

Update on TopHat & measurement system interconnection

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ISMA'2011 - 3rd AIMS workshop – February 9-11, San Diego, CA



Outline

- ① The "internet of measurements"
- ② The OneLab context

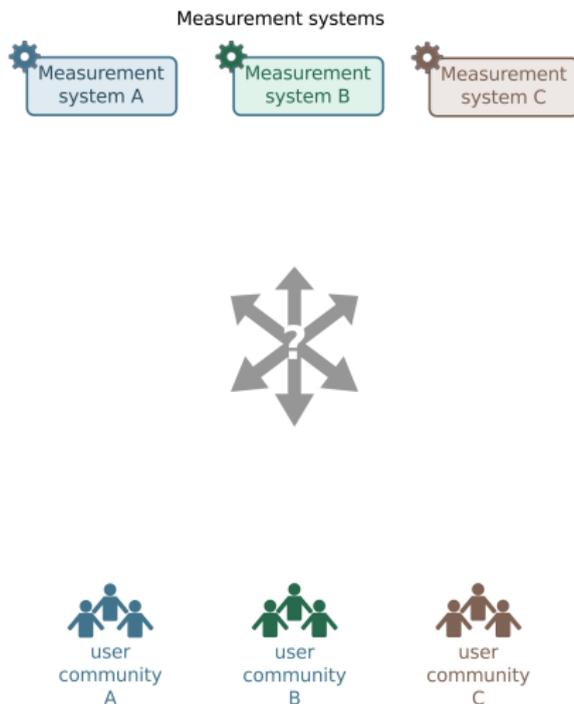
Introduction

Our challenge:

"How the interconnection of measurement systems can better serve users' needs"

- In the spirit of the CONMI workshop
 -  k. claffy, M. Crovella, T. Friedman, C. Shannon, and N. Spring, "Community-Oriented Network Measurement Infrastructure (CONMI) Workshop Report", ACM SIGCOMM Computer Communication Review (CCR), vol. 36, no. 2, pp. 41–48, Apr 2006
- We focus on serving live measurements to users.

The challenge



The value to users



- Access to relevant data/services for their usage
- Convenient interfaces (habits, consistent formats, etc.)
- Some degree of transparency (source, timestamp)
- No new account subscription
- No new AUP compliance

Value to the platforms



- Reach users and get known
- Lower user management overhead
- Extend scale through collaboration
 - vantage points
 - tools

Added-value due to diversity



P. Antoniadis, S. Fdida, T. Friedman and V. Misra,
Federation of virtualized infrastructures: sharing the value of diversity,
ACM CoNEXT 2010

All this gets easier within a **standard framework**

Efforts towards harmonization

Some steps have already been taken

- by opening interfaces for collaboration
- by serving data from several systems

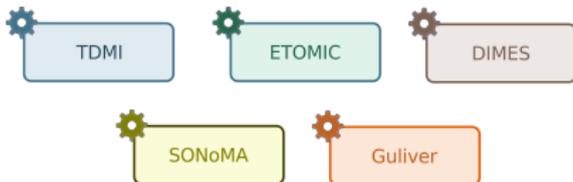
Some examples:

- perfSONAR webservice framework
- Oregon Routeviews streaming data
- iPlane serving data from their PlanetLab deployment + Looking Glass servers

