

Kiuwan On-Premises Monolithic Installation Guide

This guide will explain how to install the monolithic version of Kiuwan On-Premises.

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Kiuwan On-Premises Installation Guide

System Architecture Overview

Kiuwan On-Premises (KOP) is based on a **client-server architecture** with the following major server components:

- **WildFly** application server
- **MySQL** database
- **Redis** in-memory datastore

KOP solution is deployed on a **centralized server** (all the components are installed in the same host) and **accessed by users via HTTP** website access or **by IDE plugins** (Eclipse, Visual Studio).

KOP also supports distributed architecture with high-availability and load-balancing. For these scenarios, please contact Kiuwan support.

Server Host Requirements

Installation requirements

The **Kiuwan On-Premises (KOP)** solution is deployed on a **centralized server host** (all the components are installed in the same host) and accessed by users via HTTP or by IDE plugins (Eclipse, Visual Studio).

KOP installation process consists of **building a Docker image**.



Server Host Requirements

- **Linux** kernel version 3.10 or higher
 - If your OS is **RedHat**, **CentOS** or **Fedora** please check these Special requirements [for RedHat, CentOS, and Fedora](#).
- **CS Docker Engine** version 1.10 or higher installed on your server
- Connectivity to **SMTP Mail Server** (i.e. remotely accessible or locally installed)
- The **first phase of the installation** process (building the Kiuwan image) requires **Internet connectivity**

The installation must be executed by a Unix **user** with **privileges to execute docker server commands**.

During the installation process, you will need to specify a **KOP UNIX user and group** :

- KOP user will be the owner of the KOP processes that will run within the docker container
- the docker persistent volume will be owned by KOP user

KOP User and Group is specified during the KOP Installation process as **KIUWAN_USER** and **KIUWAN_GROUP** properties

You can create a KOP user and group by executing the next commands (no special privileges are needed):

- `sudo groupadd ${KIUWAN_GROUP}`
- `sudo useradd -g ${KIUWAN_GROUP} -s /bin/false -m -d /home/${KIUWAN_USER} ${KIUWAN_USER}`

KOP Persistent Volume is created by the installation process and must be specified as **DIR_PERSISTENT_VOLUME** property

Be sure to dispose of a minimum of 6 GB of free disk space :

- 3 Gb for Docker image
- 3 Gb for KOP Persistent Volume

KOP persistent volume contains the KOP database and its size will increase as more Kiuwan analyses are executed.

- **The recommended size for KOP persistent volume is 50 Gb**
- Try to specify an **independent disk/partition**, so you can easily increase it later if needed

Special requirements for RedHat, CentOS, and Fedora



If your docker server is running on **RedHat**, **CentOS** or **Fedora**, be sure the filesystem where docker is installed supports **d_type**.

If d_type isn't supported, you've to change it as soon as possible to prevent strange filesystem issues with Docker containers.

Some installation of the above-mentioned operating systems aren't configured with **d_type** support (see <http://www.pimwiddershoven.nl/entry/docker-on-centos-7-machine-with-xfs-filesystem-can-cause-trouble-when-d-type-is-not-supported>)

Running on XFS without d_type support causes Docker to skip the attempt to use the overlay or overlay2 driver.

Existing installs will continue to run, but produce an error. See <https://docs.docker.com/storage/storagedriver/overlayfs-driver/#prerequisites>

You can check if your existing XFS filesystem has **d_type enabled** by running these commands

```
$ docker info | grep "Supports d_type:"
Supports d_type: true

$ xfs_info /docker-mount-point | grep ftype
naming =version 2          bsize=4096          ascii-ci=0          ftype=1
```

In case you get **d_type: false** or **ftype=0**, you have to **create a new XFS filesystem with d_type support enabled**.

Unfortunately, it isn't possible to enable `d_type` support on an existing filesystem.

You have **two options**:

1. either **add a new disk and you create a new XFS partition** on it, or
2. **back up your existing data and recreate the XFS filesystem with `d_type` support enabled**.

