

# UI Developer Guide

## Introduction

This project is based on the ONAP portal SDK, version 2.4.0. It should be noted that the copyright of all the files of the aforementioned project that were left intact, has not been changed.

This UI consists of the front-end and back-end parts.

The front-end part is based on HTML, CSS, and AngularJS technologies. The back-end part is based on Spring MVC and Apache Tomcat technologies.

Based on these instructions, a user can provide the prerequisites, compile the source code and deploy the UI.

## Scope

The blueprint validation UI aims to be hosted by LF servers and will be exposed using public IP and domain names.

It provides a user-friendly way for displaying blueprints validation test results. Based on these results, the status of a blueprint can be determined (mature, incubation state, etc.).

In specific, the purpose of the UI is twofold:

1) Support full control loop of producing results. In this mode, the UI must be connected with a Jenkins instance capable of running blueprint validation tests.

It will enable the user to define a blueprint for validation using its name, version, layer, desired lab and desired timeslot. This data constitutes a submission. It should be noted that the blueprint family is derived from the blueprint name. Also, the UI will have the ability to track the lifecycle of a submission. A submission state can be one of the following: submitted, waiting, running and completed. The implementation vehicle for this action is the REST API of Jenkins. Moreover, the UI must be connected with a mysql instance and the Nexus server where the results are stored. Then, it will be able to trigger the appropriate job in Jenkins and receive the corresponding results from Nexus.

Note that it makes no difference whether the Jenkins instance is the community one or a private one.

2) Partial control of producing results. In this mode, the UI must be connected with a mysql instance and the Nexus server where the results are stored.

Every blueprint owner is responsible of executing tests and storing results in Nexus using his/her own Jenkins instance. The UI only retrieves results from Nexus and displays them.

Currently, the partial control loop is not supported.

In both modes, user authentication, authorization and accounting (AAA) will be supported in order to control access to resources, enforce policies on these resources and audit their usage.

## Prerequisites

In order for the blueprint validation UI to be functional, the following items are taken for granted:

- An appropriate mysql instance is up and running (look at the Database subsection). This prerequisite concerns both of the UI modes.

- The available labs and their silos (i.e. which silo is used by a lab in order to store results in Nexus) for blueprint validation execution are stored in mysql (look at the Database subsection). It is the lab owner's responsibility to update them using the UI. This prerequisite concerns both the partial and the full control loop modes.

- The available timeslots for blueprint validation execution of every lab are stored in the mysql (look at the Database subsection). It is the lab owner's responsibility to update them using the UI. This prerequisite concerns only the full control loop mode.

- The data of available blueprints (i.e. blueprint name) is stored in the mysql database (look at the Database subsection). This data is automatically updated by the UI using info from Nexus. If a blueprint owner's is not satisfied with this info, he/her must update it using the UI. This prerequisite concerns only the full control loop mode.

- The data of an available blueprint instance for validation (i.e. version and layer) is stored in the mysql database (look at the Database subsection). This data is automatically updated by the UI using info from Nexus. If a blueprint owner's is not satisfied with this info, he/her must update it using the UI. This prerequisite concerns only the full control loop mode.

- A Jenkins instance exists capable of executing blueprint validation tests on the specified lab and storing the results to Nexus server (look at the Jenkins configuration subsection). This prerequisite concerns only the full control loop mode.

- A Nexus server exists where all the blueprint validation results are stored (look at the Nexus subsection). This prerequisite concerns both of the UI modes.

- The whole installation and deployment of a blueprint and its corresponding blueprint family components (i.e. the appropriate edge cloud stack with its combination of infrastructure hardware components, OS, K8s, software, etc) are already performed in the appropriate lab. Recall that multiple labs can be used for a specific blueprint validation. Also, it is the responsibility of the blueprint submitter to ensure that the edge validation and community CI labs can support comprehensive validation of the blueprint and cover all use case characteristics. This prerequisite concerns both of the UI modes.

