



VR-TheWorld

Users Guide



VR-TheWorld Server



Users Guide

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Revision VRW-1.0-1-100929



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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 administrators manage the server. This includes creating maps, creating layers, uploading files, and managing tiles.

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 three end-user applications — VR-Vantage Stealth, VR-Vantage XR, and VR-Vantage IG — and the VR-Vantage Toolkit. 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.

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.

- ♦ 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.
- ♦ MÄK Plan View Display. The Plan View Display (PVD) provides a 2D, “big picture” of a virtual environment. It shows simulated entities, such as vehicles, soldiers, and tanks moving over a 2D-map display.
- ♦ 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.

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:	vrv-support@mak.com

Internet

MÄK web site home page:	www.mak.com
License key requests:	www.mak.com/support/licenses.php
Product version and platform information:	www.mak.com/support/productversions.php
For the free, unlicensed MÄK RTI:	www.mak.com/products/rti.php
Support FAQ:	www.mak.com/support/faq.php

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.
{ }	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*.

Hardware and Operating System Naming Conventions

Unless otherwise specified, references to UNIX include Linux, regardless of the type of computer it is running on. References to PCs refer to Intel processor-compatible computers running a version of Microsoft Windows.

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>



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 4 terabytes of global elevation and imagery 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 down to 15cm per pixel – including Boston, Washington DC, and two airport areas in Afghanistan
- ♦ Samples of 1:250,000 and 1:100,000 topographic maps in Southern California.

VR-TheWorld Server is built around open standards such as WMS-C (Web Mapping Service-Cached, from 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 two hardware components, a server and a RAID device. The following items are provided:

- ♦ Server and power cord
- ♦ RAID device and power cord
- ♦ eSATA cord.

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

- ♦ Server:
 - Quad core
 - 8 GB RAM
 - 250 GB hard drive
- ♦ Data storage:
 - A RAID array using RAID 5
 - 4 TB of usable space (after configuration)
 - eSATA connection.

2.2. Setting Up VR-TheWorld Server Hardware

To set up the hardware:

1. Place the server and RAID device next to each other.
2. Connect the server and RAID device with the eSATA cord.
3. Connect the power cords to each component.
4. Plug the power cords into a power outlet.
5. Connect the server to your network. Plug the ethernet cable into the left ethernet port as you face the back of the server.

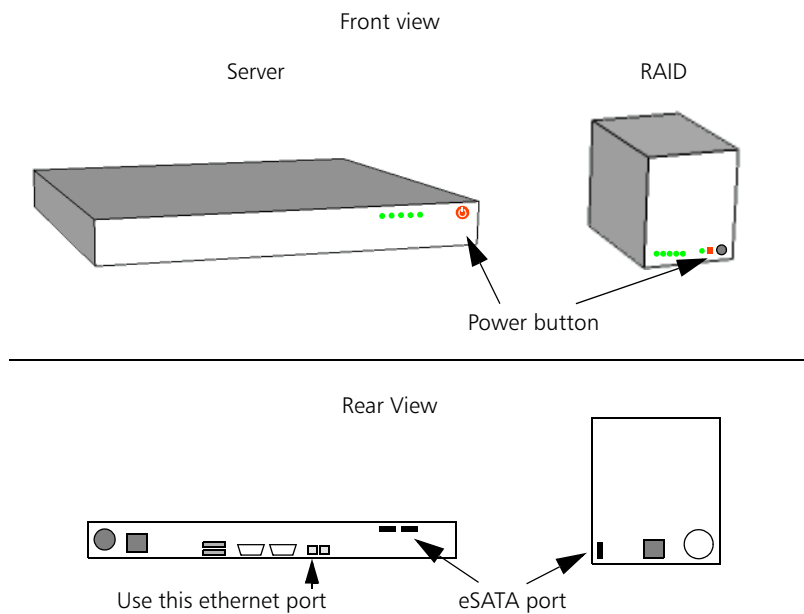


Figure 2-1. VR-TheWorld Server components

6. Turn on the RAID device.
7. 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 2-3.
2. Open a web browser.
3. Point the browser to <http://vr-theworld> (Figure 2-2).

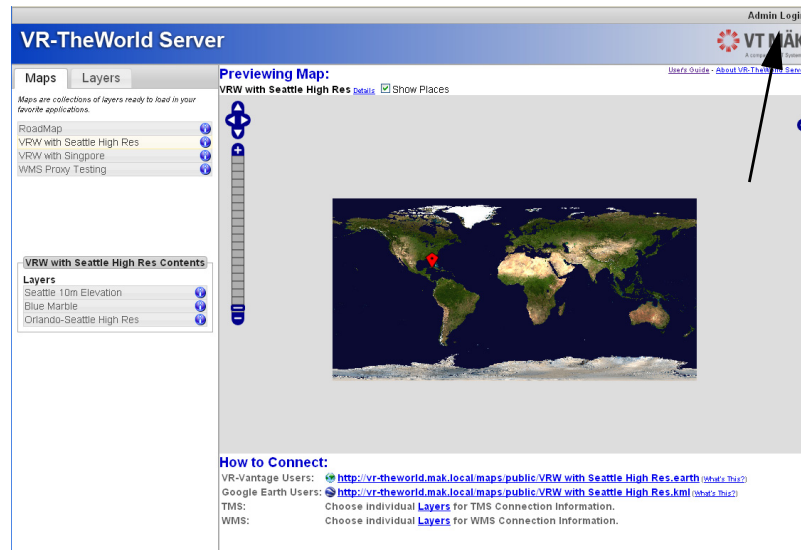


Figure 2-2. VR-TheWorld Server

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 2-3.
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 4-28. 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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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 or elevation 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 Google Earth Users link for the map (Figure 3-1). You are prompted to open the map using Google Earth.

