



A Sneak Peak of What's New in Globus GridFTP

Raj Kettimuthu

Argonne National Laboratory and
The University of Chicago



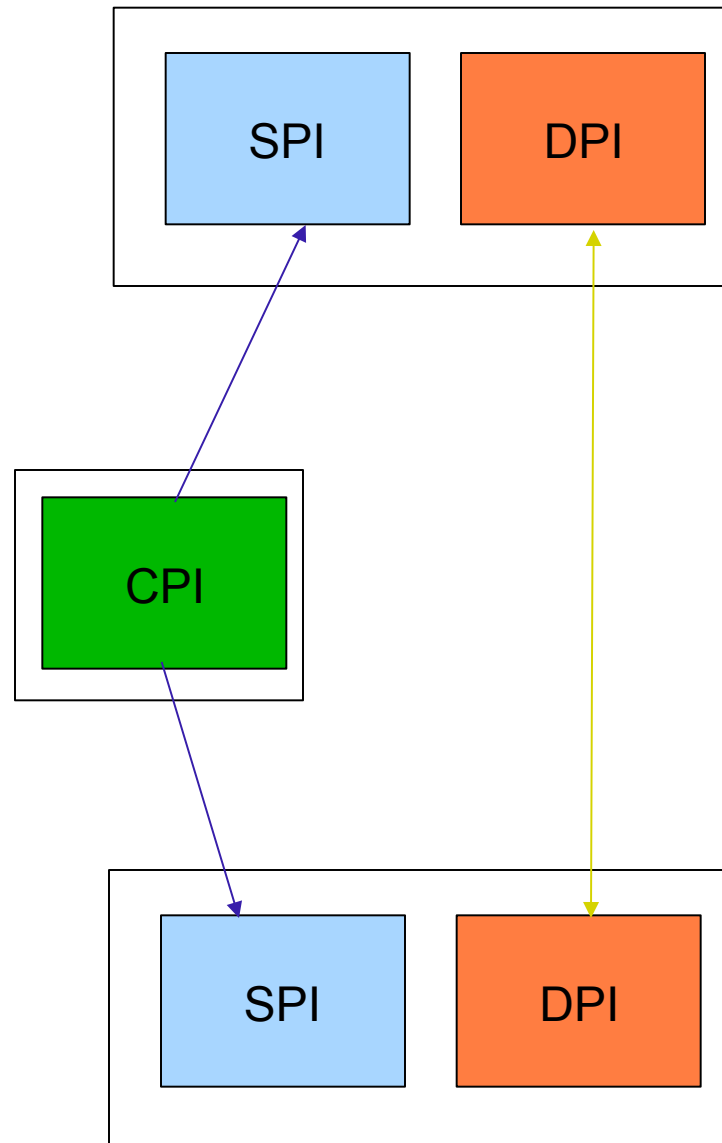
GridFTP

- A secure, robust, fast, efficient, standards based, widely accepted data transfer protocol
- We supply a reference implementation:
 - ◆ Server
 - ◆ Client tools (globus-url-copy)
 - ◆ Development Libraries
- Independent implementations interoperate
 - ◆ Fermi Lab has a home grown server that work with ours
- Lots of people have developed clients independent of the Globus Project

GridFTP

- Two channel protocol like FTP
- Control Channel
 - ◆ Communication link (TCP) over which commands and responses flow
 - ◆ Low bandwidth; encrypted and integrity protected by default
- Data Channel
 - ◆ Communication link(s) over which the actual data of interest flows
 - ◆ High Bandwidth; authenticated by default; encryption and integrity protection optional

