SLICES -

Results

Resources requested from RSpec:

Note that the results are current as of the finish time. Your resource allocation may have changed after this time if resources expired or were deleted. Check the slice page for the most up-to-date results about your slice's current allocated resources.

Node #1 (at Georgia Tech InstaGENI):

Status	Client ID	Component ID	Expiration	Type	Hostname
Unknown	router	pc1		emulab-xen	router.idsfw.ch-geni-net.instageni.rnoc.gatech.edu
Login	ssh_yonggewa@pc1.instageni.rnoc.gatech.edu -p 26564 ssh_ishah3@pc1.instageni.rnoc.gatech.edu -p 26564				
Interfaces		MAC		Layer 3	
router:right	pc1:lo0	021d8d9321bf		ipv4: 10.10.11.2	
router:switch	pc1:lo0	02ce75af13d3		ipv4: 10.10.10.2	

Node #2 (at Georgia Tech InstaGENI):

Status	Client ID	Component ID	Expiration	Type	Hostname
Unknown	switch	pc1		emulab-xen	switch.idsfw.ch-geni-net.instageni.rnoc.gatech.edu
Login	ssh_yonggewa@pc1.instageni.rnoc.gatech.edu -p 26565 ssh_ishah3@pc1.instageni.rnoc.gatech.edu -p 26565				
Interfaces		MAC		Layer 3	
switch:router	pc1:lo0	026f24ae99a5		ipv4: 192.168.129.1	

Status	Client ID	Component ID	Expiration	Type	Hostname
Unknown	switch	pc1		emulab-xen	switch.idsfw.ch-geni-net.instageni.rnoc.gatech.edu
Login	ssh_yonggewa@pc1.instageni.rnoc.gatech.edu -p 26565 ssh_ishah3@pc1.instageni.rnoc.gatech.edu -p 26565				
Interfaces		MAC		Layer 3	
switch:router	pc1:lo0	026f24ae99a5		ipv4: 192.168.129.1	
switch:left	pc1:lo0	02044724b03c		ipv4: 192.168.128.1	

Node #3 (at Georgia Tech InstaGENI):

Status	Client ID	Component ID	Expiration	Type	Hostname
Unknown	right	pc1		emulab-xen	right.idsfw.ch-geni-net.instageni.rnoc.gatech.edu
Login	ssh_yonggewa@pc1.instageni.rnoc.gatech.edu -p 26563 ssh_ishah3@pc1.instageni.rnoc.gatech.edu -p 26563				
Interfaces		MAC		Layer 3	
right:router	pc1:lo0	02179fb67616		ipv4: 10.10.11.1	

Node #4 (at Georgia Tech InstaGENI):

Status	Client ID	Component ID	Expiration	Type	Hostname
Unknown	left	pc1		emulab-xen	left.idsfw.ch-geni-net.instageni.rnoc.gatech.edu
Login	ssh_yonggewa@pc1.instageni.rnoc.gatech.edu -p 26562 ssh_ishah3@pc1.instageni.rnoc.gatech.edu -p 26562				
Interfaces		MAC		Layer 3	
left:switch	pc1:lo0	02056997437e		ipv4: 10.10.10.1	

Resources

Node #4 (at Georgia Tech InstaGENI):

Status	Client ID	Component ID	Expiration	Type	Hostname
Unknown	left	pc1		emulab-xen	left.idsfw.ch-geni-net.instageni.rnoc.gatech.edu

Login	ssh_yonggewa@pc1.instageni.rnoc.gatech.edu -p 26562
	ssh_ishah3@pc1.instageni.rnoc.gatech.edu -p 26562

Interfaces	MAC	Layer 3
left:switch	pc1:lo0 02056997437e	ipv4: 10.10.10.1

Link #1:

Client ID	Endpoint #0	Endpoint #1
switch-router	router:switch	switch:router

Link #2:

Client ID	Endpoint #0	Endpoint #1
left-switch	left:switch	switch:left

Link #3:

Client ID	Endpoint #0	Endpoint #1
right-router	right:router	router:right

View Rspec

Link #2:

Client ID	Endpoint #0	Endpoint #1
left-switch	left:switch	switch:left

Link #3:

Client ID	Endpoint #0	Endpoint #1
right-router	right:router	router:right

View Rspec

Secure | https://portal.geni.net/secure/sliceresource.php?invocation_user=ishah3&invocation_id=QKQhMr&slice_id=4c5db257-5471-4936-83cb-3487c04e88c9

GENI Portal

Home   Tools   Partners   Help   Shah, Ishita

Home → Project *ITIS6320* → Slice *idsnat* → Add Resources to *idsnat* (Results)

Add Resources to GENI Slice *idsnat* (Results)

Total run time: 29 seconds
Status: Finished

Started at: **Fri, 06 Apr 2018 22:42:20 -0400**
Finished at: **Fri, 06 Apr 2018 22:42:49 -0400**

| Results | Detailed Progress | Request RSpec | Manifest RSpec | Send Problem Report | Advanced |

Results

Resources requested from RSpec:

Note that the results are current as of the finish time. Your resource allocation may have changed after this time if resources expired or were deleted. Check the slice page for the most up-to-date results about your slice's current allocated resources.

Node #1 (at Illinois InstaGENI):

Status	Client ID	Component ID	Expiration	Type	Hostname
Unknown	outside	pc3		emulab-xen	outside.idsnat.ch-geni-net.instageni.illinois.edu
Login	ssh_yonggewa@pc3.instageni.illinois.edu -p 25203 ssh_ishah3@pc3.instageni.illinois.edu -p 25203				
Interfaces	**MAC**		**Layer 3**		
outside:NAT	pc3:lo0	0221a1b4718d	ipv4: 128.128.128.2		

Secure | https://portal.geni.net/secure/sliceresource.php?invocation_user=ishah3&invocation_id=QKQhMr&slice_id=4c5db257-5471-4936-83cb-3487c04e88c9

GENI Portal

Home   Tools   Partners   Help   Shah, Ishita

Interfaces	**MAC**		**Layer 3**		
outside:NAT	pc3:lo0	0221a1b4718d	ipv4: 128.128.128.2		

Node #2 (at Illinois InstaGENI):

Status	Client ID	Component ID	Expiration	Type	Hostname
Unknown	NAT	pc3		emulab-xen	NAT.idsnat.ch-geni-net.instageni.illinois.edu
Login	ssh_yonggewa@pc3.instageni.illinois.edu -p 25202 ssh_ishah3@pc3.instageni.illinois.edu -p 25202				
Interfaces	**MAC**		**Layer 3**		
NAT:outside	pc3:lo0	02a09ad922f3	ipv4: 128.128.128.1		
NAT:inside	pc3:eth1	029179e729ee	ipv4: 192.168.0.1		

Node #3 (at Illinois InstaGENI):

Status	Client ID	Component ID	Expiration	Type	Hostname
Unknown	inside1	pc2		emulab-xen	inside1.idsnat.ch-geni-net.instageni.illinois.edu
Login	ssh_yonggewa@pc2.instageni.illinois.edu -p 25202 ssh_ishah3@pc2.instageni.illinois.edu -p 25202				
Interfaces	**MAC**		**Layer 3**		
inside1:NAT	pc2:eth1	029e3186de6f	ipv4: 192.168.0.2		

Node #4 (at Illinois InstaGENI):

