Geographic Information Systems
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Lecture - 64
Geoserver - Raster and SLD Integration

Namaste. Welcome to NPTEL online certification course on Geographic Information Systems. I am Chandan PhD student in Ranbir and Chitra Gupta School of Infrastruture Design and Management. In this particular module we are going to see how we can use GIS as a software. And this particular hands-on will take us to the GeoServer and its application, how to add a raster into GeoServer and integration of SLD in GeoServer.

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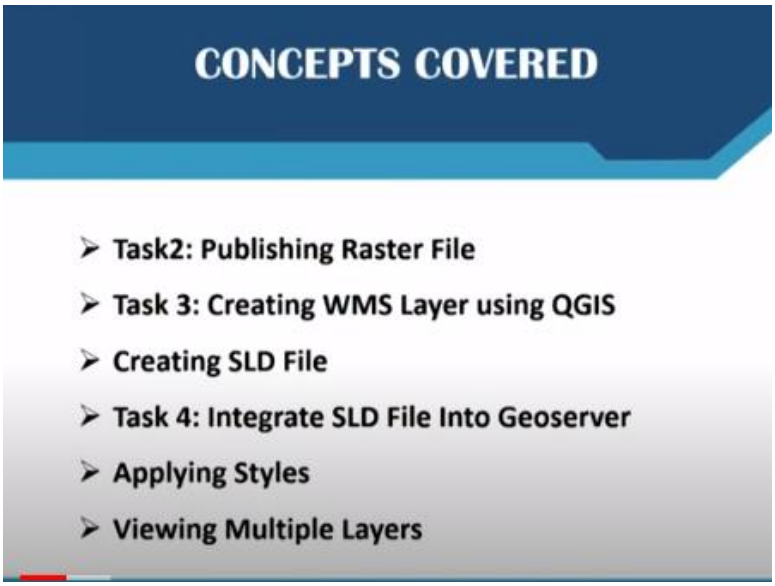

So today we are going to see the task 2 which is publication or publishing raster file. Task 3 creating WMS layer using QGIS. Creating SLD file and how to integrate this SLD file into GeoServer, applying various different styles, and finally viewing multiple layers in GeoServer.

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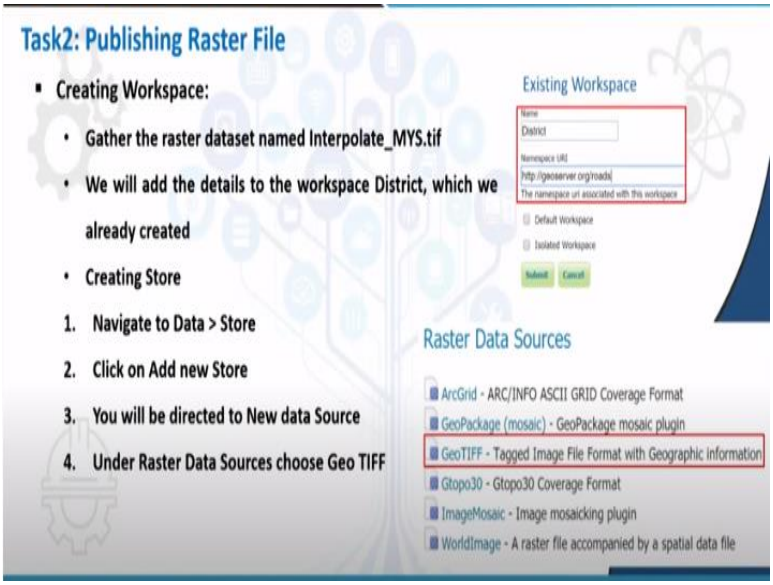

So in the previous class we had seen how to publish a vector file. So in this class, we will see how to publish a raster data. So for doing that you need to go to the website or the local host where your GeoServer is stored.

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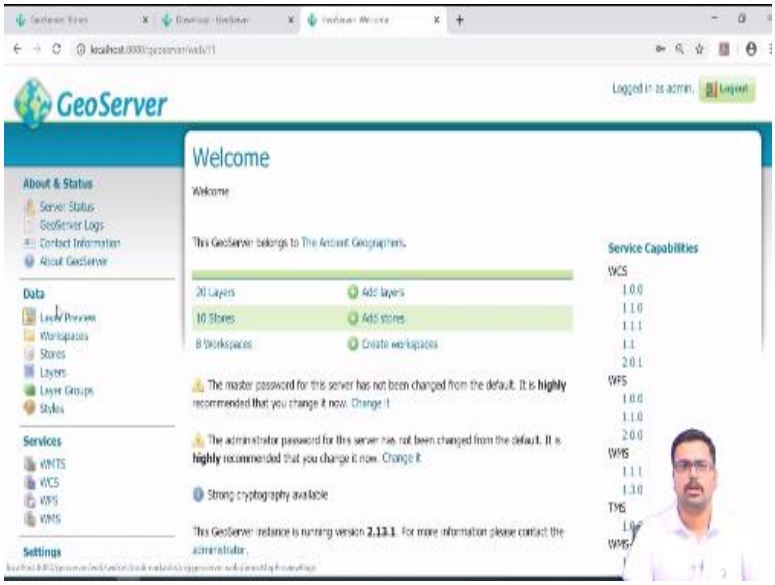

So the address is localhost hyphen, sorry, colon 8080 is the port which is given during the installation of GeoServer and forward slash GeoServer forward slash web. This is the home address of GeoServer. So once you go to the home of GeoServer, you need to login with the username and password. By default the username is admin and password is given as geoserver.

So once you give username and password, you can just click on login. So in the welcome or the homepage, you can see how many layers are present, how many

stores are there and how many workspace are there. Out of these, many of them are already existing workspaces which is called as the default workspace. In the previous GeoServer hands-on we had created a workspace by the name district in which we have added the vector shape file by the name Mysore district roads.

So let us just try to preview that one. So in under the data menu tab, you have layer preview.

