

ATLAS computing model evolution

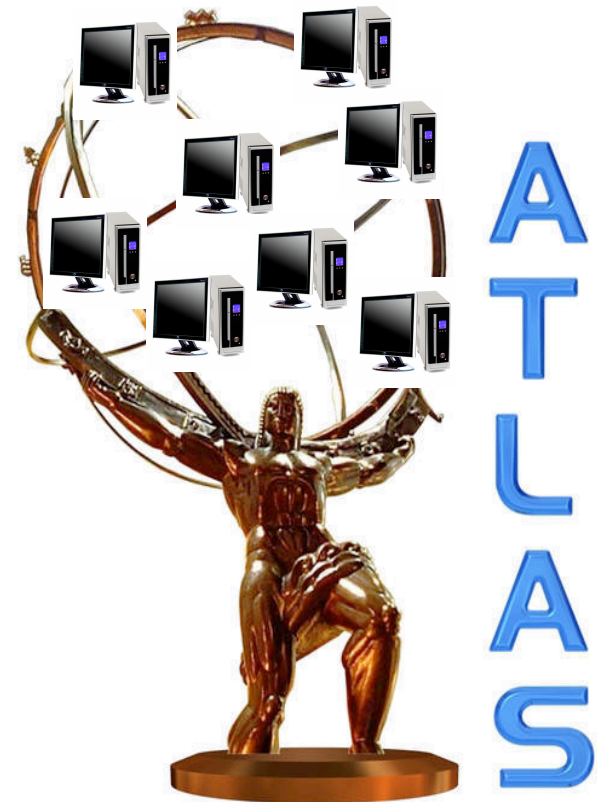
From 2D to 3D : "T2D"

Réunion des sites LCG-France, Strasbourg

30th of May 2011

ATLAS computing model evolution

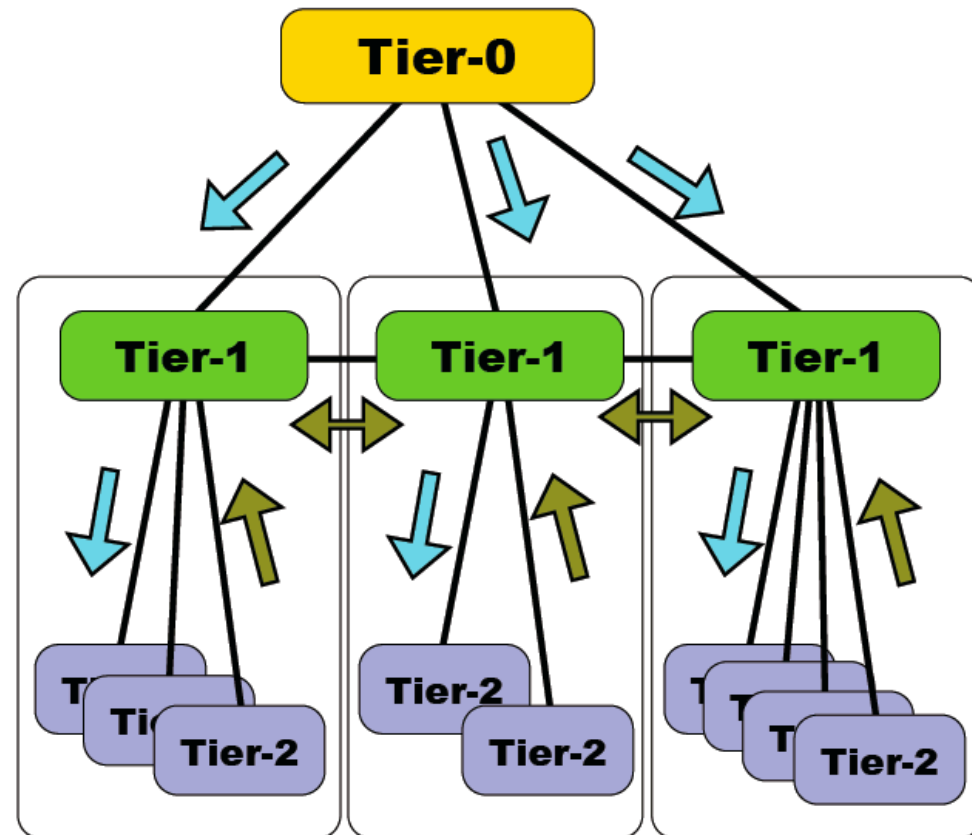
- New needs, new possibilities
- Adding a third dimension
 - T2D
 - LHCONE



