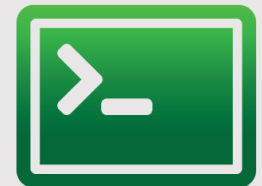


Getting Started with GENI - Part 2



Design/Setup



Execute



Finish

- Log into the **GENI** Portal

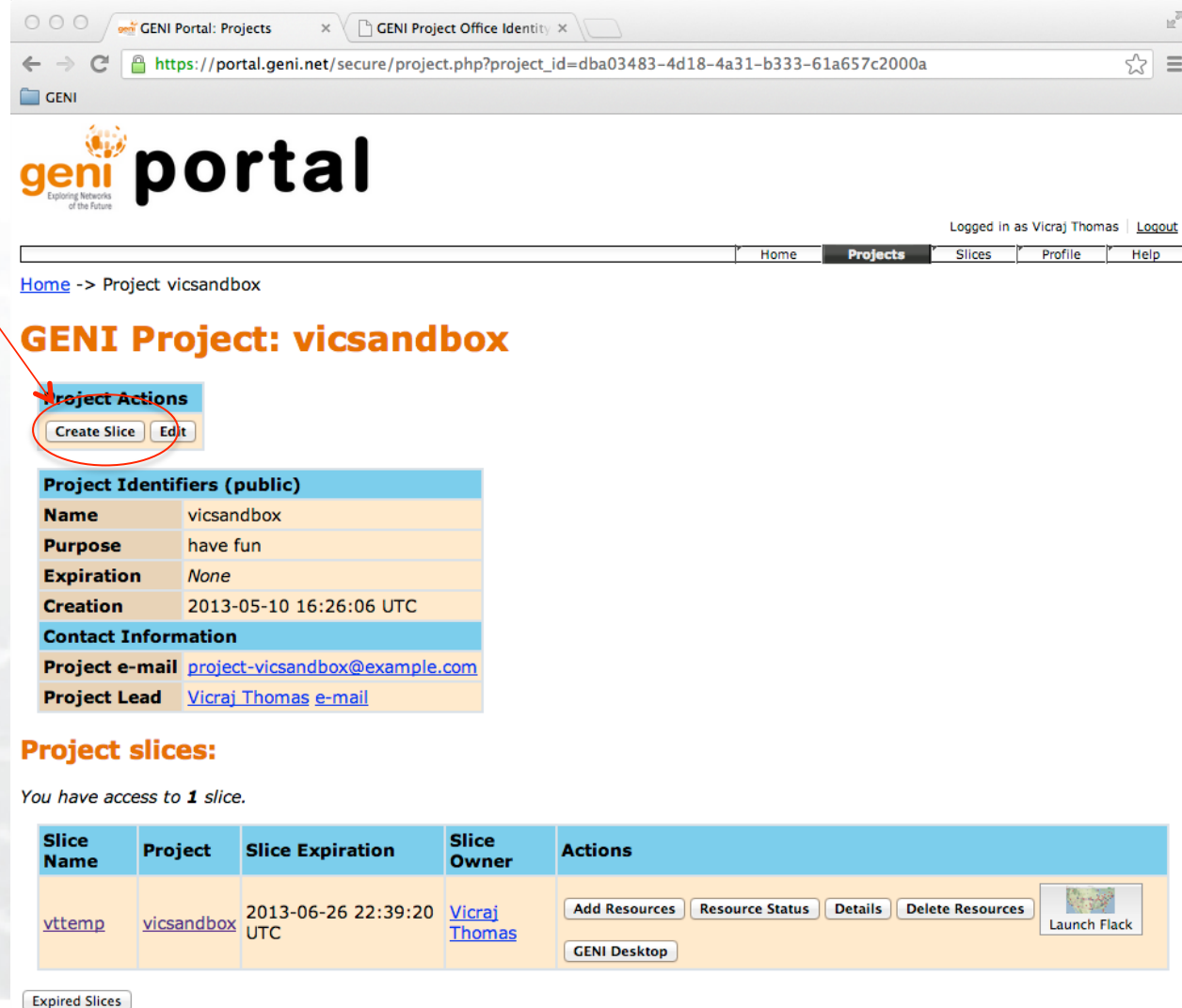


The screenshot shows a web browser window with the URL `https://portal.geni.net/eds/?entityID=https%3A%2F%2Fpanther.gpolab.bbn.com%2Fshibboleth&return=https%3A%2F%2Fporta...`. The page content includes:

- A header bar with the **GENI** logo.
- A prompt: *Please sign in using your account at one of our partners:*
- A red-bordered box containing:
 - The text "Use a suggested selection:"
 - The **geni** logo and "GENI Project Office" link.
 - The text "Or enter your college, university, or organization's name" above a text input field.
 - Buttons for "Continue" and "Get Help".
 - A link: "Allow me to pick from a list".
- Links for "Can't login via any of the above organizations? Request a login from the GPO" and "Need help? Contact GENI Help".
- A footer bar with "Web Design by Free Templates Online".
- A sponsor notice: "GENI is sponsored by the  National Science Foundation".

In Part 1 You Learned to...

