SUAS MapServer Tutorial
Create Map Server
V 1.01

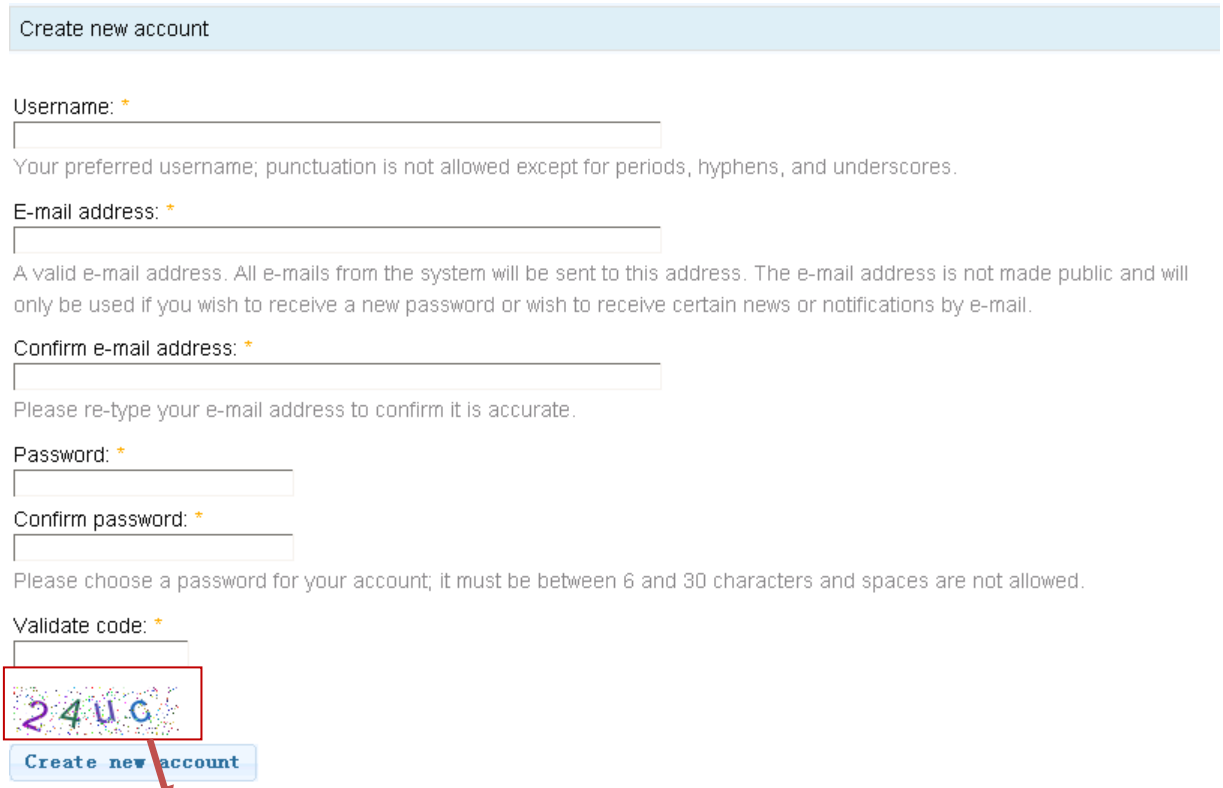
Features still under developing:

a. Import OSM data
b. WIKI atlas mode
c. Private message system
d. User comments system
e. Web GIS tool: digitalizing with Attribute data
f. Administration system
g. WFS requests, GetFeatrue Filter, Transaction, GetGmlObject…
h. User System
i. Email System for registration and mail notification

1 User System

1.1 Register new user

The first registered user will be set as the super administrator as default.



You can click the validate code image to change the image if it is not recognizable.

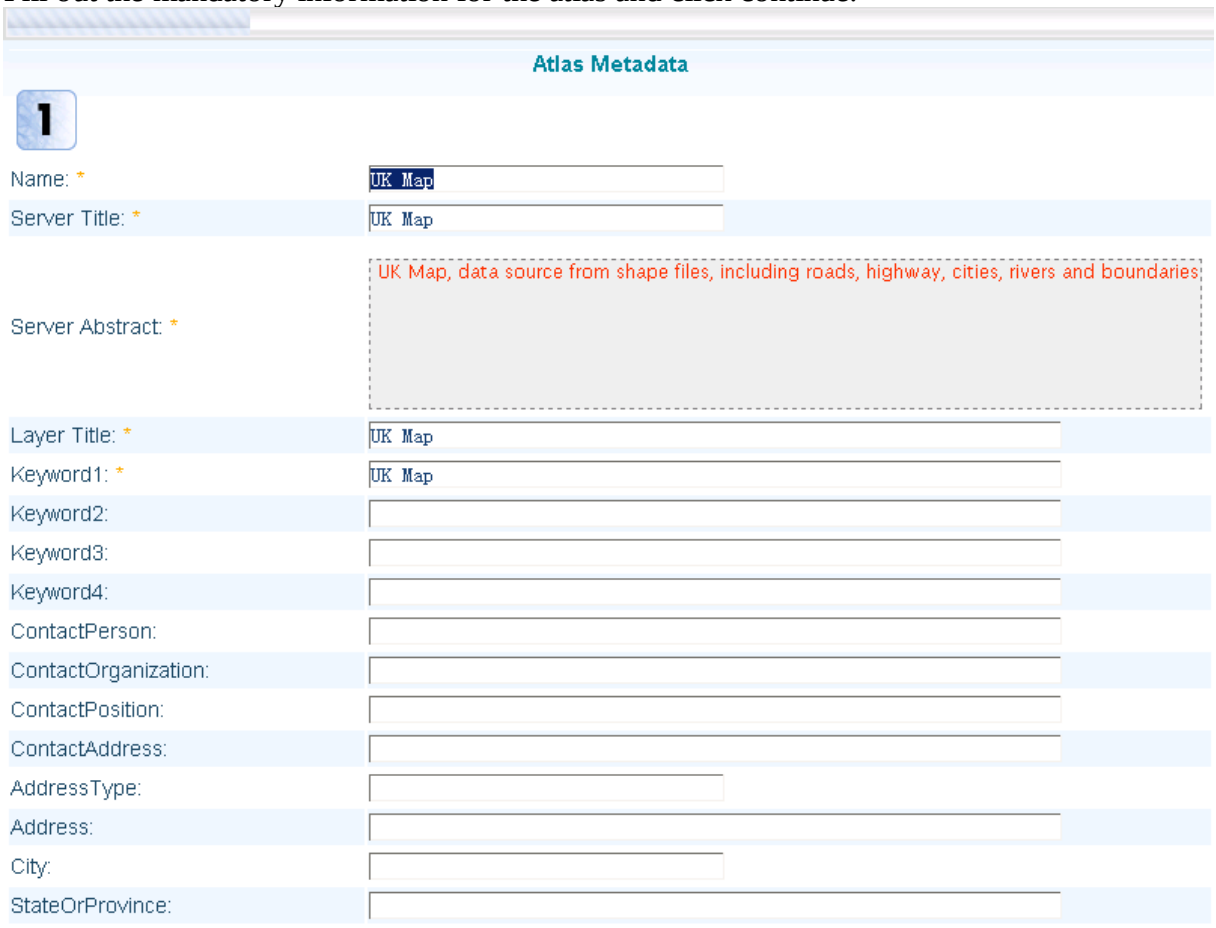
Once you have registered, after login you have the permission to create your own atlas.

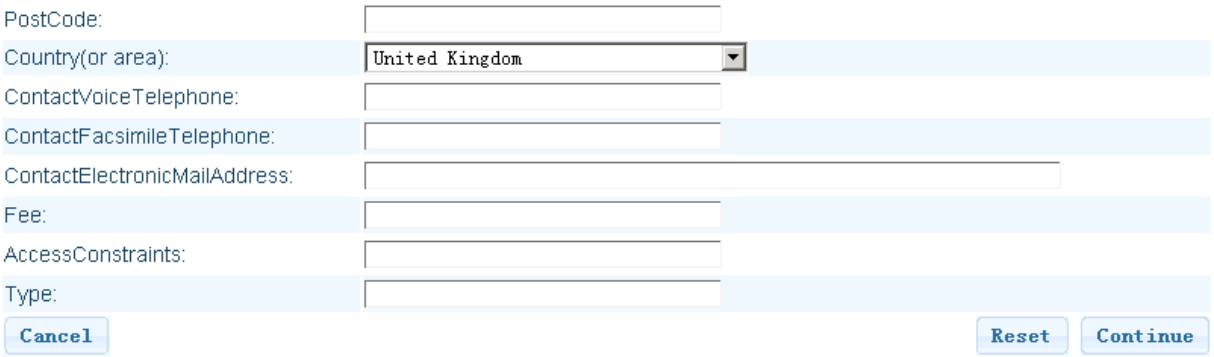
2 Create Atlas

Click Atlas->My Atlas link in the navigation bar

In the My Atlas List, you will find Create button, click it to begin to create new atlas

Step 1 Metadata
Fill out the mandatory information for the atlas and click continue.





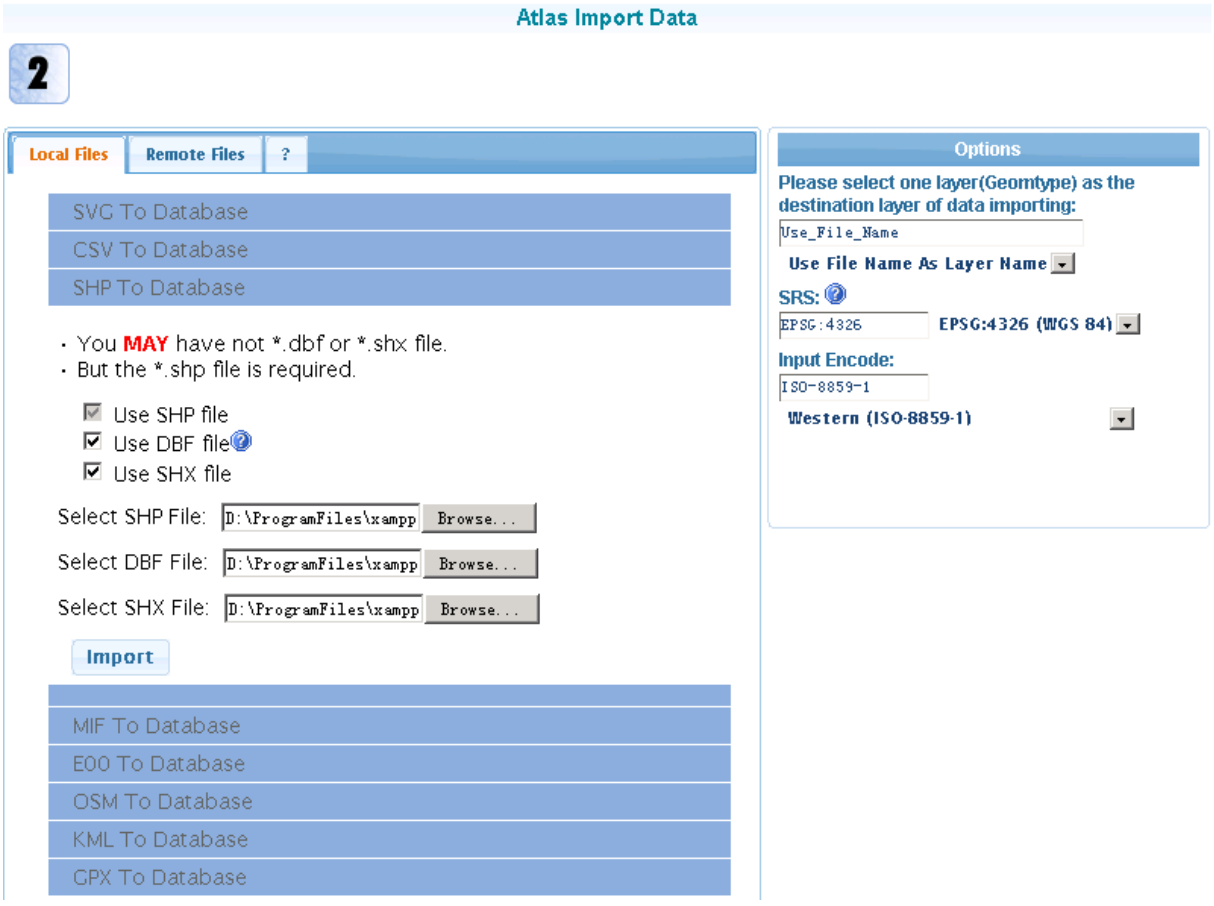
Step 2 Data Import

There are two ways to import the data: *Local files* and *Remote files*.

