

WLCG Demonstrator

WLCG storage, Cloud Resources and volatile storage into
HTTP/WebDAV-based regional federations

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Basf2 with Davix support

The Belle II software for simulation and analysis (Baf2) is based on the standard ROOT I/O library

Since the release build-2016-03-04 distributed to each sites via CVMFS, basf2 supports natively http/webdav thanks to the introduction of the TDavixFile.h library.

```
...  
filelistSIG=['https://belle-dpm-01.na.infn.it/dpm/na.infn.it/home/belle/TMP/test.root']  
inputMdstList(filelistSIG)  
...
```

Dynafed Server for Belle II

STORGE DIRAC NAME	HOSTNAME	TYPE
DESY-DE	dcache-belle-webdav.desy.de	DCACHE
GRIDKA-SE	f01-075-140-e.gridka.de	DCACHE
NTU-SE	bgrid3.phys.ntu.edu.tw	DCACHE
SIGNET-SE	dcache.ijs.si	DCACHE
UVic-SE	charon01.westgrid.ca	DCACHE
Adelaide-SE	coepp-dpm-01.ersa.edu.au	DPM
CESNET-SE	dpm1.egee.cesnet.cz	DPM
CYFRONNET-SE	dpm.cyf-kr.edu.pl	DPM
Frascati-SE	atlasse.Inf.infn.it	DPM
HEPHY-SE	hephyse.oeaw.ac.at	DPM
Melbourne-SE	b2se.mel.coepp.org.au	DPM
Napoli-SE	belle-dpm-01.na.infn.it	DPM
CNAF-SE	ds-202-11-01.cr.cnaf.infn.it	STORM
McGill-SE	gridftp02.clumeq.mcgill.ca	STORM

Dynafed server in Napoli in place since January 2016

Testbed included 14 of the 23 SRM endpoints currently in production and registered in the DIRAC server.

3 different storages technologies represented **dCache**, **DPM**, **STORM**

In addition we included an **S3** Amazon Free storage





<https://dynafed01.na.infn.it/myfed/>

Federation Views

With Dynafed we can create multiple views by aggregating storage paths in different ways. 4 different views have been created:

- **myfed/PerSite/** Shows the file systems of each storage separately (without aggregation)
- **myfed/belle/** Aggregation of all the root directories of the different sites
- **myfed/DATA+TMP/** Temporary Aggregation for testing purpose
- **myfed/s3-federation/** Testing area for cloud storage

/myfed/

Mode	Links	UID	GID	Size	Modified	Name
drwxrwxrwx	0	0	0	0	Thu, 01 Jan 1970 00:00:00 GMT	 DATA+TMP
drwxrwxrwx	0	0	0	0	Thu, 01 Jan 1970 00:00:00 GMT	 PerSite
drwxrwxrwx	0	0	0	0	Thu, 01 Jan 1970 00:00:00 GMT	 belle
drwxrwxrwx	0	0	0	0	Thu, 01 Jan 1970 00:00:00 GMT	 s3-federation

Which view could be more useful/effective?

