



VR-TheWorld

Users Guide



VR-TheWorld Server



Users Guide

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VT MÄK
68 Moulton St.
Cambridge, MA 02138 USA

Voice: 617-876-8085
Fax: 617-876-9208

info@mak.com

www.mak.com

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Preface

This manual is written for persons who will use or administer VR-TheWorld Server.

Please see release documentation for updates to this manual and the latest information about your version of VR-TheWorld Server.

How This Manual is Organized

The chapters are organized as follows:

Chapter 1, *Introduction* introduces you to VR-TheWorld Server.

Chapter 2, *Installing VR-TheWorld Server* explains how to install and setup the VR-TheWorld Server hardware.

Chapter 3, *Connecting to VR-TheWorld Server* explains how users of VR-TheWorld Server connect their application to the server.

Chapter 4, *Configuring VR-TheWorld Server* explains how to configure server and network settings. It also describes how to back up the server.

Chapter 5, *Working with Maps* describes maps and how to create them out of layer data.

Chapter 6, *Working with Layers* describes the different types of layers and how to create them.

Chapter 7, *Managing Files* explains how to upload and manage the files that make up a layer.

Chapter 8, *Editing Earth Files* explains the structure of Earth files, which are used for streaming terrain data using osgEarth applications.

Chapter 9, *Performance Considerations* explains how you can improve the performance of VR-TheWorld Server.

Appendix A, *Terrain Sources* lists the sources for the data in the layers shipped with VR-TheWorld Server.

MÄK Products

The VR-TheWorld Server is a member of the VT MÄK line of software products designed to streamline the process of developing and using networked simulated environments. The VT MÄK product line includes the following:

- ♦ VR-Link® Network Toolkit. VR-Link is an object-oriented library of C++ functions and definitions that implement the High Level Architecture (HLA) and the Distributed Interactive Simulation (DIS) protocol. VR-Link has built-in support for the RPR FOM and allows you to map to other FOMs. This library minimizes the time and effort required to build and maintain new HLA or DIS-compliant applications, and to integrate such compliance into existing applications.

VR-Link includes a set of sample debugging applications and their source code. The source code serves as an example of how to use the VR-Link Toolkit to write applications. The executables provide valuable debugging services such as generating a predictable stream of HLA or DIS messages, and displaying the contents of messages transmitted on the network.

- ♦ MÄK RTI. An RTI (Run-Time Infrastructure) is required to run applications using the High Level Architecture (HLA). The MÄK RTI is optimized for high performance. It has an API, RTIsPy®, that allows you to extend the RTI using plug-in modules. It also has a graphical user interface (the RTI Assistant) that helps users with configuration tasks and managing federates and federations.
- ♦ VR-Forces®. VR-Forces is a computer generated forces application and toolkit. It provides an application with a GUI, that gives you a 2D and 3D views of a simulated environment.

You can create and view local entities, aggregate them into hierarchical units, assign tasks, set state parameters, and create plans that have tasks, set statements, and conditional statements. VR-Forces also functions as a plan view display for viewing remote entities taking part in an exercise. Using the toolkit, you can extend the VR-Forces application or create your own application for use with another user interface.

- ♦ VR-Vantage™. VR-Vantage is a line of products designed to meet your simulation visualization needs. It includes four end-user applications (VR-Vantage Stealth, VR-Vantage XR, VR-Vantage PVD, and VR-Vantage IG), the VR-Vantage Toolkit, and VR-Vantage FreeView.
 - VR-Vantage Stealth displays a realistic, 3D view of your virtual world. You can view this world from the inside of a simulated moving vehicle, or place the eyepoint at another moving or stationary location. The Stealth lets you switch rapidly among several predefined viewpoints while the simulation is underway.
 - VR-Vantage IG is a configurable desktop image generator (IG) for out the window (OTW) scenes and remote camera views. It has most of the features of the Stealth, but is optimized for its IG function.

- VR-Vantage XR provides a common operational picture using the same 3D views as VR-Vantage Stealth, a 2D plan view, and an exaggerated reality (XR) view. Together these views provide both situational awareness and the big picture of the simulated world.
- VR-Vantage PVD provides a 2D plan view display. It gives you the big picture of the simulated world.
- The VR-Vantage Toolkit is a 3D visual application development toolkit. Use it to customize or extend MÄK's VR-Vantage applications, or to integrate VR-Vantage capabilities into your custom applications. VR-Vantage is built on top of OpenSceneGraph (OSG). The toolkit includes the OSG version used to build VR-Vantage.
- VR-Vantage Free View is a terrain and 3D model viewer that introduces some of the features of VR-Vantage applications in a useful, free utility.
- ♦ MÄK Data Logger. The Data Logger, also called the Logger, can record HLA and DIS exercises and play them back for after-action review. You can play a recorded file at speeds above or below normal and can quickly jump to areas of interest. The Logger has a GUI and a text interface. The Logger API allows you to extend the Logger using plug-in modules or embed the Logger into your own application. The Logger editing features let you merge, trim, and offset Logger recordings.
- ♦ VR-Exchange™. VR-Exchange allows simulations that use incompatible communications protocols to interoperate. For example, within the HLA world, using VR-Exchange, federations using the HLA RPR FOM 1.0 can interoperate with simulations using RPR FOM 2.0, or federations using different RTIs can interoperate. VR-Exchange supports HLA, TENA, and DIS translation.
- ♦ VR-TheWorld™ Server. VR-TheWorld Server is a simple, yet powerful, web-based streaming terrain server, developed in conjunction with Pelican Mapping. Delivered with a global base map, you can also easily populate it with your own custom source data through a web-based interface. The server can be deployed on private, classified networks to provide streaming terrain data to a variety of simulation and visualization applications behind your firewall.
- ♦ VR-inTerra. VR-inTerra is a C++ API for adding terrain agility to applications. It can load, page, or stream terrain from a wide variety of formats or sources into a single, consistent run-time representation, consisting of a collision graph and vector network.

How to Contact Us

For VR-TheWorld Server technical support, information about upgrades, and information about other MÄK products, you can contact us in the following ways:

Telephone

Call or fax us at:	Voice:	617-876-8085 (extension 3 for support)
	Fax:	617-876-9208

E-mail

Sales and upgrade information:	info@mak.com
Technical support:	support@mak.com
VR-Vantage support:	vr-v-support@mak.com

Internet

MÄK web site home page:	www.mak.com
License key requests:	www.mak.com/support/get-licenses.html
Product version and platform information:	www.mak.com/support/product-versions.html
For the free, unlicensed MÄK RTI:	www.mak.com/resources/bonus-material/cat_view/16-bonus-materials/24-mak-high-performance-rti.html
MÄK Community Forum:	www.mak.com/community-forum/1-forum.html

Post

Send postal correspondence to:	VT MÄK 68 Moulton St. Cambridge, MA, USA 02138
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When requesting support, please tell us the product you are using, the version, and the platform on which you are running.

Document Conventions

This manual uses the following typographic conventions:

<code>Monospaced</code>	Indicates commands or values you enter.
Monospaced Bold	Indicates a key on the keyboard.
<i>Monospaced Italic</i>	Indicates command variables that you replace with appropriate values.
Blue text	A hypertext link to another location in this manual or another manual in the documentation set.
Blue bold text	A hypertext link to class documentation.
{ }	Indicates required arguments.
[]	Indicates optional arguments.
	Separates options in a command where only one option may be chosen at a time.
()	In command syntax, indicates equivalent alternatives for a command-line option, for example, (-h --help).
/	Indicates a directory. Since MÄK products run on both UNIX and Windows PC platforms, we use the / (slash) for generic discussions of pathnames. If you are running on a PC, substitute a \ (backslash) when you type pathnames.
<i>Italic</i>	Indicates a file name, pathname, or a class name.
sans Serif	Indicates a parameter or argument.
➤	Indicates a one-step procedure.
Menu → Option	Indicates a menu choice. For example, an instruction to select the Save option from the File menu appears as: Choose File → Save .
i	Indicates supplemental or clarifying information.
!	Indicates additional information that you must observe to ensure the success of a procedure or other task.

Directory names are preceded with dot and slash characters that show their position with respect to the VR-TheWorld Server home directory. For example, the directory */doc* appears in the text as *./doc*.

Mouse Button Naming Conventions

An instruction to click the mouse button, refers to clicking the primary mouse button, usually the left button for right-handed mice and the right button for left-handed mice. The popup menu refers to the menu displayed when you click the secondary mouse button, usually the right button on right-handed mice and the left button on left-handed mice.

Third Party Licenses

MÄK software products may use code from third parties. This section contains the license documentation required by these third parties.

Boost License

VR-Link, and all MÄK software that uses VR-Link uses some code which is distributed under the Boost License. All header files that contain Boost code are properly attributed. The boost web site is: www.boost.org.

Boost Software License - Version 1.0 - August 17th, 2003

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libXML and libICONV

VR-Link and all MÄK software that uses VR-Link, links in libXML and libICONV. On some platforms the compiled libraries and header files are distributed with MÄK Products. MÄK has made no modifications to these libraries. For more information about these libraries please see the following web sites:

- ♦ The LGPL license is available at: <http://www.gnu.org/licenses/lgpl.html>
- ♦ Information about IconV is at: <http://www.gnu.org/software/libiconv/>
- ♦ Information about LibXML is at: <http://xmlsoft.org/>

pThreads Library

VR-Exchange links with the pThreads win32 library. The library is distributed under the GNU Lesser General Public License (LGPL). MÄK has made no modification to this library. For information about the pThreads win32 library please see: <http://sourceware.org/pthreads-win32/>

EHS, PCRE, and PME

The MÄK RTI links with the EHS, PCRE, and PME libraries. These libraries are distributed under the GNU Lesser General Public License (LGPL). MÄK has made modification to these libraries only to allow them to compile on the supported platforms. For more information about these libraries please see the following web sites:

- ♦ EHS: <http://xaxxon.slackworks.com/ehs/>
- ♦ PCRE: <http://www.pcre.org/>
- ♦ PME: <http://xaxxon.slackworks.com/pme/index.html>

LizardTech

Portions of this computer program are copyright © 1995-2010 Celartem, Inc., doing business as LizardTech. All rights reserved. MrSID is protected by U.S. Patent No. 5,710,835. Foreign Patents Pending.

Freefont OpenType Font Set

VR-Vantage applications and VR-Forces use the Freefont OpenType font set from the Free Software Foundation. It is covered by the General Public License (GPL). For details, please see: <http://www.gnu.org/licenses/gpl.html>



Introduction

VR-TheWorld Server is MÄK's streaming terrain server.

[Introduction to VR-TheWorld Server](#) 1-2

1.1. Introduction to VR-TheWorld Server

VR-TheWorld Server is a simple, yet powerful, web-based streaming terrain server, developed in conjunction with MÄK's technology partner, Pelican Mapping. It is delivered with a global base map. However, you can also easily populate it with your own custom source data through a web-based interface. The server can be deployed on private, classified networks to provide streaming terrain data to a variety of simulation and visualization applications behind your firewall.

VR-TheWorld Server has over three terabytes of global elevation, imagery, and feature data — pre-tiled for high performance access. The VR-TheWorld Basemap has:

- Global elevation. 90-meter (DTED Level 1) for the entire globe, based on the CGIAR-CSI version of NASA's SRTM30 dataset, merged with SRTM30Plus bathymetry.
- Global imagery. Landsat 7 (15m resolution for the entire globe) merged with NASA Blue Marble data (500m resolution), color-corrected for seamless display, and pre-tiled to 7 mipmap levels.
- High-resolution inset areas. The insets range from 1m to 15cm per pixel — including Boston, Washington, D. C., and two airport areas in Afghanistan.
- Samples of 1:250,000 and 1:100,000 topographic maps in Southern California.
- A highly detailed map of Hawaii, which includes:
 - 15m Harris Terracolor imagery, added to make the area surrounding the Hawaiian Islands look more like deep blue water. This product has a very nice view of the shallow water boundaries between the ocean and the islands.
 - 1ft USGS Mosaicked Digital Orthophoto Quadrangles (MDOQs) produced through the National Digital Orthophoto Program (NDOP) for the island of Oahu.
 - 1ft water replacement imagery custom built by Harris, includes Digital Globe WV2 Imagery blended into Oahu Imagery and Harris Terracolor Imagery to ease the transition between the 15m and 1ft imagery.
 - 10m Digital Elevation Model from USGS.
 - Feature data for Oahu, including building footprints for 120,000 buildings.

VR-TheWorld Server uses open standards such as WMS-C (Web Mapping Service-Cached, from Open Geospatial Consortium), WFS (Web Feature Service, from the Open Geospatial Consortium), and TMS (OSGeo's Tile Map Service). This means that clients are not limited to MÄK's visualization or simulation tools. Any customer or third party application that supports WMS-C or TMS (including web applications) can access VR-TheWorld Server immediately.



Installing VR-TheWorld Server

This chapter explains how to install the VR-TheWorld Server hardware.

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2.1. VR-TheWorld Server Components

VR-TheWorld Server is delivered as a self-contained server with all data installed.

The minimum recommended hardware configuration for running VR-TheWorld Server is:

- ♦ Server:
 - Quad core
 - 8 GB RAM
 - 250 GB hard drive
- ♦ Data storage:
 - 4 TB of usable space (after configuration)

2.2. Setting Up VR-TheWorld Server Hardware

To set up the hardware:

1. Connect two power cords to the server.
2. Plug the power cords into a power outlet.
3. Connect the server to your network. Plug the ethernet cable into the ethernet 5 port.

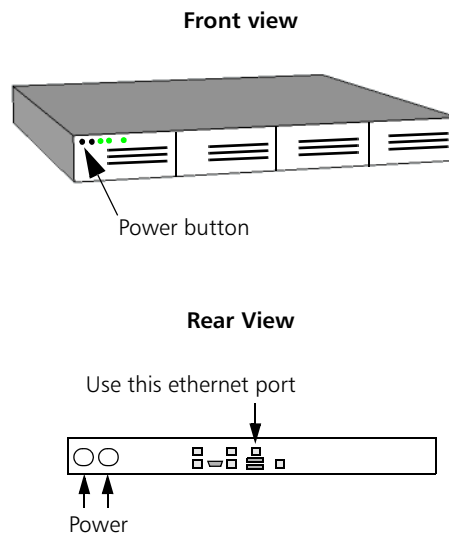


Figure 2-1. VR-TheWorld Server components

4. Turn on the server.

2.3. Connecting to the Server

When shipped, VR-TheWorld Server is configured to use DHCP and it has a static IP address. If your network has dynamic DNS set up, you can connect to the server without further configuration. If you do not have dynamic DNS, you must configure an IP address for the server.

2.3.1. Connecting to VR-TheWorld Server Using Dynamic DNS

To connect to the server using dynamic DNS:

1. Set up the server and connect it to the network as described in “[Setting Up VR-TheWorld Server Hardware](#),” on page 2-2.
2. Open a web browser.
3. Point the browser to <http://vr-theworld> ([Figure 2-2](#)).

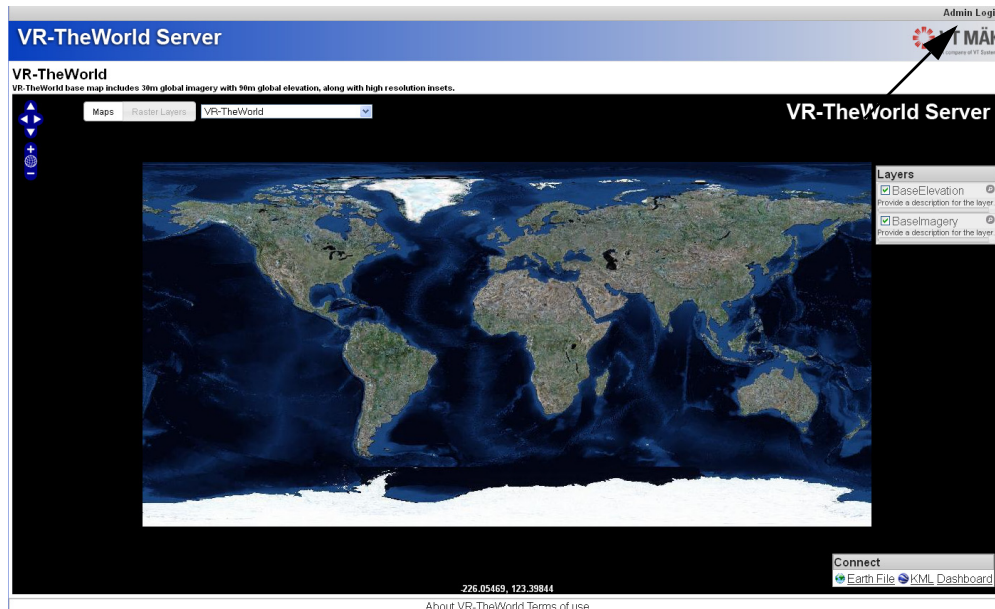


Figure 2-2. VR-TheWorld Server

4. Click Admin Login in the upper right corner of the window. The default user is admin. The default password is admin. It is recommended that you change the password the first time you log in.
5. Configure the server, as described in Chapter 4, [Configuring VR-TheWorld Server](#).

2.3.2. Connecting to VR-TheWorld Server with a Static IP Address

If you do not have dynamic DNS set up, you must connect to the server using its static IP address (192.168.9.123). Then you can configure it for your network.

To connect to the server:

1. Set up the server and connect it to the network as described in [“Setting Up VR-TheWorld Server Hardware,”](#) on page 2-2.
2. Configure a computer on your network with the IP address 192.168.9.x, where x is a number between 0-255 other than 123 and set the netmask to 255.255.255.0.
3. Open a web browser.
4. Point the browser to <http://192.168.9.123>.
5. Click Admin Login in the upper right corner of the window ([Figure 2-2](#)). The default user is admin. The default password is admin. It is recommended that you change the password the first time you log in.
6. Change the static IP address to an address of your choice, as described in [“Configuring Network Settings,”](#) on page 4-6. You can turn off the alternate IP address, or keep it active.
7. Configure general server settings, as described in Chapter 4, [Configuring VR-TheWorld Server](#).



Connecting to VR-TheWorld Server

This chapter explains how to connect VR-Vantage, Google Earth, and other applications to VR-TheWorld Server.

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Changing the Transparency of a Layer	3-10

3.1. Using VR-TheWorld Server Data in Applications

Although you can view VR-TheWorld Server maps and layers in a web browser, most people will connect to the VR-TheWorld Server from a visualization application, such as VR-Vantage, that needs to visualize the terrain over which entities are being simulated, or a CGF application, such as VR-Forces, that needs terrain on which to simulate entities and objects. This chapter explains how to connect your application to the server.