Status	Client ID	Component ID	Expiration	Type	Hostname
Unknown	inside2	pc1		emulab-xen	inside2.idsnat.ch-geni-net.instageni.illinois.edu

Type here to search   10:43 PM 4/6/2018

Interfaces		MAC		Layer 3
inside1:NAT	pc2:eth1	029e3186de6f		ipv4: 192.168.0.2

Node #4 (at Illinois InstaGENI):

Status	Client ID	Component ID	Expiration	Type	Hostname
Unknown	inside2	pc1		emulab-xen	inside2.idsnat.ch-geni-net.instageni.illinois.edu
Login	ssh_yonggewa@pc1.instageni.illinois.edu -p 25202 ssh_ishah3@pc1.instageni.illinois.edu -p 25202				

Interfaces		MAC		Layer 3
inside2:NAT	pc1:eth1	02ad28760c10		ipv4: 192.168.0.3

Link #1:

Client ID	Endpoint #0	Endpoint #1
outside-NAT	outside:NAT	NAT:outside

Link #2:

Client ID	Endpoint #0	Endpoint #1	Endpoint #2
inside-NAT	inside1:NAT	NAT:inside	inside2:NAT

View Rspec

Link #2:

Client ID	Endpoint #0	Endpoint #1	Endpoint #2
inside-NAT	inside1:NAT	NAT:inside	inside2:NAT

View Rspec

v1.6

Show Raw XML Resource Specification (Manifest)

NAT

```
byte-compiling build/bdist.linux-x86_64/egg/setuptools/command/saveopts.py to saveopts.pyc
byte-compiling build/bdist.linux-x86_64/egg/setuptools/command/upload_docs.py to upload_docs.pyc
byte-compiling build/bdist.linux-x86_64/egg/setuptools/command/install_scripts.py to install_scripts.pyc
byte-compiling build/bdist.linux-x86_64/egg/setuptools/command/build_ext.py to build_ext.pyc
byte-compiling build/bdist.linux-x86_64/egg/setuptools/command/test.py to test.pyc
byte-compiling build/bdist.linux-x86_64/egg/setuptools/command/install_egg_info.py to install_egg_info.pyc
byte-compiling build/bdist.linux-x86_64/egg/setuptools/command/install_lib.py to install_lib.pyc
byte-compiling build/bdist.linux-x86_64/egg/setuptools/command/bdist_wininst.py to bdist_wininst.pyc
byte-compiling build/bdist.linux-x86_64/egg/setuptools/command/upload.py to upload.pyc
byte-compiling build/bdist.linux-x86_64/egg/setuptools/command/bdist_rpm.py to bdist_rpm.pyc
byte-compiling build/bdist.linux-x86_64/egg/setuptools/archive_util.py to archive_util.pyc
byte-compiling build/bdist.linux-x86_64/egg/setuptools/py33compat.py to py33compat.pyc
byte-compiling build/bdist.linux-x86_64/egg/setuptools/monkey.py to monkey.pyc
byte-compiling build/bdist.linux-x86_64/egg/setuptools/config.py to config.pyc
byte-compiling build/bdist.linux-x86_64/egg/setuptools/lib2to3_ex.py to lib2to3_ex.pyc
byte-compiling build/bdist.linux-x86_64/egg/setuptools/dist.py to dist.pyc
byte-compiling build/bdist.linux-x86_64/egg/setuptools/package_index.py to package_index.pyc
byte-compiling build/bdist.linux-x86_64/egg/setuptools/py26compat.py to py26compat.pyc
byte-compiling build/bdist.linux-x86_64/egg/setuptools/extension.py to extension.pyc
byte-compiling build/bdist.linux-x86_64/egg/setuptools/namespaces.py to namespaces.pyc
byte-compiling build/bdist.linux-x86_64/egg/setuptools/py27compat.py to py27compat.pyc
byte-compiling build/bdist.linux-x86_64/egg/setuptools/extern/__init__.py to __init__.pyc
creating build/bdist.linux-x86_64/egg/EGG-INFO
copying setuptools.egg-info/PKG-INFO -> build/bdist.linux-x86_64/egg/EGG-INFO
copying setuptools.egg-info/SOURCES.txt -> build/bdist.linux-x86_64/egg/EGG-INFO
copying setuptools.egg-info/dependency_links.txt -> build/bdist.linux-x86_64/egg/EGG-INFO
copying setuptools.egg-info/entry_points.txt -> build/bdist.linux-x86_64/egg/EGG-INFO
copying setuptools.egg-info/requires.txt -> build/bdist.linux-x86_64/egg/EGG-INFO
copying setuptools.egg-info/top_level.txt -> build/bdist.linux-x86_64/egg/EGG-INFO
copying setuptools.egg-info/zip-safe -> build/bdist.linux-x86_64/egg/EGG-INFO
creating dist
creating 'dist/setuptools-33.1.1-py2.7.egg' and adding 'build/bdist.linux-x86_64/egg' to it
removing 'build/bdist.linux-x86_64/egg' (and everything under it)
Processing setuptools-33.1.1-py2.7.egg
Removing /usr/local/lib/python2.7/dist-packages/setuptools-33.1.1-py2.7.egg
Copying setuptools-33.1.1-py2.7.egg to /usr/local/lib/python2.7/dist-packages
setuptools 33.1.1 is already the active version in easy-install.pth
Installing easy_install script to /usr/local/bin
Installing easy_install-2.7 script to /usr/local/bin

Installed /usr/local/lib/python2.7/dist-packages/setuptools-33.1.1-py2.7.egg
Processing dependencies for setuptools==33.1.1
Finished processing dependencies for setuptools==33.1.1
ishah3@nat:~$
```

```
Collecting PyYAML>=3.12 (from oslo.config)
  Downloading PyYAML-3.12.tar.gz (253kB)
    100% |                                | 253kB 693kB/s
Collecting debtcollector>=1.2.0 (from oslo.config)
  Downloading debtcollector-1.19.0-py2.py3-none-any.whl
Collecting stevedore>=1.20.0 (from oslo.config)
  Downloading stevedore-1.28.0-py2.py3-none-any.whl
Collecting rfc3986>=0.3.1 (from oslo.config)
  Downloading rfc3986-1.1.0-py2.py3-none-any.whl
Collecting enum34>=1.0.4 (from oslo.config)
  Downloading enum34-1.1.6-py2-none-any.whl
Collecting six>=1.10.0 (from oslo.config)
  Downloading six-1.11.0-py2.py3-none-any.whl
Collecting oslo.i18n>=3.15.3 (from oslo.config)
  Downloading oslo.i18n-3.20.0-py2.py3-none-any.whl (42kB)
    100% |                                | 45kB 3.0MB/s
Collecting netaddr>=0.7.18 (from oslo.config)
  Downloading netaddr-0.7.19-py2.py3-none-any.whl (1.6MB)
    100% |                                | 1.6MB 122kB/s
Collecting pbr!=2.1.0,>=2.0.0 (from debtcollector>=1.2.0->oslo.config)
  Downloading pbr-4.0.1-py2.py3-none-any.whl (97kB)
    100% |                                | 98kB 3.1MB/s
Collecting wrapt>=1.7.0 (from debtcollector>=1.2.0->oslo.config)
  Downloading wrapt-1.10.11.tar.gz
Collecting funcsigs>=1.0.0 (from debtcollector>=1.2.0->oslo.config)
  Downloading funcsigs-1.0.2-py2.py3-none-any.whl
Collecting Babel!=2.4.0,>=2.3.4 (from oslo.i18n>=3.15.3->oslo.config)
  Downloading Babel-2.5.3-py2.py3-none-any.whl (6.8MB)
    100% |                                | 6.8MB 44kB/s
Collecting pytz>=0a (from Babel!=2.4.0,>=2.3.4->oslo.i18n>=3.15.3->oslo.config)
  Downloading pytz-2018.3-py2.py3-none-any.whl (509kB)
    100% |                                | 512kB 395kB/s
Installing collected packages: PyYAML, six, pbr, wrapt, funcsigs, debtcollector, stevedore, rfc3986, enum34, pytz, Babel, oslo.i18n, netaddr, oslo.config
  Running setup.py install for PyYAML
  Running setup.py install for wrapt
Successfully installed Babel-2.5.3 PyYAML-3.12 debtcollector-1.19.0 enum34-1.1.6 funcsigs-1.0.2 netaddr-0.7.19 oslo.config-6.0.1 oslo.i18n-3.20.0 pbr-4.0.1 pytz-2018.3
rfc3986-1.1.0 six-1.11.0 stevedore-1.28.0 wrapt-1.10.11
/usr/local/lib/python2.7/dist-packages/pip-7.1.2-py2.7.egg/pip/_vendor/requests/packages/urllib3/util/ssl_.py:90: InsecurePlatformWarning: A true SSLContext object is n
ot available. This prevents urllib3 from configuring SSL appropriately and may cause certain SSL connections to fail. For more information, see https://urllib3.readthed
ocs.org/en/latest/security.html#insecureplatformwarning.
  InsecurePlatformWarning
You are using pip version 7.1.2, however version 9.0.3 is available.
You should consider upgrading via the 'pip install --upgrade pip' command.
root@nat:~#
```

