Group number: 01

Visualization of Earth Modeling System (Project 1)

Prof. Johnny Wong (Advisor) & Prof. Chaoqun Lu (Client)

Team Members/Role:

Kellen Johnson – Team Communication Leader

Anish Kunduru – Team Leader

Julio Salinas – Team Concept Holder

Eli Devine – Team Webmaster

o **Weekly Summary**

We finished the design document, setup the GIS server, did some research on ArcPy, and began revising the project plan. Met with advisor and client to show an example map server and discuss potential issues that we might have. We worked on some performance testing and tried to establish clear guidelines with the client as to what the nonfunctional performance requirements are.

o **Past week accomplishments**

- Kellen Johnson: Experimentation with the arcpy Python module. Assisted Anish in creation of a basemap and publishing of map on the arcgis server. Received a copy of ArcDesktop from Josh Obrecht which I will install on our server in the near future.
- Anish Kunduru:
  - ❖ Finished/proofed design document. (2)
  - ❖ Fixed porting issues with GIS server with Kellen and Eli. (1)
  - ❖ Worked on getting map server demo ready with Kellen. (3)

- ❖ Did performance analysis and research on map services. Came up with better non-functional requirements based upon testing and research. (4)
  - ❖ Created outline for revised project plan. (1)
  - ❖ Looked into automation steps with ArcPy/ArcGIS Pro via ArcGIS for Desktop (ArcMap) API. (2)
- Eli Devine: Continued work on Website, collaboration of porting issues with Anish and Kellen, looked into created basemap created by Kellen and Anish.
- Julio Salinas: Looked over work done by team while I was away this week started project plan 2.

o **Pending issues**
- Anish Kunduru: We need to setup ArcGIS for Desktop. I plan to work on this during break, so there is no rush.

o **Individual contributions**

NAME	Individual Contributions	Hours this week	HOURS cumulative
Kellen Johnson	ArcPy experimentation. Attempted to create and publish map on own before collab with Anish.	10	66
Anish Kunduru	See past week accomplishments section. Line-by-line hours are listed in parenthesis.	13	59
Eli Devine	Helped looking into server porting issue, updated website, continued looking into work for generating maps and understanding it	7	31
Julio Salinas	Started the Project Plan 2 Reviewed and caught up on a lot of the good work done by the team during my absence.	5	29

- o **Comments and extended discussion**
    - Kellen Johnson: It looks like ArcPy might have the functionality we are looking for. We might have to build the service definitions from scratch in code.
    - Anish Kunduru: We will have to use (map) service definitions to display the data dynamically and efficiently. The goal is to basically create X-Y event layers to display data. There is some explanation about this in the ArcGIS for Desktop API (GUI builder), but we don't see anything in the ArcPy API (automation). There is, however, some mention of this in the ArcGIS Pro API. We're going to have to look more into this, and will likely have to write code to do this from scratch. In regards to performance constraints, I believe that we would be best served by hosting map services representing each ASCII file independently. The map services would be spun up and called dynamically. When the client is done utilizing the service, it would shut down automatically. While this will add some delay in initial page load, this is the only way we can host these map services without requiring tons of RAM. I did some testing/basic math and think that we can get away with this with this if we request to be allocated 16GB RAM (not necessary at this time – but will be in the future). The necessary RAM will be constant based upon user constraints, as the direct cost is the number of active maps. Similarly, we had to analyze CPU usage. As of right now, we are assigned 2 physical cores (4 logical cores). In the future, we might need 4-6 physical cores. This is a requirement that we will ask for at a later date (to prevent repeated unparking and parking of cores on our, currently unloaded, server). The big costs on the CPU are initial spool up of a service and active rendering on a dynamic map. Both of these constraints can be controlled by limiting the number of instances of each map service simultaneously permitted to run on the server and limiting the draw area (users on very high resolution screens will only get updated results up to 2K, from the center of the map, out). Eli and I did some testing on this and found out that two users are reasonably smooth with just one allocated instance and a limited draw distance. Multiple requests on the same instance are simply queued and answered FIFO. I can explain the benefits of this in more detail during the next meeting.

- o **Plan for coming week**
    - Kellen Johnson: Install ArcGIS for Desktop. Collab on Project Plan Version 2. Begin collaboration of pre-generated image layering so we can get a head-start on this while we begin other documentation (Version 2's) and our presentation slideshow.
    - Anish Kunduru: Wrap up of project plan v2, get going on the presentation, and implementation of our dynamically spooled services idea. I've already mentioned to my group that I hope to knock a chunk of this out over break.

- Eli Devine: Help work on Project Plan V2, continued work on website and ArcGIS.
- Julio Salinas: Work on Project Plan V2, keep working with team on ArcGIS.

o **<u>Summary of weekly advisor meeting</u>**

The client would like us to pre-generate static maps and dynamically load them as our semester goal before we do presentations at the end of the semester. As it stands right now, automation of either step will require the same amount of work on our end. The difference really comes down to server resources. We have tried to convey this to our client by establishing clearer performance requirements. As of now, we will move forward with the original goals our client had for interactive map generation. Our goal for this semester is to be able to display a couple sample maps using the client's actual data. Automation will likely bleed into next semester.