# InforMEA OData Toolkit

## Deployment Guide

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# Abstract

The InforMEA OData toolkit is a software product designed to make available the data stored inside a relational database, as web service endpoint using the OData protocol. This web service endpoint can later be queried by clients and data can be extracted from it.

As part of the InforMEA ecosystem, we are currently using the toolkit by deploying it on the Multilateral Environment Agreement (MEA) secretariats infrastructure, where their data is made available as OData web service. On the InforMEA website is running a client that is able to query these web services and regularly pulls data from the MEA web services and stores it on the InforMEA database.

# Installation prerequisites

The InforMEA OData toolkit has been successfully deployed on Linux, Windows and Solaris. The following software components are required on the target system:

- Relational database to retrieve the data from (i.e. MySQL, MS SQL Server)
- Oracle JDK 7.x
- A servlet container - Apache Tomcat 7.x

**Note:** Alternatively you can use OpenJDK 7 instead of Oracle JDK. We have not tried to test with JDK 8.

Installation of Java Virtual Machine and Apache Tomcat are out of the scope of this document, however, these resource might help you install:

1. http://tomcat.apache.org/tomcat-7.0-doc/introduction.html
2. http://tomcat.apache.org/tomcat-7.0-doc/setup.html
3. http://diegobenna.blogspot.com/2011/01/install-tomcat-7-in-ubuntu-1010.html

**Security tip:** For enhanced security, we recommend to use CentOS 7 with SELinux enabled. Please run Apache Tomcat with a non-privileged system account.

**Configuration:** Please allow at least 1GB of memory to the Java Virtual Machine (i.e. `Xmx1024m`). If available we recommend 2GB of maximum allocated memory. This requirement depends on the amount of data available, for a large number of records (i.e. 10.000 rows 2GB would be ideal).

**Note:** The toolkit has been also deployed within Adobe ColdFusion 10.

## Knowledge prerequisites

The person doing the configuration should have the following skills:

- *Database administration* - manage database structure, understand database security
- *System administration* - installation of software packages on the designated platform and configure a servlet container such as Apache Tomcat.

# Installation

Deploying the InforMEA OData API toolkit requires two steps:

1. First you need to prepare your database to ensure the toolkit will be able to pull the data from the database.
2. Deploy the toolkit web application within the servlet container

## Preparing the database

The InforMEA toolkit was designed to expose a pre-defined set of entities which are currently residing in the MEAs database. These entities are:

1. Contacts (i.e. National Focal Points)
2. Meetings (i.e. Conference of the Parties (COPs), Meeting of the Parties (MOPs), other)
3. Decisions - decisions taken during each meeting or convention of the parties
4. National reports (regular reports of the parties of the agreements)
5. National plans (these are various plans by the parties implemented as part of the agreement)
6. Sites - geographical sites protected under certain conventions like Ramsar or UNESCO

We assume that users of the toolkit will have one of these entities available inside their relational database, and wants to make them available as web service via the toolkit. From the logical perspective, each of these entities are made of certain attributes. Let's take for example a *Contact*. A contact is envisaged as the person or organisation that represents an MEA within a country. Usually is also called *national focal point*. This person has attributes we normally associate to a person: first name, last name, phone number etc.

We assume that when we want to make *Contacts* available via the web service, the data is already available in the database in a structured manner, so we can identify each of the *Contact*'s attributes.