Terminal window 1 (ishah3@inside1):

```
Using username "ishah3".
Authenticating with public key "imported-openssh-key"
Passphrase for key "imported-openssh-key":
Welcome to Ubuntu 12.04 LTS (GNU/Linux 3.2.0-56-generic x86_64)

 * Documentation:  https://help.ubuntu.com/
New release '14.04.1 LTS' available.
Run 'do-release-upgrade' to upgrade to it.


The programs included with the Ubuntu system are free software;
the exact distribution terms for each program are described in the
individual files in /usr/share/doc/*/copyright.

Ubuntu comes with ABSOLUTELY NO WARRANTY, to the extent permitted by
applicable law.

ishah3@inside1:~$ ping 192.168.0.3 -c 10
PING 192.168.0.3 (192.168.0.3) 56(84) bytes of data.
64 bytes from 192.168.0.3: icmp_req=1 ttl=64 time=1.67 ms
64 bytes from 192.168.0.3: icmp_req=2 ttl=64 time=1.07 ms
64 bytes from 192.168.0.3: icmp_req=3 ttl=64 time=1.04 ms
64 bytes from 192.168.0.3: icmp_req=4 ttl=64 time=1.06 ms
64 bytes from 192.168.0.3: icmp_req=5 ttl=64 time=1.00 ms
64 bytes from 192.168.0.3: icmp_req=6 ttl=64 time=0.947 ms
64 bytes from 192.168.0.3: icmp_req=7 ttl=64 time=0.974 ms
64 bytes from 192.168.0.3: icmp_req=8 ttl=64 time=1.12 ms
```

Terminal window 2 (ishah3@outside):

```
Using username "ishah3".
Authenticating with public key "imported-openssh-key"
Passphrase for key "imported-openssh-key":
Welcome to Ubuntu 12.04 LTS (GNU/Linux 3.2.0-56-generic x86_64)

 * Documentation:  https://help.ubuntu.com/
New release '14.04.1 LTS' available.
Run 'do-release-upgrade' to upgrade to it.


The programs included with the Ubuntu system are free software;
the exact distribution terms for each program are described in the
individual files in /usr/share/doc/*/copyright.

Ubuntu comes with ABSOLUTELY NO WARRANTY, to the extent permitted by
applicable law.

ishah3@outside:~$ ping 192.168.0.2 -c 10
PING 192.168.0.2 (192.168.0.2) 56(84) bytes of data.

--- 192.168.0.2 ping statistics ---
10 packets transmitted, 0 received, 100% packet loss, time 8999ms

ishah3@outside:~$
```

```
    Downloading rfc3986-1.1.0-py2.py3-none-any.whl
Collecting enum34>=1.0.4 (from oslo.config)
    Downloading enum34-1.1.6-py2-none-any.whl
Collecting six>=1.10.0 (from oslo.config)
    Downloading six-1.11.0-py2.py3-none-any.whl
Collecting oslo.i18n>=3.15.3 (from oslo.config)
    Downloading oslo.i18n-3.20.0-py2.py3-none-any.whl (42kB)
    100% |                                | 45kB 3.0MB/s
Collecting netaddr>=0.7.18 (from oslo.config)
    Downloading netaddr-0.7.19-py2.py3-none-any.whl (1.6MB)
    100% |                                | 1.6MB 122kB/s
Collecting pbr!=2.1.0,>=2.0.0 (from debtcollector>=1.2.0->oslo.config)
    Downloading pbr-4.0.1-py2.py3-none-any.whl (97kB)
    100% |                                | 98kB 3.1MB/s
Collecting wrapt>=1.7.0 (from debtcollector>=1.2.0->oslo.config)
    Downloading wrapt-1.10.11.tar.gz
Collecting funcsigs>=1.0.0 (from debtcollector>=1.2.0->oslo.config)
    Downloading funcsigs-1.0.2-py2.py3-none-any.whl
Collecting Babel!=2.4.0,>=2.3.4 (from oslo.i18n>=3.15.3->oslo.config)
    Downloading Babel-2.5.3-py2.py3-none-any.whl (6.8MB)
    100% |                                | 6.8MB 44kB/s
Collecting pytz>=0a (from Babel!=2.4.0,>=2.3.4->oslo.i18n>=3.15.3->oslo.config)
    Downloading pytz-2018.3-py2.py3-none-any.whl (509kB)
    100% |                                | 512kB 395kB/s
Installing collected packages: PyYAML, six, pbr, wrapt, funcsigs, debtcollector, stevedore, rfc3986, enum34, pytz, Babel, oslo.i18n, netaddr, oslo.config
    Running setup.py install for PyYAML
    Running setup.py install for wrapt
Successfully installed Babel-2.5.3 PyYAML-3.12 debtcollector-1.19.0 enum34-1.1.6 funcsigs-1.0.2 netaddr-0.7.19 oslo.config-6.0.1 oslo.i18n-3.20.0 pbr-4.0.1 pytz-2018.3
rfc3986-1.1.0 six-1.11.0 stevedore-1.28.0 wrapt-1.10.11
/usr/local/lib/python2.7/dist-packages/pip-7.1.2-py2.7.egg/pip/_vendor/requests/packages/urllib3/util/ssl_.py:90: InsecurePlatformWarning: A true SSLContext object is n
ot available. This prevents urllib3 from configuring SSL appropriately and may cause certain SSL connections to fail. For more information, see https://urllib3.readthed
ocs.org/en/latest/security.html#insecureplatformwarning.
    InsecurePlatformWarning
You are using pip version 7.1.2, however version 9.0.3 is available.
You should consider upgrading via the 'pip install --upgrade pip' command.
root@nat:~# cd /tmp/ryu/
root@nat:/tmp/ryu# ./bin/ryu-manager nat.py
Traceback (most recent call last):
  File "./bin/ryu-manager", line 18, in <module>
    from ryu.cmd.manager import main
ImportError: No module named ryu.cmd.manager
root@nat:/tmp/ryu# ls
bin   CONTRIBUTING.rst   debian   doc   etc   LICENSE   MANIFEST.in   nat.py   README.rst   run_tests.sh   ryu   setup.cfg   setup.py   tools   tox.ini
root@nat:/tmp/ryu#
```

```
running install_egg_info
Copying ryu.egg-info to /usr/local/lib/python2.7/dist-packages/ryu-4.24-py2.7.egg-info
running install_scripts
Installing ryu-manager script to /usr/local/bin
Installing ryu script to /usr/local/bin
root@nat:/tmp/ryu# ./bin/ryu-manager nat.py
Traceback (most recent call last):
  File "./bin/ryu-manager", line 18, in <module>
    from ryu.cmd.manager import main
  File "/usr/local/lib/python2.7/dist-packages/ryu/cmd/manager.py", line 33, in <module>
    from ryu.app import wsgi
  File "/usr/local/lib/python2.7/dist-packages/ryu/app/wsgi.py", line 23, in <module>
    from tinyrpc.server import RPCServer
ImportError: No module named tinyrpc.server
root@nat:/tmp/ryu# sudo pip install tinyrpc
The directory '/users/ishah3/.cache/pip/http' or its parent directory is not owned by the current user and the cache has been disabled. Please check the permissions and
 owner of that directory. If executing pip with sudo, you may want sudo's -H flag.
The directory '/users/ishah3/.cache/pip' or its parent directory is not owned by the current user and caching wheels has been disabled. check the permissions and owner
of that directory. If executing pip with sudo, you may want sudo's -H flag.
Collecting tinyrpc
/usr/local/lib/python2.7/dist-packages/pip-7.1.2-py2.7.egg/pip/_vendor/requests/packages/urllib3/util/ssl_.py:90: InsecurePlatformWarning: A true SSLContext object is n
ot available. This prevents urllib3 from configuring SSL appropriately and may cause certain SSL connections to fail. For more information, see https://urllib3.readthed
ocs.org/en/latest/security.html#insecureplatformwarning.
    InsecurePlatformWarning
    Downloading tinyrpc-0.8.tar.gz
Requirement already satisfied (use --upgrade to upgrade): six in /usr/local/lib/python2.7/dist-packages (from tinyrpc)
Installing collected packages: tinyrpc
    Running setup.py install for tinyrpc
Successfully installed tinyrpc-0.8
/usr/local/lib/python2.7/dist-packages/pip-7.1.2-py2.7.egg/pip/_vendor/requests/packages/urllib3/util/ssl_.py:90: InsecurePlatformWarning: A true SSLContext object is n
ot available. This prevents urllib3 from configuring SSL appropriately and may cause certain SSL connections to fail. For more information, see https://urllib3.readthed
ocs.org/en/latest/security.html#insecureplatformwarning.
    InsecurePlatformWarning
You are using pip version 7.1.2, however version 9.0.3 is available.
You should consider upgrading via the 'pip install --upgrade pip' command.
root@nat:/tmp/ryu# ./bin/ryu-manager nat.py
loading app nat.py
loading app ryu.controller.dpset
loading app ryu.controller.ofp_handler
instantiating app ryu.controller.dpset of DPSet
instantiating app ryu.controller.ofp_handler of OFPHandler
instantiating app nat.py of NAT
switch connected <ryu.controller.controller.Datapath object at 0x2264410>
```

