



Reliable Data Movement using Globus GridFTP and RFT: New Developments in 2008

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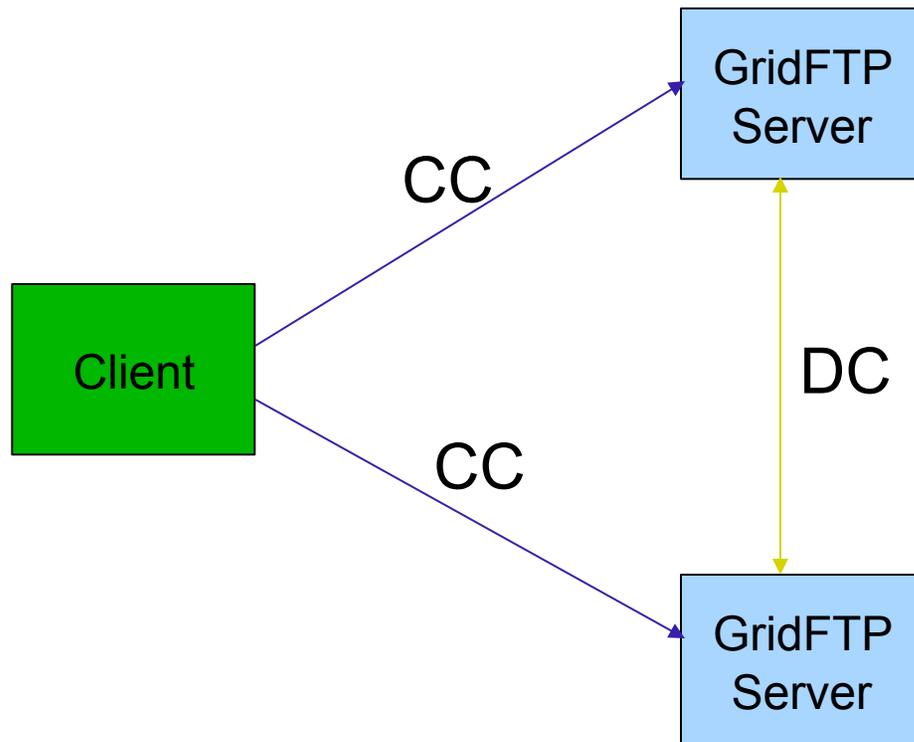
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GridFTP

- High-performance, reliable data transfer protocol optimized for high-bandwidth wide-area networks
- Based on FTP protocol - defines extensions for high-performance operation and security
- Standardized through Open Grid Forum (OGF)
- Globus implementation of GridFTP is widely used for bulk data movement
 - ◆ Average of more than 3 million transfers per day

GridFTP





Key features

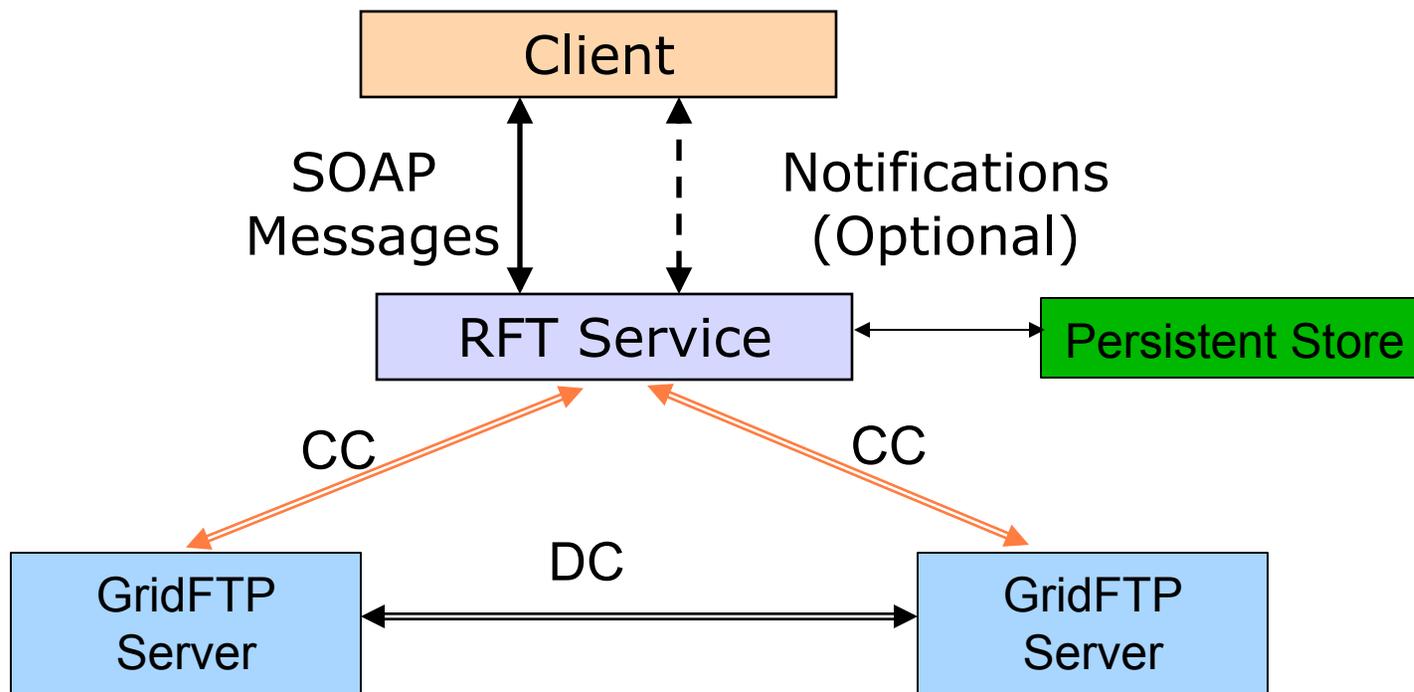
- Performance
- Security
 - ◆ GSI, SSH
 - ◆ Username/password and anonymous
- Cluster-to-cluster data movement/striping
- Support for reliable and restartable transfers
- Modular
 - ◆ Easy to plug-in alternate transport protocols
 - ◆ Storage systems too - HPSS, SRB