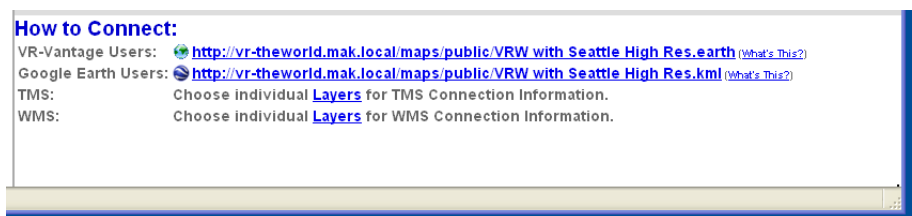


Figure 3-1. Connection URLs

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.

3.4. 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*.



This procedure only works with VR-Vantage 1.2 or later.

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 VR-Vantage Users link for the map (Figure 3-1). You are prompted to open the map using VR-Vantage.



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 *vrwLauncher.exe*.

4. Click OK. The VR-Vantage Launcher dialog box opens (Figure 3-2).

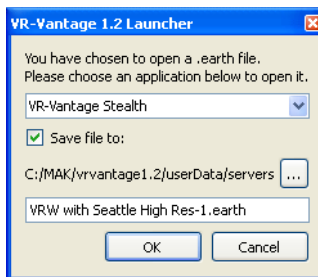


Figure 3-2. VR-Vantage Launcher dialog box

5. Select the VR-Vantage application that you want to use to open the *.earth* file.
6. 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.
7. Click OK.

3.5. 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. Select the map you want to use.
3. Click the link for WMS or TMS layers.
4. On the Layers tab (Figure 3-3), select the layer that you want to connect to.

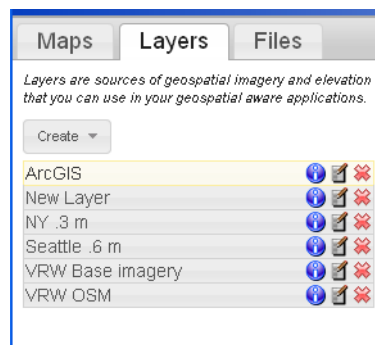


Figure 3-3. Layers tab

5. Click the link for TMS or WMS (Figure 3-4).

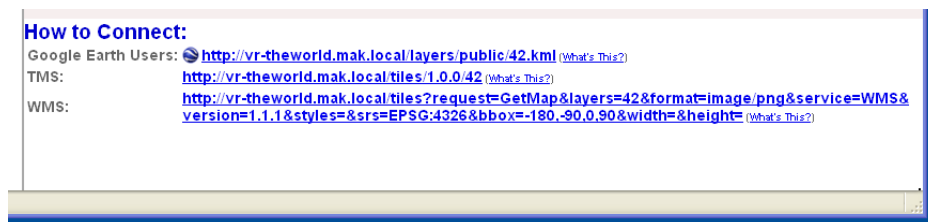


Figure 3-4. TMS and WMS links

3.6. 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 3-5). A dialog box opens that identifies the placemark (Figure 3-6).

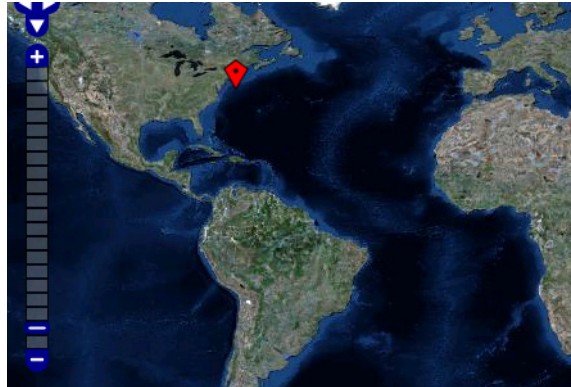


Figure 3-5. Placemark

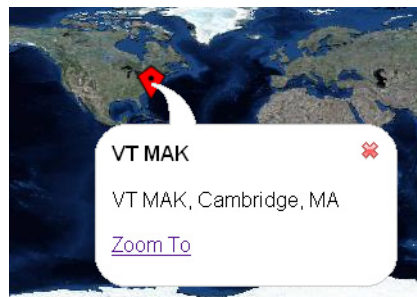


Figure 3-6. Placemark information

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.



Configuring VR-TheWorld Server

This chapter describes tasks that server administrators perform - creating layers, creating maps, and uploading files to the server.

