



# **Bottlenecks Project**

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**OPNFV**

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<b>1</b>	<b>Introduction</b>	<b>1</b>
1.1	Contact Bottlenecks . . . . .	1
<b>2</b>	<b>Bottlenecks Rubbos Installation Guide</b>	<b>3</b>
2.1	Rubbos Introduction . . . . .	3
2.2	Preinstall Packages . . . . .	3
2.3	How does Rubbos Integrate into Installers . . . . .	3
2.4	Test Result Description . . . . .	4
<b>3</b>	<b>Bottlenecks VSTF Installation Guide</b>	<b>5</b>
3.1	VSTF Introduction . . . . .	5
3.2	Pre-install Packages on the ubuntu 14.04 VM . . . . .	5
3.3	How is VSTF Integrated into Installers . . . . .	6
3.4	Test Result Description . . . . .	7
<b>4</b>	<b>Bottlenecks Test Report</b>	<b>9</b>
4.1	Scope . . . . .	9



## INTRODUCTION

### **Welcome to bottlenecks' documentation !**

[Bottlenecks](#) is an OPNFV Project.

The project's goal is to find system bottlenecks by testing and verifying OPNFV infrastructure in a staging environment before committing it to a production environment. Instead of debugging a deployment in production environment, an automatic method for executing benchmarks which plans to validate the deployment during staging is adopted. This project will provide frameworks to find the bottlenecks of OPNFV infrastructure.

The *Bottlenecks* framework is deployed in several OPNFV community labs. It is installer, infrastructure and application independent.

#### **See also:**

[Pharos](#) for information on OPNFV community labs.

## 1.1 Contact Bottlenecks

Feedback? [Contact us](#)



## BOTTLENECKS RUBBOS INSTALLATION GUIDE

### 2.1 Rubbos Introduction

Rubbos is a bulletin board benchmark modeled after an online news forum like Slashdot. It is an open source Middleware and an n-tier system model which is used to be deployed on multiple physical node to measure the whole performance of OPNFV platform. for release B. Rubbos can deploy the Apache, tomcat, and DB. Based on the deployment, rubbos gives the pressure to the whole system. When the system reaches to the peak, the throughput will not grow more. This testcase can help to understand the bottlenecks of OPNFV platform and improve the performance of OPNFV platform.

### 2.2 Preinstall Packages

There is a need to install some packages before running the rubbos, gcc, gettext, g++, libaio1, libaio-dev, make and git are necessary. When the rubbos runs on the OPNFV community continuous integration(CI) system, the required packages are installed automatically as shown in the code repository, which is /utils/infra\_setup/vm\_dev\_setup/packages.conf, besides, the packages can be encapsulated in the images initially. If someone wants to use rubbos locally, he/she has to install them by hand, such as in ubuntu 14.04,

```
apt-get update
apt-get install gettext
```

### 2.3 How does Rubbos Integrate into Installers

#### 1.Community CI System

Rubbos has been successfully integrated into fuel and compass with NOSDN scenario in OPNFV community CI system.

Heat is used to create 9 instances, which is shown in /utils/infra\_setup/heat\_template/HOT\_create\_instance.sh, the 9 instances are used for installing Apache, Tomcat, Mysql, Control, Benchmark and 4 Clients. The tools, such as rubbos, sysstat, oprofile, etc, are installed in these instances to perform the test, the test results are stored in the Benchmark instance initially, then they are copied to the Rubbos\_result instance, finally, the test results are transferred to the community dashboard.

There's a need to store our packages as large as M bytes or G bytes size, such as the images, jdk, apache-ant, apache-tomcat, etc, the OPNFV community storage system, Google Cloud Storage, is used, the packages can be downloaded from <https://artifacts.opnfv.org/bottlenecks/rubbos>.

#### 2.Local Deployment

If someone wants to run the rubbos in his own environment, he/she can keep to the following steps,

2.1 Start up instances by using heat, nova or libvirt. In Openstack Environemnt, the heat script can refer /utils/infra\_setup/heat\_template/HOT\_create\_instance.sh, if the openstack doesn't support heat module, the script /utils/infra\_setup/create\_instance.sh can be used. Without Openstack, there's a way to set up instances by using libvirt, the scripts are shown under the directory /utils/rubbos\_dev\_env\_setup.

