

The University of Kentucky GENI Instrumentation Tools

(Project Highlights)

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Project Participants

- James Griffioen (PI)
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- Hussamuddin Nasir (Lead Programmer)
- Xiongqi Wu (Research Assistant)
- Jeremy Reed (Research Assistant)
- Lowell Pike (Network Administrator)
- Woody Marvel (Technical Support)
- Lots of help from the Utah ProtoGENI group

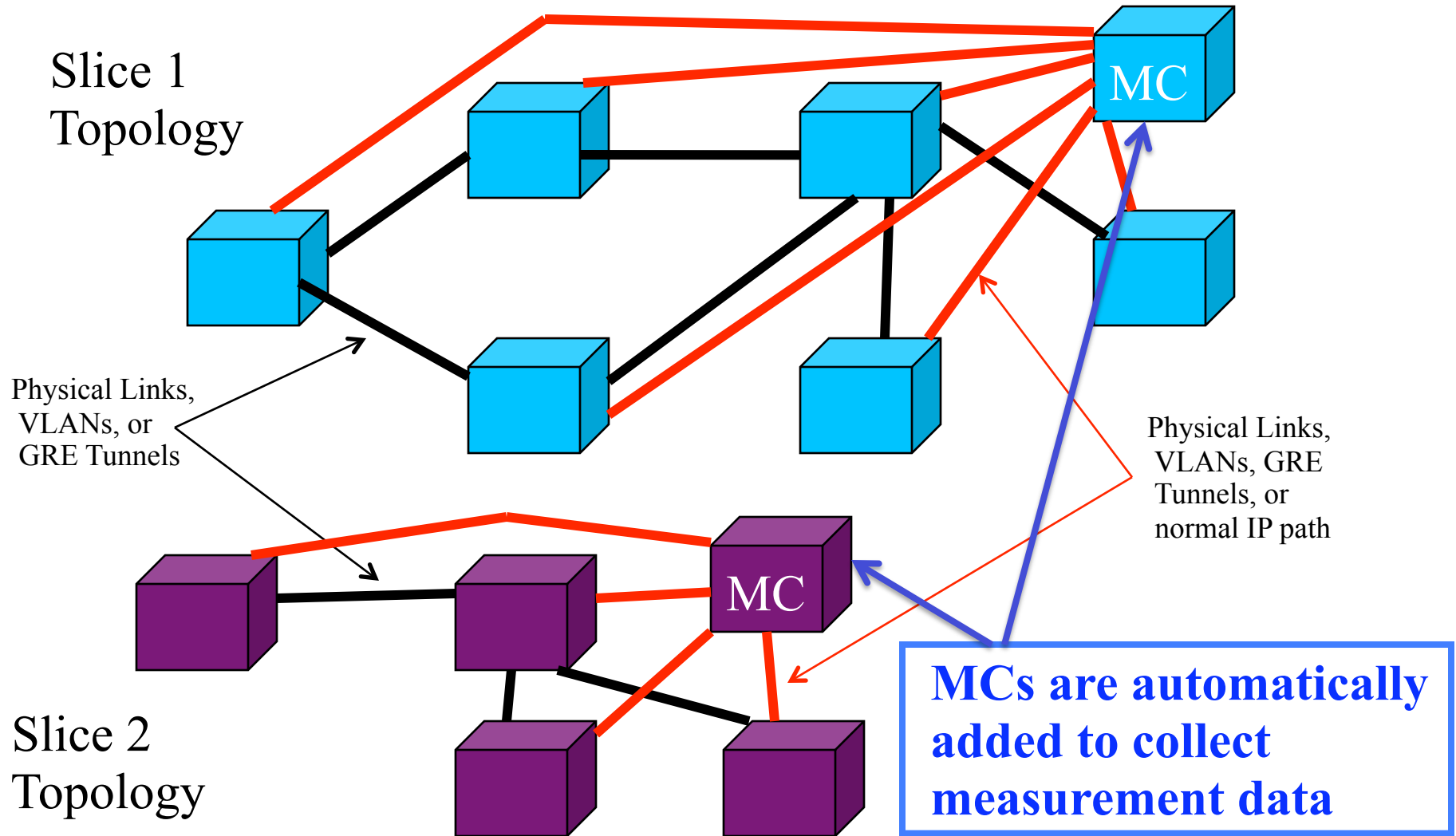
Project Objectives

- **High-level Goal:** Make it easy for users to see what is going on in their experiment - i.e., make it trivial to monitor a slice.
- **Sub-Goals:**
 - Automate the task of dynamically deploying an instrumentation and measurement infrastructure within a GENI slice.
 - Provide users with a convenient and simple-to-use interface to the measurement infrastructure.
 - Allow users to customize the interface.
 - Provide a way to save/archive measurements
 - Don't reinvent the wheel - leverage existing solutions to the greatest extent possible.

Measurement Controllers

- INSTOOLS dynamically creates and deploys slice-specific monitoring infrastructure (adding resources to the slice if necessary).
- INSTOOLS uses Measurement Controller (MC) nodes to control/manage the measurement infrastructure, collect measurement data, and make the data available to users.
 - MCs distribute the load of data collection and data presentation.
 - MCs localize data collection network traffic.
 - MCs keep measurement data private within the slice.
 - MCs can be tailored to each aggregate.

INSTOOLS Architecture: (Automated Setup)



