geni
Exploring Networks of the Future

Getting Started with GENI - Part 2

In Part 1 You Learned to…

- Log into the GENI Portal

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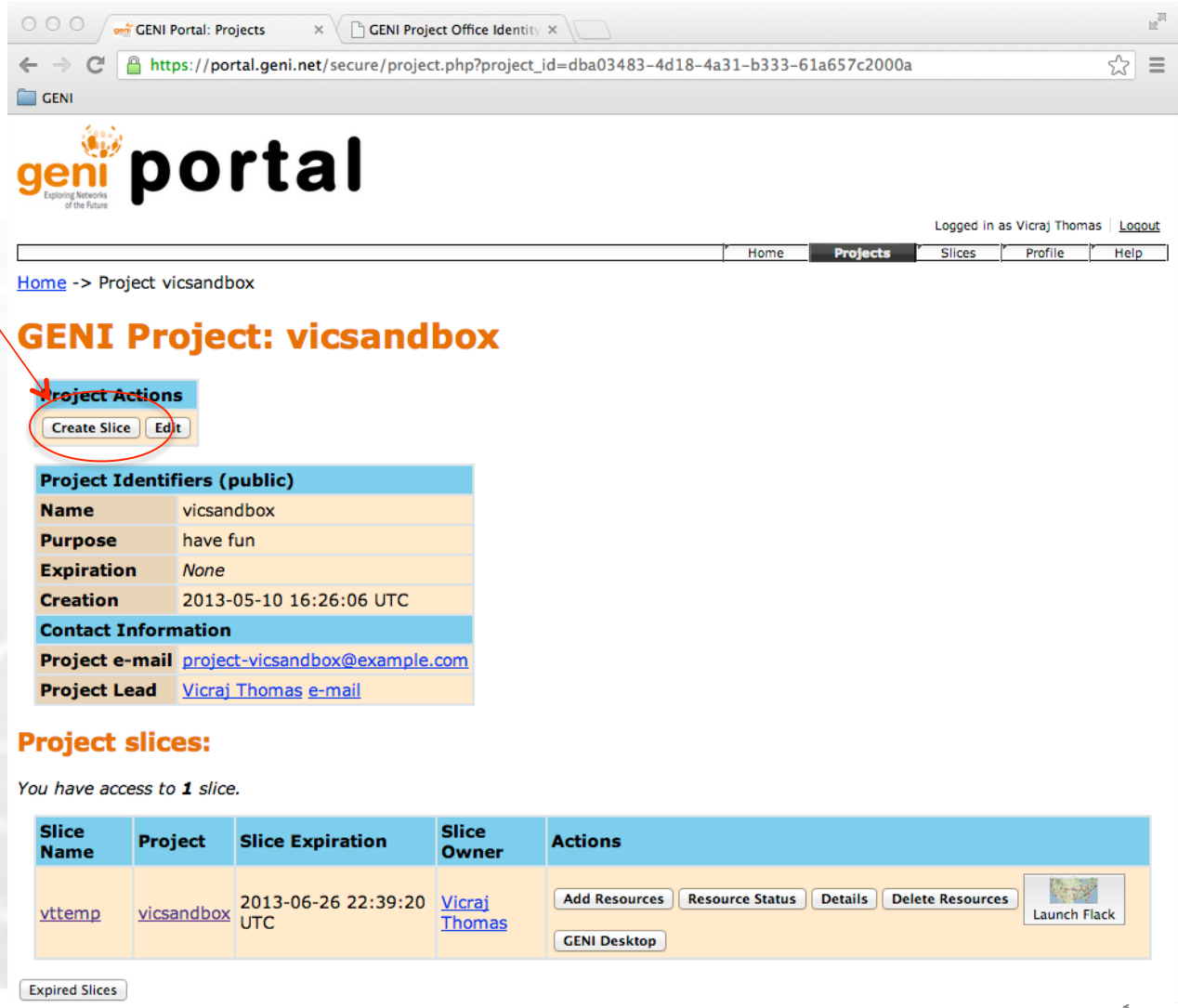
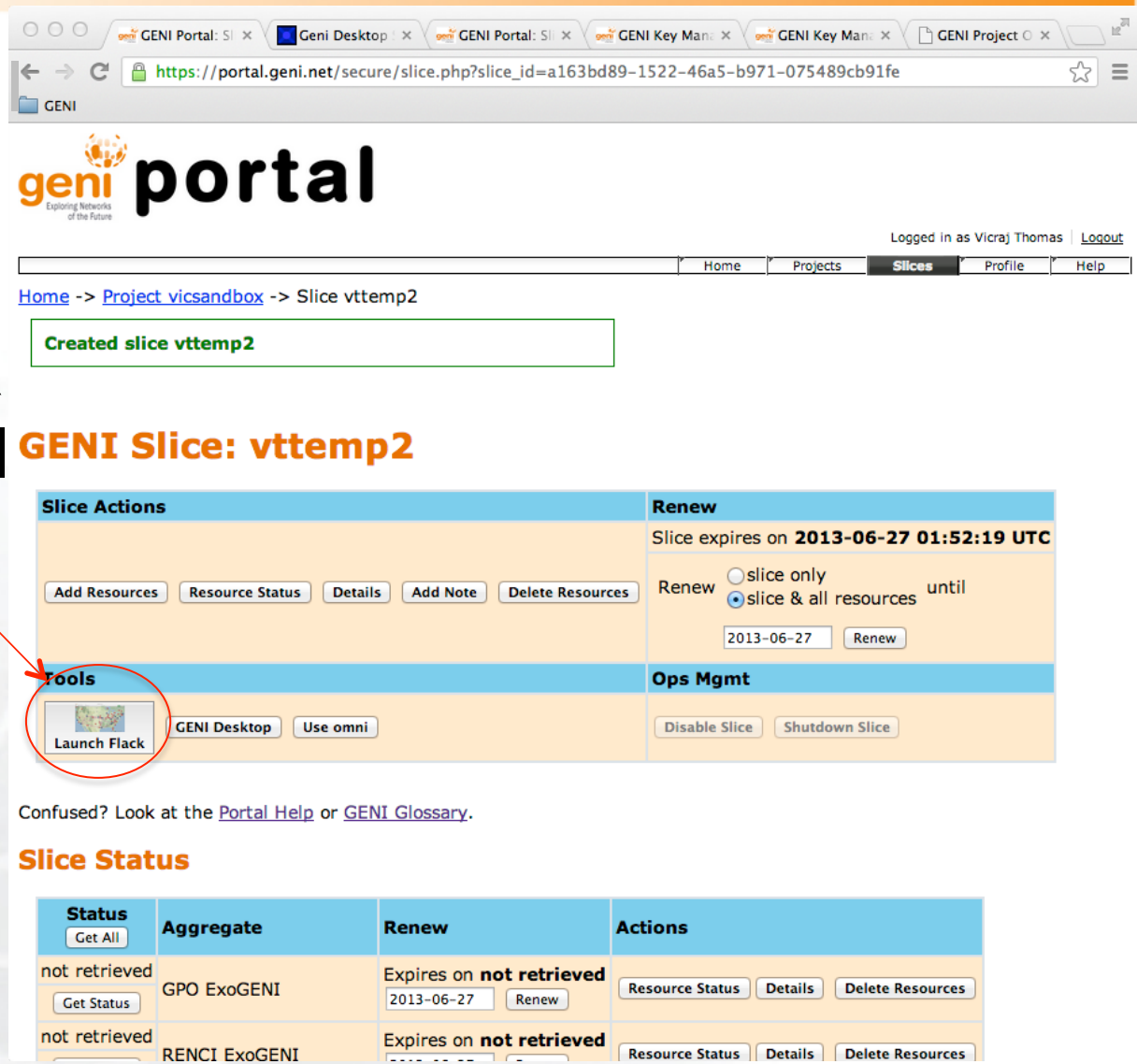