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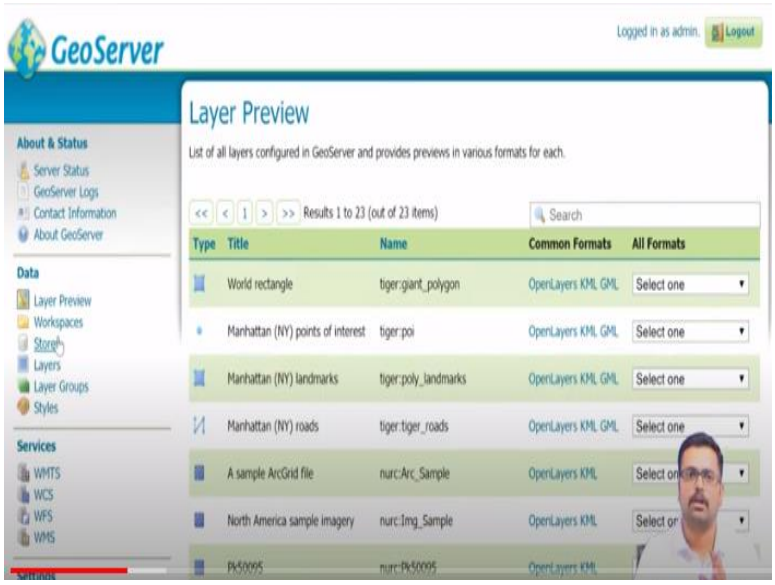

So if you click on this, so here you can see at the bottom, just browse to the bottom and you can see district roads clip. So that is the road layer which we had given.

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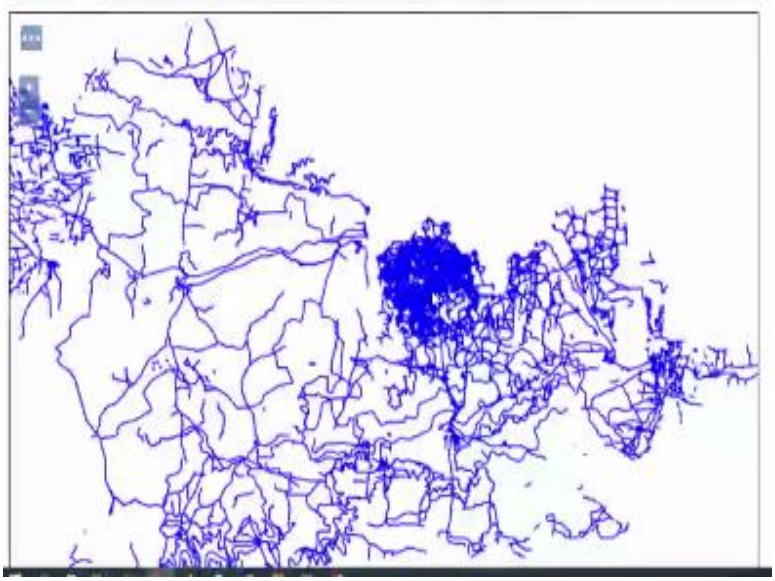

If you want to see that you can click on open layers. So this will take you to the vector shapefile which we had published in the last class. So now let us see how to add a raster into GeoServer.

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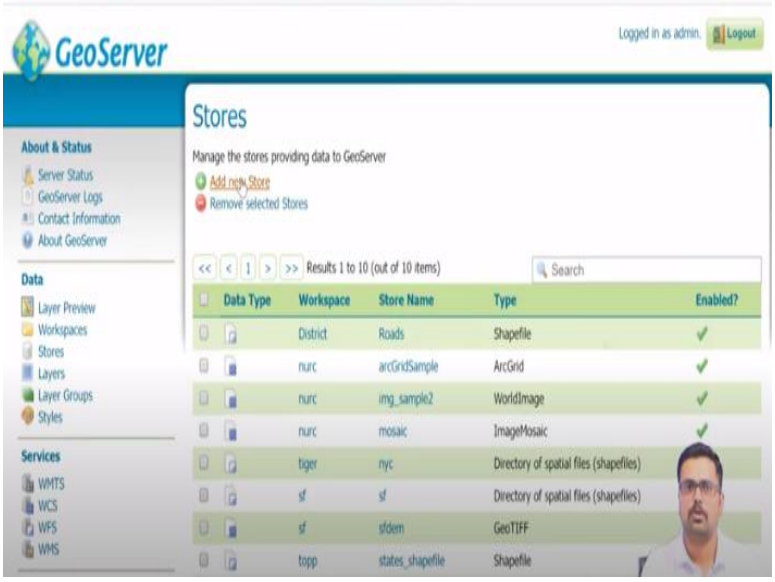

For doing that as usual, we need to first create store. Now please remember once you create a workshop for a particular location let us say you are working on Pune. Then you do not have to again create one more workspace. That particular single workspace can hold various layers. So here I am not creating one more workspace. I am keeping the district workspace as such. So I am directly going to add stores. So once you click on stores, you can say add new store.

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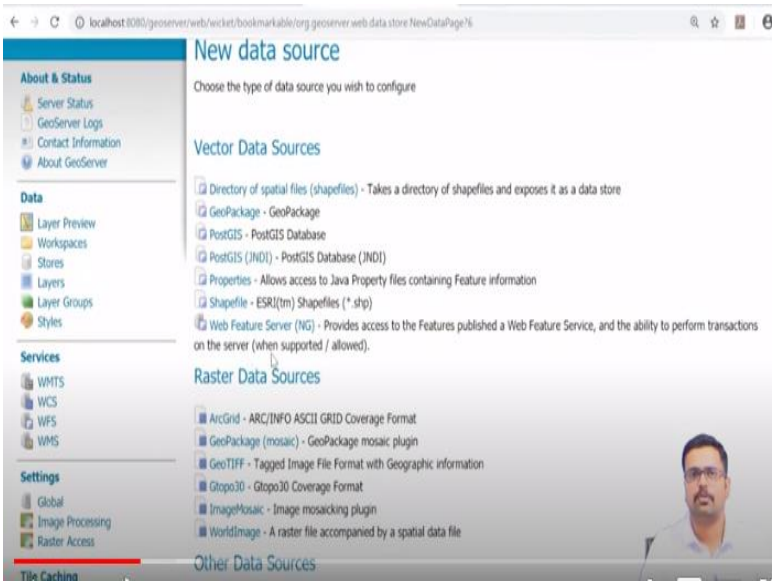

So here you can see there are various different vector data sources and raster data sources. So now what we are going to add is the rainfall interpolated map for my Mysore district that we had performed in our QGIS hands-on session. So I am going to press a GeoTIFF that is nothing but tagged image file format.

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Once you press on that, you have to give some basic information about the raster data source. So here the workspace to which it belongs is district. And data source name I am giving it as interpolation, description if you want you can give it as rainfall interpolation map of Mysore. And for the connection parameters just like we connected for the vector data here also you need to browse to the local directory where you have kept the data sets.

