

Data for Geospatial Students

Students enrolled in introductory geospatial classes need to have access to data, which can be simply located and requires only fundamental knowledge of the software being used for the first few lessons/case studies. At Jefferson Community and Technical College (JCTC) we have data available in four different ways that students can access from any location either on or off campus in the same manner. While it is important that students can find appropriate mapping data, numerical data and project the data, this is not what should be required of the students for the first exercise in an introductory class. There are four different ways that data is provided initially to the students; direct

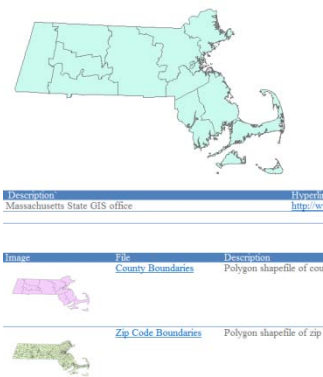


Figure 1: Portion of screen of SharePoint Portal for Massachusetts

connection to a server containing shapefiles, compressed files (zipped) through a SharePoint portal, local geo-server based maps, and internet based maps. All students connecting to the application software via a remote connection utilizing a terminal server, the students are connected in such a way that they are inside of the college firewall and can directly connect to data servers. The SharePoint data portal is established as an internet website in which the students can download appropriate map files in a compressed format. The geo-servers (both local and Internet) eliminates the need to establish projections of the base layer since the data

received from these data sources have established projections.

There are two very distinct needs for base maps in geospatial courses. The first need revolves around the new learner who is enrolled in their first geospatial class; by using server base maps, the student can eliminate many of the projection issues that plague introductory students in the first few weeks of a semester, it also eliminates issues associated with data source changes. The second need is to reduce the time required to create the base layers that will be utilized in multiple lessons; this is important both for the student learning, but also from an application level knowledge for the workforce, since many maps are

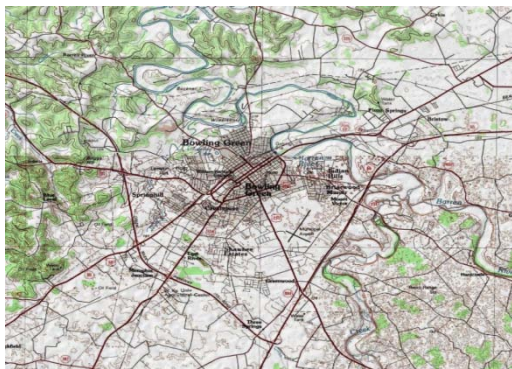


Figure 3: Portion of a map from ESRI ArcGIS Online

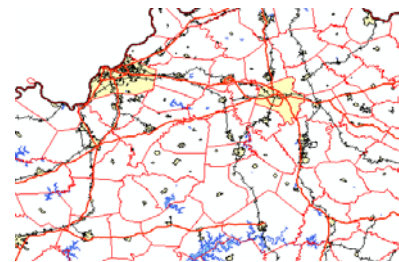


Figure 2: Portion of a map from JCTC ArcGIS Server

created on established base maps. It has been the experience of the author both with students in classes and faculty in workshops that one of the real problems that plague the new learners revolves around projection issues. The author firmly believes that to hook the learner (faculty and students) you must have them understand how to create a map and a spatial understanding, before you teach the concepts of projects and how to project data. By having generated several maps before the discussion of projections, the learner will have a

better understanding on the need for projects and the uses of different types of projects. One of the ways to eliminate these issues is to have geospatial servers that the students can connect to, to bring in their initial layer files that are projected. The geospatial server can be accessed in an online environment either by utilizing a local geospatial server such as ArcIMS or ArcGIS Server or a remote resource such as from ESRI with their ArcGIS Online. Teaching students how to attach to a server is a very simple process no more complex than the loading of data residing on their own computer.

Once students produce maps and learn about projecting data into the appropriate coordinate or reference system and have repeated the process multiple times, then creating future maps should also use established base maps since this is very typical of ways in which their employers will expect them to work. Students in geospatial classes need to have the knowledge of how to develop maps for a particular application, but once the students have learned this process and moved into more advanced processes they should have the ability to reference and utilize geographically projected base map. Students need to have the ability to access appropriate base map files; choosing the best ones for their task is critical to bringing the depth of knowledge to a new level of understanding and eliminating repetitive processes. While it is very important for students to be able to locate appropriate data and to analyze the data for correctness, it is equally important that the efforts revolve around the appropriate use of the data. One of the early problems that beginning geospatial students are impacted with is map projections; while students need to be able solve projection issues, this not a problem that should be address in the first few classes, therefore the initial data the student uses must be properly projected.

