

Tutorial: Introduction to Omni

```
$ omni.py createsliver aliceslice myRSpec.xml
INFO:omni:Loading config file omni_config
INFO:omni:Using control framework pgeni
INFO:omni:Slice urn:publicid:IDN+pgeni.gpolab.
         expires within 1 day on 2011-07-07
INFO:omni:Creating sliver(s) from rspec file
INFO:omni:Writing result of createsliver for
INFO:omni:Writing to 'aliceslice-manifest-rspe
INFO:omni: -----
INFO:omni: Completed createsliver:

Options as run:
    aggregate: https://www.emulab.
    framework: pgeni
    native: True

Args: createsliver aliceslice myRSpec.xml

Result Summary: Slice urn:publicid:IDN+pgeni
Reserved resources on https://www.emulab.net/p
Saved createsliver results to aliceslice-man
INFO:omni: =====
```

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GENI Project Office
NSDI13
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Do a Simple Client-Server Experiment

Reserve two hosts using Omni and
exchange traffic between them



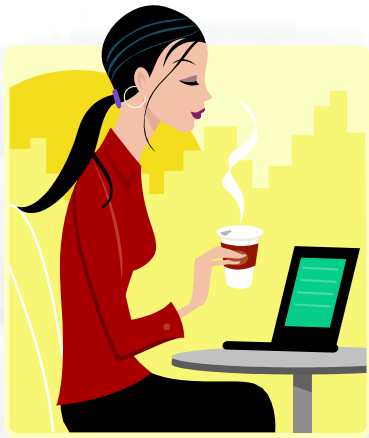
New GENI Terminology

credentials

AM API

certificate

sliver



Experimenter

GENI Certificate : identifies user; created by the Portal and you can download it through the webUI, it is an ssl certificate

GENI Credential : identifies user's permissions; you almost never have to handle; tools query if from Portal Services

GENI Keys : Access to compute resources are through ssh-keys, you can use your own or use the one GENI created for you

Passphrase : is the password that protects your private key

Omni: Resource Reservation tool

- A command line experimenter tool
- Create slices and slivers using the GENI AM API
- Written in and scriptable from Python
- Use existing accounts
 - GENI Portal
 - ProtoGENI
 - PlanetLab
- **Works with aggregates that implement the GENI AM API**
 - ProtoGENI, PlanetLab, OpenFlow, InstaGENI, ExoGENI

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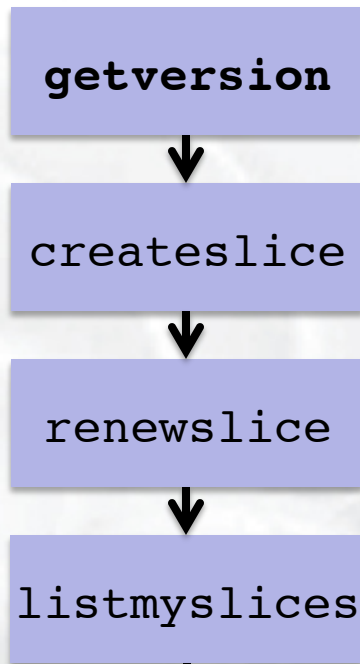
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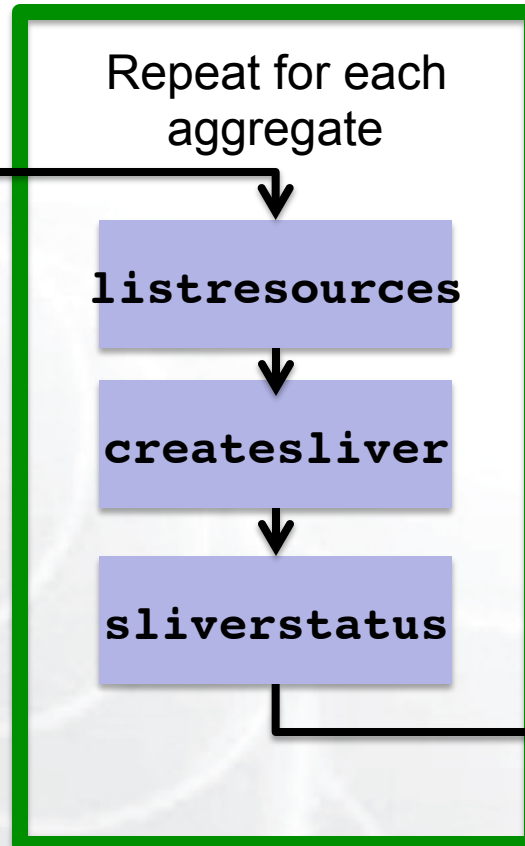
<http://trac.gpolab.bbn.com/gcf/wiki/Omni>