SRS: Spatial Reference System, for example: EPSG:4326, which is used to define the geometries' reference system in SVG file. If you are not clear, you can leave it with "SRS_not_defined".

Destination layer name: is the layer name you want to import the data into. If you use 'Use File Name As Layer Name', the uploaded file name will be used as layer name.

Input Encode: It is the encoding of the source data you want to import, such info can be find in some description data for source data, or you can export the geodata with custom encode such as 'UTF-8' in GIS software.

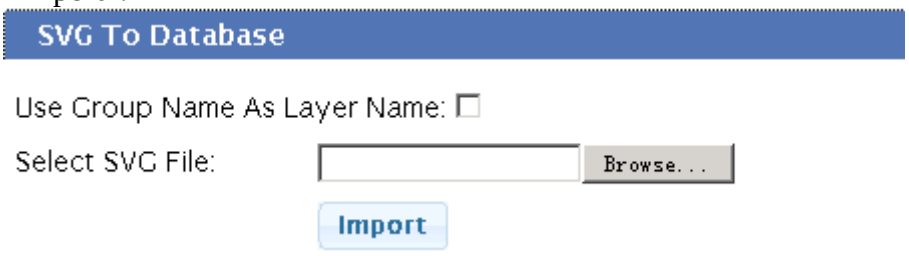


Local Files

If the size of the data is small (generally < 2Mb) and smaller than Host Server Upload Limitation(HSUL) (you can change it in php.ini, which has been described in Installation document), you can use this way to import data.

1) SVG To Database

Select the SRS from the drop-down menu and the data file from your local computer. Click "Import".



2) CSV To Database

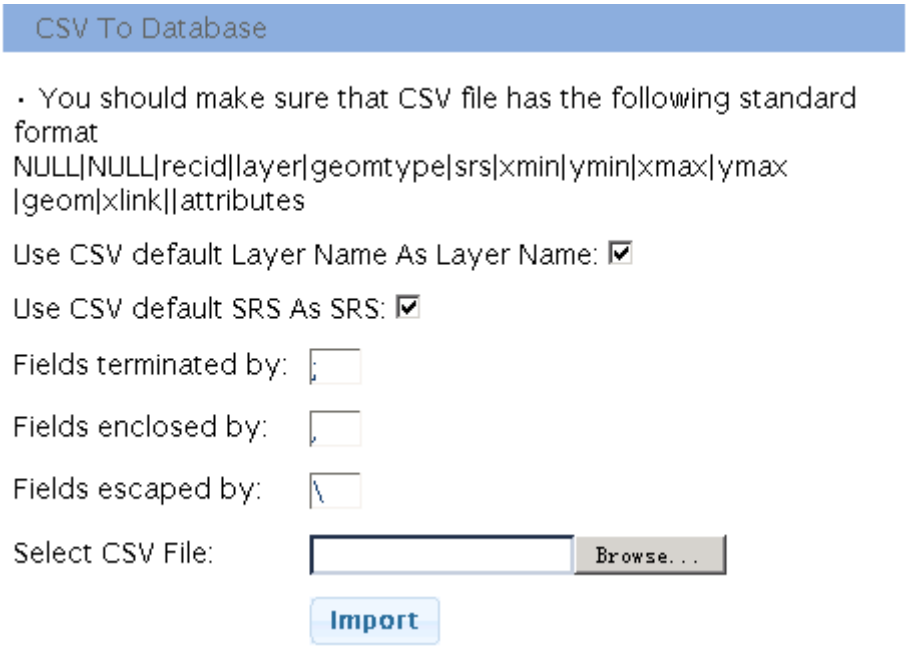
You should make sure that CSV file has the following standard format:

id|aid|recid| layer|geomtype|srs|xmin|ymin|xmax|ymax|geom|xlink|attributes

Like the example below:

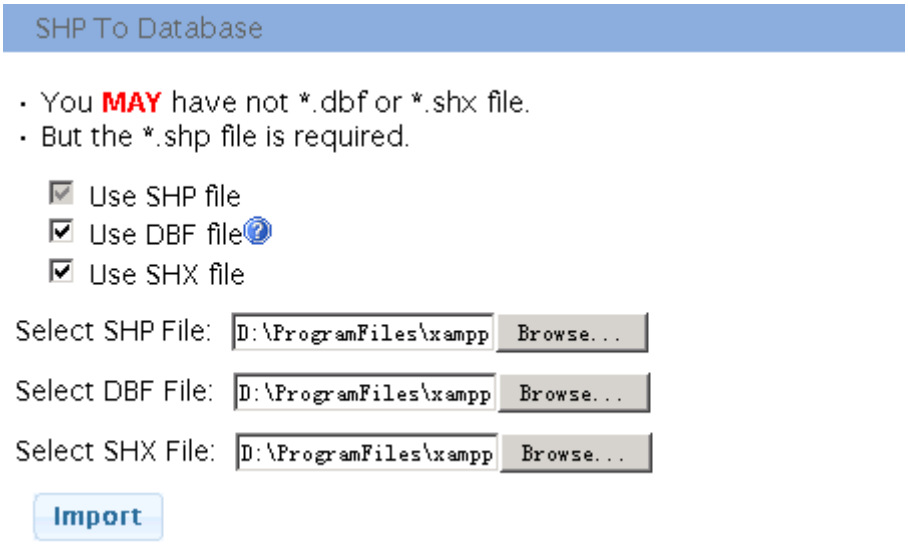
```
null;null;0;tile_test;IMAGE;EPSG:4326;-180.0;81.0;-171.0;90.0;LINESTRING(-180.0 -90.0,-180.0 -81.0,-171.0 -81.0,-171.0 -90.0,-180.0 -90.0);tile_test-0-19.png;
null;null;1;tile_test;IMAGE;EPSG:4326;-171.0;81.0;-162.0;90.0;LINESTRING(-171.0 -90.0,-171.0 -81.0,-162.0 -81.0,-162.0 -90.0,-171.0 -90.0);tile_test-1-19.png;
null;null;2;tile_test;IMAGE;EPSG:4326;-162.0;81.0;-153.0;90.0;LINESTRING(-162.0 -90.0,-162.0 -81.0,-153.0 -81.0,-153.0 -90.0,-162.0 -90.0);tile_test-2-19.png;
null;null;3;tile_test;IMAGE;EPSG:4326;-153.0;81.0;-144.0;90.0;LINESTRING(-153.0 -90.0,-153.0 -81.0,-144.0 -81.0,-144.0 -90.0,-153.0 -90.0);tile_test-3-19.png;
```

In the example, the fields was terminated by "**;**", and the data use CSV header in the first line (yellow sector). Field enclosed and escaped should be left empty.
Input right characters in the textfield and select the data file from your local computer. Click "Import".



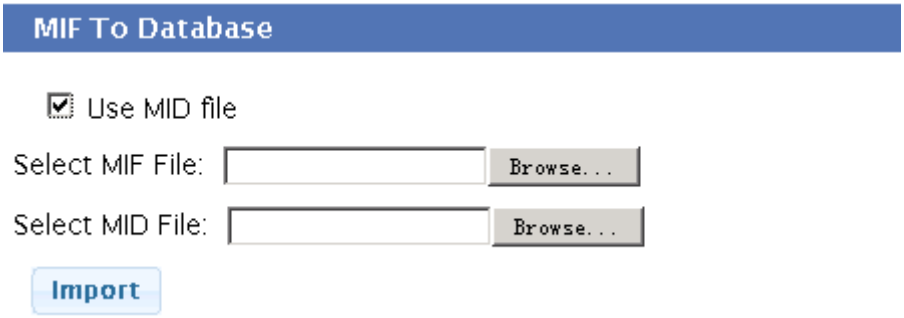
3) SHP To Database

The DBF file import will store the attributes of geometries meanwhile storing geometries of SHP file. If your checkbox here is inactive, please modify you php.ini file, delete the semicolon before extension=php_dbase.dll to open the Dbase PHP function. If you do not need metadata, just unselect it.
Select the SRS from the drop-down menu. Select "Use DBF file" and "Use SHX file", and then select the data file from your local computer. Click "Import".

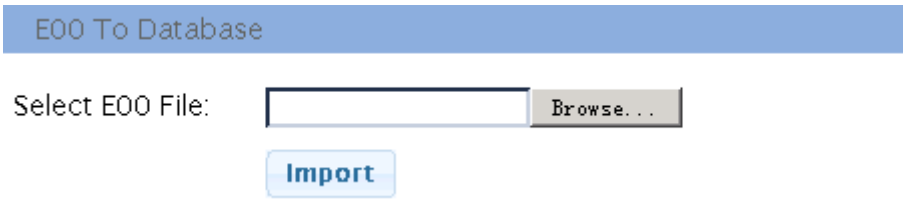


4) MIF To Database

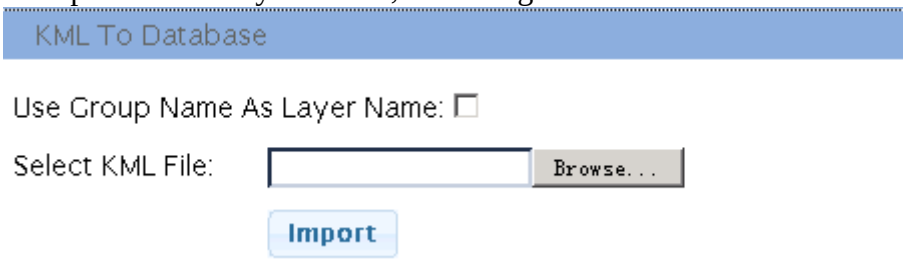
SRS is Spatial Reference System, for example: EPSG:42101, which is used to define the geometries' reference system in MIF file. If you are not clear, you can leave it with SRS_not_defined.
Select the SRS from the drop-down menu and the data file from your local computer. Click "Import".