Computing model before 2011

- Hierarchical model : clouds are \sim independent

- T0 has predefined channels with T1s
- T1s have predefined channels with others T1
- T1s communicate with the T2s of their clouds
- T2s communicate only via the T1 of their cloud



- Pre-placement of data

First experience with LHC data

Pre-placement of data did not correspond to user needs

AOD and dESD were pre-placed in the sites but

- ESDs for data performance study were more used than AODs
- ESDs were more used than derived ESD which were not enough tuned

Usage of data types were different than expectation, most of datasets were not used

⇒ New tool to measure dataset popularity

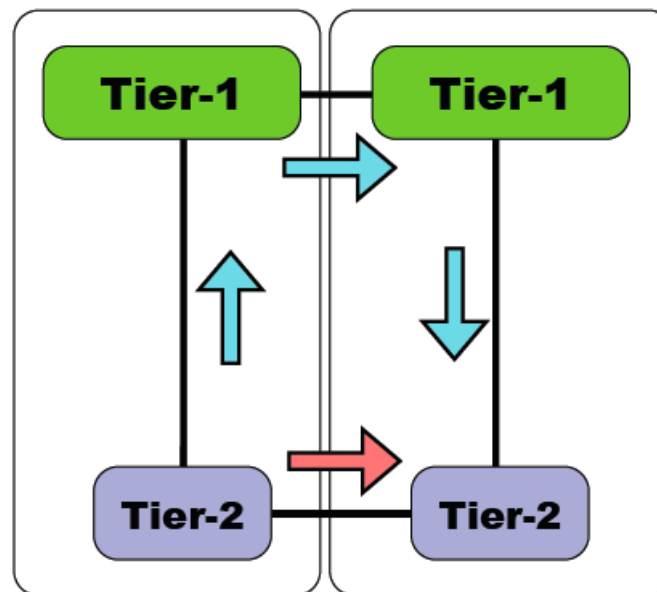
⇒ Change of distribution policies

- Dynamic data placement : PD2P
 - Subscribe data based on demand from jobs
 - Run jobs where data is now
 - Re-broker jobs when new replicas arrive
- ⇒ PD2P in place since this autumn and is working well

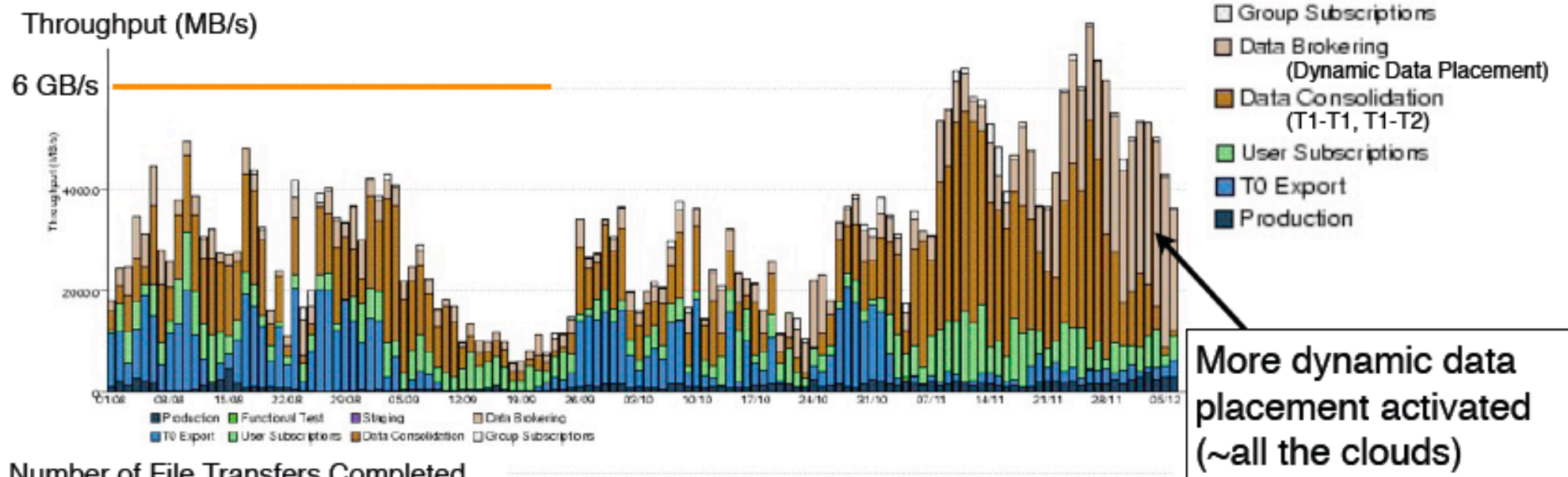
More data moving around ...

