

Scientific HPC Infrastructures

Introduction

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- ▶ To introduce scientific computing
- ▶ Get a different perspective
- ▶ Get an idea of what you can do
- ▶ Briefly mention existing infrastructures

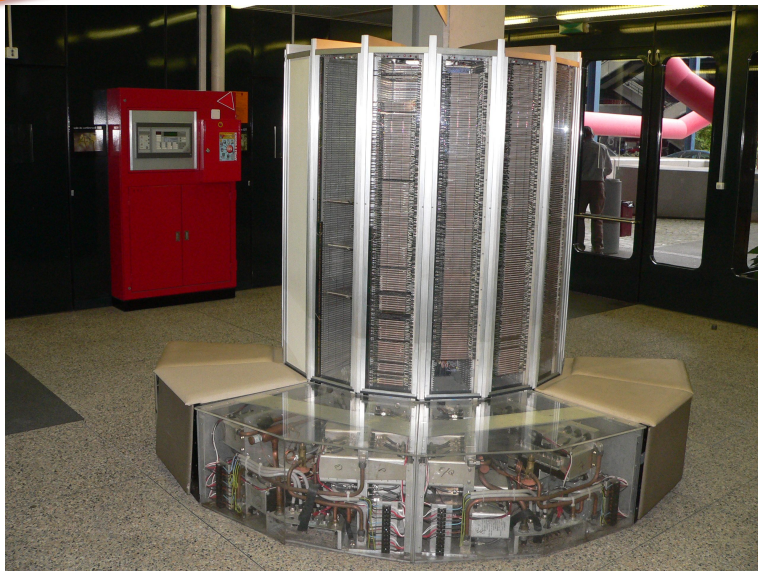
- ▶ For anyone doing any kind of research
- ▶ Widely ranging in scale and requirements
- ▶ Computing-intensive tasks
- ▶ Data-intensive tasks (*"Big Data"*)
- ▶ Reliably sharing open data & protecting sensitive data

- ▶ Computing with a particular set of requirements
- ▶ Working on demanding problems
 - ▶ performance (CPU, IO, bandwidth)
 - ▶ storage capacity (short-term, long-term)
 - ▶ scale (1k+ machines, distributed logically and geographically)
- ▶ Raw computing power and storage capacity, no “tricks”

- ▶ High-energy physics (Alice, Atlas, CMS, LHCb)
- ▶ Biology (genomics, protein analysis)
- ▶ Medicine (patient data analysis, drug development)
- ▶ Digital data preservation (truly long-term)
- ▶ Environmental sciences & Earth exploration
- ▶ Astronomy, . . .

– HPC Infrastructures –

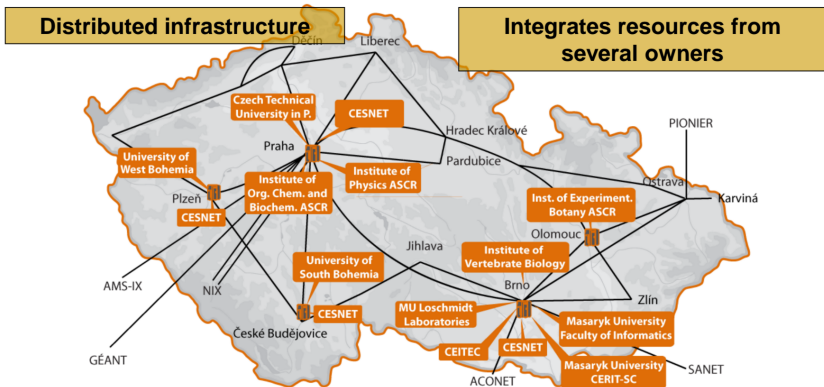
- ▶ Supercomputers (Cray, Deep Blue, ...)
- ▶ Local computing clusters (small scale)
- ▶ Grid (→ HEP) (large scale)
- ▶ *Cloud* (generic, structurally opaque)







