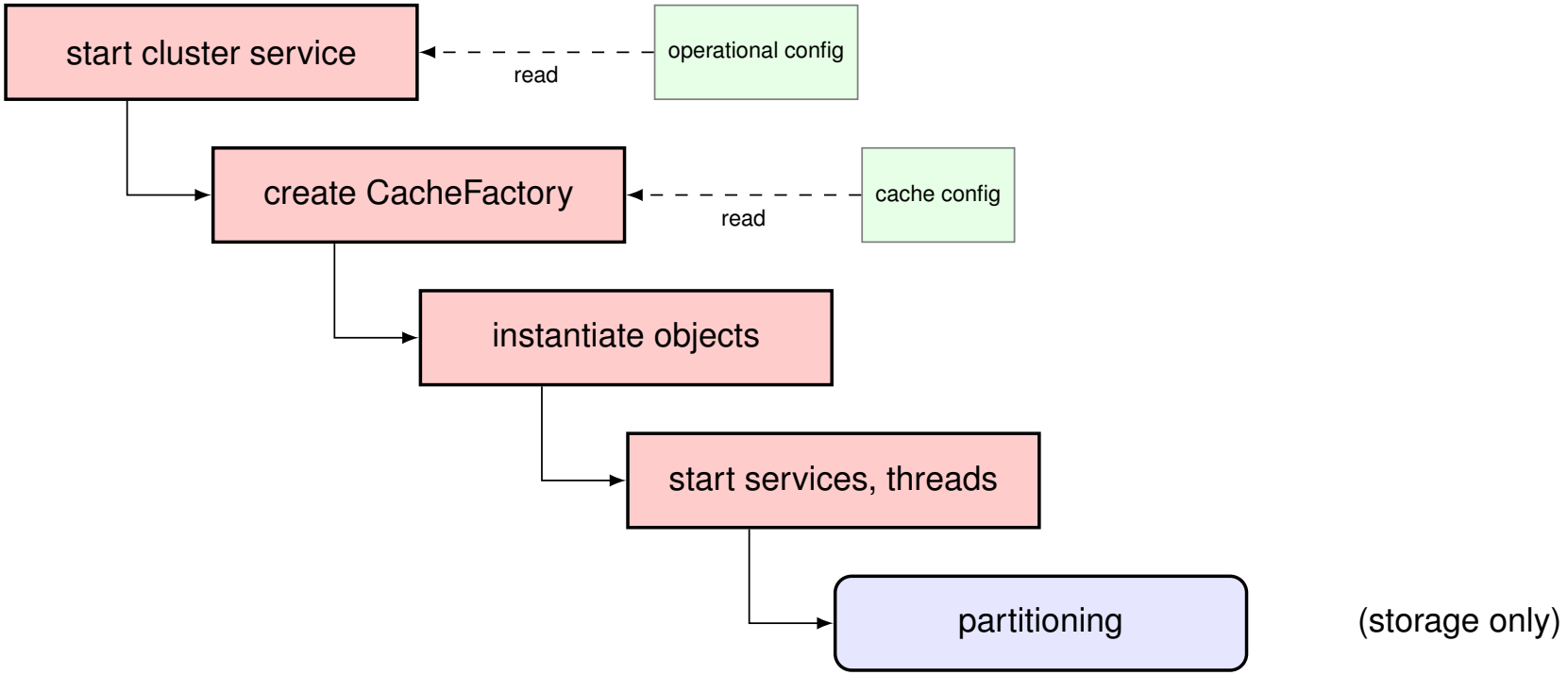


Coherence Node Startup



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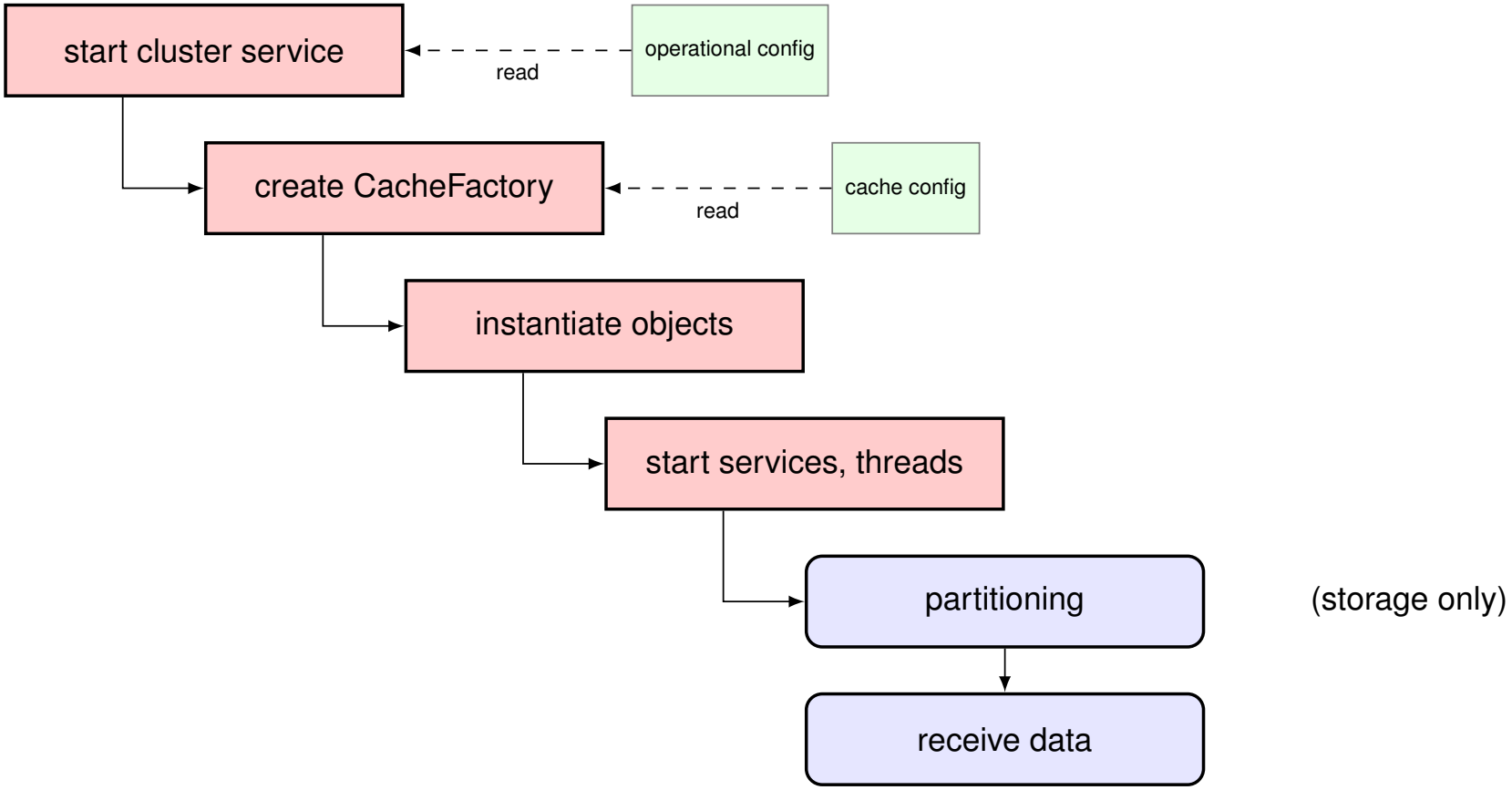