VR-TheWorld Server supports the Tile Mapping Service (TMS) and Web Mapping Service-Cached (WMS-C). It also automatically provides KML files for loading server data in Google Earth, and Earth files for loading data in VR-Vantage and other applications that support the osgEarth format.

3.2. How Maps are Organized

The data in VR-TheWorld Server is organized into maps. Each map has one or more layers. A layer is made from one or more files that contain image, elevation, or feature data. If you view the data in the web interface, it tells you what layers are in each map. If you have administrative authority, you can create, edit, and delete layers and maps for use by VR-TheWorld Server.

3.3. Viewing Maps in Google Earth

VR-TheWorld Server creates KML files that you can save and open in Google Earth or open directly into Google Earth.

To view a map in Google Earth:

1. In a web browser, connect to VR-TheWorld Server.
2. Select the map you want to view.
3. Click the KML link for the map (Figure 3-1). You are prompted to open the map using Google Earth.

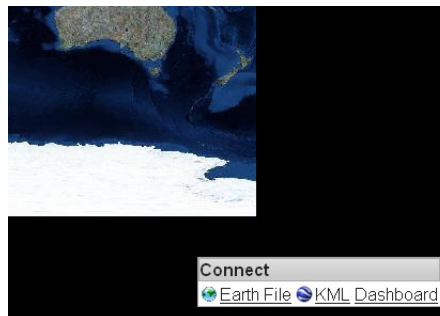


Figure 3-1. Connection URLs

4. Click OK.

To save a KML file to open in Google Earth:

1. In a web browser, connect to VR-TheWorld Server.
2. Select the map you want to view.
3. Right-click the Google Earth Users link for the map.
4. On the popup menu, choose **Save Link As**.
5. Select a directory in which to save the KML file.
6. Click Save.
7. Open Google Earth.
8. Choose **File** → **Open**.
9. Select the KML file you saved. The map is loaded.

3.3.1. Viewing the KML Extents of a Layer

When you are logged in as an administrator and you edit a layer, you have the option to connect to KML Footprints. KML Footprints show the polygonal extents of the layers. [Figure 3-2](#) illustrates the KML view of a layer and the KML Footprint view in Google Earth. For details about editing a layer, please see [“Creating a Raster Layer,”](#) on page 6-2.

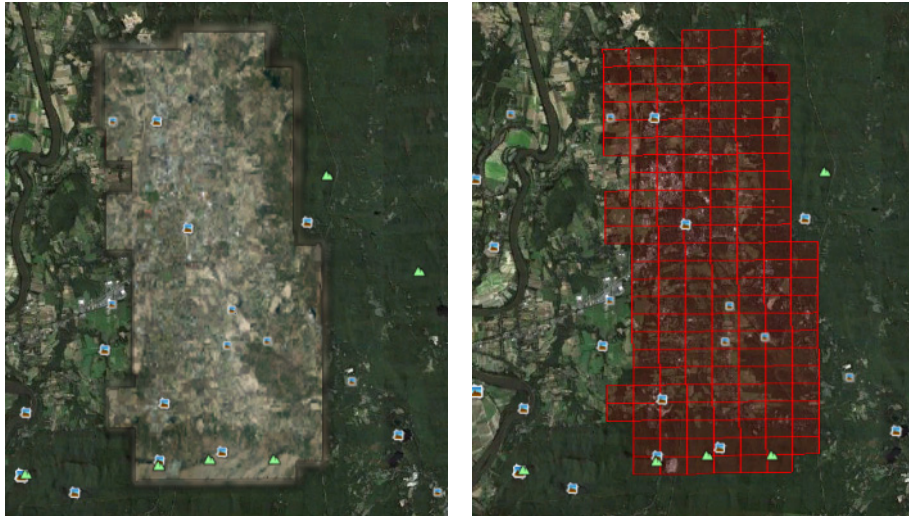


Figure 3-2. KML and KML Footprint

3.4. Viewing Maps in VR-Vantage

VR-TheWorld Server creates Earth files that you can open directly with VR-Vantage and save to the *./userData/servers*.

To connect VR-Vantage to VR-TheWorld Server:

1. In a web browser, connect to VR-TheWorld Server.
2. Select the map you want to use.
3. Click the Earth File link for the map (Figure 3-1). You are prompted to open the map using VR-Vantage (Figure 3-3).

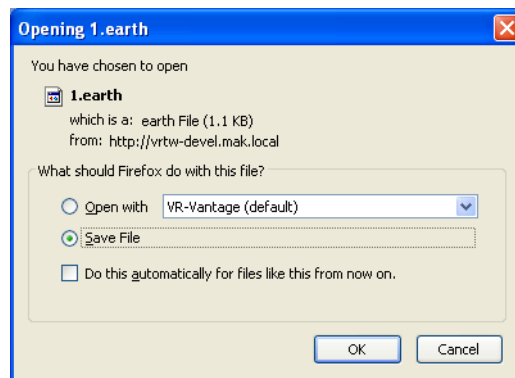


Figure 3-3. Open file prompt

4. Select the Open With option.

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- ♦ If you have more than one version of VR-Vantage installed on your computer, VR-Vantage chooses the most recent version.
 - ♦ If instead of prompting you to open the map with VR-Vantage, the browser asks you to identify the program to use, browse to the *./bin* directory for your version of VR-Vantage and select *vrvLauncher.exe*.
 - ♦ Older versions of VR-Vantage may not support all of the streaming capabilities of VR-TheWorld Server 2.0.
-

5. Click OK. The VR-Vantage Launcher dialog box opens (Figure 3-4).

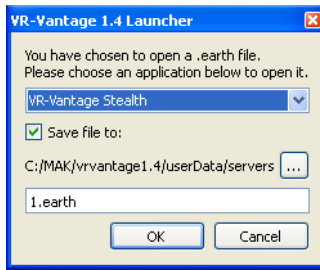


Figure 3-4. VR-Vantage Launcher dialog box

6. Select the VR-Vantage application that you want to use to open the Earth file.
7. Optionally, select Save File To to save the Earth file for future use directly from VR-Vantage. If you save the file, you can specify a location and give it a new name.
8. Click OK.

3.5. Viewing a Map in the Dashboard

The Dashboard is a simple browser-based view of a map. You can connect to it by clicking the Dashboard link in the Connect panel ([Figure 3-1](#)). This link is available from the public view of VR-TheWorld Server as well as when you are logged in as administrator. When you connect to the Dashboard view, you can copy the URL from your browser and add it to any web page from which you want to link to the particular map.

3.6. Viewing Maps in Other Applications

If you want to view server data in applications other than Google Earth and VR-Vantage, you can connect to the server using TMS or WMS. These connections are on a per layer basis. VR-TheWorld Server provides a URL with appropriate connection data. It is up to you and your application to understand how to use the URLs provided.

To connect to a layer using TMS or WMS:

1. In a web browser, connect to VR-TheWorld Server.
2. Click the Raster Layers button.
3. In the drop-down list, select the layer that you want to connect to (Figure 3-5).

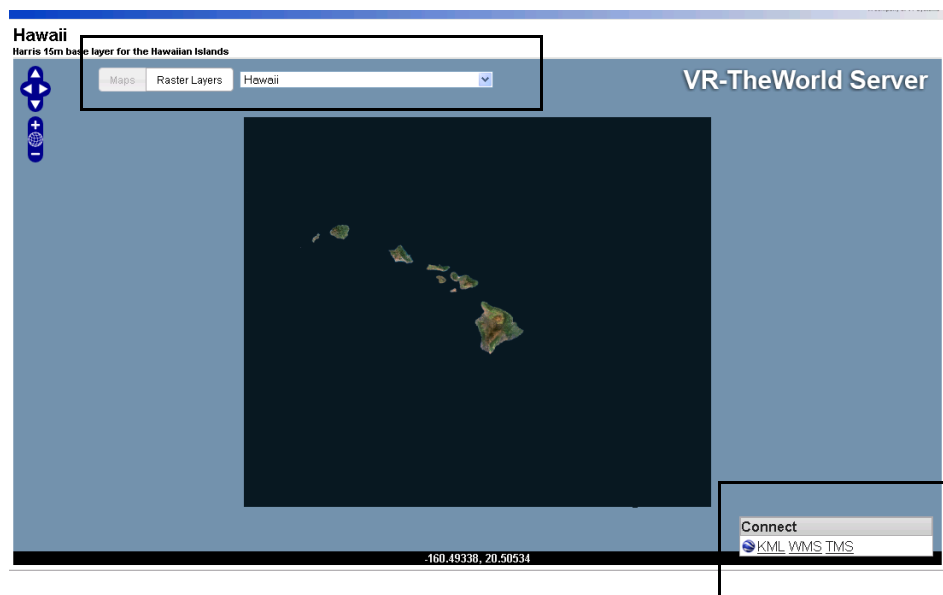


Figure 3-5. Raster layer

4. Click the link for TMS or WMS. If you clicked TMS, the browser displays details about the data in the layer. If you selected WMS, it does not show any data.
5. Copy the URL in your browser's URL field.

3.7. Zooming In to a Placemark

Map administrators can put placemarks on a map. Placemarks allow you to quickly zoom in to the location that is marked.

To zoom in to a placemark.

1. Click a placemark (Figure 3-6). A dialog box opens that identifies the placemark (Figure 3-7).

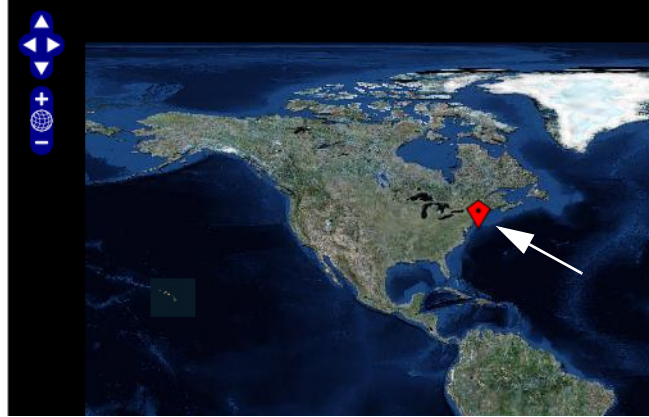


Figure 3-6. Placemark

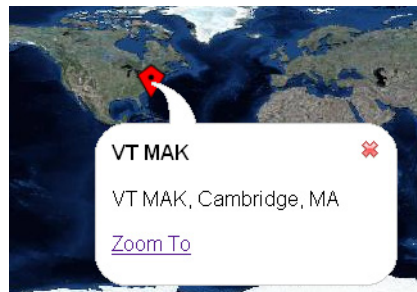


Figure 3-7. Placemark information

2. Click Zoom To. The map zooms in to the placemark.
3. Click the zoom icon on the zoom bar. The map zooms in, keeping the placemark centered.

3.8. Changing the View of a Layer

In a map with more than one layer, it is not always easy to identify where the layers are. VR-TheWorld Server has two features that help you to view layers - transparency and zoom to layer.

3.8.1. Zooming to a Layer

Zoom to layer lets you quickly view the extents of a layer.

- To zoom the view to the extents of a layer, in a map's Layers Panel ([Figure 3-8](#)), click the Zoom icon for the layer that you want to view.

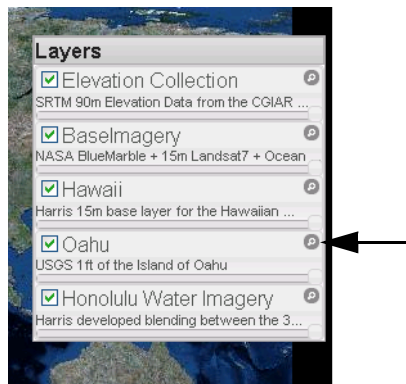


Figure 3-8. Layers Panel and zoom icon

3.8.2. Hiding Layers

You can toggle display of a layer on and off.

- To toggle the display of a layer, select or clear the check box for that layer in the Layers panel ([Figure 3-8](#)).

3.8.3. Changing the Transparency of a Layer

Layers are placed on top of each other, or at least on top of some base layer of imagery. If you want to see what is beneath a layer, you can change its transparency. Equally, by making the base layer transparent, you can easily find out where other layers are located.

Figure 3-9 shows the Hawaii map with the Honolulu Water Imagery layer fully visible and mostly transparent.



Figure 3-9. Honolulu water imagery

- To change the transparency of a layer, drag its transparency slider (Figure 3-9) to the left or right.



Configuring VR-TheWorld Server

This chapter describes basic configuration and server management tasks.

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4.1. Introduction

VR-TheWorld Server administrators configure VR-TheWorld Server through the browser interface.

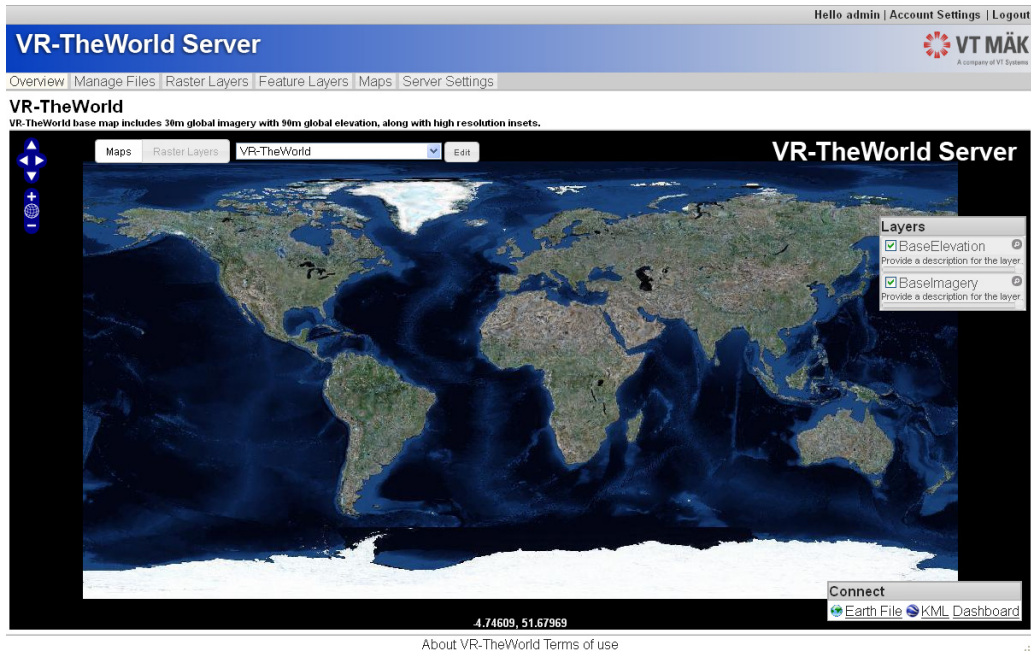


Figure 4-1. VR-TheWorld Server administrator view

4.2. Logging In to VR-TheWorld Server

To log in to the server:

1. Open a web browser.
2. Point the browser to <http://vr-theworld> (Figure 4-2).

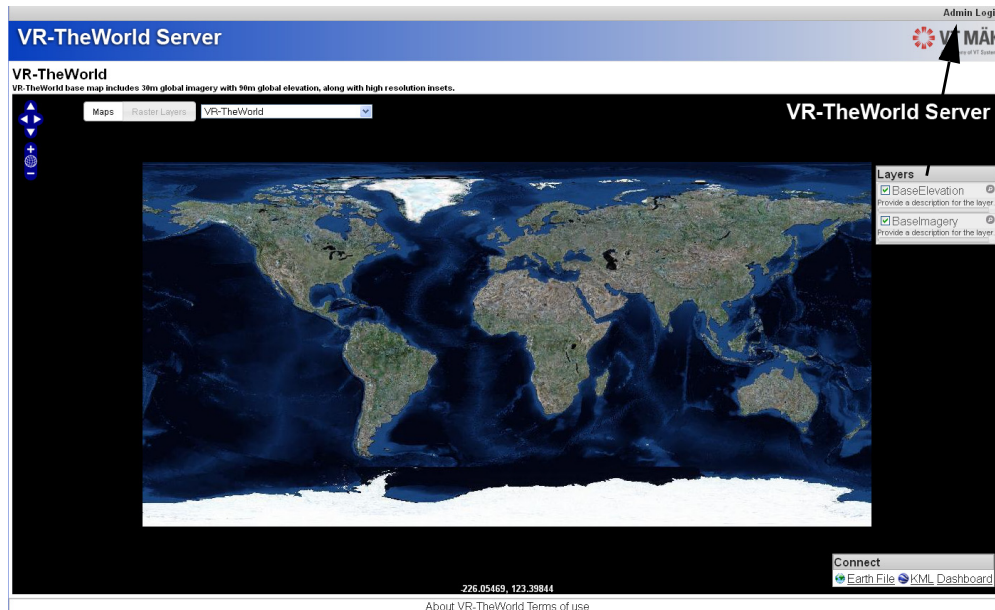


Figure 4-2. VR-TheWorld Server

3. Click Admin Login in the upper right corner of the window. The default user is admin. The default password is admin. It is recommended that you change the password the first time you log in.
4. Configure the server, as described in the rest of this chapter.

4.2.1. Changing the Admin Password

To change the admin password:

1. Log in to VR-TheWorld Server.

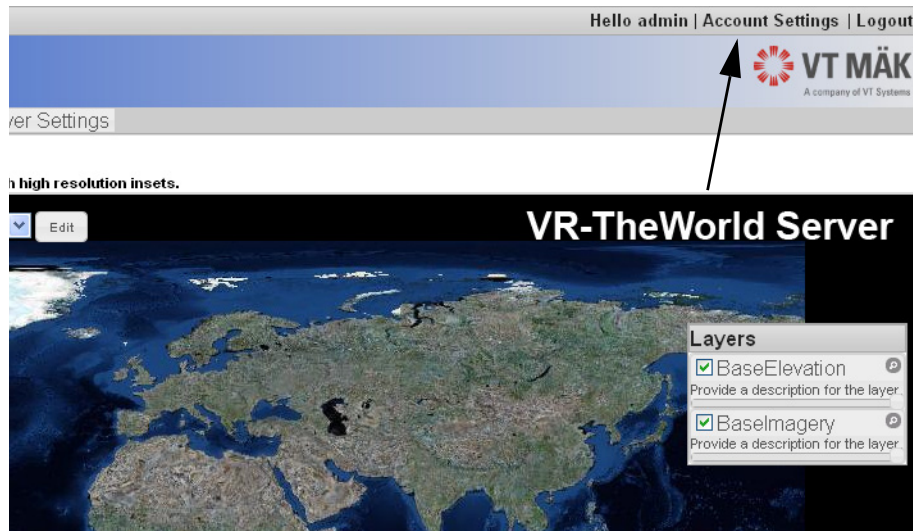


Figure 4-3. VR-TheWorld Server

2. Click Account Settings. The login settings page opens (Figure 4-4).

A screenshot of the "Account Settings" page in the VR-TheWorld Server application. The page has a blue header with the text "VR-TheWorld Server". Below the header is a navigation bar with tabs: "Overview", "Manage Files", "Raster Layers", "Feature Layers", "Maps", and "Server Settings". The "Server Settings" tab is selected. The main content area contains four input fields: "Username:" with the value "admin", "Old password:" with masked characters "•••••", "New password:", and "New password confirmation:". A "Save" button is located at the bottom left of the form.