- Log into the GENI Portal
- Create a **slice**



GENI Portal: Projects | GENI Project Office Identity

https://portal.geni.net/secure/project.php?project_id=dba03483-4d18-4a31-b333-61a657c2000a

GENI

geni portal

Logged in as Vicraj Thomas | Logout

Home | **Projects** | Slices | Profile | Help

Home -> Project vicsandbox

GENI Project: vicsandbox

Project Actions

Create Slice | Edit

Project Identifiers (public)

Name	vicsandbox
Purpose	have fun
Expiration	None
Creation	2013-05-10 16:26:06 UTC

Contact Information

Project e-mail project-vicsandbox@example.com

Project Lead [Vicraj Thomas e-mail](#)

Project slices:

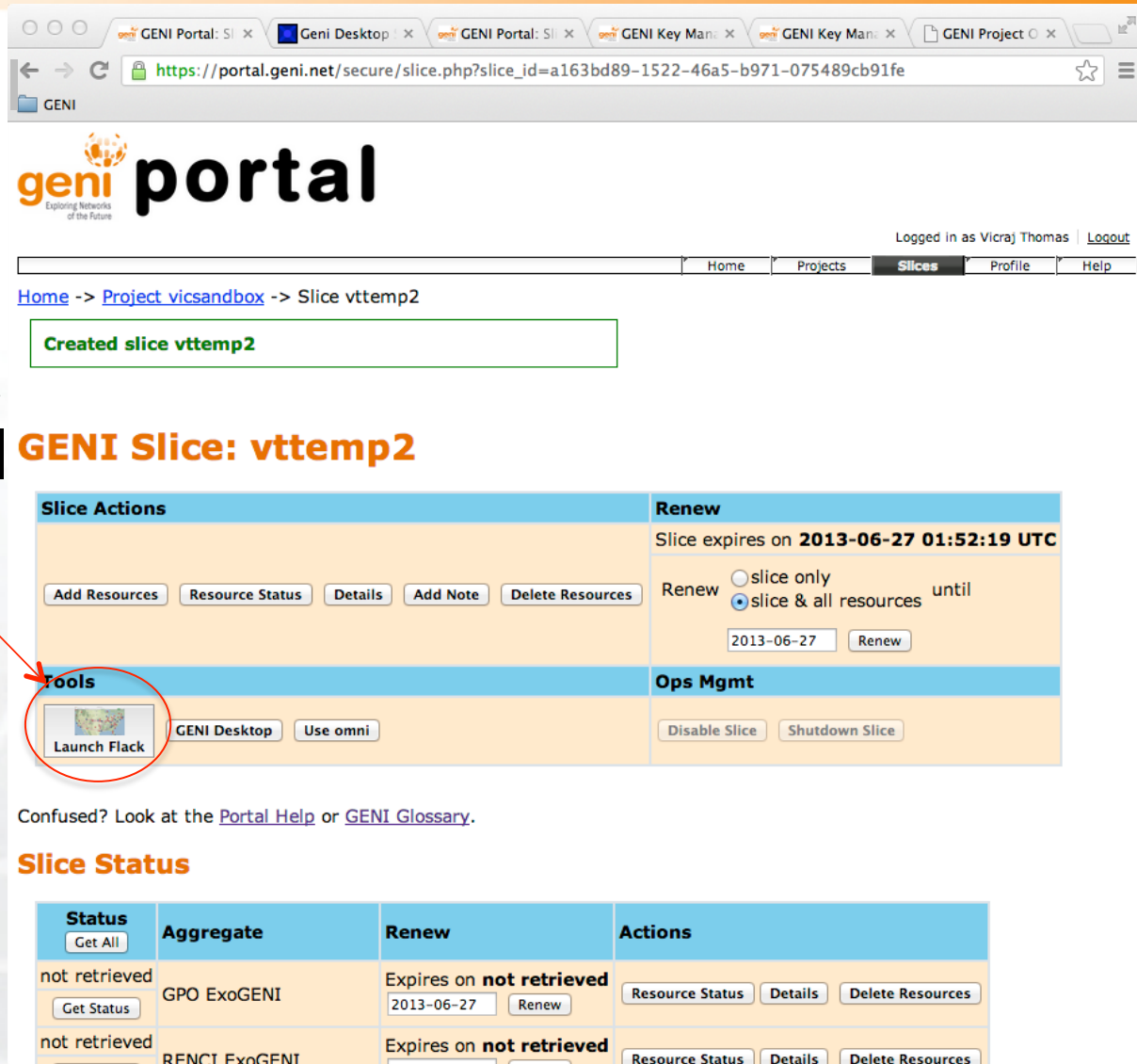
You have access to **1** slice.

Slice Name	Project	Slice Expiration	Slice Owner	Actions
vttemp	vicsandbox	2013-06-26 22:39:20 UTC	Vicraj Thomas	Add Resources Resource Status Details Delete Resources Launch Flask GENI Desktop

Expired Slices

In Part 1 You Learned to...

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



GENI Portal: SLI x Geni Desktop x GENI Portal: SLI x GENI Key Man: x GENI Key Man: x GENI Project O x

https://portal.geni.net/secure/slice.php?slice_id=a163bd89-1522-46a5-b971-075489cb91fe

geni portal

Logged in as Vicraj Thomas | [Logout](#)

Home Projects **Slices** Profile Help

Home -> [Project vicsandbox](#) -> Slice vttemp2

Created slice vttemp2

GENI Slice: vttemp2

Slice Actions	Renew
Add Resources Resource Status Details Add Note Delete Resources	Slice expires on 2013-06-27 01:52:19 UTC Renew <input type="radio"/> slice only <input checked="" type="radio"/> slice & all resources until 2013-06-27 Renew
Tools	Ops Mgmt
Launch Flack GENI Desktop Use omni	Disable Slice Shutdown Slice