Our approach fits within this movement, as well as GENI/FIRE testbed work

Our ecosystem

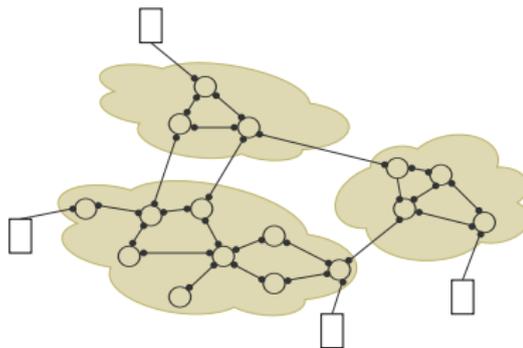
Measurement systems



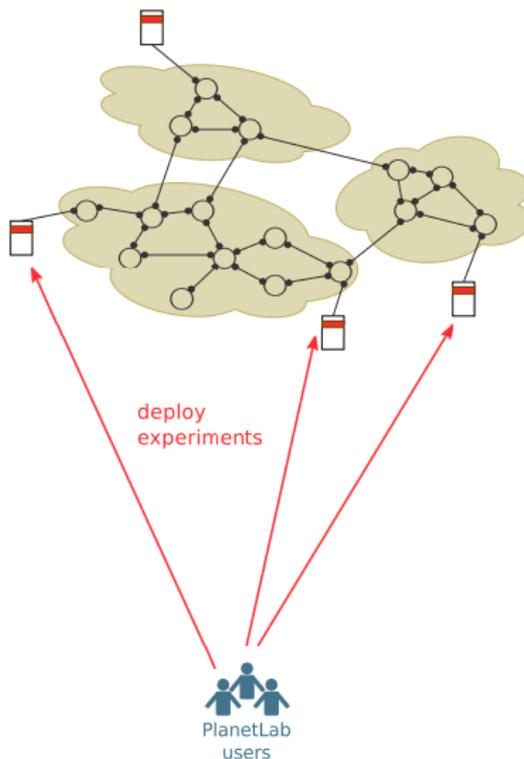
Information services



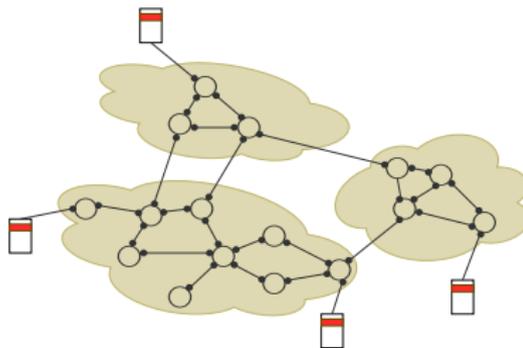
PlanetLab users' needs



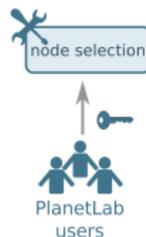
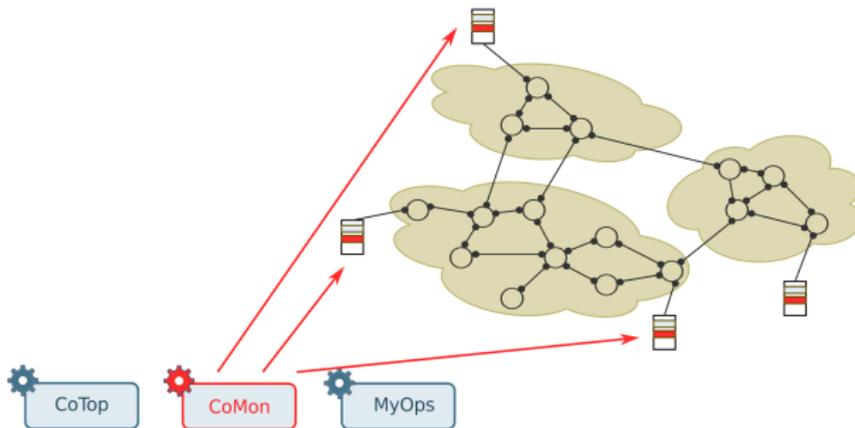
PlanetLab users' needs