In Part 1 You Learned to…

- Log into the GENI Portal
- Create a slice
- Launch the Flack experimenter tool



In Part 1 You Learned to…

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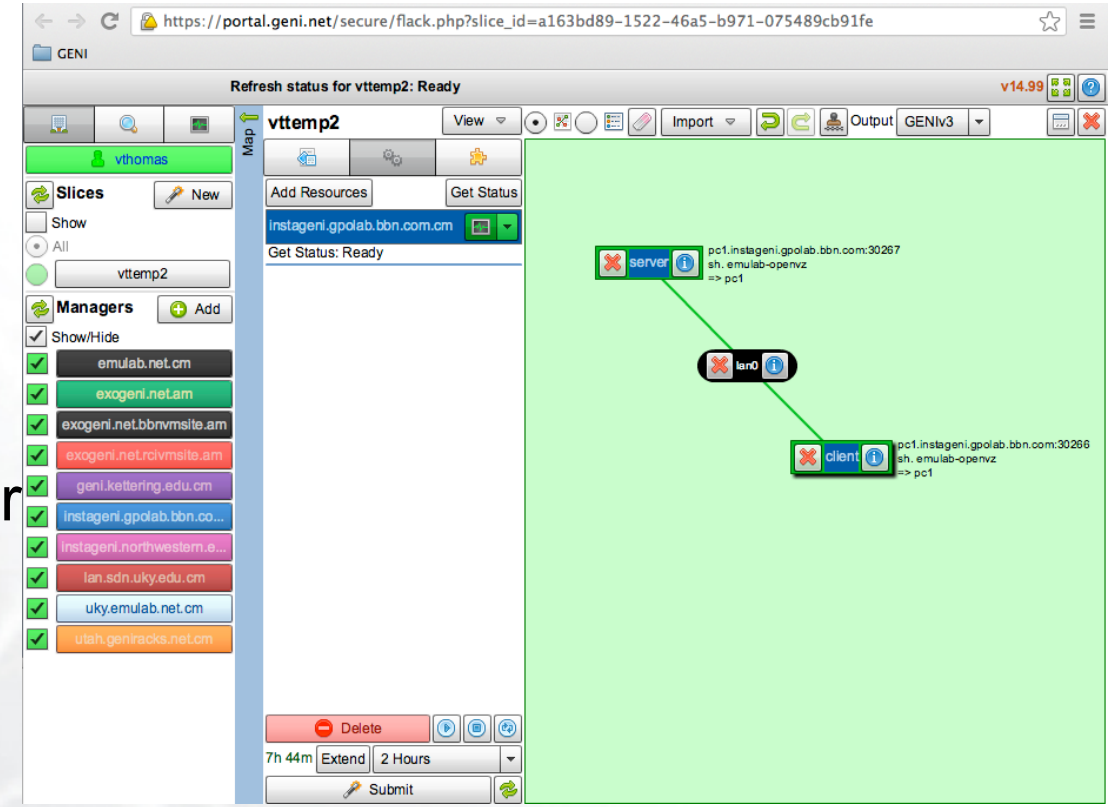
- Create a slice
- Launch the Flack experimenter tool
- Set up a simple experiment
  - Add resources to your slice from an aggregate
  - Use the resources in your slice