Data Federation with Dynafed: performance

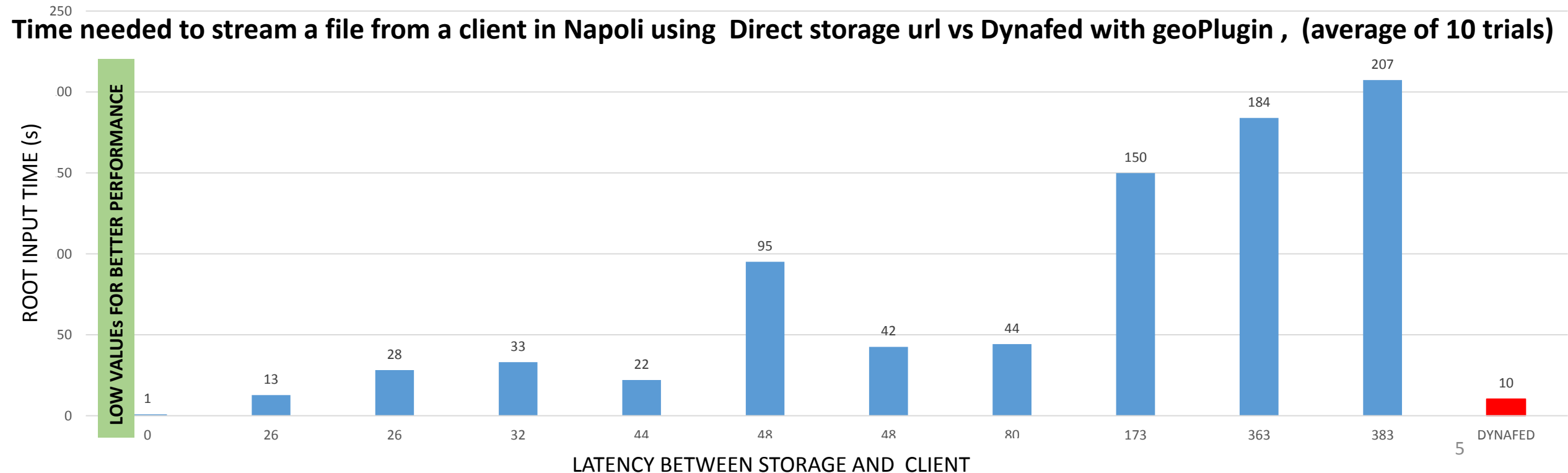
Thanks to the aggregation feature provided by Dynafed, we can access a specific file and its replicas with a single url:

http://dynafed01.na.infn.it/myfed/belle/TMP/belle/user/spardi/testhttp/mixed_e0001r0009_s00_BGx1.mdst.root

Comments

Dynafed thanks to the geoip-plugin is able to chose a convenient replica for the client

Time needed to stream a file from a client in Napoli using Direct storage url vs Dynafed with geoPlugin , (average of 10 trials)