Omni Command Workflow

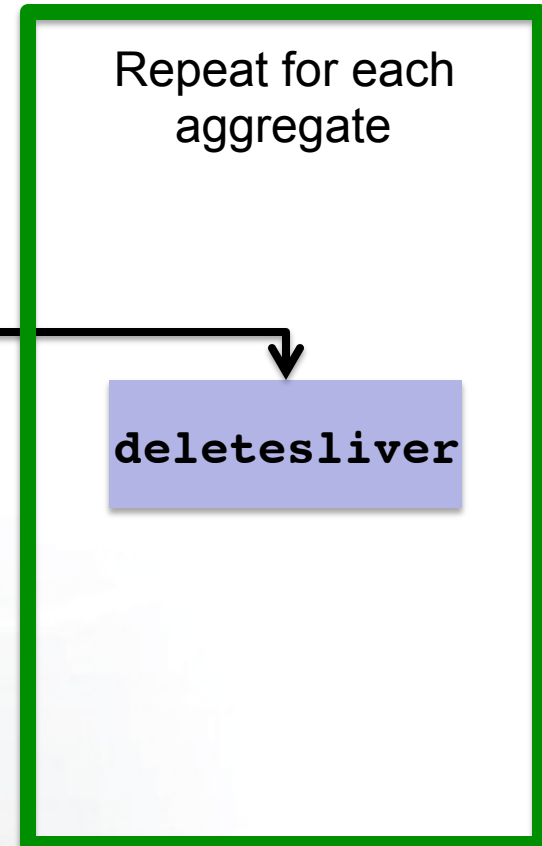
Create Slice



Create Sliver



Cleanup



Legend: **AM API command**

Run this script for standard configuration:

1. Download GENI bundle
2. Run the script

```
[omni]
default_cf = pgeni
users = gpousr21
# ----- Users -----
[gpousr21]
urn = urn:publicid:IDN
+pgeni.gpolab.bbn.com+user
+gpousr21
keys = ~/.ssh/geni_key
...
```

- ✓ You only need the Omni bundle from the portal
- ✓ Standard AM nicknames

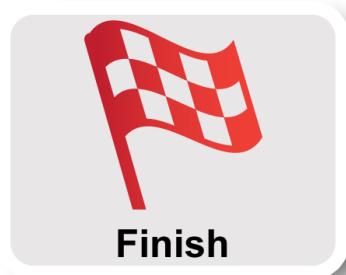
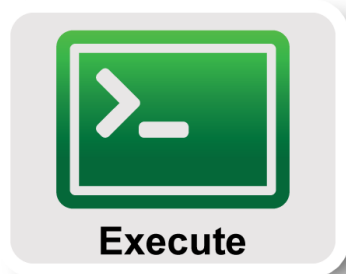
```
[omni]
default_cf = pgeni      # Tutorial accounts are on GPO's PG
users = gpousr21       # gpousr21's keys loaded on the VM to
allow login

# ----- Users -----
[gpousr21]
urn = urn:publicid:IDN+pgeni.gpolab.bbn.com+user+gpousr21
# Really important to get the keys correct!!!
#key to load on VM
keys = ~/Tutorials/Omni/gpousr20/ssh/gpousr20_key.pub

# default aggregates to run omni commands on
aggregates = http://emulab.net/protogeni/xmlrpc/am,
https://pgeni.gpolab.bbn.com/protogeni/xmlrpc/am, ...
```


- `omni.py -h`
 - Lists all commands and their arguments
 - Lists all command line options
 - Lists Omni version
 - Lists url to find out more information about Omni
- Omni Troubleshooting page:
<http://trac.gpolab.bbn.com/gcf/wiki/OmniTroubleShoot>

- Many people will be accessing the resources, so some calls might fail. Wait a bit and try again!
- Omni is a command line tool, copy-paste is your friend
- You can copy-paste between your computer and the VM.