So I have kept it in D. I will go to D. And here you can see data sets for NPTEL. Under that in the raster or in the outputs we have something called as interpolation clip. This is the interpolated map, which was clipped for Mysore district. So I am going to browse for that and then say save.

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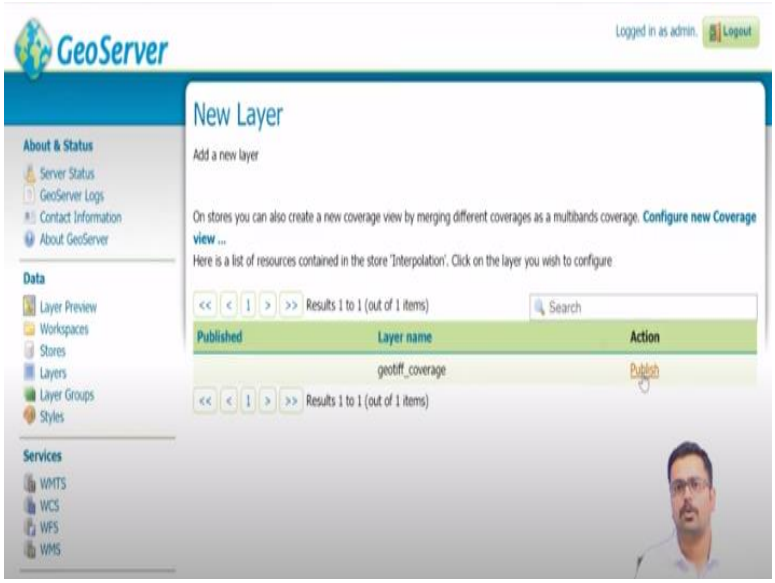

So now once you click on Save, it will be added as a new layer, but it will also ask whether you want to publish that particular layer or not. Now you can press on publish. So once before finishing the publishing action, you need to edit the layer with the other information which is required to publish.

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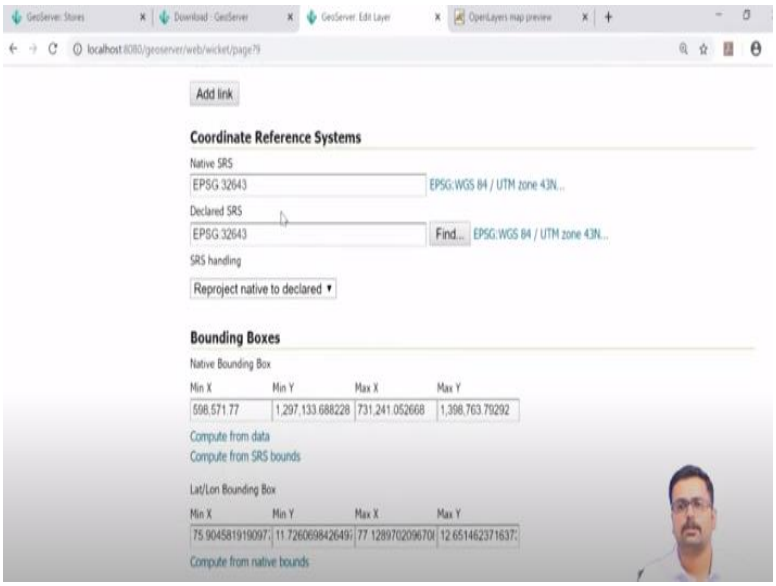

So here under the edit layer, basic resource info you can give this and once you come down, if you want you can give all this abstract and the other information. So in the coordinate reference system you can see it is belonging to 32643 EPSG code. That is nothing but WGS ATM excuse me, WGS 84 and Universal Transverse Mercator. This is the kind of projection zone number 43 north.

And after that you can say bounding boxes are already there. So if you want to take it from the data you can just click on compute from data and compute from native bounds so that it can take the extents from the already existing the raster layer.

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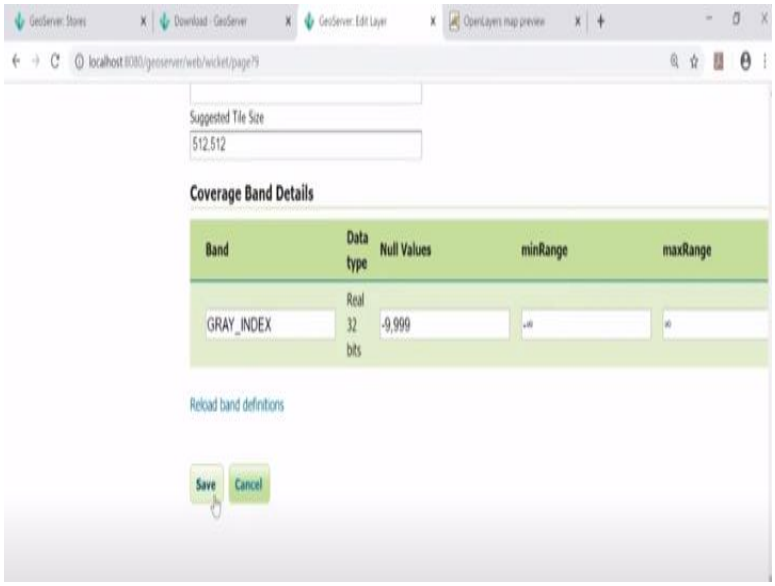

So then you also have coverage band details and minimum and maximum range. So once you look at all these things you can just press save.

