Geo-referenced Information Systems for Disaster Risk Management (Geo-DRM)

Jointly conducted by

Economic and Social Commission for Asia and the Pacific (ESCAP) and Geo-informatics center (GIC) at the Asian Institute of Technology (AIT), Bangkok

In partnership with the United Nations International Strategy for Disaster Risk Reduction (UNISDR), Asia Pacific Office, Bangkok

Installation and User Manual

UNITED NATIONS ESCAP
Economic and Social Commission for Asia and the Pacific

GIC GeoInformatics Center
Asian Institute of Technology

Contents

PREFACE

Space technology and GIS applications continue to be underutilized primarily because of the lack of capacity in developing countries in terms of human, scientific, technological, organizational and institutional resources in Asia-Pacific countries, particularly least-developed countries (LDCs), land-locked developing countries (LLDCs) and Small Island developing states (SIDS).

Against this backdrop, the UNESCAP conducted a project entitled "Improving disaster risk preparedness in the Economic and Social Commission for Asia and the Pacific (ESCAP) region", under the United Nations development Account 7th tranche (DA-7). The aim of this project is to strengthen government capacities in the implementation of the Hyogo Framework for Action (HFA), through the establishment and use of geo-reference information systems for disaster risk management (Geo-DRM) in the Asia-Pacific region. Beneficiaries were selected from disaster prone member countries in the region with a special focus on LDCs, LLDCs, SIDS as well as from other disaster-prone countries. Policy and decision makers responsible for disaster management, information, communication and space technology, geographic information systems (GIS), and statistics were identified as the target group. In this context, this project supports the implementation of the five action areas of the HFA, through enhancing technical capacity building of these countries. In addition the project encouraged systematic development, improve analytical skills, and maintenance and sharing of disaster risk management information.

Readily available statistical and geographical information is a life-saving asset at the onset of a natural disaster. Unfortunately in many countries information scattered among various agencies making the integration of information in DRR a challenging task. Also, when such information is most needed, its availability is at its lowest and obstacles towards data collection are at their highest due to destruction, displacements, and possible security concerns. The initial response phase requires rapid decision-making, while supporting information frequently takes up to months to collect.

The current project aims to address this bottleneck through enhancing the national capacity of selected LDCs, LLDCs and SIDS. ESCAP has been promoting the use of online Geo-DRM portal since 2011. A prototype Geo-DRM portal based on existing disaster database for South Asian Association for Regional Cooperation (SAARC) countries has been developed. The portal integrates geospatial data, disaster information and critical socio-economic information; it is a highly effective platform for sharing geospatial and other information products from different organizations to various stakeholders, and a tool in supporting evidence-based decision making for disaster preparedness and rapid analysis/impact assessment. In the advent of a disaster, the

Geo-DRM aims to provide the most reliable information, to the right people, at the right time to enable sound, evidence-based decision making.

During the implementation of the project, extensive hands-on sessions and technical assistant missions were conducted to give the related SAARC member countries a real practical experience in developing the systems. Training manuals were prepared with complete instructions and illustrations to explain about installation, operational, and maintenance procedures. Further, coaching videos were prepared as a quick and easy reference mechanism for the users to get a better picture about the overall process.

This manual serves as self learning guidebook that could be used by any agency in a member state of UNESCAP, in particular the SAARC member countries, in installing a Geo-DRM portal, uploading geographical data, sharing data, customizing the portal, and publishing data. An audio-visual DVD explaining the step-by-step installation is also available, and this manual may be used in conjunction with the DVD to further assist the self-installing process.

Geo-Portal Interface

UNESCAP Geo_DRM Training

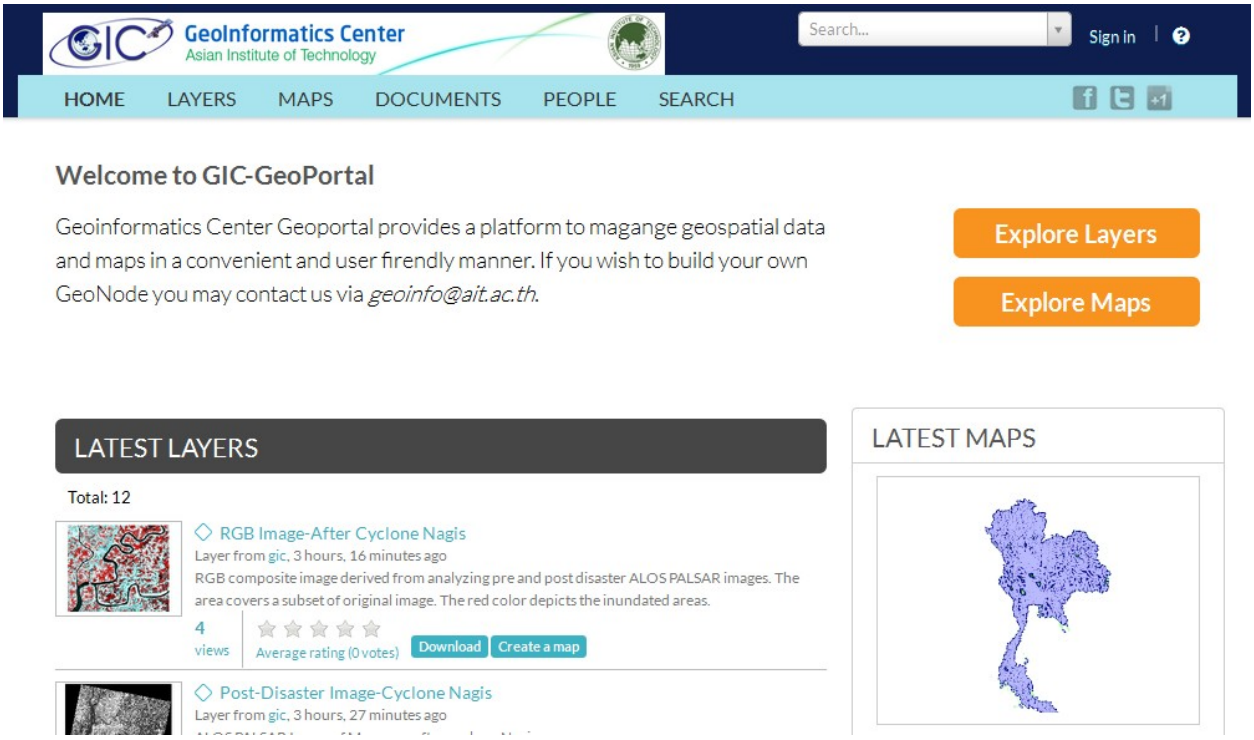
GeoNode Quickstart

GeoNode is a web-based application and platform for developing geospatial information systems (GIS) and for deploying spatial data infrastructures (SDI).

After this exercise you will learn the following:

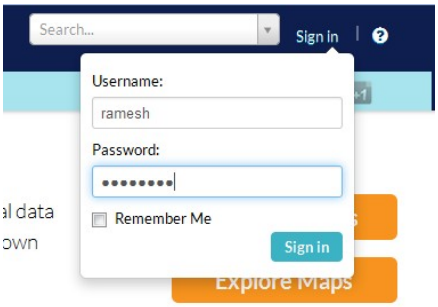
1. to register a new account to get started
2. add a new layer
3. create a map using your new layer

Open a web browser and type http://203.159.29.6/ . You will get the following page.

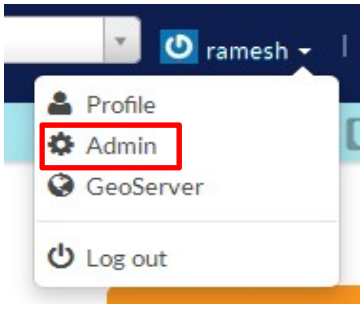


1. Register a new account

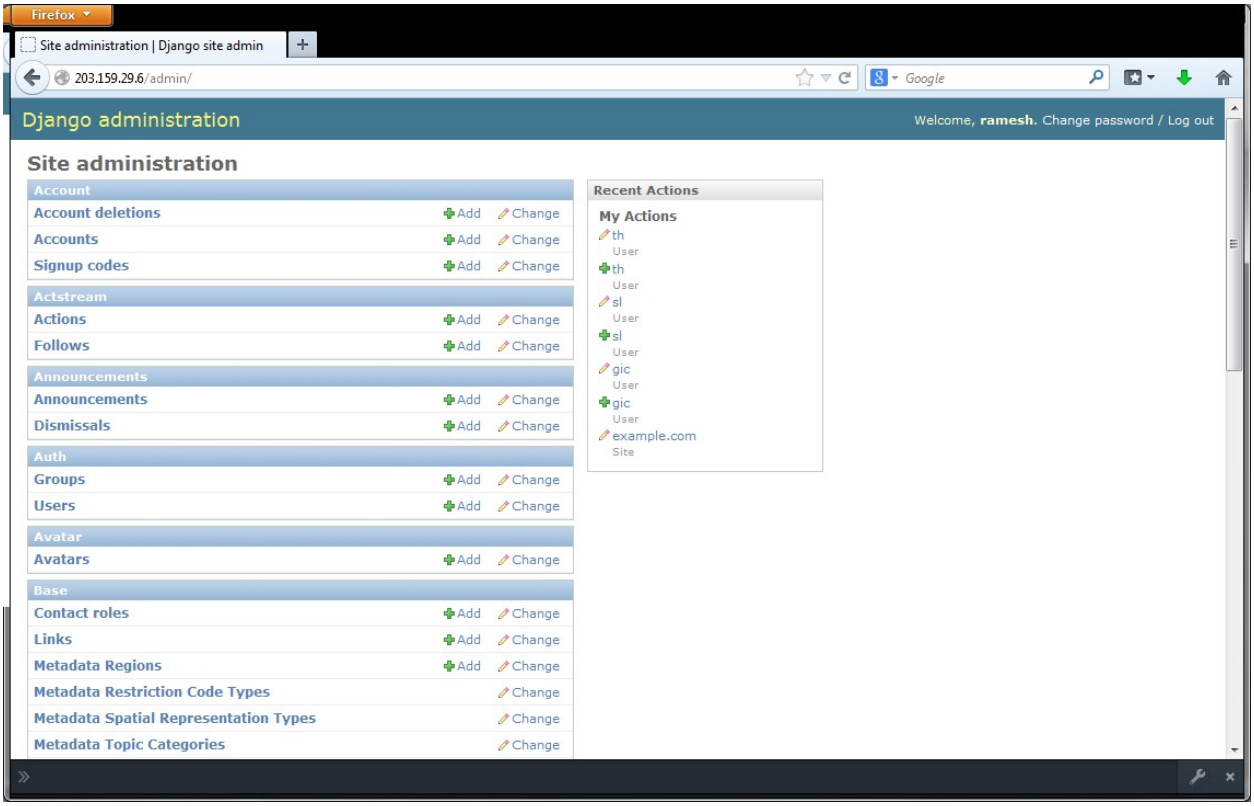
You need to login to the system as the Administrator, in order to create a new user account.



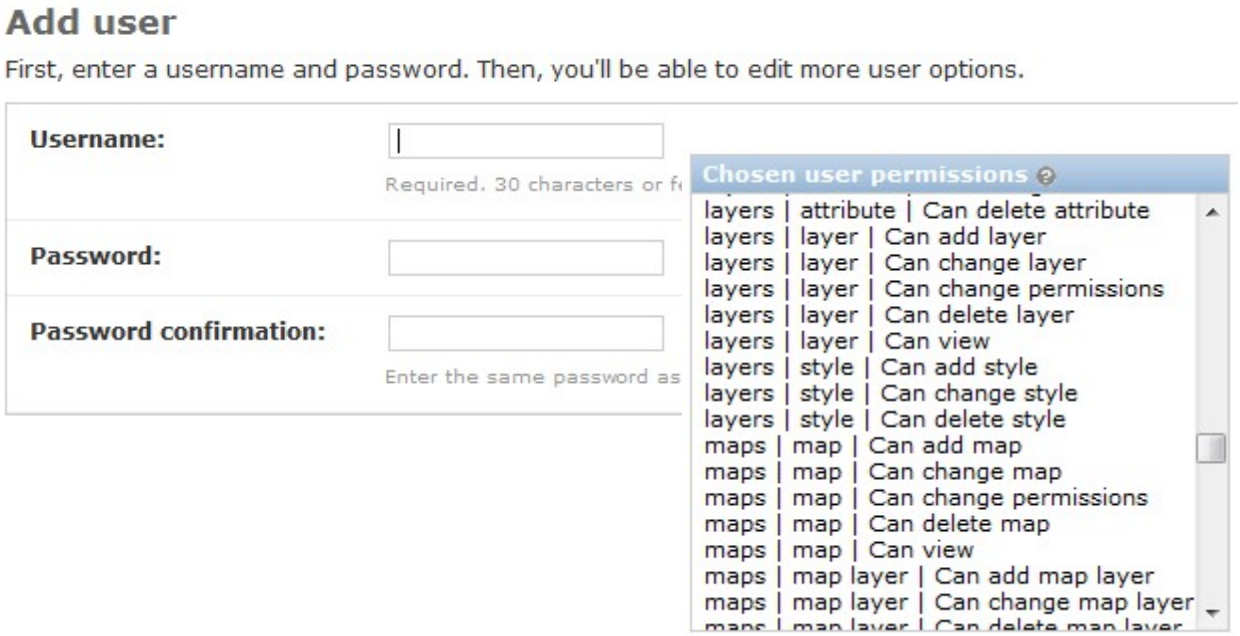
Then go to the Admin Panel.



You will get the access to Admin Panel as shown in the following image.



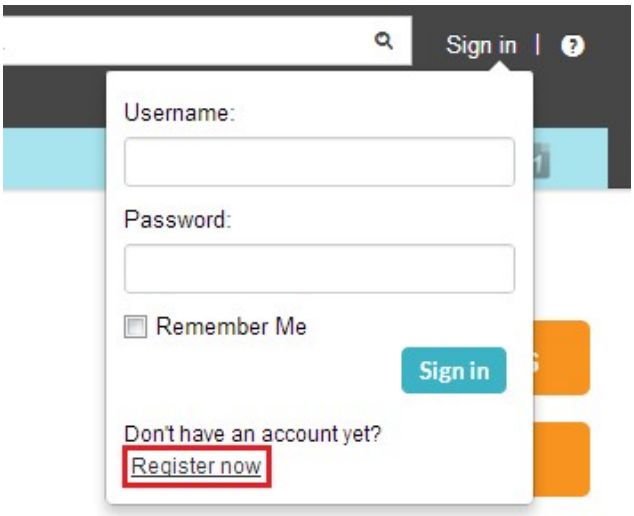
Add a new user and give required permissions.



Now you can use the newly created User Account to login to the system.

Optional: User Registration Process

You can optionally configure GeoNode to allow new users to register through the web. New registrants will be sent an email inviting them to activate their account. Once the system is configured accordingly, the users can register themselves through the login interface.

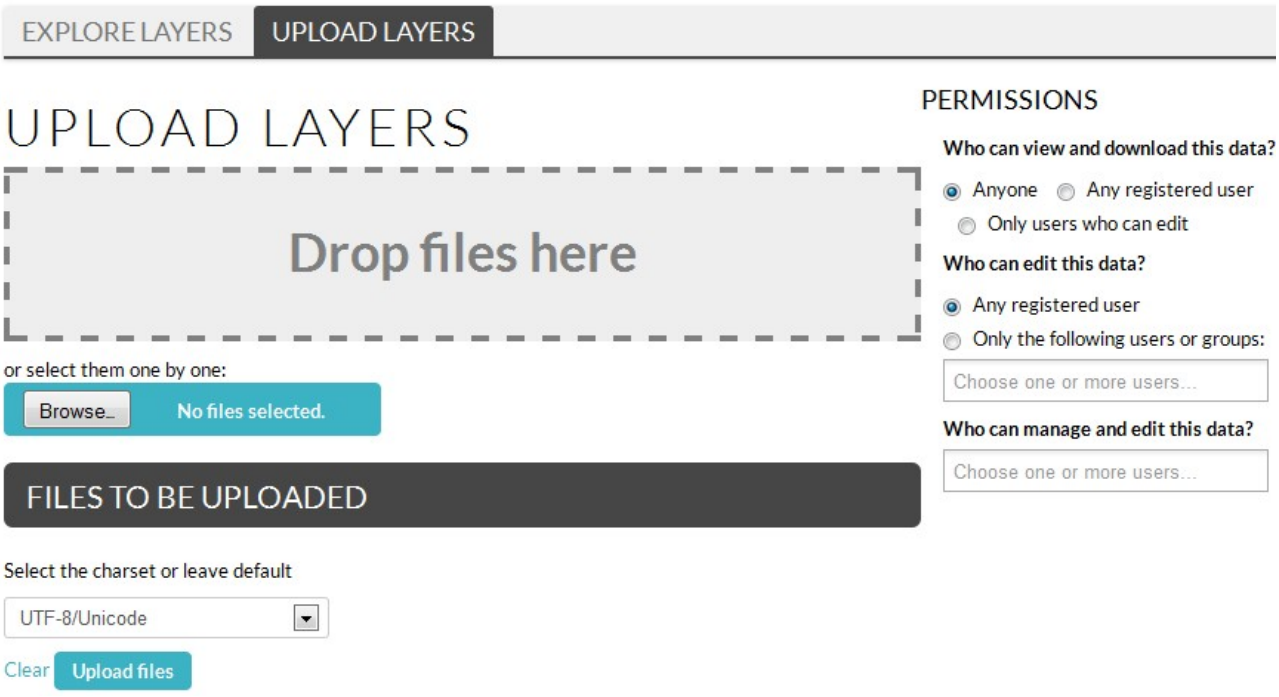


2. Add a new layer

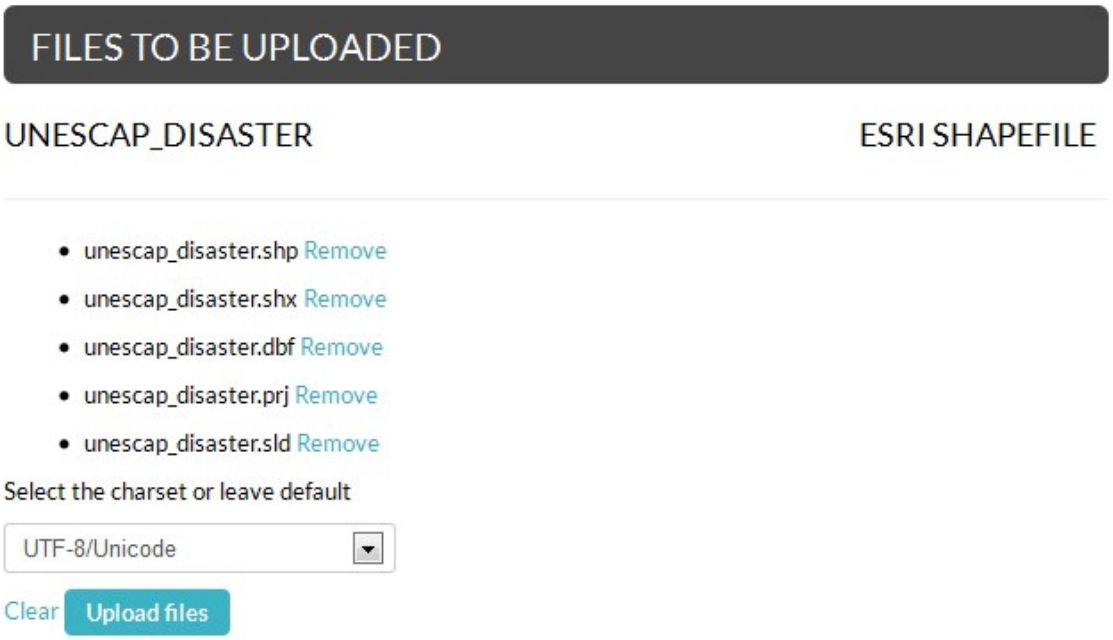
Once you logged in to the system, you can add layers to your account. Layers are a published resource representing a raster or vector spatial data source. Layers also can be associated with metadata, ratings, and comments.

1. To add a layer to your account, navigate to the welcome page. There the following toolbar can be seen:

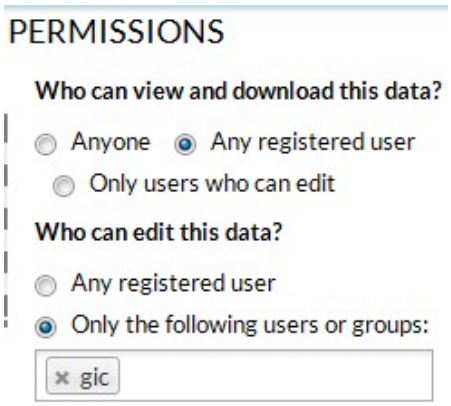
2. By clicking the *Layers* link you will be brought to the *Layers* menu where a new sub-toolbar can be seen. This toolbar allows you to *Explore* and *Upload* layers.
3. Now click *Upload Layers* and you'll see the upload form.



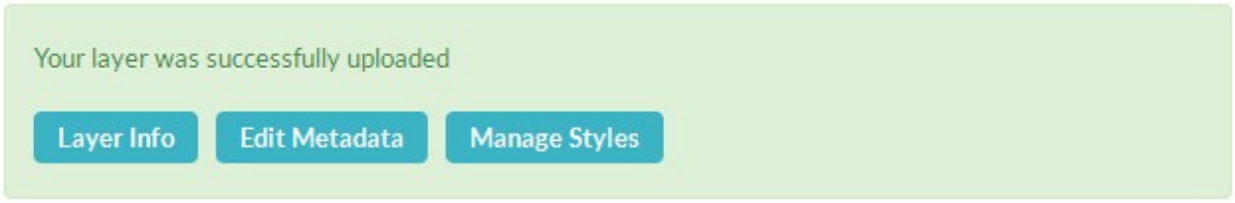
4. You have two possibilities to add your files. You can either do that by using *drag & drop* or you choose to *browse* them. Be aware that you have to upload a complete set of files, consisting of a *shp*, a *prj*, a *dbf* and a *shx* file. If one of them is missing, GeoNode will warn you before you upload them.
5. You should now be able to see all the files you want to upload.



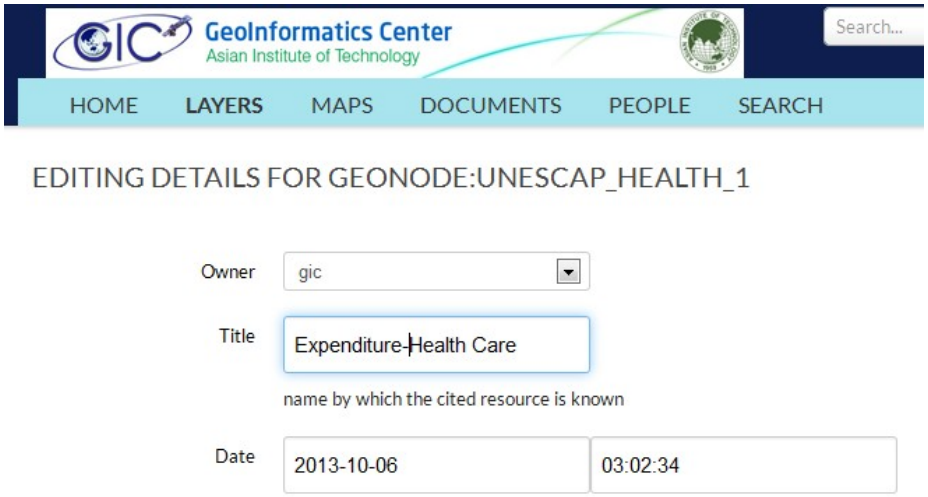
6. GeoNode has the ability to restrict who can view, edit, and manage layers. On the right side of the page you can see the *Permission* section, where you can limit the access on your layer. For an example, by selecting "*Any registered user",* from *"Who can view and download this data";* you will ensure that anonymous view access is disabled. Similarly, by selecting your username, in "*Who can edit this data"; you* will ensure that only you are able to edit the data in the layer.



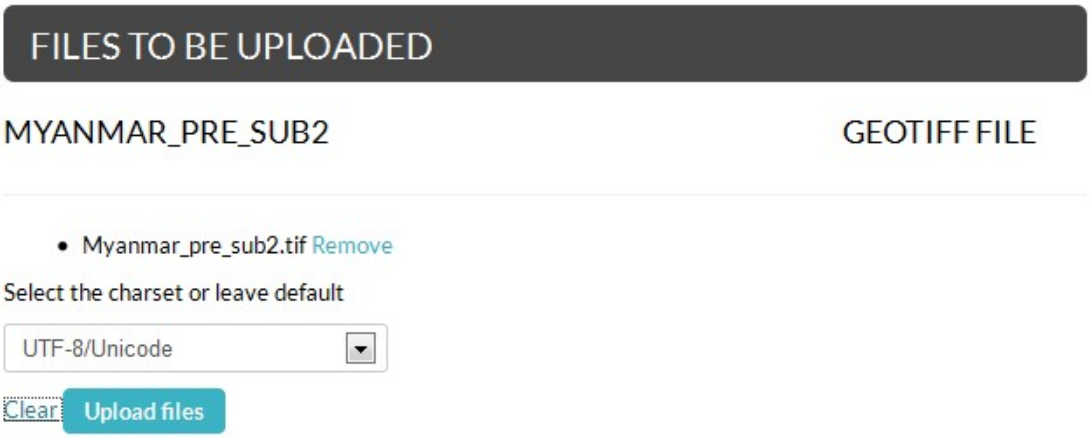
7. To upload data, click the Upload button at the bottom.
8. One you upload a data set, you would get the following options.



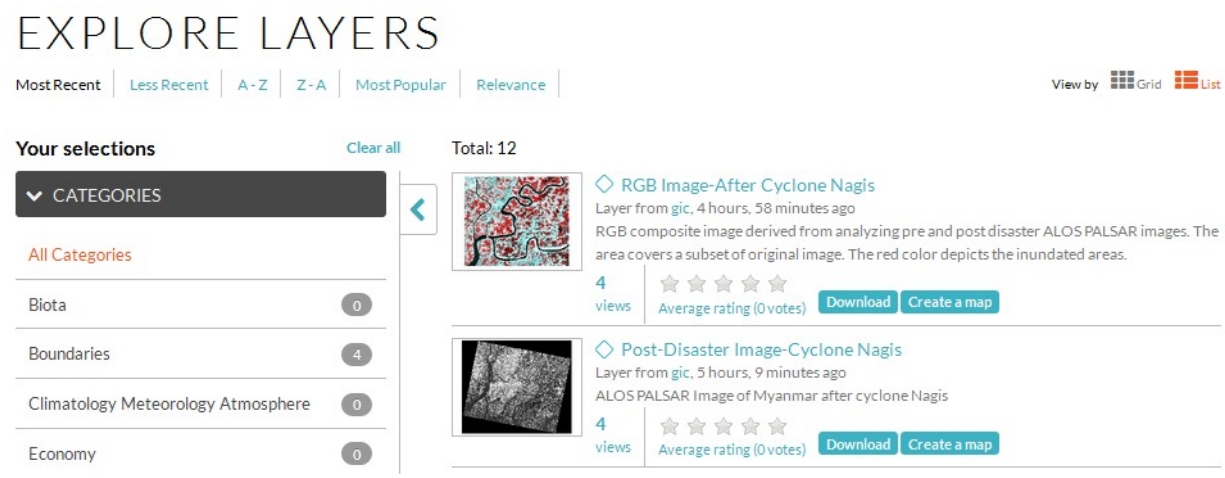
9. It is recommended to enter relevant Meta Data as much as possible by clicking on the “Edit Metadata” option.



10. Similarly you can upload GeoTIFF files to the Geo-Portal as show in the following image.



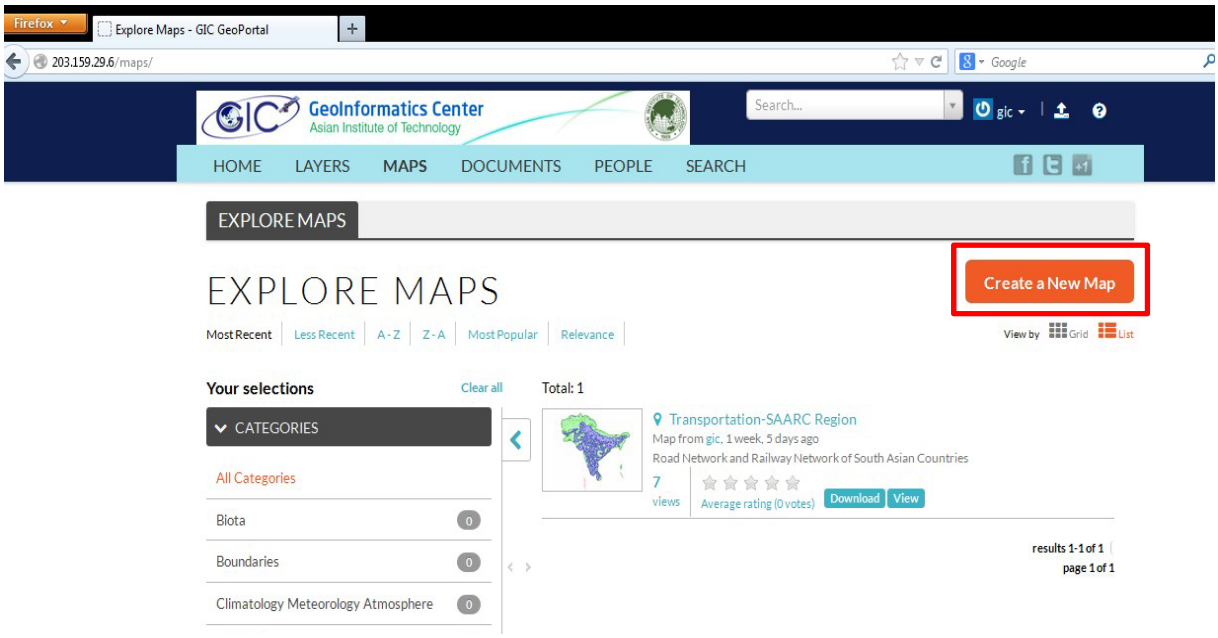
11. You can find all uploaded layer in “Explore Layers” section.



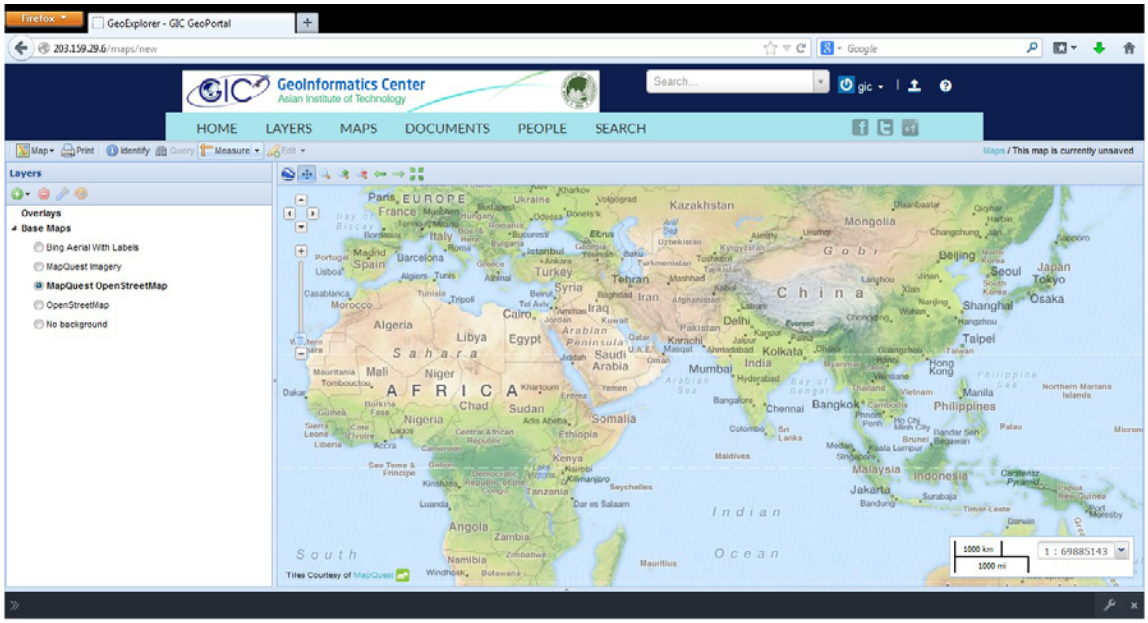
3. Create a new map

The next step for you is to create a map and add the newly created layers to this map.