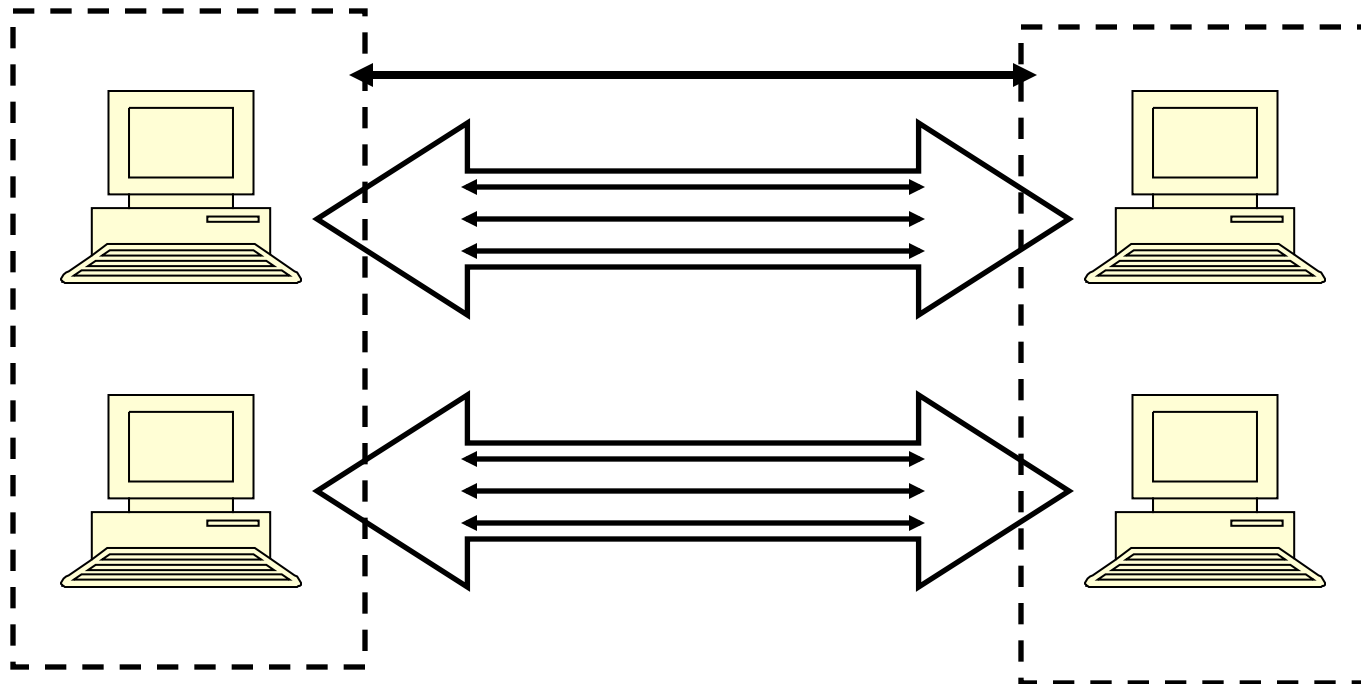
GridFTP





Striping

- GridFTP offers a powerful feature called striped transfers (cluster-to-cluster transfers)





the globus alliance

www.globus.org

Topics for discussion

- Performance enhancement
 - ◆ GridFTP over UDT
- Ease of Use enhancements
 - ◆ GridFTP over SSH
 - ◆ GridFTP Where there's FTP
- Resource Management in GridFTP
- Future directions

GridFTP over UDT

- UDT is an application-level data transport protocol that uses UDP to transfer data
- Implement its own reliability and congestion control mechanisms
- Achieves good performance on high-bandwidth, high-delay networks where TCP has significant limitations
- GridFTP uses Globus XIO interface to invoke network I/O operations



GridFTP over UDT

- XIO framework presents a standard open/close/read/write interface to many different protocol implementations
 - ◆ including TCP, UDP, HTTP -- and now UDT
- The protocol implementations are called drivers.
 - ◆ A driver can be dynamically loaded and stacked by any Globus XIO application.
- Created an XIO driver for UDT reference implementation
- Enabled GridFTP to use it as an alternate transport protocol



