



VR-TheWorld Server Quick Start Guide

VR-TheWorld Server is MAK Technologies' powerful web-based streaming terrain server that allows you stream in elevation, features, and imagery. This document walks you through the setup.

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Installing VR-TheWorld Server Software and Data

VR-TheWorld Server is built on the Docker platform. This allows you to use Linux or Windows as platforms to run VR-TheWorld Server.

A VR-TheWorld Server installation has the following software and hardware components:

- Docker. A web-based application used to deliver the VR-TheWorld Server database structure and data.
- VR-TheWorld Server software.
- VR-TheWorld Server database structure and data files. The database provided by MAK is optional. You can create your own database and use your own data files. You can also add your data files to those provided by MAK.
- Hard drive. MAK provides a hard drive with installation scripts and data files.

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

- Server:
 - Multi-core
 - 32 GB RAM
 - 250 GB hard drive
- Data storage:
 - 5 TB or more of usable space (after configuration).
- Operating system. Preferably the latest versions of Ubuntu, Windows, or Red Hat Enterprise Linux (RHEL), but at a minimum:
 - Ubuntu 20.04
 - Windows 10
 - RHEL 8

 Installing and configuring Docker on Windows requires changes to your system's BIOS as well as Windows features. Please follow the instructions closely.

1.1. Considerations for Using Docker

This section discusses the following issues that you may need to consider when using Docker:

- Ports
- Handling crashes and reboots
- Path syntax

1.1.1 Ports

Docker does not bypass firewalls. It creates rules inside the kernel to redirect traffic that comes to the host. The *docker-compose* file lists the used ports in the following format:

```
host_port : docker_port
```

By default, Docker exposes container ports to the IP address 0.0.0.0. (This matches any IP on the system). If you want to, you can tell Docker which IP address to bind on. For example, to bind on localhost port 80 and container port 8080, specify:

```
127.0.0.1:80:8080
```

Some customers may prefer this for security reasons. Otherwise, that host port becomes open to all incoming connections.

1.1.2 Handling Crashes and Reboots

You can implement a restart policy for your Docker container that prevents the need to manually restart the containers in the case of a crash or reboot.

You do this through the `--restart` argument, which can be called within the `docker run` command or the `docker update` command (once containers are running). For our case, the `docker update` command makes more sense because the `docker run` command is not called explicitly during the installation process.

Here is how to set this for a single container:

```
docker update --restart unless-stopped container_name
```

Here is how to set this for all containers:

```
docker update --restart unless-stopped $(docker ps -q)
```

Table 1 lists the potential values for the `--restart` flag. `unless-stopped` is the most commonly used value. It is designed for the use case of handling a server crash / reboot.

Table 1. Values for `--restart` flag

Command	Description
no	Default value - containers would not be restarted.
on failure	Restarts container in the case of an error (container crashes).
always	Always restart container if it stops.
unless-stopped	Always restart container unless it is manually stopped.

1.1.3 Specifying Paths in Docker

Declare all paths using a forward slash (/), not the Windows-standard backslash (\). Items are appended to Docker paths following a Unix format, therefore a path that mixes backslashes with forward slashes becomes invalid. If you want to declare the paths in a Windows format, set the `COMPOSE_CONVERT_WINDOWS_PATHS` environment variable to 1.

Installing VR-TheWorld Server on Linux

This section explains how to install VR-TheWorld Server on Linux operating systems.

Docker is supported for versions of Linux including Ubuntu. For RHEL 8 or later, use Podman.

1.2. Setting Up Your Computer

Variations in Linux systems may create problems installing Docker and running VR-TheWorld Server. Please review the issues discussed in this section to ensure that your system is properly set up.

1.2.1 Partition Setup

It is recommended that you configure */etc/fstab* to point to drives by UUID. If drives are not configured by UUID, the mount locations or order of the drivers might change after you restart the server.

Partitions should use the XFS scheme. Non-XFS partitions may experience problems when copying the contents of the external drive to the internal drive.

1.3. Installing Docker

Download and install Docker. Follow the instructions at <https://docs.docker.com/engine/install>.

i For RHEL 8 or later, Docker is not officially supported. It is recommended that you use Podman to provide comparable functionality to the Docker environment. See "1.4. Using Podman Instead of Docker for RHEL 8 and Later" on the facing page. (You can choose to download and install the compatible CentOS version of Docker but, because that is not a native tool, it is not supported.)

