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User Experience: Harvard University WMS (Distributed) Servers

The following reflects the experience of the computer science GIS group at the Harvard Division of Continuing Education (DCE) in setting up and testing distributed Web mapping servers.

Harvard's distributed geospatial Web environment considers the deployment of map services powered by different commercial map servers (ESRI ArcIMS, Intergraph GeoMedia WebMap) and open source (i.e., PostGIS/PostgreSQL, FreeBSD). Further installations and testing will be documented at Harvard's interoperability page[1].

The GIS group built a WMS server according to the OGC WMS 1.1.1 specification. The server is installed in a FreeBSD operating system for testing purposes. The GIS group plans to develop interoperable applications that will be tested in diverse environments for a multiplicity of users, both within the university and outside.

Steps for Installing OGC WMS Server on FreeBSD

This section describes the installation of an OGC WMS server (WMS 1.1.0. compliant) in a PC with a FreeBSD operating system. Many of the libraries that OGC WMS needs to have installed are available on FreeBSD under the ports system for FreeBSD[2].

This section shows how to install OGC WMS with many of the optional libraries and features. This procedure can also probably be used for other BSD based systems that make use of the 'ports' system for installing 3rd party packages. The ports system is a package management system for handling the retrieving, compiling, and installation of software that is not included with the base FreeBSD system. It is very similar to Redhat's RPM package format. For more information refer to FreeBSD system ports page[3].

These instructions will not be helpful to Linux users as the package management tools are different for Linux users (or other UNIX flavors for that matter). The following libraries are extra libraries with which WMS can link with Proj.4 (Cartographic Projection Library, necessary for WMS Clients)[4]:

- libwww (necessary for WMS Clients)
- libjpeg
- libpng
- libgeotiff
- libgif
- freetype
- gdal
- ogr
- postgis (Libraries for interfacing with Postgresql library)

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[1] *Harvard's interoperability page: http://www.gis.harvard.edu/interoperability*
[2] *FreeBSD: http://www.freebsd.org*
[3] *FreeBSD System Ports: http://www.freebsd.org/ports*
[4] *Proj.4 (cartographic projection Library): http://www.remotesensing.org/proj/*

For additional reference, you can also look at the information on compiling an OGC WMS for UNIX from *UMN Mapserver HOWTO4*[5].

NOTE: These instructions assume you have root privileges on the FreeBSD operating system. If you do not have root privileges, then these instructions don't directly apply to your environment.

Step 1: Install FreeBSD onto your system. Installation instructions for FreeBSD can be found in the FreeBSD handbook[6].

Step 2: Install the ports system during your FreeBSD installation. Although it is not required, we recommend that you update your ports collection tree on your FreeBSD system. This will update all the available 3rd party packages that FreeBSD knows of and put it on the system.

Step 3: Install the gdal port. It is located under /usr/ports/graphics/gdal. Here is a sample session of installing the gdal port:

```
> cd /usr/ports/graphics/gdal
> make
[Lots of output]
> make install
[Lots of output]
> make clean
[Lots of output]
```

Step 4: gdal will install a large set of the libraries that you will need. In particular, it will install the following:

libpng

libtiff

libgeotiff

libjpeg

libgif

In addition, gdal will install the ogr libraries for you automatically. This process will take some time depending on the speed of your system. Expect a couple of hours for building everything on a Pentium 2400Mhz-based system.

Step 5: Install libwww. This is under /usr/ports/www/libwww. Here is a sample session of what you would type in at the prompt to get it installed:

```
> cd /usr/ports/www/libwww
> make
[Lots of output]
> make install
[Lots of output]
> make clean
[Lots of output]
```

Step 6: Install the freetype library. This is under /usr/ports/print/freetype. Here is a sample installation; run:

```
> cd /usr/ports/print/freetype
[Lots of output]
```

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[5] *Compiling OGC WMS for Unix (from UMN Map Server):* http://mapserver.gis.umn.eedu/doc36/unix-install-howto.html

[6] *FreeBSD handbook:* http://www.freebsd.org/handbook

```
> make
[Lots of output]
> make install
[Lots of output]
> make clean
[Lots of output]
```

Step 7: This will install the gd2 library. This is under /usr/ports/graphics/gd2.

Here is a sample installation; run:

```
> cd /usr/ports/graphics/gd2
[Lots of output]
> make
[Lots of output]
> make install
[Lots of output]
> make clean
[Lots of output]
```

Step 8: This will install a database backend that WMS servers can connect with. The database used will be PostgreSQL.

Here is a sample installation; run:

```
> cd /usr/ports/databases/postgresql7
[Lots of output]
> make
[Lots of output]
> make install
[Lots of output]
> make clean
[Lots of output]
```

Step 9: Download, install, and configure PostGIS and Proj.4 libraries. At the time of this writing, the latest releases are Proj.4 4.4.6 libraries[7] and PostGIS release 0.7.4[8].