5) E00 To Database



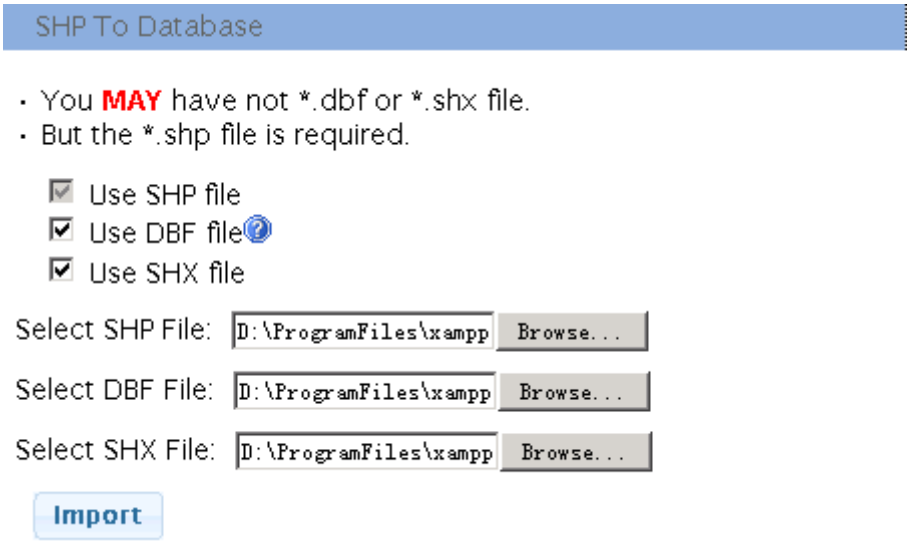
6) KML To Database
If in KML file, the geometries are ordered in node <Folder>, you can check the option 'Use Group Name As Layer Name', then the geometries in Folder will be seen as separated layer.



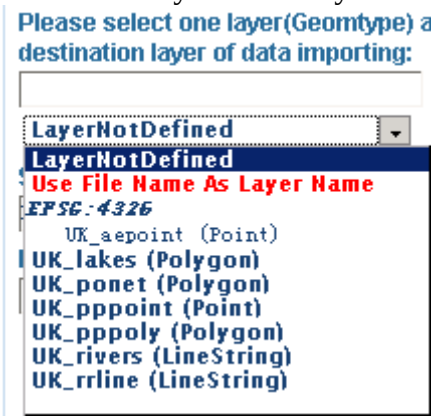
7) GPX To Database
If in GPX file, the geometries are ordered in track node, you can check the option 'Use Group Name As Layer Name', then the geometries in Folder will be seen as separated layer.

Remote Files
If the size of the data is larger than HSUL, you can use this way to import data. In consideration of the upload speed, I suggest that you should use this way when the size of the data is large enough (gernerally > 2Mb) but smaller than Host Server upload limitation. Please upload the data files into **\xampp\htdocs\suas\files\user\{uid}\data** fold in Remote Server, using FTP tools such as Filezila or something else. If you have done it, the data files will be listed in drop-down menu, you can select one to import.
Note: Do not make folder in data folder, just put files there.
All the operations of importing Remote Files are same with those of importing Local Files. You can refer to previous sector.

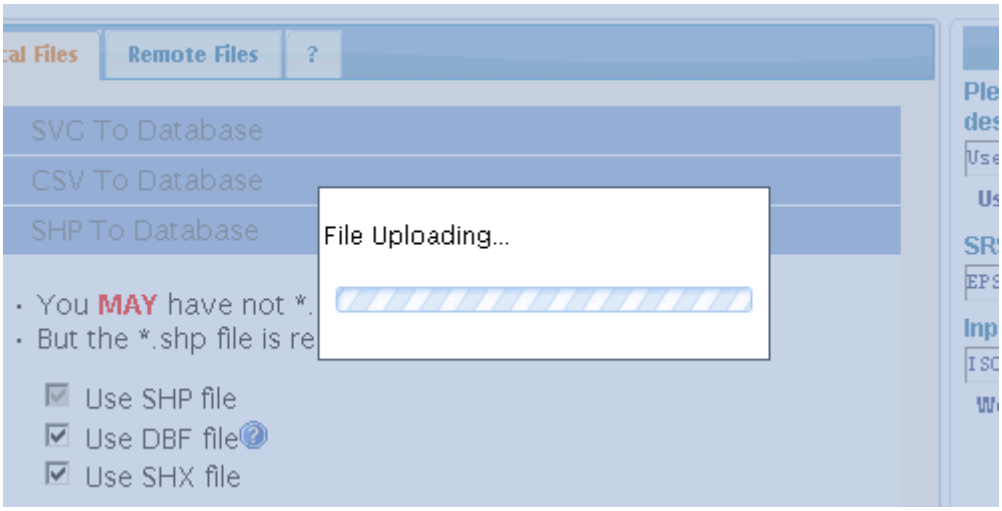
Now try to import the UK demo data.
Because the data is Shape format and its coordinate reference system is WGS84, click "SHP To Database" and select "SRS" with EPSG:4326 (it is same with WGS84). Select "Use DBF file" and "Use SHX file", the data files which you have unzipped into the data directory before will be listed in drop-down menu.



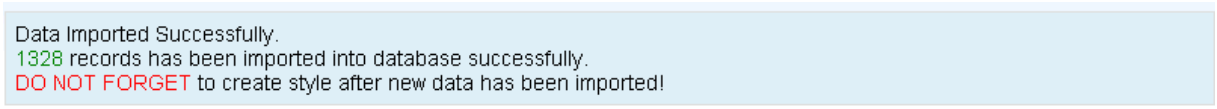
The destination layer name list will be refreshed automatically, so you can choose one as the destination layer name of your next data:



If you have imported the first data file successfully and you have more data files to import, the data uploading is using Ajax technique, so you can continue to upload the next data.



Maybe there are errors during the importing process, but these errors are only for the invalid data and will not influence on the next step. So don't care of that and go on.



The status message will tell you the importing result.

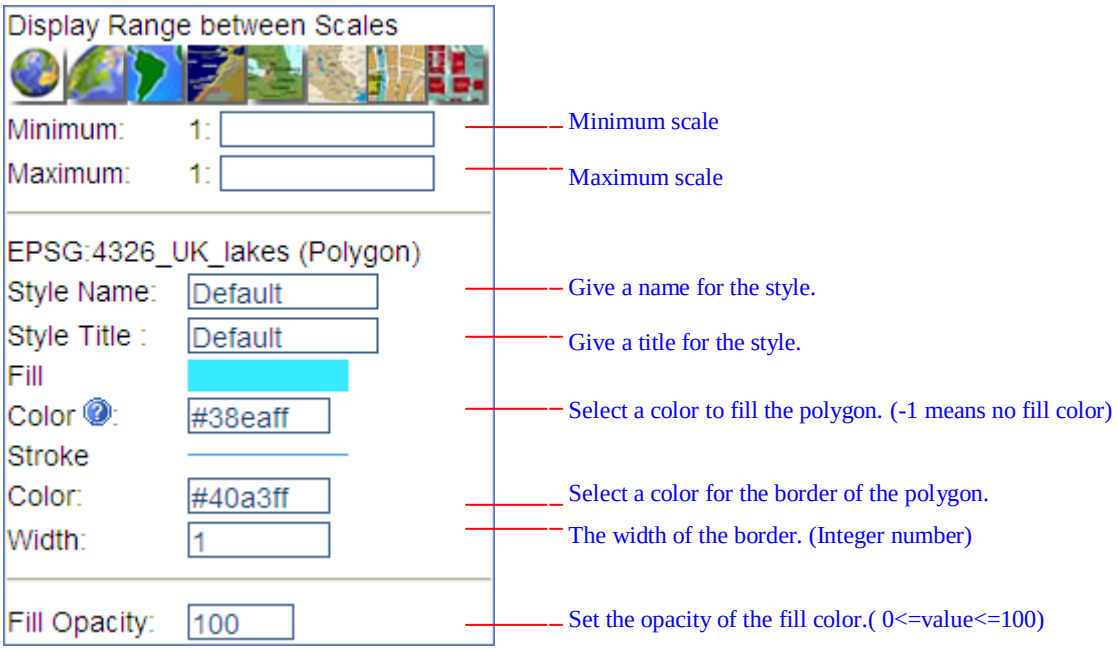
Tips:
Sometimes the data processing will last long time, please open **\xampp\htdocs\suas\models\setting.php** file and find `SITE_MAX_TIMEOUT_LIMIT,` set its value with a longer time in order to avoid the data processing to meet timeout exception. But for this you can not run PHP in safe mode. So please open php.ini file and set "safe_mode = Off".
Just be patient to wait for the processing, do not interrupt it or refresh the current page.

Step3 Style Definition
After the importation, you can click "Continue" to create styles (display range and symbology) for each layer in the data that imported before, in order to make your outputted map looks more beautiful and more professional.

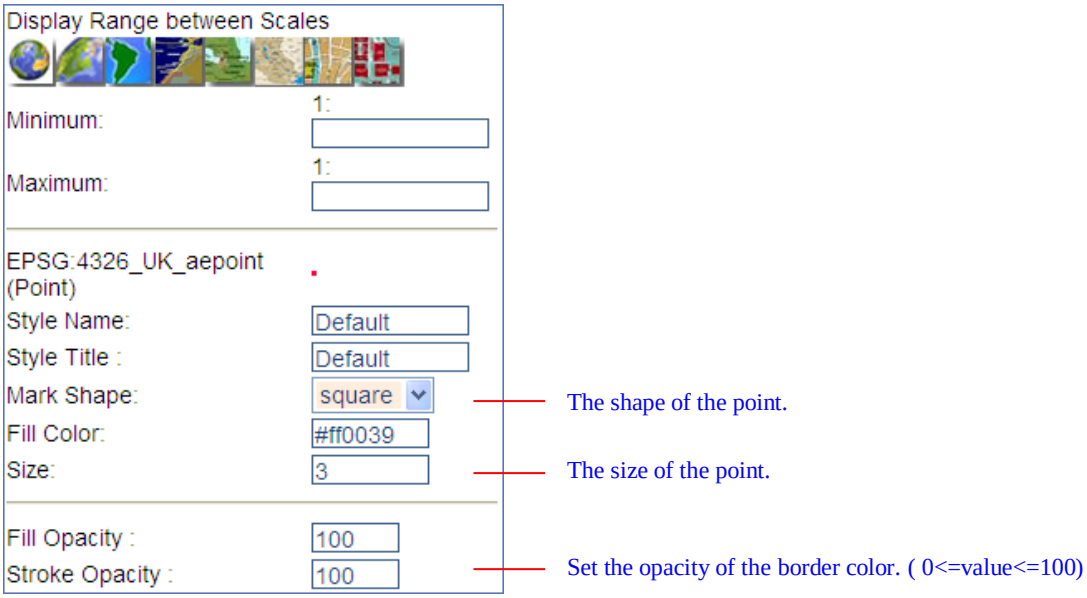
Select the layers in the new window.
You can look the help tip if you have any question about setting. After finished style definition, click "Create Style".

