RFC 242 - Condition Service

Draft

13 Pages

Abstract

Declarative Services provide a nice and powerful method to give activation conditions for a Service or Component. The Condition Service attempts to extend this, in order to support more complex scenarios, that can't be handled by the current mechanism.

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This document can be downloaded from the OSGi Alliance design repository at https://github.com/osgi/design The public can provide feedback about this document by opening a bug at https://www.osgi.org/bugzilla/.

0.4 Table of Contents

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0.5 Terminology and Document Conventions

The key words "MUST", "MUST NOT", "REQUIRED", "SHALL", "SHALL NOT", "SHOULD", "SHOULD NOT", "RECOMMENDED", "NOT RECOMMENDED", "MAY" and "OPTIONAL" in this document are to be interpreted as described in 10.1.

```
Source code is shown in this typeface.
```

0.6 Revision History

The last named individual in this history is currently responsible for this document.

Revision	Date	Comments
Initial	*2019/04/11*	*Initial Version* *Jürgen Albert, Data In Motion Consulting GmbH, j.albert@data-in-motion.biz*
Version 0.1	*2019/05/22*	*Moved using Conditions as enablement criteria to considered alternatives. Every Component now needs an implicit Conditon.* *Clarified Configurable Condition Factory.* *Jürgen Albert, Data In Motion Consulting GmbH, j.albert@data-in-motion.biz*
Version 0.2	*2019/08/14*	*Made some minor change to the explicit default condition example.* *Jürgen Albert, Data In Motion Consulting GmbH, j.albert@data-in-motion.biz*

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1 Introduction

Declarative Services are a comfortable and powerful tool with which managing the life cycle of your services is easy and comfortable. The ability to define dependencies to other services together with target filters and cardinalities, make it unmatched by most other comparable mechanisms. Unfortunately the possibilities to set conditions, under which DS should activate or deactivate a Component are limited. Thus this RFP will explore an extension to DS allowing for more complex scenarios.

2 Application Domain

Components have a clearly defined Lifecycle. Unfortunately the conditions when a component should be activated and eventually registered as a service, can be more complex then the general availability of the directly used services. Thus a Mechanism would be useful to allow a more precise and complex definition of conditions surrounding the Lifecycle of a Component

2.1 Terminology + Abbreviations

2.1.1 Conditions

DS purely depends on References and there provided conditions to determine if a component can be activated. Conditions should set of rules that gives DS, CDI or Services a clue, when a component can be enabled or disabled that are independent of the references a service requires.

3 Problem Description

Services and Components are a great way, to represent processes in the real world or more artificial things like business processes.

DS already allows the developers to define a Cardinality to each service reference, that gives clues, when a service should be activated and deactivated. The Configuration Admin extends this capability, so target filters can

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be assigned at configuration time. Additionally the amount of services to inject, can be specified more precisely then in the component xml or with the Annotations.

This RFC will explore the Use cases that exceed the possibilities DS gives the developer. The mechanism is not necessarily in the direct domain of DS, but can be picked up by it.

All the Use cases that will follow, can be achieved somehow by using e.g. DS to activate a Component, that than uses Servicetrackers, to check if the special needs are fulfilled. This is often uncomfortable, and the principle is usually the same.

4 Requirements

4.1.1 General

- G010 – It MUST provide a marker service that can be used as a mandatory injecte for any component.
- G020 – Everybody must be able to register its own Condition.
- G030 – There MUST always be a registered True Condition.
- G040 – Every registered Condition MUST have a persistent identifying property, that can be targeted by other components.
- G060 - The Condition must be supported in all injection models.
- G070 – The state of a Condition and its changes MUST be observable.

4.1.2 Configuration of Conditions

- C010 – The Solution MUST provide a mechanism to create and program conditions via configuration.
- C020 – It MUST define a domain specific language to program Conditions. It must support boolean logic and cardinality.
- C030 – The configurable component MUST provide a DTO showing the state of its requirements.

4.1.3 Declarative Services

- DS010 – DS MUST support a mechanism to bind the enablement of a component to a Condition.
- DS020 - Every DS Component by default must depend on the True Condition of G030.
- *DS030 – CDI MUST meet the Requirements DS010 and DS020 as well.*

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5 Technical Solution

This solution proposes extending the core to support Conditions and even entails changes to DS and CDI, that need to be honored by any other future Component Model, except Blueprint.