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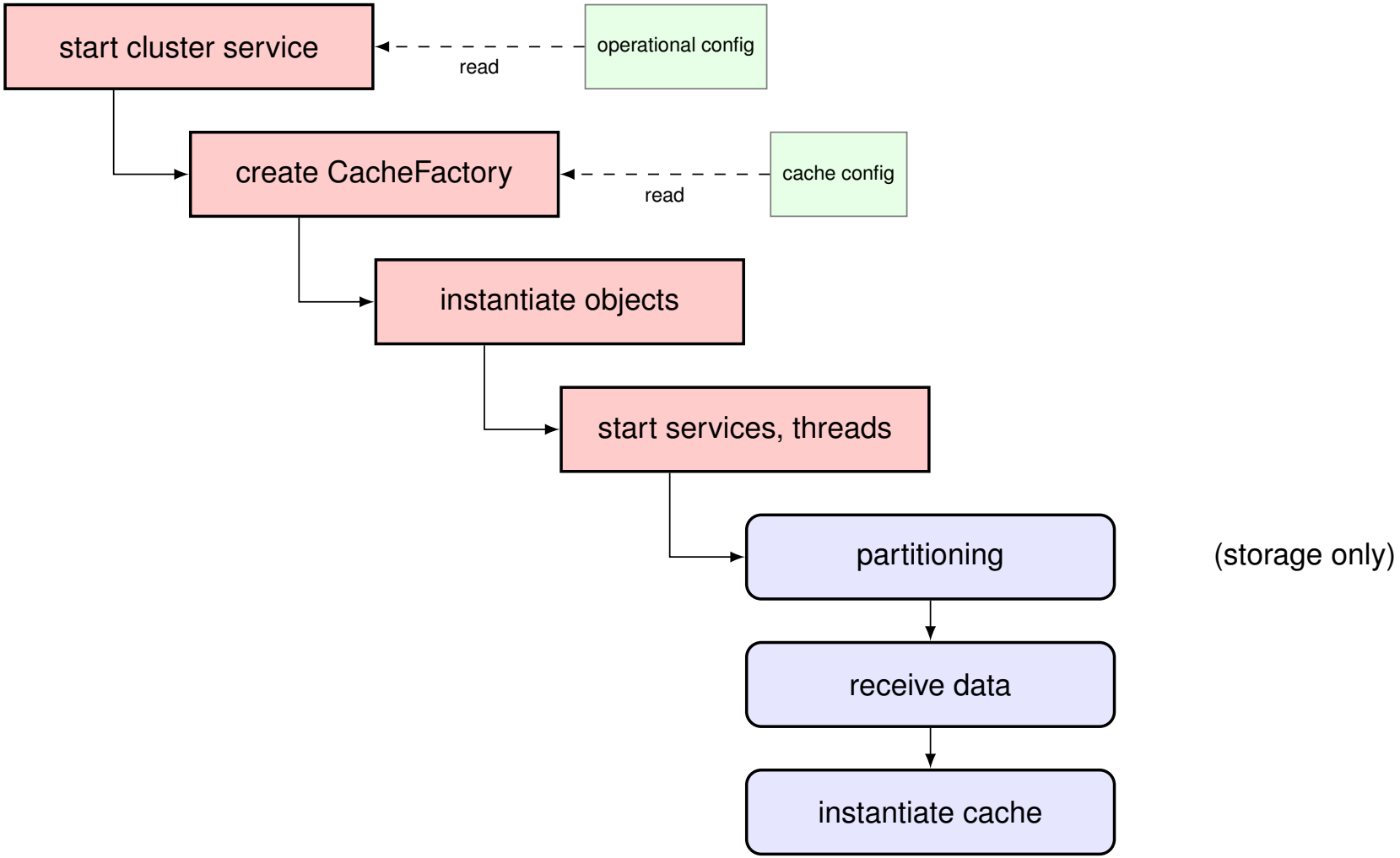

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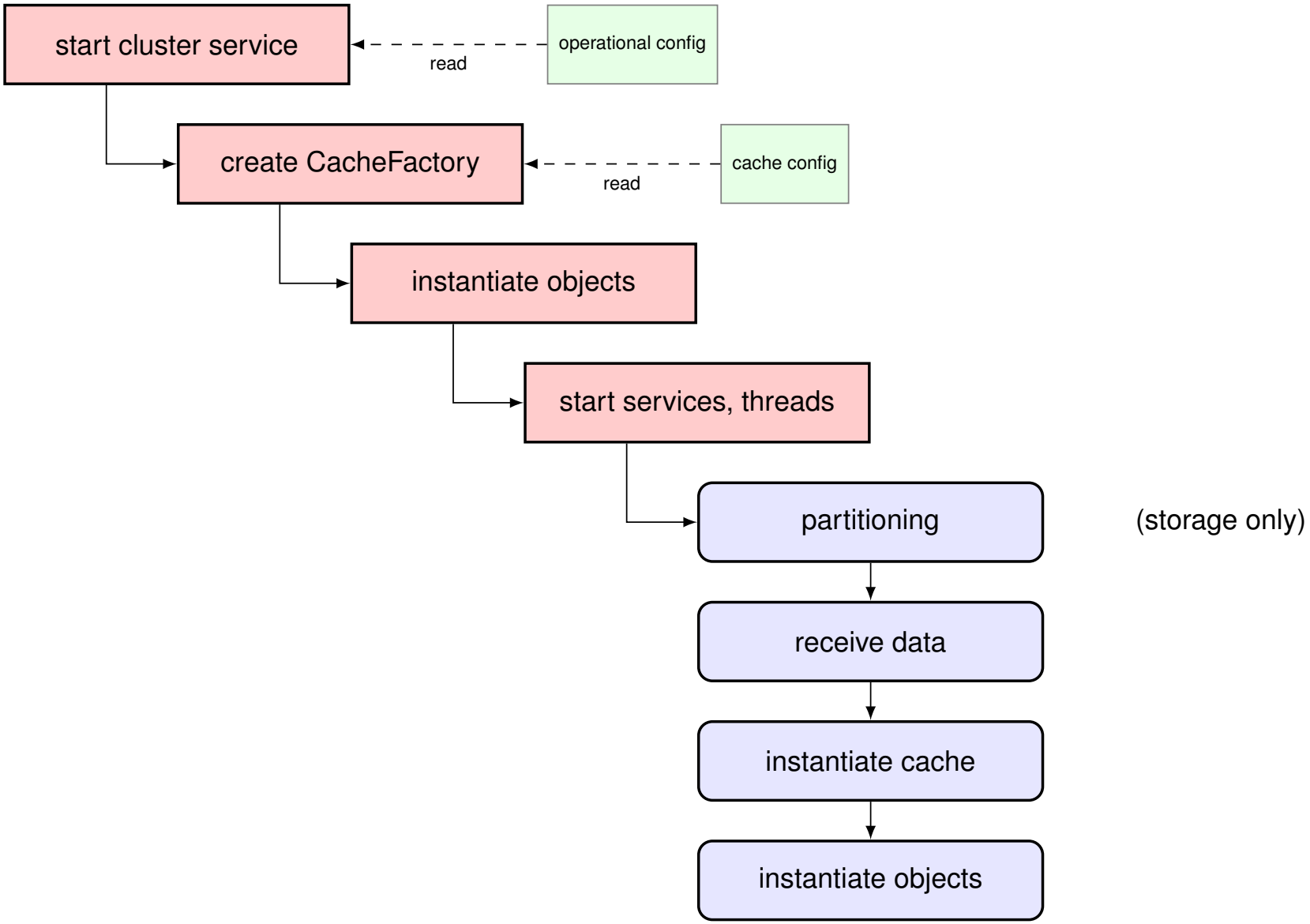
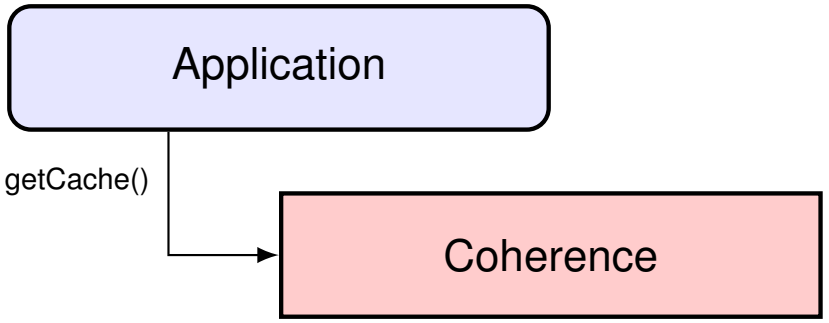


