



Sharing grid support for ALICE, ATLAS and LHCb at RO-07-NIPNE

Mihai Ciubancan, Mihnea Dulea
IFIN-HH, Romania

Cluj-Napoca | ICASC2024



Outline

- RO-07-NIPNE overview
- Network & monitoring
- RO-07-NIPNE activity
- Future plans



RO-07 overview

- RO-07-NIPNE part of RO-LCG Federation – member in WLCG collaboration
- Computing resources dedicated to 3 LHC VOs: ALICE, ATLAS, LHCb
- Storage resources dedicated to 3 LHC VOs: ALICE, ATLAS, LHCb(EOS+dCache)
- Resource manager: HTCondor fair-share policies
- Single core and multicore queues (ALICE and ATLAS - 8core)
- Ansible for upgrades
- Top-BDII, VOBOX and VOMS (eli-np.eu, ronbio, etc)



RO-07 overview

- dCache storage used for Romanian ATLAS diskless sites
- dCache upgraded from 7.2 to 8.2 to support token authentication
- 2x100Gbps external network
- 2 location: “computing room” and “storage room” with 100Gbps link interconnectivity
- Site upgraded(more then 160 machines) from CentOS7 to AlmaLinux9
- All the services upgraded using Leapp:
- CentOS7->AlmaLinux8->AlmaLinux9
- WNs using dual stack IPv4/IPv6 – VLANs configured on each node



RO-07 overview

- APC InRow Chilled Water Cooling
- APC UPS 160KVA
- **>6000** CPU
(~**1000** CPU belongs to ATLAS Bucharest Group)
- Blade + "pizza boxes"
16, 20, 32 cores/server

DCI->





RO-07 overview

4x80KVA UPS Emerson
dCache(5xDisk servers)
EOS (2xFTS servers)
6PB total capacity
4PB used capacity

