HMA-S TASK 4
HMA-S Earth Observation Products Services
(Download and Search) Demonstrator Technical Note
(D4000.3&4) & User Manual (D4000.3.2&4.2)

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<td>Claudio GIZZI</td>
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EXECUTIVE SUMMARY

The state of play of the standardization of the ground segment interfaces for EO missions is described in [RD01] and [RD02]. The figure below, taken from [RD01] highlights the existing space standards, mainly from the European Cooperation for Space Standardisation (ECSS), covering the overall earth observation process, and the interfaces where the harmonization work within the HMA projects is focused.

![Figure 1 Earth Observation Ground Segment Components [RD01]](image)

The objective of “Heterogeneous Missions Accessibility” – HMA” is to establish harmonised access to heterogeneous earth observation (EO) missions’ data from multiple mission ground segments, including national missions and ESA Sentinel missions. In practice, the goal of HMA is to standardise the ground segment interfaces of the satellite missions for easier access to EO data. The HMA Architecture Working Group (AWG) has been coordinating the ground segment interface harmonisation activities initiated by the Ground Segment Coordination Body (GSCB). These activities, which were performed under ESA contracts such as HMA-I, HMA-T and most recently HMA-Follow On (HMA-FO) have produced interface specifications standardised through the OGC Consortium. The so-called “HMA Cookbook” [RD02] describes in detail the domains which have been subject to standardisation.
The ground segment interfaces covered by HMA-related projects and in various stages of standardisation at the Open Geospatial Consortium (OGC) include:

- Dataset (i.e. Product) metadata: OGC 06-080 and OGC 10-157,
- Catalogue access (datasets): OGC 06-131, OGC 10-189,
- Catalogue access (dataset series and services) OGC 07-038, OGC 08-197,
- Feasibility Analysis: OGC 10-135,
- Ordering: OGC 06-141,
- On-line data access: including EO WMS and EO WCS OGC 10-140 and related specifications OGC 09-110 (WCS 2.0 Core), OGC 09-147 (KVP binding), OGC 09-148 (XML/Post binding), OGC 09-149 (XML/SOAP binding), OGC 11-053 (CRS Extension), etc.
- Identity management: OGC 07-118 [AD05].

The HMA-S project is the continuation of the standardisation activities from HMA-T and HMA-FO. The HMA-S project aims to further advance the HMA standardisation activities and address in particular the following interfaces:

- Dataset metadata (Task 3),
- Catalogue access (datasets, dataset series and services) (Task 4 and 5),
- Feasibility analysis (Task 7),
- Ordering and product download (Task 4),
- Processing (Task 6),
- Identity Management (Task 2) [AD05].

The objectives of the HMA-S demonstrators are on one hand to re-use existing applications to optimise the effort and maintain a set of open-source reference implementations within the scope of HMA. On the other hand, the demonstrators need to be made available as a standalone version for independent download and use; but also integrated into the HMA-S Test Bed for online access.
1. INTRODUCTION

1.1 Purpose of the Document

This document is the “HMA-S Earth Observation Products Services (Download and Search) Demonstrator Technical Note & User Manual” Technical Note. It is prepared by Astrium Ltd as a deliverable of WP4000 of the HMA for Science (HMA-S) project. It is identified as HMA-S.ASU.D4000.3 and HMA-S.ASU.D4000.4 for the Technical Notes and provides both a description of the native interfaces (HMA-S.ASU.D4000.3.1 & HMA-S.ASU.D4000.4.1) and the user manual (HMA-S.ASU.D4000.3.2 & HMA-S.ASU.D4000.4.2) for the demonstrator.

The main purpose of the present document is to provide guidance for understanding, deploying and configuring the EO Satellite OpenSearch Search and Temporal and the RESTful Encoding Ordering Services for Earth Observation Products in the context of HMA-S. It provides references and links to documents and software packages.

1.2 Scope of the Document

This document corresponds to the deliverables:
- HMA-S.ASU.D4000.3 (Demonstrator TN Search Protocol) as identified in WP4000, satisfies Task 4 I34.3 requirement in the Statement of Work (SOW) [AD04].
- HMA-S.ASU.D4000.4 (Demonstrator TN Download Protocol) as identified in WP4000, satisfies Task 4 I34.3 requirement in the Statement of Work (SOW) [AD04].
- HMA-S.ASU.D4000.3.1 (Description of the native interfaces Search Protocol) as identified in WP4000, satisfies Task 4 I34.3.1 requirement in the Statement of Work (SOW) [AD04].
- HMA-S.ASU.D4000.4.1 (Description of the native interfaces Download Protocol) as identified in WP4000, satisfies Task 4 I34.3.1 requirement in the Statement of Work (SOW) [AD04].
- HMA-S.ASU.D4000.3.2 (User Manual Search Protocol) as identified in WP4000, satisfies Task 4 I34.3.2 requirement in the Statement of Work (SOW) [AD04].
- HMA-S.ASU.D4000.4.2 (User Manual Download Protocol) as identified in WP4000, satisfies Task 4 I34.3.2 requirement in the Statement of Work (SOW) [AD04].

The present document provides the main concepts of the OpenSearch Extension to Search EO Products and RESTful Encoding Ordering Services for Earth Observation Products Demonstrators of HMA-S; it explains the role of the different components as well as the ways they can be deployed and configured. The present document does not cover the internal interfaces or the architecture of the individual components.

1.3 Readership of the Document

This document is intended to be read by the HMA-S project team and the ESA Technical Officer. The target audience also includes software architects, system integrators and system administrators.

1.4 Organisation of the Document

This document is organised as follows:
- Chapter 1 is the introduction to this document.
- Chapter 2 lists the applicable and reference documents.
- Chapter 3 terms, definitions and abbreviated terms.
- Chapter 4 describes the high level architecture of the Demonstrator and the main interfaces.
- Chapter 5 contains the installation instructions for the Demonstrator.
- Chapter 6 is the user manual for the online version of the Demonstrator.
- Annexe sizing requirements, Virtual Machine Creation and COTS Installation.

