1. **主流WebGIS开源解决方案**

现在主流的WebGIS开源解决方案分成两派，一派是C/C++，一派是java。

C/C++的解决方案为：Mapserver（服务器）+QGIS（桌面软件）+Tomcat（中间件）+PostGIS|MySQL空间扩展（数据库）+[Openlayers](http://www.opengeo.cn/bbs/thread.php?fid=5)(JS)/ openscale (FLex)(浏览器客户端)

JavaEE的解决方案为：Geoserver（服务器）+uDig（桌面软件）+Tomact（中间件）+PostGIS|MySQL空间扩展（数据库）+[Openlayers](http://www.opengeo.cn/bbs/thread.php?fid=5)(JS)/ openscale (FLex)(浏览器客户端)

Mapserver效率更高，Geoserver功能更强。Mapserver对WMS的支持更为高效，而Geoserver则更擅长于结合WFS规范的属性查询。

1. **目前GIS开源项目的不足**

* 底图处理能力不足

底图的整体处理还是用ArcGIS Desktop来进行的配置，然后将配置好的底图用ArcGIS切图。

* 空间数据的管理能力不足

目前依然是用的ArcGIS Catalog + SDE导入到Oracle数据库中。不涉及到大量空间数据库管理时，是采用的直接通过GeoServer来修改shp数据。没有统一管理，也不利于其他业务组获取数据。

* 空间分析能力不强。

部分功能已经探索出来，但是还没有GeoServer版本的空间分析产品。

1. **具体解决方案**

* 利用PostGIS将shp数据入库管理。利用uDig连接PostGIS后进行配图。uDig可以生成sld文件，以及发布到GeoServer的样式服务上去，从而实现对服务的配图控制。
* 利用GeoServer来代替ArcGIS Server。通过WMS服务可以实现类似于AGS中的export出图方式，实现部件图层的动态出图。通过WFS服务能实现与类似于AGS中的Query服务。通过WFS服务也可以实现类似于AGS中的FeatureServer服务，从而进行图层的编辑。同时，通过WFS服务还能实现类似于AGS中的GeometryServer服务，实现比如union等功能。
* 利用GeoWebCache插件，可以实现类似于AGS中的cache功能。同时支持切图。
* 利用GeoTools，可以在后台开发复杂的空间分析和相关操作的功能。Geotools是Java语言编写的开源GIS工具包。该项目已有十多年历史，生命力旺盛，代码非常丰富，包含多个开源GIS项目，并且基于标准的GIS接口。Geotools主要提供各种GIS算法，各种数据格式的读写和显示。要实现空间分析功能，只能基于它的源代码进行改写或利用

1. **GIS开源项目**

桌面：GRASS、QGIS、UDig

服务器：Geoserver、MapServer

数据库：PostGIS/PostgreSQL、MySQL Spatial

客户端：QGIS、OpenLayers、Openscale、Worldkit

工具集：JTS、GEOS（几何拓扑操作库）、Shapely、GDAL/OGR（栅格矢量数据操作库）、 Proj4（地图投影库）

中间件：GeoTools、MapTools

空间分析：中间件实现、基于OGC WPS实现

1. **CS与BS架构的三维WebGIS对比**

* C/S结构

优点：响应快（客户端与数据库直接连接）、软件设计个性化（客户端设计可以满足用户个性化需求）、处理能力强（充分利用硬件性能）。

缺点：分布能力差（需要安装，大量部署不方便）、维护成本高（客户端数量庞大不利于升级维护）、跨平台难以实现（需在不同的系统平台下重新开发）。

* B/S结构

优点：分布性广（有浏览器就可以登录工作）、维护方便（只需要在服务端进行维护就能升级）

缺点：时间冗余（一问一答方式完成信息交互带来时间冗余）、响应速度慢（三维WebGIS传输数据量大影像响应速度）、功能弱化（难以实现个性化需求，如报表工具等）、不稳定（浏览器兼容性）、同样需要本地浏览器安装插件（Skyline）。

