



E-Soter Web Portal Cookbook

D.Simms, H.I. Reuter, S. Hallett, P.Tempel, Y.Yigini, D. Leibovici, A. Pourabdollah

March, 2013



World Soil Information

Cranfield
UNIVERSITY



Bundesanstalt für
Geowissenschaften
und Rohstoffe



The University of
Nottingham

Executive Summary

This document presents a ‘Cookbook’ description for installing the software tools necessary to develop and configure an e-SOTER web portal. The portal developed may provide the basis for project, national or regional datasets held in the SOTER format. The work presented here is a direct output and deliverable of the EU Framework 7 project ‘e-SOTER – Regional Pilot Platform as EU Contribution to a Global Soil Observing System’, Grant Agreement Number 211578 and was conducted under Work Package 6 of the project.

The steps below describe the process of preparing a server to host the tools necessary to operate and run the e-SOTER web Portal and associated components. Initial steps are required to install each of the essential elements, followed by more detailed configuration of the setup and environment.

Example datasets are provided in SoTerML format to allow the new e-SOTER Web Portal to be set up to serve SOTER data across the Internet.

Contents

Executive Summary

Table of Figures

Glossary

Overview

SOTER in Context

Platform

 Accessing the server

Initial Installation

 Java

 Apache

 Tomcat

 Postgres / PostGIS

 Python

 Perl

 Wrap-up

Configuration of Installed Software

 Postgres Configuration – Preparing for the database

 Postgres Configuration - Communications

Installing GeoServer

 Preparing the server for GeoServer

 Obtaining and installing GeoServer

 Obtaining and installing GDAL

Configuring the Apache Web Server

 Changing the Apache redirects for Proxy Handling

 Restarting Apache and Tomcat servers

 Confirming the operation of GeoServer

Uploading Sample Data to the Portal

 Using ftp to upload the sample data

 Installing FTP clients

 Installing an FTP Server

 Copying over the Sample SoTerML data

Creation of the e-SOTER Database

 Using PGAdmin – the graphical database administration tool

Configuring GeoServer for Simple Objects

Installing the SoTerML processing tools

Editing Loadref.Java and Loadsample.Java

Compiling Loadref.Java and Loadsample.Java

Configuring GeoServer for a Simple Objects web Service

Testing the Server WMS Capabilities

Configuring GeoServer for Complex Objects

Installing the GeoServer Application schema extension

Configuring the Geoplan workspace folder

Copying the mapping files for workspaces

Editing the mapping files for workspaces

Copying the mapping files for schemas

Editing the mapping files for schemas

Testing the Installation

Testing the Server WFS Capabilities

Debugging

Installing Geo-network

Installing Algorithm Database

Installation and Configuration of the e-Soter Web Services Portal

Appendix One: Digital Media

Fileset One: Database files

Fileset Two: Client Data files

Fileset Three: GeoServer files

Appendix Two: SoTerML Parser

eSoterParser utility – Manual and Instructions

Introduction

Prerequisites

Instructions on use

Data outputs

Data validation

Code documentation

Source Code

Further Queries

Digital attachment

Table of Figures

Figure 1 Overview of the installation and configuration process for the e-SOTER web portal

Figure 2 Overview architecture of the e-SOTER web portal

Figure 3 Running nmap on the server

Figure 4 The Tomcat installation success webpage

Figure 5 The GeoServer home webpage

Figure 6 Logging in to GeoServer

Figure 7 Changing the GeoServer admin account password

Figure 8 GeoServer Sample Data mapping, sf:streams

Figure 9 Connecting PGAdmin to the server

Figure 10 The PGAdmin Console

Figure 11 Selecting the SQL editor in PGAdmin

Figure 12 Using the SQL editor in PGAdmin

Figure 13 Executing queries using the SQL editor in PGAdmin

Figure 14 Refreshing the table view in PGAdmin

Figure 15 Deleting tables in PGAdmin

Figure 16 Loading SQL code to the SQL editor in PGAdmin

Figure 17 The Function view in PGAdmin

Figure 18 Adding a new data store in GeoServer

Figure 19 Configuring a new data store in GeoServer

Figure 20 Viewing the test layer in OpenLayers

Figure 21 WFS capabilities of the server

Figure 22 Administrator panel for GeoNetwork

Figure 23 Adding a user groups

Figure 24 Adding Templates

Figure 25 Login bar for accessing GeoNetwork administrator interface

Figure 26 Main Page of Administration panel

Figure 27 Metadata Creation Options

Figure 28 Metadata Creation Page User Group Selection

Figure 29 Metadata Creation Screen from a template

Figure 30 Metadata insert - Import metadata record in XML or MEF format

Figure 31 Metadata in GeoNetwork

Figure 32 Metadata record of the E-Soter Central European Window

Figure 33 TRAC Home Screen

Figure 34 New Ticket Screen in TRAC

Figure 35 Main Configuration page during the Joomla installation

Figure 36 Database configuration page

Figure 37 Finalisation page to the Joomla installation

Figure 38 Installation overview during the Joomla installation

Figure 39 Success page of the Joomla installation

Figure 40 Starting screen of the eSoterParser utility

Figure 41 Selecting an Access database

Figure 42 Status page for database selection

Figure 43 Selecting a Shapefile database

Figure 44 Shapefile selection

Figure 45 Selecting the country field

Figure 46 Country field selected

Figure 47 Selecting the country field

Figure 48 Soter Unit identifier field selected

Figure 49 The “include all profiles tickbox”

Figure 50 Running the conversion

Figure 51 The SoTerML output

Figure 52 The errors log

Figure 53 The parser JavaDoc file

Figure 54 The NetBeans interface showing the eSoterParser project

Glossary

GEOSS - Global Earth Observation System of Systems

SOTER – World SOil and TERRain Digital Database

SQL – Structured Query Language

XML – Extensible Markup Language

WFS – Web Feature Service

WMS – Web Mapping Service

This report is submitted as a formal deliverable for the EU Framework 7 project 'e-SOTER – Regional Pilot Platform as EU Contribution to a Global Soil Observing System', Grant Agreement Number 211578. The work described here was conducted under Work Package 6 of this project.

Citation. This report may be cited as follows:

Simms, D., Reuter, H., Hallett, S., Tempel, P., Yigini, Y., Leibovici, D., and Pourabdollah, A. (2013) e-SOTER Portal Cookbook. 73pp. ISRIC, NL.

Disclaimer

E-Soter is furnishing this item "as is". E-Soter does not provide any warranty of the item whatsoever, whether express, implied, or statutory, including, but not limited to, any warranty of merchantability or fitness for a particular purpose or any warranty that the contents of the item will be error-free.

In no respect shall E-Soter incur any liability for any damages, including, but limited to, direct, indirect, special, or consequential damages arising out of, resulting from, or any way connected to the use of the item, whether or not based upon warranty, contract, tort, or otherwise; whether or not injury was sustained by persons or property or otherwise; and whether or not loss was sustained from, or arose out of, the results of, the item, or any services that may be provided by E-Soter

Report © e-SOTER WP6, 2013

Overview

This document presents a ‘Cookbook’ description for installing the software tools necessary to develop and configure an e-SOTER web portal. The portal developed may provide the basis for project, national or regional datasets held in the SOTER format. The work presented here is a direct output and deliverable of the EU Framework 7 project ‘e-SOTER – Regional Pilot Platform as EU Contribution to a Global Soil Observing System’, Grant Agreement Number 211578. The work described here was conducted under Work Package 6 of this project.

The steps below describe the process of preparing a server to host the tools necessary to operate and run the e-SOTER web Portal and associated components. Initial steps are required to install each of the essential elements, followed by more detailed configuration of the setup and environment. In overview the steps are as follows:

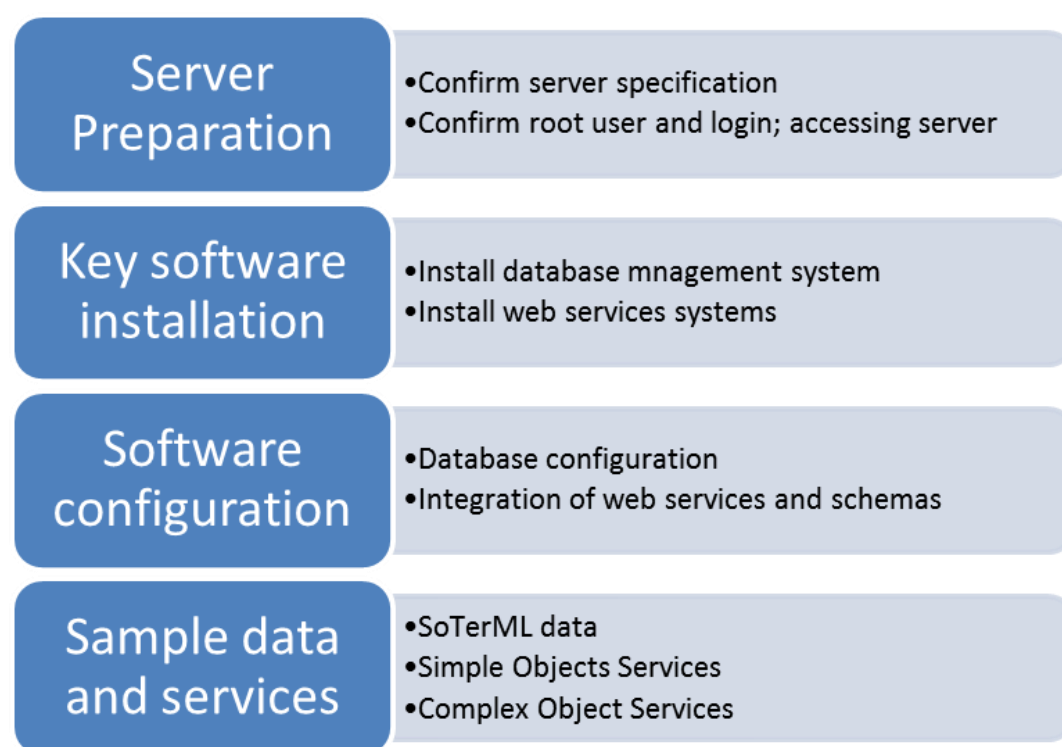


Figure 1. Overview of the installation and configuration process for the e-SOTER web portal

Part of this cookbook provides information in loading in some example SoTerML datasets and publishing them as both simple and complex object web services. You can follow these examples for your interest, or adapt them for your own purposes.

SOTER in Context

Soil and land information is needed for policy-making, hands-on management of land resources, and for monitoring of the environmental impact of development. Lack of comprehensive information about land resources - globally, nationally or locally – means uninformed policies, continuing degradation of land and water resources, unnecessary carbon emissions to the atmosphere, and no likelihood of achieving the UN Millennium Development Goals. The viability and cost of vital infrastructure is affected just as much as food and water security and response to environmental change. In the case of

the European Soil Thematic Strategy, the operational measures laid down in the Framework Directive and Impact Assessment are hampered by lack of accessible, easy-to-use, consistent, harmonized and relevant soil data.

SOTER (World SOil and TERRain Digital Database) is a long-established and well-respected methodology for capturing and representing global soils information at small scales. SOTER is intended to support a series of applications such as “crop suitability, soil degradation, forest productivity, global soil change, irrigation suitability, agro-ecological zonation, and risk of drought”.

Development of the SOTER approach has culminated in the ‘e-SOTER’ project, which has sought to create harmonized SOTER database windows in western Europe between France and England; the Chemnitz region between the Czech and German borders; northern Morocco; and China (<http://www.esoter.net/>; <http://eusoils.jrc.ec.europa.eu/projects/esoter/>). Further to this the e-SOTER project has sought to develop new, improved methodologies to create better harmonized, more comprehensive and consistent data products using state of the art data processing, remote sensing and terrain modelling tools. As the European contribution to a Global Soil Observing System (part of GEO), a key element to these phases of activity has been the concurrent development of an e-SOTER web portal and related information spatial data infrastructure, designed to hold, manipulate and disseminate SOTER databases. Parallel with this has been the development of an XML-based markup language for representing the SOTER datasets, SoTerML (Pourabdollah et al, 2012).

The traditional SOTER implementation involves the development of a database (in MS Access) with a linked GIS dataset (as a Shapefile). These two ‘legacy’ data sources work together to hold geometric features and their linked spatial properties. However, this approach is limited in a contemporary web-enabled information system where data should comply with the Open Geospatial Consortium (OGC) standards for web-based spatial services consistent with the guiding principles of the GEOSS initiative. In establishing such information systems there is a need to take advantage of the now growing suites of open-source software tools for each of the core components, comprising: database management; web services server; web server; geoprocessing tools and java servlet management. Such tools are open-source and so are free to use, providing a huge advantage for research teams and other stakeholders building such systems. However, open-source tools come with a high degree of complexity in their setup and configuration that can act as a counter to their comprehensive functionality. This manual is designed to guide the user through the process of establishing and configuring such a web portal, starting with a clean server installation.

As the architecture figure below shows, the portal components are designed to receive SOTER data in the form of a valid SoTerML ‘XML’ file, derived from the legacy data sources and produced by a SoTerML parser, described separately in Appendix Two. The data is loaded into a database built using the open source database, which is accessed by the GeoServer tool to provide spatial web-based services to external client applications, such as environmental models and web-mapping applications. The portal may be accessed via the Internet directly to access the data sources provided.

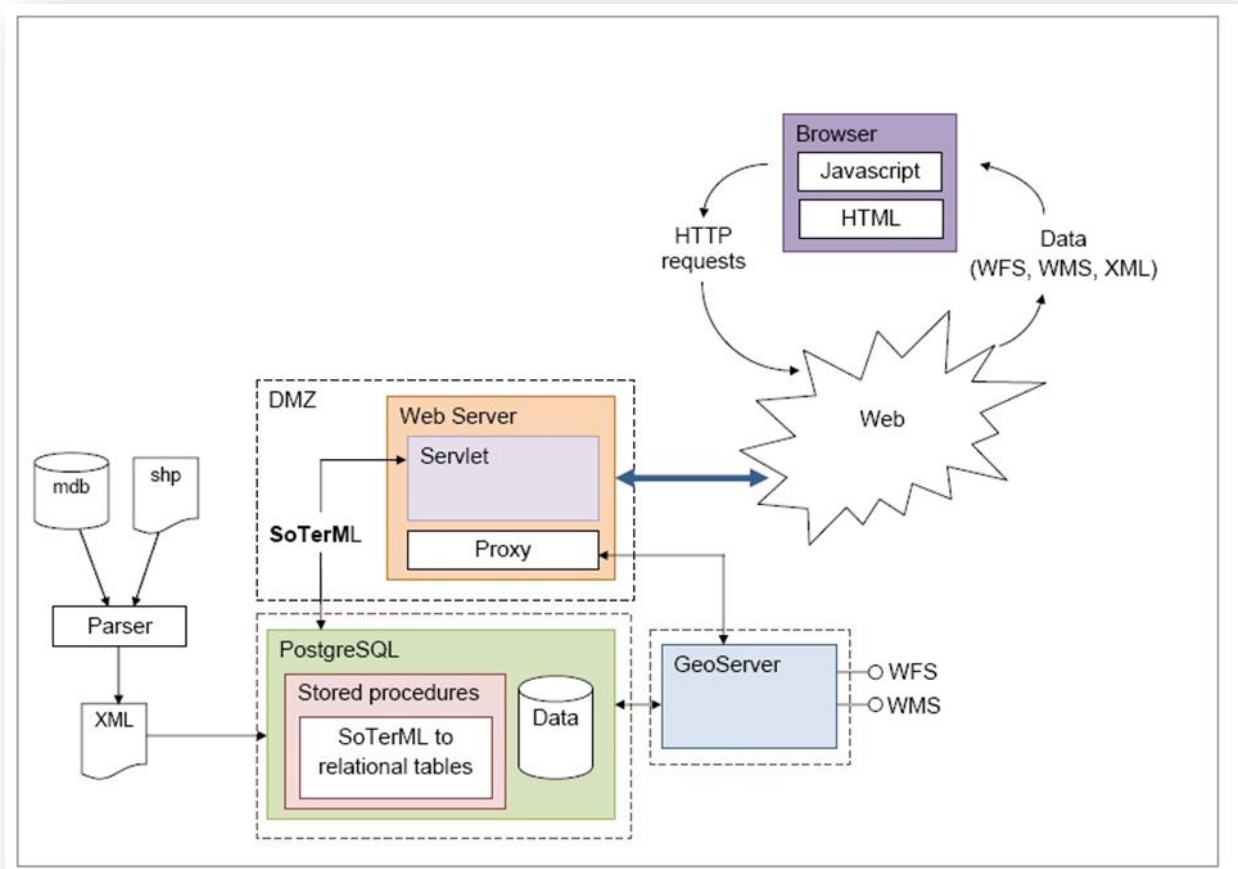


Figure 2 Overview architecture of the e-SOTER web portal

A typical Use Case scenario for the portal is that a SOTER project is undertaken which leads to the requirement for storage of the results in a database whose results can be shared. Also a legacy SOTER database may be converted to SoTerML to allow the widest access and usage of the data it holds, such that it can be uploaded to a SOTER web portal. The process for building this portal is described below.

Platform

The process descriptions below concern the configuration of the e-SOTER Web Portal server, commencing with a completely clean Linux installation. The server is assumed to have the following or equivalent specification:

- Linux - Debian
- Memory should be 1 Gb ++
- Disk capacity should be 100 Gb ++
- Visible on the Internet (e.g. in a DMZ 'demilitarised zone')

Server and Operating System

The Debian flavour of Linux is selected here by preference as it is generally considered a stable platform for building web services and is in common, widespread use for hosting such applications. Contemporary information systems practice encourages the use of 'virtual server' configurations, whereby server images are created and maintained on a computer such as a blade server, capable of holding several such virtual images. The test environments for the e-SOTER web portal have involved using virtual servers and this approach is considered practical and pragmatic for the purposes. **Responsibilities for network security are not covered in this cookbook, but are considered a prudent and important part of managing servers visible on the Internet.**

A key initial step in the process described here is to determine the Internet Protocol address of the server to be used. In Linux this is achieved with the command 'ifconfig'. In describing and then showing this command below we may also introduce the notation convention used throughout the cookbook. Log in to the server as the root 'superuser' and run the command, thus:

```
ifconfig
```

Take a note of your **Server IP address** below, for example:

```
111.222.333.444
```

For the purposes of this Cookbook, a fictional server IP address of '111.222.333.444' is assumed as some commands require IP addresses to be entered and shown.

Accessing the server

You may choose to access the server at a direct terminal. However, more likely you may choose to use another computer with a terminal emulator to open a session on the server remotely. If you do this, it is recommended you use a terminal programme such as 'PuTTY', which provides a free and excellent implementation of Telnet and SSH for Windows and Unix platforms (<http://www.chiark.greenend.org.uk/~sgtatham/putty/>). Equally, for a more graphical remote interface to the server, the 'Tight VNC' Server may be used (the server software being installed on the Debian computer server, and the client software on the remote access computer).

Linux Commands

Learning Linux can be daunting – some documentation is here <http://www.debian.org/doc/#manuals> best is the one page reference card here <http://www.debian.org/doc/#other>.

Initial Installation

As a first step it is necessary to ensure the server has all necessary updates. The examples below use the latest versions of the open source toolsets employed at the time of writing. The nature of the open source tools used here is such that when you are installing this on your server the versions will most likely have changed. You should therefore substitute the version numbers noted throughout the cookbook for the latest equivalents. Logging in as the 'superuser' root user, this is achieved as follows:

```
dpkg-reconfigure tzdata  
  
apt-get update  
  
apt-get upgrade  
  
apt-get dist-upgrade
```

Java

Java is a core requirement of the web portal. The server will require the Java Development Kit (JDK). If this is not present, install as follows:

```
apt-get install sun-java6-jdk
```

This installs Java on the server. This installation commences as a command-line process. During the installation, a graphical window appears with Sun's terms and conditions. The 'OK' option for this is activated by pressing the tab key, and then entering return. Further pages of options may then be shown, again one uses the tab key to switch between selections and the return key to select. The following installation process can take some time (c. 10 minutes).

Once Java is installed, updates to the installation should be undertaken to ensure you have the latest edition. This is achieved as follows:

```
update-alternatives --config java  
  
update-alternatives --config javac
```

The above commands may quite legitimately report no actions are required. As time passes, these commands may also be used to keep Java updated on the server.

