

# GENI

## Meso-scale Monitoring - FOAM

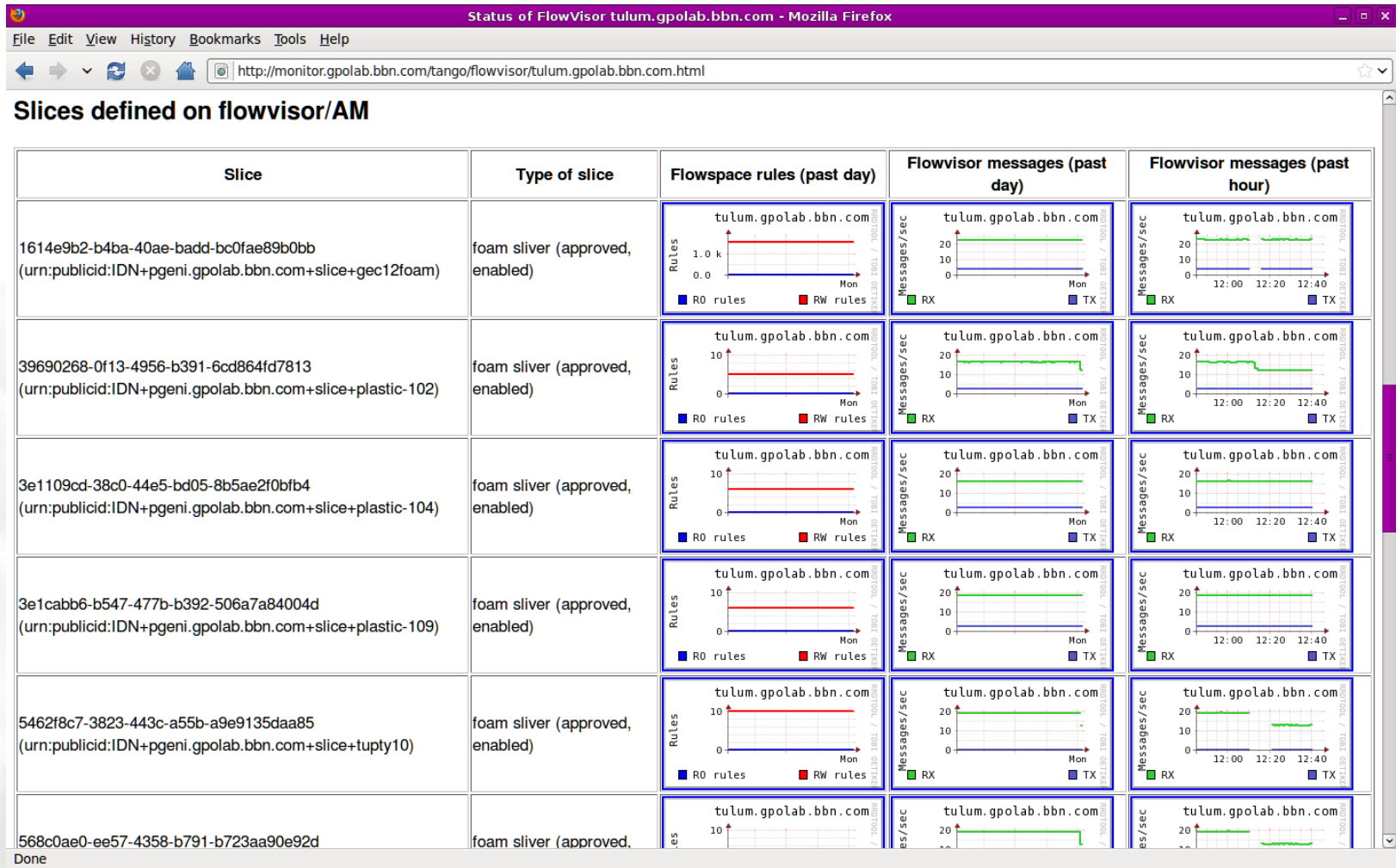
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**Kansas City, Missouri November 3, 2011**  
**[www.geni.net](http://www.geni.net)**

