



Tata Institute of Fundamental Research
टाटा मूलभूत अनुसंधान संस्थान

Status of CMS Grid Computing Facilities at TIFR

DHEP Annual Meeting

TIFR, Mumbai

May 04 - 06, 2022

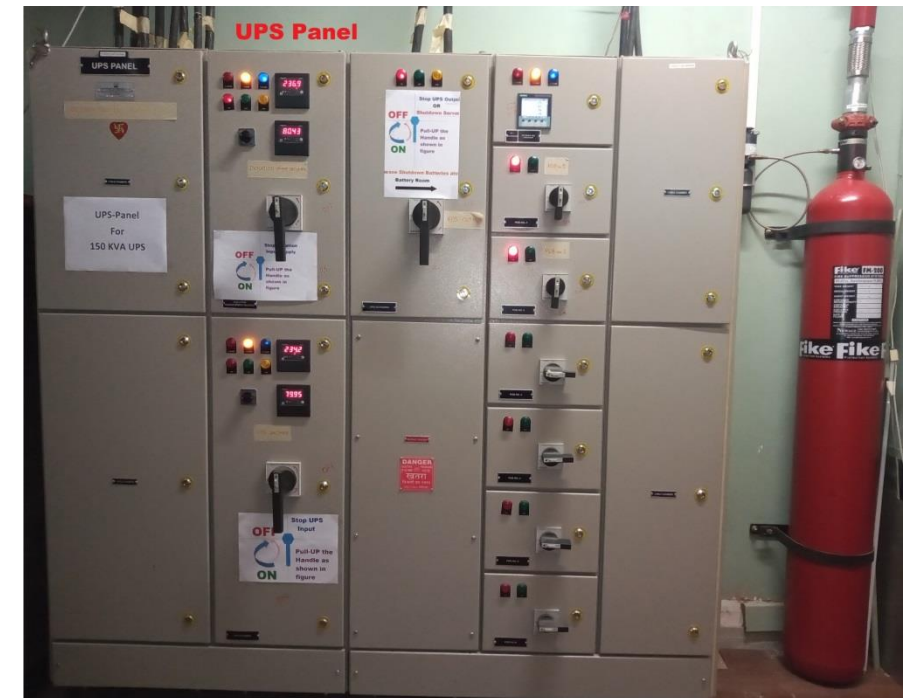
Puneet Kumar Patel, Brij Kishor Jashal, Kajari Mazumdar, Gobinda Majumder

Highlights

- Facility
- User Oriented Updates
- Software status
- Hardware status
- Pledge and Requirements
- Network
- Transfer Status
- A/R Report
- Challenges

Facility

- 12 Racks
- More than 300 servers
- Servers are fully compatible with both IPv4 and IPv6
- 16 Gbps end-to-end connectivity
- Number of switches have been increased to 7 for full connectivity
- 1Gbps switch mostly used for monitoring and login
- Dual firewall used for load balance, routing along with scanning
- 150KVA UPS + 20 min. of power backup and 220KVA Isolation transformer
- Modular UPS with one spare 30KVA module
- UPS panel is common place to control and distribute power supply
- 32 nos. new Industrial sockets have been added to support new PDUs
- FM200 Fire Suppression System
- 17RT of cooling



User Oriented Updates

- Multiple UI machines (i.e. ui2, ui3) on Linux 7 as well as active 10G link
- T3 local condor batch job submission with 368 job slots on UI
- 100TB local storage (i.e. t3store, 2, 3)
- 10TB space for individuals in T2 storage
- Direct access of T2 storage (i.e. /dpm/indiacms.res.in/home/cms/user/..)
- Web display of T2 storage:
<http://se01.indiacms.res.in/dpm/indiacms.res.in/home/cms/store/user/>
- Problem reporting via **mattermost** (web or app)
- Register case for issue, track and follow-up on **Gitlab**

Software Status

- **T2**
 - DPM upgraded to v-1.13.0 and Dome plugins with v1.15.1
 - Head Node (Apache, DPNS, DPM, SRM, XRootD)
 - Disk Node (GridFTP, RFIO, HTTP, XRootD)
 - Storage: 11PB
 - Condor upgraded to v-8.8.10_e17
 - OS upgraded to Linux 7
 - IPv6 compliant since 2019
- **T3**
 - Storage : 100TB
 - Compute: 368 job slots
 - Supporting more than 100 Indian users