1. Click the *Maps* link on the top toolbar. This will bring up the list of maps.

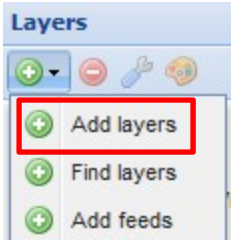


2. To add new map; click the *"Create a New Map"* button and a map composition interface will display as follows.

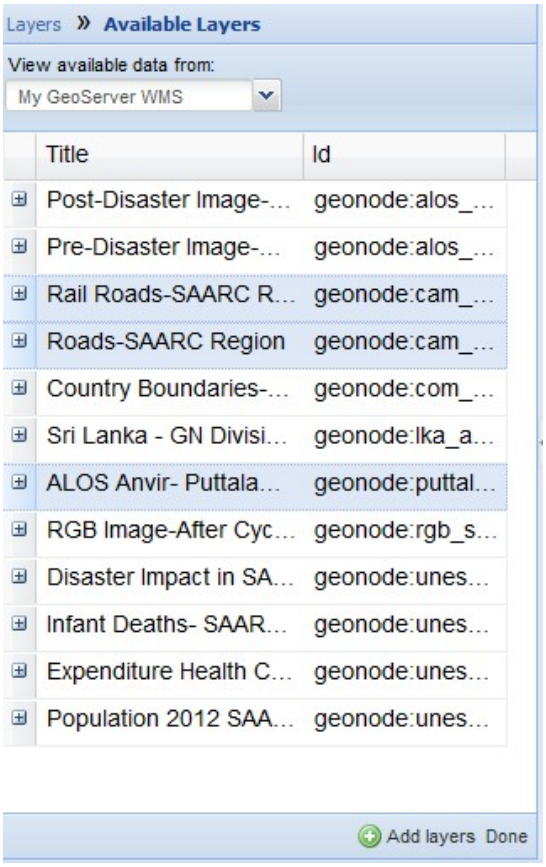


In this interface there is a toolbar, layer list, and map window. The map window contains the MapQuest OpenStreetMap layer by default. Further, there are other base layers such as Bing Aerial Map, MapQuest and OpenStreetMap available.

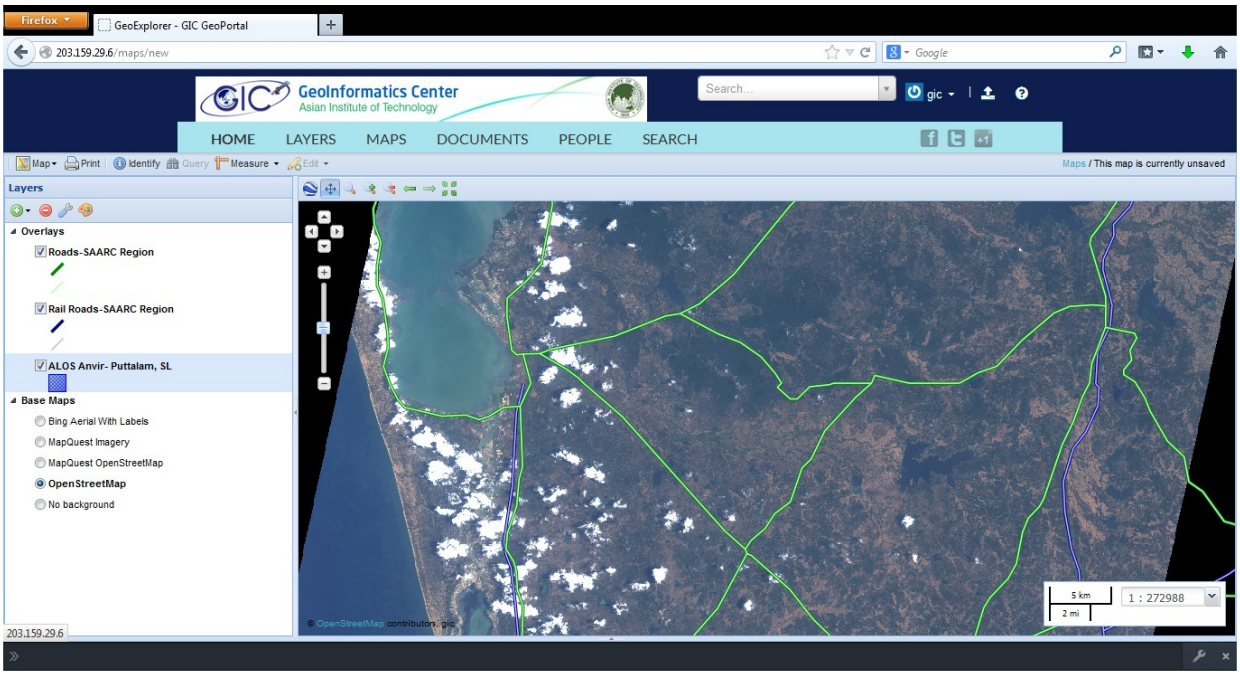
3. Click on the *New Layers* button and select *Add Layers*.



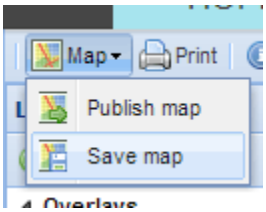
4. Now you should be able to see all the available layers.
5. Select the layers you want to show on the map. Click *Add Layers* to add them all to the map. You may select multiple layers by pressing the CTRL key while selecting layers. Once you have added all the layers, press "Done".



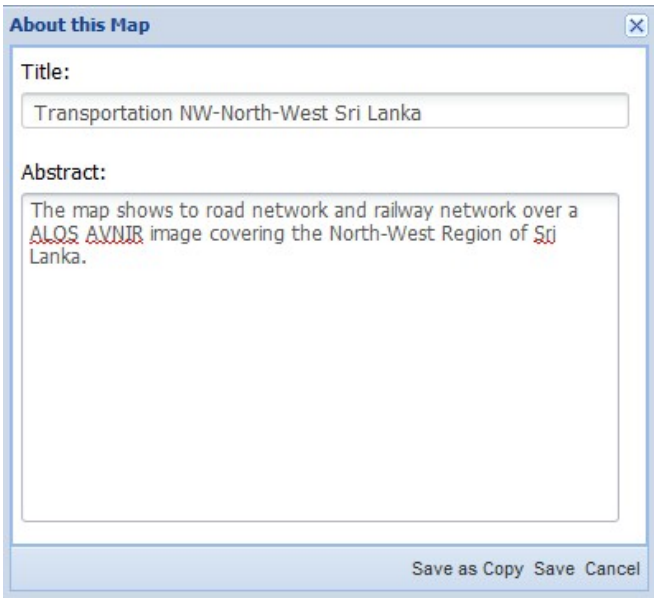
6. The selected layers are now shown on the map as follows.



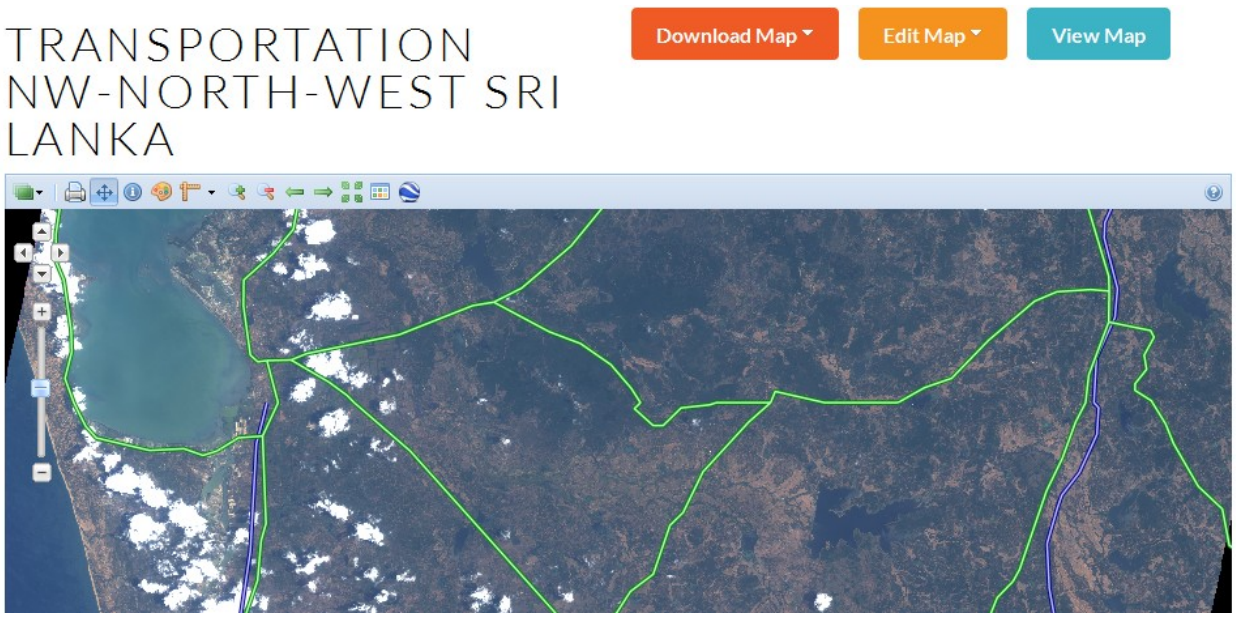
7. To save the map click on the Map button in the toolbar, and select Save Map.



8. Enter a title and abstract for your map.



9. Click Save. You can find the newly created map under Maps.



Ubuntu Installation Guide

UNESCAP Geo_DRM Training

Recommended Minimum System Requirements

For deployment of GeoNode on a single server, the following are the *bare minimum* system requirements:

- 6GB of RAM, including swap space.
- 2.2GHz processor. (Additional processing power may be required for multiple concurrent styling renderings)
- 1 GB software disk usage.
- Additional disk space for any data hosted with GeoNode and tiles cached with GeoWebCache.
- 64-bit hardware recommended.

Operating System Requirements

Linux

Ubuntu

The easiest way to install using APT, the standard installation management tool for Ubuntu and other Debian-based systems.

CentOS/RHEL and other *nix distros

We recommend you to download the latest release and modify the included `install.sh` and `support/config.sh`. GeoNode has been installed in CentOS/RHEL using this mechanism.

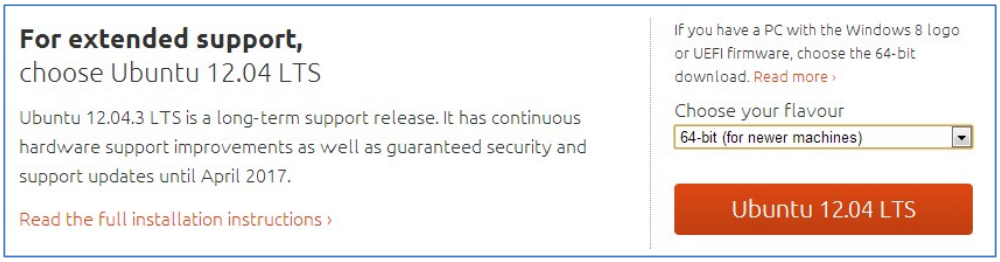
Windows, OSX and others

The recommended install method in these platforms is to use a virtualization solution, like Virtual Box, install the latest Ubuntu Linux and then proceed with the steps mentioned above.

We would proceed with Ubuntu Linux.

Step 1

The first thing you should do is head to http://www.ubuntu.com/download/ubuntu/download and download Ubuntu 12.04LTS LiveCD



Step 2

Using your disc burning software, burn the .iso you downloaded to a CD.

Step 3

Before you go any further, ensure all important data is backed up in case of data loss on your drives. This guide assumes you have media backups of your Windows partitioned hard drive and you are safe to proceed.

Step 4

Ensure you have a network cable connected, restart your computer, and boot from the CD drive.

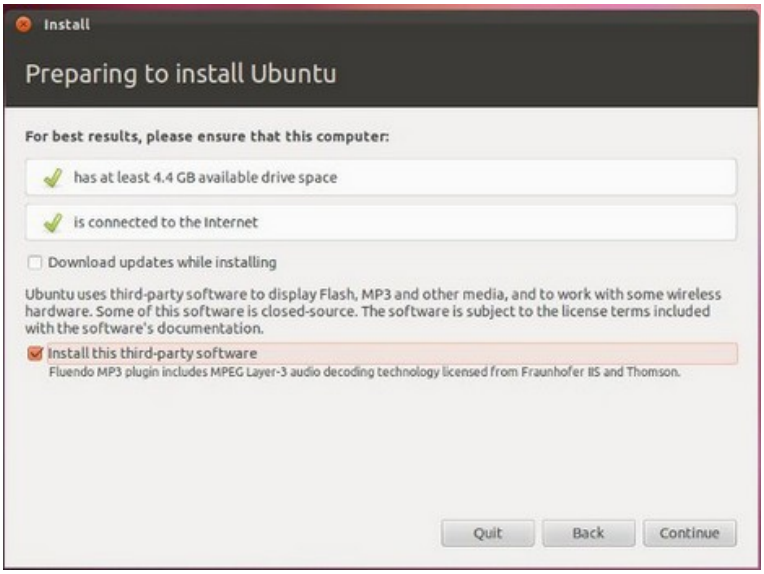
Step 5

The LiveCD will load up, and you'll be presented by the following box:

Click "Install Ubuntu".

Step 6

You will get the "Preparing to install Ubuntu" screen, as below:

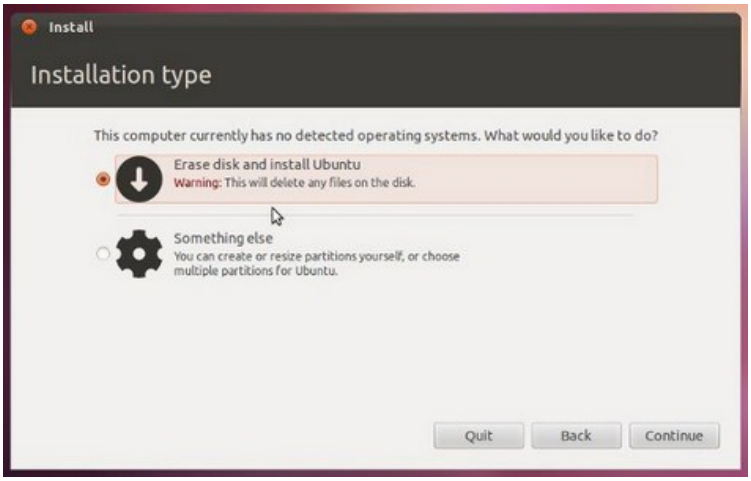


Step 7

The next screen you will see is "installation type," what you see will be dependent on whether you have an existing Windows installation or not.
I have divided this into three different sub-steps, to address three different scenarios.

Step 7-A

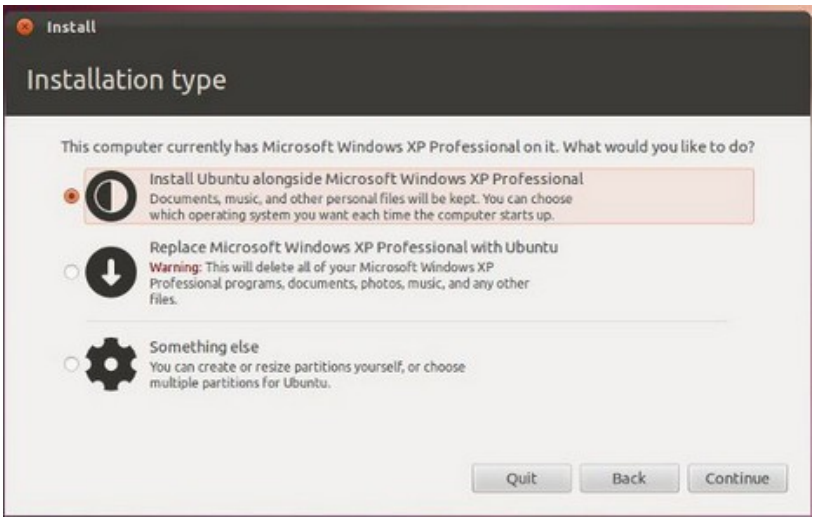
For those installing in a virtual machine or to hard disks without an OS you will see the following screen:



You have two choices:
1. Erase the entire disk and use all of it for installation -- Ubuntu will automatically partition your disk and proceed with installation.
2. Select "something else" and manually create your partitions (which is covered in detail in step 7-C).

Step 7-B

Those of you that have current Windows installations or are going to dual-boot with another existing OS will be presented with a screen similar to below:

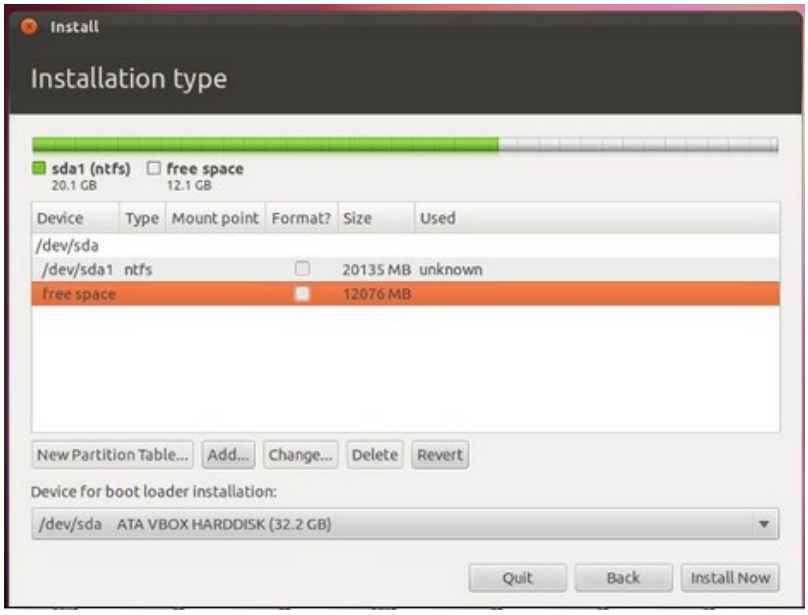


You have three options available:

1. You can choose the first option and install Ubuntu alongside your existing OS.
2. You can opt to replace your Windows installation with Ubuntu, allowing the installer to format your current partitions and automatically create new ones for Linux.
3. You can choose "something else" and create your own partition scheme and sizing (covered in detail in step 7-C).

Step 7-C

Having selected the "something else" option you will be presented with the following window somewhat like below:



Linux recognizes and assigns IDs to drive in a different manner to Windows. In the above image, you can clearly see the hard disk in the list. It is identified by "/dev/sda." Linux recognizes drives in the following way:

- Sda = 1st drive
- Sdb = 2nd drive
- Sdc = 3rd drive and so on

Partitions are also shown after the drive letters. So if there are 2 partitions on the first disk, they would be identified as:

- Sda1 – 1st drive, 1st partition
- Sda2 – 1st drive, 2nd partition

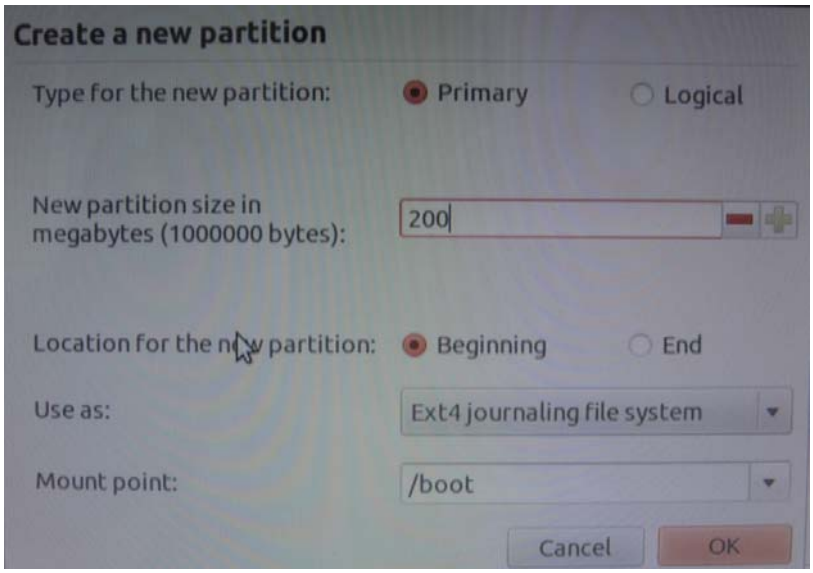
Firstly, identify your Windows installation. In this case, it's sda1 (which is the first hard disk, first partition).

Step 8

Now we need to create a minimum of three partitions:

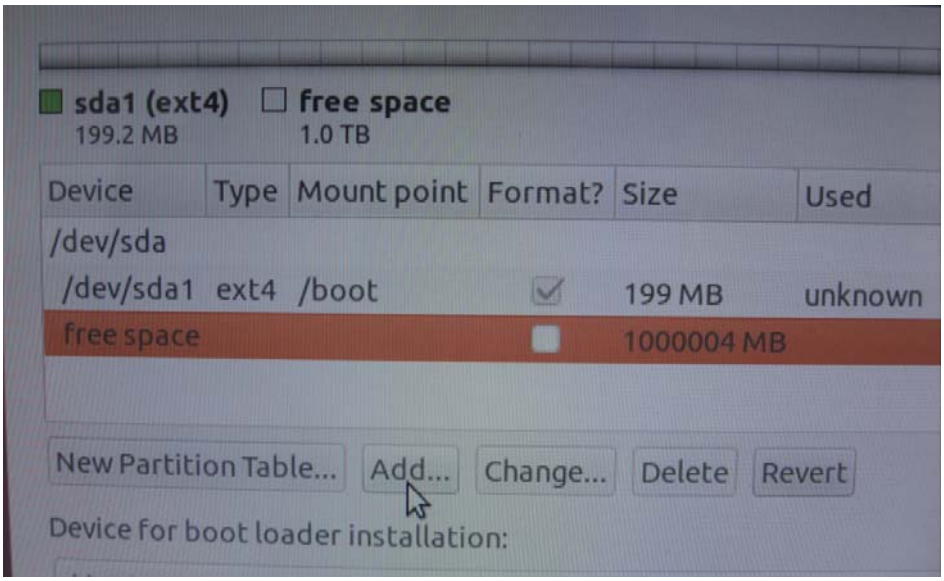
Select the free space and Click "Add". The following box will appear:

Creating boot partition



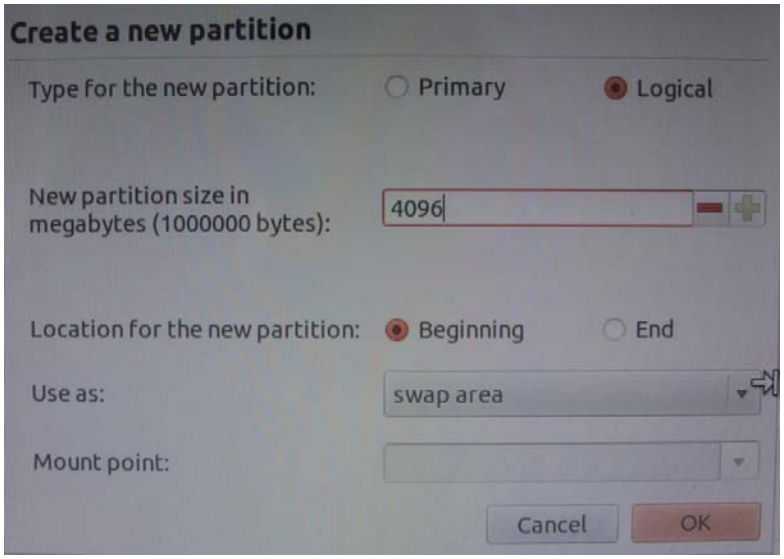
Set partition size to 200 MB, file system to Ext4 and Mount Point to /boot.

Click OK once you have finished setting the partition information and you will return to your partition screen, now showing the boot partition you just created.



Creating SWAP partition

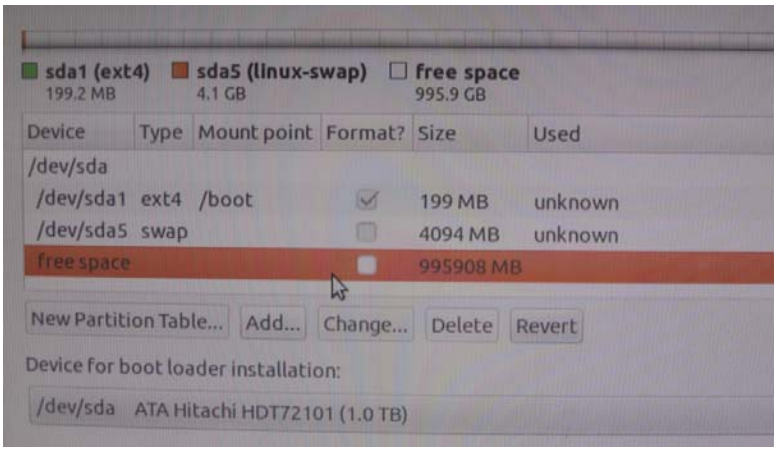
Select the free space and Click "Add".



Set partition size to 4096 MB (i.e. 2GB) and use as option to swap area.

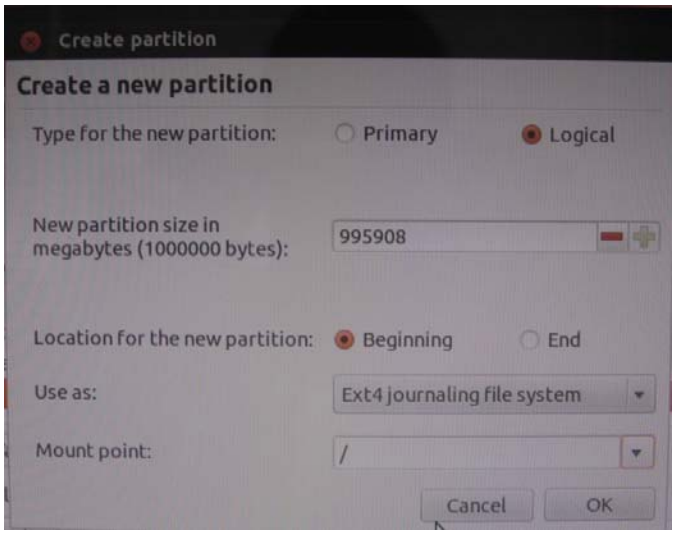
The size of the SWAP partition needs to be set at least the size of your available RAM. If you have enough of hard disk capacity it is recommended to use double the size. So if you have 2GB of RAM, set it to either 2GB or 4GB.

Click OK once you have finished setting the partition information and you will return to your partition screen, now showing the SWAP partition you just created.



Creating root partition

Select the free space and Click "Add".



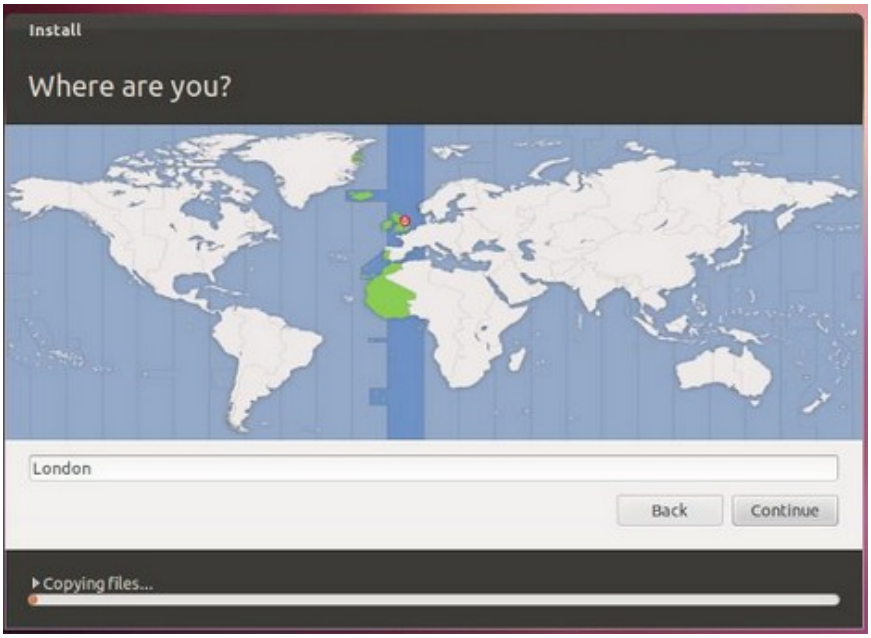
Set partition size to all available free space, file system to Ext4 and Mount Point to “/”.

So in the above example the resulting partition table would have:
/dev/sda1 is your Windows partition.
/dev/sda2 boot partition
/dev/sda3 is your SWAP space
/dev/sda4 is your root partition

Once you are done with the partitioning, click install now and proceed to the next step.

Step 9

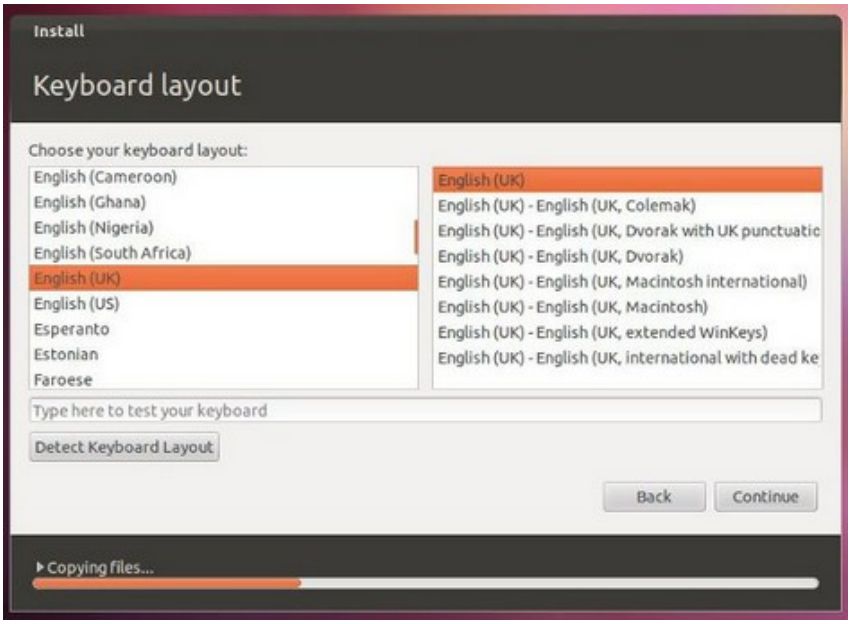
As the installation starts to copy the required files to the hard disk, you will be presented with a screen to select your location.



Just double check it is correct location, and then select continue.

Step 10

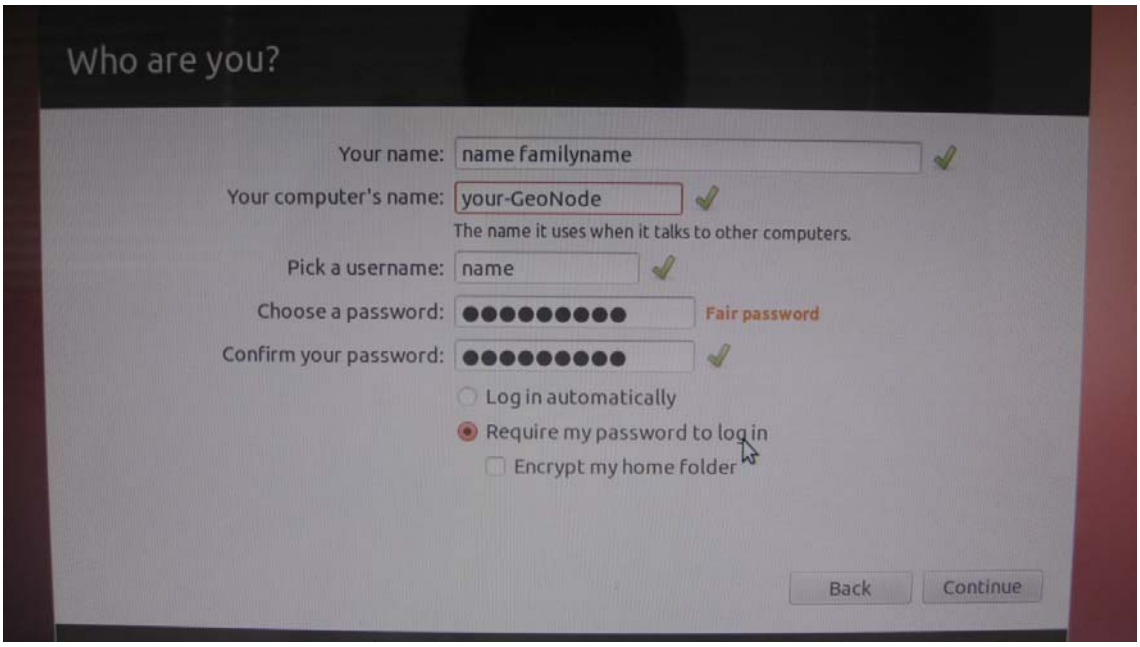
The next screen to appear will be keyboard layout:



Ensure the correct option is selected. Choose English US.