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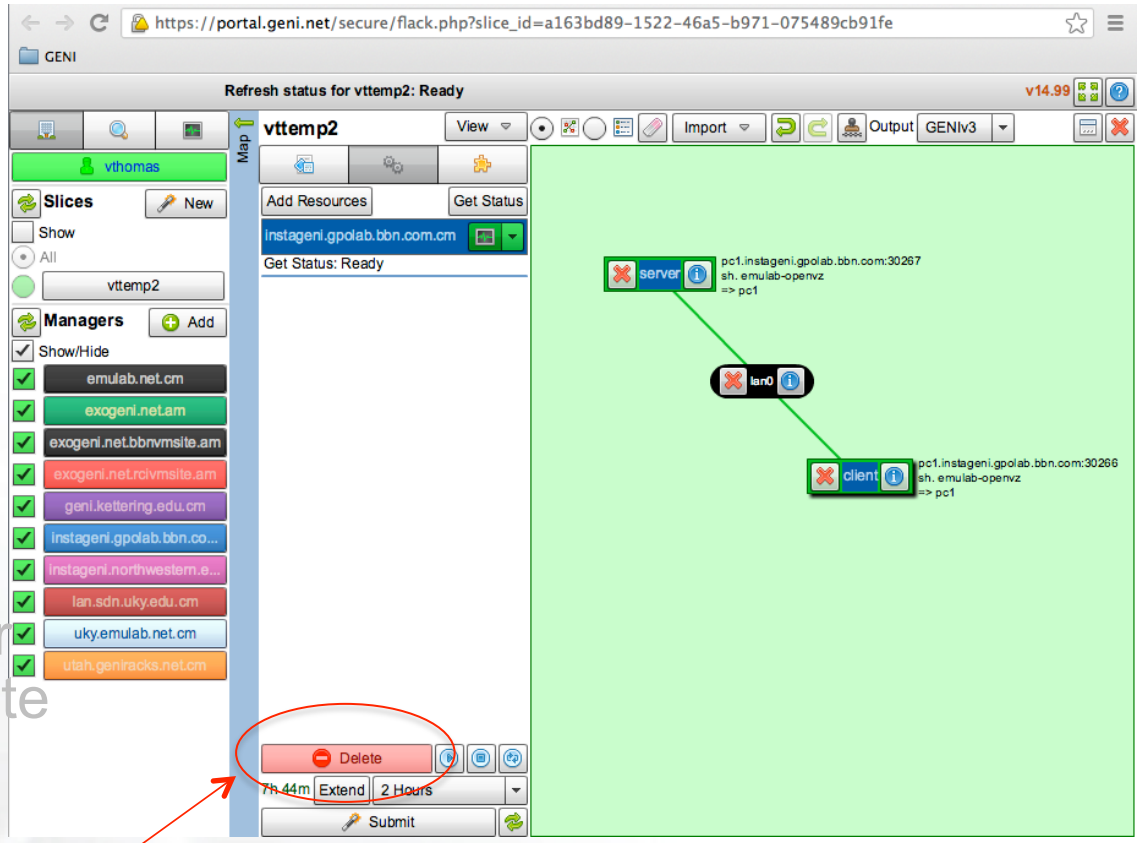
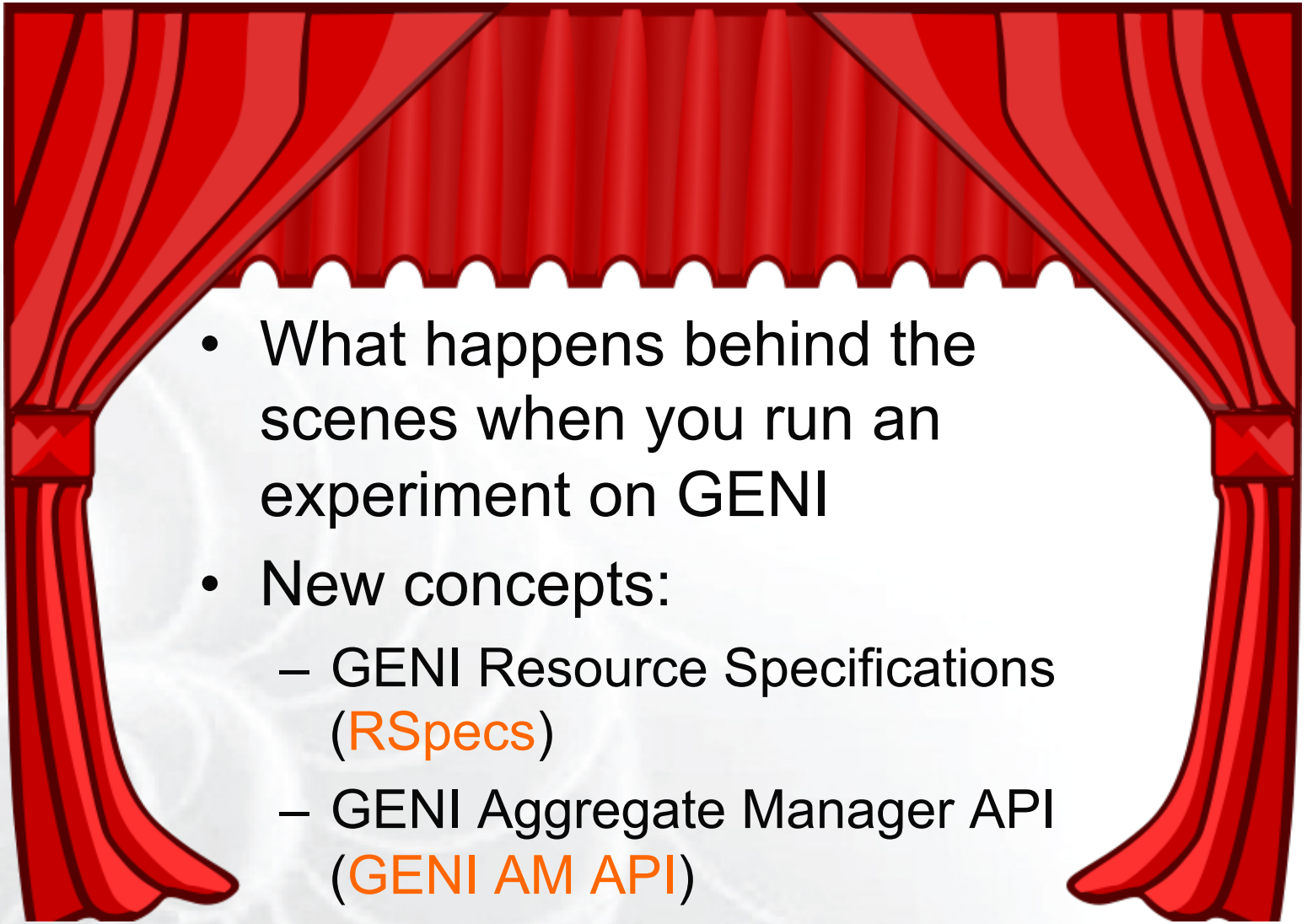