GridFTP over UDT

	Argonne to NZ Throughput in Mbit/s	Argonne to LA Throughput in Mbit/s
Iperf – 1 stream	19.7	74.5
Iperf – 8 streams	40.3	117.0
GridFTP mem TCP – 1 stream	16.4	63.8
GridFTP mem TCP – 8 streams	40.2	112.6
GridFTP disk TCP – 1 stream	16.3	59.6
GridFTP disk TCP – 8 streams	37.4	102.4
GridFTP mem UDT	179.3	396.6
GridFTP disk UDT	178.6	428.3
UDT mem	201.6	432.5
UDT disk	162.5	230.0



the globus alliance

www.globus.org

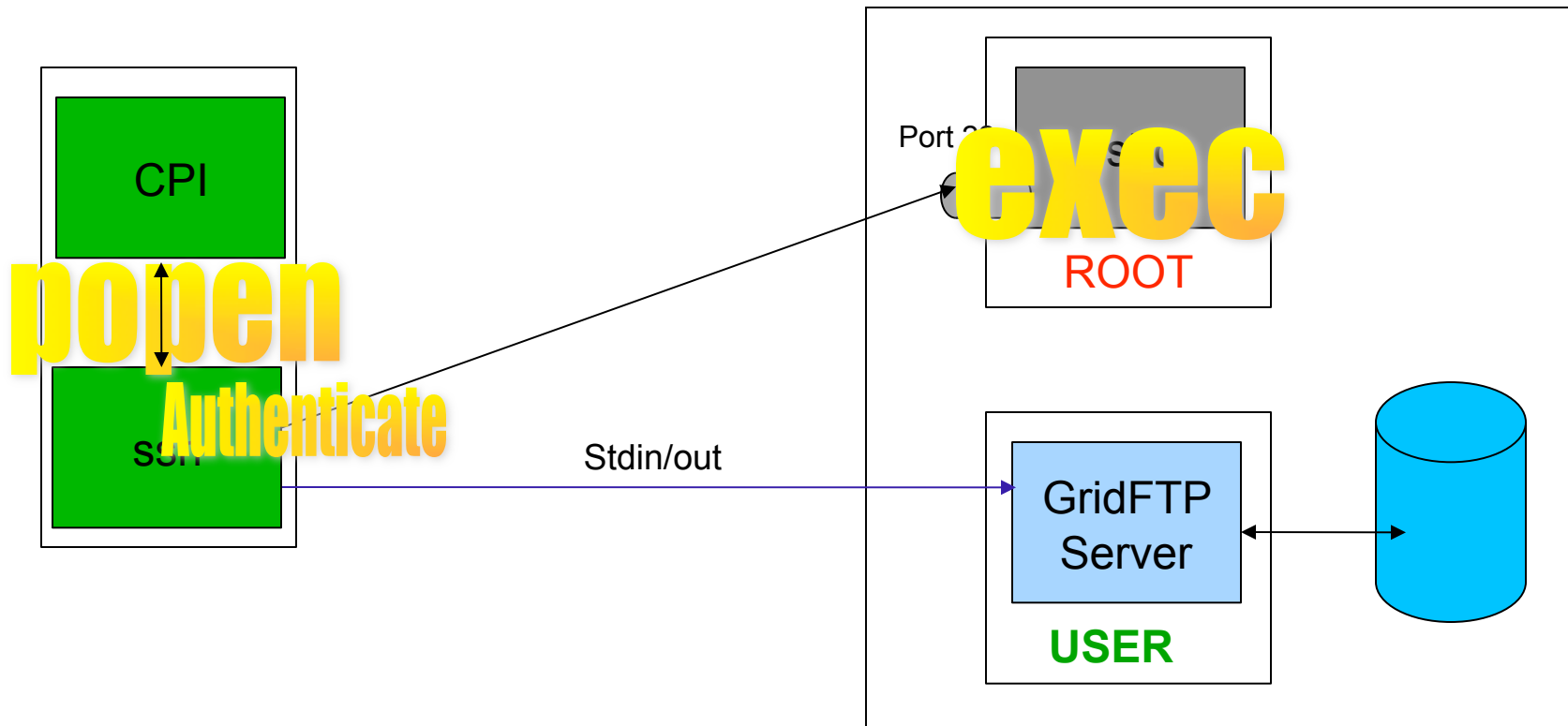
Alternate security mechanism

- GridFTP traditionally uses GSI for establishing secure connections
- In some situations, preferable to use SSH security mechanism
- Leverages the fact that an SSH client can remotely execute programs by forming a secure connection with SSHD