Apache

The next step is to install the web server 'Apache', as follows:

```
apt-get install apache2 unzip nmap
```

To 'restart', 'stop' or 'start' apache, use the following command (varying the last word)

```
service apache2 restart
```

Tomcat

Following this you must also install the Java Servlet engine 'Tomcat', as follows:

```
apt-get install tomcat6
```

Postgres / PostGIS

The next step is to install the Postgres database with the PostGIS extensions. This is achieved as follows:

```
apt-get install postgresql postgresql-server-dev-8.4 postgresql-8.4-  
postgis postgresql-client  
  
apt-get install postgresql-contrib-8.4  
  
apt-get install postgresql-8.4-postgis  
  
apt-get install postgresql-contrib
```

The steps above install the basic filesets required for the Postgres installation; configuration steps are described below.

Python

The Python language is required also, this is installed as described:

First, an initial check should be conducted to establish if python is already installed, this is achieved as follows:

```
python
```

If already installed, python reports as follows:

```
Python 2.6.6 (r266:84292 .....etc... (use Ctrl-D to quit)
```

If Python is not installed, it should be as follows:

```
apt-get install python
```

Next, the python module for postgis should be installed. This is undertaken in two stages:

Stage 1 involves installing the python dependency

```
apt-get install python-pygresql
```

Stage 2 involves installing the python module itself

```
apt-get install postgresql-plpython-8.4
```

Perl

Finally, perl scripting support should be added as follows:

```
apt-get install postgresql-plperl-8.4
```

Wrap-up

Once the installations are concluded certain packages and dependencies that are no longer required can be removed with the command:

```
apt-get autoremove
```

Once all the steps above are finished, your server will have all the requisite software components for the e-SOTER web portal. All that remains now is to configure these installations.

Configuration of Installed Software

The next section involves progressing through the steps required to configure the essential software components.

Postgres Configuration – Preparing for the database

The steps below establish a working database in Postgresql with support for PostGIS.

To undertake the next few steps, you will need to login as the database superuser by using su command as follows:

```
su - postgres
```

Note that this user has been created automatically during the initial Postgres installation. Now, logged in as the 'postgres' user, you can create a new database template with the Postgis components installed, thus:

```
createdb template_postgis15 -U postgres
```

Next use the psql command to add the language configuration as follows:

```
psql -d template_postgis15 -U postgres -c "CREATE LANGUAGE plpgsql"
```

Next, move to the correct working folder for the postgis installation scripts, for example:

```
cd /usr/share/postgresql/8.4/contrib/postgis-1.5
```

and run the setup SQL scripts, thus:

```
psql -d template_postgis15 -U postgres -f postgis.sql  
psql -d template_postgis15 -U postgres -f spatial_ref_sys.sql
```

Finally, you can install the help description for each of these functions such that it can be searched via psql or pgadmin. To do this first change folder and then run the command, thus:

```
cd /usr/share/postgresql/8.4/contrib/      (or cd ..)
psql -d template_postgis15 -U postgres -f postgis_comments.sql
```

Postgres Configuration - Communications

The next step enables the database to make external communications. To do this we need to edit the Postgres configuration file directly. This can be achieved in the Debian GUI, if installed, or at the command line with an editor such as Pico, Nano or Vi. Note you should still be logged in as the user 'postgres' to do this.

```
cd /etc/postgresql/8.4/main
pico postgresql.conf      or      vi postgresql.conf
```

In the editor, edit the 'listen_addresses' line to read as follows:

```
listen_addresses = '*'
```

Note: Entering a '*' in this way opens up communications to the Postgres server from all outside remote hosts. You may wish to take some advice from your network security specialist concerning this. For example this server may be located behind an institutional firewall and not be in the 'DMZ (demilitarised zone)' on your network.

Next you edit the client authentication configuration file, named 'pg_hba.conf'.

```
cd /etc/postgresql/8.4/main
pico pg_hba.conf      or      vi pg_hba.conf
```

Edit the file as required to allow ssl connections. For instance, to allow such ssl connections from ISRIC's servers the following line is added:

Under the section IPv4

```
host all all 137.224.252.10 255.255.255.0 md5
```

Once these edits are made, the configuration files should be reloaded, thus:

```
/etc/init.d/postgresql reload
```

It could be that a more authoritative restart is required to achieve this, thus:

```
/etc/init.d/postgresql force -reload
```

Or even

```
/etc/init.d/postgresql restart
```

It is good practice to change the password for the Postgres database from the installation default, as follows (*all on one command line*):

```
psql -d template_postgis15 -U postgres -c "ALTER USER postgres WITH  
PASSWORD 'xxxxxxx'";
```

Here the password is being set to 'xxxxxxx' – you should choose your own password. The result 'ALTER ROLE' is then reported back to indicate success.

Make a careful note of the database user/password!

This process changes the password for the Postgres database. Finally it is good practice also to change the password for the Debian Linux user 'postgres' to the same password as the Postgres database user.

Note: Remember the system user account 'postgres' is **not** the same as the Postgres database user account 'postgres'. However, best practice is to ensure both accounts share the same password.

You should currently be logged in as the user 'postgres', log back out from this user to revert to the superuser account.

```
postgres > exit  
> whoami  
root
```

Use the passwd command to change the password of the postgres system account, thus:

```
passwd postgres
```

Follow the instructions onscreen to alter the password.

Make a careful note of the postgres user password!

Postgres Password: _____

Installing GeoServer

The GeoServer tool provides published web data services for datasets held in the postgres database. The software needs to be installed on the server, as the root superuser, thus:

Preparing the server for GeoServer

The first requirement is that there are created the appropriate folder structures to hold geoserver, thus:

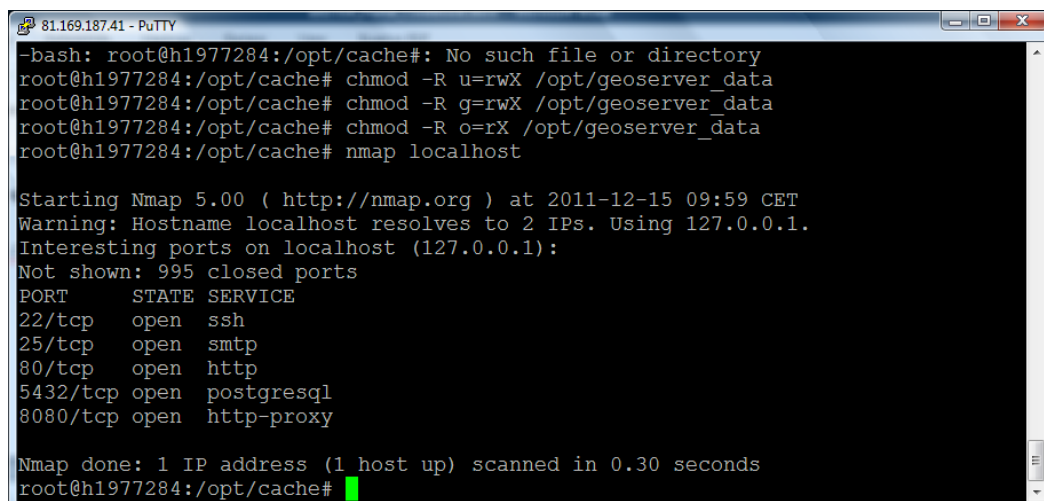

```
mkdir /opt/cache/geoserver
chown -R tomcat6:nogroup /opt/cache/geoserver
chmod -R u=rwX /opt/cache/geoserver
chmod -R g=rwX /opt/cache/geoserver
chmod -R o=rX /opt/cache/geoserver
mkdir /opt/geoserver_data/
chown tomcat6:nogroup /opt/geoserver_data/
chmod -R u=rwX /opt/geoserver_data/
chmod -R g=rwX /opt/geoserver_data/
chmod -R o=rX /opt/geoserver_data/
```

Next run the `nmap` command to provide an overview of the network environment; `nmap` is a utility used to inspect a network or for security auditing.

```
nmap localhost
```

Note: the ports 80 (http); 5432 (postgres) and 8080 (http proxy) should be open on the server.

The ‘`nmap`’ command provides a range of other useful information concerning the server communication settings.



```
81.169.187.41 - PuTTY
-bash: root@h1977284:/opt/cache#: No such file or directory
root@h1977284:/opt/cache# chmod -R u=rwX /opt/geoserver_data
root@h1977284:/opt/cache# chmod -R g=rwX /opt/geoserver_data
root@h1977284:/opt/cache# chmod -R o=rX /opt/geoserver_data
root@h1977284:/opt/cache# nmap localhost

Starting Nmap 5.00 ( http://nmap.org ) at 2011-12-15 09:59 CET
Warning: Hostname localhost resolves to 2 IPs. Using 127.0.0.1.
Interesting ports on localhost (127.0.0.1):
Not shown: 995 closed ports
PORT      STATE SERVICE
22/tcp    open  ssh
25/tcp    open  smtp
80/tcp    open  http
5432/tcp   open  postgresql
8080/tcp   open  http-proxy

Nmap done: 1 IP address (1 host up) scanned in 0.30 seconds
root@h1977284:/opt/cache#
```

Figure 3 Running `nmap` on the server

One must then confirm that the java servlet engine ‘`tomcat`’ is running correctly. Tomcat runs on port ‘8080’ by default, thus for server ‘111.222.333.444’ by example, one should try to open the webpage

on a browser on a separate computer at <http://111.222.333.444:8080/>. Hopefully you will see the page below.

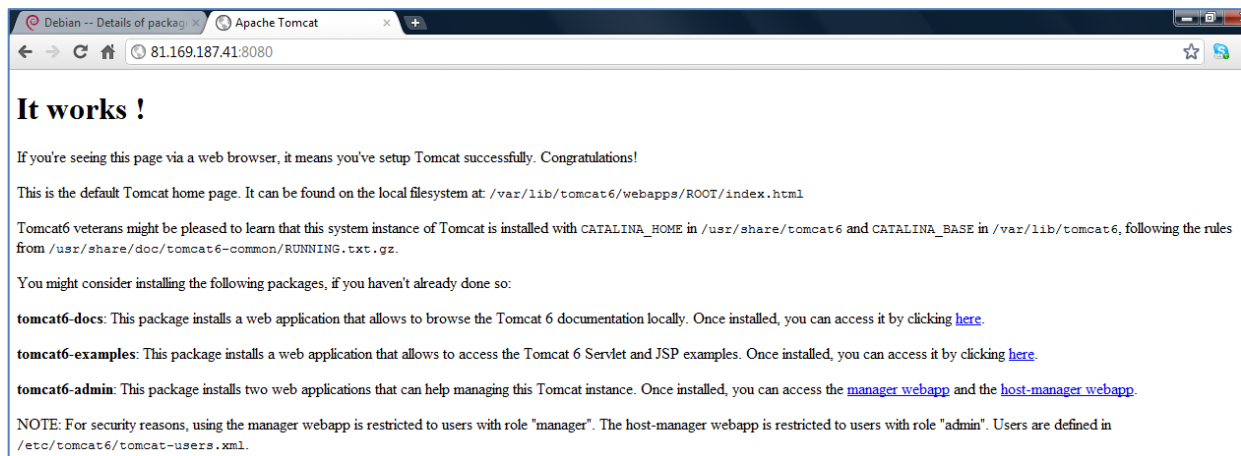


Figure 4 The Tomcat installation success webpage

Once Tomcat is operational, the next step is to move on to the GeoServer installation.

Obtaining and installing GeoServer

The GeoServer fileset may be downloaded into a temporary folder somewhere convenient (for example `/home/`) on the server, thus:

```
mkdir install
cd install
wget http://downloads.sourceforge.net/geoserver/geoserver-2.2.4-war.zip
unzip geoserver-2.2.4-war.zip
```

The files so unpacked should then be copied to their destination folder location, thus:

```
cp geoserver.war /var/lib/tomcat6/webapps/
```

Obtaining and installing GDAL

GDAL, or Geospatial Data Abstraction Library is a translator library for raster geospatial data formats (see <http://www.gdal.org/>). One must then ensure that GDAL is correctly installed. First ensure it is not already installed, thus:

```
apt-cache search gdal*
```

Assuming GDAL is not already so, it may be installed thus:

```
apt-get install libgdal1-1.6.0 gdal-bin
```

Configuring the Apache Web Server

The Apache webserver needs to be configured to work with the other tools in the e-SOTER web portal, thus:

Changing the Apache redirects for Proxy Handling

It is necessary to change the redirects in Apache, to do this use an editor such as *Pico* or *Vi* to edit the default file, thus:

```
cd /etc/apache2/sites-available/  
  
pico default          or          vi default
```

In the file, add a new clause to manage proxy handling:

```
ProxyRequests Off  
<Proxy *>  
    Order deny,allow  
    Allow from 137.224.252.10           [or whatever your server  
IP is ...]  
</Proxy>  
ProxyPass /geoserver http://localhost:8180/geoserver  
ProxyPassReverse /geoserver http://localhost:8180/geoserver  
ProxyPreserveHost On
```

Proxy Request configuration is carried out to ensure Apache handles geoserver traffic correctly.

Next, one can use the 'a2enmod' command to enable the apache2 modules, creating the proper links to the module .load and .conf files, thus:

```
a2enmod proxy  
  
a2enmod proxy_http
```

Restarting Apache and Tomcat servers

Once the configuration edits are made as described above, the Apache and Tomcat services should be restarted to pick up these edits (as the root superuser), thus:

```
/etc/init.d/apache2 restart  
  
/etc/init.d/tomcat6 restart
```

If you receive an error, check the 'default' configuration file settings carefully to ensure they are as in the section above .

Next you will need to edit the tomcat security and properties settings in the file '**tomcat6**' with an editor such as *Pico* or *Vi*, thus:

```
cd /etc/default/

pico tomcat6 or vi tomcat6
```

The settings in the file should be set thus:

```
JAVA_OPTS="-Djava.awt.headless=true -server -Xms48M -Xmx512M -Xms48M
-Xss2M -XX:
+UseConcMarkSweepGC -XX:MaxPermSize=256m -
XX:SoftRefLRUPolicyMSPerMB=36000 -DGEO
SERVER_DATA_DIR=/opt/cache/geoserver_data -
DGEOWEBCACHE_CACHE_DIR=/opt/cache/geo
server"
```

It is suggested the tomcat service now be restarted again to ensure the settings were entered correctly, thus:

```
/etc/init.d/tomcat6 restart
```

Confirming the operation of GeoServer

Finally, one should confirm the correct installation and operation of GeoServer. Run this by opening a web browser session to the server from a separate networked computer. Enter the web address of the server, with the subfolder '/geoserver'. For instance for the server '111.222.333.444', enter the following (noting the port number is '8080'):

```
http://111.222.333.444:8080/geoserver
```

Hopefully you will now be able to see the GeoServer page thus:

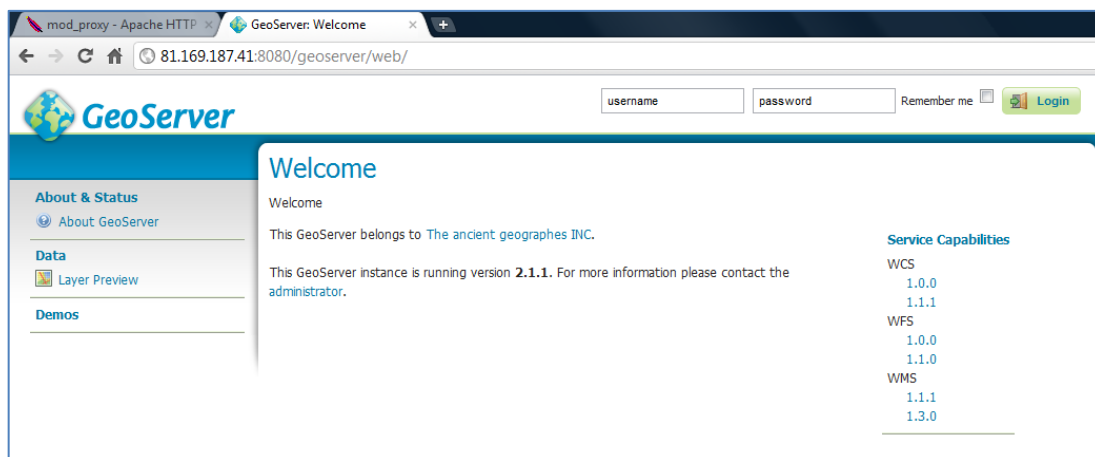


Figure 5 The GeoServer home webpage

Note the default GeoServer username and password, respectively is 'admin' and 'geoserver'. Ensure you can log in correctly to GeoServer, thus (don't tick 'remember me' until you change password):

username password Remember me ☐ Login

Figure 6 Logging in to GeoServer

It is a good idea now to change the password of the geoserver administration account. To do this, use the web gui interface and locate the 'Users' category in the menu in the left margin. Click then on the user admin in the next dialogue to show the settings for the account. From here the password can be changed.

Users list
Manage users known to GeoServer
+ Add new user
- Remove Selected(s)

Security
Users
Data security
Service security
Catalog security

Results 1 to 1 (out of 1 items)

	Username	Roles
<input type="checkbox"/>	admin	ROLE_ADMINISTRATOR

(a) => (b) =>

Edit user
You can update the password, or change the user roles

Username
admin

Password
●●●●●●●●

Confirm password
●●●●●●●●

(c)

Figure 7 Changing the GeoServer admin account password

Make a careful note of the geoserver user password!

Geoserver Password: _____

Once logged in successfully, locate the 'Server Status' and 'Logs' pages to ensure all is running well. Next open the 'Layer preview' to review some of the sample datasets. Open one or two layers in the formats 'OpenLayers', 'KML' and 'GML' (for example SF:Streams).

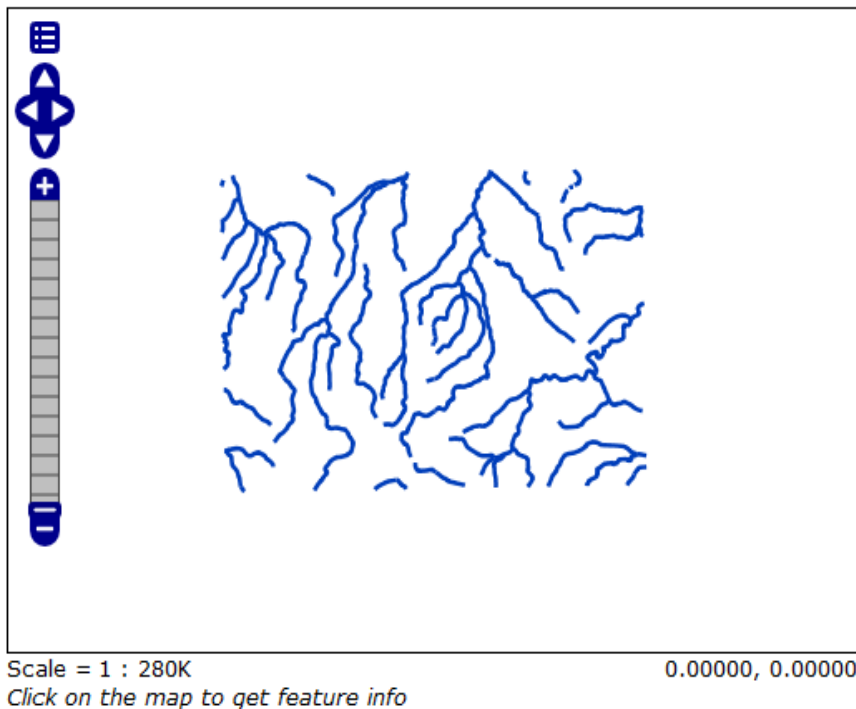


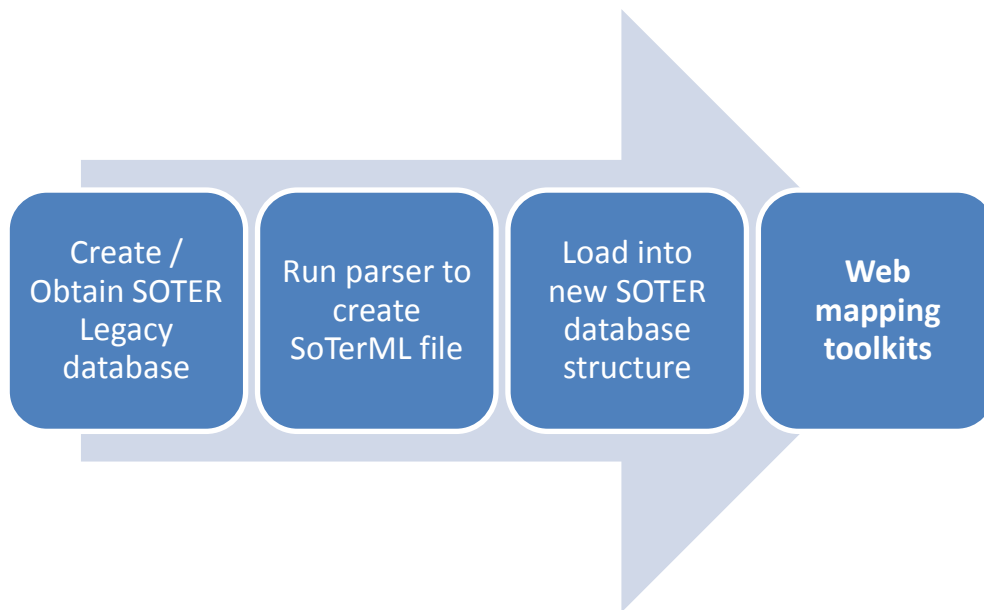
Figure 8 GeoServer Sample Data mapping, sf:streams

Uploading Sample Data to the Portal

As a part of this cookbook, we have provided some sample SoTerML data to enable a SOTER application to be established. There are several themes to this data which all need installing and configuring. This section takes you through these steps.