1.3.1 Install docker-compose

Install docker-compose as follows:

```
sudo curl -L
"https://github.com/docker/compose/releases/download/1.27.4/docker-
compose-$(uname -s)-$(uname -m)" -o /usr/local/bin/docker-compose
```

1.27.4 is the version of docker-compose in this example. If you are installing a different version, use that version number.

1.3.2 Configure the Firewall

Firewall settings may restrict the usage of certain ports through docker.

► **To set up the firewall:**

1. Find out which zone the docker interface it bound to, most likely "no zone":

```
sudo firewall-cmd --get-zone-of-interface=docker0
```
2. Add the docker0 interface to the public zone. Changes will be visible only after firewalld reloads:

```
sudo nmcli connection modify docker0 connection.zone public
```
3. Add masquerading, which allows for docker ingress and egress:

```
sudo firewall-cmd --zone=public --add-masquerade --permanent
```
4. Reload firewalld:

```
sudo firewall-cmd --reload
```
5. Reload dockerd:

```
sudo systemctl restart docker
```

1.4. Using Podman Instead of Docker for RHEL 8 and Later

For RHEL 8 or later, Docker is not officially supported because it was replaced with the Red Hat tools *buildah*, *podman*, and *podman-compose*. Although you could manually download and install the compatible CentOS versions of Docker, it is best to use the native tools.

Like Docker, Podman is a tool designed to make it easy to find, run, build, share, and deploy applications using Containers and Container Images. Podman provides a command-line interface (CLI) familiar to anyone who has used the Docker Container Engine. Most users can simply alias Docker to Podman (alias `docker=podman`) without any problems, or you can use the corresponding podman commands (for example, `podman-compose`).

For VR-TheWorld, Podman uses the same Docker container and the provided `docker-compose.yml`.

To install podman and podman-compose on Red Hat, you can either download and install the Podman Desktop for Linux from <https://podman-desktop.io> or run the following commands:

- `sudo yum -y install podman`
- `sudo yum -y install python3-pip`
- `sudo pip3 install podman-compose`

Continue with the rest of the Linux installation instructions. If you have not aliased `docker` to `podman`, use the corresponding podman command (for example, `podman-compose` instead of `docker-compose`).

 The firewall may also restrict the usage of certain ports through Podman. See "1.3.2 Configure the Firewall" above.

1.5. Installing the Data Drive

You must mount the data drive and create the installation directory. The drive is in XFS format.

► **To mount the data drive:**

1. The data drive has a USB connection. Attach it to a USB 3.0 port on your computer.
2. Issue the following command to get the location of the drive:

```
sudo fdisk -l
```

This lists all drives connected to the computer. The MAK data drive is called `/dev/sd*`, where `*` is a letter from a–z. The data drive size is 6000 GB. Write down the name of the MAK drive.

3. Create the data directory:

```
sudo mkdir -p /data
```

1.6. Copy Data or Mount the Data Drive

You can run VR-TheWorld Server from the data drive or copy the data to your computer's hard drive. For best performance, MAK recommends that you copy the data to your computer's hard drive.

- To copy the contents of the MAK data drive to an internal drive, run the following command:

```
xfsdump -J - /dev/NAMEOFDRIVE | xfsrestore -J - /data
```

where *NAMEOFDRIVE* is the name you recorded when you got the location of the disk.



- Copying the data can take more than 8–10 hours. Do not interrupt the process.
- Partitions should use the XFS scheme. Non-XFS partitions may experience problems when copying the contents of the external drive to the internal drive.



When installing a new version of VR-TheWorld Server and the MAK data over an older version of VR-TheWorld, be aware that the `xfsrestore` will merge with the existing data, replacing duplicate files but leaving any different files intact. This can result in retaining MAK data that is no longer used, but it also preserves any customer data that you have added.

- If you choose to run VR-TheWorld Server from the data drive, rather than copying data, mount the data drive to `/data`:

```
sudo mount /dev/NAMEOFDRIVE /data
```

where *NAMEOFDRIVE* is the name you recorded when you got the location of the disk.

1.7. Installing VR-TheWorld Server

VR-TheWorld Server organizes data into layers, which reference the data files. You must install the database structure. You can do so automatically or manually.

VR-TheWorld requires a post-installation license key. Request a license at <https://www.mak.com/mak-one/support/portal>. Include your contact information, the purchase order for the server, and any relevant program details. You use the license key in step 3.

