Grid meets Cloud:
Using Hosted Federation Services to Enhance Scientific Collaboration

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Grid = federation

Cloud = hosting

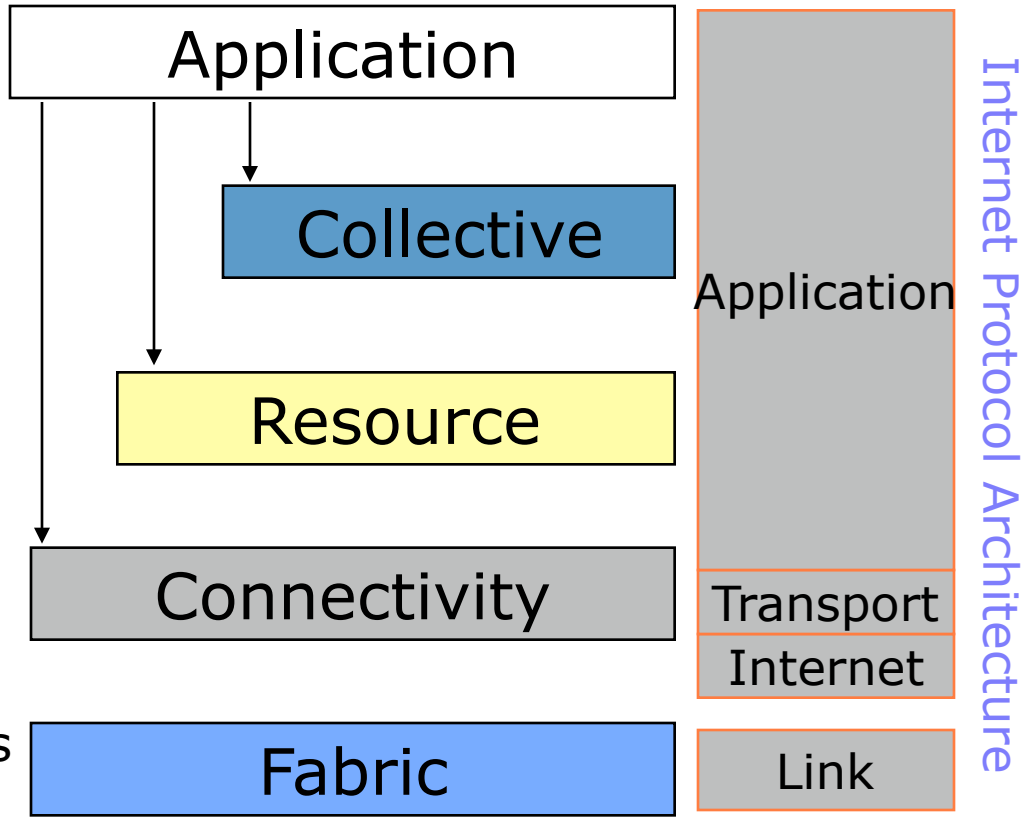
Anatomy of the Grid

"Coordinating multiple resources": ubiquitous infrastructure services, app-specific distributed services

"Sharing single resources": negotiating access, controlling use

"Talking to things": communication (Internet protocols) and security

"Controlling things locally": Access to, and control of resources



"The Anatomy of the Grid: Enabling Scalable Virtual Organizations", Foster, Kesselman, Tuecke, Intl Journal of High Performance Computing Applications, 15(3), 2001.

