

GENI Workshop Floating Cloud Tiered (FCT) Network Architecture

Rochester Institute of Technology

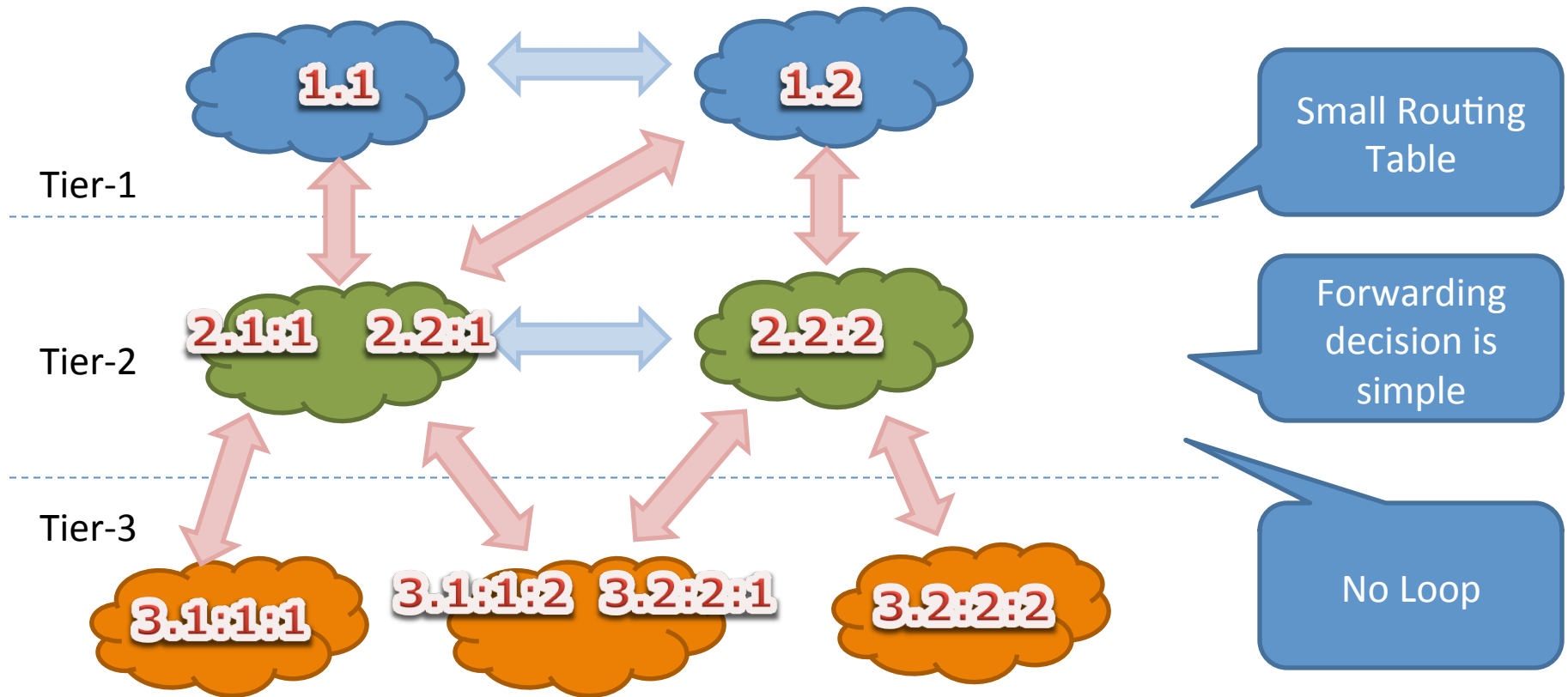
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1. Floating Cloud Tiered Architecture

- A candidate future Internet architecture
 - Define *network clouds* and apply *tiered model*
 - Scalable and Manageable
 - Structure of tiers can be dynamic
 - Flexible, Business models
 - Achieved by new tiered addressing scheme
 - Efficient, Routing, Simple
- Funded by the NSF Future Internet Design research initiative