INSTOOLS Usage Model

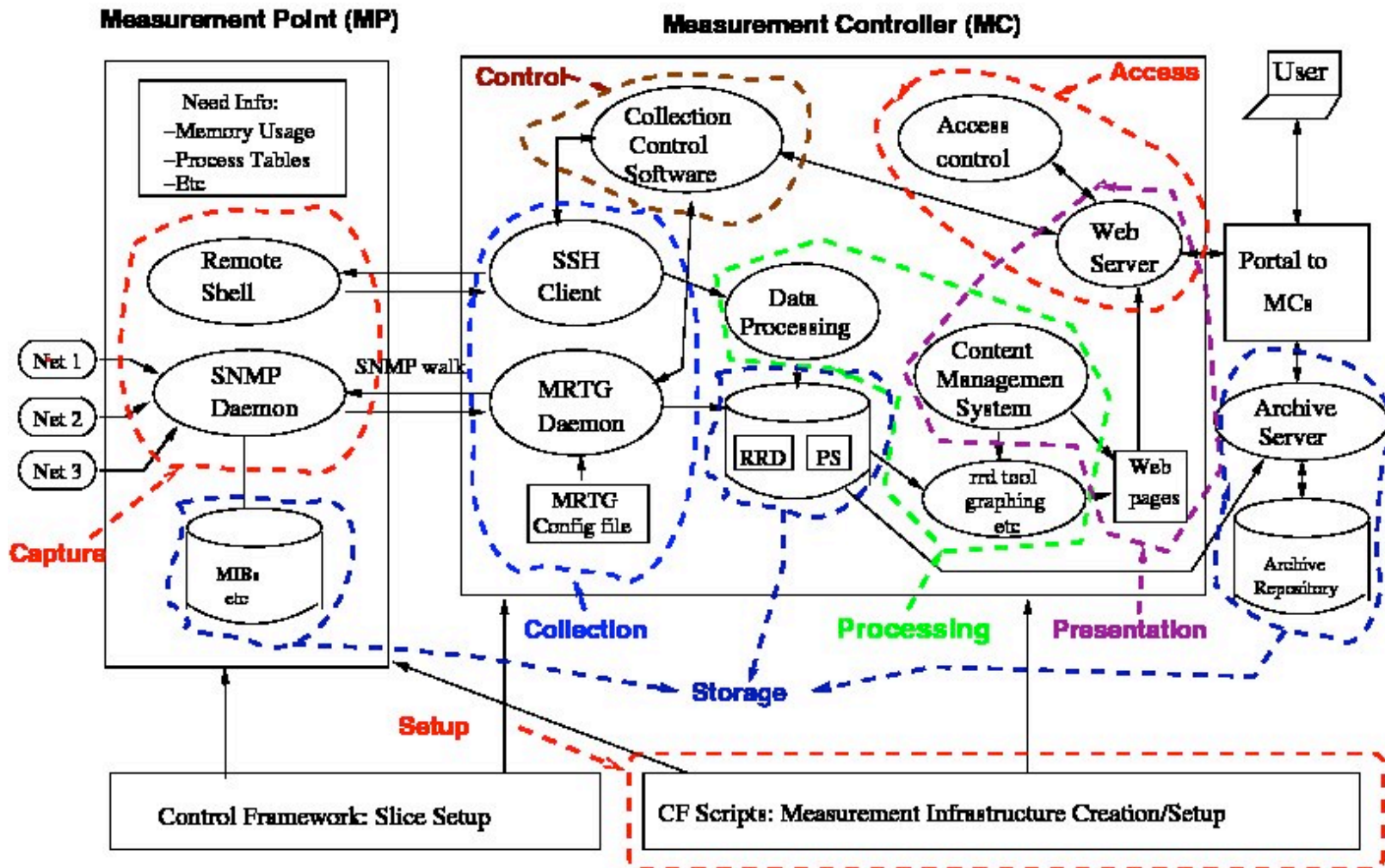
1. Create a GENI slice
2. Invoke INSTOOLS to "instrumentize the slice (i.e., create the measurement infrastructure and start it running).
3. Setup the experiment
4. Run the experiment
5. Use INSTOOLS to view the (live) measurement data (control the measurement and or measurement interface)
6. Use INSTOOLS to archive the collected data for future viewing.

INSTOOLS Architecture

(Functional Components)

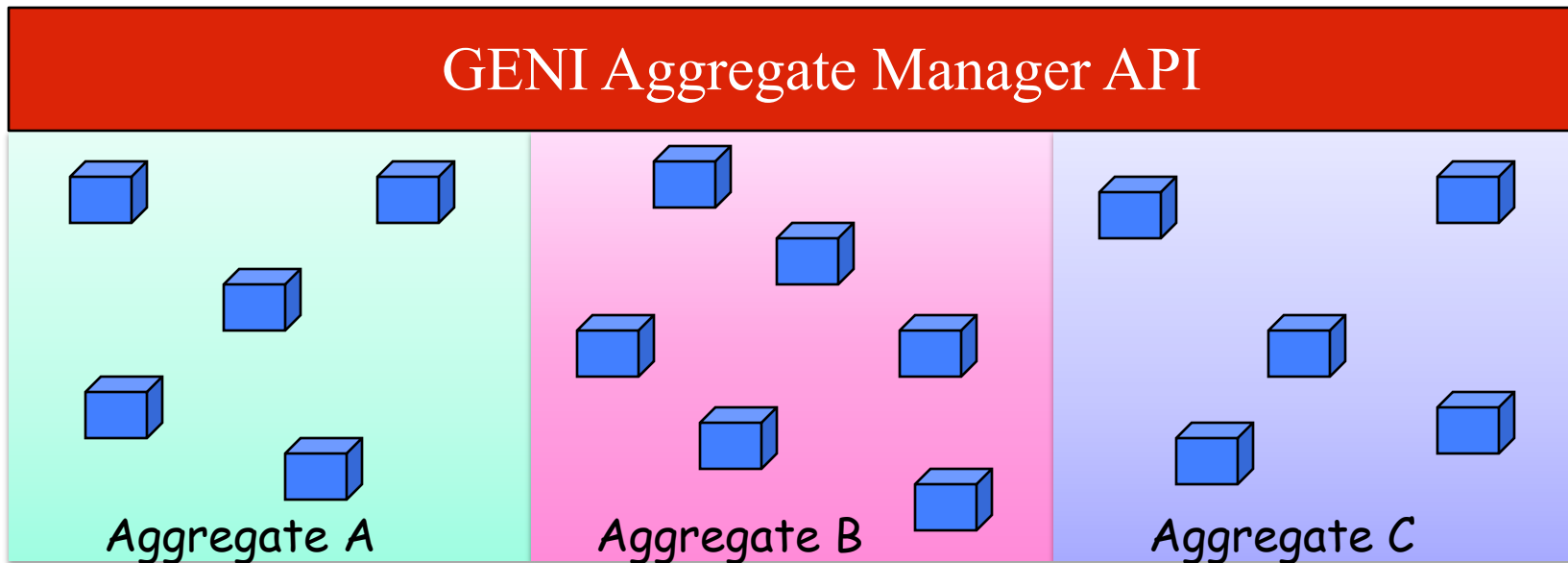
1. Setup: deploy and initialize topology-specific software and services
2. Capture: capture measurement data
3. Collection: move data to processing/storage environments
4. Storage: store data on a temporary, short term, long term, and archival basis
5. Processing: filter, convert, aggregate, summarize, etc., data
6. Presentation: present data to users in meaningful ways
7. Access Protection: protect resources and data
8. Measurement Control: Dynamically control the above components

