

Setup Development Environment for the openMDM(R) Application

Eclipse mdmbl project

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1. Introduction

1.1. General

This document serves as a guide for developers of the Eclipse mdmbl project. It describes how to setup your environment, where the source code of existing projects can be found and retrieved, how the application can be built, deployed and how to start the application.

Mailinglists:

- For development communication we use the mdmbl mailing list:
<https://dev.eclipse.org/mailman/listinfo/mdmbl-dev>
- The openMDM Working group mailing list:
<https://dev.eclipse.org/mailman/listinfo/open-measured-data-wg>

For contributing to the mdmbl project you need to sign the ECA
(Eclipse Contributor Agreement) : <https://wiki.eclipse.org/ECA>

Helpful Links:

- Eclipse Wiki - openMDM EWG:
<https://wiki.eclipse.org/Open-Measured-Data-Management-WG>
- Eclipse Project openMDM@BL:
<https://projects.eclipse.org/projects/technology.mdmbl>
- Eclipse Bugzilla mdmbl issues:
https://bugs.eclipse.org/bugs/buglist.cgi?quicksearch=openmdm&list_id=16180271
- JIRA REQU Issues:
<https://openmdm.atlassian.net/secure/RapidBoard.jspa?rapidView=57&projectKey=REQU&view=planning&selectedIssue=REQU-48>
- openMDM git repos: <http://git.eclipse.org/c/?q=mdm>

1.2. Requirements and Bugs (JIRA and Bugzilla)

Requirements:

- Requirements are created in the JIRA REQU project [1]

- Requirements are ordered by priority and maturity by the Steering Committee
- for every REQU issue one or more Eclipse Bugzilla issues [2] are created
 - a comment with the link to the Bugzilla issue is added to the REQU issue
 - the Bugzilla issue summaries follow the naming convention:
[REQU-xx] <summary>
- mdmbl dev team works on the Bugzilla issues

[1]<https://openmdm.atlassian.net/secure/RapidBoard.jspa?projectKey=REQU&rapidView=57&view=planning>

[2] <https://bugs.eclipse.org/bugs/buglist.cgi?quicksearch=mdmbl>

Bugzilla Bugs:

- created from JIRA REQU issues: the Bugzilla issue summaries follow the naming convention: [REQU-xx] <summary>, a link back to JIRA is also provided in a comment
- “real” bugs from internal or external
- technical requirements / enhancements from the team

1.3. Use of new Frameworks

To introduce a new framework to the code the QA guidelines of the EWG and the Legal Process of Eclipse (<https://www.eclipse.org/legal/EclipseLegalProcessPoster.pdf>) has to be followed:

- Get the approval for use from the the Architecture Committee. The members of the AC are listed here: <https://wiki.eclipse.org/Open-Measured-Data-Management-WG>.
- Get the IP approval from Eclipse, at least IP Check Type A, see Section [12 IP Management and Licensing Software](#)

Only if you have both approvals, you can use the libraries in the code.

1.4. Branching and versioning

Version number system changes after version 0.10. Version 0.11 was renamed in 5.0.0M1 (Version 5.0.0, Milestone 1).

This affects only the following projects:

1. org.eclipse.mdm.api.base
2. org.eclipse.mdm.api.default
3. org.eclipse.mdm.api.odsadapter
4. org.eclipse.mdm.nucleus

Stable versions are on the **master** branches.
The current development happens on the **dev** branches.

The latest stable version is the current master. Older stable versions are tagged with the version number, e.g. 0.6, 0.7, 0.8. These numbers refer to the releases in the openMDM JIRA:

<https://openmdm.atlassian.net/projects/REQU?selectedItem=com.atlassian.jira.jira-projects-plugin:release-page&status=released-unreleased>

Also see the mdmbl download page:

<https://projects.eclipse.org/projects/technology.mdmbl/downloads>

For each version since 0.7 find documentation and release notes in Git:

<http://git.eclipse.org/c/gerrit/mdmbl/org.eclipse.mdmbl.git/tree/Releases>

For version since 5.0.0M1 find also the build artefacts in Git:

<http://git.eclipse.org/c/gerrit/mdmbl/org.eclipse.mdmbl.git/tree/Releases>

Note I:

Only use code from the same version between the projects! There are breaking changes between the versions!

Note II:

All jar files that are build have the suffix *-1.0.0.jar - from existing versions up to V0.10. Newer jar files reflect the version numbers.

1.5. Eclipse Infrastructure

1.5.1. Gerrit

The mdmbl project is using Gerrit for code reviews. To configure, refer to chapter [4.4 Configure Gerrit](#).

Gerrit has a two stage reviewing system:

1. when code is checked into Gerrit, a build is automatically started. Ther Gerrit flag “verified” is set to +1, if the build succeeded
2. a committer has to review the code and if ok, the code review flag is set to +2

1.5.2. Jenkins

<https://ci.eclipse.org/mdmbl/>

There a nightly builds for the dev and the master branches of the following projects:

5. org.eclipse.mdm.api.base
6. org.eclipse.mdm.api.default
7. org.eclipse.mdm.api.odsadapter

8. org.eclipse.mdm.nucleus

There are also builds for Gerrit and Sonar.

1.5.3. Sonar

The Eclipse SonarQube server is available via <https://sonar.eclipse.org>.

Rules: Qualitygate - sonar way with findbugs

Static code analysis is configured for the dev branches of the following projects:

1. org.eclipse.mdm.api.base
2. org.eclipse.mdm.api.default
3. org.eclipse.mdm.api.odsadapter
4. org.eclipse.mdm.nucleus

Generated and test sources are excluded.

1.6. ODS Server used for Developer Tests

All released versions are tested with the following ODS Server:

- HiQSoft GmbH, Version 4.6:
<https://www.highqsoft.com/de/avalon-asam-ods-server/>
- Peak Solution GmbH, Version 2.5.8
<http://www.peak-solution.de/de/produkte-leistungen/versuchs-messdatenmanagemen-t/softwareloesungen/peak-ods-server/>

2. Prerequisites

Already installed on your machine or install it:

- Java 8:
 - Oracle Java SE 8u201 and higher
<http://www.oracle.com/technetwork/java/javase/downloads/>
 - AdoptJDK: openJDK 8 with HotSpot
<https://adoptopenjdk.net/>
- Maven: <https://maven.apache.org/>
- Git: <https://git-scm.com>

Test, if programs are available from a console:

- > java -version
- > mvn --version
- > git --version

If not, add the programs to your PATH variable or set corresponding *_HOME variables.