Creating a new XFS filesystem with `d_type` enabled is as easy at the following command:

```
$ mkfs.xfs -n ftype=1 /mount-point
```

CPU and memory requirements

Server CPU and memory requirements depend on several factors:

- how many lines of code will need to be scanned
- how many analyses will need to be executed in parallel
- how many users will access the web application



It's important to notice that we're assuming the typical use case where code analyses are performed locally through [Kiuwan Local Analyzer](#) and therefore out of server machine (typically at a user machine or within a build CI system).

Therefore, when we talk about the analysis we mean 2nd phase of the analysis (i.e. indicator calculation that is executed within the host server)

Above factors heavily influence host server requirements, but **minimum requirements** are:

Operating System	RAM	CPUs	Disk	Other SW
Linux kernel version 3.10 or higher	16 GB	Intel i7 2,5 GHz with 4 cores	750 GB	CS Docker Engine version 1.10 or higher

Note: CPU clock speed and disk speed will affect overall response time.

Above configuration is recommended for a system load that requires continuous service for:

- parallel execution of 2 analyses (any additional parallel analysis request will be enqueued, and it will be executed as soon as any of the running analyses finishes), and
- 50 concurrent web-users

Additional system requirements can be met by following the next recommendations:

- In case you need a higher number of parallel analyses executions, you should add 1 CPU core and 512 Mb for any additional required parallel analysis
- In case you need to improve response time to web users, consider to add 1Gb for every 50 additional web users.

Dependencies

KOP docker image is build based on these external dependencies

Software	Version
Ubuntu	16.04
MySQL	5.6 (latest available build)
WildFly	10.0.0.Final
Redis	3.0.7-1
JDK	8.0_202
Ant	1.7.1
Gradle	4.7
AspectJ	1.9.1
NPM	10.7.0

MongoDB	3.6.5
MySQL JConnector	5.1.39
Additional Ubuntu packages	apparmor-utils \ ca-certificates \ apt-transport-https \ apt-utils \ cron \ curl \ bc \ locales \ openssh-server \ supervisor \ tzdata \ unzip \ vim \ xmlstarlet \ wget

Installation steps

Before installing KOP, make sure that you understand the System Architecture Overview, that your server host(s) complies with the Server Host Requirements, and that you have properly prepared the Environment as follows:



Before installing KOP, make sure your server host complies with the [Server Host Requirements](#)

Installation Steps:

- [Step 1: Download and unpack KOP Installation Package](#)
- [Step 2: Configure Kiuwan Docker image](#)
- [Step 3: Build the Kiuwan Docker image](#)
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Step 1: Download and unpack KOP Installation Package



The KOP **Installation Package** consists of a tarball gz file (**docker-for-kiuwan.tar.gz**) containing all the **kiuwan docker files**, you can obtain the latest version [here](#).

- Copy the distribution tarball to your host server's installation directory (\$KOP_INSDIR)
- Uncompress the distribution tarball:
 - `tar xvfz docker-for-kiuwan.tar.gz`
- This will create a \$KOP_INSDIR/**master.YYYYMMDDHHMM.buildnumber** directory with all the kiuwan docker files
- In \$KOP_INSDIR/master.YYYYMMDDHHMM.buildnumber you will find a file named **Dockerfile** where you will configure the Kiuwan docker image.

KOP Licenses are distributed through a zip file that contains **two license distribution zip files**:

- **license.zip**
- **configq1.zip**

To install the licenses:

1. Copy both zip files to the "license" directory of your KOP installation directory
 - `cp license.zip $KOP_INSDIR/master.YYYYMMDDHHMM.buildnumber/lice`
 - `cp configq1.zip $KOP_INSDIR/master.YYYYMMDDHHMM.buildnumber/lic`
2. Continue configuring and building your KOP image

Please visit [How to Install KOP Licenses](#) is you need to reinstall (or upgrade) licenses after the docker container is built.

Step 2: Configure Kiuwan Docker image

i After unpackaging, you should **configure the docker image to be built**.