Step 11

You will now be greeted by the "who are you" screen, ready for you to fill out with your user details:



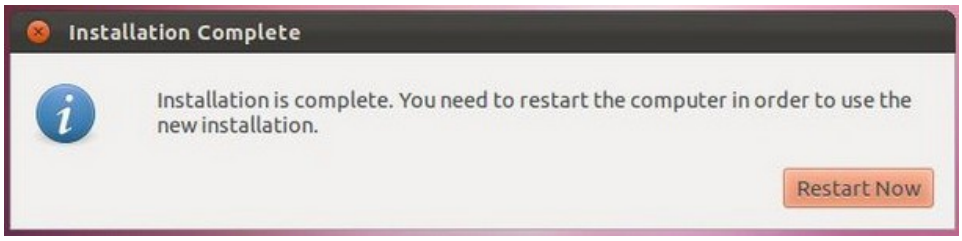
The computers name and username will automatically populate when you type your full name. You can however edit them as you please. Fill in the details and then click continue.

Step 12

The installation information screens will now appear as Ubuntu continues the installation:

Step 13

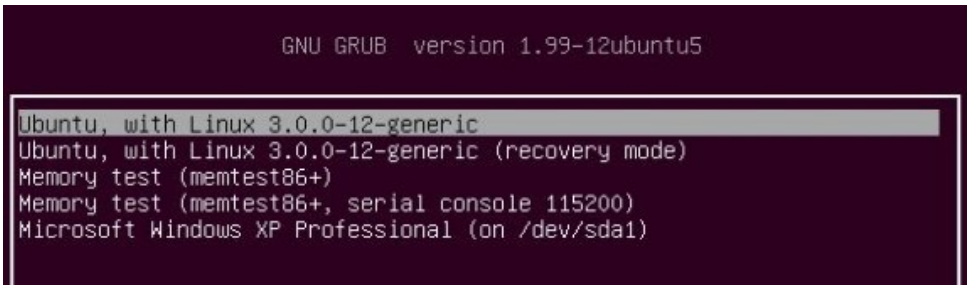
Once the installation has finished, you will be presented with the following box:



Select "restart now" and when requested, remove your installation CD and reboot.

Step 14

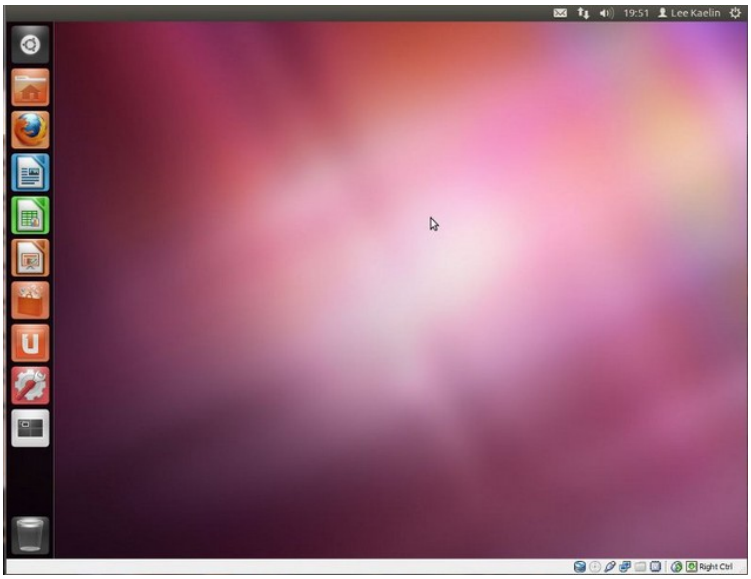
If Ubuntu is the only OS the computer will boot directly into Linux. If you're dual-booting, you will see the GRUB menu appear something similar to below



Select Ubuntu from the list, if it is not the default selection

Step 15

Enter you username and password and login to Ubuntu Desktop environment



Now your machine is ready with working Ubuntu Platform.

Reference

http://www.ubuntu.com/download/desktop

http://docs.geonode.org/en/latest/tutorials/admin/install/quick_install.html

http://www.techspot.com/community/topics/step-by-step-beginners-guide-to-installing-ubuntu-11-10.172128/

GeoNode Setup and Configuration

UNESCAP Geo_DRM Training

Setup and Configure GeoNode

Quick Installation Guide

The following is a quick guide to get GeoNode up and running in your computer.

Recommended Minimum System Requirements

For deployment of GeoNode on a single server, the following are the *bare minimum* system requirements:

- 6GB of RAM, including swap space.
- 2.2GHz processor.
- 1 GB software disk usage.
- Additional disk space for any data hosted with GeoNode and tiles cached with GeoWebCache. A decent baseline size for GeoNode deployments is 100GB.
- 64-bit hardware recommended.

Setup GeoNode

We assume that your computer satisfy the above system requirements and ready with Ubuntu 12.04 OS platform. Follow the following steps to install GeoNode.

- First, make sure you have the `add-apt-repository` binary available

```
sudo apt-get install python-software-properties
```

- Set up the GeoNode PPA repository

```
sudo add-apt-repository ppa:geonode/testing
```

- Install the package. This step will also automatically download all necessary dependencies:

```
sudo apt-get update

sudo apt-get install geonode
```

Configure GeoNode

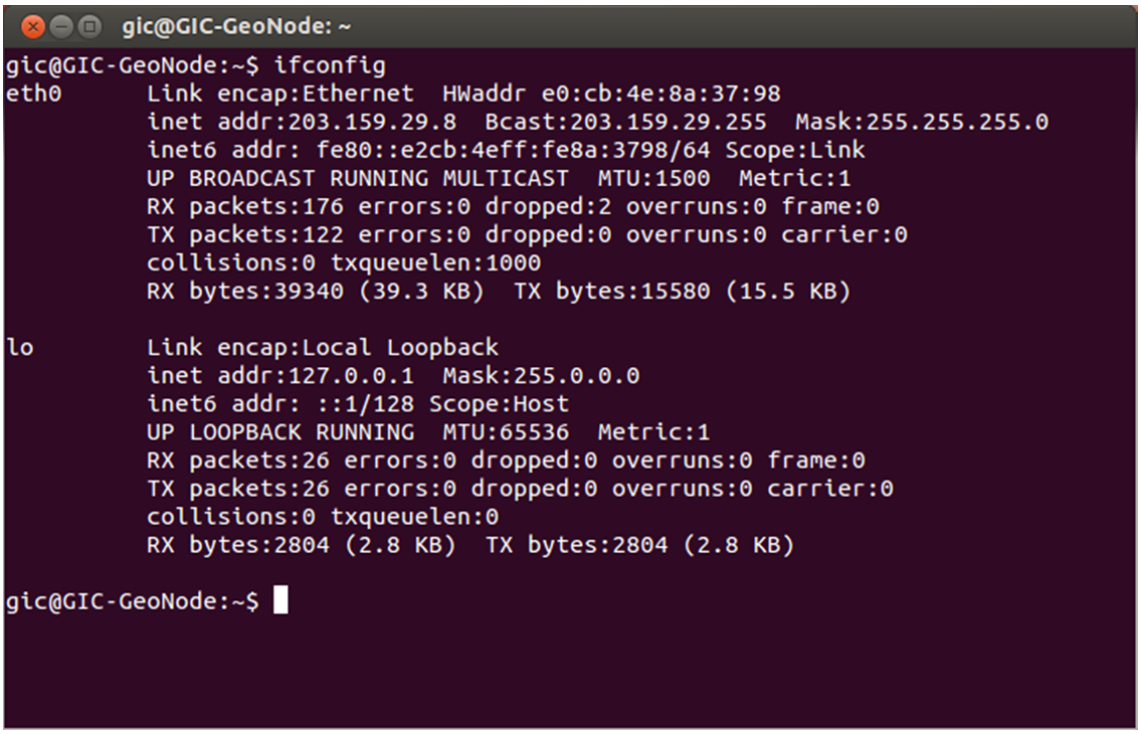
Configuring the IP address

By default GeoNode runs in `http://localhost/`, but when running in production it needs to know the public IP address.

To configure it, edit the `SITEURL` setting in `local_settings.py;` which can be found in your `/etc/geonode/local_settings.py` folder.

Finding your IP address

Open a terminal and type “ifconfig”.



Backup local_settings.py

It is recommended to take a backup of your “`local_settings.py`” before you make any changes.

```
$ cd /etc/geonode/

$ sudo cp local_settings.py local_settings.py.backup
```

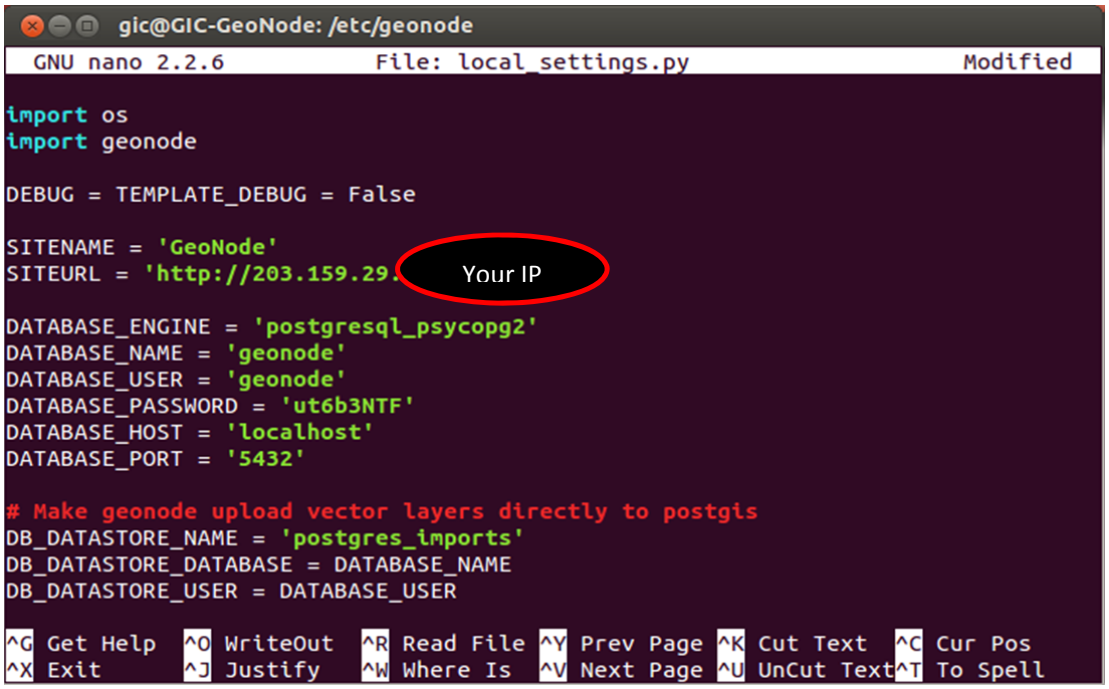
Set your IP address

To set the IP address to be used in your GeoNode Application you can run:

```
$ sudo geonode-updateip <key in your IP-ADDRESS>
```

You can observe the performed change by opening the file "`local_settings.py`".

```
$ sudo nano /etc/geonode/local_settings.py
```



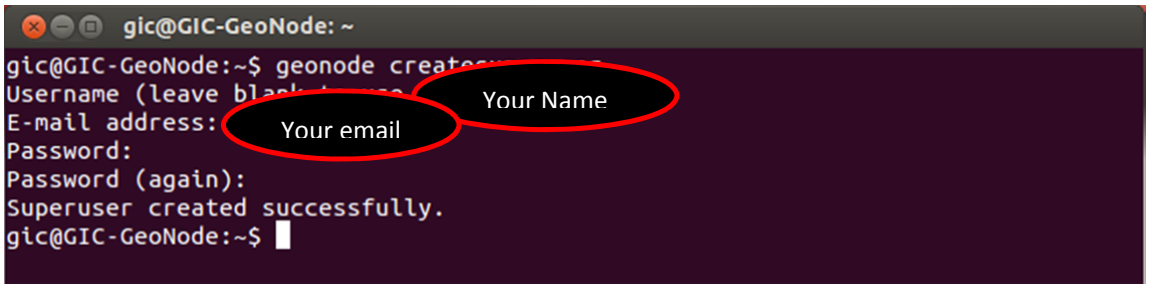
Press Crtl + X to exit from the editor.

Creating a super user

For all the administrative purposes; it is required to create an Admin User Account. To create a superuser you can run the following command:

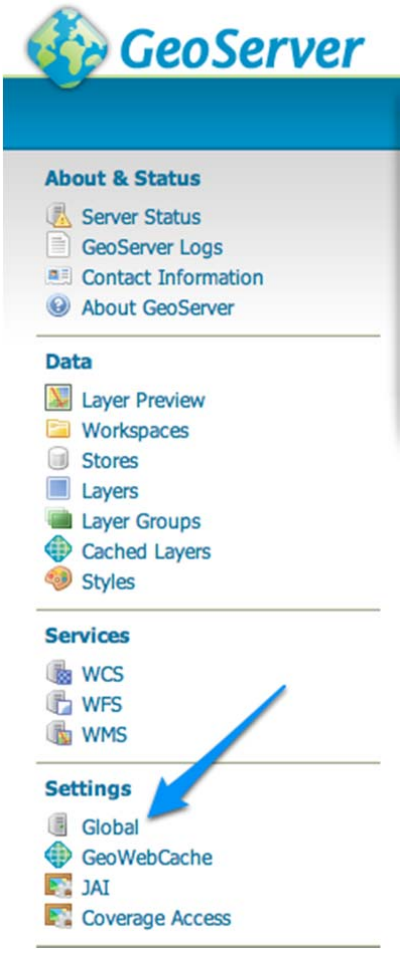
```
$ geonode createsuperuser
```

To make it unique for the training purpose; set the admin username as “admin” and password as “gic”. It is recommended to use a strong password for the admin user when you setup a server for production environment.

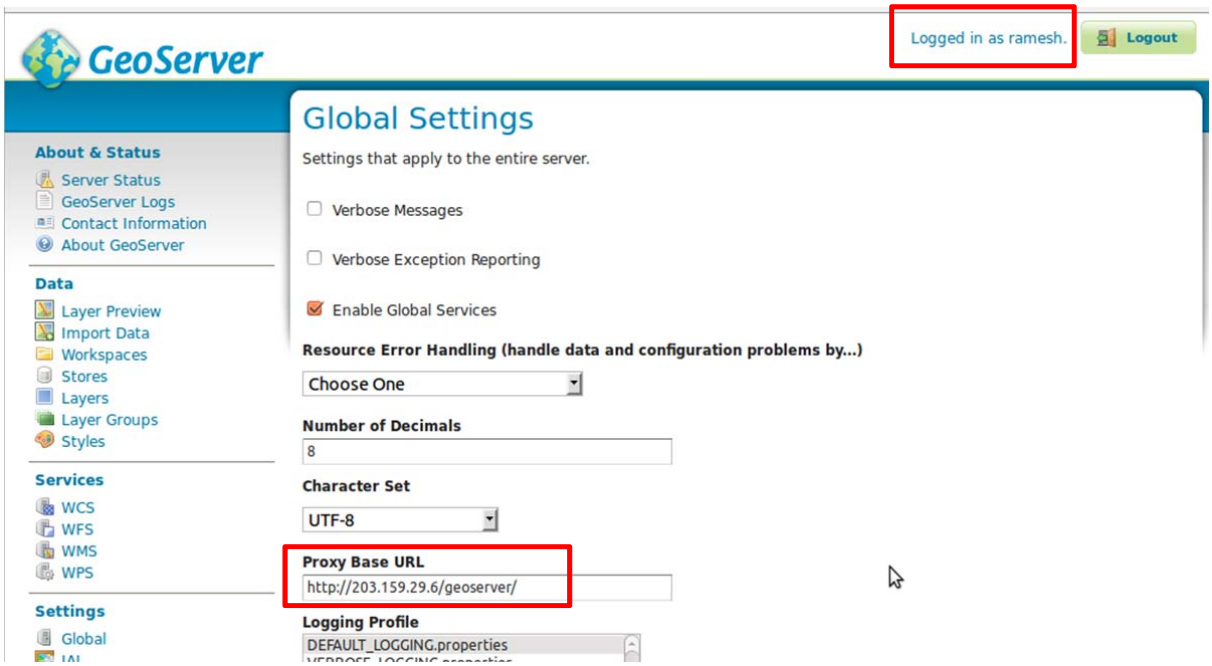


Set the correct GeoServer Proxy URL value

Navigate to `http://localhost/geoserver`, log in and click on the `Global` link in the Settings section. You can use the admin user login credentials you just created.



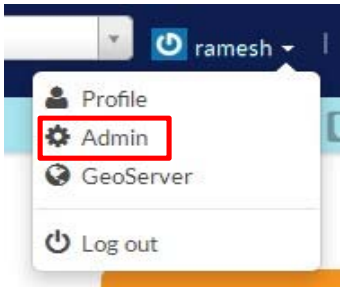
Find the `Proxy Base URL` text field, put the complete address there.



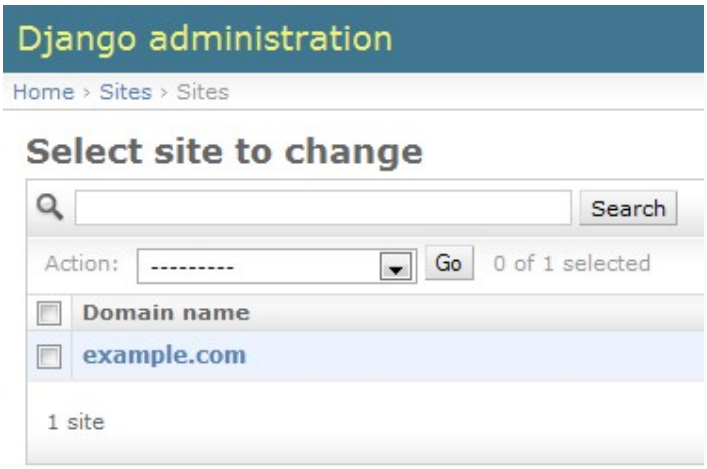
Set the Site Name

Login to the GeoNode using your administrator account. (admin/gic)

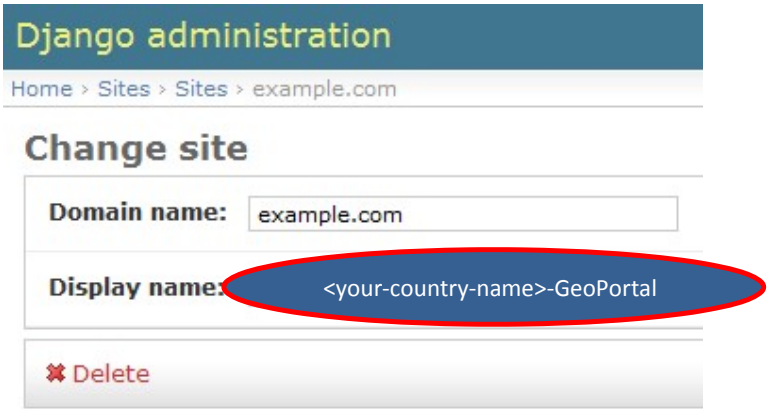
Then go to the Admin Panel.



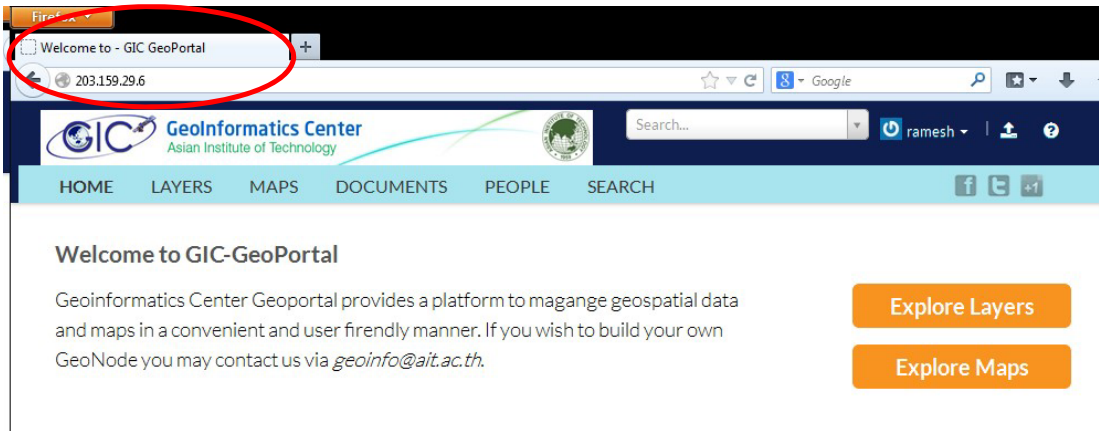
Go to Site Administration



By default there is a site named “example.com”. Click on that site and open the detail view of that site. Change the display name to a something relevant.



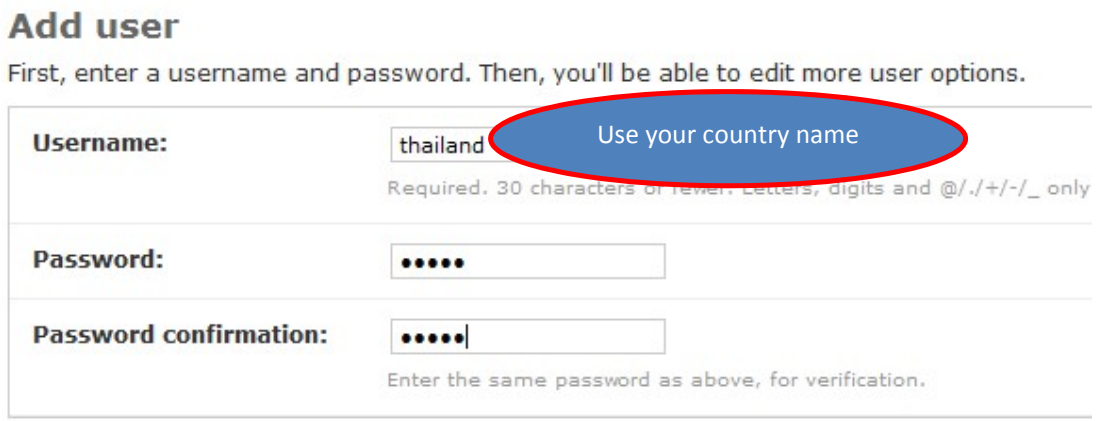
Observe the difference in the title bar of your web browser.



Create a new user account (to upload data)

Now create another user account as explained in previous session.

Admin Panel > Auth Section > Users > Add new user

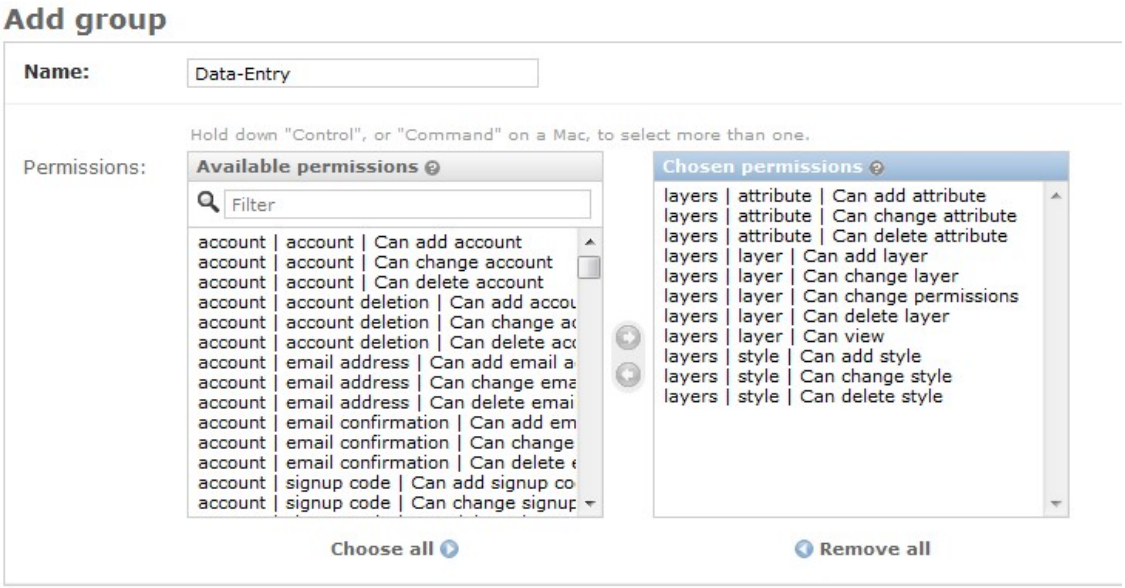


Give all the necessary permissions for the user and save.

You can create any number of users with different privileges depending on your need.

Creating Groups

Optionally you can create a group and assign required permissions for the group; if more than one user needs to be given the same permissions.



Then you can assign users to the group rather than assigning privileges individually.

Now basic GeoNode setup and configuration is done. Now logout from the Admin User and login from the User Account you just created.

Enjoy uploading your data to the newly configured GeoNode!

Security

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Usage of the GeoNode's Django Administration Panel

GeoNode has an administration panel based on the Django admin which can be used to do some database operations. Although most of the operations can be done through the normal GeoNode interface, the admin panel provides a quick overview and management tool over the database.

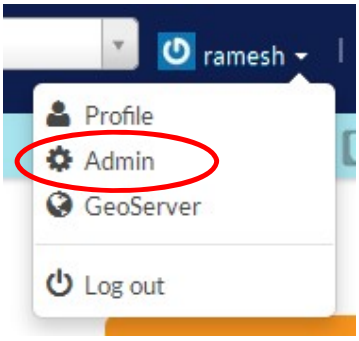
Accessing the admin panel

Only the staff users (including the superusers) can access the admin interface.

Note

User's staff membership can be set by the admin panel itself, see how in the *Manage users and groups through the admin panel* section.

The link to access the admin interface can be found by clicking in the upper right corner on the user name.

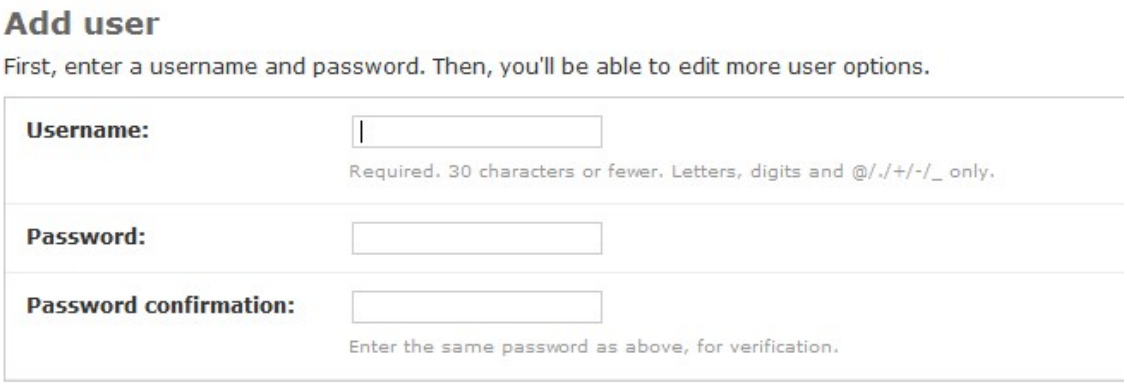


Manage users and groups through the admin panel

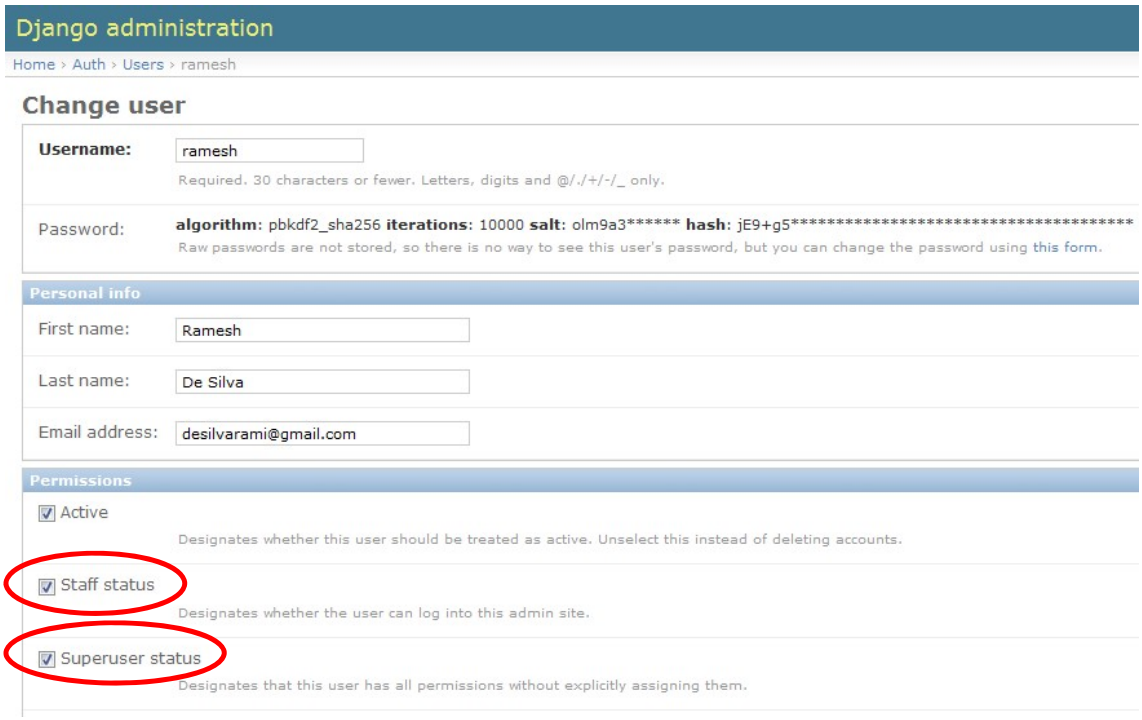
The site administration section "Auth" has two links to access the Users and Groups sections, as follows.

Adding a user

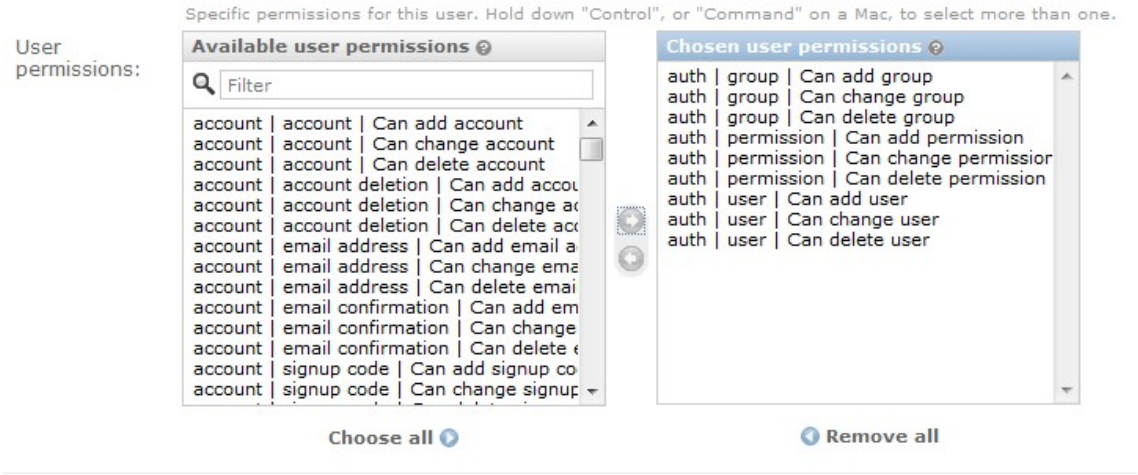
By clicking on the "add" link on the right of the Users link, it is possible to add a new user to the GeoNode site. A simple form asking for username and password will be presented as follows.



Upon clicking “save”; a new form will be presented asking for some personal information and the rights the user should have. For a normal unprivileged user, it is sufficient to just fill the personal information and then confirm with “save”. If the user has to access the admin panel or be a superuser; it’s required to tick the “staff” and “superuser” checkboxes.