and needs of T2-T2 transfers

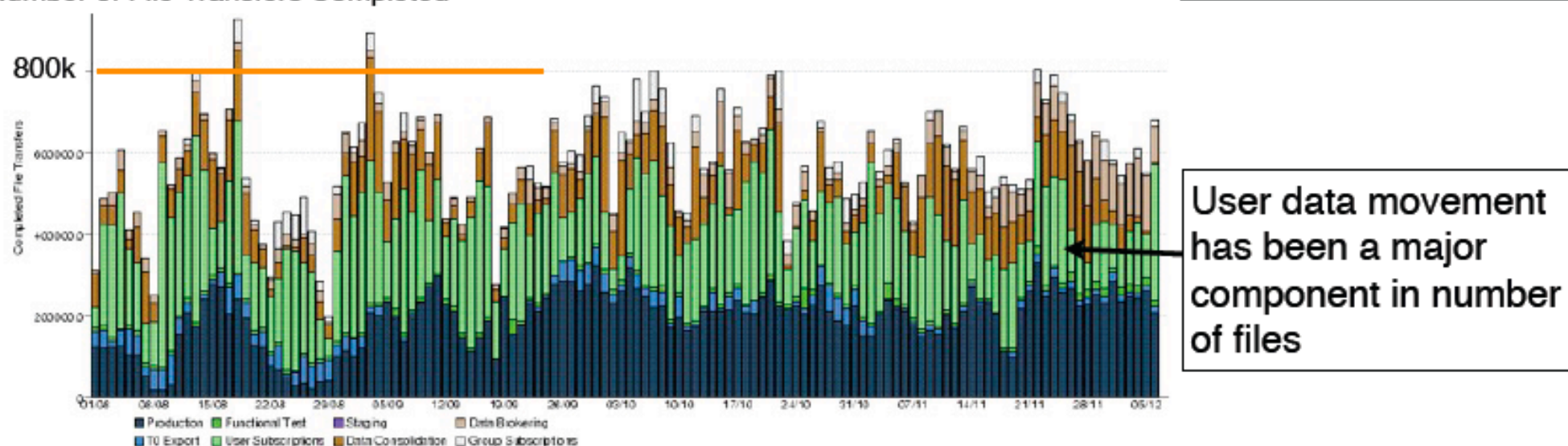
- Output of user analysis on a T2 should be stored at an other T2 often belonging to an other cloud
- Going through 2 T1s implies more steps and buffers in T1s
- Better to go directly to the other T2
- On demand replication system in place for user (DATRI)