Implementation Approach





(Proto) GENI System

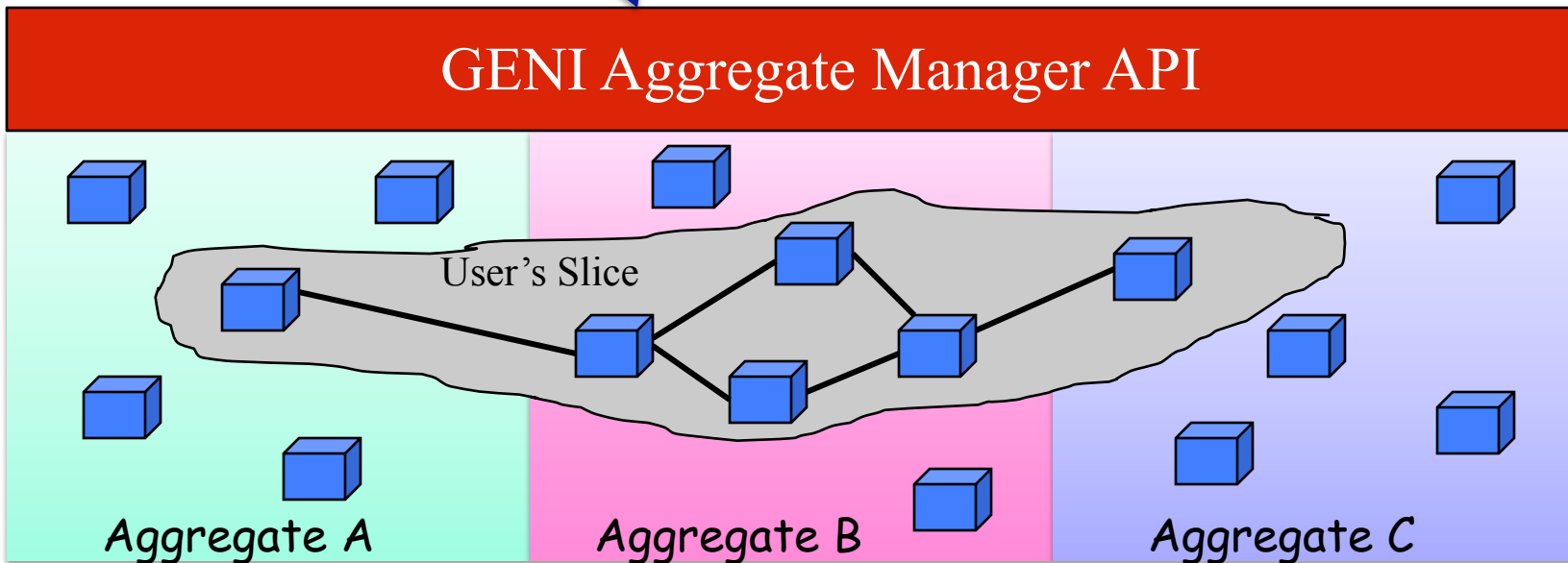




User creates a “slice” using one of the ProtoGENI APIs.

Flack GUI

Scripts Interface





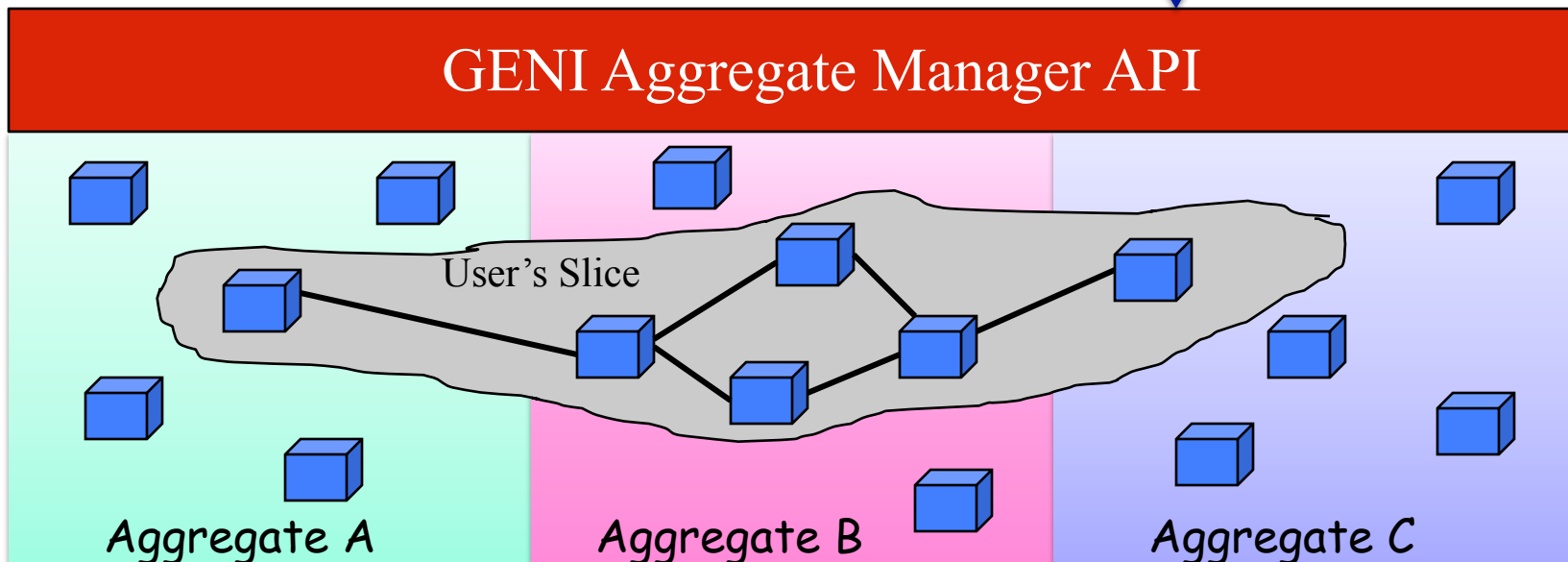
We added another set of user interface scripts that allow a user to instrument the slice

