Romanian distributed infrastructure for advanced scientific computing

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ROMANIAN TIER-2 FEDERATION

The beginning of the distributed infrastructure for scientific computing in Romania is related to the necessity of the computational support for the processing and analysis of a large amount of experimental data by the groups of researchers in elementary particle / high energy physics (HEP).

The preparation of the offline computing support in the perspective of the LHC commissioning, together with the funding provided by the EGEE projects have led to the connection of the few HTC centres managed by HEP experimentalists to the LHC Computing Grid (LCG), and later to the Worldwide LCG Collaboration (WLCG).
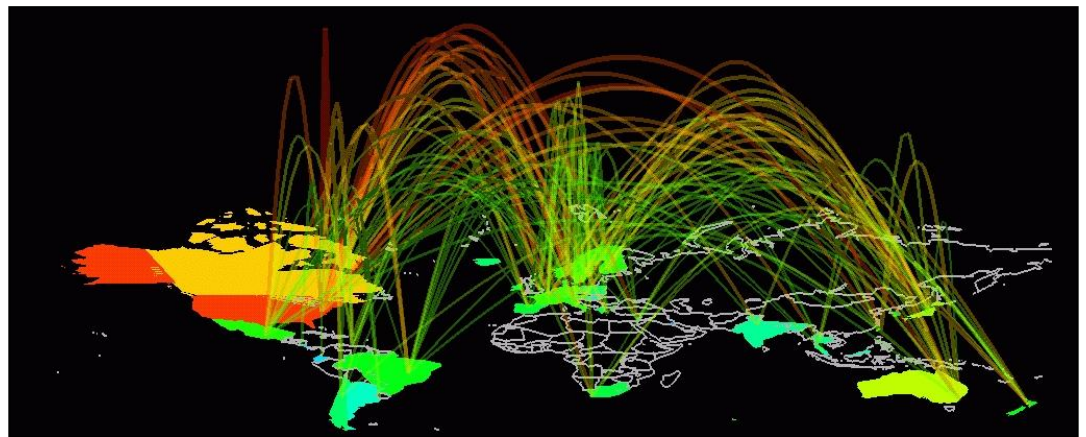
ROMANIAN TIER-2 FEDERATION

The national LCG sites are grouped since 2006 (when the WLCG MoU was signed) into the **RO-LCG consortium**: 3 institutes, 2 universities

❑ 'Horia Hulubei' NIRD in Physics and Nuclear Engineering (IFIN-HH) - coordinator
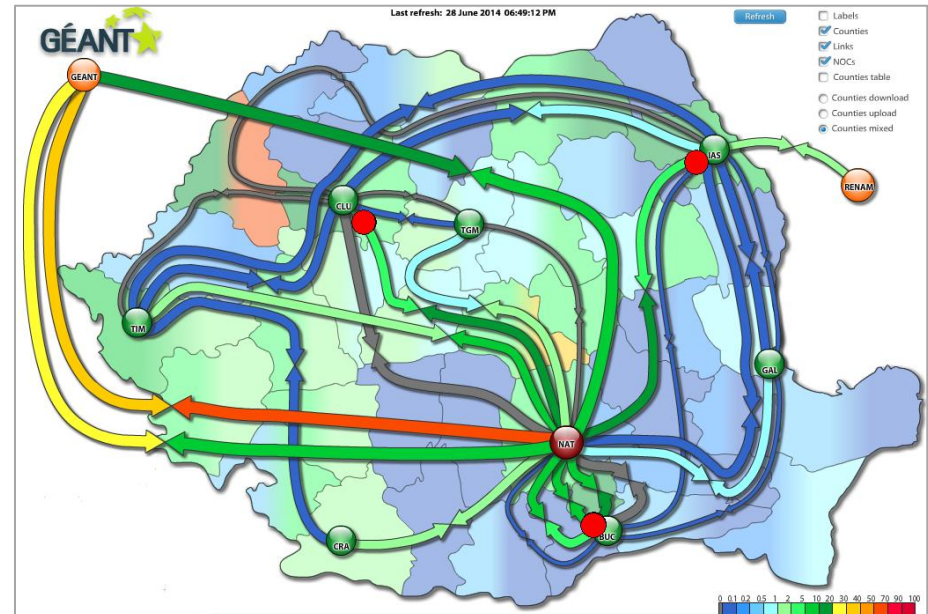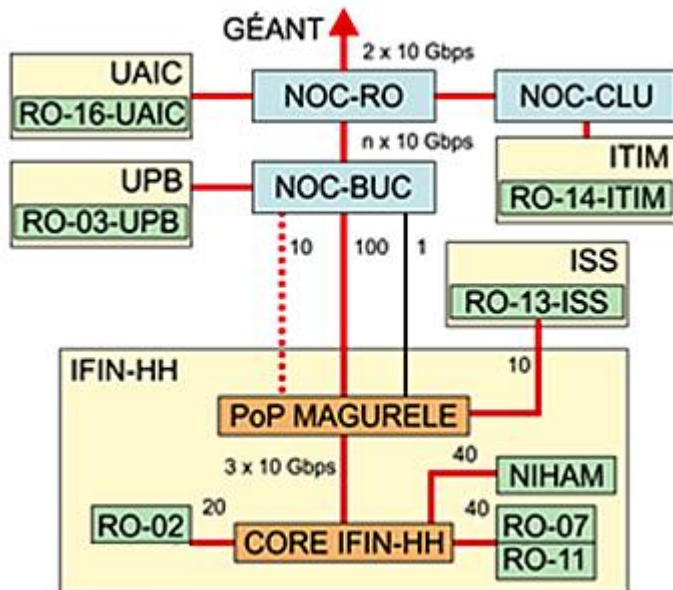
❑ Space Science Institute (ISS)