1. **附表-主流GIS软件**

|  |  |  |  |
| --- | --- | --- | --- |
| Product name | Product type | Free? | Website |
| AccessionGIS | Network analysis | N | <http://www.citilabs.com/products/accession> |
| ade4 | Mathematical/Statistical library | Y | <http://cran.r-project.org/web/packages/ade4/index.html> |
| Agent Analyst | Geosimulation | Y | <http://resources.arcgis.com/en/help/agent-analyst/> |
| AgentSheets | Geosimulation | N | <http://www.agentsheets.com/> |
| AltaMap suite | Telecommunications/visibility analysis | N | <http://www.geomicro.com/> |
| ANN | Mathematical/Statistical library | Y | <http://www.cs.umd.edu/~mount/ANN/> |
| ANUDEM | Terrain analysis | N | <http://fennerschool.anu.edu.au/research/products/anudem-vrsn-53> |
| AnyLogic | Geosimulation | N | <http://www.anylogic.com/> |
| Arc2Earth | GIS tools | N | <http://www.arc2earth.com/> |
| ArcExplorer | Viewer | Y | <http://www.esri.com/software/arcexplorer> |
| ArcGIS | GIS | N | <http://www.esri.com/> |
| ArcLogistics (ArcGIS for Transportation Analytics) | Logistics | N | <http://www.esri.com/software/arcgis/arcgis-for-transportation-analytics> |
| AutoCAD Civil 3D | Visualisation (2D and 3D) | N | <http://usa.autodesk.com/civil-3d/> |
| Bentley Microstation Geographics | GIS | N | <http://www.bentley.com/en-US/Products/MicroStation/> |
| Boundaryseer | Specialised data analysis | N | <http://biomedware.com/?module=Page&sID=boundaryseer> |
| CadCorp SIS | GIS | N | <http://www.cadcorp.com/products/> |
| CadnaA | Noise mapping | N | <http://www.datakustik.com/en/products/cadnaa/> |
| Calpuff View | Emergency and Hazard Assessment | N | <http://www.weblakes.com/calpuff/calpuff_overview.html> |
| CARIS GIS Professional | GIS | N | <http://www.caris.com/products/> |
| Cartomap | Viewer | Y | <http://www.cartoworld.com/CartoMAP.html> |
| Cellular Expert | Telecommunications/visibility analysis | N | <http://www.cellular-expert.com/> |
| Clusterseer | Cluster analysis | N | <http://biomedware.com/?module=Page&sID=clusterseer> |
| CommonGIS | GIS | (Y) | [http://www.commongis.com](http://www.commongis.com/) |
| CommunityViz | Visualisation (2D and 3D) | N | <http://www.placeways.com/communityviz/> |
| ComSuite Design | Telecommunications/visibility analysis | N | <http://www.rcc.com/comsite/comsitedesign.shtml> |
| Concorde | Optimisation | Y | <http://www.tsp.gatech.edu/concorde/index.html> |
| Coordinate Calculator | Specialised mapping | Y | <http://www.tatukgis.com/Products/CoordinateCalculator/Description.aspx> |
| Crimestat III | Crime analysis | Y | <http://www.icpsr.umich.edu/CRIMESTAT/> |
| Cube | Traffic simulation and forecasting | N | <http://www.citilabs.com/software/products/cube> |
| DEPTHMAP | Telecommunications/visibility analysis | Y | <http://www.spacesyntax.net/software/> |
| Didger | Specialised mapping | N | <http://www.goldensoftware.com/products/didger/didger.shtml> |
| DYNAMEQ | Traffic simulation and forecasting | N | <http://www.inro.ca/en/products/dynameq/> |
| Earthware | Visualisation (2D and 3D) | N | <http://www.earthware.co.uk/> |
| Easy NN | Neural networks | N | <http://www.easynn.com/> |
| EMME | Traffic simulation and forecasting | N | <http://www.inro.ca/en/products/emme/> |
| ENVI | Remote sensing analysis | N | <http://www.exelisvis.com/ProductsServices/ENVIProducts.aspx> |
| ER Mapper | Specialised mapping | N | <http://www.hexagongeospatial.com/products/remote-sensing/erdas-er-mapper/overview> |
| ERDAS Imagine (now Hexagon Geospatial) | GIS | N | <http://www.hexagongeospatial.com/> |
| eRouteLogistics | Logistics | N | <http://www.e-iit.com/RoutePlanning.html> |
| ESTAT | Exploratory data analysis (EDA/ESDA) | Y | <http://www.geovista.psu.edu/ESTAT/> |
| Farsite | Emergency and Hazard Assessment | Y | <http://www.firemodels.org/index.php/national-systems/farsite> |
