



SPRACE

T2_BR_SPRACE CMS Tier-2 Cluster

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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

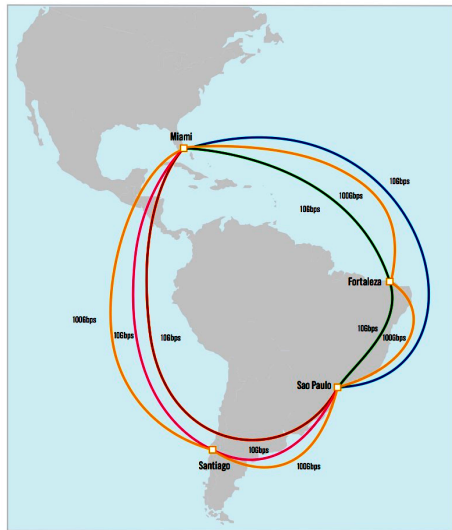
- Cluster internal connections
 - Worker nodes: 1 Gbps (to TOR switches)
 - 10 Gbps links between TOR and core switch
 - NFS, PerfSonar, Frontier, VM servers, storage servers: 10 Gbps

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

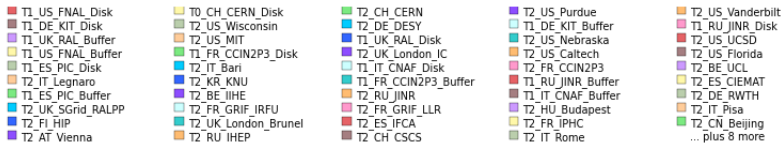
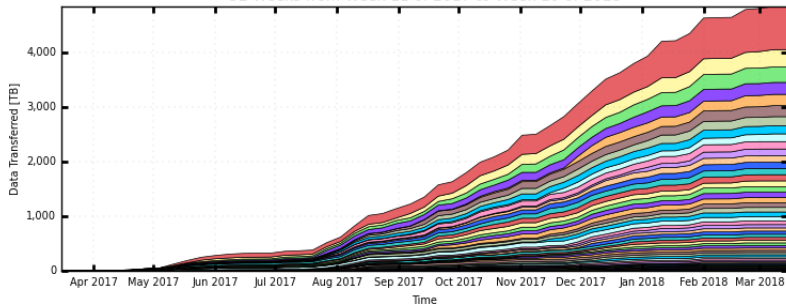
- Best academic international link in Brazil
- AmLight Connection to Miami
 - 4 X 10 Gbps (2 Pacific & 2 Atlantic)
 - 2 X 100 Gbps (1 Pacific & 1 Atlantic)



PhEDEx Transfers to SPRACE

CMS PhEDEx - Cumulative Transfer Volume

52 Weeks from Week 11 of 2017 to Week 10 of 2018

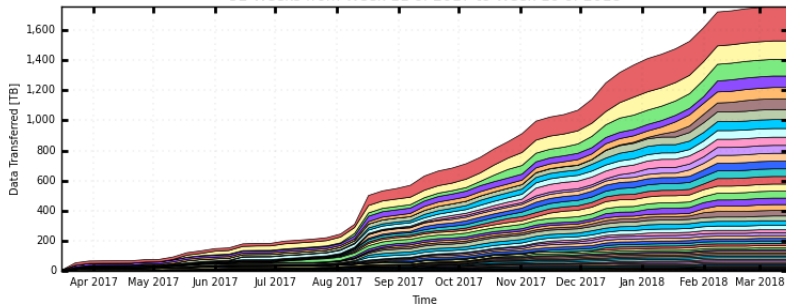


Total: 4,848 TB, Average Rate: 0.00 TB/s

PhEDEx Transfers from SPRACE

CMS PhEDEx - Cumulative Transfer Volume

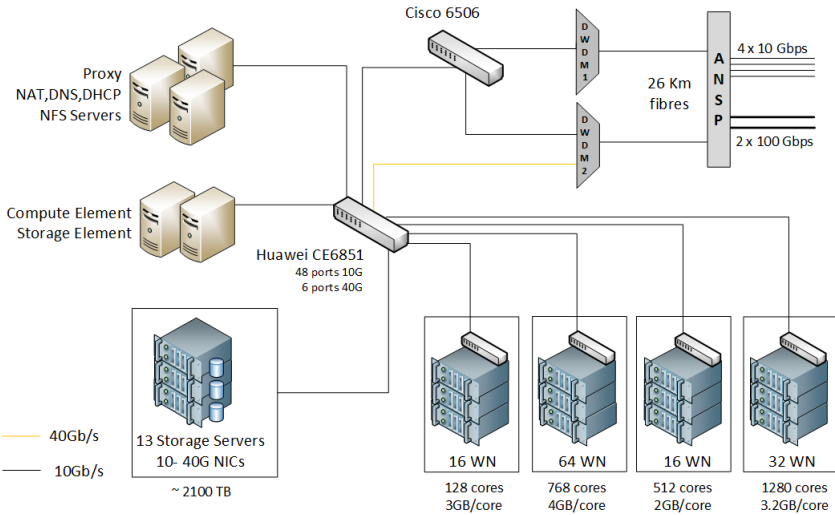
52 Weeks from Week 11 of 2017 to Week 10 of 2018