Circular Dependencies

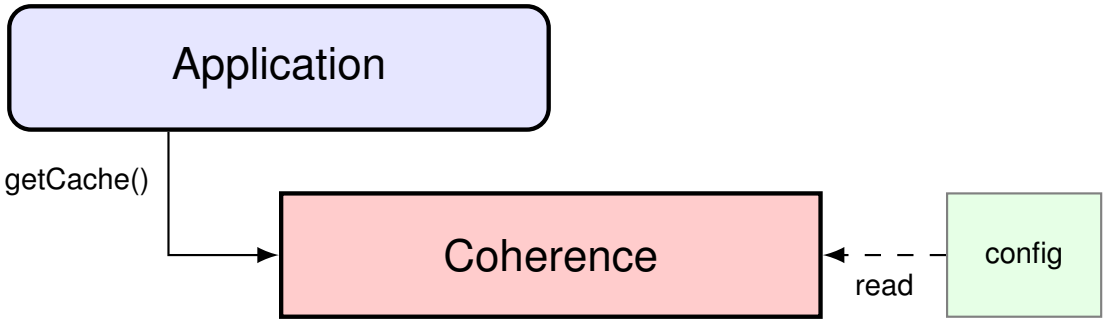
Explosion risk

Circular Dependencies

Circular Dependencies



Circular Dependencies



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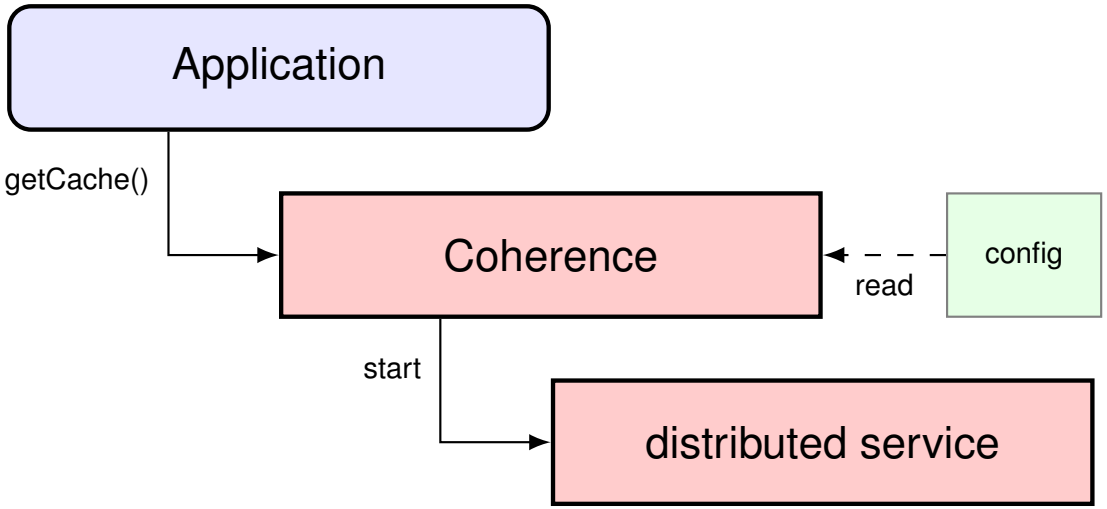

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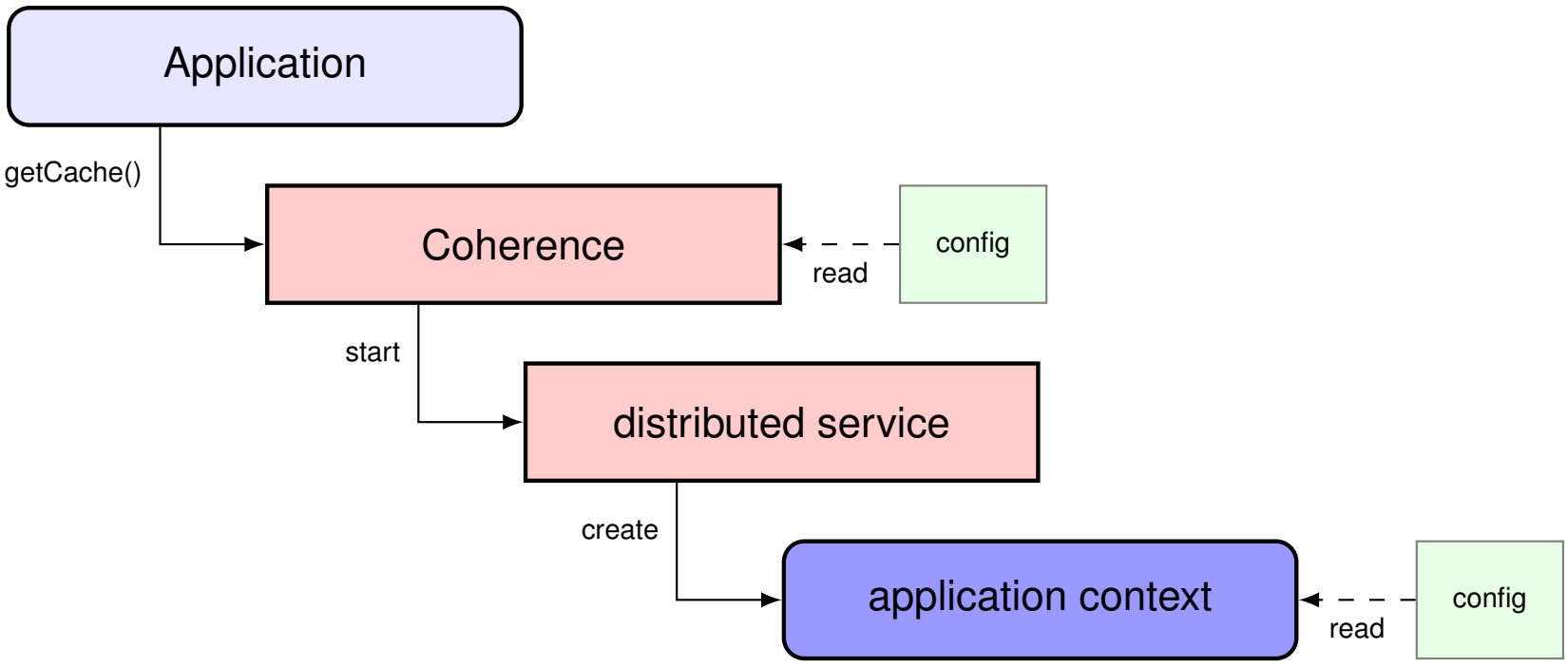

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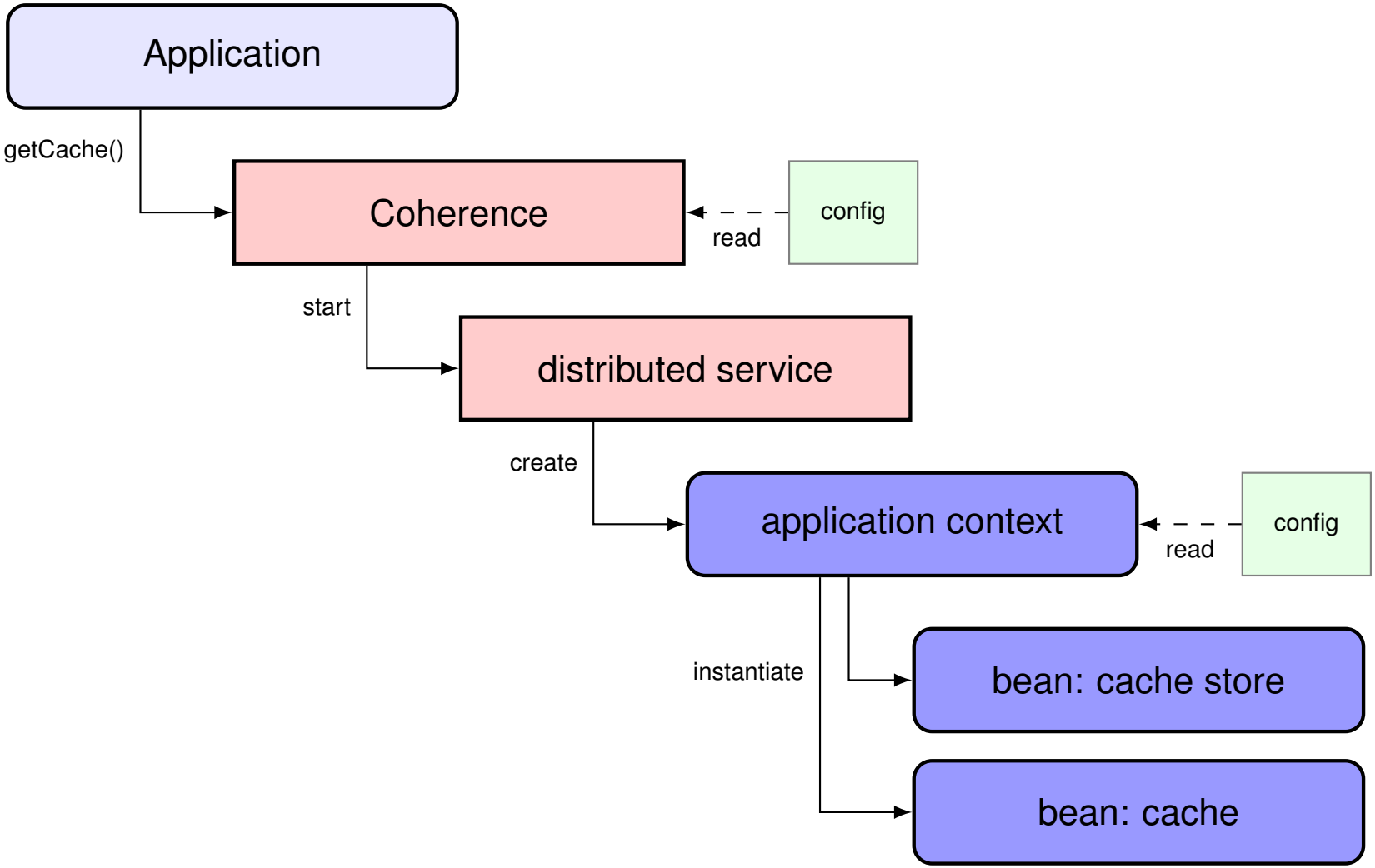