GridFTP over SSH

- sshd acts similar to inetd
- control channel is routed over ssh
 - ◆ globus-url-copy *popens* ssh
 - ◆ ssh authenticates with sshd
 - ◆ ssh/sshd remotely starts the GridFTP server as user
 - ◆ stdin/out becomes the control channel

SSHFTP Interactions





the globus alliance

www.globus.org

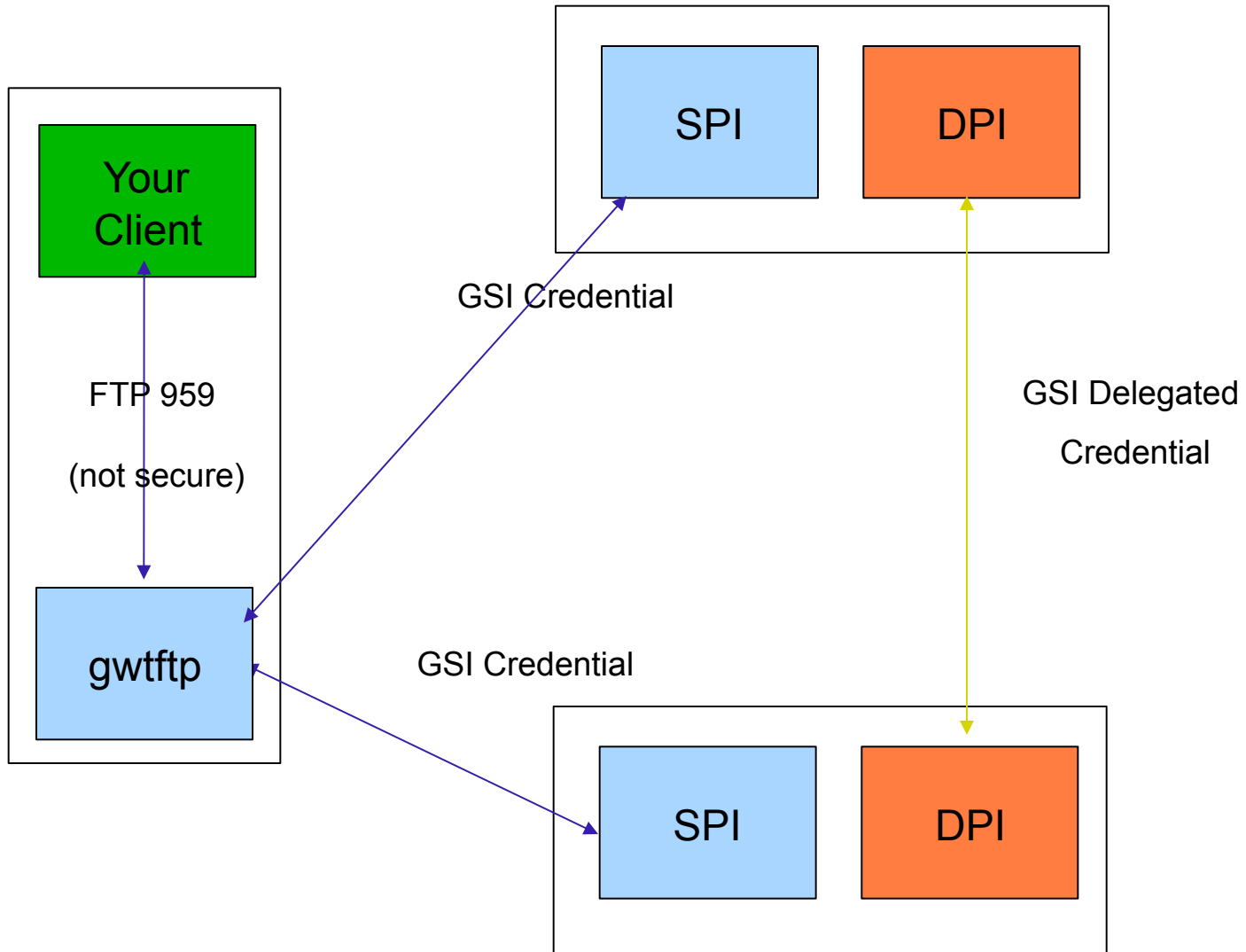
GridFTP Where there's FTP (GWFTP)

- GridFTP has been in existence for some time and has proven to be quite robust and useful
- Only few GridFTP clients available
- FTP has innumerable clients
- GUI Clients?
- Windows Clients?