| FDO | GIS tools | Y | <http://fdo.osgeo.org/> |
| Feature Analyst | Terrain analysis | N | <http://www.textronsystems.com/products/geospatial/feature-analyst> |
| FloodWorks | Hydrological analysis | N | <http://www.innovyze.com/products/floodworks/> |
| FME | Specialised mapping | N | [http://www.safe.com/solutions/for-applications/esri-arcgis//A>](http://www.safe.com/solutions/for-applications/esri-arcgis/) |
| Fractal terrains | Specialised mapping | N | <http://www.profantasy.com/products/ft.asp> |
| Fragstats | Landscape analysis | Y | <http://www.umass.edu/landeco/research/fragstats/fragstats.html> |
| GA Lib (MATLab) | Genetic algorithms | N | <http://www.mathworks.com/products/gads/index.html?ref=pfo> |
| GALib | Genetic algorithms | Y | <http://lancet.mit.edu/ga/> |
| GAM/K | Cluster analysis | Y | <http://www.ccg.leeds.ac.uk/software/gam/> |
| GDAL | GIS tools | Y | <http://www.gdal.org/> |
| GenaMap | GIS | N | <http://www.genasys.com/en/> |
| GeoDa | Exploratory data analysis (EDA/ESDA) | Y | <http://geodacenter.asu.edu/software> |
| GeoExpress | Image handling | N | <http://www.lizardtech.com/> |
| Geographic Calculator | GIS tools | N | [http://www.bluemarblegeo.com](http://www.bluemarblegeo.com/) |
| Geographically weighted regression (GWR) | Statistical analysis | N | <https://geodacenter.asu.edu/gwr_software> |
| Geomatica | GIS | N | <http://www.pci.on.ca/> |
| Geomedia | GIS | N | <http://www.intergraph.com/sgi/default.aspx> |
| Geoplot | Specialised mapping | N | <http://www.geoscan-research.co.uk/page9.html> |
| Geostat | Geostatistical analysis | N | <http://www.geostat.com/English/products.htm> |
| Geotools | GIS tools | Y | <http://geotools.codehaus.org/> |
| GMT | GIS tools | Y | <http://gmt.soest.hawaii.edu/> |
| Go Geo Resource and software list |  |  | <http://www.gogeo.ac.uk/cgi-bin/resource.cgi?cat=33> |
| Grapher | Graphing | N | <http://www.goldensoftware.com/products/grapher/grapher.shtml> |
| GRASP | Specialised data analysis | Y | <http://sourceforge.net/projects/grasper/> |
| GRASS | GIS | Y | <http://grass.osgeo.org/> |
| Groundwater Modeling System (GMS) | Hydrological analysis | N | <http://www.aquaveo.com/software/gms-groundwater-modeling-system-introduction> |
| GS+ | Geostatistical analysis | N | <http://gammadesign.com/> |
| GVSIG | GIS | Y | <http://www.gvsig.org/web> |
| Hawth's Tools | GIS tools | Y | <http://www.spatialecology.com/> |
| ICS Telecom | Telecommunications/visibility analysis | N | <http://www.atdi.com/> |
| Idrisi | GIS | N | <http://www.clarklabs.org/> |
| ILOG CP | Logistics | N | <http://www-01.ibm.com/software/websphere/optimization/routing/> |
| ILOG CPLEX | Optimisation | (Y) | <http://www.ilog.com/products/cplex/> |
| ILWIS | GIS | Y | <http://www.itc.nl/ilwis> |
| IMMI | Noise mapping | N | <http://www.woelfel.de/en/products/prediction-of-noise-and-air-pollution/immi-noise-mapping/> |
| InfoWorks | Hydrological analysis | N | <http://www.innovyze.com/products/infoworks_ws/> |
| Instant Atlas | Specilaised mapping | N | [http://www.instantatlas.com](http://www.instantatlas.com/) |
| InterPose | GIS tools | Y | <http://www.dottedeyes.com/spatial_data_loading/interpose/digimap.php> |
| ISATIS | Geostatistical analysis | N | <http://www.geovariances.com/> |
| Java Topology Suite | GIS tools | Y | <http://www.vividsolutions.com/jts/jtshome.htm> |
| Landscape Fragmentation Tool | Landscape analysis | Y | <http://clear.uconn.edu/%5C/tools/lft/lft2/index.htm> |
| Landserf | Terrain analysis | Y | [http://www.landserf.org](http://www.landserf.org/) |
| LEDA | Optimisation | N | <http://www.algorithmic-solutions.com/> |
| LIDAR Analyst | Terrain analysis | N | <http://www.textronsystems.com/products/geospatial/lidar_analyst> |
| LINGO | Optimisation | N | <http://www.lindo.com/> |
| LOLA | Locational analysis | Y | <http://www.mathematik.uni-kl.de/~lola> |