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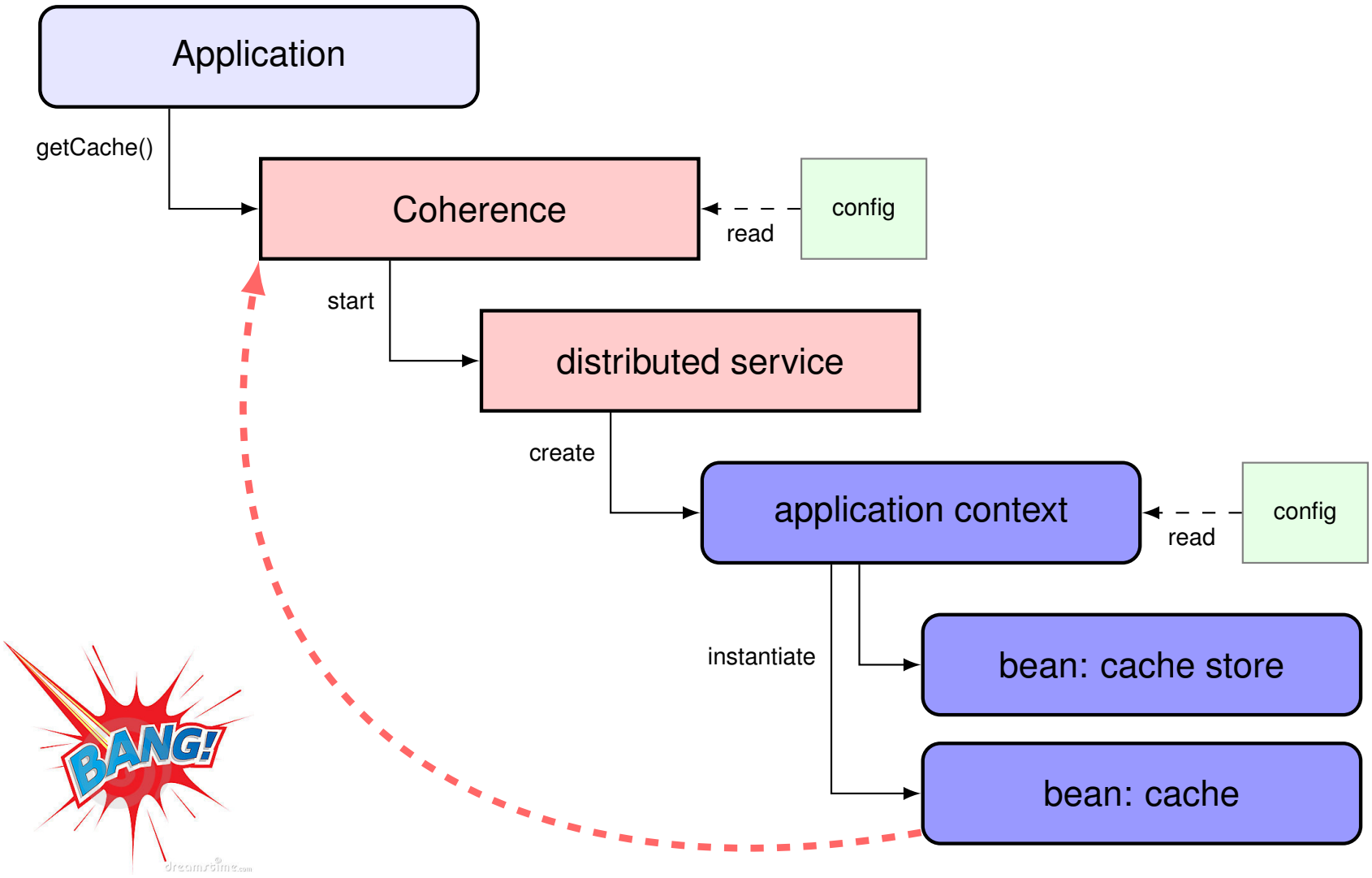
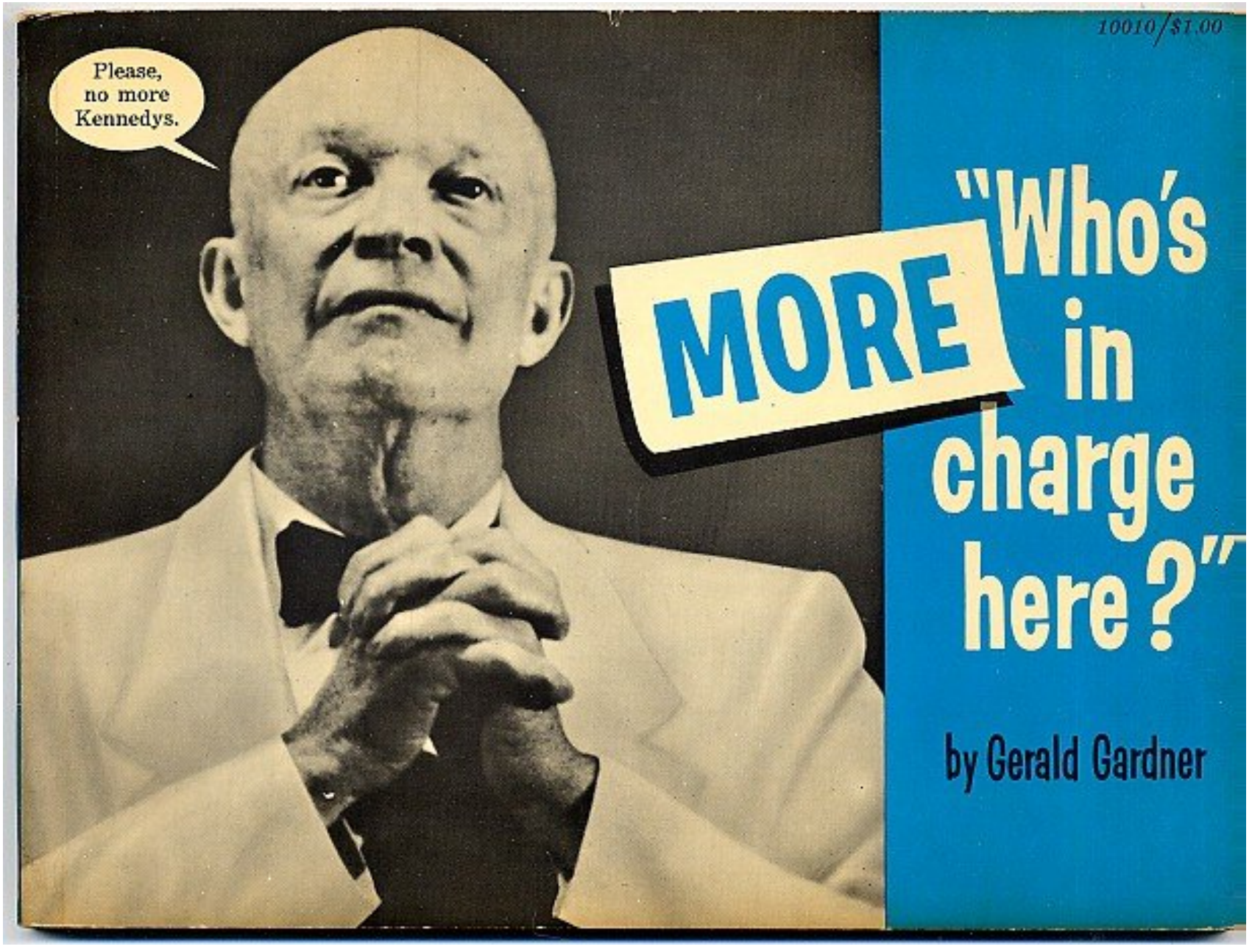



10010/$1.00
Please, no more Kennedys.
MORE "Who's in charge here?"
by Gerald Gardner

Who's in charge?

- Spring and Coherence both try to control instantiation

Who's in charge?

- Spring and Coherence both try to control instantiation
- Which one is designed as an IoC framework?

Who's in charge?

- Spring and Coherence both try to control instantiation
- Which one is designed as an IoC framework?
- Keep the framework in control ✓

Solutions?