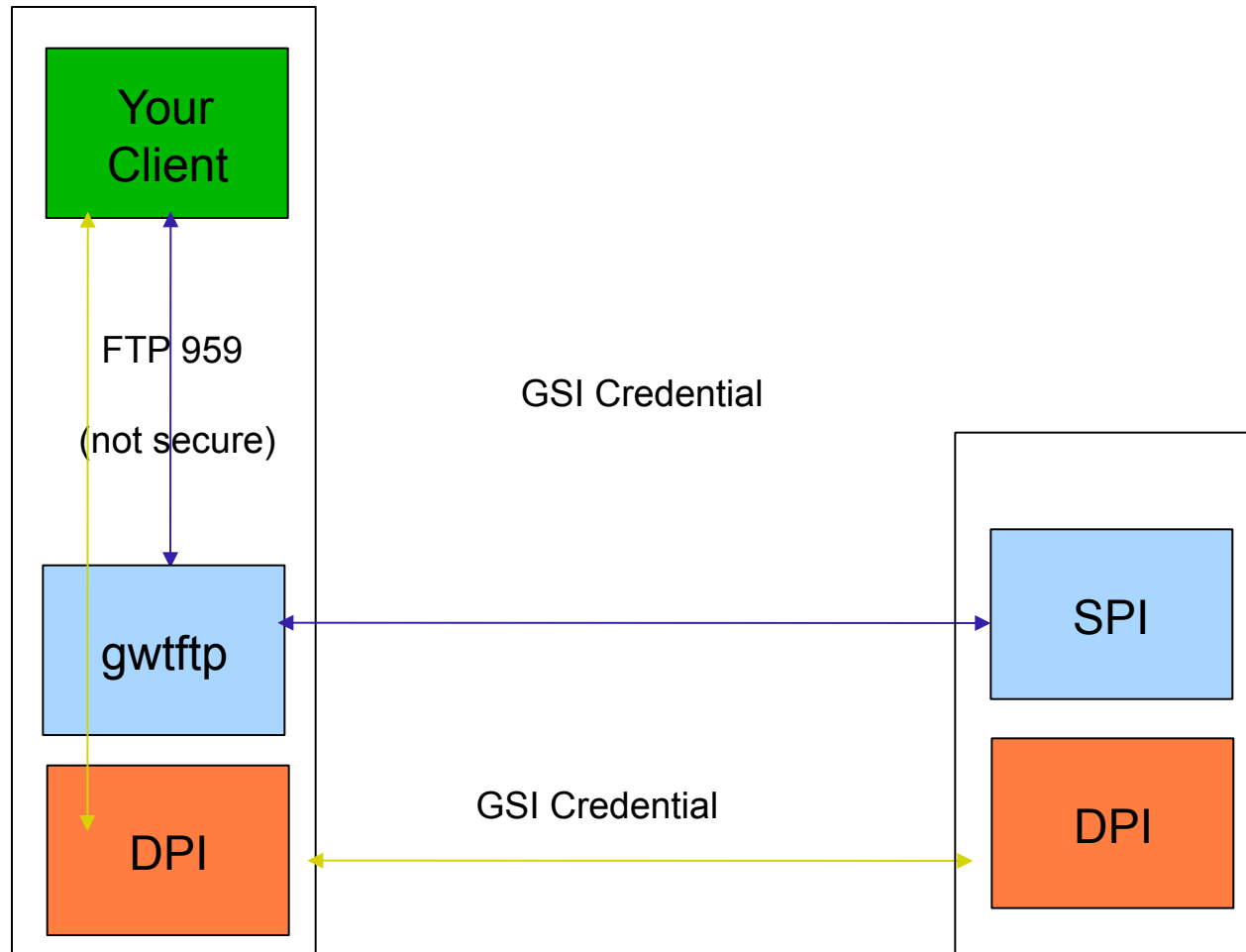
GWFTP

- GWFTP - created to leverage the FTP clients
- A proxy between FTP clients and GridFTP servers
- Not secure from client to proxy
 - ◆ Run on a trusted net (127.0.0.1)
 - ◆ Data channel routed or direct
 - ◆ If 3pt it is direct and secure
 - ◆ If 2 party must route through proxy, or be insecure