| LP-Solve | Optimisation | Y | <http://lpsolve.sourceforge.net/5.5/> |
| Manifold | GIS | N | <http://www.manifold.net/> |
| Map Comparison Kit | Spatio-temporal analysis | Y | <http://www.riks.nl/products/Map-Comparison-Kit> |
| MapGuide | GIS | Y | <http://mapguide.osgeo.org/> |
| MapInfo | GIS | N | <http://www.pbinsight.com/welcome/mapinfo/> |
| MapInfo HotSpot Detective | Crime analysis | N | <http://www.spatialdecisions.com.au/products.htm#HSD#> |
| MapMerger | Specialised mapping | N | <http://www.esea.com/mapmerger.php> |
| MAPresso | Specialised mapping | Y | <http://www.mapresso.com/> |
| Mapserver | Specialised mapping | Y | <http://mapserver.org/> |
| Maptext/Label EZ | Specialised mapping | N | <http://www.maptext.com/> |
| Maptitude | GIS | N | [http://www.maptitude.com](http://www.maptitude.com/) |
| Maptools | GIS tools |  | [www.maptools.org](http://www.maptools.org/) |
| MAPublisher | Specialised mapping | (Y) | <http://www.avenza.com/mapublisher> |
| MapViewer | GIS | N | <http://www.goldensoftware.com/products/mapviewer/mapviewer.shtml> |
| MASON | Geosimulation | Y | <http://cs.gmu.edu/~eclab/projects/mason/> |
| Mathematica | Specialised data analysis | N | <http://www.wolfram.com/products/mathematica/newin7/content/IntegratedGeodesyAndGIS/> |
| MATLab plus toolboxes | Mathematical/Statistical library | N | <http://www.mathworks.com/> |
| MATSim | Geosimulation | Y | <http://matsim.org/> |
| Mondrian | Visualisation (2D and 3D) | Y | <http://www.theusrus.de/Mondrian/> |
| Natureserve Vista | Emergency and Hazard Assessment | N | <http://www.natureserve.org/conservation-tools/natureserve-vista> |
| NetLab | Neural networks | Y | <http://www1.aston.ac.uk/eas/research/groups/ncrg/resources/> |
| NetLogo | Geosimulation | Y | <http://ccl.northwestern.edu/netlogo/> |
| NOISEMAP | Noise mapping |  | <http://www.noisemap.ltd.uk/home/homepage.html> |
| NuMAP | Neural networks | (Y) | <http://www.uta.edu/faculty/manry/new_software.html> |
| Open Layers | Specialised mapping | Y | <http://openlayers.org/> |
| OpenMap | GIS tools | Y | <https://code.google.com/p/openmap/> |
| OpenSourceGIS | GIS tools | Y | <http://opensourcegis.org/> |
| Oriana | Directional analysis | N | [http://www.kovcomp.com](http://www.kovcomp.com/) |
| OSSIM | Image handling | Y | <http://www.ossim.org/> |
| PASSaGE | Specialised data analysis | Y | <http://www.passagesoftware.net/> |
| PCRaster | GIS | Y | <http://pcraster.geo.uu.nl/> |
| PostGIS | GIS | Y | <http://postgis.refractions.net/> |
| PySal | Mathematical/Statistical library | Y | <http://geodacenter.asu.edu/pysal> |
| QGIS | GIS | Y | <http://www.qgis.org/> |
| R Spatial | Mathematical/Statistical library | Y | <http://cran.r-project.org/web/views/Spatial.html> |
| R2V | GIS tools | N | <http://www.ablesw.com/r2v/index.html> |
| REACT | Logistics | N | <http://www.mjc2.com/> |
| Repast Simphony | Geosimulation | Y | <http://repast.sourceforge.net/> |
| RiverTools | Hydrological analysis | N | <http://www.rivix.com/> |
| RoadEng | Specialised mapping | N | [http://www.softree.com](http://www.softree.com/) |
| Rookcase | Statistical analysis | Y | <http://www.lpc.uottawa.ca/data/scripts/> |
| RouteSmart | Logistics | N | <http://www.routesmart.com/> |
| SAGA | GIS | Y | <http://www.saga-gis.org/> |
| SAGE2001 (SAGE2005) | Geostatistical analysis | N | <http://www.isaaks.com/> |
| SAM | Statistical analysis | Y | <http://www.ecoevol.ufg.br/sam/> |
| SANET | Network analysis | Y | <http://sanet.csis.u-tokyo.ac.jp/> |
| SaTScan | Cluster analysis | Y | <http://www.satscan.org/> |
| S-Distance | Locational analysis | Y | <http://www.prd.uth.gr/sites/spatial_analysis/software/SdOverview_en.html.> |
| SDM | GIS tools | Y | <http://arcscripts.esri.com/details.asp?dbid=15341> |