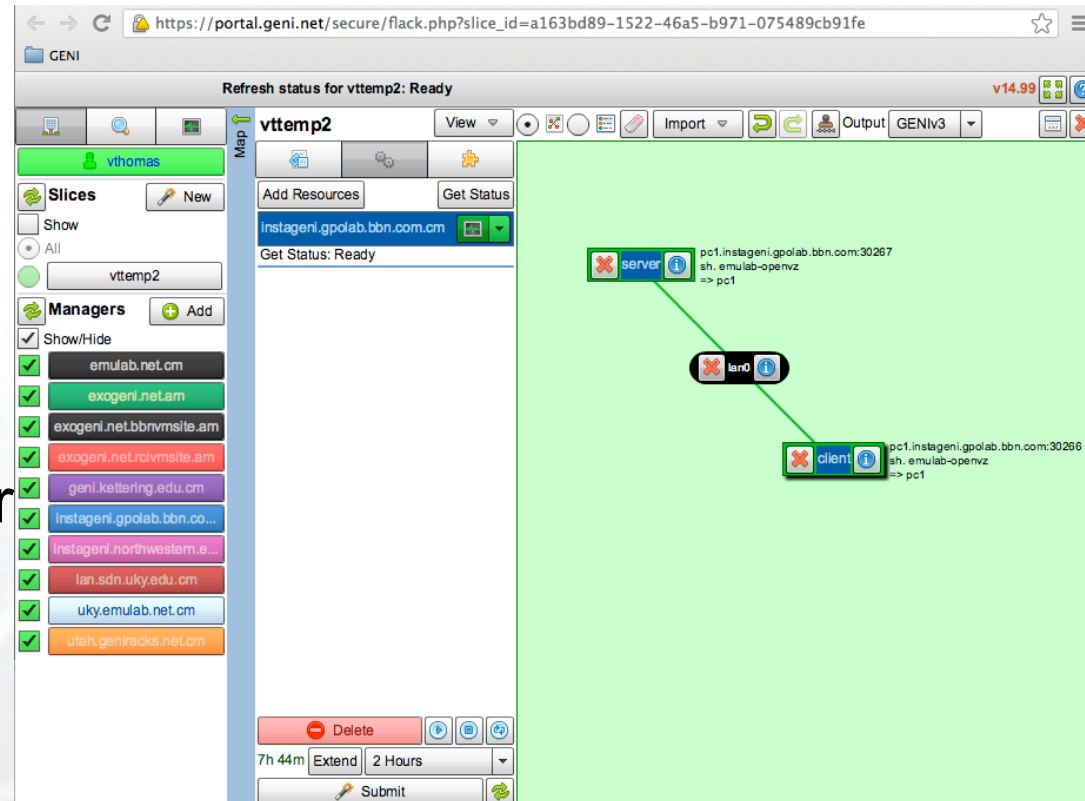
Confused? Look at the [Portal Help](#) or [GENI Glossary](#).

Slice Status

Status	Aggregate	Renew	Actions
not retrieved Get All Get Status	GPO ExoGENI	Expires on not retrieved 2013-06-27 Renew	Resource Status Details Delete Resources
not retrieved	RENCI ExoGENI	Expires on not retrieved	Resource Status Details Delete Resources

In Part 1 You Learned to...

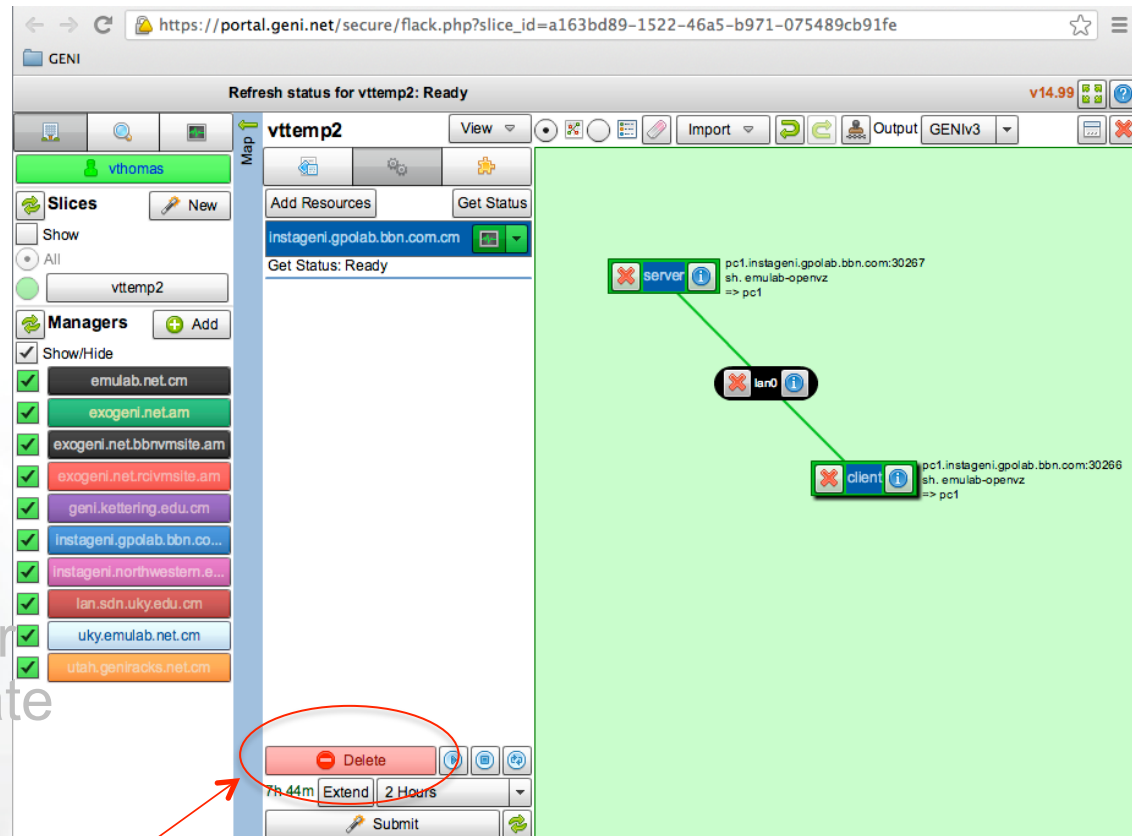
- Log into the GENI Portal
- Create a slice
- Launch the Flack experimenter tool
- Set up a simple experiment
 - Add **resources** to your slice from an **aggregate**
 - Use the resources in your slice