In the accompanying Digital media (Appendix One), there are provided a range of sample files to enable a demonstration of the eSOTER Web Portal. Sample data files are also available from the e-SOTER project website. These sample files may be loaded onto the server to allow their loading and activation in the system.

Traditionally, SOTER databases were held in dBASE and then MS Access formats. A 'parser' has been written to process legacy SOTER datasets held in the Access format into the new SoTerML format. Appendix Two presents the user guide to the parser and the digital source code files for it. The process steps typically involved are as follows:



Using ftp to upload the sample data

Sample datasets are provided and these need to be moved to the new Debian server.

Installing FTP clients

To upload the sample data files to the Debian server you can use WGET or FTP. To achieve this, one may install a copy of the ftp client software. To achieve this, ensure you are the **root super user** and type:

```
apt-get install ftp
```

To connect to the server from a **PC** to copy files using ftp, you need a local client, the open source tool 'FileZilla' is highly recommended for this task for PCs. To obtain this programme, see <http://filezilla-project.org/>. Another popular free ftp tool by contrast is WinSCP, see <http://winscp.net/eng/index.php>. Either tool will suffice.

Installing an FTP Server

As a separate procedure to this, you may also wish to install an ftp server on the debian computer. If you choose to do this, it is recommended to use the 'proftpd' server tool, installed thus:

```
apt-get install proftpd
```

As with many tools in Linux, there are often more than one options available for a given software functionality. So the VSFTP ftp server may also be preferred over proftpd.

VSFTP Installation

The vsftpd may be installed thus:

```
sudo apt-get install vsftpd
```

Edit the vsftp configuration file

```
pico /etc/vsftpd.conf
```

Search through the file and change the following lines:

```
anonymous_enable=YES Change To anonymous_enable=NO#local_enable=YES  
Change To local_enable=YES#write_enable=YES Change To  
write_enable=YES
```

Also, add a line to the bottom of the file:

```
force_dot_files=YES
```

Quit the editor and restart the vsftpd server

```
service vsftpd restart
```

You cannot ftp to a server using the root account so you may also need to create a new user on the debian server using the 'adduser' command thus (to create a new user called 'newuser'):

```
adduser newuser
```

[Choose your own name. Follow the instructions for adding passwords and user account details]

Once you can connect to the debian server you can copy over the sample data.

Note: As a security precaution, it is suggested you may not wish to leave the ftp server running all the time, but to start it only when required and stopping the service at other times.

Once the data is copied, you may wish not to leave the ftp server running. In this case you can stop the server with the following command:

```
/etc/init.d/proftpd stop
```

To start (restart) the process, type:

```
/etc/init.d/proftpd start
```

Copying over the Sample SoTerML data

Using the ftp tools, copy over the filesets identified in Appendix One. It is suggested that a temporary location be made available to upload the files to, from where they can be copied as required:

For example, here we create a folder in /home to receive the files:

```
mkdir /home/portal_data
```


Next use ftp to upload all the files identified in Appendix One to this location. When completed one should have three sub-folders, namely:

Client	Sample SoTerML file and loading utility
Db	Database configuration files
GeoServer	Webservices configuration filesets

Creation of the e-SOTER Database

The next step is to create a database to hold the e-SOTER datasets. This database will be called 'esoter' and will be created from the postgres database template created earlier, thus:

```
su postgres
createdb -T template_postgis15 esoter
```

Using PGAdmin – the graphical database administration tool

The best means to administer a Postgres database is with the 'PGAdmin' tool. pgAdmin is a programme independent of the database and can be downloaded from <http://www.pgadmin.org/index.php> compiled for a range of computer architectures (e.g. PC, Mac and Linux flavours).

pgAdmin has a graphical user interface and allows visual, fine control over the various elements of the database. PGAdmin can be installed on a Windows PC as a standalone programme and used to access the Debian server database 'esoter' created above:

Once PGAdmin is running you can make a connection to the Debian server. Use the 'File' -> 'Add Server' menu option and complete the dialog box as follows:

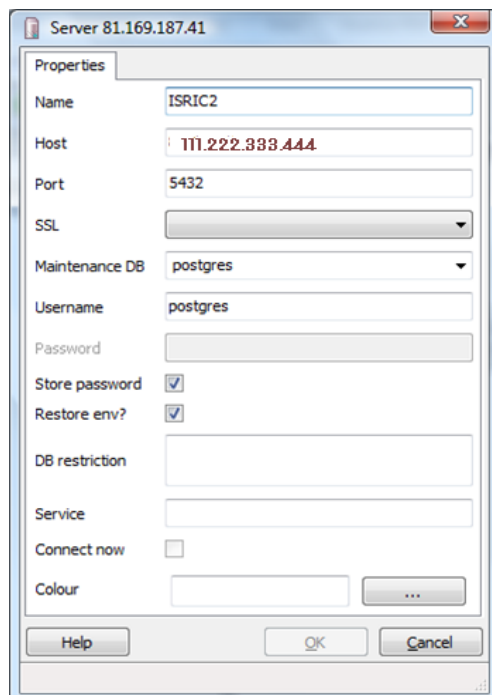


Figure 9 Connecting PGAdmin to the server

Once connected the new database is displayed in the tree hierarchy of PGAdmin, thus:

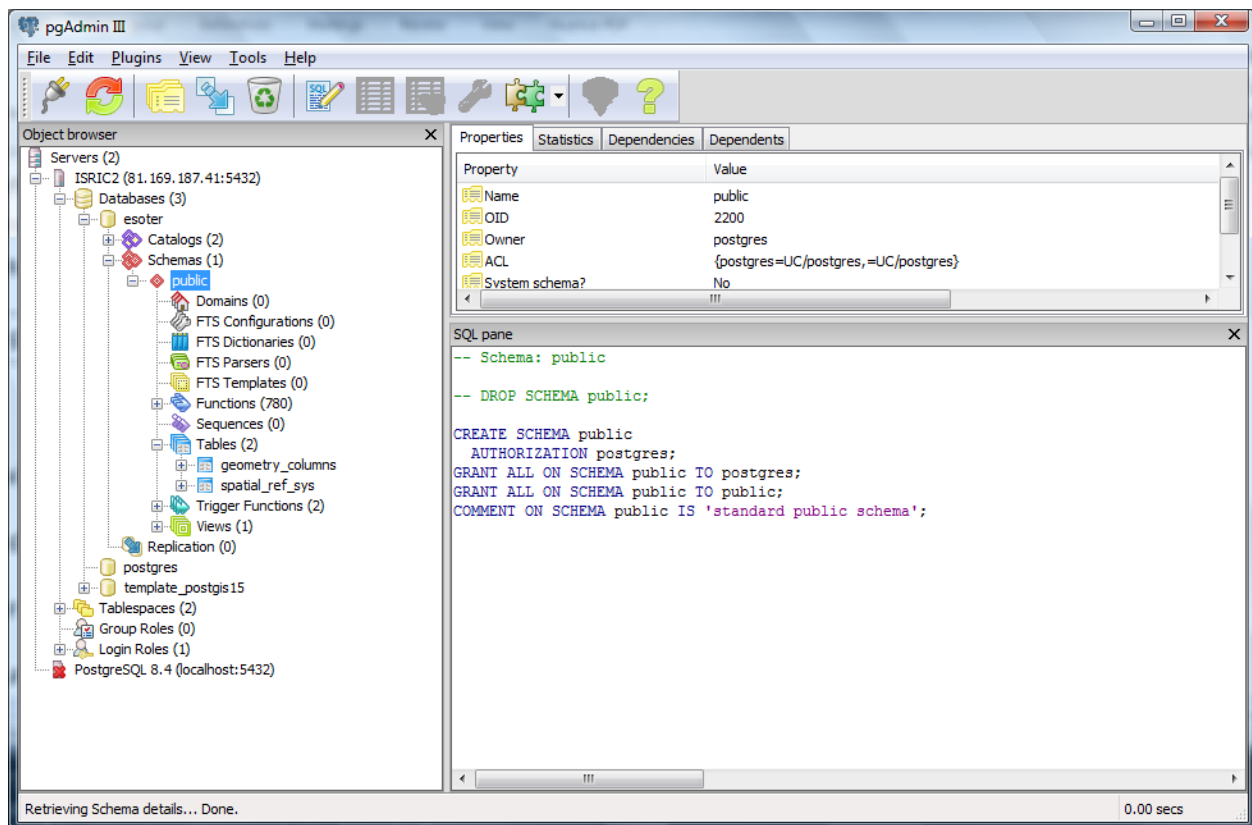


Figure 10 The PGAdmin Console

The next step is to load in the database definitions for the eSOTER database. These definitions are held in the folder 'db' of the downloaded sample datasets (see Appendix One). Locate the file '**soter_v3.sql**'.

In PGAdmin, place the cursor on the new database name ('esoter') and then open the PGAdmin SQL editor. This ensures that the tables this script creates will be written into the eSOTER database itself, thus:

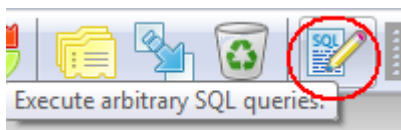


Figure 11 Selecting the SQL editor in PGAdmin

Then load into the editor the file 'soter_v3.sql', first discarding any contents already in the editor, thus:

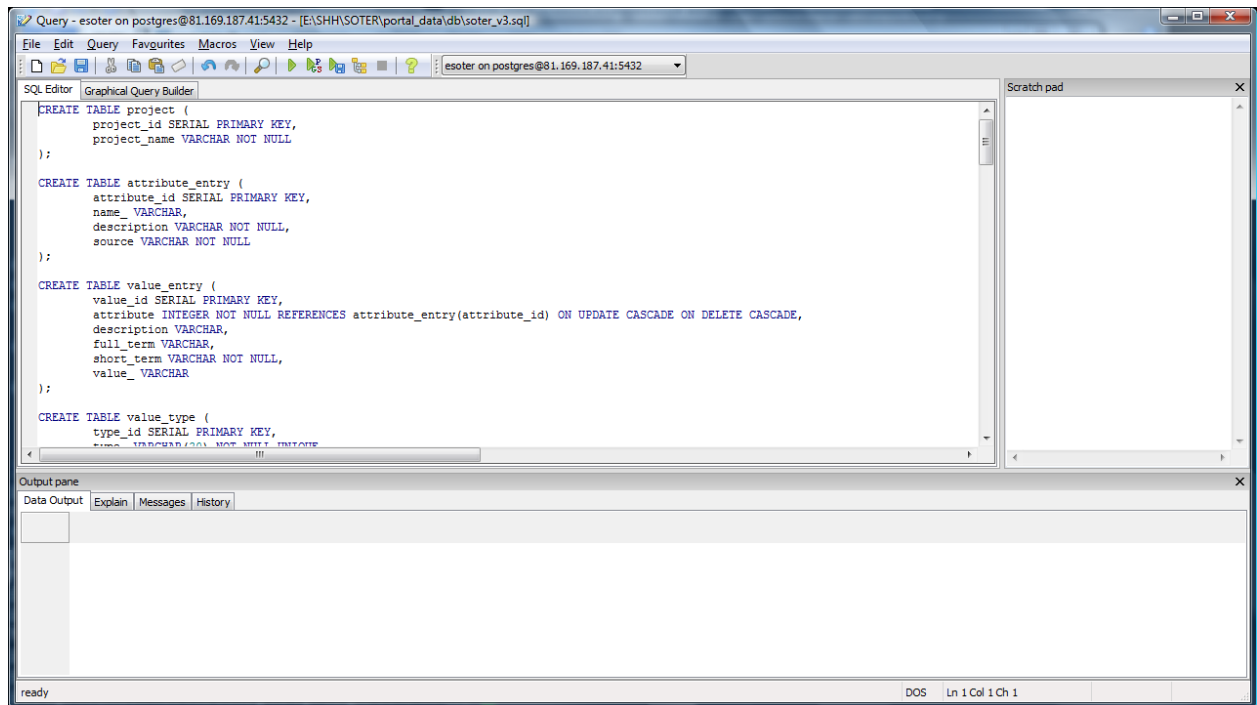


Figure 12 Using the SQL editor in PGAdmin

The script can be run with the 'Execute Query' command, thus:

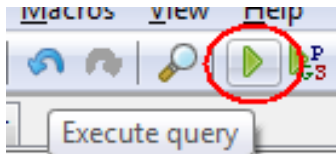


Figure 13 Executing queries using the SQL editor in PGAdmin

A number of messages will appear in the feedback window indicating the progress of the script. Once completed you can view the newly created tables in the hierarchical folder view.

Note: you MUST 'refresh' the folder view to show these new tables!

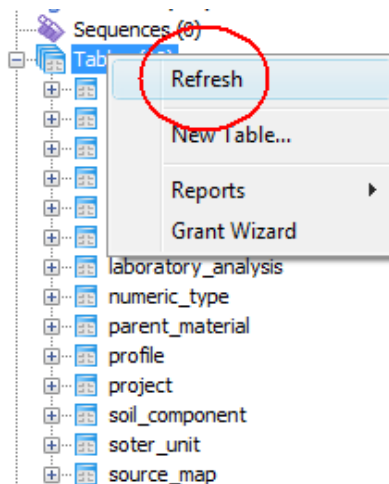


Figure 14 Refreshing the table view in PGAdmin

If by mistake you find you have created the new tables in a different database, for instance the template database, don't worry! The tables will all need to be deleted however and this is achieved by deleting all of the tables one by one from the database, **except the `spatial_ref` and `geometry_columns` tables**, via right mouse click option DROP CASCADE, thus:

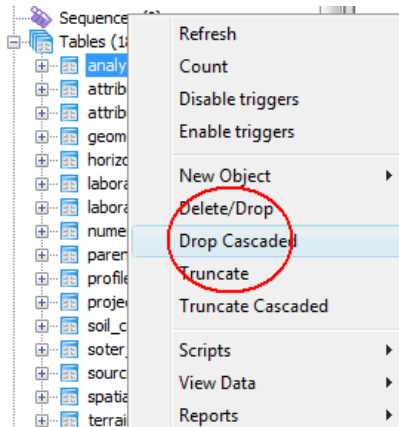


Figure 15 Deleting tables in PGAdmin

Note: remember to *refresh the view* afterwards if you do this! This is a right mouse button option.

Having loaded the file '`soter_v3.sql`', the same procedure can be followed to load and execute the SQL that writes the soter stored procedures to the database, also located in the 'db' folder (see Appendix One), '`pg_soter_upload3.sql`', thus:

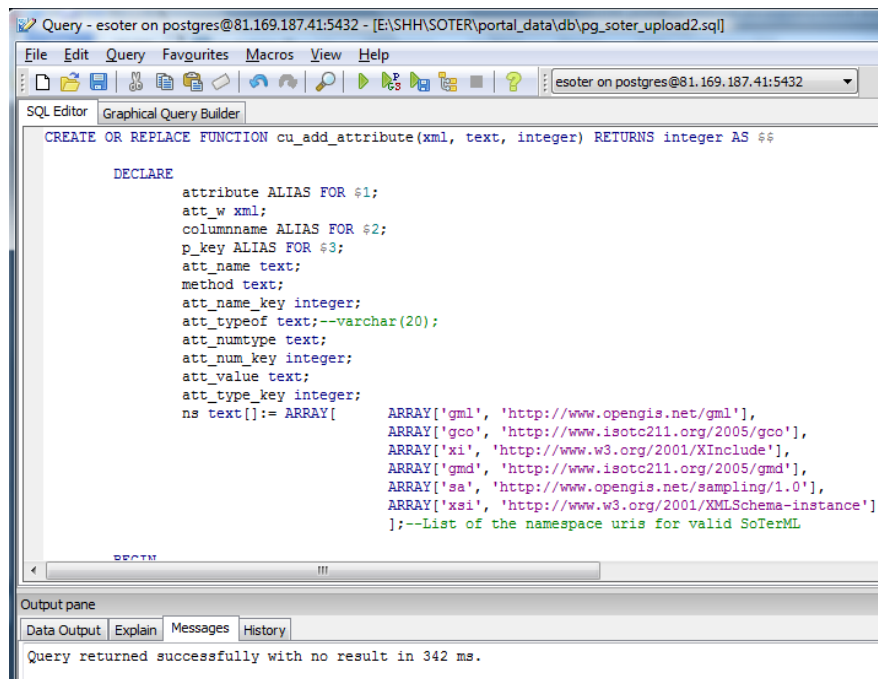


Figure 16 Loading SQL code to the SQL editor in PGAdmin

Once this has run correctly, use PGAdmin to ensure that the new functions have been created successfully. Remember to expand and refresh the functions view!

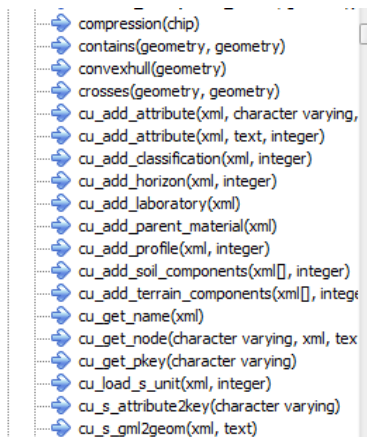


Figure 17 The Function view in PGAdmin

Once the basic database installation is complete, the sample datasets can be loaded.

Installing the SoTerML processing tools

Within the sample datasets provided (see Appendix One) are the 'Client' files required for processing SoTerML 'XML' datasets. The files can be left in the uploaded location for now. Ultimately one may wish to relocate these files elsewhere on the server. The 'soterUploader' tool loads SoTerML XML into the Postgres database. Obtaining a SoTerML XML file from a traditional e-SOTER format database is described in Appendix Two.

The tool is called 'soterUploader.jar' written in Java and has the following arguments:

-d	<i>The postgres driver class (org.postgresql.Driver)</i>
-url	<i>The path to the database jdbc:postgresql://STELLAR/upload</i>
-usr	<i>The database user name</i>
-pwd	<i>The database user password</i>
-SoTerML	<i>The path to the SoTerML to upload (eg C: /SoTerML.xml)</i>
-pj	<i>The name of the project being uploaded (eg KenyaSoterDB)</i>

To run the uploader, enter the following command, substituting your database parameters:

```
Java -jar soterUploader.jar -d org.postgresql.Driver -url jdbc:postgresql://server/soter_database -usr soter -pwd xxxxx -SoTerML //path / SoTerML.xml -pj upload_MAO
```

As the process is undertaken, messages may appear onscreen informing the user of the progress of the operation. SoTerML files can contain a lot of data and is loaded in chunks over the connection to the database. Once complete, the Postgres database will contain the data sourced from the example SoTerML 'XML' datafile.