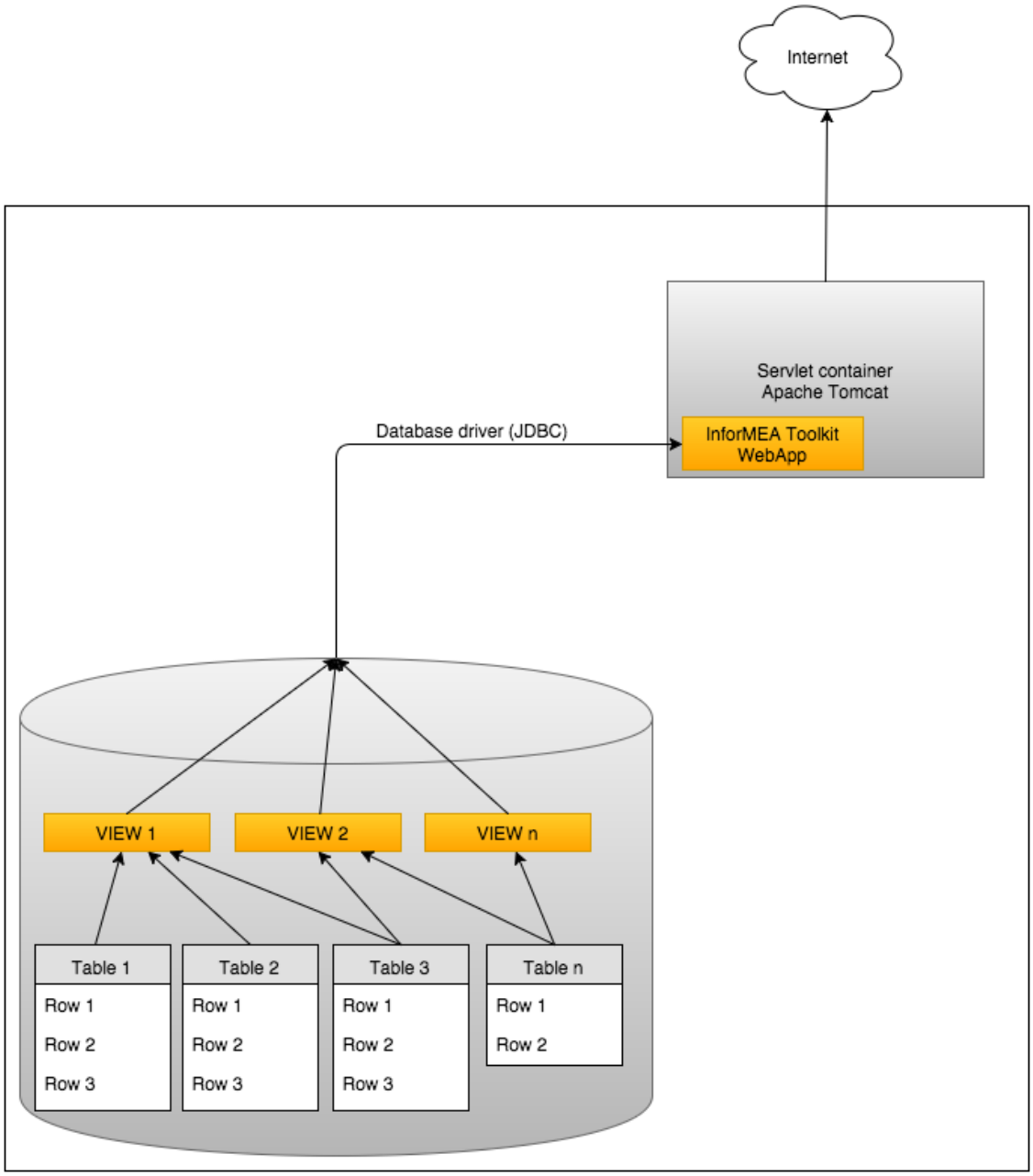
For example, let's suppose that we have a MySQL database with a table **users** which hold the persons that are focal points, and this table has columns: **first_name**, **last_name**, **address**, **institution** etc. . This means that we already have the data for focal points and we can expose it.

For another MEA (toolkit installation) let's suppose we have a MS SQL server database where the *Contacts* are kept in another table called **People**. This table also has columns called **firstName**, **lastName**, **Address** etc.

From the two examples above, you can see that we have two different installations, with two different table names, column names etc. This happens because each organisation is using its own set of tools to manage this data. Most of the MEA secretariats are using various content management systems to manage their data.

To make our toolkit generic enough to abstract the underlying database structure while still be able to extract data from each custom structure - instead of relying on SQL queries directly on the database tables, the toolkit is doing the queries on a set of pre-defined views, whose name is defined inside the toolkit. Basically this means that when installed, the toolkit will auto-detect these views in order to configure itself about the entities which are ready to be exposed.
The rest of this chapter will describe the structure of these views for you to understand how to define them in your database.

