

# **Operation of the Portuguese Tier2** (Storage Element component)

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### **Historical overview**







## **Past solutions**

dCache@Lisbon:

#### SE choice:

- Could be used by Grid and local users.
- Issues:
  - Needs too many human and computing resources to be adequate for a provider like LIP.

#### • DPM@Coimbra:

- No need to support local users in the same SE system.
- Rather simple to setup and administer.
- Robust and reliable.





## **The StoRM SRM with Lustre FS**

- Middle of 2008: New storage and computing resources were purchased.
- A decision to change the SE technology was taken: Testing and deployment of Lustre FS from SUN and StoRM SRM both at the Lisbon and Coimbra sites.

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- Lisbon, Lustre (version 1.6.6) servers:
  - 1 MGS + several MDT's:
    - 1 HP Blade, FS's on iSCSI DS.
  - 5 OSS' s Dell PE1950:
    - 20 OST's 130TB (Atlas + CMS)
  - Other VO's and local users (~20TB):
    - 1 OSS with 1 OST HP
    - 4 OSS's, older machines.
- StoRM (version 1.3.20):
  - StoRM frontend and backend:
    - 1 Dell PE1950
    - 2 GridFTP servers.
      - 1 Dell PE1950 and 1 SUN Fire X2100

- Coimbra Lustre (version 1.6.6) servers
  - 1 MGS + several MDT's:
    - 1 SUN Fire X2100
  - 2 OSS's Dell PE1950:
    - 12 OST's 75TB (Atlas)
  - Local users (12TB):
    - 2 OSS's, older machines
  - StoRM (version 1.3.20):
    - StoRM frontend and backend in seperate machines:
      - 2 SUN Fire X2100
      - 2 GridFTP servers.
        - 2 SUN Fire X2100



- StoRM decouples the SRM implementation from the underlying FS.
- The FS can be used by Grid and local users.
- Smooth learning curve for both the Lustre FS and StoRM.
- After ~9 months in operation it proved stable and robust.
- Clear "logs" for both Lustre and StoRM.
- Easy implementation of a backup policy.
  - Backup and recovery of the namespace filesystems (MDT's) was successfully tested.





## **Cons and issues I**

- Lustre 1.8.0: released May 6:
  - Needed features:
    - Pools/Groups of disks.
- StoRM 1.4.0: released May 15:
  - Needed features:
    - Space Tokens limitation (at StoRM BE configuration level).
    - Highly configurable space area policies.
    - Much improved Administration Manual (I have seen it!!).
    - Real dynamic information provider (is a cron job in 1.3.20).
- We will deploy and test them soon.





## **Cons and issues II**

- Lustre:
  - Lagging behind in version of the supported kernels.
  - Communications between clients and servers → timeout problems → hanging clients
    - Solved on the network side
- StoRM:
  - Install/config too tied to the Italian Grid specificities (work in progress to integrate in the main gLite stack).
  - Still missing the 64 bit version (though work is in progress).





## **Monitoring I**

- Lisbon:
  - Nagios: problem detection and notification
  - Cacti: detailed network graphs
  - Ganglia: detailed graphs and aggregated graphs
- Coimbra
  - Nagios + pnp: problem detection and notification and detailed graphs.





# **Monitoring II**

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#### Nagios@Lisbon

05-17-2009 12:32:40 109d 10h 6m 40s 1/2

SSH OK - OpenSSH\_4.3p2-6.cern-hpn-CERN-4.3p2-6.cern (protocol 1.99)

