



PDHonline Course G342 (4 PDH)

Introduction to GIS

Instructor: John C. Huang, Ph.D., PE

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PDH Online | PDH Center

5272 Meadow Estates Drive
Fairfax, VA 22030-6658
Phone: 703-988-0088
www.PDHonline.com

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List of geographic information systems software

GIS software encompasses a broad range of applications which involve the use of a combination of digital maps and georeferenced data. GIS software can be sorted into different categories.^[1]

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Open source software

The development of open source GIS software has—in terms of software history—a long tradition^[2] with the appearance of a first system in 1978. Numerous systems are available which cover all sectors of geospatial data handling.

Desktop GIS

The following open-source desktop GIS projects are reviewed in Steiniger and Bocher (2008/9):^[3]

- [GRASS GIS](#) – Geospatial data management, vector and raster manipulation - developed by the [U.S. Army Corps of Engineers](#)
- [gvSIG](#) – Mapping and geoprocessing with a 3D rendering plugin

- **ILWIS** (Integrated Land and Water Information System) – Integrates image, vector and thematic data.
- **JUMP GIS / OpenJUMP** ((Open) Java Unified Mapping Platform) – The desktop GISs OpenJUMP, SkyJUMP, deeJUMP and **Kosmo** all emerged from JUMP.^[3]
- **MapWindow GIS** – Free desktop application with plugins and a programmer library ^[4]
- **QGIS** (previously known as Quantum GIS) – Powerful cartographic and geospatial data processing tools with extensive plug-in support
- **SAGA GIS** (System for Automated Geoscientific Analysis) – Tools for environmental modeling, terrain analysis, and 3D mapping
- **uDig** – API and source code (Java) available.

Besides these, there are other open source GIS tools:

- **Capaware** – A C++ 3D GIS Framework with a multiple plugin architecture for geographic graphical analysis and visualization.
- **Generic Mapping Tools** – A collection of command-line tools for manipulating geographic and Cartesian data sets and producing PostScript illustrations.
- **FalconView** – A mapping system created by the Georgia Tech Research Institute for the Windows family of operating systems. A free, open source version is available.
- **Kalypso** – Uses Java and GML3. Focuses mainly on numerical simulations in water management.
- **TerraView** – Handles vector and raster data stored in a relational or geo-relational database, i.e. a frontend for **TerraLib**.
- **Whitebox GAT** – Cross-platform, free and open-source GIS software.

Other geospatial tools

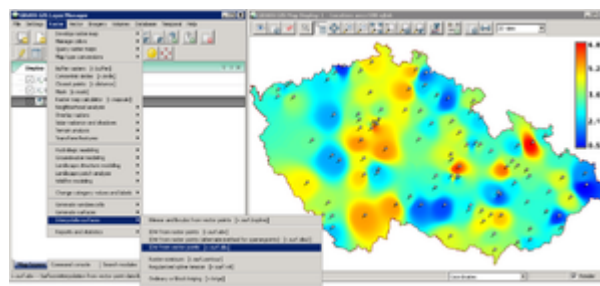
Apart from desktop GIS, many other types of GIS software exist.

Web map servers

- **GeoServer** – Written in Java and relies on **GeoTools**. Allows users to share and edit geospatial data.
- **MapGuide Open Source** – Runs on Linux or Windows, supports Apache and IIS web servers, and has APIs (PHP, .NET, Java, and JavaScript) for application development.