Configuration of Kiuwan docker image is currently done by creating a configuration file (**setting s.custom**) that will be used during the image building process.

There's a file (**settings.tpl**) you can use as a template to configure your settings.

1. Create settings.custom file by copying the template file
 - cp settings.tpl settings.custom
2. Edit the properties of settings.custom file

KOP Deployment scenarios

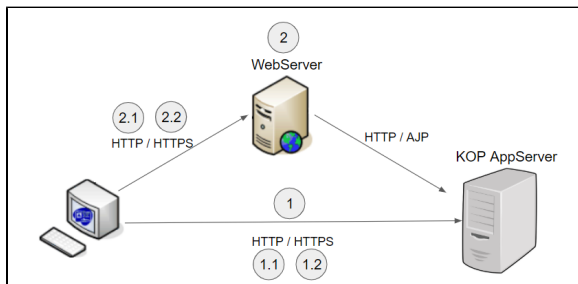
Before to install KOP, you should decide your **KOP deployment scenario**.

i KOP Deployment scenarios

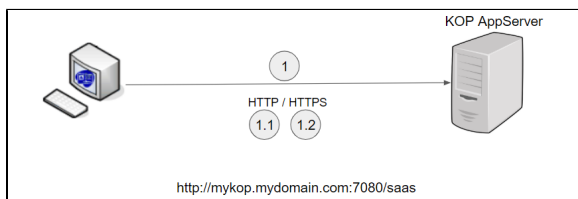
Different KOP deployment scenarios are depending on using an intermediate web server or accessing directly the KOP app server:

1. **Direct connection to KOP AppServer**
 - a. through HTTP
 - b. through HTTPS
2. **Connection to KOP AppServer through a WebServer**
 - a. through HTTP
 - b. through HTTPS

Below picture displays these different scenarios



Scenario 1 - Direct connection to KOP server



First, you should **decide on the external URL that KOP clients will use**. By KOP clients, we mean Browsers, Kiuwan Local Analyzer, Kiuwan for Developers and API-REST clients.

i **IMPORTANT:** the KOP installation process will create a docker image that will use internally this URL.

After building the docker image, if you decide to change the configured URL you must create the image again.

So be sure of your KOP URL before creating the image.

To configure your KOP in this scenario, please follow the next steps

Scenario 1.1 - Direct KOP access through HTTP

Your URL will be something like <http://mykop.mydomain.com:7080/saas>

You must configure below properties:

PropertyName	Value	Comment
KIUWAN_HOST KIUWAN_PORT	mykop. mydomain. com 7080	Hostname (Fully Qualified Domain Name , see note below) and port number to access KOP. These variables will be used to build the Kiuwan URL. Example (with default values): • http://kop.mydomain.com:7080/saas Fully Qualified Domain Name (FQDN): https://en.wikipedia.org/wiki/Fully_qualified_domain_name Must match KIUWAN_WEBSERVER_HOST
KIUWAN_WEBSERVER_PROTOCOL	http	
KIUWAN_WEBSERVER_HOST	mykop. mydomain. com	Must match KIUWAN_HOST

Scenario 1.2 - Direct KOP access through HTTPS

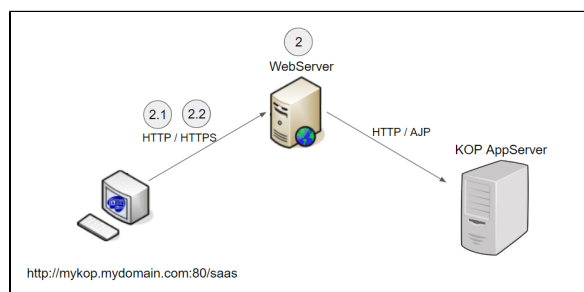
Your URL will be something like <https://mykop.mydomain.com:7080/saas>

Procedure :

1. First, create the image as HTTP using 1.1 HTTP scenario configuration ([PremisesInstallationGuide-Scenario1.1-DirectKOPAccessThroughHTTP](#))
2. Once the image is built, convert it to HTTPS following steps described at [PremisesInstallationGuide-Step5.\(Optional\)MakingKiuwanOnPremiserunningonHTTPS](#)

Scenario 2 - Connection to KOP server through a WebServer

In this scenario, a web server (typically Apache) is used as a **frontend server to redirect to the KOP app server**.