5.1 Condition

A valid Condition is a Service registration with the **org.osgi.service.condition.Condition** Interface as an exposed ObjectClass, together with a unique Condition id property (**org.osgi.service.condition.Condition**#CONDITION_ID). A Condition does not offer any functionality and acts just as a clearly identifiable Marker.

The proposed Interface is:

```
@ConsumerType
public interface Condition {

	public static final String CONDITION_ID = "osgi.condition.id";

	public static final String DEFAULT_TRUE_CONDITION_ID = "true";

	/**
	* A default instance that can be used to register Conditions,
	* without cluttering the JVM with useless Object instances.
	*/
	public static final Condition INSTANCE = new ConditionImpl();

	/**
	 * A default Implementation for the {@link Condition} interface
	 */
	static class ConditionImpl implements Condition{

	}


}
```

A Component that wishes to announce a Condition has now 3 possibilities:

1. A Component implements the **org.osgi.service.condition.Condition** Interface and announce it as an Servicetype of its own Service Registration, together with a `Condition.CONDITION_ID` property.

2. Create an own ServiceRegistration, using for example the `Condition.INSTANCE`, together with a `Condition.CONDITION_ID` property.

3. Create an own ServiceRegistration, using any Object implementing the `Condition` Interface, together with a `Condition.CONDITION_ID` property.

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5.1.1 The default TRUE Conditions

The Framework itself will always register a TRUE Condition instance, that always can be relied upon. This Condition must have the `Constants.CONDITION_ID property` with the value “true”.

5.2 Condition Factory

In order to create more complex Conditions easily a configurable Factory is called for. This allows integration of Conditions in a Systems without the requirement to actually register a Condition Service.

The implementation implementation of the ConditionFactory~~A Bundle~~ should register a `org.osgi.service.cm.ManagedServiceFactory` with the service ~~name~~PID “osgi.condition.factory”. A configuration it might receive via ConfigurationAdmin can contain two lists of target filter. One for filters that MUST find at least one Service each in order to have a Condition registered. The other one represents a List of filters, that MUST NOT find any matching service. The moment all the included and non of the exclude filters match a Service, a Condition is registered with the given identifier and the additional properties. If any of the include Services go away or an excluded Service becomes available, this Condition must be unregistered.

List of Properties:

Name	Value
`osgi.condition.identifier`	The `Constants.CONDITION_ID` that will be set to the condition that will be registered ~~when~~if all filters are satisfied
`osgi.condition.properties.*`	Properties like this will be registered with the condition ~~when~~if all filters are satisfied. The key will be the * part.
`osgi.condition.~~includes~~match.all`	An optional list of valid target filters. A Condition will be registered ~~when~~if each filter finds at least one matching service.
`osgi.condition.``match.none~~excludes~~`	An optional list of valid target filters. A Condition will not be ~~un~~registered ~~when~~if any filter finds at least one matching service.

An Example Configuration utilizing the Configurator would look like as follows:

```
{
    ":configurator:resource-version": 1,

    "osgi.condition.factory~test" : {
       "osgi.condition.identifyer" : "resulting.condition.id",
       "osgi.condition.properties.custom.condition.prop" : "my.property",
       "osgi.condition.~~includes~~match.all" : [
              "(&(objectClass=org.foo.Bar)(my.prop=foo))",
              "(my.prop=bar)"
       ],
       "osgi.condition.~~excludes~~match.none" : [
              "(&(objectClass=org.foo.Fizz)(my.prop=buzz))"
       ]
    }
}
```

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5.3 Support in DS and CDI

Conditions must be an implicit service reference, that will always be there. It can be made explicit and modified with some limitations described later.

To present all its mandatory attributes of the implicit Reference, the following example will show it as a DS Component Annotation:

```
@Component(name = "A Exampelle Component", reference = {
	@Reference(
	name="osgi.ds.activation.condition",
	target = "(osgi.conditon.id=true)",
	cardinality = ReferenceCardinality.MANDATORY,
	policy = ReferencePolicy.DYNAMIC,
	service = Condition.class,
	policyOption = ReferencePolicyOption.RELUCTANT)})
```

By default, it thus will wait for the default true Condition to be available.