You can set the styles arbitrarily for the layer in Range and Symbology window.

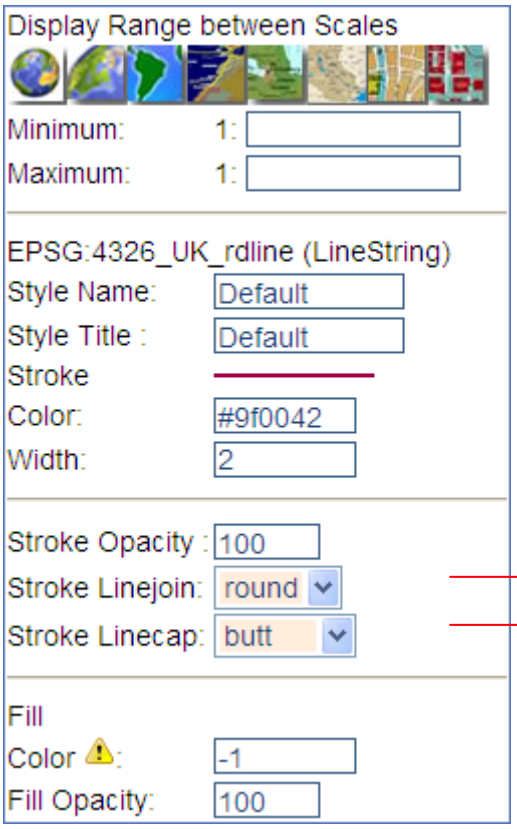
a. For Polygon Geometry
For the beginner, I suggest that you could leave the first four parameters (Minimum scale, Maximum scale, Style Name and Style Title) as default value.
Minimum scale, Maximum scale, Style Name and Style Title: Input the value in the textfield.
Fill Color and Stroke Color: Select a color in the color picker, and then the color value will be filled in the textfield automatically.
Fill Opacity: Input the value in the textfield.

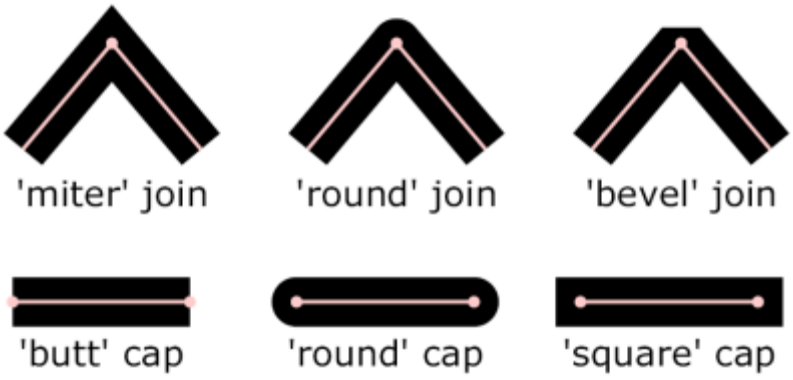


b. For Point Geometry



c. For Line Geometry



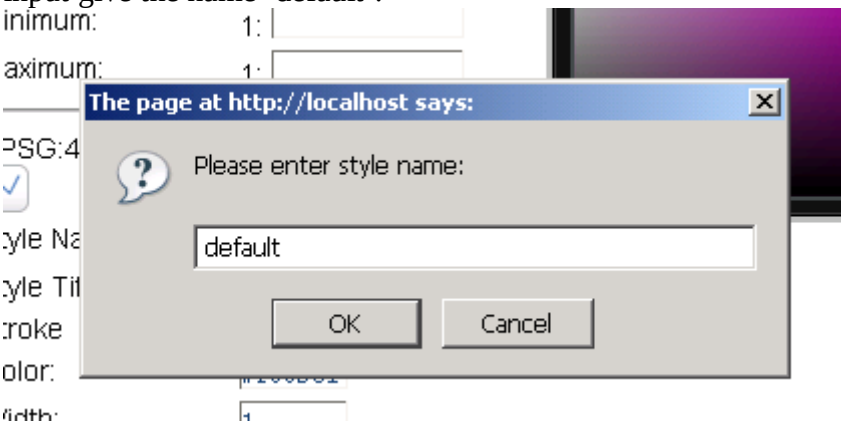


Note:
In most case, DO NOT fill line Geometry. Please leave the default value of the Fill Color to -1 (transparent). Unless you know what you are doing, the outputted map will be displayed out of your thinking.
For example, in your data the building was stored as line (It should be stored as Polygon geometry mostly), but it looks ugly and incomplete if its path is not closed.

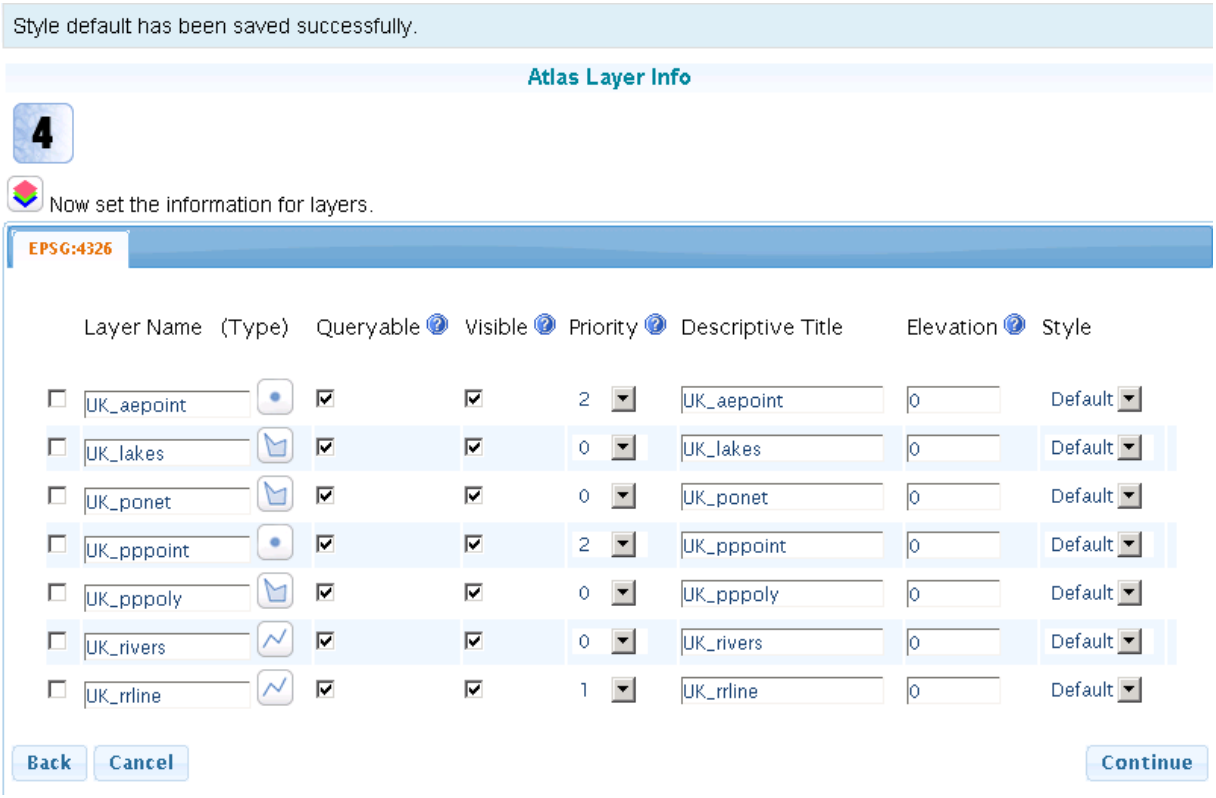
In such case, you can set the fill color for the building and the map will like below.

d. For Text

After setting click “Continue” and give the style name in the opning dialog, normally you can input give the name ‘default’.



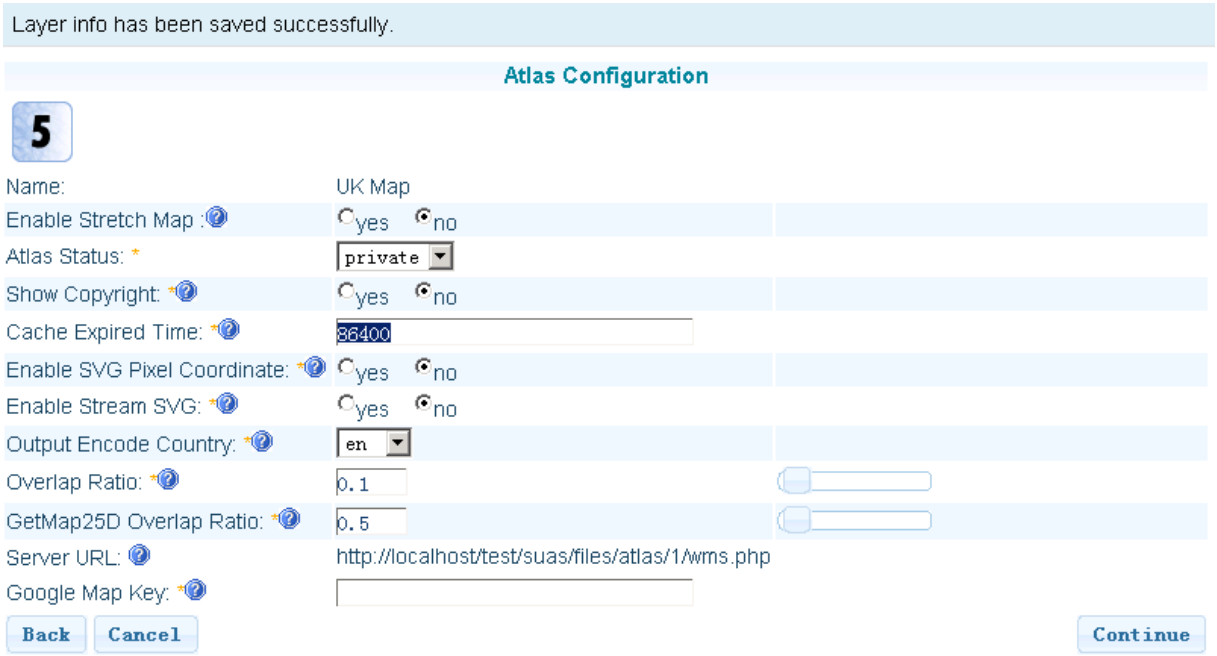
Step 4 Layer Info
After finished defining the styles, go on setting the layer info.
This section will create metadata for each layer in the database, you can decide which layer could be queried or be displayed.



Queryable: Indicates if layer supports GetFeatureInfo operation or not. Layers with type of image or text typically do not support this operation.
Visiable: Indicates if layer could be requested to display or not.
Priority: Set the priority of layer, layer with high value will overlay that with low value. For example, the text description of geometries will be always displayed on the top of geometries, so you should set it with a bigger value.
Descriptive Title: if you have time, you could give some description to each layer, so that you can remember what it is later.
Elevation: Set the elevation of layer, the value will be used to create 3D model.
Style: The name of style which you have set in Style Definition section.