As in the “direct” scenario, you should **establish the URL to be used to connect to KOP**.

Let suppose that will be something like <http://mykop.mydomain.com:80/saas>

Additionally, you will need to configure the “**internal**” **KOP app server URL**, for example, http://my_internal_kop.mydomain.com:7080/saas

Please note that WebServer can communicate to the KOP app server either through HTTP or AJP. You can configure the corresponding ports (KIUWAN_PORT and KIUWAN_APPSERVER_AJP_PORT).

Visit [Appendix1-Configuring Apache as FrontEnd WebServer to KOP](#) for help on how to configure Apache

PropertyName	Value	Comments
HTTPS	[ON OFF]	

KIUWAN_WEBSERVER_PROTOCOL	[http https]	If HTTPS=OFF, specify http If HTTPS=ON, specify https
KIUWAN_WEBSERVER_HOST KIUWAN_WEBSERVER_PORT	mykop. mydomain. com 80	External KOP hostname (Fully Qualified Domain Name , see note below) and port number to access KOP. These variables will be used to build Kiuwan URL. Example (with default values): http://mykop.mydomain.com:80/saas Fully Qualified Domain Name (FQDN): https://en.wikipedia.org/wiki/Fully_qualified_domain_name
KIUWAN_HOST KIUWAN_PORT	my_internal_kop. mydomain. com 7080	Internal KOP hostname (Fully Qualified Domain Name , see note below) and port number to access KOP. These variables will be used to build an internal Kiuwan URL. Example (with default values): http://my_internal_kop.mydomain.com:7080/saas Fully Qualified Domain Name (FQDN): https://en.wikipedia.org/wiki/Fully_qualified_domain_name KIUWAN_HOST must be different from KIUWAN_WEBSERVER_HOST. KIUWAN_PORT must be different from KIUWAN_WEBSERVER_PORT only if the frontend server and KOP app server execute in the same machine.
KIUWAN_APPSERVER_AJP_PORT	defaults to 7009	Port that the front-end server will use to communicate with KOP app server through AJP

KOP Configuration properties

PropertyName	Default value	Meaning
SysAdmin configuration		
KIUWAN_DOCKER_IMAGE		Name of the docker image (repository name) to be built
DIR_PERSISTENT_VOLUME	/Datavol	The root directory of docker server where the container volume will be bound
KIUWAN_VOL	/kiuwan_vol	Directory of the container where KOP will be installed.
EXTERNAL_PORT_TO_MAP_MYSQL_INTERNAL_PORT	3306	Docker server port to access container's MySQL you can leave it to standard 3306 if MySQL is not running in the server host
EXTERNAL_PORT_TO_MAP_SSH_PORT	2222	Docker server port to access container through SSH must be different to standard 22 because most probably SSH:22 will be running in the server host
MONGODB_START	false	Depending on your Kiuwan On-Premises purchased license: - true: Start MongoDB (license with Architecture included) - false: Don't start MongoDB (license without Architecture)
Proxy settings		