- **Part I: Design/Setup**
 - Step 1: Configure Omni
 - Step 2: Obtain Resources
- Part II: Execute
 - Execute Experiment
 - View results
- Part III: Finish
 - Teardown Experiment

Download omni bundle

Instructions:

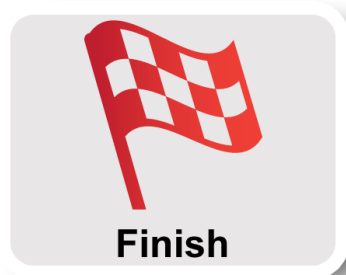
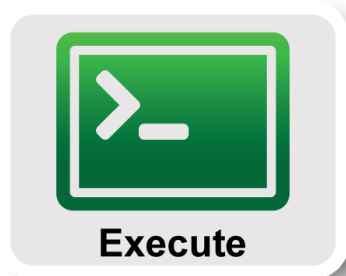
1. Choose a project below as your default omni project.
2. Click "Download omni bundle"
3. Run "omni-configure.py -f portal <location of bundle>"

Choose project as omni default: NSDI13

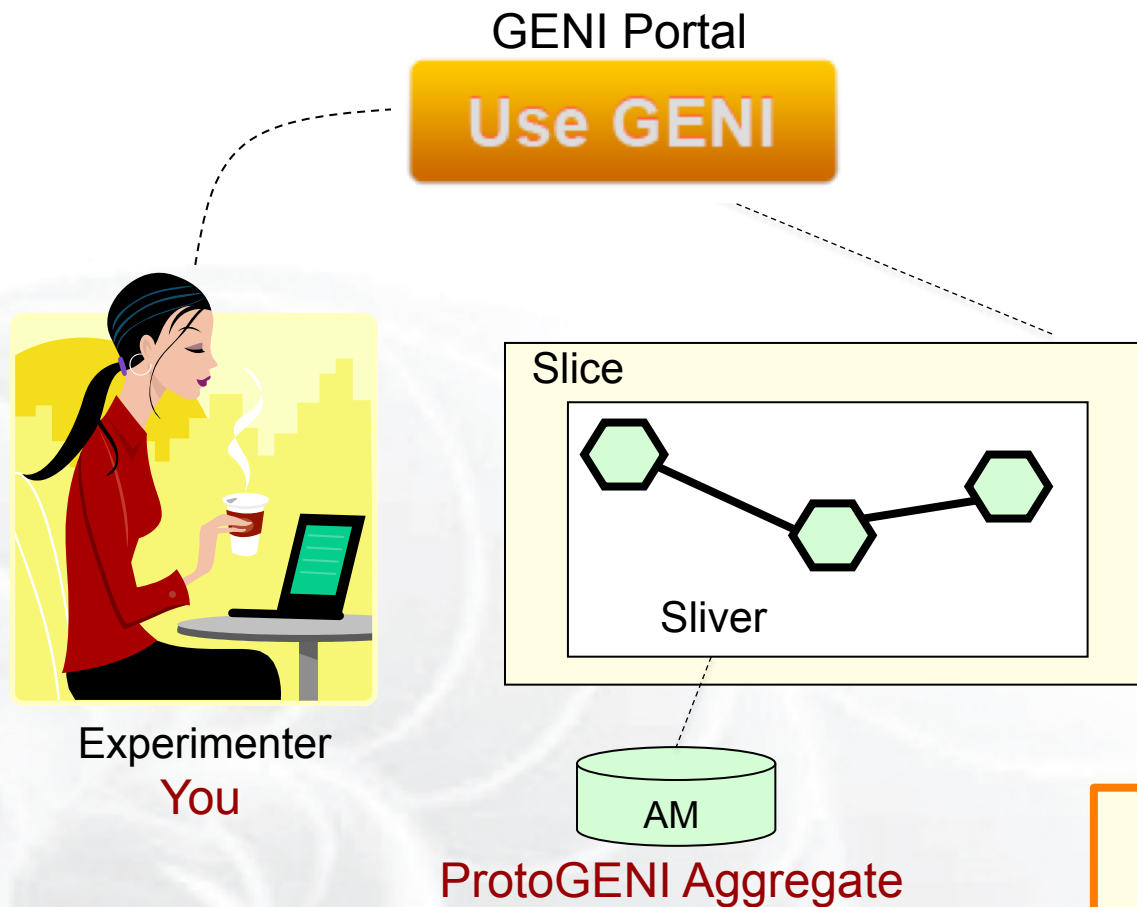
Download omni bundle

Cancel

```
geni@NSDI13-Tutorials:~$>  
omni-configure.py -f portal
```



- **Part I: Design/Setup**
 - Step 1: Configure Omni
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Once you understand how to run this simple experiment, scaling up is easy!

Resource Specification Document (RSpec)

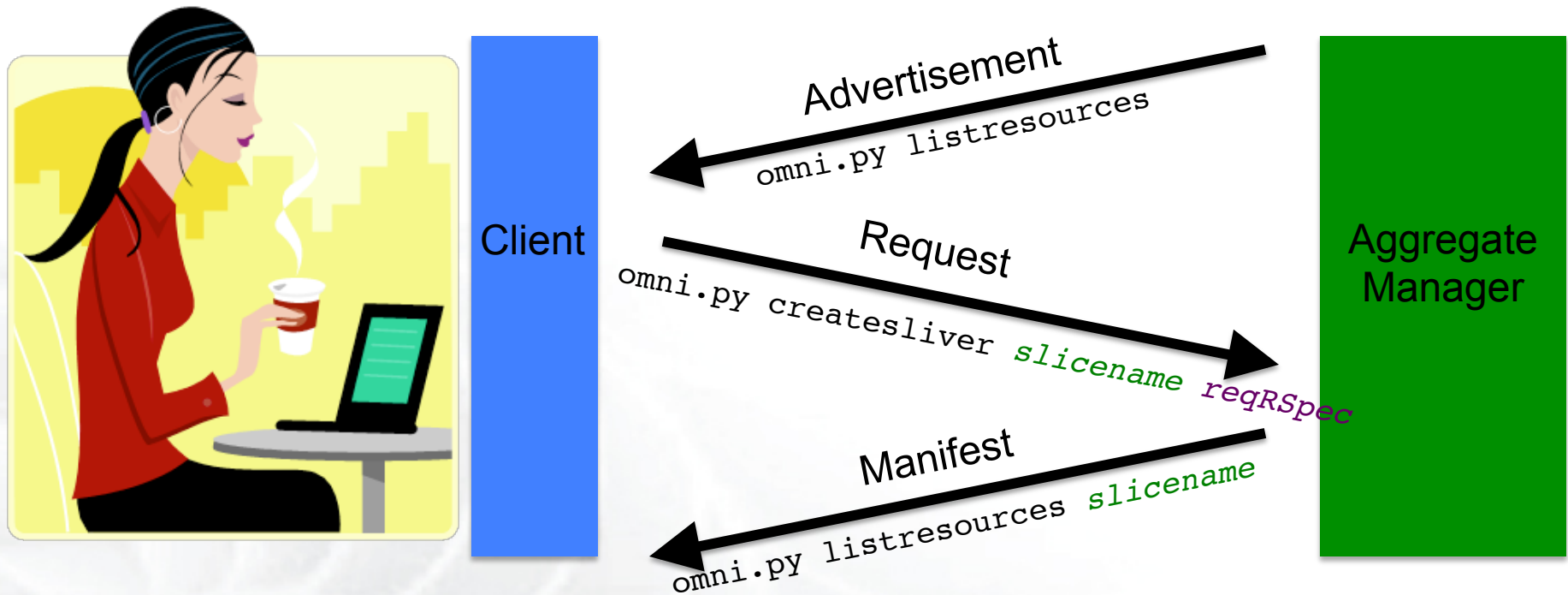
- XML document that describes resources
 - hosts, links, switches, etc

```
▼<rspec xmlns:flack="http://www.protogeni.net/flack"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
xsi:schemaLocation="http://www.geni.net/flack http://www.geni.net/flack/flack.xsd"
  ▼<node xmlns:rs="http://www.protogeni.net/rs"
component_manager_id="urn:publicid:IDN+geni.org+urn:publicid:IDN+geni.org"
  <hardware_type name="pcfast"/>
  ▼<sliver_type name="raw-pc">
    <disk_image name="urn:publicid:IDN+geni.org+urn:publicid:IDN+geni.org" />
  </sliver_type>
  ▼<services>
    <execute command="sudo /local/install" />
    <install install_path="/local" url="http://www.geni.net/flack/flack.xsd" />
  </services>
  <interface client_id="server:if0"/>
  <flack:node_info x="100" y="289" unbo... />
</node>
  ▼<node xmlns:rs="http://www.protogeni.net/rs"
component_manager_id="urn:publicid:IDN+geni.org+urn:publicid:IDN+geni.org"
  <sliver_type name="emulab-openvz"/>
  ▼<services>
    <execute command="sudo /local/install" />
    <install install_path="/local" url="http://www.geni.net/flack/flack.xsd" />
  </services>
</node>
</rspec>
```