- lazy instantiation?
- lazy initialisation?
- explicit dependencies?
- lifecycle?
- separate contexts

Outline

Objects used by Coherence

- Beans needed by Coherence during startup
- Beans needed as caches are repartitioned
- May implement Coherence interfaces
- May not call Coherence APIs during instantiation or initialisation

CoherenceBeanContext - these can and should be created before starting Coherence

Objects that use Coherence

- Beans that reference Coherence
- Application logic
  - JMS readers, message processing, etc
  - Embedded web server
- May call Coherence APIs during instantiation or initialisation
- May be empty or absent for storage, proxy, etc nodes

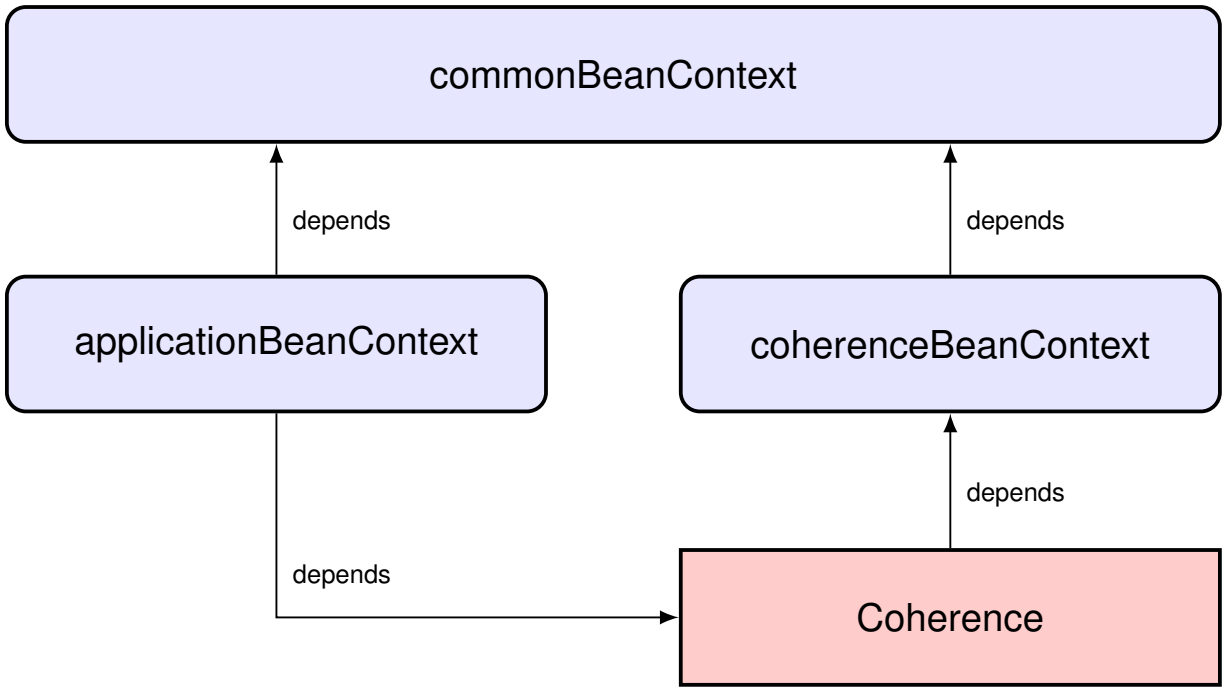
ApplicationBeanContext - these cannot be created until Coherence is available

CommonObjects

- Beans reference by Coherence and Application
- Common resources
  - DataSources
  - JMS Connections
  - etc
- May not call Coherence APIs during instantiation or initialisation
- Parent context of CoherenceBeanContext and ApplicationBeanContext

CommonBeanContext

Contexts & initialisation order



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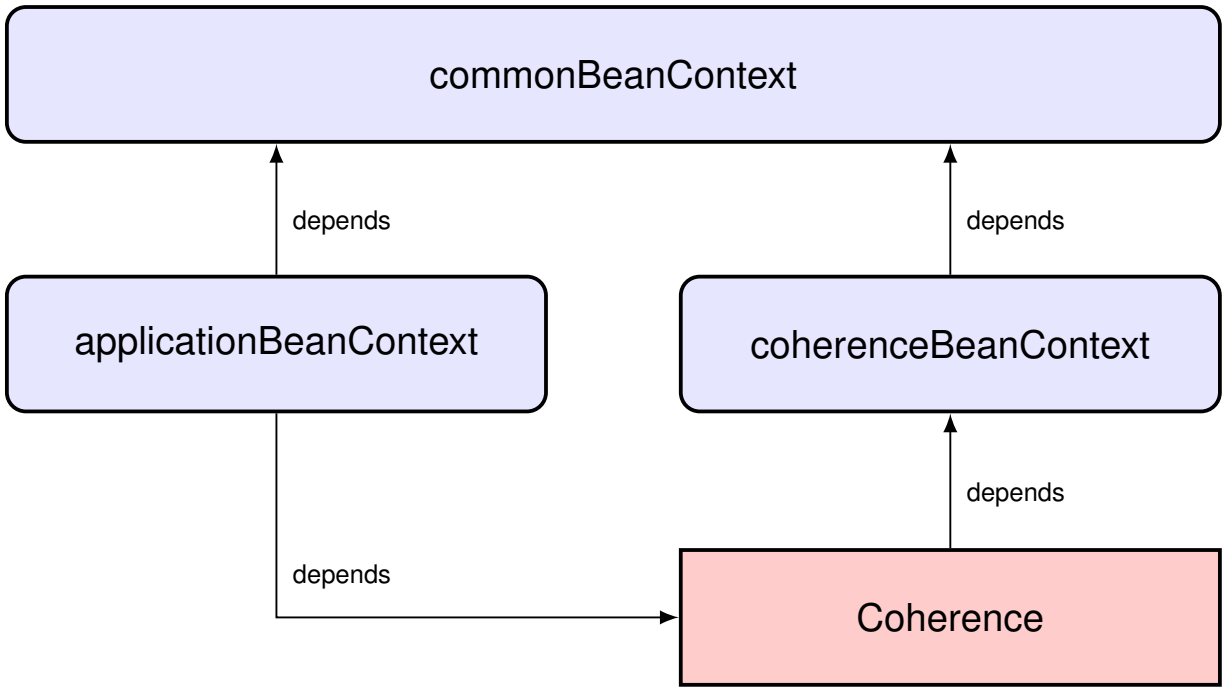
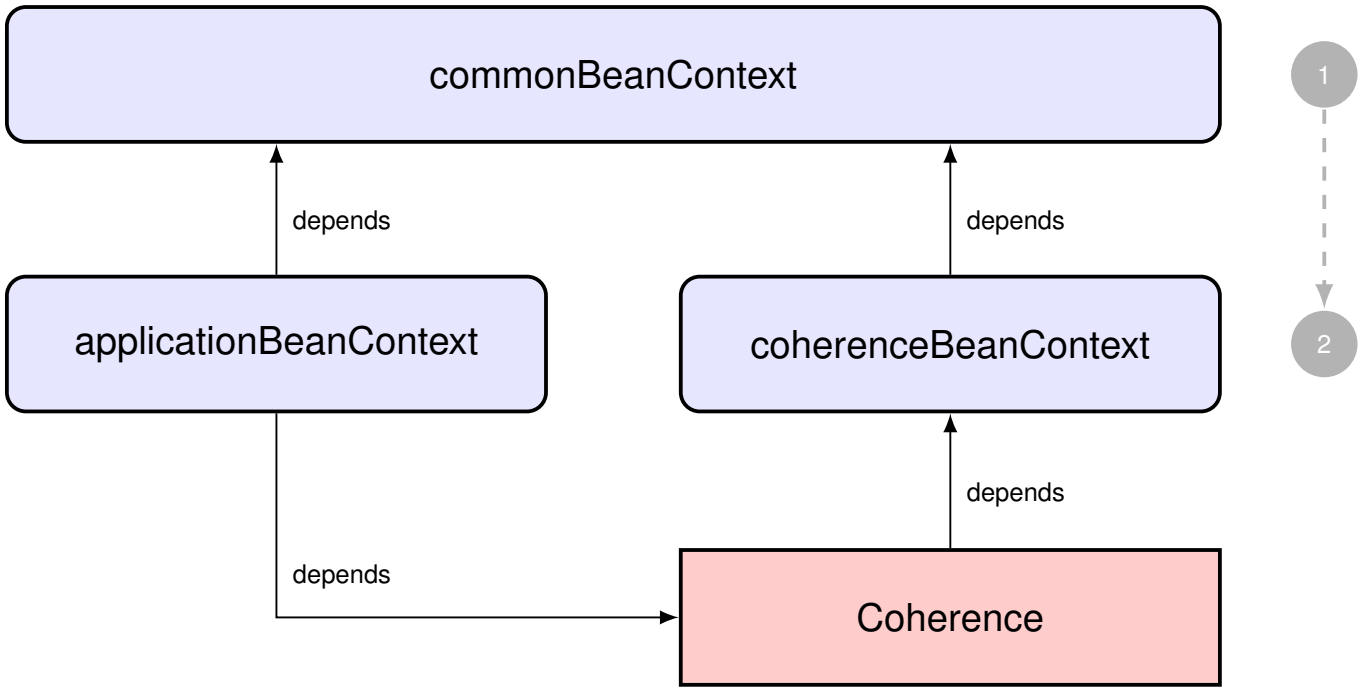