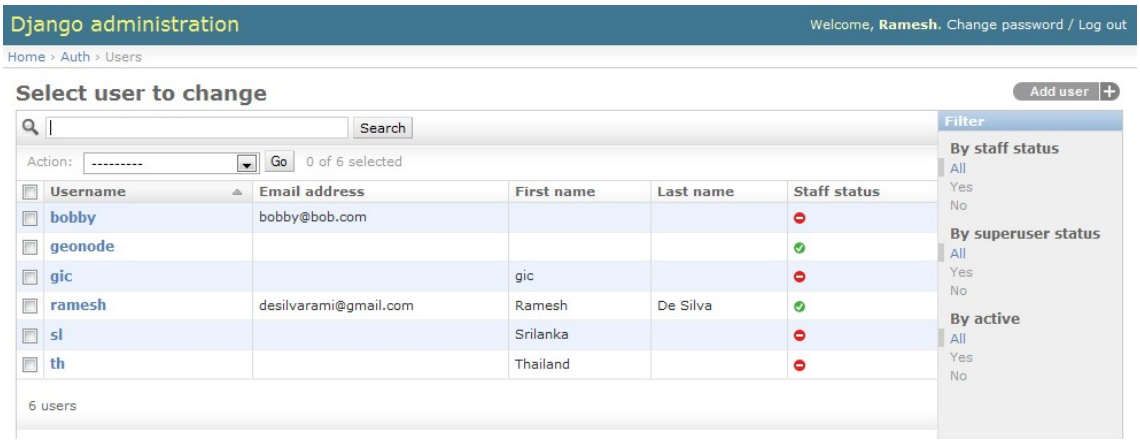


But if you need to provide some specific privileges to a user; you need to explicitly define them.



Changing a user

If you want to modify an existing user; click on “Users” then on a username in the list.



Configuring User Registration (Optional)

By default, the admin user could create new users or grant privileges to an existing user to create new users. If you need to allow the users, themselves to register with your GeoNode; you need to enable some setting as described below. In the scope of this workshop; this is not required.

To allow new user registration:

1. Set up the email backend for Django and add the appropriate settings to /etc/geonode/local_settings.py

For example: Assume you are going to use gmail SMTP server

```
EMAIL_BACKEND = 'django.core.mail.backends.smtp.EmailBackend'

EMAIL_HOST = 'smtp.gmail.com'

EMAIL_HOST_USER = 'yourgmail@gmail.com'

EMAIL_HOST_PASSWORD = 'your-gmail-pw'

EMAIL_PORT = 587

EMAIL_USE_TLS = True
```

2. One week activation window:

Edit /usr/local/lib/python2.7/dist-packages/geonode/settings.py file and set the activation window.

```
ACCOUNT_ACTIVATION_DAYS = 7
```

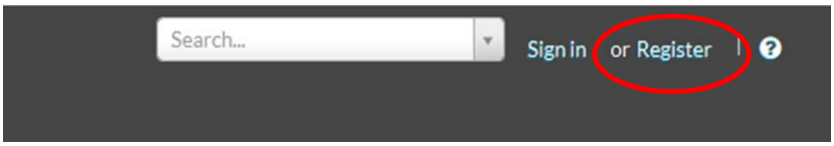
3. In the same settings file set

```
REGISTRATION_OPEN=True
```

4. Restart apache service

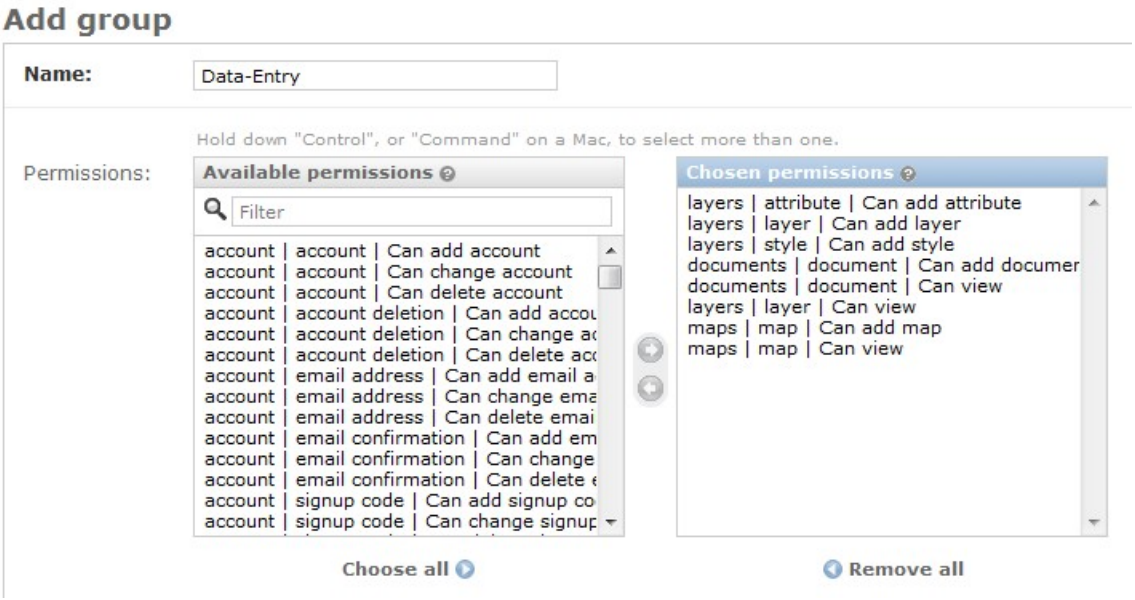
```
$ sudo service apache2 restart
```

Now you should be able to see the “Register” option. New registrants would be sent an email inviting them to activate their account.



Adding a Group

It is possible to create new groups with set of permissions which will be inherited by all the group members. Say, you want to employee some people to just to upload data only. So, you can create login IDs for them but rather than assigning permissions individually; you may create a group and assign all the permissions required to upload data and then assign each data entry user.



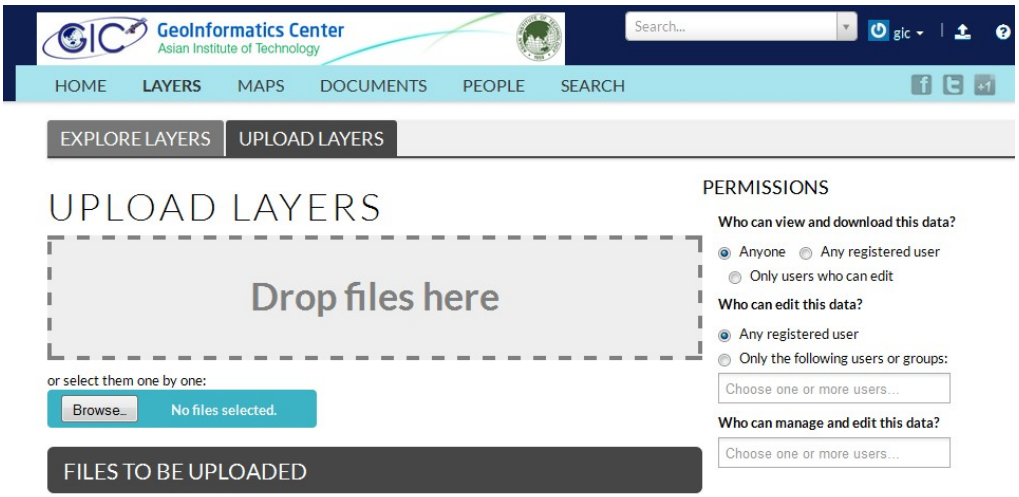
Layer Permissions

Now that we've already created some users, we will take a closer look on the security of layers, how you can protect your data not to be viewed or edited by unwanted users.

Hint

As already mentioned before; it is important to know that a superuser does have unrestricted access to all your uploaded data. That means you cannot ban a superuser from viewing, downloading or editing a layer!

The permissions on a certain layer can already be set when uploading your files. When the upload form appears (*Layers -> Upload Layer*) you will see the permission section on the right side:



As it can be seen here, the access on your layer is split up into three groups:

- view and download data
- edit data
- manage and edit data

The difference between *manage and edit layer* and *edit layer* is that a user assigned to *edit layer* is not able to change the permissions on the layer whereas a user assigned to *manage and edit layer* can change the permissions. You can now choose whether you want your layer to be viewed and downloaded by

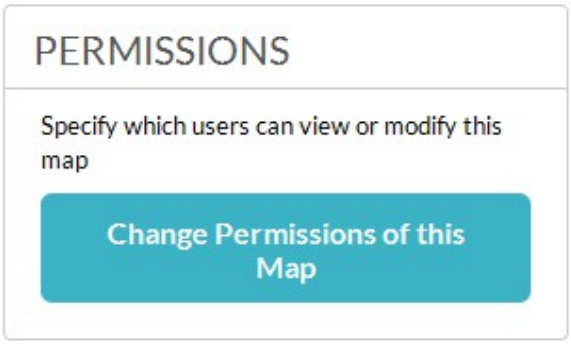
- anyone
- any registered user
- a certain user (or group)

To set the permissions on a layer which is already being added, click on the layer. You will get the layer preview with many options as shown below.

Once you click on the “Edit Permission”, you will get the same permission menu you got during the layer upload process.

Map Permissions

The permissions on maps are basically the same as on layers. Click on any map and scroll down till you see the permission options.



Document Permissions

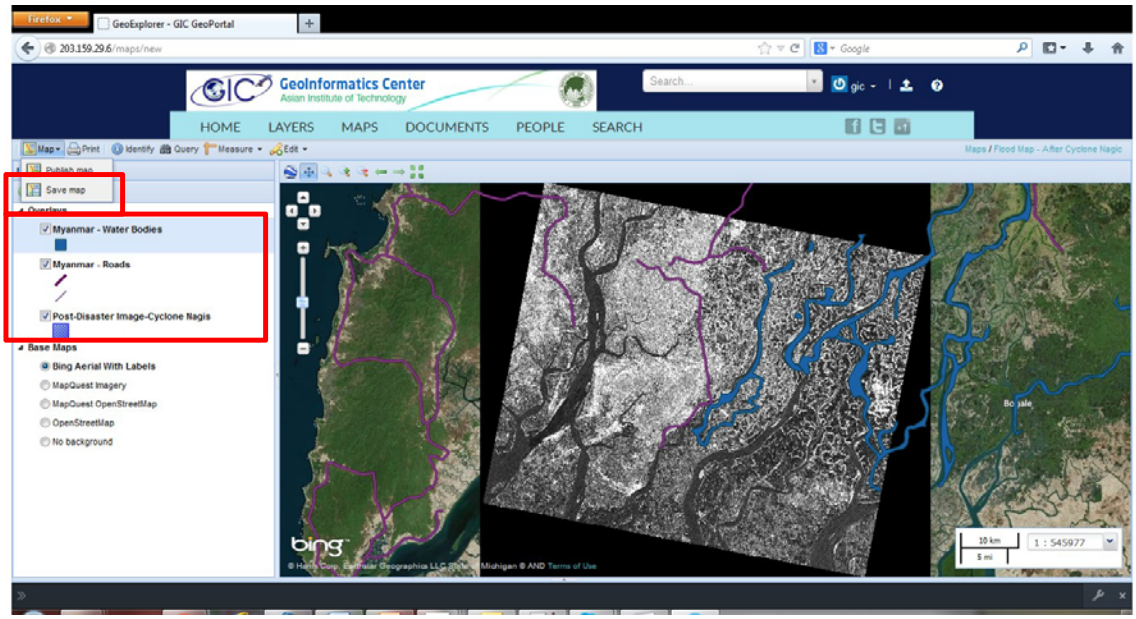
The permissions for documents are also same as the above two cases. You may set the permission while uploading the documents or you may change permissions by editing the document permissions later.

Dealing with Maps

UNESCAP Geo_DRM Training

Creating/Saving a new map

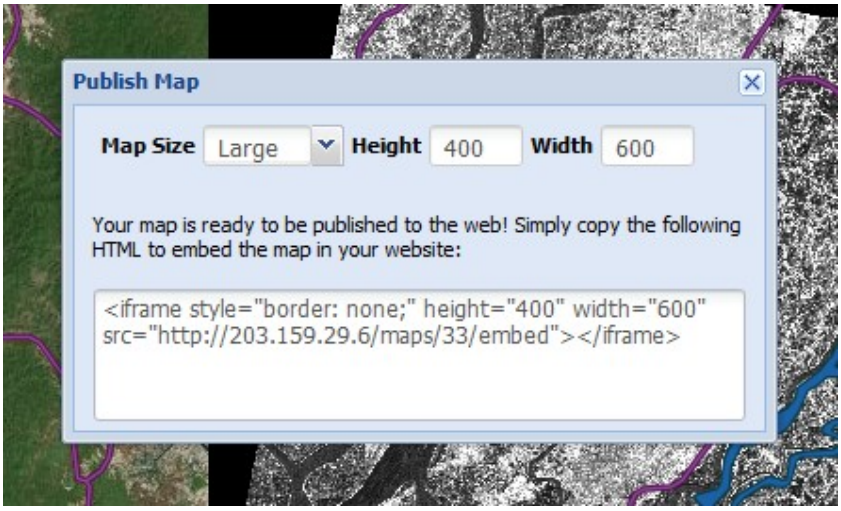
In a previous session we learnt about the process of creating maps using some data layers. In the following figure, you can observe a map with three data layers including two vector layer and a raster layer. Once you organize the layers and finished with the layer styling; you need to save the map at first.



The created maps can be seen in Explore Maps section.

Publishing a new map

Once you saved your map; it is possible to publish it in order to use it in any other web site. By doing this, you can display your map in any web server hosted anywhere in the world. Once you click on “Publish Map” option you would get a URL of the published map as shown in the following image.

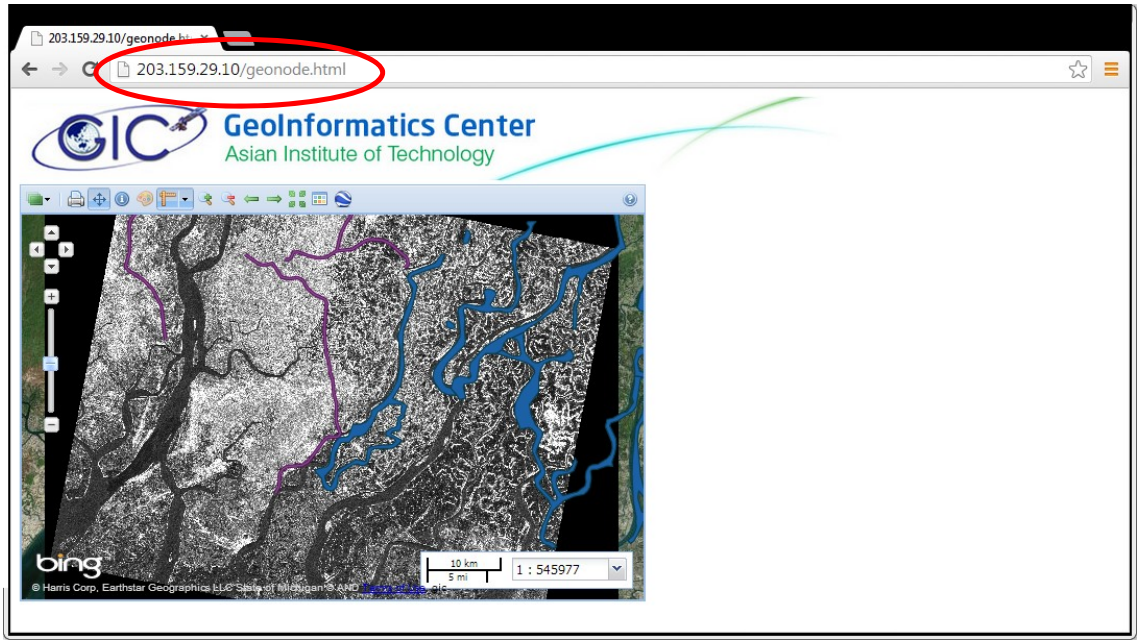


Now you can copy and paste the generated HTML code and place it in any web page.

Please check the following sample HTML code

```
<TABLE width="900" >
<TR>
<img src="logo.jpg" width="900" height="80" align="left"">
</TR>
<TR>
  <iframe style="border: none;" height="400" width="600"
src="http://203.159.29.6/maps/33/embed"></iframe></br>
</TR>
</TABLE>
```

This code is included in a web page call “geonode.html” and it is running in a different server. Check the URL of the following image.

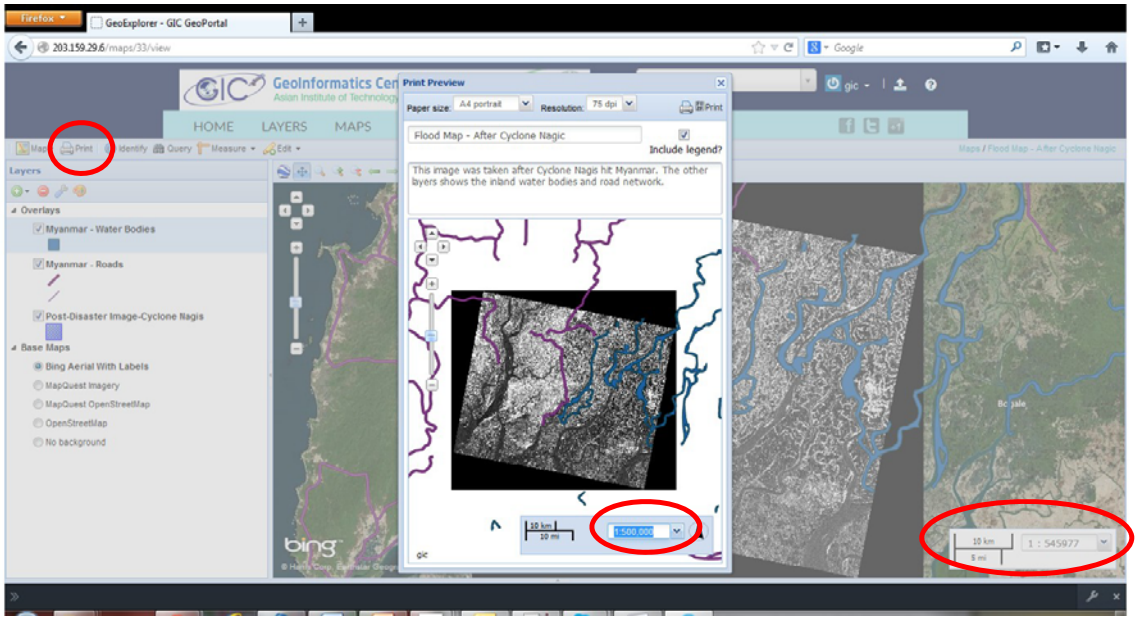


In this way, you can make your map available in any web site running anywhere in the world. Further, if you publish a map in this way; people would only be able to view your map but would not be able to download the data.

Printing Maps

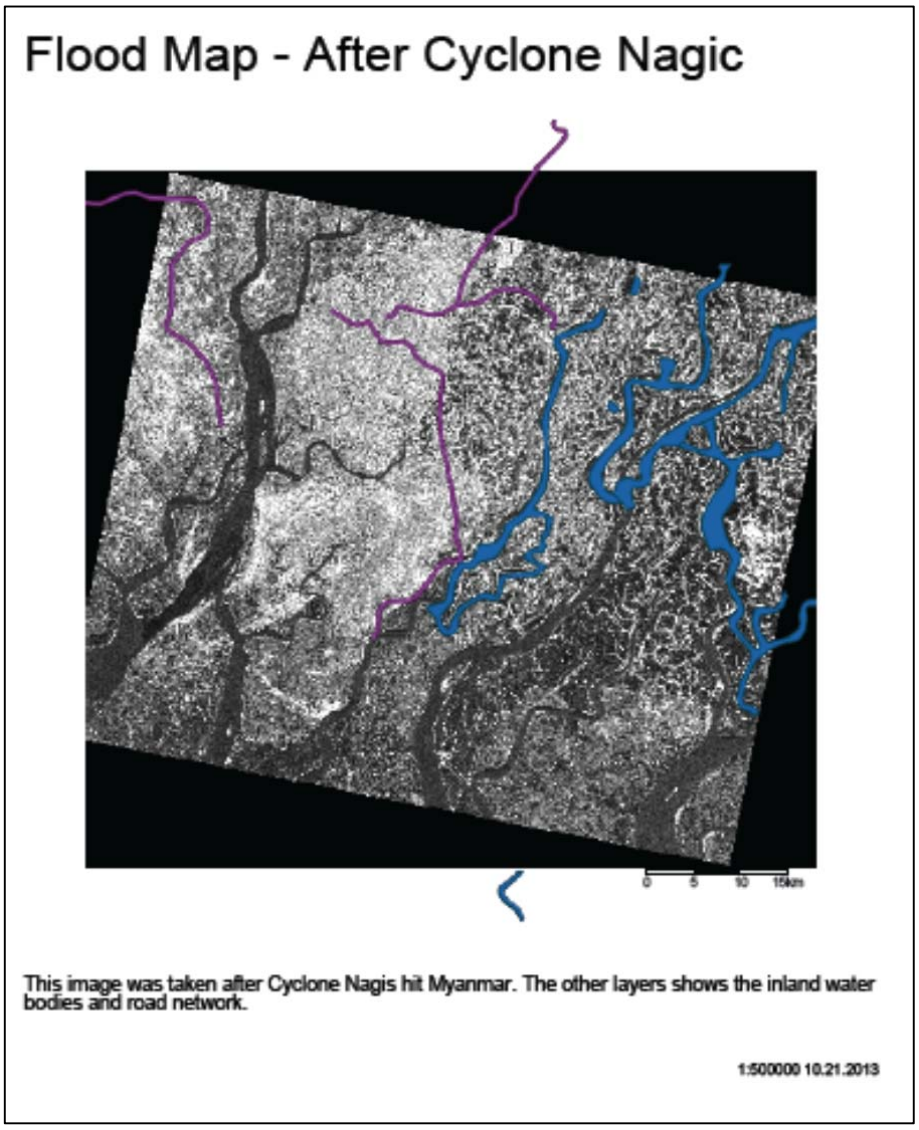
To original Scale

It is possible to print the maps available in Explore Maps sections. Go to the Map View and click on “Print” icon. First let us try to print the above map to its original scale. Observe the scale of the original map and that of the map print preview. The preview picks the closest scale of the original map.



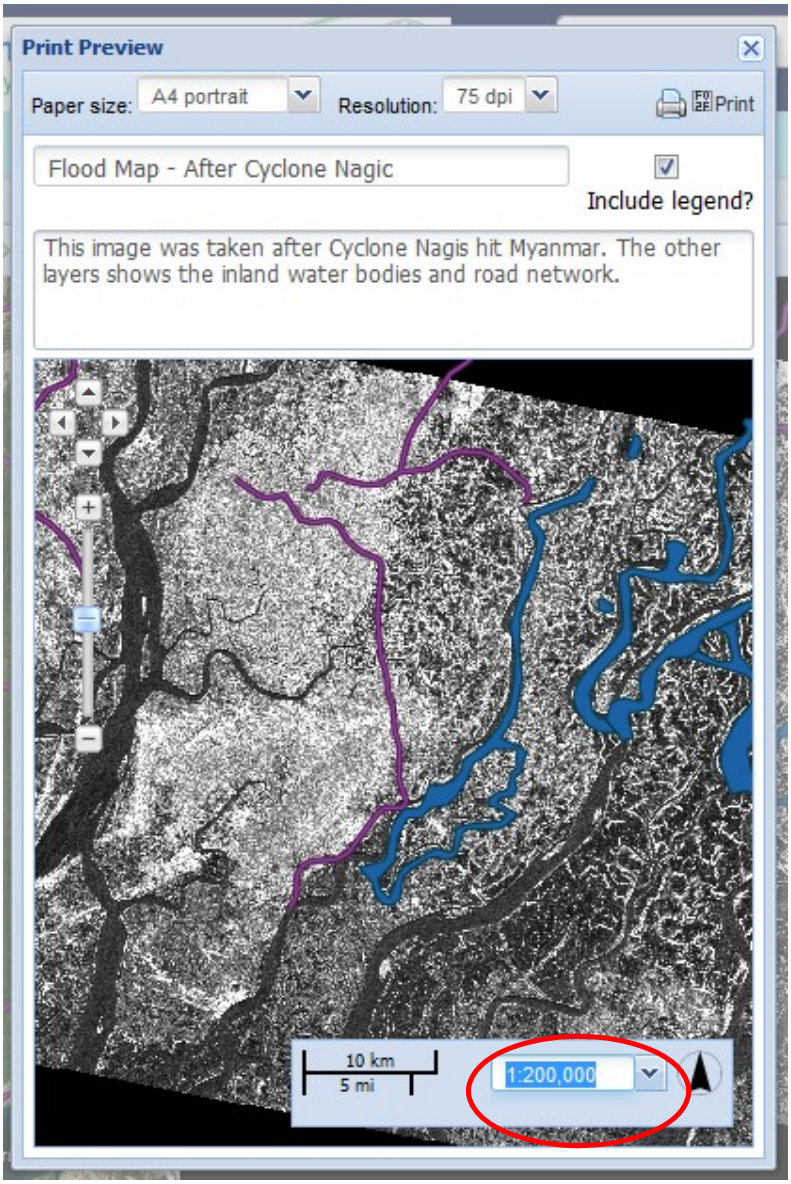
In the map preview, you can select the paper size (only A4 and legal), Resolution (75 dpi, 150 dpi, 300 dpi). Also you can select whether to print the legends or not. You may update the Title and abstract of the image.

In the generated map, you can find map elements such as Map Title, Map Body, Map Scale, Legends, Scale Bar, Abstract of the Map etc. Find below the printed map of the above example to its original scale.

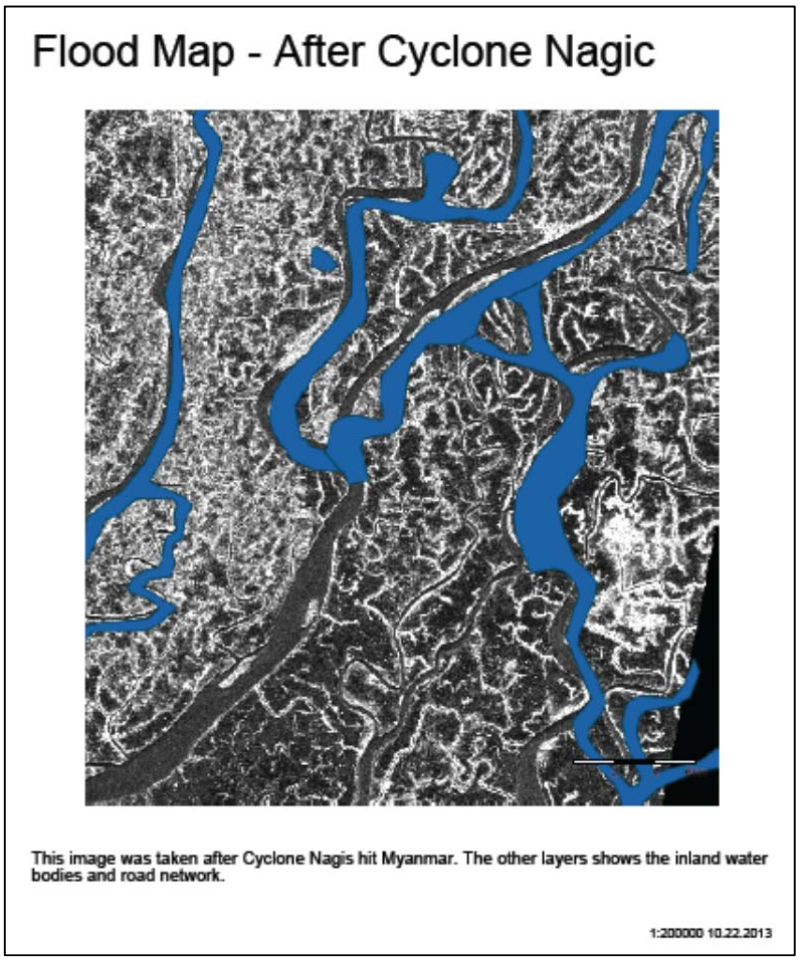


To a Smaller Scale

Now, if you want to print a small area of the map; you need to zoom in to the interested area. There are different scales available in the map preview. You need to select suitable scale in order to show the interested area. Simply zoom in or zoom out may not work well. It is recommended to zoom in to the interested area of interest by changing the map scale from the preview window. You may pan it to the correct area after selecting the desired scale.

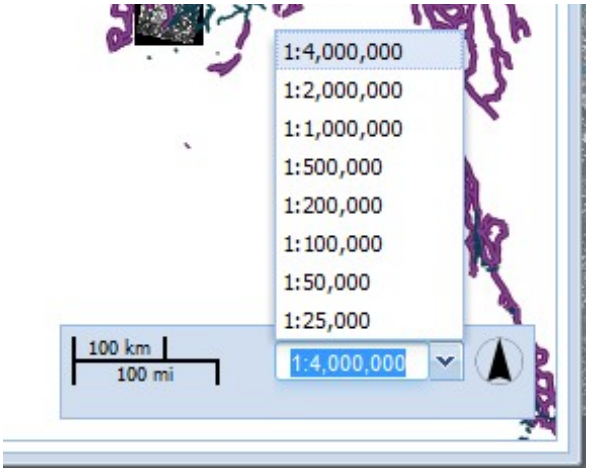


The above figure shows a printed map of a smaller area of the same map we printed earlier. GeoNode printing module help you to print a map up to 1:25000 map scale. In the above figure, the scale is set to 1:200000 while in the original map preview it was 1:500000. Following is the map print of 1:200000 scale of the same map.



To a Larger Scale

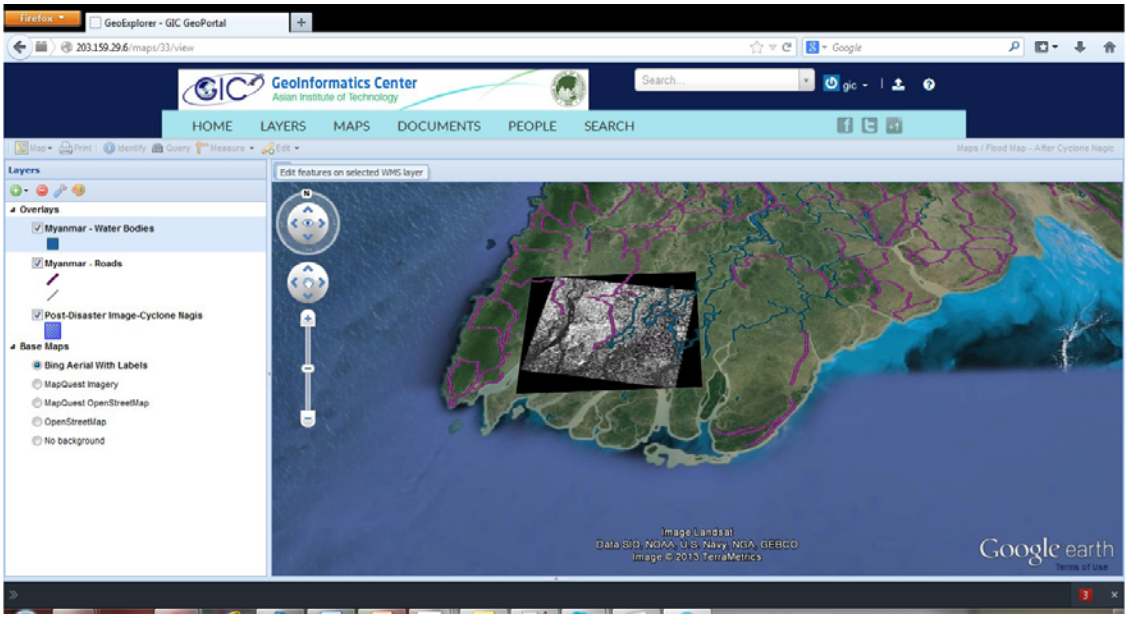
If you need to print a larger area of the earth surface, you need to select a larger scale. But there is a maximum limit in GeoNode printing module which is 1:4000000. So it is not possible to print larger areas such as continents using this option.



Open Maps on Google Earth

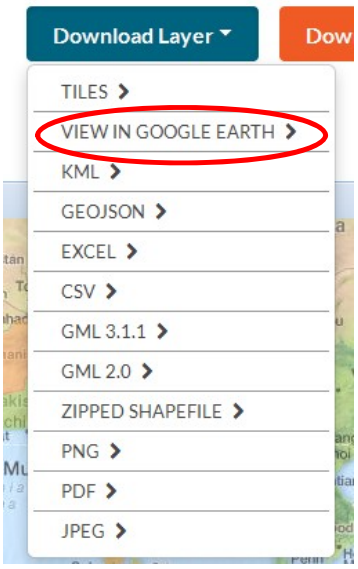
Using Google Earth Plugin

It is possible to open any data layer or a map on Google Earth. GeoNode is provided with a plugin to open any map on Google Earth without even downloading it. You need to have Google Earth installed in your machine.