Cloud Taxonomy

Software-as-a-Service (SaaS)

Platform-as-a-Service (PaaS)

Infrastructure-as-a-Service (IaaS)

Globus Toolkit

Assortment of Components for Grid Builders

- Focus on Connectivity and Resource layers
  - GRAM, GSI-OpenSSH: Run programs
  - GridFTP: Access file systems
  - OGSA-DAI, caGrid: Access databases
  - GSI, Myproxy, GAARDS: Security
  - XIO, Java Core, C Core: Communication
- A few simple Collective layer components
  - RLS: Replica tracking
  - RFT: Reliable file transfer

Many Custom Collective Layers

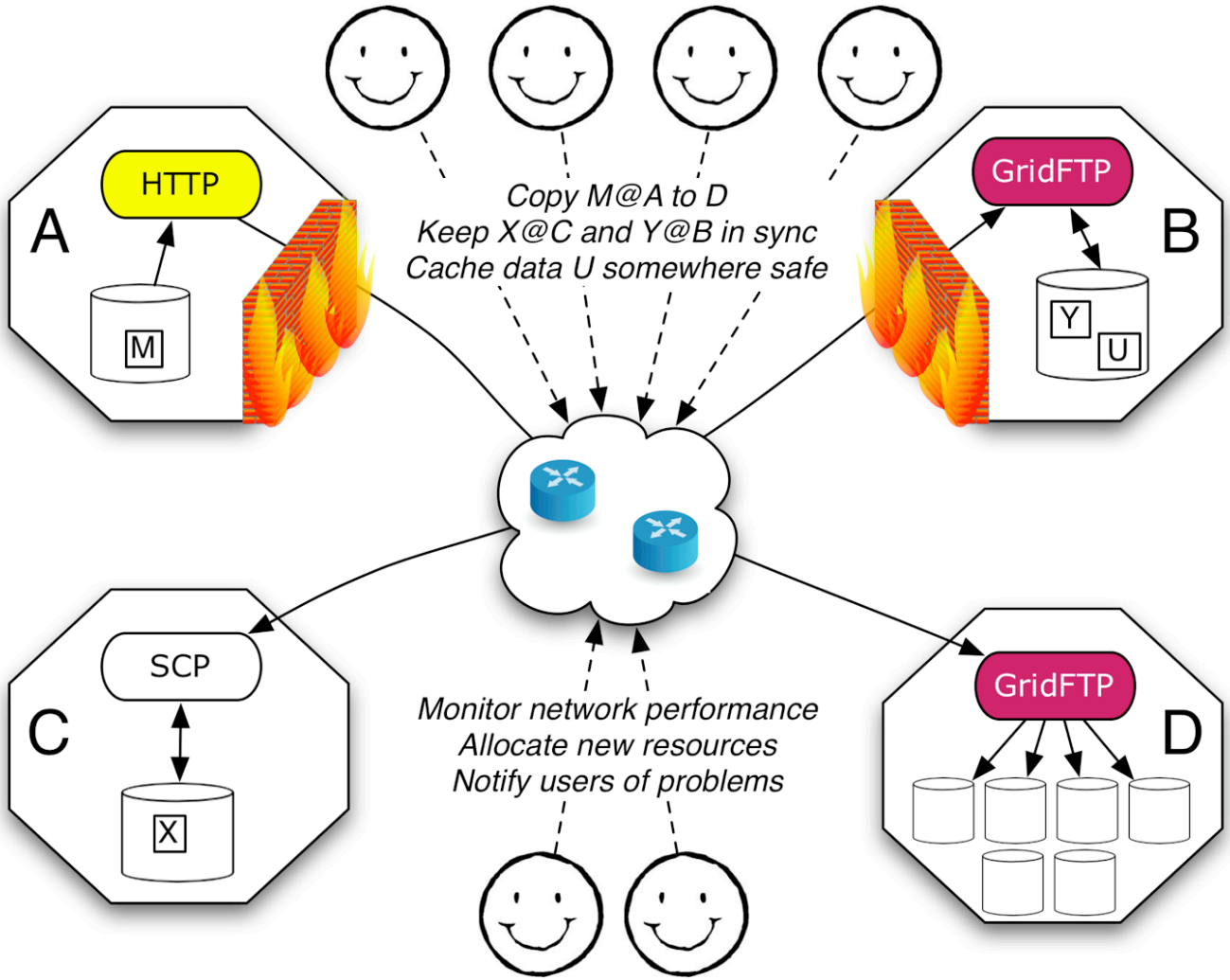
- Most Grid deployment have custom, domain-specific Collective layer
  - Built on common Resource layer components
  - E.g. Data transfer and mirroring, workflows, …
- Challenges:
  - Expensive to develop
  - Expensive to operating and supporting
  - Useful for narrow community
- How do we make these capabilities available to more users?

