Eau de Web

tripledev
www.tripledev.ee

# Deployment manual

## Support services for the Digital Agenda Data Tool

## SMART 2015/1086

Deployment manual detailing the complete process that would allow a third party to replicate the entire content and functionalities of the website in a new suitable environment

Last update: July 2016

**Table of contents**

# 1. Current installation

This document describes the hardware and software architecture currently used (as of July 2016) by the production and test instances of Digital Agenda Data Website.

It contains a detailed technical description of the software components, their configuration and installation steps on a clean system.

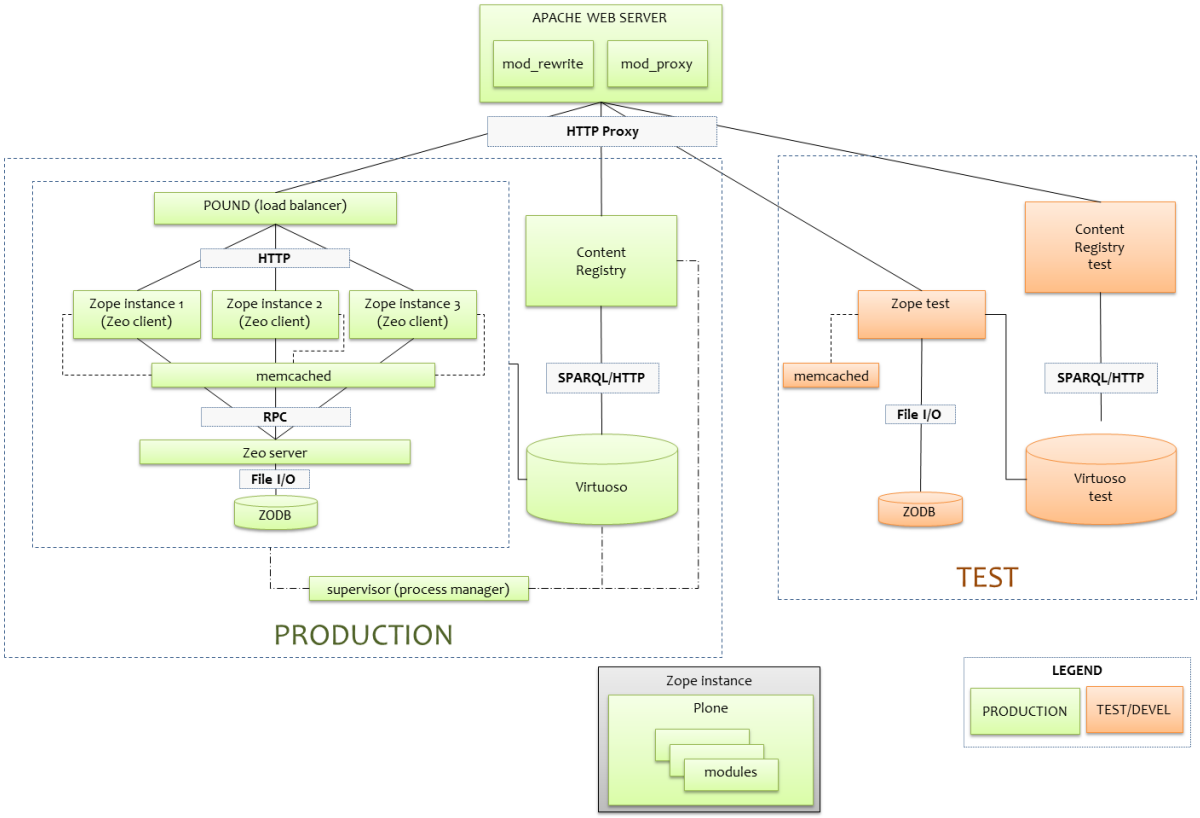
## 1.1. Domain names

| PRODUCTION | |
|---|---|
| digital-agenda-data.eu | Visualisation website (Plone) |
| www.digital-agenda-data.eu | Alias for digital-agenda-data.eu |
| digital-agenda-data.eu/data | Content Registry |
| virtuoso.digital-agenda-data.eu | OpenLink Virtuoso |
| semantic.digital-agenda-data.eu | ELDA, the linked data API tool<br>also this namespace is used by custom URI's |
| TEST | |
| test.digital-agenda-data.eu | Visualisation website (Plone) |
| test-cr.digital-agenda-data.eu | Content Registry |
| test-virtuoso.digital-agenda-data.eu | OpenLink Virtuoso |
| | |
| | |