Follow the URLs given above and download these to your FreeBSD system. For this set, it is recommended to place the downloaded archives in the directory `/usr/local/src` and open them with the tar command in `/usr/local/src.`

Once there, you can cd to the subdirectory that is created for each of them and follow the instructions in the INSTALL or README files to install the libraries onto your system. The defaults for installation should be fine. An example for installing PostGIS is given below:

```
> cd /usr/local/src/postgis
> ./configure
[Lots of output]
> make
[Lots of output]
> make install
[Lots of output]
```

[7] *Proj. 4 4.4.6 libraries: ftp://ftp.remotesensing.org/pub/proj/proj-4.4.6.tar.gz*
[8] *http://postgis.refractions.net/postgis-0.7.4 tar.gz*

Step 10: You will also need a Web server to serve HTTP requests. Install the Apache Web server (or use another if preferred)[9]. Here is a sample run for installing Apache. Apache is in the ports collection under `/usr/local/www/apache13`.

An example run follows:

```
> cd /usr/ports/www/apache13
[Lots of output]
> make
[Lots of output]
> make install
[Lots of output]
> make clean
[Lots of output]
```

Step 11: Download the UMN MapServer source archive into `/usr/local/src` (or in another preferred area). At the time of this writing the latest release of UMN Mapserver is 3.6.4[10]. Unarchive the tar file and cd into that directory.

Configuration of WMS server: you want to notify the UMN MapServer of all the available libraries since WMS has problems auto-detecting them properly if you just run the configure script.

Below is a sample for enabling all of the available libraries you installed:

```
> cd /usr/local/src/mapserver
> ./configure --with-jpeg=/usr/local --with-gd=/usr/local \
--with-freetype=/usr/local --with-wmsclient --with-
proj=/usr/local \
--with-postgis=/usr/local
--with-gdal=/usr/local
--with-ogr=/usr/local
[Lots of output]
> make
[Lots of output]
```

Step 12: The previous step created the UMN MapServer executable called mapserver. Copy this into the cgi-bin directory of Apache. By default, this is located in `/usr/local/www/cgi-bin`
`> cp mapserver /usr/local/www/cgi-bin`

Step 13: From this point, you can follow the MapServer demo tutorial53[11] to get started working with the UMN MapServer and customizing it to your needs.

Experience with ESRI ArcIMS WMS

The WMS server directly is powered by ArcIMS 3.1 spatial engine (a new ArcIMS 4.0.1 is installed on a UNIX Solaris OS). ArcIMS 3.1 spatial engine allowed us to develop a collaborative Web-based GIS tool for teaching and training called Map Events Tool. The major difference between ArcIMS version 3.1 and version 4.0.1 is that the latest version has the WMS interface built in for easing the installation of the OGC WMS connector. If you have ArcIMS 3.1, you need to download the WMS connector from ESRI's interoperability page[12].

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[9] *Apache Web server installation: http://httpd.apache.org/docs/*
[10] *UMN MapServer (version 3.6.4) download http://mapserver.gis.umn.edu/dist/mapserver-3.6.4.tar.gz*
[11] *UMN Mapserver tutorial: http://mapserver.gis.umn.edu/doc36/demo_readme.html*
[12] *ESRI's InteroperabilityWebsite: http://www.esri.com/software/opengis/interopdownload.html*

The ESRI ArcIMS OGC WMS connector works properly with ArcIMS 3.1, Apache3, Tomcat 3.2.1, or installed through ArcIMS4.0.1 on Solaris operating system.

Experience with Intergraph GeoMedia WebMap Professional

Note: For the steps on installing and customizing the GeoMedia WebMap WMS adaptor see Intergraph's contribution in Chapter 3, Recipe 4.

Recommendations

For New Users: WebMap is tightly integrated with IIS. Although it is possible to get GeoMedia WebMap Professional to work with other servers it is recommended that new users stick with using IIS as the default Web server.

Security: Make sure to update and patch your Windows system and install the latest patches for IIS to ensure that your machine is not vulnerable to any Web based viruses that can affect IIS[13]. It is also recommended that you use the IIS Lockdown Tool to make sure that IIS's default security settings are tightened up.

Cache: Create a cache directory for GeoMedia WebMap Professional from the IIS Administration Tool. Create a new virtual directory under IIS, alias: cache

Directory: E:\inetpub\wwwroot\cache. Change this to suit where your setup is Properties: Read, Run Script.

Ensure that WebMap is aware of the newly created cache directory by going to WebMap Administrator -> Tools -> Edit System Settings.

Acknowledgements

Alain Hoang, a Harvard DCE graduate student, and comments from students from GIS course CSCIE-40 at the Harvard DCE.

[13] *Window's update: http://windowsupdate.microsoft.com, Windows IIS patches: http://www.microsoft.com/technet/treeview/default.asp?url=/technet/prodtechnol/iis/Dedfauly.asp*