Globus Reliable File Transfer Service (RFT)

- GridFTP client that provides more reliability
- GridFTP - on demand transfer service
 - ◆ Not a queuing service
- RFT
 - ◆ Queues requests
 - ◆ Orchestrates transfers on client's behalf
 - ◆ Writes to persistent store
 - ◆ Recovers from GridFTP and RFT service failures

RFT

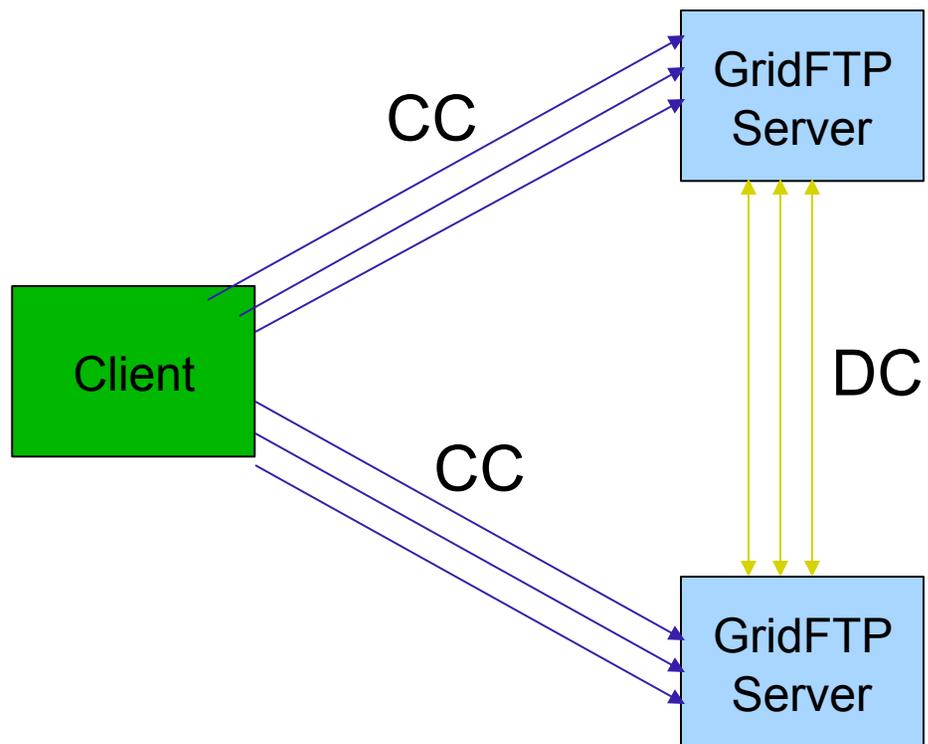




New features in GridFTP

- GridFTP information provider service
 - ◆ Max connections
 - ◆ Open connections
 - ◆ Load
- Higher level services can utilize this information for scheduling data transfers
 - ◆ Help with selecting the appropriate replica of data