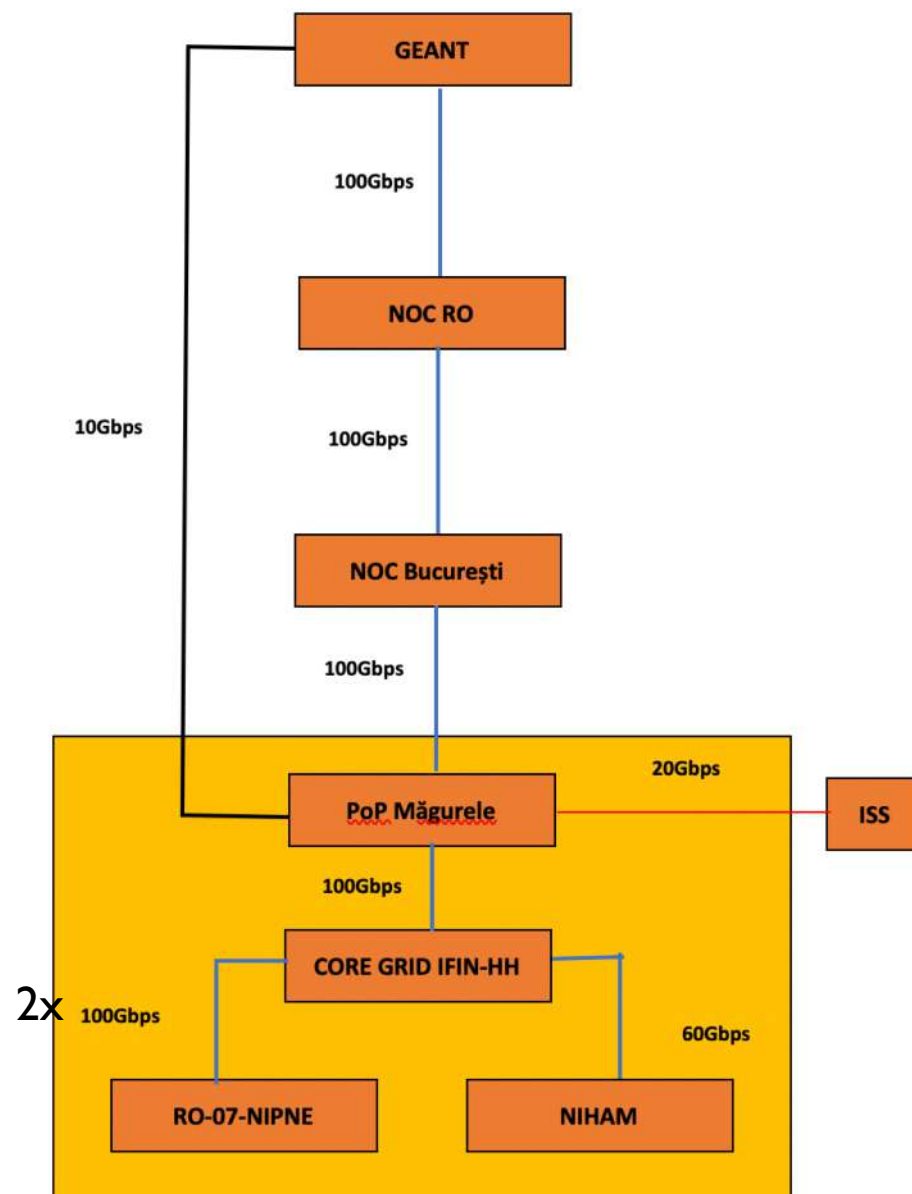
DC2->





IFIN-HH Network

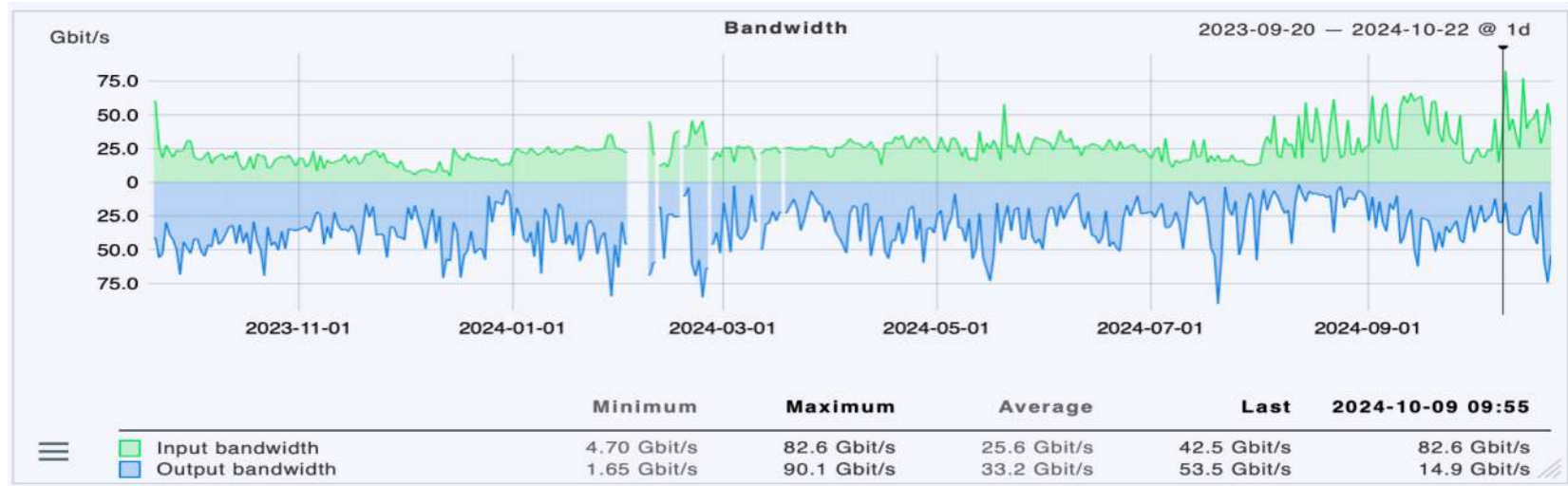
- 100Gbps uplink PoP – NOC – Bucuresti
- **100Gbps** link IFIN-HH(WLCG) – PoP
- **2x100Gbps** link RO-07-NIPNE – IFIN-HH (WLCG)
- **10Gbps** back-up uplink
- Network bandwidth(100/**10Gbps**) shared between grid sites and users network
- Integrated in LHCONe network dual stack IPv4/IPv6 for storage systems
- Implemented IPv6 for CE and WNs



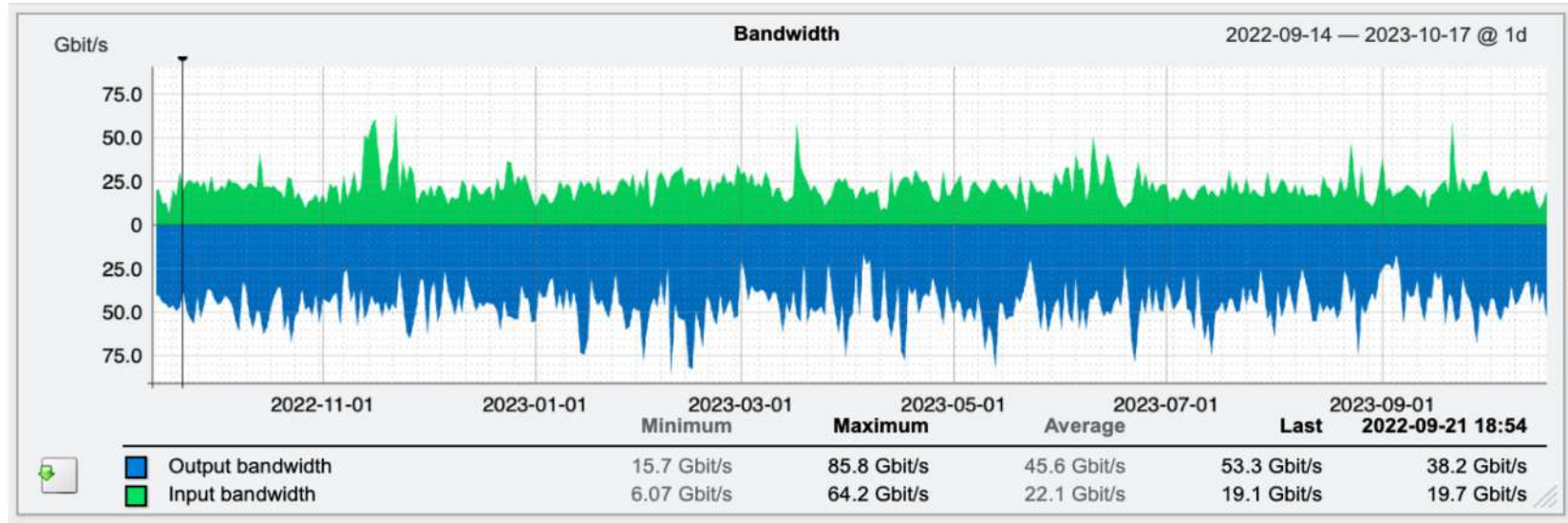


IFIN-HH Network

IFIN-HH WLCG uplink connection – 2024 traffic:



IFIN-HH WLCG uplink connection – 2023 traffic:

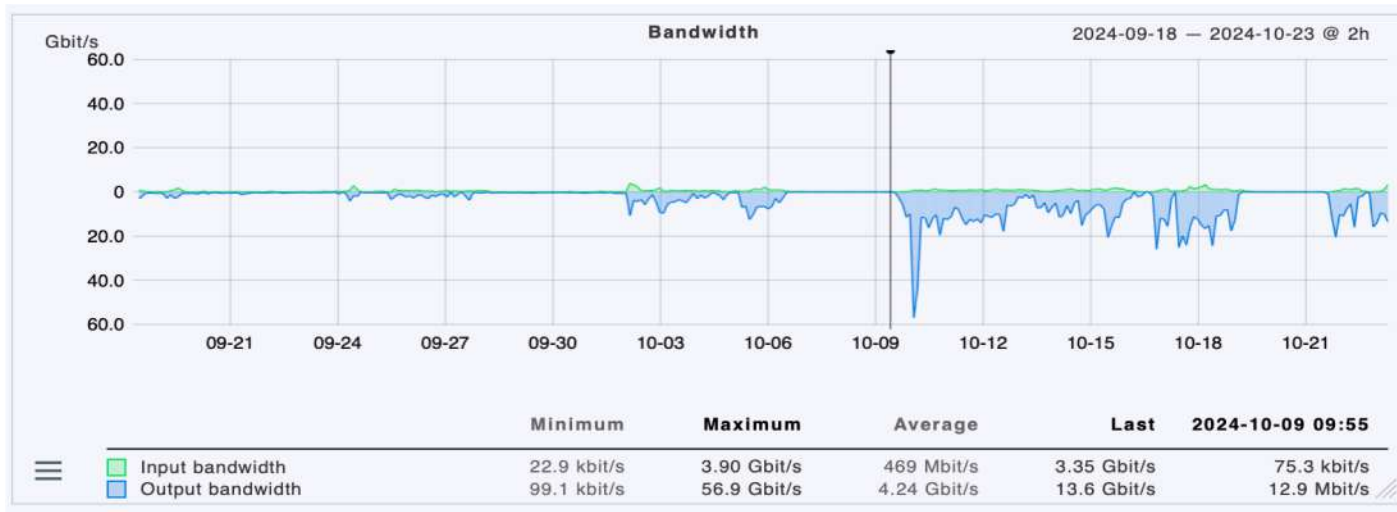




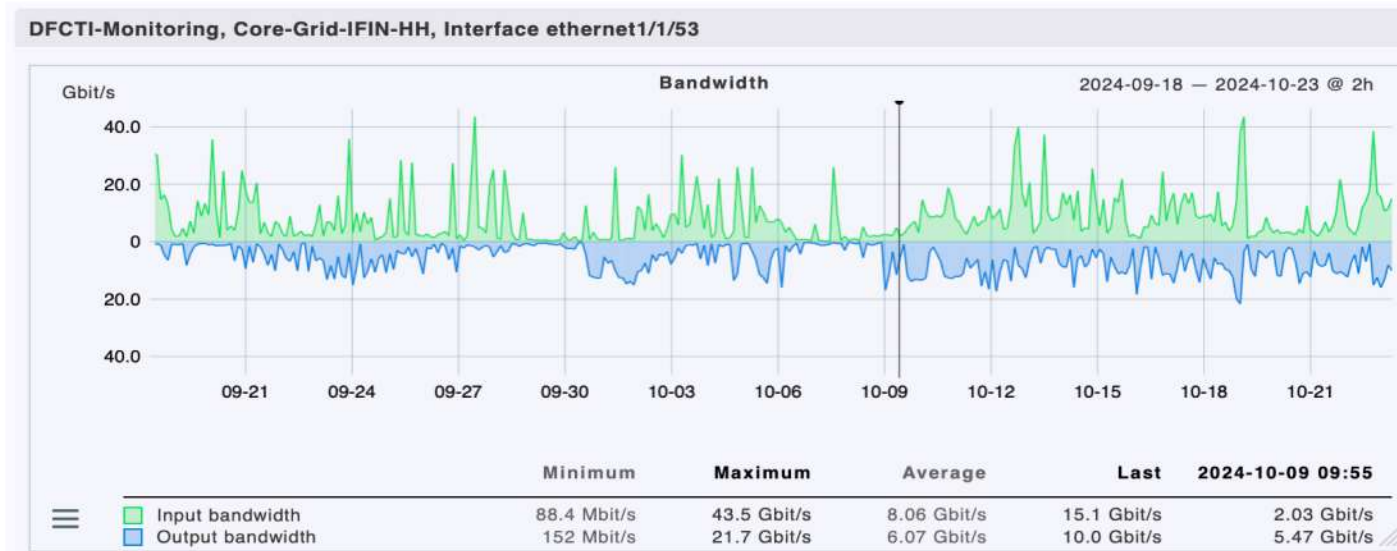
RO-07 External Network

2x100 Gbps external uplinks

RO-07-NIPNE external WNs traffic:



RO-07-NIPNE external storage traffic:



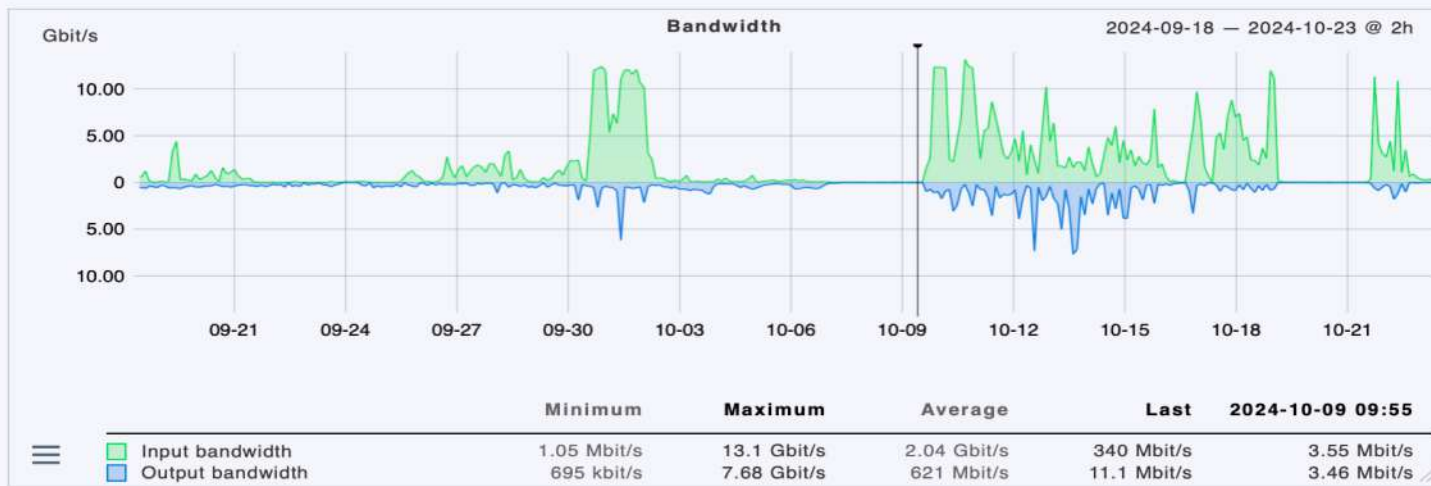


RO-07 External Network

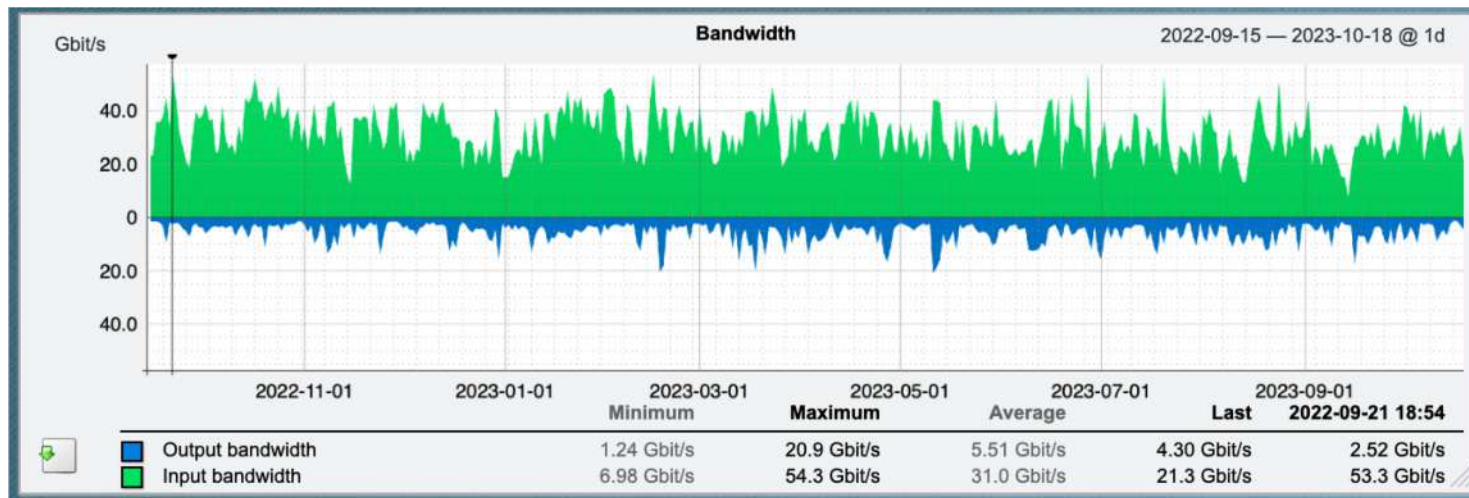
100 Gbps internal uplink:

RO-07-NIPNE internal traffic:

DFCTI-Monitoring, Core-Int-RO-07-APC-New, Interface ethernet1/1/54



RO-07-NIPNE internal traffic from last year:





RO-07 Monitoring & Alarms

- Check-mk +nagios, e-mail, sms, automatic stop for bad nodes
- ~340hosts with 3500 -> 6300 services