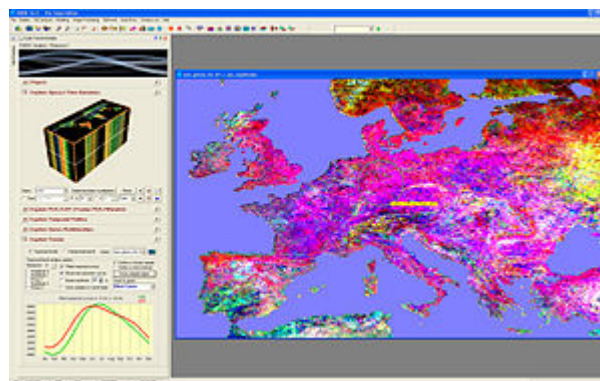
Capaware rc1 0.1



GRASS GIS 6.4

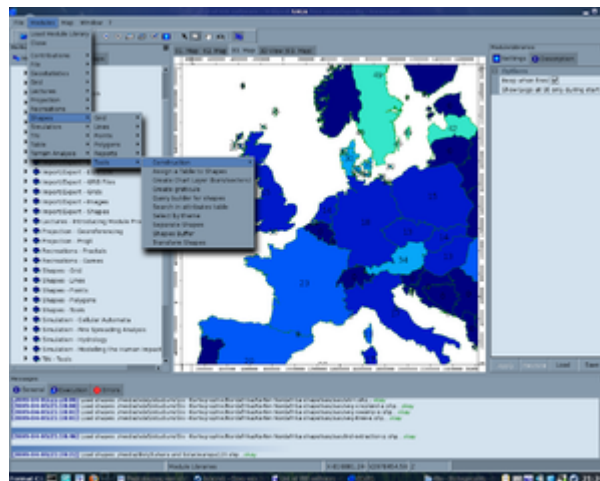


gvSIG 1.0



IDRISI Taiga 16.05

- [Mapnik](#) – C++/Python library for rendering - used by [OpenStreetMap](#).
- [MapServer](#) – Written in C. Developed by the [University of Minnesota](#).



SAGA-GIS v. 2.0.3

Spatial database management systems

- [PostGIS](#) – Spatial extensions for the open source [PostgreSQL](#) database, allowing geospatial queries.
- [ArangoDB](#) – Builtin features available for Spatial data management, allowing geospatial queries.
- [Spatialite](#) – Spatial extensions for the open source [SQLite](#) database, allowing geospatial queries.
- [TerraLib](#) – Provides advanced functions for GIS analysis.
- [OrientDB](#) – Builtin features available for Spatial data management, allowing geospatial queries.

Software development frameworks and libraries (for web applications)

- [GeoBase \(Telogis GIS software\)](#) – [Geospatial](#) mapping software available as a [software development kit](#), which performs various functions including address lookup, mapping, routing, reverse geocoding, and navigation. Suited for high transaction enterprise environments.
- [OpenLayers](#) – Open source [AJAX](#) library for accessing geographic data layers of all kinds, originally developed and sponsored by [MetaCarta](#).
- [Leafletjs](#) – Open source JavaScript Library for Mobile-Friendly Interactive Maps
- [Cesium](#) – An open-source JavaScript library for world-class 3D globes and maps

Software development frameworks and libraries (non-web)

- [GeoTools](#) – Open source GIS toolkit written in [Java](#), using [Open Geospatial Consortium](#) specifications.
- [GDAL](#) / [OGR](#)
- [Orfeo toolbox](#)

Cataloging application for spatially referenced resources

- [GeoNetwork opensource](#) – A catalog application to manage spatially referenced resources
- [pycsw](#) – pycsw is an OGC [CSW](#) server implementation written in Python

Other tools

- [Chameleon](#) – Environments for building applications with [MapServer](#).

Notable commercial or proprietary GIS software

Desktop GIS

Note: Almost all of the companies below offer Desktop GIS and WebMap Server products. Some such as Manifold Systems and ESRI offer Spatial DBMS products as well.

Companies with high market share

- Autodesk – Products that interface with its flagship AutoCAD software package include Map 3D, Topobase, and MapGuide.
- Bentley Systems – Products that interface with its flagship MicroStation software package include Bentley Map and Bentley Map View.
- ENVI – Utilized for image analysis, exploitation, and hyperspectral analysis.
- ERDAS IMAGINE by ERDAS Inc – Products include Leica Photogrammetry Suite, ERDAS ER Mapper, ERDAS ECW/JP2 SDK (ECW (file format)) are used throughout the entire mapping community (GIS, Remote Sensing, Photogrammetry, and image compression) and ERDAS APOLLO.
- Esri – Products include ArcMap, ArcGIS, ArcSDE, ArcIMS, ArcWeb services and ArcGIS Server.
- Intergraph – Products include G/Technology, GeoMedia, GeoMedia Professional, GeoMedia WebMap, and add-on products for industry sectors, as well as photogrammetry.
- MapInfo by Pitney Bowes Software – Powerful desktop GIS MapInfo Professional is enhanced with many plug-ins including MapInfo Drivetime for route analysis, MapInfo Engage 3D for 3D and statistical analysis, MapInfo MapMarker for Geocoding.
- Smallworld – developed in Cambridge, England (Smallworld, Inc.) and purchased by General Electric. Used primarily by large utilities and communications companies.