1.5 Applicability of the Document

This document applies to Task 4 of the HMA-S project.
2. APPLICABLE AND REFERENCE DOCUMENTS

2.1 Applicable Documents

The following documents are applicable to the project. In the current document, these documents are referenced as listed below.

[AD01]  HMA-S Project Management Plan, HMA-S.ASU.D100.1, Issue 1
[AD02]  ECSS – Space Engineering Standards, ECSS-E-ST-40C, 6 March 2009
[AD03]  Statement of Work LTDP-GSEG-EOPG-SW-12-0007, Heterogeneous Missions Accessibility for Science, Issue 1, Revision 0, 13/09/2012
[AD04]  HMA-S.TRD.D4000.1: OGC® OpenSearch GeoSpatial and Temporal Extensions, 2013/05/30. This document corresponds to the OGC 10-032 document created as part of the WP 4000 of the HMA-S project.
[AD05]  HMA-S.TRD.D4000.2: OpenSearch Extension for Earth Observation Products, 2013/05/30. This document corresponds to the OGC 13-026 document created as part of the WP 4000 of the HMA-S project.
[AD06]  HMA-S.TPZ.D4000.3: OGC RESTful Encoding Ordering Services for Earth Observation Products, 2013/09/04. This document corresponds to the OGC 13-042 document created as part of the WP 4000 of the HMA-S project.
[AD07]  HMA-S.TPZ.D4000.4: OGC Download Service for Earth Observation Products, 2013/05/14. This document corresponds to the OGC 13-043 document created as part of the WP 4000 of the HMA-S project.

2.2 Reference Documents

The following documents are reference to the project. In the current document, these documents are referenced as listed below.

[RD01]  Google Web Tool Kit 2.5.1 Developer’s Guide
[RD02]  JavaScript Reference from the Mozilla Developer Network
[RD03]  ECMA-262 3rd edition
[RD04]  HTML5 W3C Working Draft 29 March 2012
http://www.w3.org/TR/2012/WD-html5-20120329/
[RD05]  Cascading Style Sheets Level 2 Revision 1 Specification W3C Recommendation 07 June 2011
http://www.w3.org/TR/CSS2/
[RD06]  OpenSearch Specification 1.1 Draft 5
http://www.opensearch.org/Specifications/OpenSearch/1.1
[RD07]  ETS for OGC 07-118
http://portal.opengeospatial.org/?m=projects&a=view&project_id=309
3. TERMS, DEFINITIONS AND ABBREVIATED TERMS

3.1 Terms

3.2 Definition

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<td>AJAX</td>
<td>Group of interrelated web development techniques used on the client-side to create asynchronous web applications. With Ajax, web applications can send data to, and retrieve data from, a server asynchronously (in the background) without interfering with the display and behaviour of the existing page.</td>
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<td>GWT</td>
<td>Open Source set of tools that allows web developers to create and maintain complex JavaScript front-end applications in Java. Other than a few native libraries, everything is Java source that can be built on any supported platform. GWT is licensed under the Apache License version 2.0.</td>
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<tr>
<td>JavaScript</td>
<td>Interpreted computer programming language implemented as part of web browsers so that client-side scripts could interact with the user, control the browser, communicate asynchronously, and alter the document content that was displayed.</td>
</tr>
<tr>
<td>OpenSearch</td>
<td>OpenSearch is a collection of technologies that allow publishing of search results in a format suitable for syndication and aggregation. It is a way for websites and search engines to publish search results in a standard and accessible format.</td>
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<td>RESTful</td>
<td>REST is an architecture style that abstracts the architectural elements with a distributed hypermedia system. A RESTful Web Services use only HTTP methods.</td>
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<td>Servlet</td>
<td>Java programming language class used to extend the capabilities of a server. Although servlets can respond to any types of requests, they are commonly used to extend the applications hosted by web servers.</td>
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### 3.3 Abbreviated Terms

<table>
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<td>AJAX</td>
<td>Asynchronous JavaScript and XML</td>
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<td>ATS</td>
<td>Abstract Test Suite</td>
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<td>CITE</td>
<td>Compliance and Interoperability Testing and Evaluation</td>
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<td>Conformance Test Language</td>
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<td>DAIL</td>
<td>Data Access Integration Layer</td>
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<td>Earth Observation</td>
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<td>Hypertext Mark-up Language</td>
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<td>Key Value Pair</td>
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<td>ICD</td>
<td>Interface Control Document</td>
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<td>Java Enterprise Edition</td>
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<td>Open Geospatial Consortium</td>
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<td>Really Simple Syndication</td>
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<td>Web application Archive</td>
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<td>XML</td>
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4. DEMONSTRATOR ARCHITECTURE

4.1 Component Types

The figure below shows the Component Types and their interfaces as used in the Earth Observation Products Services (Order and Search) Demonstrator of HMA-S. The following conventions are used in the diagram below:

- Components Ey: identify external components not part of the downloadable HMA-S software.
- Components Hx.y: identify HMA-S Demonstrator components which are the output of HMA-S Task x.

![Diagram of Demonstrator Components Types and Interfaces](image)

The Earth Observation Products Services (Order and Search) Demonstrator of HMA-S complies with the revised OpenSearch Geospatial and Temporal Extensions OGC 13-032 [AD04] and a subset of the OpenSearch Extension for Earth Observation Products OGC 13-026 [AD05] and RESTful Encoding Ordering Services for Earth Observation Products OGC 10-042 [AD06] interfaces defined by HMA-S. These interfaces are shown as IF-HMAS-OpenSearch-GeoTemporal and IF-HMAS-RESTful-Order in the figure above. The Demonstrator is based on the components described in the following subsections:

4.1.1 RESTful Order & EOSatellite OpenSearch Web Client

This component allows a user to search for feasibility compliant with the interfaces:

- IF-HMAS-OpenSearch-GeoTemporal [AD4] & [AD5],
- IF-HMAS-RESTful-Order [AD6].