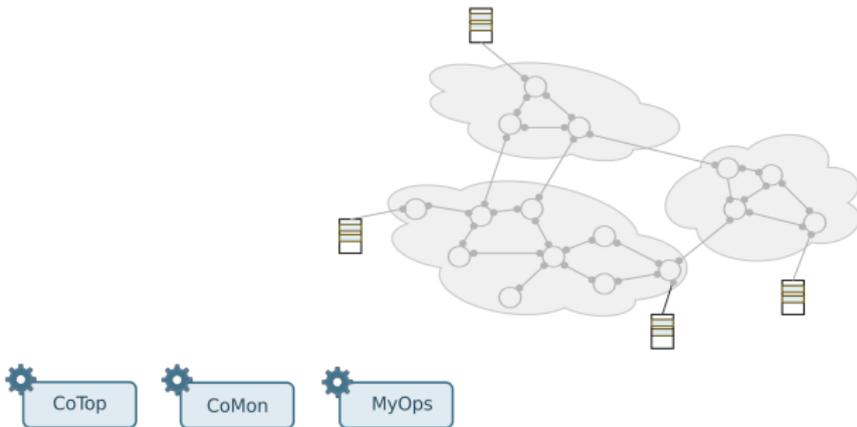
PlanetLab users' needs



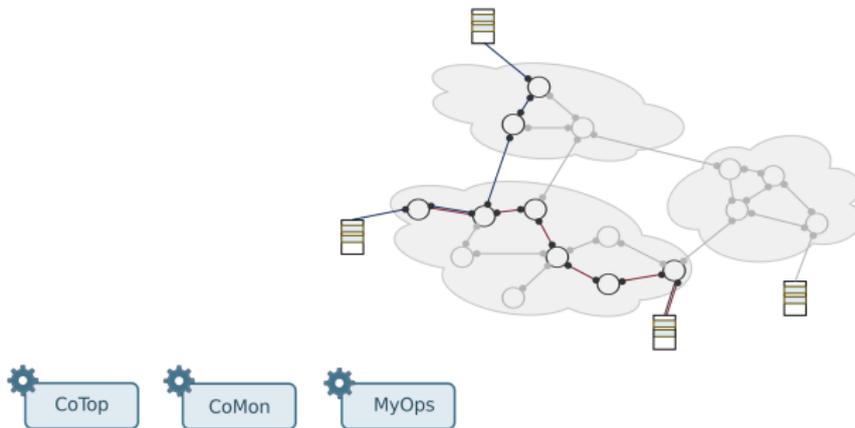
PlanetLab users' needs



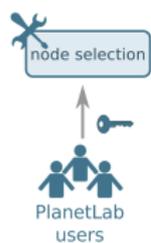
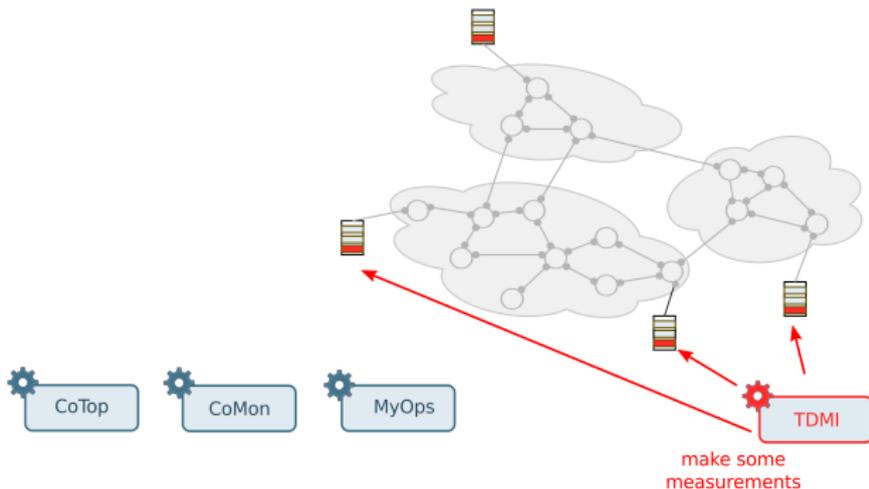
PlanetLab users' needs



PlanetLab users' needs



PlanetLab users' needs



TDMI characteristics

Sources: ~400 active PlanetLab nodes

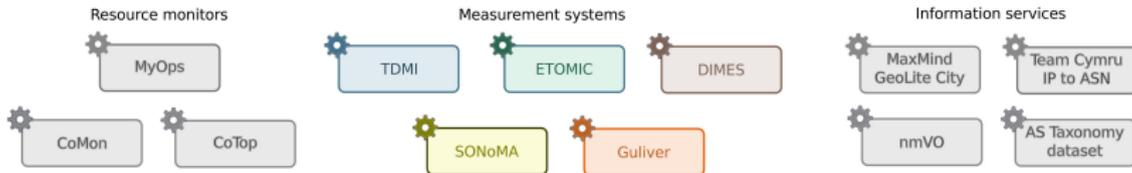
Tools: ping, traceroute, Paris Traceroute, dnsprobe



Measurements:

- Full-mesh measurements towards all PL nodes **every 5 minutes**
- Extending to a set of external destinations