Figure 4-4. Change Login Settings

3. Optionally, edit the user name.
4. Type the current password.
5. Type the new password and confirm it.
6. Click Save.

4.2.2. Logging Out of VR-TheWorld Server

- To log out of VR-TheWorld Server, in the upper right corner of the window, click Logout.

4.3. Configuring Server Settings

You can configure the following settings for VR-TheWorld Server:

- ♦ Tile Locations. The directories in which to store tiles.
- ♦ Base Layer. The base layer to use when previewing maps.
- ♦ Default Map. The default map to display.

To configure server settings:

1. Log in as administrator.
2. Select the Server Settings tab (Figure 4-5).

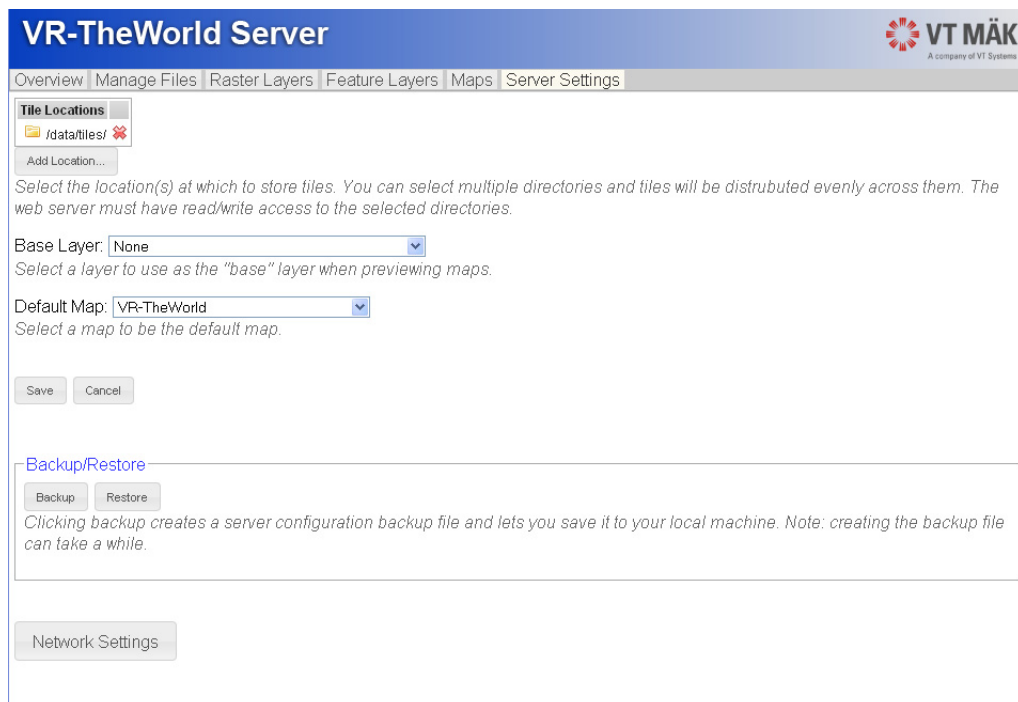


Figure 4-5. Server Settings page

3. If you want to store tiles in locations other than the `/data/tiles` directory, or in addition to the `tiles` directory, click Add Location and select a directory. Select as many locations as you would like.
4. If you want to specify a base layer for previewing maps, select a layer in the Base Layer drop-down list.

5. If you want to specify a default map, select a map in the Default Map drop-down list.
6. Save the changes.

4.4. Configuring Network Settings

You can configure the hostname of the server and its network settings. By default, VR-TheWorld Server uses DHCP. It also has a static IP address for use on networks that do not support dynamic DNS. If you want to specify your own settings, you can do so. You can also change or disable the second IP address.

To configure server settings:

1. Log in as administrator.
2. Select the Server Settings tab (Figure 4-5).
3. Click Network Settings. The Network Settings page opens (Figure 4-5).

VR-TheWorld Server

Overview | Manage Files | Raster Layers | Feature Layers | Maps | Server Settings

Network Settings

Hostname:

IP Address:

Netmask:

Default Gateway:

☒ Use DHCP

☒ Use Second IP address: 192.168.9.123

Figure 4-6. Server Settings page

4. Type a hostname in the Hostname field.
5. If you want to specify the network settings, clear the Use DHCP check box.
6. If you want to use a second IP address, select the Use Second IP Address check box.
7. Save the changes.

4.5. Backing Up the Server Configuration

You can back up and restore the map and layer configuration on the server so that you can easily restore it if necessary.

To back up the server configuration:

1. Log in as administrator.
2. Select the Server Settings tab (Figure 4-5).
3. Click the Backup button. VR-TheWorld Server creates a backup file. This can take several minutes for large configurations. Then it prompts you to save the file to your local machine (or a directory on your local network) (Figure 4-7).

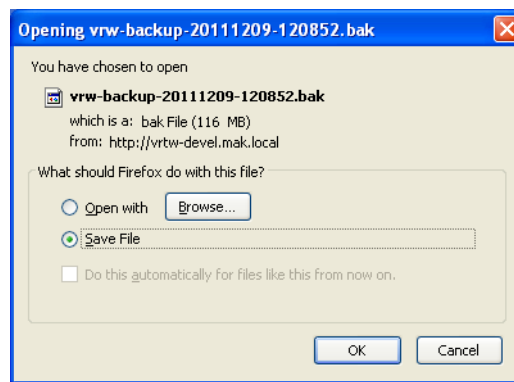


Figure 4-7. Backup prompt

4. Select the Save File option.
5. Click OK. If your system is configured to save files to a default directory, the backup file is saved to that directory. Otherwise, specify a directory and file name for the backup. The backup file also gets saved to the backups directory on the data device.

4.5.1. Restoring the Server Configuration

To restore the server configuration:

1. Log in as administrator.
2. Select the Server Settings tab (Figure 4-5).
3. Click the Restore button.
4. Specify the backup file that you want to restore.
5. Click Open.



Working with Maps

This chapter describes how to create maps.

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Adding Layers to a Map	5-5
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Removing Layers from a Map.....	5-8
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5.1. Introduction

VR-TheWorld Server data is organized into maps. It comes with some generic maps of the world. Some of them have detailed areas cut into the less-detailed global imagery. Most VR-TheWorld Server users will want to create maps that meet the needs of their applications. This chapter explains how to create maps and manage the data that they visualize.

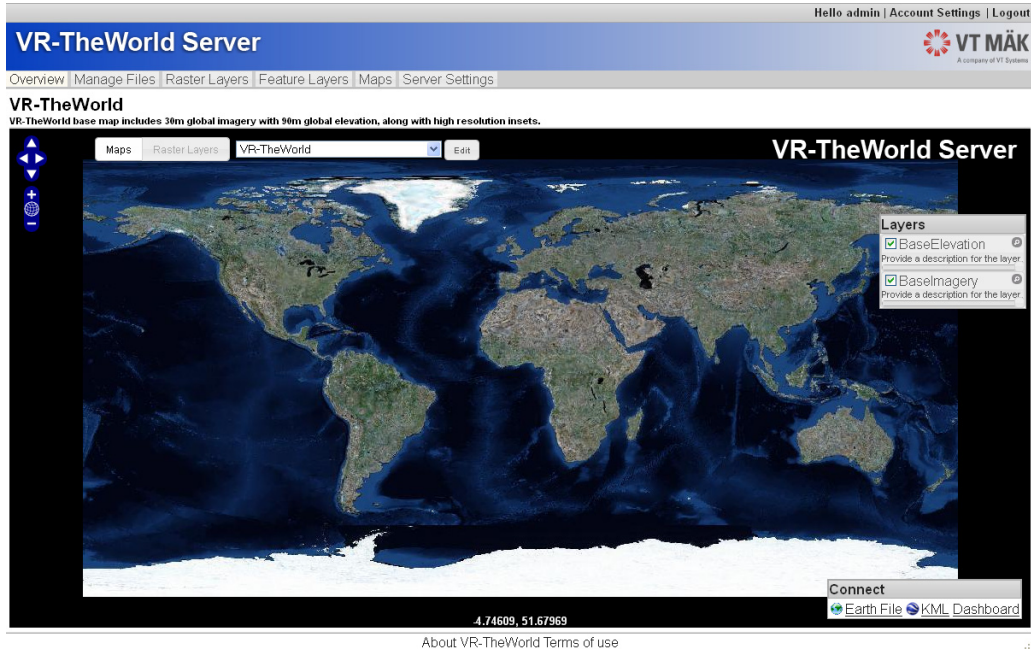


Figure 5-1. VR-TheWorld Server administrator view

5.2. Creating Maps

To create a map:

1. Log in to VR-TheWorld Server.
2. Select the Maps tab (Figure 5-2).

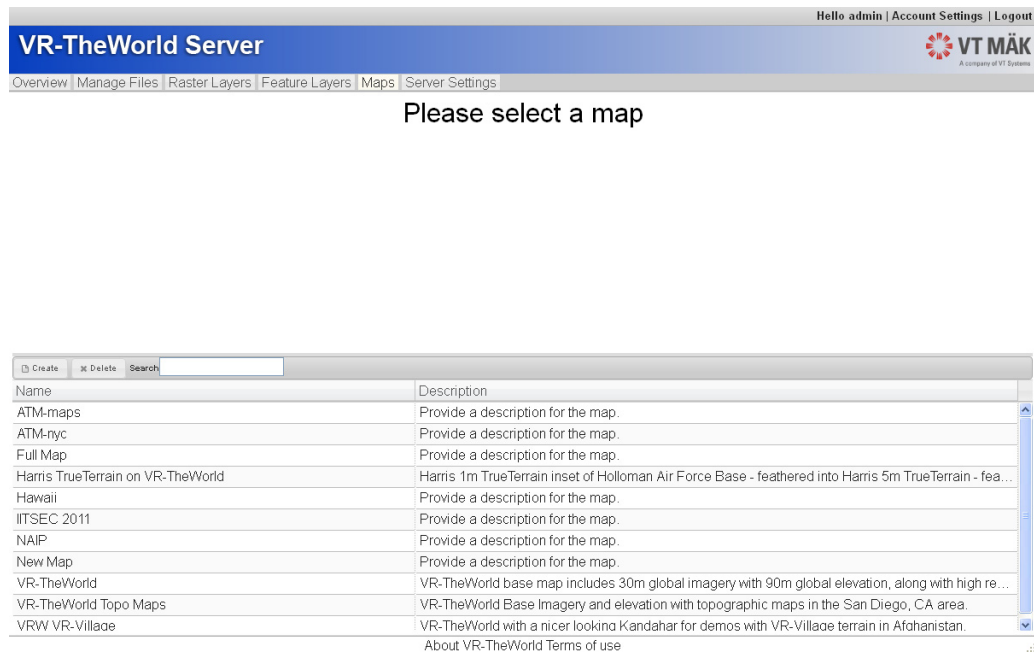


Figure 5-2. Maps tab

3. Click Create. VR-TheWorld Server creates a new map with a default name (Figure 5-3).

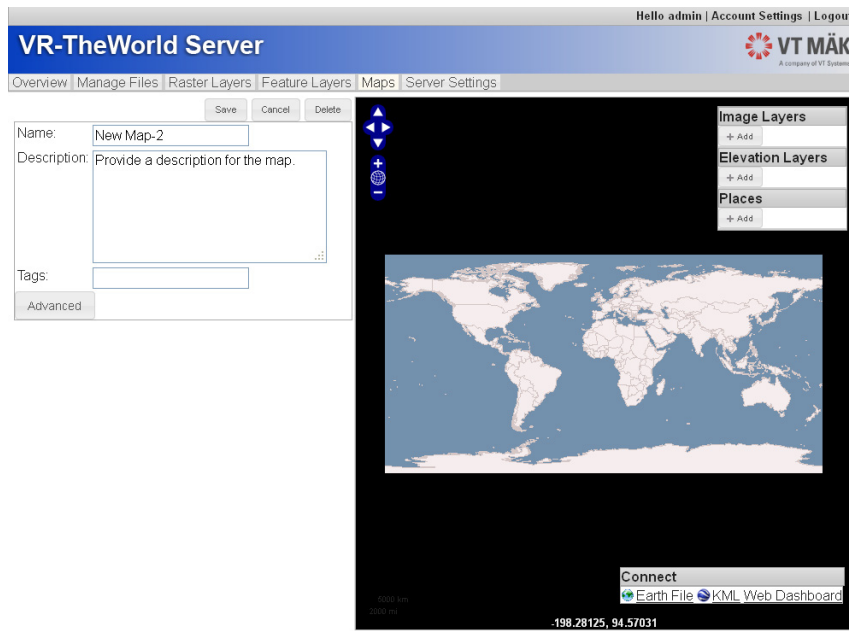


Figure 5-3. Edit map panel

4. Optionally, specify values for the following map attributes:
 - Name.
 - Description.
 - Tags.
5. Specify one or more layers for the map, as described in [“Adding Layers to a Map,”](#) on page 5-5.
6. Click Save.

5.2.1. Editing a Map

To edit a map:

1. Log in to VR-TheWorld Server.
2. Select the Maps tab ([Figure 5-2](#)).
3. Select the Map that you want to edit.
4. Click Edit. The Edit Map panel is displayed ([Figure 5-3](#)).



Alternatively, you can select a map on the Overview tab and click the Edit button next to the list of maps.

5. Change the attributes as desired.
6. Edit the layers, as described in [“Adding Layers to a Map,”](#) on page 5-5, [“Changing the Order of Layers on a Map,”](#) on page 5-7, and [“Removing Layers from a Map,”](#) on page 5-8.
7. Save your changes.

5.2.2. Adding Layers to a Map

A map is made up of one or more layers. When you create a map, you must add at least one layer. You can add a layer to a map on the Maps tab or from the Raster Layers tab.

To add a layer to a map from the Maps tab:

1. Log in to VR-TheWorld Server.
2. Select the Maps tab ([Figure 5-2](#)).
3. Select the Map that you want to edit.
4. Click Edit. The Edit Map panel is displayed ([Figure 5-3](#)).
5. Click the Add button in the Image Layers list or the Elevation Layers list ([Figure 5-4](#)).

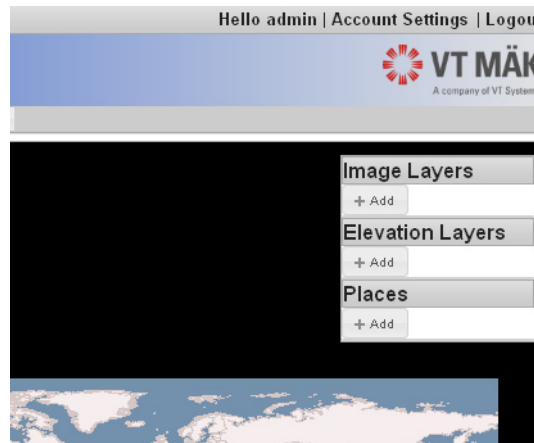


Figure 5-4. Add layer

6. The Select Layer dialog box opens.
7. Select a layer from the list.
8. Click OK. The layer is added to the map.
9. Add additional layers as needed.
10. Save the map.

To add a layer to a map from the Raster Layers tab:

1. Select the Raster Layers tab (Figure 5-5).

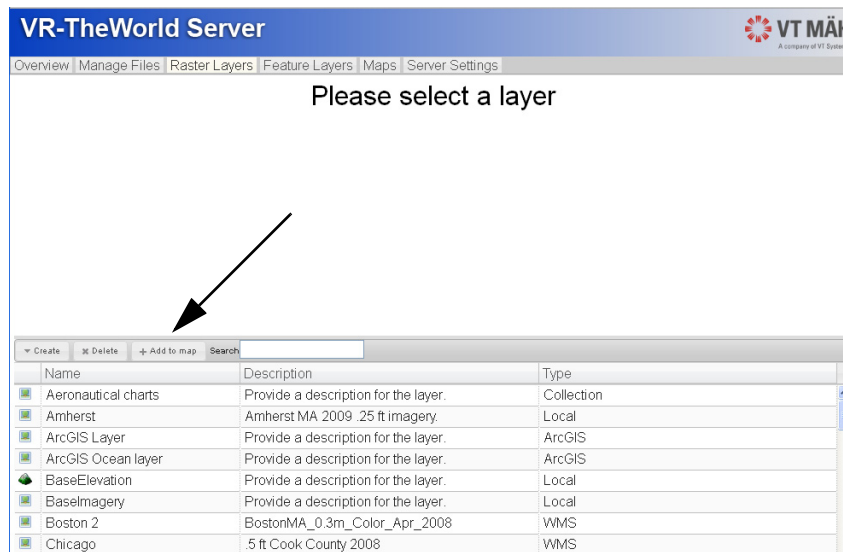


Figure 5-5. Raster Layers tab

2. Select the layer that you want to add to a map.

3. Click the Add to Map button. The Add to Map dialog box opens.
4. Select the map to which you want to add the layer.
5. Click OK.



You can also add a local layer to a map from its Edit page by clicking Add to Map.

5.2.3. Changing the Order of Layers on a Map

The order in which you add layers to a map affects their visibility. The topmost layer hides anything that is under it. Therefore, if your map is a mixture of larger low resolution images and smaller, high resolution images, put the small images on top of the larger image.

In the list of layers, the layer at the bottom is the lowest layer in the map. [Figure 5-6](#) shows the difference when the BaseImagery layer is switched in the layer order for this map.