The objective is to obtain catalog search results with the capabilities to order them via a shop cart. The demonstrator is an open-source client which:

- Share source code with Task 7 Feasibility client,
- Composed by a Web Client, a Web and Applications server based on JEE.
The implementation of the demonstrator is based on the Google Web Toolkit 2.5.1, this solution allow to implement reliable AJAX applications.

**Figure 3 Architecture of the RESTful Order & EO Satellite OpenSearch Application Server**

### 4.1.2 RESTful Order & EO Satellite OpenSearch Application Server

This component implements the catalog, the order process and a product repository. It is exposed to the Web client via the following interfaces:

- IF-HMAS-OpenSearch-GeoTemporal [AD4] & [AD5],
- IF-HMAS-RESTful-Order [AD6].

This server is implemented in JEE via a Web Application hosted on the Java web application server Apache Tomcat. And use a PostgreSQL database associated to the PostGIS spatial database extender.

The role of the RESTful Order & EO Satellite OpenSearch Application Server is to provide a:

- Catalog, host a catalog based on a set of bulk record and provide the associated interfaces to allow users to search them,
- Order process; provide all the mechanisms to allow the product ordering via a shop cart.

**Figure 4 Components Diagram of the RESTful Order & EO Satellite OpenSearch Application Server**

### 4.1.3 Component Type to Software mapping

In the context of HMA-S, this software package can be found, as open-source software, on the RSS Portal “Join and Share Area” (http://wiki.services.eoportal.org see Task 4), by following the “Open Software” link identified under “RESTful Order & EO Satellite OpenSearch Demonstrator”. Both RESTful Order & EO Satellite OpenSearch client, server and application server are available on the web site http://code.google.com/p/opensearch-earth-observation-products-system/
The following table provides summary information on these software packages.

<table>
<thead>
<tr>
<th>Software Package</th>
<th>Version</th>
<th>Component Type</th>
<th>Purpose</th>
</tr>
</thead>
<tbody>
<tr>
<td>DemonstratorClient.war</td>
<td>1.0</td>
<td>RESTful Order &amp; EO Satellite OpenSearch Application Server Web Client and Server</td>
<td>Web client to request the catalog, order and product repository server (also called web server)</td>
</tr>
<tr>
<td>hmas_server-1.0-SNAPSHOT.war</td>
<td>1.0</td>
<td>RESTful EO Satellite OpenSearch Application Server</td>
<td>Provides catalog services</td>
</tr>
<tr>
<td>ROSEO-0.0.1-SNAPSHOT.war</td>
<td>1.0</td>
<td>RESTful Order Application Server</td>
<td>Provides Order services</td>
</tr>
</tbody>
</table>

Table 1 Component Type to Software mapping

The demonstrator can be built from the source code by downloading the project for Eclipse. Note that Eclipse Indigo and GWT 2.5.1 are required.

4.2 Interfaces

4.2.1 IF-HMAS-OpenSearch-GeoTemporal

<table>
<thead>
<tr>
<th>Service Category</th>
<th>Catalog Search GeoTemporal Services</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reference to specification</td>
<td>OGC 13-032 OGC OpenSearch GeoSpatial and Temporal Extensions, OGC 13-026 OGC OpenSearch Extension for Earth Observation Products</td>
</tr>
<tr>
<td>Standard reference</td>
<td></td>
</tr>
<tr>
<td>Description</td>
<td>These interfaces return the description of the catalog search service and allow to do search request on the catalog based on the description</td>
</tr>
<tr>
<td>Format</td>
<td>Request: KVP (GET), XML (POST)</td>
</tr>
<tr>
<td>Purpose</td>
<td>Response: ATOM-XML</td>
</tr>
<tr>
<td>Comment</td>
<td>Implemented interfaces:</td>
</tr>
<tr>
<td></td>
<td>- GetOpenSearchDescription</td>
</tr>
<tr>
<td></td>
<td>- GetEOMetadataResponse</td>
</tr>
</tbody>
</table>

Table 2 IF-HMAS-OpenSearch-GeoTemporal
4.2.2 IF-HMAS-RESTful-Order

<table>
<thead>
<tr>
<th>Service Category</th>
<th>Order Services</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reference to specification</td>
<td>OGC 13-042 OGC RESTful Encoding Ordering Services for Earth Observation Products</td>
</tr>
<tr>
<td>Standard reference</td>
<td></td>
</tr>
<tr>
<td>Description</td>
<td>These interfaces manage the order process</td>
</tr>
<tr>
<td>Format</td>
<td>Request: KVP (GET), XML (POST)</td>
</tr>
<tr>
<td></td>
<td>Response: XML</td>
</tr>
<tr>
<td>Purpose</td>
<td></td>
</tr>
<tr>
<td>Comment</td>
<td>Implemented interfaces:</td>
</tr>
<tr>
<td></td>
<td>- GET / (Capabilities)</td>
</tr>
<tr>
<td></td>
<td>- GET /Contents</td>
</tr>
<tr>
<td></td>
<td>- GET /ServiceProvider</td>
</tr>
<tr>
<td></td>
<td>- GET /ServiceIdentification</td>
</tr>
<tr>
<td></td>
<td>- GET /options/{eo:identifier}/{format}</td>
</tr>
<tr>
<td></td>
<td>- POST /order</td>
</tr>
<tr>
<td></td>
<td>- GET /order/{order identifier}</td>
</tr>
<tr>
<td></td>
<td>- GET /order?{filter expression}</td>
</tr>
<tr>
<td></td>
<td>- GET /order/{order identifier}/{order item identifier}</td>
</tr>
<tr>
<td></td>
<td>- DELETE /order/{order identifier}</td>
</tr>
<tr>
<td></td>
<td>- GET /order/{order identifier}/file</td>
</tr>
<tr>
<td></td>
<td>- GET /order/{order identifier}/file?{filter expression}</td>
</tr>
<tr>
<td></td>
<td>- GET /order/{order identifier}/file?{order item identifier}/file</td>
</tr>
</tbody>
</table>