On-going works

- Creating cold and hot aisle containment zone (in progress)
- Data centre relocation (2022-23)
- Upgradation of existing resources and network bandwidth
- SciToken implementation

Hardware Status

Year	Numbers	Size (rack unit)	CPU and frequency (dual socket)	CPU cores (HT enabled)	Memory	Types of storage	Storage capacity	Power Utilization
Storage node								
Till 2019	32	4U each	8C*@(2.4GHz and 2.53GHz), 12C@2.4GHz, 20C@2.2GHz, 32C@2.8GHz	~800	4 to 8GB per core	SSD + NL-SAS	5PB	~30KVA
2020-22	54			~2488			11PB	~40KVA
Storage drive capacity: 3TB, 6TB, 8TB, 10TB								
Compute Nodes								
Till 2019	75	2U4N	16C, 48C, 56C, 72C	3500	2GB per core	SSD	10GB per core	~60KVA
2020-22	179		56C, 72C, 128C	14000				~80KVA

*C: CPU Cores

Pledge and Requirements

Federation	Year	Tier	Storage		CPU			Cooling (RT)**
			Pledge (TB)*	CMS % req.	Pledge (CPU cores)	CMS % req.	Active CPU	
T2	2022	2	11000	11.22%	14000	11.67%	6000	17RT
T2	2021	2	11000	11.96%	14000	13.08%	6000	17RT
T2	2020	2	5000	6.41%	3500	3.50%		17RT
T2	2019	2	3000	3.85%	3500	3.50%		17RT

Required cooling is 35RT

*TB: Tera Byte

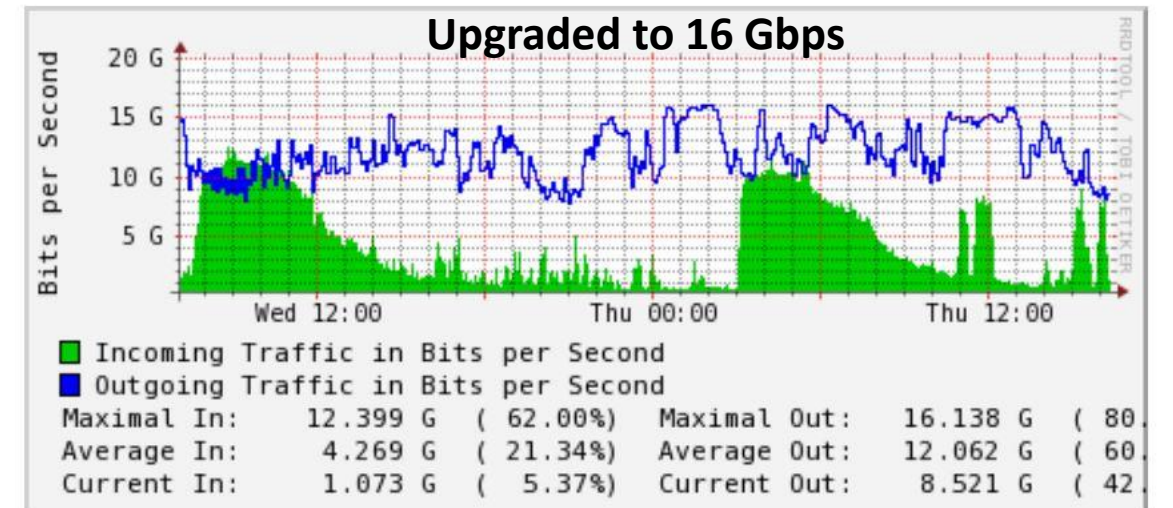
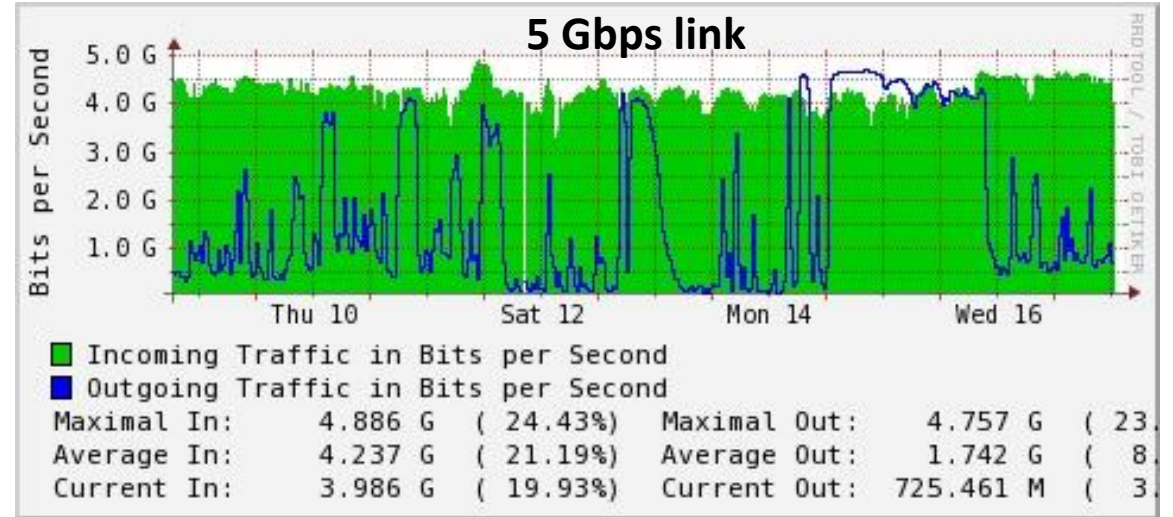
**RT: Refrigeration Ton