The schematic below shows how the InforMEA toolkit and the accompanying views are set-up within a system in order to pull the data:




One thing you will note is that for each entity there are multiple views that need to be configured. This is required because attributes are not always in a one-to-one relationship with the entity. For instance, a person might have a single first name, but the same person might work for different organisations. Also, for an organisation will work many persons, therefore the relationship is many-to-many. In this case, the '*treaty*' property of a *Contact* will be a separate table. Also, some of the properties such as titles of documents are multilingual, therefore we need a separate view to store the multiple titles associated with a document.

The structure of each entity is governed by an agreement between MEA technical group members and is expressed into a public document that is made available at http://www.informea.org/api.

Let's have a look at the structure of the required views for each entity.

# Contact

View name: informea_contacts

| Field Name | PK | Type | NULL | NOTES |
|---|---|---|---|---|
| **id** | Y | STRING | NO | |
| **country** | | STRING | NO | |
| **prefix** | | STRING | | |
| **firstName** | | STRING | | |
| **lastName** | | STRING | | |
| **position** | | STRING | | |
| **institution** | | STRING | | |
| **department** | | STRING | | |
| **type** | | STRING | | |
| **address** | | STRING | | |
| **email** | | STRING | | |
| **phoneNumber** | | STRING | | |
| **fax** | | STRING | | |
| **primary** | | BOOLEAN | | |
| **updated** | | TIMESTAMP | | |

View name: informea_contacts_treaties

| Field Name | PK | Type | NULL | NOTES |
|---|---|---|---|---|
| **id** | Y | STRING | NO | |
| **meeting_id** | | STRING | NO | |
| **language** | | STRING | NO | |
| **description** | | STRING | NO | |

# Meeting

View name: informea_meetings

| Field Name | PK | Type | NULL | NOTES |
|---|---|---|---|---|
| **id** | Y | STRING | NO | |
| **treaty** | | STRING | NO | |
| **url** | | STRING | | |
| **start** | | DATE | NO | |
| **end** | | DATE | | |
| **repetition** | | STRING | | |
| **kind** | | STRING | | |
| **type** | | STRING | | |
| **access** | | STRING | | |
| **status** | | STRING | | |
| **imageUrl** | | STRING | | |
| **imageCopyright** | | STRING | | |
| **location** | | STRING | | |
| **city** | | STRING | | |
| **country** | | STRING | | |
| **latitude** | | FLOAT | | |
| **longitude** | | FLOAT | | |
| **updated** | | TIMESTAMP | NO | |

View name: informea_meetings_description

| Field Name | PK | Type | NULL | NOTES |
|---|---|---|---|---|
| **id** | Y | STRING | NO | |
| **meeting_id** | | STRING | NO | |
| **language** | | STRING | NO | |
| **description** | | STRING | NO | |

View name: informea_meetings_title

| Field Name | PK | Type | NULL | NOTES |
|---|---|---|---|---|
| **id** | Y | STRING | NO | |
| **meeting_id** | | STRING | NO | |
| **language** | | STRING | NO | |
| **title** | | STRING | NO | |

# Decision

View name: informea_decisions

| Field Name | PK | Type | NULL | NOTES |
|---|---|---|---|---|
| **id** | Y | STRING | NO | |
| **link** | | STRING | | |
| **type** | | STRING | | |
| **status** | | STRING | | |
| **number** | | STRING | NO | |
| **treaty** | | STRING | | |
| **published** | | STRING | | |
| **meetingId** | | STRING | | |
| **meetingTitle** | | STRING | | |
| **meetingUrl** | | STRING | | |
| **updated** | | TIMESTAMP | NO | |

View name: informea_decisions_title

| Field Name | PK | Type | NULL | NOTES |
|---|---|---|---|---|
| **id** | Y | STRING | NO | |
| **decision_id** | | STRING | NO | |
| **language** | | STRING | NO | |
| **title** | | STRING | NO | |

View name: informea_decisions_content

| Field Name | PK | Type | NULL | NOTES |
|---|---|---|---|---|
| **id** | Y | STRING | NO | |
| **decision_id** | | STRING | NO | |
| **language** | | STRING | NO | |
| **content** | | STRING | NO | |