GENI v3

- AM extensions
- Client extensions
- Tool extensions

The Three Types of RSpecs

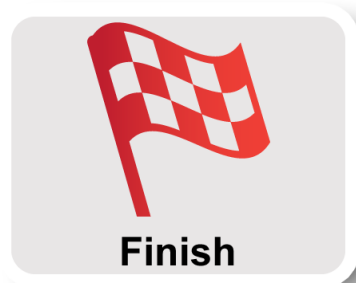


Advertisement RSpec : What does the AM have?

Request RSpec : What does the Experimenter want?

Manifest RSpec: What does the Experimenter have?

- `omni.py getversion`
- `omni.py createslice slicename`
- `omni.py renewslice slicename date`
- `omni.py listmyslices username`
- `omni.py createsliver slicename requestRSpec`
- `omni.py sliverstatus slicename`
- `omni.py listresources [slicename]`
- `omni.py deletesliver slicename`



- **Part I: Design/Setup**
 - Step 1: Establish Management Environment
 - Step 2: Obtain Resources
- **Part II: Execute**
 - Run Experiment
- **Part III: Finish**
 - Teardown Experiment

- You can write custom Python scripts
 - Call existing Omni functions
 - Parse the Output
- Example: `readyToLogin.py`
 - Calls `getversion`, `sliverstatus`, `listresources`
 - Parses output
 - Determines ssh command to log into node
 - Print ssh configuration blocks to place in your ssh config file
- More examples distributed with Omni
 - `remote-execute.py`

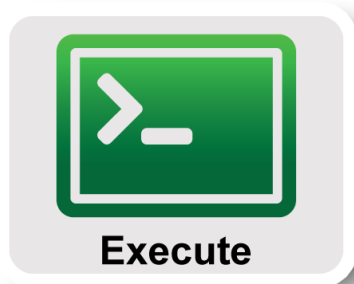
```
geni@NSDI13-Tutorials:~$>  
readyToLogin.py omni99 -a pg-utah  
  
xterm -e ssh -i /home/geni/.ssh/  
geni_key nriga@pc204.emulab.net &
```



[Web Server Statistics](#)

[Logs from the iperf Sever](#)

Experiment Workflow



- Part I: Design/Setup
 - Step 1: Establish Management Environment
 - Step 2: Obtain Resources
- Part II: Execute
 - Execute Experiment
- Part III: Finish
 - Teardown Experiment

Part III: Finish Experiment

credentials
sliver
projective
AM API resource
aggregate certificate
user
Spec



When your experiment is done, you should always release your resources.

- Normally this is when you would archive your data
- Delete your slivers at **each** aggregate

Omni: Command Line Tool

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- ✓ Written in Python
- ✓ Easy to automate experiments
- ✓ Helps with simple orchestration through omni scripting
- ✓ Talks to all AMs that speak the GENI AM API
- ✗ Very manual
- ✗ Needs RSpecs