Optimising and managing your PostgreSQL database is beyond the scope of this cookbook but instructions and guides can be found in the online PostgreSQL user community.

Configuring GeoServer for a Simple Objects web Service

The SoTerML data source contains a large array of nested data types, all interlinked. Presenting all these interlinked data 'objects' at once requires a so-called 'complex object' web service from GeoServer. However, many software client tools cannot handle complex objects. Instead these applications require so-called 'simple objects', where by a geometric point, line or polygon is accompanied by attribute data that relate specifically to that feature. Simple object web services do not therefore present interrelationships between object types and their geometry. Complex objects are described below.

As a test, one may now set up and publish a simple object web service for one of the geometric feature types in the newly loaded SoTerML data file to ensure the installation so far is working correctly. In GeoServer, click on 'Stores' in the left menu bar:

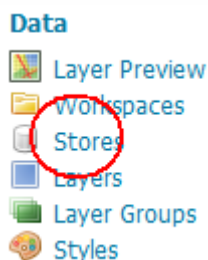


Figure 18 Adding a new data store in GeoServer

Next select 'Add new store' . Next identify 'PostGIS' database as a vector data source.

New Vector Data Source

Add a new vector data source

PostGIS
PostGIS Database

Basic Store Info

Workspace *
sf

Data Source Name *
soter_test

Description
SOTER dataset test data store

☒ Enabled

Connection Parameters

host *
localhost

port *
5432

database
<<your database name here>>

schema
public

user *
postgres

passwd
••••••••

Namespace *
<http://www.openplans.org/spearfish>

☒ Expose primary keys

Figure 19. Configuring a new data store in GeoServer

Add the data store configuration details. Remember that for ‘User’ and ‘password’ you enter the Postgres database account details. Enter your own Postgres database name also. You are then presented a list of the feature types holding geometric data from the SoTerML test file. Select, for example, ‘Profile’. The ‘Edit Layer’ dialogue appears allowing you to enter in basic layer details.

The specification for the EPSG:4326 spatial reference in GeoServer layer properties is

‘urn:ogc:def:crs:EPSG:6.6:4326’ (For more on EPSG, see <http://www.epsg.org/main.html>). This value ensures that data loaded in lat/long axis order is displayed correctly in the resulting data services. For more details see:

<http://docs.geoserver.org/latest/en/user/services/wfs/reference.html>

<http://docs.geoserver.org/latest/en/user/services/wfs/basics.html>

Bounding boxes are required, and you may use the ‘Compute from data’ and ‘Compute from native bounds’ options to enter these details automatically. When finished save the layer.

Finally, select the left bar menu option ‘Layer Preview’ to confirm all worked correctly. Locate the new layer you have just added and use OpenLayers to view the result, thus:

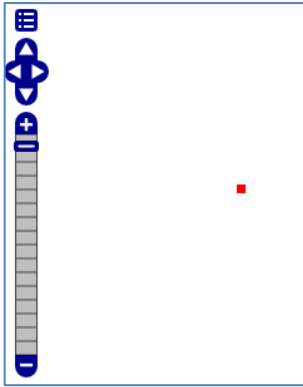


Figure 20. Viewing the test layer in OpenLayers

Simple feature services can be created for any table in the database - including views - using SQL. For example, running the following SQL from within an eSOTER database will create a dataset of all units that where uploaded under the project title 'myProject':

```
CREATE VIEW soter_units_mp AS SELECT soter_unit.soter_unit_id, soter_unit.geom FROM soter_unit  
LEFT JOIN project on project.project_id = soter_unit.project where project_name = 'myProject';
```

Note the inclusion of the geometry column, which allows the data to be visualised. Using GeoServer you can now add the table to your server in the same way as the 'Profile' table and check the results in 'Layer Preview'.

Tables and views can also be created dynamically using procedures stored within the database. Sample SQL is included with the upload scripts for building content that can be published as simple feature services.

Testing the Server WFS Capabilities

The Web Feature Service (WFS) capabilities of the server may be tested by accessing the web services from the web browser of a separate computer, thus, for example if the server IP address is '111.222.333.444', enter the URL:

```
http://111.222.333.444:8080/geoserver/wfs?request=getcapabilities
```

The resulting XML page display can be searched to locate the service you have just created, e.g. Chemnitz (one of the example e-soter datasets) thus for part of the file:


```
<FeatureType xmlns:e-Soter="e-soter">
<Name>e-Soter:Chemnitz</Name>
<Title>Chemnitz_Pilot_ETRS_UTM33</Title>
<Abstract/>
<DefaultSRS>urn:x-ogc:def:crs:EPSG:25833</DefaultSRS>
<ows:WGS84BoundingBox>
<ows:LowerCorner>11.936 49.966</ows:LowerCorner>
<ows:UpperCorner>14.021 51.034</ows:UpperCorner>
</ows:WGS84BoundingBox>
</FeatureType>
```

Testing the Server WMS Capabilities

The Web Map Service (WMS) capabilities of the server may be tested by accessing the web services from the web browser of a separate computer, thus, for example if the server IP address is '111.222.333.444', enter the URL:

```
http://111.222.333.444:8080/geoserver/wms?request=getcapabilities
```

The resulting XML page display can be searched to locate the service you have just created, e.g. Chemnitz (one of the example e-soter datasets) thus for part of the file:

```
<Layer queryable="1">
<Name>e-Soter:Chemnitz</Name>
<Title>Chemnitz_Pilot_ETRS_UTM33</Title>
<Abstract/>
<KeywordList/>
<CRS>EPSG:25833</CRS>
<CRS>CRS:84</CRS>
<EX_GeographicBoundingBox>
<westBoundLongitude>11.936</westBoundLongitude>
<eastBoundLongitude>14.021</eastBoundLongitude>
<southBoundLatitude>49.966</southBoundLatitude>
<northBoundLatitude>51.034</northBoundLatitude>
</EX_GeographicBoundingBox>
<BoundingBox CRS="EPSG:25833" minx="285014.722" miny="5539144.062" maxx="429831.327"
maxy="5654109.114"/>
<Style>
<Name>green</Name>
<Title>Green polygon</Title>
<Abstract>Green fill with black outline</Abstract>
<LegendURL width="20" height="20">
<Format>image/png</Format>
<OnlineResource xmlns:xlink="http://www.w3.org/1999/xlink" xlink:type="simple"
xlink:href="http://81.169.187.41:8080/geoserver/ows?service=WMS&request=GetLegendGraphic&format=im
age%2Fpng&width=20&height=20&layer=Chemnitz"/>
</LegendURL>
</Style>
<Style>...</Style>
</Layer>
```

Configuring GeoServer for Complex Objects

As well as presenting subsets of the whole SoTerML data source in the form of Simple Objects web services, it is also useful to be able to serve up web services that offer complex objects, whereby the entirety of interrelated objects are presented together in the same XML datastream served up by Geoserver. To do this requires further configuration of the GeoServer installation, the first step of which is to install the GeoServer Application Schema extension. It is important to ensure the Schema Extension version matches your version of the GeoServer installation.

Installing the GeoServer Application Schema Extension

GeoServer provides support for a broad selection of simple feature data stores, including property files, shapefiles, and JDBC data stores such as PostGIS. The app-schema module takes one or more of these simple feature data stores and applies a mapping to convert the simple feature types into one or more complex feature types conforming to a GML application schema. e-SOTER uses such a complex schema and so the application schema extension for GeoServer is required and should be installed. First locate a convenient folder to download the files to, for example '/home/install/geoserver':

```
mkdir /home/install/geoserver
cd /home/install/geoserver/
wget http://downloads.sourceforge.net/geoserver/geoserver-2.1.1-app-schema-plugin.zip
unzip geoserver-2.1.1-app-schema-plugin.zip
cp *.jar /var/lib/tomcat6/webapps/geoserver/WEB-INF/lib/
```

Configuring the GeoServer workspace folder

Sample datasets are provided to help configure the GeoServer services for SoTerML, see Appendix One.

Copying the mapping files for workspaces

Defining complex objects from simple objects is achieved by mapping files in GeoServer. These files define the nesting simple objects that make up the complex objects. These files can be copied to the workspace subfolder of the **stml** folder of the geoserver data directory. Presuming the sample datafiles are located in /home/portal_data/downloaded/Geoserver/workspaces/ the files can be copied across thus:

```
cp -R /home/portal_data/downloaded/Geoserver/workspaces/stml
/var/lib/tomcat6/webapps/geoserver/data/workspaces
```

This copies the sample workspace data into place. The folders must now be assigned the correct privileges, thus:

Note the commands below are each entered all on one line

```
chown -R tomcat6:nogroup
/var/lib/tomcat6/webapps/geoserver/data/workspaces/stml/

chmod -R u=rwX
/var/lib/tomcat6/webapps/geoserver/data/workspaces/stml/

chmod -R g=rwX
/var/lib/tomcat6/webapps/geoserver/data/workspaces/stml/

chmod -R o=rX
/var/lib/tomcat6/webapps/geoserver/data/workspaces/stml/
```

Editing the mapping files for workspaces

The mapping files require editing to reflect your own computing environment for the Soter database server details.

First, at the top level workspaces folder, confirm the setting for the file '**namespace.xml**':

Ensure the namespace URI is correct, the current version is <http://www.esoter.org/stml/5.2>

Located in the subfolder 'stml_SoTerUnit, there are a number of mapping files that require editing:

Open each xml file in turn and replace the '**sourceDataStores**' settings within as required, see below:

```

<sourceDataStores>
  <DataStore>
    <id>postgis_datastore2</id>
    <parameters>
      <Parameter>
        <name>dbtype</name>
        <value>postgisng</value>
      </Parameter>
      <Parameter>
        <name>host</name>
        <value>111.222.333.444</value>    (... or your server name)
      </Parameter>
      <Parameter>
        <name>port</name>
        <value>5432</value>
      </Parameter>
      <Parameter>
        <name>database</name>
        <value>esoter</value>          (... or your postgres database name)
      </Parameter>
      <Parameter>
        <name>user</name>
        <value>xxxxxxxx</value>        (... your postgres username)
      </Parameter>
      <Parameter>
        <name>passwd</name>
        <value>yyyyyyyy</value>        (... your postgres password)
      </Parameter>
      <Parameter>
        <name>schema</name>
        <value>stml</value>
      </Parameter>
      <Parameter>
        <name>Expose primary keys</name>
        <value>true</value>
      </Parameter>
    </parameters>
  </DataStore>
</sourceDataStores>

```

Also ensure that the target type reference is correct for the version of SoTerML you are using: version **5.2** at the time of writing:

```

<targetTypes>
  <FeatureType>
    <schemaUri>http://www.schema.esoter.net/stml/5.2/stml.xsd</schemaUri>
  </FeatureType>
</targetTypes>

```

Note the file '**datastore.xml**' should also be checked for the correct namespace.

```
<entry key="namespace">http://www.esoter.org/stml/5.2</entry>
```

Editing the mapping files for schemas

The schema files copied over should **not require editing**. However, inspect the files to familiarise yourself with them.

Testing the Installation

One should now be in a position to see if the server serves up data correctly. First as a precaution it is suggested the Tomcat service be restarted to ensure it is using all the edited configuration files. As the root user this is achieved thus:

```
/etc/init.d/tomcat6 restart
```

This may take longer than any previous restarts as the software will automatically download the SoTerML schema documents. You should make sure you are connected to the internet. The schema documents can also be loaded manually, refer to the GeoServer documentation for further details (<http://docs.geoserver.org/latest/en/user/data/app-schema/app-schema-resolution.html>).

Testing the Server WFS Capabilities

The Web Feature Services (WFS) capabilities of the server may be tested by accessing the web services from the web browser of a separate computer, thus, for example if the server IP address is '111.222.333.444', enter the URL:

```
http://111.222.333.444:8080/geoserver/wfs?request=getcapabilities
```

```
<?xml version="1.0" encoding="UTF-8"?>
<wfs:WFS_Capabilities xmlns:wfs="http://www.opengis.net/wfs"
  xmlns:ogc="http://www.opengis.net/ogc"
  xmlns:gml="http://www.opengis.net/gml">
  <ogc:Filter_Capabilities>
    <ogc:Spatial_Capabilities>
      <ogc:GeometryOperands>
        <ogc:GeometryOperand>gml:Envelope</ogc:GeometryOperand>
        <ogc:GeometryOperand>gml:Point</ogc:GeometryOperand>
        <ogc:GeometryOperand>gml:LineString</ogc:GeometryOperand>
        <ogc:GeometryOperand>gml:Polygon</ogc:GeometryOperand>
      </ogc:GeometryOperands>
      <ogc:SpatialOperators>
        <ogc:SpatialOperator name="Disjoint"/>
        <ogc:SpatialOperator name="Equals"/>
        <ogc:SpatialOperator name="DWithin"/>
        <ogc:SpatialOperator name="Beyond"/>
        <ogc:SpatialOperator name="Intersects"/>
        <ogc:SpatialOperator name="Touches"/>
        <ogc:SpatialOperator name="Crosses"/>
        <ogc:SpatialOperator name="Contains"/>
        <ogc:SpatialOperator name="Overlaps"/>
        <ogc:SpatialOperator name="BBOX"/>
      </ogc:SpatialOperators>
    </ogc:Spatial_Capabilities>
    <ogc:Scalar_Capabilities>
      <ogc:LogicalOperators/>
      <ogc:ComparisonOperators>
        <ogc:ComparisonOperator>LessThan</ogc:ComparisonOperator>
        <ogc:ComparisonOperator>GreaterThan</ogc:ComparisonOperator>
        <ogc:ComparisonOperator>LessThanEqualTo</ogc:ComparisonOperator>
        <ogc:ComparisonOperator>GreaterThanEqualTo</ogc:ComparisonOperator>
        <ogc:ComparisonOperator>EqualTo</ogc:ComparisonOperator>
        <ogc:ComparisonOperator>NotEqualTo</ogc:ComparisonOperator>
        <ogc:ComparisonOperator>Like</ogc:ComparisonOperator>
        <ogc:ComparisonOperator>Between</ogc:ComparisonOperator>
        <ogc:ComparisonOperator>NullCheck</ogc:ComparisonOperator>
      </ogc:ComparisonOperators>
      <ogc:ArithmeticOperators>...</ogc:ArithmeticOperators>
    </ogc:Scalar_Capabilities>
    <ogc:Id_Capabilities>...</ogc:Id_Capabilities>
  </ogc:Filter_Capabilities>
</wfs:WFS_Capabilities>
```

Figure 21. WFS capabilities of the server

Note that if there is no stml wfsoutput here, something is WRONG

Further to consulting the capabilities of the service, try to test features can be received, thus, for example if the server IP address is '111.222.333.444', enter the URL:

```
http://111.222.333.444:8080/geoserver/wfs?request=GetFeature&typeName=stml:SoTerUnit&maxFeatures=1
```

Debugging

It is possible that you may encounter some errors when undertaking the steps noted above. Inspect the system error logs to try and track down the problem. The error message are held in a log file, found at

```
/var/log/tomcat6/catalina.out
```

If exceptions occur they are reported, thus: java.io.IOException: Schema 'stml:attribute' do not exist.

As data is written to this logfile, it may be useful to view it for debugging purposes. To watch data as it is written to a file the command '**tail**' can be used (being the opposite to the 'more' command), thus:

```
tail -f /var/log/tomcat6/catalina.out
```

Running GeoServer in a production environment

See the online documentation for optimising your GeoServer installation:

<http://docs.geoserver.org/stable/en/user/production/index.html>

Installing Geo-network

GeoNetwork is a catalog application to manage spatially referenced resources. It provides powerful metadata editing and search functions as well as an embedded interactive web map viewer. It is currently used in numerous Spatial Data Infrastructure initiatives across the world.

```
##### install geonetwork

wget
http://downloads.sourceforge.net/project/geonetwork/GeoNetwork_opensource/v2.6.4/ge
onetwork.war?r=http%3A%2F%2Fsourceforge.net%2Fprojects%2Fgeonetwork%2Ffiles%2FGeoNe
twork_opensource%2Fv2.6.4%2F&ts=1309419750&use_mirror=dfn

# edit the apache

/* change apache redirects

pico /etc/apache2/sites-available/default

# add

ProxyPass /geonetwork http://localhost:8080/geonetwork

    ProxyPassReverse /geonetwork http://localhost:8080/geonetwork

/etc/init.d/apache2 restart

/etc/init.d/tomcat6 restart

/etc/init.d/apache2 restart
```

Post Installation Configurations

Geonetwork Username and Password:

New installations of GeoNetwork use admin for both username and password. It is advisable, indeed important, to change this once installed. This is undertaken from the Administration page once logged on.

The example below shows a 'walkthrough' of the demonstration configuration. First login to GeoServer.



Figure 22. Administrator panel for Geonetwork

-data directory

```
<uploadDir>data/tmp</uploadDir>

[17:53:45] Jose García: <param name="dataDir" value="../../../data" />

mkdir /var/lib/tomcat6/webapps/geonetwork/data
mkdir /var/lib/tomcat6/webapps/geonetwork/data/tmp
chown tomcat6:tomcat6 /var/lib/tomcat6/webapps/geonetwork/data
chown tomcat6:tomcat6 /var/lib/tomcat6/webapps/geonetwork/data/tmp
```

-background

```
blue background from demis.nl
geonetwork/WEB-INF/config-gui.xml
```

-for map search

```
uncomment localhost and add

<layer server="http://wms3.isric.org/geoserver/gwc/service/wms?LAYERS=bluemarble"
tocName="Map" params="{layers: 'Earth Image,Borders,Coastlines', format:
'image/jpeg'}" options="{isBaseLayer: true}" />
```


-for viewer

```

uncomment localhost and add

<layer server="http://www2.demis.nl/wms/wms.ashx?WMS=BlueMarble"
tocName="Borders"  params="{layers: 'Borders,Coastlines', transparent:
'true', format: 'image/png'}"  options="{}" />

    <layer server="http://www2.demis.nl/wms/wms.ashx?WMS=BlueMarble"
tocName="Ortophoto"  params="{layers: 'Earth Image', format: 'image/png'}"
options="{isBaseLayer: true}" />

```

- adjust image at top header

```

wget http://www.esoter.net/sites/all/themes/esoter/images/header.gif
into /var/lib/tomcat6/webapps/geonetwork/images/
change root to tomcat ownership
#edit to adjust for the isric image
web\geonetwork\xsl\banner.xsl

        </td>

        <td align="right" class="banner">

             ...
#edit web\geonetwork\geonetwork.css
td.banner
{ font-size: 8pt;
color: #ffffff;
background-image: url('images/ISRIC_bannerw.png .....
# if testing make sure the cache is empty

```

**- change the system configuration to be similar to original meta site name:ISRIC site organisation:
ISRIC World Soil Information**

```
server: meta.isric.org

port:80

feedback email: meta.isric.org

smtp smtp.isric.org

port 25

-add harvest from fao

www.fao.org

port 80

servlet geonetwork

keyword soil

    run only once

changed

<uploadDir>data/tmp</uploadDir>

<param name="dataDir" value="./data" />

    mkdir /var/lib/tomcat6/webapps/geonetwork/data

mkdir /var/lib/tomcat6/webapps/geonetwork/data/tmp

chown tomcat6:tomcat6 /var/lib/tomcat6/webapps/geonetwork/data

chown tomcat6:tomcat6 /var/lib/tomcat6/webapps/geonetwork/data/tmp
```

- adding the group e-soter

The administrator can create new groups of users. User groups can correspond to logical units within an organisation.

To create new groups you should be logged on with an account that has administrative privileges. To log in, simply go to the home page and enter your username and password in the top right corner fields, then click on the login button.

Figure 23. Adding a user group

- add template

The template options allow one to manage the metadata templates in the catalog. In order to use these facilities, you must be logged in as an administrator. After the login step, go to the administration page, thus.

Figure 24. Adding Templates

-adding metadata records

To add or edit data and metadata, the user must be registered with an Editor profile or higher. That user should be a member of the User Group (e-soter).

Creating a New Record using the web based Metadata Editor

In the home page, click on the **Administration Tab**.