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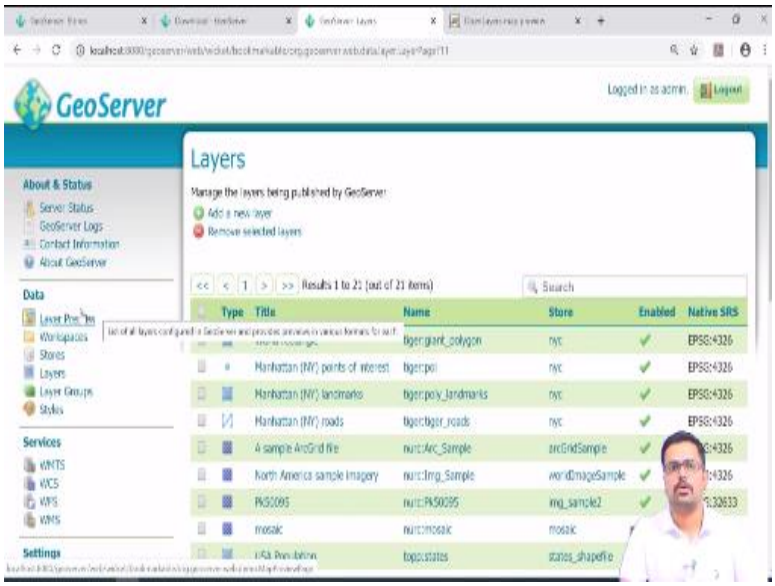

So this particular raster has been now called into GeoServer and has been added under the store. And now if you want to preview this, you can directly go to Layer preview and here at the bottom you can see under the district GeoTIFF coverage, so this is a GeoTIFF coverage file. So here you can say open layers.

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So now you can see the raster has been added. So if you want to change the name of this particular layer, that is also possible because at the left it is appearing as GeoTIFF coverage. If you need to change this, you can again once again go to layers and you can come to the bottom and here you can see GeoTIFF coverage you can click on that. So now the name section here, by default it is taking GeoTIFF coverage.

So instead of that I am just giving it as interpolation. So title also you can give it as interpolation and then you do not have to change anything else you can just say save. So now if you go to Layer preview, directly, you can see at the bottom the name will be changed from coverage to interpolation. Here you can see that. So this is how we add a raster data into GeoServer.

Next what we are going to do is we will look at how to add or create a WMS that is nothing but a web mapping service layer using QGIS. So for doing that, I am going to start QGIS interface.

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Here we are using QGIS version 3. So you can just open the QGIS version 3.4. So the whole idea is to create a layer or its style in QGIS and how we can save that particular style and how to bring that into GeoServer interface with the help of QGIS.

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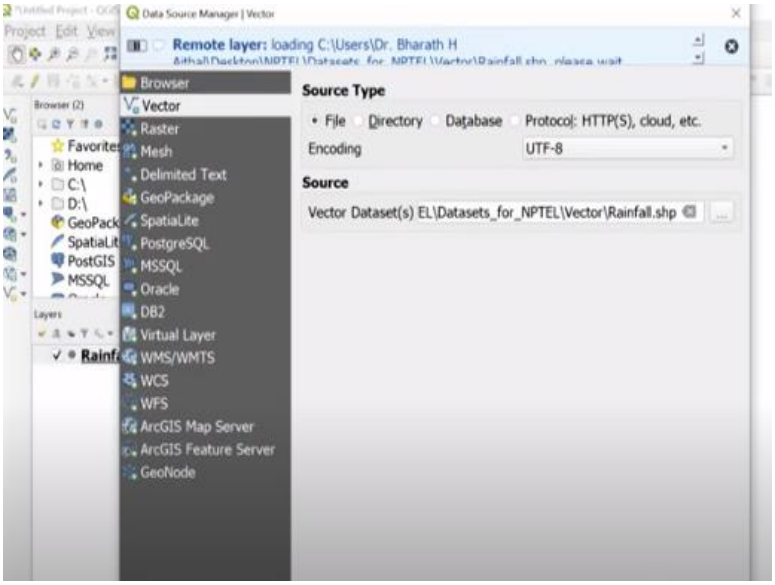

So once you open the QGIS interface, so here let us try to add the rainfall shapefile which we had seen in the our previous examples. So go to Add Layer, add vector layer. And here you can browse to the folder where we have kept our data sets. So you can choose rainfall dot shp and then say open and click on add. This is how we add a vector layer, then say close. Now let us say I need to change this particular color.

So what I will do is I will right click on rainfall, I will go to properties. In the Properties tab under the symbology. here we can easily change the color. If you want to take any of the standard colors or any variants, you can just choose it.

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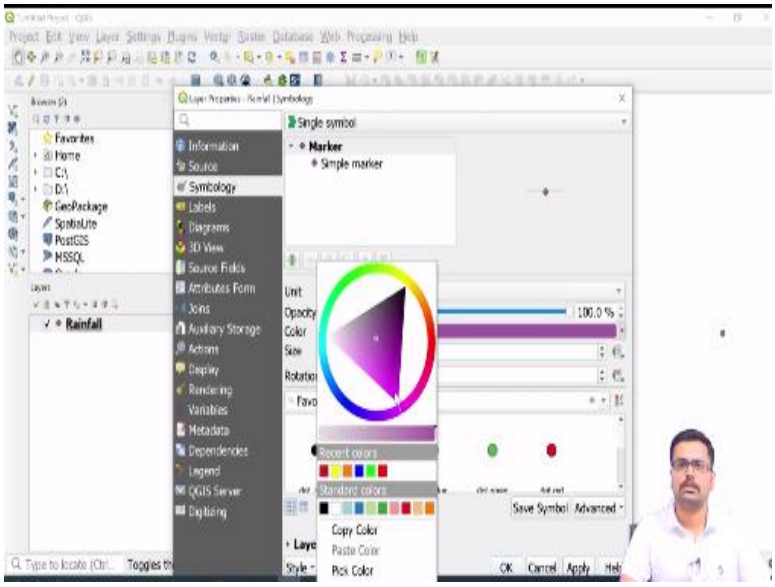

For example here let me just select pink color. Once you have chosen the color, you can just choose the size as well. So if you think this is very small size, I will keep it as 3.5. And once that is done you can say Apply. Then you can see the points has been taken the color which has been specified. Now if you want to save this particular style, we can go to style, and then you can click on Save style.

So here save style as a QGIS XML style file. So click on that. You have to save it as a SLD. That is nothing but style layer descriptor. So once you click on that it is asking for where to save. Just browse wherever you want to save this particular file. So here I am putting it in the data sets folder. I will call this as rainfall underscore style. And then say enter. So rainfall style has been taken. So you can click on okay and then say okay.