View name: informea_decisions_documents

| Field Name | PK | Type | NULL | NOTES |
|---|---|---|---|---|
| **id** | Y | STRING | NO | |
| **decision_id** | | STRING | NO | |
| **diskPath** | | STRING | | |
| **url** | | STRING | NO | |
| **mimeType** | | STRING | NO | |
| **language** | | STRING | NO | |
| **filename** | | STRING | NO | |

View name: informea_decisions_keywords

| Field Name | PK | Type | NULL | NOTES |
|---|---|---|---|---|
| **id** | Y | STRING | NO | |
| **decision_id** | | STRING | NO | |
| **namespace** | | STRING | NO | |
| **term** | | STRING | NO | |

View name: informea_decisions_longtitle

| Field Name | PK | Type | NULL | NOTES |
|---|---|---|---|---|
| **id** | Y | STRING | NO | |
| **decision_id** | | STRING | NO | |
| **language** | | STRING | NO | |
| **long_title** | | STRING | NO | |

View name: informea_decisions_summary

| Field Name | PK | Type | NULL | NOTES |
|---|---|---|---|---|
| **id** | Y | STRING | NO | |
| **decision_id** | | STRING | NO | |
| **language** | | STRING | NO | |
| **summary** | | STRING | NO | |

# National report

View name: informea_country_reports

| Field Name | PK | Type | NULL | NOTES |
|---|---|---|---|---|
| **id** | Y | STRING | NO | |
| **treaty** | | STRING | | |
| **country** | | STRING | | |
| **submission** | | STRING | | |
| **url** | | STRING | NO | |
| **updated** | | TIMESTAMP | | |

View name: informea_country_reports_title

| Field Name | PK | Type | NULL | NOTES |
|---|---|---|---|---|
| **id** | Y | STRING | NO | |
| **country_report_id** | | STRING | NO | |
| **language** | | STRING | NO | |
| **title** | | STRING | NO | |

View name: informea_country_reports_documents

| Field Name | PK | Type | NULL | NOTES |
|---|---|---|---|---|
| **id** | Y | STRING | NO | |
| **country_report_id** | | STRING | NO | |
| **diskPath** | | STRING | | |
| **url** | | STRING | NO | |
| **mimeType** | | STRING | NO | |
| **language** | | STRING | NO | |
| **filename** | | STRING | NO | |

# Action plan

View name: informea_national_plans

| Field Name | PK | Type | NULL | NOTES |
|---|---|---|---|---|
| **id** | Y | STRING | NO | |
| **treaty** | | STRING | | |
| **country** | | STRING | | |
| **submission** | | STRING | | |
| **url** | | STRING | NO | |
| **updated** | | TIMESTAMP | | |

View name: informea_national_plans_title

| Field Name | PK | Type | NULL | NOTES |
|---|---|---|---|---|
| **id** | Y | STRING | NO | |
| **national_plan_id** | | STRING | NO | |
| **language** | | STRING | NO | |
| **title** | | STRING | NO | |

View name: informea_national_plans_documents

| Field Name | PK | Type | NULL | NOTES |
|---|---|---|---|---|
| **id** | Y | STRING | NO | |
| **national_plan_id** | | STRING | NO | |
| **diskPath** | | STRING | | |
| **url** | | STRING | NO | |
| **mimeType** | | STRING | NO | |
| **language** | | STRING | NO | |
| **filename** | | STRING | NO | |

# Site

View name: informea_sites

| Field Name | PK | Type | NULL | NOTES |
|---|---|---|---|---|
| **id** | Y | STRING | NO | |
| **type** | | STRING | NO | |
| **country** | | STRING | NO | |
| **treaty** | | STRING | NO | |
| **url** | | STRING | | |
| **latitude** | | FLOAT | NO | |
| **longitude** | | FLOAT | NO | |
| **updated** | | TIMESTAMP | NO | |

View name: informea_sites_name

| Field Name | PK | Type | NULL | NOTES |
|---|---|---|---|---|
| **id** | Y | STRING | NO | |
| **site_id** | | STRING | NO | |
| **language** | | STRING | NO | |
| **name** | | STRING | NO | |