In Part 2 You will Learn…



- What happens behind the scenes when you run an experiment on GENI
- New concepts:
  - GENI Resource Specifications (RSpecs)
  - GENI Aggregate Manager API (GENI AM API)

GENI Resource Specifications (RSpecs)

- RSpecs are XML documents that describe resources
  - VMs, links, etc.

RSpec for a virtual machine with one interface:

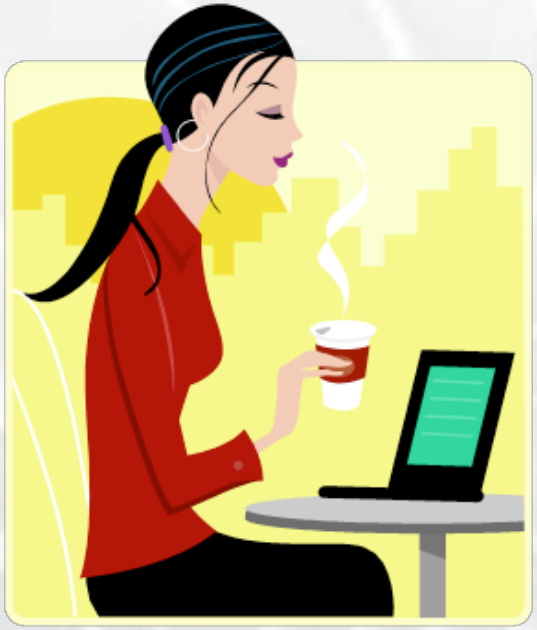
```
<?xml version="1.0" encoding="UTF-8"?>
<rspec type="request”  xsi:schemaLocation="http://www.geni.net/
resources/rspec/3  …  xmlns="http://www.geni.net/resources/rspec/3">
    <node client_id="server" component_manager_id="urn:publicid:IDN
+instageni.gpolab.bbn.com+authority+cm”>
       <sliver_type name="emulab-openvz"/>
       <interface client_id="server:if0”> </interface>
    </node>
</rspec>
```