► To install VR-TheWorld Server:

1. After you receive your license key from MAK support, change directory to the install directory:

```
cd /data/VRTheWorld
```
2. Copy the default Linux setting file, *docker-compose-linux.yml*, to *docker-compose.yml*.
3. Edit that *docker-compose.yml* file. At the end of it, there is a line `LICENSE_TEXT=`. Copy the license key text that you received and then paste it to the end of that line. Save the file.
4. Optionally, when you edit *docker-compose.yml*, you can configure the options. The file includes comments that explain the options. For more information, see "1.7.1 Configuration Options for Docker" below.
5. Load the images for VR-TheWorld Server (you must have elevated permissions to run these commands):

```
docker load < postgres_9.5-alpine.tar.gz
docker load < redis_5.0-alpine.tar.gz
docker load < vrtheworld_VERSIONOFVRTW.tar.gz
```

where *VERSIONOFVRTW* is the version of VR-TheWorld Server you are installing.

 If you have RHEL 8 or later and are using Podman, use the `podman` command-line instead if you have not aliased `docker`. For example:

```
podman load < postgres_9.5-alpine.tar.gz
```

6. Start VR-TheWorld Server:

```
docker-compose up -d
```

At this point, you can access VR-TheWorld Server using its IP address. The default username and password are `readymap`. Note that the server contains no predefined layers.

1.7.1 Configuration Options for Docker

In the *docker-compose.yml* file, you can pass optional arguments to our docker container to increase your VR-TheWorld Server performance. These are defined in the optional environment section of the file. Table 2 describes the environment variables.

Table 2. Docker environment variables

Variable	Description
NUM_WORKERS	The number of background workers started for processing general background tasks.
NUM_TILERS	The number of background workers started for seeding map tiles via cache jobs.
NUM_TILE_GENERATORS	The number of background workers started for generating map tiles on demand.
GENERATE_TILES_IN_BACKGROUND_WORKER	Whether to generate tiles on demand in a background process or in the main Apache process. By default, tiles are generated in a background process to avoid bogging down the server during periods of high load. Set this environment variable to False to restore the original behavior of generating tiles in the main Apache process.
USE_LAYER_NAMES	When set to True, VR-TheWorld Server will expose layers using their name instead of their ID in GIS services. This could make switching between VR-TheWorld Server servers that have similar layer names easier when configuring earth files.

As a general guideline, you should match NUM_TILE_GENERATORS and NUM_GENERATE_ON_DEMAND_PROCESSES to how you plan to use the server and the number of cores on the system. For example, increasing NUM_TILE_GENERATORS helps if you plan to add and tile new data and layers. Increasing NUM_GENERATE_ON_DEMAND_PROCESSES helps during server runtime if some layers are not fully tiled and have enabled the **Generate tiles on demand** option. The specific number for each should map to the number of cores on your system, and therefore should be different for 8 versus 16 versus 32 cores. Remember to reserve cores for other processes and the server web services.

To set environment variables in *docker-compose.yml*, read the instructions at: <https://docs.docker.com/compose/compose-file/#environment>.

1.8. Installing the MAK-Supplied Database

VR-TheWorld Server does not presume any particular data. You can load your own database or the database supplied by MAK. If you are using MAK ONE applications such as VR-Vantage or VR-Forces, the terrain database files provided with these applications presume use of the MAK database structure and data files.

This section explains how to load the MAK database.

 If you load the MAK database using `readymap_restore`, it removes all of the other previously defined layers from the server.

► To install the MAK database:

1. Change directory to the VR-TheWorld Server install directory:
`cd /data/VRTheWorld`
2. Shut down the docker containers and restart them:


```
docker-compose down
docker-compose up -d
```

3. Load the database into readymap:

```
docker-compose exec readymap readymap_restore
/data/backups/vrtw4.db
```

Docker sees this as */data/backups/vrtw4.db* because the default mount location is *data/added*, as configured by the *docker.yml* file. Once the installation process is complete, you can log in to the web interface of VR-TheWorld Server. The default username and password are admin.

