Comparison of Open Source Virtual Globes

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www.sourcepole.ch
About Sourcepole

- GIS-Knoppix: first GIS live-CD
- QGIS
  - Core developer
  - QGIS Mapserver
- OGR / GDAL
  - Interlis driver
  - schema support for PostGIS driver
- Ruby on Rails
  - MapLayers plugin
  - Mapfish server plugin
Overview

- Multi-platform Open Source Virtual Globes
  - Installation
    - out-of-the-box application
  - Adding user data
  - Features
  - Demo movie

- Comparison
  - User data
  - Technology

- Desired Virtual Globe features
Open Source Virtual Globes

- NASA World Wind Java SDK
- ossimPlanet
- gvSIG 3D
- osgEarth
- Norkart Virtual Globe
- Earth3D
- Marble

comparison to Google Earth
Test user data

Test data of Austrian skiing region Lech
- projection: WGS84 (EPSG:4326)
- OpenStreetMap WMS
- winter orthophoto
  - GeoTiff, 20cm resolution, 4.5GB
  - KML Tile Cache
- ski lifts, ski slopes, cable cars and POIs
  - KML
  - Shapefile
- elevation (ASTER)
  - GeoTiff, ~30m resolution, 445MB
NASA World Wind Java SDK

- created by NASA's Learning Technologies project
- now developed by NASA staff and open source community developers
NASA World Wind Java SDK

- virtual globe SDK
  - Java application or applet
  - different from NASA World Wind .Net

- no central application combining all features

- lots of example applications for different features
  - “The goal is 100s of World Winds, not one”

- no installation
  - JAVA Web Start
  - applet embedded in website
NASA World Wind Java SDK

- **User data**
  - Demo applications (GUI)
    - WMS
    - Shapefiles (polygons only)
  - Engine
    - WMS
    - World Wind TileService
    - Raster
    - Vector
    - Elevation using World Wind Server
    - 3D models
Features

- Stars
- Atmosphere
- Analytic surfaces
- Terrain profiler
- Multimedia annotations
- Surface objects
- Surface graticules
- Airspaces and builder
- OGC Catalog Service support
- Runtime statistics
Example projects

- GeoWind: GeoTools OGC integration
- JsatTrack: satellite tracking
- Geoscience Australia's World Wind Viewer
- many more

Links

- http://worldwind.arc.nasa.gov/java/demos/
- http://worldwindcentral.com/wiki/Java
Demo movie
ossimPlanet

- OSSIM advanced geo-spatial image processing
- OpenSceneGraph based renderer with OSSIM capabilities

Installation
- UbuntuGis repositories
- Windows / Mac installers
ossimPlanet

- User data
  - WMS
  - Raster
    - ossim image formats
    - GDAL formats
  - Vector
    - KML
  - Elevation
    - config file
    - ossim data format
Features

- Sessions
- Ephemeris
- Remote collaboration
- Animation path recording
- Layer operations
  - opacity
  - swipe
  - difference
- Ruler
Projects

OGIS plugin
  synchronize OGIS map with planet scene

Links

http://www.ossim.org/OSSIM/ossimPlanet.html
ossimPlanet

› Demo movie

FOSS4G Barcelona 7.-9.9.10

Comparison of Open Source Virtual Globes
gvsIG 3D

- 3D extension for gvsIG
- osgVirtualPlanets standalone framework
- Installation
  - installers from gvsIG website
gvSIG 3D

- **User data**
  - gvSIG supported formats
    - OGC
    - Raster
    - Vector
    - Elevation
  - 3D models
    - OSG
Features

- full integration into gvSIG desktop GIS
  - data styling
  - data editing
- 3D models
  - move, rotate, scale
- animation paths
- stereo view
- spherical / flat projection
gvSIG 3D

Links

- http://www.gvsig.org
- http://gvsig.org/web/projects/gvsig-desktop/devel/gvsig-3d
- http://gvsig.org/web/projects/gvsig-commons/osgvp
- http://gvsig3d.blogspot.com/
gvSIG 3D