Globus.org Service

Collective Layer Grid Services via Cloud SaaS

- End-to-end collective layer functionality targeted toward end users
  - Generalize lessons from custom Grids
  - Focus on ease of use, federation
- Hosted and supported by Globus team
- Initial focus on file transfer
  - Near term: Add sync, mirroring, caching
  - Long term: Add job execution, workflows, VO management

Globus.org Service



Applying SaaS Techniques

- Service: Built as scale-out web application
  - Hosted on Amazon Web Services
- Client: Minimize software deployment
  - Web 2.0
    - AJAX + REST
    - Notification via email, IM, SMS, Twitter, etc.
    - Enable mash-ups
  - CLI 2.0
    - ssh cli.globus.org …
  - Dynamic deployment of resource integrators
  - Mobile clients

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Web 2.0 GUI

Globus.org Console

https://globus-org.appspot.com/

Google

Globus.org Console

Welcome: globus.org.adm

Logout

monitor | profile

main

Transfers

UUID	User	Status	Deadline	Completed	Progress
a704ec19-d3af-11de-8b40-123139051d32	gftp2	ACTIVE	2009/11/18 19:30:24 GMT	0	
eb54230f-d0d3-11de-8b40-123139051d32	gftp2	SUCCESS	2009/11/15 04:12:27 GMT	2009/11/14 04:13:01 GMT	Completed 10 FileMoves
25e71a9f-d0d4-11de-8b40-123139051d32	gftp2	SUCCESS	2009/11/15 04:14:05 GMT	2009/11/14 04:15:02 GMT	Completed 10 FileMoves
11e21f3f-d0d5-11de-8b40-123139051d32	gftp2	SUCCESS	2009/11/15 04:20:41 GMT	2009/11/14 04:50:02 GMT	Completed 1000 FileMove
407eecc5-d0d9-11de-8b40-123139051d32	gftp2	SUCCESS	2009/11/15 04:50:37 GMT	2009/11/14 05:39:01 GMT	Completed 1000 FileMove
3e7a1a1f-d0e0-11de-8b40-123139051d32	gftp2	SUCCESS	2009/11/15 05:40:40 GMT	2009/11/14 06:20:02 GMT	Completed 1000 FileMove
d4e2b345-d0e5-11de-8b40-123139051d32	gftp2	SUCCESS	2009/11/15 06:20:40 GMT	2009/11/14 06:50:02 GMT	Completed 1000 FileMove
060d8f63-d0ea-11de-8b40-123139051d32	gftp2	SUCCESS	2009/11/15 06:50:41 GMT	2009/11/14 07:38:01 GMT	Completed 1000 FileMove

Controls

Filters

User Field Filter

Status

Select a Status...

