

SDN-C Development Environment Setup

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Setting Up Your Development Environment

Start by following the page [Setting Up Your Development Environment](#), this covers items such as signing up for a linux foundation account, configuring git, installing gerrit and IDE recommendations.

Downloading the Source Code

Downloading SDN-C Projects

Follow steps in [Get git command from ONAP gerrit](#) to get the `git clone` command and clone each of the following SDNC projects:

Project Name	Project Description	has code
sdnc/adaptors	SDN-C adaptors	—
sdnc/architecture	SDN-C architectural artifacts (e.g. blueprints)	—
sdnc/core	SDN-C core platform	—
sdnc/features	SDN-C Karaf features	—

sdnc/northbound	SDN-C northbound adaptors	✔ java
sdnc/oam	SDN-C OA&M tools	✔ bash, javascript, python, DGs
sdnc/parent	Parent POMS to be used by SDN-C components	✖
sdnc/plugin	SDN-C plugins	✖

Note: The ONAP SDN-C projects are more like a demo version of ECOMP's SDN-GC.

Downloading CCSDK Projects

Follow steps in [Get git command from ONAP gerrit](#) to get the `git clone` command and clone each of the following CCSDK projects:

Project Name	Project Description	has code
ccsdk/dashboard	Operations Manager Dashboard	✔
ccsdk/distribution	CCSDK distribution packaging (e.g. docker containers)	✖
ccsdk/parent	Parent POMS to be used by CCSDK clients	✖
ccsdk/platform/blueprints	Blueprints. not in Amsterdam release	✖
ccsdk/platform/nbapi	Northbound API	✔
ccsdk/platform/plugins	Platform plugins	✔
ccsdk/sli/adaptors	Common adaptors for use by directed graphs	✔
ccsdk/sli/core	Core Service Logic Interpreter classes	✔
ccsdk/sli/northbound	Common northbound APIS related to service logic interpreter	✔
ccsdk/sli/plugins	Common plugins used by directed graphs	✔ python
ccsdk/storage/esaas	Elastic Storage as a Service. not in Amsterdam release	✖
ccsdk/storage/pgaas	PGAAS (PostgreSQL as a Service)	✔ java, python, bash
ccsdk/utils	Utilities	✔ bash, yaml

Get git clone Command from ONAP gerrit

The below instructions explain how to clone a repository from gerrit with the commit message hook included and it will be configured to use HTTPS. SSH is still the recommended protocol, these instructions serve as a workaround for users behind restrictive networking rules.

If you have worked on other projects in gerrit and are already familiar with cloning from gerrit you can ignore these instructions!

i Check this only once

This should have been done as part of "Setting Up Your Development Environment" and is only needed if you are behind a proxy and plan to use HTTP.

If behind proxy, ensure git config has set http.proxy and https.proxy NVPs,

check with the following command:

```
git config -l
```

if no http/https proxies exist add them with the following commands:

```
git config --add http.proxy <your-proxy-http-url>
```

```
git config --add https.proxy <your-proxy-https-url>
```

here's an example:

```
git config --add http.proxy http://<user-id>:<password>@11234.proxy.com:8080
```

```
git config --add https.proxy https://<user-id>:<password>@11234.proxy.com:8080
```

Use your linux foundation account to login onto [ONAP projects](#).

Get Project list by entering the project key name in the **Filter**, for example *sdnc*, this list of projects under sdnc will be shown as below:

The screenshot shows the Gerrit Code Review interface for ONAP projects. The browser address bar shows the URL <https://gerrit.onap.org/r/#/admin/projects/?filter=sdnc>. The page header includes the ONAP logo and navigation links. The main content area shows a list of projects under the 'sdnc' filter. The table below is a representation of the data shown in the screenshot.

Project Name	Project Description	Repository Browser
sdnc/adaptors	SDNC adaptors	(gitweb)
sdnc/architecture	SDNC architectural artifacts (e.g. blueprints)	(gitweb)
sdnc/core	SDNC core platform	(gitweb)
sdnc/features	SDNC Karaf features	(gitweb)
sdnc/northbound	SDNC northbound adaptors	(gitweb)
sdnc/oam	SDNC OA&M tools	(gitweb)
sdnc/parent	Parent POMs to be used by SDNC components	(gitweb)
sdnc/plugins	SDNC plugins	(gitweb)

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Powered by [Gerrit Code Review \(2.12.7\)](#) | Press ? to view keyboard shortcuts

Click on the wanted project from the list, the **General** page of the selected project will be shown. the following is the **General** page of *sdnc/adaptors*:

Secure | <https://gerrit.onap.org/r/#/admin/projects/sdnc/adaptors>

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All My **Projects** People Documentation

List General Branches Tags Access Dashboards

Search term

Beili Zhou

Project sdnc/adaptors

Clone Clone with commit-msg hook anonymous http http ssh

```
git clone http://beiliz@gerrit.onap.org/r/a/sdnc/adaptors
```

Description

SDNC adaptors

Project Options

State:

Submit Type:

Allow content merges:

Create a new change for every commit not in the target branch:

Require Change-Id in commit message:

Enable signed push:

Require signed push:

Maximum Git object size limit:

Contributor Agreements

Require Signed-off-by in commit message:

its-jira Plugin

Enable its-jira integration:

Project Commands

Commands:

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Now click on *Clone with commit-msg hook*, then click on *http*, then click on the notepad icon.

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Project sdnc/adaptors

Clone Clone with commit-msg hook anonymous http http ssh

```
git clone http://beiliz@gerrit.onap.org/r/a/sdnc/adaptors && (cd adapto...
```

Description

SDNC adaptors

The git clone command for the selected project is now copied into your clipboard. You do paste to use it at where-ever you want to.

View Code on gerrit Website

ONAP code can also be viewed from gerrit web site as below (sdnc/adaptors project is used as the example here):

Secure | https://gerrit.onap.org/r/gitweb?p=sdnc/adaptors.git;a=tree

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Code Review / sdnc / adaptors.git / tree +++ git

summary | shortlog | log | commit | commitdiff | review | tree
snapshot commit ? search: re

remove sdnc/adaptors/aai-service/provider

-rwxr-xr-x	556	.gitignore	blob history raw
-rw-r--r--	67	.gitreview	blob history raw
-rw-r--r--	1015	LICENSE.txt	blob history raw
-rw-r--r--	169	README.md	blob history raw
drwxr-xr-x	-	aai-service	tree history
drwxr-xr-x	-	docs	tree history
drwxr-xr-x	-	mdsa1-resource	tree history
-rwxr-xr-x	784	pom.xml	blob history raw
drwxr-xr-x	-	resource-assignment	tree history
drwxr-xr-x	-	sql-resource	tree history
-rw-r--r--	445	version.properties	blob history raw

SDNC adaptors Atom RSS

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To view the code through gerrit client, first follow steps in [Get git command from ONAP gerrit](#) to get the Projects list page.

Then, choose either one of the following option to view the code of the desired project.

Option 1: View Through "gitweb" Option in Project List Page

Note: this option will bring you to, and only to, the HEAD branch which is the master branch.

In the project list page, click on the *gitweb* under the *Repository Browser* column of your project row.

Secure | https://gerrit.onap.org/r/#/admin/projects/?filter=sdnc

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Search term Search

List Beili Zhou ▾

Projects

Filter

S	Project Name	Project Description	Repository Browser
▶	sdnc/adaptors	SDNC adaptors	(gitweb)
Q	sdnc/architecture	SDNC architectural artifacts (e.g. blueprints)	(gitweb)
Q	sdnc/core	SDNC core platform	(gitweb)
Q	sdnc/features	SDNC Karaf features	(gitweb)
Q	sdnc/northbound	SDNC northbound adaptors	(gitweb)
Q	sdnc/oam	SDNC OA&M tools	(gitweb)
Q	sdnc/parent	Parent POMs to be used by SDNC components	(gitweb)
Q	sdnc/plugins	SDNC plugins	(gitweb)

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The master branch's summary page will be shown up. Click on the *tree* option.

Secure | https://gerrit.onap.org/r/gitweb?p=sdnc%2Fadaptors.git;a=summary

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Code Review / sdnc / adaptors.git / summary

+++ git

summary | [shortlog](#) | [log](#) | [commit](#) | [commitdiff](#) | [review](#) | **tree**

commit ▾ ? search: re

description SDNC adaptors
owner Gerrit Service User
last change Wed, 18 Oct 2017 11:06:42 -0400 (20:36 +0530)
URL <https://gerrit.onap.org/r/p/sdnc/adaptors.git>
ssh://beiliz@gerrit.onap.org:29418/sdnc/adaptors.git

shortlog

8 days ago	ramu.n	remove sdnc/adaptors/aa1-service/provider	51/10551/1	master	commit commitdiff tree snapshot
2017-09-28	Brian Freeman	Setup ReadTheDocs	83/18383/1		commit commitdiff tree snapshot
2017-09-08	Jessica Wagantall	Cleanup project's name in Sonar	89/11189/1		commit commitdiff tree snapshot
2017-08-29	Dan Timoney	Prune adaptors moved to ccSDK	27/9227/1		commit commitdiff tree snapshot
2017-08-23	Victor Morales	Change .gitreview host value	45/8445/1		commit commitdiff tree snapshot
2017-08-10	Rich Tabezki	[SDNC-30] summary	55/7155/1		commit commitdiff tree snapshot
2017-08-07	Dan Timoney	Update root pom	85/8885/1		commit commitdiff tree snapshot
2017-06-23	Dan Timoney	Merge "SDNC-15 specify the version of spring-jdbc"			commit commitdiff tree snapshot
2017-06-22	Dan Timoney	[ROOTPOM FIX] Use version 1.1.0 of root pom	13/5213/1		commit commitdiff tree snapshot
2017-06-05	Shashank Kumar...	Add logging info for resource querying.	57/4657/2		commit commitdiff tree snapshot
2017-06-05	Dan Timoney	[SDNC-14] Roll adaptors to version 1.1.2	83/4883/2		commit commitdiff tree snapshot
2017-06-05	Kevin Smokowski	SDNC-15 specify the version of spring-jdbc	41/4841/1		commit commitdiff tree snapshot
2017-05-18	Dan Timoney	Merge "fix maven local build issue"			commit commitdiff tree snapshot

Now, the repo details page will be shown and you can view the code in master branch from there.

Option 2: View from "Branches" Option in Project Page

Note: This option allows you to select a particular branch to view its code.

In the project list page, click the project under the Project Name column. (using sdnc/adaptors project as example here)

Secure | <https://gerrit.onap.org/r/#/admin/projects/?filter=sdnc>

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Projects

Filter

S	Project Name	Project Description	Repository Browser
▶	sdnc/adaptors	SDNC adaptors	(gitweb)
Q	sdnc/architecture	SDNC architectural artifacts (e.g. blueprints)	(gitweb)
Q	sdnc/core	SDNC core platform	(gitweb)
Q	sdnc/features	SDNC Karaf features	(gitweb)
Q	sdnc/northbound	SDNC northbound adaptors	(gitweb)
Q	sdnc/oam	SDNC OA&M tools	(gitweb)
Q	sdnc/parent	Parent POMs to be used by SDNC components	(gitweb)
Q	sdnc/plugins	SDNC plugins	(gitweb)

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It takes you to the project **General** page, click on the *Branches* option.