| SITATION | Locational analysis | Y | <http://sitemaker.umich.edu/msdaskin/software> |
| Smallworld | GIS | N | <http://gedigitalenergy.com/Geospatial/catalog/smallworld_core.htm> |
| Software listing | GIS tools | N | <http://ecat.giscafe.com/index.php> |
| SOM Toolbox | Neural networks | Y | <http://www.cis.hut.fi/projects/somtoolbox/> |
| SpaceStat | Statistical analysis | N | <http://biomedware.com/?module=Page&sID=spacestat> |
| Spatial Manager | GIS/mapping package | N | [http://www.spatialmanager.com](http://www.spatialmanager.com/) |
| spdep | Mathematical/Statistical library | Y | <http://cran.r-project.org/web/packages/spdep/index.html> |
| SPLANCS | Statistical analysis | Y | <http://cran.r-project.org/web/packages/splancs/index.html> |
| SPSS Base | Statistical analysis | N | <http://www.spss.com/> |
| StarLogo | Geosimulation | Y | <http://education.mit.edu/starlogo/> |
| STARS | Spatio-temporal analysis | Y | <http://regionalanalysislab.org/index.php/Main/STARS> |
| STATA/IC | Statistical analysis | N | <http://www.stata.com/> |
| Surfacewater Modeling System (SMS) | Hydrological analysis | N | [http://www.aquaveo.com/software/sms-surface-water-modeling-system-introduction](http://www.aquaveo.com/software/sms-surface-water-modeling-system-introductionl) |
| Surfer | Graphing | N | <http://www.goldensoftware.com/products/surfer/surfer.shtml> |
| Surfit | Specialised mapping | Y | <http://surfit.sourceforge.net/surfit/index.html> |
| SurGe | Specialised mapping | Y | <http://surgeweb.sweb.cz/> |
| SWARM | Geosimulation | Y | [http://www.swarm.org](http://www.swarm.org/) |
| Synchro and SIMTraffic | Traffic simulation and forecasting | N | <http://www.trafficware.com/products/planninganalysis-software/> |
| TAP | Telecommunications/visibility analysis | N | <http://www.softwright.com/products/tap-software/> |
| TAS (Whitebox) | Terrain analysis | Y | <http://www.uoguelph.ca/~hydrogeo/Whitebox/index.html> |
| TatukGIS | GIS tools | N | <http://www.tatukgis.com/> |
| TatukGIS Viewer | Viewer | Y | <http://www.tatukgis.com/Products/EditorViewer/Description.aspx> |
| TAUDEM | Terrain analysis | Y | <http://hydrology.usu.edu/taudem/taudem5/index.html> |
| Terraseer STIS (SpaceStat) | Spatio-temporal analysis | N | <http://www.terraseer.com/products_stis.php> |
| TNTMips | GIS | (Y) | <http://www.microimages.com/> |
| TransCAD | Network analysis | N | <http://www.caliper.com/tcovu.htm> |
| TransModeller | Traffic simulation and forecasting | N | <http://www.caliper.com/transmodeler/> |
| Truckstops | Logistics | N | <http://www.truckstopsrouting.com/us/> |
| TSIS-CORSIM | Traffic simulation and forecasting | N | <http://mctrans.ce.ufl.edu/featured/TSIS/> |
| uDig | GIS | Y | <http://udig.refractions.net/> |
| UrbanSim | Geosimulation | Y | <http://www.urbansim.org/> |
| Vincenty | GIS tools | Y | <http://www.ga.gov.au/earth-monitoring/geodesy/geodetic-techniques/calculation-methods.html> |
| Virtual Terrain Project | Visualisation (2D and 3D) | Y | [http://vterrain.org](http://vterrain.org/) |
| VisualBots | Genetic algorithms | Y | [http://www.visualbots.com](http://www.visualbots.com/) |
| VISUM | Traffic simulation and forecasting | N | <http://vision-traffic.ptvgroup.com/en-us/products/ptv-visum/> |
| Watershed Modeling System (WMS) | Hydrological analysis | N | <http://www.aquaveo.com/software/wms-watershed-modeling-system-introduction> |
| What's Best | Optimisation | N | <http://www.lindo.com/> |
| WinBUGS/GeoBUGS | Statistical analysis | Y | <http://www.mrc-bsu.cam.ac.uk/software/bugs/thebugs-project-geobugs/> |
| WindNinja | Specialised mapping | Y | <http://www.firelab.org/project/windninja> |
| WindWizard | Specialised mapping | (Y) | <http://www.firelab.org/project/windwizard> |
| Xpress-MP | Optimisation | (Y) | <http://www.fico.com/en/products/fico-xpress-optimization-suite/> |