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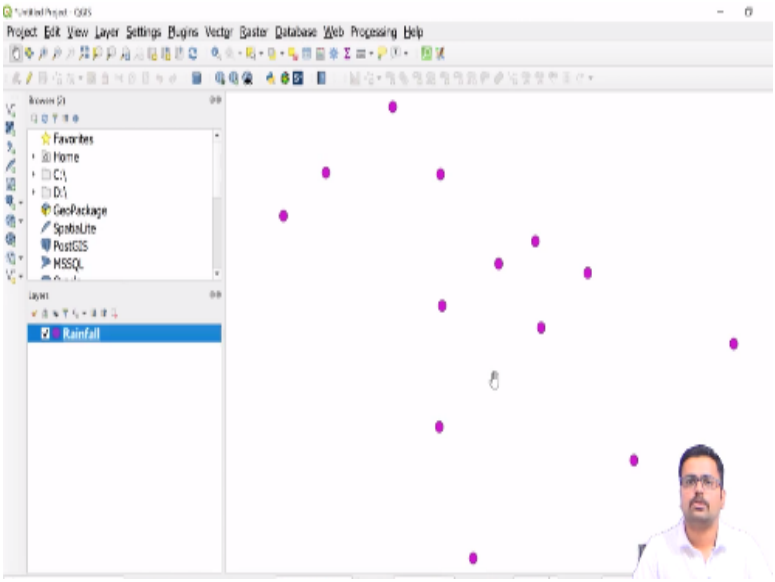

So now you can see this particular file has been saved as SLD. Now let us see how to add this rainfall data into the GeoServer and then how to give the styled layer descriptor. So what do you need to do is you need to go to GeoServer and under the Data tab you have stores. So since we have already created the workspace, I am not going to create any workspace this time, I will directly go to stores and I will go to add new store.

So whenever you need to add a vector or a raster you have to create a new store. So now what I am going to add is a shapefile. So I will under the vector data sources, I will select shapefile. So it is asking for the workspace. I will select it as district. Data source name, I will give it as rainfall. So here the description is rainfall point data. Then under the connection parameters, what I will do is I will go to browse.

And here from the D drive and data sets in the vector, I will select rainfall which is at the last. I will select rainfall dot shp and then say save. Once you save the vector it is asking for whether it is to be published or not. So here I can say publish. So once you select Publish, it will take you to the Edit layer tab wherein you need to provide some other information as well.

If you want to add any kind of additional abstract information you can add it here or you can directly go down. Here you need to say compute bounding boxes from the data. So it will take the UTM coordinates then lat long coordinates you can compute

from native bounds. You can see minimum x, minimum y, maximum x, and maximum y. That is nothing but the latitude and longitudinal extents.

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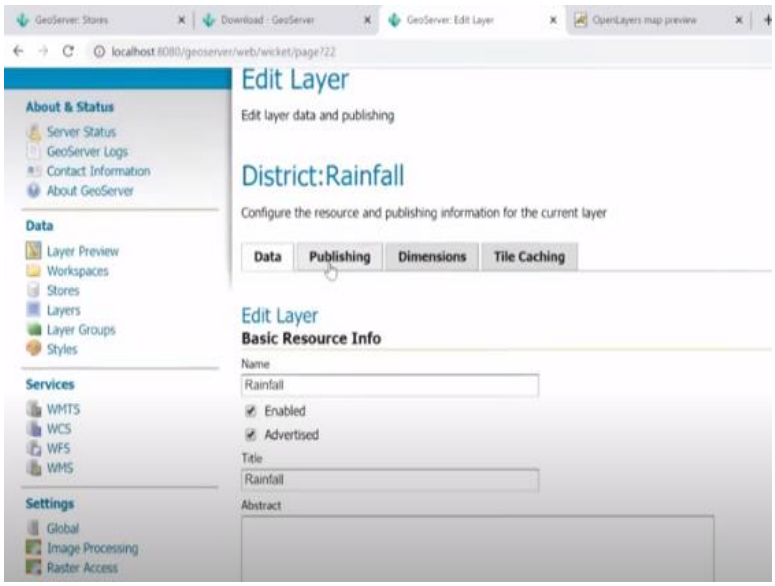

Once you have done this the next thing what you need to do is under the publishing tab, you need to assign the styles for this particular layer. So the styling which we saved was from the QGIS that particular thing we can upload here. So you can just come down and under the default style you can choose the one which is okay since we have not yet saved the style it is not appearing.

So as of now we will proceed with the default style. And at the bottom I will just say save. Now if I go to Layer preview, so here I can see that there is this point data that is the shapefile.

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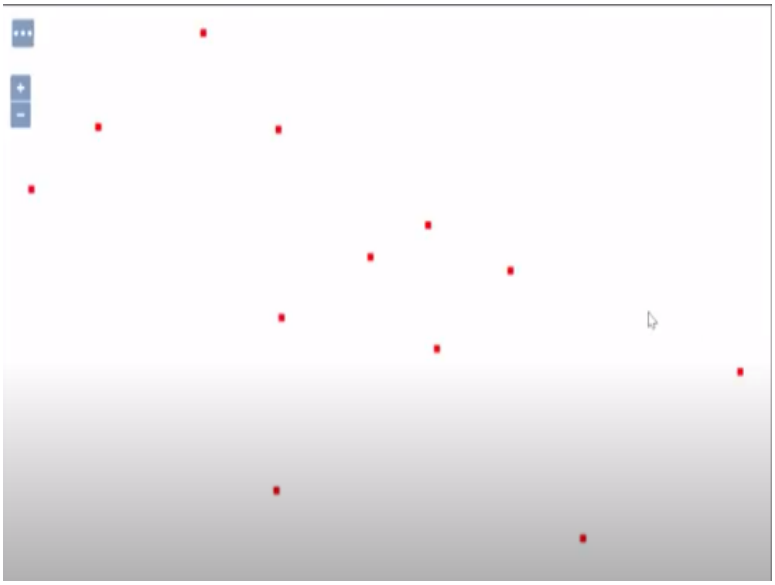

You can click on open layers to view it. So it is by default taking red color, but what we did in QGIS was pink color with 3.5 size. So now let us see how to import that particular style layer descriptor into QGIS. So to import style layer descriptor you have to go to under the Data tab styles. So here you need to click on Add a new style.