3. Installations

3.1. Gradle

See <https://gradle.org/install/> for installation on you system.

OR:

- Download Gradle from <http://gradle.org/downloads>
- Unzip the file into a directory without spaces (recommended).
- Create a GRADLE_HOME environment variable that points to this directory.
- Adjust your PATH environment variable to include \$GRADLE_HOME/bin (%GRADLE_HOME%\bin on Windows).
- Test your setup by invoking `gradle --version`.

3.2. Eclipse IDE

Get the current JEE Distribution from <https://www.eclipse.org/downloads>

It is recommended to use the Eclipse Installer.

Note: installation is tested with Eclipse Oxygen, Eclipse 2018/12, Eclipse 2019/03

Install Plugins:

- Gradle: follow this tutorial <http://www.vogella.com/tutorials/EclipseGradle/article.html>.
Already included in the Eclipse Oxygen JEE Distribution
- SonarLint via Eclipse Marketplace
- EclEmma Code Coverage Tool (optional)

Create a new workspace for the mdmbl projects and configure it:

- set encoding to UTF-8
- set formatting rules to the Eclipse default rules [built in]

Formatter:

We highly recommend to use the Eclipse 2019/03 IDE. Set the formatting rules to the Eclipse default rules [built in].

If you use a former version, then import the formatting rules from:

org.eclipse.mdm.nucleus/eclipse_formatter.xml

THIS IS IMPORTANT as the default rules in Eclipse are changing with the releases.

3.3. Database for the User Preference Service

The Preference service stores its data to a relational database. The database connection is looked up by JNDI and the JNDI name and other database relevant parameters are specified in src/main/resources/META-INF/persistence.xml. The default JNDI name for the JDBC resource is set to jdbc/openMDM.

For the User Preference Service you need a database with a schema “openMDM”.

Note: “openMDM” is the default schema name, it can be changed in the file:

```
/org.eclipse.mdm.nucleus/org.eclipse.mdm.preferences/src/main/resources/META-INF/persistence.xml
```

3.3.1. Apache Derby Database

The Glassfish Application Server has included the Derby libraries, so first get the Glassfish, as described this [chapter](#).

Create database and tables:

- Change to your <glassfish_root> directory
- Start the database:.

```
<glassfish_root>$ ./glassfish/bin/asadmin start-database
```

- Start the ij Tool (http://db.apache.org/derby/papers/DerbyTut/ij_intro.html):

```
<glassfish_root>$ java -jar ./javadb/lib/derbyrun.jar ij
```

- Create database with default name “openMDM”

```
ij> CONNECT  
'jdbc:derby://localhost:1527/openMDM;create=true';
```

- Create the table “preference”

```
ij> CREATE TABLE OPENMDM.PREFERENCE (ID BIGINT GENERATED BY
DEFAULT AS IDENTITY NOT NULL, keyCol VARCHAR(255), SOURCE
VARCHAR(255), username VARCHAR(255), valueCol
CLOB(2147483647) NOT NULL, PRIMARY KEY (ID));
```

- Add constraints

```
ij> CREATE TABLE OPENMDM.PREFERENCE (ID BIGINT GENERATED BY
DEFAULT AS IDENTITY NOT NULL, keyCol VARCHAR(255), SOURCE
VARCHAR(255), username VARCHAR(255), valueCol
CLOB(2147483647) NOT NULL, PRIMARY KEY (ID));
```

```
ij> ALTER TABLE OPENMDM.PREFERENCE ADD CONSTRAINT
UNQ_PREFERENCE_0 UNIQUE (source, username, keyCol);
```

- Check table:

```
ij> SELECT * FROM OPENMDM.PREFERENCE;
```

- close ij

```
ij> exit;
```

- Stop database.

```
<glassfish_root>$ ./bin/asadmin stop-database
```

3.3.2. Other Database Products

There is also the possibility to use other database products. For Postgres DB you will find the according sql scripts after the nucleus build in the following directory:

```
$workspace/org.eclipse.mdm.nucleus/build/distributions/schema/org.
eclipse.mdm.preferences
```

Other database products supported by EclipseLink may also work, but are neither tested nor supported by the mdmbl project.

3.4. Glassfish

3.4.1. Supported versions

- 4.1.2 - Full Platform from <https://javaee.github.io/glassfish/download>
 - Some patches are necessary. Refer to this [chapter](#) for patching glassfish.
- 5.1.0 - Full Platform from <https://projects.eclipse.org/projects/ee4j.glassfish/downloads>

- Deployment with Glassfish Administration Console is not possible, because of a Glassfish Bug: 545170 - "Archive Path is NULL" when deploying from GUI (https://bugs.eclipse.org/bugs/show_bug.cgi?id=545170)
- Refer to this [chapter](#) for deploying by command line

3.4.2. Installation

- Unzip the file into a directory without spaces (recommended).
- Test it:
 - change to the glassfish-root directory
 - invoke `./glassfish/bin/asadmin start-domain``
 - change to your browser
 - URL localhost:8080 should show you a welcome page
 - URL localhost:4848 should show you the admin page
 - Note: if you need to change the default ports 8080 or 4848 please see the glassfish documentation

3.4.1. Configure JDBC for the User Preference Service DB

For the **User Preference Service DB** configure JDBC resource and its dependent JDBC Connection Pool. It has to be created and configured within the glassfish web administration console or through asadmin command line tool.