The activation conditions target Filter can be changed by setting the component property "org.osgi.ds.activation.condition.target" to a valid Filter expression. This will delay the activation of the component until a Condition matching the given filter becomes available.

The implicit Reference can become an explicit reference and modified there as shown with the following Example:

```
@Component
public class MyComponent {

	@Reference(name="osgi.ds.activation.condition", target = "(foo=bar)")
	private Condition defaultCondition;

}
```

It can be used with any of the known injection points, similar to any other Service. It is not permitted to use the Reference name “org.osgi.ds.activation.condition” with any other type then Condition. Any other attribute can be changed at the users discretion and at his own risk.

To allow the convenient change of the default activation target, the following Annotation will be provided:

```
@ComponentPropertyType
@Retention(RetentionPolicy.CLASS)
@Target(ElementType.TYPE)
@RequireServiceComponentRuntime
public @interface DefaultActivationCondition {
	/**
	 * Prefix for the property name. This value is prepended to each property
	 * name.
	 */
	String PREFIX_ = "osgi.ds.activation.condition";

	/**
	 * Service property providing a new target filter for the default activation
	 * Condition
```

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```
	 *
	 * @return The target filter for the default activation condition.
	 */
	String target();
}
```

6 Data Transfer Objects

Special DTOs are not necessary. A Condition is just a Service. All required Information are already available through the DTOs of DS and CDI. The default condition dependency reference however needs to be visible in the respective DTOs.

7 Javadoc

Please include Javadoc of any new APIs here, once the design has matured. Instructions on how to export Javadoc for inclusion in the RFC can be found here: https://www.osgi.org/members/RFC/Javadoc

8 Considered Alternatives

8.1 Use conditions to trigger Components enablement

This notion was abandoned right from the start, because a Condition is just a Service and DS and CDI have already mechanisms in place to react and require to them.

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Currently Components have an enabled flag, to tell DS to handle a Component. A component can disable itself via its Components Context. The only possibility to enable a Component again would be to hand the `ComponentContext` to someone else, so he can enable it again or via the ServiceComponentRuntime Service.

Conditions can be a more powerful and convenient way for a component developer, to control its enablement. Thus a new enablement condition filter will be used beside the enable marker.

8.1.1 XML Schema

To use the condition as trigger, a new field `enablementCondition` is added to the component XML schema of type String. The filed is optional and must be a valid filter if set.

Do we want to mark the enable field as deprecated or do we want to keep it forever?

8.1.2 Annnotation

The @Component Annotation must be amended with the following field:

```
String enablementCondition() default "";
```

This will be mapped to its counterpart in the component XML at build time.

8.1.3 Behavior

DS must adhere to the following rules:

	State	Behavior
1	`enable=true` `enablementCondition=<empty>`	DS enables the Component, the moment the default true Condition becomes available (see 5.1.1).
2	`enable=true` `enablementCondition=”(foo=bar)”`	DS enables the Component, the moment a condition matching the given filter becomes available.
3	`enable=false` `enablementCondition=<empty>`	The Component is disables. If the enable state is changed via DTOs or ComponentContext the behaviour of 1 applies.
4	`enable=false` `enablementCondition=”(foo=bar)”`	The Component is disables. If the enable state is changed via DTOs or ComponentContext the behaviour of 2 applies.

9 Security Considerations

Description of all known vulnerabilities this may either introduce or address as well as scenarios of how the weaknesses could be circumvented.

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10 Document Support

10.1 References

[1]. Bradner, S., Key words for use in RFCs to Indicate Requirement Levels, RFC2119, March 1997.

[2]. Software Requirements & Specifications. Michael Jackson. ISBN 0-201-87712-0

Add references simply by adding new items. You can then cross-refer to them by chosing <Insert><Cross Reference><Numbered Item> and then selecting the paragraph. ***STATIC REFERENCES (I.E. BODGED) ARE NOT ACCEPTABLE, SOMEONE WILL HAVE TO UPDATE THEM LATER, SO DO IT PROPERLY NOW.***

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10.3 Acronyms and Abbreviations

10.4 End of Document

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