The screenshot shows the GENI portal interface for a slice named 'vttemp2'. The browser address bar shows the URL: https://portal.geni.net/secure/flack.php?slice_id=a163bd89-1522-46a5-b971-075489cb91fe. The interface includes a 'Refresh status for vttemp2: Ready' message and a 'v14.99' version indicator. On the left, there is a 'Slices' section with a 'New' button and a 'Show' checkbox, and a 'Managers' section with an 'Add' button and a 'Show/Hide' checkbox. Below these are several aggregates with checkmarks, including 'emulab.net.cm', 'exogeni.net.am', 'exogeni.net.bbrvmsite.am', 'exogeni.net.rcivmsite.am', 'geni.kettering.edu.cm', 'instageni.gpolab.bbn.co...', 'instageni.northwestern.e...', 'lan.sdn.uky.edu.cm', 'uky.emulab.net.cm', and 'uiah.geniracks.net.cm'. The main area shows the slice 'vttemp2' with 'Add Resources' and 'Get Status' buttons. Below these are the resource details: 'instageni.gpolab.bbn.com.cm' and 'Get Status: Ready'. On the right, a network diagram shows a 'server' node connected to a 'client' node via a 'lan0' interface. The server node is labeled 'pc1.instageni.gpolab.bbn.com:30267 sh.emulab-openvz => pc1' and the client node is labeled 'pc1.instageni.gpolab.bbn.com:30266 sh.emulab-openvz => pc1'. At the bottom, there is a 'Delete' button, a timer showing '7h 44m' and '2 Hours', and a 'Submit' button.

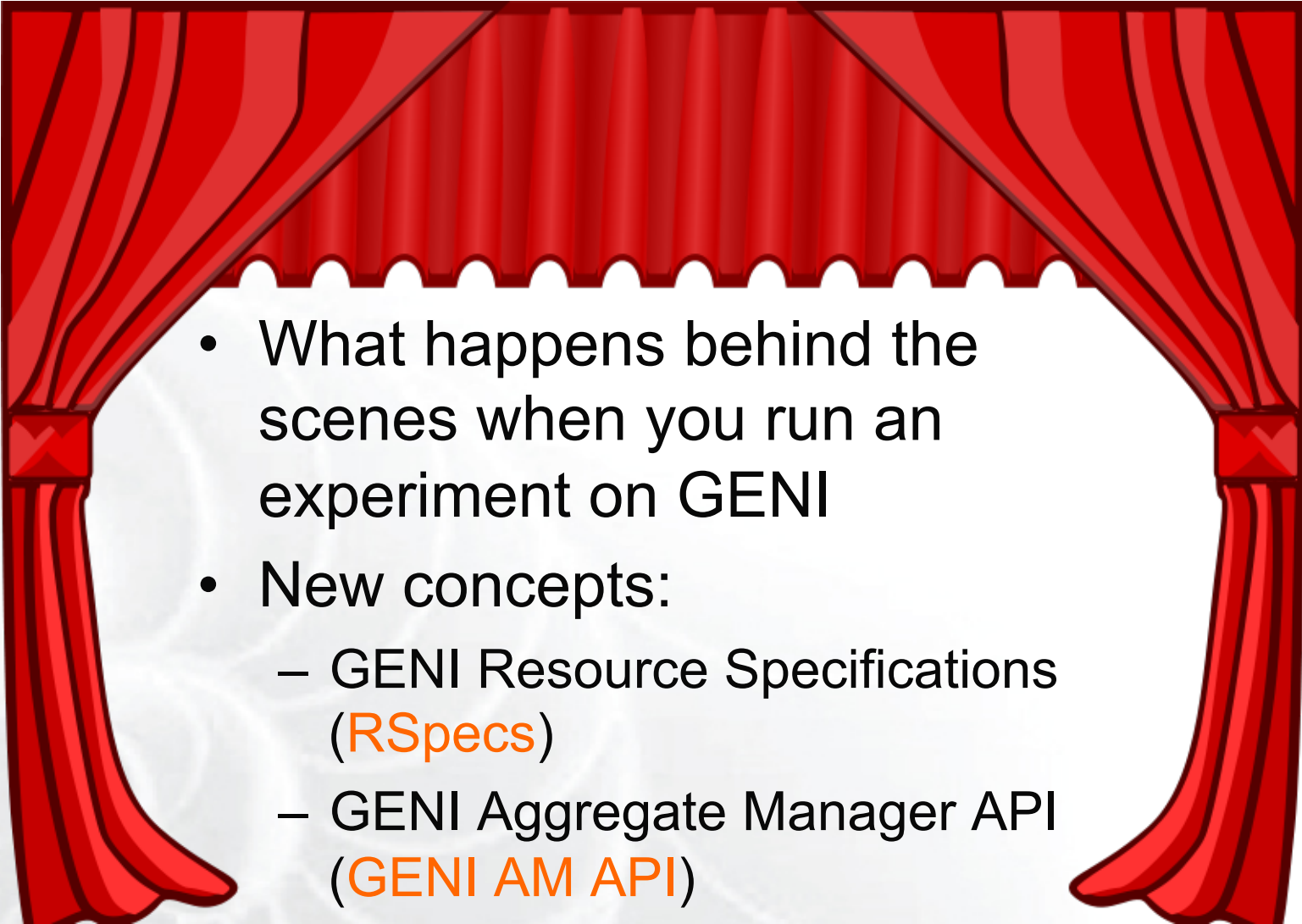
In Part 1 You Learned to...