<u>03</u>	<u> </u>	OK (	05-15-2009	08:54:45	51d 15h :	12m 16s 1	1/3	/: 40%used(	8572MB/2154	2MB) (<90%) : Oł	<
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	eth1	OK	05-15-2009	08:56:03	51d 20h 4	42m 35s 1	1/3	OK: eth1: Li	nk is up at 100	00Mb/s, Full duple	x
	eth2	OK	09:02:40	51d 20h 4	41m 2s 1	1/3	OK: eth2: Link is up at 1000Mb/s, Full duplex				
	eth3	OK	08:56:40 5	51d 20h (	39m 29s 1	1/3	OK: eth3: Link is up at 1000Mb/s, Full duplex				
	load	OK	05-15-2009	08:55:12 4	41d 22h 4	49m 19s 1	1/3	Load : 0.00	0.00 0 00 : 04	<	
	lustre health	ОК	05-15-2009	09:03:54	51d 20h 3	36m 23s 1	1/3	SNMP OK - I	healthy		
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Service Stars Service Stars CO PING OK TRAFLAN & OK OK OK OK OK OK OK OK OK OK	Institution         Institution         Attempt           K         05-17-2009         12:32:27         104-18h:50m:46         1/2           K         05-17-2009         12:32:27         104-18h:50m:46         1/2           K         05-17-2009         12:32:27         104-18h:50m:46         1/2           K         05-17-2009         12:38:00         0d 18h:7m:29s         1/2           K         05-17-2009         12:38:00         0d 18h:7m:29s         1/2           K         05-17-2009         12:38:68         0d 12h:30m:20s         1/2           K         05-17-2009         12:38:68         1/2         1/2           K         05-17-2009         12:38:68         1/2         1/2           K         05-17-2009         12:38:68	Status Details For All Hosts           Status Details For All Hosts           Status Information           OK. 192.168.4.1;rta 0165ms, lost 0%           OK. Gigab/Ethermed/01 s UP at 1Gbps. RX=604.2K0ps (0.0           OK: Gigab/Ethermed/01 is UP at 1Gbps. RX=604.2K0ps (0.0           OK: Ogab/Ethermed/01 is UP at 1Gbps. RX=604.2K0ps (0.0           SMM OK + 122.168.33: ma 3.915ms, bet 0%           SMM OK + 1.382.64	J6%), TX=41.13%bps (0%) 6), TX=604.4%bps (0.06%)	60	IUS ntp pin sst sw Ups Av	tre_mdt_osc ] g ] 'ap S erage S	L00.000% (100. L00.000% (100. L00.000% (100. L00.000% (100. D9.966% (99.96 L00.000% (100. D9.997% (99.99)	000%) 0.000% (0.000 000%) 0.000% (0.000 000%) 0.000% (0.000 000%) 0.000% (0.000 7%1 0.000% (0.000	(CISCO)	3100       3.200       0.000%	00% 00% 00% 00% 00%
Jagi Service V Sta 22 PING OK TRAFLAN & OK	Issue (1)         Issue (1)         Duration (1)         Attempt           Issue (1)         05-17-2009 12:32:27         1044 18h 50m 4h         1/2           Issue (1)         05-17-2009 12:32:27         1044 18h 50m 4h         1/2           Issue (1)         05-17-2009 12:32:27         1044 18h 50m 4h         1/2           Issue (1)         05-17-2009 12:32:30         104 18h 7m 29h         1/2           Issue (1)         05-17-2009 12:32:30         124 20h 23m 6h         1/2           Issue (1)         05-17-2009 12:32:30         124 20h 23m 6h         1/2           Issue (1)         05-17-2009 12:32:31         104 19h 57m 3h         1/2           Issue (1)         05-17-2009 12:32:31         124 19h 57m 3h         1/2	Status Details For All Hosts           OK. 192.168.4.1:rta 0.165ms, lost 0%           OK. GigabEthermetil is UP at 1Gbps. RX=604.2Kbps (0.0           OK. GigabEthermetil is UP at 1Gbps. RX=604.2Kbps (0.0           OK. GigabEthermetil is UP at 1Gbps. RX=41.04Kbps (0%           SMMP WARNING - '30' 35           OK - fs2.168.3.3: rta 3919ms, lost 0%           SSMO OK - r328 24	26%), TX=41.13%0ps (0%) 6), TX=604.4%0ps (0.06%)	00 U		tre_mdt_osc ] g ] 'ap S erage S	L00.000% (100. L00.000% (100. L00.000% (100. L00.000% (100. B9.966% (99.96 L00.000% (100. B9.997% (99.99)	000%) 0.000% (0.000 000%) 0.000% (0.000 000%) 0.000% (0.000 000%) 0.000% (0.000 000%) 0.000% (0.000 7%1 0.000% (0.000	(CISCO)	3100       0.000%       0.000%       0.000%         0.000%       0.000%       0.000%       0.000%         0.000%       0.000%       0.000%       0.000%         0.000%       0.000%       0.000%       0.000%         0.000%       0.000%       0.000%       0.000%         0.000%       0.000%       0.000%       0.000%         0.000%       0.000%       0.000%       0.000%	00% 00% 00% 00% 00%