- 1 Select **New Metadata** from the List of the admin page.
- 2 Select the metadata standard **Template**, if possible, using the preferred ones. GeoNetwork opensource comes by default with support for three internationally-recognised metadata standards, ISO19139 (http://www.iso.org/iso/catalogue_detail.htm?csnumber=32557), FGDC (<http://www.fgdc.gov/metadata>) and Dublin core (<http://dublincore.org/>). For the ISO standard, two templates have been developed; one for vector and one for raster data. Both contain a relevant set of elements to describe the respective types of data. More templates can be developed online.

- 3 Select the **Group Esoter** the metadata will belong to. These are the groups authorized to add metadata to by your administrator.
- 4 Click on **Create**.

- Step by Step: adding a metadata

- 1 Enter username and password and click on the login button. The system will identify you and assign the correct privileges to work with

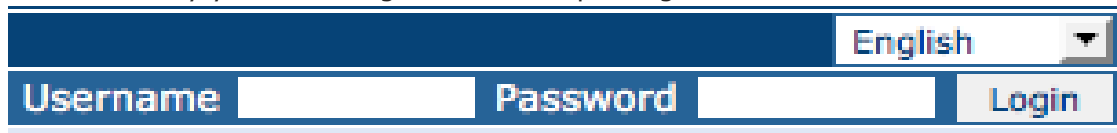


Figure 25. Login bar for accessing Geonetwork administrator interface

- 2 Open the Administration page by clicking the Administration button in the banner and then click on the New metadata link.

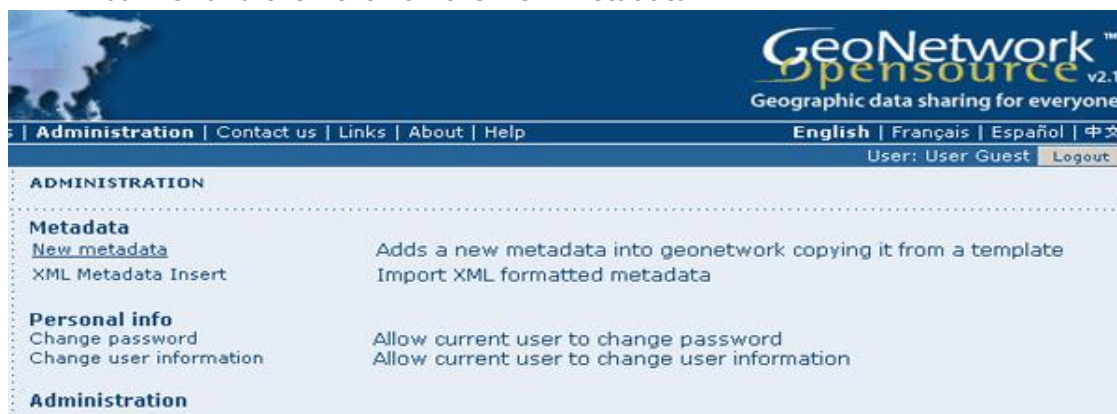


Figure 26. Main Page of Administration panel

From the metadata creation page, select the metadata standard to use from the dropdown list



Figure 27. Metadata Creation Options

- 3 After selecting the correct template, identify which group of users the metadata will belong to and finally click on **Create**.

METADATA CREATION

Template

Template for Vector data in ISO19139 (preferred!)

Group

Sample group

Sample group

Back

Create

Figure 28. Metadata Creation Page User Group Selection

- 4 A new metadata form based on the selected template will be displayed to fill out (Figure 30) or, the option "IMPORT METADATA RECORD IN XML OR MEF FORMAT" can also be used to insert new metadata (Figure 31).

Default view

By Group

ISO Minimum

ISO Core

ISO All

By Package

Metadata

Identification

Maintenance

Constraints

Spat. Info

Ref. system

Distribution

Data quality

App. schema

Catalog

Content Info

Ext. Info

XML view

Reset

Save

Save and close

Check

Other actions

Cancel

No preview available

Parent/child metadata:

Add or update parent metadata

Related service metadata:

Link service metadata

Related feature catalogues:

Link feature catalogue

Identification info

Title *

E-Soter UK Pilot Window

English

Date *

Clear

Date type *

Creation

Edition

Presentation form

Digital map

Abstract *

E-Soter UK Pilot Window

English

Purpose

English

Figure 29 Metadata Creation Screen from a template

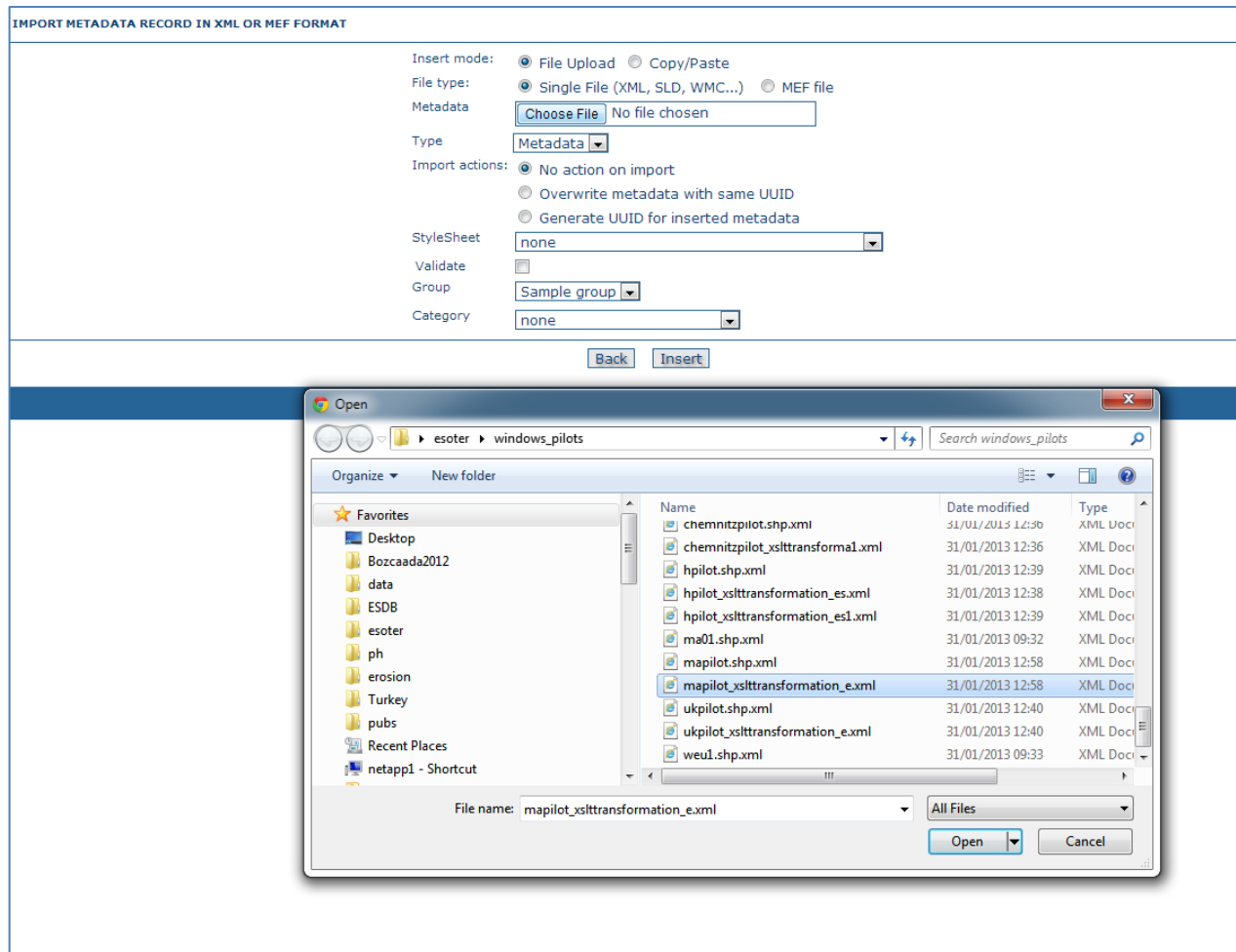


Figure 30. Metadata insert - Import metadata record in XML or MEF format

The Metadata for following data files are imported into Geonetwork using “Metadata Insert” option. The Metadata in XML format were created using ArcGIS 10.x Export Metadata Tool.

- **E-Soter Central European Window**
 - E-Soter H. Pilot Window – 1/250K
 - E-Soter Chemnitz Pilot Window – 1/250K
- **E-Soter Western European Window**
 - E-Soter UK Pilot Window- 1/250K
- **E-Soter Moroccan Window**
 - E-Soter Moroccan Pilot Window- 1/250 K

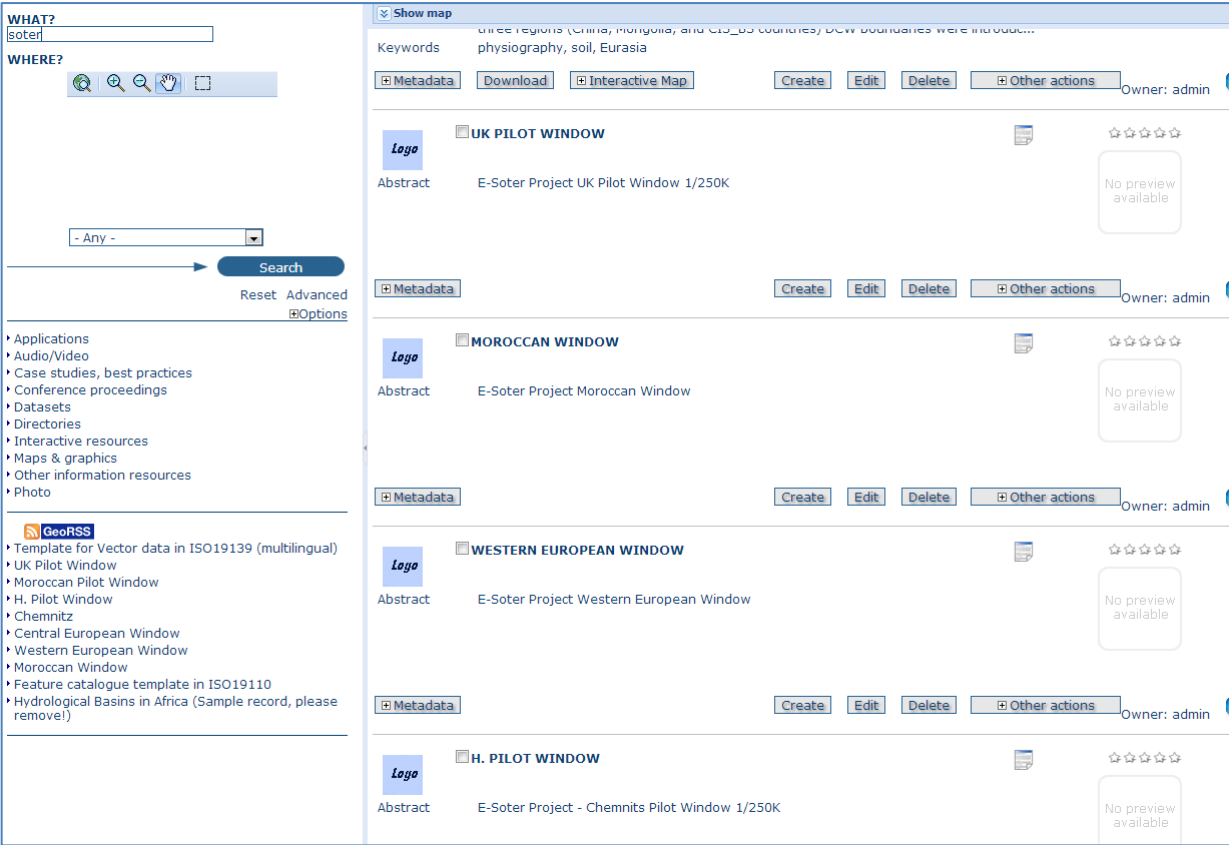


Figure 31. Metadata in Geonetwork

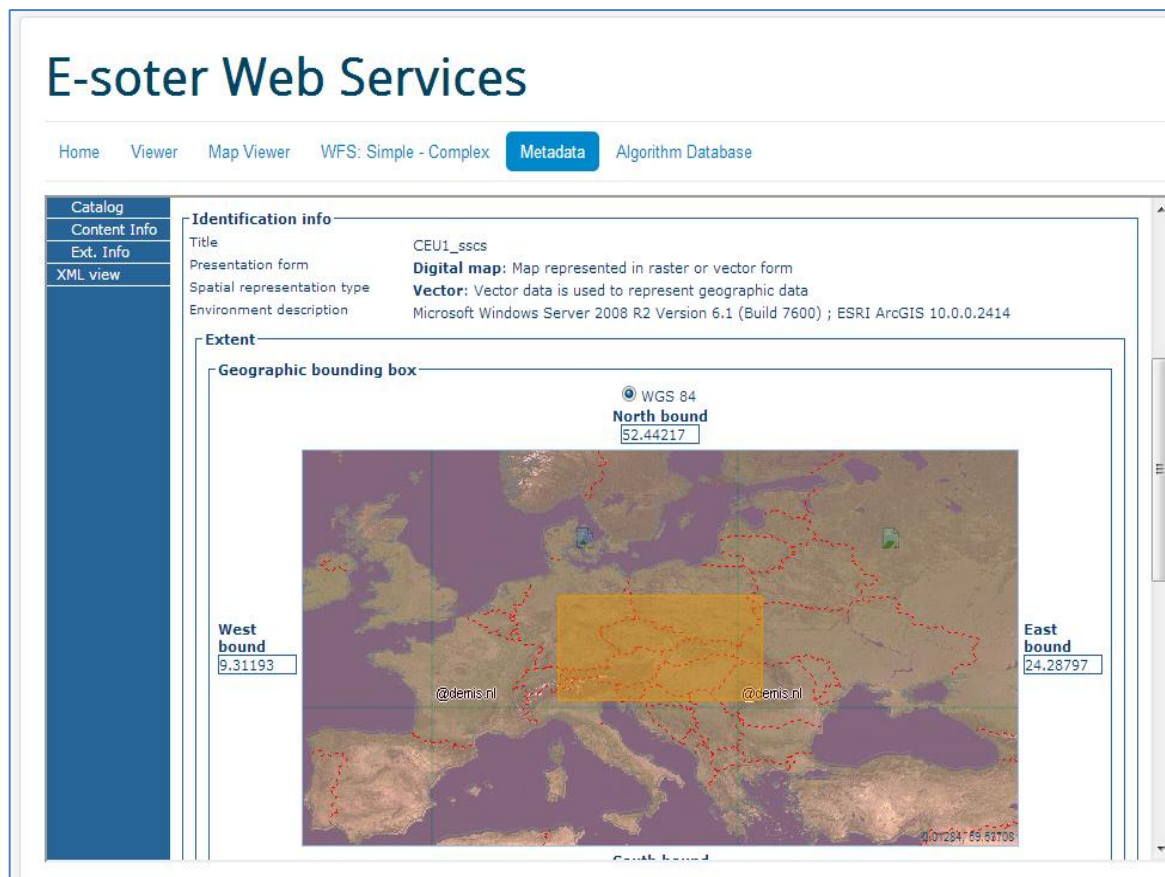


Figure 32. Metadata record of the E-Soter Central European Window

Installing the Algorithm Database

A mechanism was required that was capable of holding stakeholder uploaded algorithms, ready for processing into the information infrastructure. A number of approaches were considered, and the most practicable solution is recommended as an installation of the 'Trac' software tool.

Trac is an enhanced wiki and issue tracking system for projects. Trac uses a minimalistic approach to web-based software project management. Our mission is to help developers write great software while staying out of the way. Trac should impose as little as possible on a team's established development process and policies. It provides an interface to Subversion (or other version control systems), an integrated Wiki and convenient reporting facilities. And GIT as TRAC plugin, is a distributed revision control and source code management (SCM) system.

install algorithm database - TRAC

trac and git repository

trac & svn on same service

apt-get install trac

apt-get install trac-git

/opt/iscric for svn

/opt/pwd fpr passwords

/opt/iscric_trac for trac

/opt/git

cd /opt/git

git init

git commit

get doc from server

<http://jonas.nitro.dk/git/quick-reference.html>

and store into /opt/git/

git add filename

git commit -m 'Initial commit'

git commit --amend --author='Your Name <you@example.com>'

trac-admin /opt/trac initenv

enter

git

/opt/git

find /opt/trac -type f -exec chmod 660 {} \; find /opt/trac -type d -exec chmod 2770 {} \; chown -R root.www-data /opt/trac chown -R root.www-data /opt/git

apt-get install libapache2-mod-python

```
##### apache default file

<Location /trac>

    SetHandler mod_python

    PythonHandler trac.web.modpython_frontend

    PythonInterpreter main

    PythonOption TracEnv /opt/trac

    PythonOption TracUriRoot /trac

    SetEnv PYTHON_EGG_CACHE /tmp

</Location>

<Location "/trac/login">

    AuthType Basic

    AuthName "trac"

    AuthUserFile /opt/pwd/trac.htpasswd

    Require valid-user

</location>

htpasswd -cb trac.htpasswd hir esoter12

htpasswd -b trac.htpasswd wp WPesoter (TBREMOVED HIR)

http://portal.esoter.net/trac

works

check / /opt/trac/conf/trac.ini

git_bin = /usr/bin/git

add

components]

tracext.git.* = enabled

[header_logo]

alt = esoter.net

height =

link = www.esoter.net
```

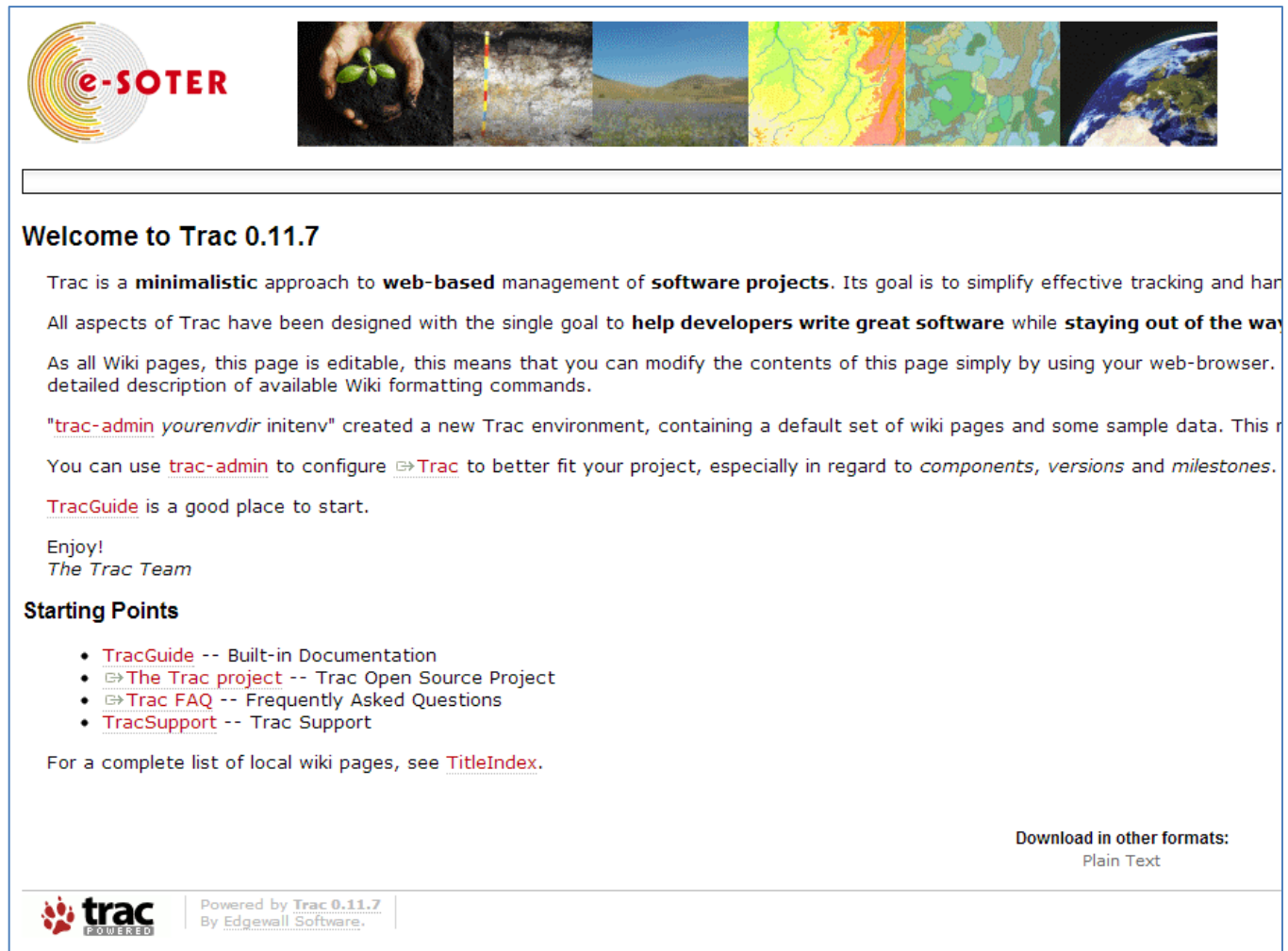


Figure 33. TRAC Home Screen

Opening and Managing Tickets in TRAC

A ticket contains the following information attributes:

- **Reporter** — The author of the ticket
- **Type** — The nature of the ticket (for example, defect or enhancement request).
- **Component** — The project module or subsystem this ticket concerns.
- **Version** — Version of the project that this ticket pertains to.
- **Keywords** — Keywords that a ticket is marked with. Useful for searching and report generation.
- **Priority** — The importance of this issue, ranging from *trivial* to *blocker*. A pull-down if different priorities where defined.