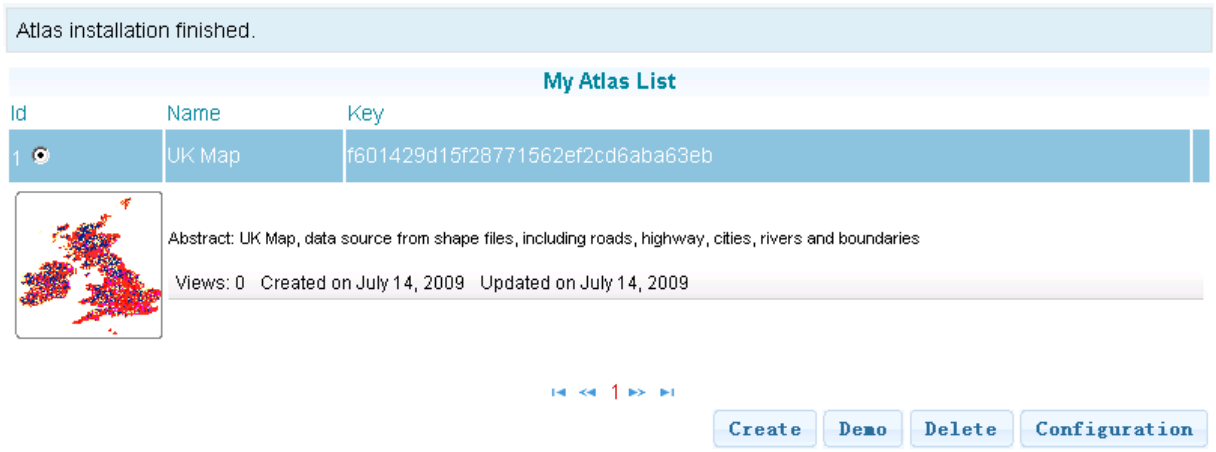
After set these values respectively, click “Create Metadata”.

Step 5: Atlas Configuration



Last Step: Complete Installation

After completed installation, you can use SUAS MapServer or set the database configuration again if you want to change some settings.

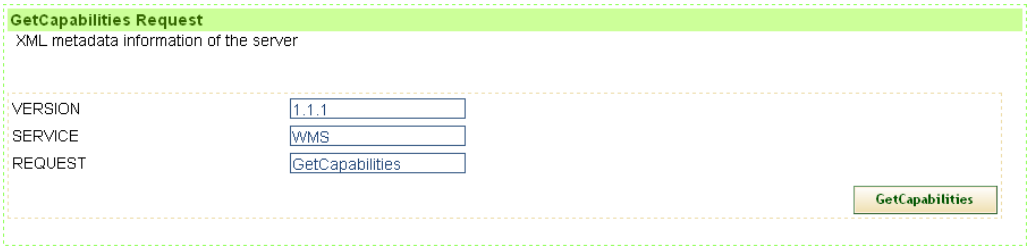


3 Web Map Service (WMS) Demo

SUAS MapServer publishes Geodata according to OGC's WMS 1.1.1 specification.

3.1 GetCapabilities

Sending a GetCapabilities request is the first step in the communication between clients and Map Server.

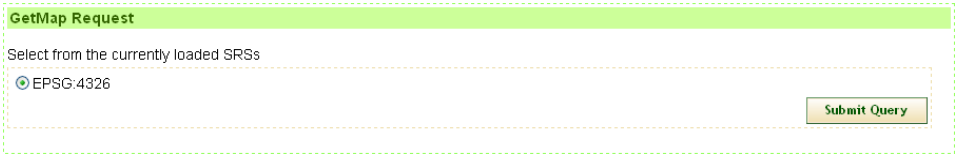


The purpose of the GetCapabilities operation is described in the Basic Service Elements section. In the particular case, the response of a GetCapabilities request is general information about the service itself and specific information about the available maps. This information will be sent back to clients as XML document.
Click “GetCapabilities” to send request and get the XML document.

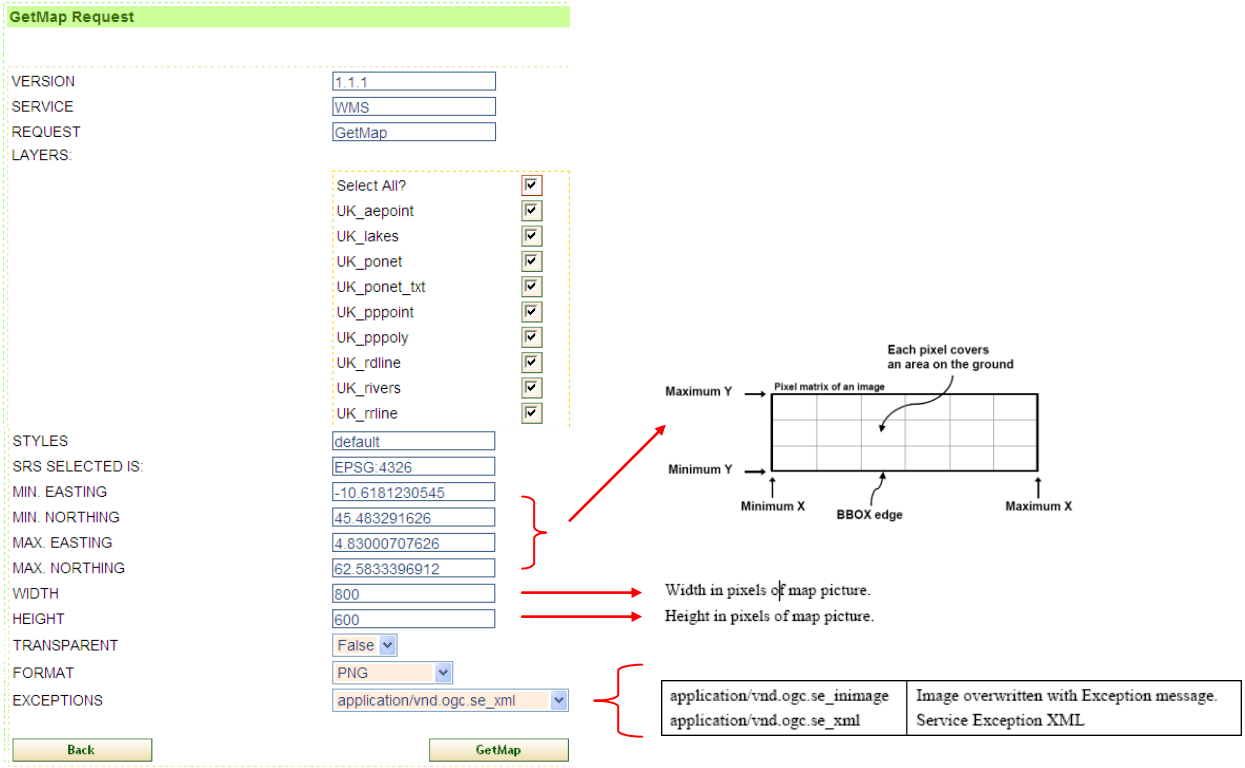
```
<?xml version="1.0" encoding="UTF-8" ?>
<!DOCTYPE WMT_MS_Capabilities (View Source for full doctype...)>
- <WMT_MS_Capabilities version="1.1.1" updateSequence="20071203">
  - <Service>
      <Name>OGC:WMS</Name>
      <!-- Human-readable title for pick lists -->
      <Title>Open Source SUAS MapServer</Title>
      <!-- Narrative description providing additional information -->
      <Abstract>Open source based WMS compliant Web Map Sever</Abstract>
    - <KeywordList>
        <Keyword>WMS</Keyword>
        <Keyword>SVG</Keyword>
        <Keyword>WEB MAP SERVER</Keyword>
      </KeywordList>
      <!-- Top-level address of service or service provider -->
      <OnlineResource xmlns:xlink="http://www.w3.org/1999/xlink" xlink:type="simple" xlink
      <!-- Contact information -->
    - <ContactInformation>
      - <ContactPersonPrimary>
          <ContactPerson>PG</ContactPerson>
          <ContactOrganization>HfT</ContactOrganization>
        </ContactPersonPrimary>
        <ContactPosition>HfT</ContactPosition>
```

3.2 GetMap

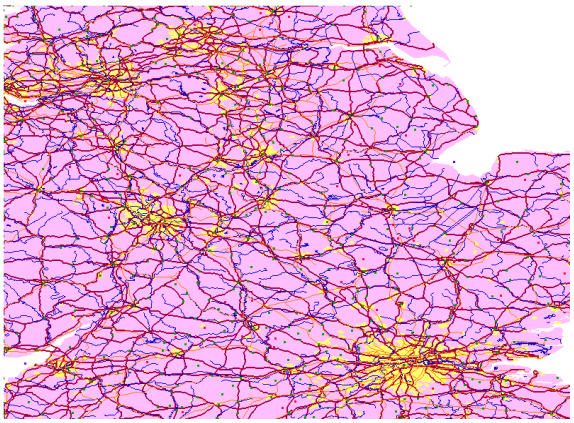
The GetMap operation is designed to produce a map, which is defined to be either a pictorial image or a set of graphical elements.
Select a SRS of the dataset in the database. Click “Submit Query”.



Set the parameters of the map for GetMap request. Click "GetMap".

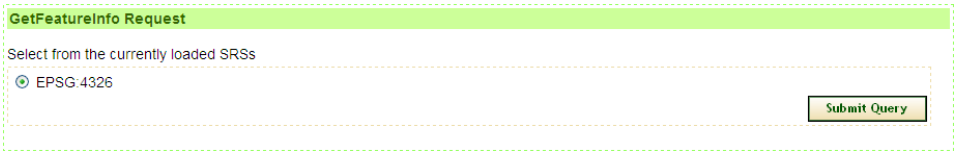


Then you can get the map in the format of which you have selected.