## Developer's guide

### Download the project

```
~$ git clone "https://gerrit.akraino.org/r/validation"
```

### Prerequisites

#### Tools

In order to setup the development environment, the following tools are needed:

- JDK 1.8
- Maven
- docker
- MySQL client

Execute the commands below in order to install these tools (note that the PROXY\_IP and PROXY\_PORT variables must be substituted with the ones that are used by the hosting operating system)

If the host is behind a proxy, define this proxy using the following commands:

```
~$ sudo touch etc/apt/apt.conf.d/proxy.conf
~$ sudo sh -c 'echo "Acquire::http::proxy \"http://<PROXY_IP>:<PROXY_PORT>/\";" >> /etc/apt/apt.conf.d/proxy.conf'
~$ sudo sh -c 'echo "Acquire::https::proxy \"https://<PROXY_IP>:<PROXY_PORT>/\";" >> /etc/apt/apt.conf.d/proxy.conf'
~$ sudo sh -c 'echo "Acquire::ftp::proxy \"ftp://<PROXY_IP>:<PROXY_PORT>/\";" >> /etc/apt/apt.conf.d/proxy.conf'
~$ sudo apt-get update
~$ export http_proxy=http://<PROXY_IP>:<PROXY_PORT>
~$ export https_proxy=http://<PROXY_IP>:<PROXY_PORT>
```

Install jdk and maven using the following commands:

```
~$ sudo apt install default-jdk
~$ sudo apt install maven
```

If the host is behind a proxy, configure this proxy for maven:

```
~$ nano ~/.m2/settings.xml
<Paste the following lines>
```

```
<settings xmlns="http://maven.apache.org/SETTINGS/1.0.0" xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance" xsi:
schemaLocation="http://maven.apache.org/SETTINGS/1.0.0 http://maven.apache.org/xsd/settings-1.0.0.xsd">
<proxies>
<proxy>
<active>true</active>
<protocol>http</protocol>
<host><PROXY_IP></host>
<port><PROXY_PORT></port>
<nonProxyHosts>127.0.0.1|localhost</nonProxyHosts>
</proxy>
<proxy>
<id>https</id>
<active>true</active>
<protocol>https</protocol>
<host><PROXY_IP></host>
<port><PROXY_PORT></port>
<nonProxyHosts>127.0.0.1|localhost</nonProxyHosts>
</proxy>
</proxies>
</settings>

<Save and exit from nano>
```

Install docker using the following commands:

```
~$ sudo apt install docker.io
~$ sudo groupadd docker
~$ sudo gpasswd -a $USER docker
~$ newgrp docker
```

If the host is behind a proxy, configure docker to use this proxy:

```
~$ mkdir /etc/systemd/system/docker.service.d
~$ sudo nano /etc/systemd/system/docker.service.d/http-proxy.conf

<Paste the following lines>

[Service]
Environment="HTTP_PROXY=http://<PROXY_IP>:<PROXY_PORT>/"

<Save and exit from nano>

~$ sudo systemctl daemon-reload
~$ sudo systemctl restart docker
```

Install mySQL client:

```
~$ sudo apt install mysql-client
```

## Database

A mysql database instance is needed for both modes of the UI with the appropriate databases and tables in order for the back-end system to store and retrieve data.

The pom.xml file supports the creation of an appropriate docker image for development purposes. The initialization scripts reside under the db-scripts directory.

Also, a script has been developed, namely validation/docker/mysql/deploy.sh which easily deploys the container. This script accepts the following items as input parameters:

CONTAINER\_NAME, name of the container, default value is akraino-validation-mysql  
MYSQL\_ROOT\_PASSWORD, the desired mysql root user password, this variable is required  
MYSQL\_USER, the mysql user, the default value is 'akraino'  
MYSQL\_PASSWORD, the desired mysql user password, this variable is required  
REGISTRY, registry of the mysql image, default value is akraino  
NAME, name of the mysql image, default value is validation  
TAG\_PRE, first part of the image version, default value is mysql  
TAG\_VER, last part of the image version, default value is latest

In order to build and deploy the image using only the required parameters, the below instructions should be followed:

The mysql root password and the mysql user password (currently the UI connects to the database using the akraino user) should be configured using the appropriate variables and the following commands should be executed (the user should override default variables based on requirements):

```
~$ cd validation/ui
~$ mvn docker:build -Ddocker.filter=akraino/validation:dev-mysql-latest
~$ cd ../docker/mysql
~$ ./deploy.sh --TAG_PRE dev-mysql --MYSQL_ROOT_PASSWORD <mysql root user password> --
MYSQL_PASSWORD <mysql akraino user password>
~$ mysql -p<MYSQL_AKRAINO_PASSWORD> -uakraino -h <IP of the mysql container> < ../../ui/db-scripts
/examples/initialize_db_example.sql
```

In order to retrieve the IP of the mysql container, the following command should be executed:

```
~$ docker inspect <name of the mysql container>
```

Furthermore, the TAG\_PRE variable should be defined because the default value is 'mysql' (note that the 'dev-mysql' is used for development purposes - look at pom.xml file).