Flack GUI

Scripts Interface

INSTOOLS Scripts

MC Software	SNMP, Netflow, OS Utilities, etc
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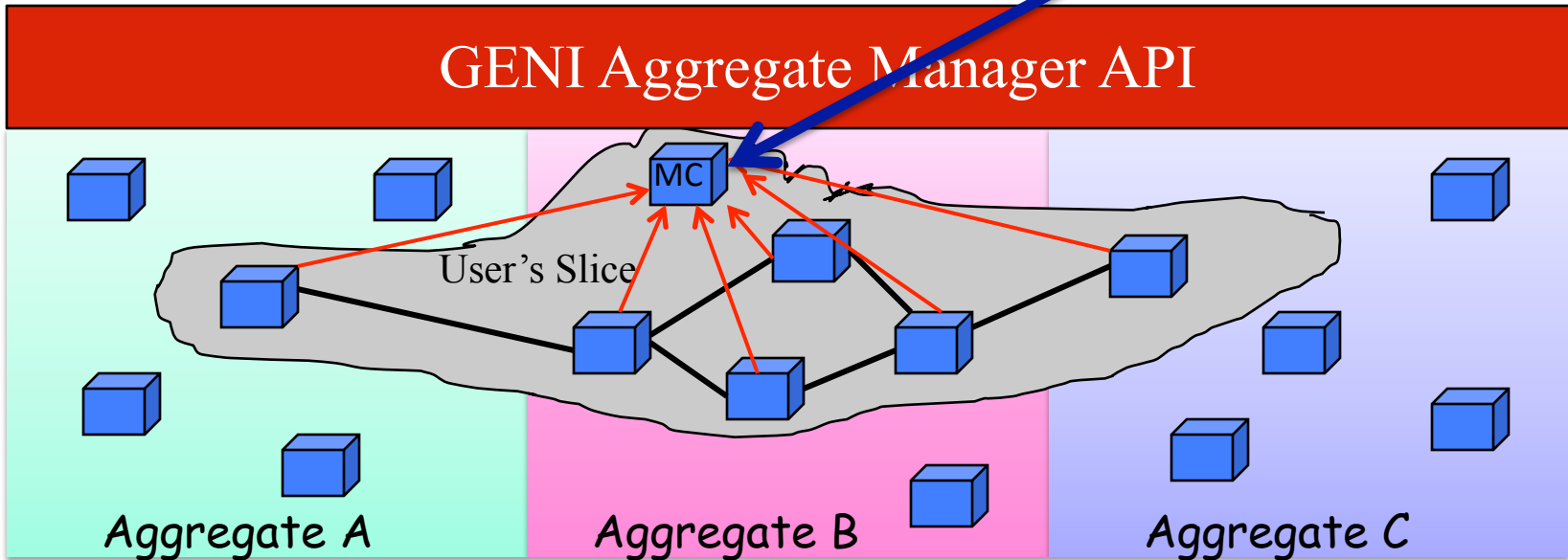
INSTOOLS adds MC to slice

Flack GUI

Scripts Interface

INSTOOLS Scripts

MC Software	SNMP, Netflow, OS Utilities, etc
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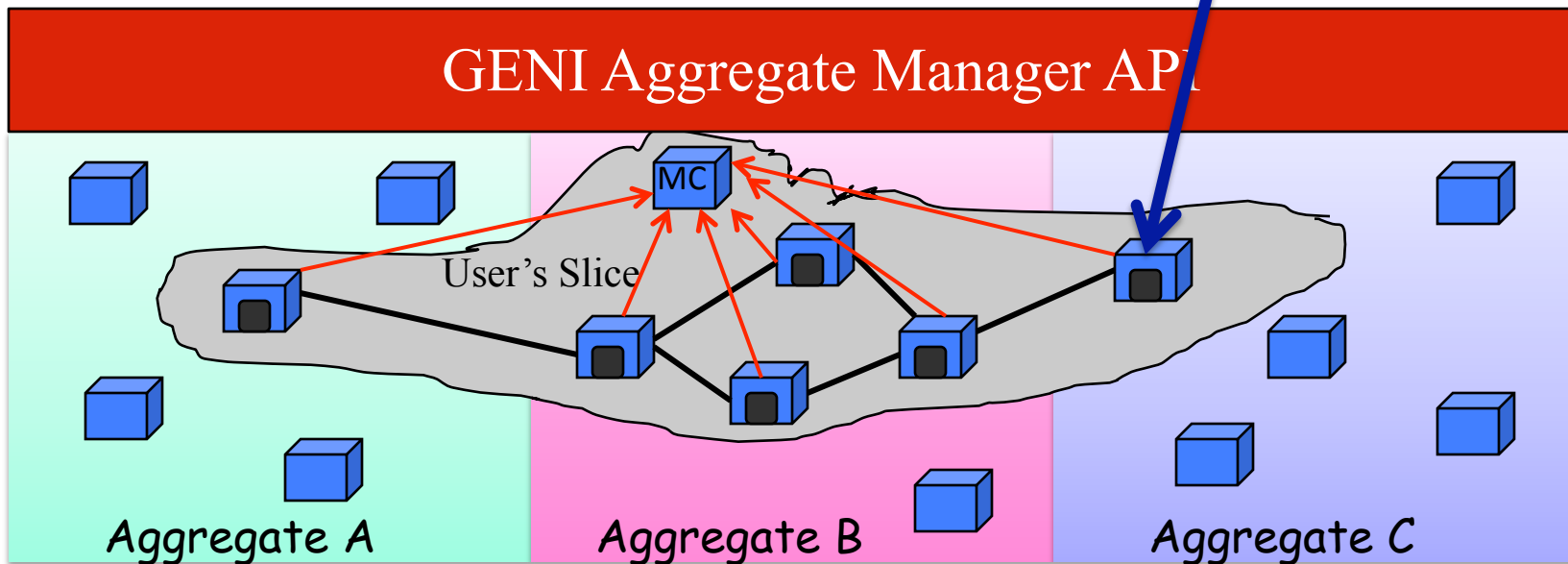
INSTOOLS adds monitoring software to slice resources

Flack GUI

Scripts Interface

INSTOOLS Scripts

MC Software	SNMP, Netflow, OS Utilities, etc
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User views measurement data on the MC.