Table 3 IF-HMAS-RESTful-Order

4.3 Persistent HMA-S Testbed

The Demonstrator components described in the current document can be downloaded individually by an interested user:

- Download links are also on the ESA HMA-S wiki page for the Task 7 (https://wiki.services.eoportal.org/tiki-index.php?page=HMA-S+Task+4),
- On the dedicated Google Code project (http://opensearch-earth-observation-products-system.googlecode.com/svn),
- Can be accessed on-line as they are part of the persistent Testbed at ESRIN.

The addresses where the components are accessible are included below:

TBD: all URLs below to be updated and have common base URL as installed on a single Virtual Machine to be redeployed at ESA.

<table>
<thead>
<tr>
<th>ID</th>
<th>Service</th>
<th>URL</th>
</tr>
</thead>
<tbody>
<tr>
<td>4.1</td>
<td>Web Server</td>
<td><a href="http://localhost:8080/DemonstratorClient">http://localhost:8080/DemonstratorClient</a></td>
</tr>
<tr>
<td>4.2</td>
<td>Catalog Applications Server</td>
<td><a href="http://localhost:8080/hmas_server-1.0-SNAPSHOT/hmas">http://localhost:8080/hmas_server-1.0-SNAPSHOT/hmas</a></td>
</tr>
<tr>
<td>4.3</td>
<td>Order Applications Server</td>
<td><a href="http://localhost:8080/ROSEO-0.0.1-SNAPSHOT/ROSEO/1.0.0">http://localhost:8080/ROSEO-0.0.1-SNAPSHOT/ROSEO/1.0.0</a></td>
</tr>
</tbody>
</table>

Table 4 Persistent HMA-S Testbed URL per Service
5. SOFTWARE INSTALLATION MANUAL

The purpose of the present section is to provide references to provide installation and configuration information for the different software packages that implement the architecture described in the previous chapter.

These packages can be installed on a physical or virtual physical.

Different annexes are available at the end of this document for:
- Annexe A, sizing required for the whole architecture,
- Annexe B, create and set the Virtual Machine,
- Annexe C, installation and configuration of the Operating System,
- Annexe D, COTS installation.

5.1 Web Client

This installation procedure describes how to install the Web Client for testing the standard [AD04] and [AD06].

5.1.1 Prerequisites

Before starting the installation, the following prerequisites must be satisfied:
- A machine with CentOS 6.3 (64-bit),
- Root password to log in the machine,
- Java Development Kit (JDK) version 7.x (64-bit)
  o JDK version 7 Update 45 is recommended
  o Installed in \opt\java
- Apache Tomcat version 7.x
  o apache-tomcat-7.0.42 is recommended
  o Installed in \srv
- The web client Web application Archive file (file DemonstratorClient.war), located and available from the svn at the address:
- The source code of the application is located on the svn repository:
5.1.2 Installation

First open a session via SSH to the Linux machine under the root account.

5.1.2.1 Compilation

No compilation of the client is required.

5.1.2.2 Deployment

As root on the Linux machine, copy “DemonstratorClient.war” file to the directory $TOMCAT_HOME/webapps/

Set tomcat as user and group owner for the file $TOMCAT_HOME/webapps/DemonstratorClient.war

Start Tomcat.

5.1.2.3 Configuration

No configuration for the Web Client is required.

5.1.3 Installation Testing

After finishing the steps above, on a client machine open a web browser. Open the following URL http://VIRTUAL_MACHINE_IP:TOMCAT_PORT/DemonstratorClient through the web browser. If the installation is successful the main page below is displayed:

![Figure 5 Successful Installation of Demonstrator Web Client](image-url)
5.2 Application Server

This installation procedure describes how to install the Earth Observation OpenSearch Catalogue and Ordering services Server.

5.2.1 Prerequisites

Before starting the installation, the following prerequisites must be satisfied:

- A machine with CentOS 6.3 (64-bit),
- Root password to log in the machine,
- Java Development Kit (JDK) version 7 (64-bit)
  - JDK version 7 Update 45 is recommended
  - Installed in /opt/java
- Apache Tomcat version 7.x
  - apache-tomcat-7.0.42 is recommended
  - Installed in /srv/tomcat
- PostgreSQL version 9.x (64-bits) with pgAdmin III
  - PostgreSQL version 9.2 is recommended
- PostGis version 9.2
- The HMA-S Catalog server Web application Archive file (file hmas_server-1.0-SNAPSHOT.war), located and available from the svn at the address:
- The HMA-S Order server Web application Archive file (file ROSEO-0.0.1-SNAPSHOT.war), located and available from the svn at the address:
  https://opensearch-earth-observation-products-system.googlecode.com/svn/DemonstratorROSEO/ROSEO-0.0.1-SNAPSHOT.war
- Catalog database backup (file postgresHmas.backup), located and available from the svn at the address:
  https://opensearch-earth-observation-products-system.googlecode.com/svn/DB/postgresHmas.backup
- Order database initializer (file ROSEODBInitializer-1.0-SNAPSHOT-jar-with-dependencies.jar) located and available from the svn at the address:
- Some static files needed to run the application, located and available from the svn at the address:
  https://opensearch-earth-observation-products-system.googlecode.com/svn/NeededFiles/hmas

5.2.2 Installation

First open a session via SSH to the Linux machine under the root account.