If the database must be re-deployed (it is assumed that the corresponding mysql container has been stopped and deleted) while the persistent storage already exists (currently, the 'akraino-validation-mysql' docker volume is used), a different approach should be used after the image building process.

To this end, another script has been developed, namely validation/docker/mysql/deploy\_with\_existing\_storage.sh which easily deploys the container. This script accepts the following as input parameters:

CONTAINER\_NAME, the name of the container, default value is akraino-validation-mysql  
REGISTRY, the registry of the mysql image, default value is akraino  
NAME, the name of the mysql image, default value is validation  
TAG\_PRE, the first part of the image version, default value is mysql  
TAG\_VER, the last part of the image version, default value is latest

In order to deploy the image using only the required parameters and the existing persistent storage, the below instructions should be followed (the user should override the default variables based on the requirements):

```
~$ cd validation/docker/mysql
~$ ./deploy_with_existing_persistent_storage.sh --TAG_PRE dev-mysql
```

Finally, if the database must be re-deployed (it is assumed that the corresponding mysql container has been stopped and deleted) and the old persistent storage must be deleted, the used docker volume should be first deleted (note that all database's data will be lost).

To this end, after the image build process, the following commands should be executed (the user should override the default variables based on the requirements):

```
~$ docker volume rm akraino-validation-mysql
~$ cd validation/docker/mysql
~$ ./deploy.sh --TAG_PRE dev-mysql --MYSQL_ROOT_PASSWORD <root user password> --MYSQL_PASSWORD
<mysql akraino user password>
~$ mysql -p<MYSQL_AKRAINO_PASSWORD> -uakraino -h <IP of the mysql container> < ../../ui/db-scripts
/examples/initialize_db_example.sql
```

In the context of the full control loop mode, the following tables must be initialized with appropriate data:

- lab (here, every lab owner should store the name of the lab and the silo used for storing results in Nexus)
- timeslot (here, every lab owner should register the available timeslots that can be used for blueprint validation test execution)
- blueprint\_layer (here, all the blueprint layers should be registered. These layers will be referenced by the blueprint instances)
- blueprint (here, every blueprint owner should register the name of the blueprint)
- blueprint\_instance\_for\_validation (here, every blueprint owner should register the blueprint instances for validation, i.e. version and layer)
- blueprint\_instance\_blueprint\_layer (here, the many-to-many relationship between blueprint instances and layers is formulated)
- blueprint\_instance\_timeslot (here, the many-to-many relationship between blueprint instances and timeslots is formulated)

As it has been already mentioned, a user can perform CRUD operations on these tables using the UI. Also, all these tables except from lab and timeslot are initialized and updated automatically by the UI by fetching data from Nexus. It is the lab owners responsibility to update them if a modifications is needed (especially the data related to lab and timeslot tables).

An example of data initialization is stored in the following file:

*db-scripts/examples/initialize\_db\_example.sql*

Some of this data is illustrated below (refer to 'org.akraino.validation.ui.data' package for more info regarding available values):

```
Labs:
id:1, lab:'att', silo:'att-blu-val'

Timeslots:
id:1 , start date and time: 'now', duration: null, lab: 1

Blueprint layers:
id:1, layer: 'hardware';

Blueprints:
id: 2 , blueprint_name : 'rec'

Blueprint Instances:
id: 2, blueprint_id: 2 (i.e. rec), version: "master"

blueprint_instances_blueprint_layers
blueprint_id: 2 (i.e. rec), layer_id: 1 (i.e. hardware)

blueprint_instances_timeslots
blueprint_instance_id: 2 (i.e. rec), timeslot_id: 1 (i.e. now in att lab)
```

It should be noted that currently the start date and time and the duration of the timeslot are not taken into account by the UI (see limitation section). Therefore, a user should define 'now' and null respectively for their content.

Based on this data, the UI enables the user to select an appropriate blueprint instance for validation.

In the following lines it is explained how a user can update database using the mysql tool. However, it is advised that UI should be used for this purpose as it supports a more user-friendly way.