Starting with the March 2024 MAK database, there is a significant change to the data layers provided with VR-TheWorld. VR-TheWorld now supports WebP format raster imagery layers. WebP combines the best of the JPEG and PNG formats, providing lossy or lossless compression and supporting transparency. WebP also produces images that are smaller than both corresponding PNG or JPEG images. The database introduces a new global imagery layer, based on Sentinel-2, which is a WebP layer. Depending on which versions of the MAK ONE products that you need to support, you may want to manage tiling of the global imagery layers to either conserve disk space or pre-tile areas for better performance. See "Managing VR-TheWorld Global Imagery Layers" on page 19 for more details.

Installing VR-TheWorld Server on Windows

This section explains how to install VR-TheWorld Server on Windows.

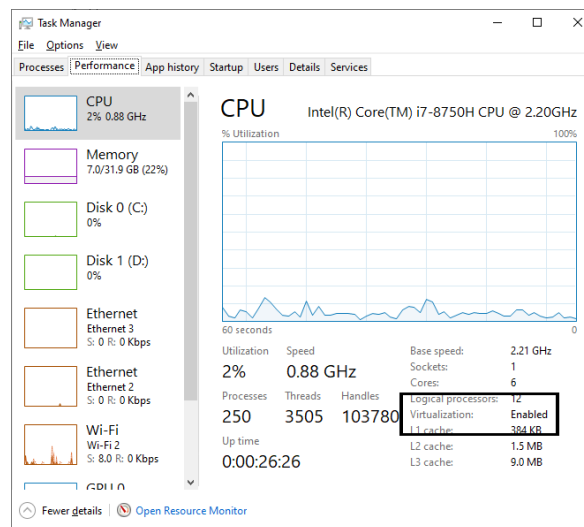
1.9. Prerequisites for Using Docker

To use Docker on Windows, you must enable virtualization, WSL2 (Windows Subsystem for Linux version 2), and Hyper-V. These are all capabilities that are built into Windows, but which might not be enabled.

► **To check the status of virtualization:**

1. Open Task Manager.
2. Select the Performance tab.
3. The status of virtualization is displayed under the graph (Figure 1).

Figure 1. Task Manager, Performance tab



If virtualization is not enabled, you must enable it. Instructions for doing so are readily available using an internet search.

1.9.1 Windows 10

► **To enable Hyper-V and WSL on Windows 10:**

1. Open the Control Panel.
2. Click Programs.
3. Click Turn Windows Features On or Off. The Windows Features window opens.
4. In the list, locate Hyper-V and Windows Subsystem for Linux. Select those check boxes.

5. Click OK.
6. Restart the machine to apply your changes.

1.9.2 Windows 11

► **To enable Hyper-V and WSL on Windows 11:**

1. Open Settings.
2. Click Apps.
3. Click Optional Features.
4. Click Add a Feature and then locate Hyper-V. Select the check box and then click Install.
5. Click Add a Feature and then locate Windows Subsystem for Linux. Select the check box and then click Install.
6. Restart the machine to apply your changes.

1.9.3 Check for and Install Latest Version of WSL2

► **To check the WSL version and ensure that version 2 is enabled or either Windows 10 or 11:**

1. As an administrator, run a Command Prompt window (or PowerShell).
2. Type `wsl -v` and then press Enter.
3. When the version is returned, check that it begins with 2.
4. You should also ensure that the latest version of WSL is installed. To install it, type `wsl --update` and then press Enter.

1.10. Docker or Podman Desktop Application

For Windows, there are two supporting environments that you can use to run Docker containers: Docker Desktop or Podman Desktop.

As of 2022, Docker Desktop changed from an open-source model to a paid subscription. Commercial use of Docker Desktop at a company of more than 250 employees or more than \$10 million in annual revenue requires a paid subscription. If this applies and you prefer not pay the subscription, use Podman Desktop.

1.10.1 Installing Docker Desktop

► **To install Docker Desktop:**

1. Download and install Docker Desktop.
2. Follow the instructions at <https://docs.docker.com/desktop/install/windows-install>.

1.10.2 Installing Podman Desktop

► **To install Podman Desktop:**

1. Download and install Podman Desktop for Windows.
2. Follow the instructions at <https://podman-desktop.io/docs/installation/windows-install>.
3. Once the installation is complete, be sure to set up the Compose Resources.

You can run Podman either under the root user (rootful) or a non-privileged user (rootless). When installed, rootless is the default. However, Docker containers normally function with root privileges. You can switch the machine to rootful by stopping it and using the set command.