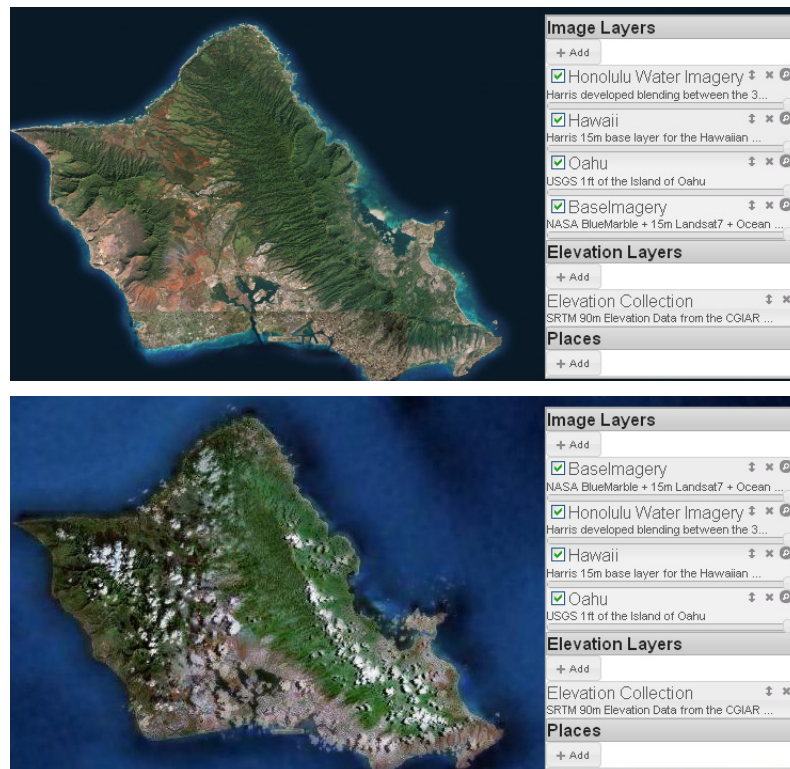


Figure 5-6. Layer order

To change the order of a layer:

1. Log in to VR-TheWorld Server.
2. Select the Maps tab (Figure 5-2).
3. Select the Map that you want to edit.
4. Click Edit. The Edit Map panel is displayed (Figure 5-3).
5. In the Layers list, click and hold the double ended arrow icon (↕) and drag the layer to a different location in the list.
6. Save the map.

5.2.4. Removing Layers from a Map

To remove a layer from a map:

1. Log in to VR-TheWorld Server.
2. Select the Maps tab (Figure 5-2).
3. Select the Map that you want to edit.
4. Click Edit. The Edit Map panel is displayed (Figure 5-3).
5. In the Layers list, click the Delete icon (✕) for the layer you want to remove.
6. Save the map.

5.2.5. Adding Features to a Map

In osgEarth, you can view feature data as well as raster images. There is no simple graphical way to add feature layers to a map, as there is for adding raster layers; it requires complex mapping. Therefore, to add a feature layer to a map, you must write feature blocks using the osgEarth XML syntax and add them to the Earth file. VR-TheWorld Server has a simple interface for doing this. For details about creating Earth files, please see Chapter 8, [Editing Earth Files](#).



The XML code for feature layers is inserted only in Earth files. It is not added to KML files or any other format.

To add a feature layer to the Earth file for a map:

1. Log in to VR-TheWorld Server.
2. Select the Maps tab ([Figure 5-2](#)).
3. Select the Map that you want to edit.
4. Click Edit. The Edit Map panel is displayed ([Figure 5-3](#)).
5. Click Advanced. The Advanced dialog box opens ([Figure 5-7](#)).

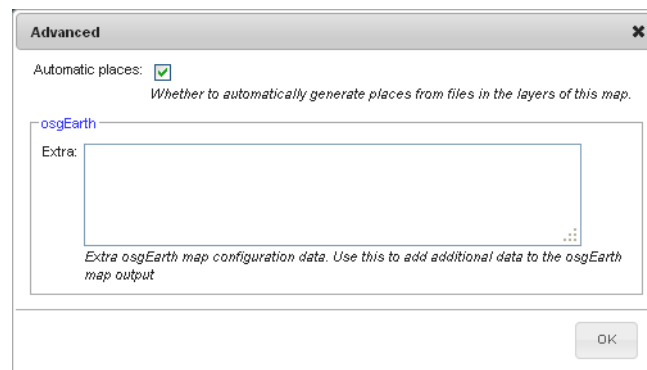


Figure 5-7. Advanced dialog box

6. In the Extra text box, type or paste the XML code for adding the feature layers.

5.2.6. Previewing Maps

When you create a map, VR-TheWorld Server creates connection files.

To preview a map:

1. Create a new map.
2. Click a connection option in the Connect panel (Figure 5-8):
 - Earth File lets you open the map in a program that can read Earth files.
 - KML lets you open the map in Google Earth.
 - Web Dashboard opens the map in your browser.



Figure 5-8. Connect tab

5.2.7. Adding a Placemark to a Map

A placemark marks a location on a map. Users can quickly zoom in to a placemark. Placemarks are displayed in a browser as elongated red diamonds ([Figure 5-9](#)). Google Earth displays them as pushpins. They are not displayed in VR-Vantage.



Figure 5-9. Placemarks

Only administrators can create placemarks.

To create a placemark:

1. Log in to VR-TheWorld Server.
2. Select the Maps tab ([Figure 5-2](#)).
3. Select the Map that you want to edit.
4. Click Edit. The Edit Map panel is displayed ([Figure 5-3](#)).
5. Zoom in on the map (**Shift**+drag) to the location where you want to put the placemark. Zoom in as much as you need to accurately place it.



The zoom level you use when you place the placemark is the zoom level that the browser will go to when it is selected by a user.

6. Click the Add button on the Places list ([Figure 5-10](#)).

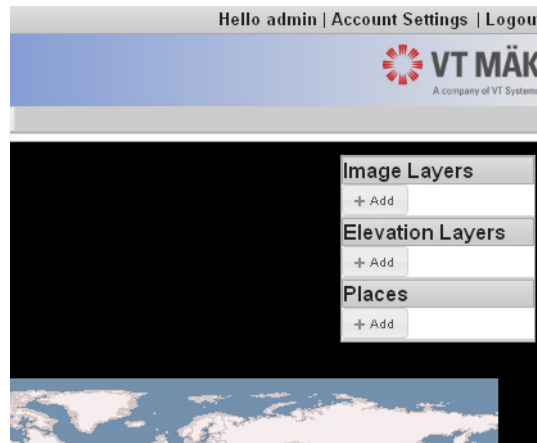


Figure 5-10. Add Place

7. Click on the map where you want to place the placemark. A mark is placed just below where you clicked. A dialog box opens ([Figure 5-11](#)).

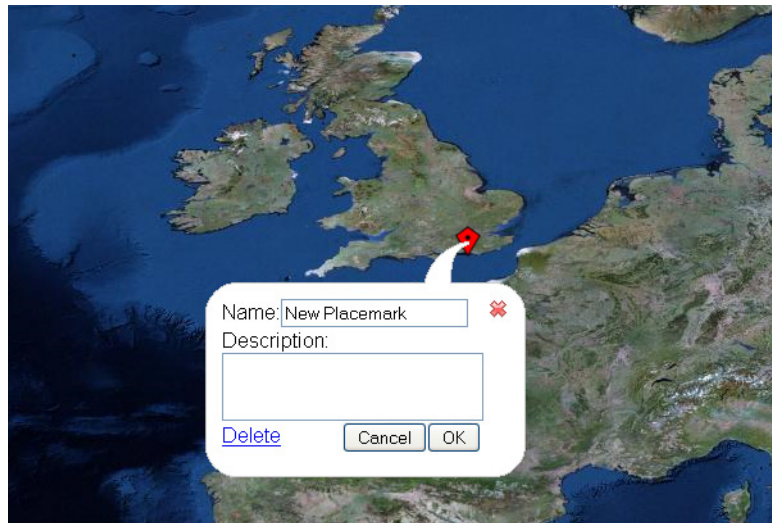


Figure 5-11. New placemark

8. Type a name for the placemark in the Name box.
9. Type a description of the placemark in the Description box.
10. Click OK. The placemark gets added to the list of placemarks for the map.
11. Save the map.

5.2.8. Adding Placemarks Automatically

You can create placemarks automatically. The Automatic Places features creates a placemark for each file in each layer on the map. This can be convenient if you have widely dispersed layers or layers made up of few files. If a layer has many files, it may just cause a large clutter of placemarks.

To create placemarks automatically:

1. Select the Maps tab (Figure 5-2).
2. Select the Map that you want to edit.
3. Click Edit. The Edit Map panel is displayed (Figure 5-3).
4. Click Advanced. The Advanced dialog box opens (Figure 5-7).
5. Select the Automatic Places check box.
6. Save the map. The placemarks are not visible on the Edit page or listed in the Places list, but will be visible if viewed in the Dashboard.

5.2.9. Editing a Placemark

You can change a placemark's name and description. You cannot move it.

To edit a placemark:

1. Log in to VR-TheWorld Server.
2. Select the Maps tab (Figure 5-2).
3. Select the Map that you want to edit.
4. Click Edit. The Edit Map panel is displayed (Figure 5-3).
5. In the list of placemarks (Figure 5-12), click the placemark that you want to edit. The map zooms to the placemark and opens a dialog box with its details.

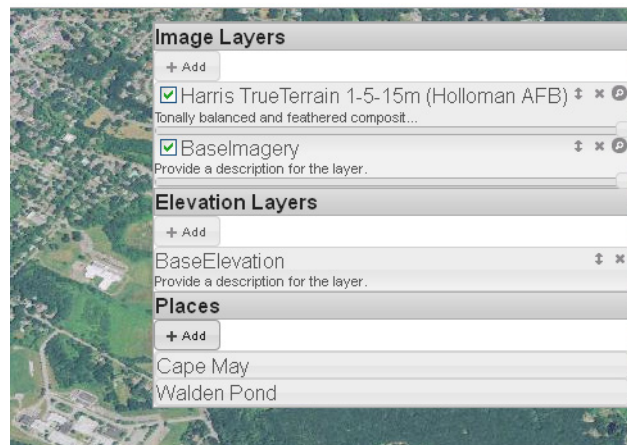


Figure 5-12. Placemark list

6. Change the name or description.
7. Click OK.
8. Save the map.

5.2.10. Deleting a Placemark

To delete a placemark:

1. Log in to VR-TheWorld Server.
2. Select the Maps tab (Figure 5-2).
3. Select the Map that you want to edit.
4. Click Edit. The Edit Map panel is displayed (Figure 5-3).
5. In the list of placemarks, click the placemark that you want to delete. The map zooms to the placemark and opens a dialog box with its details.
6. Click Delete.
7. Save the map.

5.2.11. Deleting Maps

To delete a map:

1. Log in to VR-TheWorld Server.
2. Select the Maps tab (Figure 5-2).
3. Select the Map that you want to delete.
4. Click the Delete button. You are prompted to confirm the deletion.
5. Click OK.

5.3. Integrating Local Data with Served Data

VR-TheWorld Server customers may want to integrate locally stored data with data served from VR-TheWorld Server. You could, of course, upload the local data to the server. However, this might not be practical due to the amount of data, for security considerations, or other reasons.

The process for integrating data is, in general terms, quite simple – create a Earth file for the local data and merge it with the Earth file for the served data. When you load the Earth file in your application, it will grab the data from all the locations specified in the file. When you merge the files, remember that the draw order for layers is top down. (The first layer specified is the first one drawn.)



Working with Layers

This chapter describes how to create and edit layers.

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6.1. Layers

Layers are the building blocks of maps. VR-TheWorld Server supports raster layers and feature layers. Raster layers can contain image data or elevation data. Feature layers contain feature data.

6.2. Creating a Raster Layer

VR-TheWorld Server supports the following types of raster layers:

- ♦ Local layer. A local layer uses the files on the server.
- ♦ Remote layer. A remote layer connects to another file server and makes it seem as if the files are coming from VR-TheWorld Server.
- ♦ Composite layer. A composite layer is a layer that is made up of other layers. Composite layers are more configurable than other layers. Composite layers may improve performance because there is one place to look for all the required data.

Layers are made up of files. In addition to the files provided with VR-TheWorld Server, you can upload your own data for storage on the server. Image files must be georeferenced, such as GeoTIFFs.

You can create the following types of raster layers:

- ♦ Image. A local layer.
- ♦ Elevation. A local layer.
- ♦ WMS. A remote layer.
- ♦ TMS. A remote layer.
- ♦ ArcGIS. A remote layer.
- ♦ VPB. A remote layer.
- ♦ Collection. A composite layer.

This section describes the “top-down” method for creating a layer. For another way to create a layer, please see [“Creating a Raster Layer from a File,”](#) on page 6-9.

To create a raster layer:

1. Connect to VR-TheWorld Server.
2. Log in as administrator.
3. Click the Raster Layers tab ([Figure 6-1](#)).

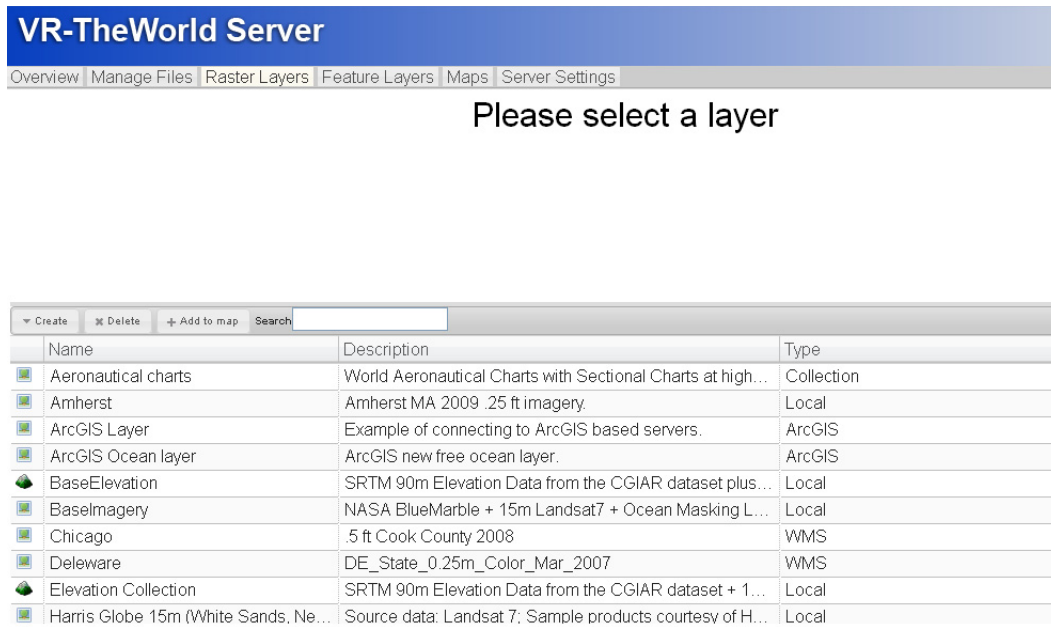


Figure 6-1. Raster Layers tab

4. Click **Create** → *layer type*, where *layer type* is:

- Image
- Elevation
- WMS
- TMS
- ArcGIS
- VPB
- Collection.

The browser displays an Edit page for the layer (Figure 6-2).

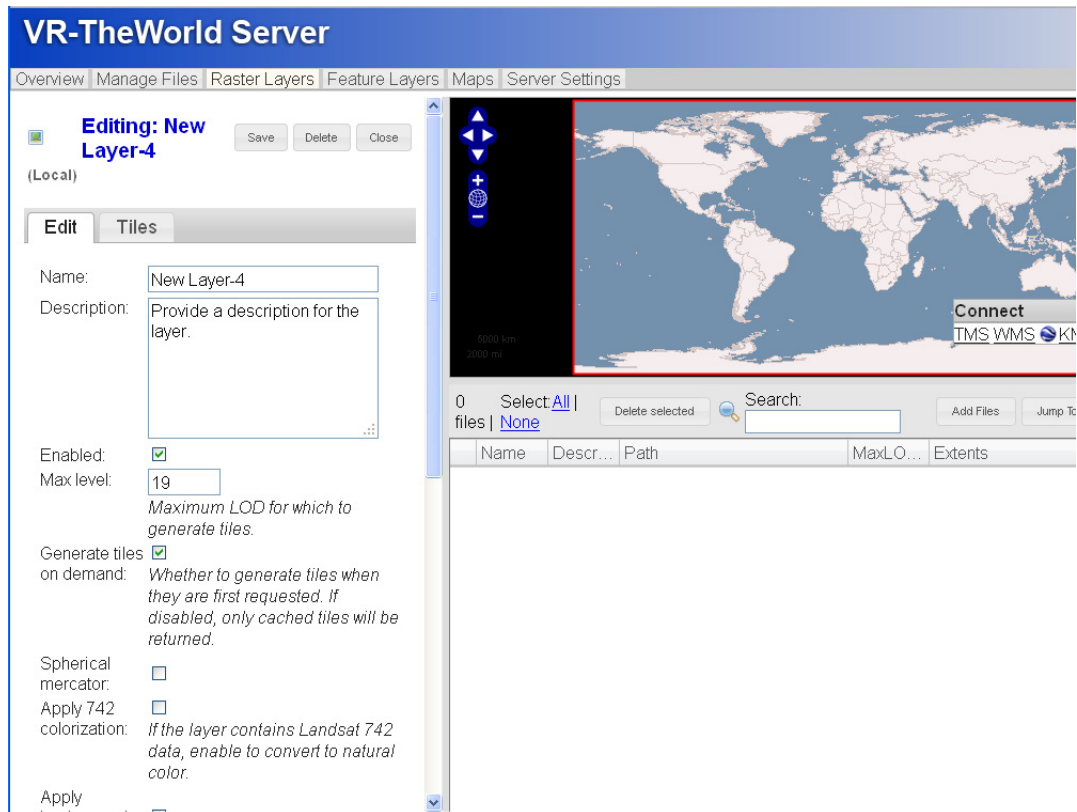


Figure 6-2. Edit local image layer

5. Fill in the attributes for the layer. For details about the attributes of each layer type, please see “[Layer Attributes](#),” on page 6-5.
6. If you are creating a composite layer, add layers, as described in “[Adding Layers to a Composite \(Collection\) Layer](#),” on page 6-12.
7. Click Save.

6.2.1. Layer Attributes

The tables in this section describe the attributes for the different types of layers.

Table 6-1: Image and elevation layer attributes

Attribute	Description
Name	A name for the layer.
Description	Optional description for the layer.
Enabled	When selected, the layer is listed when clients query for what layers are available and it will serve up tiles. If clear, layer is not available and does not serve tiles.
Max level	Maximum LOD for which to generate tiles.
Generate tiles on demand	Whether to generate tiles when they are first requested. If disabled, only cached tiles will be returned.
Spherical mercator	A type of projection used by some applications, such as Google Maps. This projection assumes the world is round.
Apply 742 colorization	If the layer contains Landsat 742 data (mid-infrared, near-infrared, and green), convert to natural color. This improves the appearance of the data.
Apply background color	If selected, areas that use the background color become transparent.
Background color	Specifies which color should be considered the background. This is the color that will be transparent if Apply Background Color is enabled.
Make similar background colors transparent	When selected, colors that are similar to the background color will also be made transparent.
Tags	Specify optional metadata that you can add to the layer.
Tile size	The size of each tile, in pixels.
Format	The raster format to use for the tiled images.
Automatic max level	If selected, compute the maximum LOD level based on source data. If false, the LOD specified by Max Level will be used.
Resample	Algorithm to use when resampling data.
Blur when upsampling	Slightly blur imagery if upsampling. This can make for a smoother appearance when displaying low resolution imagery above its maximum resolution.