For example, if a user wants to define a new lab with the following data:

*lab: community, silo : 'community'*

the following file should be created:

*name: dbscript*  
*content:*

```
SET FOREIGN_KEY_CHECKS=1;
use akraino_bluvalui;
insert into lab (id, lab, silo) values(2, 'community', 'community');
```

Then, the following command should be executed:

```
~$ mysql -p<MYSQL_AKRAINO_PASSWORD> -uakraino -h <IP of the mysql container> < ./dbscript.sql
```

For example, if a user wants to define a new timeslot with the following data:

*start date and time:'now', duration: 0, lab: AT&T*

the following file should be created:

*name: dbscript*

*content:*

```
SET FOREIGN_KEY_CHECKS=1;
use akraino_bluvalui;
insert into timeslot values(2, 'now', null, 2);
```

2 is the id of the community lab.

Then, the following command should be executed:

```
~$ mysql -p<MYSQL_AKRAINO_PASSWORD> -uakraino -h <IP of the mysql container> < ./dbscript.sql
```

Furthermore, if a user wants to define a new blueprint, namely "newBlueprint", and an instance of this blueprint with version "master" and layer "k8s" and assign a timeslot to it, the following file should be created:

*name: dbscript*

*content:*

```
SET FOREIGN_KEY_CHECKS=1;
use akraino_bluvalui;
insert into blueprint (id, blueprint_name) values(3, 'newBlueprint');
insert into blueprint_instance (id, blueprint_id, version) values(3, 3, 'master');
insert into blueprint_layer (id, layer) values(4, 'k8s');
insert into blueprint_instance_blueprint_layer (blueprint_instance_id, blueprint_layer_id) values(3, 4);

insert into blueprint_instance_timeslot (blueprint_instance_id, timeslot_id) values(3, 2);
```

Then, the following command should be executed:

```
~$ mysql -p<MYSQL_AKRAINO_PASSWORD> -uakraino -h <IP of the mysql container> < ./dbscript.sql
```

The UI will automatically retrieve this new data and display it to the user.

## Jenkins Configuration

Recall that for full control loop, a Jenkins instance is needed capable of executing blueprint validation tests to the specified lab. The Blueprint validation UI will trigger job executions in that instance.

It should be noted that it is not the UI responsibility to deploy a Jenkins instance.

Furthermore, this instance must have the following option enabled: "Manage Jenkins -> Configure Global Security -> Prevent Cross Site Request Forgery exploits".

Also, currently, the corresponding Jenkins job should accept the following as input parameters: "SUBMISSION\_ID", "BLUEPRINT", "VERSION", "LAYER", "OPTIONAL", "LAB" and "UI\_IP".

The "SUBMISSION\_ID" and "UI\_IP" parameters (i.e. IP address of the UI host machine-this is needed by the Jenkins instance in order to send back Job completion notification) are created and provided by the back-end part of the UI.

The "BLUEPRINT", "VERSION", "LAYER" and "LAB" parameters are configured by the UI user. The parameter "OPTIONAL" defines whether the optional test cases should be included or not.

Moreover, as the Jenkins notification plugin (<https://wiki.jenkins.io/display/JENKINS/Notification+Plugin>) seems to ignore proxy settings, the corresponding Jenkins job must be configured to execute the following commands at the end (Post-build Actions)

TBD

## Nexus server

All the blueprint validation results are stored in Nexus server for both modes of the UI.

It should be noted that it is not the UI responsibility to deploy a Nexus server.

These results must be available in the following url:

[https://nexus.akraino.org/content/sites/logs/<lab\\_silo>/bluval\\_results/<Blueprint name>/<Blueprint version>/<timestamp>/results/<layer>/<name\\_of\\_the\\_test\\_suite>](https://nexus.akraino.org/content/sites/logs/<lab_silo>/bluval_results/<Blueprint name>/<Blueprint version>/<timestamp>/results/<layer>/<name_of_the_test_suite>)

where <lab\_silo> is the silo used by a lab for storing results in Nexus (for example 'att-blu-val'), <Blueprint name> is the name of the blueprint, <Blueprint version> the the blueprint version, <timestamp> is the timestamp used for producinf the results, <layer> is the blueprint layer and <name\_of\_the\_test\_suite> is the name of the corresponding test suite.

Below, an example URL is illustrated

[https://nexus.akraino.org/content/sites/logs/att-blu-val/bluval\\_results/rec/master/20190611-132818/results/hardware/bios\\_version/](https://nexus.akraino.org/content/sites/logs/att-blu-val/bluval_results/rec/master/20190611-132818/results/hardware/bios_version/)

Moreover, the results should be stored in the 'output.xml' file and placed in the aforementioned URL using the following format:

TBD

## Compiling

```
~$ cd validation/ui
~$ mvn clean package
```

## Deploying

The pom.xml file supports the building of an appropriate container image using the produced war file.

