RFC-227 Configuration Admin Updates

Draft

12 Pages

Abstract

10 point Arial Centered.

Updates to Configuration Admin for R7.

0 Document Information

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0.3 Feedback

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

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		*Initial Version* *Carsten Ziegeler, Adobe <cziegele@adobe.com>*
0.1	*28-JUN-2016*	*Updates from Darmstadt F2F (ConfigurationPlugin)* *Carsten Ziegeler, Adobe <cziegele@adobe.com>*

1 Introduction

This RFC collects a numbers of requested enhancements to Configuration Admin Service that were suggested after Release 6 design work was completed. Some of the requirements are extracted from RFC 218 Configurator.

2 Application Domain

The Configuration Admin Specification was last change as part of Release 5. From that specification:

> The Configuration Admin service is an important aspect of the deployment of an OSGi framework. It allows an Operator to configure deployed bundles. Configuring is the process of defining the configuration data for bundles and assuring that those bundles receive that data when they are active in the OSGi framework.

3 Problem Description

3.1 RFC 218 Configurator

RFC 218 defines the Configurator, an extender that allows the storage of configuration data in a bundle. Some of the requirements from that RFC can best be realized with new features/requirements for the Configuration Admin Service.

3.2 Support ConfigurationPlugin-like behavior for non-MS/MSF users (Bug 2908)

The ConfigurationPlugin defined in the Configuration Admin Service Specification is invoked before a configuration is delivered to a ManagedService(Factory). The plugin is able to modify the configuration properties. There are several use cases like replacing configuration values with values provided through system properties (or similar mechanism), decode values, or provide additional properties.

While this works with registering a ManagedService(Factory), component containers like Declarative Services or Blueprint are not required to register ManagedServices on behalf of their components. Therefore whether the ConfigurationPlugin mechanism works with such containers is implementation dependent and not specified.

4 Requirements

4.1 Configuration Admin

- C0010 – It must be possible to specify the service.pid value when creating a factory configuration. This implies the need for a get_or_create factory configuration method in ConfigurationAdmin. (RFC 218)
- C0020 – It must be possible to prevent the updating of a configuration by the runtime even the developer forced it. (RFC 218)
- C0030 – It must be possible to avoid any action if a configuration is updated with the exact samef properties and values as it already has (RFC 218)
- C0040 - Support ConfigurationPlugin-like behavior for non-MS/MSF users

5 Technical Solution

5.1 PID Handling of Factory Configurations

The current Configuration Admin Service Specification provides no control over the PID of a factory configuration: a new factory configuration gets assigned a PID generated by the *Configuration Admin*. This makes it hard for any (provisioning) tool to manage such a configuration as it needs to store this generated PID in order to later on update or delete the factory configuration.

Configuration Admin specifies that a “PID should follow the symbolic-name syntax”, however in the examples in table 104.1 non symbolic-names are used. For targeted PIDs it's already defined that the pipe character '|' is used to separate the PID part from the target information which in fact means that a PID must not use this character. This should be more precisely specified in section 104.3.1. In the same way as the pipe character has been

introduced as a special character the character '#' is introduced as another special character for the PID handling of factory configurations.

By introducing two new methods on the *Configuration Admin* service, a client of the service can specify the PID of the factory configuration by providing the factory PID and a name:

```
public Configuration getFactoryConfiguration(String factoryPid, String name,
String location) throws IOException;

public Configuration getFactoryConfiguration(String factoryPid, String name)
throws IOException;
```

These methods require a factoryPID and a name argument. The method still generates a PID however the generated PID has the form: `factoryPid#name`. This ensures that the *Configuration Admin* can still guarantee uniqueness of the PID. If a configuration with the given combination of factoryPID and name already exists, this is returned, otherwise a new factory configuration is returned. The returned configuration has the factoryPID and a generated PID as mentioned above. Location handling, binding and permission checks works as defined for `getConfiguration`.