Floating Cloud Tiered with Routing



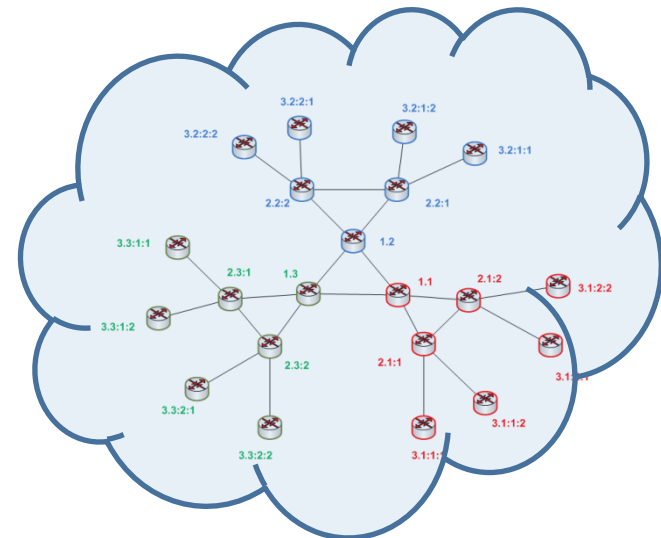
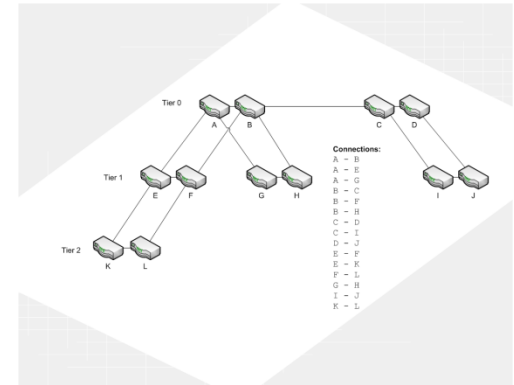
Source Cloud ID : 3.1:1:1
Destination Cloud ID: 3.2:2:2 ---> 1.2:2:2

Our Goal with GENI testbed

- Enable real world comparative studies
- Realistic performance analysis
- FCT router is implemented in Linux
 - FCT validation testing
 - FCT performance optimization
- Compare with current routing protocols
 - OSPF
 - BGP
- Transition from IP -> FCT
 - Encapsulate IP packet
 - Use Multi Protocol Label Switching (MPLS)