The image can be downloaded from the community cloud storage

```
curl --connect-timeout 10 -o bottlenecks-trusty-server.img
http://artifacts.opnfv.org/bottlenecks/rubbos/bottlenecks-trusty-server.img
```

2.2 Ssh into the control node and clone the bottlenecks codes to the root directory.

```
git clone https://git.opnfv.org/bottlenecks /bottlenecks
```

2.3 Download the packages and decompress them into the proper directory.

```
curl --connect-timeout 10 -o app_tools.tar.gz
http://artifacts.opnfv.org/bottlenecks/rubbos/app_tools.tar.gz
curl --connect-timeout 10 -o rubbosMulini6.tar.gz
http://artifacts.opnfv.org/bottlenecks/rubbos/rubbosMulini6.tar.gz
```

```
tar xzf app_tools.tar.gz -C /bottlenecks/rubbos
tar xzf rubbosMulini6.tar.gz -C /bottlenecks/rubbos/rubbos_scripts
```

2.4 Ssh into the Control node and run the script

```
source /bottlenecks/rubbos/rubbos_scripts/1-1-1/scripts/run.sh
```

2.5 Check the test results under the directory /bottlenecks/rubbos/rubbos\_results in Control node. The results are stored in the format of xml, move them to the brower chrome, then you can see the results.

## 2.4 Test Result Description

In OPNFV community, the result is shown in the following format

```
[{'client': 200, 'throughput': 27},
 {'client': 700, 'throughput': 102},
 {'client': 1200, 'throughput': 177},
 {'client': 1700, 'throughput': 252},
 {'client': 2200, 'throughput': 323},
 {'client': 2700, 'throughput': 399},
 {'client': 3200, 'throughput': 473}]
```

The results are transferred to the community database and a map is drawn on the dashboard. Along with the growth of the number of the client, the throughput grows at first, then meets up with a point of inflexion, which is caused by the bottlenecks of the measured system.



## BOTTLENECKS VSTF INSTALLATION GUIDE

### 3.1 VSTF Introduction

VSTF(Virtual Switch Test Framework) is a system-level testing framework in the area of network virtualization, and it could help you estimate the system switch ability and find out the network bottlenecks by main KPIs(bandwidth, latency, resource usage and so on), VSTF owns a methodology to define the test scenario and testcases, Now we could support Tu testcases in the Openstack environment, More scenarios and cases will be added.

#### 3.1.1 VSTF TestScenario

1. Tu - VM to VM
2. Tn - Physical Nic loopback
3. TnV - VNF loopback
4. Ti - VM to Physical Nic

### 3.2 Pre-install Packages on the ubuntu 14.04 VM

#### 3.2.1 VSTF VM Preparation Steps

1. Create a ubuntu 14.04 VM
2. Install dependency inside VM
3. Install vstf python package inside VM

#### 3.2.2 VM preparation

Install python2.7 version and git

```
sudo apt-get install python2.7
sudo apt-get install git
```

Download Bottlenecks package

```
sudo cd /home/
sudo git clone https://gerrit.opnfv.org/gerrit/bottlenecks
```

Install the dependency

```
sudo apt-get install python-pip
sudo pip install --upgrade pip
sudo dpkg-reconfigure dash
sudo apt-get install libjpeg-dev
sudo apt-get install libpng-dev
sudo apt-get install python-dev
sudo apt-get install python-testrepository
sudo apt-get install git
sudo apt-get install python-pika
sudo apt-get install python-oslo.config
sudo pip install -r /home/bottlenecks/vstf/requirements.txt
```

### Install vstf package

```
sudo mkdir -p /var/log/vstf/
sudo cp -r /home/bottlenecks/vstf/etc/vstf/ /etc/
sudo mkdir -p /opt/vstf/
sudo cd /home/bottlenecks;sudo rm -rf build/
sudo python setup.py install
```

## 3.2.3 Image on the Cloud

Name	vstf-image
URL	<a href="http://artifacts.opnfv.org/bottlenecks/vstf-manager-new.img">http://artifacts.opnfv.org/bottlenecks/vstf-manager-new.img</a>
Format	QCOW2
Size	5G
User	root
Passwd	root

There is a complete vstf image on the cloud ,you could download it and use it to deploy and run cases ,but do not need VM preparation steps.