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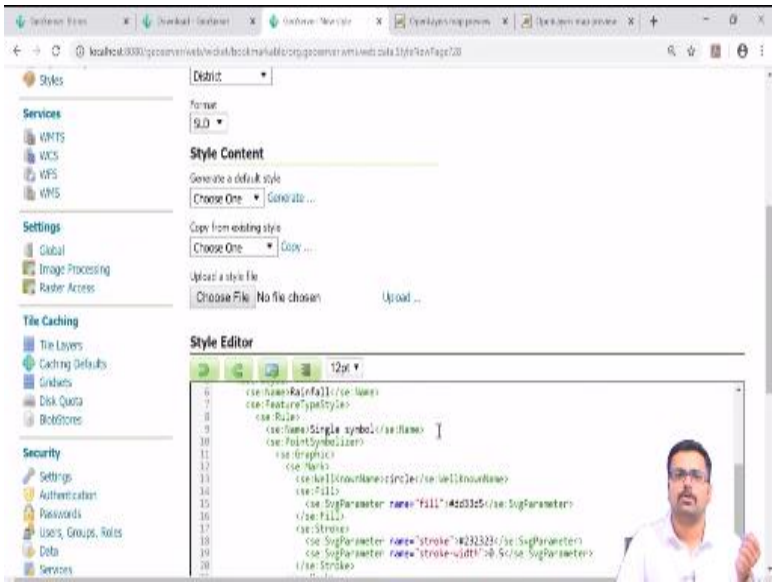

So a name for that new style will be rainfall style and workspace to which it belongs is district. And format is SLD. So here there is one more option called Add legend. If you want to add any kind of legend that is also possible you can add it here. As of now I am leaving it blank. Format is SLD that is nothing but style layer descriptor. So here under the style content, I am choosing the third option, upload a style file.

If you have already existing style, you can choose any one from generate default style or existing style. Since this we are relying upon the QGIS, we are going to choose that particular file. So once that is done you can go to D drive where you have saved it as SLD file. Under the data sets you have rainfall style dot SLD. I will just open this. Once you open you have to click on Upload.

So once you say upload, now you can see in the Style Editor tab the code has been taken. So here you can see the stroke width and all. If you want to change you can change here also if you want to change the color. For example, here the color is 232323 that is in terms of hexadecimal that is hashtag RR GG BB. So the pink color which you have given it is taking 232323. If you want to change you can change here also.

Once that is loaded, you can say validate. So no validation errors. Then you can say Apply. So it is successfully applied. Once it is applied you can say Submit. Now the new style has been created as rainfall style okay. So now let us try to put this particular style into our already existing layer. So for doing that you need to go to layers and at the bottom you have this rainfall shapefile.

So click on the rainfall it will take you to the Edit layer tab. Under publishing you can select publishing tab browse down. So under WMO setting you can select the recently created rainfall style that is nothing but district rainfall style. So here you can see it is by default taking whatever we created in QGIS that is nothing but pink colored and 3.5 is your size. So available styles also you can select, you can just double click on district rainfall.

So on to the right you can see selected styles. Once the style is chosen, you can directly go down and say Save. Now you can go to Layer preview to view that particular style whether it has come or not. And in the rainfall you can say open layers. So now you can see the rainfall has taken the values of whatever color you specified in QGIS. So this is how we create a WMS layer using QGIS and SLD and then bring the SLD to GeoServer.

So the next task is to upload multiple layers and view multiple layers simultaneously. So for doing this, what we are going to do is we will go to the GeoServer menu tab. So far what we have done is we have taken a shapefile. In the task we took the roads shapefile and in the task 2 we imported or we published the interpolation file, which is a raster. And lastly we also imported vector again and we applied the WMS sorry we applied the SLD.

So all these three layers let us group it together and see how it appears in GeoServer. So I am going to layer groups.

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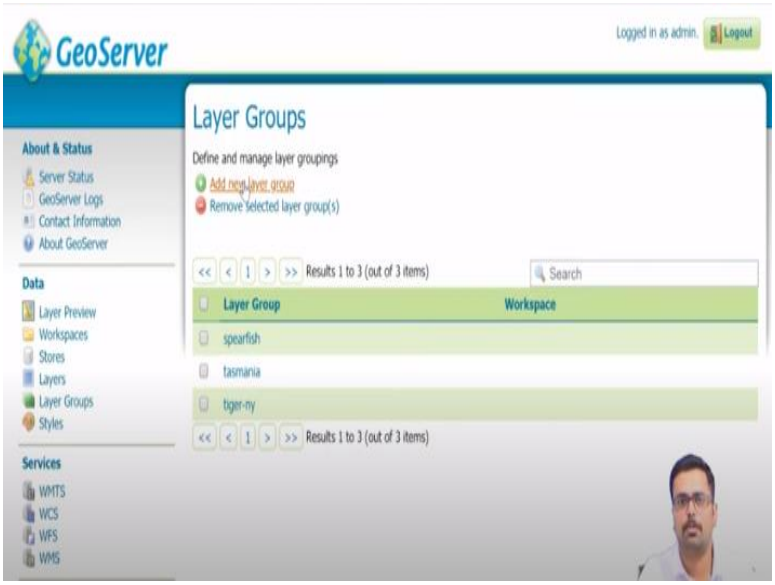

So here in the layer groups, you can say add new layer group. So name for that layer group would be I will give it as Mysore underscore layers, and title also I will keep it same. So here in title, I will put it as Mysore layers. And in the abstract I will give it as Mysore layers consisting of roads, interpolated map and rainfall data. So abstract you can give as per your wish. And then here you can say workspace.

So I will choose it as district. And once the workspace has been selected, you do not have to give the bounds now only. By default it will take once you upload what layers you need. So you can just go to Add Layer and you can add the layers whichever you want. So here there are three different layers. So let us add it one by one.

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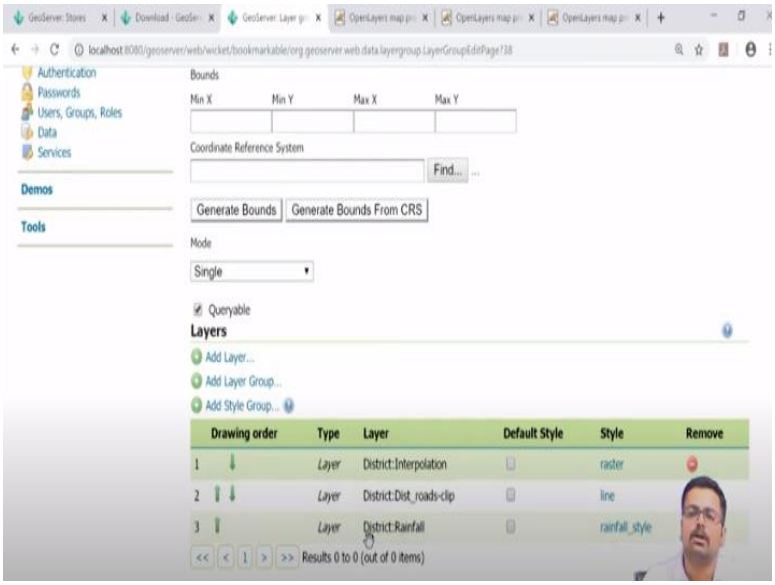

First I will add it as district road clip. So now you can see here at the bottom it has been added. Next I will add one more that is interpolation and one more layer that is rainfall. So all the three I will add one by one. Now here one important thing is the layer has to be in a order. So how to put it in order. First you need to put the raster then line and then at the last we have to put the point.