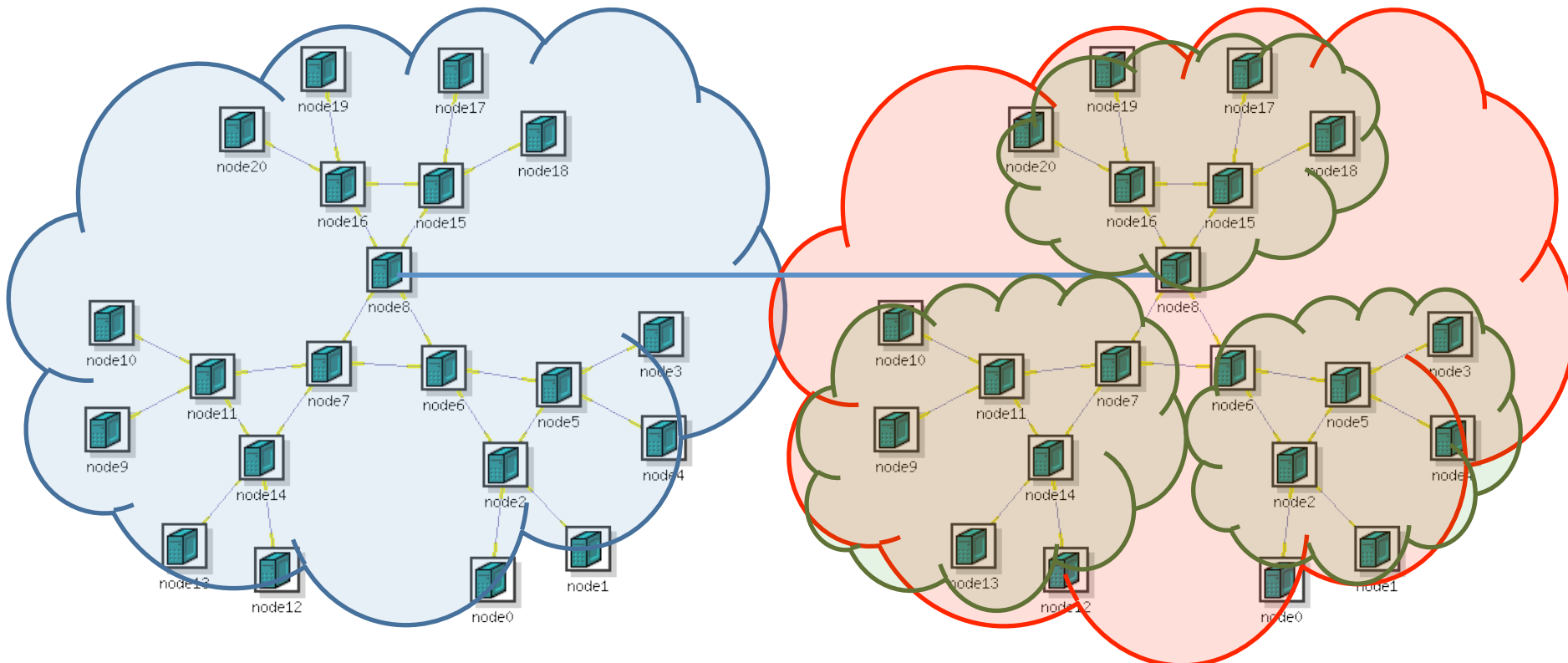
2. Testbed

- We started from RIT testbed
 - 12 nodes
 - Linux based FCT router
 - Generates FCT packets
 - Forwards FCT packets
- Next, tested in Emulab
 - Expanded network - nodes and size
 - Intra-Cloud/Domain level
 - Compare with other protocols