Secure | <https://gerrit.onap.org/r/#/admin/projects/sdnc/adaptors>

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Project sdnc/adaptors

Clone Clone with commit-msg hook anonymous http http ssh

```
git clone http://beiliz@gerrit.onap.org/r/a/sdnc/adaptors
```

Description

SDNC adaptors

Project Options

State:

Submit Type:

Allow content merges:

Create a new change for every commit not in the target branch:

Require Change-Id in commit message:

Enable signed push:

Require signed push:

Maximum Git object size limit:

Contributor Agreements

The project page will be switched to **Branches** page. Check out the *Branch Name* column, click the *gitweb* on the same row of the desired branch.

Secure | <https://gerrit.onap.org/r/#/admin/projects/sdnc/adaptors.branches>

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List General **Branches** Tags Access Dashboards

Search term Beili Zhou

Project sdnc/adaptors

Filter

Branch Name	Revision	
HEAD	master	(gitweb)
refs/meta/config	de2846cb4089a504a860bde1f9c535e921ad2a81	(gitweb)
master	d69f503c3231553405a4cbc7ab08f40c6f55befd	(gitweb)
release-1.0.0	4b6b15e41cea0e537dd49121a299c56905c6cf83	(gitweb)
release-1.1.0	c6709820f1f890d05370e4496293635661b60a46	(gitweb)

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The project Summary page of the selected branch will be shown up. Click on the *tree* option.

Secure | https://gerrit.onap.org/r/gitweb?p=sdnc%2Fadaptors.git;a=shortlog;h=refs%2Fheads%2Frelease-1.0.0

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Account signup / management | JIRA | Jenkins | Build logs | Sonar | Nexus | Docker Registry | Wiki | Mailing lists | Sign-off Rules

Code Review / sdnc / adaptors.git / shortlog

summary | shortlog | log | commit | commitdiff | review | tree

commit ? search: re

sdnc/adaptors.git

2017-09-20	Jessica Waganall	Cleanup project's name in Sonar	05/14005/1	release-1.0.0	commit commitdiff tree snapshot
2017-04-04	Dan Timoney	[POM VERSION] Root pom version fix	31/2981/1		commit commitdiff tree snapshot
2017-03-06	Dan Timoney	[RELEASE] Fix version.properties	05/1085/1		commit commitdiff tree snapshot
2017-02-24	Dan Timoney	[VERSION] Roll back to snapshot	09/1389/1		commit commitdiff tree snapshot
2017-02-22	Dan Timoney	[STAGING] Staging properties	05/1185/1		commit commitdiff tree snapshot
2017-02-21	Dan Timoney	[STAGING] Add build profiles	19/1119/1		commit commitdiff tree snapshot
2017-02-21	Dan Timoney	[STAGING] Add staging plugin	05/1095/1		commit commitdiff tree snapshot
2017-02-20	Dan Timoney	[VERSION] Official root pom version	41/1041/1		commit commitdiff tree snapshot
2017-02-20	Dan Timoney	[SKIPTESTS] Disable tests	03/093/1		commit commitdiff tree snapshot
2017-02-20	Dan Timoney	[VERSION] Change version to snapshot	87/987/1		commit commitdiff tree snapshot
2017-02-15	Dan Timoney	Initial commit for OpenECOMP SDN-C adaptors	47/447/1		commit commitdiff tree snapshot
2017-02-14	Andrew Grimberg	Initial empty repository			commit commitdiff tree snapshot

SDNC adaptors

Atom RSS

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Now, the repo details page will be shown and you can view the code in master branch from there.

Compiling

Maven

Version has to be version greater or equal to 3.3.3

Ensure your maven is installed / set up as per instruction from [Maven](#) section of [Setting Up Your Development Environment](#) page.

File settings.xml

Get settings.xml file

Following instruction from [Maven Example settings.xml](#) section of [Setting Up Your Development Environment](#) page to get your settings.xml file.



Just to emphasis

If behind proxy,
Add proxy definition under proxies block, if under proxy

```

1 <proxy>
2   <id>optional</id>
3   <active>true</active>
4   <protocol>http</protocol>
5   <host>11234.proxy.com</host>
6   <port>8080</port>
7   <nonProxyHosts>local.net|localhost|127.0.0.1</nonProxyHosts>
8 </proxy>

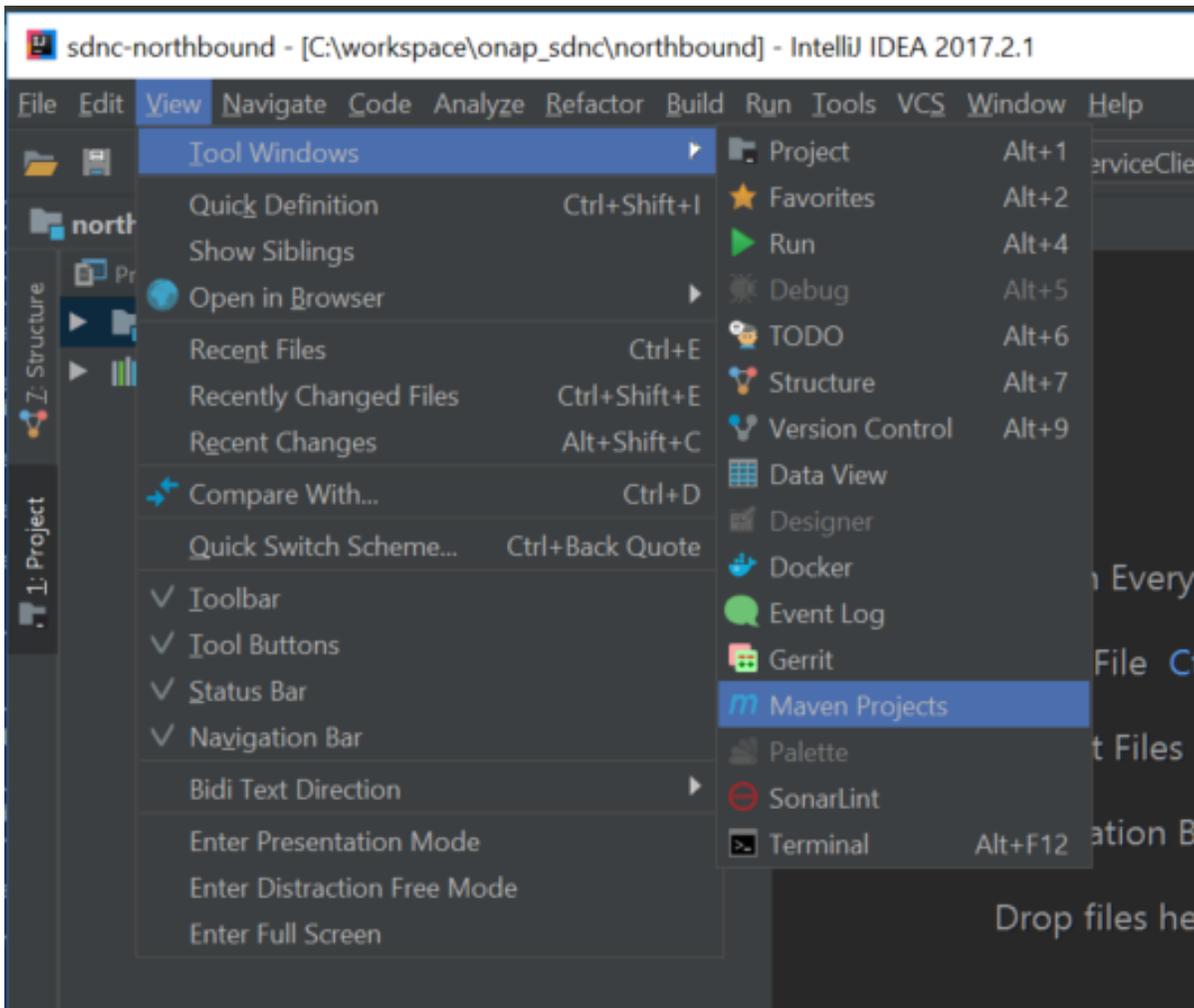
```

Configure settings file in IntelliJ

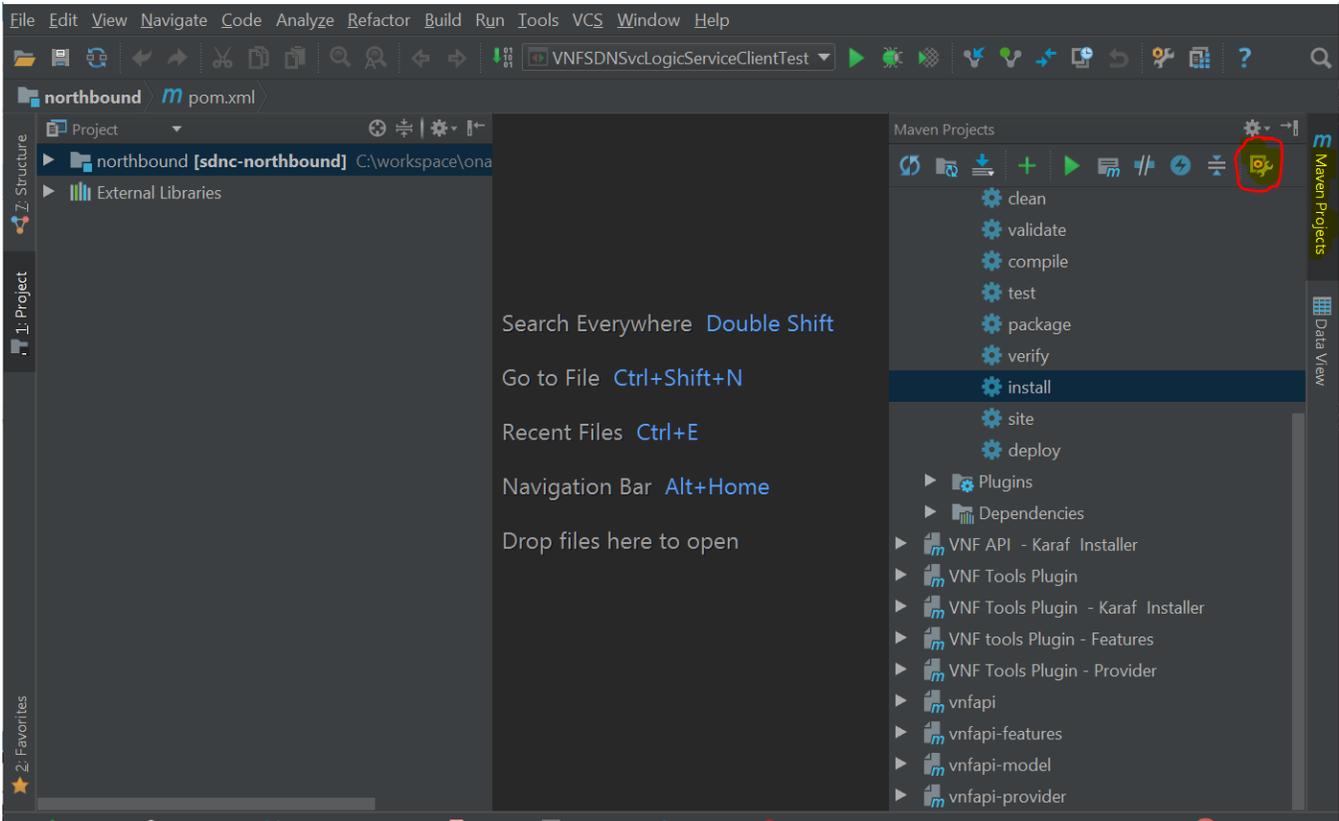
If you are going to compile with IntelliJ, follow steps in this section to configure settings.xml file in IntelliJ.