Description for the Derby Database with defaultname "openMDM":

- Start Glassfish: `./glassfish/bin/asadmin start-domain``
- Start Derby DB: `./glassfish/bin/asadmin start-database``
- start: <http://localhost:4848/>
- Menu Item: JDBC-> JDBC Connection Pools -> new
 - poolname: <mypool_name>
 - Resource Type: javax.sql.DataSource
 - Database Driver Vendor: Derby
 - -> next
 - set properties: User, Password, DatabaseName to openMDM
 - -> finish
 - check it: open Connection Pool, try the ping button
- Menu item JDBC -> JDBC Resources -> new
 - JNDI NAME: jdbc/openMDM
 - Pool Name: <mypool_name>
- stop glassfish `./glassfish/bin/asadmin stop-domain domain1``
- stop Derby DB: `./glassfish/bin/asadmin stop-database``

3.5. Database for ODS-Server

The database product is dependent of the ODS Server you use. To start an ODS Server you need a loaded ASAM ODS Application Model in the DB.

3.5.1. Embedded Apache Derby Database and Peak ODS Server

If you use a Peak ODS Server from Peak Solutions GmbH: they provide an embedded demo Derby Database with an Application Model and Data. Follow their instructions.

3.5.2. Oracle 11g XE Release 2

- Download and install it:
<http://www.oracle.com/technetwork/database/database-technologies/express-edition/downloads/index.html>
- Note for Ubuntu Users: see this article
<http://tuhrig.de/3-ways-of-installing-oracle-xe-11g-on-ubuntu/>
- Note for Linux Users: Installing the Docker Container works, see:
<https://hub.docker.com/r/alexeiled/docker-oracle-xe-11g/>

To load an empty Application Model to the DB: please refer to Jira-Ticket ORGA-178

3.6. ODS Server

ASAM ODS-Server e.g. from

- Peak Solution:
<http://www.peak-solution.de/de/produkte-leistungen/versuchs-messdatenmanagemen/t/softwareloesungen/peak-ods-server/>
Note: you also need the **notification service plugin** for Peak ODS Server
- HiQSoft:
<https://www.highqsoft.com/de/avalon-asam-ods-server/>
- or another compliant data source (e.g. PAK adapter)

- Get a (test) license from the vendors and follow the installation instructions.
- If you already imported an Application Model to your database and database is running, then the ODS Server should start.

Notes for running a Peak ODS Server:

- You need the notification service. Check if there is the `notification-plugin-1.1.0.jar` in the `$odsserver_root/lib` directory or copy it there.
- Configure parameters in `$odsserver_root/cfg/server.properties`:
 - Add the following line to enable the notification service:
`JMS_FORWARDER.PORT=8089`

- The Peak ODS Server can run its own ORB daemon. Just leave the following parameter blank: `NAMESERVICE=`
- Use the Peak demo Derby DB (MDMNVH DB) in embedded mode, the database starts automatically with the Peak ODS Server startup.
Username and password are the name must be the name of the schema.
 - `DB_DRIVER = DERBY_EMBEDDED`
 - `DB_URL = jdbc:derby: /<path_to_MDMNVH_DerbyDB>/MDMNVH;create=false`
 - `DB_USER = MDMNVH`
 - `DB_PASSWORD = MDMNV`

3.7. ElasticSearch

ElasticSearch can be downloaded at <https://www.elastic.co/products/elasticsearch>

Use version 2.x., e.g.

<https://www.elastic.co/de/downloads/past-releases/elasticsearch-2-4-2>

Upgrade to version 5.x is planned, but it is not working yet, see:

https://bugs.eclipse.org/bugs/show_bug.cgi?id=520297

For testing purpose, it can be simply started by executing `bin/run.bat`

4. Get and build the code

4.1. Source Code Repositories

The application is split into several modules, each one dedicated to a certain scope of functions. All source code has been made available in git repositories hosted by the Eclipse Foundation <https://eclipse.org/org/foundation/>

The version control system used to track all changes is Git: <https://git-scm.com/>

We strongly recommend to use a separate workspace for the openMDM projects.

4.1.1. Manually checkout

- Change to the workspace directory
- Run the following command to checkout the source code. You have to adapt the URL for each project: ``git clone <repository URL>``

Checkout the following projects

```
git clone http://git.eclipse.org/gitroot/mdmbl/org.eclipse.mdm.api.base.git
```

```
git clone http://git.eclipse.org/gitroot/mdmbl/org.eclipse.mdm.api.default.git
```

```
git clone http://git.eclipse.org/gitroot/mdmbl/org.eclipse.mdm.api.odsadapter.git
```

```
git clone http://git.eclipse.org/gitroot/mdmbl/org.eclipse.mdm.nucleus.git
```

Additional tools:

```
git clone http://git.eclipse.org/gitroot/mdmbl/org.eclipse.mdm.openatfx.mdf.git
```

```
git clone http://git.eclipse.org/gitroot/mdmbl/org.eclipse.mdm.mdfsoriter.git
```

4.1.2. Checkout in Eclipse IDE

Alternatively configure eGit in your Eclipse IDE and checkout there.

- Open the Git Perspective
- Open “Clone a Git Repository ...”
- Checkout with Username / Password:

If you follow this way, the Git / Gerrit Configuration described in this [chapter](#) will be obsolete.

`https://<eclipse_username>@git.eclipse.org/r/a/mdmbl/<my_repo>`,

the password is the Gerrit Password, look there:

<https://git.eclipse.org/r/#/settings/http-password>

e.g. <https://awittek@git.eclipse.org/r/a/mdmbl/org.eclipse.mdm.api.base>

- Or anonymous with the URIs above.
- Screenshot:

The screenshot shows the 'Clone Git Repository' dialog box in Eclipse IDE. The title bar reads 'Clone Git Repository'. Below the title bar, there is a 'Source Git Repository' section with the instruction 'Enter the location of the source repository.' and a 'GIT' logo. The dialog is divided into several sections:

- Location:** The 'URI' field contains `https://awittek@git.eclipse.org/r/a/mdmbl/org.eclipse.mdm.api.odsadapter`. There is a 'Local File...' button to the right.
- Host:** The field contains `git.eclipse.org`.
- Repository path:** The field contains `/r/a/mdmbl/org.eclipse.mdm.api.odsadapter`.
- Connection:** The 'Protocol' dropdown is set to 'https'. The 'Port' field is empty.
- Authentication:** The 'User' field contains 'awittek'. The 'Password' field is masked with dots. There is a checked checkbox for 'Store in Secure Store'.