- Log into the GENI Portal
- 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
- **Delete resources in your slice**



The screenshot shows the GENI portal interface for a slice named 'vttemp2'. The interface includes a navigation menu on the left with sections for 'Slices' and 'Managers'. The 'Slices' section shows a list of slices, including 'vttemp2'. The 'Managers' section shows a list of aggregates, including 'emulab.net.cm', 'exogeni.netAm', 'exogeni.net.bbrvmsite.am', 'exogeni.net.rcivmsite.am', 'geni.kettering.edu.cm', 'instageni.gpolab.bbn.co...', 'instageni.northwestern.e...', 'lan.sdn.uky.edu.cm', 'uky.emulab.net.cm', and 'utah.geniracks.net.cm'. The main area displays the slice 'vttemp2' with a 'Map' view showing a network diagram. The diagram includes a 'server' node connected to an 'lan0' node, which is connected to a 'client' node. The 'server' node is labeled 'pc1.instageni.gpolab.bbn.com:30267 sh.emulab-openvz => pc1'. The 'client' node is labeled 'pc1.instageni.gpolab.bbn.com:30266 sh.emulab-openvz => pc1'. A red circle highlights the 'Delete' button in the bottom right corner of the slice view, with a red arrow pointing to it. The 'Delete' button is labeled 'Delete' and has a red minus sign icon. Below the 'Delete' button are 'Extend' and '2 Hours' buttons, and a 'Submit' button.

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**)

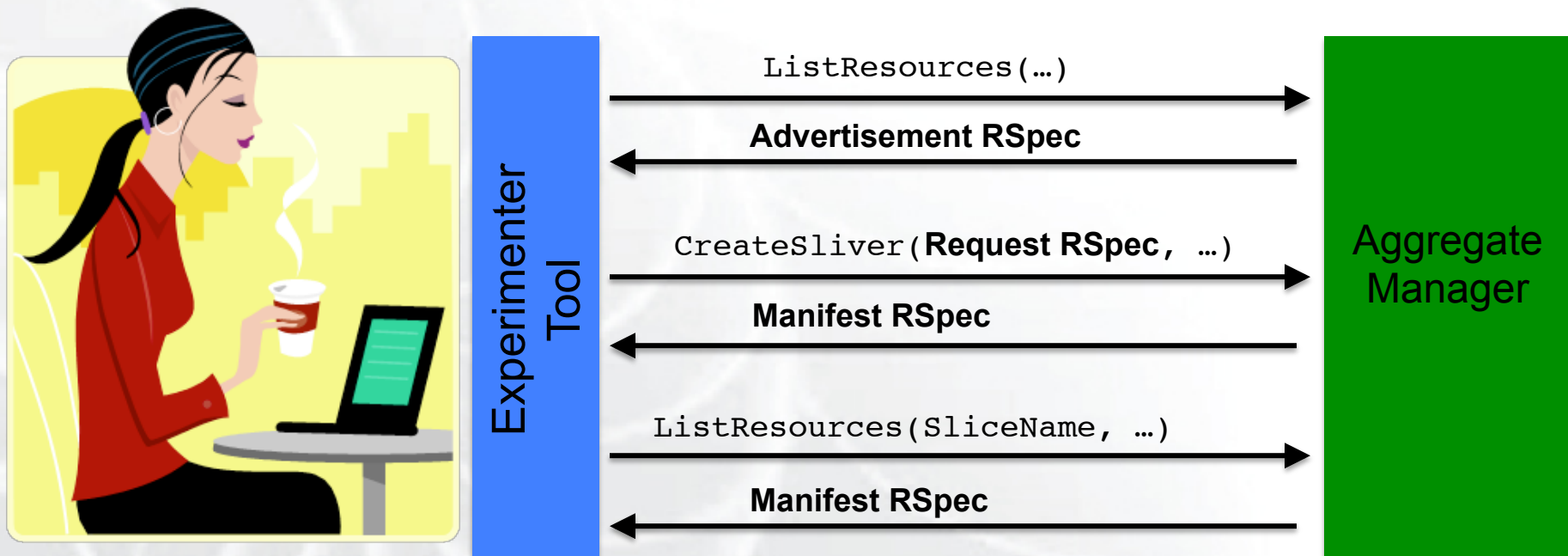
- RSpecs are XML documents that describe resources
 - VMs, links, etc.