* All these domains are virtual hosts and point to a single IP address (85.9.22.69) but could be moved to different hosts if required.

## 1.2. Deployment diagram

The main software components and their interaction are depicted in the diagram below:




## 1.3. Operating system, system tools, libraries and prerequisites

All software is running in a Linux server (CPU: Intel® Quad Core™ i7-4770 HyperThreading, RAM: 16 GB DDR3, RAID 1 2*2 TB SATA):

- Linux CentOS 7.2 64bit
- Kernel 3.10.0-327.4.5.el7.x86_64 (updated constantly).

### 1.3.1. Libraries, tools, prerequisites

An updated full installation script is maintained at https://github.com/digital-agenda-data/scoreboard.vagrant. The repository contains a Vagrantfile[1] configuration together with necessary scripts and configuration files required to create from scratch a complete development server.

The main installation script is called "bootstrap.sh" and contains command-line instructions for the download, compilation and installation of each software component.

### 1.3.2. Scheduled tasks

In addition to the backup and system monitoring jobs, cron jobs are used to generate the RDF, CSV and TSV exports for each datasets. The last modification time of each dataset is verified before exporting. Because of their relative large size, the files are archived (zip) and served as static files directly by Apache http server.

The crontab for user scoreboard shows:

30 23 * * * /var/local/plone/export/export_datasets_prod.sh

15 23 * * * /var/local/test-plone/export/export_datasets_test.sh

[1] https://www.vagrantup.com/

## 1.4. Major software components

The following software components have not been developed specifically for the Digital Agenda Scoreboard project.

### 1.4.1. Virtuoso Open-Source Edition

This component is used as *storage engine* for semantic and relational data.

| | |
|---|---|
| **Vendor** | OpenLink Software |
| **Open Source** | Yes, GPL v2 (http://www.openlinksw.com/dataspace/doc/dav/wiki/Main/VOSLicense) |
| **Technology** | native/mixed |
| **Home page** | http://www.openlinksw.com/dataspace/doc/dav/wiki/Main<br>http://docs.openlinksw.com/virtuoso |
| **Source code** | https://github.com/openlink/virtuoso-opensource |
| **Current version** | 07.20.3217-pthreads (release 7.2.4.2) |
| **Management interface** | http://virtuoso.digital-agenda-data.eu (production instance)<br>http://test-virtuoso.digital-agenda-data.eu (test instance) |
| **Installation details** | Home dir: /var/local/virtuoso (production) and /var/local/test-virtuoso (test)<br>Data files (production): /var/local/virtuoso/var/lib/virtuoso/db/<br>Data files (test): /var/local/test-virtuoso/var/lib/virtuoso/db/<br><br>Disk size: 2GB (production) + 2GB (test) |

### 1.4.2. Content Registry

This component is used to maintain and browse through data and metadata

| | |
|---|---|
| **Vendor** | TripleDev, founded by the European Environment Agency and DG-Connect |
| **Open Source** | Yes |
| **Technology** | Java |
| **Source code** | https://github.com/digital-agenda-data/scoreboard.contreg |
| **Management interface** | http://digital-agenda-data.eu/data (production instance)<br>http://test-cr.digital-agenda-data.eu (test instance) |
| **Installation details** | Home dir (production): /var/local/cr<br>Home dir (test): /var/local/test-cr<br><br>Disk size (without staging data files): 100 MB (production) + 100 MB (test) |

### 1.4.3. Plone

This component is used as a content management framework and application server for the visualisation website.