<code>USE_PROXY</code>	false	- false: don't use proxy to build container - true: use proxy to build container
<code>HOST_PROXY</code> <code>PORT_PROXY</code>		Hostname (or IP address) and port number of proxy used for Internet connectivity during the image building process
<code>USER_PROXY</code> <code>PWD_PROXY</code>		Username and password to connect Proxy.
<code>NO_PROXY</code>	localhost, 127.*	A comma-separated list of destinations that will not be accessed through the proxy. Do not use quotes (single or double) to enclose these values. <i>Important: KIUWAN_HOST value is automatically appended</i>
KOP users		
<code>KIUWAN_USER</code> <code>KIUWAN_GROUP</code>	kiuwan kiuwan	System user/group for KOP installation and execution
<code>MYSQL_ROOT_PWD</code>	root	Password for the <i>root</i> user of KOP's MySQL instance
<code>KIUWAN_MYSQL_USER</code> <code>KIUWAN_MYSQL_USER_PWD</code>	kiuwan kiuwan	Username and password used by KOP to access MySQL database
<code>SSH_ROOT_PWD</code>	password	Password for <i>root</i> user (SSH) of Kiuwan Container
<code>KIUWAN_EMAIL_ADMIN_ACCOUNT</code>		The email address of <i>kiuwanadmin</i> user this email address will be used to send notifications to <i>kiuwanadmin</i> user
KOP e-mail (SMTP) configuration		
<code>KIUWAN_SMTP_HOST</code> <code>KIUWAN_SMTP_PORT</code>		SMTP host and port
<code>KIUWAN_SMTP_USER_ACCOUNT</code> <code>KIUWAN_SMTP_USER_PASSWORD</code>		SMTP account: username and password
<code>KIUWAN_EMAIL_USER_ACCOUNT</code>		Sender email address for KOP email notifications
Advanced configuration (WildFly, MySQL, Redis, etc)		
<code>INNODB_BUFFER_POOL_SIZE</code>	2G	
<code>APPS_JVMMAXMEMORY</code>	3G	Max amount of heap memory to be used by WildFly
<code>KIUWAN_REDIS_MAXMEMORY</code>	2gb	Max memory limit to be used by Redis server (https://redis.io/topics/config)

You can visit the [Advanced Configuration](#) for additional configuration parameters.

Step 3: Build the Kiuwan Docker image



After configuration, you will **build the Kiuwan docker image**.

IMPORTANT: Please be sure you have already installed KOP licenses, otherwise the docker image will not be built.

To build the docker image:

```
cd $KOP_INSTDIR/master.YYYYMMDDHHMM.buildnumber
./create_and_init_kop.sh
```

This step requires Internet connectivity.

If your installation uses a **proxy**, you should have previously configured the proxy settings.

In case you need to execute the Kiuwan container in a host server without Internet connectivity:

1. Build the image in a connected server host
2. Save the image, transfer it to the target host server and then load it and execute it (as further described)

After the image creation, you will be able to list the images in your docker server and identify your kiuwan image by issuing the next command:

```
docker images
```

REPOSITORY	TAG	IMAGE ID	CREATED	SIZE
kop	v1.2	fb3e8e47ab44	4 hours ago	2.12GB
ubuntu	14.04	a35e79164dfb	4 weeks ago	222MB

Step 3.1 (Optional) Moving the image to another server host

After creating the image, if you want to move it to another host server you first must save it to a tarball by executing:

```
docker save kop:v1.2 > kop_v12_saved_image.tar
```

Then, transfer the image tarball to the destination host and load it by executing:

```
docker load --input kop_v12_saved_image.tar
```

Step 4: Executing the Kiuwan Docker container



After executing docker image build script (*./create_and_init_kop.sh*), two scripts are generated based on **settings.custom** configuration file

```
run_kop.sh
```

Script to start the Kiuwan docker container and make KOP fully available and accessible to users.

```
run_init_kop.sh
```

Script to initialize the Kiuwan docker container (i.e. resetting completely the KOP installation to factory defaults) without to create a new image. This script will remove any existing data of KOP installation (for example, all the database contents will be deleted).

IMPORTANT:

- These scripts are based on settings.custom values at the moment of building the docker image.
- If you later change settings.custom file, the new configuration values will not be applied until a new image is built (and new scripts will be generated)

You can **stop the Kiuwan container** by issuing the following command:

```
docker stop <my_container_name>
```

Step 4.1 Execution in debug mode (only sshd)

Just in case you are running with problems while executing the Kiuwan container, you can run it in debug mode.

This means to apply the configuration but not starting the services, allowing you to access the container through ssh.