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4.1. Introduction

VR-TheWorld Server administrators configure VR-TheWorld Server through the browser interface. It has tabs on the left side of the window for configuring maps, layers, and files, a preview of the database, and connection URLs.

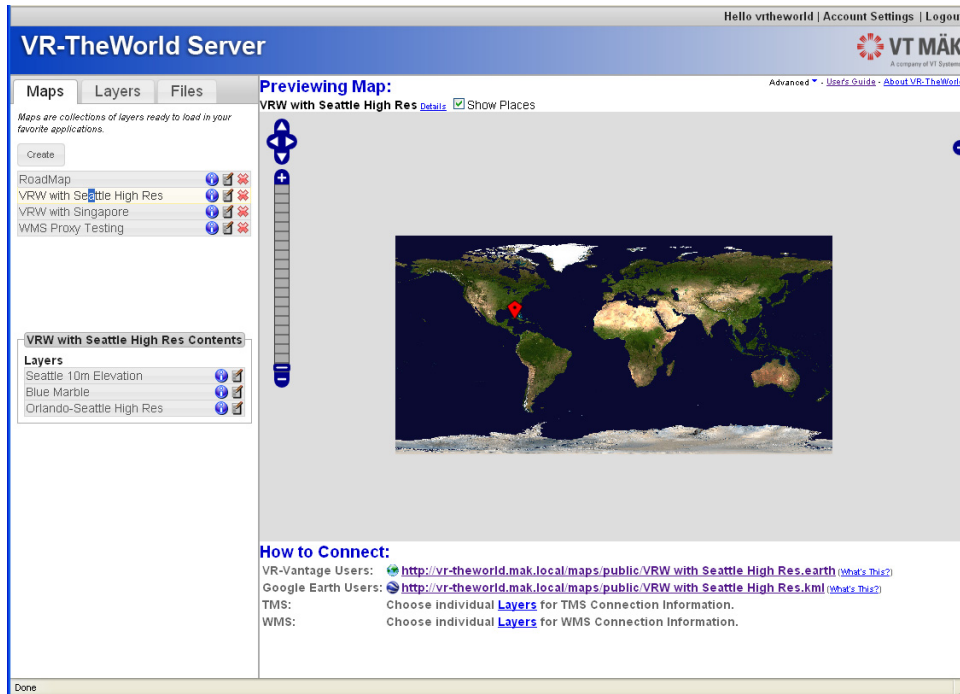


Figure 4-1. VR-TheWorld Server

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).

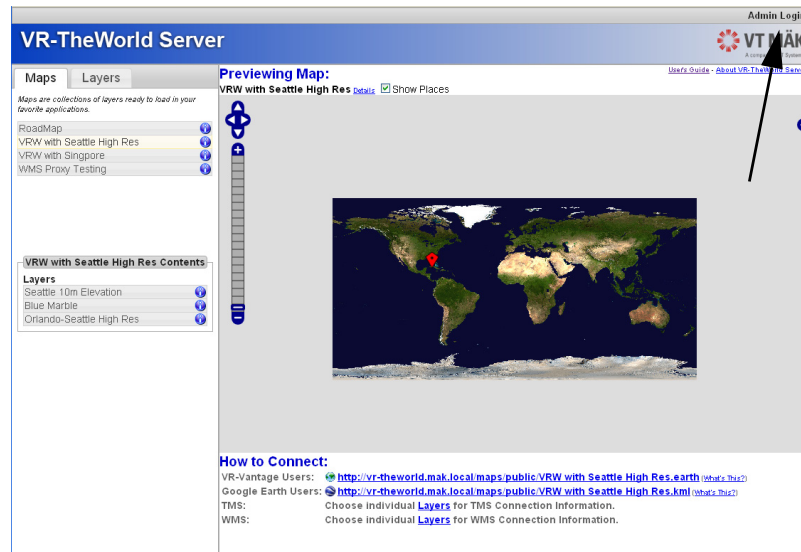


Figure 4-2. VR-TheWorld Server

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 into VR-TheWorld Server.

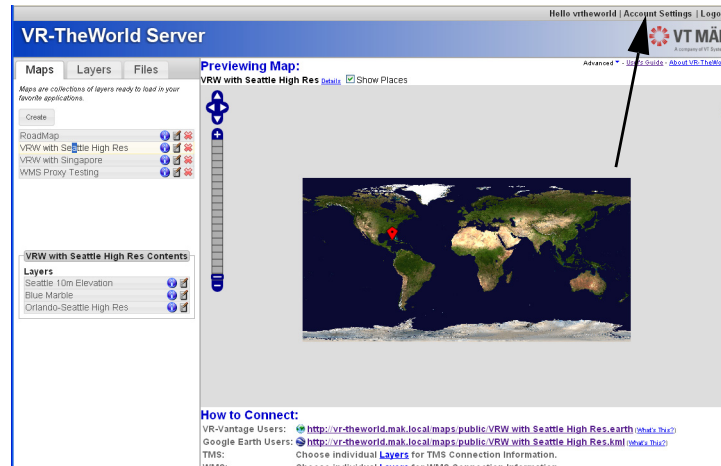


Figure 4-3. VR-TheWorld Server

2. Click Account Settings. The Change Login Settings page opens (Figure 4-4).

Change Login settings

Username:

Old password:

New password:

New password confirmation:

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. Creating Maps

To create a map:

1. Log into VR-TheWorld Server.
2. Select the Maps tab (Figure 4-5).

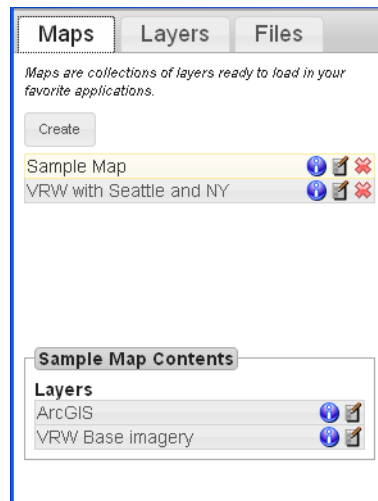


Figure 4-5. Maps tab

3. Click Create. VR-TheWorld Server creates a new map with a default name. It displays the Edit tab (Figure 4-6).

Editing: New Map [Save] [Delete] [Cancel]

Provide a description for the map.

Edit [Places] [Connect]

Name: Sample Map

Description: Provide a description for the map.

Tags:

Osgearth cache path:

Osgearth loading policy mode: Standard

Osgearth loading policy num threads per core: 2

Layers

Layer	Opacity	Default?		
ArcGIS		☒	▲	▼
VRW Base imagery		☐	▲	▼

Add Layer: VRW Base imagery

Figure 4-6. Edit map tab

4. Optionally, specify values for the following map attributes:
 - Name.
 - Description.
 - Tags.
 - Osgearth Cache Path.
 - OsgEarth Loading Policy Mode.
 - OsgEarth Loading Policy Number of Threads Per Core.
5. Specify one or more layers for the map, as described in [“Adding Layers to a Map,”](#) on page 4-8.
6. Click Save.

4.3.1. Editing a Map

To edit a map:

1. Log into VR-TheWorld Server.
2. Select the Maps tab ([Figure 4-5](#)).
3. Select the Map that you want to edit.
4. Click the Edit icon (). The Edit tab is displayed ([Figure 4-6](#)).
5. Change the attributes as desired.
6. Edit the layers, as described in “[Editing a Layer](#),” on page 4-23.
7. Save your changes.

4.3.2. Adding Layers to a Map

A map is made up of one or more layers. So, when you create a map, you must add at least one layer.

To add a layer to a map:

1. Log into VR-TheWorld Server.
2. Select the Maps tab ([Figure 4-5](#)).
3. Select the Map that you want to edit.
4. Click the Edit icon (). The Edit tab is displayed ([Figure 4-6](#)).
5. In the Add Layer drop-down list, select a layer. It is added to the list of layers for the map.
6. Save the map.

4.3.3. 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 on the Edit Map tab (Figure 4-6), the layer at the top of the list is the lowest layer in the map.

To change the order of a layer:

1. Log into VR-TheWorld Server.
2. Select the Maps tab (Figure 4-5).
3. Select the Map that you want to edit.
4. Click the Edit icon (). The Edit tab is displayed (Figure 4-6)
5. In the Layers list, click the up or down arrow for the layer whose position you want to change.
6. Save the map.

4.3.4. Removing Layers from a Map

To remove a layer from a map:

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

4.3.5. Previewing Maps

When you create a map, VR-TheWorld Server creates a URL for a 3D preview of the map. The first time you preview a map, if ReadyMapServer is not installed, you are prompted to download and install it.

To preview a map:

1. Create a new map.
2. Click the Connect tab (Figure 4-7).

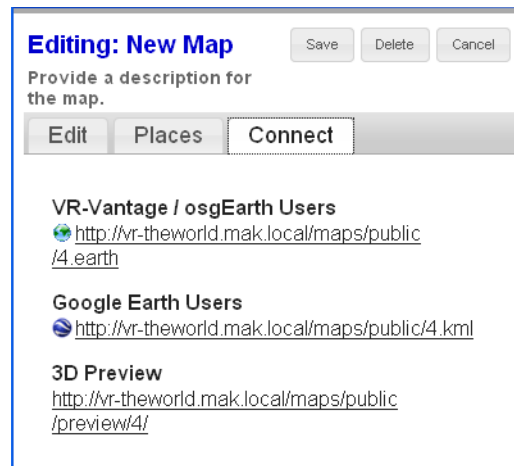


Figure 4-7. Connect tab

3. Click the 3D Preview link.

4.3.6. 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 4-8). Google Earth displays them as pushpins. They are not displayed in VR-Vantage.