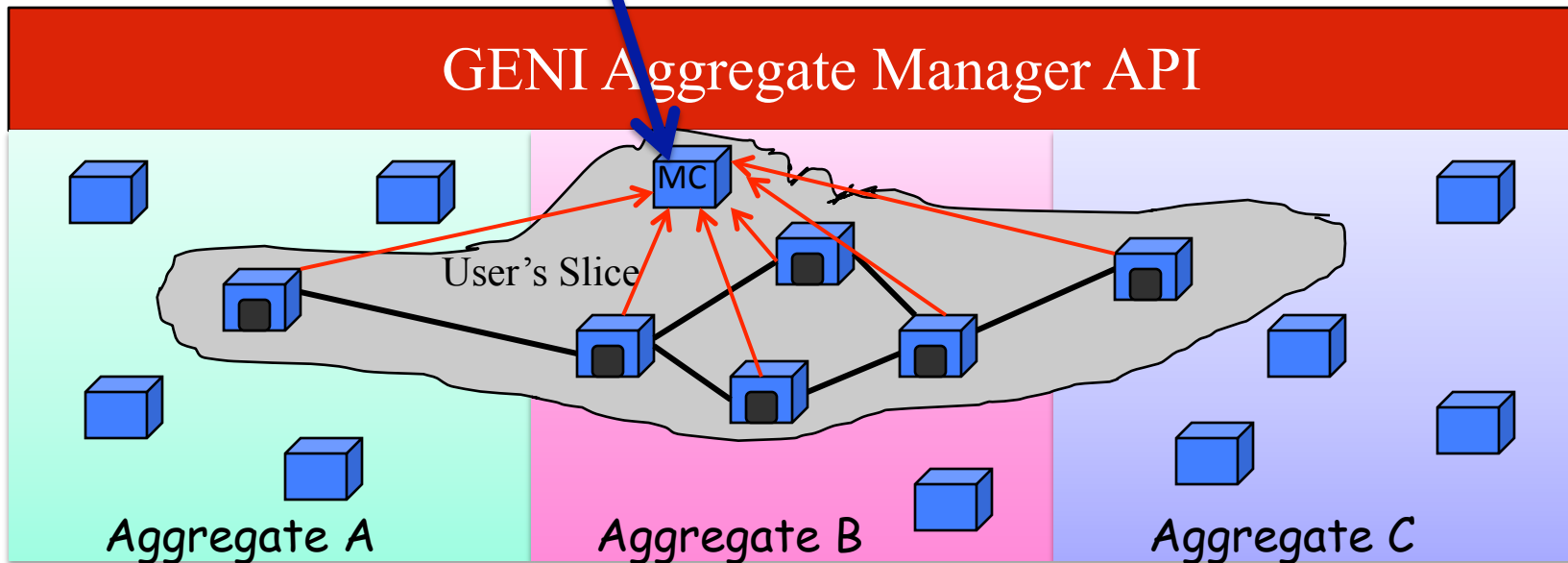
Web Server
Access to MC

Flack
GUI

Scripts
Interface

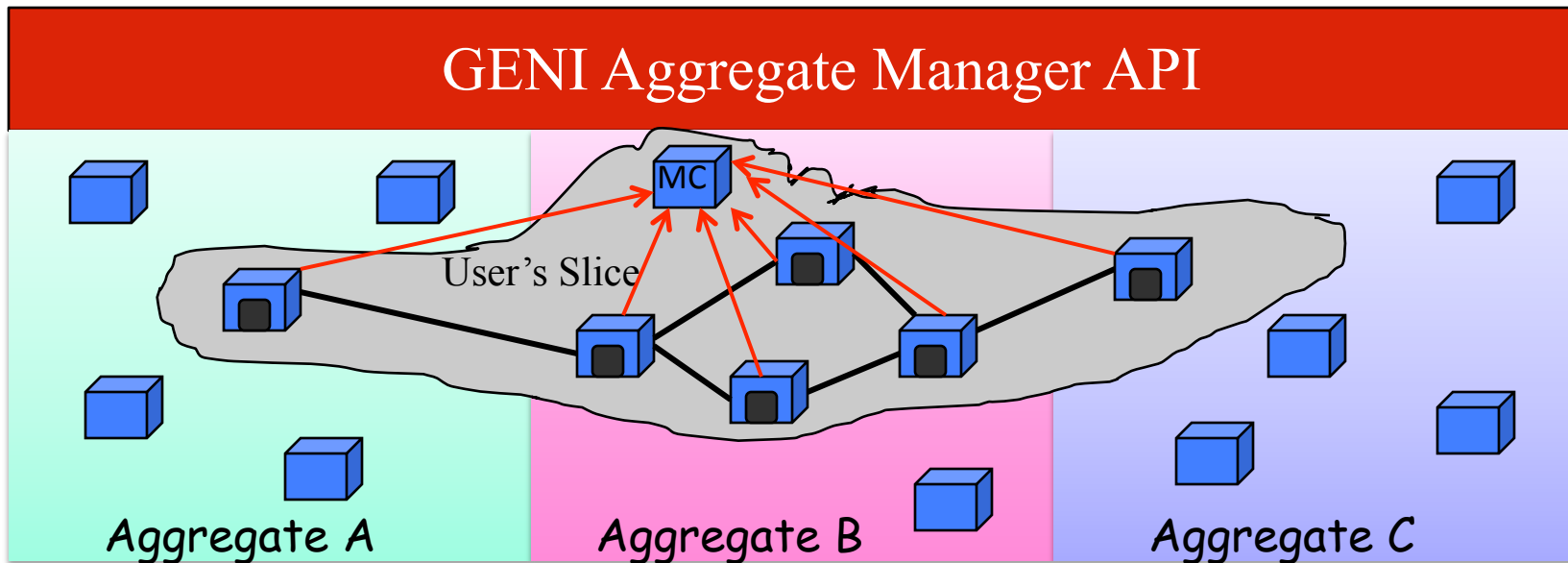
INSTOOLS Scripts

MC Software	SNMP, Netflow, OS Utilities, etc
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