| | |
|---|---|
| **Vendor** | The Plone Foundation |
| **Open Source** | Yes |
| **Technology** | Python |
| **Home page** | http://plone.org/ |
| **Source code** | https://github.com/plone |
| **Current version** | Plone 4.3, Zope 2.13.19 |
| **Installation details** | Home dir (production): /var/local/plone<br>Home dir (test): /var/local/test-plone<br><br>Disk size: ~ 700 MB (production) + 700 MB (test) |

### 1.4.4. ELDA

An implementation of the Linked Data API

| | |
|---|---|
| **Vendor** | Epimorphics Ltd. |
| **Open Source** | Yes |
| **Technology** | Java |
| **Home page** | http://www.epimorphics.com/web/tools/elda.html |
| **Source code** | https://code.google.com/p/elda/source/ |
| **Current version** | 1.2.16 |

| | |
|---|---|
| **Web interface** | http://semantic.digital-agenda-data.eu/ |
| **Installation details** | Home dir (production): /var/local/elda<br><br>Disk size: 100 MB |

### 1.4.5. Apache Web Server

This is the public web server and reverse proxy that stands in front of all application servers.

| | |
|---|---|
| **Vendor** | The Apache Software Foundation |
| **Open Source** | Yes |
| **Technology** | Native |
| **Home page** | http://httpd.apache.org/ |
| **Current version** | 2.2.15 |
| **Web interface** | http://digital-agenda-data.eu (production)<br>http://test.digital-agenda-data.eu (test) |
| **Installation details** | Web dir: /var/www/<br><br>Disk size: 100 MB |
| **Virtual Hosts** | Production:<br>▪ digital-agenda-data.eu (main website)<br>▪ semantic.digital-agenda-data.eu (Linked Data API)<br>▪ virtuoso.digital-agenda-data.eu (Virtuoso)<br>Test:<br>▪ test.digital-agenda-data.eu (website)<br>▪ test-cr.digital-agenda-data.eu (Content Registry)<br>▪ test-virtuoso.digital-agenda-data.eu (Virtuoso) |

## 1.5. Source code

The following components have been developed specifically for the Digital Agenda Scoreboard project:

| Description | Technology | URL |
|---|---|---|
| Installation scripts for the entire solution on a development environment using Vagrant and VirtualBox | scripts | https://github.com/digital-agenda-data/scoreboard.vagrant |
| Build scripts for Plone | Python | https://github.com/digital-agenda-data/scoreboard.buildout |
| Visualisation website | Javascript (96%), Python | https://github.com/digital-agenda-data/scoreboard.visualization |
| Plone theme, CSS stylesheets, front-end widgets (e.g. navigation) | Javascript (55%), CSS (43%), Python | https://github.com/digital-agenda-data/scoreboard.theme |
| Backend components (data access, SPARQL queries) | Python | https://github.com/digital-agenda-data/edw.datacube |
| Content Registry with modifications for the Digital Agenda Scoreboard | | https://github.com/digital-agenda-data/scoreboard.contreg |
| RDF data model and initial content of the triple store | RDF | https://github.com/digital-agenda-data/rdf |
| Various utility scripts used in day-to-day maintenance | scripts | https://github.com/digital-agenda-data/scripts |

### 1.5.1. Data files

The following files need to be copied and replaced in the case of a server migration in order to keep all current data. They cannot be restored by other means except a clean re-upload of all datasets:

| PRODUCTION |
|---|

| | | |
|---|---|---|
| /var/local/virtuoso/var/lib/virtuoso/db/**virtuoso.db** | 2.2 GB | Semantic data |
| /var/local/plone/scoreboard.buildout/var/**filestorage/Data.fs** | 60 MB | ZODB database, contains metadata for all objects (datasets, charts, users, settings, etc.) created in the visualisation website |
| /var/local/plone-scoreboard/scoreboard.buildout/var/**blobstorage** | 10 MB | Directory containing binary objects (images, attachments, etc.) |
| **TEST** | | |
| /var/local/test-virtuoso/var/lib/virtuoso/db/**virtuoso.db** | 2.2 GB | Semantic data |
| /var/local/test-plone/scoreboard.buildout/var/filestorage/**Data.fs** | 60 MB | ZODB database, contains metadata for all objects (datasets, charts, users, settings, etc.) created in the visualisation website |
| /var/local/test-plone/scoreboard.buildout/var/**blobstorage** | 10 MB | Directory containing binary objects (images, attachments, etc.) |
| /etc/httpd/ssl/* | < 1 MB | SSL certificates |