If you did not make your *Maven Project* by default shown, do the following:

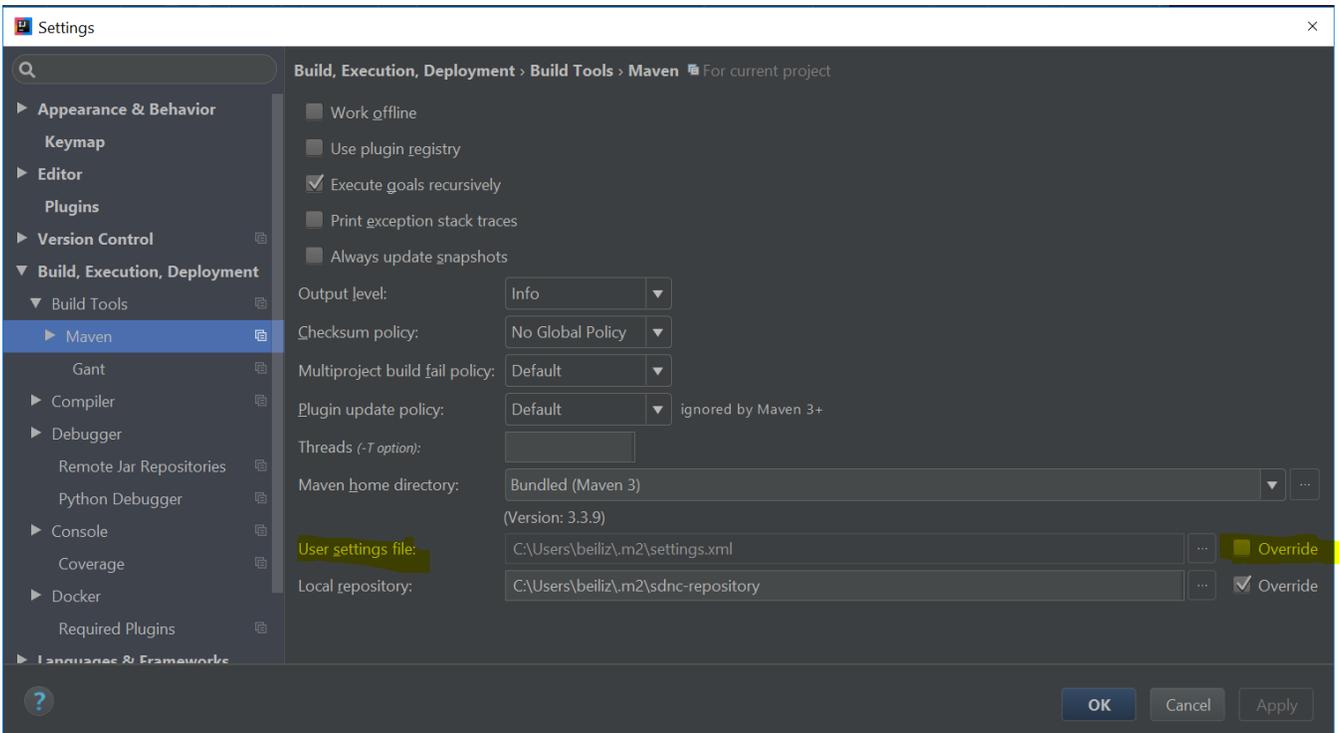
In IntelliJ, Select **View** -> **Tool Windows** -> **Maven Project**



The maven project will shown on the right side of the IntelliJ window.



Click the *Maven Settings* wrench to bring up the **Settings** window:



Select the *Override* of the **User settings file**, add the settings.xml file full path, the **Apply** button will be enabled. click on **Apply** to apply the change.

Build The Code

Projects Build Order

The SDN-C projects repositories should be built in the following order:

- sdnc/core
- sdnc/adaptors
- sdnc/northbound
- sdnc/plugins
- sdnc/oam

Run Maven Build

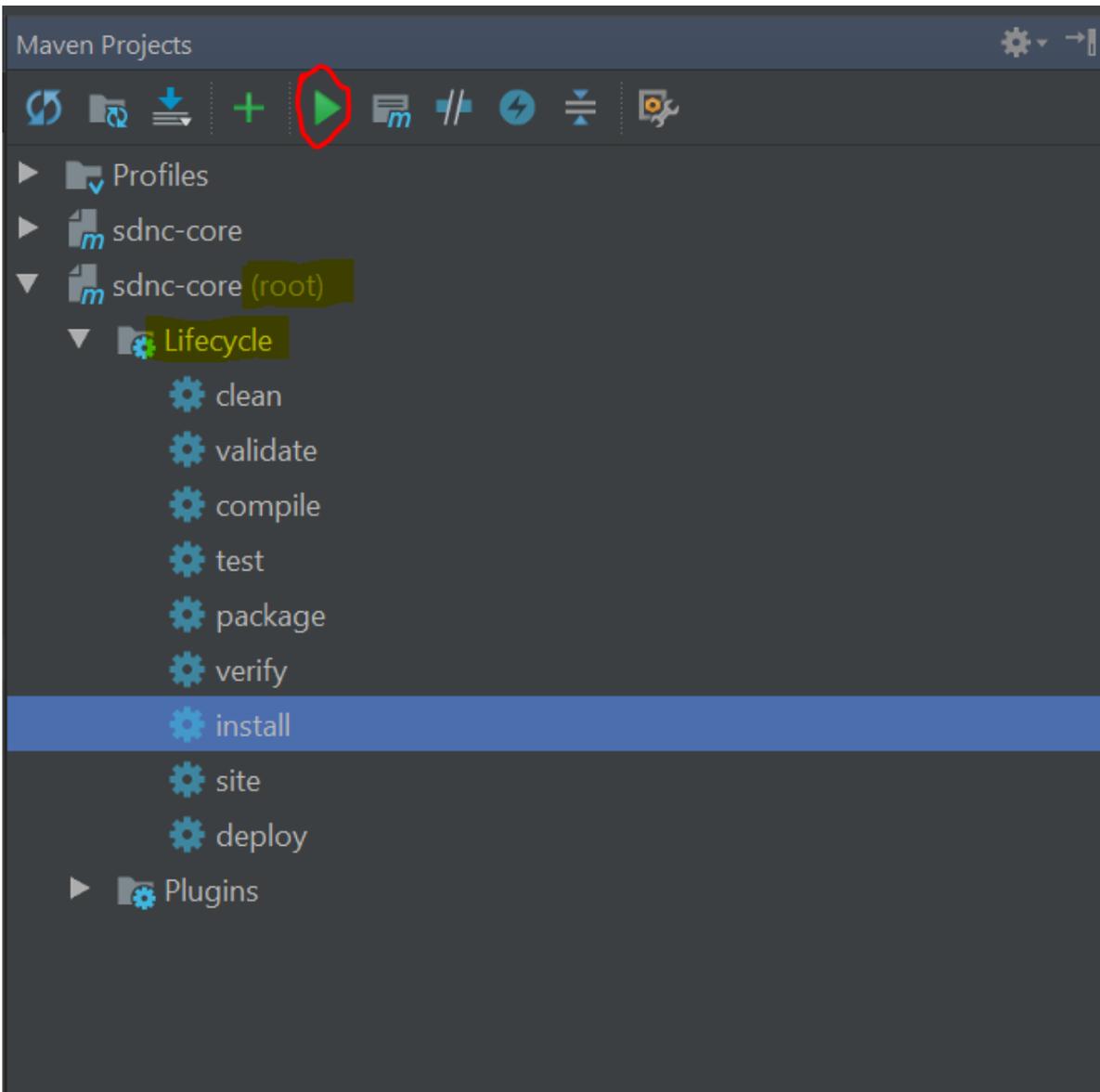
Build From Command Line

Under the directory where your clone code is, run the following command to build the project

```
mvn clean install -s <the settings.xml file with full path>
```

Build Within IntelliJ

From IntelliJ *Maven Projects* window, find the module marked with **(root)**, expand it by clicking on the triangle on the left side or double clicking the text. It will then show two folders : *Lifecycle* and *Plugins*. Use the same way to expand the *Lifecycle* folder, the build options are now shown:



To run the build, double click the **Install** or select **install** and then click on the **Run Maven Build** triangle icon.

To do clean, double click the **clean** or select **clean** and then click on the **Run Maven Build** triangle icon.

Tips

Skip Maven Javadoc Build

In the case, maven javadoc compilation failing which causes build process abort. To continue build the code, we need to skip the maven javadoc compilation.

From command line

add the "maven.javadoc.skip=true" in the command line build command as the following:

```
mvn clean install -Dmaven.javadoc.skip=true -s <the settings.xml file with full path>
```

From pom file

add the following property definition:

POM file property to skip Maven JAVADOC build

```
<properties>
  <maven.javadoc.skip>true</maven.javadoc.skip>
</properties>
```

Unit Testing

Definition of Good Unit Test

Before start writing unit test, it's important that there's a common definition of what a good unit test is.

From the official site of Roy Osherove's book [The Art of Unit Testing](#):

A unit test is an automated piece of code that invokes a unit of work in the system and then checks a single assumption about the behavior of that unit of work.

In SDN-C project, the **unit of work** is being defined as Java Method and a "**good**" Unit Test:

- Is fully automated, integrated with the build process, executes fast, and can be run in any order.
- Executes a specific service flow through a Java method with a known expected result based on the input parameters provides.
- Executes in isolation and doesn't interact with any external methods.
- Executes in memory and does not interact with any external systems, files or databases.
- Consistently return the same result and the result can be trusted. It's Reliable, Repeatable, and Deterministic.