# Real examples & considerations

There are already available real examples of these SQL views which you can use to speed up the views creation task. Here are some links:

1. https://github.com/InforMEA/odata.provider/blob/master/etc/informea_odata.sql
2. https://github.com/bonnconvention/informea.toolkit_views

Annex A shows an example on how to create the views for contacts from a Drupal database

**MySQL tip:** MySQL supports referencing tables from other databases. To keep your database clean we suggest to create an additional database that keeps only the views and reference the tables from the database with data, like so:

```
CREATE VIEW `separate_database`.`my_view` AS
      SELECT a.* FROM `real_database`.`my_table` …
```

# Toolkit deployment

To install the toolkit, please visit the InforMEA page where we are keeping all the information related to the Toolkit - http://www.informea.org/api.

The toolkit is packaged as Web Application archive (WAR) that can be directly deployed in Tomcat. There is a Github repository where all the source code and releases are kept. Currently the address is: https://github.com/informea/odata.provider. Steps to install:

1. Stop Tomcat servlet container
2. Go to $TOMCAT_HOME/webapps/ and create a directory called '*informea*' (context). Download the latest release WAR archive from the repository 'releases' into informea and unzip in the newly created directory;
3. Edit WEB-INF/classes/META-INF/persistence.xml file and set the following values correctly

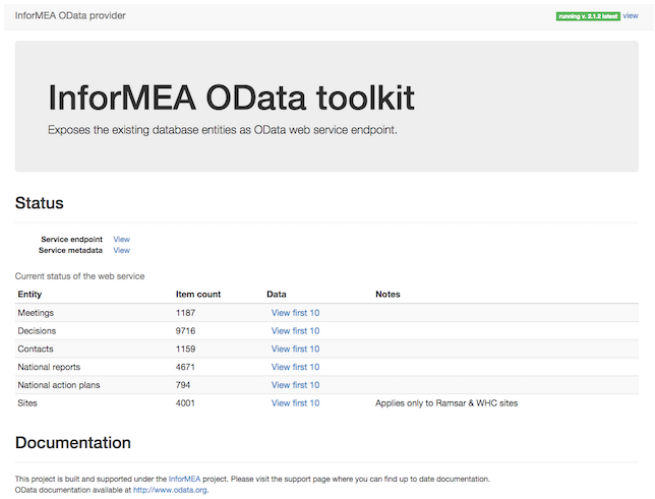
```
<property name="javax.persistence.jdbc.url" value="jdbc:mysql://
localhost/informea_odata_test_source?zeroDateTimeBehavior=convertToNull"
/>
<property name="eclipselink.connection-pool.default.url"
value="jdbc:mysql://localhost/informea_odata_test_source?
zeroDateTimeBehavior=convertToNull" />
```

JDBC URL: Replace here with your own JDBC string, currently we ship drivers for MySQL and MS SQL Server.

```
<property name="javax.persistence.jdbc.user" value="jenkins" />
<property name="javax.persistence.jdbc.password" value="jenkins" />
```

Database user and password to connect to the database

4. Start Tomcat and look into the logs for potential errors and try to access http://tomcat:8080/informea - which should bring up the OData toolkit page which looks like this:




**Security info:** When you are configuring the database account that will connect via JDBC, the user will need the SELECT privilege and none of the privileges required to alter the data or structure of any table or views (i.e. DROP, CREATE, ALTER table).

# Security considerations

By default, access to the web service endpoint is available via the following URL:

http://tomcat:8080/CONTEXT/informea.svc

Our recommendation is to run the servlet engine only by listening on the localhost interface (127.0.0.1) - and proxy the requests using a web server such as Apache HTTP server or nginx. This will provide more flexibility over the access and configuration, and sometimes better overall security.

This endpoint is public and anyone with the URL can retrieve all the exposed information. If you want to secure access to the resource to have control over who is retrieving the data, this can be configured by adding HTTP Basic Auth authentication to the service.

There are multiple ways to do this - and depends largely on the deployment architecture. It can be done from the servlet container via Tomcat authentication configuration, or from Apache web server if is configured to proxy requests.