The following data files can be copied, but can also be re-created:

| | | |
|---|---|---|
| **PRODUCTION** | | |
| /var/local/cr/apphome/staging/* | | Staging files uploaded in Content Registry (e.g. *.mdb) |
| /var/local/cr/apphome/acl/* | | Access Control Lists (ACLs) designating access permissions of users and groups to the functionality of Content Registry. |
| /var/local/cr/apphome/filestore/* | | Files uploaded by users, and also content of the dynamically editable documentation sections of the Content Registry user interface. |
| /var/www/html/download/* | 50 MB | Datasets exported as csv, tsv and ttl (e.g. as listed in page http://digital-agenda-data.eu/datasets/digital_agenda_scoreboard_key_indicators#download) |
| **TEST** | | |
| /var/local/test-cr/apphome/staging/* | | Staging files uploaded in CR test (e.g. *.mdb) |
| /var/local/test-cr/apphome/acl/* | | Access Control Lists (ACLs) designating access permissions of users and groups to the functionality of Content Registry. |
| /var/local/test-cr/apphome/filestore/* | | Files uploaded by users, and also content of the dynamically editable documentation sections of the Content Registry user interface. |
| /var/www/test-html/download/* | 50 MB | Datasets exported as csv, tsv and ttl |

Some of the above files can be re-created if lost:

- The files in /var/local/(test-)cr/apphome/staging/* can be downloaded or obtained in other ways from their original providers, such as Eurostat. For example the latest MS Access statistics on ICT survey can be downloaded from http://epp.eurostat.ec.europa.eu/portal/page/portal/information_society/data/comprehensive_databases They can be downloaded directly into the above location in Content Registry file system, or they can be downloaded via the "Staging files" section in Content Registry's "Admin actions".
- The files in /var/local/(test-)cr/apphome/acl/* can be re-created when building Content Registry from source code and providing the corresponding folder path in build properties (see below).
- The files in /var/local/(test-)cr/apphome/filestore/* can only be re-created by users re-uploading them via dedicated sections in Content Registry web interface.

### 1.5.2. SSL certificates

The domain digital-agenda-data.eu uses a single wildcard certificate for all HTTPS subdomains. This has to be configured in Apache web server (see section below). The following files (from /etc/httpd/ssl) need to be restored:

- STAR_digital-agenda-data_eu.key
- STAR_digital-agenda-data_eu.crt
- STAR_digital-agenda-data_eu.ca-bundle

The current certificate expires on 13.05.2017.

### 1.5.3. System services

The following systemd services start automatically on reboot:

| Service name Production | Service name Test | Purpose | Configuration |
|---|---|---|---|
| httpd | | Apache, the web server | default + SSL + https://github.com/digital-agenda-data/scoreboard.vagrant/blob/master/etc/scoreboard-prod.conf https://github.com/digital-agenda-data/scoreboard.vagrant/blob/master/etc/scoreboard-test.conf |
| supervisord | supervisord-test | Orchestrates sub-processes (plone instances, memcached, pound, zeo) | https://github.com/digital-agenda-data/scoreboard.vagrant/blob/master/etc/supervisord.service<br><br>https://github.com/digital-agenda-data/scoreboard.vagrant/blob/master/etc/supervisord-test.service |
| virtuoso7 | virtuoso7-test | Virtuoso, the semantic database | https://github.com/digital-agenda-data/scoreboard.vagrant/blob/master/etc/virtuoso7.service https://github.com/digital-agenda-data/scoreboard.vagrant/blob/master/etc/virtuoso7-test.service |
| cr | cr-test | Content Registry (data maintenance tool) | https://github.com/digital-agenda-data/scoreboard.vagrant/blob/master/etc/cr.service<br><br>https://github.com/digital-agenda-data/scoreboard.vagrant/blob/master/etc/cr-test.service |
| mariadb | | Used by Piwik, the web analytics tool | default |
| elda | | Linked data API | https://github.com/digital-agenda-data/scoreboard.vagrant/blob/master/etc/elda.service |