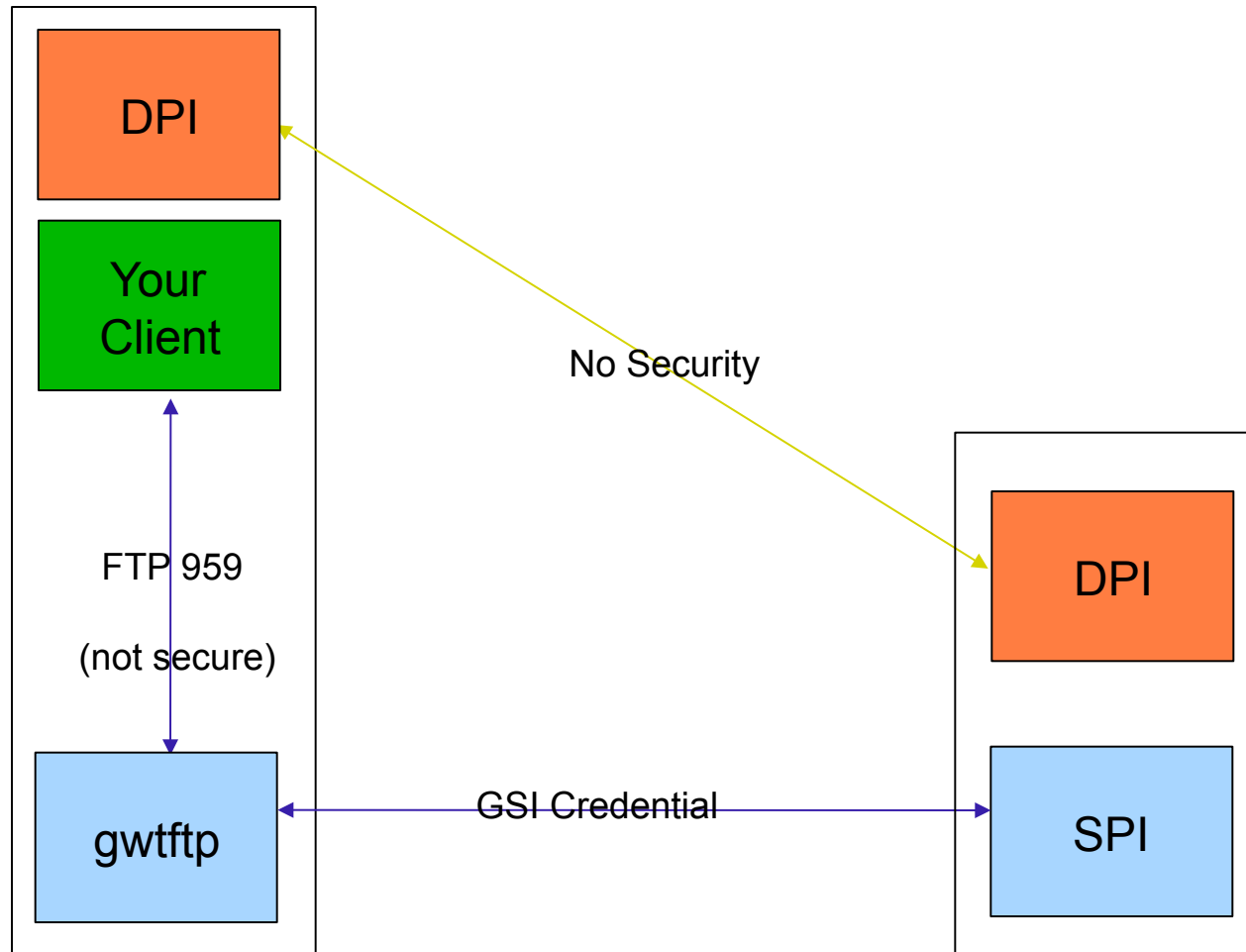
GWFTP (3pt)



GWFTP (2pt routed)



