

FTS3: quantitative monitoring

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Outline

- WLCG Data Movement
- Monitoring Architecture
- Functionality
- FTS3 Performance
- Conclusions



WLCG data movement model





FTS3

- Main features:
 - Transfer auto-tuning/adaptive optimisation
 - Modular protocol support
 - Smart transfer retry mechanism
 - Resource sharing
 - VO activity shares
- FTS3 officially started production for WLCG on August 1st, 2014
 - Atlas Rucio and CMS ASO were being commissioned during the same period



FTS3 monitoring architecture





Functionality

- FTS transfer monitoring
 - FTS Dashboard
 - Calculate transfer throughput and volume per VO/workflow, site, host and country
 - Correlation of number of transfers and volume transferred
 - SRM overhead measurement
 - VO/workflow shares monitoring
 - Aggregate and report on common errors
 - FTS service monitoring
 - Per link/endpoint file transfers
 - Service configuration
 - Service performance monitoring
- WLCG transfer monitoring
 - WLCG Transfer Dashboard: Aggregation of Xrootd/FTS transfers throughput/volume per VO, site, host and country



FTS activity-share commissioning

{"vo":"atlas","active":true,"share":[{"testactivity10":0.1},{"testactivity70":0.7},{"testactivity20":0.2}]}



Workflows =
$$\{A_{1,} A_{2,} A_{3,} ..., A_{n}\}$$

if $A_{jActive} < A_{jQueued} \& A_{iActive} < A_{iqueued}$
then $A_{jActive} \approx A_{iActive} \times A_{jShares} / A_{iShares}$



FTS optimiser commissioning

20*1000 files, 1 GB files



✓ FTS3 Optimiser can increase throughput



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FT3: Quantitative Monitoring, CHEP2015

Algorithm improvement measurement during production

~ 20 M files, ~ 6 PB data, ~ 3 GB avg size



✓ For files > 2GB, the throughput has been increased by ~ 33%



Transfer auto-tuning optimisation

ATLAS data taking exercise: transfer from EOS to CASTOR



 The load on the storage has been adjusted automatically by FTS to maximise the throughput and efficiency

FTS performance for WLCG during the first phase of production

2^{OP}

25P

Ihch

0P

5P

15P

10P

зо́ь

35P

Troubleshooting transfer issues CMS CSA14 challenge

Grouping transfer failures by destination

Troubleshooting transfer issues CMS CSA14 challenge

TRANSFER MATRIX (2014-08-01 00:	00 to 2014-0	8-07 00:00 UTC LOCK	(ED)					MAX CELL	S V P P	0 - ¢
- Summary	Matrix	Transfers Plots	Correlated Plo	Ranking Plots	Latency plots	Details	FTS 3 Jobs	MAP Experimental		
From:2014-08-01 00:00 UTC To: 2014-08-07 00:00 UTC VOs cms									Displaying 0 of 0 sources and 0 o	0 destinations
Activities	100 %	-	Ļ							
Servers lcgfts3.gridpp.rl.ac.uk Sources Countries: Sites: Host: Tokens: Grouping: HOST	ERROR SAMPLES: *> *									
Destinations	Code Sample 748									Total /48173
Host: srm01.ifca.es	#INVAL	ID_ARGUMENT		DESTINATION SRM_PUT_TURL error on the turl request : [SE][StatusOfPutRequest][SRM_FAILURE] No free space on Storage Area						e 48100
► VOs	#COMM	UNICATION_ERRO	DR_ON_SEND	TRANSFER globus_xio: Unable to connect to hibat0087.cmsaf.mit.edu:2811 globus_xio: System error in co nnect: Connection timed out globus_xio: A system call failed: Connection timed out						63
Activities	#FILE_I	EXISTS		DESTINATION MAKE_PARENT srm-ifce err: File exists, err: [SE][Mkdir][SRM_DUPLICATION_ERROR] ht //srm01.ifca.es:8444/srm/managerv2: Directory specified exists!						10

Classifying the errors

Summary and conclusions

- FTS3 started production in August 1st 2014 and has shown good performance
- FTS3 monitoring has been crucial for the service commissioning and during production
- Next:
 - Evolve FTS3 monitoring to correlate network and FTS measurements for easier troubleshooting
 - Explore historical monitoring data to improve service efficiency