# 2. Installation from source code

## 2.1. In a virtualized environment

In order to install all applications in a virtual machine using Vagrant and VirtualBox, use the scripts maintained at https://github.com/digital-agenda-data/scoreboard.vagrant (connection to the Internet is required):

- Install Vagrant https://www.vagrantup.com/downloads.html with support for VirtualBox https://www.virtualbox.org/wiki/Downloads
- git clone https://github.com/digital-agenda-data/scoreboard.vagrant.git
- then follow the instructions from the README file:
  - vagrant box add centos/7 --provider virtualbox
  - vagrant plugin install vagrant-vbguest
  - vagrant plugin install vagrant-cachier
  - vagrant up

The installation script can be used with small adaptations on a physical server (without Vagrant).

## 2.2. In a pre-configured server

In order to install the DAD applications in an existing environment (assumed to be CentOS7 or compatible), use the example installation scripts for Plone, Virtuoso and Content Registry:

- install_plone_novagrant.sh
- install_virtuoso_novagrant.sh
- install_cr_novagrant.sh (requires Virtuoso to be installed first)

The scripts should be executed as root.

Each script contains at the beginning of the file various configuration settings (e.g. home directory, ports, etc.) which can be used to switch between production and test configurations.

**Important note**:

After installation, either edit your local hosts file and map digital-agenda-data.eu domain to the IP of your test server, or, alternatively, edit /etc/httpd/conf.d/scoreboard-prod.conf and change all occurrences of “digital-agenda-data.eu” to the actual hostname of the server, including in lines similar to the ones below:

ProxyPass / http://localhost:8440/VirtualHostBase/http/**digital-agenda-data.eu**:80/Plone/VirtualHostRoot/ timeout=300 retry=0

RewriteRule ^/(.*) http://localhost:8448/VirtualHostBase/http/**test.digital-agenda-data.eu**:80/Plone/VirtualHostRoot/$1 [P]

## 2.3. Testing installation

To test that all applications were correctly installed, use the following commands:

### 2.3.1. Plone

a. check the output of supervisorctl:

```
[root@localhost]# /var/local/plone/bin/supervisorctl status
instance1                        RUNNING   pid 32179, uptime 0:00:10
```

```
instance2                RUNNING   pid 32182, uptime 0:00:09
instance3                RUNNING   pid 32183, uptime 0:00:08
memcached                   RUNNING   pid 31277, uptime 0:56:29
pound                    RUNNING   pid 31808, uptime 0:25:58
zeo                     RUNNING   pid 31805, uptime 0:25:59
```

for test environment use:

```
[root@localhost]# /var/local/test-plone/bin/supervisorctl status
instance                 RUNNING   pid 9800, uptime 5:57:50
memcached                   RUNNING   pid 9799, uptime 5:57:50
```

b. Check open ports:

```
[root@localhost]# netstat -tlpn | grep -E "(844[0-9])|(1121[0-1])|(889[0-1])|(111[1-2])|(808[0-1)"
```

production:

```
# Virtuoso
tcp        0      0 0.0.0.0:1111            0.0.0.0:*               LISTEN      21431/virtuoso-t
tcp        0      0 0.0.0.0:8890            0.0.0.0:*               LISTEN      21431/virtuoso-t
# Plone
tcp        0      0 127.0.0.1:8440          0.0.0.0:*               LISTEN      31808/pound
tcp        0      0 127.0.0.1:8441          0.0.0.0:*               LISTEN      32179/python
tcp        0      0 127.0.0.1:8442          0.0.0.0:*               LISTEN      32182/python
tcp        0      0 127.0.0.1:8443          0.0.0.0:*               LISTEN      32183/python
tcp        0      0 0.0.0.0:11210           0.0.0.0:*               LISTEN      31282/memcached
# Content Registry
tcp6       0      0 :::8080                 :::*                    LISTEN      21557/java
```