Concurrency



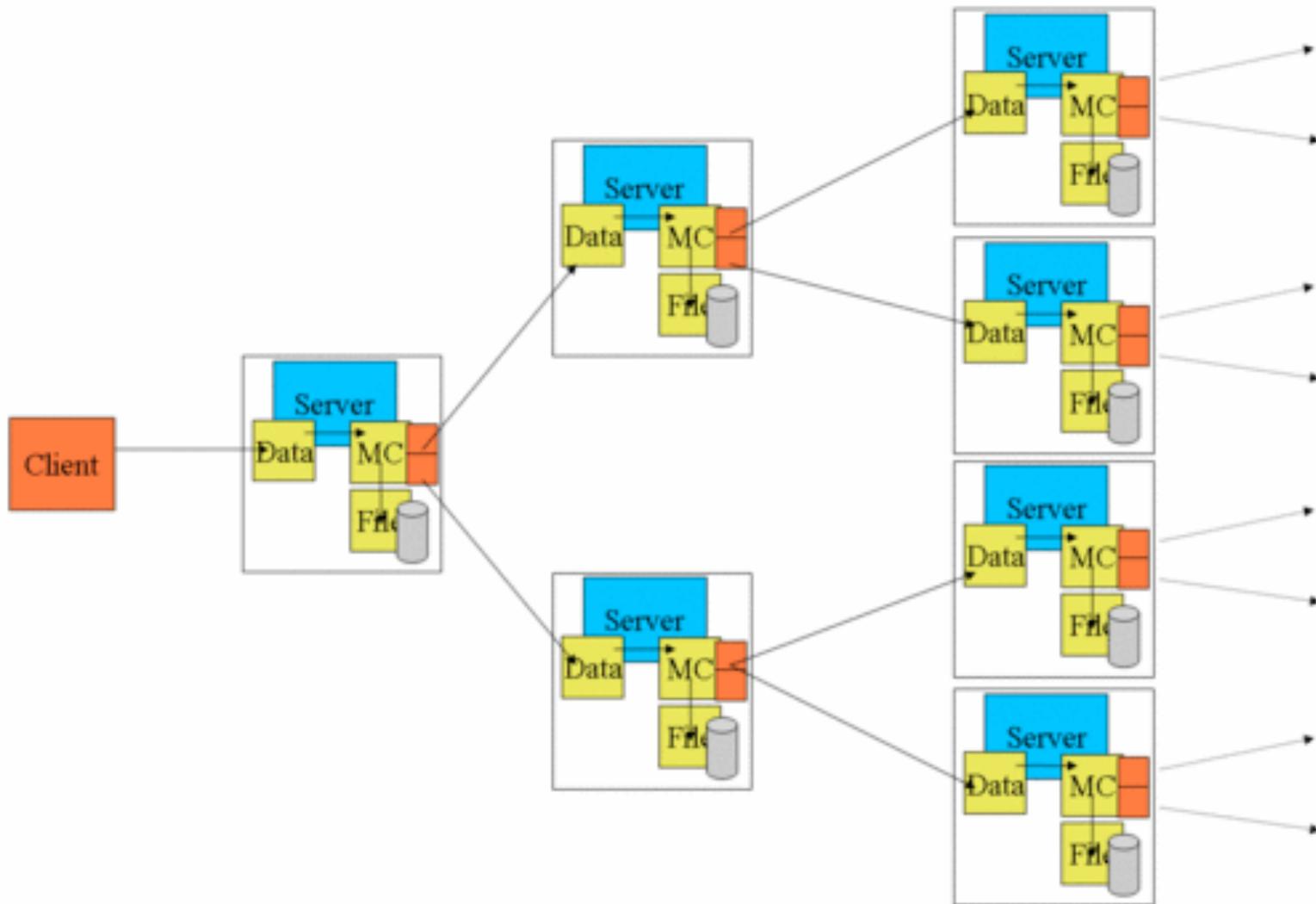


Concurrency

- Client submits concurrent transfer requests to the server
 - ◆ Significantly improves the performance of lots of small files transfers
 - ◆ APS used this feature to transfer 1 TB of data to Australia at 30x faster than SCP
 - ◆ LIGO used this feature to transfer 1.5 TB of data from Milwaukee to Germany at 80 MB/s