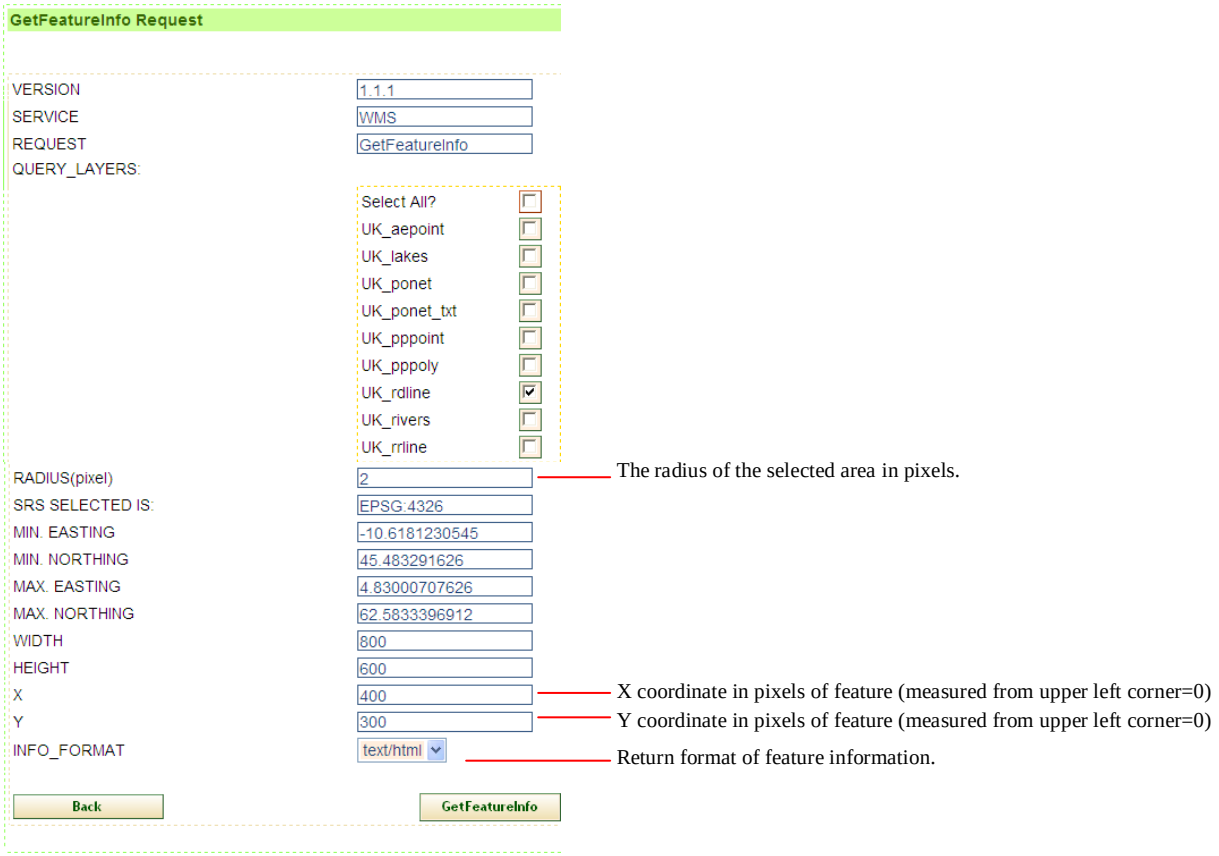


3.3 GetFeatureInfo

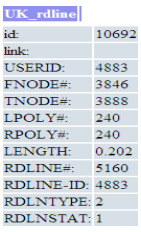
The GetFeatureInfo operation is designed to provide clients of a WMS with more information about features in the pictures of maps that were returned by previous Map requests.
Select a SRS of the dataset in the database. Click "Submit Query".



GetFeatureInfo is an optional operation. It is only supported for those Layers for which the attribute queryable (true) has been defined (Refer to “Install SUAS MapServer” Chapter 2.3.5.). A Client should not issue a GetFeatureInfo request for other layers.
Set the parameters of the map for GetFeatureInfo request. Click “GetFeatureInfo”.



You can get the attribute information about the feature “UK_rdline” in html format.

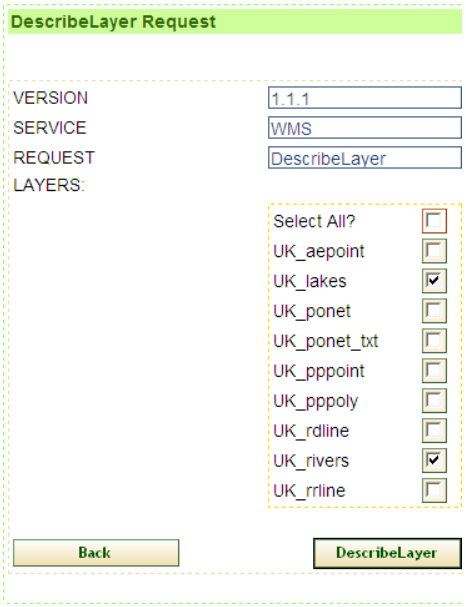


UK_rdline	
id:	10692
link:	
USERID:	4883
FNODE#:	3846
TNODE#:	3888
LPOLY#:	240
RPOLY#:	240
LENGTH:	0.202
RDLINE#:	5160
RDLINE-ID:	4883
RDLNTYPE:	2
RDLNSTAT:	1

3.4 DescribeLayer

The **optional** DescribeLayer operation defines a user-defined style requires information about the features being symbolized, or at least their feature type.
The DescribeLayer operation applies only to a Styled Layer Descriptor (SLD) WMS.

SLD-enabled WMS retrieves features from a Web Feature Service (WFS) and applies explicit styling information provided by the user in order to render a map.
Set the parameters for DescribeLayer request. Click “DescribeLayer”.

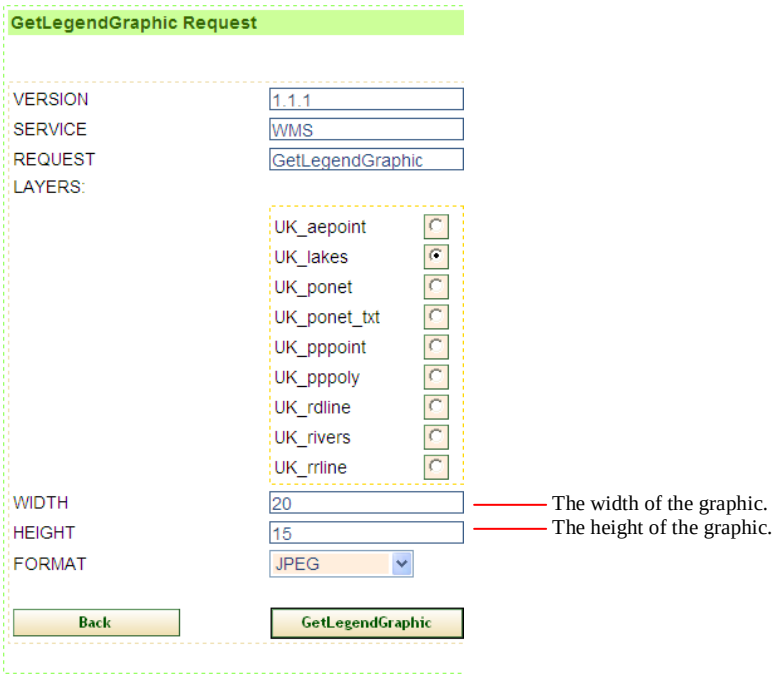


You can get the information about the selected layers in XML format.

```
<?xml version="1.0" encoding="UTF-8" ?>
- <WMS_DescribeLayerResponse version="1.1.1">
  - <LayerDescription name="UK_lakes" wfs="http://localhost/suas/WFS/getmapcap.php">
      <Query typeName="UK_lakes" />
    </LayerDescription>
  - <LayerDescription name="UK_rivers" wfs="http://localhost/suas/WFS/getmapcap.php">
      <Query typeName="UK_rivers" />
    </LayerDescription>
  </WMS_DescribeLayerResponse>
```

3.5 GetLegendGraphic

The **optional** GetLegendGraphic operation applies only to a Styled Layer Descriptor WMS. It could generate a legend entry for a layer in graphic format.
Set the parameters for GetLegendGraphic request. Click “GetLegendGraphic”.

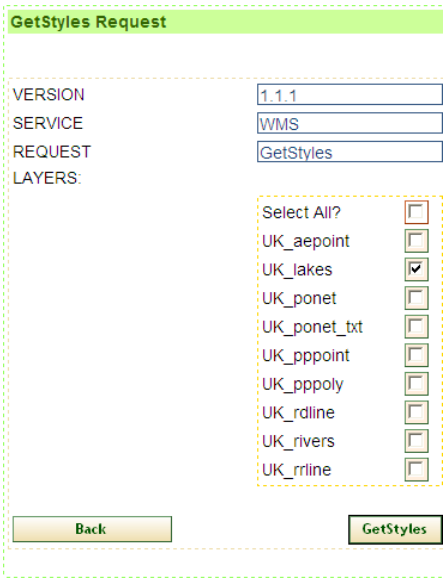


You can get the graphic for the selected layer.

UK Layer	
	UK_aepoint
	UK_rdline
	UK_lakes

3.6 GetStyles

The **optional** GetStyles operation applies only to a Styled Layer Descriptor WMS. It is used to retrieve user-defined styles from a WMS.
Set the parameters for GetStyles request. Click “GetStyles”.



You can get the style information about the selected layer in XML format.

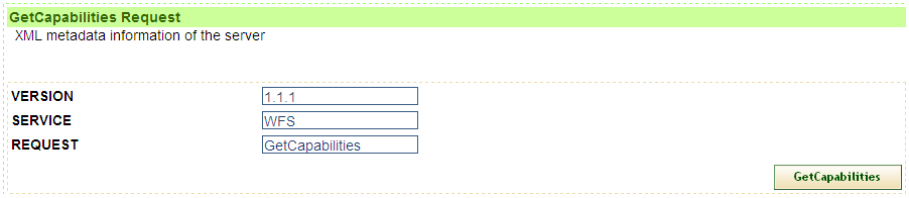
```
<?xml version="1.0" encoding="utf-8" ?>
- <StyledLayerDescriptor version="1.0.0" xmlns:ogc="http://www.openg
    xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance">
  - <NamedLayer>
      <Name>UK_lakes</Name>
    - <UserStyle>
        <Name>Default</Name>
        <Title>Default</Title>
        <IsDefault>1</IsDefault>
      - <FeatureTypeStyle>
        - <Rule>
            <Name>UK_lakes_Style_Rule</Name>
            <Title>UK_lakes Style Rule</Title>
          - <PolygonSymbolizer>
            - <Fill>
                <CssParameter name="fill">#38eaff</CssParameter>
                <CssParameter name="fill-opacity">100</CssParameter>
              </Fill>
            - <Stroke>
                <CssParameter name="stroke">#40a3ff</CssParameter>
                <CssParameter name="stroke-width">1</CssParameter>
              </Stroke>
            </PolygonSymbolizer>
          </Rule>
        </FeatureTypeStyle>
      </UserStyle>
    </NamedLayer>
  </StyledLayerDescriptor>
```

4 Web Feature Service (WFS) Demo

Web Feature Service allows a client to retrieve and update geospatial data encoded in Geography Markup Language (GML) from multiple Web Feature Services.