Jacsical Starting of Control of C	Institution         Institution         Attempt           K         05-17-2009         12:32:27         1044 18h 50m 4h         1/2           K         05-17-2009         12:32:27         1044 18h 50m 4h         1/2           K         05-17-2009         12:32:27         1044 18h 50m 4h         1/2           K         05-17-2009         12:32:00         104 18h 7m 29s         1/2           K         05-17-2009         12:32:00         104 18h 7m 32s         1/2           K         05-17-2009         12:32:34         534 0h 38m 24s         1/2           K         05-17-2009         12:32:31         524 19h 57m 32s         1/2           K         05-17-2009         12:32:41         124 19h 57m 32s         1/2	Status Details For All Hosts           Status Details For All Hosts           V         Status Information           OK. 192.1684.1: rta 0.165ms, lost 0%         OK Gigab/Ethernet0/2 is UP at 1Gbps, RX=604.2K0ps (0/0           OK: Gigab/Ethernet0/2 is UP at 1Gbps, RX=614.2K0ps (0%         SNMP WARNING - '30' 35           OK - 192.168.3.3: rta 3.919ms, lost 0%         SSH 0K - orpitib (protocol 2.0)           SMMP OK - 132 8.2         SMMP OK - 55 37	06%), TX-41.13%0ps (0%) 6), TX-604.4%0ps (0.06%)	0 5 60 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	IUS Intp pin sst sw up Av	tre_mdt_osc ] g ] 'ap 5 erage 9	L00.000% (100. L00.000% (100. L00.000% (100. L00.000% (100. B9.966% (99.960 L00.000% (100. B9.997% (99.99)	000%) 0.000% (0.000 000%) 0.000% (0.000 000%) 0.000% (0.000 000%) 0.000% (0.000 7%1 0.000% (0.000 face Traffic	(CISCO)	3100025500     0.000% [0.000%] 0.00     0.000% [0.000%] 0.00     0.000% [0.000%] 0.00     0.000% [0.000%] 0.00     0.000% [0.000%] 0.00     0.000% [0.000%] 0.00     0.000% [0.000%] 0.00	00% 00% 00% 00% 00% 00%
Service Servic	Isster         Isster         Isster         Isster           K         05-17-2009 12:32:27         1044 18h 50m 4b         1/2           K         05-17-2009 12:32:27         1044 18h 50m 4b         1/2           K         05-17-2009 12:32:27         1044 18h 50m 4b         1/2           K         05-17-2009 12:32:20         104 18h 7m 29s         1/2           K         05-17-2009 12:32:30         52d 20h 23m 6s         1/2           K         05-17-2009 12:32:46         53d 0h 38m 24s         1/2           K         05-17-2009 12:32:45         53d 0h 38m 24s         1/2           K         05-17-2009 12:32:45         198 0h 7m 32s         1/2           K         05-17-2009 12:31:48         120 17h 15m 34s         1/2           K         05-17-2009 12:31:48         120 17h 15m 1/2         1/2           K         05-17-2009 12:31:48         120 17h 15m 1/2         1/2           K         05-17-2009 12:31:48         1/2 17h 15m 1/2         1/2           K         05-17-2009 12:31:48         1/2 17h 15m 1/2         1/2           K         05-17-2009 12:31:48         1/2 17h 15m 1/2         1/2	Status Details For All Hosts           Status Details For All Hosts           V         Status Information           OK. 192.168.4.1; ra 0.165ms, lost 0%         OK           OK Gigab/Ethernet0/2 is UP at 1Gbps, RX=604.2K0ps (0.0           OK: Gigab/Ethernet0/1 is UP at 1Gbps, RX=41.04K0ps (0%           SNMP WARNING - 150* 35           OK - royptib (protocol 2.0)           SNMP OK - 55 37           OK - C opptib (protocol 2.0)           SNMP OK - 65 37           OK - c opptib (protocol 2.0)	06%), TX-44.13%0ps (0%) 6), TX-604.4%0ps (0.06%)	0 0 1 1 40 2 20		tre_mdt_osc 1	L00.000% (100. L00.000% (100. L00.000% (100. D9.966% (99.966 L00.000% (100. D9.997% (99.99)	000%) 0.000% (0.000 000%) 0.000% (0.000 000%) 0.000% (0.000 000%) 0.000% (0.000 7%1 0.000% (0.000 face Traffic	(CISCO)	3100 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	00% 00% 00% 00% 00% 00%