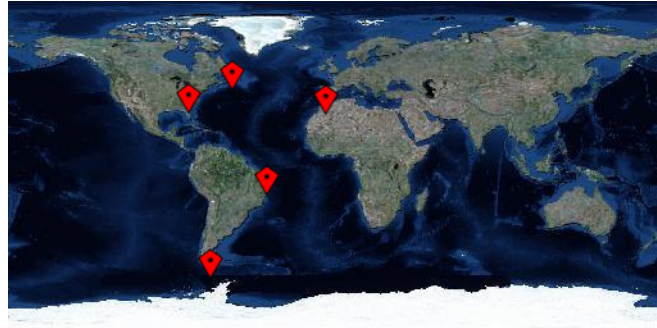


Figure 4-8. Placemarks

Only administrators can create placemarks.

To create a placemark:

1. Click the Edit icon (✎) for the map on which you want to add a placemark. The Edit page is displayed (Figure 4-6).
2. Click the Places tab (Figure 4-9).

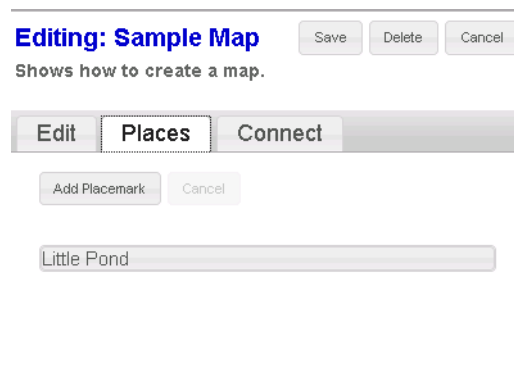


Figure 4-9. Places tab

3. Zoom in on the map 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.

4. Click Add Placemark.
5. 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 4-10).

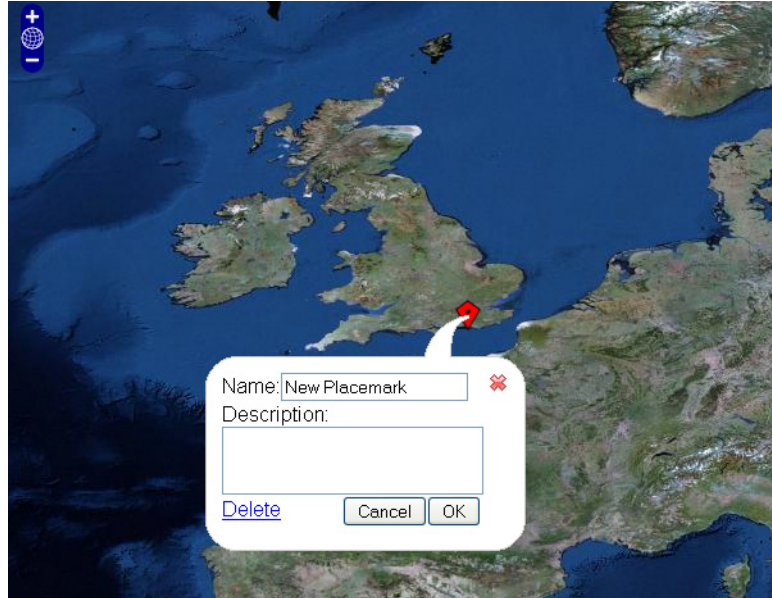


Figure 4-10. New placemark

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

4.3.7. Editing a Placemark

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

To create a placemark:

1. Click the Edit icon (✎) for the map on which you want to edit a placemark. The Edit page is displayed (Figure 4-6).
2. Click the Places tab (Figure 4-9).
3. In the list of placemarks, click the placemark that you want to edit. The map zooms to the placemark and opens a dialog box with its details.
4. Change the name or description.
5. Click OK.
6. Save the map.

4.3.8. Deleting a Placemark

To delete a placemark:

1. Click the Edit icon (✎) for the map on which you want to delete a placemark. The Edit page is displayed (Figure 4-6).
2. Click the Places tab (Figure 4-9).
3. In the list of placemarks, click the placemark that you want to delete.
4. Click Delete.
5. Save the map.

4.3.9. Deleting Maps

To delete a map:

1. On the Map tab, click the Delete icon (✖) next to the map that you want to delete. You are prompted to confirm the deletion.
2. Click OK.

4.4. Creating Layers

Layers are the building blocks of maps. VR-TheWorld Server supports the following types of 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 image and elevation data for storage on the server. Image files must be georeferenced, such as GeoTIFFs.

To create a layer:

1. Connect to VR-TheWorld Server.
2. Log in as administrator.
3. Click the Layers tab (Figure 4-11).

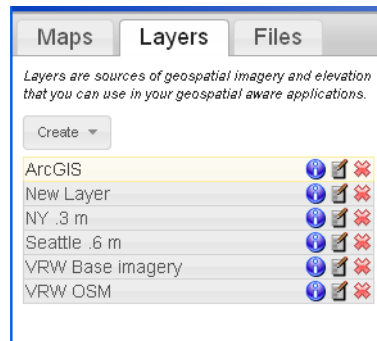


Figure 4-11. Layers tab

4. Click **Create** → *layer type* → *layer subtype*, where *layer type* is Local Layer, Remote Layer, or Composite Layer and *layer subtype* is a particular kind of layer type. Composite layers do not have subtypes. The browser displays an Edit page for the layer (Figure 4-12).

