



# Parallel Data Transfer Solutions for the Grid

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# Outline

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Parallel storage on clusters

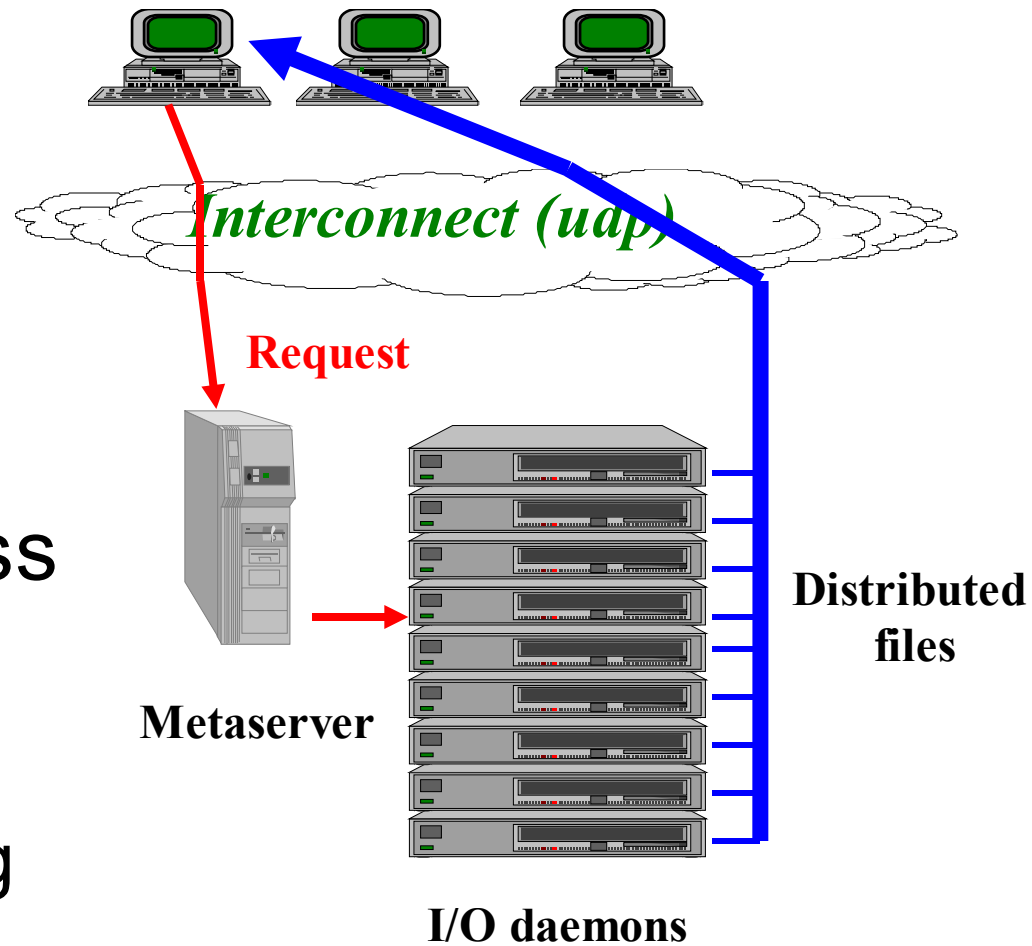
NFSp

Grid Data Transfer

Gxfer

# NFSp. Parallel NFS for clusters

- The cluster holds the file system
- Standard NFS client
- Parallel file access
- Adaptive placement
  - Striping / mirroring
- Fault tolerance
  - Duplication of IODs





# Current NFSp Status

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Works nice under Linux 2.4 (IA32)

Good performance measures

Full use of a commodity network

But...

NFS block size fixed to 8 KB

=> bottleneck at the metaserver level



# Gxfer: Grid Data Transfer

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Efficient site-to-site file transfer