Overview

HostsUnhandledState338000

ServicesUnhandledState5626252104

EventsUnhandledState000

Dashboards

Overview

Linux hosts

Windows hosts

Main Overview

Network Topology

Problems

System

Applications

DFCTI

Certificates validity

Current Problems

DHCP

GRID Links

Other departments

RoEDU Main Links

Edit

Host groups

Service groups

GRID Network

Interfaces

Storage mount options

SW Network Interfaces

Views

Overview

All hosts

Linux hosts

Windows hosts

Host search

Service search

Parent / Child topology

Host groups

Service groups

Scheduled downtimes

Comments

Main Overview

Network Topology

Problems

History

System

Checklist dashboard

Alert handler executions

Crash reports

Failed notifications

Pending service discovery

Pending services

Unmonitored services

Event Console

Business Intelligence

Applications

Inventory

DFCTI

Agent update status

Certificates validity

Current Problems

DHCP

DHCP pools

Depts internal Switches and APs

GRID Links

Hosts with service problems

Offices

Other departments

RoEDU Main Links

SSL Certificates

Switches with IP

Metrics

Bandwidth

Round trip average

IT infrastructure efficiency

All hosts

Monitor > Overview > All hosts

CommandsHostsAdd toExportDisplayHelp

Acknowledge problemsSchedule downtimesFilterShow checkboxes

IFIN / GRID / 0

StateHostIconsOKWaUnCrPd

UParc0atlas1.nipne.ro233020

UPbdl.nipne.ro191000

UPcondor1atlas.nipne.ro194000

UPeos.nipne.ro270000

UPfst1.nipne.ro370000

UPfst2.nipne.ro370000

UPgridgw.nipne.ro202010

UPnewvobox.nipne.ro172010

UPperforan1.nipne.ro221000

UPperforan2.nipne.ro01000

UPstorage1.nipne.ro37180170

UPstorage2.nipne.ro1182010

UPstorage3.nipne.ro3415010

UPstorage4.nipne.ro3615020

UPstorage17.nipne.ro2710010

UPtbl00.nipne.ro204020

UPtbl01.nipne.ro201010

UPtbl02.nipne.ro184020

UPvirtual1.nipne.ro283110

IFIN / GRID / 1

StateHostIconsOKWaUnCrPd

DOWNDELL-MD320021010

UPDELL-ME408480000

UPFST1-DeI348040000

UPStorage2-DELLME408470000

UPStorage3-DELL348040000

DOWNStorage3-infotrand21010

UPStorage4-DELL3480-140000

UPStorage4-DELL3480-240000

IFIN / GRID / 2Net-Core

StateHostIconsOKWaUnCrPd

UPCERN-Connect-lasi200000

UPCERN-Connect-NIHAM460000

UPCERN-Connect-RO-7-APC390000

UPCERN-Connect-RO-7-APC-New620000

UPCERN-Connect-RO-7-DC360000

UPCERN-Pub-RO-7330000

UPCORE-RO-7-1GB280000

IFIN / GRID / 2Net-Access

StateHostIconsOKWaUnCrPd

UPAccess012800000

UPAccess024000000

UPAccess042300000

UPAccess052800000

UPAccess103910000

UPAccess112000000

UPAccess121200000

IFIN / GRID / IFIN

StateHostIconsOKWaUnCrPd

UPargus.nipne.ro220010

UPcloud-bdl.nipne.ro330000

UPcloud-ctrl.nipne.ro380000

UPctrl-os.nipne.ro380040

UPnpoc2.nipne.ro232020

UProc.nipne.ro250000

UPtbl06.nipne.ro280010

UPtblui.nipne.ro250000

IFIN / LAN / CORE_NET

StateHostIconsOKWaUnCrPd

UPCore-Grid-IFIN-HW530000

UPCore-GRID-S5232F270000

UPCore-IFIN-ELI-Neffiltr270000

UPCore-IFIN-HH-new1460000

UPCore-IFIN-HW200010

UPCore-IFIN-HH500010

UPDFCTI300000

UPex.nipne.ro100000

UPFortiAnalyzer100000

UPFortiAuthenticator800000

UPFortiGate330000

UPFortiGate-interim492010

UPmail.nipne.ro120000

UPnix100000

UPSW-DFN-S4148T350000

UPWLAN-RUCKUS160000

UPWLAN-Ruckus-vS2110000

IFIN / LAN / DFCTI

StateHostIconsOKWaUnCrPd

UPSW-DataCenter-Cyber250000

UPSW-DataCenter-checkMK340000

UPSW-DFCTI-1130000

UPSW-DFCTI-2150000

UPSW-DFCTI-APC-rack4150000

UPSW-DFCTI-cameraUP520000

UPSW-DFCTI-HPC220000

UPSW-DFCTI-HPC-10Gb640000

UPSW-DFCTI-Operator141000

UPSW-DFCTI-POP370000

UPSW-DFCTI-POP-10Gb200000

UPSW-DFCTI-Profe211000

UPSW-DFCTI-VMware260000

IFIN / LAN / DFCTI / CCA

StateHostIconsOKWaUnCrPd

UPSW-DFCTI-CCA-CBID890000

UPSW-DFCTI-CCA-DC460000

UPSW-DFCTI-CCA-HVAC590000

UPSW-DFCTI-CCA-Idrac350000

UPSW-DFCTI-CCA-Idrac-R1.1110000

UPSW-DFCTI-CCA-server-PDI-R1.7200000

UPSW-DFCTI-CCA-user1280000

IFIN / LAN / DFCTI / HVAC / HVAC-CCA

StateHostIconsOKWaUnCrPd

UPCBID-chiller-A232020

UPCBID-CRV1.11100010

UPCBID-CRV1.21100010

UPCBID-CRV1.31100010

UPCBID-CRV2.140000

UPCBID-CRV2.21100010

UPCBID-CRV2.340000

UPCBID-UPS-A240020

UPCBID-UPS-B230030

UPUPS-CCA_building240040

IFIN / LAN / DFCTI / HVAC / HVAC-Centre-de-Calcul

StateHostIconsOKWaUnCrPd

UPChiller-York100000

UPPDU_APC_DFCTI600000

UPRC_01_DFCTI1200010

UPRC_02_DFCTI500000

UPRC_03_DFCTI110020

UPRC_04_DFCTI1200010

UPRC_05_DFCTI600000

UPRC_06_DFCTI600000

UPRC_07_DFCTI100020

UPRC_08_DFCTI600000

UPRC_09_DFCTI110010

UPRC_10_DFCTI110020

UPSenzori_APC_DFCTI251050

UPStruxureAPC_DFCTI190000

UPUPS-POP600000

UPUPS_APC_DFCTI150000

IFIN / LAN / Departamente / Grup2

StateHostIconsOKWaUnCrPd

UPBiblioteca260000

UPC3S-Scoolov210000

UPCentru-Conferinta230000

UPDFPE-C5170000

UPDFPE-C21-PDI230000

UPDFPE-C24-Alexa360000

UPDFPE-Lucian700000

UPDoctorant1160000

UPSDIALA-BioTurn600000

UPSW-DFT-ei0170000

UPSW-DFT-ei1121000

UPSW-DFT-ei2204000

UPTEORIE230000

IFIN / no_Agent

StateHostIconsOKWaUnCrPd

UP46.243.116.129100000

UP81.180.86.1100000

UP194.102.58.1100000

UPBackupLink-RoEdu100000

UPMainLink-CFR-to-google100000

UPtao.nipne.ro100000

178 rows



RO-07 Monitoring

RO-07-NIPNE infrastructure:

IFIN / GRID / 0							
State	Host	Icons	OK	Wa	Un	Cr	Pd
UP	arc6atlas1.nipne.ro	≡	23	3	0	2	0
UP	bdii.nipne.ro	≡	19	1	0	0	0
UP	condor1atlas.nipne.ro	≡	19	4	0	0	0
UP	eos.nipne.ro	≡	27	0	0	0	0
UP	fst1.nipne.ro	≡	37	0	0	0	0
UP	fst2.nipne.ro	≡	67	0	0	0	0
UP	gridgw.nipne.ro	≡	20	2	0	1	0
UP	newvobox.nipne.ro	≡	17	2	2	1	0
UP	perfsonar1.nipne.ro	≡	22	1	0	0	0
UP	perfsonar2.nipne.ro	≡	0	1	0	1	0
UP	storage1.nipne.ro	≡	37	18	0	17	0
UP	storage2.nipne.ro	≡	118	2	0	1	0
UP	storage3.nipne.ro	≡	34	15	0	1	0
UP	storage4.nipne.ro	≡	36	15	0	2	0
UP	storage17.nipne.ro	≡	27	10	0	1	0
UP	tbit00.nipne.ro	≡	20	4	0	2	0
UP	tbit01.nipne.ro	≡	20	1	0	1	0
UP	tbit02.nipne.ro	≡	18	4	0	2	0
UP	virtual1.nipne.ro	≡	28	3	1	1	0

IFIN / GRID / 1							
State	Host	Icons	OK	Wa	Un	Cr	Pd
DOWN	DELL-MD3200	≡	2	1	0	1	0
UP	DELL-ME4084	≡	8	0	0	0	0
UP	FST1-Dell3460	≡	4	0	0	0	0
UP	Storage2-DELLME4084	≡	7	0	0	0	0
UP	Storage3-DELL3460	≡	4	0	0	0	0
DOWN	Storage3-Infotrand	≡	2	1	0	1	0
UP	Storage4-DELL3460-1	≡	4	0	0	0	0
UP	Storage4-DELL3460-2	≡	4	0	0	0	0

IFIN / GRID / 1Net-Core							
State	Host	Icons	OK	Wa	Un	Cr	Pd
UP	CERN-Connect-Iasi	≡	2	0	0	0	0
UP	CERN-Connect-NIHAM	≡	46	0	0	0	0
UP	Core-Int-RO-07-APC	≡	38	0	0	0	0
UP	Core-Int-RO-07-APC-New	≡	62	0	0	0	0
UP	Core-Int-RO-07-DC	≡	36	0	0	0	0
UP	CORE-Pub-RO-07	≡	33	0	0	0	0
UP	CORE-RO-07-1GB	≡	28	0	0	0	0

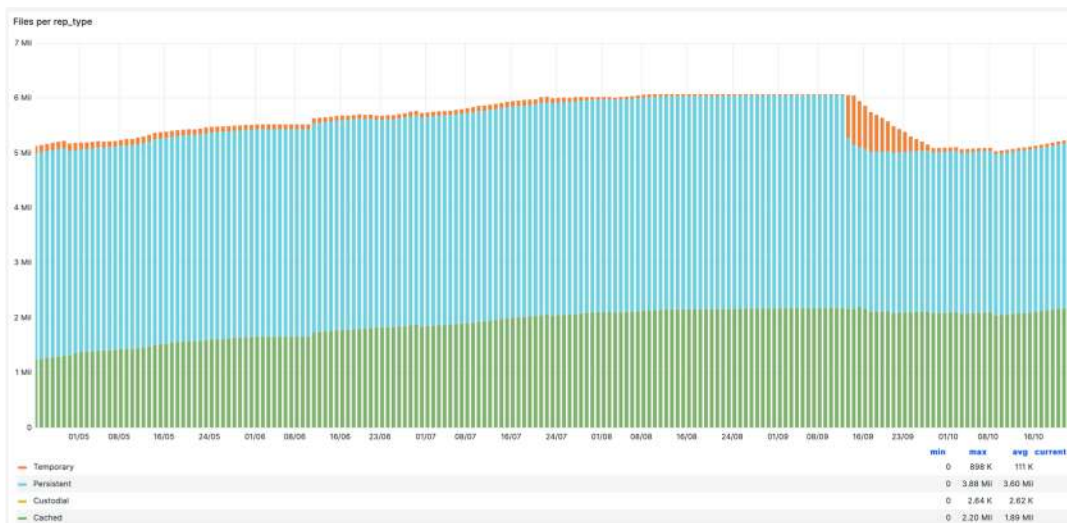
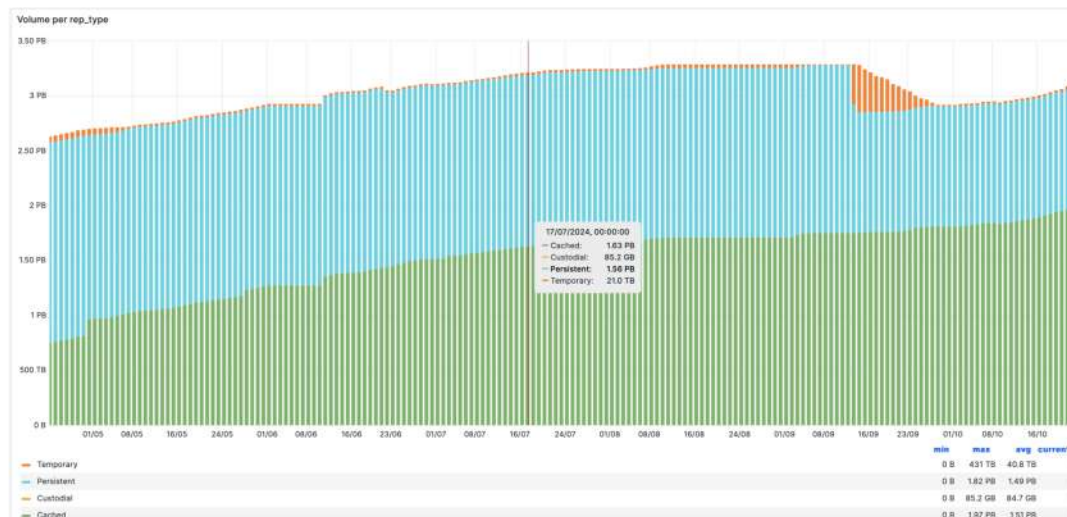
IFIN / GRID / 2Net-Access							
State	Host	Icons	OK	Wa	Un	Cr	Pd
UP	Access01	≡	28	0	0	0	0
UP	Access02	≡	40	0	0	0	0
UP	Access04	≡	23	0	0	0	0
UP	Access05	≡	28	0	0	0	0
UP	Access10	≡	39	1	0	0	0
UP	Access11	≡	20	0	0	0	0
UP	Access12	≡	12	0	0	0	0