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-opensvz"/>
    <interface client_id="server:if0"> </interface>
  </node>
</rspec>
```

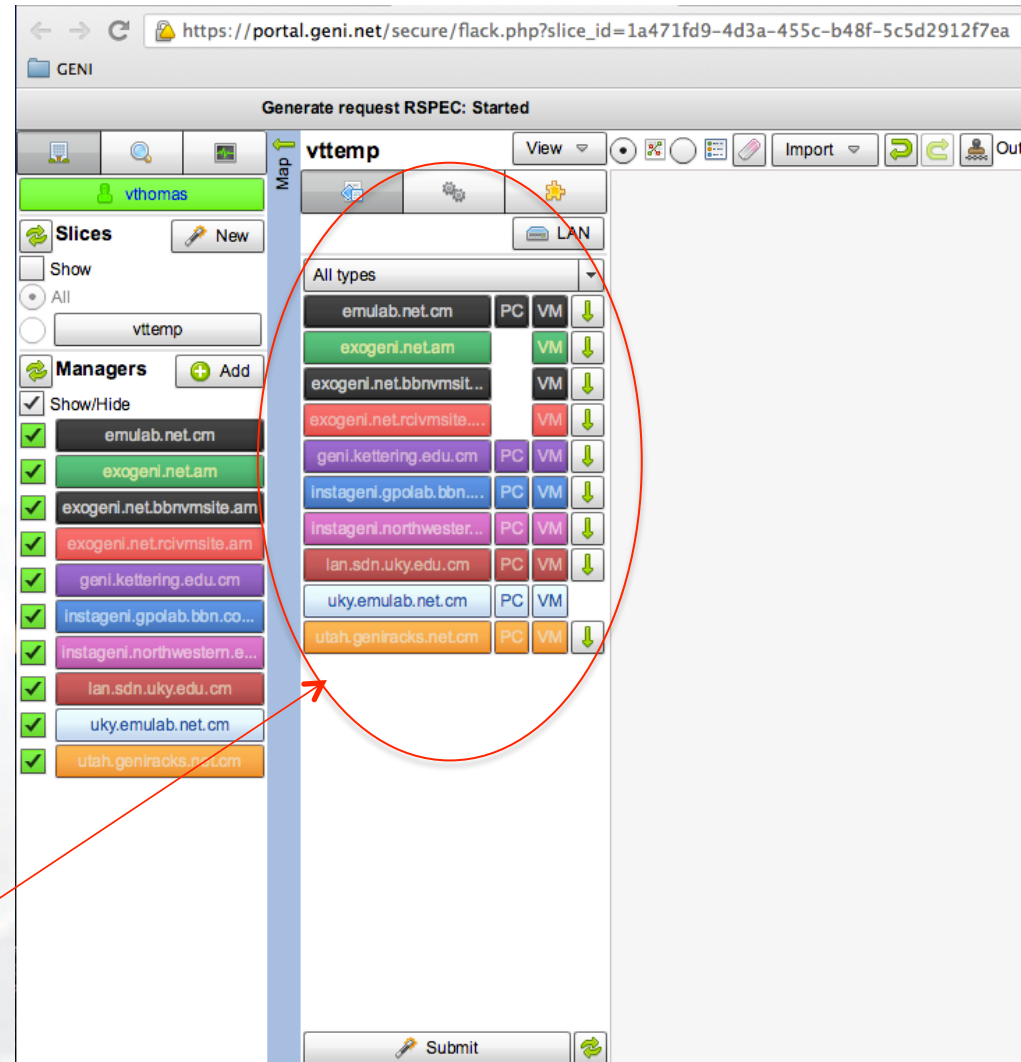

- RSpec documents are exchanged by experimenter tools (e.g. Flack) and aggregates
 - Aggregates use RSpecs to describe what they have – **Advertisement RSpecs**
 - Experimenters use RSpecs to describe the resources they want – **Request RSpecs**
 - Aggregates use RSpecs to describe the resources allocated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

- 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



https://portal.geni.net/secure/flack.php?slice_id=1a471fd9-4d3a-455c-b48f-5c5d2912f7ea

GENI

Generate request RSPEC: Started

Map vtemp View Import Out

vtomas

Slices New

Show All vtemp

Managers Add

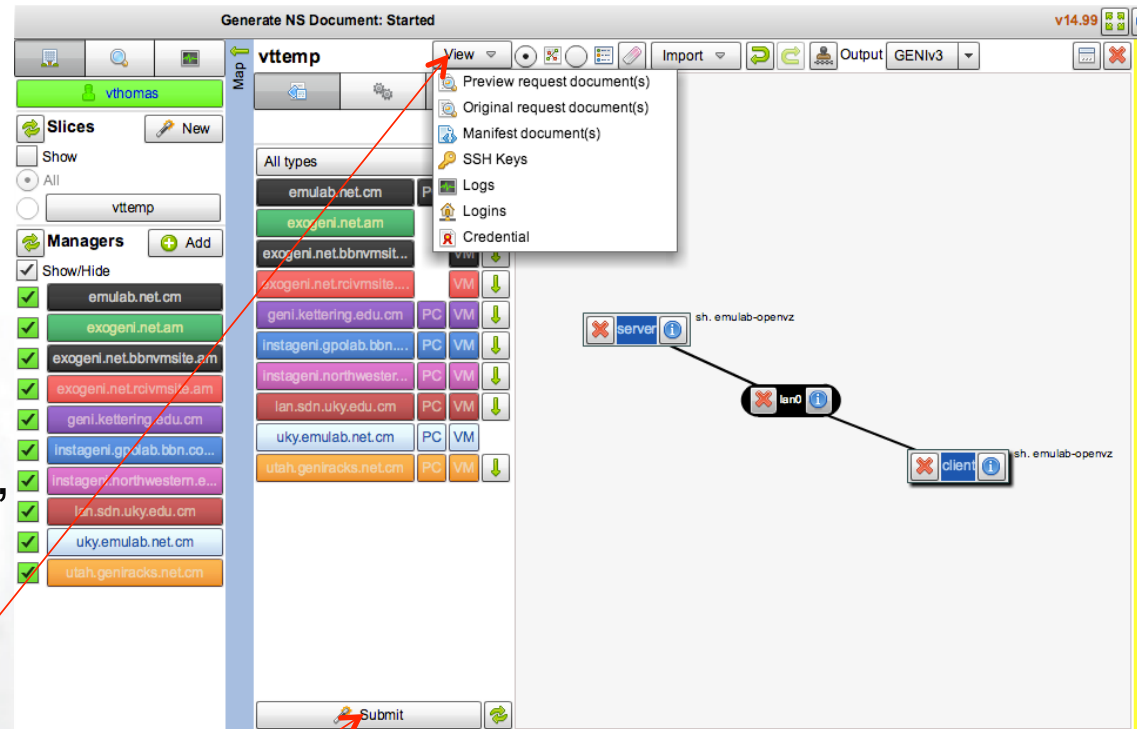
Show/Hide

<input checked="" type="checkbox"/>	emulab.net.cm	PC	VM	↓
<input checked="" type="checkbox"/>	exogeni.netLam	VM	↓	
<input checked="" type="checkbox"/>	exogeni.net.bbrvmsite.am	VM	↓	
<input checked="" type="checkbox"/>	exogeni.net.rcivmsite.am	VM	↓	
<input checked="" type="checkbox"/>	geni.kettering.edu.cm	PC	VM	↓
<input checked="" type="checkbox"/>	instageni.gpolab.bbn.co...	PC	VM	↓