As a KML

Alternatively, you can download the KML format of a data layer and open it on Google earth Client.

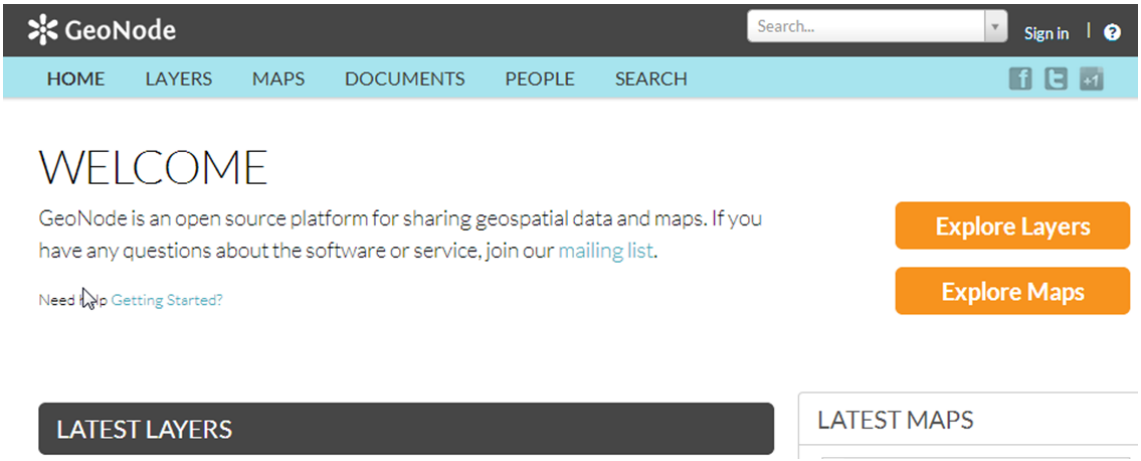


Customizing the Look and Feel of the Geo-Portal

UNESCAP Geo_DRM Training

Theming your GeoNode project

There are a range of options available to you if you want to change the default look and feel of your GeoNode project. Since GeoNode's style is based on Bootstrap which is a powerful framework for web development; you will be able to make use of all that Bootstrap has to offer in terms of theme customization. The following image shows the default appearance of GeoNode interface.



Logos and Graphics

GeoNode intentionally does not include a large number of graphics files in its interface. This keeps page loading time to a minimum and makes for a more responsive interface. That said, you are free to customize your GeoNode's interface by simply changing the default logo, or by adding your own images and graphics to deliver a GeoNode experience the way you envision int.

Your GeoNode project has a directory already set up for storing your own images. You should place any image files that you intend to use for your project in this directory (cd var/www/geonode/static/geonode/img).

Let's walk through an example of the steps necessary to change the default logo.

1. Change into the img directory:

```
$ cd var/www/geonode/static/geonode/img
```

2. If you haven't already, download your logo image. Now copy it to this location:

```
$ cp <path-to-your-logo>/yourlogo.jpg .
$ cd ../../..
```

3. Override the CSS that displays the logo

Edit "/var/www/geonode/static/geonode/css/site_base.css" with your favorite editor and add the following lines. Make sure to update the width, height, and URL to match the specifications of your image.

! Very Important

You should always backup the original file before you change any configuration file. Otherwise certain misconfiguration may cause complete failure in your system.

```
$ cd /var/www/geonode/static/geonode/css/
$ sudo cp base.css base.css.org
$ sudo nano base.css
```

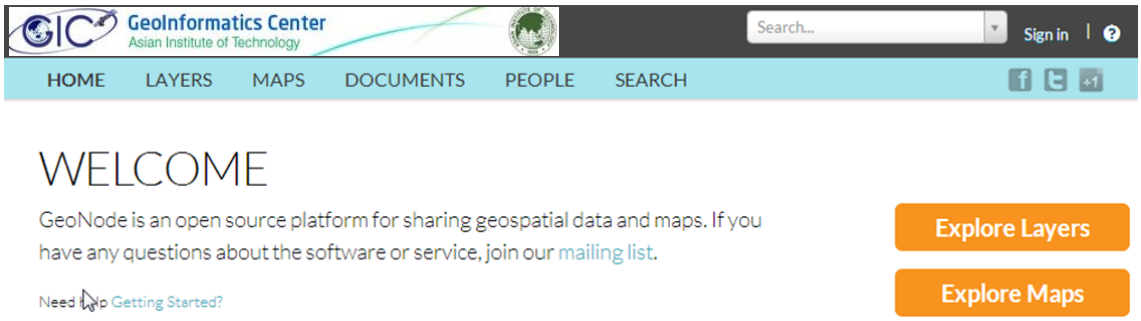
Now change the following lines

```
.nav-logo {
    width: 500px;
    height: 50px;
    background: url(../img/GIC-logo.JPG) no-repeat;
}
```

4. Restart your GeoNode project and look at the page in your browser:

```
$ sudo geonode collectstatic -v0
```

Now you can see your company logo instead of GeoNode default logo. Visit your site at http://localhost/ or http://<your-ipaddress>



Changing Background Color

In the last section you already learned how to override GeoNode's default CSS rules to include your own logo. You are able to customize any aspect of GeoNode's appearance this way.

Follow the following instructions to change the background color of the header to match the color in our logo graphic.

1. Reopen /var/www/geonode/static/geonode/css/base.css in your editor and edit the following rule

```
$ cd /var/www/geonode/static/geonode/css/
$ sudo nano base.css
```

2. Add a rule to change the background color of the header to match the logo graphic we used:

```
.navbar .navbar-inner {

    background: #0e60c3;

}
```

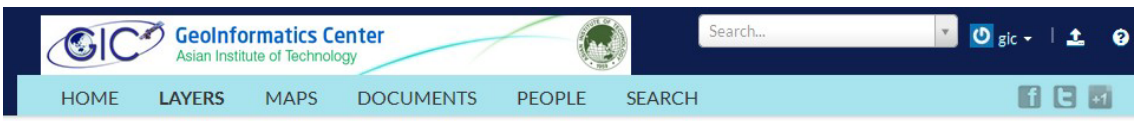
! Note

To find the hexadecimal values of different colors; you may refer to the web link at http://www.javascripter.net/faq/rgbtohex.htm

3. Restart your GeoNode project and look at the page in your browser:

```
$ sudo geonode collectstatic -v0
```

Now you can see the change in background color. Visit your site at http://localhost/ or http://<your-ipaddress>



Changing Menu Bar Color

Similarly you can change the color of the menu bar by performing the following change to the same file.

1. Reopen /var/www/geonode/static/geonode/css/base.css in your editor and edit the following rule

```
$ cd /var/www/geonode/static/geonode/css/
$ sudo nano base.css
```

2. Add a rule to change the background color of the header to match the logo graphic we used:

```
.nav-box {

    background: :#0b803e;

}
```

3. Restart your GeoNode project and look at the page in your browser:

```
$ sudo geonode collectstatic -v0
```

Templates and static pages

We have changed the default logo and adjusted the colors in header area and menu bar. The next step is to update the content of the homepage itself. Your GeoNode project includes basic templates that you will use to change the content of your pages.

Customizing the home page

GeoNode uses Django's template engine. The folder "/etc/geonode/templates" is empty by default but it is above other folders in the template lookup hierarchy. This means that it is possible to copy any html template to that location and it will take presence. Let's start by doing the following:

```
$ cd /usr/local/lib/python2.7/dist-packages/geonode/templates
$ sudo cp index.html /etc/geonode/templates
```

The copy of index.html that was just created takes precedence over the default one, the text in the main section can be changed there and a reload of the web page in the browser will show the updated version.

Note

Changes to templates are picked up automatically and do not require a server restart.

Now let's make some changes to the index.html file we just copied to "/etc/geonode/templates"

1. Open "/etc/geonode/templates/index.html" in your editor

```
$ cd /etc/geonode/templates
$ sudo nano index.html
```

2. Edit the <h1> element to something other than "Welcome":

```
 <h1>{% trans "Welcome to GIC-GeoPortal" %}</h1>
```

3. Edit the introductory paragraph to include something specific about your GeoNode project:

```
<div class="intro">
   <p>
      {% blocktrans %}
           Geoinformatics Center Geoportal provides a
platform to magange geospatial data and maps in a
convenient and user friendly manner. If you wish to build
your your GeoNode.
       {% endblocktrans %}
    </p>
</div>
```

4. Now save and close the edited index.html file.

5. Now browse http://localhost or http://<your-ipaddress>. You should find your home page with your own customized text.

Adding External WMS

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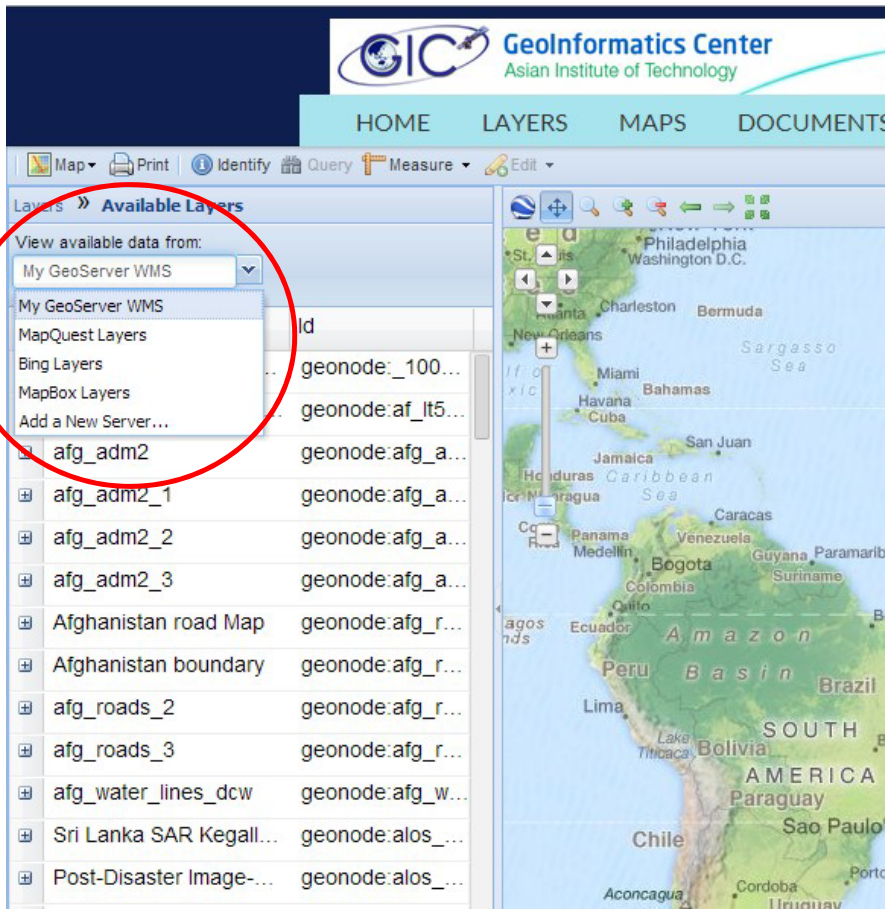
Temporary Adding an External WMS

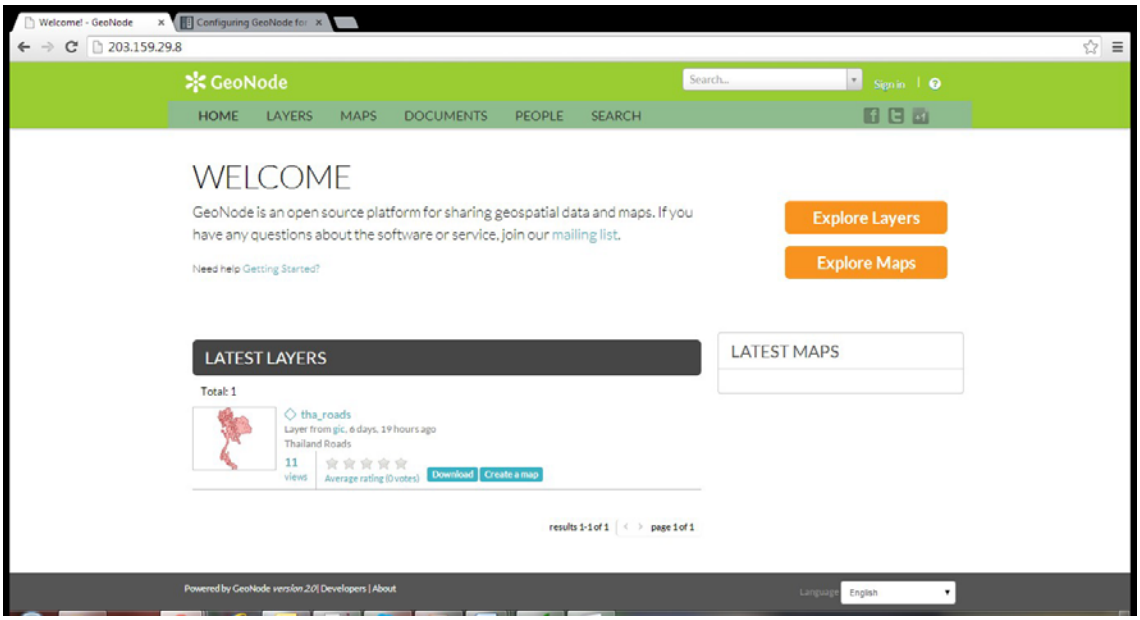
The default Geo Explorer view consists with some base layers and some default data layers. The most of the data layers are from the local WMS server running in the Geo-Portal. As shown in the following diagram, the system shows all the data layers available in the "My GeoServer WMS" and few other default layers.



It is possible to add External WMS Sources to this Map View too. This feature would help using data layers from different WMS servers to create your maps. Following are the instructions to add an external WMS source.

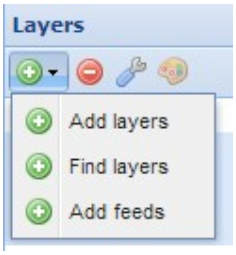
1. Identify an External WMS

First of all, you need to identify an external WMS source. Note, in this demonstration, our Geo-Portal is running in the IP Address 203.159.29.6 and as shown in the above diagram there are many data layers are available in the same. Now consider another Geo-Portal instance running in the IP Address 203.159.29.8 as shown in bellow diagram. There is only one data layer available in that portal.

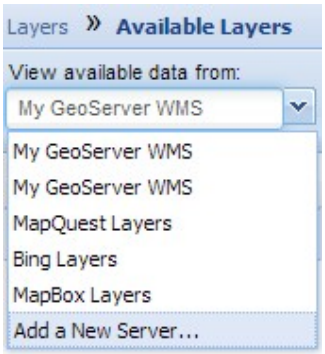


2. Adding the External WMS to Map View

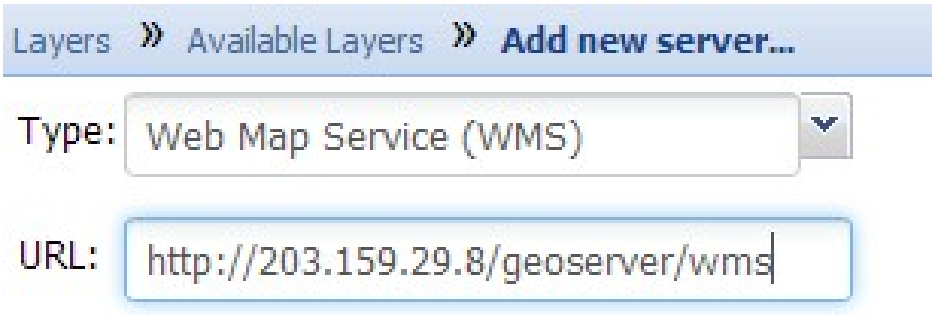
Now let's try to add this external WMS source to our map view. Click on Add Layer button



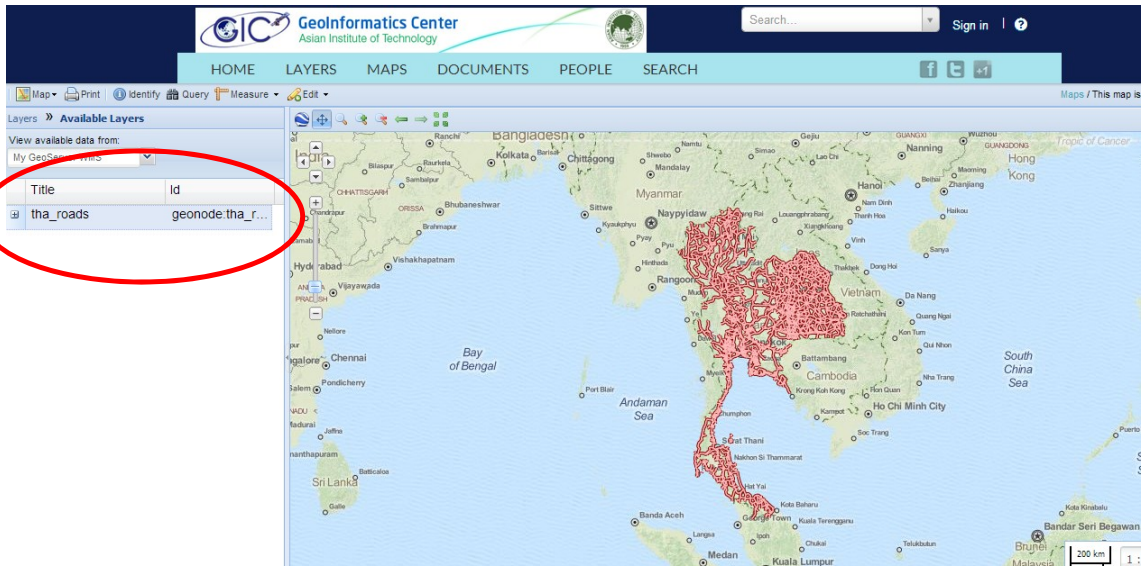
Then select "Add New Server"



And now enter the WMS URL of the identified WMS Server.



This should result a new WMS server entry in available layer list. Observe that the new WMS source shows the only data layer available in the WMS Server.



3. Security Enhancement

You can add external WMS to the Map View by following above instructions up to GeoNode 2.0 beta version. But starting from GeoNode 2.0 release, this feature has been limited to controlled access by introducing additional security measures. The administrator of the Geo-Portal needs to define the External WMS sources which users could temporary add to the Map View. The administrator needs to configure the URLs or IP Addresses of the external WMS sources in the /etc/geonode/local_setings.py.

```
$ cd /etc/geonode/

$ sudo nano local_settings.py
```

Then add the following entry to this file

```
PROXY_ALLOWED_HOSTS = ('ip-of-GeoNode','ip-of-ext-wms-server',)
```

If you go with the example scenario here the entry should be like

```
PROXY_ALLOWED_HOSTS = ('203.159.29.6','203.159.29.8',)
```

Note

It is very important to follow the exact syntax given in the above example. Observe the colons, commas and parenthesis.

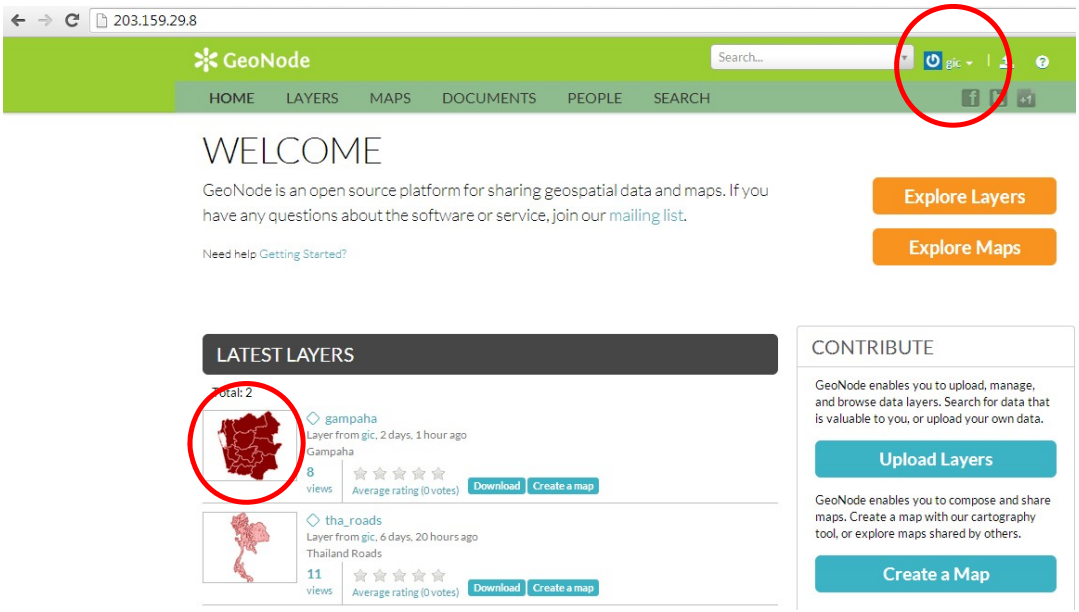
After adding this entry, make sure to restart apache web server.

```
$ sudo service apache2 restart
```

Will People get access to all my data layers in this way?

You may wonder whether your data are safe, if people can access them by connecting as an external WMS. But you need not to worry. By connecting your server as an external WMS source, people could access the data layers which you have shared with everyone. The following demonstration would clear your doubts.

You have observed there was only one data layer in our external WMS. But actually there were two data layers with different permissions. One was shared with everyone and the other layer was opened only for registered users.



Permanently Adding an External WMS

The process explained above would add an external WMS server to the Geo Explorer Map View for a given session. If you refresh your browser or you start another session you have to manually add it again.

But it is possible to permanently add an external WMS source to the “Available Layer” list.

Note

Make sure the external WMS server is 24 x 365 up and running server before permanently adding it to layer tree. Otherwise it will give error message every time you visit the Geo Explorer Map View

Let’s add the same External WMS source to Layer List in our Geo-Portal. By default fallowing entries are in our layer list.

Open /etc/geonode/local_setting.py.

```
$ cd /etc/geonode/

$ sudo nano local_settings.py
```

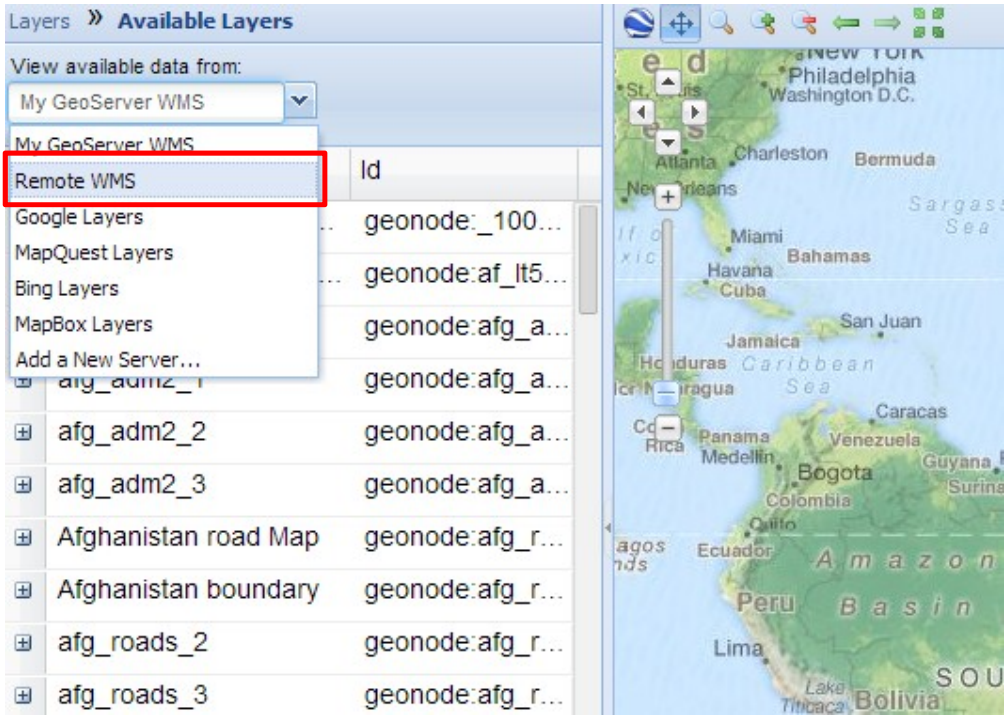
Now add the following entry. Let's name the new WMS server as "Remote WMS"

```
{
    "source": {
        "ptype": "gxp_wmscsource",
        "url": "http://203.159.29.8/geoserver/wms",
        "title": "Remote WMS",
        "restUrl": "/gs/rest"
     }
  },
```

You need to restart apache after that.

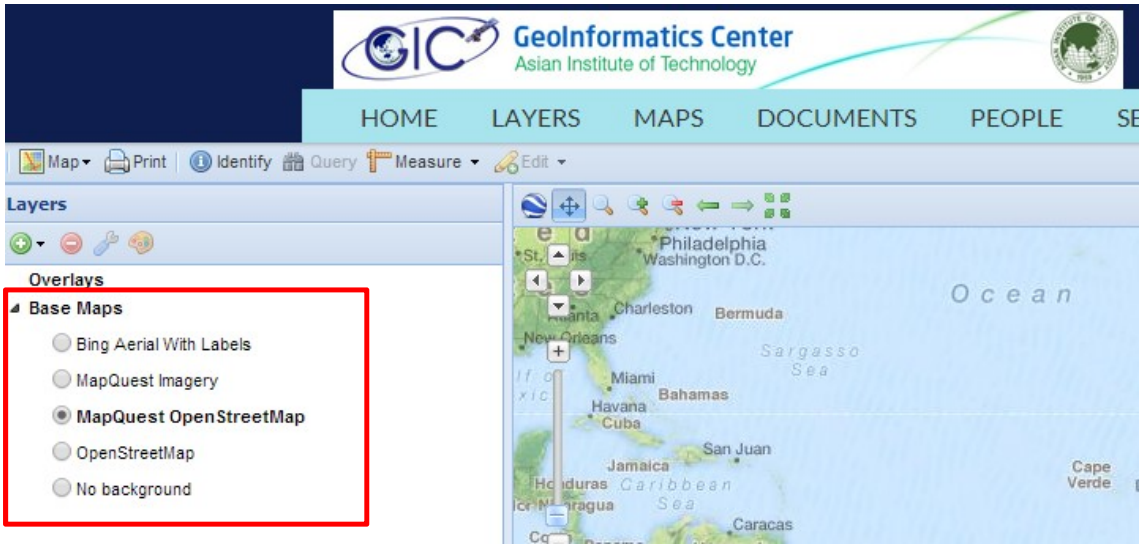
```
$ sudo service apache2 restart
```

Now the newly added external WMS source should be permanently there in the Layer Tree.



Permanently Adding a Base Map

Other than the WMS data sources, it is possible to add Base Maps to the Geo Explorer Map View. Following are the default Base Maps provided in the GeoNode based Geo-Portals.



Open /etc/geonode/local_setting.py. Always make a backup of the file before editing it.

```
$ cd /etc/geonode/

$ sudo cp local_settings.py local_settings.py.bak

$ sudo nano local_settings.py
```

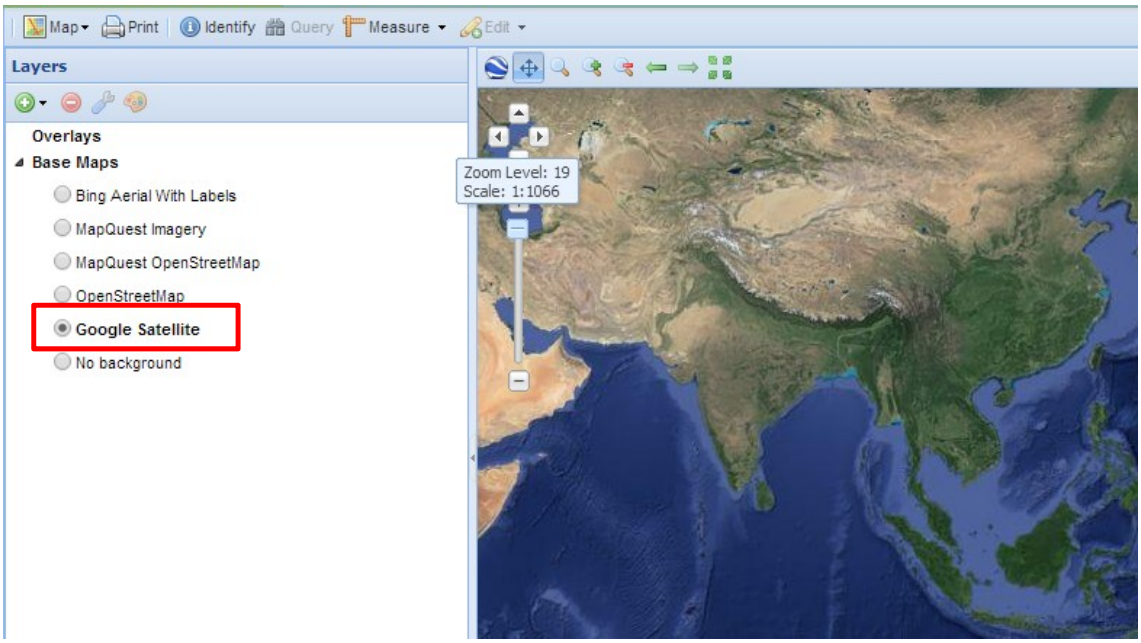
Now add the following entry.

```
  {
    "source": {
         "ptype":"gxp_googlesource",
                 },
    "group":"background",
    "name":"SATELLITE",
    "visibility": False,
    "fixed": True,
  },
```

You need to restart apache after that.

```
$ sudo service apache2 restart
```

Now the newly added Google Satellite Base Map should be permanently there in the Base Map List.

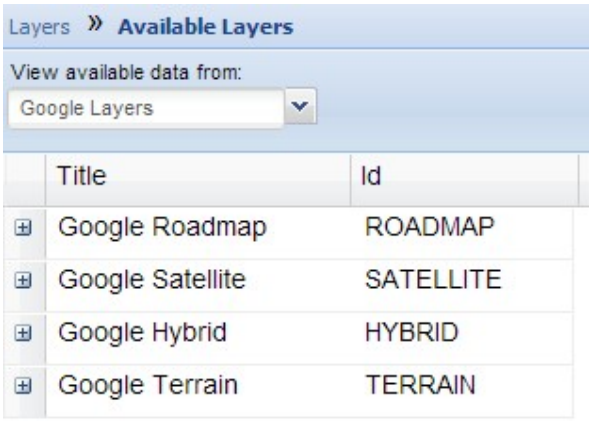


Will it be Google Satellite only?

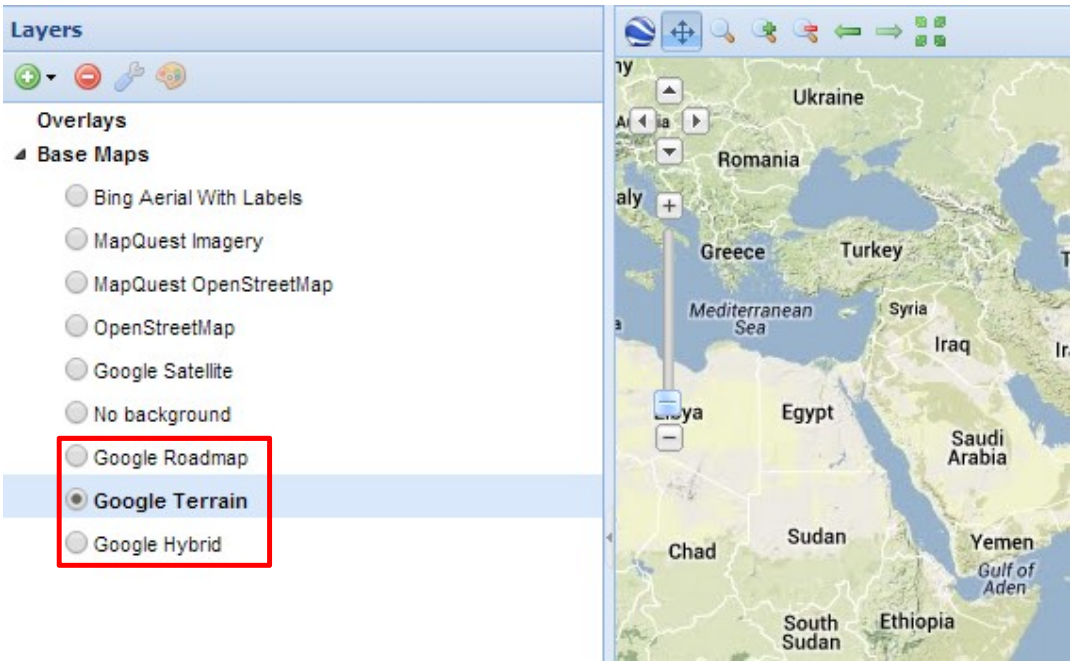
No, once you add Google Satellite to your base map list it is possible to call Google Roadmap, Google Hybrid, Google Terrain maps to your map view.