5.2.2.1 Compilation

No compilation of the server is required.
5.2.2.2 Deployment

As root on the Linux machine, copy “hmas_server-1.0-SNAPSHOT.war” and “ROSEO-0.0.1-SNAPSHOT.war” files to the directory $TOMCAT_HOME/webapps/

Update the permissions (add tomcat user and group as owner) and rights (7 for the tomcat user and group and execution for everyone ) of the directory $CATALINA_HOME/shared/lib and on the files $TOMCAT_HOME/webapps/hmas_server-1.0-SNAPSHOT.war and $TOMCAT_HOME/webapps/ROSEO-0.0.1-SNAPSHOT.war

Be careful: the two application servers and the client archives have to be put in the same TOMCAT directory.

Move the whole folder “hmas” (getting back from the svn folder “NeededFiles”) in the directory : root/home/ of the machine. All the files contained in the “hmas” folder of the svn have to be placed in a root/home/hmas folder.

Database: Check if the context.xml file of the ROSEO archive is right. This file is located in the META-INF folder.

Replace the url attribute :

“jdbc:postgresql://<VIRTUAL_MACHINE_IP>:5432/ROSEODatabase” with the IP address and check if the username and password attributes are right (postgres for username and password for password).

Open pgAdmin III on the machine and open a connection to the remote database <VIRTUAL_MACHINE_IP>:5432:

- In the File tab, click on “Add Server”.
- In the opened window, complete the form as shown below -> change name and host with the IP address of your virtual machine (the username is “postgres” and the password is “password”):

Figure 6 Deployment, Create New Database Sever Registration

- Once you are connected to the remote database server, create a new database named “osresult” by right clicking on “Databases”.
- Add two new extensions to the database by right clicking on “Extensions”. You must add “postgis” and “postgis_topology”:
- Right click on the osresult database and click on “Restore…”. Move the “postgresHmas.backup” as restore file and the database is ready.

- Create an other database named “ROSEODatabase”.

- Open a command prompt and run the file named “ROSEODBInitializer-1.0-SNAPSHOT-jar-with-dependencies.jar” by entering in the console:

  ```
  java -jar ROSEODBInitializer-1.0-SNAPSHOT-jar-with-dependencies.jar <VIRTUAL_MACHINE_IP>:5432 postgres password
  ```

  Be aware that you have to be in the folder where you have downloaded the ROSEODBInitializer-1.0-SNAPSHOT-jar-with-dependencies.jar file so this command line can work.

- Check if the ROSEODatabase has been built correctly. It must contain 4 tables: collection, eoproduct, order and orderitem.

Start the Apache Tomcat Java application server.
5.2.2.3 Configuration
No configuration of the Web application Server is required.

5.2.2.4 Import of MetaData
The database is delivered with a set of records but in parallel the user can import their own metadata in the demonstrator catalogue.

The binary “HMAS-DB-Import-1.0.0.jar” must be used for the import, the mandatory options are:

```java
java -jar HMAS-DB-Import-1.0.0.jar CatalogData.csv DBSrvHostName DBLogin DBPassword
```

The file CatalogData.csv describes the metadata to import, the first line is the header and each other are the records to import, the format is:

```plaintext
platform;orbitType;sensorType;sensorMode;resolution;swathId;wavelength;spectralRange;orbitNumber;orbitDirection;track;frame;identifier;type;acquisitionType;status;archivingCenter;archivingDate;acquisitionStation;processingCenter;processingSoftware;processingDate;processingLevel;compositeType;contents;cloudCover;snowCover;footprint;upperRight;upperLeft;lowerLeft;lowerRight
ENVISAT;GEO;ASAR;RADAR;RADAR;80.0;HG5431DF;10;INFRARED;2;ASCENDING;60;50;ASA_IM__0CNPDE2dd100dd122cc_014441_00ss000162086_00146_d41282_7918.N1;ASA_IM__0P;NOMINAL;ARCHIVED;PDHS-E;21-12-2013;station;PDHS-K;PROCESSOR SOFT NAME;21-12-2014;PROCESSING LEVEL;P10D;CONTENTS;30;2;48.367792 -4.534302 47.986843 2.343140;43.369769 4.408569;43.878742 -4.204712
```

The binary of the tool, example file and source code are available at the address:

```
```

5.2.3 Installation Testing
After finishing the steps above, on a client machine open a web browser. Open the following URL

```
http://VIRTUAL_MACHINE_IP:TOMCAT_PORT/DemonstratorClient
```

If the installation is successful the main page below is displayed:

![Figure 9 Successful Installation of Demonstrator Web CI & Web Server](image-url)
Click on the left side of the interface. Add the following URL
http://VIRTUAL_MACHINE_IP:TOMCAT_PORT/hmas_server-1.0-SNAPSHOT in the form : Be careful : It
may doesn’t be “localhost:8080”! If you are connecting from another machine you have to put the IP address
of the machine where the Opensearch/Ordering server is hosted.

Click on the button “Send”. The search form is built following the OpenSearch description result.

The OpenSearch description document can be downloaded at the URLs:
http://VIRTUAL_MACHINE_IP:TOMCAT_PORT/hmas_server-1.0-SNAPSHOT/hmas/cat/os
and
http://VIRTUAL_MACHINE_IP:TOMCAT_PORT/hmas_server-1.0-SNAPSHOT/

6. USER MANUAL

The demonstrator is based on a web application, all the functionalities are organised around the map.