Terminal window 1 (ishah3@inside1: ~):
```
Using username "ishah3".
Authenticating with public key "imported-openssh-key"
Passphrase for key "imported-openssh-key":
Welcome to Ubuntu 12.04 LTS (GNU/Linux 3.2.0-56-generic x86_64)

 * Documentation:  https://help.ubuntu.com/
New release '14.04.1 LTS' available.
Run 'do-release-upgrade' to upgrade to it.


The programs included with the Ubuntu system are free software;
the exact distribution terms for each program are described in the
individual files in /usr/share/doc/*/copyright.

Ubuntu comes with ABSOLUTELY NO WARRANTY, to the extent permitted by
applicable law.

ishah3@inside1:~$ ping 192.168.0.3 -c 10
PING 192.168.0.3 (192.168.0.3) 56(84) bytes of data.
64 bytes from 192.168.0.3: icmp_req=1 ttl=64 time=1.67 ms
64 bytes from 192.168.0.3: icmp_req=2 ttl=64 time=1.07 ms
64 bytes from 192.168.0.3: icmp_req=3 ttl=64 time=1.04 ms
64 bytes from 192.168.0.3: icmp_req=4 ttl=64 time=1.06 ms
64 bytes from 192.168.0.3: icmp_req=5 ttl=64 time=1.00 ms
64 bytes from 192.168.0.3: icmp_req=6 ttl=64 time=0.947 ms
64 bytes from 192.168.0.3: icmp_req=7 ttl=64 time=0.974 ms
64 bytes from 192.168.0.3: icmp_req=8 ttl=64 time=1.12 ms
64 bytes from 192.168.0.3: icmp_req=9 ttl=64 time=1.02 ms
64 bytes from 192.168.0.3: icmp_req=10 ttl=64 time=1.07 ms

--- 192.168.0.3 ping statistics ---
10 packets transmitted, 10 received, 0% packet loss, time 9012ms
rtt min/avg/max/mdev = 0.947/1.101/1.674/0.199 ms
ishah3@inside1:~$ nc 128.128.128.2 6666
Ishita, HI!!
```

Terminal window 2 (ishah3@outside: ~):
```
Passphrase for key "imported-openssh-key":
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applicable law.

ishah3@outside:~$ ping 192.168.0.2 -c 10
PING 192.168.0.2 (192.168.0.2) 56(84) bytes of data.

--- 192.168.0.2 ping statistics ---
10 packets transmitted, 0 received, 100% packet loss, time 8999ms

ishah3@outside:~$ nc -l 6666
Ishita, HI!!
```