Table 6-2: ArcGIS layer attributes

Attribute	Description
Name	A name for the layer.
Description	Optional description for the layer.
Enabled	When selected, the layer is listed when clients query for what layers are available and it will serve up tiles. If clear, layer is not available and does not serve tiles.
Tags	Specify optional metadata that you can add to the layer.
URL	Address of the remote service.
Format	The image format returned by the remote layer.
Layers	Lets you do something with layers, but normally not specified.

Table 6-3: TMS layer attributes

Attribute	Description
Name	A name for the layer.
Description	Optional description for the layer.
Enabled	When selected, the layer is listed when clients query for what layers are available and it will serve up tiles. If clear, layer is not available and does not serve tiles.
Spherical mercator	A type of projection used by some applications, such as Google Maps. This projection assumes the world is round.
Tags	Specify optional metadata that you can add to the layer.
URL	Address of the remote service.
Service version	The TMS version that the TMS server is using.
Layer name	The name of the layer on the TMS server.
Google TMS	Select if connecting to a server that uses the Google TMS scheme.
Format	The extension of the files (JPG, PNG, TIF).

Table 6-4: WMS layer attributes (Sheet 1 of 2)

Attribute	Description
Name	A name for the layer.
Description	Optional description for the layer.
Data type	Image data or elevation data.

Table 6-4: WMS layer attributes (Sheet 2 of 2)

Attribute	Description
Enabled	When selected, the layer is listed when clients query for what layers are available and it will serve up tiles. If clear, layer is not available and does not serve tiles.
Max level	Maximum LOD for which to generate tiles.
Generate tiles on demand	Whether to generate tiles when they are first requested. If disabled, only cached tiles will be returned.
Spherical mercator	A type of projection used by some applications, such as Google Maps. This projection assumes the world is round.
Apply 742 colorization	If the layer contains Landsat 742 data (mid-infrared, near-infrared, and green), convert to natural color. This improves the appearance of the data.
Apply background color	If selected, areas that use the background color become transparent.
Background color	Specifies which color should be considered the background. This is the color that will be transparent if Apply Background Color is enabled.
Make similar background colors transparent	When selected, colors that are similar to the background color will also be made transparent.
Tags	Specify optional metadata that you can add to the layer.
URL	Address of the remote service.
Layers	Lets you do something with layers, but normally not specified.
Style	Specifies the WMS style to use. Sometimes WMS servers publish layers with different styles. For example, imagine if we had a layer that had all the interstates in the US that we could connect to. You might have three different styles that could specify different thicknesses for the roads: <code>small_road</code> , <code>med_road</code> , and <code>large_road</code> . You could select which style you wanted by specifying the name of the style. A lot of WMS servers just have a single default style, so most of the time it is fine to just leave this blank.
Format	The format of the output you would like (image/jpg or image/png).
Tile size	Size of the image being requested, in pixels.
SRS	Projection requested.
Proxy	If selected, the remote WMS images are tiled and cached in the local server repository and can be accessed via TMS.

Table 6-5: VPB layer attributes

Attribute	Description
Name	A name for the layer.
Description	Optional description for the layer.
Enabled	When selected, the layer is listed when clients query for what layers are available and it will serve up tiles. If clear, layer is not available and does not serve tiles.
Tags	Specify optional metadata that you can add to the layer.
Directory structure	The type of directory structure used by the VPB database. Valid values are nested, task, and flat. This is dependent on the options you provided when generating the VPB database with <code>vpbmaster / osgdem</code> . The default style for <code>vpbmaster / osgdem</code> is nested. If you use distributed builds, the correct setting is "task".
URL	Address of the remote service.
Primary split level	The primary split level used when generating the VPB database. This is controlled using the <code>--split</code> or <code>--splits</code> option to <code>osgdem/vpbmaster</code>
Secondary split level	The secondary split level used when generating the VPB database. This is controlled using the <code>--split</code> or <code>--splits</code> option to <code>osgdem/vpbmaster</code>
Layer number	The imagery layer (color layer) to use from the VPB database. Default: 0.
Base name	The base filename of VPB database subtiles. By default, <code>osgEarth</code> uses the filename in the root URL as the base name, but you can override it using this property.

Table 6-6: Composite layer attributes (Sheet 1 of 2)

Attribute	Description
Name	A name for the layer.
Description	Optional description for the layer.
Enabled	When selected, the layer is listed when clients query for what layers are available and it will serve up tiles. If clear, layer is not available and does not serve tiles.
Max level	Maximum LOD for which to generate tiles.
Generate tiles on demand	Whether to generate tiles when they are first requested. If disabled, only cached tiles will be returned.

Table 6-6: Composite layer attributes (Sheet 2 of 2)

Attribute	Description
Spherical mercator	A type of projection used by some applications, such as Google Maps. This projection assumes the world is round.
Apply 742 colorization	If the layer contains Landsat 742 data (mid-infrared, near-infrared, and green), convert to natural color. This improves the appearance of the data.
Apply background color	If selected, areas that use the background color become transparent.
Background color	Specifies which color should be considered the background. This is the color that will be transparent if Apply Background Color is enabled.
Make similar background colors transparent	When selected, colors that are similar to the background color will also be made transparent.
Tags	Specify optional metadata that you can add to the layer.
Tile size	The size of each tile, in pixels.
Format	The raster format to use for the tiled images.

6.2.2. Creating a Raster Layer from a File

You can create a layer from one or more files in the Manage Files tab.

To create a layer from a file:

1. Select the Manage Files tab.
2. Select one or more files.
3. Choose **Actions** → **Create Raster Layer**. The Create Raster Layer dialog box opens.
4. Type a name for the layer, or accept the default name (the name of the first file selected.)
5. Click OK. The layer is built. You are prompted to view the layer. If you click Yes, you can edit the layer properties.

6.3. Adding Files to a Local Layer

A layer is made up of one or more files. The files are listed when you edit a layer (Figure 6-3). You can add files to a layer from the Edit Layer view or from the Manage Files tab.

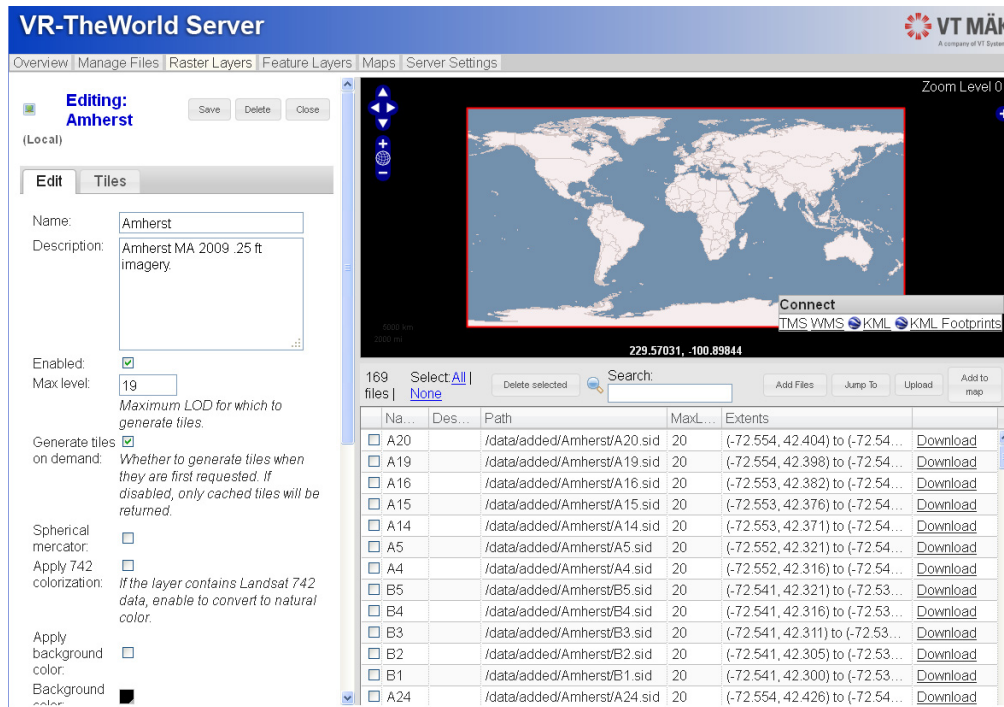


Figure 6-3. Layer file list

To add files to a local layer from the Edit Layer view:

1. Enter Edit mode as follows:
 - a. Select the Raster Layers tab.
 - b. Select the layer you want to edit.
 - c. Click the Edit button.



You can also enter Edit mode by selecting a Raster Layer on the Overview tab and clicking the Edit button.

2. In the file list, click Add Files. The Select File dialog box opens.
3. Select the file you want to add or select a directory from which you want to add all files. (For details about how to make files available to the server, please see Chapter 7, *Managing Files*.)
4. Click OK. The files are added to the layer.

5. Add more files as desired.
6. Save the layer.

To add files to a raster layer from the Manage Files tab:

1. Select the Manage Files tab.
2. Select the files that you want to add to a layer.
3. Choose **Actions** → **Add to Raster Layer**. A list of layers is displayed.
4. Select the layer that you want to add the selected files to.
5. Click OK. The files get added to the layer.

6.4. Deleting Files from a Local Layer

To delete files from a local layer:

1. Enter Edit mode as follows:
 - a. Select the Raster Layers tab.
 - b. Select the layer you want to edit.
 - c. Click the Edit button.



You can also enter Edit mode by selecting a Raster Layer on the Overview tab and clicking the Edit button.

2. In the file list, select the files that you want to delete. (To select all of the files, click Select: All.
3. Click Delete Selected.
4. Save the layer.

6.5. Adding Layers to a Composite (Collection) Layer

A composite layer is made up of one or more layers. Therefore, when you create a composite layer, you must specify the layers that it contains. You can change the order of layers in a composite layer and you can delete layers, as described in “[Changing the Order of Layers on a Map](#),” on page 5-7 and “[Removing Layers from a Map](#),” on page 5-8.

To add layers to a composite layer:

1. Select the Raster Layers tab ([Figure 6-1](#)).
2. Create a new composite layer or select an existing composite layer and click the Edit button. The Edit page for a composite layer opens ([Figure 6-4](#)).

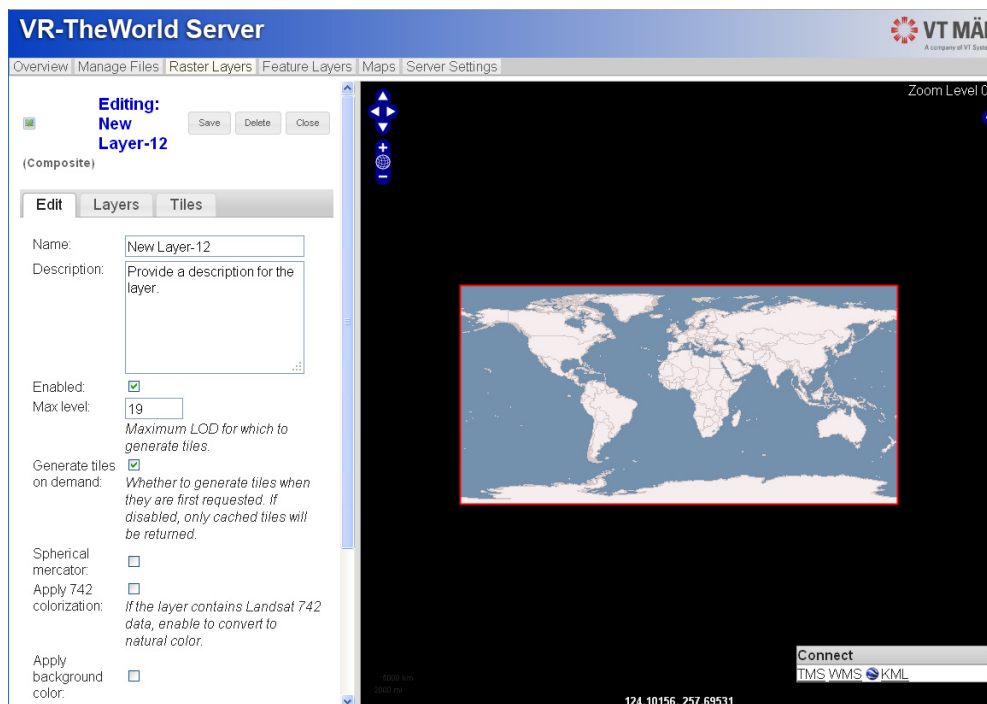


Figure 6-4. Composite layer, Layers tab

3. Select the Layers tab ([Figure 6-5](#)).

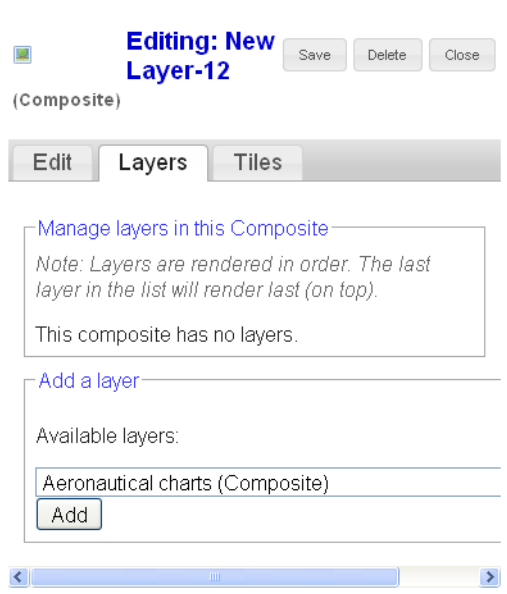


Figure 6-5. Layers tab

4. In the Add a Layer group box, select a layer from the drop-down list.
5. Click Add. The layer is added to the Manage Layers in this Composite list.

6.6. Changing the View of a Layer

When you are editing a layer, you have the following options for changing the view of the layer:

- ♦ Zoom
- ♦ Pan
- ♦ Jump to latitude/longitude.

6.6.1. Zooming the View of a Layer

When you zoom a layer, the Zoom Level is shown in the upper right corner of the map display (Figure 6-6).



Figure 6-6. Zoom level

To zoom the view of a layer, use one of the following methods:

- ♦ Hold down the **Shift** key and drag a bounding box around the area you want to zoom in on.
- ♦ Click one of the zoom controls (Figure 6-6).

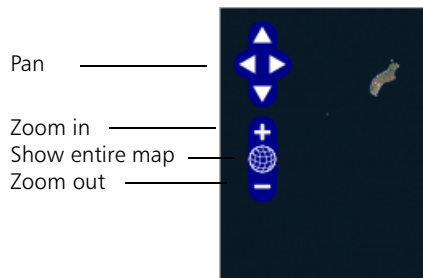


Figure 6-7. Pan and zoom controls

Zoom Levels

When you are editing a layer, VR-TheWorld Server displays the zoom level at which the layer is being displayed (Figure 6-6). The zoom levels correspond to the number of LODs in the layer, which is determined by the Max Level attribute.

The zoom level is useful for diagnostic purposes. If the layer has some sort of display problem, if you identify the zoom level at which the problem exists, you can regenerate the tiles for that LOD level or range of LODs.

6.6.2. Panning the View of a Layer

To pan the view of a layer, use one of the following methods:

- Click one of the Pan controls ([Figure 6-7](#)).
- Click on the map and drag it to the desired view.

6.7. Tiling Raster Layers

All of the data served by VR-TheWorld Server is tiled. Tiling is the process of splitting large images into small images for fast loading and viewing within different terrain extents and levels-of-detail (LODs). You can configure VR-TheWorld Server to generate tiles as needed, or you can build the tiles manually

6.7.1. Tiling Raster Layers Automatically

If Generate Tile on Demand is enabled for a layer, when an application requests imagery and no tiles exist for the requested area, VR-TheWorld Server automatically tiles the images. The tiles are kept on the server for future use. Depending on the size of the area being requested, the tiling process can affect performance.

6.7.2. Tiling Raster Layers Manually

You can build tiles before you plan to access the data. This will improve performance the first time you access the data, compared to the performance of the automatic tiling process.

Manual tiling runs in the background. While manual tiling is in operation, the performance of the server could slow down.

6.8. Tile Management Tasks for Raster Layers

VR-TheWorld Server lets you create, schedule, and run three tile management tasks for raster layers – build tiles, delete tiles, and rebuild invalid tiles. You can run tasks against an entire layer or just a region. You can schedule a task to run at a particular time. If you do not schedule a task, you must start it manually.

6.8.1. Creating a Task

To create a task:

1. Log in as administrator.
2. Select the Raster Layers tab (Figure 6-1). VR-TheWorld Server loads the raster layers. (This may take a few seconds.)

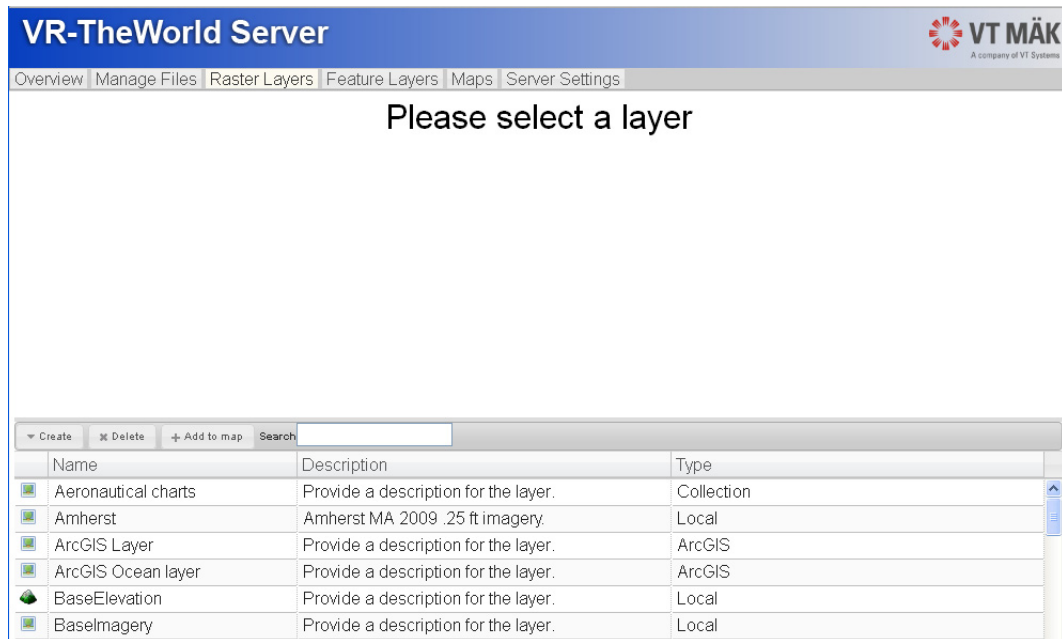


Figure 6-8. Raster Layers tab

3. In the list of layers, select the layer for which you want to create a tile management task. VR-TheWorld Server displays the layer and some information about it (Figure 6-9).