<input checked="" type="checkbox"/>	instageni.northwestern.e...	PC	VM	↓
<input checked="" type="checkbox"/>	lan.sdn.uky.edu.cm	PC	VM	↓
<input checked="" type="checkbox"/>	uky.emulab.net.cm	PC	VM	↓
<input checked="" type="checkbox"/>	utah.geniracks.net.cm	PC	VM	↓

Submit

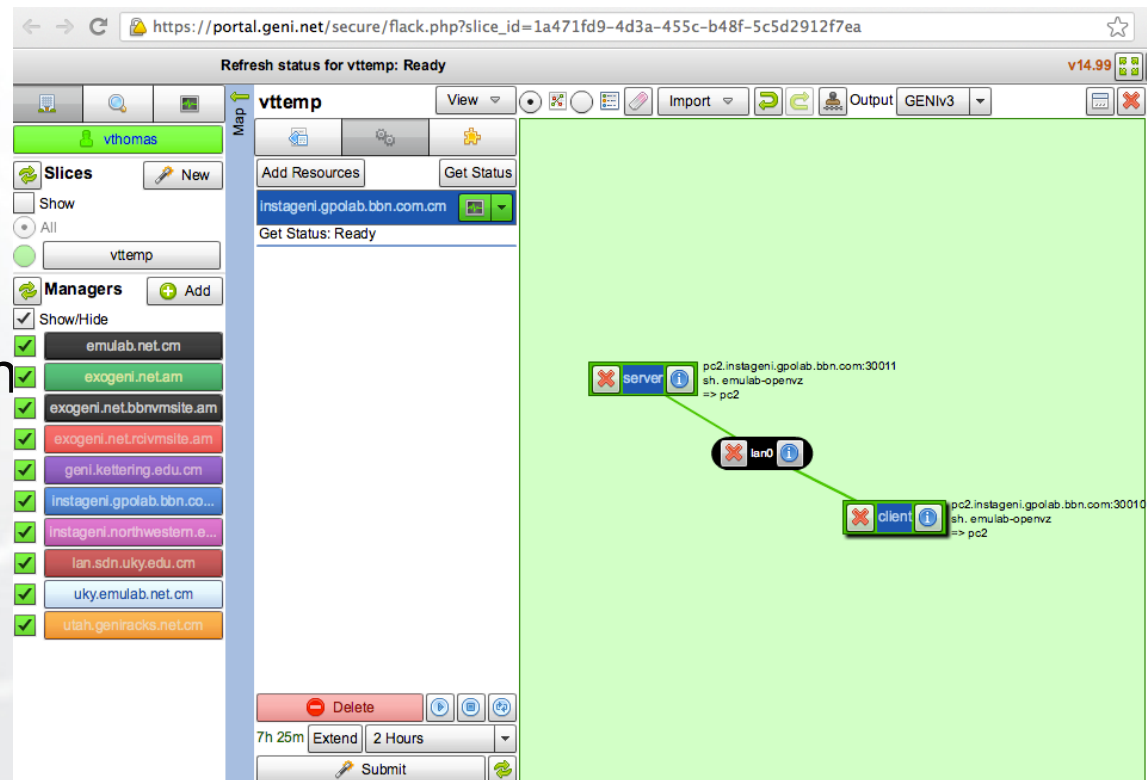
Putting it all Together...

- 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...

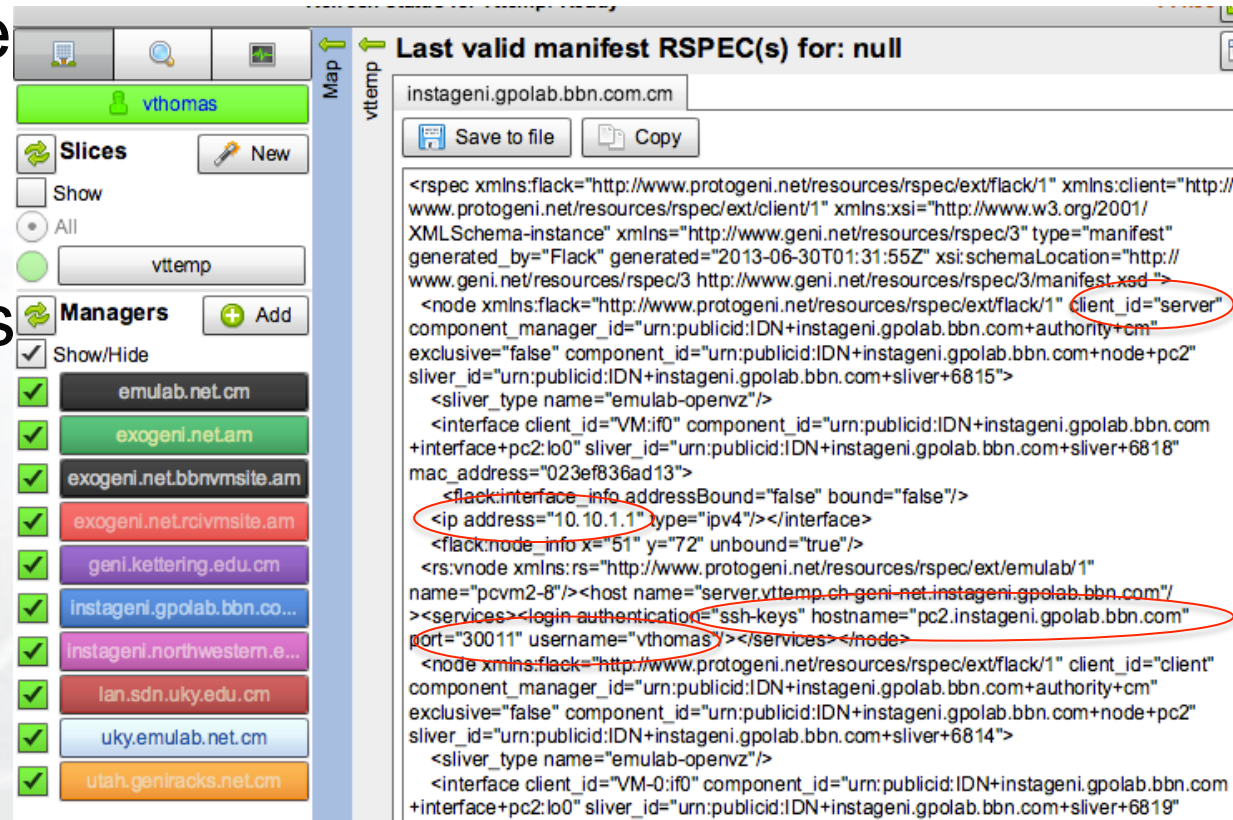
- Flack periodically calls `sliverStatus` on the aggregates to check on the status of your request
- When `sliverStatus` shows:
 - Resources have been allocated, Flack turns its canvas yellow
 - Resources are ready to use, Flack turns its canvas green



The screenshot shows the GENI portal interface for a slice named 'vtemp'. The status is 'Ready'. The main canvas displays a network diagram with a 'server' node connected to a 'client' node via a 'lan0' interface. The sidebar shows a list of managers, including 'emulab.net.cm', 'exogeni.netAm', and 'instageni.gpolab.bbn.com...'. The bottom control bar includes a 'Delete' button, a '7h 25m' timer, an 'Extend' button, a '2 Hours' timer, and a 'Submit' button.