Terminal window 3 (root@nat: /tmp/ryu):
```
Copying ryu.egg-info to /usr/local/lib/python2.7/dist-packages/ryu-4.24-py2.7.egg-info
running install_scripts
Installing ryu-manager script to /usr/local/bin
Installing ryu script to /usr/local/bin
root@nat:/tmp/ryu# ./bin/ryu-manager nat.py
Traceback (most recent call last):
  File "./bin/ryu-manager", line 18, in <module>
    from ryu.cmd.manager import main
  File "/usr/local/lib/python2.7/dist-packages/ryu/cmd/manager.py", line 33, in <module>
    from ryu.app import wsgi
  File "/usr/local/lib/python2.7/dist-packages/ryu/app/wsgi.py", line 23, in <module>
    from tinyrpc.server import RPCServer
ImportError: No module named tinyrpc.server
root@nat:/tmp/ryu# sudo pip install tinyrpc
The directory '/users/ishah3/.cache/pip/http' or its parent directory is not owned by the current user and the cache has been disabled. Please check the permissions and
 owner of that directory. If executing pip with sudo, you may want sudo's -H flag.
The directory '/users/ishah3/.cache/pip' or its parent directory is not owned by the current user and caching wheels has been disabled. check the permissions and owner
of that directory. If executing pip with sudo, you may want sudo's -H flag.
Collecting tinyrpc
/usr/local/lib/python2.7/dist-packages/pip-7.1.2-py2.7.egg/pip/_vendor/requests/packages/urllib3/util/ssl_.py:90: InsecurePlatformWarning: A true SSLContext object is n
ot available. This prevents urllib3 from configuring SSL appropriately and may cause certain SSL connections to fail. For more information, see https://urllib3.readthed
ocs.org/en/latest/security.html#insecureplatformwarning
  InsecurePlatformWarning
  Downloading tinyrpc-0.8.tar.gz
Requirement already satisfied (use --upgrade to upgrade): six in /usr/local/lib/python2.7/dist-packages (from tinyrpc)
Installing collected packages: tinyrpc
  Running setup.py install for tinyrpc
Successfully installed tinyrpc-0.8
/usr/local/lib/python2.7/dist-packages/pip-7.1.2-py2.7.egg/pip/_vendor/requests/packages/urllib3/util/ssl_.py:90: InsecurePlatformWarning: A true SSLContext object is n
ot available. This prevents urllib3 from configuring SSL appropriately and may cause certain SSL connections to fail. For more information, see https://urllib3.readthed
ocs.org/en/latest/security.html#insecureplatformwarning
  InsecurePlatformWarning
You are using pip version 7.1.2, however version 9.0.3 is available.
You should consider upgrading via the 'pip install --upgrade pip' command.
root@nat:/tmp/ryu# ./bin/ryu-manager nat.py
loading app nat.py
loading app ryu.controller.dpset
loading app ryu.controller.ofp_handler
instantiating app ryu.controller.dpset of DPSet
instantiating app ryu.controller.ofp_handler of OFPHandler
instantiating app nat.py of NAT
switch connected <ryu.controller.controller.Datapath object at 0x2264410>
Created mapping: 192.168.0.2 51436 to 128.128.129.1 59999
```

```
Using username "ishah3".
Authenticating with public key "imported-openssh-key"
Passphrase for key "imported-openssh-key":
Welcome to Ubuntu 12.04 LTS (GNU/Linux 3.2.0-56-generic x86_64)

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PING 192.168.0.3 (192.168.0.3) 56(84) bytes of data.
64 bytes from 192.168.0.3: icmp_req=1 ttl=64 time=1.67 ms
64 bytes from 192.168.0.3: icmp_req=2 ttl=64 time=1.07 ms
64 bytes from 192.168.0.3: icmp_req=3 ttl=64 time=1.04 ms
64 bytes from 192.168.0.3: icmp_req=4 ttl=64 time=1.06 ms
64 bytes from 192.168.0.3: icmp_req=5 ttl=64 time=1.00 ms
64 bytes from 192.168.0.3: icmp_req=6 ttl=64 time=0.947 ms
64 bytes from 192.168.0.3: icmp_req=7 ttl=64 time=0.974 ms
64 bytes from 192.168.0.3: icmp_req=8 ttl=64 time=1.12 ms
64 bytes from 192.168.0.3: icmp_req=9 ttl=64 time=1.02 ms
64 bytes from 192.168.0.3: icmp_req=10 ttl=64 time=1.07 ms

--- 192.168.0.3 ping statistics ---
10 packets transmitted, 10 received, 0% packet loss, time 9012ms
rtt min/avg/max/mdev = 0.947/1.101/1.674/0.199 ms
ishah3@inside1:~$ nc 128.128.128.2 6666
Ishita, HI!!
^C
ishah3@inside1:~$ ping 128.128.128.2
PING 128.128.128.2 (128.128.128.2) 56(84) bytes of data.
64 bytes from 128.128.128.2: icmp_req=1 ttl=63 time=5.41 ms
64 bytes from 128.128.128.2: icmp_req=2 ttl=63 time=5.50 ms
64 bytes from 128.128.128.2: icmp_req=3 ttl=63 time=5.15 ms
64 bytes from 128.128.128.2: icmp_req=4 ttl=63 time=5.19 ms
```

```
Using username "ishah3".
Authenticating with public key "imported-openssh-key"
Passphrase for key "imported-openssh-key":
Welcome to Ubuntu 12.04 LTS (GNU/Linux 3.2.0-56-generic x86_64)

 * Documentation:  https://help.ubuntu.com/
New release '14.04.1 LTS' available.
Run 'do-release-upgrade' to upgrade to it.


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applicable law.

ishah3@inside2:~$ ping 128.128.128.2
PING 128.128.128.2 (128.128.128.2) 56(84) bytes of data.
64 bytes from 128.128.128.2: icmp_req=1 ttl=63 time=6.34 ms
64 bytes from 128.128.128.2: icmp_req=2 ttl=63 time=5.02 ms
64 bytes from 128.128.128.2: icmp_req=3 ttl=63 time=5.29 ms
64 bytes from 128.128.128.2: icmp_req=4 ttl=63 time=5.35 ms
64 bytes from 128.128.128.2: icmp_req=5 ttl=63 time=4.86 ms
```

```
ishah3@outside: ~
Using username "ishah3".
Authenticating with public key "imported-openssh-key"
Passphrase for key "imported-openssh-key":
Welcome to Ubuntu 12.04 LTS (GNU/Linux 3.2.0-56-generic x86_64)

 * Documentation:  https://help.ubuntu.com/
New release '14.04.1 LTS' available.
Run 'do-release-upgrade' to upgrade to it.



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ishah3@outside:~$ ping 192.168.0.2 -c 10
PING 192.168.0.2 (192.168.0.2) 56(84) bytes of data.

--- 192.168.0.2 ping statistics ---
10 packets transmitted, 0 received, 100% packet loss, time 8999ms

ishah3@outside:~$ nc -l 6666
Ishita, HI!!
ishah3@outside:~$ sudo tcpdump -i eth1 -n icmp
tcpdump: verbose output suppressed, use -v or -vv for full protocol decode
listening on eth1, link-type EN10MB (Ethernet), capture size 65535 bytes
23:13:47.197661 IP 128.128.129.1 > 128.128.128.2: ICMP echo request, id 3204, seq 39, length 64
23:13:47.197699 IP 128.128.128.2 > 128.128.129.1: ICMP echo reply, id 3204, seq 39, length 64
23:13:47.291908 IP 128.128.129.1 > 128.128.128.2: ICMP echo request, id 3153, seq 142, length 64
23:13:47.291933 IP 128.128.128.2 > 128.128.129.1: ICMP echo reply, id 3153, seq 142, length 64
23:13:48.199492 IP 128.128.129.1 > 128.128.128.2: ICMP echo request, id 3204, seq 40, length 64
23:13:48.199540 IP 128.128.128.2 > 128.128.129.1: ICMP echo reply, id 3204, seq 40, length 64
23:13:48.292942 IP 128.128.129.1 > 128.128.128.2: ICMP echo request, id 3153, seq 143, length 64
23:13:48.292969 IP 128.128.128.2 > 128.128.129.1: ICMP echo reply, id 3153, seq 143, length 64
23:13:49.201373 IP 128.128.129.1 > 128.128.128.2: ICMP echo request, id 3204, seq 41, length 64
23:13:49.201419 IP 128.128.128.2 > 128.128.129.1: ICMP echo reply, id 3204, seq 41, length 64
23:13:49.294121 IP 128.128.129.1 > 128.128.128.2: ICMP echo request, id 3153, seq 144, length 64
23:13:49.294149 IP 128.128.128.2 > 128.128.129.1: ICMP echo reply, id 3153, seq 144, length 64
```