SET OK Service Stars Service Stars	Isster         Isster         Ourstion 11 wr.         Attempt           K         05-17-2009 12:32:27         104d 18h 50m 4b         1/2           K         05-17-2009 12:32:27         104d 18h 50m 4b         1/2           K         05-17-2009 12:32:27         104d 18h 50m 4b         1/2           K         05-17-2009 12:32:30         0d 18h 7m 29s         1/2           K         05-17-2009 12:32:30         52d 20h 23m 6s         1/2           K         05-17-2009 12:32:45         53d 0h 38m 24s         1/2           K         05-17-2009 12:32:43         54d 17h 17m 32s         1/2           K         05-17-2009 12:32:43         38d 17h 14m 19         1/2	Status Details For All Hosts           OK. 192.168.4.1: rta 0.165ms, lost 0%           OK. GigabtEthernet02 is UP at 1Gbps. RX=604.2Kbps (0.0           OK. GigabtEthernet01 is UP at 1Gbps. RX=41.04Kbps (0%           SNMP WARNING - "50" 35           OK nyptile (protocol 2.0)           SNMP OK - 13 28 24           SNMP OK - 55 37           OK. 192.168.34.rta 4.102ms, lost 0%           SSH OK - nyptile (protocol 2.0)           SNMP OK - 12 18 23	06%), TX=41.13%0ps (0%) 6), TX=604.4%0ps (0.06%)	0 5 1 1 1 1 1 1 1 1 1 1 20		tre_mdt_osc 1 9 1 1 2 2 3 9 2 1 9 1 9 1 9 1 9 1 9 1 9 1 9 1 1 1 1 1	L00.000% (100. L00.000% (100. L00.000% (100. D9.966% (99.966 L00.000% (100. D9.997% (99.99) Inter	00000) 0.00000 (0.000 00000) 0.00000 (0.000 00000) 0.00000 (0.000 00000) 0.00000 (0.000 00000) 0.00000 (0.000 7%1 0.00000 (0.000 face Traffic	(CISCO)	3100 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	00% 00% 00% 00% 00% 00% 00%
Service Servic	Instrument         Instrum	Status Details For All Hosts           OK. 192.168.41.rta 0.165ms, lost 0%           OK. Glgab/Elthernet02 is UP at 1Gbps. RX=604.2K0ps (0%           SNMP WARNING - "50" 35           OK. 192.168.33.rta 3.919ms, lost 0%           SNMP OK - 13 26 24           SNMP OK - 55 37           OK N 192.168.34.rta 4.102ms, lost 0%           SSH OK - uppille (protocol 2.0)           SNMP OK - 12 18 23           OK - 192.168.34.rta 2.402ms, lost 0%	06%), TX=41.13%pps (%) 6), TX=60.4.4%pps (0.6%)	0 5 1 1 1 1 1 1 1 1 20		tre_mdt_osc 1	L00.000% (100. L00.000% (100. L00.000% (100. J99.966% (99.966 L00.000% (100. J99.997% (99.99) Inter	000%) 0.000% (0.000 000%) 0.000% (0.000 000%) 0.000% (0.000 000%) 0.000% (0.000 000%) 0.000% (0.000 7%1 0.000% (0.000 face Traffic	6)       mcit01         6)       0.000% (0.000%         6)       0.000% (0.000%         6)       0.000% (0.000%         %)       0.034% (0.034%         %)       0.000% (0.000%         %)       0.003% (0.003%         %)       0.003% (0.003%         %)       0.003% (0.003%         %)       0.003% (0.003%         %)       0.003% (0.003%	3100 2345 0.00     0.000% 0.000% 0.00     0.000% 0.000% 0.00     0.000% 0.000% 0.00     0.000% 0.000% 0.00     0.000% 0.000% 0.00     0.000% 0.000% 0.00     0.000% 0.000% 0.00	00%