► **To switch your machine to rootful:**

1. Open a Command Prompt window.
2. Enter the following commands:

```
podman machine stop
podman machine set --rootful
podman machine start
```

i If you update the components of the Podman Desktop for Windows (for example, you update to a new version in the Desktop GUI), after updating, you must repeat this step and restart the VR-TheWorld Docker container.

1.11. Attach the Data Drive and Copy Data

The drive provided by MAK for Windows is in NTFS format.

► **To attach the data drive and copy the data:**

1. Plug the USB cable from the data drive into a USB 3.0 port on your machine.
2. Open a console window.
3. Enter `diskmgmt.msc`. The screen displays a list of all drives connected to the system.
4. Write down the letter of the data drive provided.
5. In Windows File Explorer, create a directory (folder) called **data** on the target drive. VR-TheWorld Server uses this directory to store all of the files it needs to use.

i If you had a previous installation of VR-TheWorld, be sure to delete all of the files in your data drive. If you added your own data, do not delete that data but do delete everything else. Depending on the copy process you use, it may or may not overwrite your data.

6. Copy the data from the source directory to your data directory. The source and tile data contain millions of files, which can cause the copy process to take a very long time.

1.12. Configuring Podman to Autostart

If you are using Podman, you must ensure that the VR-TheWorld container automatically starts when Windows boots up.

► **To configure Podman to autostart on Windows boot:**

1. Run the Windows Task Scheduler as a user with Administrator privileges.
2. Create a new task by choosing **Action > Create Task**.
3. In the General tab:
 - a. Enter a Name, such as `Start VR-TheWorld`.
 - b. Enter a description, such as `Start the VR-TheWorld Sever at login`.
 - c. Select the option `Run Whether User Is Logged On or Not`.
 - d. From the `Configure For` list, select the version of your OS (Windows 10 or 11).
4. Select the Triggers tab and then click `New`. The New Trigger dialog box opens.
5. In the New Trigger dialog box:
 - a. From the `Begin the Task` list, select `At Startup`.
 - b. Select the `Delay Task For` check box and then select `1 Minute`.
 - c. Select the `Enabled` check box.
 - d. Click `OK` to add the new trigger and return to the Create Task dialog box.
6. Select the Actions tab and then click `New`. The New Action dialog box opens.
7. In the New Action dialog box:
 - a. From the `Action` list, select `Start a Program`.
 - b. Click the `Browse` button next to the `Program/Script` box.
 - c. Locate `podman.exe` (for example, `C:/Program Files/RedHat/Podman/podman.exe`) and then click `Open`.
 - d. In the `Add Arguments` box, enter `machine start`.
 - e. Click `OK` to add the new action and return to the Create Task dialog box.
8. In the Actions tab, click `New` to add a second action.
9. In the New Action dialog box:
 - a. From the `Action` list, select `Start a Program`.
 - b. Click the `Browse` button next to the `Program/Script` box.
 - c. Locate `docker-compose`, select it, and then click `Open`.
 - d. In the `Add Arguments` box, enter `up -d`.

- e. In the Start In box, enter the location of where you copied the VR-TheWorld directory (for example, *D:/VRTheWorld*).
 - f. Click OK to add the new action.
10. In the Actions tab, make sure that both actions are listed and also that podman.exe is first in the list.
11. Select the Conditions tab and clear all of the Start check boxes.
12. Select the Settings tab and:
 - a. Select Run Task as Soon as Possible After a Scheduled Start Is Missed
 - b. Select If The Task Fails, Restart Every and then select 1 Minute.
 - c. In the Attempt to Restart Up To box, enter 5.
13. Click OK to add the scheduled task. When you reboot the machine, VR-TheWorld should be accessible as a service without requiring a login.

1.13. Configuring WSL2 Networking

By default, WSL uses a NAT (Network Address Translation) based architecture for networking. WSL2 has a virtualized ethernet adapter with its own unique IP address. To connect to the web service running in the Docker container, running as part of WSL2, you must complete the following steps to enable the VR-TheWorld server to be accessed using the IP address of your Windows PC.

Use the Netsh interface command to add a port proxy that listens on your host port and connects that port proxy to the IP address for the WSL2 VM.