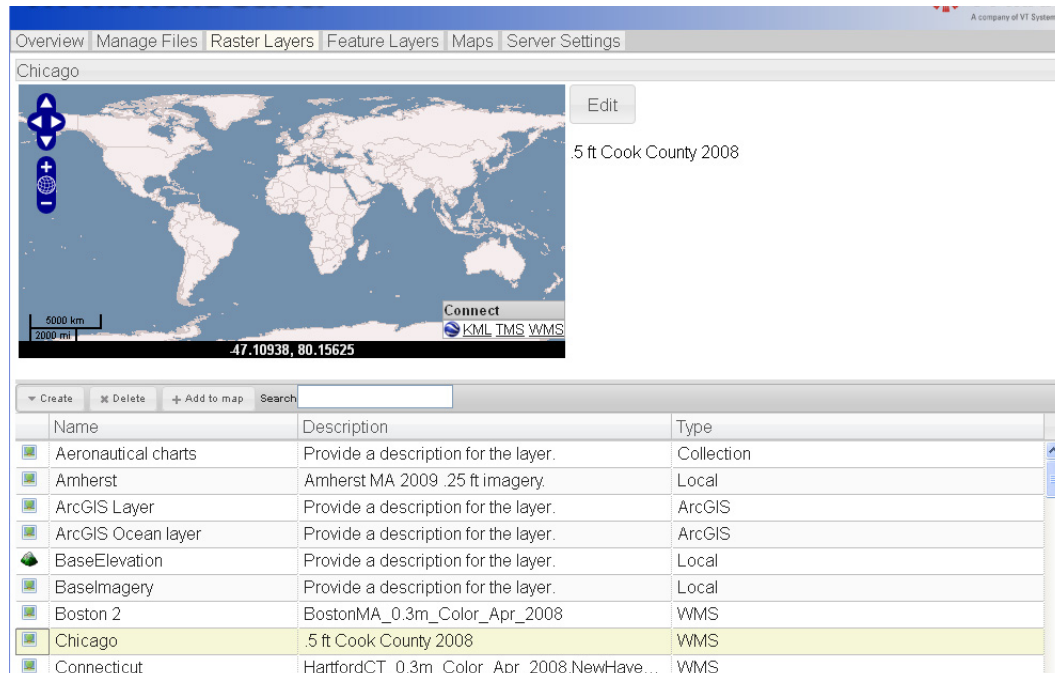


Figure 6-9. Raster Layers tab, layer selected

4. Click Edit. The Edit panel opens.
5. Click the Tiles tab (Figure 6-10).

Editing: Chicago
(WMS)

Save Delete Close

Edit Tiles

Add Task

Name: myTask

Task: Build Tiles

LOD Ranges: Automatic

Where: Automatic

☐ Run at a scheduled time

Add

Current Tasks

Name	Task	Status	Progress
(203)	Seed Scheduled	0%	Start
		0 of 0 complete	
(204)	Seed Cancelling	41%	Cancel
		474300 of 1160992 complete	

Purge Tiles

This will delete all generated tiles for this layer!

Purge all tiles now

Figure 6-10. Tiles tab

6. In the Add Task group box, in the Name box, type a name for the task.
7. In the Task drop-down list, select the type of task to run.



When you delete tiles, they are deleted one at a time. If you want to delete all tiles, it may be quicker to purge the tiles, in which case, the entire cache directory is deleted. For details, please see [“Purging Tiles,”](#) on page 6-20.

8. If you want to specify the LOD range:
 - a. In the LOD Ranges drop-down list, select Select. The LOD Ranges group box is displayed.
 - b. Type the range of LOD values to use.
 Otherwise, accept the default choice (Automatic).

9. If you want to specify the area for which to create tiles:
 - a. In the Where drop-down list, select Select Region. The Selected Region group box is displayed.
 - b. Type the coordinates of the Lower Left and Upper Right corners of the region, or hold **CTRL** and drag a bounding box on the map.Otherwise, accept the default choice (Automatic).
10. If you want to run the task at a particular time:
 - a. Select the Run at a Scheduled Time check box.
 - b. Specify the date and time to run the task.If you do not schedule a task to run at a particular time, you must start it manually.
11. Click Add. The task is added to the Current Tasks list.

6.8.2. Starting a Task

You start a task on the Tiles tab.

To start a task from the Tiles tab:

1. Log in as administrator.
2. Select the Raster Layers tab ([Figure 6-1](#)). VR-TheWorld Server loads the raster layers. (This may take a few seconds.)
3. Select the layer for which you want to start a task.
4. Click Edit. The Edit panel opens.
5. Click the Tiles tab ([Figure 6-10](#)). Tasks for this layer are listed in the Current Tasks group box.
6. Click the Start button for the task you want to run.

6.8.3. Purging Tiles

If you want to delete all of the tiles for a layer, the quickest way to do it is to purge the tiles.

To purge the tiles in a layer:

1. Log in as administrator.
2. Select the Raster Layers tab ([Figure 6-1](#)). VR-TheWorld Server loads the raster layers. (This may take a few seconds.)
3. Select the layer for which you want to start a task.
4. Click Edit. The Edit panel opens.
5. Click the Tiles tab ([Figure 6-10](#)).
6. In the Purge Tiles group box, click Purge All Tiles Now.

6.9. Creating and Editing Feature Layers

Feature layers allow you to add streaming features to your terrain. Feature data is contained in shapefiles (.shp).

To create a feature layer:

1. Select the Feature Layers tab (Figure 6-11).

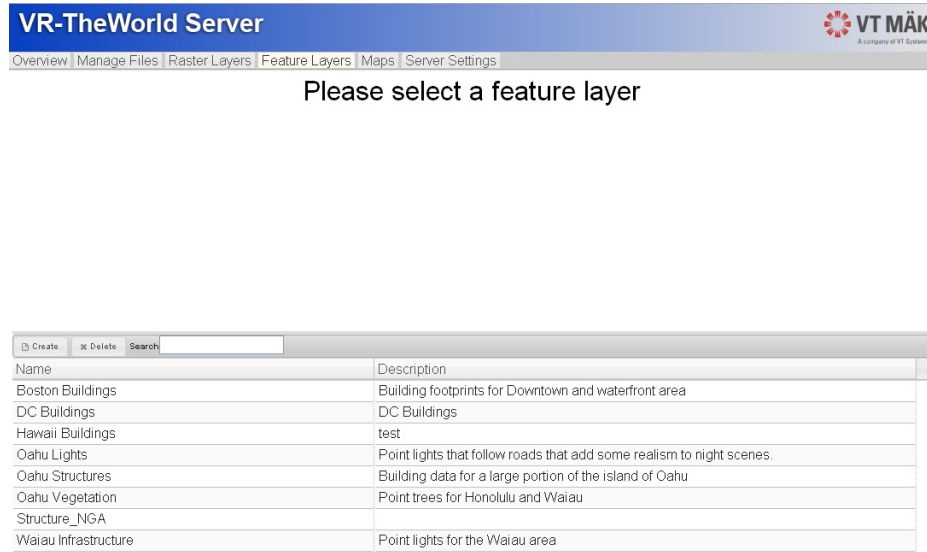


Figure 6-11. Feature layer tab

2. Click Create. The Create New Feature Layer screen is displayed.
3. Type a name for the layer.
4. Optionally, type a description.
5. Click Browse. The Select File dialog box opens.
6. Select a shapefile for this layer. The Layer field gets filled in from data in the shapefile.
7. Click Create. The layer is created and the Edit screen is displayed.

6.9.1. Creating a Feature Layer from a File

You can create a feature layer from one or more files in the Manage Files tab.

To create a feature layer from a file:

1. Select the Manage Files tab.
2. Select one or more files.
3. Choose **Actions** → **Create Feature Layer**. The Create Feature Layer dialog box opens ([Figure 6-12](#)).

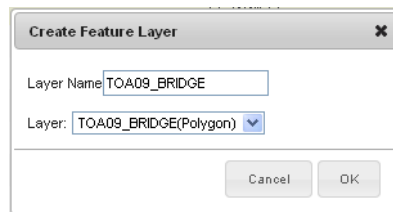


Figure 6-12. Create Feature Layer dialog box

4. In the Layer Name box, type a name for the layer, or accept the default name (the name of the first file selected.)
5. If the feature you selected is a feature store that has multiple feature layers, in the Layer drop-down list, select the feature type that you want to add. (VMAP or S-57 files may have many feature types stored in the same file. Shapefiles only have one feature layer per file.)
6. Click OK. The layer is built. You are prompted to view the layer. If you click Yes, you can edit the layer properties.

6.9.2. Editing a Feature Layer

You can change the name and description of a feature layer. You can also specify parameters for tiling it. You cannot change the properties.

To edit a feature layer:

1. Select the Feature Layers tab (Figure 6-11).
2. Select the feature layer that you want to edit. Information about the layer is displayed (Figure 6-13).

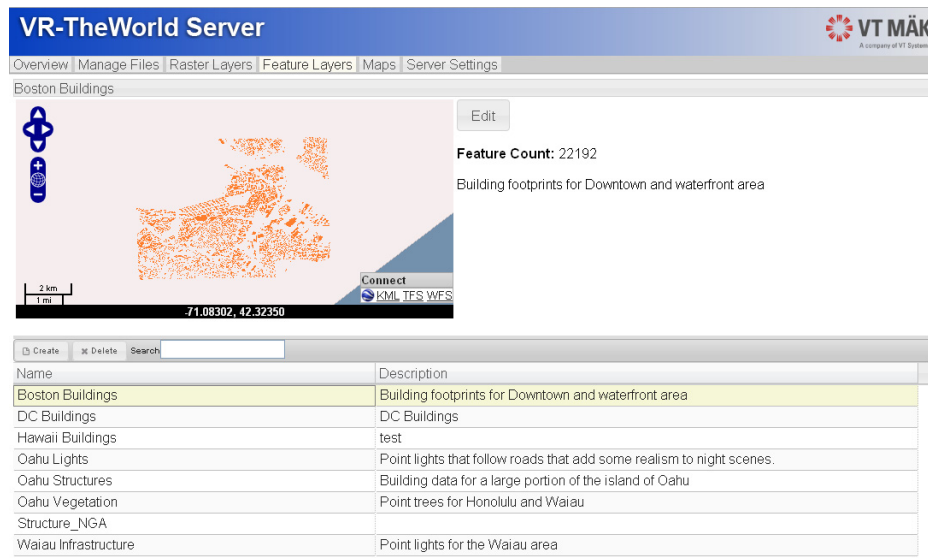


Figure 6-13. Feature layer selected

3. Click the Edit button. The Edit panel is displayed (Figure 6-14).

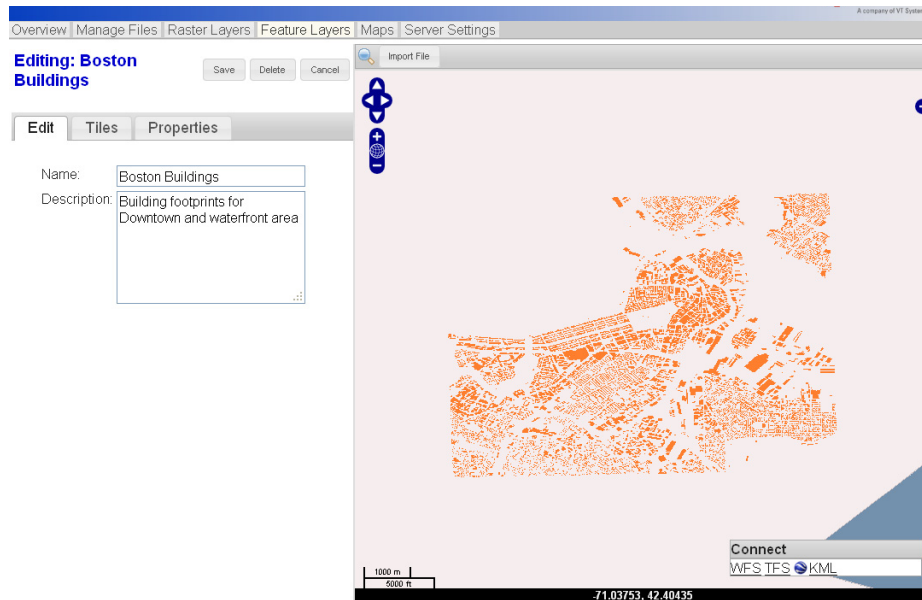


Figure 6-14. Feature edit panel

4. On the Edit tab, change the name or description.
5. Click Save.

6.9.3. Adding Files to a Feature Layer

To add files to a feature layer from the Manage Files tab:

1. Select the Manage Files tab.
2. Select the files that you want to add to a layer.
3. Choose **Actions** → **Add to Feature Layer**. A list of features layers opens.
4. Select the layer that you want to add the selected files to.
5. Click OK. The Select Layer dialog box opens. (If the feature you selected is a feature store that has multiple feature layers, they are listed in the Layer drop-down list. VMAP or S-57 files may have many feature types stored in the same file. Shapefiles only have one feature layer per file.)

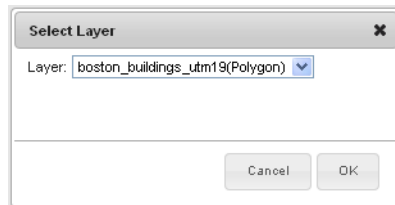


Figure 6-15. Select Layer dialog box

6. Select a layer from the list. In some cases, features are incompatible with each other. If this is the case, VR-TheWorld Server displays a notification message.
7. Click OK.

6.9.4. Tiling Feature Layers

You can create tiles for the Tiling Feature Service (TFS). Tiling a feature layer serves a different purpose than tiling raster layers. When you tile a feature layer you specify the order in which features are loaded. For example, you could specify that features above a certain height get loaded first, so that as you approach a city, the skyline becomes visible before smaller buildings do. If you do not tile a feature layer, features get loaded randomly, which may not provide the ideal visual experience.

Feature tiling is optional. Unlike raster layers, feature layers do not get tiled automatically if you do not tile them manually. If you want the benefits of tiling for a feature layer, you must tile it.

The feature tiling generates a quadtree that starts with a single tile that encompasses the bounds of the entire feature dataset. The Max Features option is the maximum number of features to place in a quadtree tile. So if you pick 500 and sort by 'height', the tallest 500 buildings go into the first cell, then the next tallest 500 (in each child cell) are placed, and so on.

The First Level specifies the first level in the quadtree that features actually start to appear. For example, if you had a worldwide shapefile of buildings, you do not really need the tallest 500 buildings in the world to appear at a global view. If you picked level 10 as your first level you would not see buildings start to appear until you zoomed down close enough for level 10 to be visible.

The units list allows you to specify the first level in different ways. If you pick LOD, you are picking an explicit level in the quadtree. If you pick meters or Km you are telling it to pick a level that would be visible at that viewing distance. For example, if you specify First Level as 5 and choose Km in the list, you are picking a level of detail that is appropriate for a viewing distance of 5 Km.

To tile a feature layer:

1. Select the Feature Layers tab.
2. Select the feature layer that you want to tile.
3. Click the Edit button.
4. Select the Tiles tab.
5. Click Tile Layer. The Tile Layer dialog box opens ([Figure 6-16](#)).

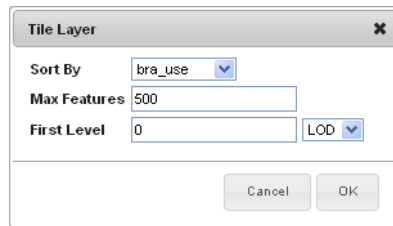


Figure 6-16. Tile Layer dialog box

6. In the Sort By drop-down list, select the attribute to sort by.
7. In the Max Features box, specify the maximum number of features to place in a quadtree tile.
8. In the First Level box, specify the first level in the quadtree at which features start to appear.
9. In the drop-down list, select the how the first level is specified (LOD, M, or Km).
10. Click OK.



Managing Files

This chapter describes how to manage the files on the server.

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7.1. Managing Files

VR-TheWorld Server has almost 4 TB of terrain data. You may have additional terrain data that you want to serve using VR-TheWorld Server. You can add your data to the server to make it available through VR-TheWorld Server.

VR-TheWorld Server supports the following raster file formats:

- ♦ MRSID
- ♦ GDAL virtual
- ♦ Geotiff
- ♦ JPEG 2000
- ♦ DEM
- ♦ DTED
- ♦ Arcinfo Binary Grid
- ♦ Magellan BLX Topo
- ♦ Bathymetry Attributed Grid
- ♦ VTP Binary terrain format
- ♦ USGS DOQ
- ♦ ESRI *.hdr*
- ♦ Envisat Image Product
- ♦ ERMMapper
- ♦ FITS
- ♦ Erdas Imagine
- ♦ National Imagery Transport Files (CIB, CADRG, and so on)
- ♦ BSB Nautical chart format.

VR-TheWorld Server supports the following vector file formats:

- ♦ Shape
- ♦ KML
- ♦ GPX
- ♦ VMAP
- ♦ S-57.

7.2. Creating a Folder

VR-TheWorld Server stores files in folders (directories). You can create new folders for your data or store data in existing folders.