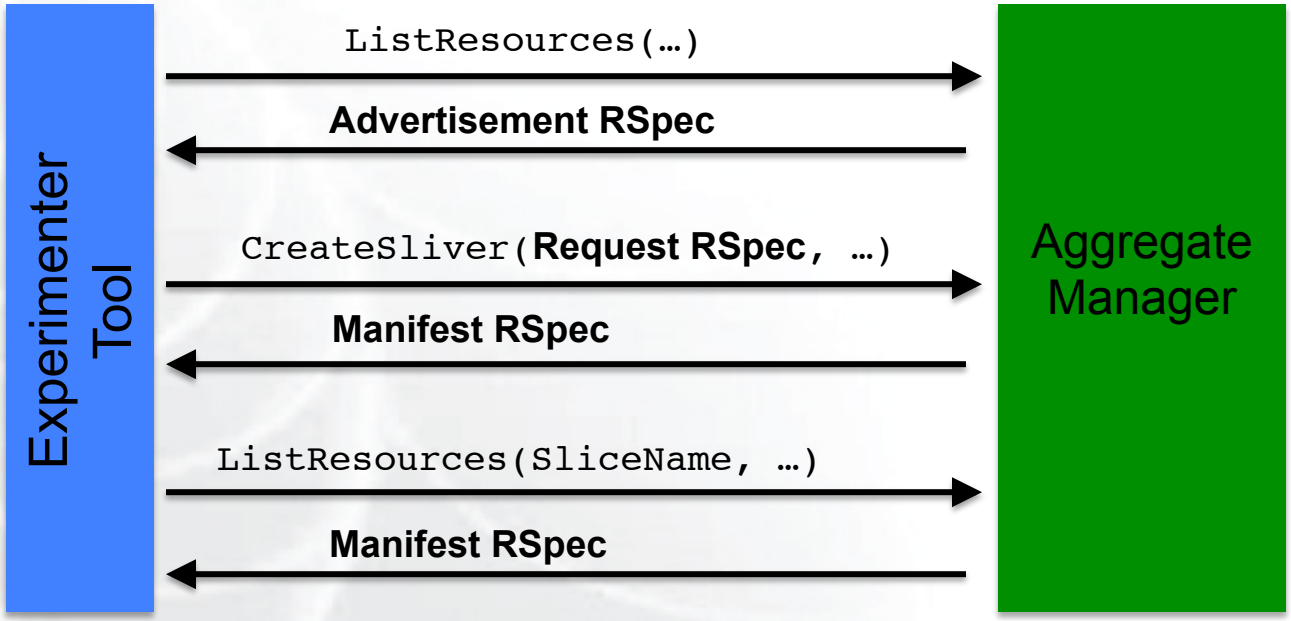
RSpecs

- RSpec documents are exchanged by experimenter tools (e.g. Flack) and aggregates
  - Aggregates use RSpecs to describe what they have – Advertisement RSpecs
  - Experimenters use RSpecs to describe the resources they want – Request RSpecs
  - Aggregates use RSpecs to describe the resources allocated to an experimenter – Manifest RSpecs

The GENI AM API

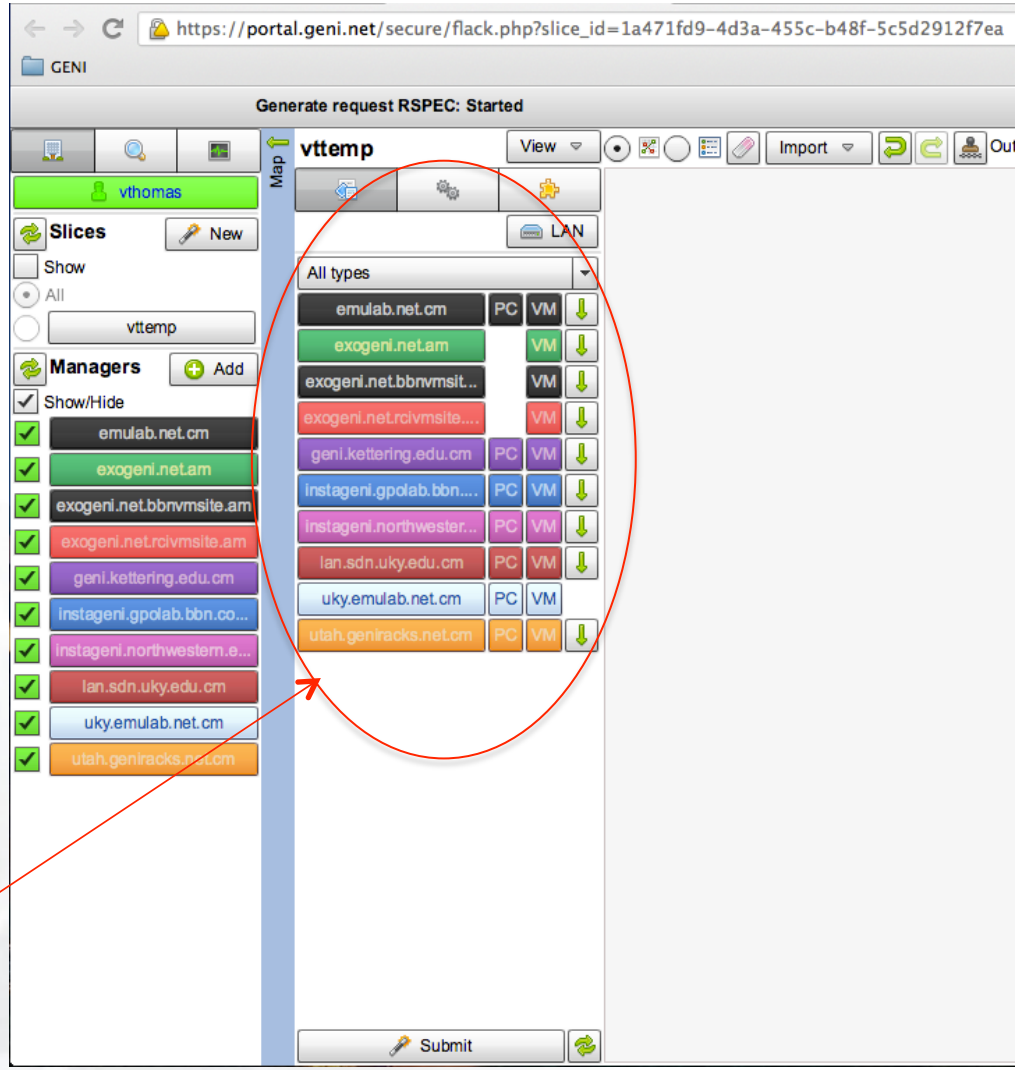
- Experimenter tools and aggregates talk to each other using the GENI Aggregate Manager API (GENI AM API)