Unit Test Best Practices

- **Arrange, Act, and Assert**
 - Arrange everything you need for the Unit Test.
 - Act invokes the method under test and captures the results.
 - Assert represents the act of testing, it compares the actual result against the expected result. Assert(s) must be present to have a valid unit test.
- **Assert The Results Are Correct**
 - The Unit Test expects a result based on input and asserts it.
 - Simply testing that no exception has been thrown is not enough.
 - Avoid the common mistake of testing all of the functionality in one test case.
- **Use a Naming Convention for Test Cases**
 - Follow the shared naming convention when naming test cases.
 - Standards increase maintainability, readability and visibility.
- **Avoid Test Interdependence**
 - Each test should handle its own setup and tear down.
 - Do not maintain state information between test cases
- **Keep Test Short, Sweet, and Visible**
 - You want the test setup logic to be visible at a glance.
 - Unit test code should be concise

- When a unit test fails you want to quickly and easily see what went wrong.

Unit Test Coverage

When determining what to unit test there are several key principles to keep in mind.

- Unit tests should verify business logic.
- Unit tests should be written that verify your code behaves as expected in "normal" scenarios as well as in more "unexpected" scenarios, like boundary conditions or error conditions (null or missing input values)
- Every time a bug is reported unit tests should be created or enhanced for the faulty code
- Do not unit test trivial code like getters and setters.
- Do not unit test external frameworks or application library functions, assume they work.
- Do not unit test database operations, assume they work when the database is available.

Java code coverage can be measured using an external tool such as JaCoCo which ONAP sonar build is using.

JUnit Test

JUnit is the unit test framework used for testing Java. It is recommend to use Junit4 and Mockito to write the junit tests.

JUnit Unit Test Naming Conventions

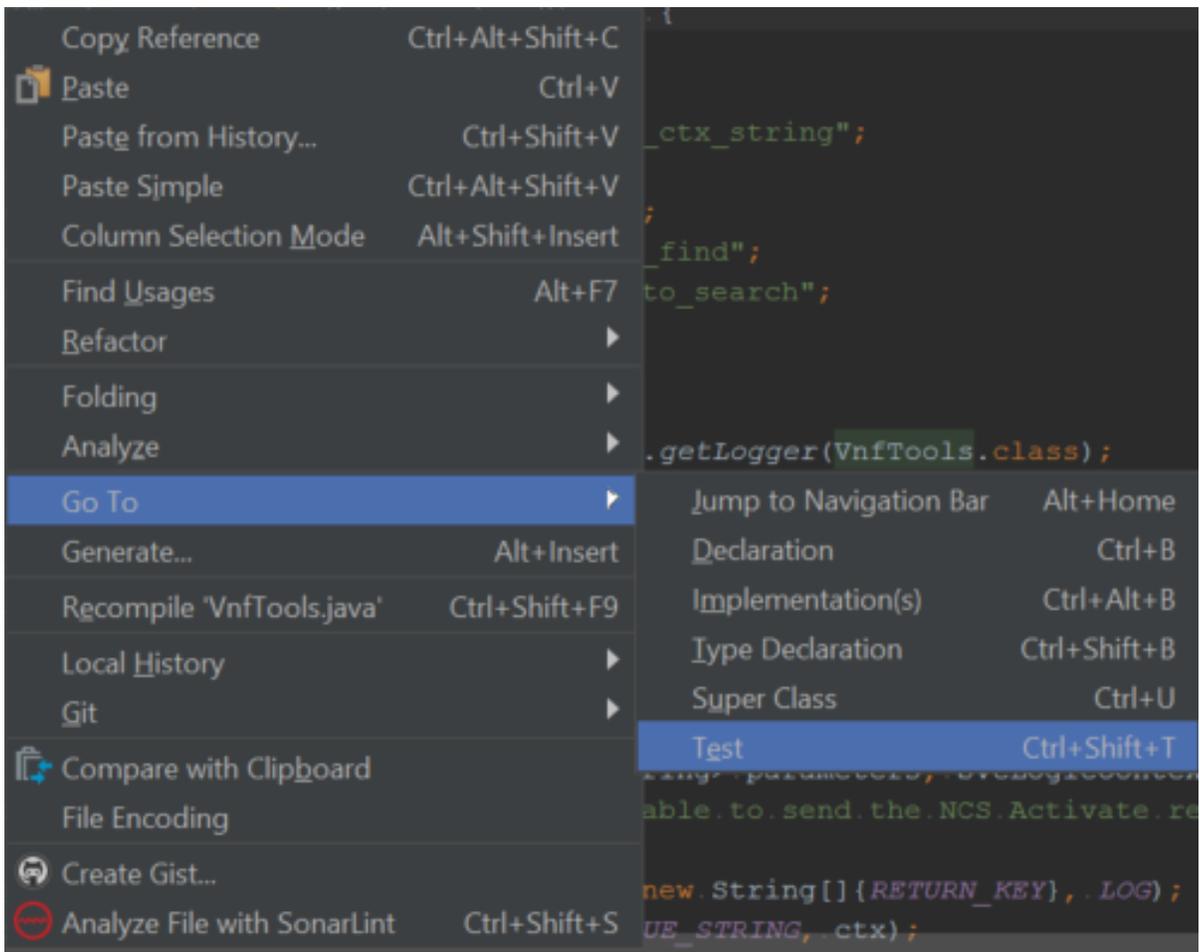
- The name of the test class should be the name of the class it is testing plus the word Test.
 - For example, class *MyClass.java* has test class *MyClassTest.java*.
- The name of a test should contain the name of the method being tested, scenario and expected output.
 - For example, test *createCustomerWithNoNameRaisesException* would be a test which is testing the method *createCustomer*, it tries to do so without providing a name so an exception should be raised.

Create JUnit Test in IntelliJ

This applies to both creating brand new JUnit Test class or navigating to existing test class to add new additions.

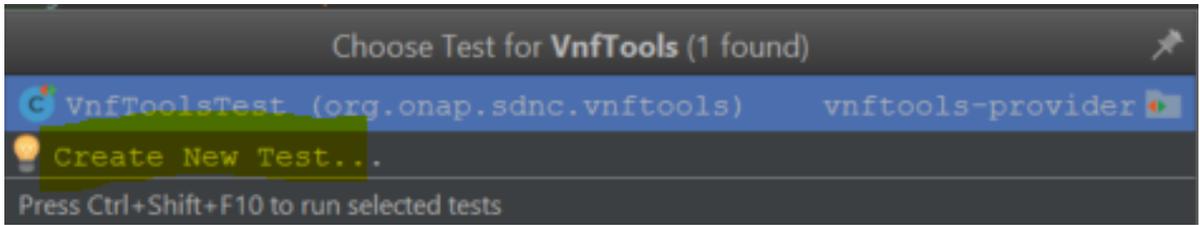
Open the class that you are going to write JUnit test for in IntelliJ.

In anywhere of this class editor, do **Ctrl+Shift+T** or right click to bring up right click menu, then select *Go To*, then *Test* in the cascaded menu:

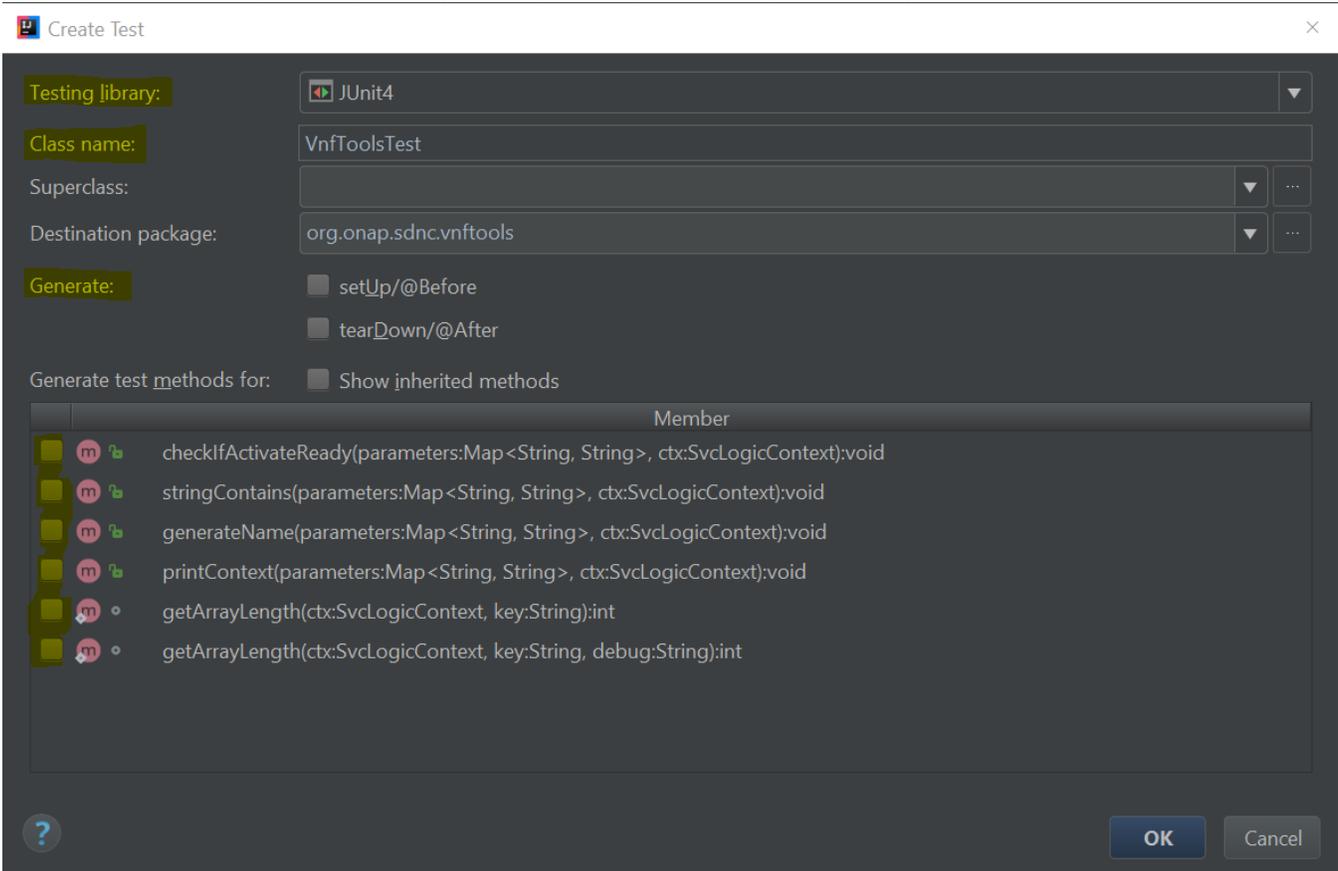


This will bring up the *Choose Test for...* window as below.

Choose *Create New Test...* for creating brand new JUnit Test, or just choose the test class to go to the existing tests.