GENI testbed

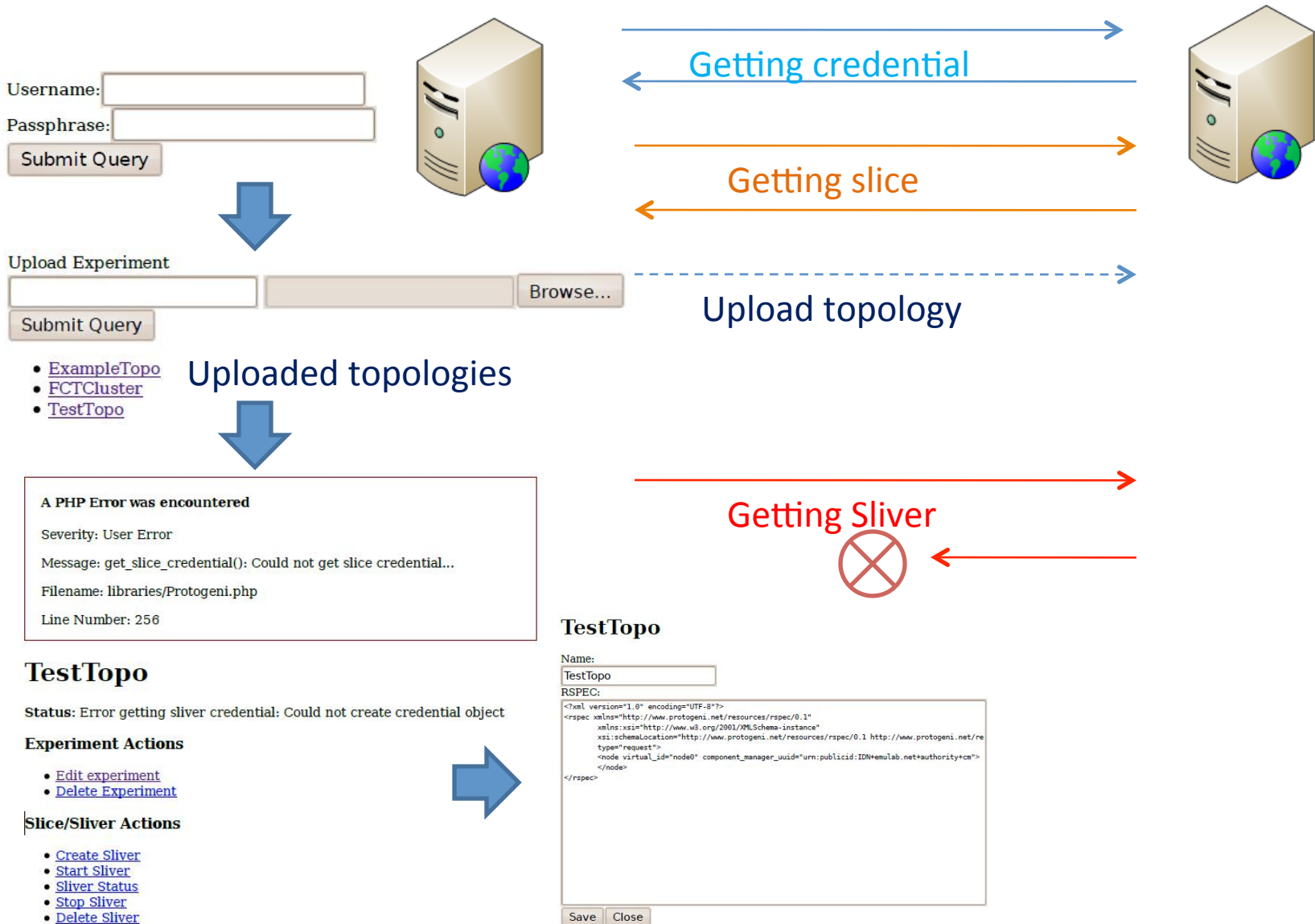
- Multi-sites nation wide network
 - Both intra- and inter- clouds/domain
 - Near realistic scenarios



GENI testbed

- We have tried to create WEB-based User Interface (Web-UI) for GENI
 - Multiple sites to be established
 - PHP based
 - Used Python test scripts to develop our PHP application
 - Uses JQuery, Codeigniter and some basic Ajax calls
 - Supported most of the GENI API calls
 - PHP function did not work with the CreateSliver API call
 - Encoding method of parameters may be different?

WEB-UI for GENI



WEB-UI

- New Interface...