4.1 GetCapabilities

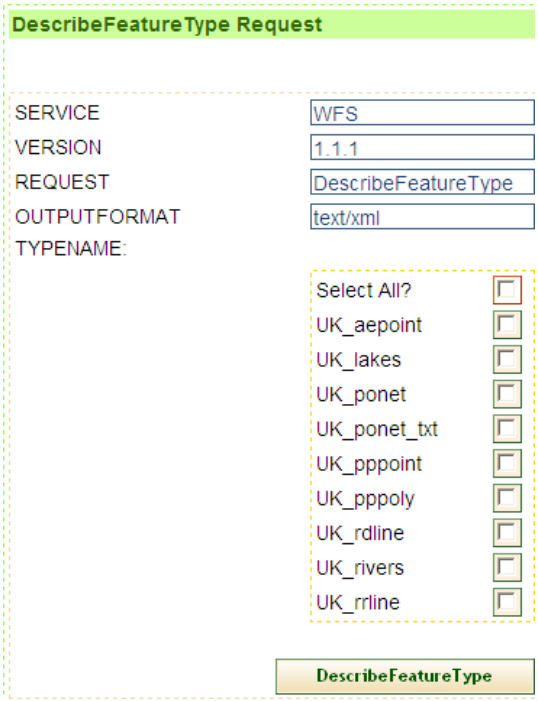
The GetCapabilities operation indicates which feature types it can service and what operations are supported on each feature type.
Click “GetCapabilities” to send request and get the XML document.




```
<?xml version="1.0" encoding="UTF-8" ?>
- <WFS_Capabilities updateSequence="0" version="1.1.1" xmlns:v
    xmlns="http://www.opengis.net/wfs" xmlns:gml="http://v
    xsi:schemaLocation="http://www.opengis.net/wfs http://
  - <Service>
      <Name>SUAS MapServer WFS</Name>
      <Title>SUAS MapServer WFS</Title>
      <OnlineResource>www.easywms.com</OnlineResource>
    </Service>
  - <Capability>
    - <Request>
      - <GetCapabilities>
        - <DCPType>
          - <HTTP>
              <Get onlineResource="http://localhost/suas/WF
              <Post onlineResource="http://localhost/suas/WF
            </HTTP>
          </DCPType>
        </GetCapabilities>
      - <DescribeFeatureType>
        - <SchemaDescriptionLanguage>
```

4.2 DescribeFeatureType

The DescribeFeatureType operation is used to describe the structure of any feature type it can service.
Set the parameters for DescribeFeatureType request. Click “DescribeFeatureType”.

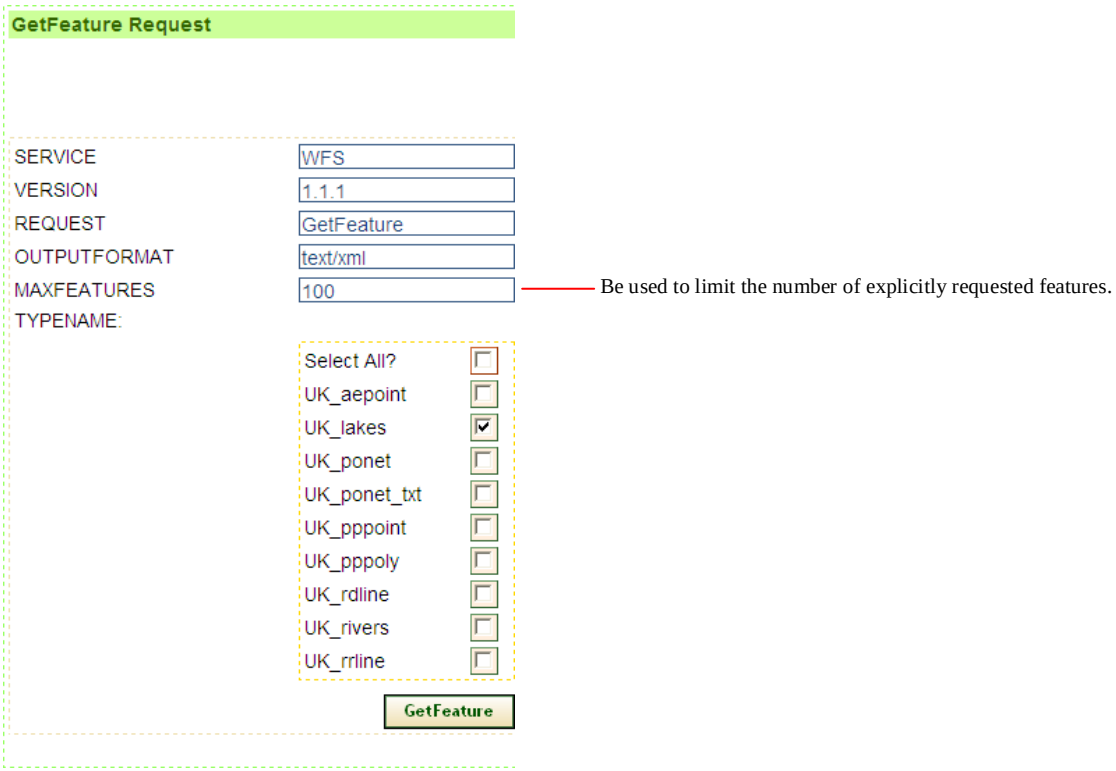


You can get the structure information about the selected feature in XML format.

```
<?xml version="1.0" encoding="UTF-8" ?>
- <xsd:schema targetNamespace="http://localhost/suas/WFS/Schemas/gml" e
    xmlns:xsd="http://www.w3.org/2001/XMLSchema" xmlns:ingr="http://local
    <xsd:import namespace="http://www.opengis.net/gml" schemaLocation="htt
    <xsd:element name="featureCollection" type="ingr:featureCollectionType" sul
  - <xsd:complexType name="featureCollectionType">
    - <xsd:complexContent>
        <xsd:extension base="gml:AbstractFeatureCollectionType" />
      </xsd:complexContent>
    </xsd:complexType>
    <xsd:element name="UK_rdline" type="ingr:UK_rdlineType" substitutionGroup="
  - <xsd:complexType name="UK_rdlineType">
    - <xsd:complexContent>
      - <xsd:extension base="gml:AbstractFeatureType">
        - <xsd:sequence>
            <xsd:element name="USERID" minOccurs="0" type="xsd:double" />
            <xsd:element name="FNODE#" minOccurs="0" type="xsd:double" />
            <xsd:element name="TNODE#" minOccurs="0" type="xsd:double" />
```

4.3 GetFeature

The GetFeature operation allows retrieval of features from a web feature service.
Set the parameters for GetFeature request. Click “GetFeature”.



You can get the information about the selected feature in XML format.

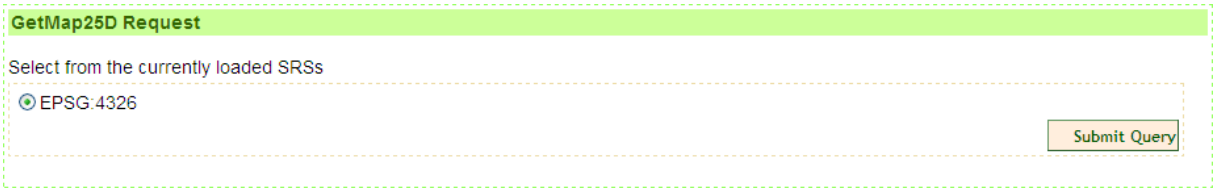
```
<?xml version="1.0" encoding="UTF-8" ?>
- <wfs:FeatureCollection service="WFS" version="1.1.1" outputFormat="GML2" xmlns:myns="http://www.ttt.org/myn
  xmlns:wfs="http://www.opengis.net/wfs" xmlns:ogc="http://www.opengis.net/ogc" xmlns:gml="http://www.
  xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance" xsi:schemaLocation="http://www.opengis.net/w
  basic.xsd">
 - <gml:boundedBy>
  - <gml:Box srsNam="EPSG:4326">
      <gml:coordinates>-10.6181230545, 45.483291626, 4.83000707626, 62.5833396912</gml:coordinates>
    </gml:Box>
  </gml:boundedBy>
 - <gml:featureMember>
  - <myns:UK_lakes fid="163">
   - <gml:boundedBy>
    - <gml:Box srsName="EPSG:4326">
        <gml:coordinates>-7.68988752365,55.2432861328,-7.6742773056,-7.6742773056</gml:coordinates>
      </gml:Box>
    </gml:boundedBy>
    <myns:msGeometry />
    <myns:FID>0</myns:FID>
    <myns:AREA>0</myns:AREA>
    <myns:PERIMETER>0</myns:PERIMETER>
    <myns:DNNET_>0</myns:DNNET_>
    <myns:DNNET_ID>0</myns:DNNET_ID>
    <myns:DNPYTYPE>0</myns:DNPYTYPE>
   </myns:UK_lakes>
  </gml:featureMember>
 - <gml:featureMember>
  - <myns:UK_lakes fid="164">
   - <gml:boundedBy>
```

5 WMS Extension

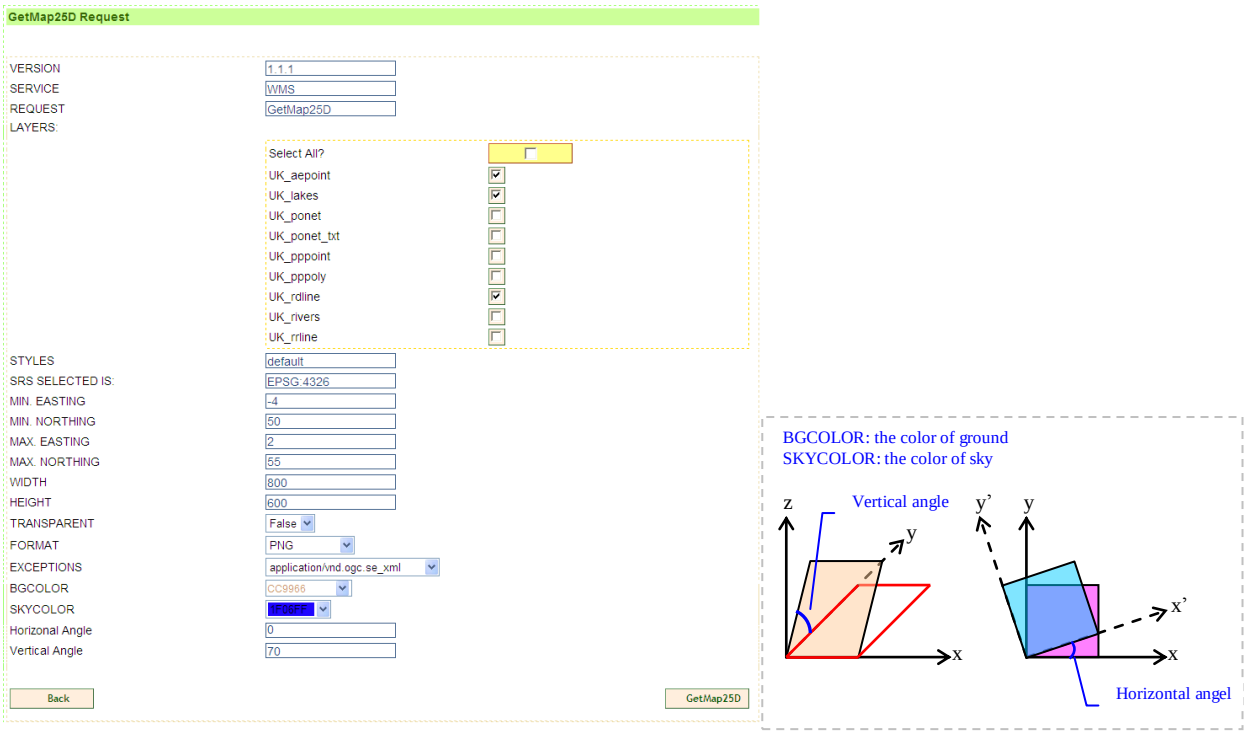
SUAS MapServer provides some special features as extension besides OGC's WMS 1.1.1 specification.