IFIN / LAN / DFCTI / HVAC / HVAC-Centru-de-Calcul							
State	Host	Icons	OK	Wa	Un	Cr	Pd
UP	Chiller-York	≡	1	0	0	0	0
UP	PDU_APC_DFCTI	≡	6	0	0	0	0
UP	RC_01_DFCTI	≡	12	0	0	1	0
UP	RC_02_DFCTI	≡	5	0	0	0	0
UP	RC_03_DFCTI	≡	11	0	0	2	0
UP	RC_04_DFCTI	≡	11	1	0	1	0
UP	RC_05_DFCTI	≡	6	0	0	0	0
UP	RC_06_DFCTI	≡	6	0	0	0	0
UP	RC_07_DFCTI	≡	11	0	0	1	0
UP	RC_08_DFCTI	≡	6	0	0	0	0
UP	RC_09_DFCTI	≡	11	0	0	1	0
UP	RC_10_DFCTI	≡	11	0	0	2	0
UP	Senzori_APC_DFCTI	≡	24	2	0	5	0
UP	StruxureAPC_DFCTI	≡	19	0	0	0	0
UP	UPS-POP	≡	8	0	0	0	0
UP	UPS_APC_DFCTI	≡	15	0	0	0	0



RO-07 Activity

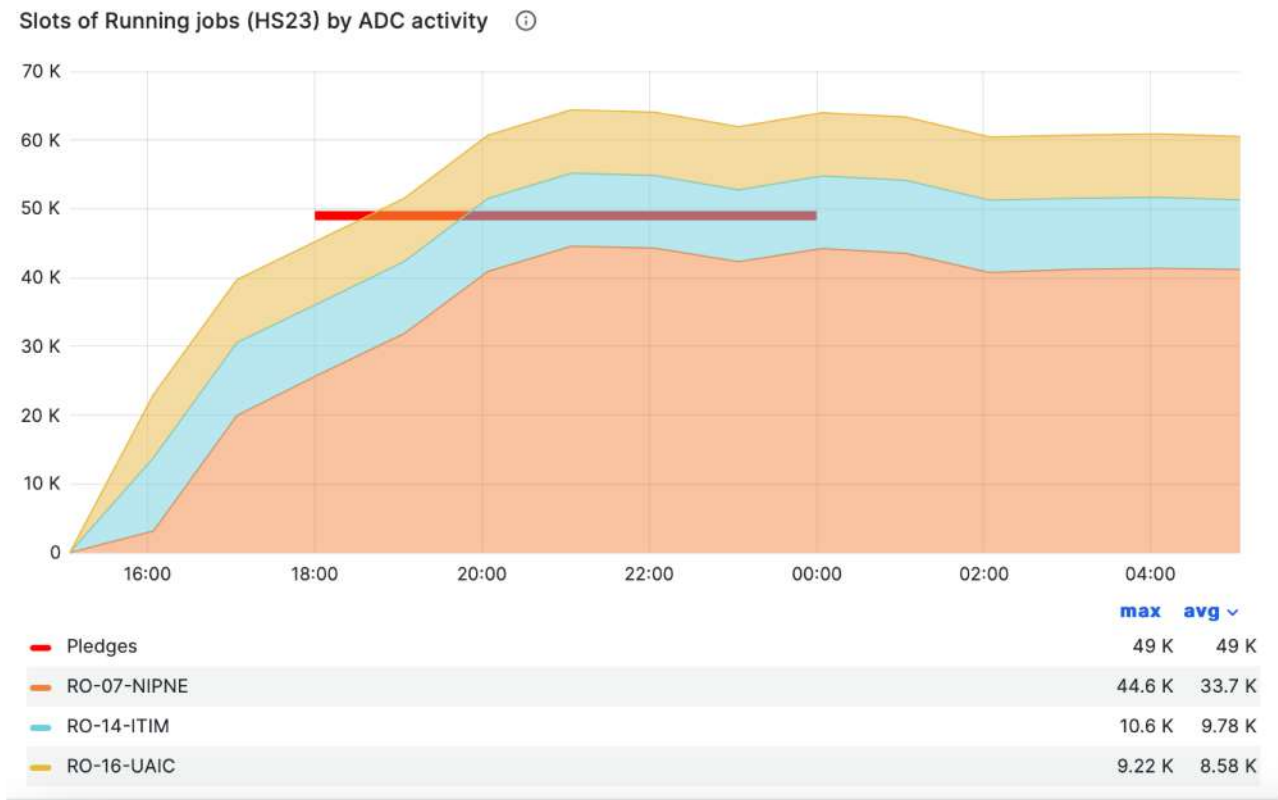
- dCache
spacetokens
deployed dedicated
for ATLAS used
also by the other
romanian ATLAS
sites (diskless) and
for LHCb 4,6PB
- dCache upgraded
from 7.2 to 8.2 for
enable token
authentication
- Head-node and disk
servers migrated
from CentOS7 to
AlmaLinux9