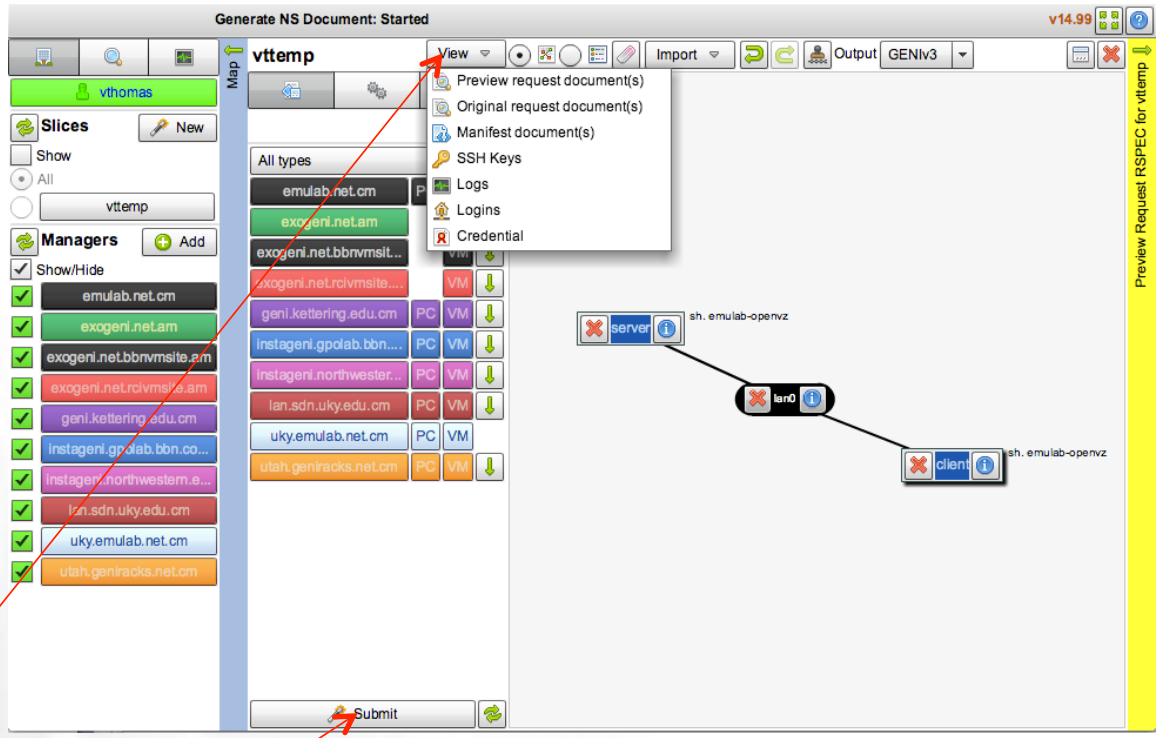
Putting it all Together…

- Flack calls `ListResources` on all aggregates it knows about
- Aggregates send back advertisement RSpecs
- Flack uses information in the advertisements to populate its palette of resources



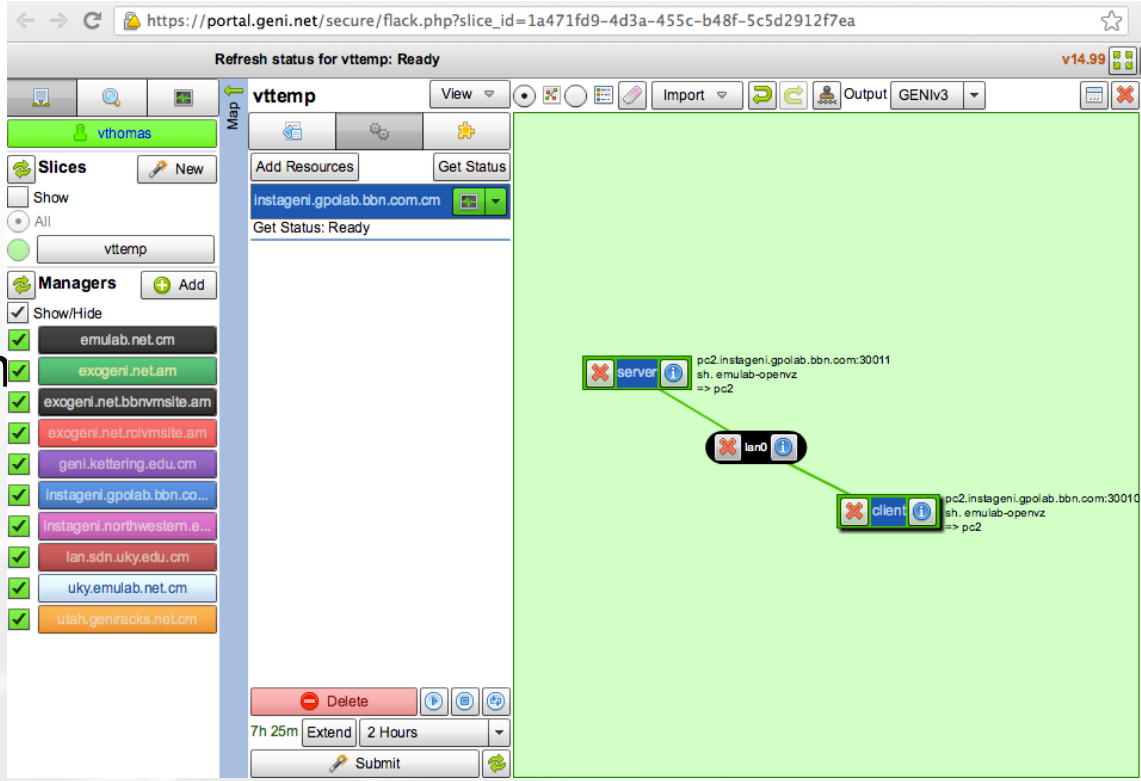
Putting it all Together…

- When you drag and drop resources on to the Flack canvas, it creates request RSpecs for these resources
  - To view the request Rspec click on “View” and select “Preview request documents”
- When you click “Submit”, Flack makes `createSliver` calls on the aggregates