Firewall


```
ishah3@switch: /tmp/ryu
ishah3@switch:/tmp/ryu$ sudo pip install tinyrpc
Downloading/unpacking tinyrpc
  Downloading tinyrpc-0.8.tar.gz
  Running setup.py (path:/tmp/pip_build_root/tinyrpc/setup.py) egg_info for package tinyrpc

Requirement already satisfied (use --upgrade to upgrade): six in /usr/local/lib/python2.7/dist-packages (from tinyrpc)
Installing collected packages: tinyrpc
  Running setup.py install for tinyrpc

Successfully installed tinyrpc
Cleaning up...
ishah3@switch:/tmp/ryu$ ./bin/ryu-manager --verbose ryu/app/simple_switch.py
loading app ryu/app/simple_switch.py
loading app ryu.controller.ofp_handler
instantiating app ryu.controller.ofp_handler of OFPHandler
instantiating app ryu/app/simple_switch.py of SimpleSwitch
BRICK SimpleSwitch
  CONSUMES EventOFPPortStatus
  CONSUMES EventOFPPacketIn
BRICK ofp_event
  PROVIDES EventOFPPortStatus TO {'SimpleSwitch': set(['main'])}
  PROVIDES EventOFPPacketIn TO {'SimpleSwitch': set(['main'])}
  CONSUMES EventOFPEchoReply
  CONSUMES EventOFPPortDescStatsReply
  CONSUMES EventOFPHello
  CONSUMES EventOFPPortStatus
  CONSUMES EventOFPSwitchFeatures
  CONSUMES EventOFPErrorMsg
  CONSUMES EventOFPEchoRequest
connected socket:<eventlet.greenio.GreenSocket object at 0x7f37276e54d0> address:('127.0.0.1', 36928)
hello ev <ryu.controller.ofp_event.EventOFPHello object at 0x7f3728f48d90>
move onto config mode
switch features ev version=0x1,msg_type=0x6,msg_len=0xb0,xid=0xc7e654bf,OFPSwitchFeatures(actions=4095,capabilities=199,datapath_id=15687245639489,n_buffers=256,n_table
s=254,ports={1: OFPPhyPort(port_no=1,hw_addr='02:04:47:24:b0:3c',name='eth1',config=0,state=0,curr=0,advertised=0,supported=0,peer=0), 2: OFPPhyPort(port_no=2,hw_addr='
02:6f:24:ae:99:a5',name='eth2',config=0,state=0,curr=0,advertised=0,supported=0,peer=0), 65534: OFPPhyPort(port_no=65534,hw_addr='0e:44:78:b4:2f:41',name='br0',config=1
,state=1,curr=0,advertised=0,supported=0,peer=0)})
move onto main mode
EVENT ofp_event->SimpleSwitch EventOFPPacketIn
packet in 15687245639489 02:ce:75:af:13:d3 ff:ff:ff:ff:ff:ff 2
EVENT ofp_event->SimpleSwitch EventOFPPacketIn
packet in 15687245639489 02:05:69:97:43:7e 02:ce:75:af:13:d3 1
EVENT ofp_event->SimpleSwitch EventOFPPacketIn
packet in 15687245639489 02:ce:75:af:13:d3 02:05:69:97:43:7e 2
```

```
  PROVIDES EventOFPPortStatus TO {'SimpleSwitch': set(['main'])}
  PROVIDES EventOFPPacketIn TO {'SimpleSwitch': set(['main'])}
  CONSUMES EventOFPEchoReply
  CONSUMES EventOFPPortDescStatsReply
  CONSUMES EventOFPHello
  CONSUMES EventOFPPortStatus
  CONSUMES EventOFPSwitchFeatures
  CONSUMES EventOFPErrorMsg
  CONSUMES EventOFPEchoRequest
connected socket:<eventlet.greenio.GreenSocket object at 0x7f37276e54d0> address:('127.0.0.1', 36928)
hello ev <ryu.controller.ofp_event.EventOFPHello object at 0x7f3728f48d90>
move onto config mode
switch features ev version=0x1,msg_type=0x6,msg_len=0xb0,xid=0xc7e654bf,OFPSwitchFeatures(actions=4095,capabilities=199,datapath_id=15687245639489,n_buffers=256,n_table
s=254,ports={1: OFPPhyPort(port_no=1,hw_addr='02:04:47:24:b0:3c',name='eth1',config=0,state=0,curr=0,advertised=0,supported=0,peer=0), 2: OFPPhyPort(port_no=2,hw_addr='
02:6f:24:ae:99:a5',name='eth2',config=0,state=0,curr=0,advertised=0,supported=0,peer=0), 65534: OFPPhyPort(port_no=65534,hw_addr='0e:44:78:b4:2f:41',name='br0',config=1
,state=1,curr=0,advertised=0,supported=0,peer=0)})
move onto main mode
EVENT ofp_event->SimpleSwitch EventOFPPacketIn
packet in 15687245639489 02:ce:75:af:13:d3 ff:ff:ff:ff:ff:ff 2
EVENT ofp_event->SimpleSwitch EventOFPPacketIn
packet in 15687245639489 02:05:69:97:43:7e 02:ce:75:af:13:d3 1
EVENT ofp_event->SimpleSwitch EventOFPPacketIn
packet in 15687245639489 02:ce:75:af:13:d3 02:05:69:97:43:7e 2
^CKeyboard Interrupt received. Closing RYU application manager...
ishah3@switch:/tmp/ryu$ sudo ovs-ofctl del-flows br0
ishah3@switch:/tmp/ryu$ cd