At the bottom of the dialog, there are four buttons: a help icon (?), '< Back', 'Next >', 'Cancel', and 'Finish'.

4.2. Importing projects to the Eclipse IDE

Import the project to your Eclipse IDE via File -> Import -> Import as existing gradle project. If importing all projects at once via the parent directory fails, import each project separately. Build the projects in the order they are listed above, because of the dependencies between them.

Refer to the documentation and follow it:

- <http://git.eclipse.org/c/gerrit/mdmbl/org.eclipse.mdm.nucleus.git/tree/README.md>

If there are still java errors after importing and building, right click on the project -> Gradle -> Refresh Gradle Project

For other build problems. see the section [4.4 Known setup bugs](#). If your problem is not listed there, create a Bugzilla Bug for it:

https://bugs.eclipse.org/bugs/enter_bug.cgi?product=MDMBL

After importing the projects to the IDE, you have all repository connections in the Git perspective.

4.3. Building the projects

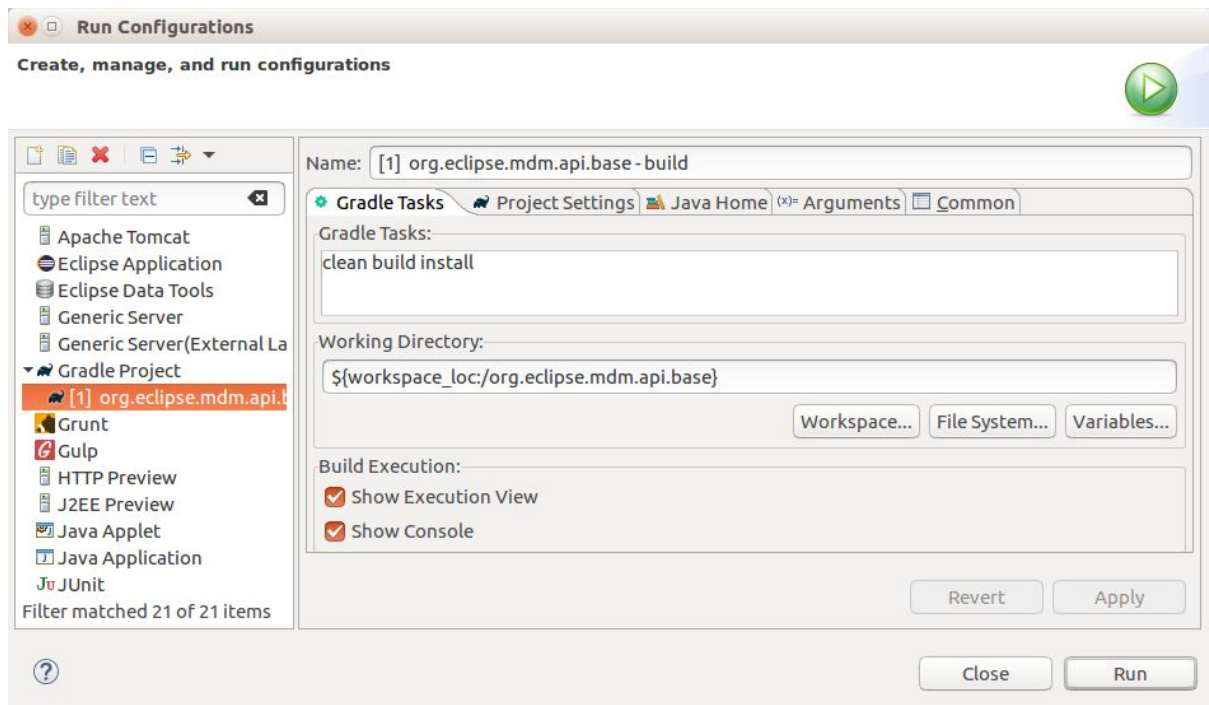
4.3.1. Building projects separately

Run `./gradlew clean build` in the root directory of each project to build it.

Execute `./gradlew clean build install` also generates a JAR to be placed in your local cache.

From there it can be retrieved when subsequent projects are build.

Or you build the projects in the Eclipse IDE via a Run Configuration:



Please see the README.md files in the root directory of the projects for exact information about how the projects are built.

Note: some projects depend on each other, so you have to build them in a specific order:

1. org.eclipse.mdm.api.base
2. org.eclipse.mdm.api.default
3. org.eclipse.mdm.api.odsadapter
4. org.eclipse.mdm.nucleus

The other projects can be built independently.

4.3.2. Building all projects for the core application

Running the gradlew script from org.eclipse.mdm.nucleus project will build the following projects:

1. org.eclipse.mdm.api.base.git
2. org.eclipse.mdm.api.default.git
3. org.eclipse.mdm.api.odsadapter.git
4. org.eclipse.mdm.nucleus.git

4.3.3. Building the projects without web frontend

To build the application without the web frontend, pass the argument **skipNode** to the build script of the org.eclipse.mdm.nucleus project.

```
> ./gradlew clean build -PskipNode
```


4.4. Configure Git and Gerrit

For checking in code to a repository you need to configure Gerrit in the Git perspective.

Additional informations:

- Gerrit can be found at <https://git.eclipse.org/r/>
- There is a tutorial, it also explains how to use Gerrit with Eclipse:
<http://www.vogella.com/tutorials/Gerrit/article.html>
- See documentation from Eclipse: <https://wiki.eclipse.org/Gerrit>

Prerequisites:

- Get your Gerrit Password via:
<https://git.eclipse.org/r/#/settings/http-password>
- Configure your Gerrit settings: <https://git.eclipse.org/r/#/settings/>
-> Watch the mdmbl projects.