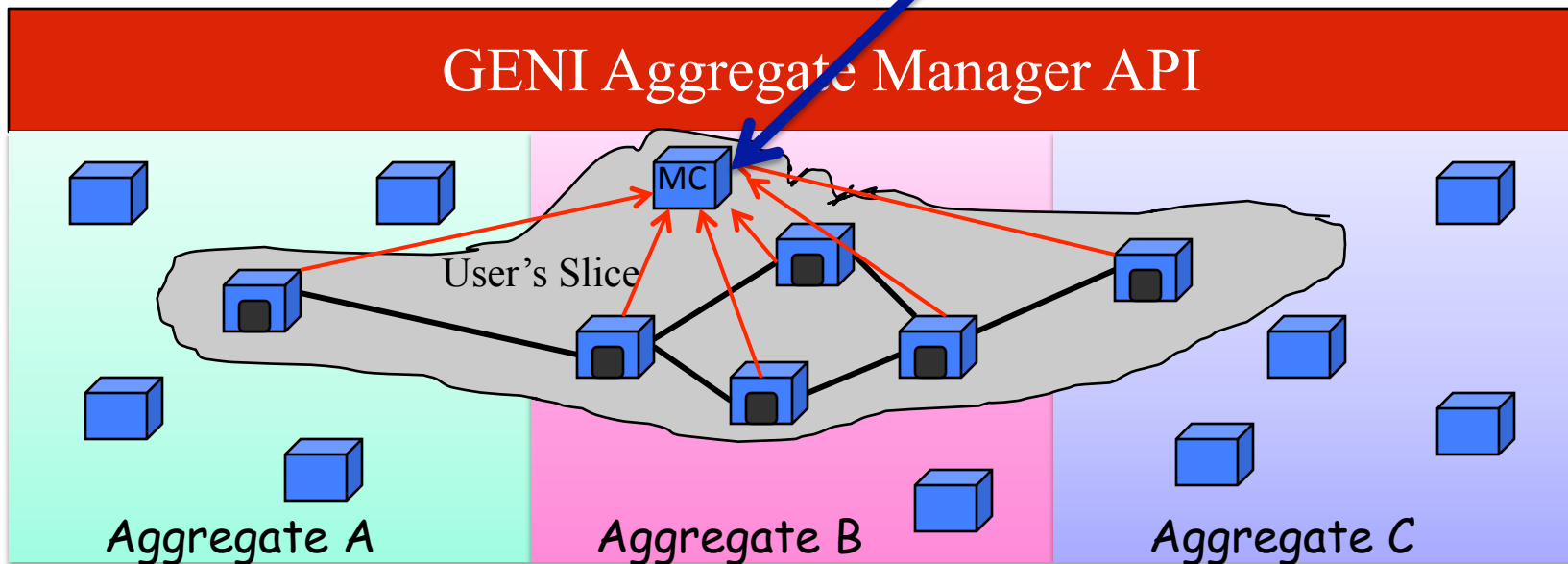


INSTOOLS Scripts have now been integrated into the ProtoGENI Interfaces



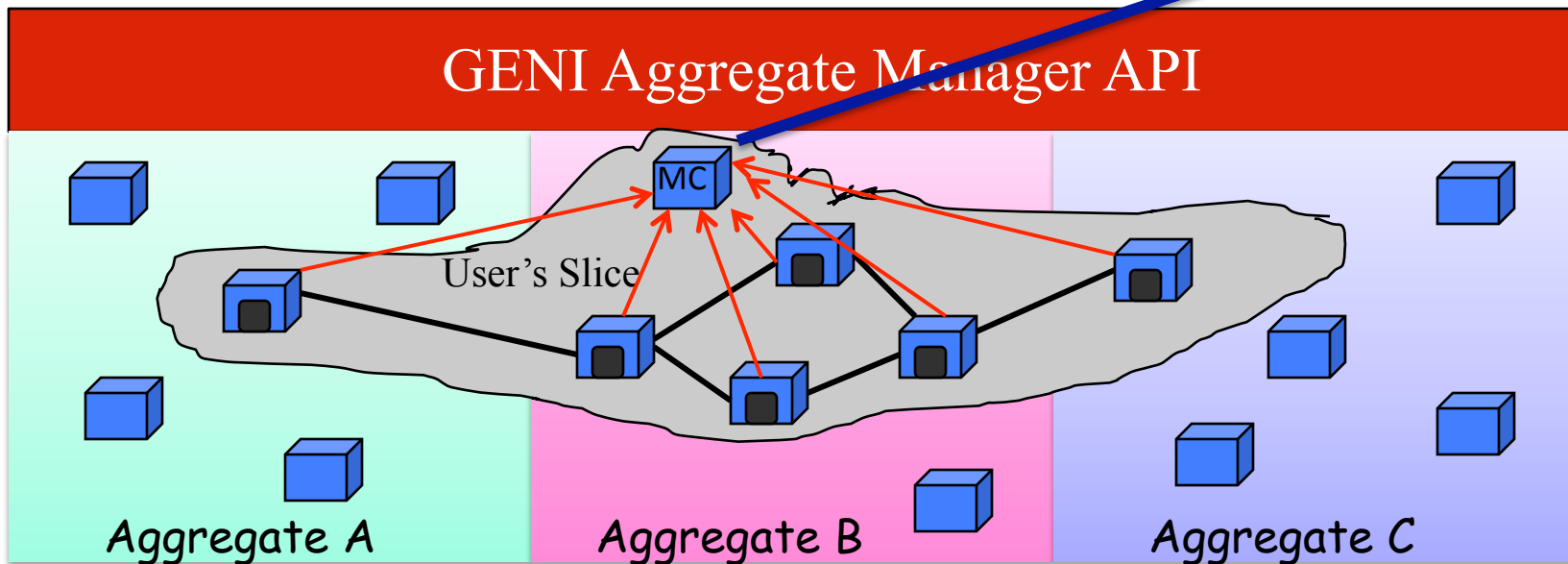


A GENI Monitoring Portal has been added as a single point of access to measurement information.