Make full use of resources

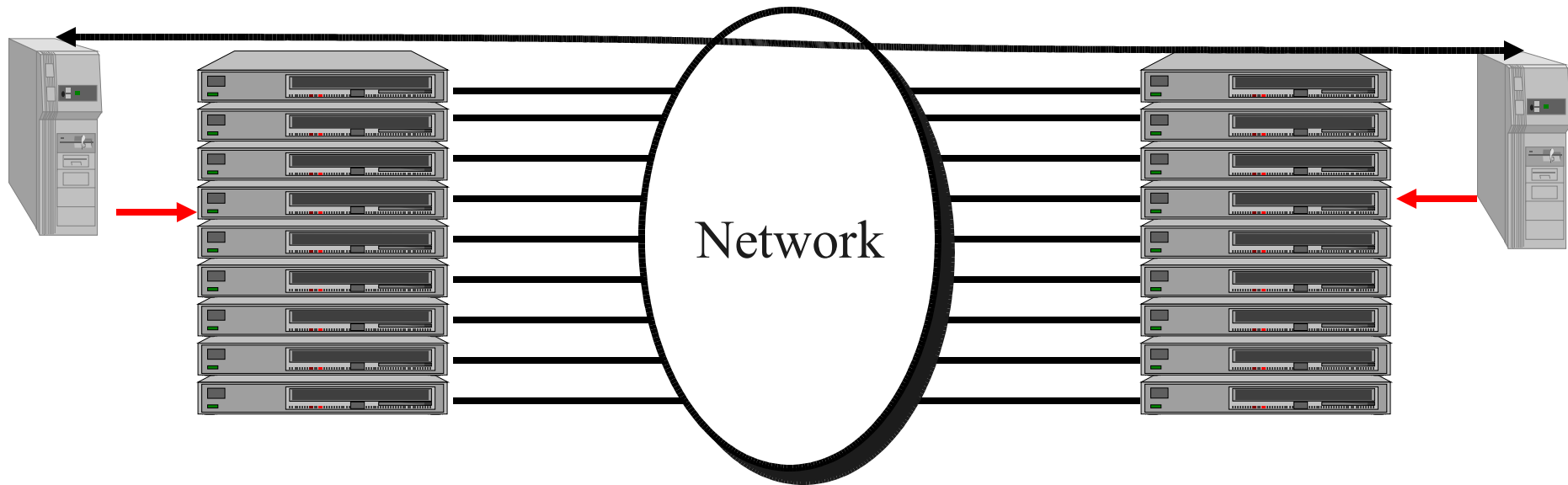
Network bandwidth

Storage bandwidth

Contribute protocol and implementation

# Gxfer operation overview

Initial negotiation



Phase 1: negotiation between the metasever and its IODs

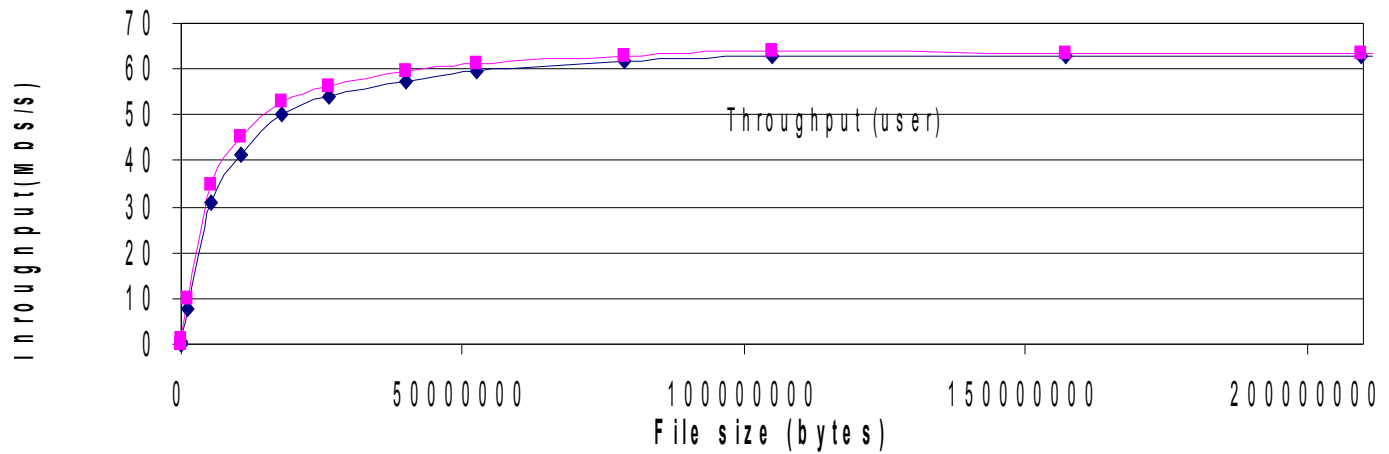
Phase 2: communication between each metasever and its IODs