- ▶ CESNET
 - ▶ MetaCentrum (→ NGI_CZ)
 - ▶ data, networking, identity, research
 - ▶ see <http://www.metacentrum.cz/en/>
- ▶ CERIT-SC
 - ▶ transformed Supercomputing Center Brno (SCB)
 - ▶ see <http://www.cerit-sc.cz/en/>
- ▶ IT4Innovations
 - ▶ National Supercomputing Center (academia + industry)
 - ▶ see <http://www.it4i.cz/?lang=en>



Computing services:

- ▶ grid computing
- ▶ cloud computing
- ▶ Hadoop
- ▶ specialized environments

Storage services:

- ▶ NGI storage systems
- ▶ CESNET DU

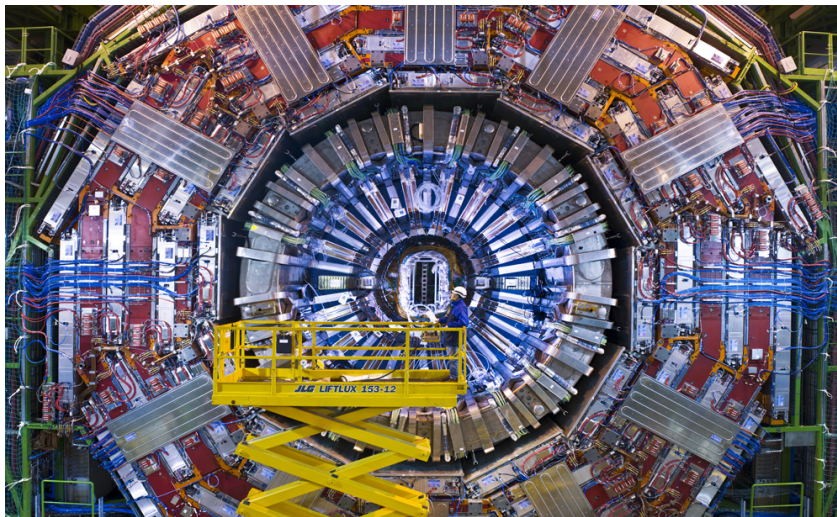
Collaboration & Support services:

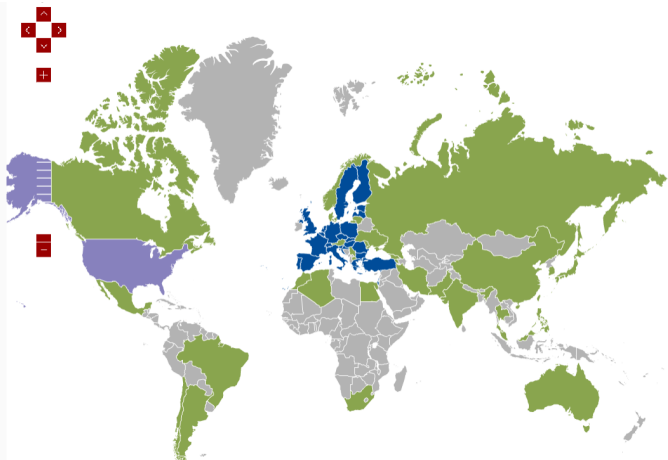
- ▶ interdisciplinary and infrastructure research (CERIT-SC)
- ▶ user support activities

- ▶ EGI (formerly known as *European Grid Infrastructure*)
- ▶ WLCG (*The Worldwide LHC Computing Grid*)
 - ▶ High-energy physics community (*HEP*)
 - ▶ CERN (*The European Organization for Nuclear Research*)
- ▶ PRACE Research Infrastructure









Caption (as of July 2015)
 blue: EGI council members
 green: integrated resource infrastructure providers
 purple: peer resource infrastructure providers

- ▶ No Longer Just HEP
- ▶ Bio-informatics, Ecology, Chemistry, Geology, ...
- ▶ The Long Tail of Science
- ▶ Scientific Gateways (DIRAC, Chipster, COMPSs, Catania SG)

– That's All Folks! –

...

Do you have any questions?

- ▶ ask **NOW!**
- ▶ ask directly at parak@cesnet.cz or sustr4@cesnet.cz
- ▶ send your questions to cloud@metacentrum.cz