Demo movie
osgEarth

- scalable terrain rendering toolkit for OpenSceneGraph
  - developed and maintained by Pelican Mapping

Installation

- UbuntuGis repositories
- Windows / Mac build from source only
osgEarth

- User data using config file
  - Raster / elevation
    - WMS / WMS-T / WCS / TMS
  - GDAL
  - MetaCarta TileCache
  - NASA World Wind TileService
  - ArcGIS
- Vector
  - OGR (geometry with offset / draped)
  - AGGLite feature-rasterizing image driver
- 3D models
  - OSG
- Virtual Planet Builder (VPB) terrain database
osgEarth

Features

- Renderer only
- Drape vector data on the terrain
- Reproject data on the fly
- Optimized VirtualPlanetBuilder terrains
osgEarth

- Projects
  - QGIS plugin
    - render QGIS map canvas on globe

- Links
  - http://osgearth.org/
osgEarth

Demo movie
osgEarth

OGIS plugin demo movie
Norkart Virtual Globe

- initially developed by SINTEF (largest independent research organisation in Scandinavia) (2001)
  - acquired by Norkart Geoservice (2006)

- no installation
  - Java Web Start
Norkart Virtual Globe

- User data using config file
  - WMS
  - 3D models
    - VRML
    - X3D
  - levels of detail
  - Billboards
  - Viewpoints
  - Flight paths
Norkart Virtual Globe

Features
- Project files
- Animation paths
- Viewpoints
- Placename search

Links
- http://www.virtual-globe.info/
Norkart Virtual Globe

Demo movie
Diploma thesis of Dominique Andre Gunia at Braunschweig University of Technology

- Earth3D application
- Earth3D library

Installation

- Ubuntu package
- Windows / Mac installer
- Java Web Start
Earth3D

- **User data**
  - preprocessing using server software only

- **Features**
  - Marketplace
  - Screenshot
  - Capture movie

- **Links**
  - [http://www.earth3d.org/](http://www.earth3d.org/)
Demo movie

Earth3D

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Marble

- KDE Education Project
  - Marble Desktop Globe
  - Marble Widget

- limited virtual globe
  - fixed top-down view, no camera rotation
  - no elevation data
  - not 'real' 3D

- Installation
  - Linux Package
  - Windows / Mac installer

- Links
  - http://edu.kde.org/marble/
Google Earth

- Virtual Globe reference application

- Links
  - http://earth.google.com
Google Earth

Advantages

- huge amount of default data
- user data
  - Raster KML (image/TileCache)
  - Vector KML
  - 3D models (KML/COLLADA)
  - WMS as image overlay
- multi-platform
- does not require 3D hardware
- features
  - search
  - routing
  - web infos
Google Earth

- Limitations
  - closed source
  - no plugins, only mashups
  - limited data usage permissions
  - user data
    - no elevation
Google Earth

Demo movie
<table>
<thead>
<tr>
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Desired Virtual Globe features

- Adding user data
  - support standard formats
    - OGC, GDAL/OGR, KML
  - minimize preprocessing
    - reproject on the fly
  - place models
    - move, rotate, scale
  - caching

- Data styling
  - colors
  - visibility ranges
  - opacity
Desired Virtual Globe features

- **Navigation**
  - GUI elements
  - intuitive mouse handling
  - move to dataset
  - viewpoints

- **GIS tools**
  - 3D measurements
  - terrain profiling

- **Image and movie export**
  - animation paths
[1] UbuntuGis repositories for ossimPlanet and osgEarth
  > https://launchpad.net/~ubuntugis/+archive/ppa
  > https://launchpad.net/~ubuntugis/+archive/ubuntugis-unstable

Test data
  > KMZ
    > http://www.winterbergbahnen.at/3dwinter/KMZ/23_Lech_Zuers.kmz
  > WMS
    > http://osm.wheregroup.com/cgi-bin/osm_basic.xml?
  > ASTER DEM
    > http://asterweb.jpl.nasa.gov/gdem.asp
Thank you!

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