- **FlowVisor OpenFlow Aggregate Manager**
  - Replaces the AM and OIM parts of Expedient
  - Only an AM so far – no end-user opt-in (yet)
  - GENI AM API interface for experimenters
  - JSON API interface for administration
  - foamctl command-line interface to the JSON API
  - Lightweight nginx front-end provides HTTPS
  - Runs on Ubuntu 10.04 LTS now, Red Hat 6 soon
  - 0.4 running at BBN now (for the past few weeks)
  - 0.6 release Nov 21<sup>st</sup> for widespread deployment

<https://openflow.stanford.edu/display/DOCS/FOAM>

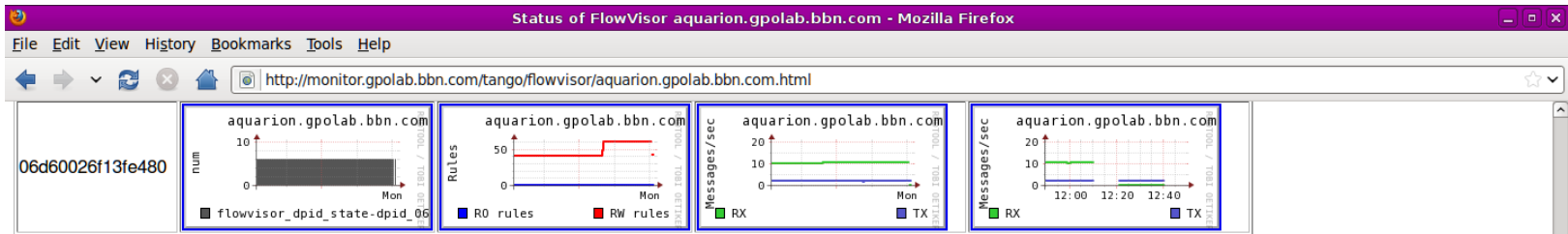
- Pain point: Hard to link FlowVisor slices, GENI slivers, GENI slices, and experimenter identities
- Foam helps: `show-sliver` shows lots of info

```
+$ foamctl show-sliver -u $sliver_urn --passwd-file=/opt/foam/etc/foampasswd
{
  "sliver": {
    "status": "Approved",
    "deleted": "False",
    "slice_urn": "urn:publicid:IDN+pgeni.gpolab.bbn.com+slice+plastic-104",
    "enabled": true,
    "email": "jbs@bbn.com",
    "controllers": [
      {
        "url": "tcp:naxos.gpolab.bbn.com:33104",
        "type": "primary"
      }
    ],
    "expiration": "2011-11-04 16:20:15.204288",
    "desc": "plastic-104 OpenFlow resources at BBN.",
    "sliver_urn": "urn:publicid:IDN+pgeni.gpolab.bbn.com+slice+plastic-104:3e1109cd-38c0-44e5-
      bd05-8b5ae2f0bfb4",
    "id": 31,
    "flowvisor_slice": "3e1109cd-38c0-44e5-bd05-8b5ae2f0bfb4"
  }
}
```



(our production FOAM instance)

<http://monitor.gpolab.bbn.com/tango/flowvisor/tulum.gpolab.bbn.com.html>



## Slices defined on flowvisor/AM

Slice	Type of slice	Flowspace rules (past day)	Flowvisor messages (past day)	Flowvisor messages (past hour)
0ec14a7d-e7b6-4018-9640-f6b85663296f (urn:publicid:1DN+pgeni.gpolab.bbn.com+slice+tut02)	foam sliver (approved, enabled)			
1938ee9f-4515-41f8-bec8-b41f42b0ab33 (urn:publicid:1DN+pgeni.gpolab.bbn.com+slice+slice01)	foam sliver (pending)			
b69c3e9a-32d2-46a0-be9d-d6eea8f69f36 (urn:publicid:1DN+pgeni.gpolab.bbn.com+slice+testdef)	foam sliver (approved, enabled)			
e0b807bd-e575-425d-999f-f0e79bf1771d (urn:publicid:1DN+pgeni.gpolab.bbn.com+slice+tut01)	foam sliver (approved, enabled)			
fvadmin	native slice			

[http://monitor.gpolab.bbn.com/ganglia/graph.php?c=Core&h=aquarion.gpolab.bbn.com&g=flowrule\\_report\\_h&m=flowvisor\\_slice\\_state-slice\\_b69c3e9a-32d2-46a0-be9d-d6eea8f69f36&r=day&vl=num&n=0&x=10&z...](http://monitor.gpolab.bbn.com/ganglia/graph.php?c=Core&h=aquarion.gpolab.bbn.com&g=flowrule_report_h&m=flowvisor_slice_state-slice_b69c3e9a-32d2-46a0-be9d-d6eea8f69f36&r=day&vl=num&n=0&x=10&z...)