SEI OKK	Issue 11         Lest Check 11/20         Duration 11/20         Attempt           05 17 2009 12:32:27         104d 18h 50m 49         12           05 17 2009 12:32:07         104d 18h 50m 49         12           05 17 2009 12:32:00         0d 18h 7m 298         12           05 17 2009 12:32:00         0d 18h 7m 298         12           05 17 2009 12:32:00         0d 18h 7m 298         12           05 17 2009 12:32:00         522 20h 23m 68         12           05 17 2009 12:32:00         524 20h 23m 68         12           05 17 2009 12:32:00         524 20h 23m 68         12           05 17 2009 12:32:00         524 20h 23m 68         12           05 17 2009 12:32:00         524 17h 19m 19         12           05 17 2009 12:32:01         524 17h 19m 19         12           05 17 2009 12:32:42         384 17h 17m 228         12           05 17 2009 12:32:42         384 17h 17m 228         12           05 17 2009 12:32:42         384 17h 17m 228         12           05 17 2009 12:32:45         104d 18h 50m 26         12           05 17 2009 12:32:45         104d 18h 50m 26         12           05 17 2009 12:32:45         104d 18h 50m 26         12           05 17 2009 12:32:45         104d 18h	Status Details For All Hosts           Status Details For All Hosts           VI         Status Information           OK. 192.168.4.1; rta 0.165ms, lost 0%         OK           OK. Gigab/Elthernet0/2 is UP at 1Gbps. RX=604.2K0ps (0.0           OK. Gigab/Elthernet0/1 is UP at 1Gbps. RX=41.04K0ps (0%           SNMP WARNING - '30' 35           OK. 192.168.33; rta 3.919ms, lost 0%           SSH OK oryptile (protocol 2.0)           SNMP OK - 13 28 24           SNMP OK - 12 18 23           OK - 192.168.34; rta 4.102ms, lost 0%           SSH OK oryptile (protocol 2.0)           SNMP OK - 12 18 23           OK - 192.168.42; rta 0.497ms, lost 0%           OK - 192.168.42; rta 0.497ms, lost 0%           OK - 192.168.42; rta 0.497ms, lost 0%	06%), TX-41.13%pps (0%) 66%), TX-604.4%pps (0.06%) 6), TX-604.4%pps (0.06%) 6), TX-637.7%pps (0.06%)	0 5 1 1 1 1 1 1 1 20		tre_mdt_osc 1	L00.000% (100. L00.000% (100. L00.000% (100. D9.966% (99.966 L00.000% (100. D9.997% (99.99) Inter Inter	00006) 0.000% (0.000 0006) 0.000% (0.000 000%) 0.000% (0.000 000%) 0.000% (0.000 000%) 0.000% (0.000 7%1 0.000% (0.000 face Traffic Uweek 18	(CISCO) (CISCO) (Veek 19	31 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	00%
Nacon view of the second secon	Issue 11         Lest Check 11/20         Duration 11/20         Attempt           05 17 2009 12:32:27         104d 18h 50m 4h         12           05 17 2009 12:32:07         104d 18h 50m 4h         12           05 17 2009 12:32:00         0d 18h 7m 29h         12           05 17 2009 12:32:00         0d 18h 7m 29h         12           05 17 2009 12:32:00         0d 18h 7m 29h         12           05 17 2009 12:32:01         522 20h 23m 6h         12           05 17 2009 12:32:05         524 20h 23m 6h         12           05 17 2009 12:32:05         524 20h 23m 6h         12           05 17 2009 12:32:05         524 20h 23m 6h         12           05 17 2009 12:32:05         524 20h 23m 6h         12           05 17 2009 12:32:05         524 17h 19m 16         12           05 17 2009 12:34:16         524 17h 19m 19         12           05 17 2009 12:34:18         524 17h 17m 22h         12           05 17 2009 12:34:12         384 17h 17m 22h         12           05 17 2009 12:34:20         124 18h 50m 2h         12           05 17 2009 12:34:20         124 18h 50m 2h         12           05 17 2009 12:34:20         124 18h 50m 2h         12           05 17 2009 12:34:20         124 18h 50m 2	Status Details For All Hosts           OK. 192.168.41.rta 0.165ms, lost 0%           OK. Gigab/Ethernet02 is UP at 1Gbps. RX=604.2Kbps (0)           OK. Gigab/Ethernet01 is UP at 1Gbps. RX=41.04Kbps (0%           SNMP WARNING - '30' 35           OK nyptile (protocol 2.0)           SNMP OK - 13 28 24           SNMP OK - 13 28 