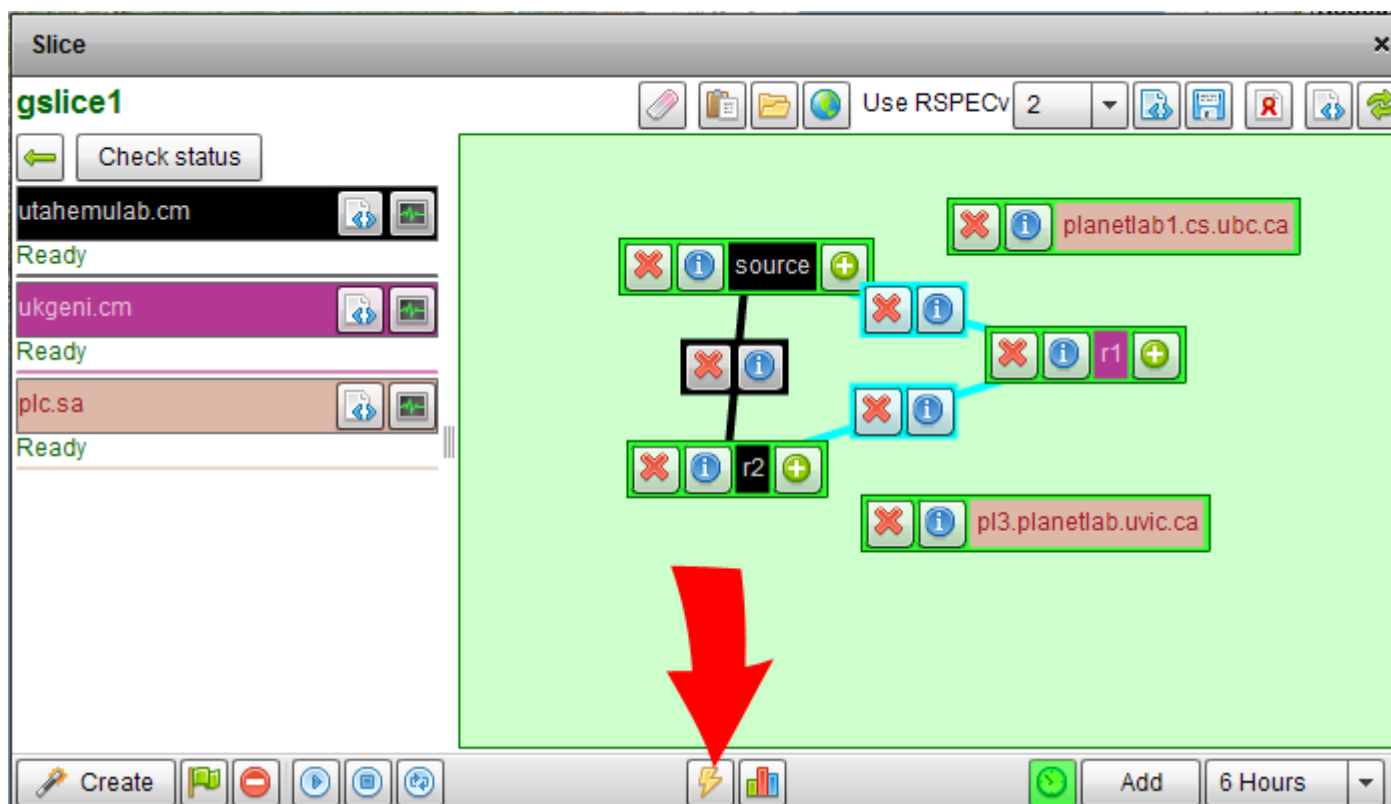


Added an archive service at Kentucky that provides users with the same look/feel when accessing archived data.



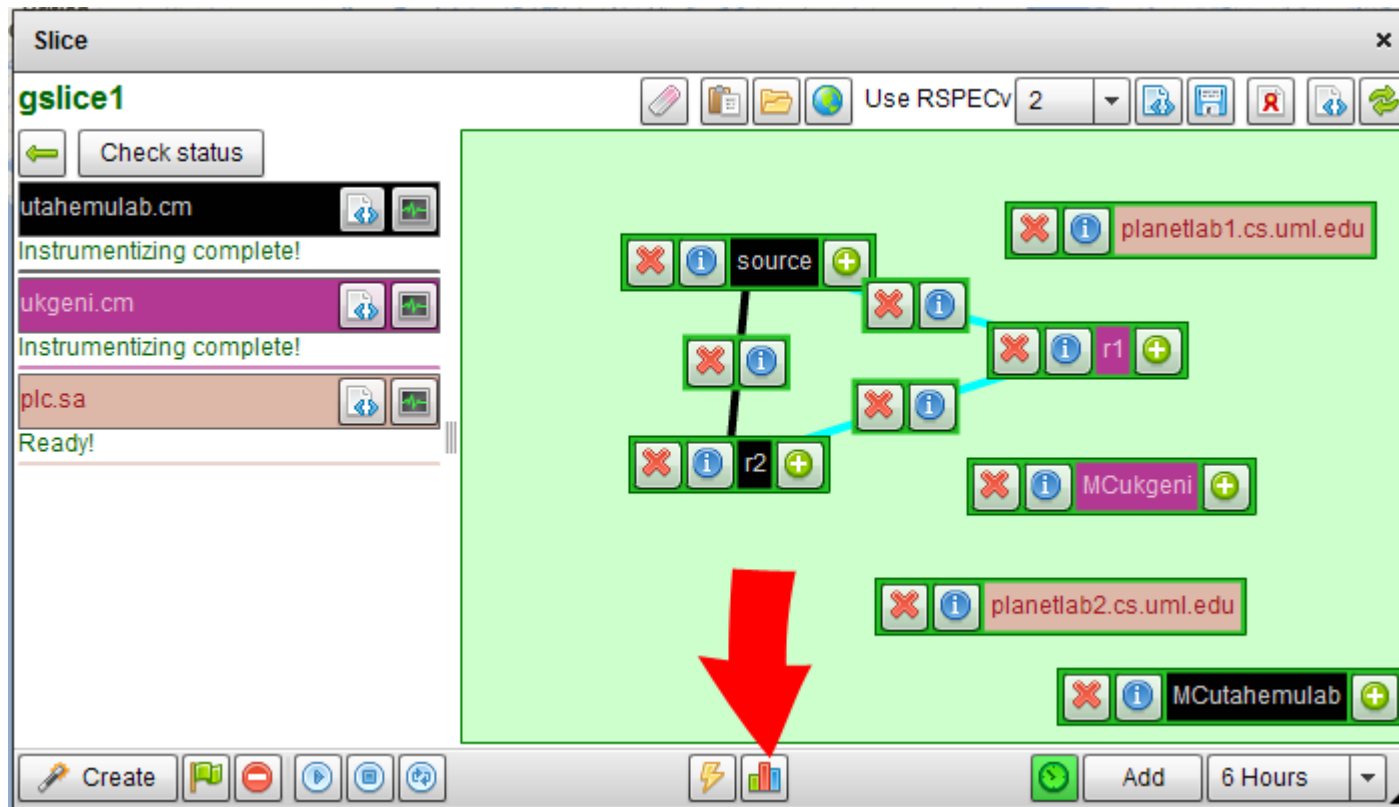
Flack Integration

- Enables slice creation and instrumentation from a single GUI.