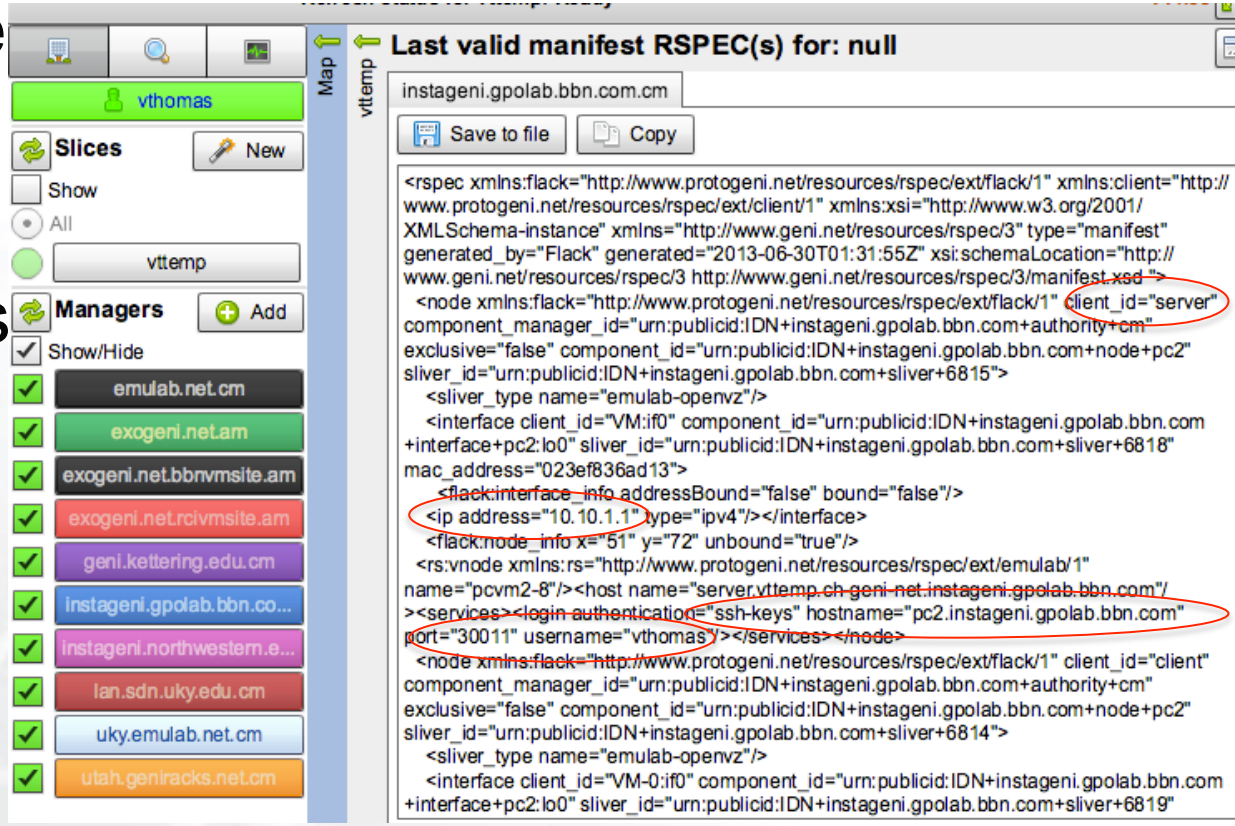
Putting it all Together…

- Flack periodically calls `sliverStatus` on the aggregates to check on the status of your request
- When `sliverStatus` shows:
  - Resources have been allocated, Flack turns its canvas yellow
  - Resources are ready to use, Flack turns its canvas green