Aggregating topology information with TopHat



PlanetLab
Europe
users



PlanetLab
Central
users



DIMES
users



ETOMIC
users

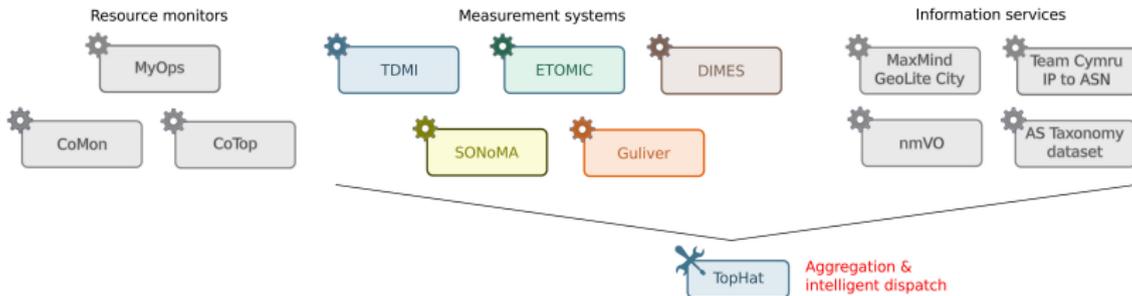


SONoMA
users



Guliver
users

Aggregating topology information with TopHat



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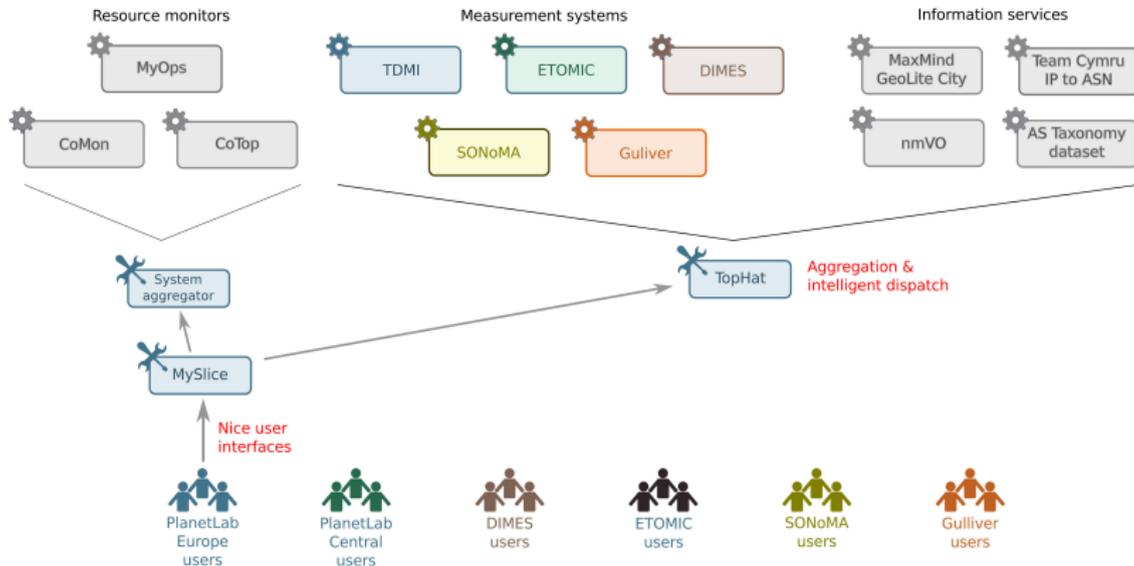


SONoMA
users



Guliver
users

Serving users with MySlice



Serving users with MySlice

Measurement data available through MySlice, the default PLE interface

- Geolocalization (city, country, etc.) & AS-level information
- Consolidated data from previous measurements (averages, etc.)

Serving users with MySlice

Measurement data available through MySlice, the default PLE interface

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Goal: Leverage PLE topological and geographical diversity

- new columns for node-related information
- we are currently integrating pair-wise data

Serving users with MySlice



PlanetLab Europe

- Home
- News
- About
- Join us
- Support
- Security Notice
- Documentation
 - ASP
 - Guides
 - API
 - Tutorials

Intranet

- Mailing Lists

Syndicate

My slice upmc_tophat

[Slice master](#) [Site upmc](#) [Default](#)

Details

3 users

1051 nodes (2 reservable)

Leases - 2 reservable node(s) (7)

Node table layout (7)

Add/remove columns **Column description and configuration**

ADD	REMOVE	DESCRIPTION
<input type="checkbox"/>	<input type="checkbox"/>	Act on all slices
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Location (Region)
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Memory size
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Memory utilization
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Operating system
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Reliability
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Active slices
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Slices in memory

Range: number of active slices over the selected period for which GridLab reports a value. The period is the next second for which data is available, with GridLab data being collected by MySlice daily.