RO-07 Activity

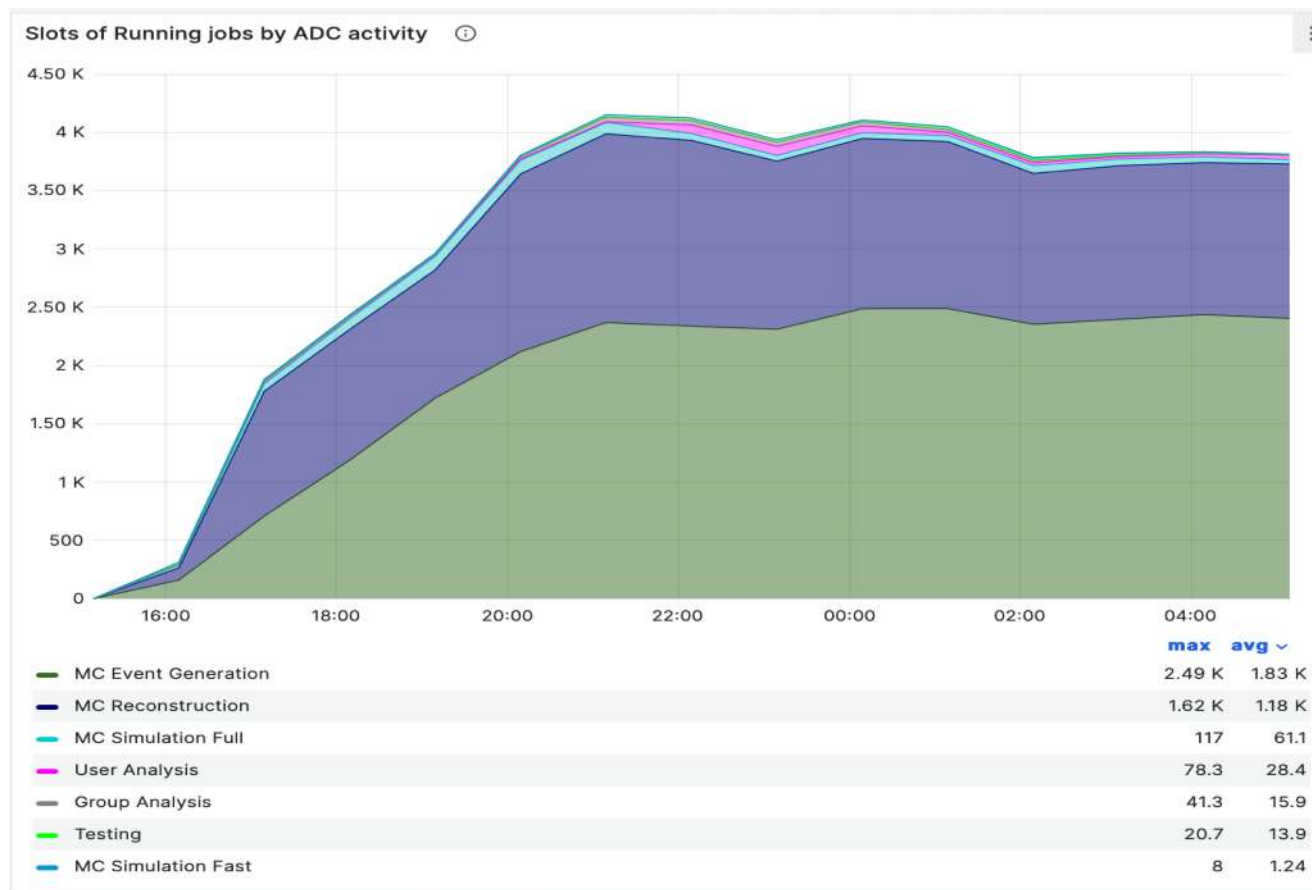
- dCache spacetokens deployed dedicated for ATLAS used also by the other romanian ATLAS sites (diskless) and for LHCb 4,6PB
- dCache upgraded from 7.2 to 8.2 for enable token authentication
- Head-node and disk servers migrated from CentOS7 to AlmaLinux9





RO-07 Activity

- EOS storage dedicated to Alice experiment of 1PB capacity





Future plans

By the end of 2024

- Replace Cisco ASR 9006 router with Cisco ASR 9902 router, that support 100Gbps interfaces
- Install and configure ~1PB of storage for ATLAS and LHCb
- Decommission old storage(due to slow transfer and lack of spare disks)

2025

- Increase the number of computing nodes(depends on the future budget)
- Increase the storage(depends on the future budget)
- Increase the back-up connectivity bandwidth



Present & Future





Present & Future





Thank you!
Any question?