Web browsers supported is Chrome version 34 and above,
6.1 OpenSearch Extension for Earth Observation Products Demonstrator

With a web browser open the Web Client URL. Click on the tab “Catalogue Search” and on “Search”, in the field copy the address of the OpenSearch Extension for Earth Observation Products description document (http://VIRTUAL_MACHINE_IP:TOMCAT_PORT/hmas_server-1.0-SNAPSHOT)

Figure 10 HMA-S OS Ext for EO Demonstrator Web Client, Main Page

The OpenSearch Description Document of the Tasking Service looks like:

```
```

Figure 11 HMA-S OS Ext for EO Demonstrator Web Client, OpenSearch Description Document
The GUI is built following the Description Document, create the AOI or set it by entering its coordinates in the fields, and click on the button “Draw AOI”.

Figure 12 HMA-S OS Ext for EO Demonstrator Web Client, Start Draw AOI

On the map define the AOI, the coordinates will appear in the fields “Area of Interest”.

Figure 13 HMA-S OS Ext for EO Demonstrator Web Client, Draw AOI on map
Define the period (begin and end dates) for “Acquisition Date”.

Figure 14 HMA-S OS Ext for EO Demonstrator Web Client, Set Period Dates

Following the OpenSearch Description document parameters can be set for “Acquisition Parameters”.

Figure 15 HMA-S OS Ext for EO Demonstrator Web Client, Acquisition Parameters
Following the OpenSearch Description document parameters can be set for “Validation Parameters”.

Figure 16 HMA-S OS Ext for EO Demonstrator Web Client, Validation Parameters

Following the OpenSearch Description document parameters can be set for “Processing Parameters”.

Figure 17 HMA-S OS Ext for EO Demonstrator Web Client, Processing Parameters
Click on the button “Send request”.

Figure 18 HMA-S OS Ext for EO Demonstrator Web Client, Send Request

The results are displayed in the tab “Results” and footprints on the map.

Figure 19 HMA-S OS Ext for EO Demonstrator Web Client, Catalogue Search Results
Click on the button “See request URL” to see the search request URL for the results.

Figure 20 HMA-S OS Ext for EO Demonstrator Web Client, Display Request URL

Results can be displayed or hide by clicking on the button “Hide” and XML of each of the them. Search results can be displayed by clicking on the button “See XML file”.

Figure 21 HMA-S OS Ext for EO Demonstrator Web Client, Action on Result
Figure 22 HMA-S OS Ext for EO Demonstrator Web Client, XML OpenSearh Result
6.2 Restful Ordering Service Demonstrator

With a web browser open the Web Client URL. Click on the tab “Catalogue Search” and on “Search”, in the field copy the address of the OpenSearch Extension for Earth Observation Products description document.

On the map define the AOI, the coordinates will appear in the fields “Area of Interest”.

Figure 23 HMA-S Restful Ordering Service Demonstrator Web Client, Main Page

Figure 24 HMA-S Restful Ordering Service Demonstrator Web Client, Set AOI
Define the period (begin and end dates) for “Acquisition Date”.

Figure 25 HMA-S Restful Ordering Service Demonstrator Web Client, Set Period Dates

Following the OpenSearch Description document parameters can be set for “Acquisition Parameters” and “Validation Parameters”.

Figure 26 HMA-S Restful Ordering Service Demonstrator Web Client, Set Acquisition and Validation Parameters
Following the OpenSearch Description document parameters can be set for “Processing Parameters”.

Click on the button “Send request”.

Figure 27 HMA-S Restful Ordering Service Demonstrator Web Client, Set Processing Parameters

Figure 28 HMA-S Restful Ordering Service Demonstrator Web Client, Send Request
The results are displayed in the tab “Results” and footprints on the map.

Figure 29 HMA-S Restful Ordering Service Demonstrator Web Client, Display Results

Select one of the result.

Figure 30 HMA-S Restful Ordering Service Demonstrator Web Client, Result Selection
Click on the tab “Detail” to display the detail of the selected result.

Figure 31 HMA-S Restful Ordering Service Demonstrator Web Client, Display Result Detail

Select the result to add to the shop cart.

Figure 32 HMA-S Restful Ordering Service Demonstrator Web Client, Select Results for Shop Cart
Click on the button “See request URL” to see the search request URL for the results.

Figure 33 HMA-S Restful Ordering Service Demonstrator Web Client, Display Request URL

Click on the button “See XML file” to display the XML file for the results.

Figure 34 HMA-S Restful Ordering Service Demonstrator Web Client, Click on See XML for results
XML for the searched results.

Figure 35 HMA-S Restful Ordering Service Demonstrator Web Client, Display XML Results

Click on the button “Add to ShopCart” to add the selected results to the shop cart.

Figure 36 HMA-S Restful Ordering Service Demonstrator Web Client, Add results to the shop cart
In the tab “ShopCart” the results can be displayed.

Set the options for each of the results by clicking on the button “Options”.

Figure 37 HMA-S Restful Ordering Service Demonstrator Web Client, Shop Cart

Figure 38 HMA-S Restful Ordering Service Demonstrator Web Client, Shop Cart Options Button
In the new window set the options and click on the button “Submit”.

![Figure 39 HMA-S Restful Ordering Service Demonstrator Web Client, Set the Options](image)

Results with options set become ready.

![Figure 40 HMA-S Restful Ordering Service Demonstrator Web Client, Result with Options Ready](image)
To see the Options at XML click on the button “GetOptions”.

Figure 41 HMA-S Restful Ordering Service Demonstrator Web Client, Click on button “GetOptions”

Display XML for GetOptions.

Figure 42 HMA-S Restful Ordering Service Demonstrator Web Client, Display XML for GetOptions
When all the results are ready click on the button “Order”.

Figure 43 HMA-S Restful Ordering Service Demonstrator Web Client, Click on button Order

The confirmation of the order is displayed.

Figure 44 HMA-S Restful Ordering Service Demonstrator Web Client, Order Confirmation
In the tab “Order” all the ordered results are displayed with their ID and status. GetOrder can be displayed by clicking on the button “GetXML”.