4.4.1. Configure repositories

Go to your Eclipse IDE -> Git Perspective:

For all projects do:

- Expand the project
- Remotes -> origin -> Select "Configure Push" from context menu -> OK
- URI -> click change button
- Configure URI Window:
 - URI: `https://<eclipse_username>@git.eclipse.org/r/a/mdmbl/<projectname>`
e.g.
`https://<eclipse_username>@git.eclipse.org/r/a/mdmbl/org.eclipse.mdm.api.base`
 - Protocol: choose HTTPS
 - Fill in username and password (the Gerrit one from the settings above)
 - Check the option "Store in secure store"
- Back to the "Configure Push" Window, section "Ref mapping" -> add
 - Local Branch: HEAD
 - Choose remote branch:
 - for the dev branch e.g. refs/for/dev
 - for the master branch: refs/heads/master
 - OK
- Try the "Dry-Run" Button to test your configuration
- Save
- "Gerrit Configuration" (right click on the remote)
 - URI: same as above
 - Username: same as above
 - Destination branch: dev (or another)
- Finish

4.4.2. Configure Push

To push code to Gerrit you can

- 1) As a committer
 - a) Push code directly to Gerrit without any review (in Git repositories view: Push to upstream)
 - b) Push code to Gerrit for reviewing (in Git repositories view: Push to Gerrit)
- 2) As a non-committer
 - a) Push code to Gerrit for reviewing (in Git repositories view: Push to Gerrit)

4.4.3. Commits to Gerrit

- Add Signed-Off-By when you commit to sign off the commit
- In Eclipse: open the git staging perspective, there is a window called "Commit message" and next to the label "Commit Message" there are 3 buttons. the middle button is the "Add signed-off-by" button. Click it.

5. Deploy and configure application

The build of the nucleus module creates:

`/org.eclipse.mdm.nucleus/build/distributions/mdm_web-VERSION.zip`

The ZIP archive contains:

- the backend `org.eclipse.mdm.nucleus-VERSION.war`
- the configurations in `/configuration`
- sql scripts for the User Preference Service in `/schema`.

5.1. Configuration

- copy the content of the extracted `/configuration` folder to `$GLASSFISH_ROOT/domains/domain1/config`
- Configuration file: `org.eclipse.mdm.property/global.properties`
To enable globally the freetext search set the parameter: `freetext.active=true`
- if you enable the `freetext.active` parameter (`=true`), make sure
 - that ElasticSearch is started and that the port in the property `elasticsearch.url` is set correct (check it in the ElasticSearch log and via your browser with the url and port, the result should be a json response)
 - the freetext parameters are set in the `service.xml`
 - freetext search is active for at least one service
- Configuration file: `org.eclipse.mdm.connector/service.xml`
 - configure the data sources, for ODS Servers look into your ODS Server log file to determine the corba URL

- To use the freetext search configure for each datasource separately:
 - specific parameters for the NotificationService and the freetext search
 - set the freetext.active parameter to true (Example2)
 - Disable the freetext search for a datasource:
 - set the freetext.active parameter to false (Example3)
- or**
- leave away the freetext.* parameters, as they are optional (Example1)

```

<services>
<!-- Example1: ODS Server without freetext.* parameters -> freetext search is not active -->
<service entityManagerFactoryClass="org.eclipse.mdm.api.odsadapter.ODSContextFactory">
  <param name="nameservice">corbaloc::1.2@YOUR_HOST1:2809/NameService</param>
  <param name="servicename">YOUR_SERVICE1.ASAM-ODS</param>
</service>
<!-- Example2: Peak ODS-Sever with active freetext search -->
<service entityManagerFactoryClass="org.eclipse.mdm.api.odsadapter.ODSContextFactory">
  <param name="nameservice">corbaloc::1.2@YOUR_HOST2:2809/NameService</param>
  <param name="servicename">YOUR_SERVICE2.ASAM-ODS</param>
  <!--The indexing requires a user to get the Dataltems from the ODS Server. Those are the
credentials for the user -->
  <param name="freetext.active">true</param> <!--to configure the Avalon, set to false (*) -->
  <param name="freetext.user">sa</param>
  <param name="freetext.password">sa</param>
  <param name="freetext.notificationType">peak</param>
  <param name="freetext.notificationUrl">http://YOUR_HOST2:8089/api</param>
</service>

<!-- Example3: Avalon ODS-Sever -> freetext search is not active-->
<service entityManagerFactoryClass="org.eclipse.mdm.api.odsadapter.ODSContextFactory">
  <param name="nameservice">corbaloc::1.2@YOUR_HOST3:2809/NameService</param>
  <param name="servicename">YOUR_SERVICE3.ASAM-ODS</param>
  <!--The indexing requires a user to get the Dataltems from the ODS Server. Those are the
credentials for the user -->
  <param name="freetext.active">false</param> <!--to configure the Avalon, set to true (*) -->
  <param name="freetext.user">sa</param>
  <param name="freetext.password">sa</param>
  <param name="freetext.notificationType">avalon</param>
  <param name="freetext.pollingInterval">5000</param>
</service>
</services>

```

- configure the LoginModule (see org.eclipse.mdm.realms - README.md)
- restart the application server

5.2. Deployment of org.eclipse.mdm.nucleus

Deploy the backend (org.eclipse.mdm.nucleus-VERSION.war) on your Glassfish server

5.2.1. Deployment in GlassFish Server Administration Console

- Open admin console at <http://localhost:4848/>
- Select “Deploy an Application”
- Select “Choose file” under “Packaged File to Be Uploaded to the Server” und select the war file
- Adapt the “Context Root” and the “Application Name” to “org.eclipse.mdm.nucleus”
- Click “OK”
- Afterwards, goto <http://localhost:8080/org.eclipse.mdm.nucleus> and Login with sa/sa

5.2.2. Deployment through command line

The command line utility `asadmin` is available under `GLASSFISH_HOME/glassfish/bin/asadmin`.

To deploy the war file through command line execute the following command (replacing `PATH-TO-WAR` and `VERSION`)

```
asadmin deploy --force=true --name org.eclipse.mdm.nucleus  
PATH-TO-WAR/org.eclipse.mdm.nucleus-VERSION.war
```

5.3. Property lookups for parameters values in service.xml

The `service.xml` contains all information necessary for the Connector-Service to connect to the available datasources/adapters instances. Since this information includes secret information like passwords, it is possible to provide lookups, which gives you the possibility to specify tokens as references to properties defined elsewhere.

