Evolving capabilities for virtual globes

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Position Description:

This position is based in Mountain View, CA.

Google is seeking an experienced GIS data-processing Engineer to develop software tools to fuse massive image and vector datasets into a multi-terabyte 3D model of the globe.

Responsibilities:

- Development of tools, software and processes to execute the data preparation of imagery, terrain, and vector data for publishing in the Google Earth database (and maps).
- Create the framework and tools to shepherd data from acquisition through final deployment.
- Ensure all data has the proper metadata information via proper reporting from data scripts to database tools.
- Build validation to ensure all data adheres to strict accuracy and quality specifications.
- Produce reports related to imagery, terrain, and vector data.

Requirements:

- BS/MS Computer Science/Engineering or GeoSciences.
- Experience working with large data sets and fluency with vector, image and/or terrain data.
- Proven experience with Open GIS standards, file formats, tools (i.e. ERDAS Imagine, Adobe Photoshop, ESRI) and databases.
- Experience with C++, Python, and/or Java.
- Strong Linux knowledge and scripting (perl or shell) skills.
- Strong organizational and communication skills.
- Minimum 3 years of relevant industry experience.
Overview

* We have questions.
* We have this new tool in virtual globes.
* Can virtual globes answer our questions, and if so, how?

* Future directions

Thesis: If a lot of people know how to solve problems in a spatially-referenced 3D environment, lots of problems will get solved. We'll be able to share the solutions, and the logic taken to get there.
a software system for spatially-referenced three-dimensional information management, analysis, and visualization

* Nintendo Wii Weather Channel (December 2006)
* Microsoft Live Local 3D (11/2006/aka Spaceland)
* Dapple Earth Explorer (July 2006)
* Wayfinder Earth (beta, 2006)
* ESRI ArcGIS Explorer (11/2006)
* Volvo Ocean Race Virtual Spectator (2005)
* Erdas Imagine Virtual GIS (2005)
* Google Earth (6/2005)
* Global-i (~2005)
* Punt (2005)
* Ping 3map (2005)
* EarthSLOT (2004)
* osgPlanet (2004)
* Eingana (2000 to ~2003)
* Keyhole Earthviewer (June 2001/now Google Earth)
* SINTEF Virtual Globe (2001-2006 / now Norkart)
* Celestia (2001)
* Skyline Software TerraSuite (~2001)
* GeoFusion GeoPlayer (company formed 2001)
* SRI Terravision (2000)
* Hipparchus (~1992)
* Mark Pesce's WebEarth (~1996)
* Microsoft MapPoint Virtual Globe
* GeoVirtual GeoShow3D
* Viewtec TerrainView
* Gaia
* Virtual Spectator
* PYXIS
* Talent Cruiser
* Virtual Terrain Project
* Earthsim
* GeoVirtual
* GRIFINOR
* Norkart Virtual Globe
* AGI-STK
Under the hood

web browser :: HTML
Google Earth :: KML

KML looks like this

```xml
<?xml version="1.0" encoding="UTF-8"?>
<kml xmlns="http://earth.google.com/kml/2.0">
  <Placemark>
    <name>Plano House</name>
    <Point>
      <coordinates>14.22,43.22,200</coordinates>
    </Point>
  </Placemark>
</kml>
```
Under the hood

web browser :: HTML
Google Earth :: KML

KML looks like this

```xml
<?xml version="1.0" encoding="UTF-8"?>
<kml xmlns="http://earth.google.com/kml/2.0">

<Placemark>
<name>Plano House</name>
<description>I grew up in this house.</description>
<address>2501 Brennan Dr., Plano, Texas</address>

<TimeSpan>
<begin>1974</begin>
<end>1987</end>
</TimeSpan>

</Placemark>

</kml>
```
Emerging functionality

* visibility
* global systems
* collaborative data collection
* streaming data and unfolding time
* time-space queries (eg. Google Earth Time Slider and Celestia Eclipse Finder)
* interactive, dynamic spatial data
* volume
* mining images for 3D spatial data (neo-remote sensing)
How can I get an answer for my question?

Dependent on...

- The question: can the question be framed in a manner that a computer can answer?
- The user: what context is necessary? relevant interface?
- Data: do you have what you need? can you get it? need to convert to other format?
- Analytical expertise: does the algorithm exist, can you get it, can you code it?
- Uncertainty and accuracy: how reliable is the answer?
- Answer visualizers: is there a meaningful way to give the answer?
data collector / sensor

expert agent / parser

input: web interface

output: virtual globe

USER

database
A useful skill set for scientific interaction with virtual globes:

1) be able to move data to and from the internet
2) be able to programmatically manipulate and reorganize your data
3) understand enough about geography to stay out of trouble (source projections, sampling bias, unaccounted global loops, etc.)
4) communicate with others using virtual globes solving similar problems
Evolving platform: extending the model to the Eames’ and Morrisons’ Powers of Ten

progression:
1. view
2. add
3. query
4a. communicate
4b. mirror world (more realism/physics)
5. inhabit
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communities:
http://bbs.keyhole.com
http://www.earthslot.org

blogs:
http://planetgs.com

a few globe links:
http://earth.google.com
http://worldwind.arc.nasa.gov
http://local.live.com
http://www.esri.com/explorer
http://www.shatters.net/celestia

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