The name can be used to find a factory configuration using `listConfigurations`:

```
ConfigurationAdmin ca = …;
ca.listConfigurations("(service.pid=my.factory.pid#myname)");
```

5.2 Locking Configuration Records

The `Configuration` interface is enhanced with the following methods:

```
/**
 * Locks or unlocks the configuration.
 * @param flag If {@code true} the configuration is locked,
 *             if {@code false} the configuration is unlocked.
 * @throws IOException If the new lock state cannot be persisted.
 * @throws IllegalStateException If this configuration has been deleted.
 */
public void setLocked(boolean flag) throws IOException;

/**
 * Check if the configuration is currently locked.
 * @return {@code true} if the configuration is locked, {
 *         {@code false} otherwise.
 * @throws IllegalStateException If this configuration has been deleted.
 */
public boolean isLocked();
```

If the configuration is locked using `setLocked(true)` this state is persisted and the configuration remains locked until it is explicitly unlocked calling `setLocked(false)`. If the configuration is locked and Configuration.setProperties(Dictionary), Configuration.update(Dictionary) or `Configuration.delete()` is called, a `LockedConfigurationException` (subclass of IOException) is thrown.

5.2.1 Security impacts

A new action, LOCK, is added to the configuration permission. In order to lock or unlock a configuration, the caller needs the permission to do so. The verification of the permission is handled in the same way as for the CONFIGURE action as outline in section 104.11.1.

5.3 Improving Configuration Updates

Currently, any call of the update method on the Configuration object assumes that the configuration actually changed. The change count is increased, listeners and managed service (factories) are informed.

Configuration Admin should actually check whether the updated configuration is the same as the previous configuration, and if so ignore this operation. This allows all (provisioning) clients to simply update a configuration without reimplementing a complicated change check, Doing it once in Configuration Admin is more efficient and improves the handling for every client.

As configurations should only contain a limited set of types, equals can be called on the property values to find out whether the values are the same. For arrays, equals need to be called on each member of the array.

```
/**
 * Update the properties of this {@code Configuration} object if the
 * provided properties are different than the currently stored set
 *
 * If the properties are the same, no operation is performed, otherwise it
 * stores the properties in persistent storage after adding or overwriting
 * the following properties:
 * <ul>
 * <li>"service.pid" : is set to be the PID of this configuration.</li>
 * <li>"service.factoryPid" : if this is a factory configuration it is set
 * to the factory PID else it is not set.</li>
 * </ul>
 * These system properties are all of type {@code String}.
 *
 * <p>
 * If the corresponding Managed Service/Managed Service Factory is
 * registered, its updated method must be called asynchronously. Else, this
 * callback is delayed until aforementioned registration occurs.
 *
 * <p>
 * Also notifies all Configuration Listeners with a
 * {@link ConfigurationEvent#CM_UPDATED} event.
 *
 * @param properties the new set of properties for this configuration
 * @throws LockedConfigurationException If the configuration is locked
 * @throws IOException if update cannot be made persistent
 * @throws IllegalArgumentException if the {@code Dictionary} object
 *         contains invalid configuration types or contains case variants of
 *         the same key name.
 * @throws IllegalStateException If this configuration has been deleted.
 */
public void setProperties(Dictionary<String, ?> properties) throws IOException;
```

5.4 Capabilities

The Configuration Admin implementation bundle must provide the osgi.implementation capability with name osgi.cm. This capability can be used by provisioning tools and during resolution to ensure that a Configuration Admin implementation is present to manage configurations. The capability must also declare a uses constraint for the org.osgi.service.cm package and provide the version of this specification:

```
Provide-Capability: osgi.implementation;
                    osgi.implementation="osgi.cm";
                    uses:="org.osgi.service.cm";
                    version:Version="1.6"
```

This capability must follow the rules defined for the osgi.implementation Namespace.