When *Create New Test...* is selected, the *Create Test* window will be brought up:



The test **Class name** is automatically generated and shown in the window. Ensure the **Testing library** is selected with *JUnit4*.

Select

- *setUp* and *tearDown* for automatically generated *setUp* and *tearDown* methods block for each test case set up and tear down.
- the methods under **Generate test methods for** to automatically generate test method block for that method.

Click **OK** button, once you completed your selection/set up in the *Create Test* window.

It will bring you to the edit page of the new test class.

Add Dependency to POM File

If the Junit and mockito dependencies are not in the module and its parent pom file, add them to the module's pom.xml file. A sample snippet is below:

JUnit dependencies in POM file

```
<dependency>
  <groupId>junit</groupId>
  <artifactId>junit</artifactId>
  <version>${junit.version}</version>
  <scope>test</scope>
</dependency>
<dependency>
  <groupId>org.mockito</groupId>
  <artifactId>mockito-core</artifactId>
  <version>${mockito.version}</version>
  <scope>test</scope>
</dependency>
```

Mock Class Level Attributes

More about how to use Mockito can be found from [Mockito Tutorial](#).

Sometimes you do want to set/get class level attributes to satisfy complex test code and still keep the test coverage in sonar achievable, [Whitebox](#) of package *org.mockito.internal.util.reflection* could be used to do code reflection.

static Object	<code>getInternalState(Object target, String field)</code>
static void	<code>setInternalState(Object target, String field, Object value)</code>

Issue With Using PowerMockito

There are multiple advantages of using PowerMockito to easily write the junit test.

However, we don't recommend to use Powermockito, due to the issue of [Jacoco is not compatible with PowerMockito](#).

Committing Code

Install git-review

To commit code to ONAP, you must have git-review installed. The steps in this section only need to be done one time, except the Tips 😊. This should have been done already during [Setting Up Your Development Environment](#).

On Linux

run the following command to check if *git-review* is installed as part of your OS image.

```
git-review
```

If not the following command to install the *git-review*.

```
sudo apt install git-review
```

here's an example:

install git-review on Linux

```
ubuntu@beili-ws-01:~/Videos$ git-review
```

```
The program 'git-review' is currently not installed. You can install it by typing:
```

```
sudo apt install git-review
```

```
ubuntu@beili-ws-01:~/Videos$ sudo apt install git-review
```

On Windows

must have git installed

If you do not have git installed, following *Install Git on Windows* at [atlassian's tutorials for installing git](#) to

- download the [Git for Windows installer](#)
- start installer and follow **Git Setup** wizard screen **Next** until **Finish** prompts to complete the installation.

must have python installed

If you do not have python installed, following [Python & pip Windows installation](#) to

- download [Python window installer](#)
- start installer and *select Add Python to PATH* option

install git-review using pip

Open a *git bash terminal* by

- going to the *bin* directory under your *git* installed directory (for example, *C:\Program Files\Git\bin* directory),
- run *bash.exe*

In the git bash terminal, run the following command to install git-review

```
c:/Python27/Scripts/pip2.7 install git_review --proxy <your proxy>
```

Set Git Remote Gerrit

Check your git remote setting, use the following command

```
git remote -v
```

Here's an example of output:

git remote output

```
C:\workspace\onap_sdnc\northbound>git remote -v
gerrit http://beiliz@gerrit.onap.org/r/a/sdnc/northbound (fetch)
gerrit http://beiliz@gerrit.onap.org/r/a/sdnc/northbound (push)
origin http://beiliz@gerrit.onap.org/r/a/sdnc/northbound (fetch)
origin http://beiliz@gerrit.onap.org/r/a/sdnc/northbound (push)
```

If the *gerrit* does not exist, you need to set it up with the following command:

```
git remote add gerrit <the link of the origin>
```

Note: the remote origin is added automatically after git clone of the repo. The gerrit link is the same as the origin's, hence, we just directly use it.

Set Git Config

Use the following command to check your git config:

```
git config -l
```

Ensure that you have the following configuration set properly:

GIT Config Key	Expected Value	Setting Command
core.eol	lf	git config --global core.eol lf
core.autocrlf	true	git config --global core.autocrlf true
user.name	your name	git config --global user.name <your name>
user.email	your email address	git config --global user.email <your email address>

Creating A Review

Checkout the master branch, work on your changes, once you are ready for submission, do the following to create a review.

1. Ensure your workspace is clean and up-to-date

Use the following command to check all the changes in the master branch

```
git status
```

Ensure

- your branch is up-to-date with the origin/master
 - do a *git pull* to get the latest master code
- all the changed files are the ones you wanted to submit.
 - remove any un-wanted files

2. Run the following commands in the listed order to create a review

Steps	Command	Notes
-------	---------	-------

1	<code>git commit -sam <comment summary></code>	Commit summary should not exceed 50 char. See ONAP Commit Messages for more details.
2	<code>git log --shortstat</code>	<p>To ensure change lines are properly done and your commit has the following:</p> <ul style="list-style-type: none"> ◦ Change-Id ◦ Signed-off-by <p>Here's an example:</p> <pre> git log --shortstat C:\workspace\onap_sdnc\northbound>git log --shortstat commit 4728eada855f9162030f5b46a2513e3dbffa757c Author: beili.zhou <beili.zhou@amdocs.com> Date: Fri Oct 13 19:19:11 2017 -0400 Sonar coverage vnfapi -VNFSDNSvcLogicServiceClient Add Junit test case for VNFSDNSvcLogicServiceClient In VNFSDNSvcLogicServiceClient: - Fix sonarlint issues (remove un-used import and etc) - Changed tab to 4 spaces as per ONAP Java code style Issue-Id: SDNC-123 Change-Id: Id176e915f17ef5fab6805415f92d60b4c8e95b2 Signed-off-by: beili.zhou <beili.zhou@amdocs.com> 2 files changed, 580 insertions(+), 240 deletions(-) </pre> <p>If the Change-Id does not exist, do not proceed. You need to following Fix no change-id to fix it before proceeding further.</p>
3	<code>git commit --amend</code>	<p>Use this command to do the following:</p> <ul style="list-style-type: none"> ◦ add more description about this commit (refer to Commit Messages for how to organize commit description) ◦ insert <i>Issue-Id: <your ONAP issue id></i> before the <i>Change-Id</i>
4	<code>git review</code>	<p>This command will create the review at Gerrit.</p> <p>Once this command is completed, your newly created review can be found from Outgoing reviews in Gerrit self dashboard .</p>

3. Update the Gerrit Review to get ready

From [Gerrit self dashboard](#), click your newly created review, it will bring up the review details.

Click the **Add** button in the *Reviewers* section, to add reviewers (who is going to review your code) and committers (who is going to review your code as well as approve and commit your code).

The screenshot shows the Gerrit review details page. At the top, the Owner is Beili Zhou. Below that, the Reviewers section shows 'ONAP Jobbuilder' and a yellow 'Add...' button. The Project is 'sdnc/northbound', the Branch is 'master', and the Topic is '2 weeks ago'. At the bottom, there are two buttons: 'Cherry Pick' and 'Revert'.

Note:

- The *ONAP Jobbuilder* will be added automatically within one or two minutes after the review created, and a verify build will also be automatically triggered for your review in ONAP jenkins server.
- The committer can be found from *Software Defined Network Controller* section in [Resources and Repositories \(Deprecated\)](#) page.

By now, you will just wait and check your email for information of

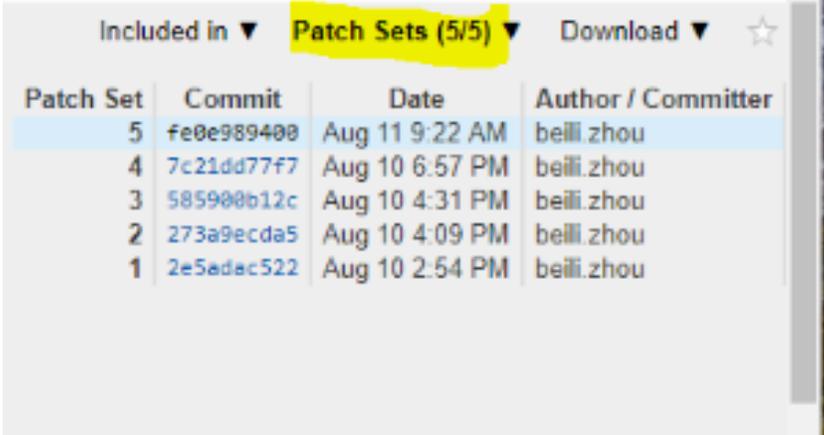
- If the verify jenkins build is passed for your review
 - If it is passed, *ONAP Jobbuilder* will add a **+1** to the *Verified* field in your review.
- If there's any comments in your review
 - the comments details can be view from the **History** section by clicking on the description or *Expand All* button
- If your review has been merged
 - If your review is merged or in process to be merged, you will see in the *Code-Review* field, you have a **+2** from one of the committer you have added in your *Reviewers*.

Tips

How to Change the Comments in a Review

Oops, I made a mistake in my review comments. It cannot be changed in the gerrit review. 😞

Go back to your workspace, and do the following to change the comments of your existing review.

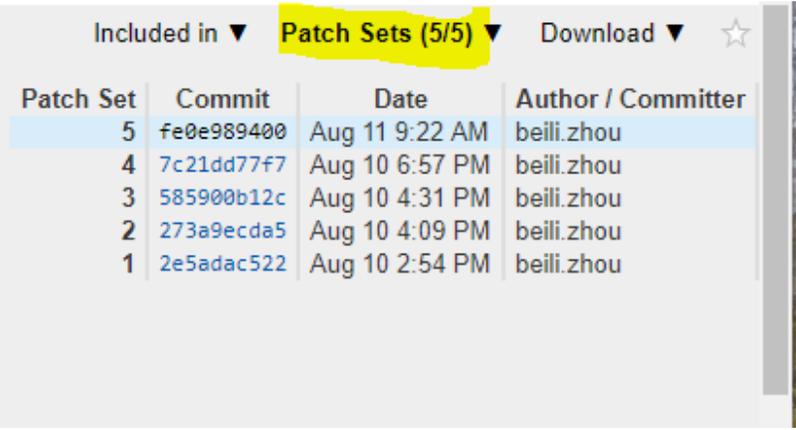
Steps	Command	Notes																								
1	git commit --amend	update the comment as desired																								
2	git log --shortstat	validate your commit now has the updated comments, as well as the Change-Id as the one in the gerrit review																								
3	git review	<p>push the changed comment to the review again.</p> <p>Once the command is completed, go to your review, you will see</p> <ul style="list-style-type: none"> • the comments content adjust to your new ones • the <i>Patch Sets</i> is now increased by one, such as from (1/1) to (2/2). here's an example:  <p>The screenshot shows a table of patch sets in Gerrit. The header includes 'Included in', 'Patch Sets (5/5)', and 'Download'. The table has four columns: Patch Set, Commit, Date, and Author / Committer. The rows are numbered 1 to 5, with the most recent commit at the top.</p> <table border="1"> <thead> <tr> <th>Patch Set</th> <th>Commit</th> <th>Date</th> <th>Author / Committer</th> </tr> </thead> <tbody> <tr> <td>5</td> <td>fe0e989400</td> <td>Aug 11 9:22 AM</td> <td>beili.zhou</td> </tr> <tr> <td>4</td> <td>7c21dd77f7</td> <td>Aug 10 6:57 PM</td> <td>beili.zhou</td> </tr> <tr> <td>3</td> <td>585900b12c</td> <td>Aug 10 4:31 PM</td> <td>beili.zhou</td> </tr> <tr> <td>2</td> <td>273a9ecda5</td> <td>Aug 10 4:09 PM</td> <td>beili.zhou</td> </tr> <tr> <td>1</td> <td>2e5adac522</td> <td>Aug 10 2:54 PM</td> <td>beili.zhou</td> </tr> </tbody> </table>	Patch Set	Commit	Date	Author / Committer	5	fe0e989400	Aug 11 9:22 AM	beili.zhou	4	7c21dd77f7	Aug 10 6:57 PM	beili.zhou	3	585900b12c	Aug 10 4:31 PM	beili.zhou	2	273a9ecda5	Aug 10 4:09 PM	beili.zhou	1	2e5adac522	Aug 10 2:54 PM	beili.zhou
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How to Update the Code in a Review

Now, I got comments in my view, and I have made the code adjustment in my workspace and tested.