Phase 3: actual data transfer between IODs

Phase 4: acknowledgements

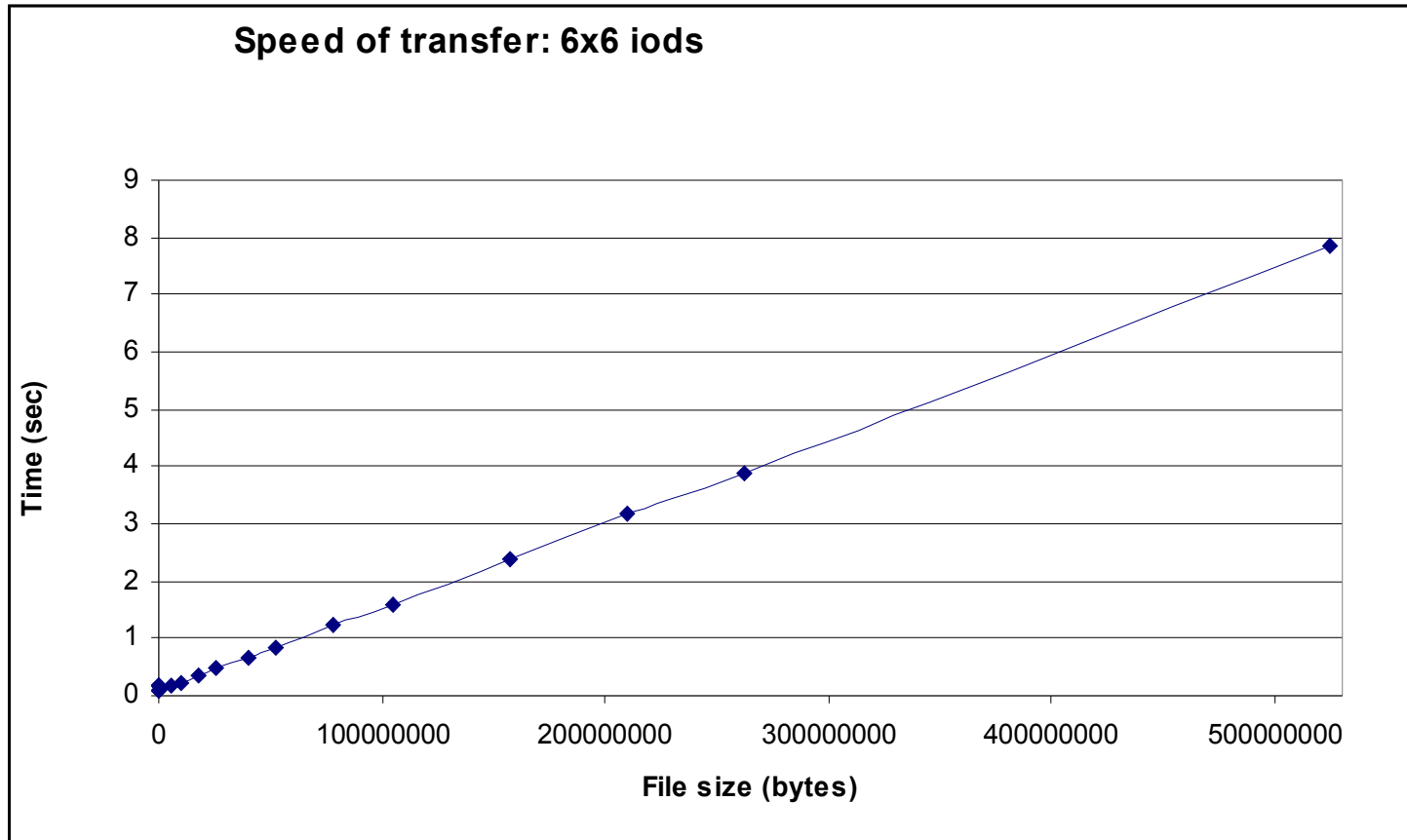
# Performance

Bandwidth : 6 x 6 iod (150 kilometers)  
(Theoretical max : 75 MB/s) icluster and urec (VTHD , 1 GB/s)



It scales well

# Performance (cont'd)





# Gxfer Status

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Grid Communication protocol defined

- Exchange metadata, storage description, commands

  - create and modify files

  - define where data of a file are stored (list {iod ref, file, offset})

- Any data point-to-point data transfer service can be used

Working library

- Several underlying protocols supported (ftp, babarftp, TCP)

Working and stable

- Deployed on the E\*toile testbed

  - ~300 PCs on 10 sites

Available for download soon

Port to Globus in progress

- GridFTP interaction