The bundle providing the Configuration Admin service must provide a capability in the osgi.service namespace representing this service. This capability must also declare a uses constraint for the org.osgi.service.cm package:

```
Provide-Capability: osgi.service;
                    objectClass:List<String>="org.osgi.service.cm.ConfigurationAdmin";
                    uses:="org.osgi.service.cm"
```

This capability must follow the rules defined for the osgi.service Namespace.

5.5 Improved ConfigurationPlugin Support

This has been discussed as part of RFC 165 and removed from that RFC (see section 6.2 in RFC 165).

The Configuration Admin service allows third-party applications to participate in the configuration process. Bundles that register a service object under a ConfigurationPlugin interface can transform the configuration dictionary just before it reaches the configuration target service. In order to support Configuration Admin clients not registering a ManagedService(Factory), a new method `getModifiedProperties(ServiceReference<ManagedService>)` is added to the Configuration interface. If this is invoked, Configuration Admin calls all `ConfigurationPlugin` services as already described in the specification and the modified configuration properties are returned as a `Dictionary`.

The service reference passed into the method can point to a placeholder service which is registered on behalf of the bundle using the configuration. For example, DS can register such a service for each bundle it is extending. As that service should not be called by Configuration Admin it will register it without a PID service property, therefore it will be ignored. The advantage of this approach is that the passed in reference is a valid service reference.

TODO : Permission for calling getModifiedProperties() ?

Alternative:

Interface and method names are just placeholders atm – we should come up with better ones once we decided on the approach.

In the context of RFC 165 and the corresponding bug https://osgi.org/members/bugzilla/show_bug.cgi?id=1272 it was discussed to deprecate ConfigurationPlugin and therefore the solution at that time was discarded. A new interface ConfigurationTransformer could replace the ConfigurationPlugin:

```
void transform(Bundle bundle, Dictionary properties)
```

The method works as ConfigurationPlugin#modifyConfiguration. When Configuration#getModifiedProperties() (no argument necessary anymore) is called, the ConfigurationTransformer services are called in order of their service ranking, lowest first. Same is done when the configuration is passed to a managed service (factory).

ConfigurationPlugin (and ConfigurationTransformer) only covers the way out, but not the way in. There are several use cases for processing the configuration before it hits Configuration Admin. A new interface ConfigurationProcessor defines services to be called by Configuration Admin just before it persists the configuration:

```
void process(Bundle bundle, Dictionary properties)  throws IOException;
```

ConfigurationAdmin calls the processors before persisting the configuration in order of their service ranking, lowest first. A processor might throw an IOException to prevent from updating.

5.6 Clarifications

5.6.1 ConfigurationPlugin Ranking

While it is explained that plugins are ordered by service.cmRanking, it is not explicitly mentioned which order is used when two plugins have the same ranking. It would be nice to clarify this, e.g. ordering by service.id in that case (lowest last).

5.6.2 Modifications by ConfigurationPlugin

The current spec text is a little bit unclear how to handle modifications of plugins with a cmRanking below 0 or above 1000. While it reads that these “should” not modify the properties, it also states that these are called before/after modifications are made. This leads to the assumption that any modifications of such plugins are ignored. This could be made more explicit.

It also states that any exception thrown by a plugin is ignored (and logged), but it’s not stated what happens with modifications already done by this plugin. While this is of course an edge case, the spec should be more precise.

5.6.3 ManagedService(Factory) without PID property

It’s not explicitly mentioned what happens with ManagedService(Factory) services registered without a PID. Such services are obviously ignored.

6 Data Transfer Objects

RFC 185 defines Data Transfer Objects as a generic means for management solutions to interact with runtime entities in an OSGi Framework. DTOs provides a common, easily serializable representation of the technology.

For all new functionality added to the OSGi Framework the question should be asked: would this feature benefit from a DTO? The expectation is that in most cases it would.

The DTOs for the design in this RFC should be described here and if there are no DTOs being defined an explanation should be given explaining why this is not applicable in this case.

This section is optional and could also be provided in a separate RFC.

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

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.

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

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10.3 Acronyms and Abbreviations

10.4 End of Document