Completed After

Completed Before

Widgets

Loading "https://globus-org.appspot.com/", completed 23 of 24 items

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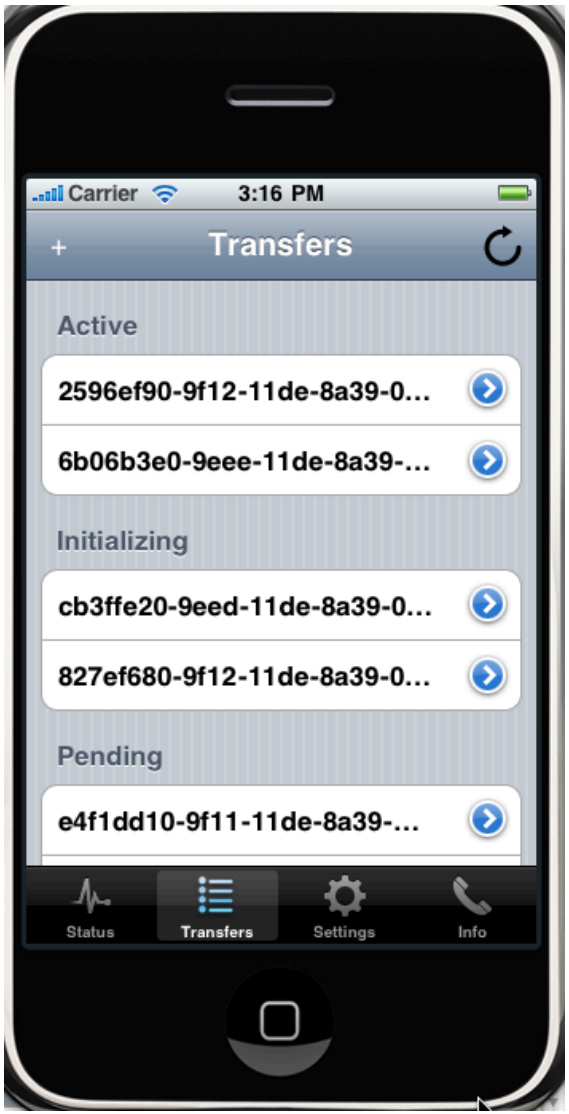
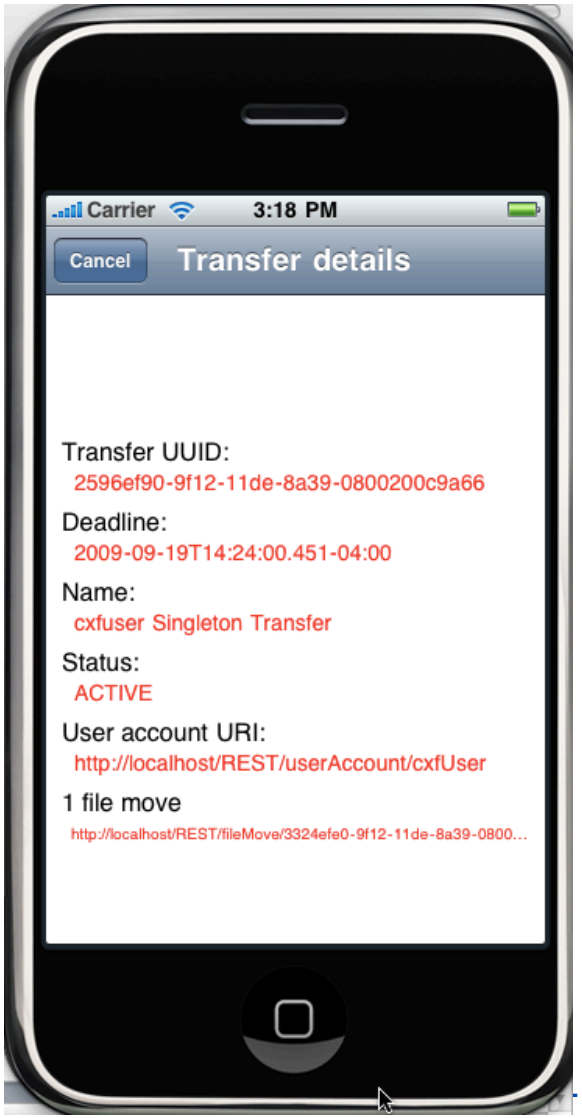
iPhone Client





Demo

- CLI (beta)
- Monitoring GUI (prototype)
- REST (prototype)
- iPhone App (prototype)

For More Information

- http://www.globus.org/service
- Viva Globus: December 16 @ Argonne
  - For Globus developers
  - http://dev.globus.org/wiki/Meetings/vivaGlobus
- GlobusWorld: March 2-4 @ Argonne
  - For Globus users and community
  - http://www.globusworld.org