5.1 GetMap25D

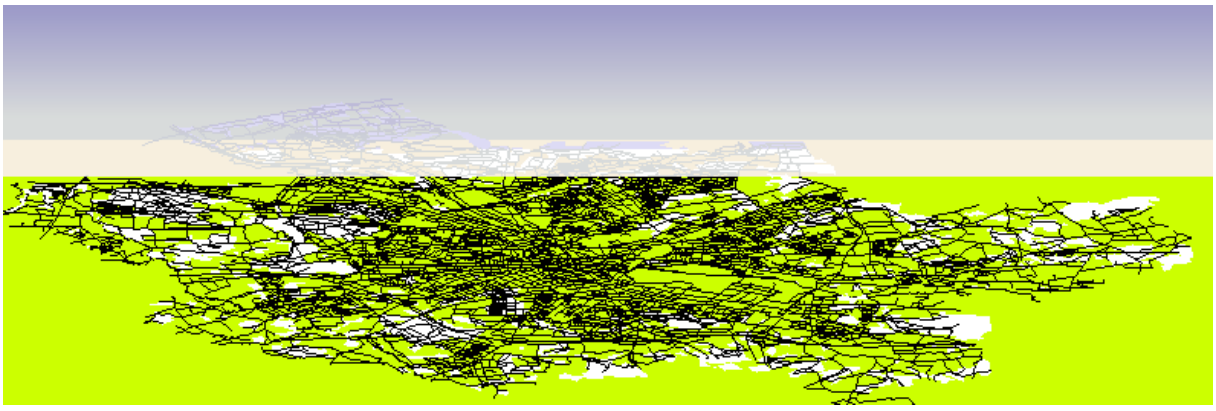
SUAS MapServer provides GetMap25D extension for simulating the fake 3D map with looking down angle of view. Now only supports raster image.
Select a SRS of the dataset in the database. Click “Submit Query”.



Set the parameters of the map for GetMap25D request. Click “GetMap25D”. The parameters are similar with GetMap request.



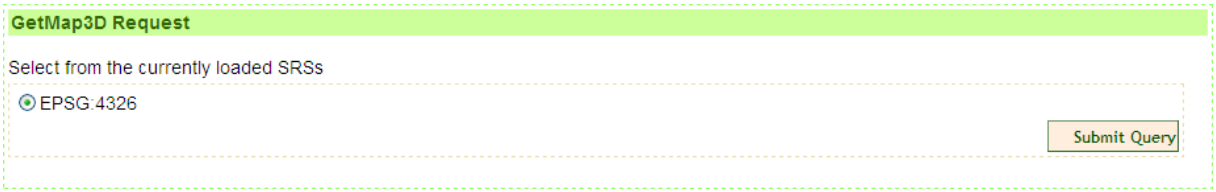
Then you can get the 2.5D map like the following in the format of which you have selected.



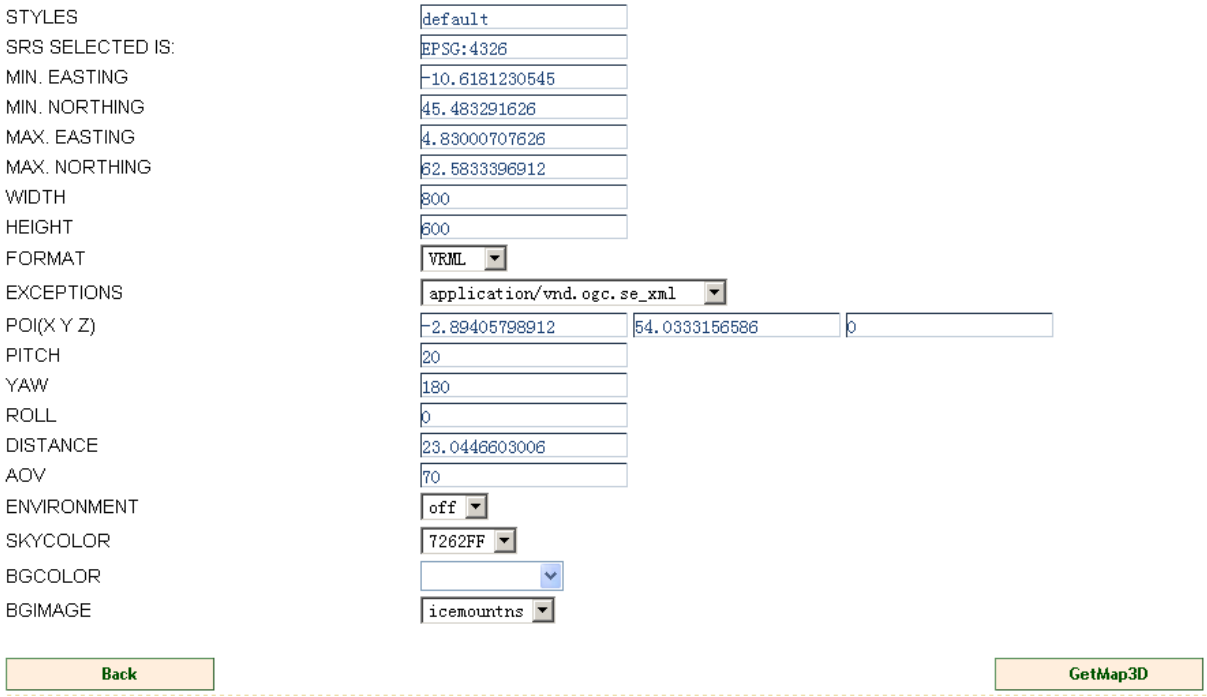
This function still has some bugs, some king of data can not be rendered correctly, Hui will fix that.

5.2 GetMap3D

SUAS MapServer provides GetMap3D extension for creating the real 3D map.
Select a SRS of the dataset in the database. Click “Submit Query”.



Set the parameters of the map for GetMap3D request. Click “GetMap3D”.



The special parameters for the GetMap3D could be found in the following image. This GetMap3D request is inspirited by the GetScene request from Web 3D Service (W3DS), so that some of the parameters are reserved:

a) Point of Interest (POI): the exact location in x,y,z space of the viewer's focus.

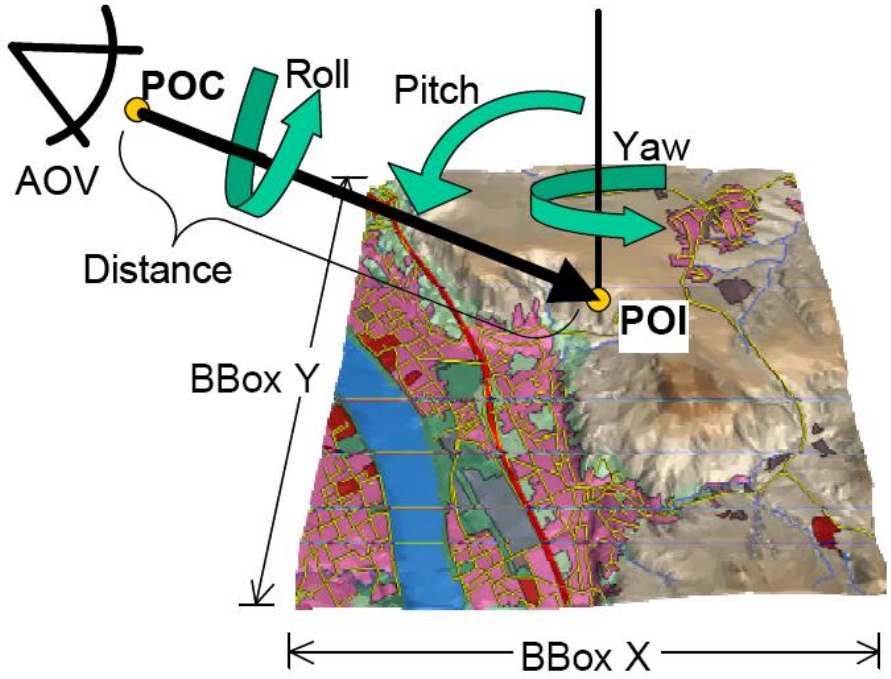
b) Distance: the distance between the viewer and the POI in meters.

c) Pitch: the angle or inclination (in degrees) between the viewer and the POI (0 ºmeans the viewer is looking horizontally and -90 ºmeans the viewer is looking straight down on the POI).

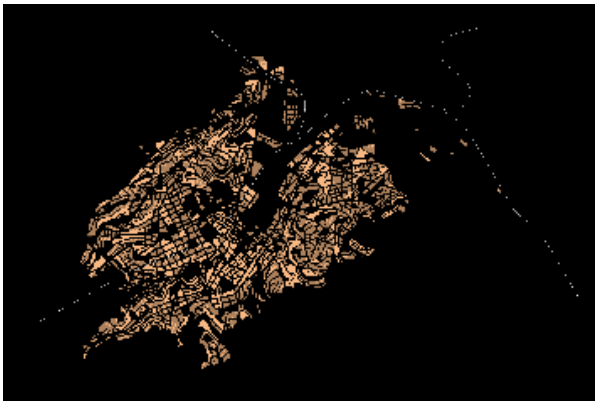
d) Yaw: azimuth, the angle representing the "head swivel" (0 ºfaces due north, 90 ºfaces

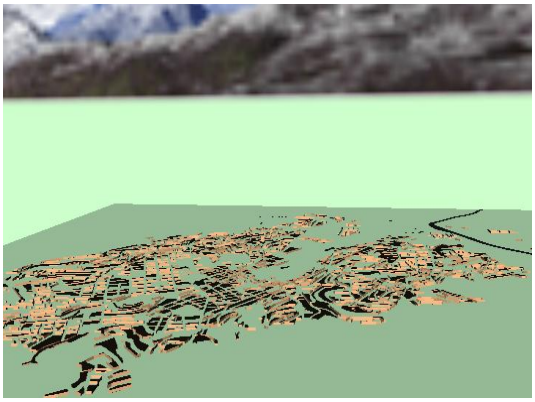
due east, etc.).

e) Angle of view (AOV): The angle representing the breadth of landscape in the viewer's scene.



When ENVIRONMENT is set to be off, the 3D scene will not used the image as environment to make it more like real world. If you selected VRML and X3D format, you can use the VRML viewer to view the outputted map.





If you choose KML format, and the coordinate system of the map is WGS84, you can view the map in Google Earth.
Open the Google Earth firstly before you send the GetMap3D request, and Google Earth will be deployed when the 3D map has been generated by SUAS. The orange polygons in the following map are the lakes in Bratain.

This function still has problem when rendering the polyline shapes for some data (some data works very fine). Hui is working for that.

5.3 Map Viewers

WMS Demo and WFS Demo only provide the basic features for demonstration. For advanced applications and better user capabilities, you had better use the Map Viewers, such as Open Layers.

WMS Demo	WMS Extension	WFS Demo
GetCapabilities	SUAS Map Client	GetCapabilities
GetMap	Map Viewers	DescribeFeatureType
GetFeatureInfo	2.5D Navigation	GetFeature
DescribeLayer	3D Navigation	GetGmlObject
GetLegendGraphic	GetThematicMap	Transaction
GetStyles		