❑ NIRD for Isotopic and Molecular Technology, Cluj (ITIM)

❑ 'Alexandru Ioan Cuza' University, Iasi (UAIC)

❑ Politehnica University Bucharest (UPB)

RO-LCG contribution to WLCG

❑ RO-LCG currently provides more than 11,000 CPU cores and 7 PetaBytes storage capacity for 3 of the 4 major experiments conducted at LHC (ALICE, ATLAS and LHCb)

❑ With 52,449,000 CPU core hours run in 2018, that represented almost 2% of the total wallclock time provided by all 37 Tier2s for the 4 major LHC experiments, RO-LCG ranked 10th worldwide

❑ The same ranking holds for the CPU time consumed by the grid jobs (39,630,000 hours)

National Grid Infrastructure

The **Romanian National Grid Infrastructure** (**NGI_RO**) is an open consortium of seven research and academic institutions whose purpose is to promote, implement, maintain and operate the national distributed computing infrastructure for science and education. [http://ngi-ro.ifin.ro/]

Among the NGI_RO **objectives**: Provision of top quality services of **grid** and **cloud** computing, data storage and management, to the national research and academic communities.

NGI_RO:

- is part of **EGI = EU Infrastructure for Advanced Research**, https://www.egi.eu
- is represented by IFIN-HH in the **EGI Council**, https://www.egi.eu/about/egi-council/
- provides IaaS within the **EGI Federated Cloud** (https://www.egi.eu/federation/), through the CLOUDIFIN site (which was registered in EGI FedCloud in 2017)
- IFIN-HH participates in the **EOSC-hub** project, as partner of the **EGI.eu Foundation**

Integrating and managing services for the European Open Science Cloud, https://eosc-hub.eu/ , H2020, 2018-2020

'Horia Hulubei'
National Institute for R&D in
Physics and Nuclear Engineering

IFIN-HH

National Institute for R&D of
Isotopic and Molecular
Technologies
Cluj-Napoca

Institute of Space Science

ISS

'Alexandru Ioan Cuza' University
of Iasi

West University
of Timisoara

'Politehnica' University
of Bucharest

'Ovidius' University
of Constanta

Members: 3 R&D institutes + 4 universities located in 5 cities

Resource centers: all 7 RO-LCG sites + one HTC centre (GRIDIFIN) and a Cloud computing centre (CLOUDIFIN)

GRIDIFIN provides user access to the parallel computing resources, both in CPU and GPGPU technologies, as well as sequential computing support, for nuclear and astro-physics, nanophysics, biology, multi- and interdisciplinary research. The main user community is ELI-NP (*PIC* simulations)