Network

Error types of failed jobs



	total	percentage
FileOpen	596762	35.55%
Other	285040	16.98%
Executable	275208	16.40%
Success	187131	11.15%
FileRead	134742	8.03%
Environment	104418	6.22%
Value	69979	4.17%
StageOut	22368	1.33%
Others	2875	0.17%

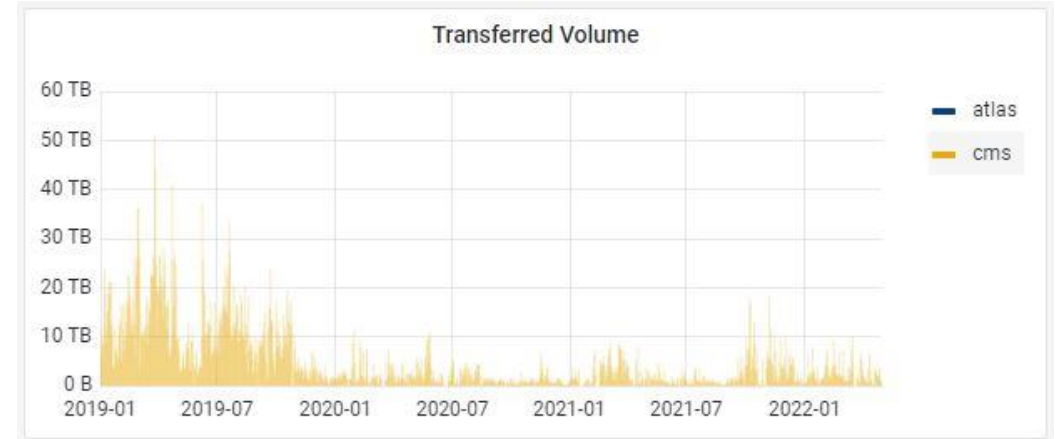
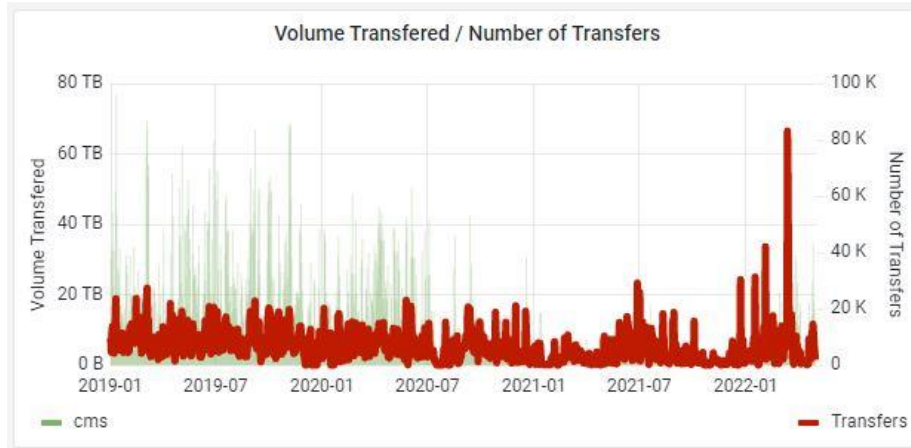