Select period:

Unit: %

Source:

1051 nodes currently in upmc_tophat

1 2 3 4 5 6 7 8 9 10

Search and

ID	SYN	RES	LOC	OS	MEM	PK	TS
planetlab3.infomark.uni-wuerzburg.de	PLC	boot	Germany	linux	5	100	1
peerwinde.univ.fr	PLC	boot	France	RHEL5	3	100	1
medlab3.infn.pd.ac.it	PLC	boot	Belgium	Ubuntu	31.4	100	2
phnrc.net.unipd.it	PLC	Sched	Italy	Ubuntu	3.5	95	1
planetlab3.unipd.it	PLC	boot	Italy	RHEL5	7.0	95	3
planetlab3.univie.it	PLC	boot	France	Redhat5	1	95	0

Jordan.Augé@PLC

- Logout of PlanetLab Europe
- My Account
- My Site Accounts
- Local Accounts (show)
- All Accounts (show)
- Site
- My Site
- Pending Requests
- Nodes
 - My Site Nodes
 - Register Node
- Slices
 - My Site Slices
 - Create Slice
 - Status
- Admin search
- ADD Node
- Tags
- Node groups
- Permissions
- Events
- About MyPLC
- PLC API doc
- MMAPI doc

PlanetLab Europe

- Home
- my account
- Contributors
- Governance Plan
- Getting Started with PLC
- Network Requirements
- news aggregator
- Documentation
- administrator
 - access control
 - aggregator
 - blocks
 - content
 - input formats
 - logs
 - modules

Serving users with MySlice

HOSTNAME	AU	ST	RES	LCN	LCY	R	?
cs-planetlab3.cs.surrey.sfu.ca	PLC	boot		Canada	Vancouver	100	
planetlab-01.cs.princeton.edu	PLC	boot		United States	Princeton	100	
planetlab2.unl.edu	PLC	boot		United States	Lincoln	100	
ttu1-1.nodes.planet-lab.org	PLC	boot		United States	n/a	100	
ttu2-1.nodes.planet-lab.org	PLC	boot		United States	n/a	100	
planetlab-node-01.ucd.ie	PLC	boot		Ireland	Dublin	0	
planetlab3.eecs.northwestern.edu	PLC	boot		United States	Evanston	100	
planetlab4.warsaw.rd.tp.pl	PLC	boot		Poland	n/a	100	
planetlab2.informatik.uni-erlangen.de	PLC	boot		Germany	Erlangen	100	
planetlab2.pop-pa.rnp.br	PLC	boot		Brazil	n/a	98	

Serving users with MySlice

Add/remove columns

CR	CPU clock rate	<input type="checkbox"/>
DA	Date added	<input type="checkbox"/>
DF	Disk space free	<input type="checkbox"/>
DN	Toplevel domain name	<input type="checkbox"/>
DS	Disk size	<input type="checkbox"/>
HC	Hop count (pairwise)	<input type="checkbox"/>
IP	IP address	<input type="checkbox"/>
L	Load	<input type="checkbox"/>
LCN	Location (Country)	<input checked="" type="checkbox"/>

Column description and configuration

Hop count (pairwise)

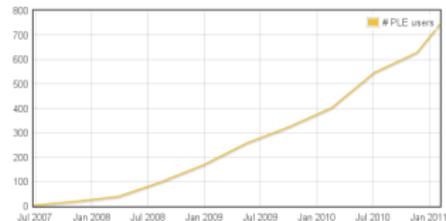
TopHat conducts traceroutes every five minutes in a full mesh between all PlanetLab nodes. The hop count is the length of the traceroute from the node to the reference node, based upon the most recently reported traceroute.