Follow the steps to push your new code changes to the your existing reiew.

Steps	command	notes
1	git commit -sam "my updated code"	To create a new commit with your updated code
2	git log --shortstat	<p>you will see the most 2 recent commits are from</p> <ul style="list-style-type: none"> • your commit from step 1 • your original commit of the existing review

3	git rebase -i HEAD~2	<p>To run rebase interactively for the most recent 2 commits</p> <p>In the interactive mode, it will bring up the text which contains pick for your last 2 commits along with the following content:</p> <pre data-bbox="370 226 1323 646"> # # Commands: # p, pick = use commit # r, reword = use commit, but edit the commit message # e, edit = use commit, but stop for amending # s, squash = use commit, but meld into previous commit # f, fixup = like "squash", but discard this commit's log message # x, exec = run command (the rest of the line) using shell # # These lines can be re-ordered; they are executed from top to bottom. # # If you remove a line here THAT COMMIT WILL BE LOST. # # However, if you remove everything, the rebase will be aborted. # # Note that empty commits are commented out </pre> <p>Do the following:</p> <ul style="list-style-type: none"> • replace the pick in the start line of your commit from step 1 (marked with "my updated code") with s or squash, • remove any other text line related to this commit in the line below. • save the change by entering :wq <p>Once this command is completed, 2 commits will be merged into 1 commit.</p>																								
4	git log --shortstat	<p>you will see there's only 1 commit which replaces the 2 commit you have seen in step 2.</p> <p>validate your commit has the Change-Id as the one in the gerrit review</p>																								
5	git review	<p>push the changed comment to the review again.</p> <p>Once the command is completed, go to your review, you will see</p> <ul style="list-style-type: none"> • the comments content adjust to your new ones • the <i>Patch Sets</i> is now increased by one, such as from (1/1) to (2/2). here's an example:  <table border="1" data-bbox="430 1176 1226 1606"> <thead> <tr> <th>Patch Set</th> <th>Commit</th> <th>Date</th> <th>Author / Committer</th> </tr> </thead> <tbody> <tr> <td>5</td> <td>fe0e989400</td> <td>Aug 11 9:22 AM</td> <td>beili.zhou</td> </tr> <tr> <td>4</td> <td>7c21dd77f7</td> <td>Aug 10 6:57 PM</td> <td>beili.zhou</td> </tr> <tr> <td>3</td> <td>585900b12c</td> <td>Aug 10 4:31 PM</td> <td>beili.zhou</td> </tr> <tr> <td>2</td> <td>273a9ecda5</td> <td>Aug 10 4:09 PM</td> <td>beili.zhou</td> </tr> <tr> <td>1</td> <td>2e5adac522</td> <td>Aug 10 2:54 PM</td> <td>beili.zhou</td> </tr> </tbody> </table>	Patch Set	Commit	Date	Author / Committer	5	fe0e989400	Aug 11 9:22 AM	beili.zhou	4	7c21dd77f7	Aug 10 6:57 PM	beili.zhou	3	585900b12c	Aug 10 4:31 PM	beili.zhou	2	273a9ecda5	Aug 10 4:09 PM	beili.zhou	1	2e5adac522	Aug 10 2:54 PM	beili.zhou
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1	2e5adac522	Aug 10 2:54 PM	beili.zhou																							

How to Fix a Commit which Does Not have a Change-Id

This would only happen when you are creating your very first review in a repo. It mainly because your workspace might have some mis-config which lead your repo clone was not done properly with the *Clone with commit-msg hook* option.

Follow the steps below to do the correction.

Steps	Command	Notes
1	git reset HEAD~1	to undo the commit

2	from github helper page , download commit-msg , and place it under your <repo>/git/hooks directory if your O/S adds and extension to the file, remove. It must be named "commit-msg"	set the proper commit-msg hook this will set the Change-Id properly in your commit
3	Use your previous command to create the commit again	
4	git log --shortstat	to check the existence of Change-Id

How to Find All of Your Merged Changes

You can find your recent merged changes from [Gerrit self dashboard](#), however, it only works for **Recent** changes.

To find all of your changes, you can type in "*is:closed(owner:self)*" in the *Search* field at [Gerrit self dashboard](#), then click on the *Search* button.



Deployment

Deploying a Minimal ONAP SDN-C Environment

This tutorial is based on ONAP-integration project^[1] which utilizes Vagrant^[2], a deployment tool to build an ONAP environment.

The goal of this section is to guide how to quickly deploy a running ONAP SDN-C environment which is going to use the existed image in the ONAP Nexus3 server.

Actually it supports various automate deployment environment including compiling code with maven, building docker images as part of the deployment procedure.



ONAP-integration

"Integration framework, automated tools, code and scripts, best practice guidance related to cross-project Continuous System Integration Testing (CSIT), and delivery of ONAP."

Setup

Tool	Version	Introduction
Vagrant	1.9.5	https://www.vagrantup.com/
Virtualbox	5.1.20	https://www.virtualbox.org/
Git	2.14.3	https://git-scm.com/

(1) After installation, make sure that your system is restarted in order to let configuration be activated.

Basic Installations

Windows 10

Download the exe of the following (from the link listed in the above table) and install:

- vagrant
 - https://releases.hashicorp.com/vagrant/?_ga=2.74767696.373821479.1506869076-1225456615.1499750393
- virtualbox
 - https://www.virtualbox.org/wiki/Download_Old_Builds_5_1
- git
 - <https://git-scm.com/downloads>

Ubuntu 16.04

Do the following:

- [Install virtualbox](#)
- [Create Virtualbox "vboxnet0" Host-only networking](#)
- [Install vagrant](#)
- [Install git](#)

Install virtualbox

Add the following line to your `/etc/apt/sources.list`:

```
deb http://download.virtualbox.org/virtualbox/debian xenial contrib
```

Run the command below

```
wget -q https://www.virtualbox.org/download/oracle_vbox_2016.asc -O- | sudo apt-key add -  
wget -q https://www.virtualbox.org/download/oracle_vbox.asc -O- | sudo apt-key add -  
sudo apt-get update  
sudo apt-get install virtualbox-5.1
```

Create Virtualbox "vboxnet0" Host-only networking

On windows installation this may have been created already.

See "https://www.virtualbox.org/manual/ch06.html#network_hostonly"

```
VBoxManage hostonlyif create
```

Install vagrant

```
wget https://releases.hashicorp.com/vagrant/1.9.5/vagrant_1.9.5_x86_64.deb  
sudo dpkg -i vagrant_1.9.5_x86_64.deb
```

Install git

```
sudo apt-get install git
```

Integration Project

Download The Project

Clone the intergration project with the following command:

```
git clone https://git.onap.org/integration
```

Hint: More information could be found under `integration\bootstrap\vagrant-onap\README.md`

Configure Deployment Mode

There is an `settings.yaml.development` under `integration\bootstrap\vagrant-onap\etc (deprecated - /etc directory has been moved to project integration/devtool)` used for different deployment scenarios.

The goal is to have a running SDN-C environment, so in the configuration, it turns off clone and build project. Only file name called `settings.yaml` will be picked-up by the deployment script.

Run the following command to create `settings.yaml` file from the repo's `settings.yaml.development` file:

```
cp settings.yaml.test settings.yaml  
vim settings.yaml
```

Here's the example of the outcoming `settings.yaml` file:

```
build_image: "False"
clone_repo: "False"
compile_repo: "False"
enable_oparent: "False"
skip_get_images: "False"
skip_install: "False"
```

Hint:

- Under `integration\bootstrap\vagrant-onap\doc\source\features\configure_execution.rst`, it talks about the functionality of these attributes.
- Under `integration\bootstrap\vagrant-onap\doc\source\features\example_usage.rst`, it talks about the use cases of using this tool.

Modify Vagrantfile

`vim integration/bootstrap/vagrant-onap/Vagrantfile`

- In configuration = {...}, find `docker_version` and update the corresponding value to 'latest'
- If you are using VirtualBox provider and have an issue with the VM vagrant creates not resolving hostnames then enable the `natdnshostresolver1`

Here is the diff that worked at the time of writing this.

```
diff --git a/bootstrap/vagrant-onap/Vagrantfile b/bootstrap/vagrant-onap/Vagrantfile
index 0664e5f..667d3bf 100644
--- a/bootstrap/vagrant-onap/Vagrantfile
+++ b/bootstrap/vagrant-onap/Vagrantfile
@@ -13,7 +13,7 @@ configuration = {
   'nexus_password'      => 'docker',
   'dmaap_topic'         => 'AUTO',
   'artifacts_version'   => '1.0.0',
-  'docker_version'     => '1.0-STAGING-latest',
+  'docker_version'     => 'latest',
   # Parameters for DCAE instantiation
   'dcae_zone'           => 'iad4',
   'dcae_state'          => 'vi',
@@ -302,6 +302,11 @@ end

Vagrant.configure("2") do |config|

+  if provider == :virtualbox && "sdnc".eql?(requested_machine)
+    config.vm.network "forwarded_port", guest: 8282, host: 8282, protocol: "tcp", auto_correct: true
+    config.vm.network "forwarded_port", guest: 8201, host: 8201, protocol: "tcp", auto_correct: true
+  end
+
  # PROXY definitions
  if ENV['http_proxy'] != nil and ENV['https_proxy'] != nil and ENV['no_proxy'] != nil
    if not Vagrant.has_plugin?('vagrant-proxyconf')
@@ -340,6 +345,7 @@ Vagrant.configure("2") do |config|
  # Common Settings:

  nodeconfig.vm.provider "virtualbox" do |vbox|
+  vbox.customize ['modifyvm', :id, '--natdnshostresolver1', 'on']
  vbox.customize ['modifyvm', :id, '--nictype1', 'virtio']
  vbox.customize ['modifyvm', :id, '--audio', 'none']
  vbox.customize ['modifyvm', :id, '--vram', '1']
```

Also

Modify the SDN-C Deployment Script

The `get_sdnc_images` function in the "integration/bootstrap/vagrant-onap/lib/sdnc" may need to be synchronized with the images defined in the docker compose file [\[sdnc/oam.git\] / installation / src / main / yml / docker-compose.yml](#). If these are not synchronized you will get a

```
pull access denied for [image name], repository does not exist or may require 'docker login'
```

In addition to the synchronizing the images the keyword `openecomp` has changed to `onap`.