Transfer Status

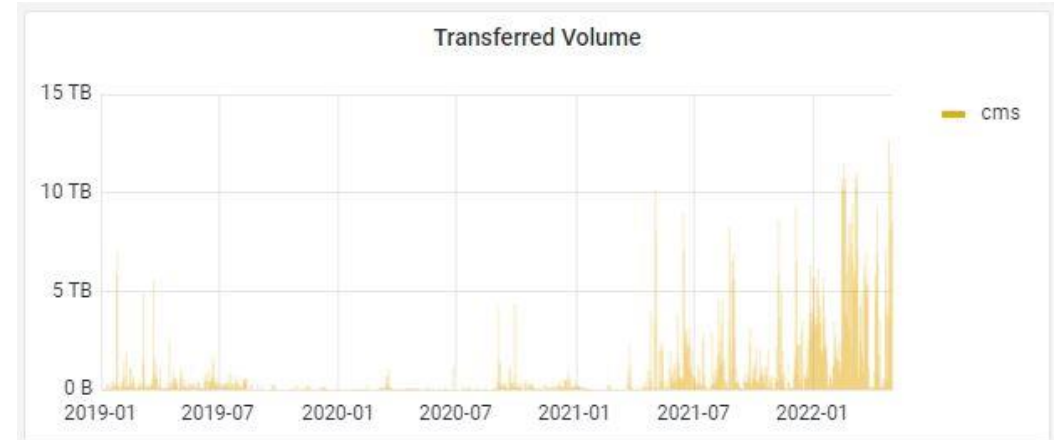
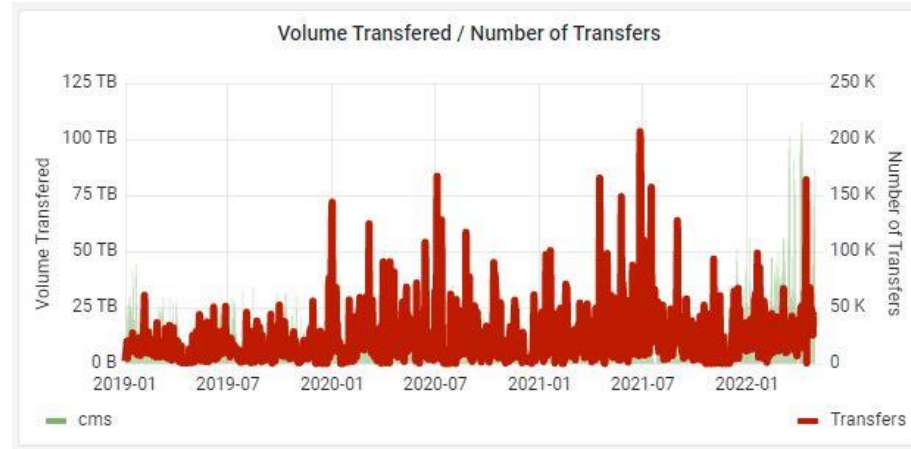
FTS Transfers

Xrootd Transfers

Uploads



Downloads



A/R Report



Challenges

- Virtual Chassis (VC) issue on new 10G switches, resolution received as new firmware after 8 months
- Network congestion in the international links lead to data transfer failures
- Undersea fibre cut incidence and Link reduced to 5Gbps
- Site went to waiting room several time due to high transfer failures
- Site suffered several Power and cooling outages which reduced the performance
- Name resolution issue on DNS from ERNET
- CPU core count reduced because of current cooling issue
- Experienced multiple disk failures in storage servers due to heating issue
- Issue in host certificate e.g "ERROR: Copy failed with mode 3rd push, with error: Transfer failed: failure: problem sending data: Certificate for doesn't match any of the subject alternative names: [puneet.patel@tifr.res.in]\n"
- Lost RAID controller card on dpms27. Half of the data have been recovered out of 30TB

Thank You !