Dynamic Data Placement



Number of File Transfers Completed



Adding a third dimension

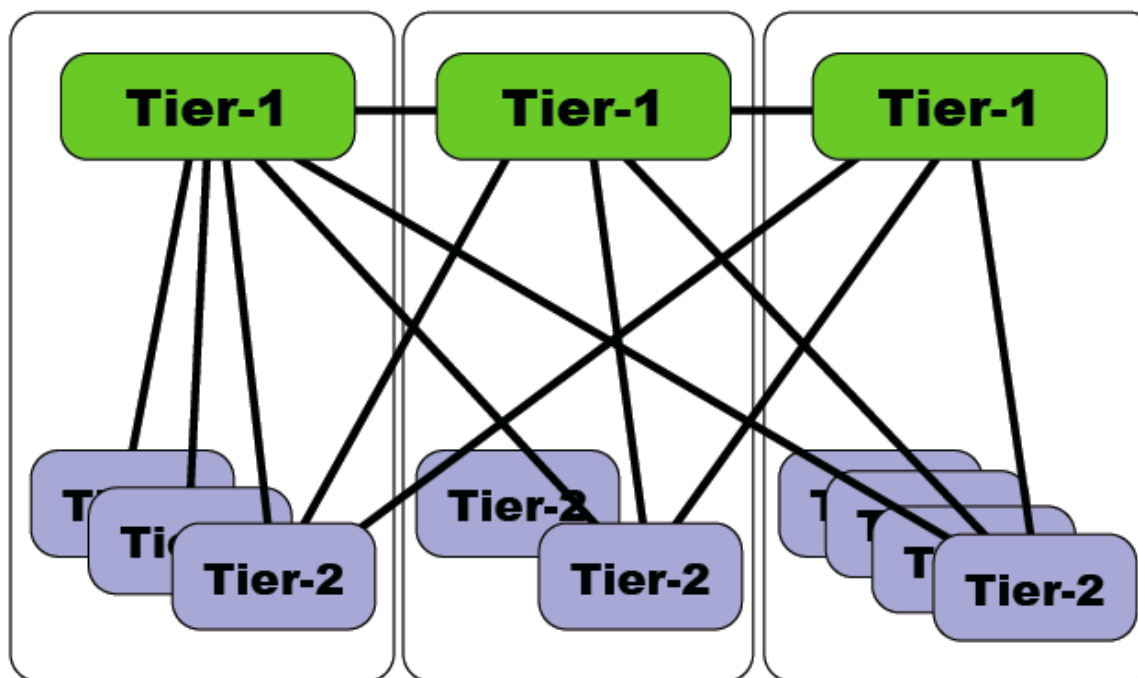
- Break down clouds
 - For data distribution through PD2P between clouds
 - For T2-T2 transfers for analysis data
 - To allow T2s to run MC production for several T1s

⇒ Hierarchical model for data distribution abandoned

- New independent T2 network in preparation : LHCONE
 - For T2-T1, T2-T2 traffic
- ATLAS decided to set new communication channels for T2 without waiting for LHCONE ⇒ T2Ds

What is a T2D ?

- T2Ds are T2s directly (DDM) connected to T1s of different clouds
- ⇒ T2Ds can contribute to production in other clouds
- ⇒ ATLAS would like all the T2 to become T2D



Status of T2Ds

Today : 22 T2s approved as T2D

- From 3 to 5 sites by cloud

Currently approved French T2Ds :

- GRIF-LPNHE
- GRIF-LAL
- Tokyo-LCG2

Next candidates for French Cloud

- Beijing
- LPC

Sites are tested for file transfers (as a function of size) every week
and T2Ds list is updated every 3 months

Sonar view

Here search on IN2P3-LPC

Index **Expanded Table** Gridmap Alternative views Admin ATLAS SSB Instructions Ask the ATLAS SSB people!