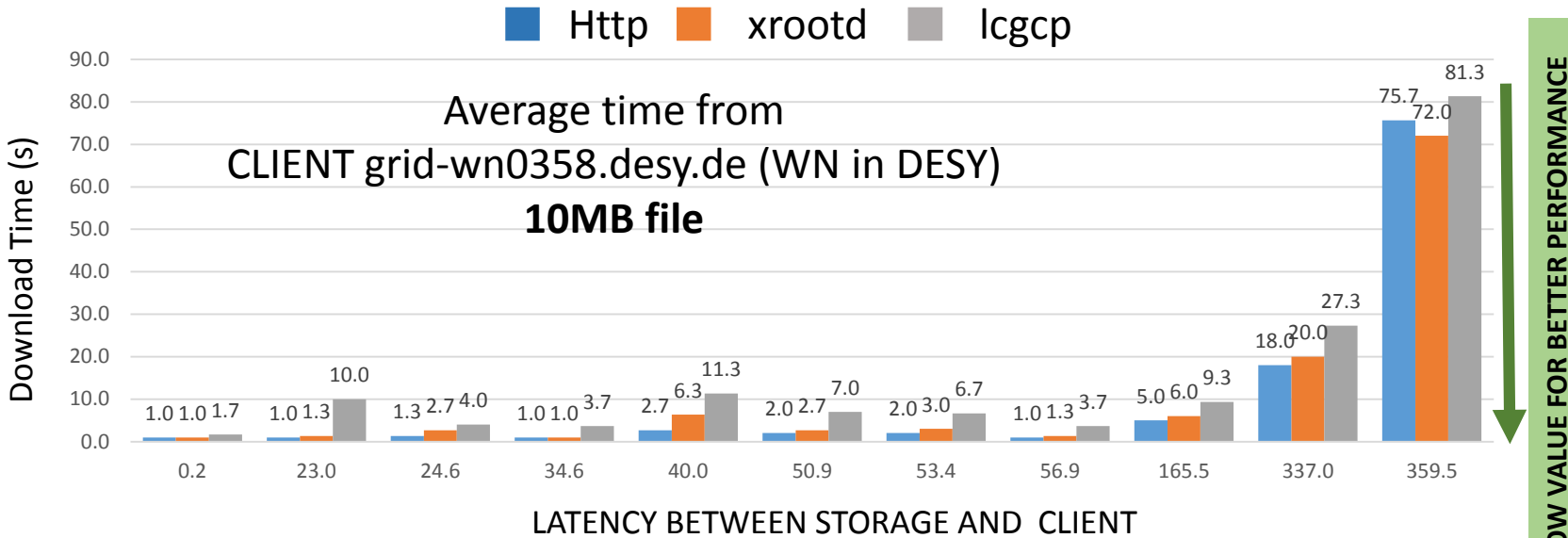


Further Investigations

- About Cloud and heterogeneous resources
 - Aggregate Cloud Storage areas provided via a Swift interface by sites running on OpenStack or similar
 - Investigate performance with cloud resources
- Other interesting topics
 - Http interface Monitoring using the WLCG Nagios probe
 - Implementation and integration of Cache systems

Backup - Test with Http

File Transfer protocols: Download



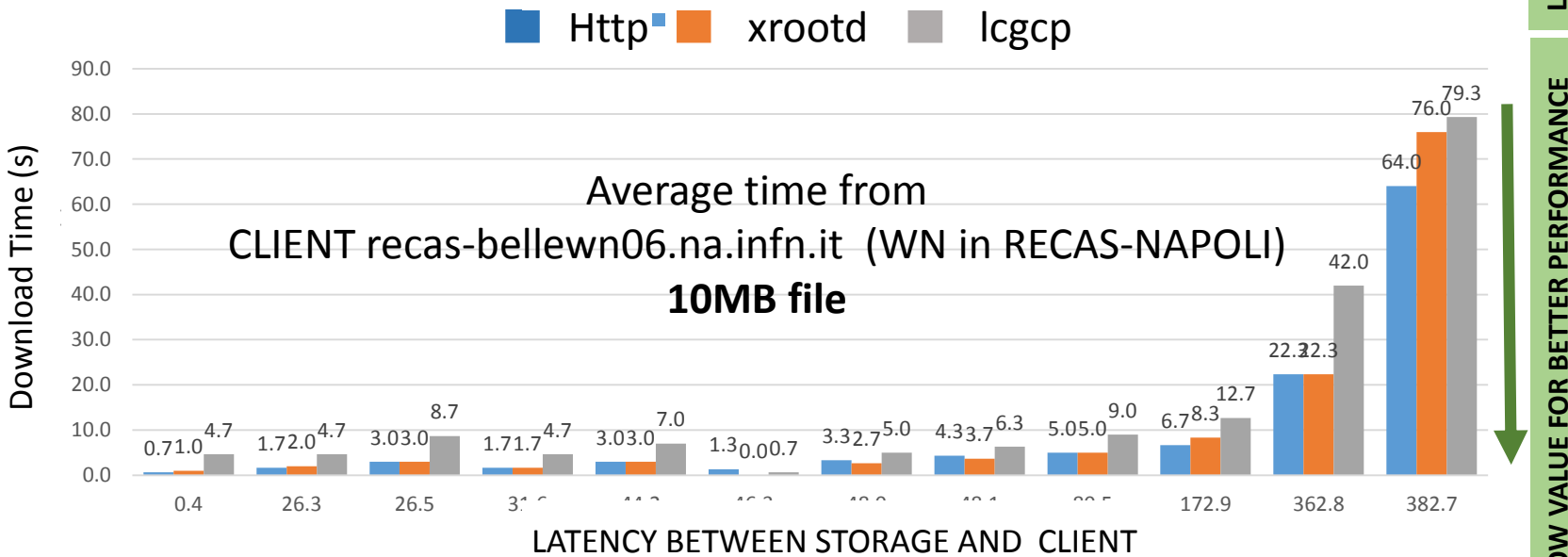
NB. We started with download to test transfers with different protocols under controlled circumstances

Description

File download performance in function of the latency from the two different Sites.