To create a folder:

1. Log in as administrator.
2. Select the Manage Files tab (Figure 7-1).

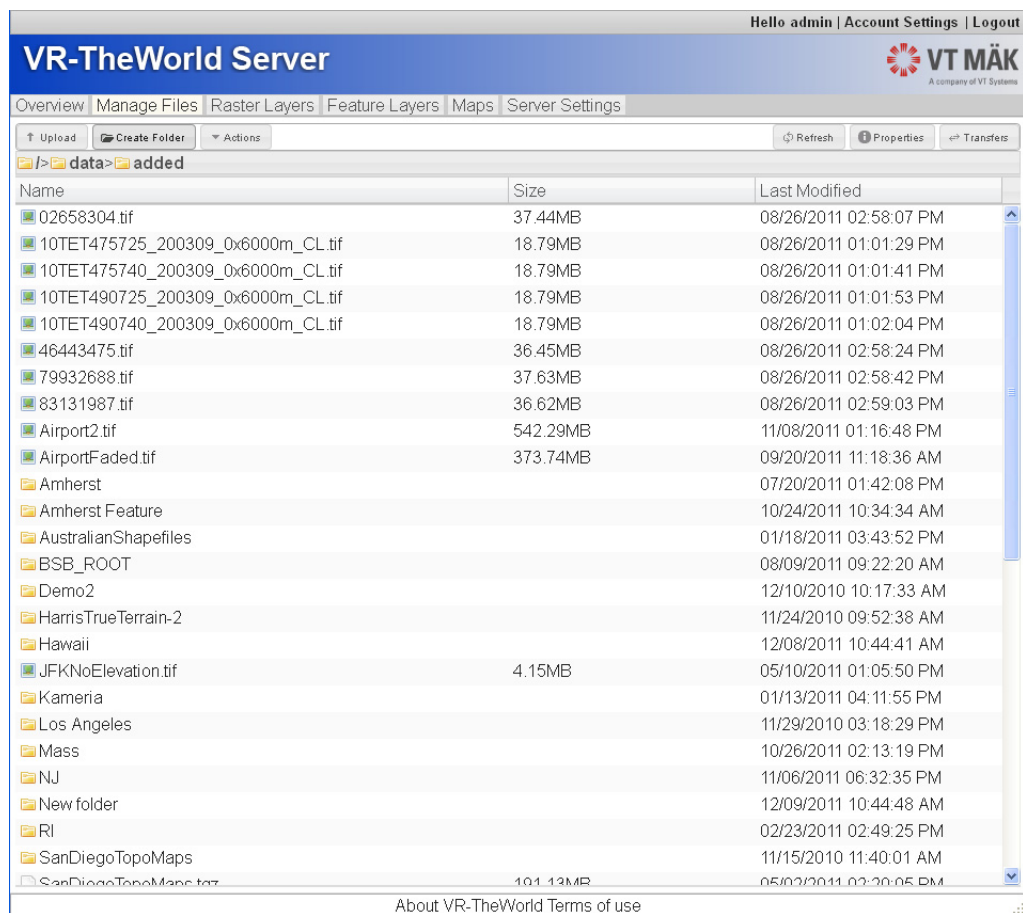


Figure 7-1. Manage Files tab

3. Click Create Folder. The Create Folder dialog box opens.
4. Type a name for the new folder.
5. Click OK. The folder is added to the files list.

7.3. Uploading Files

You can upload individual files and compressed files. If you upload a *.zip*, *.tar*, or *.tar.gz* file, VR-TheWorld Server uncompresses it.

To upload a file:

1. Log in as administrator.
2. Select the Manage Files tab (Figure 7-1).
3. Select the folder into which you want to upload a file.
4. Click Upload. A file selection dialog box opens.
5. Select the files you want to upload. (You can select multiple files using standard file selection methods.)
6. Click Open. VR-TheWorld Server provides feedback about the progress of the upload process (Figure 7-2).

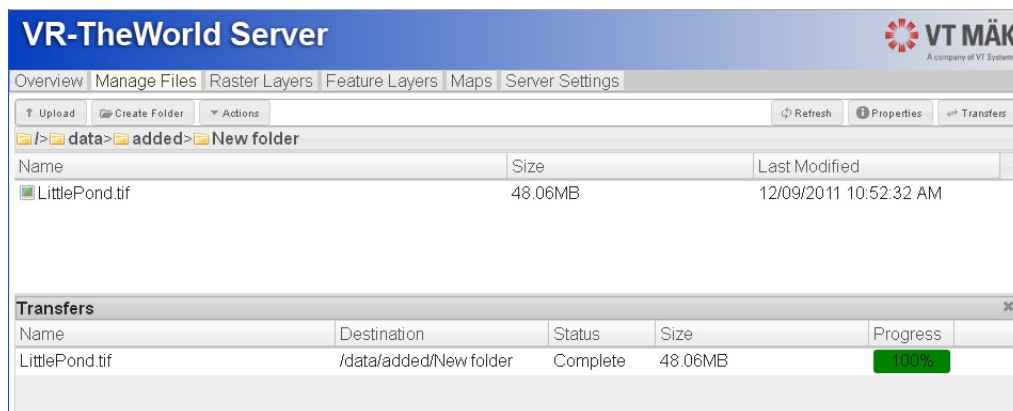


Figure 7-2. Upload status



You can also upload files from the Edit panel for local layers. The files do not get added to the layer, they just get uploaded.

7.3.1. Viewing the Transfers List

Uploading files to the server can be a time-consuming process. The Transfers list shows the status of files that you have selected for upload.

To view the Transfers list:

1. Log in as administrator.
2. Select the Manage Files tab (Figure 7-1).
3. Click the Transfers button. The status of all upload requests is displayed (Figure 7-2).

7.4. Moving Files

To move a file:

1. Log in as administrator.
2. Select the Manage Files tab (Figure 7-1).
3. Select the file you want to move.
4. Click **Actions** → **Move**. The Move File To dialog box opens.
5. Select the folder that you want to move the file to.
6. Click OK.

7.5. Downloading Files

You can download files from the server to a local computer.

To download a file:

1. Log in as administrator.
2. Select the Manage Files tab (Figure 7-1).
3. Select the file you want to download.
4. Click **Actions** → **Download**. A file open dialog box opens (Figure 7-3).

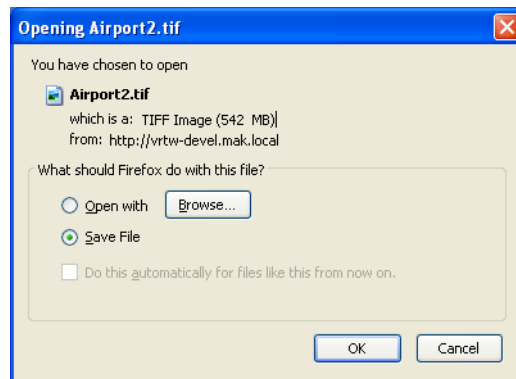


Figure 7-3. Download file

5. Select the Save File option.
6. Click OK. If your system is configured to save files to a default directory, the file is downloaded to that directory. Otherwise, specify a directory and file name for the file.

7.6. Viewing File Properties

VR-TheWorld Server can display information about the files in the database, such as the filename, pathname, type, size, and so on.

To display information about a file:

1. Select the Manage File tab.
2. Select the file for which you want to view information.
3. Click the Properties button. File properties are displayed (Figure 7-4).

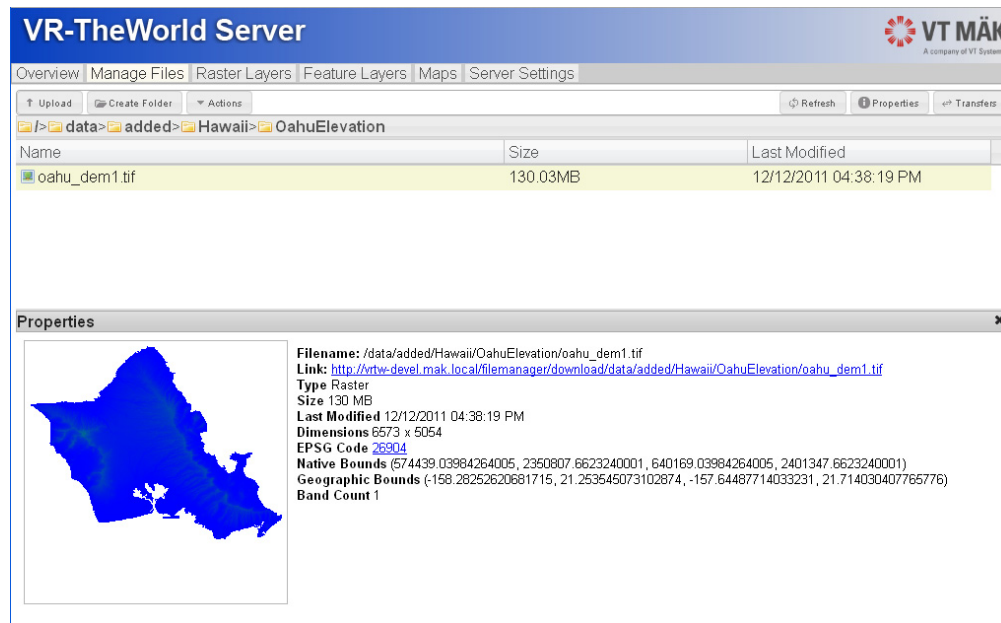


Figure 7-4. File properties

7.7. Deleting Files

To delete a file:

1. Log in as administrator.
2. Select the Manage Files tab (Figure 7-1).
3. Select the file or folder that you want to delete.
4. Click **Actions** → **Delete**.
5. Confirm the request to delete the file.

7.8. Renaming Files

To rename a file:

1. Log in as administrator.
2. Select the Manage Files tab ([Figure 7-1](#)).
3. Select the file you want to rename.
4. Click **Actions** → **Rename**. The Rename dialog box opens.
5. Type a new name for the file.
6. Click OK.



Editing Earth Files

VR-TheWorld Server can create Earth files for use in programs that use osgEarth, such as VR-Vantage and VR-Forces. This chapter provides some basic information about the syntax of Earth files.

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8.1. Earth Files

The Earth file is an XML configuration file used to display terrain databases in osgEarth. The file format is documented at <http://osgearth.org/wiki/Documentation>. This chapter supplements the information on the osgEarth web site. In particular, it explains how to configure streaming features, for which there is no GUI in VR-TheWorld Server.

8.2. A Simple Earth File

The VR-TheWorld map has one image layer, one elevation layer, and five placemarks. Here is what its Earth file looks like:

```
<!--
VR-TheWorld
VR-TheWorld base map includes 30m global imagery with 90m global
elevation, along with high resolution insets.
-->
<map name="VR-TheWorld" type="globe" version="2">
  <image name="BaseImagery" driver="tms">
    <url>http://vrtw-devel.mak.local/tiles/1.0.0/1/</url>
  </image>
  <heightfield name="BaseElevation" driver="tms">
    <url>http://vrtw-devel.mak.local/tiles/1.0.0/2/</url>
  </heightfield>
  <external>
    <viewpoint height="0" lat="30.3229522705" long="-97.7872467041"
      name="Austin, TX" heading="0.0" pitch="-89.0"
      range="220731.221463"/>
    <viewpoint height="0" lat="31.4875030518" long="65.8475875855"
      name="Kandahar, Afghanistan" heading="0.0" pitch="-89.0"
      range="55182.8053662"/>
    <viewpoint height="0" lat="34.9411582947" long="69.259185791"
      name="Bagram Air Base, Afghanistan" heading="0.0" pitch="-89.0"
      range="27591.4026831"/>
    <viewpoint height="0" lat="42.3234558105" long="-71.0976791382"
      name="Boston, MA" heading="0.0" pitch="-89.0"
      range="55182.8053662"/>
    <viewpoint height="0" lat="38.893661499" long="-77.0114135742"
      name="Washington, DC" heading="0.0" pitch="-89.0"
      range="55182.8053662"/>
  </external>
</map>
```

Table 8-1 describes the XML elements in the file and their attributes.

Table 8-1: Earth file elements and attributes

Element	Attribute	Description
<!-- -->		Comment block.
map		Root level element. All other elements must be in the map block.
	name	The name of the map.

Table 8-1: Earth file elements and attributes

Element	Attribute	Description
image	type	The projection - globe or projected.
	version	The VR-TheWorld Server version.
	name	Specifies an image layer.
	driver	The driver to use to fetch tiles, for example, TMS, WMS, or GDAL.
	url	The location of the files. This could be a web address or a local path. For more information, please see “Deciphering the URL,” on page 8-3.
heightfield	name	Specifies an elevation layer.
	driver	The driver to use to fetch tiles, for example, TMS, WMS, or GDAL.
	url	The location of the files. This could be a web address or a local path. For more information, please see “Deciphering the URL,” on page 8-3.
external	viewpoint	Specifies map data that is not part of a layer, such as placemarks.
		Specifies the location of the item, the location from which to view it, and its name.

8.2.1. Deciphering the URL

The URLs that VR-TheWorld Server generates for TMS layers look similar to the following:

```
<url>http://vrtw-devel.mak.local/tiles/1.0.0/165/</url>
```

The WMS URL for the same layer is:

```
http://vrtw-devel.mak.local/tiles?request=GetMap&layers=165&format=image/png&service=WMS&version=1.1.1&styles=&srs=EPSG:4326&bbox=-180,-90,0,90&width=&height=
```

The URL points to the location of the layer in the VR-TheWorld Server database. Each layer is referenced by a number. In this example, this is layer 165. The URL for a layer is not displayed on the Raster Layers page or the Edit page for a layer, but you can get it looking at the connection details for the layer.

To get the URL for a TMS connection:

1. Log in to VR-TheWorld Server.
2. Select the Raster Layers tab.

3. Select the layer for which you need the URL.
4. In Connect window, click TMS. VR-TheWorld Server displays a screen of data about the layer. The URL in the browser window is the URL for the layer (Figure 8-1).

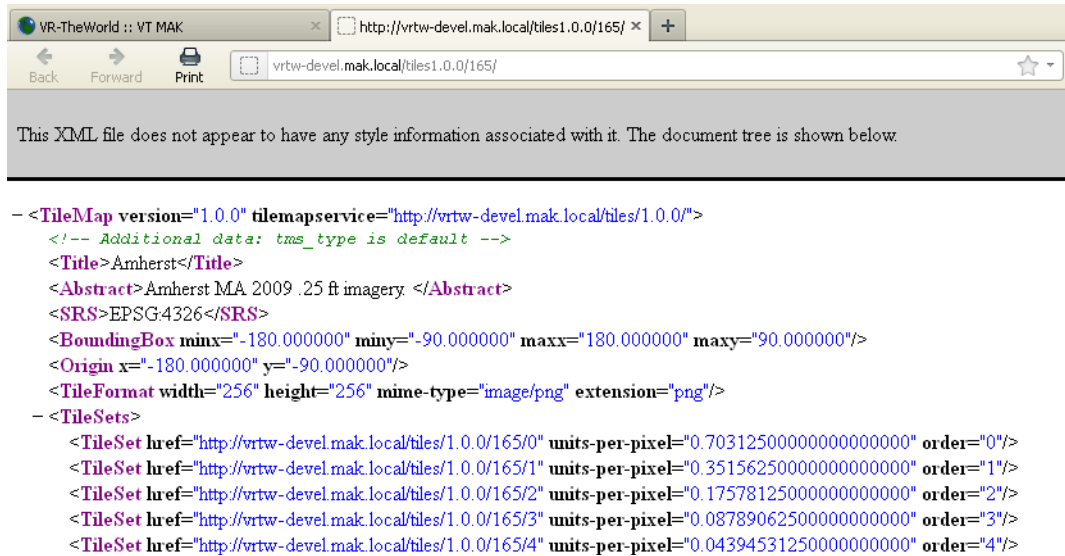


Figure 8-1. TMS URL

To get the URL for a WMS connection:

1. Log in to VR-TheWorld Server.
2. Select the Raster Layers tab.
3. Select the layer for which you need the URL.
4. In Connect window, click WMS. The browser does not display any data. The URL in the browser window is the URL for the layer (Figure 8-2).

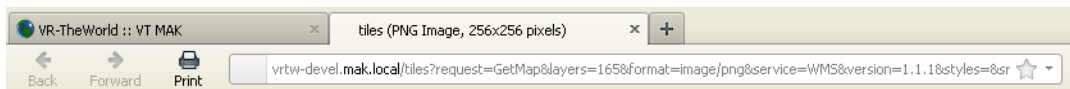


Figure 8-2. WMS URL

8.3. Adding Feature Layers to an Earth File

As noted in [“Adding Features to a Map,”](#) on page 5-9, VR-TheWorld Server does not automatically add feature layers to Earth files like it does for raster and elevation layers. You can add the XML for features layers in the osgEarth group box on the Advanced dialog box or you can add them to the Earth file that VR-TheWorld Server generates. The advantage to adding them in the Advanced dialog box is that they will be saved with the map and you will not have to edit the Earth file each time you generate a new one.

The following Earth file has cut-in sites and feature data.

```

1  <!--
2  Hawaii
3  Oahu with cut in site and extruded buildings
4  -->
5  <map name="Hawaii" type="geocentric" version="2">
6    <image name="BaseImagery" driver="tms">
7      <url>http://vr-theworld/tiles/1.0.0/1/</url>
8    </image>
9    <image name="ImCol" driver="tms">
10     <url>http://vr-theworld/tiles/1.0.0/213/</url>
11   </image>
12   <heightfield name="elcol" driver="tms">
13     <url>http://vr-theworld/tiles/1.0.0/212/</url>
14   </heightfield>
15   <!-- the masking geometry -->
16   <mask name="HonoluluRunway26L-8R-mask" driver="feature" >
17     <features driver="ogr">
18       <geometry>
19         POLYGON((-157.908913 21.306395 2.161207, -157.947497
20 21.306406 2.163878, -157.947499 21.307210 1.366011, -157.908913
21 21.307204 2.364334))
22       </geometry>
23     </features>
24   </mask>
25   <!-- Extruded buildings -->
26   <model name="buildings" driver="feature_geom">
27     <features name="buildings" driver="ogr">
28
29     <url>../../data/Terrain/Hawaii/Features/StructuresA.shp</url>
30     <typename>2</typename>
31   </features>
32
33   <layout>
34     <tile_size_factor>45</tile_size_factor>
35     <level name="default" max_range="20000">
36       <selector class="buildings"/>
37     </level>
38   </layout>
39
40   <styles>
41     <library name="us_resources">
42       <url>../../appData/osgEarth/catalog.xml</url>
43     </library>
44
45     <style type="text/css">
```

```

46         buildings {
47             extrusion-height:      [hgt2d];
48             extrusion-flatten:     true;
49             extrusion-wall-style:   building-wall;
50             extrusion-roof-style:   building-rooftop;
51             extrusion-random-seed:  1;
52             altitude-clamping:      terrain;
53         }
54         building-wall {
55             skin-library: us_resources;
56             skin-tags:        building;
57             fill:              #ffffff;
58         }
59         building-rooftop {
60             skin-library: us_resources;
61             skin-tags:     rooftop;
62             skin-tiled:    true;
63             fill:          #ffffff;
64         }
65     </style>
66 </styles>
67 <lighting>true</lighting>
68
69 </model>
70
71 <model name="point trees" driver="feature_geom">
72
73     <features name="points" driver="ogr">
74
75         <url>../../data/Terrain/Hawaii/Features/VegetationP.shp</url>
76         <build_spatial_index>true</build_spatial_index>
77     </features>
78
79     <styles>
80         <style type="text/css">
81             points {
82                 marker:          [LongType];
83                 marker-scale:     1;
84                 altitude-clamping: terrain;
85                 altitude-offset:  0;
86             }
87         </style>
88     </styles>
89     <clustering>false</clustering>
90     <lighting>true</lighting>
91 </model>
92
93
94 <!-- Trees
95     <model name="trees" driver="feature_geom">
96
97
98         <features name="forest" driver="wfs">
99             <url> http://vr-theworld/features/wfs </url>
100             <typename>7</typename>
101         </features>
102
103
104         <clustering>true</clustering>

```

```

105
106
107     <layout>
108         <crop_features>true</crop_features>
109         <level max_range="100000" min_range="0">
110             <selector class="parks-outline"/>
111         </level>
112         <level max_range="10000">
113             <selector class="parks-1"/>
114         </level>
115         <level max_range="5000">
116             <selector class="parks-2"/>
117         </level>
118         <level max_range="1500">
119             <selector class="parks-3"/>
120         </level>
121     </layout>
122
123     <styles>
124         <style type="text/css">
125             parks-1 {
126                 marker:                model("../data/tree.osg");
127                 marker-placement:      random;
128                 marker-density:        1000;
129                 marker-scale:          2;
130                 altitude-clamping:     terrain;
131             }
132             parks-2 {
133                 marker:                model("../data/tree.osg");
134                 marker-placement:      random;
135                 marker-density:        1000;
136                 marker-scale:          2;
137                 altitude-clamping:     terrain;
138                 marker-random-seed:    1;
139             }
140             parks-3 {
141                 marker:                model("../data/tree.osg");
142                 marker-placement:      random;
143                 marker-density:        1000;
144                 marker-scale:          2;
145                 altitude-clamping:     terrain;
146                 marker-random-seed:    2;
147             }
148             parks-outline {
149                 stroke:                #00ff00ff;
150                 altitude-offset:        25;
151                 altitude-clamping:     terrain;
152             }
153         </style>
154     </styles>
155 </model> -->
156
157 <options>
158     <lighting>true</lighting>
159     <elevation_interpolation>triangulate</elevation_interpolation>
160     <terrain>
161         <min_tile_range_factor>3</min_tile_range_factor>
162     </terrain>
163     <cache type="filesystem">

```

```
165         <path>../../appData/cache</path>
166     </cache>
167 </options>
</map>
```

8.3.1. Cut-in Sites – The mask Element

In the Earth file in the previous section, lines 16-24 are a `mask` element. When you build a map, there may be areas of the terrain where you want to use high-resolution hand-modeled terrain, rather than the data provided with VR-TheWorld Server. To do this, you create the terrain in a modeling tool and then cut it into VR-TheWorld Server. The `mask` element lets you essentially cover the base terrain data with your hand-modeled data. [Table 8-2](#) describes the mask element and its sub-elements.