**Figure 45 HMA-S Restful Ordering Service Demonstrator Web Client, Order Tab**

GetOrder XML for one of the order.

**Figure 46 HMA-S Restful Ordering Service Demonstrator Web Client, Display GetOrder**
Order can be deleted by clicking on the button “Delete”.

Figure 47 HMA-S Restful Ordering Service Demonstrator Web Client, Delete Order.
7. ANNEXE A: SIZING REQUIREMENTS

The sizing requirements are not linked to the type of the machine (physical or virtual), these requirements are the same for both types.

Sizing requirements are define by:
- CPU, frequency in GHz and quantity of Core per CPU,
- Memory, amount in GB,
- Hard drive, size in GB.

7.1 Web Client Machine Requirements

The Web Client machine has low sizing requirements.

<table>
<thead>
<tr>
<th>CPU</th>
<th>Memory (GB)</th>
<th>Hard Drive (GB)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Frequency (GHz)</td>
<td>Quantity of Core per CPU</td>
<td></td>
</tr>
<tr>
<td>2.6</td>
<td>1</td>
<td>2</td>
</tr>
</tbody>
</table>

Table 5 Sizing Requirements for the Web Client Machine

7.2 Web and Applications Servers Requirements

The Web and Applications Server sizing requirements are:

<table>
<thead>
<tr>
<th>CPU</th>
<th>Memory (GB)</th>
<th>Hard Drive (GB)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Frequency (GHz)</td>
<td>Quantity of Core per CPU</td>
<td></td>
</tr>
<tr>
<td>2.6</td>
<td>1</td>
<td>4</td>
</tr>
</tbody>
</table>

Table 6 Sizing Requirements for the Applications Server Machine
8. ANNEXE B: CREATE AND SET THE VIRTUAL MACHINE

This procedure is based on VMware Player version 5.0.2 build-1031769. This software can be downloaded at: http://www.vmware.com/products/player/

Start the VMware Player, click on “Create a New Virtual Machine”.

![Figure 48 VMware Player Create a New Virtual Machine](image)
Select the option “I will install the operating system later.”

Figure 49 VMware Player Create a New Virtual Machine, OS install method

Select “CentOS 64-bit” as guest Operating System list.

Figure 50 VMware Player Create a New Virtual Machine, Guest OS selection
For each of the boxes set the name of the Virtual Machine.

![Virtual Machine Name](image1)

**Figure 51 VMware Player Create a New Virtual Machine, Virtual Machine name**

Set the disk size following the Annexe A table, select the option “Split virtual disk into multiple files”.

![Disk Capacity](image2)

**Figure 52 VMware Player Create a New Virtual Machine, Disk Capacity**
Click on the button “Customize Hardware…”. 

![Image of VMware Player Create a New Virtual Machine, Customize Hardware]

**Figure 53 VMware Player Create a New Virtual Machine, Customize Hardware**

Set the memory amount following the Annexe A table,

![Image of VMware Player Create a New Virtual Machine, Set memory amount]

**Figure 54 VMware Player Create a New Virtual Machine, Set memory amount**
Set the quantity of core per CPU following the Annexe A table.

Figure 55 VMware Player Create a New Virtual Machine, Quantity of core per CPU
Set the Network connection to “Bridged: Connected directly to the physical network” and select “Replicate physical network connection state”.
Remove each of the devices below (selects the device and click on the button “Remove”):
- Floppy,
- Sound Card,
- Printer.
Click on the button “Close”.

Figure 56 VMware Player Create a New Virtual Machine, Network Connection
At the end of the creation of the Virtual Machine click on the button “Finish”.

Figure 57 VMware Player Create a New Virtual Machine, End of creation

The new Virtual Machine is listed in the VMware Player main interface.

Figure 58 VMware Player Create a New Virtual Machine, List of Virtual Machine
9. ANNEXE C: INSTALLATION AND CONFIGURATION OF THE OPERATING SYSTEM

Download the CentOS 6.3 64-bits iso minimal version from the CentOS web site (http://www.centos.org).

Select the Virtual Machine, click on the button “Edit virtual machine settings”.

Figure 59 Installation of the Operation System, VMware Player
Click on the device “CD/DVD” and click on the button “Browse” to select the iso of the OS.

Figure 60 Installation of the Operation System, Select ISO of the OS
Start the Virtual Machine, click on the button “Next”.

Select the language in the list, click on the button “Next”.

Figure 61 Installation of the Operation System, Virtual Machine start

Figure 62 Installation of the Operation System, language selection
Select the keyboard layout in the list, click on the button “Next”.

![Keyboard layout selection](image1)

**Figure 63 Installation of the Operation System, keyboard layout selection**

Select “Basic Storage Devices” for the device type, click on the button “Next”.

![Storage device type](image2)

**Figure 64 Installation of the Operation System, Storage device type**
Select “Yes, discard any data”, click on the button “Next”.

![Figure 65](image1.png)

**Figure 65** Installation of the Operation System, Storage Device Warning

Set the hostname of the Virtual Machine, click on the button “Next”.

![Figure 66](image2.png)

**Figure 66** Installation of the Operation System, Hostname
Set the time zone, click on the button “Next”.

![Image of time zone setup](image1)

Figure 67 Installation of the Operation System, Time Zone

Set the root password, click on the button “Next”.

![Image of root password setup](image2)

Figure 68 Installation of the Operation System, Set root password
Set the installation type, click on the button “Next”.

Figure 69 Installation of the Operation System, Installation Type

Write the storage configuration to the disk by clicking on “Write changes to disk”, click on the button “Next”.

Figure 70 Installation of the Operation System, Write changes to disk
Wait during the installation of the OS.

At the end of the installation click on the button “Reboot”.

