Helix Nebula – The Science Cloud
Introduction and Overview

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CHEP 2016 San Francisco – contribution # 397
Scale of LHC Data Tomorrow
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Short term: until end of Run 2

Estimated: Estimates made in 2014 for Run 2 up to 2017
20%: Growth of 20%/yr starting in 2016 (“flat budget”)

Ian Bird, WLCG workshop Oct 2016
Scale of LHC Data Tomorrow

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2026: HL-LHC

Data estimates for 1st year of HL-LHC (PB)

Raw Derived Data estimates for 1st year of HL-LHC (PB)

ALICE ATLAS CMS LHCb

Ian Bird, WLCG workshop Oct 2016
Scale of LHC Data Tomorrow

Short term: until end of Run 2

Data:
- Raw 2016: 50 PB → 2027: 600 PB
- Derived (1 copy): 2016: 80 PB → 2027: 900 PB

Estimated: Estimates made in 2014 for Run 2 up to 2017
20%: Growth of 20%/yr starting in 2016 ("flat budget")

CPU Needs for 1st Year of HL-LHC (kHS06)

- x60 from 2016

2026: HL-LHC

Ian Bird, WLCG workshop Oct 2016
Future Requirements

- Not only LHC, but a number of particle physics projects with high data rates
- Not only particle physics, but also other physics fields (e.g. astronomy)
- Not only physics, but also other sciences (e.g. life sciences, material science)
  - E.g. EBI: Data doubles every 12 months
Scaling up: Public Clouds (1)

- Additional resources, perhaps later replacing on-premise capacity
- Potential benefits:
  - Economy of scale
  - More elastic, adapts to changing demands
  - Somebody else worries about machines and infrastructure
Scaling up Further: Public Clouds (2)

- Potential issues:
  - Cloud provider’s business models not well adapted to procurement rules and procedures of public organisations
  - Lack of skills for and experience with procurements
  - Market largely not targeting compute-heavy tasks
    - Performance metrics/benchmarks not established
  - Legal impediments
  - Not integrated with on-premise resources and/or publicly funded e-infrastructures
HELIX NEBULA Science Cloud
Joint Pre-Commercial Procurement

Procurers: CERN, CNRS, DESY, EMBL-EBI, ESRF, IFAE, INFN, KIT, SURF-Sara, STFC

Experts: Trust-IT & EGI.eu

The group of procurers have committed
• >1.6M€ of procurement funds
• Manpower for testing/evaluation
• Use-cases with applications & data
• In-house IT resources

To procure innovative IaaS level cloud services integrated into a hybrid cloud model
• Commercial cloud services
• European e-Infrastructures

Services will be made available to end-users from many research communities

Co-funded via H2020 (Jan’16-Jun’18)
• Grant Agreement 687614

Total procurement commitment >5M€
User groups to be supported

- High Energy Physics
  - LHC experiments
  - Belle II
  - COMPASS
- Astronomy
  - CTA – Cherenkov Telescope Array
  - MAGIC
  - Pierre Auger Observatory
- Life Sciences
  - ELIXIR
  - Euro-BioImaging
  - Pan-Cancer
  - BBMRI
  - WeNMR
- Photon/Neutron science
  - PETRA III, European XFEL, 3DIX, OCEAN, OSIRIS
- Long tail of science
Technical Challenges

Compute
- Integration of some HPC requirements

Storage
- Caching at provider’s site, if possible automatically (avoid managed storage)

Network
- Connection via GÉANT
- Support of identity federation (eduGAIN) for IT managers

Procurement
- Match of cloud providers’ business model with public procurement rules
HNSciCloud Project Phases

We are here

Preparation

- Analysis of requirements, current market offers and relevant standards
- Build stakeholder group
- Develop tender material

Implementation and sharing

- 4 Designs
- 3 Prototypes
- 2 Pilots

Each step is competitive - only contractors that successfully complete the previous step can bid in the next

Tender

Call-off

Call-off

Jan’16

200+ downloads 70+ requests for clarifications

Dec’18
HNSciCloud – Current Status

- Official start of project: Jan 2016, duration: 30 months
- Tender announced in Jan 2016
- 17-Mar-2016: Open market consultation
- 21-Jul-2016: Tender issued (> 200 downloads, > 70 requests for clarification)
- 07-Sep-2016: Tender information day – design phase
- 19-Sep-2016: Deadline for tender replies
  - Sufficient number of valid tenders received
  - Evaluation by administrative and technical experts
- 07-Oct-2016: Award decision, contracts
- 02-Nov-2016: Kick-off meeting with contractors
Summary

Commercial cloud services are expected to play an increasing role in the computing models of scientific Research Infrastructures as part of a hybrid cloud platform.

Such a hybrid cloud platform has the potential to serve many high-profile research projects.

Helix Nebula Science Cloud is a Pre-Commercial Procurement project with a budget of more than 5M€ that is co-funded by the European Commission.

The objective is to produce a hybrid cloud platform for the European research community.

Changes to the procurement process in the public research sector are necessary to benefit from a dynamic Digital Single Market and should be supported by the platform.

A hybrid cloud poses a number of technical challenges that are being addressed by Helix Nebula Science Cloud.

Helix Nebula Science Cloud is the first in a foreseen series of EC co-funded projects which will contribute to the European Cloud Initiative.