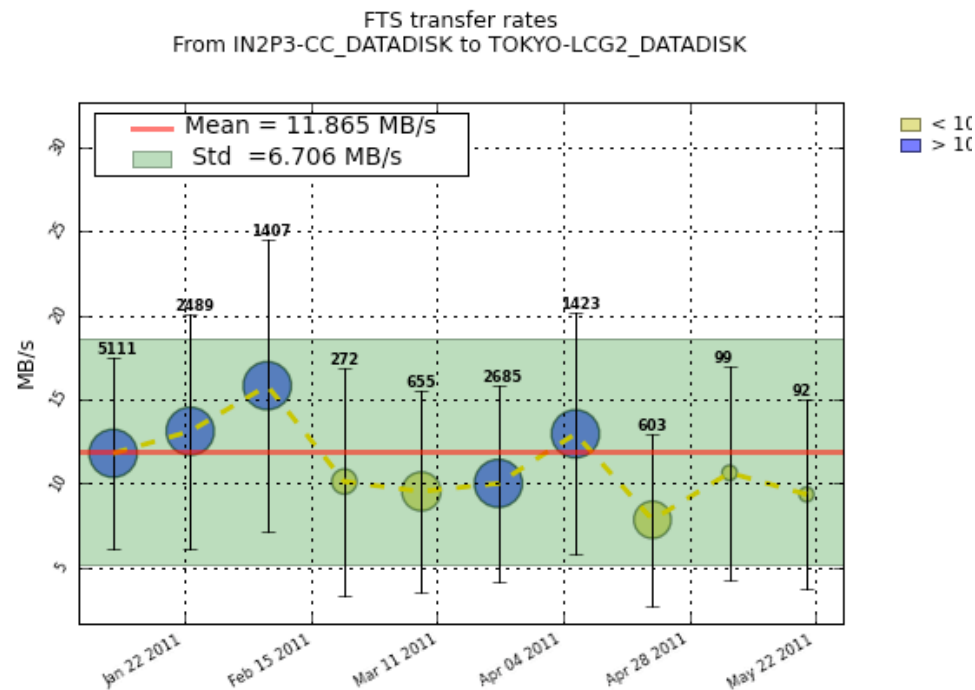
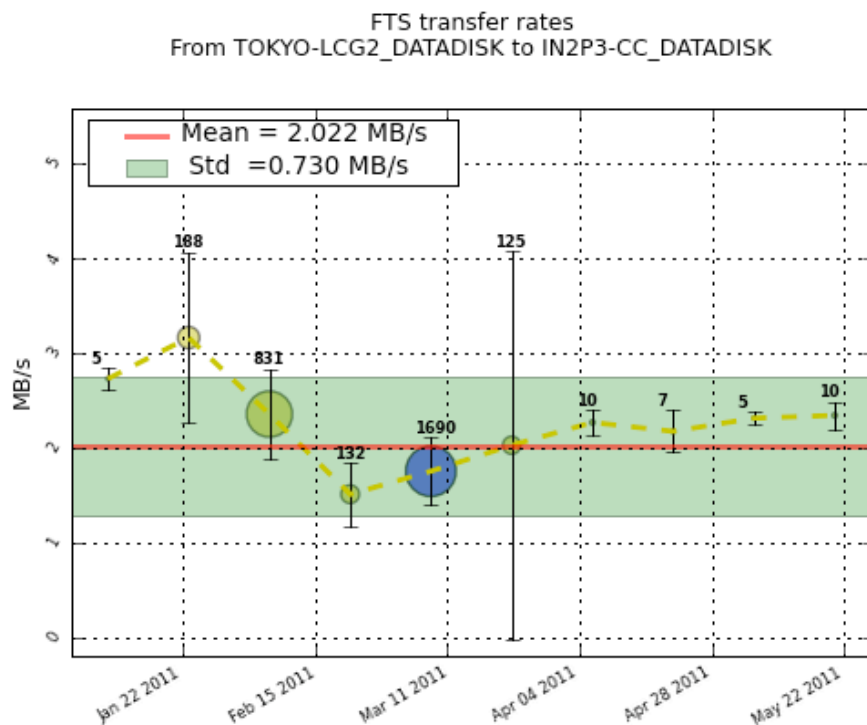
Show 200 entries Copy Print Save view: Sonar Search...