There are different lookups available:

- * `sys`: Looks up variables defined as system properties
- * `env`: Looks up variables defined as environment variables

Example:

```
`<param name="password">${env:odsPassword}</param>`
```

5.4. Configure system properties

- use system property "org.eclipse.mdm.api.odsadapter.filetransfer.interfaceName" to set a specific network interface name to be used
- use system property "org.eclipse.mdm.configPath" to redefine the location of the Glassfish config folder, e.g. "GLASSFISH_ROOT/glassfish/domains/domain1/config"

5.5. Deploy application in Glassfish

Deploying the application:

- start ORB (`$JAVA_HOME/bin/orbd -ORBInitialPort 2809`) (skip this if you are using Peak ODS Server with no NAMESERVICE specified in the `server.properties`)
- start ODS Server with corresponding database
- start Elasticsearch
- start Glassfish
 - `> asadmin start-database`
 - `> asadmin start-domain`

5.6. Configure Login Module (Realm Configuration)

The realm is configured in a standardized way. Configure your LDAP, AD or other systems according to the glassfish documentation:

<https://javaee.github.io/glassfish/doc/4.0/security-guide.pdf>

For local installations you can setup and configure a file realm, described in the `readme.md` file of the `org.eclipse.mdm.nucleus` project:

<http://git.eclipse.org/c/mdmbl/org.eclipse.mdm.nucleus.git/tree/README.md>

Note: The component "org.eclipse.mdm.realms" is not used any longer, since 5.0.0M4

5.7. Headless Deployment

The default configuration for the authentication method is set to "FORMULAR" . If you want to do a headless deployment change it to "BASIC".

Change this file:

`org.eclipse.mdm.nuclues/org.eclipse.mdm.application/src/main/webconfig/web.xml`

from

```
<auth-method>FORMULAR</auth-method>
```

to

```
<auth-method>BASIC</auth-method>
```

5.8. Configure icons for the web frontend

All icons for the web frontend are taken from the FAMFAMFAM Silk Icons library, version 1.3 (<http://www.famfamfam.com/lab/icons/silk/>) This library is licenced under the Creative

Commons Attribution 3.0 License (<https://creativecommons.org/licenses/by/3.0/>). This library was approved by the Eclipse Foundation, see CQ 17759.



















Note:

A lot of users of other mdm applications are used to the icons from this document

https://www.highqsoft.com/download/ao_base.htm

These icons are not open source, so we do not use them in our application.

The mapping from the ao elements to FAMFAMFAM icons:

ASAM ODS 5.3.0 Base Element Definitions	FamFamFam Silk Icons, V1.3
https://www.highqsoft.com/download/ao_base.htm#AoFile	 page_white_stack
https://www.highqsoft.com/download/ao_base.htm#AoEnvironment	 database
folder	 folder
https://www.highqsoft.com/download/ao_base.htm#AoMeasurementQuantity	 chart_curve_go
https://www.highqsoft.com/download/ao_base.htm#AoMeasurement	 chart_curve
https://www.highqsoft.com/download/ao_base.htm#AoParameter	 shape_square
https://www.highqsoft.com/download/ao_base.htm#AoParameterSet	 shape_move_forwards
project	 house
structure level	 paste_plain
https://www.highqsoft.com/download/ao_base.htm#AoSubmatrix	 calendar
https://www.highqsoft.com/download/ao_base.htm#AoTestEquipmentPart	 monitor
https://www.highqsoft.com/download/ao_base.htm#AoTestEquipment	 computer
https://www.highqsoft.com/download/ao_base.htm#AoTest	 brick_add
https://www.highqsoft.com/download/ao_base.htm#AoTestSequencePart	 shape_move_front
https://www.highqsoft.com/download/ao_base.htm#AoTestSequence	 page_white_stack
test step	 brick
https://www.highqsoft.com/download/ao_base.htm#AoUnitUnderTestPart	 cog
https://www.highqsoft.com/download/ao_base.htm#AoUnitUnderTest	 cog_go

The mapping is defined in:

org.eclipse.mdm.nucleus/org.eclipse.mdm.application/src/main/webapp/src/styles.css

5.9. I18N configuration of the web frontend

I18N support for web frontend, languages available: English, German.

For adding a new language see:

[org.eclipse.mdm.nucleus/org.eclipse.mdm.application/src/main/webapp/README_I18N.md](https://github.com/eclipse/mdm-nucleus/blob/master/org.eclipse.mdm.application/src/main/webapp/README_I18N.md)

Files with translations:

[org.eclipse.mdm.nucleus/org.eclipse.mdm.application/src/main/webapp/src/assets/i18n/*.json](https://github.com/eclipse/mdm-nucleus/blob/master/org.eclipse.mdm.application/src/main/webapp/src/assets/i18n/*.json)

6. Start application

- start ORB (`$JAVA_HOME/bin/orbd -ORBInitialPort 2809`) (skip this if you are using Peak ODS Server with no NAMESERVICE specified in the `server.properties`)
- start the database for the ODS Server (if necessary)
- start the ODS server
- start Elasticsearch
- start Glassfish (including database for UPS)

Change to your browser URL is <http://localhost:8080/org.eclipse.mdm.nucleus>.

You should see the openMDM LoginPage. Look for user/ password in the database in the `userXX` table, e.g. `sa/sa`.

7. Known (setup) problems and solutions

7.1. Build

- The build of the `org.eclipse.mdm.api.odsadapter` project does need a “gradle clean install” as a “gradle install” breaks with build errors that package “`com.google.protobuf`” does not exist

7.2. Glassfish

7.2.1. Glassfish - Inconsistent Module State

- `org.glassfish.deployment.common.DeploymentException: Error in linking security policy for org.eclipse.mdm.nucleus -- Inconsistent Module State`
 - **Deployment went wrong**
 - **delete**
`$glassfish_root/glassfish/domains/domain1/applications/org.eclipsemdm.nucleus`

- delete \$glassfish_root/glassfish/domains/domain1/generated
- restart Glassfish

7.2.2. Glassfish - java.lang.ClassNotFoundException

If you run into "java.lang.ClassNotFoundException: javax.xml.parsers.ParserConfigurationException not found by org.eclipse.persistence.moxy" this is a bug described in https://bugs.eclipse.org/bugs/show_bug.cgi?id=463169 and <https://java.net/jira/browse/GLASSFISH-21440>.