test:

```
# Virtuoso
tcp        0      0 0.0.0.0:1112            0.0.0.0:*               LISTEN      21452/virtuoso-t
tcp        0      0 0.0.0.0:8891            0.0.0.0:*               LISTEN      21452/virtuoso-t
# Plone
tcp        0      0 0.0.0.0:11211           0.0.0.0:*               LISTEN      9802/memcached
tcp        0      0 0.0.0.0:8448            0.0.0.0:*               LISTEN      9800/python
# Content Registry
tcp6       0      0 :::8081                 :::*                    LISTEN      22129/java
```

c. Check service status - all should print “active (running)”:
**Production:**

```
systemctl status httpd
systemctl status supervisord
systemctl status cr
systemctl status virtuoso7
```

**Test:**

```
systemctl status supervisord-test
systemctl status cr-test
systemctl status virtuoso7-test
```

## 2.4. Log files

For troubleshooting, check the following log files (assuming the default home directories have been used):

| Category | Application | Log file(s) |
|---|---|---|

| | | |
|---|---|---|
| Production | HTTPD web server | /var/log/httpd/digital-agenda-data_log |
| | Plone | /var/local/plone/var/log/instance{1,2,3}.log |
| | Content Registry | /var/local/cr/tomcat/logs/catalina.out |
| | Virtuoso | /var/local/virtuoso/var/lib/virtuoso/db/virtuoso.log |
| | | |
| Test | Plone | /var/local/test-plone/var/log/instance.log |
| | Content Registry | /var/local/test-cr/tomcat/logs/catalina.out |
| | Virtuoso | /var/local/virtuoso/var/lib/virtuoso/db/virtuoso.log |
| | | |

## 2.5. Application-specific settings

### 2.5.1. Plone

The following settings are explained in more details in deliverable D2 - Technical Report:

- Open https://digital-agenda-data.eu and login using an administrator account using the Login link in the footer
- Check the SMTP settings in page http://digital-agenda-data.eu/mail-controlpanel
- Check the reCAPTCHA keys in page http://digital-agenda-data.eu/recaptcha-settings
- Check the email addresses that receive notifications when comments are posted, in page http://digital-agenda-data.eu/ploneboard_notification
- Check the properties in page http://digital-agenda-data.eu/portal_registry/ (select prefix IDataCubeSettings from the dropdown list). In particular, the test instance must have different values for parameters DEFAULT_CR_URL, DEFAULT_SPARQL_ENDPOINT, DEFAULT_USER_SPARQL_ENDPOINT

### 2.5.2. Content Registry

**NB!** An important property to set is *application.homeDir*. This is the root directory of CR's resource files that are needed at run-time. The default value of the production instance is "/var/local/cr/apphome"

In addition to *application.homeDir*, you should normally only need to check these properties:

- *application.homeURL* (further commented in the file)
- *deployment.host* (further commented in the file)
- *mail.** (further commented in the file)
- *virtuoso.db.url* (check Virtuoso host name and port number)
- *virtuoso.db.usr*, *virtuoso.db.pwd*, *virtuoso.db.rousr*, *virtuoso.db.ropwd* (use the user names and passwords in the *1_create_users.sql* file that you will import into Virtuoso below)

The users and access permissions of CR are stored in "acl" directory under app-home. If the value of *useCentralAuthenticationService* build property was set to "false", then users and their passwords are configured in the self-explanatory *users.xml* file. Users' membership in groups can be configured in *cr.groups.xml* file. For example, to grant certain users access to all admin-level functionality in CR, simply add them into the *cr_admin* group.