Here is the diff that worked at the time of writing this.

```
diff --git a/bootstrap/vagrant-onap/lib/sdnc b/bootstrap/vagrant-onap/lib/sdnc
index a69ce18..ff582fe 100755
--- a/bootstrap/vagrant-onap/lib/sdnc
+++ b/bootstrap/vagrant-onap/lib/sdnc
@@ -3,7 +3,7 @@
 source /var/onap/functions
 source /var/onap/ccsdk

-sdnc_src_folder=$git_src_folder/openecomp/sdnc
+sdnc_src_folder=$git_src_folder/onap/sdnc
sdnc_repos=("sdnc/adaptors" "sdnc/architecture" "sdnc/core" "sdnc/features" \
"sdnc/northbound" "sdnc/oam" "sdnc/parent" "sdnc/plugins")

@@ -45,9 +45,11 @@ function get_sdnc_images {
     if [[ "$build_image" == "True" ]]; then
         _build_sdnc_images
     else
-        pull_openecomp_image sdnc-image openecomp/sdnc-image:latest
-        pull_openecomp_image admportal-sdnc-image openecomp/admportal-sdnc-image:latest
-        pull_openecomp_image dgbuilder-sdnc-image openecomp/dgbuilder-sdnc-image:latest
+        pull_onap_image sdnc-image onap/sdnc-image:latest
+        pull_onap_image admportal-sdnc-image onap/admportal-sdnc-image:latest
+        pull_onap_image ccscdk-dgbuilder-image onap/ccscdk-dgbuilder-image:latest
+        pull_onap_image sdnc-ueb-listener-image onap/sdnc-ueb-listener-image:latest
+        pull_onap_image sdnc-dmaap-listener-image onap/sdnc-dmaap-listener-image:latest
     fi
     pull_docker_image mysql/mysql-server:5.6
 }
```

Deployment

Start Deployment

```
cd integration/bootstrap/vagrant-onap
./tools/run.sh sdnc
```

This will configure and start the guess VM

configure and start the sdnc docker resources on the guest VM.

and finally the SDNC will start

Base OS	Guess OS	dockercontainer
PortForwarding BaseOS -> GuessOS 8201 -> 8201 8282 -> 8282	PortForwarding GuessOS -> onap/sdnc-image:latest 8201 -> 8101 8282 -> 8181	onap/sdnc-image:latest
		otherdockercontainers



wait

Once the vagrant has completed running it will still take some time for SDNC to come up. Have patience.

Connecting to your deployment

Basic Usage of Vagrant

Vagrant commands are executed on the Base OS.

Get Detail about the vagrant Commands

Print the usage use the '-h' option

```
vagrant -h
vagrant <command> -h
```

check running vm instances

From the Base OS use the following command to see the running guest VM id and name.

```
vagrant global-status
```

Port Forwarding

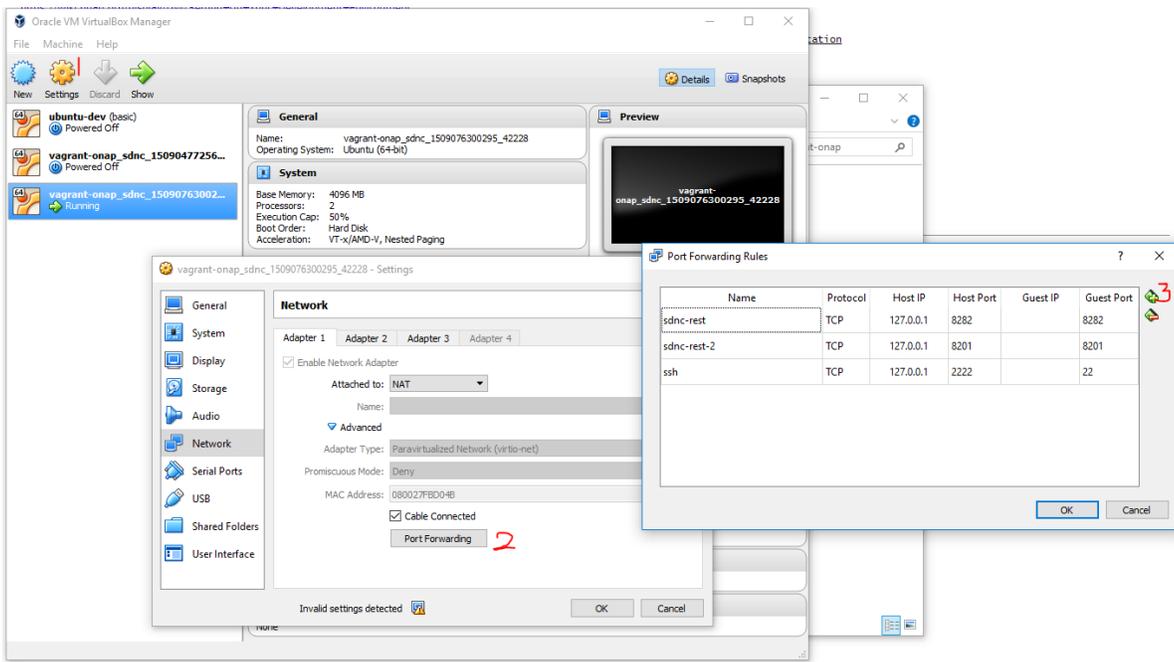
The guest VM is running in its own private network and is using the NAT to get the the Base OS network. To see the port forwarding run the following command.

```
vagrant port sdnc
```

If you don't see any ports Oops. Configuring port-forwarding should have been configured earlier when editing the [\[integration.git\] / bootstrap / vagrant-onap / Vagrantfile](#). Something must of went wrong. Here is the example of a snippet that can be added to the Vagrant file.

```
Vagrant.configure("2") do |config|
  if provider == :virtualbox && "sdnc".eql?(requested_machine)
    config.vm.network "forwarded_port", guest: 8282, host: 8282, protocol: "tcp", auto_correct:
true
    config.vm.network "forwarded_port", guest: 8281, host: 8202, protocol: "tcp", auto_correct:
true
  end
end
```

Port forwarding can also be configured in the Virtual Box Gui. Here is an example



ssh to the Guest OS

The follow command will open a ssh terminal to the running guess vm. The guest vm name or id can be used.

```
vagrant ssh sdnc
```

Basic Usage of Docker

docker commands are executed on the guest OS

Get Detail about the dockerCommands

Print the usage use the '-h' option

```
vagrant -h
```

```
vagrant <command> -h
```

List docker container images

On the Guess VM execute the docker commands

```
docker images
```

List the running docker containers

The following command will list the running docker containers. The container's id, name and which ports are forwarded to the Guess OS can be found in this list.

```
docker ps -a
```

open a terminal to a docker running docker container

Use the docker container id or name use the following command to open a terminal to that container.

```
docker exec -i -t sdnc_controller_container bash
```

OpenDaylight RestConf API Web GUI

To connect to the running sdnc port forwarding must be configured correctly. The port forwarded in the instruction above was 8282.

<http://baseoshostip:8282/apidoc/explorer/index.html>

The credentials to connect to the SDNC Web GUI are can be found in the file [\[sdnc/oam.git\] / installation / sdnc / src / main / scripts / startODL.sh](#). Look for the variable ODL_ADMIN_PASSWORD

Here is an example

```
Credentials: admin/Kp8bJ4SXszM0WXlhak3eHlcse2gAw84vaoGGmJvUy2U
```

Reference:

[1] ONAP integration: <https://git.onap.org/integration/>

[2] Vagrant: <https://www.vagrantup.com/>

[3] ONAP SDC setup: [Using Vagrant-Onap for local deployment of SDC project - WIP!!!#OnapforlocaldeploymentofSDCproject-WIP!!!-InitialSetup](#)

[4] Virtualbox Download link: https://www.virtualbox.org/wiki/Linux_Downloads

Deploying New Code (based on the standard ONAP lab setup)

This tutorial talks about one way to deploy new sdnc code into the corresponding docker image which is based on the previous chapter "Deploying a Minimal ONAP SDN-C Environment"

Example: Deploy feature.zip File into Docker Image

The example is about adding a new rpc in the generic-resource-api which is a sub-module of northbound project.

Download Project

Download sdnc-northbound project and put it under integration/bootstrap/vagrant-onap/opt/openecomp/sdnc

This step is not necessary which is used to align with the folder path where ONAP-integration clone, compile project.

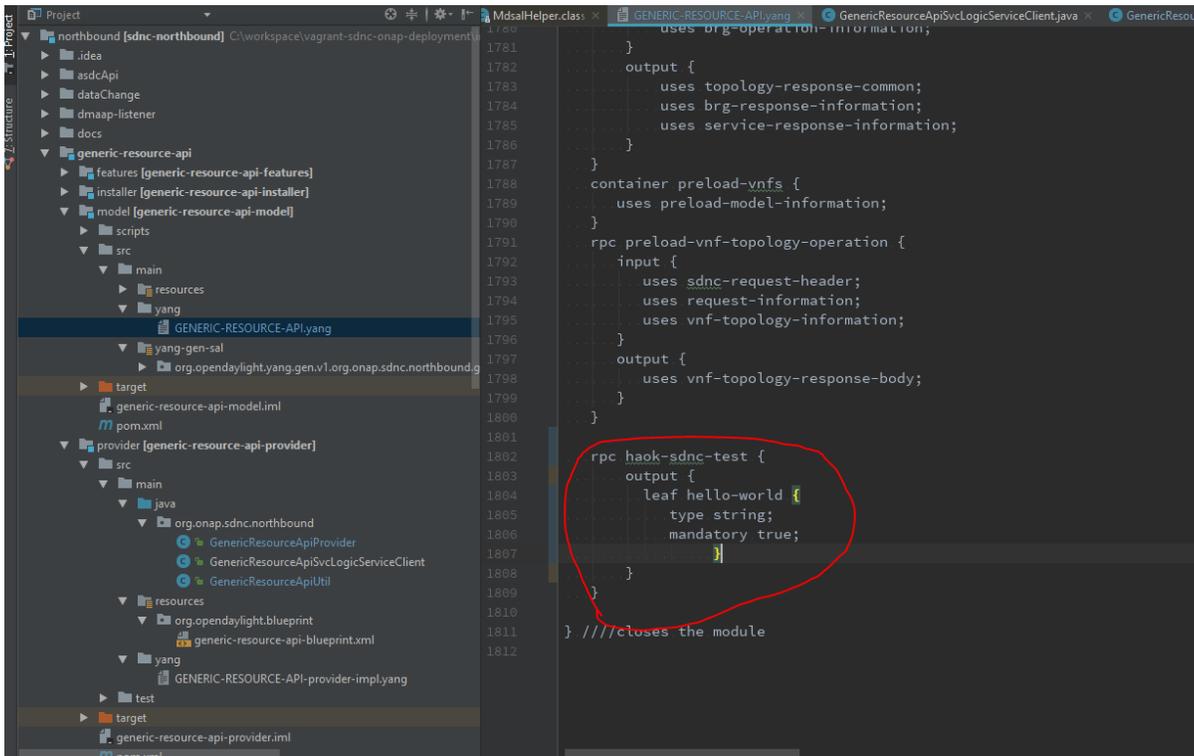
Add a New RPC

Edit northbound/generic-resources-api/model/src/main/yang/GENERIC-RESOURCES-API.yang

For example

```
...
rpc haok-sdnc-test {
  output {
    leaf hello-world {
      type string;
      mandatory true;
    }
  }
}
...