This solution is to replace

GLASSFISH_HOME/glassfish/modules/org.eclipse.persistence.moxy.jar with this:

<http://central.maven.org/maven2/org/eclipse/persistence/org.eclipse.persistence.moxy/2.6.1/org.eclipse.persistence.moxy-2.6.1.jar>

7.2.3. Glassfish - org.osgi.framework.BundleException

If you run into "org.osgi.framework.BundleException: Unresolved constraint in bundle com.fasterxml.jackson.module.jackson-module-jaxb-annotations": this is a compatibility problem with the installed jackson libraries.

The solution is to replace

GLASSFISH_HOME/glassfish/modules/jackson-*.jar with these files:

- <http://central.maven.org/maven2/com/fasterxml/jackson/core/jackson-annotations/2.8.1/jackson-annotations-2.8.1.jar>
- <http://central.maven.org/maven2/com/fasterxml/jackson/core/jackson-core/2.8.1/jackson-core-2.8.1.jar>
- <http://central.maven.org/maven2/com/fasterxml/jackson/core/jackson-databind/2.8.1/jackson-databind-2.8.1.jar>
- <http://central.maven.org/maven2/com/fasterxml/jackson/jaxrs/jackson-jaxrs-base/2.8.1/jackson-jaxrs-base-2.8.1.jar>
- <http://central.maven.org/maven2/com/fasterxml/jackson/jaxrs/jackson-jaxrs-json-provider/2.8.1/jackson-jaxrs-json-provider-2.8.1.jar>

Rename the jars to the replaces (remove the versions).

7.2.4. Glassfish - java.lang.NoSuchMethodError

If you are using the REST-API to access the MDM entities (CREATE und UPDATE) and encounter the following error:

```
java.lang.NoSuchMethodError:
com.fasterxml.jackson.databind.deser.std.UntypedObjectDeserializer
.<init>
```

replace the jackson libraries as mentioned in 7.2.3.

7.2.5. Glassfish - WEB9102: Login failed: Lookup failed

If you cannot login to the webclient and the glassfish log shows the following error:

```
WEB9102: Web Login Failed:
com.sun.enterprise.security.auth.login.common.LoginException:
Login failed: Lookup failed for
'java:global/org.eclipse.mdm.nucleus/ConnectorService!org.eclipse.
mdm.connector.boundary.ConnectorService' in
SerialContext[myEnv={java.naming.factory.initial=com.sun.enterpris
e.naming.impl.SerialInitContextFactory,
java.naming.factory.state=com.sun.corba.ee.impl.presentation.rmi.J
NDIStateFactoryImpl,
java.naming.factory.url.pkgs=com.sun.enterprise.naming}|#]
```

check that the war file was deployed with the Application Name "org.eclipse.mdm.nucleus"

8. Extended configurations (run & IDE)

8.1. Hot Deployment

- On the command line run "gradlew clean install" in org.eclipse.mdm.nucleus
- Eclipse setup:
- Import all projects into Eclipse (tested with Buildship 2.2.x)
- Import -> Gradle Project
 - org.eclipse.mdm.nucleus
- In project "org.eclipse.mdm.nucleus"
 - Project Properties
 - Project Facets (if project is not faceted yet)
 - Convert to faceted form ...
 - Select "Dynamic Web Module"
 - Builders (optional)
 - Disable "Validation" (speeds up redeployment)
 - Deployment Assembly
 - Remove all entries
 - Add following sources
 - To Deploy Path WEB-INF/lib
 - Java Build Path Entries
 - Add Project and External Dependencies
 - Project
 - org.eclipse.mdm.api.base
 - org.eclipse.mdm.api.default
 - org.eclipse.mdm.api.odsadapter

- org.eclipse.mdm.businessobjects
 - org.eclipse.mdm.connector
 - org.eclipse.mdm.filerelease
 - org.eclipse.mdm.freetextindexer
 - org.eclipse.mdm.preferences
 - org.eclipse.mdm.property
 - To Deploy Path WEB-INF/classes
 - Folder
 - org.eclipse.mdm.application/bin
 - To Deploy Path /
 - Folder
 - org.eclipse.mdm.application/build/node/dist
 - To Deploy Path /WEB-INF
 - Folder
 - org.eclipse.mdm.application/src/main/webconfig
- In projects
 - org.eclipse.mdm.api.base
 - org.eclipse.mdm.api.default
 - org.eclipse.mdm.api.odsadapter
 - org.eclipse.mdm.businessobjects
 - org.eclipse.mdm.connector
 - org.eclipse.mdm.filerelease
 - org.eclipse.mdm.preferences
 - org.eclipse.mdm.property
 - Project Properties
 - Project Facets
 - Set Java Version to 1.8
- In project "org.eclipse.mdm.connector"
 - Gradle -> Refresh Gradle Project
- Check that in project org.eclipse.mdm.nucleus the Deployment Assembly settings were not reset. Otherwise redo.
- Setup Glassfish (Servers View)
 - Servers -> Create new
 - Complete setup for local Glassfish instance
 - Install Glassfish tools if needed
(<https://marketplace.eclipse.org/content/glassfish-tools>)
 - Double-click on Glassfish server
 - Publishing
 - "Automatically publish when resources change"
 - Context Menu -> Add and Remove ...
 - Add org.eclipse.mdm.nucleus to Glassfish

- Configure Glassfish
 - Open Management Console (localhost:4848)
 - Configurations
 - server-config
 - System Properties
 - Add property
org.jboss.weld.serialization.beanIdentifierIndex
Optimization to false
- Start Glassfish in "Debug"-Mode to have your changed sources published

8.2. Angular Live Development Server

During development a full build of the MDM5 Webclient, which is part of the nucleus, is quite time consuming. It is more efficient to skip the client build entirely by using the parameter `-PskipNode`, which excludes the JavaScript-Code from being build and included in the war file. For the UI you can start the "NG Live Development Server".