When you go to Available Layer list you can see an additional entry named “Google Layers”

Now if you select the newly added Google Layers list, you can find the available google map layers.



Now it is possible to add any of these layers to your map view.



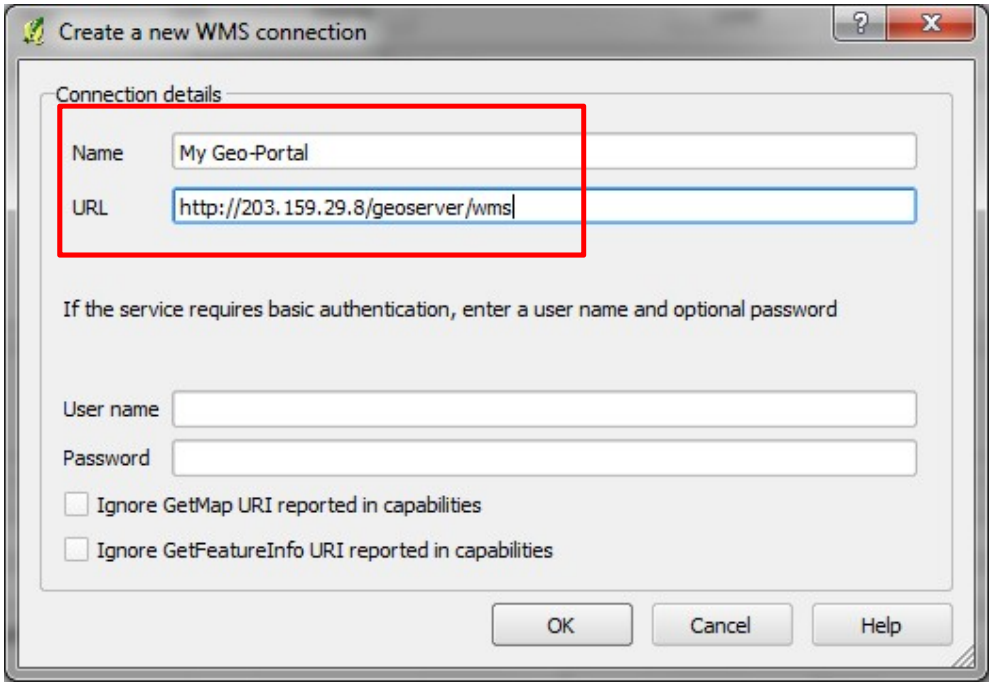
Accessing Geo-Portal Data via Quantum GIS

It is possible to access data layers in the Geo-Portal via Quantum GIS desktop application. Quantum GIS supports populating data from various data sources such as vector files, raster files, Postgres/PostGIS databases and WMS sources. Therefore, we can define our Geo-Portal as a potential WMS source in QGIS and retrieve data from the same. This can be very useful feature as we can use available data in the Geo-Portal directly from QGIS desktop application where we can integrate with other data and do many GIS analysis. But it has to be noted that the data layers populated from Geo-Portal are loaded as WMS hence feature data are not available for analysis.

1. Making a connection to Geo-Portal

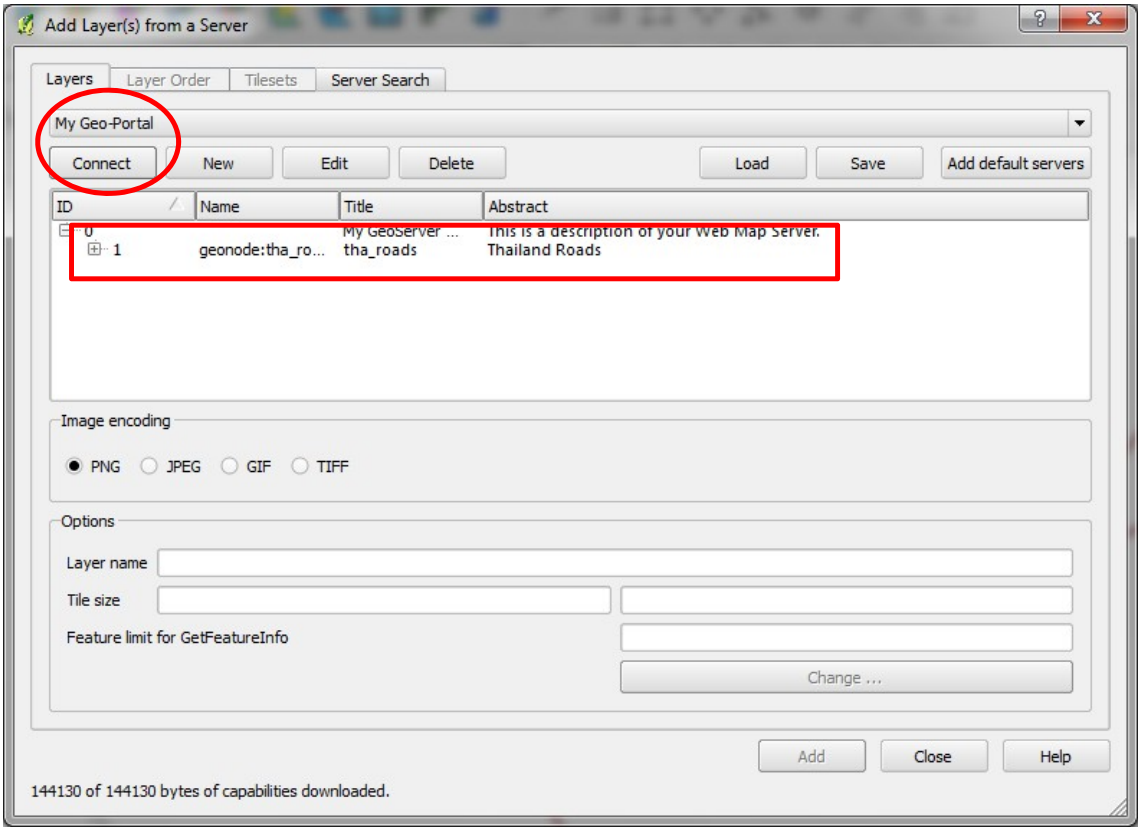
Click on “Add WMS Layer” icon

Create a new WMS Connection to your Geo-Portal by define the WMS URL



2. Connecting to WMS Source

Now it is possible to connect to the WMS Server using the new connection. Select the connection you just prepared and press connect. You will see the available layers in your Geo-Portal.

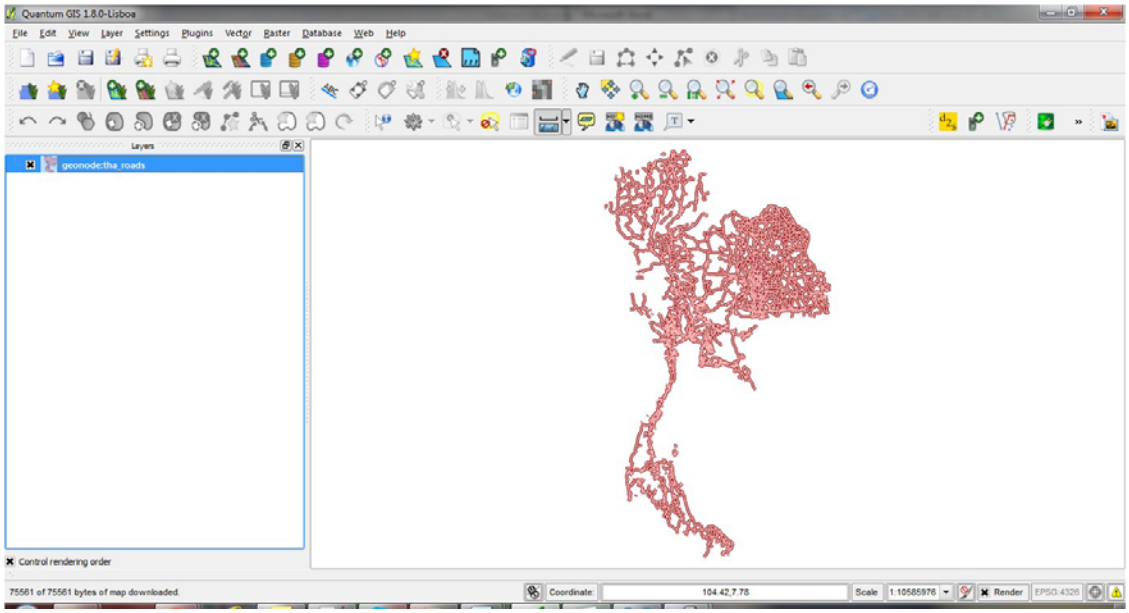


Note

In this case also, it is possible to access the data layers which have been provided with open access. That is, the data layers where permissions had been set to share with “Anyone” would be visible in this manner.

3. Populating data to QGIS

Now select the required data layers and press “Add” to bring them in to Map View



Backup and Restore

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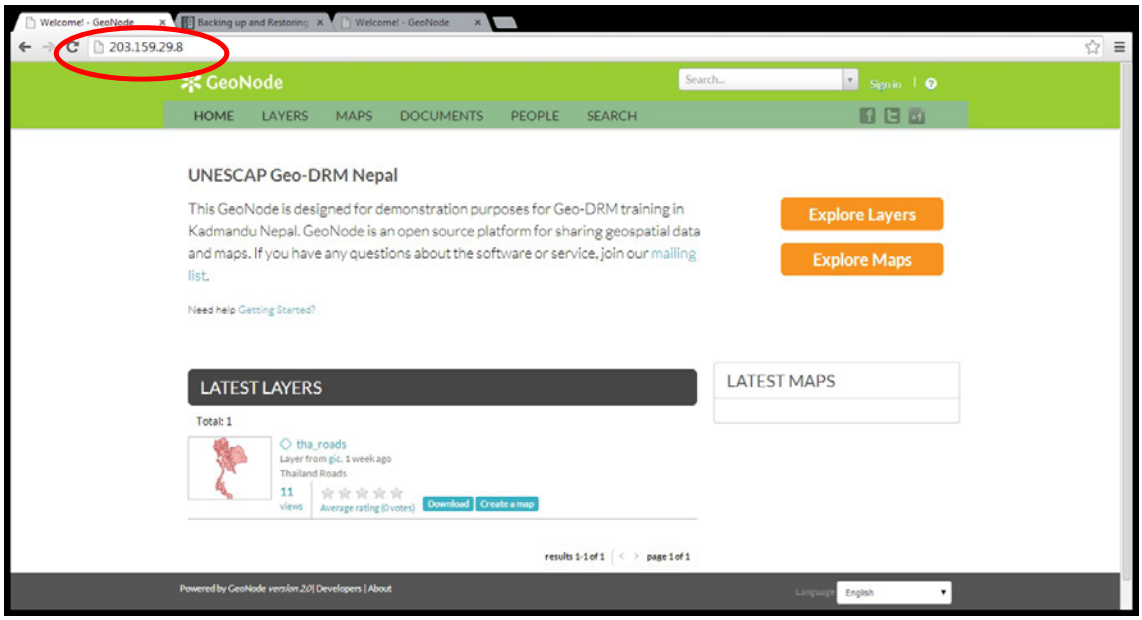
Backing up your system

In order to completely backup a GeoNode installation requires that each separate component of GeoNode be tackled separately. There are separate backup files for Geonode/Django and GeoServer.

Consider the term “Original Geo-Portal” is being used to refer the Geo-Portal which we need to backup. The term “New Geo-Portal” is used to newly installed Geo-Portal for restoration purpose.

1. Backup Configuration files

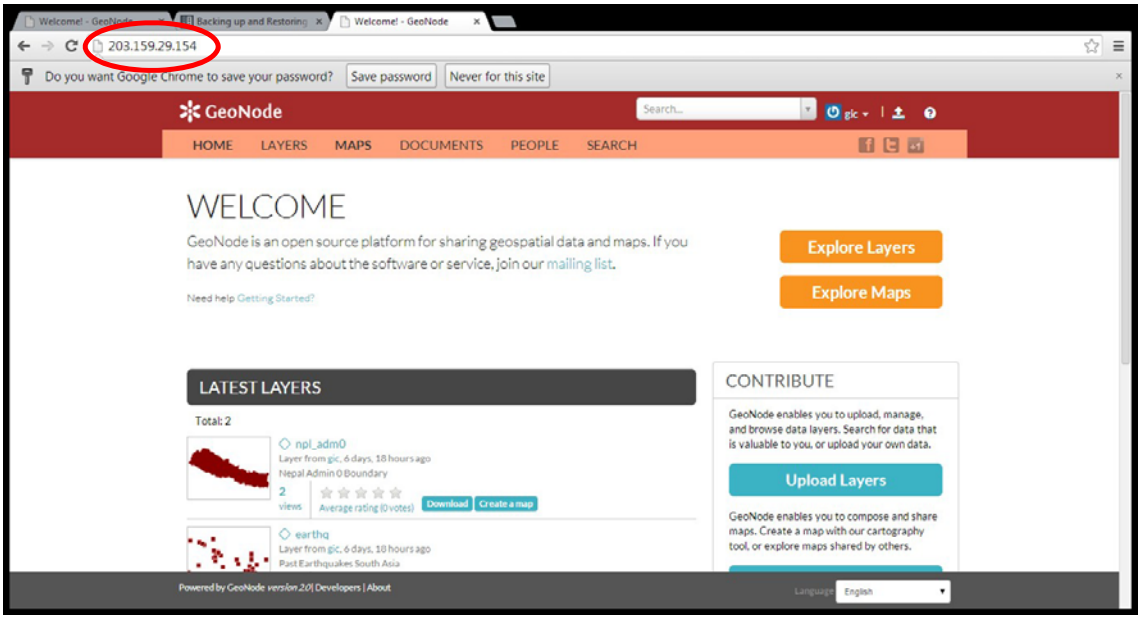
First you need to stop all required services prior to back up your system. Backup following files and folders in the original Geo-Portal.



Original Geo-Portal

In this example the original Geo-Portal is running in IP Address 203.159.29.8

Let’s assume we have another Geo-Node instance running in 203.159.29.154 and we consider that as the New Geo-Portal.



New Geo-Portal

Now consider backing-up all the required files and folders.

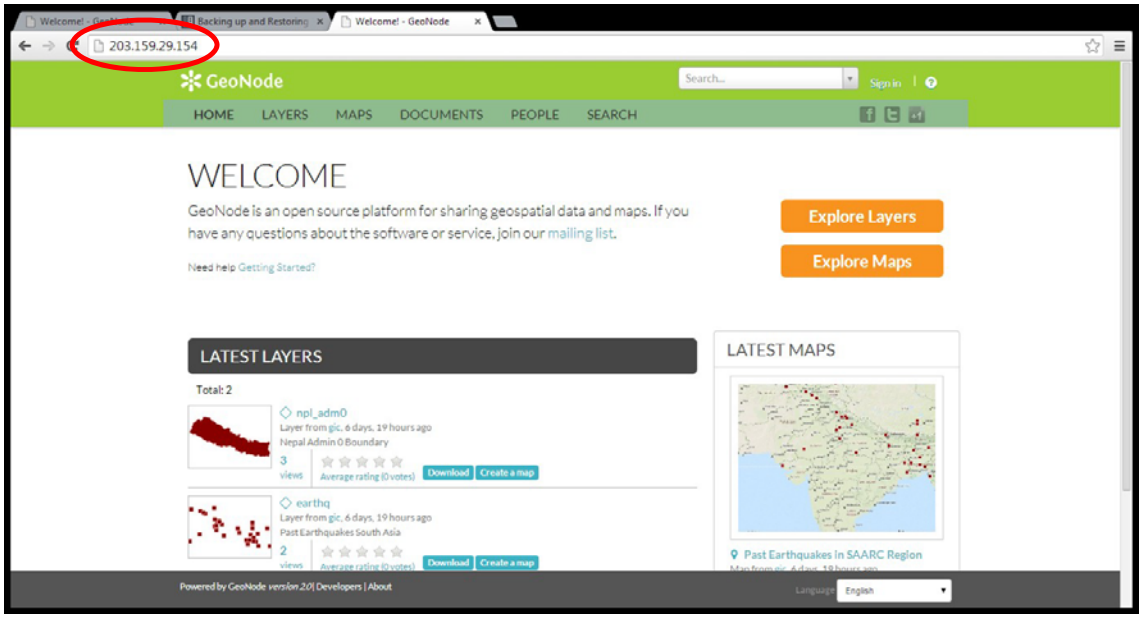
```
$ sudo service apache2 stop

$ sudo /etc/init.d/tomcat7 stop

$ cd /home/gic

$ mkdir backups

$ cd backups

$ tar -cvzf geonodeConfigBackup.tgz /etc/geonode

$tar -cvzf geonodeDataBackup.tgz  /var/lib/geoserver/geonode-
data/

$ tar -cvzf geonodeCSS.tgz /var/www/geonode

$ sudo service apache2 start

$ sudo /etc/init.d/tomcat7 start
```

2. Restoring the Look and Feel

Copy the backed-up geonodeCSS.tgz file to the new Geo-Portal. Let's assume we have copied the geonodeCSS.tgz file to /home/gic/remote-backup folder of the new Geo-Portal.

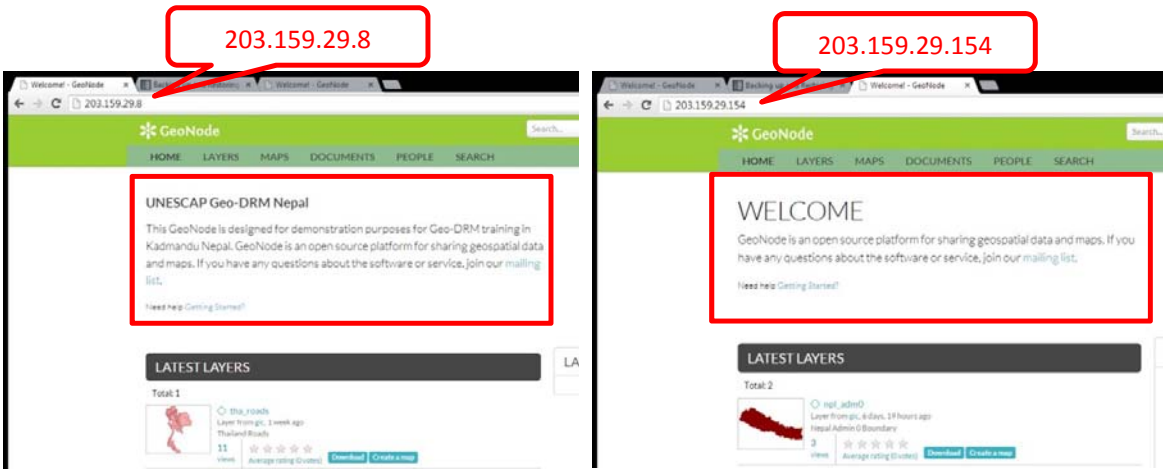
```
$ cd /home/gic/remote-backup

$ sudo service apache2 stop

$ sudo /etc/init.d/tomcat7 stop

$ sudo tar -C / -xvzf geonodeCSS.tgz

$ sudo service apache2 start

$ sudo /etc/init.d/tomcat7 start
```

If you browse New Geo-Portal, you should observe the difference in appearance.



3. Restoring templates

Note the front page contents of Original and New Geo-Portals



Original Geo-Portal

New Geo-Portal

Let's try to restore the contents of index.html.

Go to Original Geo-Portal and copy the index.html at /etc/geonode/templates.

```
$ cd /etc/geonode/templates
```

Now copy the index.html to New Geo-Portal backup directory (/home/gic/remote-backup). You can use "scp" command to remotely copy the file. Otherwise you may use a thumb drive to transfer the file.

Note

Make sure to change the username, IP Address and backup directory path etc. of the following command, according to the credentials of your system.

```
$ cd /etc/geonode/templates

$ scp index.html gic@203.159.29.154:/home/gic/remote-backup
```

Now move to New Geo-Portal and copy the index.html to /etc/geonode/templates of the New Geo-Portal

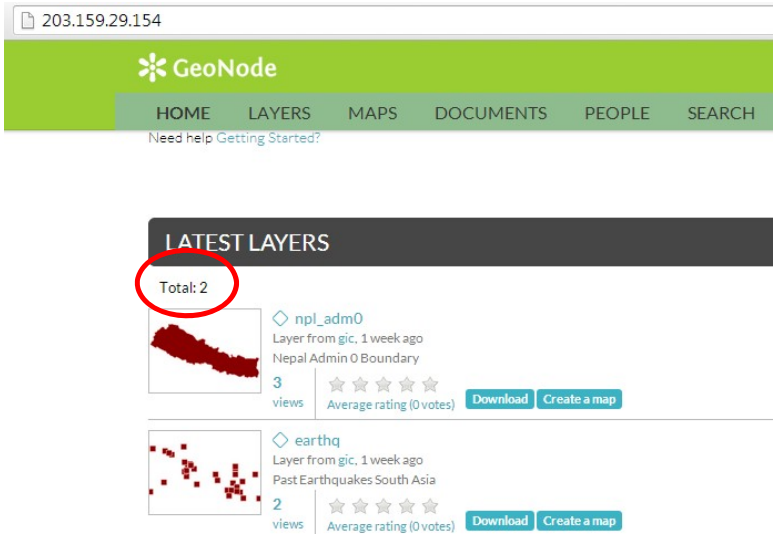
```
$ cd /home/gic/remote-backup/
```

```
$ sudo cp index.html /etc/geonode/templates/
```

Now open your browser and access the New Geo-Portal and observe the changes.

4. Backing-up the Database

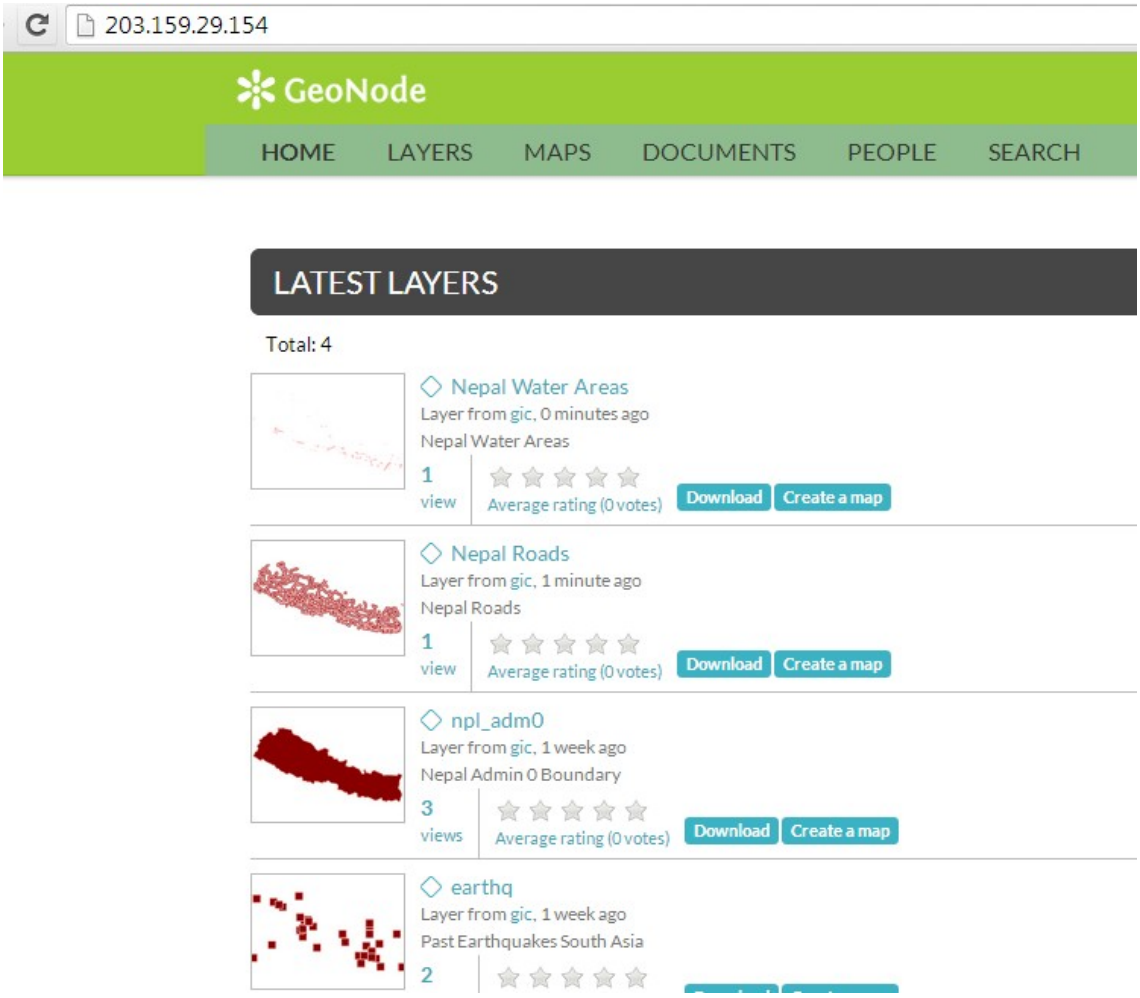
This time we will learn how to back-up the “geonode” database and restore it later. Observe that we have only **two data layers** in our Geo-Portal.



Make a backup of the GeoNode database (PostgreSQL needs to be running):

```
$ cd /home/gic/backups/

$ sudo -u postgres -i pg_dump -c -Fc geonode > geonodedb.backup
```

Now let's add some more data layers to our Geo-Portal



Now there are **four data layers** in the Geo-Portal. Let's assume we experienced a database crash at this point. Since we have a backup of our database at an earlier occasion; we can try to restore it to that state. Obviously, we would lose the data we uploaded after performing the database backup.

5. Restoring to a previous state

First, stop all relevant services.

```
$ sudo service apache2 stop

$ sudo /etc/init.d/tomcat7 stop
```

PostgreSQL needs to be running

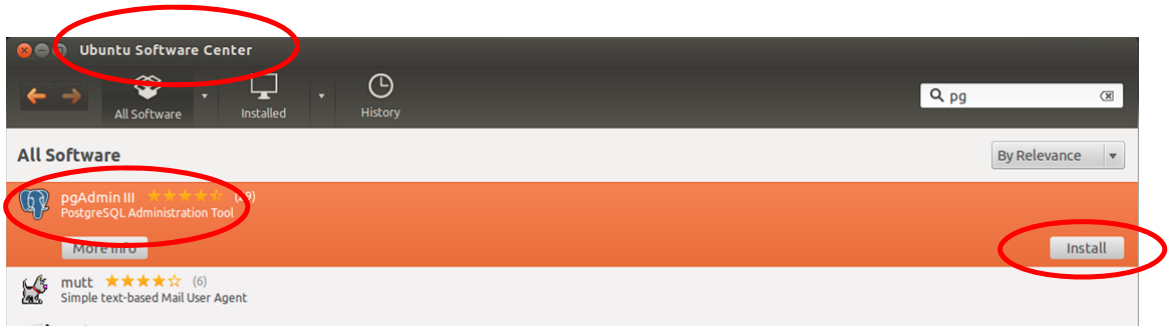
```
$ sudo service postgresql start

$ sudo -u postgres psql
```

Then you command prompt changes

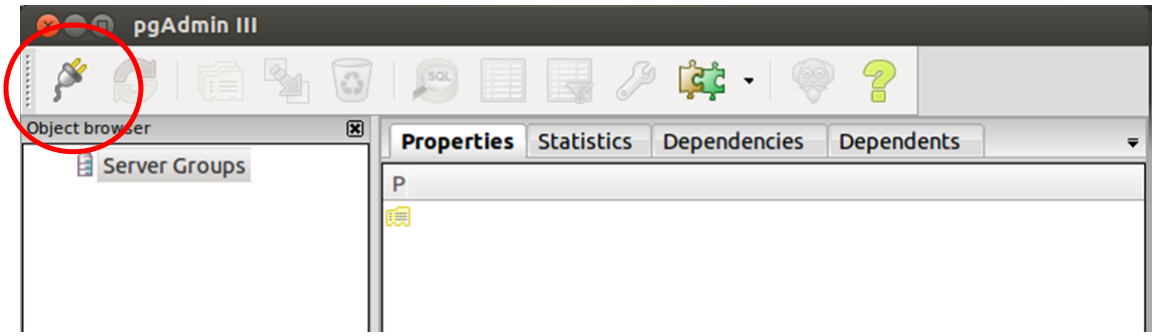
```
postgres=#

postgres=# drop database geonode;

DROP DATABASE

postgres=#

postgres=# create database geonode;

CREATE DATABASE

postgres=#
```

Press Ctrl+z to escape this prompt. Now we have deleted the “geonode” database and created a blank database with the same name. Next, we need to restore the database backup to the newly created empty database.

We may use a different approach to perform this task. Let’s install a GUI tool called “pgAdmin III” in our Ubuntu Linux system and try to access the database system via that.



Open pgAdmin III application and create a connection to the database

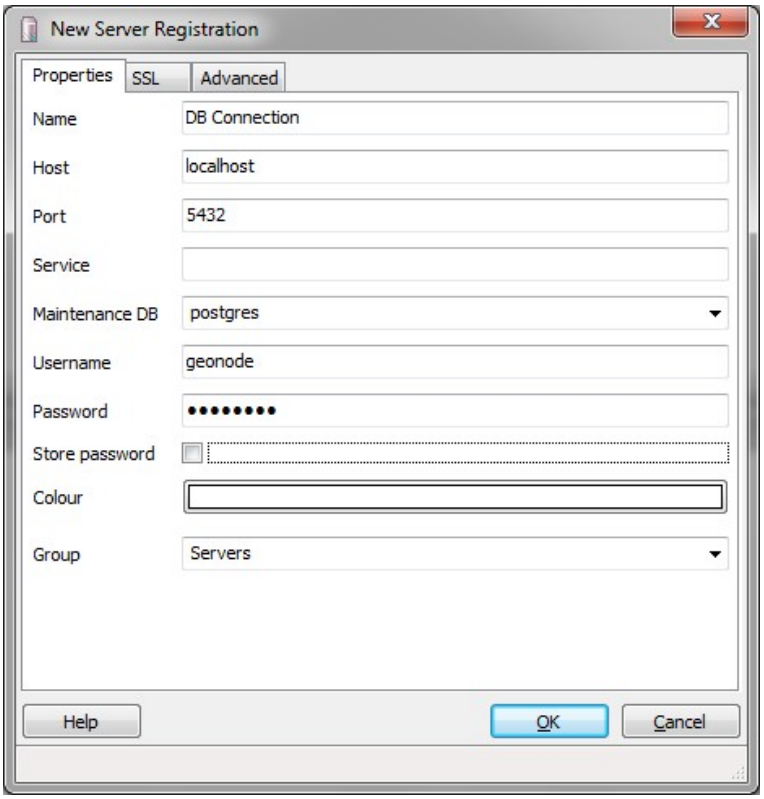


For that, you need to know the login credentials. You can find them from local_settins.py file

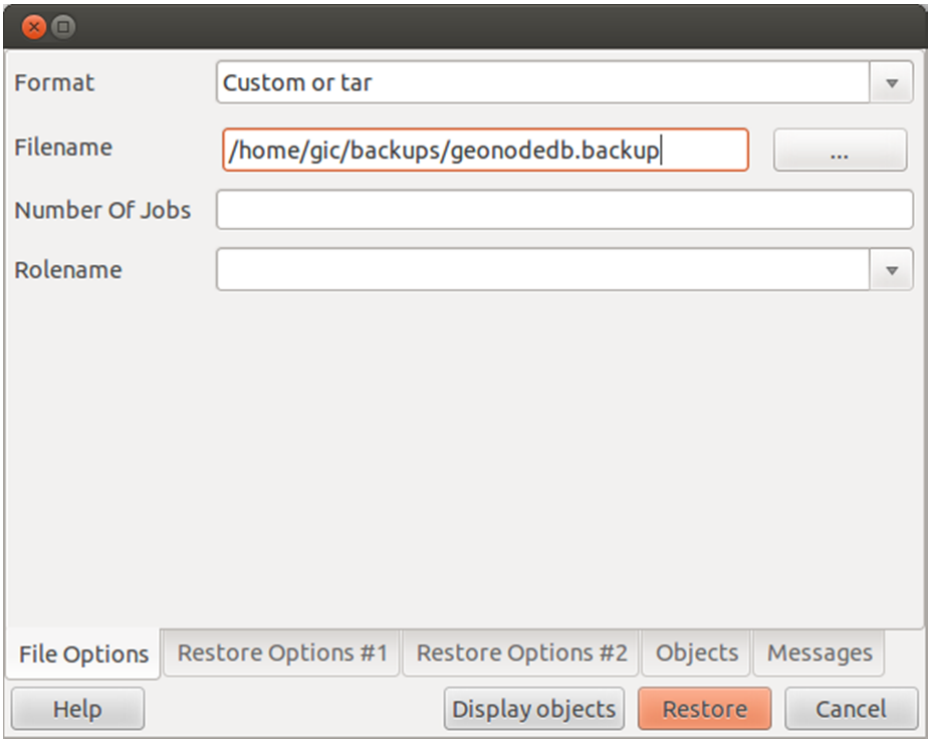
```
$ cd /etc/geonode

$ nano local_settings.py
```

```
DATABASE_ENGINE = 'postgresql_psycopg2'

DATABASE_NAME = 'geonode'

DATABASE_USER = 'geonode'

DATABASE_PASSWORD = 'Tw2ogHrG'

DATABASE_HOST = 'localhost'

DATABASE_PORT = '5432'
```

Using these login credentials, create a connection to the database management system.