After the container is built, you can execute (run) the Kiuwan container **in debug mode** by issuing the following command:

```
docker run --rm --name <my_container_name> \
    -h <my_container_host_name> \
    -v <server_host_mount_dir:container_mount_dir> \
    -p <ssh_port_ext>:22 \
    -d \
    <image_name:version>
```

Step 5: Making Kiuwan On-Premises run on HTTPS (Optional)

If you need to execute Kiuwan On-Premises over HTTPS protocol, please follow the next steps.

Step 5.1 Create your KOP SSL configuration file

SSL configuration is currently done by creating a configuration file (**ssl.custom**) within **ssl** directory

There's a file (**ssl.tpl**) you can use as a template to configure your settings.

1. `cd ssl`
2. Create **ssl.custom** file by copying the template file
 - `cp ssl.tpl ssl.custom`
3. Edit the properties of **ssl.custom** file and change default values

Property Name	Default value	Meaning
Commons		
SSL_O		Your Organization
SSL_LOCALITY		Your Locality
SSL_STATE		Your State
SSL_COUNTRY		Your Country
SSL_OU		Your Organization Unit
Keystore		
SSL_KS_PWD		Password for Keystore that will be created
Aliases		
SSL_ALIAS	wildfly	Alias of the Certificate to be created.
HTTPS_PORT	8443	HTTPS port

Step 5.2 Create the Private key and Certificate Signing Request (CSR) for your server

1. Within **ssl** directory execute the script **CreateKey_and_ReqCSR.sh**
2. This script generates the CSR file under **ssl/certs**
 - That file is named `<yourhost.yourdomain.com>.csr`, according to `$KIUWAN_HOST` configuration property
3. Send CSR file to your CA (Certificate Authority)
4. CA will send back to you two files:
 - CA's Certificate file (IMPORTANT: rename it to **ca.crt**)
 - Your host's Certificate file: for example **yourhost.yourdomain.com.crt**
5. Copy received files to **ssl/certs** directory

Step 5.3 Create the Keystore and switch from HTTP to HTTPS

1. Within ssl directory execute the script ***TransferFilesToContainer.sh***
 - This script transfers your server's certificate, your private key and CA's certificate to KOP container
 - Also, it transfers the script templates that will be used to create the keystore and to change the configuration from http to https
2. Within ssl directory execute the script ***run_create_Keystore.sh***
 - This script executes (into the container) the script create_Keystore.sh (created from template create_Keystore.tpl)
3. Within ssl directory execute the script ***run_change_ToHTTPS.sh***
 - This script stops wildfly service and executes the script change_ToHTTPS.sh (created from template change_ToHTTPS.tpl), this script will create files with .rollback extension of modified ones
 - Then, it starts wildfly service



After the conversion to HTTPS, please download a new version of the Kiuwan Local Analyzer from your KOP site.

Step 5.4 Just in case you are using your own CA, make it valid to your browsers and Java

If the certificate is signed by **your own Certification Authority**, the browsers will not recognize it as a valid CA and you will get an error messages such as:

*Your connection is not private
Attackers might be trying to steal your information from youthost.yourdomain.com (for example, passwords, messages, or credit cards).*

NET::ERR_CERT_AUTHORITY_INVALID

To solve this issue, you have to **import your CA Certificate into your browser** :

- In Chrome: Configuration >> Settings >> Advanced >> Manage certificates >> Import (ca.crt) into "Trusted root certification entity store"

Additionally, you must **import your CA Certificate into Java's Keystore** (cacerts)



Importing CA Cert into Java's Keystore must be done in the **KOP Container** as well as in **any client machine using Kiuwan for Developers (K4D) plugin**.