Editing: New Layer-4 Save Delete Cancel

Provide a description for the layer. (Local)

Edit Tiles Connect

Name: New Layer-4

Description: Provide a description for the layer.

Data type: Imagery
Note: Tiff is usually the best format for elevation datasets.

Enabled: ☒

Max level: 19
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: ☐

Apply 742 colorization: ☐
If the layer contains Landsat 742 data, enable to convert to natural color.

Apply background color: ☐

Background color:

Figure 4-12. Edit Layer page

5. Fill in the attributes for the layer. For details about the attributes of each layer type, please see [“Layer Attributes,”](#) on page 4-15.
6. If you are creating a composite layer, add layers, as described in [“Adding Layers to a Composite Layer,”](#) on page 4-21.
7. Click Save.

4.4.1. Layer Attributes

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

Table 4-1: Local 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.
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.

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

Attribute	Description
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 4-2: MapServer 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.
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.
Mapfile	A map server file (which allows you to specify layer information in a separate file).
Tile size	The size of each tile, in pixels.

Table 4-2: MapServer layer attributes (Sheet 2 of 2)

Attribute	Description
Format	The raster format to use for the tiled images.
Layers	Comma separated list of layer names to display in the Mapfile. For example, if you have 10 different layers specified in a map file, but you only want to serve up layer1 and layer2, you can specify "layer1,layer2" as the layers.

Table 4-3: ArcGIS layer attributes

Attribute	Description
Name	A name for the layer.
Description	Optional description for the layer.
Data type	Image data or elevation data.
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 4-4: TMS layer attributes

Attribute	Description
Name	A name for the layer.
Description	Optional description for the layer.
Data type	Image data or elevation data.
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.
Service version	The TMS version that the TMS server is using.
Layer name	The name of the layer on the TMS server.

Table 4-4: TMS layer attributes

Attribute	Description
Google TMS	Select if connecting to a server that uses the Google TMS scheme.
Format	The extension of the files (JPG, PNG, TIF).

Table 4-5: 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.
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.

Table 4-5: WMS layer attributes (Sheet 2 of 2)

Attribute	Description
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 4-6: VPB layer attributes

Attribute	Description
Name	A name for the layer.
Description	Optional description for the layer.
Data type	Image data or elevation data.
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 <code>nested</code> , <code>task</code> , and <code>flat</code> . 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 <code>nested</code> . If you use distributed builds, the correct setting is <code>"task"</code> .
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>

Table 4-6: VPB layer attributes

Attribute	Description
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, osgEarth uses the filename in the root URL as the base name, but you can override it using this property.

Table 4-7: Composite 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.

4.4.2. Adding Layers to a Composite 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 4-9 and [“Removing Layers from a Map,”](#) on page 4-9.

To add layers to a composite layer:

1. Create a new composite layer or select an existing composite layer and click the Edit icon (✎).
2. Select the Layers tab ([Figure 4-13](#)).

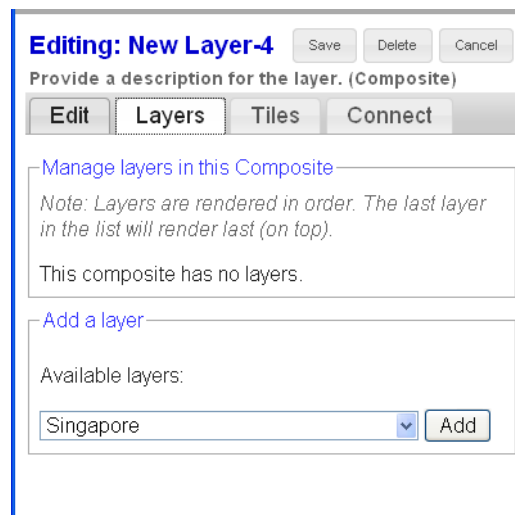


Figure 4-13. Composite layer, Layers tab

3. In the Add a Layer group box, select a layer from the drop-down list.
4. Click Add.

4.4.3. 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 4-14).

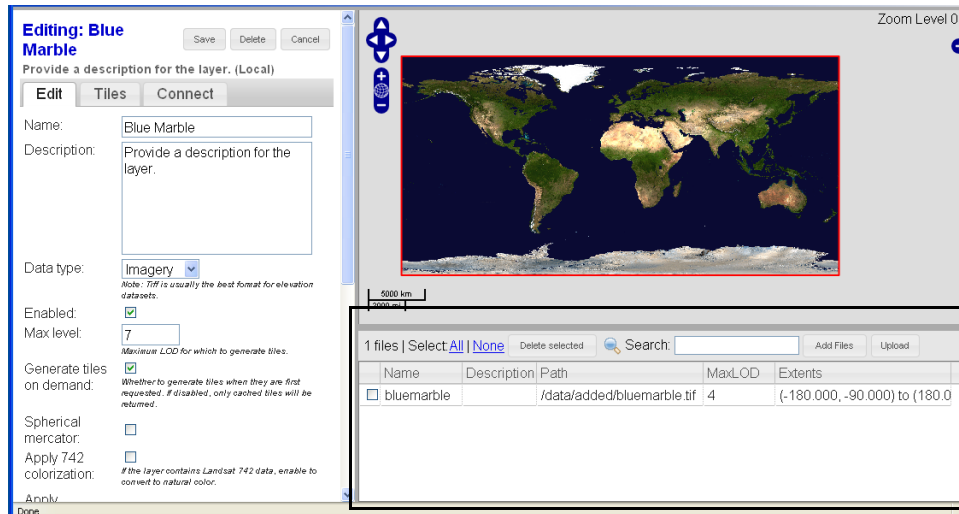


Figure 4-14. Layer file list

To add files to a local layer:

1. Select a layer and click the Edit icon (✎), or create a new layer.
2. In the file list, click Add Files. The Select file or Directory 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 “Managing Files,” on page 4-24.)
4. Click OK. The files are added to the layer.
5. Add more files as desired.
6. Save the layer.

4.4.4. Deleting Files from a Local Layer

To delete files from a local layer:

1. Select a layer and click the Edit icon (✎).
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.

4.4.5. Editing a Layer

To edit a layer:

1. On the Layers tab, select the layer for which you want to create a tile management task.
2. Click the Edit icon (✎). The Edit tab is displayed (Figure 4-15).

Editing: New Layer [Save] [Delete] [Cancel]

Provide a description for the layer. (Local)

Edit [Tiles] [Connect]

Name:

Description:

Data type: Note: Tiff is usually the best format for elevation datasets.

Enabled: ☒

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: ☐

Apply 742 colorization: ☐ If the layer contains Landsat 742 data, enable to convert to natural color.

Apply background color: ☐

Background color:

Make similar background: ☐

Figure 4-15. Edit Layer tab

3. Change the attributes as desired.

4.5. 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.

4.5.1. 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. Select the Files tab (Figure 4-16).

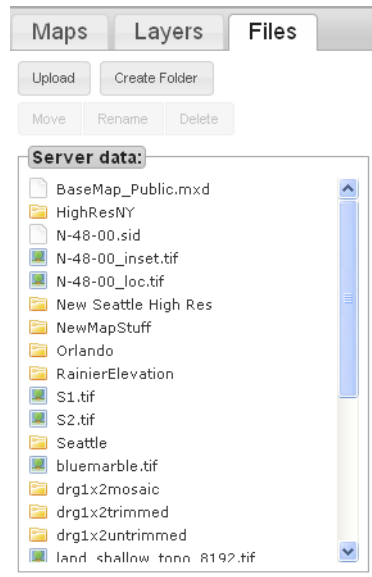


Figure 4-16. Files tab

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

4.5.2. 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. Select the Files tab (Figure 4-16).
2. Select the folder into which you want to upload a file.
3. Click Upload. A file selection dialog box opens.
4. Select the files you want to upload. (You can select multiple files using standard file selection methods.)
5. Click Open. VR-TheWorld Server provides feedback about the progress of the upload process.

4.5.3. Moving Files

To move a file:

1. Select the Files tab (Figure 4-16).
2. Select the file you want to move.
3. Click Move. The Move File To dialog box opens.
4. If you want to move the file to the root directory, click Move to Root. Otherwise, select the folder that you want to move the file to and click OK.

4.5.4. Deleting Files

To delete a file:

1. Select the Files tab (Figure 4-16).
2. Select the file or folder that you want to delete.
3. Click Delete.
4. Confirm the request to delete the file.

4.5.5. Renaming Files

To rename a file:

1. Select the Files tab (Figure 4-16).
2. Select the file you want to rename.
3. Click Rename. The Rename File dialog box opens.
4. Type a new name for the file.
5. Click OK.

4.6. 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. On the menu bar above the map preview (Figure 4-17), choose **Advanced** → **Server Settings**.

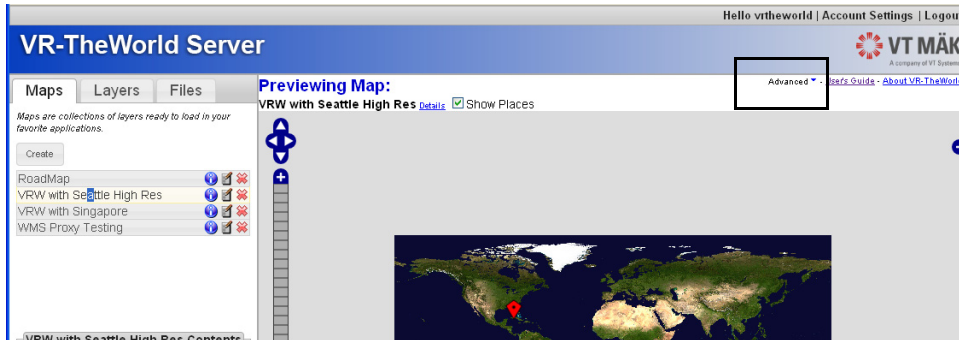


Figure 4-17. Advanced menu

The Server Settings page opens (Figure 4-18).