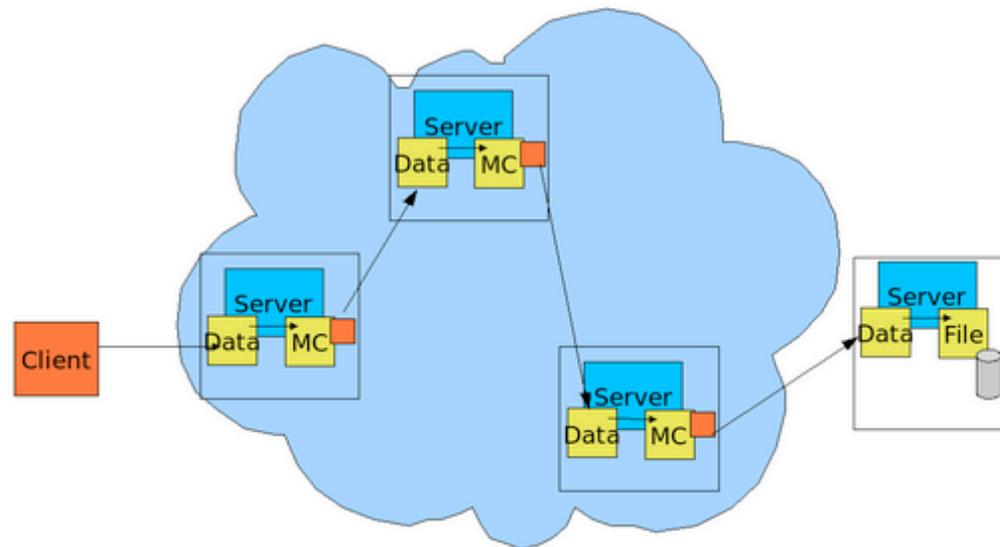
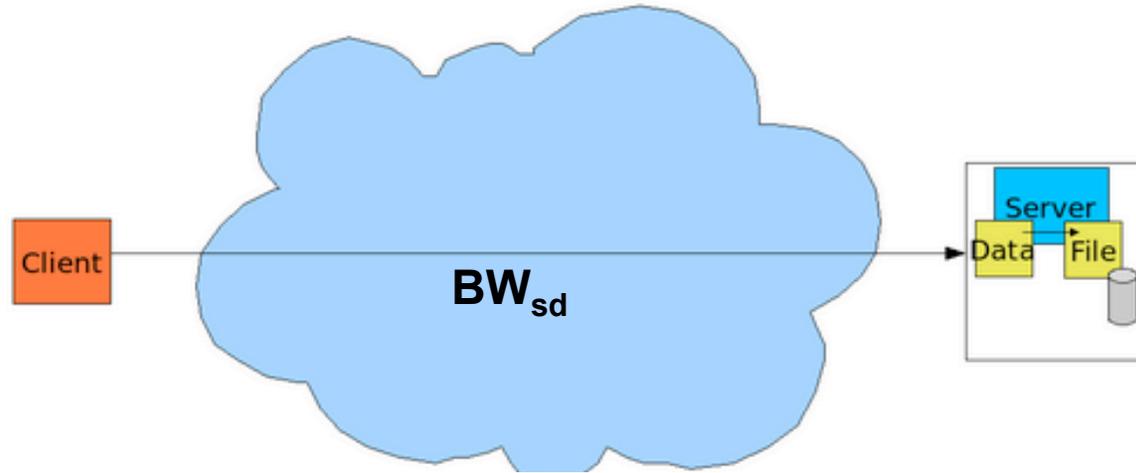
Multicasting





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GridFTP Overlay Network





Bottleneck detection

- Determine the bottleneck for the data transfer performance
- Network read, network write, disk read, disk write
- Netlogger is used to determine these values
- Netlogger is shipped with Globus, starting from 4.2
 - ◆ `./configure --enable-netlogger`
 - ◆ `make gridftp globus_xio_netlogger_driver`

Popen

- Popen XIO driver
 - ◆ allows users to open pipes to the standard IO of existing programs
 - ◆ leverage programs like you can with UNIX pipes
 - ◆ `globus-gridftp-server -p 5000 -fs-whitelist popen,file,ordering -aa`
 - ◆ `globus-url-copy -dst-fsstack popen:argv=#/usr/bin/zip#/home/bresnaha/text.txt.zip#-,ordering ftp://localhost:5000/home/bresnaha/text.txt ftp://localhost:5000/y`



New features in RFT

- Command line client in C
 - ◆ A new feature rich and fast command line client.
 - ◆ Globus-crft
- GT4.2 RFT has more robust retry mechanisms.
 - ◆ help prevent overheating in certain cluster configurations.



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Connection caching

- Instead of only caching connections across a users single transfer request they are now cached against all transfer requests.
- This has dramatic performance increases when a user performs multiple requests
- Eliminate authentication overhead on the control and data channels



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Connection caching

- Measured performance improvement for jobs submitted using Condor-G
- For 500 jobs - each job requiring file stageIn, stageOut and cleanup (RFT tasks)
 - ◆ 30% improvement in overall performance
 - ◆ No timeout due to overwhelming connection requests to GridFTP servers