So here the interpolation is at the middle. So I am going to draw this in the order to the top. So now interpolation is at the first then is road and then is rainfall. Now suppose let us say if you just make it in the other sequence. So what happens is on the interpolation map, your rainfall and roads will come and sit so that you can never see it because interpolation map will be sitting on top.

So drawing order you just be careful. First you need to, in the first you need to put interpolation map or raster, then road layer and then rainfall that is point layer. Now once all the three layers are taken to the layer grouping then you can go here and say generate bounds. So directly it will generate the bounds from the data which you have added and it is also showing the EPSG code correctly. So now you can verify that and then say save.

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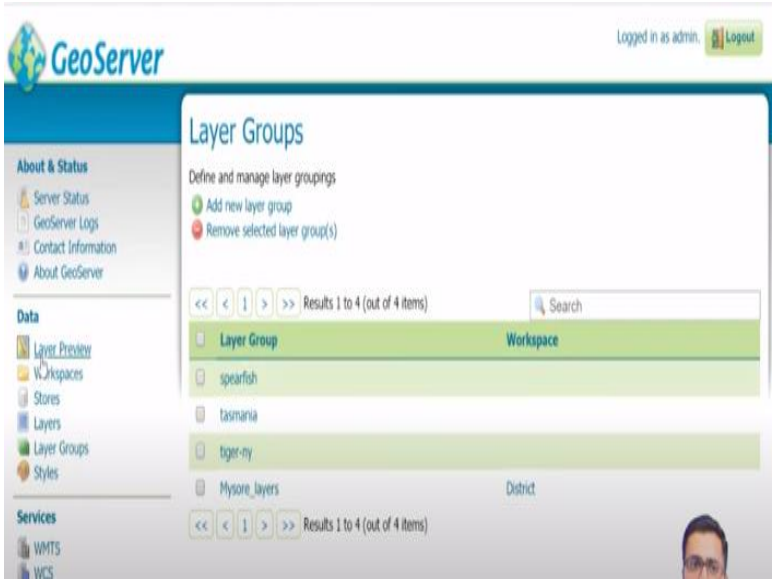

So once you save this, you can see in the layer groups Mysore layers layer group has been created under the workspace district. Now let us see how this layer group together will appear in GeoServer. So to view that I will go to the menu under the menu data layer preview. So here at the bottom you can see this particular symbol which is in green color. This is for later groups, Mysore layers in the workspace of district. So I am going to open layers and open this.

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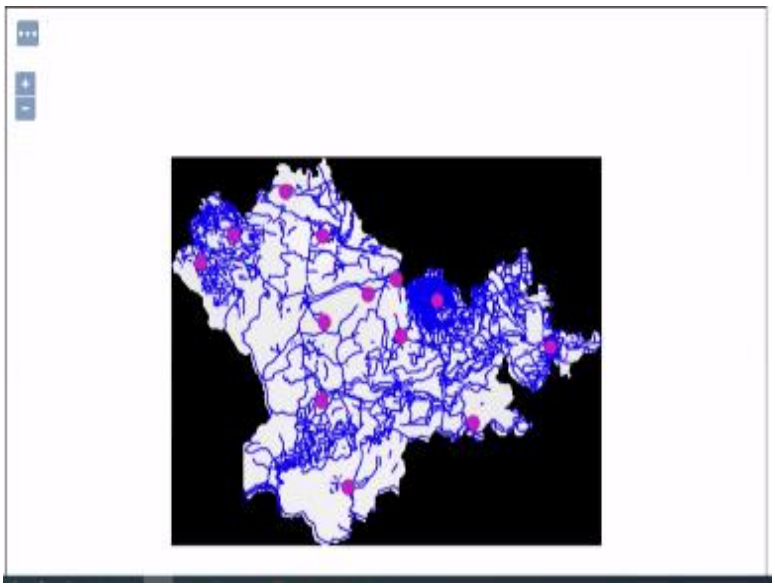

So now you can see first there is a raster on top of a raster there is a road and on top of road you have the rainfall dot shp that is nothing but the vector. So this is how we visualize and we also we can take the SLD from QGIS. And finally, we can also see how to display multiple layers in GeoServer. So this particular thing can be taken into your webpage. This is what Bhuvan uses as a back end, Bhuvan and various other

websites use GeoServer. So GeoServer applications can be seen in various other websites.

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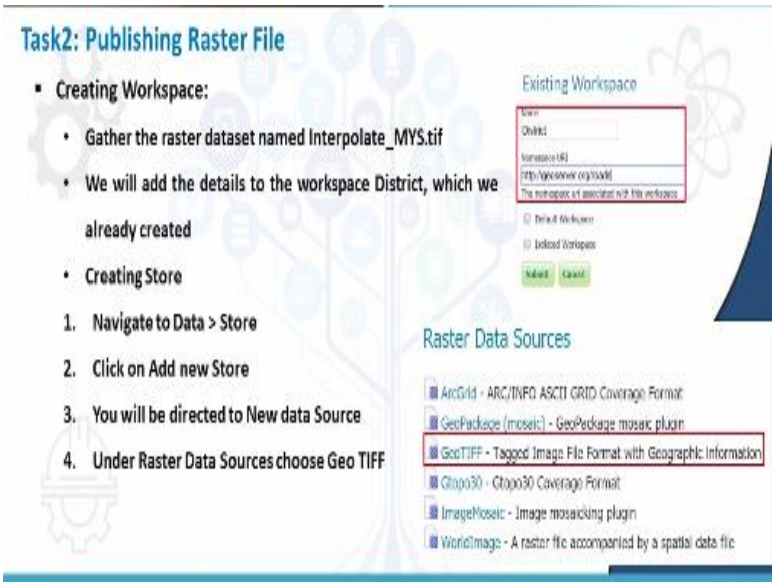

So far we have seen how to publish a raster file and how to integrate the styled layer descriptor into the GeoServer interface.