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

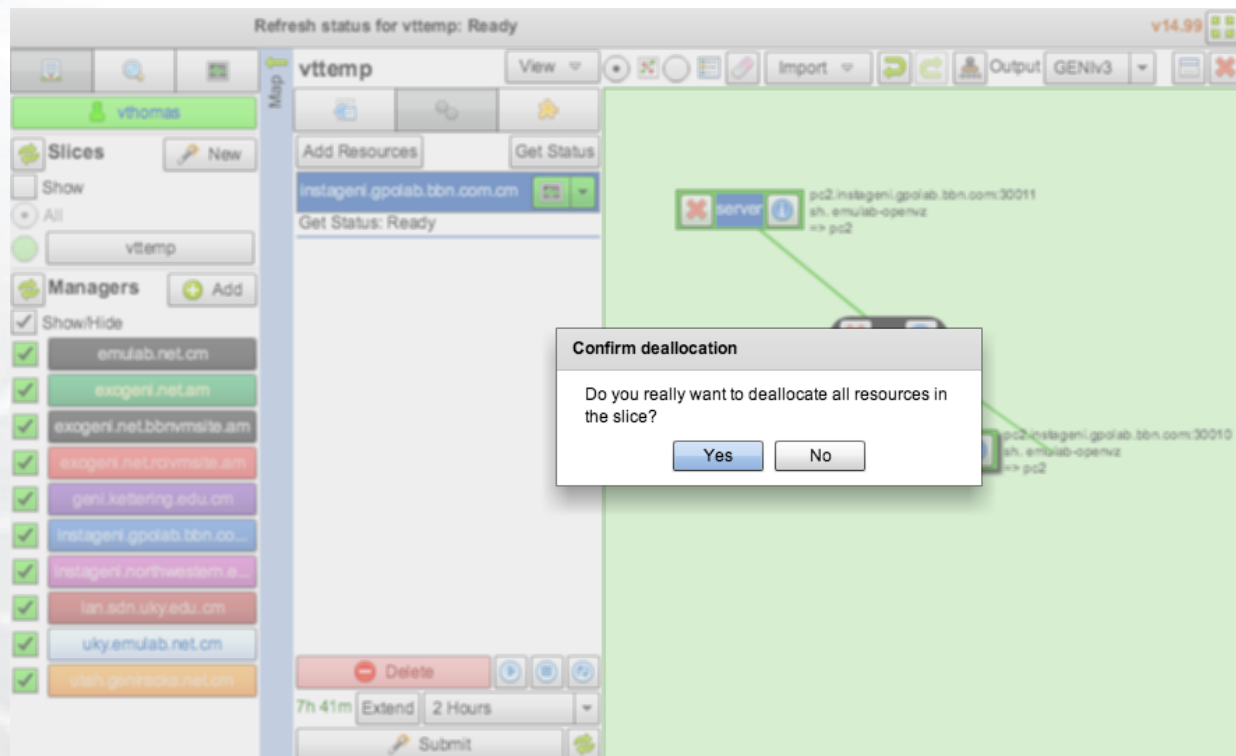


The screenshot shows the Geni web interface. On the left, a sidebar displays a list of managers with checkboxes. The 'vttemp' slice is selected. The main content area shows the 'Last valid manifest RSpec(s) for: null' for the slice 'instageni.gpolab.bbn.com.cm'. The RSpec XML content is displayed, with several elements circled in red to highlight specific information:

- `client_id="server"` in the `<node>` element.
- `ssh-keys` in the `<login_authentication>` element.
- `port="30011"` in the `<services>` element.
- `ip address="10.10.1.1"` in the `<flack:interface_info>` element.
- `x="51" y="72"` in the `<flack:node_info>` element.

Putting it all Together...

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



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

- 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.

- `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

- 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

- 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

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:

```
geni@NSDI13-Tutorials:~$>
```

```
omni-configure.py
```