x order of initialisation

Contexts & initialisation order



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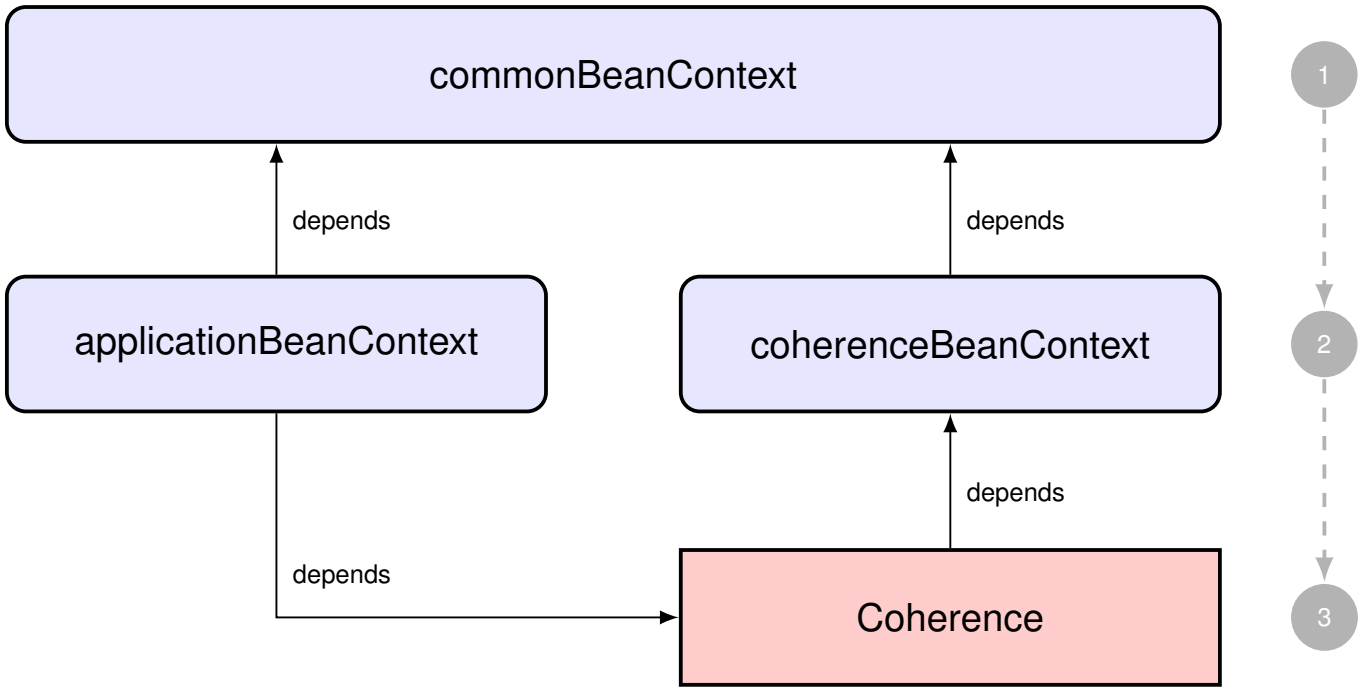

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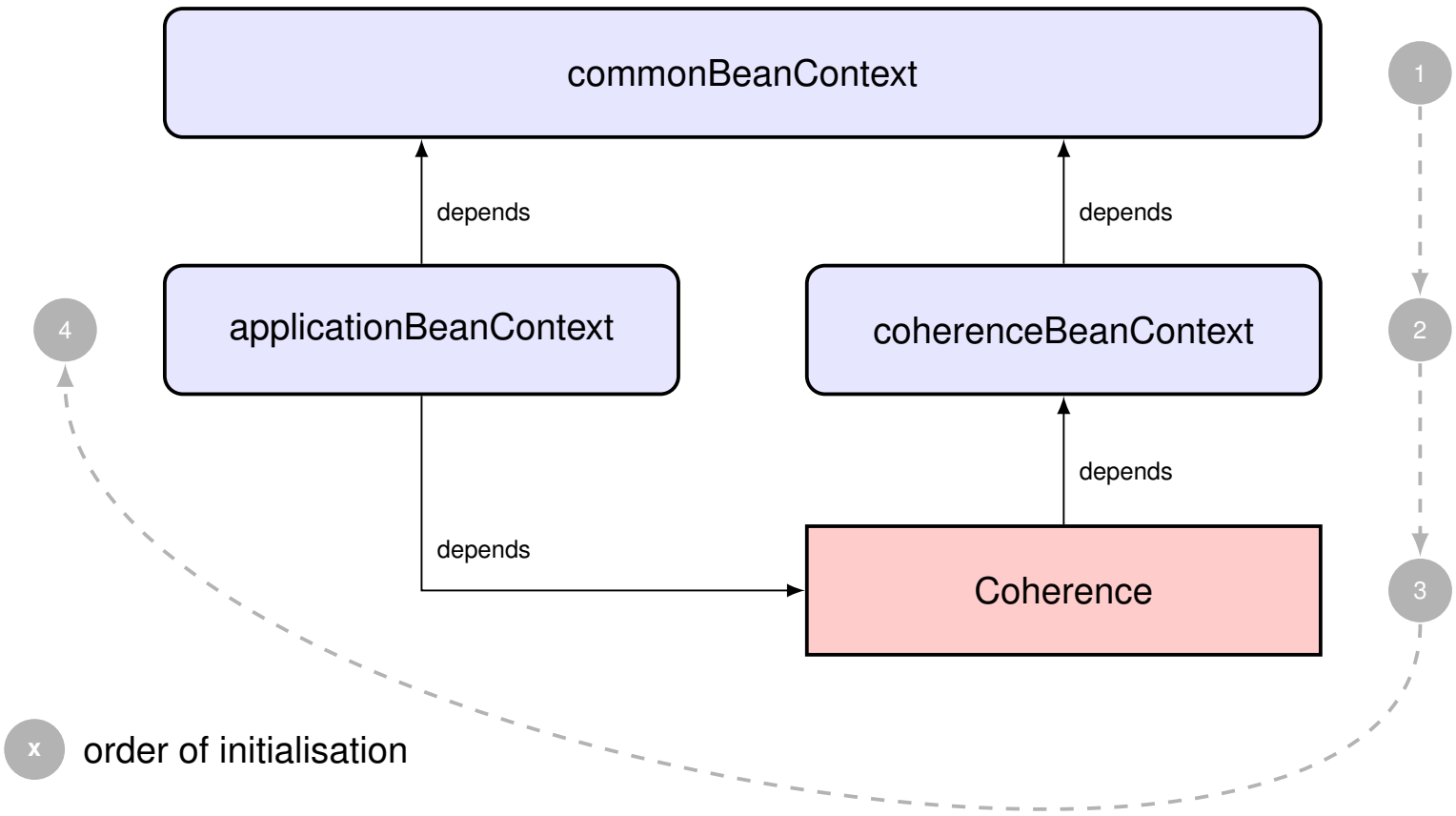

Prevent Premature Instantiation

```
public class ValidatingCacheFactoryBuilder extends
        DefaultCacheFactoryBuilder {

    private static boolean buildOk = false;

    @Override
    public ConfigurableCacheFactory getConfigurableCacheFactory(
            ClassLoader loader) {
        if (!buildOk) {
            throw new IllegalStateException("Attempt to build a
                cache factory too early");
        }
        return super.getConfigurableCacheFactory(loader);
    }

    static void enableBuild() {
        buildOk = true;
    }
}
```

Define the contexts

Use a master context: masterContext.xml

```
<?xml version="1.0" encoding="UTF-8"?>
<beans>

   <bean id="commonBeanContext"
         class="org.springframework.context.support.ClassPathXmlApplicationContext">
     <constructor-arg><value>UtilBeanContext.xml</value></constructor-arg>
   </bean>
```

Define the contexts

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<?xml version="1.0" encoding="UTF-8"?>
<beans>

   <bean id="commonBeanContext"
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     <constructor-arg><value>UtilBeanContext.xml</value></constructor-arg>
   </bean>

   <bean id="coherenceBeanContext"
         class="org.springframework.context.support.ClassPathXmlApplicationContext">
     <constructor-arg>
       <list><value>CoherenceBeanContext.xml</value></list>
     </constructor-arg>
     <constructor-arg>
       <ref bean="commonBeanContext"/>
     </constructor-arg>
   </bean>
```

Define the contexts

Use a master context: masterContext.xml