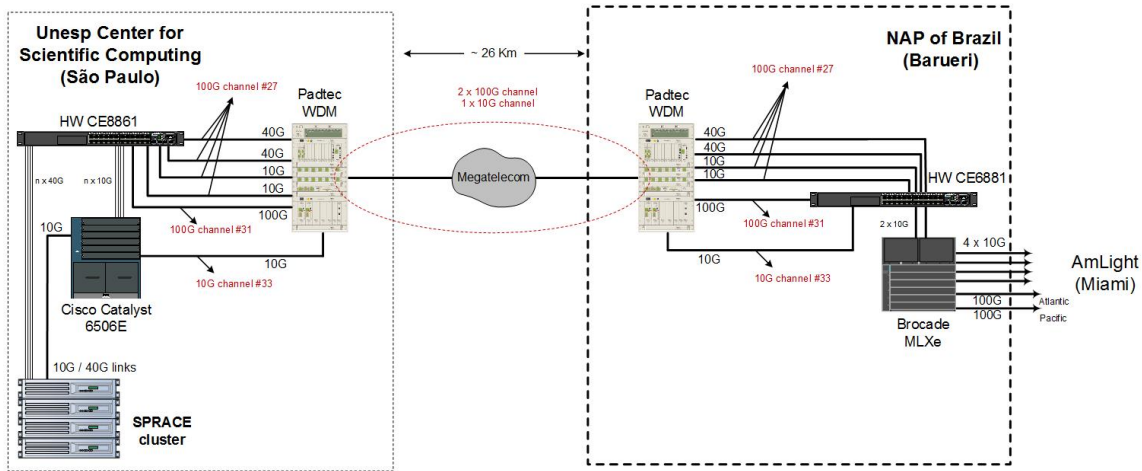
- | | | | | |
|------------------------|---------------------|--------------------|-------------------|-----------------------|
| ■ T1_US_FNAL_Disk | ■ T1_US_FNAL_Buffer | ■ T2_CH_CERN | ■ T2_US_Purdue | ■ T1_DE_KIT_Buffer |
| ■ T0_CH_CERN_Export | ■ T1_UK_RAL_Disk | ■ T2_US_MIT | ■ T2_DE_DESY | ■ T2_US_Caltech |
| ■ T1_FR_CCIN2P3_Disk | ■ T2_UK_London_IC | ■ T2_US_Nebraska | ■ T2_IT_Bari | ■ T2_US_Florida |
| ■ T2_BE_IHHE | ■ T1_RU_JINR_Disk | ■ T1_ES_PIC_Disk | ■ T1_DE_KIT_Disk | ■ T2_IT_Legnaro |
| ■ T1_IT_CNAF_Disk | ■ T2_KR_KNU | ■ T2_US_Wisconsin | ■ T2_ES_CIEMAT | ■ T2_DE_RWTH |
| ■ T2_US_UCSD | ■ T2_CH_CSCS | ■ T1_UK_RAL_Buffer | ■ T0_CH_CERN_Disk | ■ T2_IT_Pisa |
| ■ T1_FR_CCIN2P3_Buffer | ■ T1_RU_JINR_Buffer | ■ T2_CN_Beijing | ■ T2_FI_HIP | ■ T2_FR_GRIF_LLRL |
| ■ T1_IT_CNAF_Buffer | ■ T2_US_Vanderbilt | ■ T2_ES_IFCA | ■ T2_RU_JINR | ■ T2_FR_IPHC |
| ■ T2_EE_Estonia | ■ T2_FR_CCIN2P3 | ■ T2_IT_Rome | ■ T2_HU_Budapest | ■ T2_UK_London_Brunel |
| ■ T2_AT_Vienna | ■ T1_ES_PIC_Buffer | ■ T2_PT_NCG_Lisbon | ■ T2_RU_IHEP | ... plus 9 more |

Total: 1,756 TB, Average Rate: 0.00 TB/s

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
- evaluate the use of GPUs in the near future

Storage

- Increase the space to 3 PB in 2022
- Add more 500 TB in 2024



Questions?