## 3.3 How is VSTF Integrated into Installers

### 3.3.1 VM requirements

Name	FLAVOR	IM-AGE_NAME	NETWORK
vstf-manager	m1.large	vstf-image	control-plane=XX.XX.XX.XX
vstf-tester	m1.large	vstf-image	control-plane(eth0)=XX.XX.XX.XX test-plane(eth1)=XX.XX.XX.XX
vstf-target	m1.large	vstf-image	control-plane(eth0)=XX.XX.XX.XX test-plane(eth1)=XX.XX.XX.XX

m1.large means 4U4G for the target image Size 5GB For the network used by VMs,network need two plane ,one plane is control plane and the other plane is test plane.

### 3.3.2 OPNFV community Usage in the CI system

Project Name	Project Category
bottlenecks-daily-fuel-vstf-lf-master	bottlenecks

OPNFV community jenkins Project info

Main Entrance for the ci test:

```
cd /home/bottlenecks/ci;
bash -x vstf_run.sh
```

### 3.3.3 Test on local(Openstack Environment)

download the image file

```
curl --connect-timeout 10 -o /tmp/vstf-manager.img \
http://artifacts.opnfv.org/bottlenecks/vstf-manager-new.img -v
```

create the image file by the glance

```
glance image-create --name $MANAGER_IMAGE_NAME \
--disk-format qcow2 \
--container-format bare \
--file /tmp/vstf-manager.img
```

create the keypair for the image(anyone will be ok)

```
cd /home/bottlenecks/utils/infra_setup/bottlenecks_key
nova keypair-add --pub_key $KEY_PATH/bottlenecks_key.pub $KEY_NAME
```

create the vstf three VMs in the openstack by heat

```
cd /home/bottlenecks/utils/infra_setup/heat_template/vstf_heat_template
heat stack-create vstf -f bottleneck_vstf.yaml
```

launch the vstf process inside the vstf-manager vstf-tester vstf-target VMs

```
cd /home/bottlenecks/utils/infra_setup/heat_template/vstf_heat_template
bash -x launch_vstf.sh
```

edit the test scenario and test packet list in the vstf\_test.sh, now support the Tu-1/2/3

```
function fn_testing_scenario(){
    ...
    local test_length_list="64 128 256 512 1024"
    local test_scenario_list="Tu-1 Tu-3"
    ...
}
```

launch the vstf script

```
cd /home/bottlenecks/utils/infra_setup/heat_template/vstf_heat_template
bash -x vstf_test.sh
```

## 3.4 Test Result Description

### 3.4.1 Result Format

For example after the test, The result will display as the following format

```
{ u'64': { u'AverageLatency': 0.063,
          u'Bandwidth': 0.239,
          u'CPU': 0.0,
          u'Duration': 20,
          u'MaximumLatency': 0.063,
          u'MinimumLatency': 0.063,
          u'MppspGhz': 0,
          u'OfferedLoad': 100.0,
          u'PercentLoss': 22.42,
          u'RxFrameCount': 4309750.0,
          u'RxMbps': 198.28,
          u'TxFrameCount': 5555436.0,
          u'TxMbps': 230.03}}
```

### 3.4.2 Option Description

Option Name	Description
AverageLatency	The average latency data during the packet transmission (Unit:microsecond)
Bandwidth	Network bandwidth(Unit:Million packets per second)
CPU	Total Resource Cpu usage(Unit: Ghz)
Duration	Test time(Unit: second)
MaximumLatency	The maximum packet latency during the packet transmission (Unit:microsecond)
MinimumLatency	The maximum packet latency during the packet transmission (Unit:microsecond)
MppspGhz	Million Packets per second with per CPU resource Ghz(Unit: Mpps/Ghz)
OfferedLoad	The load of network offered
PercentLoss	The percent of frame loss rate
RxFrameCount	The total frame on Nic rx
RxMbps	The received bandwidth per second
TxFrameCount	The total frame on Nic rx
TxMbps	The send bandwidth per second

## BOTTLENECKS TEST REPORT

### 4.1 Scope

This document provides an overview of the results of test cases developed by the OPNFV Bottlenecks Project, executed on OPNFV community labs.

OPNFV CI(Continuous Integration) system provides automated build, deploy and testing for the software developed in OPNFV. Unless stated, the reported tests are automated via Jenkins Jobs.

Test results are visible in the following dashboard:

- *Testing dashboard*: uses Mongo DB to store test results and Bitergia for visualization, which includes the rubbos test result, vstf test result.