```
<?xml version="1.0" encoding="UTF-8"?>
<beans>

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     <constructor-arg><value>UtilBeanContext.xml</value></constructor-arg>
   </bean>

   <bean id="coherenceBeanContext"
         class="org.springframework.context.support.ClassPathXmlApplicationContext">
     <constructor-arg>
       <list><value>CoherenceBeanContext.xml</value></list>
     </constructor-arg>
     <constructor-arg>
       <ref bean="commonBeanContext"/>
     </constructor-arg>
   </bean>

   <bean id="applicationBeanContext" lazy-init="true"
         class="org.springframework.context.support.ClassPathXmlApplicationContext">
     <constructor-arg>
       <list><value>ApplicationBeanContext.xml</value></list>
     </constructor-arg>
     <constructor-arg>
       <ref bean="commonBeanContext"/>
     </constructor-arg>
   </bean>
</beans>
```

Access a Bean

```
public class BeanLocator {

    private static ApplicationContext applicationContexts =
        new ClassPathXmlApplicationContext(
            "classpath:masterContext.xml");

    public static BeanFactory getContext(String contextName) {
        return (BeanFactory)
            applicationContexts.getBean(contextName);
    }

    public static Object getBean(String contextName,
        String beanName) {
        return getContext(contextName).getBean(beanName);
    }
}
```

Reference a Bean

```
<cachestore-scheme>
    <class-scheme>
        <class-factory-name>
            org.cohbook.configuration.spring.BeanLocator
        </class-factory-name>
        <method-name>getBean</method-name>
        <init-params>
            <init-param>
                <param-value>coherenceBeanContext</param-value>
            </init-param>
            <init-param>
                <param-value>exampleCacheLoader</param-value>
            </init-param>
        </init-params>
    </class-scheme>
</cachestore-scheme>
```

Starting a Node

```
public static void main(String[] args) {

    loadCoherenceProperties();

    BeanLocator.getContext("coherenceBeanContext");

    CacheFactory.ensureCluster();

    BeanFactory bf =
        BeanLocator.getContext("applicationBeanContext");

    // Application logic

}
```

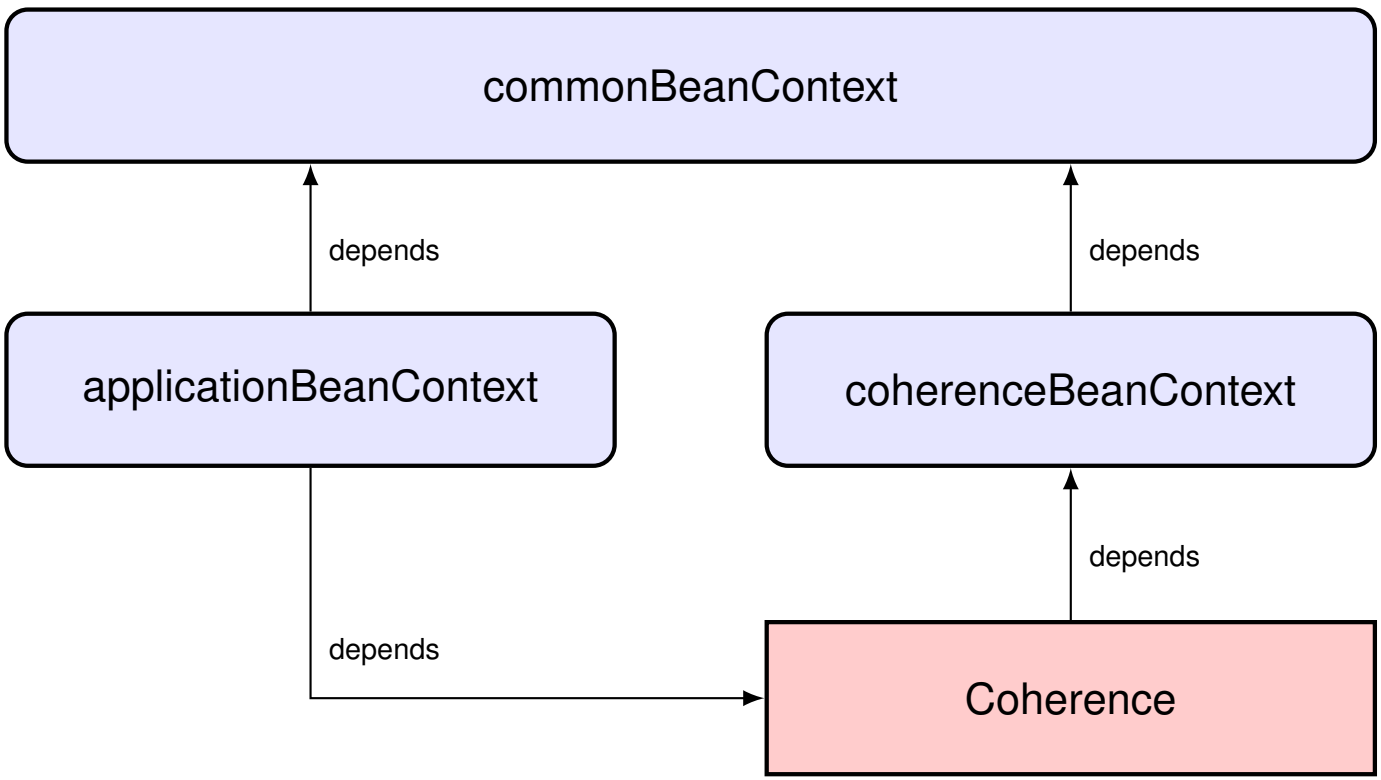
Outline

Circular dependency

Problem: What if a bean that Coherence depends on, also depends on Coherence?

e.g. A Controllable CacheStore that references a replicated control cache to determine whether to persist.

Circular Dependency 2



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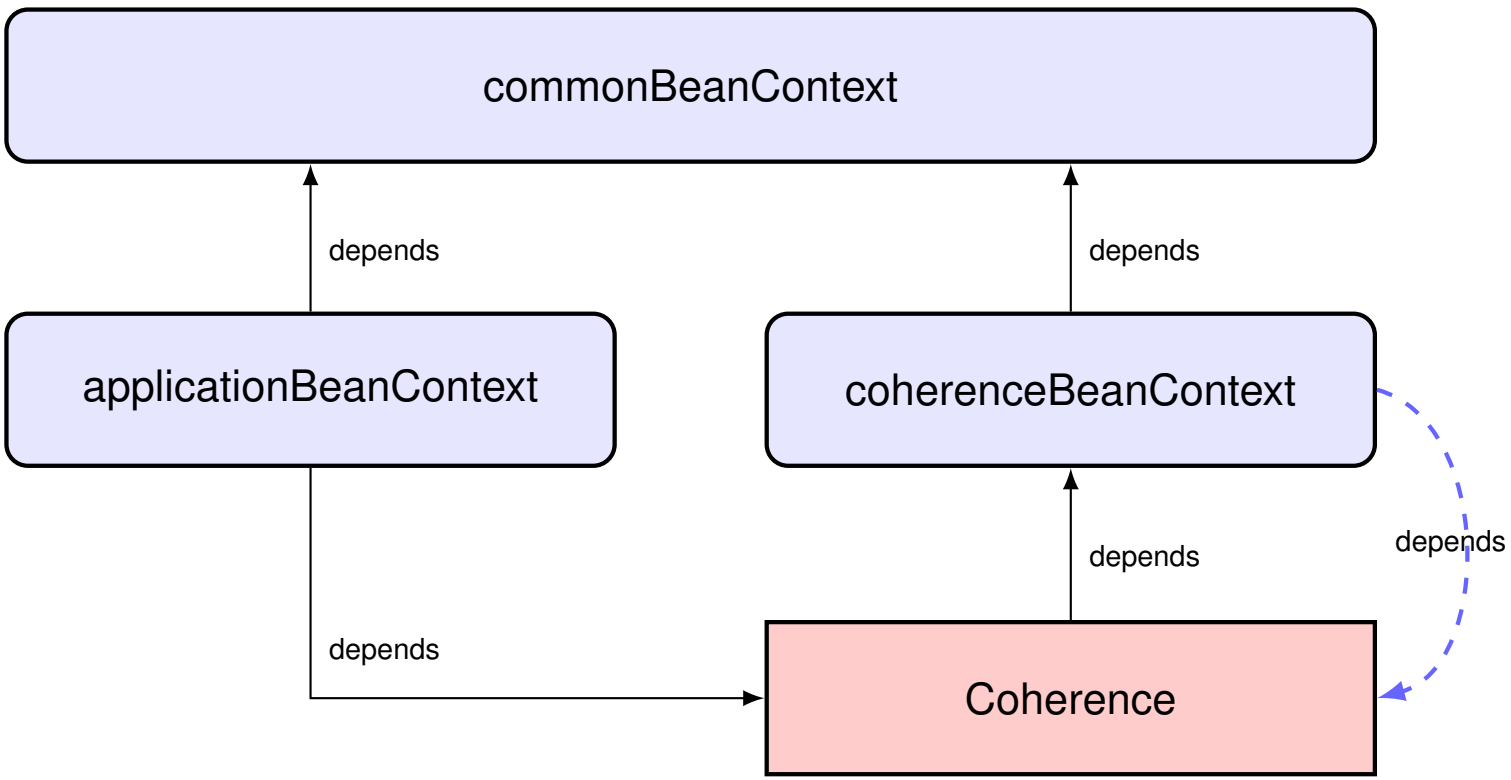

Using Spring SmartLifeCycle

- After Coherence beans instantiated and initialised
- Permit Coherence to start
- Start Coherence
- Implement start method in beans with circular dependencies

Permit Coherence to Start