GWFTP (2pt direct)





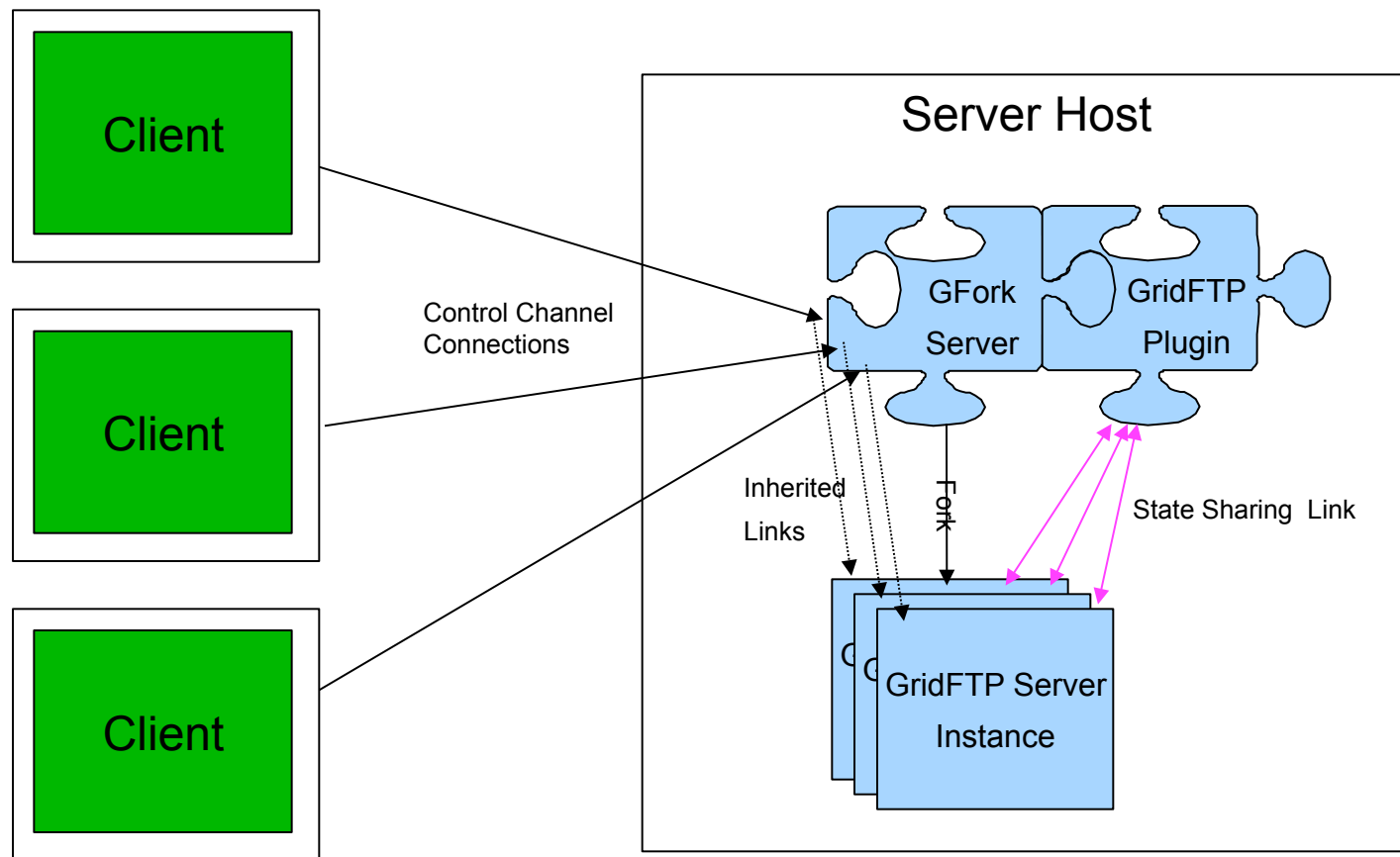
the globus alliance

www.globus.org

Resource management

- Fork/Exec is safer service model
 - ◆ sandboxes leaks/segfaults/security/etc
 - ◆ If 1 session dies service exists
- Transient state
 - ◆ We need permanent & shared state between sessions

