gvSIG: towards 4D GIS

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- gvSIG's background & updates
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gvSIG Background

- Mostly funded by Regional Ministry of Infrastructure and Transport of Valencia, Spain & EU Funds
- Developed by IVER, Prodevelop & other companies and universities
- GPL License
- Java. Multiplatform support (Windows, Linux, Mac)
- GUI in 12 languages, Spanish & English manuals
- First released in October 2004
- Version 1.1 is available now!
gvSIG Background

- Rich desktop GIS client
- Multiple vector, raster, DB support
- Integration with OGC web services (WMS, WFS, WCS, CSW, WMC)
- Remote catalog and gazetter search
- Editing, vector and raster geoprocessing
gvSIG News

- gvSIG is now in the OSGeo Project Incubator!

- You are invited to the 3rd gvSIG Conference:
  November 14th to 16th in Valencia, Spain
gvSIG Updates

- Recent improvements:
  - JCRS Extension to manage Coordinate Reference Systems and transformations
  - Field calculator
  - ArcSDE and Oracle DB connectors
  - DB connection manager (GeoDB)
  - Field calculator
  - Loading DWG R14
  - SEXTANTE integration
gvSIG Updates

- JCRS
gvSIG Updates

- Field calculator

El cálculo de la expresión se realizará en este momento sobre los registros existentes en la tabla.

Columna: Area
- **GeoDB**
gvSIG Current Development

- Raster Analysis tools (pilot published)
- Network Analysis tools (pilot published)
- **3D and Animation extension (pilot coming soon)**
- Metadata editing and publishing extension (prototype completed)
- Web service publishing extension (architecture completed)
- gvSIG Mobile (prototype completed)
- Extended symbology (prototype completed)
gvSIG Current Development

- Metadata editing & publishing

![gvSIG Metadata Editing and Publishing Interface](image)
gvSIG Current Development

- Extended symbology
3D Visualization

- Objectives:
  - Cool navigation and pretty pictures... but also...
  - Fully integrated with regular GIS layers and tools
  - Use of local and remote data
  - Dynamic change of layer properties
  - Both globe-like and XY+Z views
  - On-the-fly terrain data fusion and multiple surfaces
3D Views in gvSIG

- Use gvSIG's document-type extensibility
- Share most properties with 2D Views
3D Views in gvSIG

- Can be spherical or 'flat' (projected XY + Z)
Layers in 3D

- Layers are the same in 2D and 3D (can be copied/pasted), with some additional properties in 3D
  → all gvSIG data sources are supported in 3D
Layers in 3D

- Raster layers (and eventually TINs) can be
  - Displayed as images (textures) on terrain
  - Used to define the terrain elevation
- Feature layers can be
  - Rasterized and displayed as textures
  - Displayed as 3D objects
Architecture of 3D extension

- Use of multiresolution tiling (as NASA Worldwind, Google Earth, TileCache) in disk & memory caches
- Collaboration with OpenSceneGraph (OSG) project to use and extend C++ rendering library (osgTerrain in particular): Universidad Politécnica de Valencia
- Java wrapper built on OSG → jOSG
- gvSIG's 3D extension provides tiled data on-demand to the caches
- 3D geometries and symbols in gvSIG translate into OSG objects, and viceversa
Architecture of 3D extension

1. Tile request
   - libjOSG
   - gvSIG's 3D Extension
     (Add/remove layers...)
   - Open Scene Graph

2. Tile caching
   - Data Sources
   - Multiresolution caché (disk)
     -> Scene graph (memory)

3. Tile paging in
   - OpenGL rendering
Integration with gvSIG tools

- Example: gazetter service search
Time in GIS

- Time stamping (time series)
  - Layers
  - Features / grids
- Events / processes
  - At fixed locations (grids, networks)
  - On dynamic objects
- Real-time tracking
  - GPS
Time in GIS

- A set of related problems:
  - Temporal sources, acquisition
  - Data model
  - Storage
  - Query / Visualization / Animation
  - Analysis
Time in gvSIG: approach

- First steps:
  - Time-stamped data support
    - Features (time as an attribute)
    - Raster
    - Time dimension in web services
  - Visualization / animation framework
    - Combine out-of-the-box animation types:
      - For temporal data
      - View and layer animation (important for presentation purposes)
    - Extensibility of animation types
Time in gvSIG: approach

- Future steps:
  - Time Reference Systems, 4D extent control
  - Time-dependent symbology
  - Events and processes
  - Dynamic simulation framework
  - 4D analysis & geostatistics
Time in gvSIG: architecture

Animation Framework

2D View & Layer Animation

Temporal Animation

3D View Animation

Time queries

3D Extension

Mapping Framework (FMap)
Animation Framework

- Each project contains one or more *Animation Tracks*, each of a specific *Animation Type* (view, layer visibility, temporal...) and controlling a specific object.

- Two kinds of tracks:
  - *'Arbitrary time' tracks*: $t \in [0, 1]$ (e.g. for view animation). Can be defined by keyframes or functions.
  - *'Dated time' tracks*: $t$ defined by year, month, day... but also mapped to arbitrary time $[0, 1]$ (these are used for temporal data animation).

- Both kinds of tracks can be played simultaneously with any desired duration or number of frames.
Temporal Data Animation

- Dated time tracks interpolate a dated 'time window' (e.g. a week) between starting and ending dates.
- The changing time window is applied as a 'temporal filter' to display the layer for each new animation frame.
- Multiple dated tracks have consistent dates by default, but the user can introduce shifts to superimpose data from different times.

Consistent (not shifted)  
Superimposed (shifted)
The Animation GUI works with all Animation Types registered by gvSIG Extensions

Simple tools allow users to create view and temporal animation tracks

Animation play controls provide a simple way to control the animation by duration or number of steps
Implementation & Release Plan

- Pilot (install on gvSIG 1.1) 2007 Q4
- Basic 3D & Animation 2008 Q1
- Temporal Data Animation 2008 Q3
- Full functionality 2009 Q1
Thanks!

- Find more about gvSIG at
  
  www.gvsig.gva.es

- Subscribe to mailing lists for info and support

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