24           SNMP OK - 13 28 24           SNMP OK - 12 18 23           OK - 192.168.34.rta 4.102ms, lost 0%           SSH OK - nyptile (protocol 2.0)           SNMP OK - 12 18 23           OK - 192.168.42.rta 0.497ms, lost 0%	66%), ТХ=41.13Кора (0%) 66%), ТХ=604.4Кора (0.06%) 5), ТХ=604.4Кора (0.06%) 6), ТХ=637.7Кора (0.06%)	0 1 40 1 20		tre_mdt_osc 1 g 1 g 2 g 2 g 2 g 2 g 2 g 2 g 2 g 2	L00.000% (100. L00.000% (100. L00.000% (100. B9.966% (99.96% L00.000% (100. B9.997% (99.99) Inter Inter 17 ; t 20.366	0.000%       0.000%       (0.000         0.000%       0.000%       (0.000         0.00%       0.000%       (0.000         0.00%       0.000%       (0.000         0.00%       0.000%       (0.000         0.00%       0.000%       (0.000         7%1       0.000%       (0.000         face       Traffic         week       18         imports       76	<pre>60 mctol 61 0.000% (0.000% 61 0.000% (0.000% 62 0.000% (0.000% 63 0.000% (0.000% 64 0.000% 64 0.000% (0.000% 64 0.000% 64 0.000% (0.000% 64 0.000% 64 0</pre>	31000350.000% 0.000% 0.000% 0.00 0.000% 0.000% 0.00 0.00 0.000% 0.000% 0.00 0.0	00% 00% 00% 00% 00% 00% 00%
SOURCE STATES ST	Issue 11         Last Check 100         Duration 101         Attempt           4         05/17.2009 12:32:27         10/41 18h 50m 46         1/2           4         05/17.2009 12:32:27         10/41 18h 50m 46         1/2           4         05/17.2009 12:32:20         5/2/200 12:06:00         1/2           4         05/17.2009 12:32:30         5/2/200 32:06:00         1/2           5         05/17.2009 12:32:30         5/2/200 32:06:00         1/2           5         05/17.2009 12:32:30         5/2/200 37:02:09         1/2           5         05/17.2009 12:32:31         5/2/19:05 77:02:09         1/2           5         05/17.2009 12:32:33         3/2/11:11 17:11 12:20         1/2           5         05/17.2009 12:32:33         3/2/11:11 17:11 12:20         1/2           5         05/17.2009 12:32:30         1/2/11:11 17:11 12:20         1/2           5         05/17.2009 12:32:30         1/2/11:11 17:11 12:20         1/2           5         05/17.2009 12:32:30         1/2/11:11 17:11 12:20         1/2           5         05/17.2009 12:32:30         1/2/11:11 17:11 12:20         1/2           5         05/17.2009 12:32:30         1/2/11:11 17:11 12:20         1/2           5         05/17.2009 12:3	Status Details For All Hosts           OK. 192.1684.1; rao 0165ms, lost 0%           OK. Gigab/Ethernet02 is UP at 1Gbps. RX=604.2K0ps (0.0           OK. Gigab/Ethernet02 is UP at 1Gbps. RX=41.04K0ps (0%           SNMP WARNING - '30' 35           OK. 192.168.33; rad 3919ms, lost 0%           SSH OK - cryptib (protocol 2.0)           SMMP OK - 13 28 24           SMMP OK - 13 28 24           SMMP OK - 127 138           OK - leg2.168.34; rad 102ms, lost 0%           SSH OK - cryptib (protocol 2.0)           SMMP OK - 121 28 23           OK - 192.168.42; rad 0.497ms, lost 0%           OK - 192.168.42; rad 0.497ms, lost 0%           OK - Gigab/Ethernet 0/47 is UP at 1Gbps. RX=47.1Kbps (09           NTP OK: Offset 7.8e-05 seccs           OK - 192.168.21; rad 0.140ms, lost 0%	06%), TX=41.13%0ps (0%) 6), TX=604.4%0ps (0.06%) 6), TX=604.4%0ps (0.06%) 6), TX=637.7%0ps (0.06%)	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0		tre_mdt_osc 1 g 1 cap 5 s 2 eraqe 9 week 0 Mb/s 1as 3 Mb/s 1as	L00.000% (100. L00.000% (100. L00.000% (100. D9.966% (99.96% L00.000% (100. 39.997% (99.99) Inter Inter 17 ;t 20.366 ;t 10.55	0.000%       0.000%       (0.000         000%       0.000%       (0.000         000%       0.000%       (0.000         000%       0.000%       (0.000         000%       0.000%       (0.000         000%       0.000%       (0.000         7%1       0.000%       (0.000         face       Traffic         week       18         Wb/s       avg       76         Mb/s       avg       10	(CISCO) (CISCO) (CISCO) (0.12 Mb/s max	3 3 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	00% 00% 00% 00% 00% 00%