Search

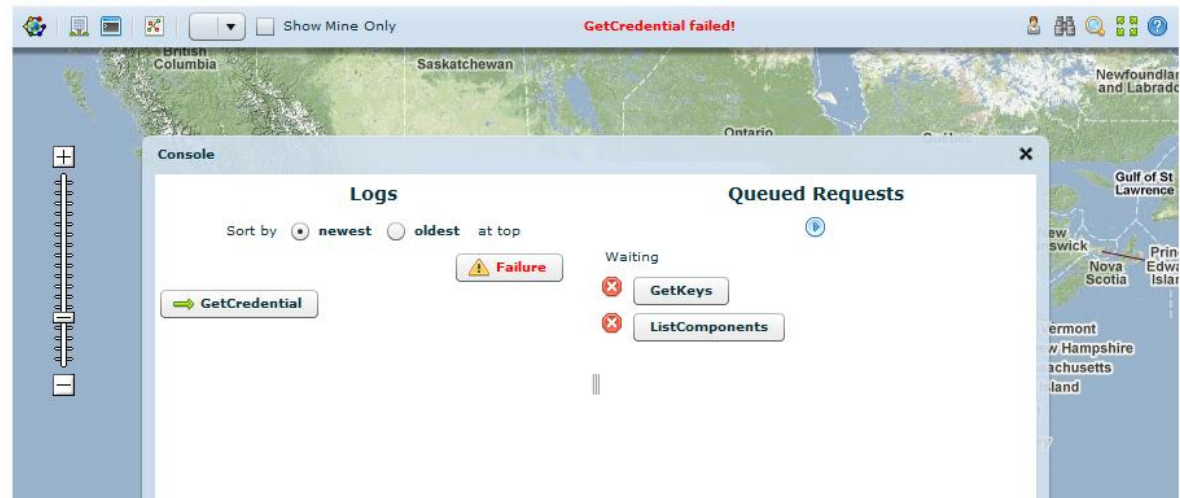
[Login](#) | [Help/Guide](#) | [Settings](#) | [My Notifications](#) | [About Trac](#)

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[Start Page](#) | [Index by Title](#) | [Index by Date](#) | [Last Change](#) | [Watch Page](#)

Map Interface

[Old flash interface](#) | [Manual](#)



The screenshot displays the Protogeni web interface. At the top, there is a navigation bar with links for Login, Help/Guide, Settings, My Notifications, and About Trac. Below this is a search bar and a set of tabs for Wiki, View Tickets, Search, Timeline, and Roadmap. A secondary row of links includes Start Page, Index by Title, Index by Date, Last Change, and Watch Page.

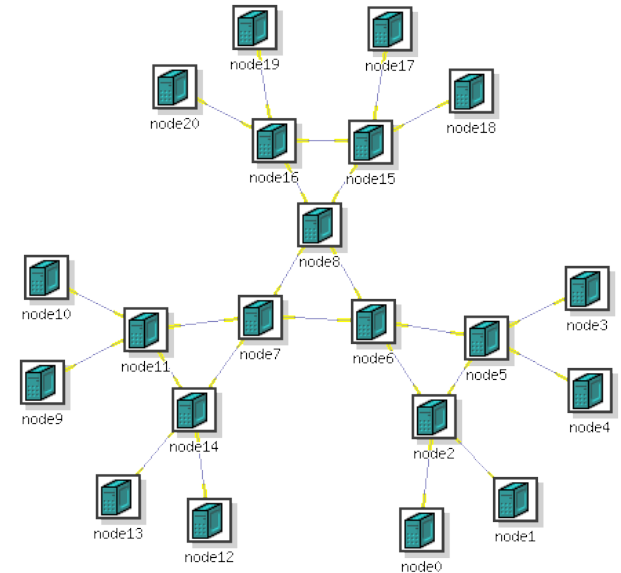
The main content area is titled "Map Interface" and includes a link to the "Old flash interface" and a "Manual" link. The interface features a map of Canada with provinces like British Columbia, Saskatchewan, and Ontario visible. A console window is open in the foreground, showing a "Failure" message and a "GetCredential" button. To the right of the console, there is a "Queued Requests" section with a "Waiting" status and buttons for "GetKeys" and "ListComponents".

3. Preliminary Results & Feedbacks

- OSPF
- FCT

- OSPF tested using QUAGGA
- FCT using our own code

- Statistics
 - Initial convergence time
 - Node Failure Convergence time
 - Number of Control Packets
 - Data Packets loss during convergence
 - Routing Table size



Issues

- Issues
 - Availability of number of nodes
 - Number of Ethernet ports is limited (5 in Emulab)
 - Control port is dynamically assigned
 - Unable to setup native OSPF routing (i.e. gated)
- Questions
 - Nodes synchronization across sites
 - Any standard routing protocols which can be used for comparison study in (multi-sites) test bed
 - Statistics Measurements tools