(Performance tuning with HTTP)

LOW VALUE FOR BETTER PERFORMANCE



Test Analysis

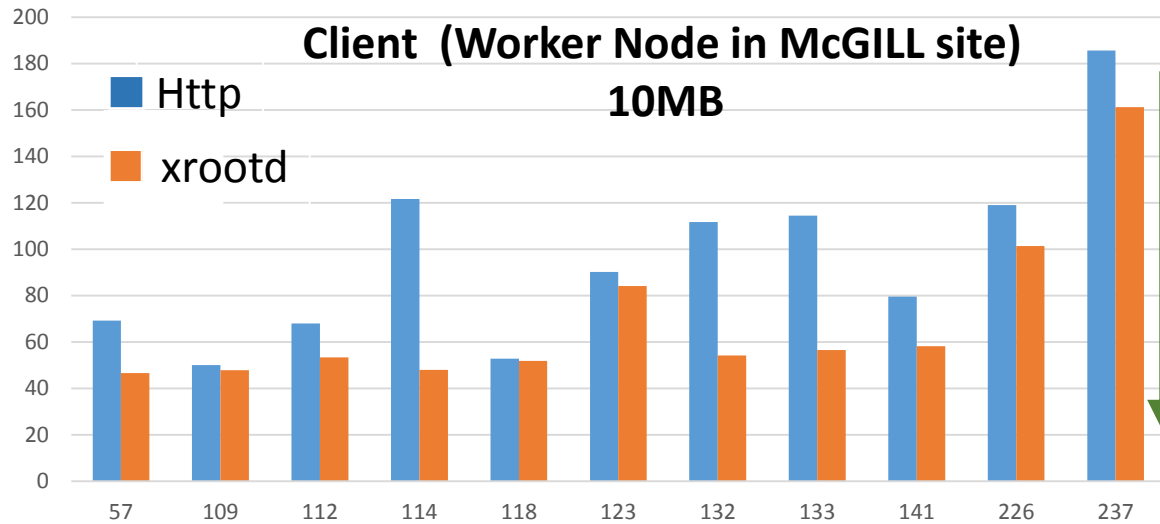
http, xrootd performs quite similar in the case of file download.

Graphs show the overhead added by the SRM interface using lcg-cp command with gridftp.

Need to test with FTS "transfers"