Select reference node:

Source: **TopHat**

Incentives for interconnection

Target more than 800 active users



Get credit for your data



on our website

```
{  
  'nb_slices': 111,  
  'node_id': 617,  
  'boot': 286,  
  'cpu_use_busy': 33.663200000000003,  
  'source': {  
    'MyOps': ['boot'],  
    'CoMon': ['num_slices', 'cpu_use_busy']  
  }  
}
```

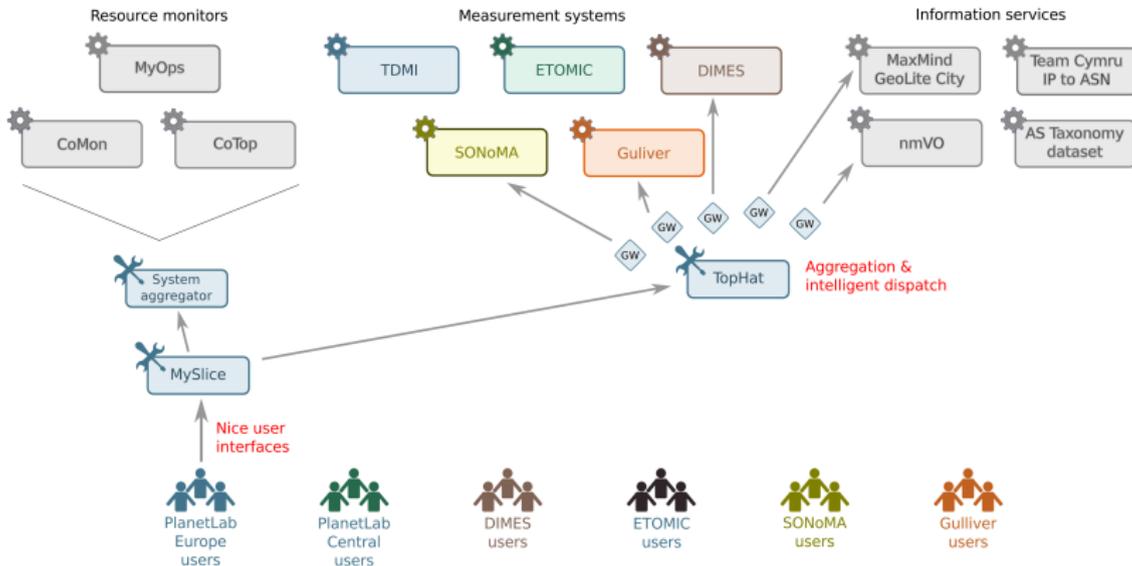
in the API results



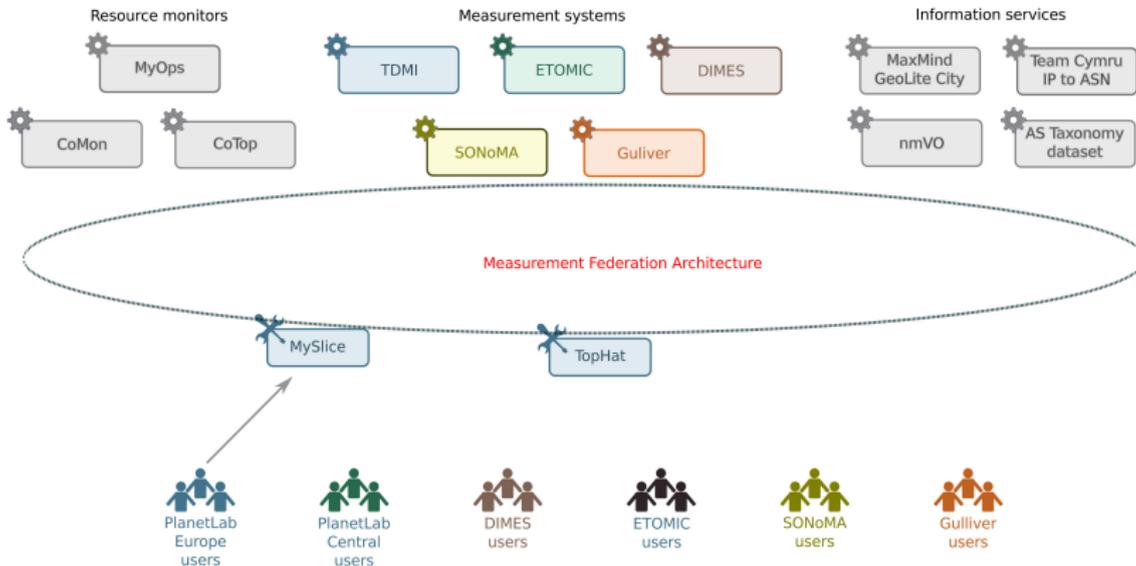
in our GUI

Basic accounting mechanism in place

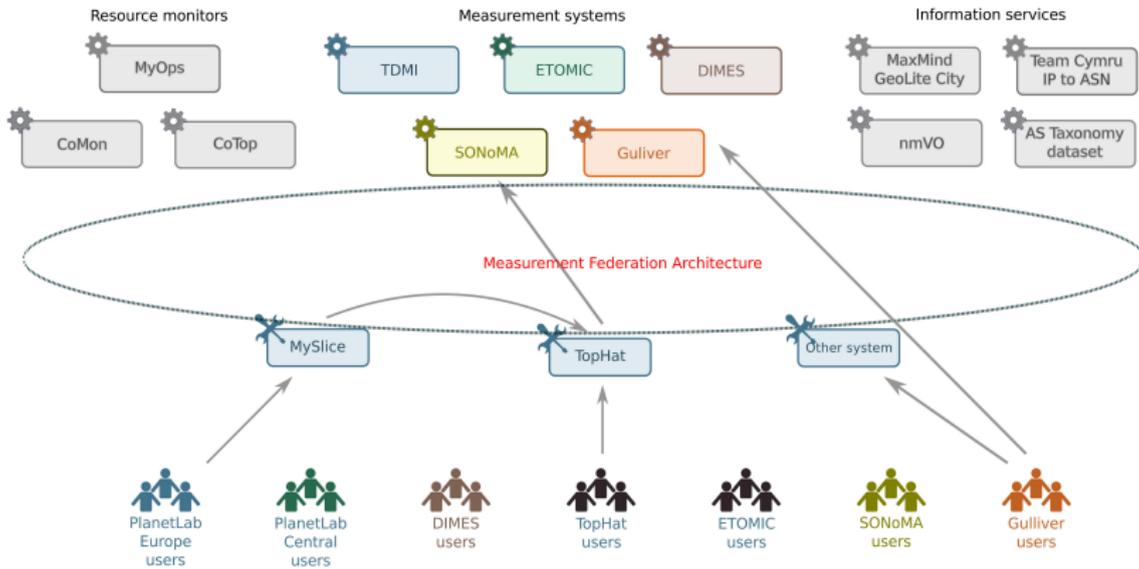
Current interconnection framework



Towards a Measurement Federation Architecture ?



Towards a Measurement Federation Architecture ?



Requirements for interface

- Learning about resources and services
- Learning about their capabilities
- Using those services (possibly across systems)
- Authorization and authentication

Similar challenges as in the GENI/FIRE communities for the testbed federation

Interconnected measurement systems



TopHat Dedicated Measurement Infrastructure (UPMC)