GFork

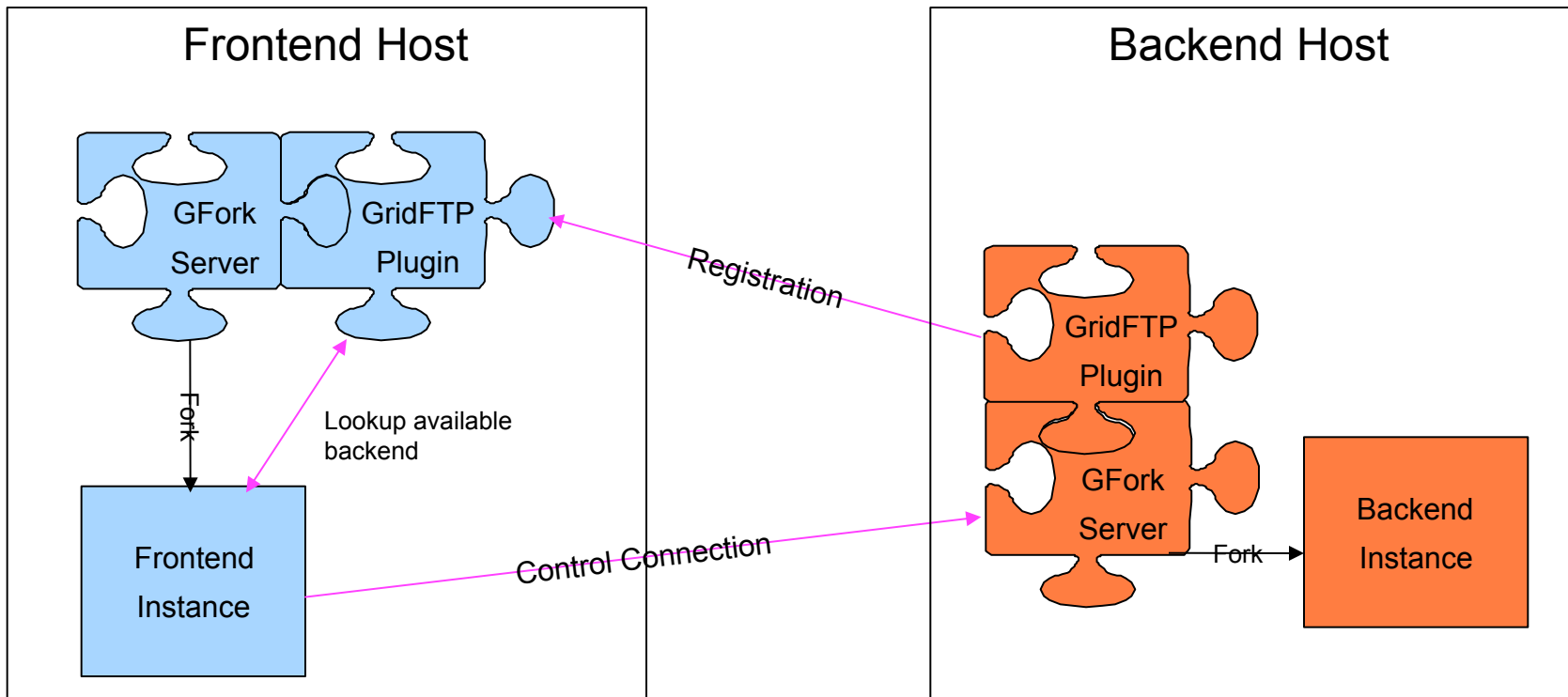




Dynamic Backends

- Dynamic list of available backends (DPIS)
- Frontend (SPI) listens for registration
 - ◆ Backends register (and timeout)
 - ◆ Select backend(s) to use for a transfer
- Backend failure is not system failure
- Resources can be provisioned to suit load

Dynamic Backends





Future directions

- Resource Properties
 - ◆ GridFTP server expose state via resource properties
 - Server load
 - Connection limits
 - ◆ Act as a WS-MDS provider
- Firewall traversal
 - ◆ Simultaneous open
 - ◆ Capability to make use of dynamic firewall port opening