- **Milestone** — When this issue should be resolved at the latest. A pull-down menu containing a list of milestones.
- **Assigned to/Owner** — Principal person responsible for handling the issue.
- **Cc** — A comma-separated list of other users or E-Mail addresses to notify.
- **Resolution** — Reason for why a ticket was closed. One of the following choices: 'fixed', 'invalid', 'wontfix', 'duplicate', or 'worksforme'.
- **Status** — What is the current status? One of the following: 'new', 'assigned', 'closed', 'reopened'.
- **Summary** — A brief description summarizing the problem or issue.
- **Description** — The body of the ticket. A good description should be specific, descriptive and to the point.

With appropriate permissions a ticket entered into Trac can at any time be modified by **annotating**.

Then, annotations like changes and comments to the ticket are logged as a part of the ticket itself.

When viewing a ticket, [the history of changes](#) will appear below the main ticket area.

All edits (field changes, new comments, comment edits) update the “last changed” time of the ticket.

All edits (new comments, comment edits) update the “last changed” time of the ticket.

Create New Ticket

Properties

Summary: WP5 - Model Applications

Description:

B

I

A

The goal of WP5 is to demonstrate the improvement of the e-SOTER database compared with existing databases by running various interpretations relevant to the EU Soil Thematic Strategy. This implies investigating whether use of the e-SOTER database will improve evaluation of threats to soil quality and performance compared with using data from previous soil maps and databases. Two soil threats identified by the EU Soil Thematic Strategy were selected for the example applications of the e-SOTER database: soil erosion and susceptibility to subsoil compaction. Appropriate models were selected that can measure the threats at the relevant scales.

Type: defect

Milestone:

Version:

Cc:

Assign to:

Priority: major

Component: component1


Keywords:

☐ I have files to attach to this ticket

Preview

Create ticket

Note: See [TracTickets](#) for help on using tickets.



Powered by Trac 0.11.7

By Edgewall Software.

Figure 34. New Ticket Screen in TRAC

Installation and Configuration of the e-Soter Web Services Portal

E-Soter Portal – CMS Installation

The e-SOTER recommendation for web management is to utilise a ‘Content management System’, or CMS. The CMS offers a tool to separate management of the website from the content, allowing for edits to be made online. The well-known Wikipedia website for example operates on this principle. A number of CMS software tools exist, or which is was held that ‘Joomla’ was the most advantageous. Joomla is free, open-source software.

Installation / Main Configuration

Joomla uses a database such as MySQL. To install Joomla one should first have configured an installation of a database. To configure MySQL one can use phpMyAdmin graphical tool to establish username, database and password. phpMyAdmin can be installed as follows,

Phpmyadmin

We recommend the excellent ‘phpMyAdmin’ database web management console. All the database administration can be undertaken through a web page.

To install Phpmyadmin, enter:

```
apt-get install phpmyadmin
```

Select 'apache2' as the web server

Create a phpMyAdmin password; you should now be able to call up the phpMyAdmin home page at

`http://111.222.333.444/phpmyadmin – login as root/<password>`

Note user privileges to the database are all managed via phpMyAdmin. Each user account needs to have specified the host from which the user will come onto the database. The '%' (all servers) option may not always be recognised and you may need to repeat a configuration for servers: '127.0.0.1', '111.222.333.444', 'localhost' and '<server name>'.

A bit fiddly – essentially you open up the privileges for the user and duplicate the settings varying the host each time. To help with this, note that once phpMyAdmin is installed, one can see the various options the phpMyAdmin user has pre-assigned. Note that connecting to the database from the SSH terminal uses 'localhost', whereas connecting from a webserver can use '127.0.0.1' – so the source varies according to source. One needs to experiment!

Remember later that if you receive a '500' error on the webserver when trying to access the database, it is likely due to the incorrect privileges. You may need to look at the webserver apache logfiles in a new window ('/var/log/apache2/') to actually see the error.

```
more /var/log/apache2/error.log
```

or better still to see only new lines as they appear in the log file

```
tail -f /var/log/apache2/error.log
```

Using PhpMyAdmin you must create database, username and password. Use the following:

Database: esoter

User: esoter

Password: _____

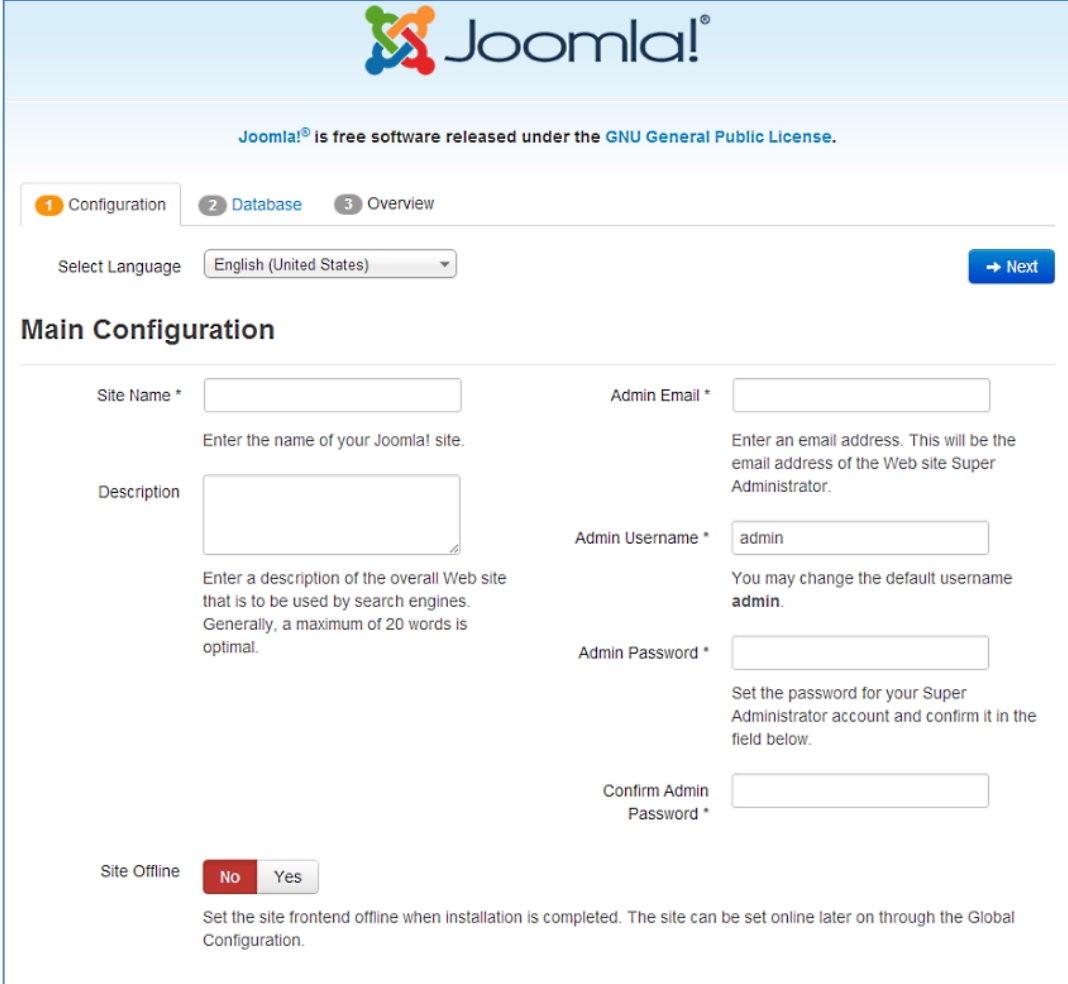
Having done this, the next task is to download the latest release of Joomla open source content management system (<http://www.joomla.org/download.html>). Requirements for Joomla are listed below.

Table 1. Requirements for Joomla 3.x

Software	Recommended	Minimum	More information
----------	-------------	---------	------------------

PHP (Magic Quotes GPC off)	5.3.1 +	5.3.1 +	http://www.php.net
Supported Databases:			
MySQL (InnoDB support required)	5.1 +	5.1 +	http://www.mysql.com
MSSQL	10.50.1600.1+	10.50.1600.1+	http://www.microsoft.com/sql
PostgreSQL	8.3.18 +	8.3.18 +	http://www.postgresql.org/
Supported Web Servers:			
Apache (with mod_mysql, mod_xml, and mod_zlib)	2.x +	2.x +	http://www.apache.org
Nginx	1.1	1.0	http://wiki.nginx.org/
Microsoft IIS	7	7	http://www.iis.net

With the above requirements met, and the database created as noted above, and with the required Joomla! files placed in the server web folder (e.g. /var/www/), next step is to configure Joomla. The Joomla software includes a built-in web installer, activated by browsing to the site's domain name, *portal.esoter.net/installation/*.



The screenshot shows the Joomla! Main Configuration page. At the top, the Joomla! logo is displayed. Below it, a message states: "Joomla!® is free software released under the GNU General Public License." The navigation tabs are "1 Configuration", "2 Database", and "3 Overview". The "Select Language" dropdown is set to "English (United States)". A "Next" button is visible. The "Main Configuration" section contains several form fields:

- Site Name ***: A text input field with the instruction "Enter the name of your Joomla! site."
- Description**: A text area with the instruction "Enter a description of the overall Web site that is to be used by search engines. Generally, a maximum of 20 words is optimal."
- Admin Email ***: A text input field with the instruction "Enter an email address. This will be the email address of the Web site Super Administrator."
- Admin Username ***: A text input field with the value "admin" and the instruction "You may change the default username **admin**."
- Admin Password ***: A text input field with the instruction "Set the password for your Super Administrator account and confirm it in the field below."
- Confirm Admin Password ***: A text input field.
- Site Offline**: A toggle switch with "No" selected and "Yes" as an option. The instruction below is "Set the site frontend offline when installation is completed. The site can be set online later on through the Global Configuration."

Figure 35. Main Configuration page during the installation

Joomla tries to identify the **Select Language** field automatically from your browser's language. This can be changed if needed as required.

The following information should be completed.

- **Site Name:** The name the portal (E-Soter Web Services) — this can be changed at any point later in the Site Global Configuration page.
- **Description:** Enter a description of the website. This is the *global fallback* meta description used on every page which will be used by search engines. Generally, a maximum of 20 to 25 words is optimal. Again, this can be changed on the Site Global Configuration page at any time.
- **Admin Email Address:** The admin email address. Enter a valid email in case you forget your password. This is the email address where you'll receive a link to change the admin password.
- **Admin Username:** Joomla! uses a default "admin" as the username for the **Super User**. And, It should be changed immediately (which a good Security measure) using My Profile in the *Administration* interface after installation.
- **Admin Password:** Remember that super user has maximum control of the site (frontend & backend), so try to use a difficult password. Use My Profile in the *Administration* interface to change it later. Confirm the password in the **Confirm Admin Password** box.
- **Site Offline:** Click the Yes or No box. Yes - this means when installation is complete, the Joomla! website will display the 'Site is offline message' when *yoursitename.com* is browsed to view the home page. No - this means the site is live when *yoursitename.com* is browsed to view the home page.

When everything on the first page is completed, click the **next button** to proceed:

Database Configuration

Joomla!® is free software released under the GNU General Public License.

1 Configuration 2 Database 3 Overview

Database Configuration

← Previous → Next

Database Type *
This is probably "MySQLi"

Host Name *
This is usually "localhost"

Username *
Either something as "root" or a username given by the host

Password
For site security using a password for the database account is mandatory

Database Name *
Some hosts allow only a certain DB name per site. Use table prefix in this case for distinct Joomla! sites.

Table Prefix *
Choose a table prefix or use the **randomly generated**. Ideally, three or four characters long, contain only alphanumeric characters, and **MUST** end in an underscore. **Make sure that the prefix chosen is not used by other tables.**

Old Database Process *
Any existing backup tables from former Joomla! installations will be replaced

Figure 36. Database configuration

For simplification, these instructions are a reference to installing with a [MySQLi](#) database. The database refers to here is created previously in the steps listed above. The instructions on the installation page are self-explanatory, but are noted below:

- **Database Type:** MySQLi is the database type for use.
- **Hostname:** Identifies the name of your database server. In this case it is `localhost`.
- **Username:** The username used to connect to the database `Username`
- **Password:** The password for the database's username `Password`
- **Database Name:** The name of the database `Database Name`
- **Table Prefix:** One is generated automatically, but it can be changed. For example, `jos3_` can be used. Just don't forget to put the underscore character (`_`) at the end of the prefix. `Table Prefix`
- **Old Database Process:** Should the installer backup or delete existing tables during the installation of new tables? Click, Yes or No to select the choice. In this case (which is a fresh installation) there are no such old tables in the database, so this step can be skipped.

All these choices can be edited on the Site Global Configuration page, under Server options subsequently, after the installation has completed.

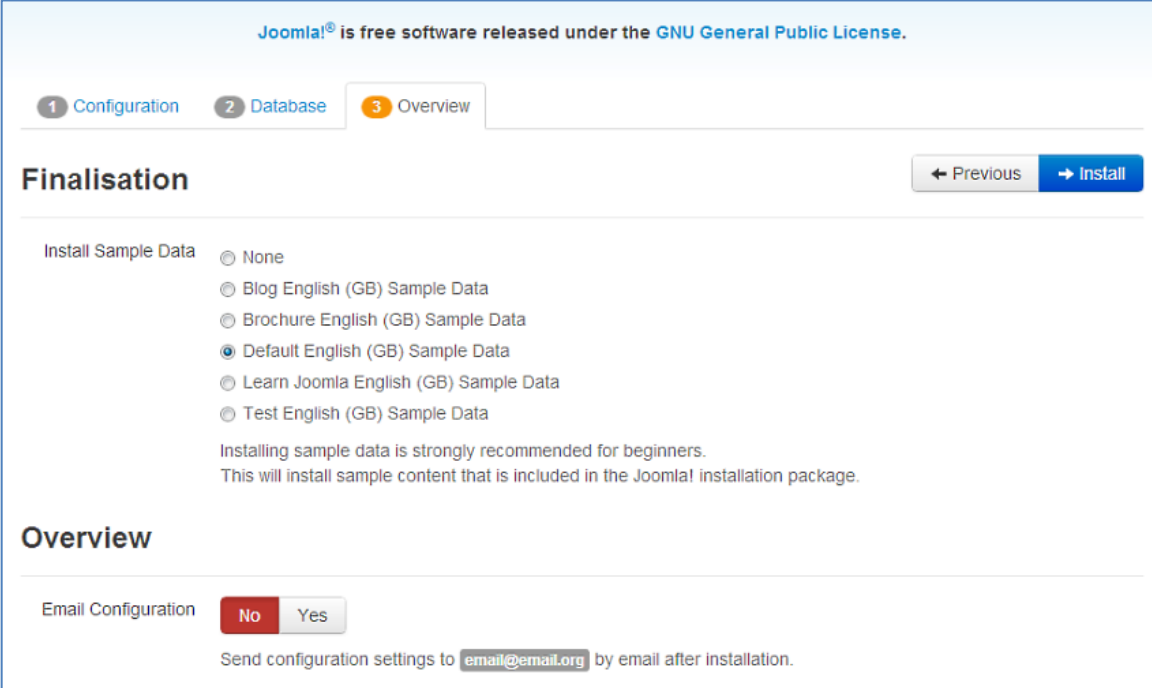
When all the information has been filled in, click the **next button** to proceed:

Overview

The next steps finalise the Joomla installation. The last page of the web browser installation contains a summary of all the information about the installation. This includes the options (at the top) for installing sample data and (to the bottom) the installation's configurations.

Install Sample Data and Email Configurations

The first options are for automatically installing sample content to the website and emailing the configuration settings. This step is for beginners wishing to see how Joomla and its database 'backend' works and operates – for e-soter installations this step should be skipped.



The screenshot shows the Joomla! installation 'Finalisation' page. At the top, it states 'Joomla! is free software released under the GNU General Public License.' Below this is a progress bar with three steps: '1 Configuration', '2 Database', and '3 Overview', with '3 Overview' being the active step. The main heading is 'Finalisation'. To the right of the heading are two buttons: '← Previous' and '→ Install'. Under the heading, there is a section 'Install Sample Data' with six radio button options: 'None', 'Blog English (GB) Sample Data', 'Brochure English (GB) Sample Data', 'Default English (GB) Sample Data' (which is selected), 'Learn Joomla English (GB) Sample Data', and 'Test English (GB) Sample Data'. Below these options is a note: 'Installing sample data is strongly recommended for beginners. This will install sample content that is included in the Joomla! installation package.' Further down is a section 'Overview' with an 'Email Configuration' section containing 'No' and 'Yes' buttons, with 'No' being selected. At the bottom, there is a text field for an email address, currently containing 'email@email.org', with the text 'Send configuration settings to' on the left and 'by email after installation.' on the right.

Figure 37. “Finalisation” page to the Joomla installation

Checking Your Configurations

If everything is in order, you will see the install at the top of the overview page. If not, this is the place to check and see what may be causing an issue. Further details on learning how to configure Joomla are available online here <http://help.joomla.org/>.

Main Configuration

Site Name	My Website
Description	My test website
Site Offline	No
Admin Email	email@email.org
Admin Username	Administrator
Admin Password	*****

Database Configuration

Database Type	mysql
Host Name	localhost
Username	joomla_test
Password	*****
Database Name	joomla_test
Table Prefix	joomla_
Old Database Process	Backup

Pre-Installation Check

PHP Version >= 5.3.1	Yes
Magic Quotes GPC Off	Yes
Register Globals Off	Yes
Zlib Compression Support	Yes
XML Support	Yes
Database Support: (mysql, pdo, mysqli)	Yes
MB Language is Default	Yes
MB String Overload Off	Yes
INI Parser Support	Yes
JSON Support	Yes
configuration.php Writeable	Yes

Recommended settings:

These settings are recommended for PHP in order to ensure full compatibility with Joomla. However, Joomla! will still operate if your settings do not quite match the recommended configuration.

Directive	Recommended	Actual
Safe Mode	Off	Off
Display Errors	Off	Off
File Uploads	On	On
Magic Quotes Runtime	Off	Off
Output Buffering	Off	On
Session Auto Start	Off	Off
Native ZIP support	On	On

Figure 38. Installation overview during the Joomla installation

This **section** is broken into 4 groups:

- **Main Configuration:** All the website specific information, such as the website name, description, admin username, etc.
- **Database Configuration:** Contains the information about the database Joomla will use.
- **Pre-Installation Check:** These requirements must all be shown as Yes. With the exception of the PHP Version, the rest are usually controlled in the `php.ini` file.
- **Recommended Settings:** These are settings are recommended in the PHP configuration, but will not prevent Joomla! from being installed.
- If everything is correct and all checks are passed, you may now click the **Install** button in the top right corner of the **Overview** page. This will start the actual installation process.

After you click the **Install** button, progress bar should be seen with additional information of the installation. Once the installation completes, the success page is shown.