CLOUDIFIN currently supports the VOs: *eli-np.eu*, *ronbio.ro* (computational biology), *gridifin.ro* (nano- and condensed matter physics), *fedcloud.egi.eu*, *biomed* (medicine), and *benchmark.terradue.com* (partnership EGI+ESA within the project „*Copernicus Space Component Worldwide Sentinels Data Access Benchmark*"

	NGI_RO		Search

NGI_RO — Operations Center Information

+ 🏠 CLOUDIFIN || romania — Site Information

+ 🏠 GRIDIFIN || romania — Site Information

+ 🏠 NIHAM || romania — Site Information

+ 🏠 RO-03-UPB || romania — Site Information

+ 🏠 RO-07-NIPNE || romania — Site Information

+ 🏠 RO-11-NIPNE || romania — Site Information

+ 🏠 RO-13-ISS || romania — Site Information

+ 🏠 RO-14-ITIM || romania — Site Information

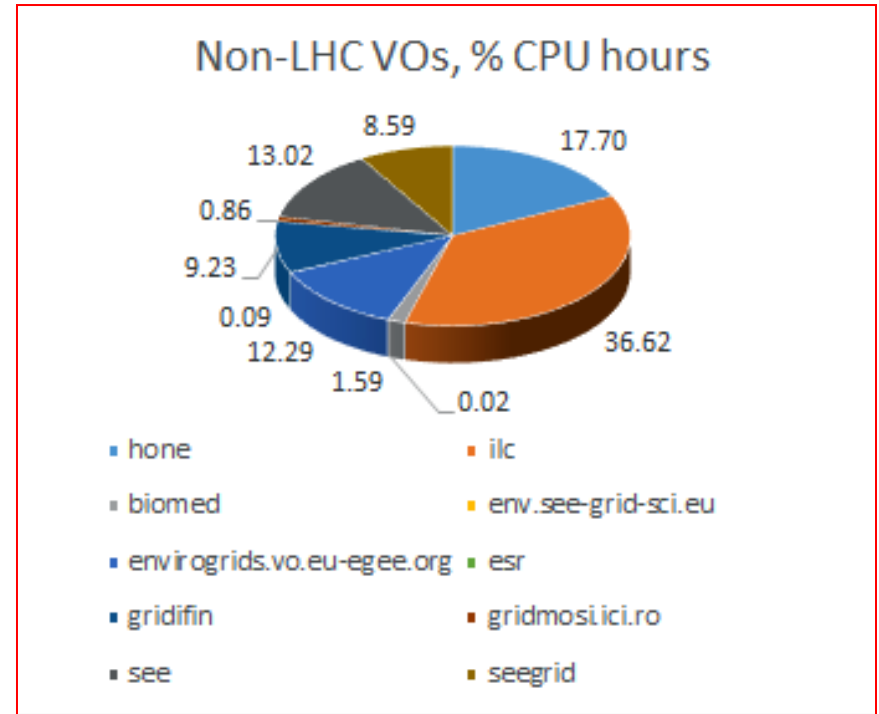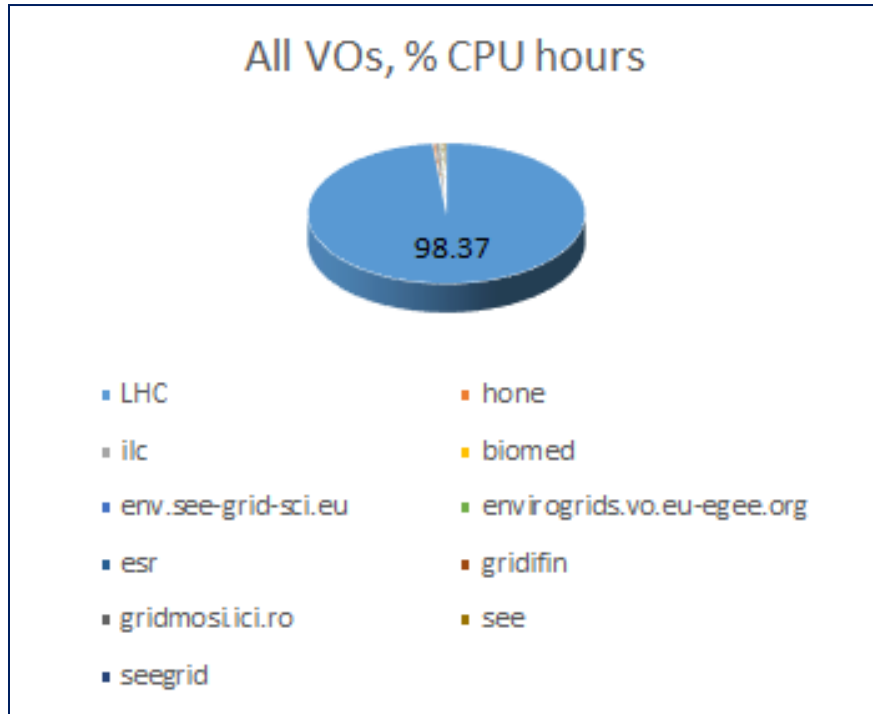+ 🏠 RO-16-UAIC || romania — Site Information