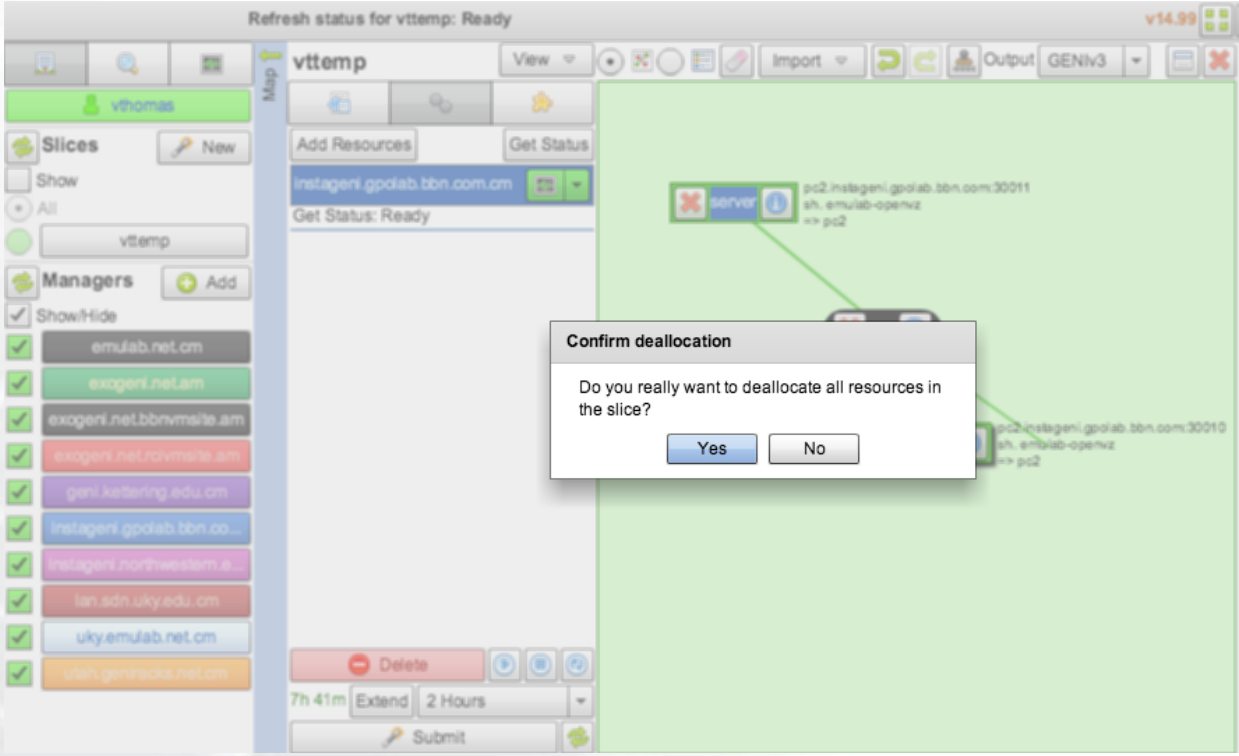
Putting it all Together…

- listResources with a slice name returns a manifest RSpec
- Manifest includes names and ports used to ssh into VMs
  - Flack uses this information to help you log into your resources



Putting it all Together…

- When you deleted your resources, Flack called `deleteSliver` on the aggregates



Hands-On Exercise

- Reinforce understanding of the new concepts by:
  - Viewing and editing RSpec documents
  - Making the AM API calls ourselves using the Omni experimenter tool

The Exercise

- Repeat the experiment from Part 1 by loading an RSpec into Flack
  - Instead of drawing the topology ourselves (saves time)
- Edit the RSpec using Flack but don't "submit"
- Save the request RSpec generated by Flack into a file
- Use Omni to make GENI AM API calls to send the request RSpec, check status of resources, etc.

GENI AM API Calls Used

- `listresources`: Get an advertisement rspec listing the resources at an aggregate
- `createsliver`: Request resources from an aggregate
- `sliverstatus`: Get status of resources allocated to a slice at an aggregate
- `deletesliver`: Delete resources allocated to a slice by an aggregate

For a complete list of GENI AM API calls see:
`http://groups.geni.net/geni/wiki/GAPI_AM_API`

Omni: Resource Reservation tool

- A command line experimenter tool
- Useful for making AM API calls on aggregates
- Written in and scriptable from Python
- **Works with aggregates that implement the GENI AM API**
  - ProtoGENI, PlanetLab, OpenFlow, InstaGENI, ExoGENI

```
$ 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: ==================================
```

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

Omni Commands You Will Use

- `omni.py –a aggregatename listresources`
- `omni.py –a aggregatename createsliver slicename requestRSpec`
- `omni.py –a aggregatename sliverstatus slicename`
- `omni.py –a aggregatename listresources slicename`
- `omni.py –a aggregatename deletesliver slicename`

- A useful utility (distributed with Omni): `readyToLogin.py`
  - Gives you the ssh commands you need to log into your nodes
    - `readyToLogin.py` parses the output of `sliverStatus` to determine the hostname, portname and username for the ssh commands

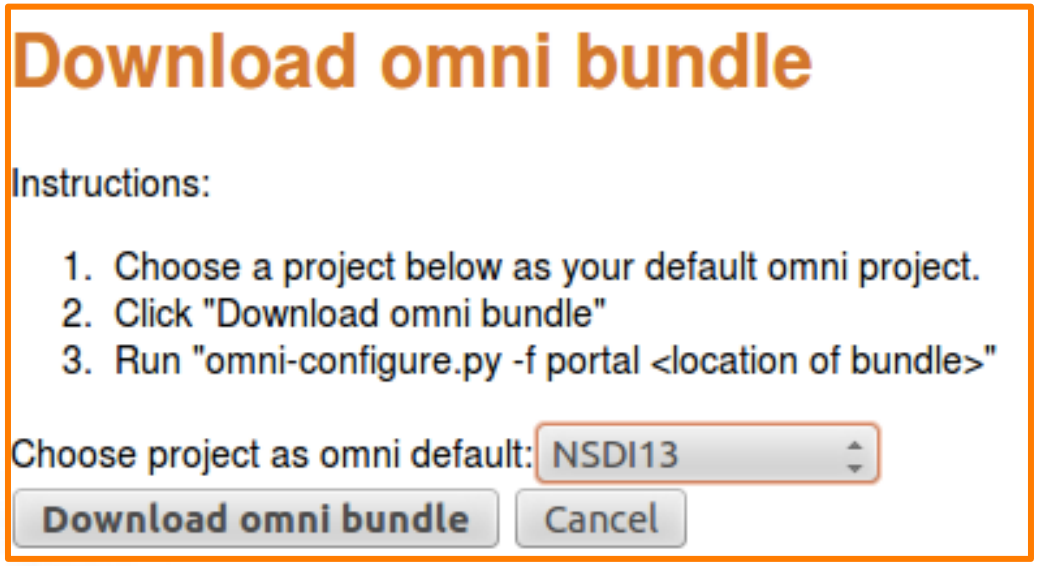
Configuring Omni

- Omni reads a configuration file `omni_config` to:
  - Get usernames for accounts to be created on compute resources
  - Find locations of ssl certs and ssh key files
    - ssl certs are used to secure communication between Omni and the aggregates
    - ssh key pairs are used log into compute resources
  - Find standard nicknames for aggregates
    - E.g. you can refer to the InstaGENI rack at BBN as ig-bbn instead of https://boss.instageni.gpolab.bbn.com:12369/protogeni/xmlrpc/am/2.0

Creating an Omni Config File

1. Download the GENI bundle from the GENI Portal

2. Run the script `omni-configure.py`
   - Distributed with Omni
   - Already installed on your virtual machine




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