► To configure WSL2 networking:

1. As an administrator, run PowerShell or open a Command Prompt window.
2. Enter the following command, where *eth0 IP address* is the address of the ethernet adapter inside WSL2. To get this address, start a terminal for the Linux running inside WSL2 and then type `ifconfig`. The inet address will be displayed with `eth0`.

```
netsh interface portproxy add v4tov4 listenport=80
listenaddress=0.0.0.0 connectport=80 connectaddress=eth0 IP
address
```

In this command, the port numbers are both 80. The `listenaddress=0.0.0.0` means that incoming requests will be accepted from any IP address.

3. You may also need to update your Windows Firewall rules to enable connections to port 80. If you are unable to because of security restrictions, you can also use port 8080, but you must then update the ports definition to 8080:80 in your *docker-compose.yml* file and access the server using *PC name* or *IP address:8080/vr-theworld*.

1.14. Installing VR-TheWorld Server

You can pass optional arguments to our docker container to increase your VR-TheWorld Server performance. These are defined in the optional environment section of the file.

Table 2 on page 8 describes the environment variables.

VR-TheWorld requires a post-installation license key. Request a license at <https://www.mak.com/mak-one/support/portal>. Include your contact information, the purchase order for the server, and any relevant program details. You use the license key in step 6.

► **To install VR-TheWorld Server on Windows:**

1. After you receive your license key from MAK support, open a console window.
2. Change directory to the data drive:
`cd DATADrive:\data\VRTheWorld`
3. Copy *docker-compose-windows.yml* to *docker-compose.yml*.
4. In a text editor, open *docker-compose.yml*.
5. In the lines under `volumes:`, replace `DATADrive` with the drive letter where you installed the data.
6. At the end of the file, there is a line `LICENSE_TEXT=`. Copy the license key text that you received and then paste it to the end of that line.
7. Save the file and close it.
8. In your console window, in `DATADrive:/data/VRTheWorld`, execute the following commands:

```
docker load -i postgres_9.5-alpine.tar.gz
docker load -i redis_5.0-alpine.tar.gz
docker load -i vrtheworld_VERSIONOFVRTW.tar.gz
```

where *VERSIONOFVRTW* is the version of VR-TheWorld Server that you are installing.

9. Start VR-TheWorld Server:

```
docker-compose up -d
```

❗ If you use Podman Desktop, use the podman command-line option instead, if you have not aliased docker. For example:
`podman load < postgres_9.5-alpine.tar.gz`

You can now access VR-TheWorld Server using its IP address. The default username and password are readymap.

1.15. Installing the MAK-Supplied Database

VR-TheWorld Server does not presume any particular data. You can load your own database or the database supplied by MAK. If you are using MAK ONE applications such as VR-Vantage or VR-Forces, the terrain database files provided with these applications presume use of the MAK database structure and data files.

This section explains how to load the MAK database.

⚠ If you load the MAK database using `readymap_restore`, it removes all of the other previously defined layers from the server.

► **To install the MAK database:**

1. Change directory to the VR-TheWorld Server install directory:
`cd DATADrive:\data\VRTheWorld`
2. Shut down the docker containers and restart them:
`docker-compose down`
`docker-compose up -d`
3. Load the MAK database into readymap (this takes 5 to 10 minutes):
`docker-compose exec readymap readymap_restore`
`/data/backups/vrtw4.db`

Docker sees this as `/data/backups/vrtw4.db` because the default mount location is `DATADrive:data/added`, as configured by the `docker.yml` file. Once the installation process is complete, you can log in to the web interface of VR-TheWorld Server. The default username and password are `admin`.

Starting with the March 2024 MAK database, there is a significant change to the data layers provided with VR-TheWorld. VR-TheWorld now supports WebP format raster imagery layers. WebP combines the best of the JPEG and PNG formats, providing lossy or lossless compression and supporting transparency. WebP also produces images that are smaller than both corresponding PNG or JPEG images. The database introduces a new global imagery layer, based on Sentinel-2, which is a WebP layer. Depending on which versions of the MAK ONE products that you need to support, you may want to manage tiling of the global imagery layers to either conserve disk space or pre-tile areas for better performance. See "Managing VR-TheWorld Global Imagery Layers" on page 19 for more details.

Enabling SSL for the VR-TheWorld Server

By default, VR-TheWorld Server is configured to use HTTP (Hypertext Transfer Protocol). HTTP does not encrypt data, which means that any data transferred can potentially be intercepted and read by others. However, it is faster because it does not encrypt data. HTTP uses port 80 by default.