```



Use Maven to Build Project

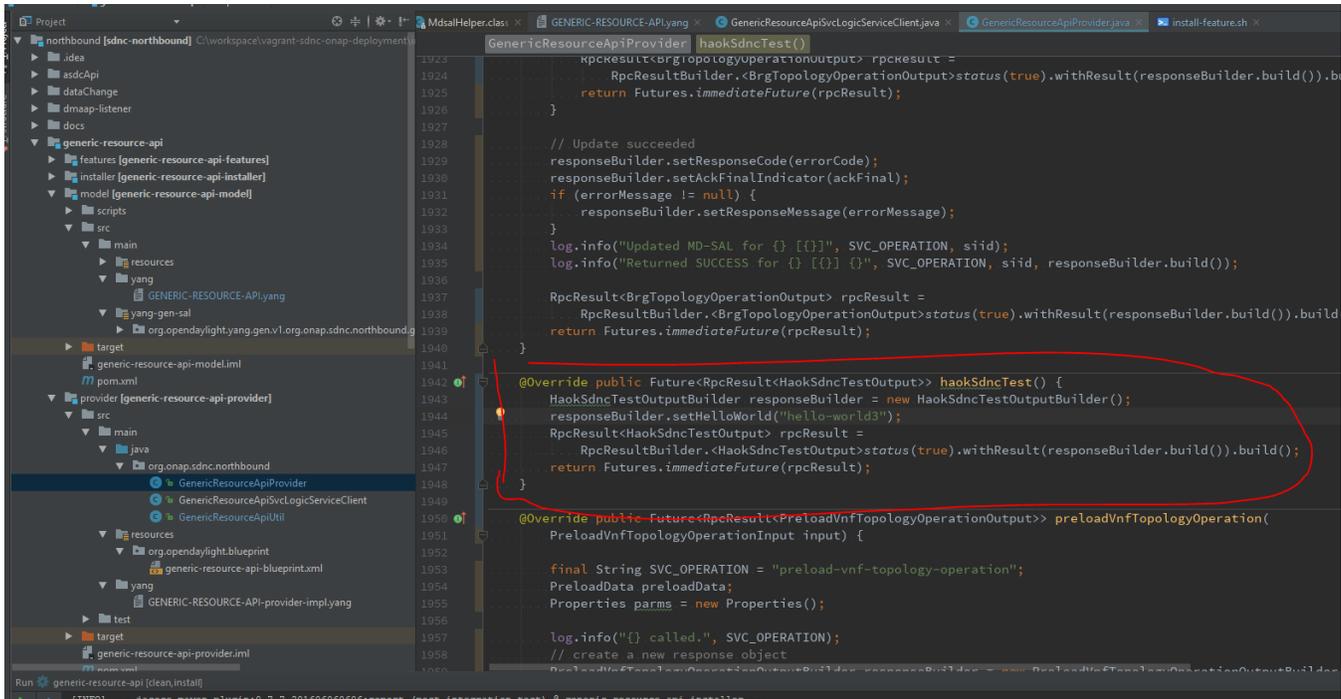
build generic-resources-api/model

Write a Simple Implementation

Implement the new rpc generated by YANG model in GenericResourcesApiProvider

For example

```
@Override public Future<RpcResult<HaokSdncTestOutput>> haokSdncTest() {
    HaokSdncTestOutputBuilder responseBuilder = new HaokSdncTestOutputBuilder();
    responseBuilder.setHelloWorld("hello-world3");
    RpcResult<HaokSdncTestOutput> rpcResult =
        RpcResultBuilder.<HaokSdncTestOutput>status(true).withResult(responseBuilder.build()).build();
    return Futures.immediateFuture(rpcResult);
}
```



Copy and unzip feature

```
vagrant ssh $(vagrant global-status | grep sdnc | awk '{print $1}')
```

```
docker cp /opt/openecomp/sdnc/northbound/generic-resource-api/installer/target/sdnc-generic-resource-api-1.2.0-SNAPSHOT-installer.zip $(docker ps -a | grep "/sdnc-image" | awk '{print $1}'):/opt/sdnc/features
```

```
docker exec -it $(docker ps -a | grep "/sdnc-image" | awk '{print $1}') bash
```

```
cd /opt/sdnc/features
```

```
unzip -o sdnc-generic-resource-api-1.2.0-SNAPSHOT-installer.zip
```

```
unzip -o -d /opt/opendaylight/current sdnc-generic-resource-api/sdnc-generic-resource-api-1.2.0-SNAPSHOT.zip
```

```
rm sdnc-generic-resource-api-1.2.0-SNAPSHOT-installer.zip
```

```
rm -rf sdnc-generic-resource-api
```

Re-install Feature

```
/opt/opendaylight/current/bin/client -u karaf feature:uninstall sdnc-generic-resource-api
```

```
/opt/opendaylight/current/bin/client -u karaf feature:repo-remove mvn:org.onap.sdnc.northbound/generic-resource-api-features/1.2.0-SNAPSHOT/xml/features
```

```
/opt/opendaylight/current/bin/client -u karaf feature:repo-add mvn:org.onap.sdnc.northbound/generic-resource-api-features/1.2.0-SNAPSHOT/xml/features
```

```
/opt/opendaylight/current/bin/client -u karaf feature:install sdnc-generic-resource-api
```

```
docker restart $(docker ps -a | grep "/sdnc-image" | awk '{print $1}')
```

Hint: The version 1.2.0-SNAPSHOT could be updated in the future. Please update the version according to the current project version.

Here is a simple sdnc-docker-auto-deploy script if you would like to use.

Download Link: [sdnc-docker-auto-deploy.zip](#)

After download this link, **unzip** the file under integration/vagrant-onap/opt.

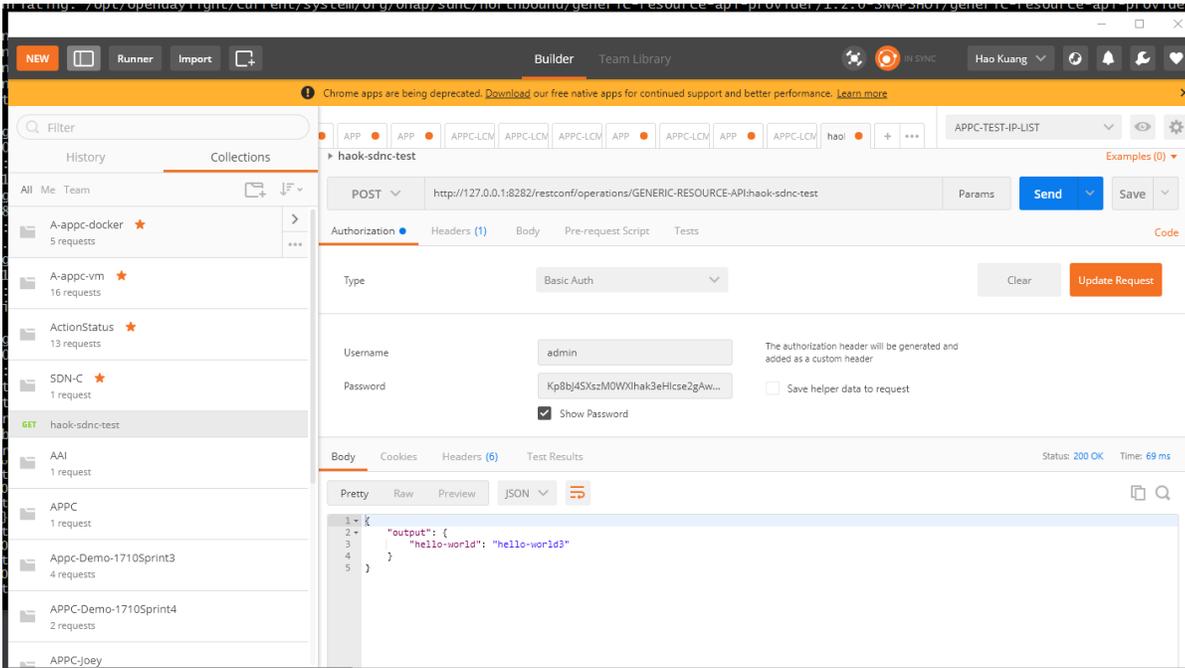
Use **Vagrant ssh** to connect your running sdnc vm.

and find the script, run **./sdnc-docker-auto-deploy.cfg**.

The corresponding configuration is in **sdnc-docker-auto-delpoy.cfg**.

Verify new rpc

It takes a minute to restart the karaf platform which really depends on the performance of your host machine.



Remote Debugging

This is the tutorial about how to turn on the remote debug for sdnc docker instance.

SSH to VM

```
vagrant ssh ${vm-id}
```

Pre-setup

```
export MTU=$(/sbin/ifconfig | grep MTU | sed 's/. *MTU:/' | sed 's/ .*//' | sort -n | head -1)
```

```
alias docker-compose=/opt/docker/docker-compose
```

```
docker rm ${sdnc-docker-instance-id}
```

```
//check the java process to make sure it's been killed, if not run "sudo kill -9 ${PID}"
```

```
ps aux | grep java
```

Update docker-compose yaml file

```
vim /opt/openecomp/sdnc/oam/installation/src/main/yaml/docker-compose.yaml
```

Under sdnc service, add **"5005:5005"** under ports

Under sdnc service, add **"KARAF_DEBUG=true"** under environment.

Below shows the example