Success and Finishing Up the Installation

Joomla! 3 is now installed, but there is one last step to complete the installation and start using the site. **Installation Folder should be deleted (or renamed)**. Click on **Remove Installation folder** and a success message will appear. Now the **Administrator pages can be navigated** by clicking **Administrator** or by navigating directly to the portal by clicking **Site**.

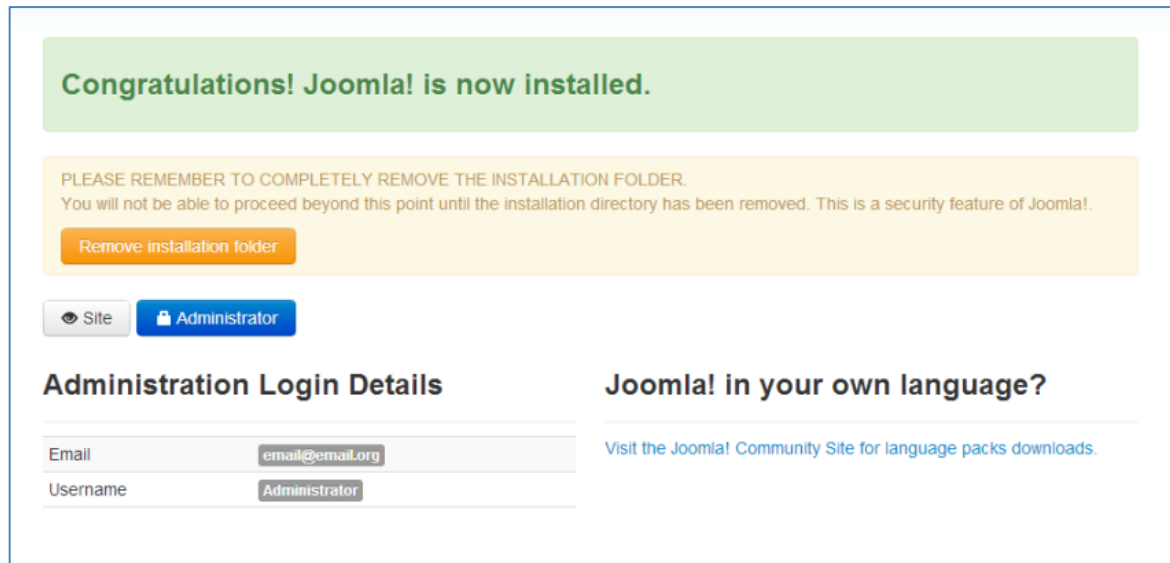


Figure 39. Success page of the Joomla installation

Visitor Tracking

Visitors: Piwik is a popular and capable open source web analytics system written by a team of international developers, and runs on a [PHP/MySQL](#) webserver.

Code (embedded in `/var/www/modules/mod_footer/tmpl/default.php`):

```
<!-- Piwik --><script type="text/javascript">

var pkBaseURL = (("https:" == document.location.protocol) ?
"http://webstats.isric.org/" : "http://webstats.isric.org/");
document.write(unescape("%3Cscript src='" + pkBaseURL +
"piwik.js' type='text/javascript'%3E%3C/script%3E"));

</script><script type="text/javascript"> try { var piwikTracker =
Piwik.getTracker(pkBaseURL + "piwik.php", 6); piwikTracker.trackPageView();
piwikTracker.enableLinkTracking();

} catch( err ) {}</script><noscript><p></p></noscript>

<!-- End Piwik Tracking Code -->
```

Epilogue

This document has presented a ‘Cookbook’ description for installing the software tools necessary to develop a SOTER web portal, including all the various software tools and utilities. Further configuration will be required by any user, but it is hoped that the steps as outlined in this document will aid the process of designing, installing and commissioning a SOTER portal. The use of open source software

has been adopted wherever practicable throughout the process. Using open source tools has a huge strength of advantage in the cost is zero at the point of installation. However, users will have to observe how the tools and the elements within the wider system are updated and revised and adapt their own systems accordingly.

For further information regarding eSoter, please visit <http://www.esoter.net/>.

Appendix One: Digital Media

A digital inclusion is provided with this cookbook that provides digital copy of the filesets required to enable a demonstration of the eSOTER web portal.

Fileset One: Database files

The following files are provided, comprising sample PostgreSQL database functions and data structures required for eSOTER:

soter_v3.sql – Database structures (not data)
pg_soter_upload3.sql – Utility functions

Fileset Two: Client Data files

The following client data files are provided, comprising sample SoTerML files and the source Java code required to load the data into the database:

soterUploader.jar
SoTerML_MAO.xml
./src – Folder containing all Java source code

Fileset Three: GeoServer files

Once the sample datasets are installed and operational in the database, the next step is to publish them as simple and complex web services via GeoServer. The following schema and workspace files are provided relative to SoTerML, or 'stml':

Schemas

[schemas\stml](#)
[schemas\stml\5.2](#)
[schemas\stml\5.2\AttributeReference.xml](#)
[schemas\stml\5.2\SoilClassification.xsd](#)
[schemas\stml\5.2\stml.xsd](#)

Workspaces

[workspaces\stml](#)
[workspaces\stml\namespace.xml](#)
[workspaces\stml\workspace.xml](#)
[workspaces\stml\stml_SoTerUnit](#)
[workspaces\stml\stml_SoTerUnit\TerrainComponent.xml](#)
[workspaces\stml\stml_SoTerUnit\stml_SoTerUnit.xml](#)
[workspaces\stml\stml_SoTerUnit\datastore.xml](#)
[workspaces\stml\stml_SoTerUnit\Attribute.xml](#)
[workspaces\stml\stml_SoTerUnit\ParentMaterial.xml](#)
[workspaces\stml\stml_SoTerUnit\stml_SoTerUnit](#)
[workspaces\stml\stml_SoTerUnit\stml_SoTerUnit\featuretype.xml](#)

Appendix Two: SoTerML Parser

Prior to the e-SOTER project, SOTER database traditionally comprised a combination of an MS Access database (to hold the attributes) and an ESRI Shapefile (to hold the geometry). This 'loosely-coupled' data source arrangement is replaced now by the XML mark-up language 'SoTerML', which in one file format holds spatial and attribute data.

One of the key issues for the e-SOTER project WP6 has been the transferral of large sets of legacy data files from the old SOTER format to the new SOTER-ML Soter XML-based mark-up language.

This Appendix presents a parser, written in the computer language Java, that can convert traditional SOTER databases to the new markup format. The eSoterParser tool documented here has been written by the Cranfield University team as a common utility able to do this by taking an existing standard SOTER data source and transforming it.

Further to this, an XML validation tool is presented that allows users to check the conformity of the XML so produced.

eSoterParser utility – Manual and Instructions

for v1.6

S. Hallett, D.Simms, A.Rayner, P.Tempel, H.Reuter, Y.Yigini, D. Leibowith, A. Pourabdollah

Introduction

The work presented here is a direct output and deliverable of the EU Framework 7 project 'e-SOTER – Regional Pilot Platform as EU Contribution to a Global Soil Observing System', Grant Agreement Number 211578 (see <http://www.esoter.net/>). The work described here was conducted under Work Package 6 of this project.

One of the key issues for the e-SOTER project WP6 is the transferring of any of the large set of legacy data files from the old SOTER format to the new SOTER-ML Soter XML-based mark-up language. The eSoterParser tool documented here has been written by the Cranfield University team as a common utility able to do this by taking an existing standard SOTER data source and transforming it.

Prerequisites

In order to run the utility, you should have a 32bit Windows operating system, having a valid ODBC driver for Access (this would be the default if you have MS Office installed).

Your computer must have the Java SE Runtime, or the Java SDK already installed and correctly configured on the PC.

To test that Java is correctly installed (e.g. all the paths and environment variables are set up correctly) - type at the command prompt "java". If you then receive a page full of java help text, then all is well, if not consult your java installation notes.

This code has been tested and runs successfully on standard Windows 7, XP and Vista computers.

Note, should you wish to edit the code etc., we would recommend using the free IDE toolkit 'NetBeans' (<http://netbeans.org/>). The NetBeans project file is included in the distribution.

Instructions on use

1. Download and unpack the compressed folder "eSoterParser.zip", say to c:\eSoterParser\.
2. All compiled binary files required to run the tool are contained within this folder (the distribution code was compiled in Java). The source code is also provided.
3. Sample SOTER databases are provided in the "SampleData" subfolder . The 'esoter' folder contains the datafiles created by the e-soter project for the three windows (see <http://www.esoter.net/> for more details). The data files are in a legacy SOTER format comprising a shapefile and linked MS Access database.

The data files comprise:

eSOTER_v20110620_v2.mdb – MS Access data file with soil attribute data

CEU01.* - Central European window spatial data

WEU01.* - Western European window spatial data

MA01.* - Moroccan window spatial data

eSOTER_ONEFULLRECORD.mdb – a test database with one single but complete record. Use for testing

4. Change to the "dist" (distribution code) folder (".\eSoterParser\dist").

6. Run eSoterParser by typing at the prompt:

```
java -jar "eSoterParser.jar"
```

7. This starts the GUI for the tool, allowing you to select the relevant legacy SOTER database files, starting with the appropriate mdb Access database. There are three distinct actions required to select the necessary files. The GUI guides you through with 'tick' marks that go green when each selection is made successfully.

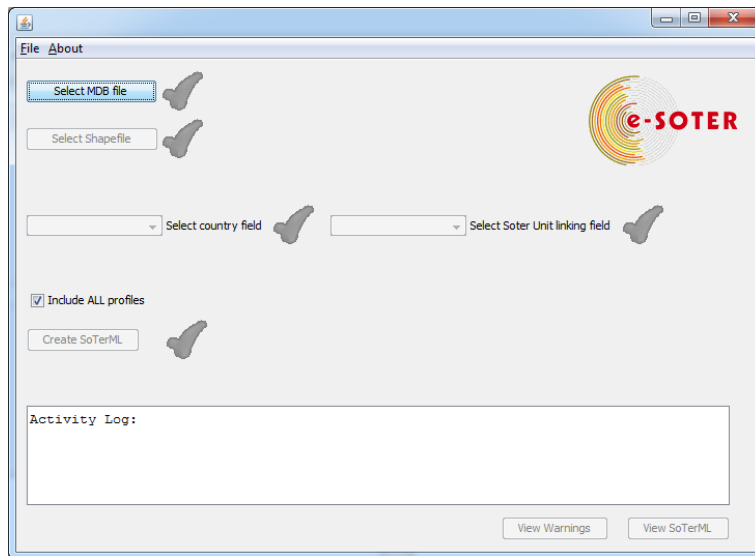


Figure 40. Starting screen of the eSoterParser utility

The first step is to select the Microsoft Access (version 2007) containing the non-spatial data attributes. Use the first button to open a dialogue box to navigate to and select the MDB database file.

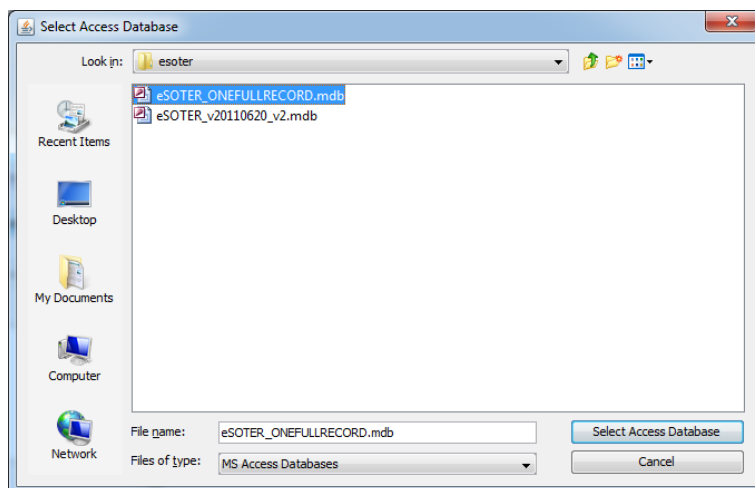


Figure 41 Selecting an Access database.

Note, after selecting the file the green tick appears to indicate completion of this task. The parser also identifies the version of the SOTER database and displays this in the Activity Log window:

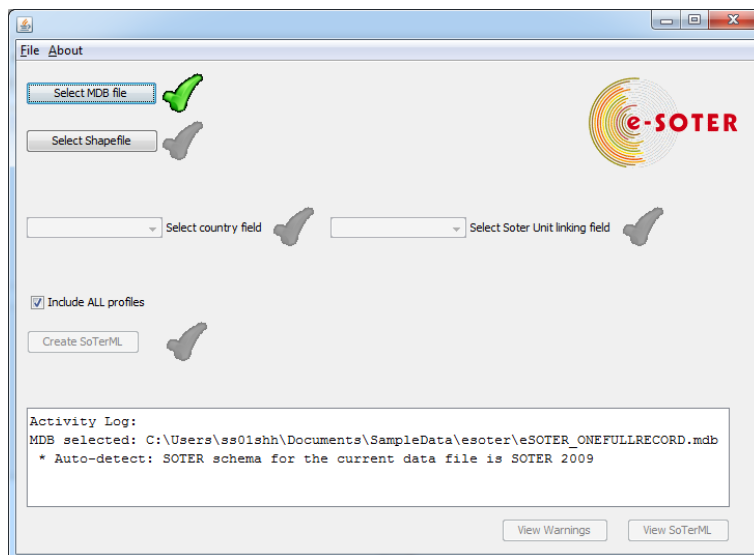


Figure 42 Status page for database selection

The **second step** is to select the GIS Shapefile database (DBF file) containing the spatial elements of the Soter Units. Use the second button to open a dialogue box to navigate to and select the DBF database file.

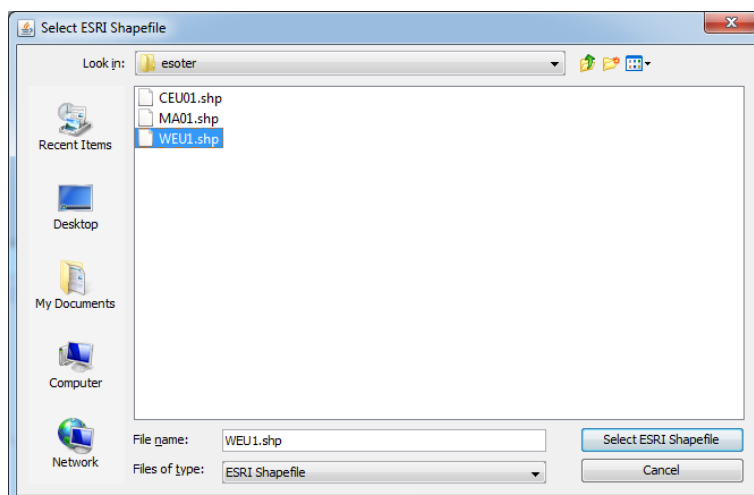


Figure 43 Selecting a Shapefile database.

Note, that after selecting the shapefile another green tick appears to indicate completion of this task. The parser also now identifies the data fields in the shapefile (dbf) database, allowing you to select which one is used to link together with the Access database.

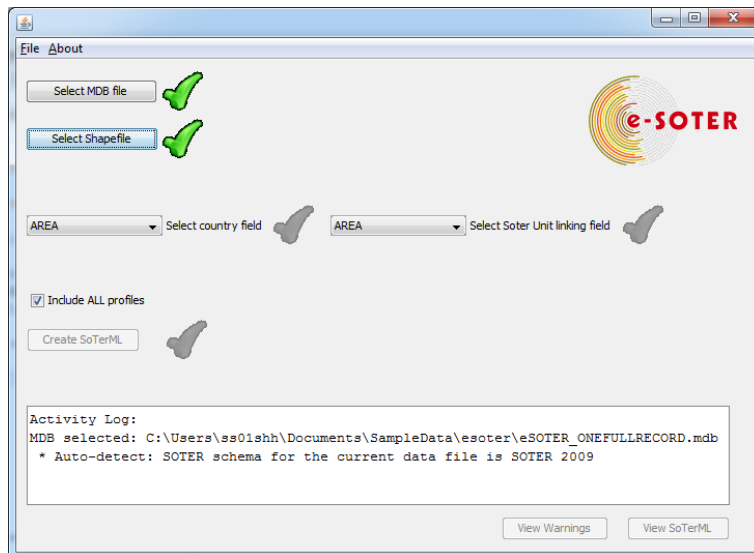


Figure 44 Shapefile selection.

The **third step** is to select the Shapefile attribute database (dbf) field from the drop down combobox that holds the country definitions for the shapefile polygons. There must be a field holding country information, but the field name is now always consistent between SOTER databases – so a selection is necessary. The field required may be named “Country”.

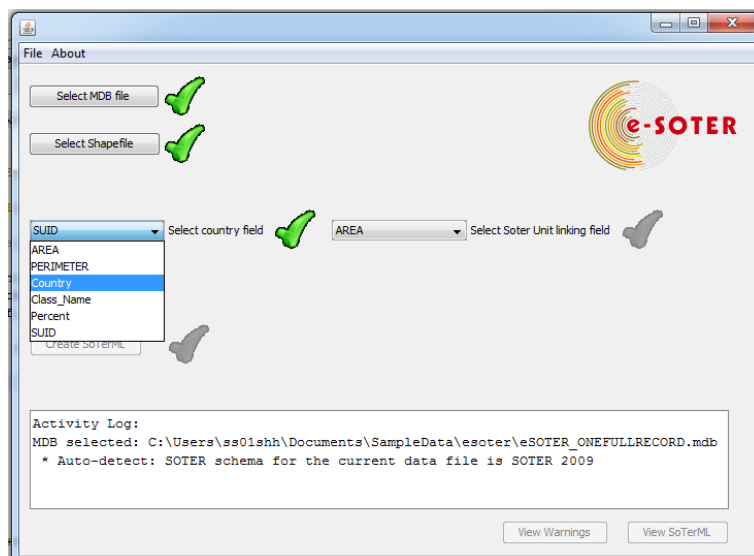


Figure 45 Selecting the country field.

Once the field is selected, the user interface displays your selection.

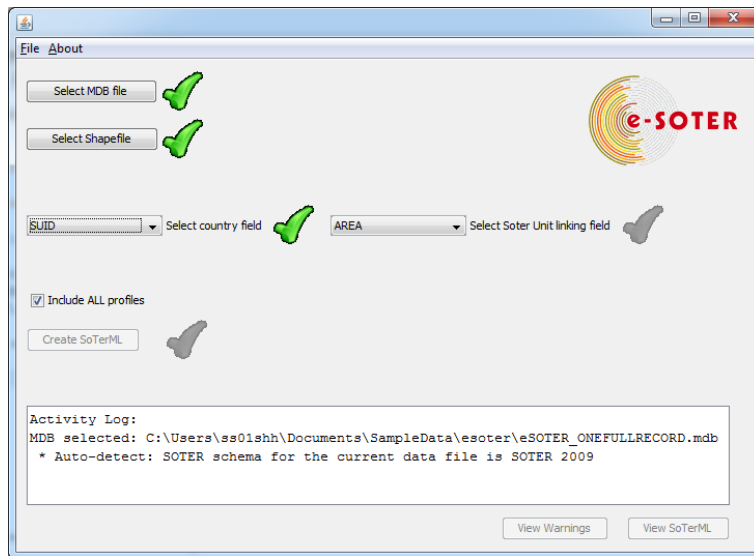


Figure 46 Country field selected.

The fourth step is to select the Shapefile attribute database (dbf) field from the drop down combobox that will be used to connect the records in this table with the records in the MS Access table. This is how the legacy SOTER file data structure represents the link between the geometric and attribute features of the data. The utility tool presents a dynamic list of field names for selection. The field required is usually named “**SUID**” (Soter Unit Identifier).

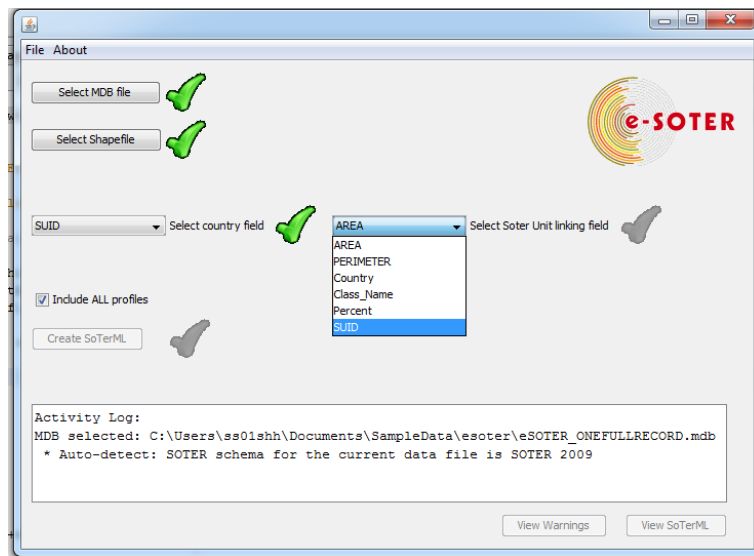


Figure 47 Selecting the country field.