Companies with minor but notable market share

- Cadcorp – Products include Cadcorp SIS, GeognoSIS, mSIS and developer kits.
- Caliper – Products include Maptitude, TransModeler and TransCAD.
- Conform by GameSim – Software for fusing and visualizing elevation, imagery, vectors, and LiDAR. The fused environment can be exported into 3D formats for gaming, simulation, and urban planning.^[5]
- Dragon/ips – Remote sensing software with GIS capabilities.
- Geosoft – GIS and data processing software used in natural resource exploration.
- GeoTime – software for 3D visual analysis and reporting of location data over time; an ArcGIS extension is also available.
- Global Mapper – GIS software package currently developed by Blue Marble Geographics; originally based on USGS dlgv32 source code.
- Golden Software – GIS and scientific software for a wide variety of professional geological applications. Products include *Surfer* for gridding and contouring, *MapViewer* for thematic mapping and spatial analysis, *Strater* for well or borehole logging and cross sections, *Voxler* for true 3D well and component mapping, *Didger* for digitizing and coordinate conversion, and *Grapher* for 2D and 3D graphing.
- Kongsberg Gallium Ltd. – Products include InterMAPhics and InterView. High performance GIS visualization and analytics toolkits supporting multiple platforms, including flavors of Unix, Windows and Android. Primarily intended for mission critical visualizations
- MapDotNet – Framework written in C#/ .NET for building WPF, Silverlight, and HTML5 applications.
- Manifold System – GIS software package.
- CitySurf Globe – Server based 3D GIS software, developed by PiriReis.

- [RegioGraph](#) by [GfK GeoMarketing](#) – GIS software for business planning and analyses; company also provides compatible maps and market data.
- [RemoteView](#) by [Overwatch](#) – RemoteView is one of the most widely used imagery analysis tools within the US government to collect geospatial intelligence.
- [SuperMap Inc.](#) – a professional GIS software provider that offers Desktop, Component, Web, and Mobile GIS for global markets.
- [TerrSet](#) (formerly [IDRISI](#)) – GIS and Image Processing product developed by Clark Labs at [Clark University](#). Especially effective for raster GIS analysis and image processing. Affordable and robust, it is used for both operations and education.
- [TNTmips](#) by [Microlmages](#) – a professional system integrating desktop GIS, advanced image processing, 2D-3D-stereo visualization, desktop cartography, geospatial database management, and webmap publishing.

GIS as a service

Many suppliers are now starting to offer Internet based services as well as or instead of downloadable software and/or data. These can be free, funded by advertising or paid for on subscription; they split into three areas:

- [SaaS](#) – Software as a Service: Software available as a service on the Internet
 - [ArcGIS Online](#) – ESRI's cloud based version of [ArcGIS](#)^[6]
 - [CartoDB](#) – Online mapping platform that offers an open source, cloud based SaaS model^[7]
 - [Mapbox](#) – Provider of custom online maps for websites ^[8]
- [PaaS](#) – Platform as a Service: [geocoding](#) or analysis/processing services
 - [ArcGIS Online](#)^[9]
 - [Google Maps JavaScript API version 3](#)^[10]
 - [Here Maps JavaScript API version](#) ^[11]
 - [Microsoft Bing Geocode Dataflow API](#)^[12]
 - [US Census Geocoder](#)^[13]
- [DaaS](#) – Data as a Service: data or content services
 - [ArcGIS Online](#)^[14]
 - [Apple Maps](#)^[15]
 - [Google Maps](#)^[16]
 - [Here Maps](#)^[17]
 - [OpenStreetMap](#)^[18]
 - [Microsoft Bing Maps](#)^[19]

Spatial DBMS

- [Boeing's Spatial Query Server](#) – Spatially enables Sybase ASE.
- [DB2](#) – Allows spatial querying and storing of most spatial data types.
- [Informix](#) – Allows spatial querying and storing of most spatial data types.
- [MySQL](#) – Allows spatial querying and storing of most spatial data types.

- Microsoft SQL Server (2008 and later) – The latest player in the market of storing and querying spatial data. GIS products such as MapInfo and Cadcorp SIS can read and edit this data while ESRI and others are expected to be able to read and edit this data at some point in the future.
- Oracle Spatial – Product allows users to perform complex geographic operations and store common spatial data types in a native Oracle environment. Most commercial GIS packages can read and edit spatial data stored in this way.
- SAP HANA - Allows users to store common spatial data types, load spatial data files with well-known text (WKT) and well-known binary (WKB) formats and perform spatial processing using SQL. Open Geospatial Consortium (OGC) certification allows third party GIS software providers to store and process spatial data. GIS products such as ArcGIS from ESRI works with HANA.^[20]
- Teradata – Teradata geospatial allows storage and spatial analysis on location-based data which is stored using native geospatial data-types within the Teradata database.
- VMDS – Version managed data store from Smallworld.

Geospatial Internet of Things

- SensorUp -- SensorUp provides the Cloud hosting and SDKs, based on the Open Geospatial Consortium SensorThings API standard, allowing developers to build applications that connects with Internet of Things sensor observations and tasking. SensorUp's OGC standard-based platform includes sensor data, analytics, and mapping SDK.

See also

- Comparison of geographic information systems software
- GIS Live DVD
- Open Source Geospatial Foundation (OSGeo)

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