LOW VALUE FOR BETTER PERFORMANCE

File Read protocols: streaming with HTTP vs xrootd



LOW VALUE FOR BETTER PERFORMANCE

Description

File streaming performance, using a basf2 analysis job

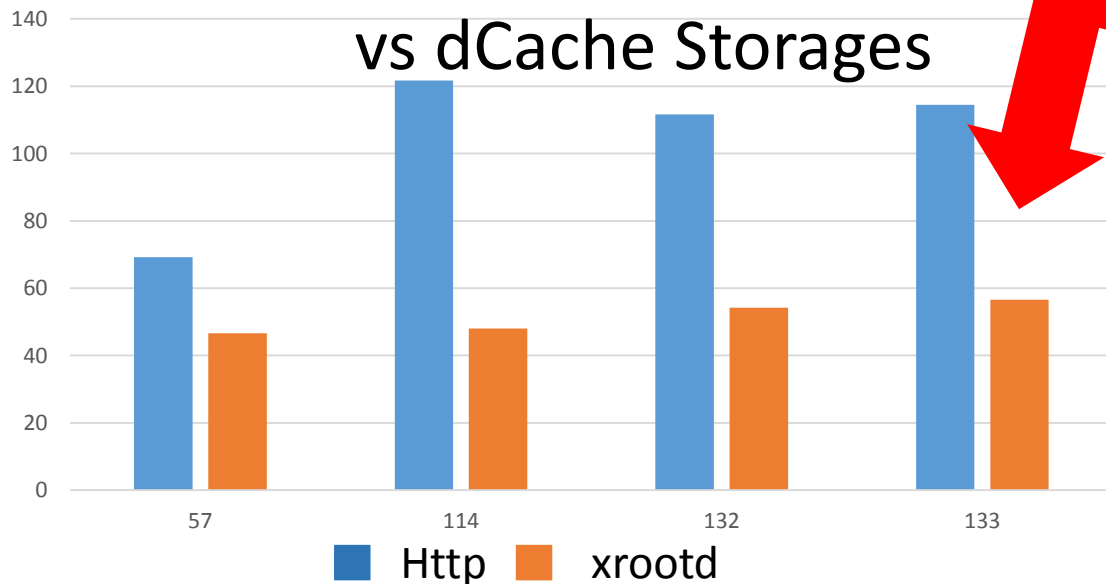
Comments

In case of dCache Storages, http, xrootd differ of about 50% in most cases.

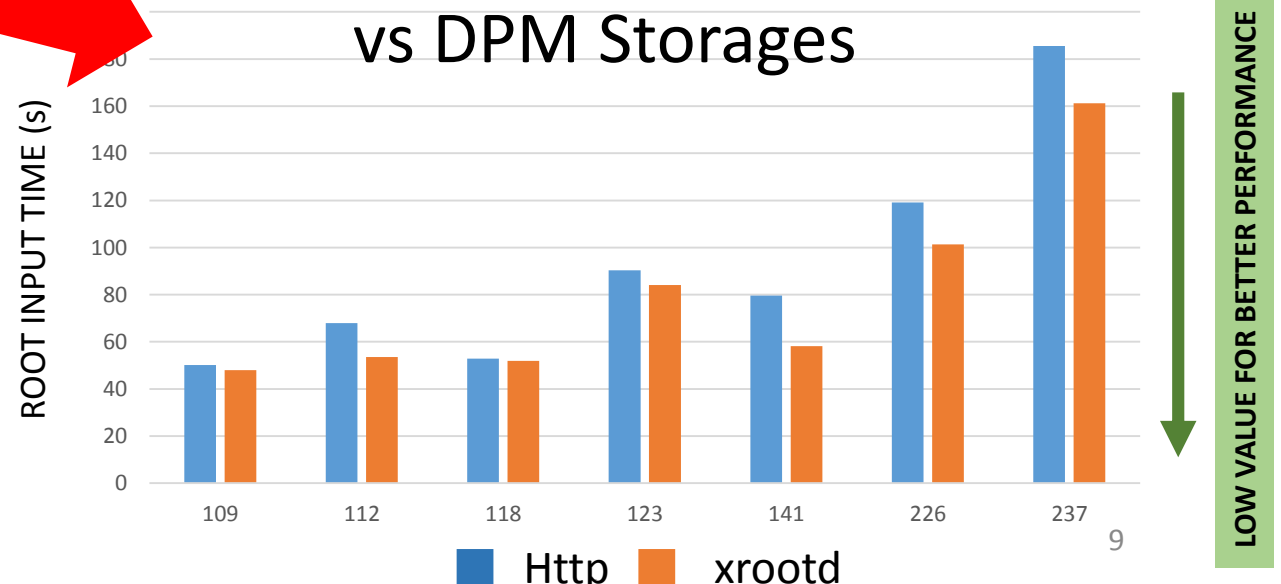
In case of DPM Storages the two protocols perform quite similarly in most cases.

LATENCY BETWEEN STORAGE AND CLIENT

vs dCache Storages



vs DPM Storages



LOW VALUE FOR BETTER PERFORMANCE