Service Servic	Issue 1         Last Check 155         Duration 151         Attempt           6         05/17/2009 12:32:27         10/41 18h 50m 46         1/2           6         05/17/2009 12:32:27         10/41 18h 50m 46         1/2           6         05/17/2009 12:32:20         10/18h 70 729         1/2           6         05/17/2009 12:32:30         52/2 2/0 32m 66         1/2           6         05/17/2009 12:32:30         52/2 2/0 32m 66         1/2           6         05/17/2009 12:32:30         52/2 19h 57m 32a         1/2           6         05/17/2009 12:32:31         52/2 19h 57m 32a         1/2           6         05/17/2009 12:32:32         3/2/2 1/2 h 54m 40a         1/2           6         05/17/2009 12:32:31         3/2/2 1/1 H 1m 19         1/2           6         05/17/2009 12:32:32         3/2/2 1/1 H 1m 19         1/2           6         05/17/2009 12:32:31         3/2/2 1/1 H 1m 19         1/2           6         05/17/2009 12:32:32         3/2/2 1/1 H 1m 19         1/2           6         05/17/2009 12:35:40         1/4/2 1h 50m 2a         1/2           6         05/17/2009 12:35:40         1/4/2 1h 50m 2a         1/2           6         05/17/2009 12:35:40         1/4/1 1h 50m 2a<	Status Details For All Hosts           Status Information           OK: Glgab/Ethernet02 is UP at 1Gbps. RX=41.04K0ps (0%           SNMP WARNING - '30' 35           OK - 152:168.33; rta 3:919m, lost 0%           SSH OK - cryptib (protocol 2.0)           SNMP OK - 132:82.4           SNMP OK - 55:37           OK - 192:168.34; rta 1:02m, lost 0%           SSH OK - cryptib (protocol 2.0)           SNMP OK - 132:82.4           OK - 192:188.4:2; rta 0:497m, lost 0%           SSH OK - cryptib (protocol 2.0)           SNMP OK - 12:18:23           OK - 192:188.4:2; rta 0:497m, lost 0%           SNMP OK 21:28:24; rta 0:497m, lost 0%           OK - 192:182:1; rta 0:497m, lost 0%           OK - 192:182:1; rta 0:497m, lost 0%           SH OK - OpenSH:4.392:4; rta 0:497m, lost 0%	08%), TX-41.13%Dps (0%) 6), TX-604.4%Dps (0.06%) 6), TX-604.4%Dps (0.06%) 7), TX-637.7%Dps (0.06%) 7), TX-637.7%Dps (0.06%)	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0		tre_mdt_osc 1 g 1 cap 5 s 2 eraqe 5 week 0 Mb/s las 3 Mb/s las	L00.000% (100. L00.000% (100. L00.000% (100. L00.000% (100. D9.966% (99.96% L00.000% (100. 39.997% (99.99) Inter Inter 17 ;t 20.36 ;t 10.55	0.000%       0.000%       (0.000         000%       0.000%       (0.000         000%       0.000%       (0.000         000%       0.000%       (0.000         000%       0.000%       (0.000         000%       0.000%       (0.000         7%1       0.000%       (0.000         face       Traffic         week       18         Week       18         Mb/s       avg       10	<pre>60 mcitO1 61 0.000% (0.000% 61 0.000% (0.000% 62 0.000% (0.000% 63 0.000% (0.000% 64 0.000% 64 0.000% (0.000% 64 0.000% 64 0.000% (0.000% 64 0.000% 64 0.000% (0.000% 64 0.000% 64 0.000% 64 0.000% (0.000% 64 0.000% 64 0</pre>	3 3 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	00%