Table 8-2: mask element

Element	Attribute	Description
mask		Element for cutting in geometry.
	name	Name of the mask.
	driver	The driver to use
features		List of features in the mask.
	driver	The driver to use. OGR reads raw vector feature data from shapefiles and other formats.
geometry		Specifies the 3D boundaries of the site. You must know this information.
	geometry_url	The location of the file with the feature data.

8.3.2. Extruded Buildings

If you are simulating in an urban environment, you want your terrain to have realistic 3D buildings. However, modeling hundreds or thousands of buildings by hand would be an arduous and expensive task. VR-TheWorld Server can extrude buildings from point features and apply textures to them to create a realistic environment with relatively little work. Publicly available GIS data that has footprint and height data can provide the input.

In the example Earth file, lines 26-69 configure extruded buildings in a model element. [Table 8-3](#) describes the `model` element, its attributes, and sub-elements.

Table 8-3: model element – extruded buildings

Element	Attribute	Description
model		Base element for specifying a feature layer.
	name	Name of the layer.
	driver	Driver to use for creating models.

Table 8-3: model element – extruded buildings

Element	Attribute	Description
The <code>features</code> and <code>layout</code> elements specify how to get and load the feature data. The <code>features</code> block is mandatory. <code>layout</code> is optional		
<code>features</code>		Specifies source of data.
	<code>name</code>	Name of the element.
	<code>driver</code>	Driver to use to get the data.
	<code>url</code>	Location of the feature data.
<code>layout</code>		Specifies how to load the data.
<code>tile_size_factor</code>		The data specified in the <code>features</code> element gets cut into tiles. This attribute specifies how aggressively to tile it.
<code>level</code>	<code>name</code>	The level specifies the level (LOD) beyond which not to display the features.
	<code>max_range</code>	Distance beyond which the feature is not displayed.
<code>selector</code>	<code>class</code>	Specifies the type of feature.
<code>styles</code>		The <code>styles</code> element and sub-elements specify how to render the scene. In this case, it shows how to render buildings. This element is mandatory.
<code>library</code>		A texture library.
	<code>name</code>	Name of the texture library.
	<code>url</code>	The location of the library.
<code>style</code>		A specific style.
	<code>type</code>	
	<code>buildings</code>	How to extrude the buildings. The extrusion-height attribute matches an attribute in the shape file.
	<code>building-wall</code>	Specifies the texture library to use. Note that it matches the name value in the <code>library</code> element.
<code>lighting</code>		Specifies whether or not to enable lighting. Usually true.

8.3.3. Configuring Trees

In addition to extruding buildings, this terrain has many point trees (lines 71-90. The elements and attributes used for point trees are similar to those used for extruded buildings. The additional element to note is `clustering`. Clustering takes all pieces of geometry in a tile and aggregates them into a single piece of geometry. This improves performance, because one object renders more quickly than many. However, when you do this all of the objects have the same center point. Since trees are billboards and rotate around the center point, to cluster point trees would result in odd looking behavior, so `clustering` is disabled.

The terrain also has trees that are not rendered individually, but as forests. They are configured in lines 95-156. Note that `clustering` is enabled for this model block.

8.3.4. Configuring Options

The Earth file has several `option` elements that affect the entire map. [Table 8-4](#) describes the option elements.

Table 8-4: option element

Element	Attribute	Description
lighting		Enables or disables lighting for the entire map. This is usually true.
elevation_interpolation		Specifies how OSG interprets elevation between grid posts. If you are using VR-Forces or visualizing a VR-Forces simulation, set this to triangulate to ensure correlation.
cache		Specifies caching for terrain data.
	type	The type of caching to use.
	path	The location of the data cache.



Performance Considerations

This chapter describes ways to improve performance for VR-TheWorld Server.

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9.1. Maximizing Performance

In most cases, VR-TheWorld Server will perform well out-of-the-box. However, performance will be affected by network performance and the configuration of the applications that is streaming the terrain. The issues discussed in following sections may help you maximize performance.

9.1.1. Tile Size

The tile size parameter on imagery and elevation layers controls the pixel size of the image VR-TheWorld creates during tiling. The number is used both for the length and the width of the tile, so if the parameter is 256, the tile will be 256x256 pixels. VR-TheWorld can use any number in this field, but if the end application is to be an osgEarth based application, such as VR-Vantage, or any other 3D Application like Google Earth it is important that the number be a power of 2. This is because the tiles will be used as textures in the graphics card. Imagery tile size is recommended to be 256. Elevation layer tile size is recommended to be 32. In the case of elevation, this controls how many points end up in the 3D terrain patch that is created from the tile. Increasing the number beyond 32 will require the client to have very powerful graphics hardware.

9.1.2. Pre-Tile Layers

If a layer is not tiled, VR-TheWorld generates the tiles on the fly and stores them as they are required. This is useful for being able to quickly test layers and interact with the data. However this generating process can cause undesirable slow spots when the client application is moving around the data. If all the tiles are generated, the server just needs to look up the tile and return instead of having to render it.

At times it may not be feasible to pre-generate all the tiles. Tiling tasks can take a long time depending on the detail level and the area covered. In this case, it is often best to generate the lowest levels first. The hardest tiles to generate are the overview tiles. These tiles tend to have the most source files required for every tile. So if your data extends to level 18, if you create a tiling task that does levels 0-12 instead of automatically tiling all levels, you will drastically reduce the length of time the task takes. Every level is roughly 4 times the size of the previous level in terms of numbers of tiles.

This approach means clients will only generate tiles once they zoom in to areas, which typically represent a low number of tiles. While the tiling operation is running, the client can usually still show the lower resolution tiles that are already generated until the higher resolution is available.

9.1.3. Composite Layers

Each layer in a map represents a new connection to VR-TheWorld by the client and tiles that must be downloaded for any given area. The client then draws each layer onto the scene. Composite layers allow you to combine layers on the server and have the server perform the task of rendering every layer to generate the final image. The server then caches the rendered tiles like any other layer. This allows the client to make a single connection to the server and only render one tile over a basemap layer instead of rendering multiple layers and downloading multiple tiles. It is not recommended to combine the base global layers such as Base Imagery into composite layers since the base layers are very large and this may ultimately cause the base layers to be copied to the composite layer. A typical map would be expected to have a base layer and one or two overlay layers for maximum performance.

9.1.4. Files Per Layer

VR-TheWorld can have difficulty when there are more than 1000 source files in a layer. This is due to the tile rendering process and how much memory can be consumed by large numbers of highly compressed source files. If you want to have layers with more than 1000 source files then it is recommended that you split the layer into multiple smaller layers and use a composite layer to pull the split layers together.

9.1.5. Client-Side Caching

If you use VR-Vantage, it caches as much of the VR-TheWorld terrain as it can, which will eliminate the need to re-download tiles for areas that have recently been viewed. This is the most dramatic improvement in performance that can be achieved. osgEarth applications can add caching to their Earth file by adding a `cache` block to the `options` block. For details about the `cache` block, please see [“Configuring Options,”](#) on page 8-10.

9.1.6. Feature Attributes

When using features, it is best to upload feature data sets that match the client tasks as closely as possible. When a client connects to VR-TheWorld for features, it downloads all the feature attributes associated with the feature. If unused attributes are removed from the feature data set before uploading to VR-TheWorld then they will not be downloaded by the clients. This in turn makes the size of the feature tiles smaller and quicker to download.

9.1.7. Controlling where Paging is Handled

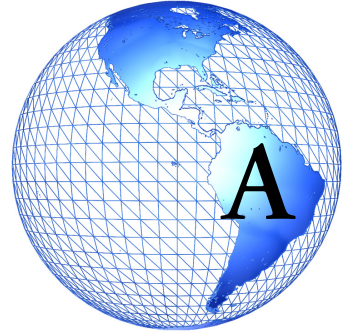
If you include a `<level>` block in the `<layout>` element, the entire dataset is downloaded from the server at once and all the paging is done locally, ignoring any pre-tiling done on the server. Therefore, do not include a `<level>` block if you have a large data set. The layout block should look like:

```
<layout>
  <tile_size_factor>5</tile_size_factor>
</layout>
```

9.2. OSG and osgEarth Environment Variables

You can improve performance for some terrains by configuring the following environment variables:

- The `OSG_MAX_PAGEDLOD`. `OSG_MAX_PAGEDLOD` specifies the target maximum number of paged LODs to maintain. Default: 200. Set it to a lower value if you need to reduce memory consumption when using paged terrains.
- `GDAL_CACHEMAX`. `GDAL_CACHEMAX` specifies the maximum cache size for streaming terrain. The default value is 200 MB, which is often adequate. However, if you are using a highly detailed terrain, increasing the cache size to a larger value, such as 2000, can significantly improve performance.
- You can configure caching in the `<cache>` element in the `.earth` file or in the `OSGEARTH_CACHE_PATH` environment variable.



Terrain Sources

This chapter describes ways to improve performance for VR-TheWorld Server.

Terrain Sources	A-2
---------------------------------------	-----

A.1. Terrain Sources

Table A-1 lists the terrains installed by VR-TheWorld Server and details about them.

Table A-1: VR-TheWorld Server data sources (Sheet 1 of 6)

Layer	Details	
Base imagery	Source	Pelican Mapping
	Website	
	Comments	Base imagery layer is made by Pelican Mapping combining LandSat 7 15m imagery and BlueMarble ocean imagery.
	Layer type	Tile only.
Base Imagery Boston Inset	Source	Pelican Mapping
	Website	http://www.mass.gov/mgis/massgis.htm
	Comments	U.S. Geological Survey (USGS) data obtained from Massachusetts Geographic Information System (MassGIS).
	Layer type	Tile only.
Base Imagery DC inset	Source	Pelican Mapping
	Website	http://data.dc.gov/
	Comments	District of Columbia GIS Program 2008 Orthophoto.
	Layer type	Tile only.
Base Imagery Afghanistan inset	Source	Pelican Mapping
	Website	http://mapserver.cmf.nrl.navy.mil/
	Comments	Sourced from Project Rampant Lion 1
	Layer type	Tile only.
Base elevation	Source	Pelican Mapping
	Website	http://srtm.csi.cgiar.org/ http://topex.ucsd.edu/WWW_html/srtm30_plus.html
	Comments	Sourced from CGIAR. The 90m elevation posts are ultimately from the Shuttle Radar Topographic Mission. Bathymetry comes from the Scripps Institute of Oceanography SRTM30PLUS.
	Layer type	Tile only.

Table A-1: VR-TheWorld Server data sources (Sheet 2 of 6)

Layer	Details	
Amherst	Source	Amherst, Massachusetts, USA
	Website	http://www.amherstma.gov/index.aspx?nid=1432
	Comments	
	Layer type	Local.
WAC, SEC, TAC and combined Aeronautical Charts layers	Source	U.S. Federal Aviation Administration (FAA)
	Website	http://aeronav.faa.gov/index.asp?xml=aeronav/applications
	Comments	Purchased from Mypilotstore.com, then downloaded more from the FAA.
	Layer type	Local.
Chicago	Source	USGS
	Website	http://seamless.usgs.gov/hro.php
	Comments	Seamless data warehouse: IL_CookCounty_0.5ft_Color_May_2008_01, IL_CookCounty_0.5ft_Color_May_2008_02, IL_CookCounty_0.5ft_Color_May_2008_03, IL_DupageCounty_0.5ft_Color_May_2008
	Layer type	WMS, locally tiled.
Delaware	Source	USGS
	Website	http://seamless.usgs.gov/hro.php
	Comments	Seamless data warehouse: DE_State_0.25m_Color_Mar_2007
	Layer type	WMS, locally tiled.
Harris globe - White Sands, Holloman AFB	Source	Harris Corporation
	Website	
	Comments	Demonstration layers.
	Layer type	Local.
Hawaii	Source	Harris Corporation
	Website	
	Comments	Purchased from Harris. 15m Hawaiian Islands.
	Layer type	Local.

Table A-1: VR-TheWorld Server data sources (Sheet 3 of 6)

Layer	Details	
HI RNC	Source	U.S. National Oceanic and Atmospheric Administration (NOAA)
	Website	http://www.charts.noaa.gov/RNCs/RNCs.shtml
	Comments	National Ocean and Atmosphere Administration Office of Coast Survey.
	Layer type	Local.
Honolulu Water imagery	Source	Harris Corporation
	Website	
	Comments	Purchased from Harris. Blending between 1ft and 15m coast line for south Oahu.
	Layer type	Local.
Kandahar	Source	MÄK
	Website	
	Comments	VR-Village inset into the Project Lion sourced Kandahar image.
	Layer type	Local.
Long Island	Source	USGS
	Website	http://seamless.usgs.gov/hro.php
	Comments	Seamless data warehouse: NY_StateLongIsland_0.5ft_Color_Apr_2007
	Layer type	WMS, locally tiled.
Mass15 and 30cm	Source	Massachusetts Geographic Information System (MassGIS)
	Website	http://www.mass.gov/mgis/massgis.htm
	Comments	Work in progress.
	Layer type	Local.
miami	Source	USGS
	Website	http://seamless.usgs.gov/hro.php
	Comments	Seamless data warehouse: FL_DadeCounty_1.0ft_Color_Jan_2009
	Layer type	WMS, locally tiled.

Table A-1: VR-TheWorld Server data sources (Sheet 4 of 6)

Layer	Details	
NAIP	Source	U.S. Department of Agriculture (USDA)
	Website	http://seamless.usgs.gov/naip.php
	Comments	Seamless data warehouse.
	Layer type	WMS, partially locally tiled.
nexrad	Source	Iowa State University
	Website	http://mesonet.agron.iastate.edu/docs/nexrad_composites/
	Comments	Not tiled, because map updates every 45 minutes.
	Layer type	WMS.
NJ	Source	USGS
	Website	http://njgin.state.nj.us/ortho2007/
	Comments	Originally USGS data downloaded through seamless, but it moved to the New Jersey Geographic Information Network (NJGIN) site.
	Layer type	Local.
NYC	Source	USGS
	Website	http://seamless.usgs.gov/hro.php
	Comments	Seamless data warehouse: NY_StateLongIsland_2.0ft_Color_Apr_2008
	Layer type	WMS, locally tiled.
Oahu	Source	USGS
	Website	http://hawaii.wr.usgs.gov/oahu/index.html
	Comments	
	Layer type	Local.
Oahu DRG	Source	USGS
	Website	http://hawaii.wr.usgs.gov/oahu/index.html
	Comments	
	Layer type	Local.
Oahu 10m DEM	Source	USGS
	Website	http://hawaii.wr.usgs.gov/oahu/index.html
	Comments	
	Layer type	Local.

Table A-1: VR-TheWorld Server data sources (Sheet 5 of 6)

Layer		Details
Ocean Route Charts	Source	FAA
	Website	http://aeronav.faa.gov/index.asp?xml=aeronav/applications
	Comments	
	Layer type	Local.
Orlando	Source	USGS
	Website	http://seamless.usgs.gov/hro.php
	Comments	Seamless data warehouse: Orange and Seminola Counties Apr 2008 1f
	Layer type	WMS, locally tiled.
Ridge Radar	Source	NOAA NWS
	Website	http://www.nws.noaa.gov/gis/otherpage.htm
	Comments	National weather service, live updating, not tiled.
	Layer type	WMS
San Diego	Source	USGS
	Website	
	Comments	Probably USGS.
	Layer type	Local.
Spot Map	Source	SpotImage.
	Website	
	Comments	Example layer of SpotImage.
	Layer type	WMS
US Canada Border	Source	USGS
	Website	http://seamless.usgs.gov/hro.php
	Comments	Seamless data warehouse: high resolution border imagery.
	Layer type	WMS, partially tiled.
Boston Buildings	Source	Pelican Mapping
	Website	
	Comments	Probably from MassGIS, but no longer available on that site.
	Layer type	

Table A-1: VR-TheWorld Server data sources (Sheet 6 of 6)

Layer		Details
DC buildings	Source	District of Columbia Geographic Information System (DC GIS)
	Website	http://data.dc.gov/
	Comments	District of Columbia GIS Program.
	Layer type	
Oahu Lights	Source	MÄK
	Website	
	Comments	
	Layer type	
Oahu Buildings	Source	Honolulu Land Information System (HoLIS)
	Website	http://gis.hicentral.com/data.html
	Comments	Airport cropped out of data.
	Layer type	
Oahu Vegetation	Source	MÄK
	Website	
	Comments	
	Layer type	
Structure NGA	Source	HoLIS
	Website	http://gis.hicentral.com/data.html
	Comments	Original Oahu buildings.
	Layer type	
Waiau Infrastruc- ture	Source	MÄK
	Website	
	Comments	
	Layer type	



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Link - Simulate - Visualize