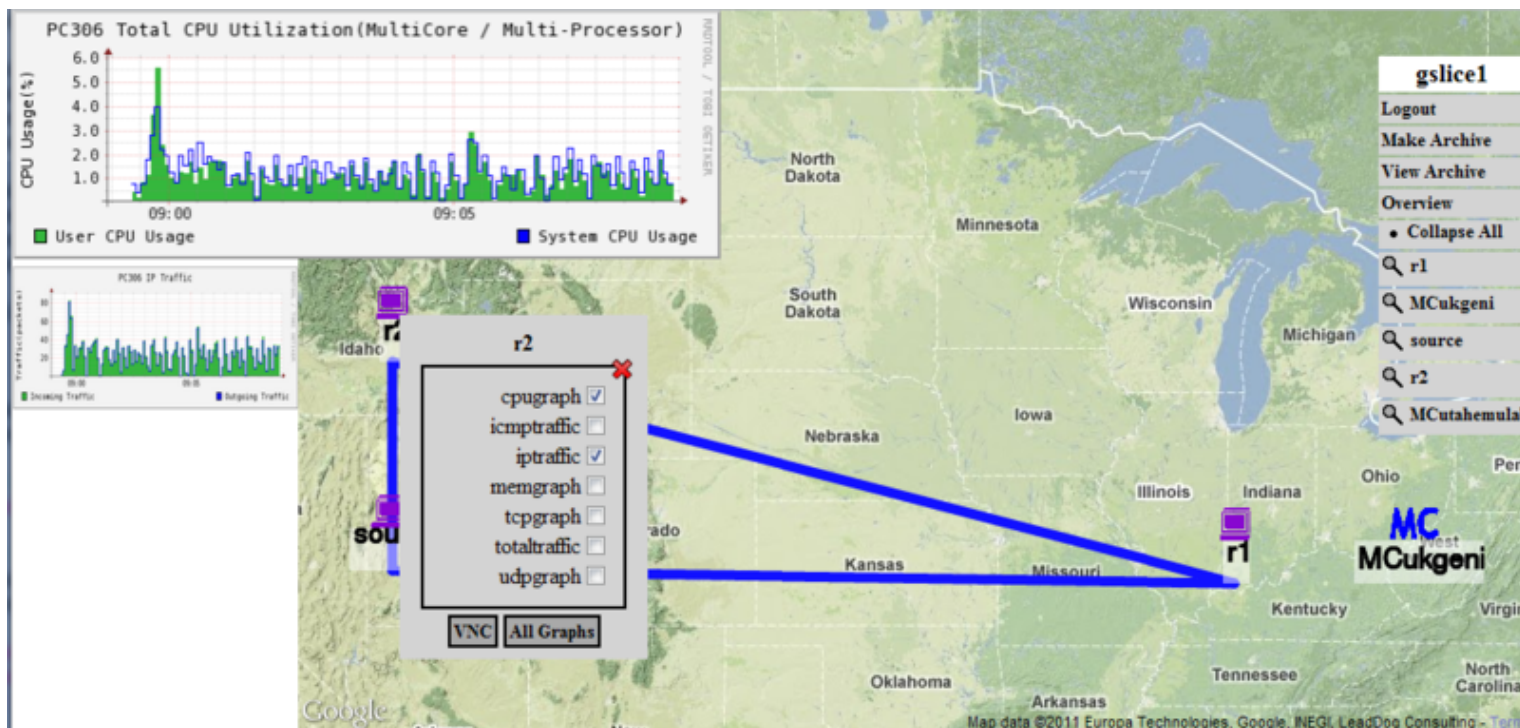
GENI Monitoring Portal (GMP)

- Provides Access to all measurement data and archive services.



GENI Monitoring Portal (GMP)

- Provides Access to all measurement data and archive services.



UK Archive Service

- Provides the same look/feel as interacting with the live measurement data.

The screenshot shows the UK Archive Service website. The header features the University of Kentucky logo and the text 'Welcome to the INSTOOLS Archive Site'. The user is logged in as 'ukgeni.demouser' and has options for 'My account' and 'Log out'. The main content area displays 'Welcome to the INSTOOLS Archive Site' and 'You are demouser registered with ukgeni Slice Authority'. Below this is a section titled 'Archival Data for Slicename : demoslice' containing a table of data with columns for Date, Component Manager, View, and Delete. At the bottom of the page, there is a 'Drupal' logo.

Date	Component Manager	View	Delete
07/26/2011 03:21:45 EST	ukgeni	View	Delete
07/26/2011 03:21:45 EST	utahemulab	View	Delete
07/26/2011 03:01:26 EST	ukgeni	View	Delete
07/26/2011 03:01:23 EST	utahemulab	View	Delete
07/26/2011 02:32:17 EST	utahemulab	View	Delete
07/26/2011 02:32:16 EST	ukgeni	View	Delete

Summary of Recent Additions

1. Significant improvements to our **GENI Monitoring Portal (GMP)** that simplifies access to measurement.
2. Addition of an intermediate **Instrumentation Manager** that simplifies the design of - and thus facilitates a wider range of - user interfaces.
3. Integration with the FLACK client.
4. Support for Archive Services (e.g., the Kentucky Archive Service, the CNRI Archive Service, and (coming soon) the GMOC Archive Service).
5. A **Kentucky Archive Service** that recreates a user interface with the same look-and-feel of the live MC interface.
6. Support for both RSPEC v1 and RSPEC v2 (including cross-aggregate and some support for cross-cluster)
7. Support for more Node OSes (Ubuntu)
8. Simplified authentication processes
9. Improved robustness and tolerance of failures.

Thank You!

Questions?

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