Settings

Tile Locations

/cache/ ✖

Add Location...

Select the location(s) at which to store tiles. You can select multiple directories and tiles will be distributed evenly across them. The web server must have read/write access to the selected directories.

Base Layer None ▾

Select a layer to use as the "base" layer when previewing maps.

Default Map None ▾

Select a map to be the default map.

Save Cancel

Figure 4-18. Server Settings page

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

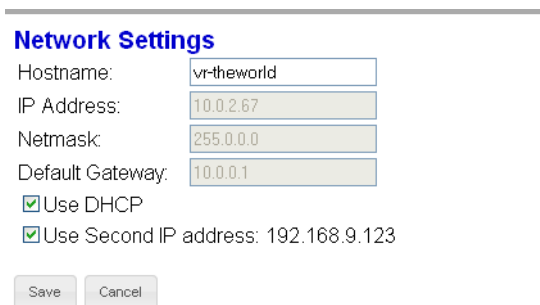
4.7. Configuring Network Settings

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. On the menu bar above the map preview ([Figure 4-17](#)), choose **Advanced** → **Network Settings**.

The Network Settings page opens ([Figure 4-18](#)).



Network Settings

Hostname:

IP Address:

Netmask:

Default Gateway:

☒ Use DHCP

☒ Use Second IP address: 192.168.9.123

Figure 4-19. Server Settings page

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

4.8. Tiling Data

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. You can configure VR-TheWorld Server to generate tiles as needed, or you can build the tiles manually

4.8.1. Tiling Data 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.

4.8.2. Tiling Data 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.

4.9. Tile Management Tasks

VR-TheWorld Server lets you create, schedule, and run three tile management tasks – 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.

4.9.1. Creating a Task

To create a task:

1. On the Layers tab ([Figure 4-11](#)), select the layer for which you want to create a tile management task.
2. Click the Edit icon (). The Edit tab opens ([Figure 4-15](#)).
3. Click the Tiles tab ([Figure 4-20](#)).
4. In the Add Operation group box, in the Name box, type a name for the task.
5. In the Task drop-down list, select the type of task to run.

i

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 4-31.

6. 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).

Editing: Sample Layer Save Delete Cancel

Shows how to create a layer. (Local)

Edit Tiles Connect

Add Task

Name

Task Build Tiles ▼

LOD Ranges Automatic ▼

Where Automatic ▼

☐ Run at a scheduled time

Add

Current Tasks

Name	Task	Status	Progress	
Task 1(34) Seed Scheduled			0%	Start ✖
			0 of 0 complete	

Purge Tiles

This will delete all generated tiles for this layer!

Purge all tiles now

Figure 4-20. Tiles tab

7. 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 press CTRL and drag a bounding box on the map.

Otherwise, accept the default choice (Automatic).

8. 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.

9. Click Add. The task is added to the Current Tasks list.

4.9.2. Starting a Task

You can start a task on the Tiles tab or on the Tasks page.

To start a task from the Tiles tab:

1. Select the Layers tab.
2. Select the layer for which you want to start a task.
3. Click the Edit icon (). The Edit tab opens ([Figure 4-15](#)).
4. Click the Tiles tab ([Figure 4-20](#)). Tasks for this layer are listed in the Current Tasks group box.
5. Click the Start button for the task you want to run.

To start a task from the View Tasks page:

1. Select the Maps tab, Layers tab, or Files tab.
2. Choose **Advanced** → **View Tasks**. The Tasks page opens. It lists all configured tasks.
3. Click the Start button for the task you want to run.

4.9.3. 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. Select the Layers tab.
2. Select the layer for which you want to start a task.
3. Click the Edit icon (). The Edit tab opens ([Figure 4-15](#)).
4. Click the Tiles tab ([Figure 4-20](#)).
5. In the Purge Tiles group box, click Purge All Tiles Now.

4.10. 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. On the menu bar above the map preview (Figure 4-17), choose **Advanced** → **Server Settings**. The Server Settings page opens (Figure 4-18).
2. 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 4-21).

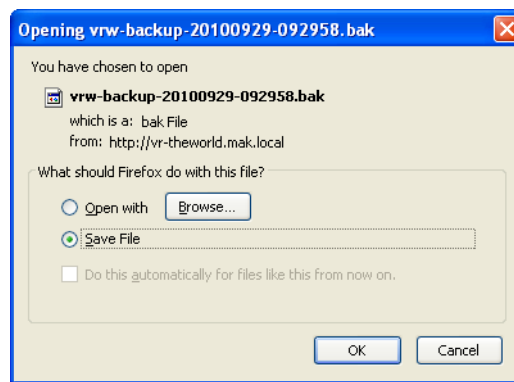


Figure 4-21. Backup prompt

3. Select the Save File option.
4. 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.

4.10.1. Restoring the Server Configuration

To restore the server configuration:

1. On the menu bar above the map preview (Figure 4-17), choose **Advanced** → **Server Settings**. The Server Settings page opens (Figure 4-18).
2. Click the Restore button.
3. Specify the backup file that you want to restore.
4. Click Open.



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