SCUPICAL STATES	Issue 1         Last Check 155         Duration 151         Attempt           6         05-17-2009 12:32:27         104d 18h 50n 4h         1/2           6         05-17-2009 12:32:07         104d 18h 50n 4h         1/2           6         05-17-2009 12:32:00         0d 18h 70:29         1/2           6         05-17-2009 12:32:00         6d 12h 30m 20s         1/2           6         05-17-2009 12:32:00         6d 12h 30m 20s         1/2           6         05-17-2009 12:32:08         6d 12h 30m 20s         1/2           6         05-17-2009 12:32:08         6d 12h 30m 20s         1/2           6         05-17-2009 12:32:31         6d 21h 14m 11s         1/2           6         05-17-2009 12:32:41         1/2 2/2 354m 40s         1/2           6         05-17-2009 12:35:45         1/4 18h 50m 2s         1/2           6         05-17-2009 12:35:40         1/4 18h 50m 2s         1/2	Status Details For All Hosts           OK- 192.168.4.1: ra 0.165ms, lost 0%           OK GigabiEthermet0/1 is UP at 1Gbps. RX=41.04K0ps (0%           SNMP WARNING - '30' 35           OK - 192.168.3.1: ra 3.919ms, lost 0%           SSH OK - cryptib (protocol 2.0)           SNMP OK - 132 824           SNMP OK - 55 37           OK - 192.168.3.4: ra 1.402ms, lost 0%           SSM OK - cryptib (protocol 2.0)           SNMP OK - 132 824           OK - 192.168.3.4: ra 1.402ms, lost 0%           SSM OK - cryptib (protocol 2.0)           SNMP OK - 132 182           OK - 192.168.2.1: ra 0.497ms, lost 0%           SSM OK - cryptib (protocol 2.0)           SNMP OK - 132 182           OK - 192.168.2.1: ra 0.140ms, lost 0%           SSM OK - cryptib (protocol 2.0)           SNMP OK - 132 182.1: ra 0.140ms, lost 0%           SSM OK - cryptib (protocol 2.0)           SNMP OK - 132 182.2: ra 0.497ms, lost 0%           SSM OK - cryptib (protocol 2.0)           NTP OK Offset 7.8e-05 seccs           OK + 182.182.1	D6%), TX-41.13%Dps (0%) 6), TX-604.4%Dps (0.06%) 6), TX-604.4%Dps (0.06%) 7), TX-637.7%Dps (0.06%) 7) 7), TX-637.7%Dps (0.06%) 7) 7), TX-637.7%Dps (0.06%) 7) 7), TX-637.7%Dps (0.06%) 7), TX-637.7%	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0		tre_mdt_osc 1	L00.000% (100. L00.000% (100. L00.000% (100. L00.000% (100. 39.966% (99.96% L00.000% (100. 39.997% (99.99) Inter 17 ;t 20.36 ;t 10.55 12:38	000000) 0.00000 (0.000 000000) 0.000000 (0.000 000000) 0.000000 (0.000 000000) 0.000000 (0.000 000000) 0.000000 (0.000 7001 0.000000 (0.000 7001 0.000000 (0.000 7001 0.000000 (0.000 face Traffic face Traffic week 18 i Mb/s avg 70 0 Mb/s avg 10	<pre>60 mcitO1 61 0.000% (0.000% 61 0.000% (0.000% 62 0.000% (0.000% 63 0.000% (0.000% 64 0.000% 64 0.000% (0.000% 64 0.000% (0.000% 64 0.000% (0.000% 64 0.000% 64 0.000% (0.000% 64 0.000% 64 0.000% (0.000% 64 0.000% 64 0.000%</pre>	31 a c a y s o c b c c c y s c c c c y s o c c c c c y s c c c c y s c c c c y s c c c y s c c c c	00%



## **Monitoring III**

#### Ganglia@Lisbon

• Ganglia clusters:





## **Performance I**

#### **ATLAS Distributed analysis tests: HammerCloud**

#### # Events /second

#### Input method: FileStager









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## **Performance II**



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## **Summary / Conclusion**

- The Storage Element based on the Lustre FS and StoRM SRM:
  - Has proved to be stable, reliable and robust.
  - Appropriate to any site size (no nearline).
  - Number of updates is low:
    - We have made only one update of Lustre and one of StoRM since we have the system in production.





## **Future**

- New hardware is arriving soon at LIP, includes:
  - 10Gb NICS for all the Lustre OSS's.
  - Machines with 10Gb NIC's to serve as GridFTP servers for Lisbon and Coimbra.
- New site is now being deployed as part of the federated Portuguese T2.
- Test cluster with Lustre 1.8.0
- Development/Inclusion of other Nagios sensors and Ganglia metrics.
- STEP'09 next week will stress all we have.
  - Note: STEP09 computing stress testing of all LHC experiments as near the real LHC data taking and processing, as possible.



# **Questions??**