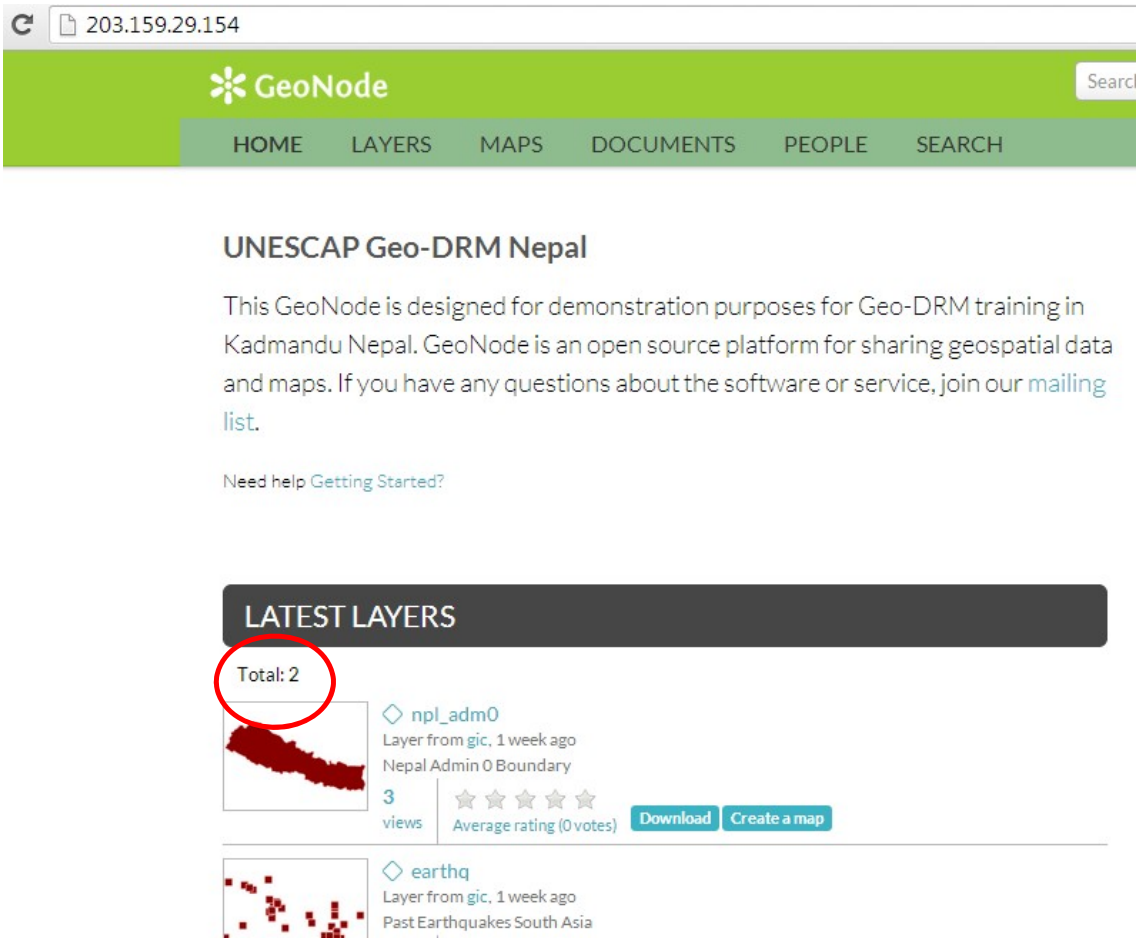
You should observe an empty database call “geonode”. Right-click on the database and select “Restore” option and point to the database backup we obtained.



Now, start all relevant services.

```
$ sudo service apache2 start

$ sudo /etc/init.d/tomcat7 start
```

If you access your Geo-Portal, there would be only two data layers after the restore.



Basic QGIS

UNESCAP Geo_DRM Training

Working on Data Resources for Disaster Response using Quantum GIS (QGIS)

1. Available data online

1.1 USGS Earthquake Data

USGS provides earthquake worldwide event.

http://earthquake.usgs.gov/earthquakes/map/

Available format:

- KML (Keyhole Markup Language) – Allow to select which magnitude to display
- GeoJSON – A format for encoding a variety of geographic data structure
- CSV (Comma Seperated Values) – Able to create location using lat/lon using QGIS

Practice:

1) Browse to http://earthquake.usgs.gov/earthquakes/map/ > Download file
2) In September 2011, Earthquake at Magnitude 6.9, Depth 20 km occurred in India-Nepal Border Region Browse to the link below and download GIS File (HAZUS.Zip)
   http://earthquake.usgs.gov/earthquakes/shakemap/global/shake/c0005wg6/#download

> **Note**:
> PGA – Peak Ground Acceleration

1.2 Open Street Map (OSM)

- Open data http://www.openstreetmap.org
- Free to use it for any purpose as long as you credit OpenStreetMap and its contributors.
- Free to alter or build upon the data in certain ways, you may distribute the result only under the same license.

Practice: Download vector baseline

1) Browse to http://downloads.cloudmade.com/
2) Select Asia > Southern Asia > Nepal > Nepal_shapefiles.zip > Save and Unzip
3) Data available: Administrative Boundary, Highway, POI (i.e., school, hospital)

> **Note**:
> Save download data to use in GIS Application exercise

1.3 Digital Elevation Model – Aster GDEM

Advanced Spaceborne Thermal Elevation Map (Aster) Global Digital Elevation Map (GDEM), In cooperation between the Ministry of Economy, Trade and Industry of Japan (METI) and the National Aeronautics and Space Administration (NASA) on a project to develop ASTER GDEM, a DEM data which is acquired by a satellite-borne sensor "ASTER" to cover all the land on earth [http://asterweb.jpl.nasa.gov/gdem.asp].

GDEM Available Sites:

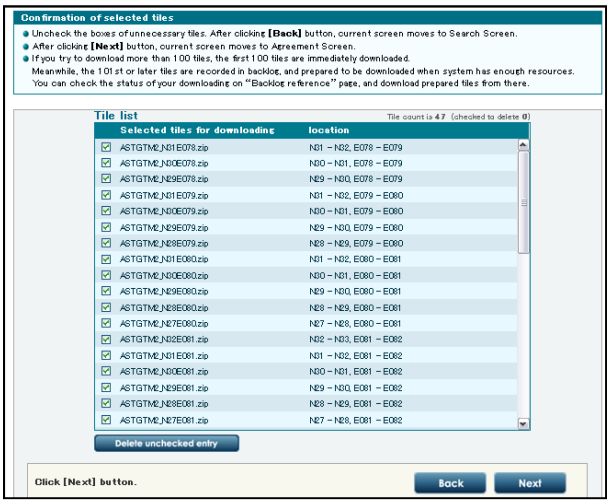
- National Aeronautics and Space Administration (NASA) http://reverb.echo.nasa.gov/reverb/#utf8=%E2%9C%93&spatial_map=satellite&spatial_type=rectangle
- U.S. Geological Survey (USGS) Global Data Explorer http://gdex.cr.usgs.gov/gdex/
- Japan Space Systems http://www.jspacesystems.or.jp/ersdac/GDEM/E/index.html

Practice:

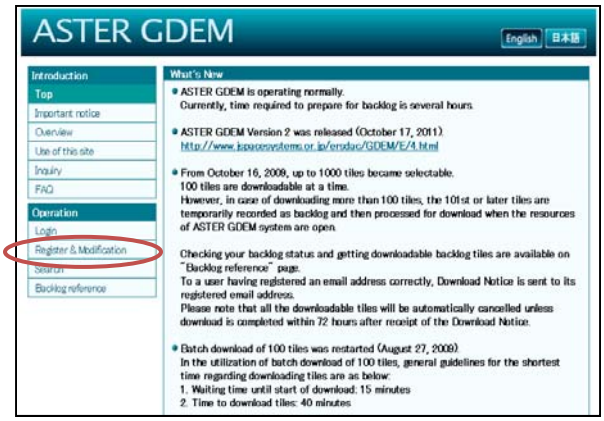
1) Browse to http://gdem.ersdac.jspacesystems.or.jp
2) On the left menu > Search
3) Selection options (i.e. Select Tiles by polygon, Select Tiles by shapefile)
4) Try: Select Tiles by polygon > Start > Click and close loop > OK > Next

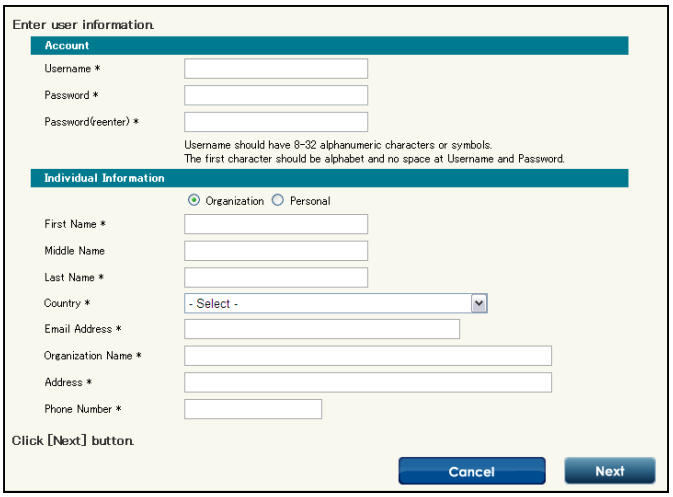
> Note:
> If loop is not closed, system will ask to fix polygon > YES

5) Check or Unchecked to download



6) In order to Download file, users are requested to register



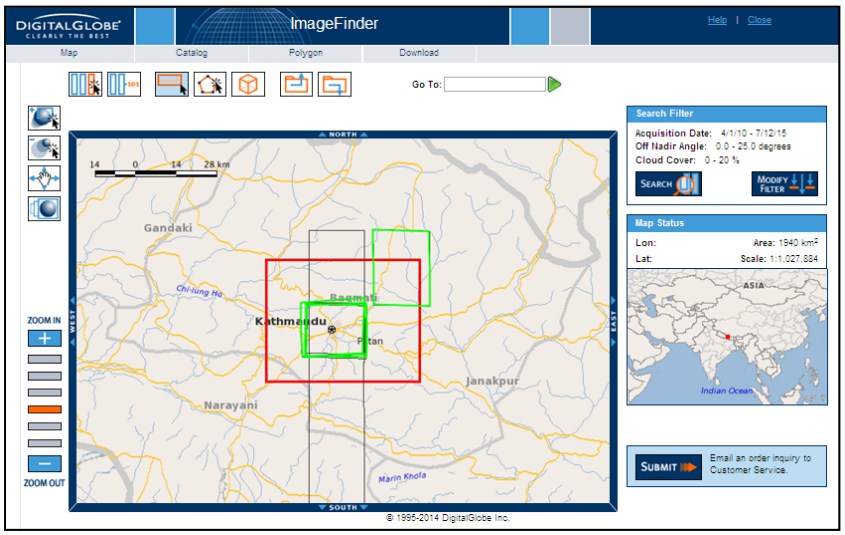


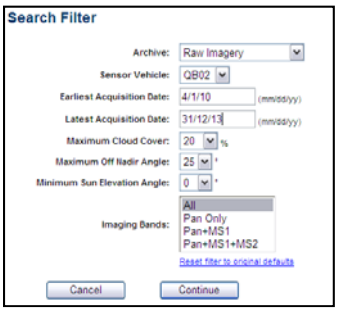
1.4 High Resolution Imagery

- Commercial Earth Satellite imaging – Digital Globe www.digitalglobe.com

Practice:

1) Browse Digital Globe: https://browse.digitalglobe.com
2) Select Area (i.e., Kathmandu, Nepal)
    a. Drawing polygon (i.e., drag box, point and click)
    b. Select by user shapefile
3) Select Modify Filter (i.e., acquisition start date/end date) > Click Continue
4) On Main Map Page > Click Search





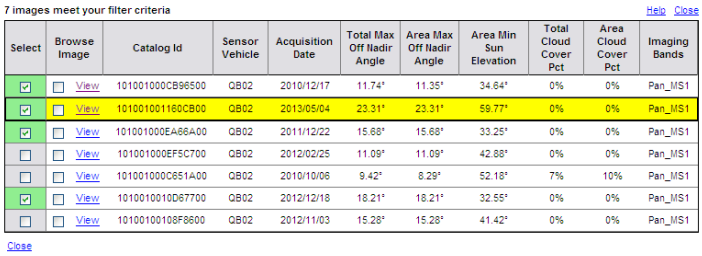
Note:

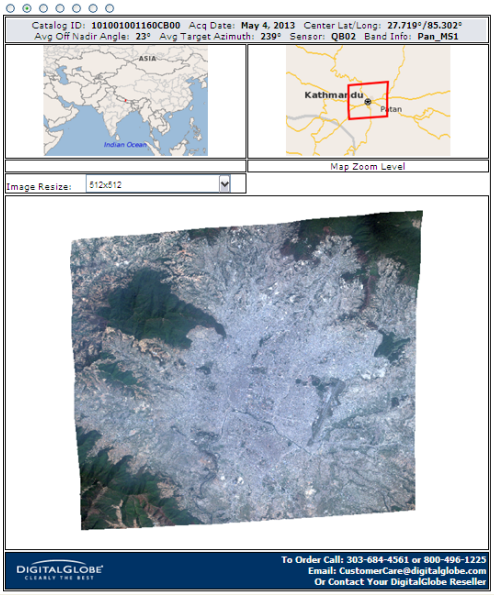
Parameter	Description
Archive	Search for either strips or InTrack stereo imagery.
Sensor Vehicle	Search for imagery from QuickBird 2, WorldView 1, or both.
Maximum Cloud Cover	Limit search results by the maximum cloud cover percentage within the polygon or map extent for the strip.
Acquisition Date	Enter a date range between April 1, 2002 and the current date to limit search results to imagery captured between those dates.
Maximum off-nadir angle	Limit search results by maximum satellite off-nadir angle within the polygon or map extent for the strip.
Minimum Sun Elevation Angle	Limit search results by the minimum sun elevation angle within the polygon or map extent for the strip.

Source: Help (DigitalGlobe)

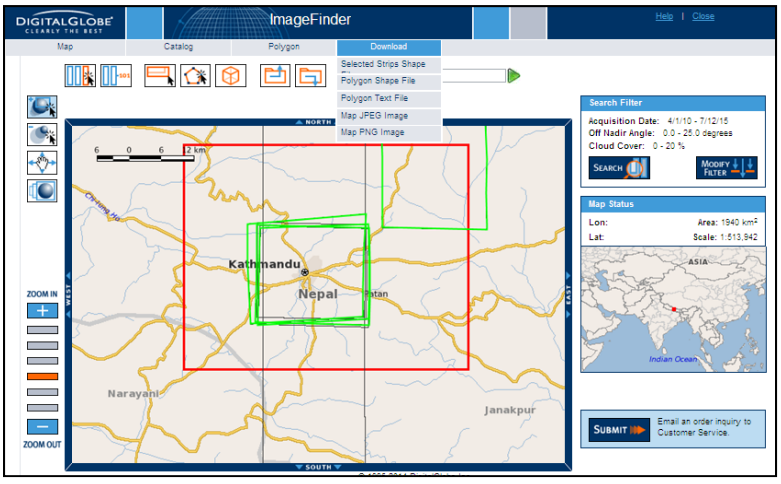
5) Results display images meet user setting criteria

6) Image Resize > Max available resolution > Right Click > Save Picture As [QB_04052013.png]





7) Download > Selected Strips Shape File [This will be used in the next session (geo-reference)]

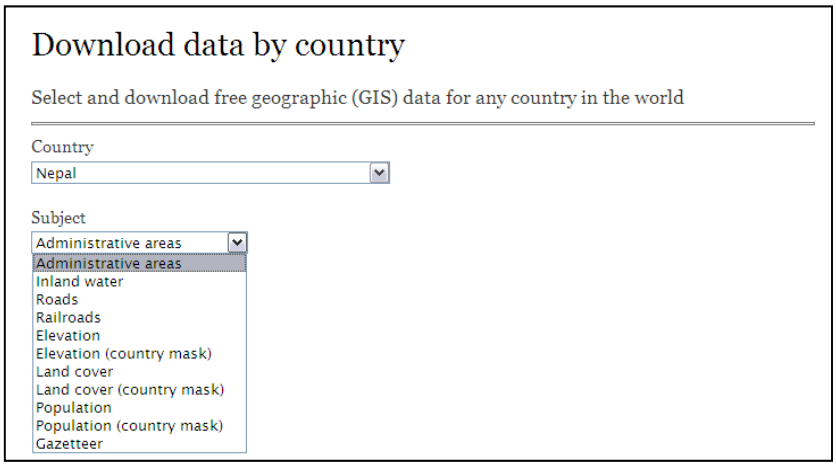


1.5 Diva GIS

- Provide free spatial country level data

Practice:

1) Browse: http://www.diva-gis.org/
2) Select Country ➔ Nepal; Subject ➔ Administrative areas

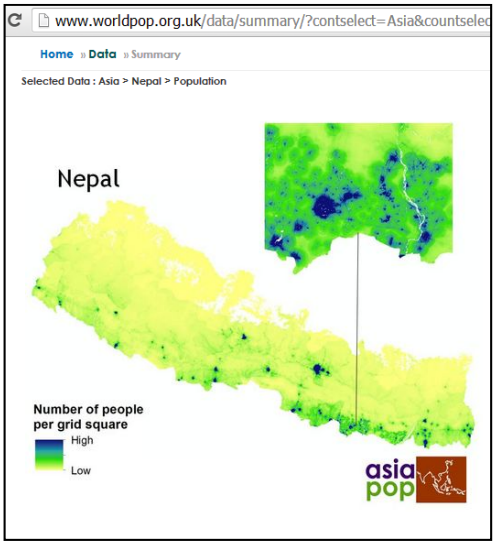


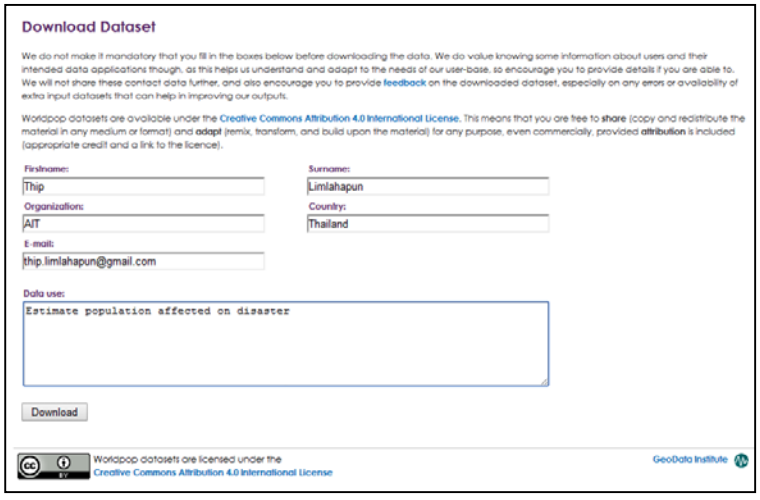
1.6 World Pop

- World Population Data

Practice:

1) Browse: http://www.worldpop.org.uk/
2) Menu Data > Data Availability > Population
3) Scroll Down > Asia > Nepal > Click Go to summary page
4) Fill out information to download data





2. QGIS

2.1 Introduction

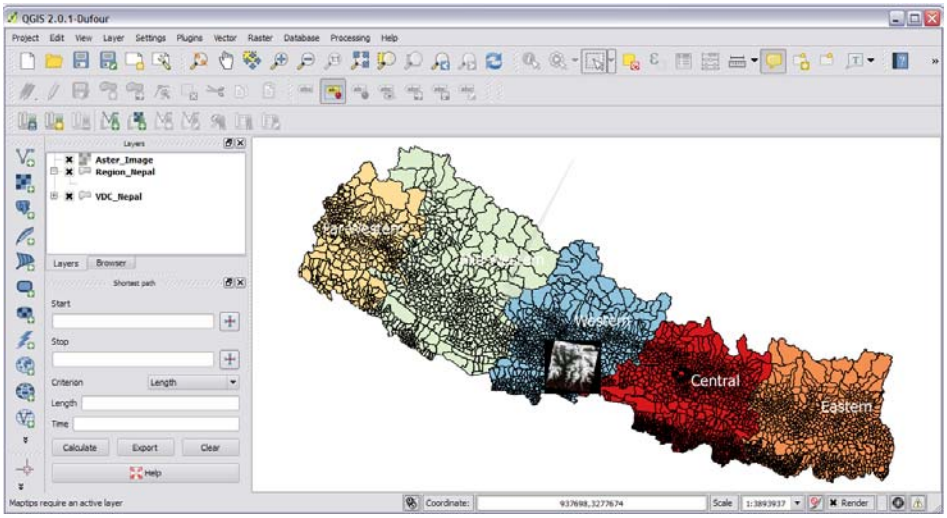
- GIS tool
- Free and Open Source Software

➢ *2.2 Function*

- ***View*** – Able to view and overlay different data format (vector, raster, PostGIS, Delimited Text Layer) in different projections.

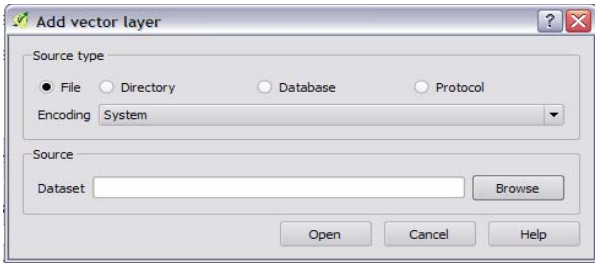
Add Vector Layer

Add Raster Layer



Practice:

1) Add Vector 
2) Dataset > Click Browse > D:\ GIS_Training\Nepal\VDC_Nepal.shp > Open

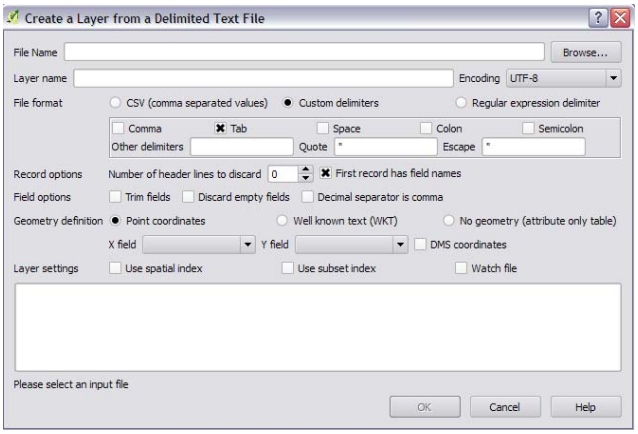


3) Add Raster 
4) Locate to Folder where data is kept ➔ D:\ GIS_Training\Nepal\Aster_Image.tiff > Open
5) ***Add few dataset (i.e., earthquake) which were downloaded from USGS Website***

- ***Create*** – Able to view and overlay different data format (vector, raster, PostGIS, Delimited Text Layer

Practice:

1) Create layer from a Delimited Text File or CSV format where lat/lon are available 



2) Digitize

- ***Edit –*** Able to edit, change or modify feature or attribute table

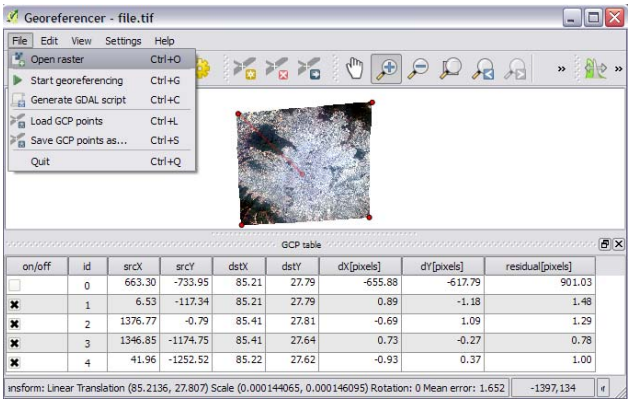
Practice:

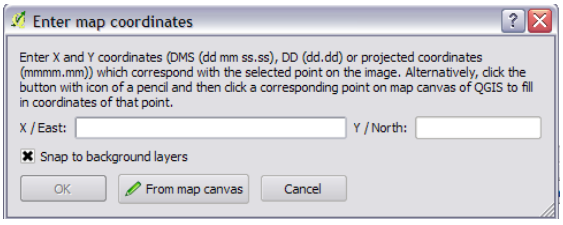
This exercise, we will geo-reference image.

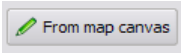
There are two ways to geo-reference image, a) apply geo-referencer in QGIS > raster > georeferencer; and b) convert shape file foot print to grid and copy header file to original (non-georeference) image.

a) Geo-referencer

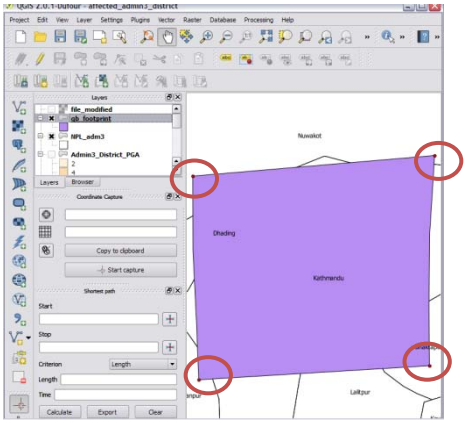
1) Add Vector layer (qb_footprint.shp)
2) From Menu > Raster > Georeferencer > Georeferencer >

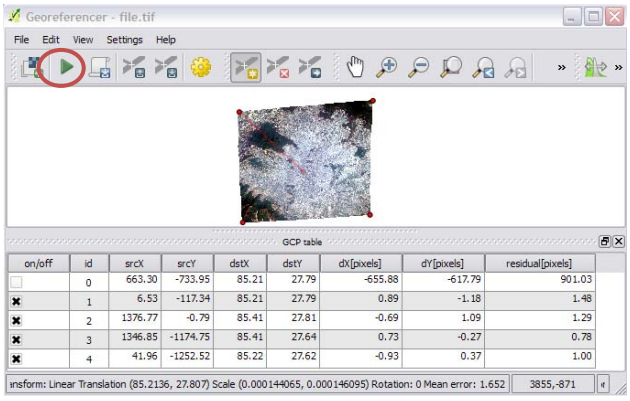




3) Menu File > Open Raster
4) Register with coordinate: Click Add Point  > Click Upper-Left Corner at QB raster image > [Enter map coordination pop-up] > Click From map canvas botton 

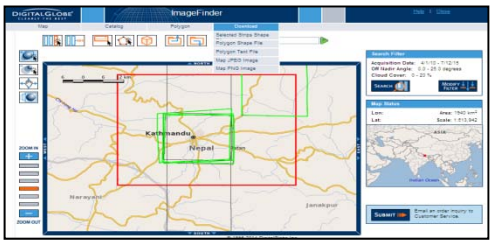
5) Click at the Vector layer (qb_footprint.shp) at the same corner
6) Repeat the step for all 4 corners
7) Georeferencer Window > Click Start georeferencing 



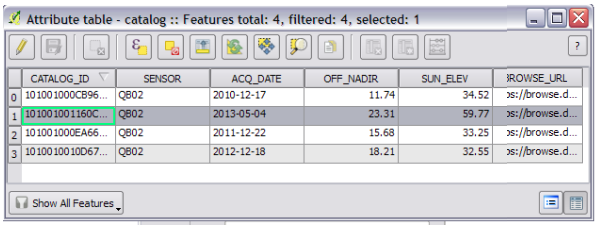


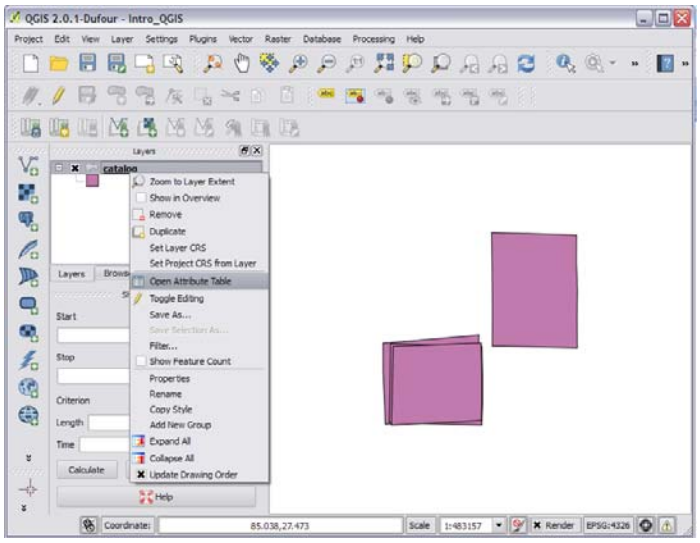
b) Header file creation (Trick)

1) Add shape file > catalog.shp > Right click > Open Attribute table > Select feature (i.e. QB-ACQ-date 2013-05-04)
2) From Catalog layer > Right Click > Save Selection As…> E:/GIS_Training/Nepal/QB_04052013.shp (give same name as QB PNG image)

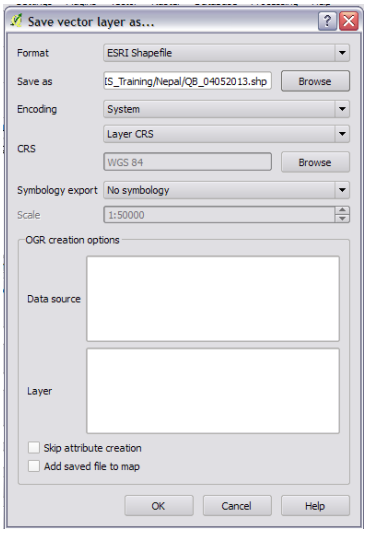


Digital Globe

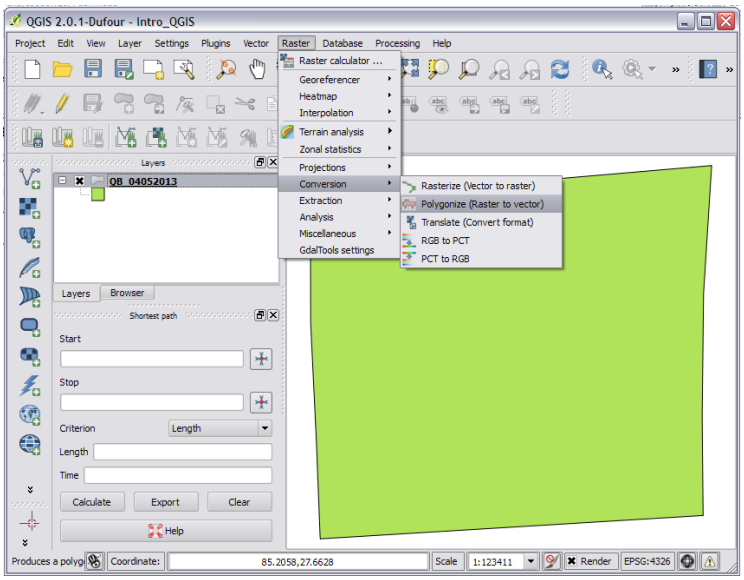


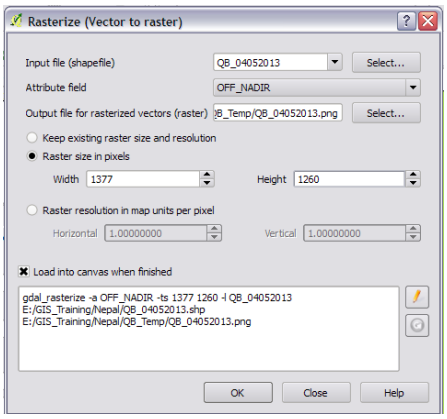


3) Add E:/GIS_Training/Nepal/QB_04052013.shp
4) From Raster Menu > Conversion > Rasterize (Vector to Raster) [Setting] > Click OK