Log in to the KOP container and execute the next commands:

1. `cd /opt/jdk*/jre/lib/security/`
2. `supervisorctl stop wildfly`
3. `cp cacerts cacerts.bck.original`
4. `keytool -import -noprompt -alias root -keystore cacerts -trustcacerts -file /<kiuwan_vol>/configurations/ssl/ca.crt -storepass changeitsupervisorctl start wildfly`
 - **NOTE:** change <kiuwan_vol> to the value of \$KIUWAN_VOL (as configured in *settings.custom*)

Then, log in to your docker server and make above changes persistent (i.e. to keep them after rebooting the container):

1. `docker commit <kop docker name> <kop docker image>`
 - **NOTE:** run 'docker ps' to get NAMES and IMAGE values of your KOP container

Rollback to HTTP

In case you need to **change back to HTTP**, follow the next steps:

1. Log in to your docker server and go to your installation directory (\$KOP_INSTDIR)
2. `cd ssl`
3. execute the script ***run_rollback_HTTPS.sh***

After execution, KOP will come back to configuration previous to the execution of run_change_ToHTTPS.sh script.

Step 6: Accessing Kiuwan On-Premises

KOP URL

Once Kiuwan On-Premises container is running, you can access it from a browser in the following URL:

`http[s]://<KIUWAN_HOST>:<KIUWAN_PORT>/saas`

- cd to **\$KOP_INSDIR/updates/bin**
- Execute the script **./updateKiuwanLauncher.sh**
 - This script makes all the work to upgrade your current KOP app instance to the new one (CORE and CLIENTES will be updated)

To upgrade **ONLY Kiuwan Clients**:

- cd to **\$KOP_INSDIR/updates/bin**
- Execute the script **./updateClientsLauncher.sh**
 - This script makes new KLA and K4D ready to be downloadable by KOP client users.

Advanced Configuration

As above specified, the *settings.custom* file allows you to specify most (but not all) configuration parameters.



There are some additional configuration parameters that you can configure at **Dockerfile** (located in your **\$KOP_INSDIR**)

The configuration is done at *settings.custom* file always take precedence over configuration done at Dockerfile.

Component	PropertyName (=default value)	Meaning
TimeZone	KIUWAN_TIMEZONE ='UTC'	Timezone to be used by the Kiuwan application.
WildFly	APPS_JVMMINMEMORY=512M APPS_JVMMAXMEMORY=3G	Max and Min amount of <i>heap memory</i> to be used by WildFly.
	APPS_JVMMINMETASIZE=96M APPS_JVMMAXMETASIZE=512M	Max and min amount of <i>perm gen memory</i> to be used by WildFly (see https://issues.jboss.org/browse/WFLY-5955)
MySQL	innodb_buffer_pool_size=2G join_buffer_size=4M query_cache_limit=16M read_buffer_size=16M read_rnd_buffer_size=4M sort_buffer_size=4M max_connections=1024 tmp_table_size=16M max_allowed_packet=64M	Default MySQL parameters used to create database instance. (see https://dev.mysql.com/doc/refman/5.6/en/ for reference) redis
Redis	KIUWAN_REDIS_MAXCLIENTS=100 KIUWAN_REDIS_MAXMEMORY=2gb	Maximum number of Redis clients that could be handled simultaneously (https://redis.io/topics/clients) Max memory limit to be used by Redis server (https://redis.io/topics/config)

Appendix 1 - Configuring Apache as FrontEnd WebServer to KOP

If you choose the Apache web server as the front-end for your Kiuwan On-Premises installation, you may follow the following configuration examples and/or check your current configuration agrees with the suggested examples.

HTTP Protocol

For this kind of access you just need to add a virtual host and configure how Apache will talk to Kiuwan.

Before this make sure your Apache installation has these modules available:

- mod_proxy
- mod_proxy_ajp (if you want ajp communication between front and backend servers)
- mod_proxy_http (if you want ajp communication between front and backend servers)
- mod_proxy_wstunnel