```
public static class BuilderLifeCycle implements SmartLifecycle {

    public static final int BEFORE_CLUSTER_PHASE = 100;
    public static final int CLUSTER_PHASE = 200;
    public static final int AFTER_CLUSTER_PHASE = 300;

    public void start() {
        ValidatingCacheFactoryBuilder.enableBuild();
        CacheFactory.ensureCluster();
    }

    public int getPhase() {
        return CLUSTER_PHASE;
    }

    public boolean isAutoStartup() {
        return true;
    }
    .
    .
    .
}
```

Starting a Node with SmartLifecycle

. . . In the Coherence beans context . . .

```
<bean class="...BuilderLifeCycle"/>
```

Starting a Node with SmartLifecycle

. . . In the Coherence beans context . . .

```
<bean class="...BuilderLifeCycle"/>
```

. . . The main method . . .

```
public static void main(String[] args) {

    loadCoherenceProperties();

    BeanLocator.getContext("coherenceBeanContext").start();

    BeanFactory bf =
        BeanLocator.getContext("applicationBeanContext");

    // Application logic

}
```

Outline

Recipe: Avoid static Coherence Methods

```
<bean id="cacheFactory"
    class="com.tangosol.net.CacheFactory"
    factory-method="getConfigurableCacheFactory"/>
```

Recipe: Avoid static Coherence Methods

```
<bean id="cacheFactory"
    class="com.tangosol.net.CacheFactory"
    factory-method="getConfigurableCacheFactory"/>

<bean id="exampleCache" factory-bean="cacheFactory"
    factory-method="ensureCache">
    <constructor-arg value="test"/>
    <constructor-arg><null/></constructor-arg>
</bean>
```

Recipe: Avoid static Coherence Methods

```
<bean id="cacheFactory"
    class="com.tangosol.net.CacheFactory"
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<bean id="exampleCache" factory-bean="cacheFactory"
    factory-method="ensureCache">
    <constructor-arg value="test"/>
    <constructor-arg><null/></constructor-arg>
</bean>

<bean id="distributedService" factory-bean="cacheFactory"
    factory-method="ensureService">
    <constructor-arg value="exampleDistributedService"/>
</bean>
```

Recipe: Avoid static Coherence Methods

```
<bean id="cacheFactory"
    class="com.tangosol.net.CacheFactory"
    factory-method="getConfigurableCacheFactory"/>

<bean id="exampleCache" factory-bean="cacheFactory"
    factory-method="ensureCache">
    <constructor-arg value="test"/>
    <constructor-arg><null/></constructor-arg>
</bean>

<bean id="distributedService" factory-bean="cacheFactory"
    factory-method="ensureService">
    <constructor-arg value="exampleDistributedService"/>
</bean>

<bean id="cluster" class="com.tangosol.net.CacheFactory"
    factory-method="getCluster"/>
```

Configuration Macro 1

```
<cachestore-scheme>
    <class-scheme>
        <class-factory-name>
            org.cohbook.configuration.spring.BeanLocator
        </class-factory-name>
        <method-name>getBean</method-name>
        <init-params>
            <init-param><param-value>coherenceBeanContext</param-value></init-param>
            <init-param><param-value>dynamicCacheLoader</param-value></init-param>
            <init-param><param-value>cacheName</param-value></init-param>
            <init-param><param-value>{cache-name}</param-value></init-param>
        </init-params>
    </class-scheme>
</cachestore-scheme>
```

Configuration Macro 2

```
public class BeanLocator {

    ...

    public static Object getBean(
            String contextName, String beanName,
            String propertyName, Object
            propertyValue) {

     if (propertyValue instanceof Value) {
            propertyValue = ((Value)propertyValue).get();
        }
        Object bean = getContext(contextName).getBean(beanName);
        PropertyAccessor accessor =
            PropertyAccessorFactory.forBeanPropertyAccess(bean);
        accessor.setPropertyValue(propertyName, propertyValue);
        return bean;
    }
}
```

Configuration Macro 3

```
<bean id="dynamicCacheLoader"
        class="org.cohbook.configuration.spring.DynamicCacheLoader"
    scope="prototype">
    <constructor-arg>
        <ref bean="exampleDataSource"/>
    </constructor-arg>
</bean>
```

Injection In Grid Objects 1

- Transported objects may need references to beans
  - Invocable
  - EntryProcessor
  - Filter
  - Aggregator
  - Cache keys/values (if you really must)
- How and when do we inject these values?

Injection In Grid Objects 1

- Transported objects may need references to beans
  - Invocable
  - EntryProcessor
  - Filter
  - Aggregator
  - Cache keys/values (if you really must)
- How and when do we inject these values?
  - During deserialisation!

Injection In Grid Objects 2

```
public class SpringSerializer implements Serializer {

    private final Serializer delegate;
    private final String applicationContextName;
```

Injection In Grid Objects 2

```
public class SpringSerializer implements Serializer {

    private final Serializer delegate;
    private final String applicationContextName;

    public SpringSerializer(String applicationContextName,
        Serializer delegate) {
        this.applicationContextName = applicationContextName;
        this.delegate = delegate;
    }
```

Injection In Grid Objects 2

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public class SpringSerializer implements Serializer {

    private final Serializer delegate;
    private final String applicationContextName;

    public SpringSerializer(String applicationContextName,
        Serializer delegate) {
        this.applicationContextName = applicationContextName;
        this.delegate = delegate;
    }

    private AutowireCapableBeanFactory getBeanFactory() {
        return BeanLocator.getContext(applicationContextName)
                .getAutowireCapableBeanFactory();
    }
```

Injection In Grid Objects 2

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        this.delegate = delegate;
    }

    private AutowireCapableBeanFactory getBeanFactory() {
        return BeanLocator.getContext(applicationContextName)
                .getAutowireCapableBeanFactory();
    }

    @Override
    public Object deserialize(BufferInput in) throws
        IOException {

        Object result = delegate.deserialize(in);

        getBeanFactory().autowireBeanProperties(result,
           AutowireCapableBeanFactory.AUTOWIRE_BY_TYPE, false);

        return result;
    }
```

Injection In Grid Objects 2

```
public class SpringSerializer implements Serializer {

    private final Serializer delegate;
    private final String applicationContextName;

    public SpringSerializer(String applicationContextName,
        Serializer delegate) {
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    @Override
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        IOException {

        Object result = delegate.deserialize(in);

        getBeanFactory().autowireBeanProperties(result,
           AutowireCapableBeanFactory.AUTOWIRE_BY_TYPE, false);

        return result;
    }

    @Override
    public void serialize(BufferOutput bufferoutput, Object obj)
            throws IOException {
        delegate.serialize(bufferoutput, obj);
    }
}
```

Recipe: Spring JMX Exporter

```
public class SpringCoherenceJMXExporter extends MBeanExporter {
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    @Override
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Recipe: Spring JMX Exporter

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public class SpringCoherenceJMXExporter extends MBeanExporter {

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        Registry registry =
            CacheFactory.ensureCluster().getManagement();
```

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    protected void doRegister(Object mbean, ObjectName
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        Registry registry =
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        String sname =
            registry.ensureGlobalName(objectName.getCanonicalName());
```

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public class SpringCoherenceJMXExporter extends MBeanExporter {

    @Override
    protected void doRegister(Object mbean, ObjectName
        objectName)
            throws JMXException {

        Registry registry =
            CacheFactory.ensureCluster().getManagement();

        String sname =
            registry.ensureGlobalName(objectName.getCanonicalName());

        registry.register(sname, mbean);
    }
}
```

Finally...

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`http://www.coherencecookbook.org/downloads`

Luncheon!