It is started by invoking "npm start" in the root path of the angular application (org.eclipse.mdm.nucleus\org.eclipse.mdm.application\src\main\webapp). After successful compilation you are able to see the webclient under <http://localhost:4200/>.

Changes to the angular application will trigger an incremental compile of the changed sources.

Additionally the the live development server implements a proxy, which forwards all requests to http://localhost:4200/org.eclipse.mdm.nucleus/* to <http://localhost:8080/>. So if the Glassfish with the MDM5 backend does not run on port 8080, you have to change the proxy configuration in

`org.eclipse.mdm.nucleus/org.eclipse.mdm.application/src/main/webappproxies/development.config.json`.

To avoid issues with the form based authentication, it is easier to switch to basic authentication by changing the web.xml in this scenario. Otherwise you may get errors for the backend requests, because you are not automatically forwarded to the login page.

8.3. SonarQube

The Eclipse SonarQube server is available via <https://sonar.eclipse.org>.

Note: Do not use SonarLint plugin as the current version does not support the old SonarQube version at Eclipse and the old one has less features that the SonarQube plugin

- Install SonarQube plugin version 3.5
 - Install new Software...
 - Add <http://downloads.sonarsource.com/eclipse/eclipse/>
 - Select all plugins to be installed

- Oxygen might complain about Erlang Configuration Helper to not be installable
- Configure SonarQube in Eclipse: Eclipse Preferences -> SonarQube -> Servers
 - Edit the default server or create a new one if none present
 - SonarQube Server ID: Eclipse
 - SonarQube Server URL: <https://sonar.eclipse.org>
 - Username: your username for eclipse.org
 - Password: your password for eclipse.org
- Associate projects with Eclipse SonarQube:
 - Edit Project Properties for all projects from
 - org.eclipse.mdm.api.base
 - org.eclipse.mdm.api.default
 - org.eclipse.mdm.api.odsadapter
 - org.eclipse.mdm.nucleus
- Configure
 - Associate with SonarQube: Association should be proposed automatically
- Available Views are
 - SonarQube Issues
 - SonarQube Rule Description
- Analysis can be performed via
 - Project context menu
 - SonarQube -> Analyze
 - The results of the analysis are then written to Eclipse SonarQube

9. Development Rules

9.1. Commit comments

Prefix every commit with the Bugzilla ID if there is one, e.g. your commit message would be "518433: made some changes".

9.2. Tasks in the code

TODO / FIXME and other tasks have to follow this naming schema:

```
// {TASK_NAME} {my_committer_id}, {yyyy-MM-dd}: {my_comment}
```

e.g.

```
// TODO mkoller, 2017-11-14: Currently only the first Adapter is indexed.
```

You can do that manually or you can import the following snippet In the Eclipse IDE via Preferences ->Java -> Editor -> Templates

```

<!-- Import: Eclipse IDE -> Window -> Preferences -> Java -> Editor Templates -> Import --><!-- User
Variable: add to eclipse.ini -> "-Duser.name=<my name>" →
<templates>
  <template autoinsert="true" context="java" deleted="false" description=""
enabled="true"      name="TODO">// TODO ${user}, ${d:date('yyyy-MM-dd')}:
  </template>
  <template autoinsert="true" context="java" deleted="false" description=""
enabled="true" name="FIXME">// FIXME ${user}, ${d:date('yyyy-MM-dd')}:
  </template>
</templates>

```

Usage in code: "TOD"+ [Ctrl+Space]

You have to set your Eclipse user to your committer ID:

edit the file eclipse.ini and set the parameter:

```
-Duser.name=your_eclipse_committer_id
```

9.3. Working with committer feature branches

Develop on your committer feature branch. Make code reviews as usual via Gerrit on your branch.

Committer feature branches have a special name scheme:

`${my_committer_id}/my_branch`.

Only for those references under refs/heads (and refs/tags) with your Commmitter ID you will be able to delete the branch afterwards.

- To create a branch: create the branch with the name scheme -> **`${my_committer_id}/my_branch`**
- To delete a branch in Eclipse: Project → Team → Remote → Push ...
 - “Next” on first wizard screen
 - Select branch to delete in “Add delete ref specification”
 - Click “Add Spec” (the branch is now listed in “Specifications for push”)
 - “Finish”
- When integrating your branch into the dev branch
 - Checkout the dev branch
 - Merge your feature branch into the dev branch, but with having Git a merge commit created although it was a fast-forward merge

```
git merge --no-ff your_feature_branch
```
 - Push the dev branch to Gerrit

Note: Without the no-ff option Gerrit refuses to accept the push due to “no new changes”.

10. Tipps+Tricks

10.1. Handling of Relations

- First, you should consider if you really need to access relations directly. For most use cases there already is a function in the OpenMDM 5 business logic available which does what is required.
- The BaseEntityManager interface allows you to traverse parent and children relations.
- If you need to read other relation types, you can implement and use a BaseEntitySearchQuery. For details look at the method changeRelation in org.eclipse.mdm.api.odsadapter.RelationTest.
- For setting relations you need to access to BaseEntityFactory.get*Store. Typically this is only possible for the adapter implementation, because the contents of the stores might not be 100% consistent over different adapters. The adapter may choose make these methods publicly accessible, as is the case for the ODSAdapter, but be aware that this is currently adapter specific. See org.eclipse.mdm.api.odsadapter.RelationTest for an example. Please note that you can only modify mutable relations (in the MutableStore), e.g. no parent child relations.

11. Troubleshooting

Look into the Logfiles:

- Glassfish:
`$glassfish_root/domains/domain1/logs/server.log`
- Derby DB for User Preference Service:
`$glassfish_root/databases/derby.log`
- The Logfiles of your ODS compatible datasource

12. IP Management and Software Licensing

This section was moved to a separate document. See:

https://wiki.eclipse.org/images/5/50/OpenMDM_IP_management_and_Software_Licensing.pdf