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Lesson of the past on (non-)sustainability

NGI_RO in 2014: the number of active (EGI certified) sites decreased from 17 to 10

Name	Certification Status	Production Status	Scope(s)
RO-18-INCDTP	Uncertified	Production	Local
RO-15-NIPNE	Certified	Production	EGI
RO-08-UVT	Uncertified	Production	Local
RO-14-ITIM	Certified	Production	EGI
RO-01-ICI	Certified	Production	EGI
RO-11-NIPNE	Certified	Production	EGI
NIHAM	Certified	Production	EGI
RO-12-ICI	Closed	Production	EGI
RO-03-UPB	Uncertified	Production	Local
RO-09-UTCN	Certified	Production	EGI
RO-07-NIPNE	Certified	Production	EGI
PPS-RO-01-UPB	Closed	PPS	EGI
RO-13-ISS	Certified	Production	EGI
RO-17-INCDMTM	Uncertified	Production	Local
RO-19-UCV	Uncertified	Production	Local
RO-02-NIPNE	Certified	Production	EGI
RO-16-UAIC	Certified	Production	EGI

Lesson of the past on (non-)sustainability

Grid usage in 2014: 98.37% of CPU hours ran for the LHC user communities

All VOs, % CPU hours

98.37

- LHC
- ilc
- env.see-grid-sci.eu
- esr
- gridmosi.ici.ro
- seegrid
- hone
- biomed
- envirogrids.vo.eu-egee.org
- gridifin
- see

Non-LHC VOs, % CPU hours

8.59
13.02
0.86
9.23
0.09
12.29
1.59
0.02
17.70
36.62

- hone
- biomed
- envirogrids.vo.eu-egee.org
- gridifin
- see
- ilc
- env.see-grid-sci.eu
- esr
- gridmosi.ici.ro
- seegrid

Supported by sites that dont't exist today because the project funding and/or the local interest ended:
`envirogrids.vo.eu-egee.org` - models/scenarios for environment of Black Sea Catchment [FP7]
`see, seegrid` - regional (South East Europe) [FP7]
`hone` (36%), `ilc` (17%) – High Energy Physics

Grid sites created by and dedicated to relatively short life projects died with the projects

Contribution to the sustainable development

The Romanian distributed infrastructure for advanced scientific computing is open and adaptable towards the support of various topics with significant impact on the sustainable regional development.

In particular, it can contribute to the following prioritary areas:

• The development of the knowledge-based society through research, education and information technology - by extending NGI_RO support to topics which are applicative and with social impact

• Support of business competitiveness - through HTC/Cloud services provided to, e.g., SMEs

Provision of Cloud and HTC services for enterprises and technological clusters interested in the economic applications of the results of the research and development activity.

Also, providing technical assistance, consultancy, expertise, provision of computer and technological applications on the profile of Cloud and HTC for the economic environment

• Investing in people and capacities - NGI_RO is capable to create highly-qualified jobs and to increase the competitiveness of human resources through professional development in the IT field, in which the demand for labor force is growing.

Partner universities will play a key role in this direction.

THANK YOU
FOR YOUR ATTENTION !

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