

Leading Edge Technology Initiative

Virtualizing the GIS Application Desktop through Remote Connect Technology

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Currently, there are two major areas of work in leading edge technology both to accommodate the learner no matter if they are in a virtual, hybrid or in a traditional classroom environment and can be used in secondary and post secondary classes. The first area is to insure that full versions of software are available to the student, both on and off campus. The student is not required to load software, with the exception of a web browser plug in. The second area is providing students with data for base maps, in multiple formats. This is an effort to facilitate learning and remove many of the traditional frustrations/barriers for introductory users and students.

The leading edge work will take on several distinct roles and will evolve as the technology changes. The first will be to develop publications such as white papers and blogs on how to mirror the demonstrational work done by co-PI Vince DiNoto and his associates at Jefferson CTC. This will be useful for other GIS programs across the country. Many institutions do not have the expertise to fully implement GIS from a technical stand point, especially in the secondary environment (facts learned by the University of Kentucky in an iTest Grant project). Therefore, the lessons learned will be distributed to assist programs in minimizing the hardware and software troubleshooting. This allows teachers to focus on teaching the content area. The second is to allow faculty the ability to remotely access software so they can determine if the application delivery system is right for them. Third, the data services will be available to students and educators to use. Customized information (data) will be developed for partners and content will be delivered in multiple formats for direct incorporation into maps as well as for downloading or viewing in web applications.

The leading edge work will also require the use of the current technologies in the web 2.0 environment to meet the needs of the student learner. Dean DiNoto also works with the ICT Center in Springfield, MA which has provided numerous presentations and workshops on how to best deliver content utilizing web 2.0 tools. The dissemination of material will include the best pedagogy available including social networking, podcasting, video, Kindle and blogs as well as conference presentations. The multiple modes of delivering lessons learned will accelerate the learning curve for users and help in the faster delivery of content to students. The development of leading edge technologies is parallel with the concepts of web 2.0. Web 2.0 focuses on the use of information and applications, rather than the physical locations of the services. Remotely accessible software enables teachers to focus on the content quality and can be delivered seamlessly for best possible student results. The student is allowed to learn the geospatial content in a manner that is suitable to their learning style. The leveling of the playing field will be important for all users, but will have a greater impact on smaller colleges.

Remote Software Access

For the past 15 months co-PI DiNoto and a team of support specialist has worked on developing the delivery of software applications via a server which has included members of the geospatial community outside of his organization and GeoTech partners. The software delivery is not limited to geospatial software and users must meet all licensing requirements.

- The first goal is to deliver software to students enrolled in virtual classes. A full version of the software is provided via the Internet. Both traditional students and virtual classroom students may continue their work in GIS, on or off campus.
- The second goal is the delivery of all software to students and faculty via server based technology (terminal servers). This allows software use on or off campus for students and faculty members via a remote connection. Students, Faculty, and Staff would have access to their physical desktop on or off campus.

During developmental stages several software packages were tested for performance and cost structure. Citrix was a very good platform to work with and was tested both at a SAME TEC workshop and with students in the fall of 2008. All users were very impressed with the delivery of information, yet the cost of the software was beyond the scope of most colleges. In consultation with members of the KITCenter, we were informed that Microsoft Server 2008 had a much better Terminal Service package built within compared to previous versions. Beta testing on the Microsoft Server 2008 was conducted during the fall of 2008. Testing involved the use of MS Server 2008 for an introductory to GIS workshop in December of 2008. A decision was made to retain the MS Server 2008 and availability was granted to students enrolled in a virtual class titled “Advanced GIS” in the spring of 2009. While the terminal services server is in public address space and password protected, it resides on a physical test box. Plans are currently being finalized to purchase a server class machine to host the services.

Pros

Only need to patch a single copy of the software

Web based connection

Cost for license of terminal services is low

Easy to install by IT professionals

Good delivery of material

Good storage of material

Integrates into Active Directory

Easy to add new software in the middle of a semester

Cons

Requires a broadband connection

Must use Microsoft Internet Explorer

If your connection is lost or a server goes down applications will not be available.

Will not work on multiple platforms (Citrix would)

Data Creation, Storage and Retrieval

There are many different ways in which data can be viewed through a browser, integrated into mapping software or on products like ArcExplorer and Google Earth. The work in this area integrates many of these concepts. One of the most frustrating things that a beginning GIS student/faculty can experience is the inability to find information. Once the information is located they discover that the data does not properly overlay with their map due to projection problems. Data layers that are projected prior to download from the base information can eliminate some of this frustration. It is important that students understand projections in an introductory course, but the placement of this learning should not be on the first map created. This service can also be useful in keeping geospatial curriculum geographically neutral, allowing different colleges to use the same curriculum but with their own local data. This work is both as a demonstration project as well as a production service for the GeoTech Center.

- The first concept was to bring about the delivery of base maps that could be utilized with the curriculum modules that would be warehoused by the Center. The site that would be set-up would not try to duplicate the many geo data servers that are already available but would be designed to provide foundations for the beginning student learner. The content will be delivered through the use of an ArcGIS Server and potentially other servers. The students would attach directly to the server through the software.
- Data will be warehoused in a compressed format for download. Again the purpose of this data hosting is not to duplicate what others organizations have available. But instead to have base information available for the student learner to eliminate some of the frustration that student can have in locating of data. This will also allow partner institutions to submit data for hosting that is geographically specific to their community and thus make content more relevant in their classes.
- To deliver web information for college educators that can be used for value added decision making within the institution. Some of the services that would be provided to the ATE community would be the location of all ATE grants, amounts received and topical areas of work. Providing demographical information in a simple format to partner colleges will assist in their IR function as well as other projects. Much of what will be hosted in the web environment will be demonstrational information that institutions could use as a guide to develop similar concepts. As partners develop more information it can be hosted for them on the GeoTech servers.

- Learning material will be available for the use of others to set-up similar sites for data storage in similar formats as discussed in the prior section.

As part of the cutting edge technology three major components will be integrated into the concepts.

1. Dissemination of lessons learned to the educational community. Co-PI DiNoto has already presented these concepts at SAME TEC, KY GIS Conference, ATE PI Conference and Convergence Conference and has two papers pending at the League CIT conference. In addition this will be a component part of the GeoED'09 Conference
2. Use of information, applications and services will be available to the two year college community with specific content for partner institutions. All software applications provided must be within the licenses of the software. The team will also provide technical assistance and mentoring to those partner colleges requesting assistance. This has already begun through the MentorLinks project and direct contacts.
3. Documentation will be created in multiple formats (blogs, pdf files, video, etc.) to assist others in installing similar services at their home institution. Serving information is important but helping others to develop their infrastructure is more important.

The diagram presented below will be an interactive diagram posted on the web. A click on any icon will take you to a description and learning aides, in addition some of the objects will link directly to the device. The reason that some icons will not have a direct connection is due to license issues with software. The diagram will initially be posted on JCTC servers, but moved to <http://geotechcenter.org> as soon as the new site is designed. In addition several blogs will be written that will lead people to the work of the GeoTech Center in leading edge.

The question of time constrains is an important one to understand, that is why a full time GIS Technician was hired at Jefferson with the grant and the College splitting the cost. The technician, Ross Allen, reports directly to Vince DiNoto and has degrees in geospatial technologies. Co-PI DiNoto spends a substantial percentage of his time in designing and implementing new technologies for the use of the educational community with the largest percentage committed to geospatial technologies discussed above.

Leading Edge Initiative Terminal Services and GeoServer Network Diagram