Optionally, you can configure the server to use HTTPS (Hypertext Transfer Protocol Secure), which is an extension of HTTP that uses the SSL/TLS protocol for encryption and authentication. It ensures that data sent from the server remains encrypted. HTTPS uses port 443 by default.

To enable HTTPS/SSL, you must obtain a digital certificate that authenticates a website's identity and enables an encrypted connection. The certificate contains the website's public key and other information. There are a number of commercial Certificate Authorities or tools to generate certificates.

Once you have a certificate, you must store it on the server PC. Add the certificates to the server:

- For Linux, the certificate files can be copied to `/etc/ssl/certs` or you can create a directory within the VR-TheWorld directories (for example, `/data/VRTheWorld/certs`).
- For Windows, create a location for the certificates, which could be in your VR-TheWorld directories (for example, `D:\data\VRTheWorld\certs`)

After the certificate is installed, you need to update your `docker-compose.yml` file:

1. Change directory (cd) to the `data/VRTheWorld` directory.
2. Stop you server: `docker-compose down`.
3. Edit your `docker-compose.yml` file.
4. Add the following:
 - a. To volumes, for example on Linux:


```
- /etc/ssl/certs:/etc/ssl/certs # Location of SSL certs on local machine outside of container
```

 To volumes, for example on Windows:


```
- D:\data\VRTheWorld\certs:/etc/ssl/certs # Location of SSL certs on local machine outside of container
```

 where the first part is the location of your certificates, in Linux or Windows format.
 - b. Add to ports:


```
- "443:443"
```
 - c. Add to environment:


```
- USE_SSL=1
          - SSL_CERTIFICATE_FILE=/etc/ssl/certs/vrtheworld-cert.crt
```

- SSL_CERTIFICATE_KEY_FILE=/etc/ssl/certs/vrtheworld-cert.key
- SSL_CERTIFICATE_CHAIN_FILE=/etc/ssl/certs/vrtheworld-cert.crt

where the *crt* and *key* values are the location and name of your certificates, respectively.

5. Save the file.

6. Restart the server: `docker-compose up -d`

You should now be able to access your server using

`https://<your IP address>/vr-theworld`

HTTP calls will continue to work, but they will automatically redirect to HTTPS.

Managing VR-TheWorld Global Imagery Layers

As of March 2024, VR-TheWorld now includes a new global imagery layer, based on Sentinel-2, which is a WebP format layer. WebP layers are only supported by products part of the MAK ONE 2024 release and later. VR-TheWorld still includes the old layer, although it has also been updated to the Sentinel-2 dataset, but it is in JPEG format and only partially tiled.

The two main imagery layers used by the MAK ONE demonstration scenarios and terrains are:

- Raster Layer 142, which is the WebP layer
- Raster Layer 224, which is the JPEG layer

Layer 224 was the imagery primary layer used in the MAK ONE examples until March 2024, when it was replaced by Layer 142. Both layers are marked as **Generate tiles on demand**, and therefore create tiles for areas that were not previously tiled. However, if you know which layers will be used, you can manage the tiles to conserve disk space or tile your specific areas of interest for improved performance.

Layer 142 is a Collection Layer, comprised of a number of other layers. It is mostly tiled, especially for areas that are heavily used in the MAK ONE examples (for example, Southern California and Hawaii). It is globally tiled to LOD 11.

Layer 224 is also a Collection Layer. It is comprised of the Global EOX Sentinel-2 Cloudless 2020 layer (LODs 0-8) and Layer 142 (LODs 9+), essentially making it a mirror of Layer 142. However, each layer requires its own tiles.

If you use only products that are part of the MAK ONE 2024 release and later:

- You do not need Layer 224. If you want, you can select the layer, go to the Tiles tab, and Delete All Tiles.
- If you have specific areas of interest, you may want to choose Layer 142, zoom to that area, use **Shift**+click, drag to draw a box around the area, and then Generate Area to pre-tile that area.

If you use only products prior to the MAK ONE 2024 release:

- Layer 224 will be your primary imagery layer. If you have specific areas of interest, you may want to choose Layer 224, zoom to that area, use **Shift**+click, drag to draw a box around the area, and then Generate Area to pre-tile that area.
- You must not delete the tiles for Layer 142 because tiling 224 uses 142 to generate tiles for 224.

If you use a combination of products released before and after the MAK ONE 2024 release:

- If you have specific areas of interest, you will likely want to tile that area in both 142 and 224.