Site Name	SrcSite	SrcCloud	SrcTier	DstSite	DstCloud	DstTier	AvgBRS(MB/s)	EvS	AvgBRM(MB/s)	EvM	AvgBRL(MB/s)	EvL	Prio
AGLT2 to IN2P3-LPC	AGLT2	US	T2D	IN2P3-LPC	FR	T2D	0.57+/-0.03	10	3.32+/-1.07	10	13.09+/-6.29	10	5
AUSTRALIA-ATLAS to IN2P3-LPC	AUSTRALIA-ATLAS	CA	T2	IN2P3-LPC	FR	T2D	0.39+/-0.01	10	2.51+/-0.81	10	0.00+/-0.00	0	2
BEIJING-LCG2 to IN2P3-LPC	BEIJING-LCG2	FR	T2D	IN2P3-LPC	FR	T2D	0.41+/-0.11	11	1.26+/-0.49	53	1.33+/-0.11	5	6
BNL-OSG2 to IN2P3-LPC	BNL-OSG2	US	T1	IN2P3-LPC	FR	T2D	0.43+/-0.20	10	4.98+/-0.51	10	16.91+/-3.84	10	7
CA-ALBERTA-WESTGRID-T2 to IN2P3-LPC	CA-ALBERTA-WESTGRID-T2	CA	T2	IN2P3-LPC	FR	T2D	0.48+/-0.03	10	3.28+/-0.39	10	0.00+/-0.00	0	2
CA-SCINET-T2 to IN2P3-LPC	CA-SCINET-T2	CA	T2D	IN2P3-LPC	FR	T2D	0.55+/-0.10	10	3.34+/-1.74	10	2.96+/-2.24	10	5
CA-VICTORIA-WESTGRID-T2 to IN2P3-LPC	CA-VICTORIA-WESTGRID-T2	CA	T2D	IN2P3-LPC	FR	T2D	0.55+/-0.09	10	4.41+/-1.23	10	15.42+/-3.36	10	5
CERN-PROD to IN2P3-LPC	CERN-PROD	CERN	T0	IN2P3-LPC	FR	T2D	0.77+/-0.17	10	10.17+/-2.82	119	37.93+/-10.84	289	7
CSCS-LCG2 to IN2P3-LPC	CSCS-LCG2	DE	T2	IN2P3-LPC	FR	T2D	0.89+/-0.06	10	5.87+/-1.46	5	0.00+/-0.00	0	2
CSTCDIE to IN2P3-LPC	CSTCDIE	NL	T3	IN2P3-LPC	FR	T2D	0.83+/-0.08	10	6.85+/-0.10	5	0.00+/-0.00	0	0
CYFRONET-LCG2 to IN2P3-LPC	CYFRONET-LCG2	DE	T2	IN2P3-LPC	FR	T2D	0.66+/-0.09	10	2.19+/-0.17	5	0.00+/-0.00	0	2
DESY-HH to IN2P3-LPC	DESY-HH	DE	T2D	IN2P3-LPC	FR	T2D	0.88+/-0.04	10	7.65+/-1.26	5	23.78+/-7.48	10	5
DESY-ZN to IN2P3-LPC	DESY-ZN	DE	T2D	IN2P3-LPC	FR	T2D	0.45+/-0.13	10	4.17+/-1.13	5	33.97+/-7.49	10	5
FZK-LCG2 to IN2P3-LPC	FZK-LCG2	DE	T1	IN2P3-LPC	FR	T2D	0.67+/-0.20	10	2.82+/-1.56	5	7.63+/-5.64	10	7
GOEGRID to IN2P3-LPC	GOEGRID	DE	T2	IN2P3-LPC	FR	T2D	0.68+/-0.04	10	4.39+/-1.65	5	0.00+/-0.00	0	2
GRIF-IRFU to IN2P3-LPC	GRIF-IRFU	FR	T2	IN2P3-LPC	FR	T2D	0.69+/-0.06	15	4.30+/-0.41	5	0.00+/-0.00	0	6
GRIF-LAL to IN2P3-LPC	GRIF-LAL	FR	T2D	IN2P3-LPC	FR	T2D	1.44+/-1.24	17	7.30+/-2.92	1705	45.37+/-24.95	18	6
GRIF-LPHE to IN2P3-LPC	GRIF-LPHE	FR	T2D	IN2P3-LPC	FR	T2D	0.95+/-0.10	12	5.87+/-3.06	240	50.35+/-31.68	74	6

Some asymmetries observed

For large files (> 1 GB)

- LYON → TOKYO
12 MB/s



- TOKYO → LYON
2 MB/s

➞ Network issue ?

For the near future

ATLAS-France would like that

- ALL French T2s be connected to LHCONE
- As well as the other T2s of the French Cloud

Conclusion

New computing model for ATLAS

- Files transfers in 3D now, cloud boundaries tend to disappear
- Dynamic placement of data (PD2P)
- T2-T2 transfers for analysis files

New needs for connectivity

- Waiting for LHCONE development for T2-T2 connectivity
- Settling of T2Ds : T2s with connections to all T1s
- All T2 have to become T2D
- Some asymmetries in transfers : network issue ?