E:/GIS_Training/Nepal/QB_04052013.shp





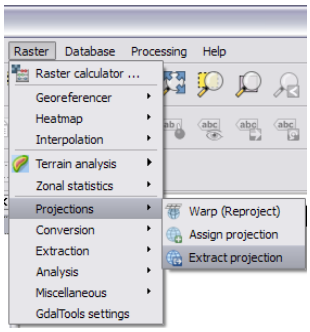
Input (Shapefile)
E:/GIS_Training/Nepal/QB_04052013.shp

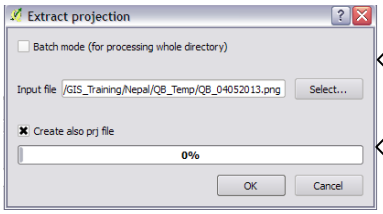
Output (Raster)
E:/GIS_Training/Nepal/**QB_Temp**/ QB_04052013.png

Raster size in pixels
Width: 1377 Height: 1260

Check from original QB image downloaded

5) Raster Menu > Projections > Extract Projection > [Setting] > Click OK
6) Copy (.prj, .wld, and .xml) files to original QB image folder
7) Open Raster E:/GIS_Training/Nepal/QB/ QB_04052013.png

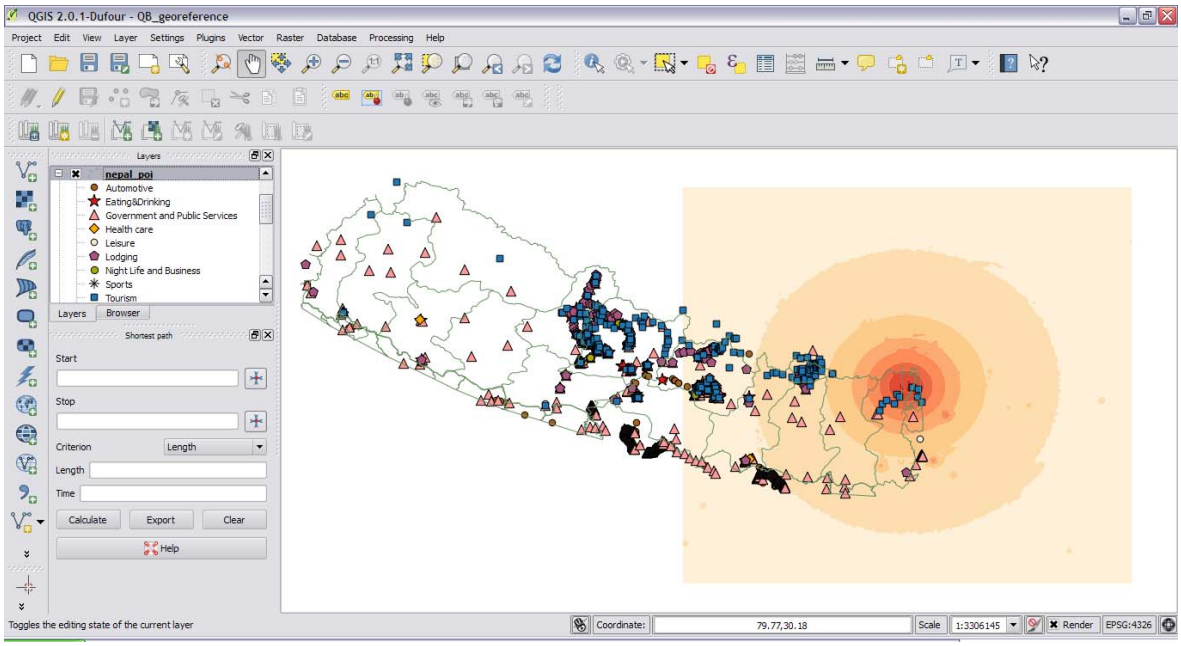




Input file
E:/GIS_Training/Nepal/**QB_Temp**/ QB_04052013.png

Check: Create also prj file

- ***Visualize***

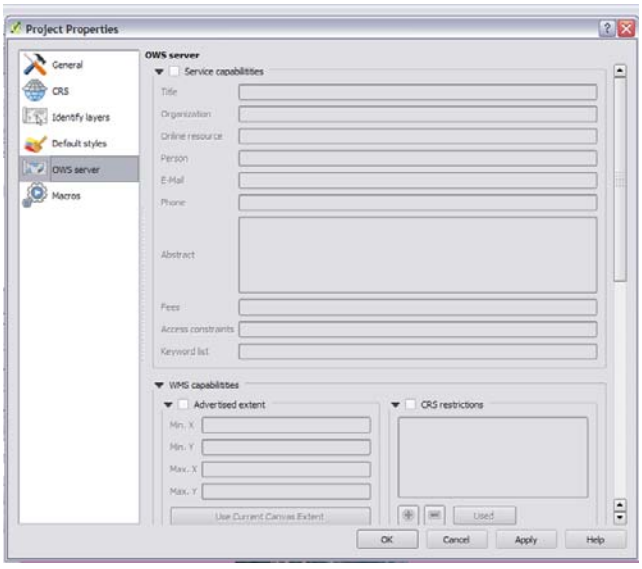


- ***Analyze –*** Perform spatial data analysis (i.e., vector analysis, geo-processing, database, and management tool)

Note:
Practice: Geo-processing techniques on spatial and its attribute through GIS Applications

- ***Publish –*** Share information, be able to create a web map service (WMS) from QGIS project

2) Project Menu > Project Properties > OWS Server
   [Continued in GeoNode Session]

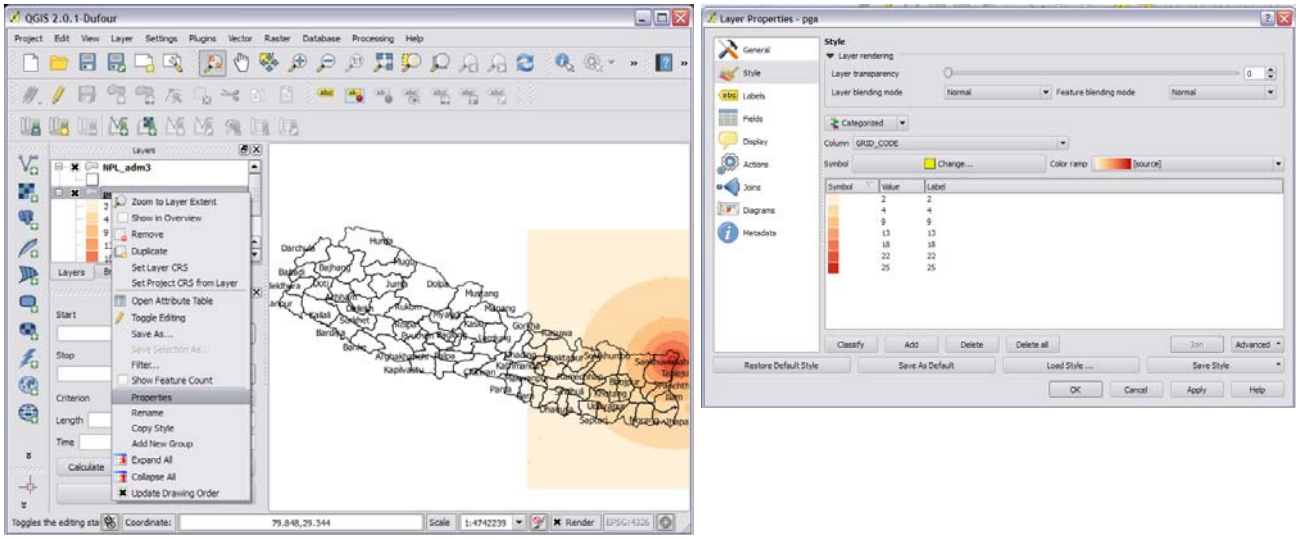


3. Applications

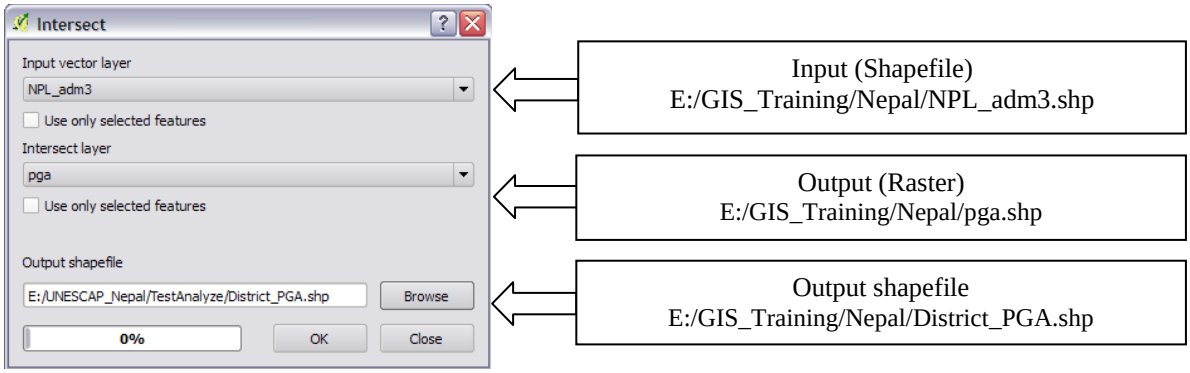
3.1 Estimation on administrative areas affected by earthquake

1) From QGIS > Add Vector (administrative boundary) and peak ground acceleration radius affected by earthquake > NPL_adm3.shp and PGA.shp

2) Adjust symbol > Right Click > Properties > Style



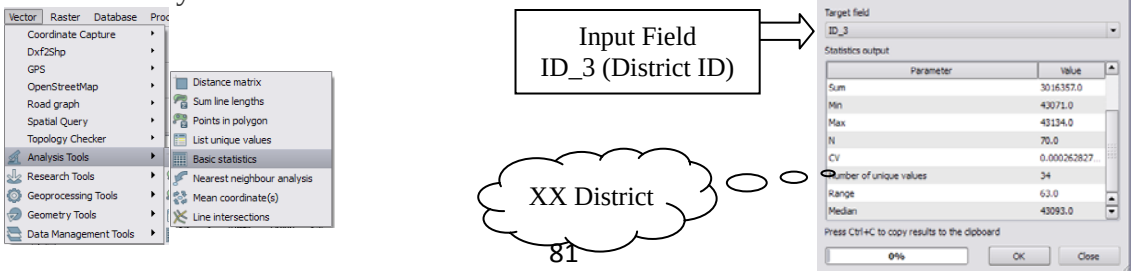
3) Intersect Admin Boundary with earthquake PGA polygon (NPL_adm3.shp and PGA.shp) > Vector > Geo Processing Tools > Intersect > [Setting] > OK



Quiz:

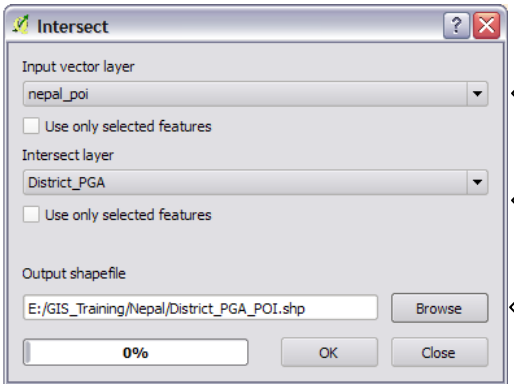
How many districts possibly sensed by the earthquake?

4) Vector > Analysis tool > Basic Statistics



3.2 Estimation on infrastructure affected by earthquake

1) From QGIS > Add Vector (Nepal Place of Interest) and district affected (create from previous exercise ***3.1*** > District_PGA.shp. and Nepal_POI.shp
2) Menu Vector > Geoprocessing Tools > Intersect



Input (Shapefile)
E:/GIS_Training/Nepal/nepal_poi.shp

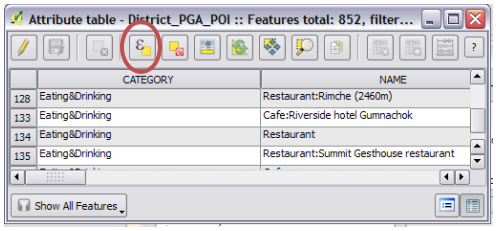
Output (Raster)
E:/GIS_Training/Nepal/District_PGA.shp

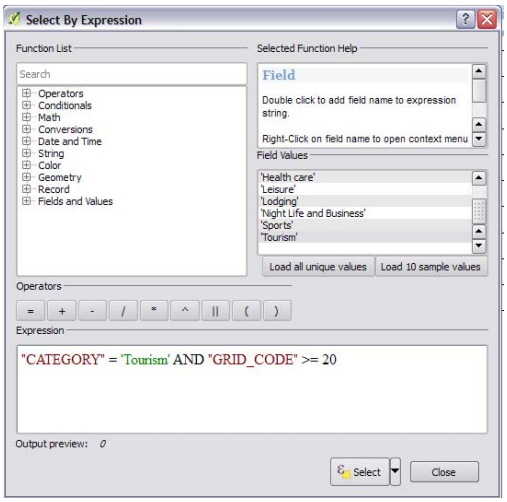
Output shapefile (Point)
E:/GIS_Training/Nepal/District_PGA_POI.shp

Quiz:

1. What types of Poi possibly the most affected by the earthquake**?**
2. How many places in Government and Public Services and Health care possibly affected by the earthquake and in each level.

3) Open Attribute table > Select by Expression





Note:

- Check roughly in attribute table
- Apply query expression

"CATEGORY" = 'Tourism' AND "GRID_CODE" >= 20

"CATEGORY" = 'Government and Public Services' AND "GRID_CODE" >= 8 AND "GRID_CODE" <= 16
"CATEGORY" = 'Government and Public Services' AND "GRID_CODE" <= 4

"CATEGORY" = 'Health care' AND "GRID_CODE" >= 8 AND "GRID_CODE" <= 16
"CATEGORY" = 'Health care' AND "GRID_CODE" <= 4

Answer 1

POI	**Sensed Strongly** (20-24)
Tourism	4

Answer 2

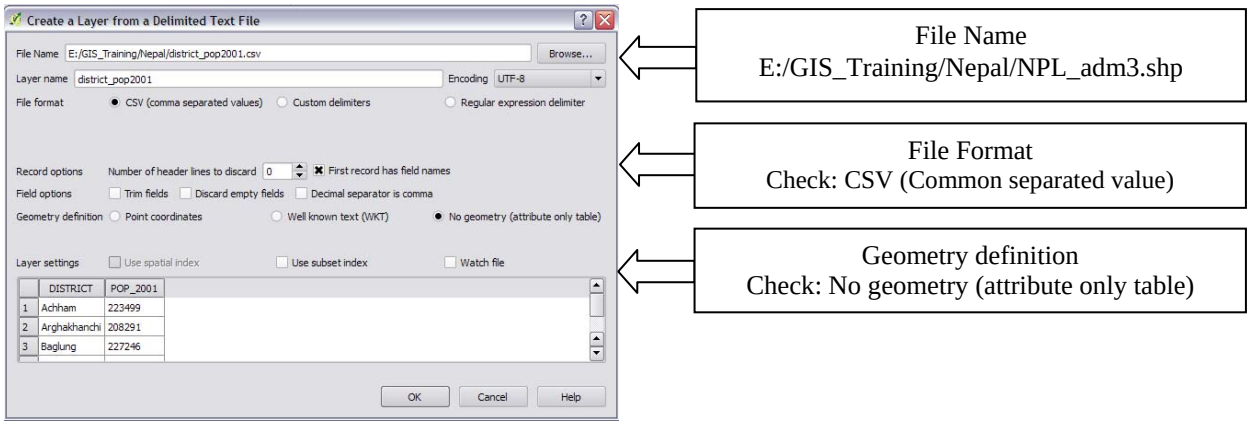
POI	**Sensed**		
	Strongly (20-24)	Moderate (8-16)	Weak (2-4)
Government and Public	0	3	298
Health care	0	0	43

You may classify each POI types

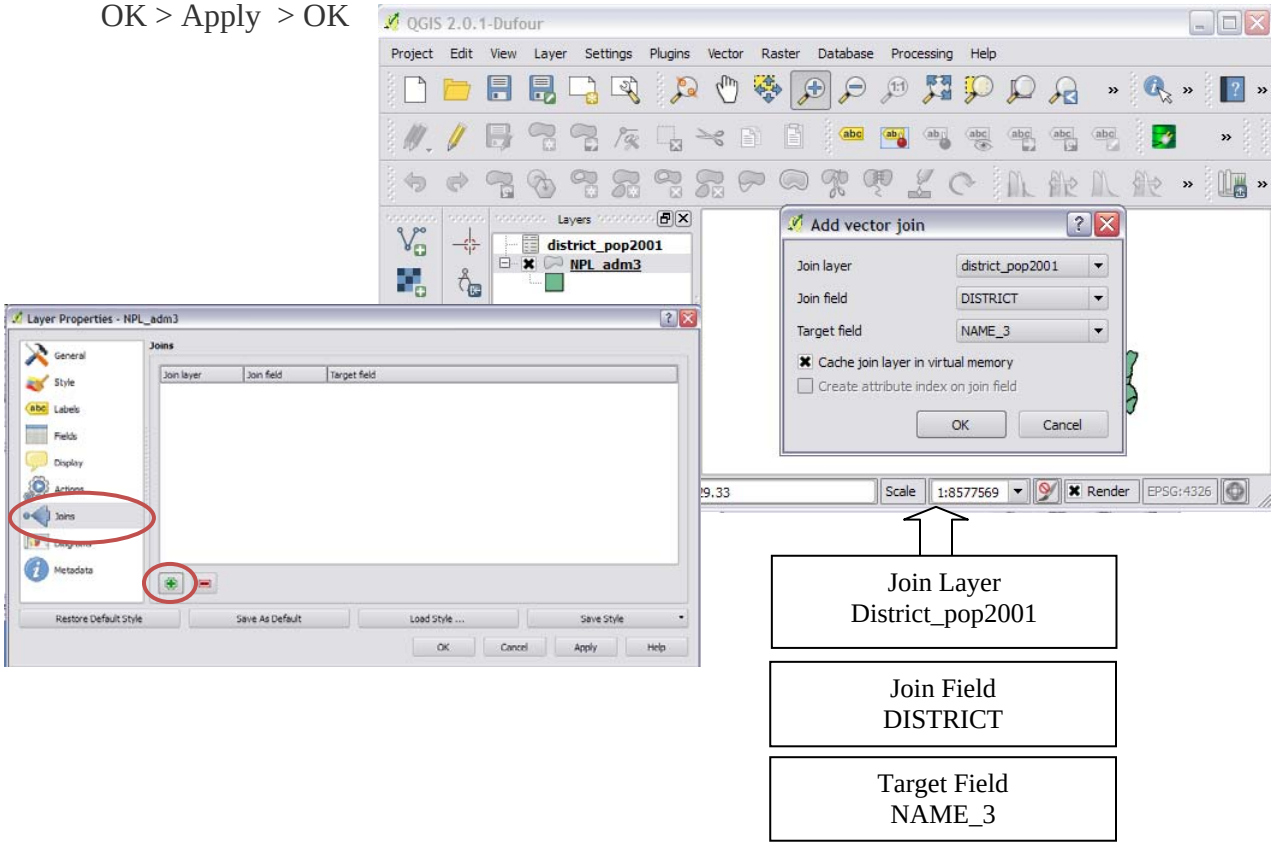
POI	**Sensed**		
	Strongly (20-24)	Moderate (8-16)	Weak (2-4)
Automotive			
Eating&Drinking			
Government and Public			
Services			
Health care			
Leisure			
Lodging			
Night Life and Business			
Sports			
Tourism			

3.3 Estimation on people affected by earthquake

1) From QGIS > Add Vector (E:/GIS_Training/Nepal/NPL_adm3.shp) and Table (E:/GIS_Training/Nepal/district_pop2001.csv) > [Setting] > OK



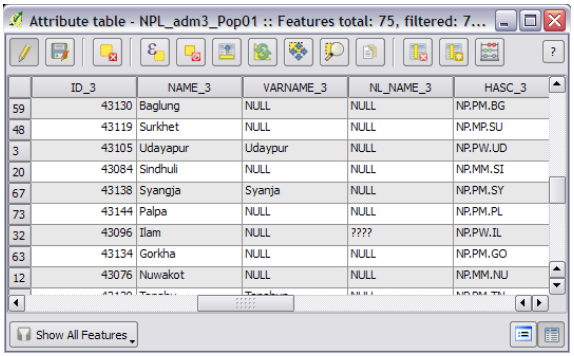
2) Right Click on NPL_adm3.shp > Properties > Joins> Add Vector Join [Setting] > OK > Apply > OK

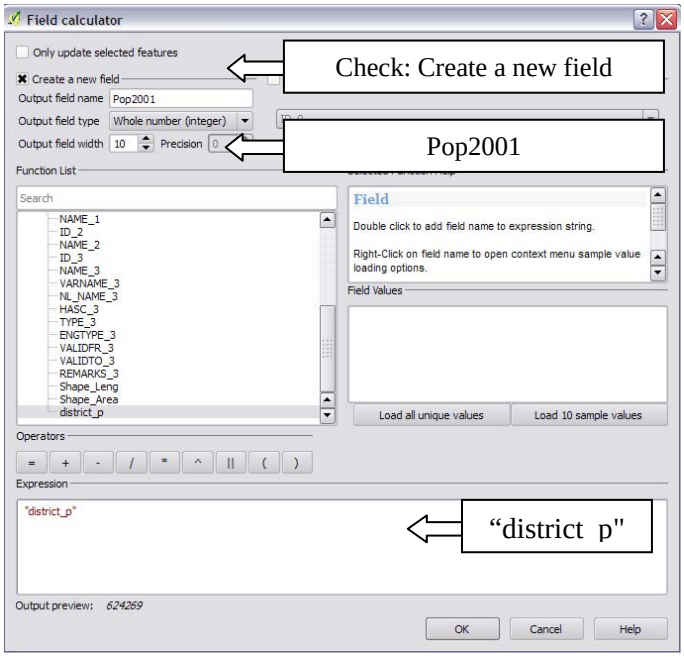


3) Check Attribute Table > NPL_adm3 > Right Click > Open Attribute Table >

4) Export to a new layer > NPL_adm3 > Right Click > Save as > (E:/GIS_Training/Nepal/Processed/NPL_adm3_Pop01.shp)

5) Add (E:/GIS_Training/Nepal/Processed/NPL_adm3_Pop01.shp) > Open Attribute Table > Toggle Editing mode > Open Field Calculator > [Setting] > OK



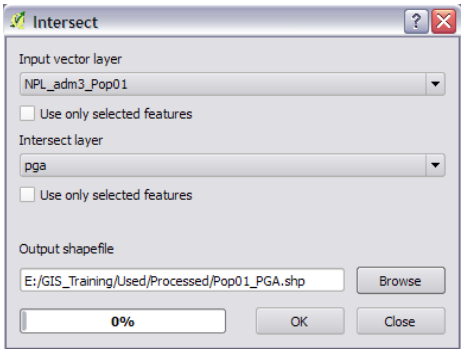


6) Repeat by Adding 2 more Columns [Area, and Pop_Den (Pop Density)]

Area ➔ Expression: $area

Pop Den ➔ Expression: "Pop2001" / "Area"

5) Add Earthquake PGA polygon (E:/GIS_Training/Nepal/PGA.shp) > Intersect: from Menu Vector > Geo Processing Tools > Intersect > [Setting] > OK



Input (Shapefile)
E:/GIS_Training/Nepal/NPL_adm3_Pop01.shp

Output (Raster)
E:/GIS_Training/Nepal/PGA.shp

Output shapefile (Point)
E:/GIS_Training/Nepal/Processed/Pop01_PGA.shp

QUIZ: Which province and how many people affected at the strongest level of earthquake?

Data Preparation

UNESCAP Geo_DRM Training

Representing Geographic Features

How do we describe geographical features?

- by recognizing two *types of data*:
  - **Spatial data** which describes location (where)
  - **Attribute data** which specifies characteristics at that location (what, how much, and when)

How do we represent these digitally in a GIS?

- by grouping into ***layers*** based on similar characteristics (e.g hydrography, elevation, water lines, sewer lines, grocery sales) and using either:
  - **vector** data model (*coverage* in ARC/INFO, *shapefile* in ArcView)
  - **raster** data model (*GRID or Image* in ARC/INFO & ArcView)
- by selecting appropriate ***data properties*** for each layer with respect to:
  - ***projection, scale, accuracy,*** and ***resolution***

GIS Data Structures

- **Spatial data types and Attribute data types**
- **Relational database management systems (RDBMS): basic concepts**
  - DBMS and Tables
  - Relational DBMS
- **Raster data structures: *represents geography via grid cells***
  - tesselations
  - run length compression
  - quad tree representation
  - BSQ/BIP/BIL
  - DBMS representation
  - File formats

- **Vector data structures: *represents geography via coordinates***
  - whole polygon
  - point and polygon
  - node/arc/polygon
  - Tins
  - File formats

Spatial Data Types

- *continuous:* elevation, rainfall, ocean salinity
- *areas:*
  - *unbounded:* landuse, market areas, soils, rock type
  - *bounded:* city/county/state boundaries, ownership parcels, zoning
  - *moving:* air masses, animal herds, schools of fish
- *networks:* roads, transmission lines, streams
- *points:*
  - *fixed:* wells, street lamps, addresses
  - *moving:* cars, fish, deer

Attribute data types

Categorical (name):

- nominal
  - no inherent ordering
  - land use types, county names
- ordinal
  - inherent order
  - road class; stream class

- often coded to numbers eg SSN but can't do arithmetic

Numerical:

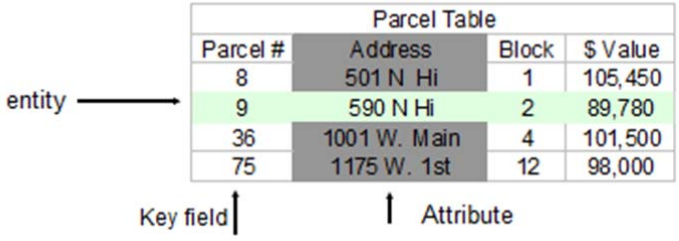
Known difference between values

- interval
  - No natural zero
  - can't say 'twice as much'
  - temperature (Celsius or Fahrenheit)
- ratio
  - natural zero
  - ratios make sense (e.g. twice as much)
  - income, age, rainfall

- may be expressed as *integer* [whole number] or *floating point* [decimal fraction]

Attribute data tables can contain locational information, such as addresses or a list of X,Y coordinates. ArcView refers to these as event tables. However, these must be converted to true spatial data (shape file), for example by geocoding, before they can be displayed as a map.

Data Base Management Systems (DBMS)



Contain **Tables** or ***feature classes*** in which:

- ***rows***: entities, records, observations, features:
  - 'all' information about one occurrence of a feature
- ***columns***: attributes, fields, data elements, variables, items (ArcInfo)
  - one type of information for all features

The ***key field*** is an attribute whose values uniquely identify each row

Relational DBMS

Tables are related, or *joined*, using a common record identifier (column variable), present in both tables, called a *secondary (or foreign) key*, which may or may not be the same as the key field.

Parcel Table			
Parcel #	Address	Block	$ Value
8	501 N Hi	1	105,450
9	590 N Hi	2	89,780
36	1001 W. Main	4	101,500
75	1175 W. 1st	12	98,000

Geography Table			
Block	District	Tract	City
1	A	101	Dallas
2	B	101	Dallas
4	B	105	Dallas
12	E	202	Garland

Secondary or foreign key

Goal: produce mapof values by district/ neighborhood

Problem: no district code available in Parcel Table

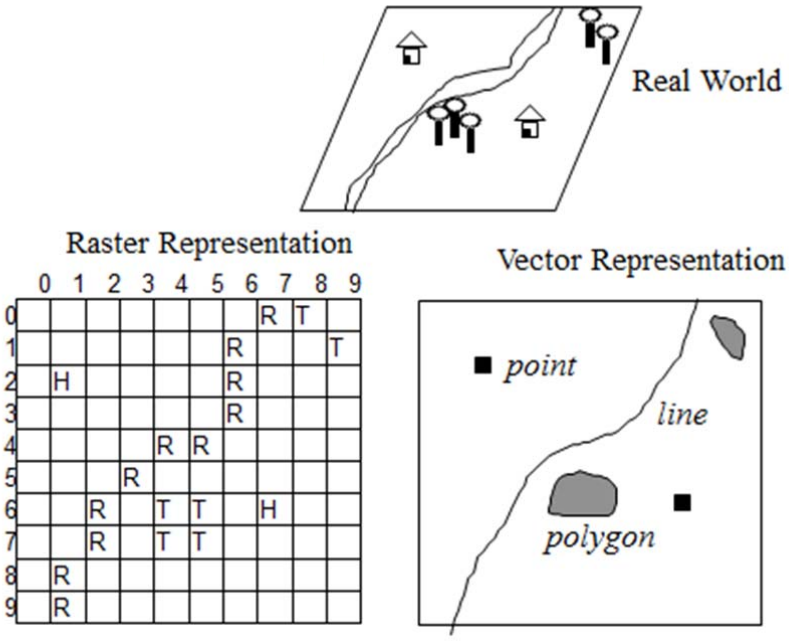
Solution: join Parcel Table, containing values, with Geograpahy Table, containing location codings, using Block as key field

GIS Data Models

- **Raster data model**
  - location is referenced by a grid cell in a rectangular array (matrix)
  - attribute is represented as a single value for that cell
  - much data comes in this form
    - images from remote sensing (LANDSAT, SPOT)
    - scanned maps
    - elevation data from USGS
  - best for continuous features:
    - elevation
    - temperature
    - soil type
    - land use

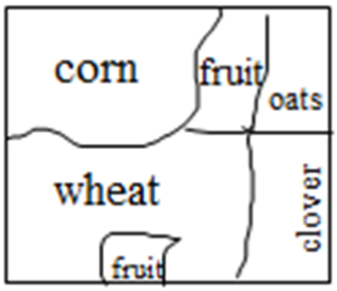
- **Vector data model**
  - location referenced by x,y coordinates, which can be linked to form lines and polygons
  - attributes referenced through unique ID number to tables
  - much data comes in this form
    - DIME and TIGER files from US Census
    - DLG from USGS for streams, roads, etc
    - census data (tabular)
  - best for features with discrete boundaries
    - property lines
    - political boundaries
    - transportation

Concept of Vector and Raster



Representing Data using Raster Model

- area is covered by grid with (usually) equal-sized cells
- location of each cell calculated from origin of grid:
  - "two down, three over"
- cells often called *pixels* (picture elements); raster data often called *image* data
- attributes are recorded by assigning each cell a single value based on the majority feature (attribute) in the cell, such as land use type.
- easy to do overlays/analyses, just by 'combining' corresponding cell values: "*yield= rainfall + fertilizer*" (why raster is faster, at least for some things)
- simple data structure:
  - directly store each layer as a single table
    (basically, each is analagous to a "spreadsheet")
  - computer data base management system not required (although many raster GIS systems incorporate them)



	0	1	2	3	4	5	6	7	8	9
0	1	1	1	1	1	4	4	5	5	5
1	1	1	1	1	1	4	4	5	5	5
2	1	1	1	1	1	4	4	5	5	5
3	1	1	1	1	1	4	4	5	5	5
4	1	1	1	1	1	4	4	5	5	5
5	2	2	2	2	2	2	2	3	3	3
6	2	2	2	2	2	2	2	3	3	3
7	2	2	2	2	2	2	2	3	3	3
8	2	2	4	4	2	2	2	3	3	3
9	2	2	4	4	2	2	2	3	3	3

Raster Data Structures: Concepts

- grid often has its origin in the upper left but note:
  - State Plane and UTM, lower left
  - lat/long & cartesian, center
- single values associated with each cell
  - typically 8 bits assigned to values therefore 256 possible values (0-255)
- rules needed to assign value to cell if object does not cover entire cell
  - majority of the area (for continuous coverage feature)
  - value at cell center
  - 'touches' cell (for linear feature such as road)
  - weighting to ensure rare features represented
- choose raster cell size 1/2 the length (1/4 the area) of smallest feature to map (smallest feature called minimum mapping unit or resel--**res**olution **el**ement)
- *raster orientation*: angle between true north and direction defined by raster columns
- *class:* set of cells with same value (e.g. type=sandy soil)
- *zone:* set of *contiguous* cells with same value
- *neighborhood:* set of cells adjacent to a target cell in some systematic manner

Reference

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