There are many different ways which data can be utilized in geospatial mapping.

- A. The data can be downloaded in a compressed format. This data can be downloaded either from a college server, in which it may have had value added information. If the student is within the firewall they can access the data directly from the storage system and not need to search for the information or utilize an Internet site, which will make the download of the information much quicker. Once the data file has been downloaded it will be needed to be uncompressed; geospatial files contain multiple files which must remain in the same folder.
- B. Connecting directly to the shapefiles, students can utilize information directly on a file server without the need to download the information; the student is only able to view and use the information but cannot write or modify the file information. If there is a need for this type of modification of information such as joining data to the shapefile it will need to be copied to a student use location.
- C. GeoServer based information that can be utilized as a base layer(s) are very important, for these base layers, if loaded first, can establish the projection for the student learner. This information must be on specific geospatial servers, running an appropriate server application in which the server understands geography. The author has used two servers of this type and they both are running in a virtual environment. The ArcIMS server has the ability to serve vector based information and the ArcGIS Server will serve map images. The servers can use the same service for many different map applications which might include the use of the service in a web or flex application, while at the same time being a layer in a student map.

- D. Internet based geo-server. There is lots of data that has been mounted by professionals that can be connected directly with ArcMap. The instructor has no control over what is available and how it may change, this type of connection may contain the greatest levels of cartography. Depending on the application this may be good or bad, depending on what layers can be turned on and off in attached map.

If the map files are located on an ArcGIS Server (local or internet based) there is no control over the symbology since the data being received is an image. For those files locally constructed, many layers can be available for the student to turn on or off as appropriate, keeping each layer to single type of data gives the learner the maximum flexibility. The Figure 4 to the right shows some of the layers available for students in a Kentucky base map. Thus, if the service designer chooses to turn label names on at a certain zoom and off at another zoom level, you cannot control this function or if the designer chooses to make roads red and you want them black, you again have no control using the ArcGIS Server. If the map files are located on an ArcIMS Server, they can be constructed in a vector format (for shapefiles) and thus the user can control some of the functionality of the files. Both types of servers are important for the student learner to understand and utilize in an introductory level class.

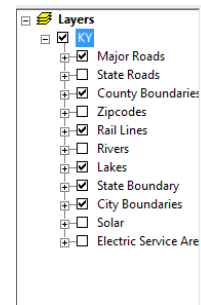


Figure 4: JCTC Kentucky Map Layers

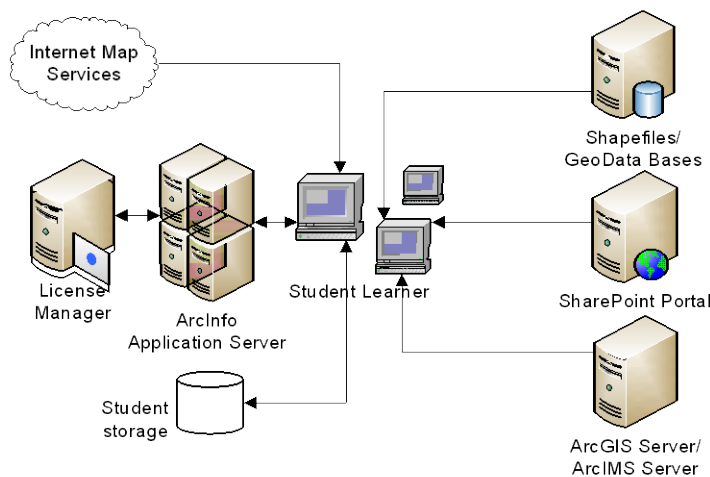


Figure 5: Student Learner Configuration at JCTC

The configuration for the student learner at Jefferson is the following. By utilizing an online application server we have created a learning experience similar for all students learning in virtual, hybrid or on campus formats. We have also reduced the time students must remain on campus to complete their assignments. (See the virtualization white paper for more information.)

This allows the student learner to be in control of when assignments are completed and at what location. It allows for students to learn in virtual modes such as hybrid and distance learning environments, which for many students are the only way in which they can do their learning because of constraints beyond the normal course offerings. It also provides for the IT staff to only maintain a single copy of the software which can be utilized in an on campus environment the same way in which it would be utilized off campus. In addition, software updates which might not occur except once a year or semester because of campus loads procedures can be addressed immediately. This allows that important security patch that normally would not automatically be accomplished can be done since

there is only a single copy of the software. The software is license legal in its usage since it is utilizing the software license manager.