Figure 71 Installation of the Operation System, Installation process

Figure 72 Installation of the Operation System, End of installation
ANNEXE D: COTS INSTALLATION

9.1 JDK

The JDK must be installed on all the Virtual Machines.
From the Sun Oracle web site (http://www.oracle.com/technetwork/java/javase/downloads/jdk7-downloads-1880260.html) download the JDK version 7 update 45 for Linux 64-bits.
The file is named: jdk-7u45-linux-x64.bin

Create directory

```bash
# mkdir -p /usr/java
```

Move to directory

```bash
# cd /usr/java
```

Change the rights

```bash
# chmod 700 /tmp/jdk-7u45-linux-x64.bin
```

Execute the installation binary

```bash
# /tmp/jdk-7u45-linux-x64.bin
```

Set the environment variable JAVA_HOME

```bash
# export JAVA_HOME=/usr/java/jdk1.7.0_45
```

Add the JAVA_HOME variable to the PATH

```bash
# export PATH=$JAVA_HOME/bin:$PATH
```

Check if java binary is found

```bash
# which java
```

Check the version of java

```bash
# java -version
java version "1.7.0_45"
Java(TM) SE Runtime Environment (build 1.7.0_45-b40)
Java HotSpot(TM) 64-Bit Server VM (build 11.0-b40, mixed mode)
```
9.2 Tomcat

Tomcat must be installed on all the Virtual Machines.
From the Tomcat Apache web site (http://tomcat.apache.org/download-70.cgi) download Tomcat version 7.0.42.
The file is named: apache-tomcat-7.0.42.tar.gz

For security reasons create a user account with no login shell for running the Tomcat server

```
# groupadd tomcat
# useradd -g tomcat -s /usr/sbin/nologin -m -d /home/tomcat tomcat
```

Extract the tar.gz file to /srv

```
# cd /srv
# tar zxvf /tmp/apache-tomcat-7.0.42.tar.gz
```

Changed the ownership of all files and directories to tomcat

```
# chown -R tomcat.tomcat /srv/apache-tomcat-7.0.42
```

Check the Tomcat version

```
# /var/lib/apache-tomcat-7.0.42/bin/version.sh
Using CATALINA_BASE: /srv/apache-tomcat-7.0.42
Using CATALINA_HOME: /srv/apache-tomcat-7.0.42
Using CATALINA_TMPDIR: /srv/apache-tomcat-7.0.42/temp
Using JRE_HOME: /usr/java
Server version: Apache Tomcat/7.0.42
Server built: Jul 22 2009 02:00:36
Server number: 7.0.42.0
OS Name: Linux
OS Version: 2.6.18-6-amd64
Architecture: x86_64
JVM Version: 1.7.45
JVM Vendor: Free Software Foundation, Inc.
```

Start Tomcat

```
# su -p -s /bin/sh tomcat $CATALINA_HOME/bin/startup.sh
Using CATALINA_BASE: /srv/apache-tomcat-7.0.42
Using CATALINA_HOME: /srv/apache-tomcat-7.0.42
Using CATALINA_TMPDIR: /srv/apache-tomcat-7.0.42/temp
Using JRE_HOME: /usr/java/jdk1.7.0_45
```

Stop Tomcat

```
# su -p -s /bin/sh tomcat $CATALINA_HOME/bin/shutdown.sh
Using CATALINA_BASE: /srv/apache-tomcat-7.0.42
Using CATALINA_HOME: /srv/apache-tomcat-7.0.42
Using CATALINA_TMPDIR: /srv/apache-tomcat-7.0.42/temp
Using JRE_HOME: /usr/java/jdk1.7.0_45
```

9.3 PostgreSQL and PostGis extension

PostgreSQL as well as Postgis must be installed on all the Virtual Machines.

Log into the system with root access. These instructions assume that you are using a command-line editor vi, however use whatever text utility you are comfortable with.
9.3.1 Configure YUM

Open the first file for editing:

```
vi /etc/yum.repos.d/CentOS-Base.repo
```

On line 19, at the end of the [base] section, insert:

```
exclude=postgresql*
```

And near line 28 at the end of the [updates] section, insert again:

```
exclude=postgresql*
```

Save and close the file (with vi, press "esc" to go to command-mode, then type :wq).

9.3.2 Download and install PGDG RPM file

A PGDG RPM file needs to be downloaded for your platform and your PostgreSQL version requirements (you can choose the later). Find the correct RPM file for your system from here: http://yum.postgresql.org/repopackages.php

For example, if you have a 64-bit OS and want to install PostgreSQL 9.2:

```
curl -O http://yum.postgresql.org/9.2/redhat/rhel-6-x86_64/pgdg-centos92-9.2-6.noarch.rpm
rpm -ivh pgdg-centos92-9.2-6.noarch.rpm
```

A second repository, EPEL 6, is required for additional packages for GDAL. For all platforms, download the epel-release-6-7.noarch file from http://download.fedoraproject.org/pub/epel/6/i386/repoview/epel-release.html which will select your local mirror. Install the RPM:

```
curl -O http://<some mirror>/linux/fedora/fedora-epel/6/i386/epel-release-6-7.noarch.rpm # update this!
rpm -ivh epel-release-6-7.noarch
```

9.3.3 Install PostGIS

Install everything with:

```
yum install postgresql92-server postgis2_92
```

Now perform a few post-installation setup commands, in the order: (1) Initialize the database cluster (required), (2) start database (recommended, if you want to use it straight away), (3) allow it to start-up automatically on reboot (recommended):

```
service postgresql-9.2 initdb
service postgresql-9.2 start
```
9.3.4 Spatially enabling a database

Spatially enabling a database using extensions is a new feature of PostgreSQL 9.2. Connect to your database using pgAdmin or psql, and run the following commands. To add postgis with raster support:

```
CREATE EXTENSION postgis;
```

To add topology support, a second extension can be created on the database:

```
CREATE EXTENSION postgis_topology;
```