Once the field is selected, the user interface displays your selection.

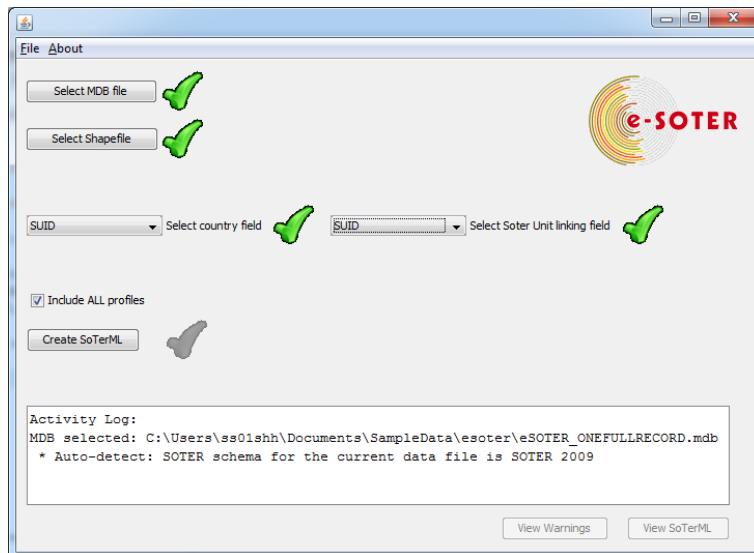


Figure 48 Soter Unit identifier field selected.

The fifth step is to note the tick box for including all profiles. Each SoilComponent in the SOTER database can have a representative profile associated with it, plus a number of other supporting profiles. The representative profile will always be selected if present and output the 'representativeProfile' tag. You may then choose whether or not to include the other associated profiles (which will not include the representative profile), written out to the 'profile' tag. The tick box is on by default.

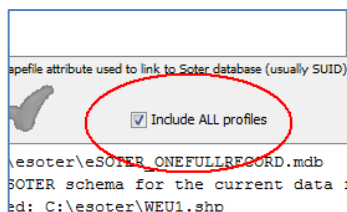


Figure 49 The "include all profiles tickbox"

The sixth step is to select the "CreatSoterML" button to start the conversion. Conversion may take some time, but eventually, a new output SOTERML file is created in the database folder "SoTerML.xml". This is a plain text file (although likely a rather large one). You can then view this SoTerML file or also view any errors that were reported.

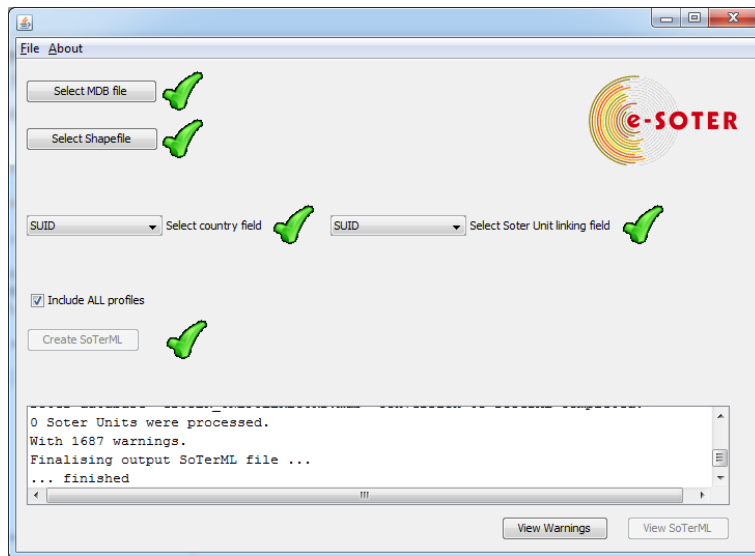


Figure 50 Running the conversion.

A message box provides feedback as to the success of the operation. Further buttons allow you to view in Notepad the output SoterML.xml file and the Errors log, both files being created in the folder containing the source data. Rerunning the conversion overwrites these files.

Data outputs

The parser creates two files, 'SoTerML.xml' and 'Errors.log'.

The errors file shows any data exceptions encountered during the process.

The SoTerML file may be opened in any text editor for inspection, thus:

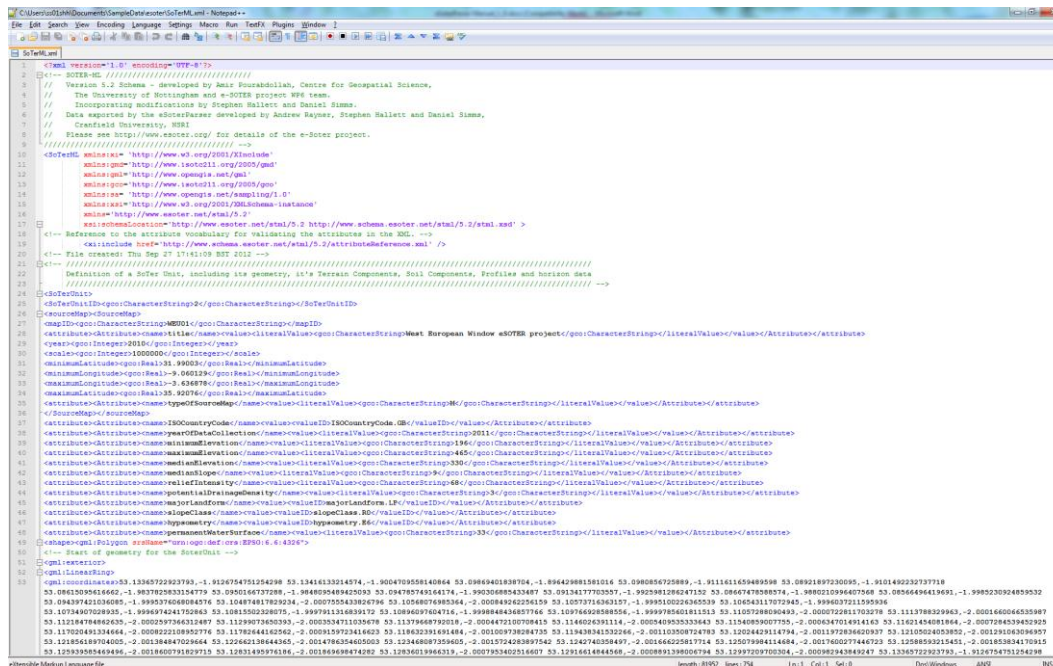
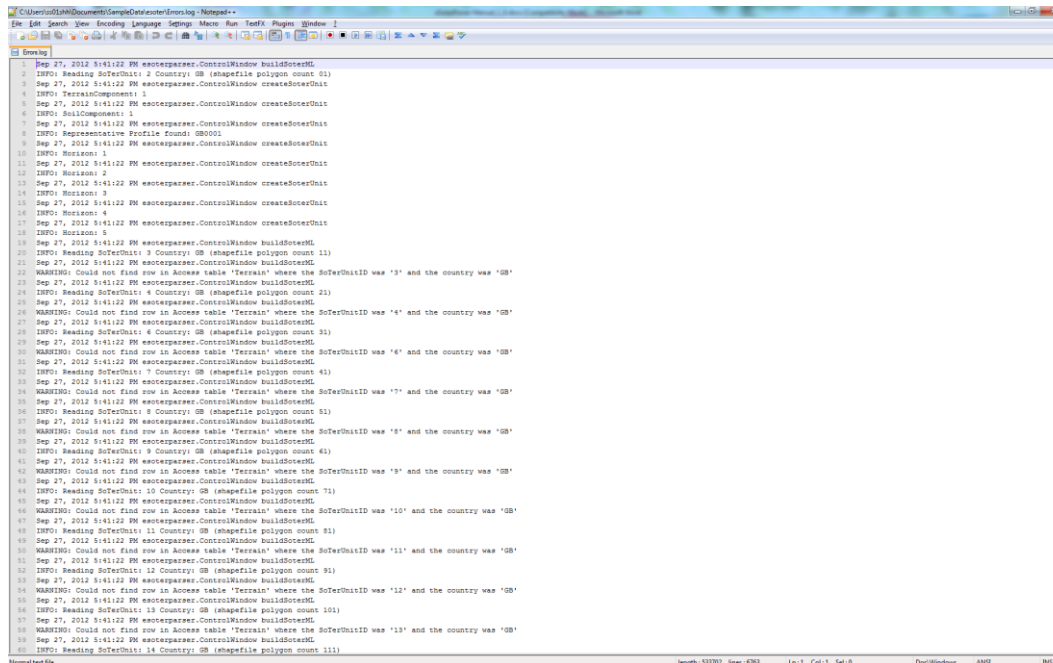


Figure 51 The SoTerML output.

The error file also provides useful information on the progress of the data transformation and any issues that might have occurred. It is a text file that can be opened in any text editor. Issues noted are likely to imply issues for checking in the source MS Access database.



```

1 Sep 27, 2012 5:41:22 PM esoterparser.ControlWindow buildSoterML
2 INFO: Reading SoTerML: 2 Country: GB (shapefile polygon count 91)
3 Sep 27, 2012 5:41:22 PM esoterparser.ControlWindow createSoterUnit
4 INFO: TerrainComponent: 1
5 Sep 27, 2012 5:41:22 PM esoterparser.ControlWindow createSoterUnit
6 INFO: SoilComponent: 1
7 Sep 27, 2012 5:41:22 PM esoterparser.ControlWindow createSoterUnit
8 INFO: Representative Profile found: 00001
9 Sep 27, 2012 5:41:22 PM esoterparser.ControlWindow createSoterUnit
10 INFO: Horizon: 1
11 Sep 27, 2012 5:41:22 PM esoterparser.ControlWindow createSoterUnit
12 INFO: Horizon: 2
13 Sep 27, 2012 5:41:22 PM esoterparser.ControlWindow createSoterUnit
14 INFO: Horizon: 3
15 Sep 27, 2012 5:41:22 PM esoterparser.ControlWindow createSoterUnit
16 INFO: Horizon: 4
17 Sep 27, 2012 5:41:22 PM esoterparser.ControlWindow createSoterUnit
18 INFO: Horizon: 5
19 Sep 27, 2012 5:41:22 PM esoterparser.ControlWindow buildSoterML
20 INFO: Reading SoTerML: 3 Country: GB (shapefile polygon count 11)
21 Sep 27, 2012 5:41:22 PM esoterparser.ControlWindow buildSoterML
22 WARNING: Could not find row in Access table 'Terrain' where the SoTerMLID was '3' and the country was 'GB'
23 Sep 27, 2012 5:41:22 PM esoterparser.ControlWindow buildSoterML
24 INFO: Reading SoTerML: 4 Country: GB (shapefile polygon count 21)
25 Sep 27, 2012 5:41:22 PM esoterparser.ControlWindow buildSoterML
26 WARNING: Could not find row in Access table 'Terrain' where the SoTerMLID was '4' and the country was 'GB'
27 Sep 27, 2012 5:41:22 PM esoterparser.ControlWindow buildSoterML
28 INFO: Reading SoTerML: 5 Country: GB (shapefile polygon count 31)
29 Sep 27, 2012 5:41:22 PM esoterparser.ControlWindow buildSoterML
30 WARNING: Could not find row in Access table 'Terrain' where the SoTerMLID was '5' and the country was 'GB'
31 Sep 27, 2012 5:41:22 PM esoterparser.ControlWindow buildSoterML
32 INFO: Reading SoTerML: 6 Country: GB (shapefile polygon count 41)
33 Sep 27, 2012 5:41:22 PM esoterparser.ControlWindow buildSoterML
34 WARNING: Could not find row in Access table 'Terrain' where the SoTerMLID was '6' and the country was 'GB'
35 Sep 27, 2012 5:41:22 PM esoterparser.ControlWindow buildSoterML
36 INFO: Reading SoTerML: 7 Country: GB (shapefile polygon count 51)
37 Sep 27, 2012 5:41:22 PM esoterparser.ControlWindow buildSoterML
38 WARNING: Could not find row in Access table 'Terrain' where the SoTerMLID was '7' and the country was 'GB'
39 Sep 27, 2012 5:41:22 PM esoterparser.ControlWindow buildSoterML
40 INFO: Reading SoTerML: 8 Country: GB (shapefile polygon count 61)
41 Sep 27, 2012 5:41:22 PM esoterparser.ControlWindow buildSoterML
42 WARNING: Could not find row in Access table 'Terrain' where the SoTerMLID was '8' and the country was 'GB'
43 Sep 27, 2012 5:41:22 PM esoterparser.ControlWindow buildSoterML
44 INFO: Reading SoTerML: 9 Country: GB (shapefile polygon count 71)
45 Sep 27, 2012 5:41:22 PM esoterparser.ControlWindow buildSoterML
46 WARNING: Could not find row in Access table 'Terrain' where the SoTerMLID was '9' and the country was 'GB'
47 Sep 27, 2012 5:41:22 PM esoterparser.ControlWindow buildSoterML
48 INFO: Reading SoTerML: 10 Country: GB (shapefile polygon count 81)
49 Sep 27, 2012 5:41:22 PM esoterparser.ControlWindow buildSoterML
50 WARNING: Could not find row in Access table 'Terrain' where the SoTerMLID was '10' and the country was 'GB'
51 Sep 27, 2012 5:41:22 PM esoterparser.ControlWindow buildSoterML
52 INFO: Reading SoTerML: 11 Country: GB (shapefile polygon count 91)
53 Sep 27, 2012 5:41:22 PM esoterparser.ControlWindow buildSoterML
54 WARNING: Could not find row in Access table 'Terrain' where the SoTerMLID was '11' and the country was 'GB'
55 Sep 27, 2012 5:41:22 PM esoterparser.ControlWindow buildSoterML
56 INFO: Reading SoTerML: 12 Country: GB (shapefile polygon count 101)
57 Sep 27, 2012 5:41:22 PM esoterparser.ControlWindow buildSoterML
58 WARNING: Could not find row in Access table 'Terrain' where the SoTerMLID was '12' and the country was 'GB'
59 Sep 27, 2012 5:41:22 PM esoterparser.ControlWindow buildSoterML
60 INFO: Reading SoTerML: 13 Country: GB (shapefile polygon count 111)
61 Sep 27, 2012 5:41:22 PM esoterparser.ControlWindow buildSoterML
62 WARNING: Could not find row in Access table 'Terrain' where the SoTerMLID was '13' and the country was 'GB'
63 Sep 27, 2012 5:41:22 PM esoterparser.ControlWindow buildSoterML
64 INFO: Reading SoTerML: 14 Country: GB (shapefile polygon count 121)

```

Figure 52 The errors log.

Data validation

The 'SoTerML.xml' is a standard XML file and as such can be validated to ensure it is correctly formed. A standalone Validator is provided that uses SAX to validate the XML file. Validation is used to check the data in the XML file against the namespace information it contains. A command-line XML Validator tool 'Validate-z1.jar', also written in the computer language Java is provided to check conformity of the SoTerML file. It is used thus:

Usage:

```
java -jar Validate-z1.jar <path to xml>
```

Example of using the validator tool:

```
cd c:\location_of_validator
```

```
java -jar Validate-z1.jar c:\location_of_SoTerML\SoTerML.xml
```

Code documentation

The software code for the parser is commented throughout and this has been used to generate a JavaDoc file outlining the architecture of the programme. The JavaDoc is included in the distribution package 'eSoTerParser\dist\javadoc' as a self-contained web page that can be run in a browser by loading the index file, thus:

All Classes

AboutBox

ControlWindow

DBFParser

MDBParser

MDBParser.MDBTable

ShapeParser

SoterVersion

XMLDoc

Package Class Use Tree Deprecated Index Help

Prev Package

Next Package

Frames

No Frames

Package esoterpaser

Class Summary

Class	Description
AboutBox	Application AboutBox
ControlWindow	Main control window for parser
DBFParser	The SoterML_Parser dbf file reader.
MDBParser	The SoterML_Parser mdb file reader.
ShapeParser	The SoterML_Parser shapefile file reader.
XMLDoc	The SoterML_Parser file writer.

Enum Summary

Enum	Description
MDBParser.MDBTable	Enumerations of permissible recordsets as prepared statements
SoterVersion	Enumeration to allow declaration of the SOTER schema version (1995 or 2009)

Package Class Use Tree Deprecated Index Help

Prev Package

Next Package

Frames

No Frames

Figure 53 The parser JavaDoc file

The JavaDoc file is of specialised interest to programmers wishing to understand the parser's operations.

Source Code

The software source code for the parser is provided within the distribution. Developed in NetBeans, the project files are also provided to open the code in NetBeans as required.

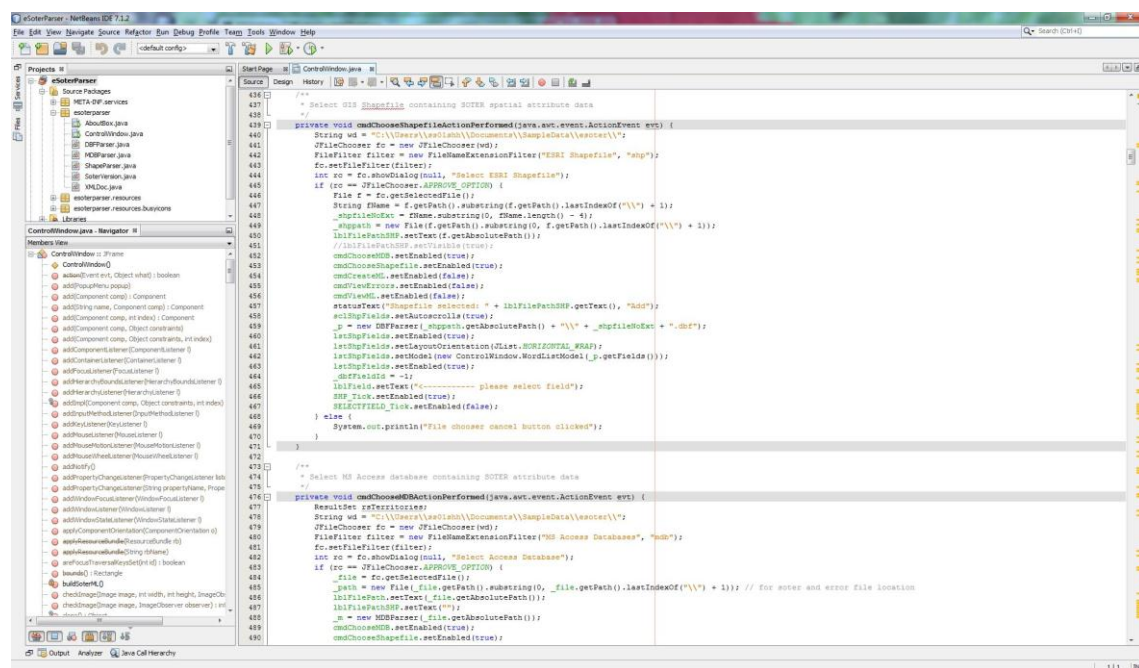


Figure 54 The NetBeans interface showing the eSoterParser project

Further Queries

For any queries relating to the SOTER parser, please contact:

Dr Stephen Hallett
Principal Research Fellow in Soil Informatics
National Soil Resources Institute (NSRI)
Bullock Building (B53)
Cranfield University
Cranfield
Bedfordshire

MK43 OAL
United Kingdom
Tel +44 (0) 1234 750111 Switchboard (ext. 2750)
Fax +44 (0) 1234 752970
Email: s.hallett@cranfield.ac.uk
Website: <http://www.cranfield.ac.uk/sas/>

Digital attachment

The following file contains the materials relating to the parser as outlined above:

E-SoTer Parser v1_6.zip