(our tutorial FOAM instance – note Pending sliver)

<http://monitor.gpolab.bbn.com/tango/flowvisor/aquarion.gpolab.bbn.com.html>

Status of GENI slice urn:publicid:IDN+pgeni.gpolab.bbn.com+slice+plastic-101 - Mozilla Firefox

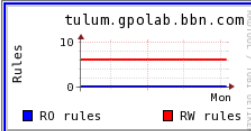
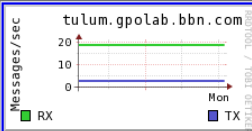
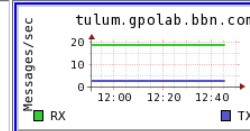
File Edit View History Bookmarks Tools Help

http://monitor.gpolab.bbn.com/tango/slice/urn:publicid:IDN+pgeni.gpolab.bbn.com+slice+plastic-101.html

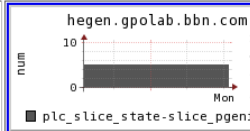
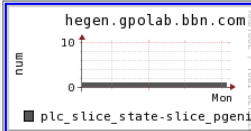
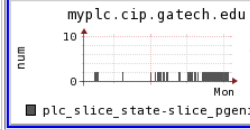
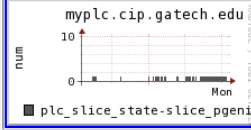
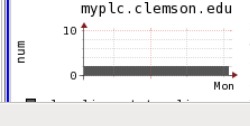
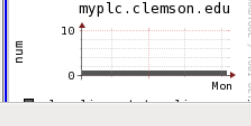
## Status of GENI slice urn:publicid:IDN+pgeni.gpolab.bbn.com+slice+plastic-101

Last update: 2011-10-31 12:42:57.566778

### FlowVisors containing FOAM sliver in slice

Flowvisor	FV slice name	Flowspace rules (past day)	Flowvisor messages (past day)	Flowvisor messages (past hour)
<a href="http://tulum.gpolab.bbn.com">tulum.gpolab.bbn.com</a>	c0b17abe-7274-451f-859e-ef8aa3762f45			

### MyPLC servers containing sliver in slice

MyPLC	Nodes in sliver (past day)	Users in sliver (past day)
<a href="http://hegen.gpolab.bbn.com">hegen.gpolab.bbn.com</a>		
<a href="http://myplc.cip.gatech.edu">myplc.cip.gatech.edu</a>		
<a href="http://myplc.clemson.edu">myplc.clemson.edu</a>		

Done

(things in the plastic-101 slice, at multiple aggregates)

<http://monitor.gpolab.bbn.com/tango/slice/urn:publicid:IDN+pgeni.gpolab.bbn.com+slice+plastic-101.html>

- Pain Point: Approving (“opting in”) slivers is hard
- FOAM helps: An engine for automating approval decisions
- 0.4 only has a default policy setting
- 0.6 will have hooks for other policies, based on:
  - Slice owner
  - Flowspace characteristics (overlaps, or doesn't, etc)
  - Other fields in the sliver record (e.g. controller URL)
  - Fuzzier things, e.g. “a sliver like this one I approved before”
- Some of those may not make it by the Nov 21<sup>st</sup> release, but will be added soon after

<https://openflow.stanford.edu/bugs/browse/FOAM-152>

- Pain point: Expedient's algorithm for turning rspecs into flowspace was very verbose
- FOAM helps: Its algorithm is much more succinct
- ...and you can see the flowspace, and the number of flowspace rules, with `show-sliver`
- Our production FV at BBN went from 6000 rules to 200 (higher at the moment due to a legitimately large sliver for a GEC 12 tutorial)