# References

- OData specifications & information - http://www.odata.org/
- InforMEA project API page - http://www.informea.org/api
- Tomcat basic authentication - http://www.avajava.com/tutorials/lessons/how-do-i-use-basic-authentication-with-tomcat.html

# Annex A - SQL Example

```
-- CONTACTS (Focal Points)
-- informea_contacts
CREATE OR REPLACE DEFINER =`informea`@`localhost` SQL SECURITY DEFINER VIEW
`informea_contacts` AS
  SELECT
    a.uuid AS id,
    iso2.field_country_iso2_value AS country,
    prf.field_person_prefix_value AS prefix,
    fst.field_person_first_name_value AS firstName,
    lst.field_person_last_name_value AS lastName,
    pos.field_person_position_value AS `position`,
    inst.field_person_institution_value AS institution,
    dept.field_person_department_value AS department,
    t1.name AS `type`,
    addr.field_address_value AS ADDRESS,
    mail.field_person_email_email AS email,
    tel.field_contact_telephone_value AS phoneNumber,
    fax.field_contact_fax_value AS fax,
    pri.field_contact_primary_nfp_value AS `primary`,
    IFNULL(upd.field_last_update_value, NOW()) AS updated
  FROM `informea_drupal`.node a
    LEFT JOIN `informea_drupal`.field_data_field_country cou ON cou.entity_id =
a.nid
    INNER JOIN `informea_drupal`.node nc ON (cou.field_country_target_id =
nc.nid AND nc.type = 'country')
    INNER JOIN `informea_drupal`.field_data_field_country_iso2 iso2 ON nc.nid =
iso2.entity_id

    LEFT JOIN `informea_drupal`.field_data_field_person_prefix prf ON
prf.entity_id = a.nid
    LEFT JOIN `informea_drupal`.field_data_field_person_first_name fst ON
fst.entity_id = a.nid
    LEFT JOIN `informea_drupal`.field_data_field_person_last_name lst ON
lst.entity_id = a.nid

    LEFT JOIN `informea_drupal`.field_data_field_person_position  pos ON
pos.entity_id = a.nid
    LEFT JOIN `informea_drupal`.field_data_field_person_institution inst ON
inst.entity_id = a.nid
    LEFT JOIN `informea_drupal`.field_data_field_person_department dept ON
dept.entity_id = a.nid

    LEFT JOIN `informea_drupal`.field_data_field_person_type ptype ON
ptype.entity_id = a.nid
    INNER JOIN `informea_drupal`.taxonomy_term_data t1 ON
ptype.field_person_type_tid = t1.tid

    LEFT JOIN `informea_drupal`.field_data_field_address addr ON addr.entity_id
= a.nid
    LEFT JOIN `informea_drupal`.field_data_field_person_email mail ON
mail.entity_id = a.nid
    LEFT JOIN `informea_drupal`.field_data_field_contact_telephone tel ON
tel.entity_id = a.nid
    LEFT JOIN `informea_drupal`.field_data_field_contact_fax fax ON
fax.entity_id = a.nid
    LEFT JOIN `informea_drupal`.field_data_field_contact_primary_nfp pri ON
pri.entity_id = a.nid

    LEFT JOIN `informea_drupal`.field_data_field_last_update upd ON
upd.entity_id = a.nid
  WHERE
```

```
    a.`type` = 'contact_person'
  GROUP BY a.nid;


-- informea_contacts_treaties
CREATE OR REPLACE DEFINER =`informea`@`localhost` SQL SECURITY DEFINER VIEW
`informea_contacts_treaties` AS
  SELECT
    CONCAT(a.uuid, '-', d.field_odata_identifier_value) AS id,
    a.uuid AS contact_id,
    d.field_odata_identifier_value AS treaty
  FROM `informea_drupal`.node a
  INNER JOIN `informea_contacts` b ON a.nid = b.id
  INNER JOIN `informea_drupal`.field_data_field_treaty c ON a.nid = c.entity_id
  INNER JOIN `informea_drupal`.field_data_field_odata_identifier d ON
c.field_treaty_target_id = d.entity_id;
```