In order to build the image, the following commands should be executed:

```
cd validation/ui
mvn docker:build -Ddocker.filter=akraino/validation:dev-ui-latest
```

Also, a script has been developed, namely validation/docker/ui/deploy.sh which easily deploys the container. This script accepts the following as input parameters:

CONTAINER\_NAME, the name of the container, default value is akraino-validation-ui  
DB\_IP\_PORT, the IP and port of the mysql instance, this variable is required  
MYSQL\_USER, the mysql user, the default value is 'akraino'  
MYSQL\_PASSWORD, the mysql user password, this variable is required  
REGISTRY, the registry of the ui image, default value is akraino  
NAME, the name of the ui image, default value is validation  
TAG\_PRE, the first part of the image version, default value is ui  
TAG\_VER, the last part of the image version, default value is latest  
JENKINS\_URL, the URL of the Jenkins instance (http or https must be defined), the default value is '<https://jenkins.akraino.org/>'  
JENKINS\_USERNAME, the Jenkins user name, the default value is 'demo' (in the context of UI full control loop mode, this parameter must be changed to include a real Jenkins user)  
JENKINS\_USER\_PASSWORD, the Jenkins user password, the default value is 'demo' (in the context of UI full control loop mode, this parameter must be changed to include a real Jenkins user password)  
JENKINS\_JOB\_NAME, the name of Jenkins job capable of executing the blueprint validation tests, the default value is 'validation' (in the context of UI full control loop mode, this parameter must be changed to include a real Jenkins job name)  
NEXUS\_PROXY, the needed proxy in order for the Nexus server to be reachable, default value is none  
JENKINS\_PROXY, the needed proxy in order for the Jenkins server to be reachable, default value is none  
CERTDIR, the directory where the SSL certificates can be found, default value is the working directory where self signed certificates exist only for demo purposes  
ENCRYPTION\_KEY, the key that should be used by the AES algorithm for encrypting passwords stored in database, this variable is required  
UI\_ADMIN\_PASSWORD, the desired Blueprint Validation UI password for the admin user, this variable is required  
TRUST\_ALL, the variable that defines whether the UI should trust all certificates or not, default value is false  
USE\_NETWORK\_HOST, the variable that defines whether the UI container should run in 'network host' mode or not, default value is "false"

So, for a functional UI, the following prerequisites are needed:

- The mysql container in up and running state
- A Jenkins instance capable of running the blueprint validation test (this is optional and is needed only for UI full control loop mode)
- A Nexus repo in which all the test results are stored.

Then, the following commands can be executed in order to deploy the UI container:

```
cd ../docker/ui
./deploy.sh --TAG_PRE dev-ui --DB_IP_PORT <IP and port of the mysql> --MYSQL_PASSWORD <mysql akraino password> --
ENCRYPTION_KEY <encryption key> --UI_ADMIN_PASSWORD <UI admin user password>
```

The content of the DB\_IP\_PORT can be for example '172.17.0.3:3306'. Also, the value of the encryption key can be for example 'AGAdG4D04BKm2IxIWEr8o=='.

Currently, one user is supported by the UI, namely admin (full privileges). Its password is initialized during UI deployment. This password can be modified using the UI. Furthermore, more users can be created/modified using the UI.

Furthermore, the TAG\_PRE variable should be defined as the default value is 'ui' (note that the 'dev-ui' is used for development purposes - look at pom.xml file).

If no proxy exists, the proxy ip and port variables should not be defined.

More users can be created using the 'Create User' tab of the UI. This tab is available only for the admin user.

If the content of the 'USE\_NETWORK\_HOST' is equal to true (in this case, the ports 8443 and 443 must be available on the host), the UI should be available in the following url:

`https://<IP of the host>`

Else, the UI should be available in the following url:

`https://<IP of the UI container>`

As far as the SSL certificates are concerned, self-signed built-in certificates exist in the 'validation/docker/ui' directory which are used by default. It should be noted that these certificates should be used only for demo purposes. If a user wants to use different ones which are more appropriate for a production environment, the directory that contains these new certificates must be defined using the 'CERTDIR' parameter of the 'validation/docker/ui/deploy.sh' script. It should be noted that the certificates must have specific names, that are 'bluval.crt' and 'bluval.key' for the certificate and the key respectively.

## Limitations

- The UI has been tested using Chrome and Firefox browsers.
- The back-end part of the UI does not take into account the start date and time and duration of the configured timeslot. It immediately triggers the corresponding Jenkins Job.