ishah3@switch:~$ wget https://github.com/GENI-NSF/geni-tutorials/raw/master/OpenFlowNetworkDeviceFirewall/gpo-ryu-firewall.tar.gz
--2018-04-07 00:25:39--  https://github.com/GENI-NSF/geni-tutorials/raw/master/OpenFlowNetworkDeviceFirewall/gpo-ryu-firewall.tar.gz
Resolving github.com (github.com)... 192.30.253.112, 192.30.253.113
Connecting to github.com (github.com)|192.30.253.112|:443... connected.
HTTP request sent, awaiting response... 302 Found
Location: https://raw.githubusercontent.com/GENI-NSF/geni-tutorials/master/OpenFlowNetworkDeviceFirewall/gpo-ryu-firewall.tar.gz [following]
--2018-04-07 00:25:40--  https://raw.githubusercontent.com/GENI-NSF/geni-tutorials/master/OpenFlowNetworkDeviceFirewall/gpo-ryu-firewall.tar.gz
Resolving raw.githubusercontent.com (raw.githubusercontent.com)... 151.101.32.133
Connecting to raw.githubusercontent.com (raw.githubusercontent.com)|151.101.32.133|:443... connected.
HTTP request sent, awaiting response... 200 OK
Length: 5157 (5.0K) [application/octet-stream]
Saving to: 'gpo-ryu-firewall.tar.gz'

100%[==========================================================================================>] 5,157       --.-K/s   in 0s

2018-04-07 00:25:40 (28.1 MB/s) - 'gpo-ryu-firewall.tar.gz' saved [5157/5157]

ishah3@switch:~$
```

```
From left-left-switch (10.10.10.1) icmp_seq=190 Destination Host Unreachable
From left-left-switch (10.10.10.1) icmp_seq=191 Destination Host Unreachable
From left-left-switch (10.10.10.1) icmp_seq=192 Destination Host Unreachable
From left-left-switch (10.10.10.1) icmp_seq=193 Destination Host Unreachable
From left-left-switch (10.10.10.1) icmp_seq=194 Destination Host Unreachable
64 bytes from left-left-switch (10.10.10.1): icmp_seq=195 ttl=63
64 bytes from left-left-switch (10.10.10.1): icmp_seq=196 ttl=63
64 bytes from left-left-switch (10.10.10.1): icmp_seq=197 ttl=63
64 bytes from left-left-switch (10.10.10.1): icmp_seq=198 ttl=63
64 bytes from left-left-switch (10.10.10.1): icmp_seq=199 ttl=63
64 bytes from left-left-switch (10.10.10.1): icmp_seq=200 ttl=63
64 bytes from left-left-switch (10.10.10.1): icmp_seq=201 ttl=63
64 bytes from left-left-switch (10.10.10.1): icmp_seq=202 ttl=63
64 bytes from left-left-switch (10.10.10.1): icmp_seq=203 ttl=63
64 bytes from left-left-switch (10.10.10.1): icmp_seq=204 ttl=63
64 bytes from left-left-switch (10.10.10.1): icmp_seq=205 ttl=63
64 bytes from left-left-switch (10.10.10.1): icmp_seq=206 ttl=63
64 bytes from left-left-switch (10.10.10.1): icmp_seq=207 ttl=63
64 bytes from left-left-switch (10.10.10.1): icmp_seq=208 ttl=63
64 bytes from left-left-switch (10.10.10.1): icmp_seq=209 ttl=63
64 bytes from left-left-switch (10.10.10.1): icmp_seq=210 ttl=63
64 bytes from left-left-switch (10.10.10.1): icmp_seq=211 ttl=63
64 bytes from left-left-switch (10.10.10.1): icmp_seq=212 ttl=63
64 bytes from left-left-switch (10.10.10.1): icmp_seq=213 ttl=63
64 bytes from left-left-switch (10.10.10.1): icmp_seq=214 ttl=63
64 bytes from left-left-switch (10.10.10.1): icmp_seq=215 ttl=63
64 bytes from left-left-switch (10.10.10.1): icmp_seq=216 ttl=63
64 bytes from left-left-switch (10.10.10.1): icmp_seq=217 ttl=63
64 bytes from left-left-switch (10.10.10.1): icmp_seq=218 ttl=63
64 bytes from left-left-switch (10.10.10.1): icmp_seq=219 ttl=63
64 bytes from left-left-switch (10.10.10.1): icmp_seq=220 ttl=63
64 bytes from left-left-switch (10.10.10.1): icmp_seq=221 ttl=63 time=1.05 ms
64 bytes from left-left-switch (10.10.10.1): icmp_seq=222 ttl=63 time=1.67 ms
64 bytes from left-left-switch (10.10.10.1): icmp_seq=223 ttl=63 time=1.19 ms
64 bytes from left-left-switch (10.10.10.1): icmp_seq=224 ttl=63 time=1.20 ms
64 bytes from left-left-switch (10.10.10.1): icmp_seq=225 ttl=63 time=1.06 ms
^C
--- left-left-switch ping statistics ---
225 packets transmitted, 132 received, +42 errors, 41% packet loss, time 224852ms
rtt min/avg/max/mdev = 0.850/23.960/2003.336/193.210 ms, pipe 3
ishah3@right:~$ nc -l 5001
HI!Ishita! HI
Hi!
```