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And finally, we have seen also how to put multiple layers.

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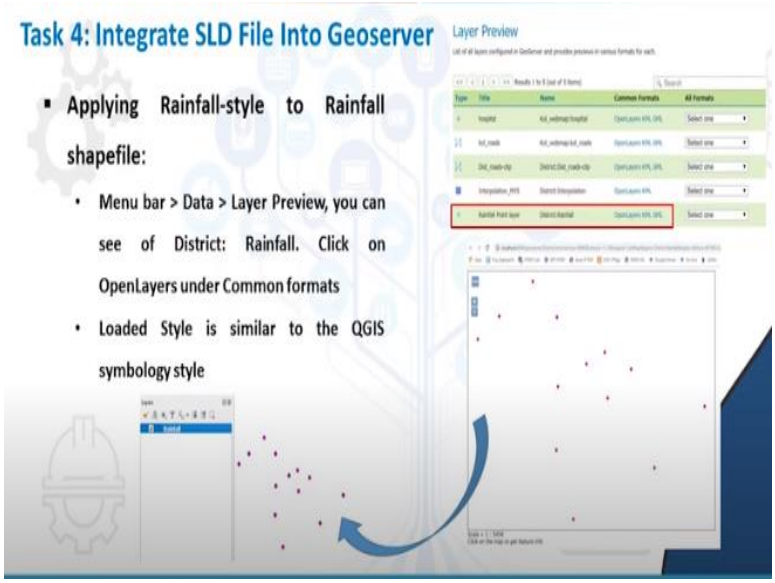

And I was also speaking about what should be the order of arranging.

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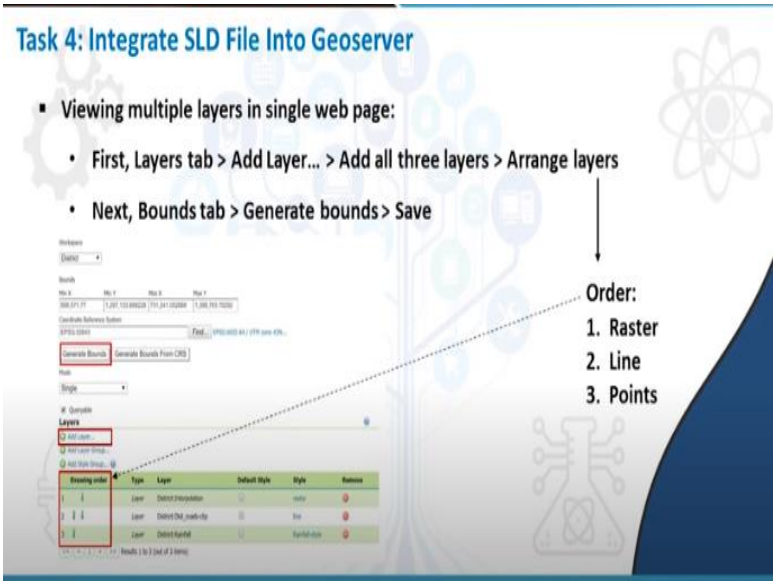

First it should be a raster then line and then points.

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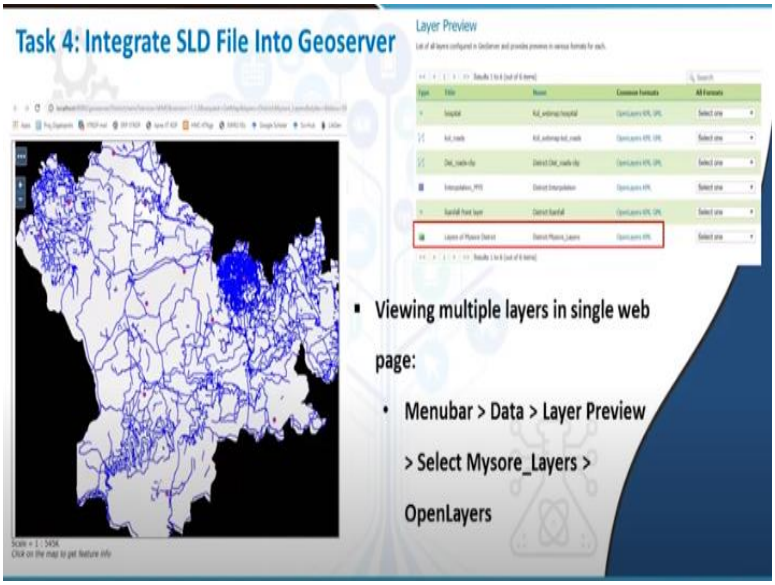

And then we can visualize the integration of the three layers.

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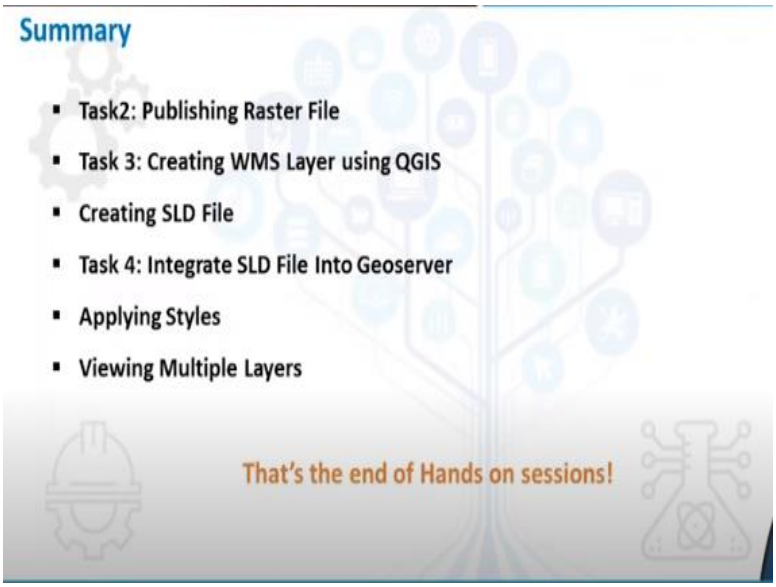

And we also saw the styling and importing the styling in GeoServer and finally viewing all these things together. So this is the end of the GeoServer session. I hope that you are clear with the concepts of QGIS and GeoServer. And I wish you all the best for your future. So here we come to the end of hands-on session. Thank you very much.