⇒ All French T2s have to be connected to LHCONE as well as other T2 of the French Cloud

T2Ds List

- IT INFN-MILANO-ATLASC_DATADISK
- IT INFN-ROMA1_DATADISK
- IT INFN-NAPOLI-ATLAS_DATADISK
- UK UKI-LT2-QMUL_DATADISK
- UK UKI-NORTHGRID-LANCS-HEP_DATADISK
- UK UKI-NORTHGRID-MAN-HEP_DATADISK
- UK UKI-SCOTGRID-GLASGOW_DATADISK
- FR GRIF-LAL_DATADISK
- FR GRIF-LPNHE_DATADISK
- FR TOKYO-LCG2_DATADISK
- DE DESY-HH_DATADISK
- DE DESY-ZN_DATADISK
- DE LRZ-LMU_DATADISK
- DE MPPMU_DATADISK
- ES IFIC-LCG2_DATADISK
- ES IFAE_DATADISK
- ES UAM-LCG2_DATADISK
- US NET2_DATADISK
- US SWT2_CPB_DATADISK
- US MWT2_DATADISK
- US SLACXRD_DATADISK
- US AGLT2_DATADISK

FTS channels ATLAST2D-IN2P3

<https://cctools2.in2p3.fr/stockage/fts/monitoring/ftschannel.php?channel=ATLAST2D-IN2P3&vo=atlas#config>

[Home] FTS Monitor v1.5.4b5 - last updated: 27/05/2011 12:43:04 (updated every 600 s)

Filter by channel: for VO

Jobs **Transfers stats** **Errors stats** **Configuration**

Parameters

Between **[ATLAS-T2D]** and **IN2P3-CC**
group [ATLAS-T2D] members:

- AGLT2
- BU_ATLAS_Tier2
- DESY-HH
- DESY-ZN
- GRIF-LAL
- GRIF-LPNHE
- IFAE
- IFIC-LCG2
- INFN-MILANO-ATLASC
- INFN-NAPOLI-ATLAS
- INFN-ROMA1
- LRZ-LMU
- MPPMU
- MWT2_UC
- SWT2_CPB
- TOKYO-LCG2
- UAM-LCG2
- UKI-LT2-QMUL
- UKI-NORTHGRID-LANCS-HEP
- UKI-NORTHGRID-MAN-HEP
- UKISCOTGRID-GLASGOW
- WT2

Sonar tests

Frequency

- Triggered on Monday
- Stopped and cleaned on Thursday
- Check the Sonar results on Friday

Tests consists of 15 FTS transfers

- 5 small files: 20 MB each (def = 0-100MB)
- 5 medium files: 200 MB each (def = 100MB-1GB)
- 5 large files: 2 GB each (def = 1GB- ∞)

Criteria

Average Byterate

SMALL	<0.05MB/s	<0.1MB/s	≥ 0.1 MB/s
MEDIUM	<1MB/s	<2MB/s	≥ 2 MB/s
LARGE	<10MB/s	<15MB/s	≥ 15 MB/s

Number of files transferred

SMALL	≤ 3	4	≥ 5
MEDIUM	≤ 2	3	≥ 4
LARGE	≤ 1	2	≥ 3

Tests results

<http://dashb-atlas-ssb.cern.ch/dashboard/request.py/siteview?view=Sonar>

How to become a T2D ?

Prerequisites for sites

- T2D should demonstrate good connectivity from/to every T2 and provide a certain level of commitment

Requirements for clouds (T1)

- Dedicated FTS channel to be defined @ Lyon between T2Ds and T1
- list of ATLAST2D at Lyon :

<https://cctools2.in2p3.fr/stockage/fts/monitoring/ftschannel.php?channel=ATLAST2D-IN2P3&vo=atlas#config>

⇒ Sites are tested regularly for small and medium files transfers and for large files if they have been identified as candidate for T2D = "Sonar tests"

– Sonar tests results here :

<http://dashb-atlas-ssb.cern.ch/dashboard/request.py/siteview?view=Sonar>

!!! Obsolete link : http://bourricot.cern.ch/dq2/ftsmon/sonar_view/cached/

FTS channels defined at T1s

Each FTS service provider (T1s and T0) should

- Create a "cloud" T1S containing all the T1s+CERN
- Create a "cloud" T2DS containing all the T2s in the list below

For a given T1 (call it myT1)

- create the channel T2DS->myT1
- for each T2D (call them myT2D_1, myT2D_n) served by that FTS, create the channel T1S->myT2D_1, T1S-myT2D_n
- In terms of number of transfer slots for the channel, consider T2DS and T1S virtual sites as any other T1, so between 10 and 20 slots