ishah3@left: ~

```
Using username "ishah3".
Authenticating with public key "imported-openssh-key"
Passphrase for key "imported-openssh-key":
Welcome to Ubuntu 14.04.1 LTS (GNU/Linux 3.13.0-33-generic x86_64)

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ishah3@left:~$ nc 10.10.11.1 5001
Ishita! HI
Hi!
```

```
EVENT ofp_event->SimpleSwitch EventOFPPacketIn
packet in 15687245639489 02:05:69:97:43:7e 02:ce:75:af:13:d3 1
EVENT ofp_event->SimpleSwitch EventOFPPacketIn
packet in 15687245639489 02:ce:75:af:13:d3 02:05:69:97:43:7e 2
^CKeyboard Interrupt received. Closing RYU application manager...
ishah3@switch:/tmp/ryu$ sudo ovs-ofctl del-flows br0
ishah3@switch:/tmp/ryu$ cd
ishah3@switch:~$ wget https://github.com/GENI-NSF/geni-tutorials/raw/master/OpenFlowNetworkDeviceFirewall/gpo-ryu-firewall.tar.gz
--2018-04-07 00:25:39--  https://github.com/GENI-NSF/geni-tutorials/raw/master/OpenFlowNetworkDeviceFirewall/gpo-ryu-firewall.tar.gz
Resolving github.com (github.com)... 192.30.253.112, 192.30.253.113
Connecting to github.com (github.com)|192.30.253.112|:443... connected.
HTTP request sent, awaiting response... 302 Found
Location: https://raw.githubusercontent.com/GENI-NSF/geni-tutorials/master/OpenFlowNetworkDeviceFirewall/gpo-ryu-firewall.tar.gz [following]
--2018-04-07 00:25:40--  https://raw.githubusercontent.com/GENI-NSF/geni-tutorials/master/OpenFlowNetworkDeviceFirewall/gpo-ryu-firewall.tar.gz
Resolving raw.githubusercontent.com (raw.githubusercontent.com)... 151.101.32.133
Connecting to raw.githubusercontent.com (raw.githubusercontent.com)|151.101.32.133|:443... connected.
HTTP request sent, awaiting response... 200 OK
Length: 5157 (5.0K) [application/octet-stream]
Saving to: 'gpo-ryu-firewall.tar.gz'

100%[=================================================================================================>] 5,157       --.-K/s   in 0s

2018-04-07 00:25:40 (28.1 MB/s) - 'gpo-ryu-firewall.tar.gz' saved [5157/5157]

ishah3@switch:~$ tar xvfz gpo-ryu-firewall.tar.gz
./._gpo-ryu-firewall
gpo-ryu-firewall/
gpo-ryu-firewall/._fw.conf
gpo-ryu-firewall/fw.conf
gpo-ryu-firewall/simple_firewall.py
gpo-ryu-firewall/utils.py
ishah3@switch:~$ cd gpo-ryu-firewall/
ishah3@switch:~/gpo-ryu-firewall$
ishah3@switch:~/gpo-ryu-firewall$ /tmp/ryu/bin/ryu-manager simple_firewall.py
loading app simple_firewall.py
loading app ryu.controller.dpset
loading app ryu.controller.ofp_handler
instantiating app simple_firewall.py of SimpleFirewall
instantiating app ryu.controller.dpset of DPSet
instantiating app ryu.controller.ofp_handler of OFPHandler
switch is connected <ryu.controller.controller.Datapath object at 0x7f35ba4ba4d0>
Extracted rule {'sport': '54574', 'dport': '5001', 'sip': '10.10.10.1', 'dip': '10.10.11.1'}
Allow Connection rule {'dport': '5001', 'dip': '10.10.11.1', 'sip': '10.10.10.1', 'sport': 'any'}
```

```
reading manifest template 'MANIFEST.in'
warning: no previously-included files matching '*' found under directory 'doc/build'
warning: no previously-included files matching '*~' found anywhere in distribution
warning: no previously-included files matching '*.pyc' found anywhere in distribution
warning: no previously-included files matching '.gitignore' found anywhere in distribution
writing manifest file 'ryu.egg-info/SOURCES.txt'
running install_lib
running install_data
running install_egg_info
removing '/usr/local/lib/python2.7/dist-packages/ryu-4.24.egg-info' (and everything under it)
Copying ryu.egg-info to /usr/local/lib/python2.7/dist-packages/ryu-4.24.egg-info
running install_scripts
Installing ryu-manager script to /usr/local/bin
Installing ryu script to /usr/local/bin
ishah3@switch:/tmp/ryu$ sudo pip install tinyrpc
Downloading/unpacking tinyrpc
  Downloading tinyrpc-0.8.tar.gz
  Running setup.py (path:/tmp/pip_build_root/tinyrpc/setup.py) egg_info for package tinyrpc

Requirement already satisfied (use --upgrade to upgrade): six in /usr/local/lib/python2.7/dist-packages (from tinyrpc)
Installing collected packages: tinyrpc
  Running setup.py install for tinyrpc

Successfully installed tinyrpc
Cleaning up...
ishah3@switch:/tmp/ryu$ ./bin/ryu-manager --verbose ryu/app/simple_switch.py
loading app ryu/app/simple_switch.py
loading app ryu.controller.ofp_handler
instantiating app ryu.controller.ofp_handler of OFPHandler
instantiating app ryu/app/simple_switch.py of SimpleSwitch
BRICK SimpleSwitch
  CONSUMES EventOFPPortStatus
  CONSUMES EventOFPPacketIn
BRICK ofp_event
  PROVIDES EventOFPPortStatus TO {'SimpleSwitch': set(['main'])}
  PROVIDES EventOFPPacketIn TO {'SimpleSwitch': set(['main'])}
  CONSUMES EventOFPEchoReply
  CONSUMES EventOFPPortDescStatsReply
  CONSUMES EventOFPHello
  CONSUMES EventOFPPortStatus
  CONSUMES EventOFPSwitchFeatures
  CONSUMES EventOFPErrorMsg
  CONSUMES EventOFPEchoRequest
```

```
Using username "ishah3".
Authenticating with public key "imported-openssh-key"
Passphrase for key "imported-openssh-key":
Welcome to Ubuntu 14.04.1 LTS (GNU/Linux 3.13.0-33-generic x86_64)

 * Documentation:  https://help.ubuntu.com/

The programs included with the Ubuntu system are free software;
the exact distribution terms for each program are described in the
individual files in /usr/share/doc/*/copyright.

Ubuntu comes with ABSOLUTELY NO WARRANTY, to the extent permitted by
applicable law.

ishah3@right:~$ ping left
PING left-left-switch (10.10.10.1) 56(84) bytes of data.
64 bytes from left-left-switch (10.10.10.1): icmp_seq=1 ttl=63 time=8.16 ms
64 bytes from left-left-switch (10.10.10.1): icmp_seq=2 ttl=63 time=1.38 ms
64 bytes from left-left-switch (10.10.10.1): icmp_seq=3 ttl=63 time=1.26 ms
64 bytes from left-left-switch (10.10.10.1): icmp_seq=4 ttl=63 time=1.03 ms
64 bytes from left-left-switch (10.10.10.1): icmp_seq=5 ttl=63 time=1.14 ms
64 bytes from left-left-switch (10.10.10.1): icmp_seq=6 ttl=63 time=1.19 ms
```

```
EVENT ofp_event->SimpleSwitch EventOFPPacketIn
packet in 15687245639489 02:05:69:97:43:7e 02:ce:75:af:13:d3 1
EVENT ofp_event->SimpleSwitch EventOFPPacketIn
packet in 15687245639489 02:ce:75:af:13:d3 02:05:69:97:43:7e 2
^CKeyboard Interrupt received. Closing RYU application manager...
ishah3@switch:/tmp/ryu$ sudo ovs-ofctl del-flows br0
ishah3@switch:/tmp/ryu$ cd
ishah3@switch:~$ wget https://github.com/GENI-NSF/geni-tutorials/raw/master/OpenFlowNetworkDeviceFirewall/gpo-ryu-firewall.tar.gz
--2018-04-07 00:25:39--  https://github.com/GENI-NSF/geni-tutorials/raw/master/OpenFlowNetworkDeviceFirewall/gpo-ryu-firewall.tar.gz
Resolving github.com (github.com)... 192.30.253.112, 192.30.253.113
Connecting to github.com (github.com)|192.30.253.112|:443... connected.
HTTP request sent, awaiting response... 302 Found
Location: https://raw.githubusercontent.com/GENI-NSF/geni-tutorials/master/OpenFlowNetworkDeviceFirewall/gpo-ryu-firewall.tar.gz [following]
--2018-04-07 00:25:40--  https://raw.githubusercontent.com/GENI-NSF/geni-tutorials/master/OpenFlowNetworkDeviceFirewall/gpo-ryu-firewall.tar.gz
Resolving raw.githubusercontent.com (raw.githubusercontent.com)... 151.101.32.133
Connecting to raw.githubusercontent.com (raw.githubusercontent.com)|151.101.32.133|:443... connected.
HTTP request sent, awaiting response... 200 OK
Length: 5157 (5.0K) [application/octet-stream]
Saving to: 'gpo-ryu-firewall.tar.gz'

100%[===================================================================================================>] 5,157       --.-K/s   in 0s

2018-04-07 00:25:40 (28.1 MB/s) - 'gpo-ryu-firewall.tar.gz' saved [5157/5157]

ishah3@switch:~$ tar xvfz gpo-ryu-firewall.tar.gz
./._gpo-ryu-firewall
gpo-ryu-firewall/
gpo-ryu-firewall/._fw.conf
gpo-ryu-firewall/fw.conf
gpo-ryu-firewall/simple_firewall.py
gpo-ryu-firewall/utils.py
ishah3@switch:~$ cd gpo-ryu-firewall/
ishah3@switch:~/gpo-ryu-firewall$
ishah3@switch:~/gpo-ryu-firewall$ /tmp/ryu/bin/ryu-manager simple_firewall.py
loading app simple_firewall.py
loading app ryu.controller.dpset
loading app ryu.controller.ofp_handler
instantiating app simple_firewall.py of SimpleFirewall
instantiating app ryu.controller.dpset of DPSet
instantiating app ryu.controller.ofp_handler of OFPHandler
switch is connected <ryu.controller.controller.Datapath object at 0x7f35ba4ba4d0>
Extracted rule {'sport': '54574', 'dport': '5001', 'sip': '10.10.10.1', 'dip': '10.10.11.1'}
Allow Connection rule {'dport': '5001', 'dip': '10.10.11.1', 'sip': '10.10.10.1', 'sport': 'any'}
```