🔗 <http://www.top-hat.info>



ETOMIC (ELTE, Universidad Autónoma de Madrid)

🔗 <http://www.etomic.org>



SONoMA (ELTE)

🔗 <http://www.etomic.org/sonoma>



DIMES (Tel-Aviv University)

🔗 <http://www.netdimes.org>



[Gulliver Project](#)

Gulliver (University of Tokyo)

🔗 <http://www.gulliver.wide.ad.jp>



Interconnected information systems



IP to ASN mapping service (Team Cymru)

🔗 <http://www.team-cymru.org>



GeoLite City (MaxMind)

🔗 <http://www.maxmind.com/app/geolitecity>



AS Taxonomy (Georgia Tech)

🔗 http://www.ece.gatech.edu/research/labs/MANIACS/as_taxonomy/



CoMon / CoTop (Princeton University)

🔗 <http://http://comon.cs.princeton.edu/>

🔗 <http://codeen.cs.princeton.edu/cotop/>



Network Measurement Virtual Observatory (ELTE)

🔗 <http://nm.vo.elte.hu>



Conclusion Getting started!

You can use our system now

- PlanetLab user? just log in
- if not, contact us

You can interconnect your measurement system with ours

You can plug in your tools

Visit our website: [🔗 http://www.top-hat.info](http://www.top-hat.info)