

T2_BR_SPRACE CMS Tier-2 Cluster

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Computing Resources

Worker Nodes

- □ 29,702 HS06, we pledged 25,200 HS06 to CMS
- □ 128 worker nodes
 - 1,792 physical cores
 - 2,688 HT cores
 - 768 cores with 4 GB
 - 128 cores with 3 GB
 - 1,280 cores with 3.2 GB
 - 512 cores with 2 GB



Storage Servers

□ 2,325 TB

□ dCache distributed storage system

- 1 Storage Element
- 13 Pools Servers AKA data nodes
 - 10/40 Gbps NIC
 - 852 hard disks (1–6 TB)



Servers

□ Headnodes and Auxiliary Servers

- CE: HTCondor-CE gatekeeper and HTCondor job scheduler
- Shared Filesystems: NFS
- Proxy Servers: 2 frontier squids
- Support services: Grafana, VM servers, DNS server, Prometheus, AlertManager, The Foreman, Ansible



LAN

□ Cluster internal connections

- Worker nodes: 1 Gbps (to TOR switches)
- 10 Gbps links between TOR and core switch
- NFS, PerfSonar, Frontier, VM servers, storage servers: 10 Gbps

MAN

□ SPRACE to ANSP provider

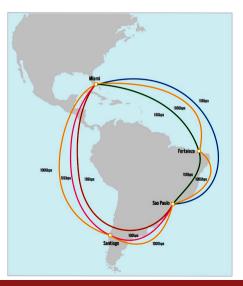
- 10 Gbps, in production
- 100 Gbps (2 X 40G + 2 X 10G)
- Full 100 Gbps channel
- Links fully dedicated, independent from university commodity network

WAN

 $\hfill\square$ Best academic international link in Brazil

□ AmLight Connection to Miami

- 4 X 10 Gbps (2 Pacific & 2 Atlantic)
- 2 X 100 Gbps (1 Pacific & 1 Atlantic)



Site Readiness

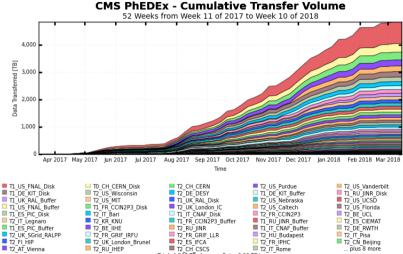
CMS Log Retrieval SiteReadiness 1 day status ranking of All/25ites for 2018-Jan-01 (00.00.00 to 2018-Dec-31 23:59:59 UTC						
Silve	Bur Graph:	Status Value: exhibit description:				
12.07. Legense		6.995	9,997			
TLEX.CBMIT		6.995	2,005			
12,41,458		6.785	2,255			
12.15.Wissmin		6.955	8.965			
TL BL Rodgerd		6.754	2.755			
D DK Looks K		6.915	8,960			
TLALIENT		6.915	8,975			
N Lonion Brand			4,917			
12 US Netrada	TI ES PIC					_
11.15.109	TI_ES_FIC					
R.F. GREAT	TI DE KIT					
TL SA NPT	II_DE_KI					
TLUCOPT 11.15.007	TI RU JINR					
	IL RU JINK					
11,08,0007	T2 BR SPRACE	-				
11,68,6050	12_BR_SPRACE					
TURNE	T2 US Purdue					
TURAT	12_US_Purduc					
TOTO IN T	T2 US Florida					
TUROPING MAN	14_US_Florida					
TOO Parks						
12.00,Phride		6.942	9,942			
TUTUNA		6.749	0.763			
LINCONFUNE		6.949	0.040			
11,78,00109		6.957	0.957			
EK, NGAL, KALPP		6.755	0.954			
TLUS FAM.		6.955	0.005			
TLCLCDA		6.966	0.904			
TLOR, human		6,899	0.004			
TLUS.Colork		6.877	9.882			
11.84.89114		6.874	0.000			
11.00.000		6.875	0.355			
TL/RCOMP		0.883	0.000			
TL IT. Pos		0.855	0.897			
12.06.103		6.876	0.054			
TLEX. Fatosis		0.425	0.429			
TI.Pl. Inbob		0.894	0.015			
TI, FR. IPIK		0.005	0.825			
11.11.107		0.034	0.410			
T2.53 Yandohit		0.894	0.825			
TLOS Miles		0.000	0.001			
11.81.018		0.895	0.015			
10.00		0.000	4.607			
TL TW. NOR		6.792	9.825			
11.15,1078		0.792	9.755			
LOCOCARC		6.775	0.00			
PT NGLIdes		6.715	0.712			
TURAN		0.755	8772			
TLEXIECA		6.670	4752			
TL FL CNF		6.579	9.796			
10,0,000						
T2_AT_Neess		0.644	0.794			
D_DR_METE		6.537	9,545			
13,17,Kenn		6.452	0.475			
11.16. Water		6.325	0.512			
10,000		0.548	9.34.8			
TURNER		6.594	0.949			
TUPK MP		6.965	0.000			
11,88,1004		4.965	0.04.6			
12,83, MNP		6.000	0.000			
EL TH, CENSTRA		6.000	0.000			

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□ Good results in availability and reliability

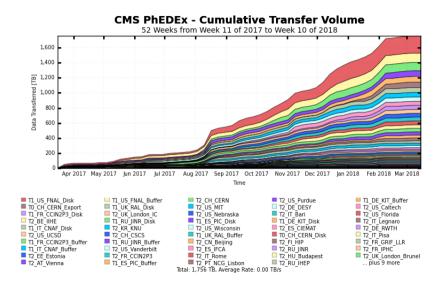
- 94,5% in the last year of RUN II(2018)
- Site admin hard work
- Datacenter stability (network, power, cooling)

PhEDEx Transfers to SPRACE



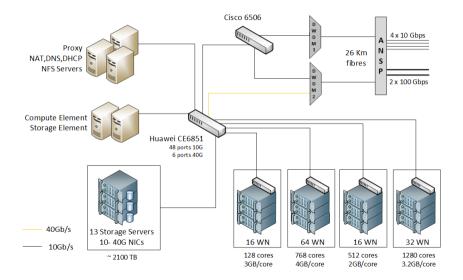
Total: 4,848 TB, Average Rate: 0.00 TB/s

PhEDEx Transfers from SPRACE

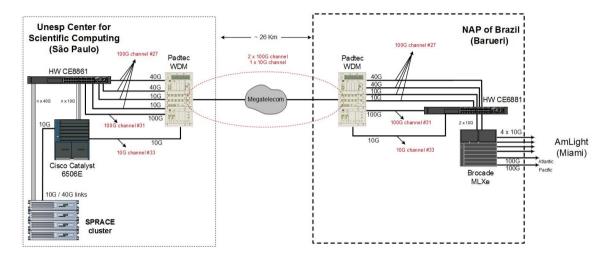


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SPRACE Cluster



SPRACE External Connections





What to expect to RUN 3

Processing

□ Increase of processing power

- add more WN
- decomission of older machines
- increase our CPU pledge to 30 kHS06 in 2022
- Another increase on the CPU pledge to 45 kHS06 in 2024
- improve the LAN to 10 Gb on the WN and to 40 Gb on the TOR switches

 $\hfill\square$ evaluate the use of GPUs in the near future

Storage

 \Box Increase the space to 3 PB in 2022

 \Box Add more 500 TB in 2024



Questions?