To add a virtual host for Kiuwan On-Premises, you can add a file in your Apache installation folder (i.e. /etc/apache2/sites-available/kop.conf) with the following content. Make sure you replace the variables put inside brackets for those you previously configured when installing your Kiuwan On-Premises instance and a protocol is set (choose between ajp or http) in the ProxyPass directives:

```
<VirtualHost *: [KIUWAN_WEBSERVER_PORT]>
    ServerName [KIUWAN_WEBSERVER_HOST]
    ServerAdmin webmaster@localhost
    DocumentRoot /var/www/html

    LogLevel debug
    ErrorLog ${APACHE_LOG_DIR}/error.log
    CustomLog ${APACHE_LOG_DIR}/access.log combined

    ProxyRequests Off
    ProxyPreserveHost On
    <Proxy *>
        Require all granted
    </Proxy>

    ProxyPass / [ajp|http]://[KIUWAN_HOST]:
[KIUWAN_PORT]/
    ProxyPassReverse / [ajp|http]://[KIUWAN_HOST]:
[KIUWAN_PORT]/

    <Location />
        Require all granted
    </Location>
</VirtualHost>
```

HTTPS Protocol

For this kind of access you will need:

- A virtual host configured in Apache will talk to Kiuwan (see below).
- Open an https port in Apache (usually 443).
- A certificate for the exposed hostname (KIUWAN_WEBSERVER_HOST).

Before this make sure your Apache installation has these modules available:

- mod_proxy
- mod_proxy_ajp (if you want ajp communication between front and backend servers)
- mod_proxy_http (if you want ajp communication between front and backend servers)
- mod_proxy_wstunnel
- mod_rewrite
- mod_ssl

Please make sure you generate a certificate for your Kiuwan hostname and it is signed by a trusted CA inside your organization. At this point you need three files:

- [KIUWAN_WEBSERVER_HOST].crt: the certificate for your kiuwan host.
- [KIUWAN_WEBSERVER_HOST].key: the private key.
- ca.crt: the trusted CA certificate.

Refer to [PremisesInstallationGuide-Step5.2CreatethePrivatekeyandCertificateSigningRequest\(CSR\)foryourserver](#) for more information on how to create and install certificates.

Please note that you must install the CA certificate on the docker container before proceeding.

Place the previous files at these locations (we put here the default locations for these files, but it is up to you to change these paths):

- /etc/ssl/certs/[KIUWAN_WEBSERVER_HOST].crt
- /etc/ssl/private/[KIUWAN_WEBSERVER_HOST].key
- /etc/apache2/ssl.crt/ca.crt

Now you should tell Apache to listen on the configured https port, editing the ports.conf file (i.e. /etc/apache2/ports.conf):

```
Listen [KIUWAN_WEBSERVER_PORT]
```

To add a virtual host for Kiuwan On-Premises, you can add a file in your Apache installation folder (i.e. /etc/apache2/sites-available/kop.conf) with the following content. Make sure you replace the variables put inside brackets for those you previously configured when installing your Kiuwan On-Premises instance and a protocol is set (choose between ajp or http) in the ProxyPass directives:

```
<VirtualHost *: [KIUWAN_WEBSERVER_PORT]>
    ServerName [KIUWAN_WEBSERVER_HOST]
    ServerAdmin webmaster@localhost
    DocumentRoot /var/www/html

    SSLEngine on
    SSLCertificateFile /etc/ssl/certs/[KIUWAN_WEBSERVER_HOST].crt
    SSLCertificateKeyFile /etc/ssl/private/[KIUWAN_WEBSERVER_HOST].key
    SSLCertificateChainFile /etc/apache2/ssl.crt/ca.crt

    LogLevel debug
    ErrorLog ${APACHE_LOG_DIR}/error.log
    CustomLog ${APACHE_LOG_DIR}/access.log combined

    ProxyRequests Off
    ProxyPreserveHost On
    <Proxy *>
        Require all granted
    </Proxy>

    ProxyPass / [ajp|http]://[KIUWAN_HOST]:
[KIUWAN_PORT]/
    ProxyPassReverse / [ajp|http]://[KIUWAN_HOST]:
[KIUWAN_PORT]/

    <Location />
        Require all granted
    </Location>

    # Redirect http traffic to https
    RewriteEngine On
    RewriteCond %{HTTPS} off
    RewriteRule ^.*$ https://%{SERVER_NAME}%{REQUEST_URI} [R,L]

</VirtualHost>
```