



**GHENT  
UNIVERSITY**

# HPC-UGENT USER MEETING 2017

Dr. Ewald Pauwels  
[hpc@ugent.be](mailto:hpc@ugent.be)  
<http://hpc.ugent.be>

15/12/2017

# PROGRAM

- (13h00: Optional tour of datacenter)
- 14h00: Welcoming address
- 14h15: Overview of HPC-UGent, VSC, future plans
- 14h45: Review of user poll results, Q&A
- 15h15: User in the spotlight - Pieter Reyniers, LCT
- 15h45: Slots for 1-minute poster presentations
- 16h15 - 18h00 Networking reception & poster session

# ABOUT HPC-UGENT

Part of ICT department, Infrastructure office

## **Mission**

HPC-UGent provides centralised scientific computing services, training, and support for researchers from Ghent University, industry, and other knowledge institutes.

# ABOUT HPC-UGENT

## Personnel

- User support
- Training
- Infrastructure installation and upkeep (software & hardware)
- Outreach + marketing
- Collaboration with other supercomputing centers



Alvaro Simon Garcia  
*Cloud, user support*



Andy Georges  
*Sysadmin, integration*



Ewald Pauwels  
*Team lead*



Jens Timmerman  
*Security, sysadmin*



Kenneth Hoste  
*User support*



Kenneth Waegeman  
*Sysadmin, storage*



Stijn De Weirdt  
*Technical lead*



Wouter Depypere  
*Sysadmin*

# HPC-UGENT INFRASTRUCTURE



## Storage

\$VSC_HOME	35 TB	
\$VSC_DATA	702 TB (1 PB)	2017-Q2
\$VSC_SCRATCH	1 PB	2017-Q2
\$VSC_SCRATCH_KYUKON		
\$VSC_SCRATCH_PHANPY	35 TB SSD	

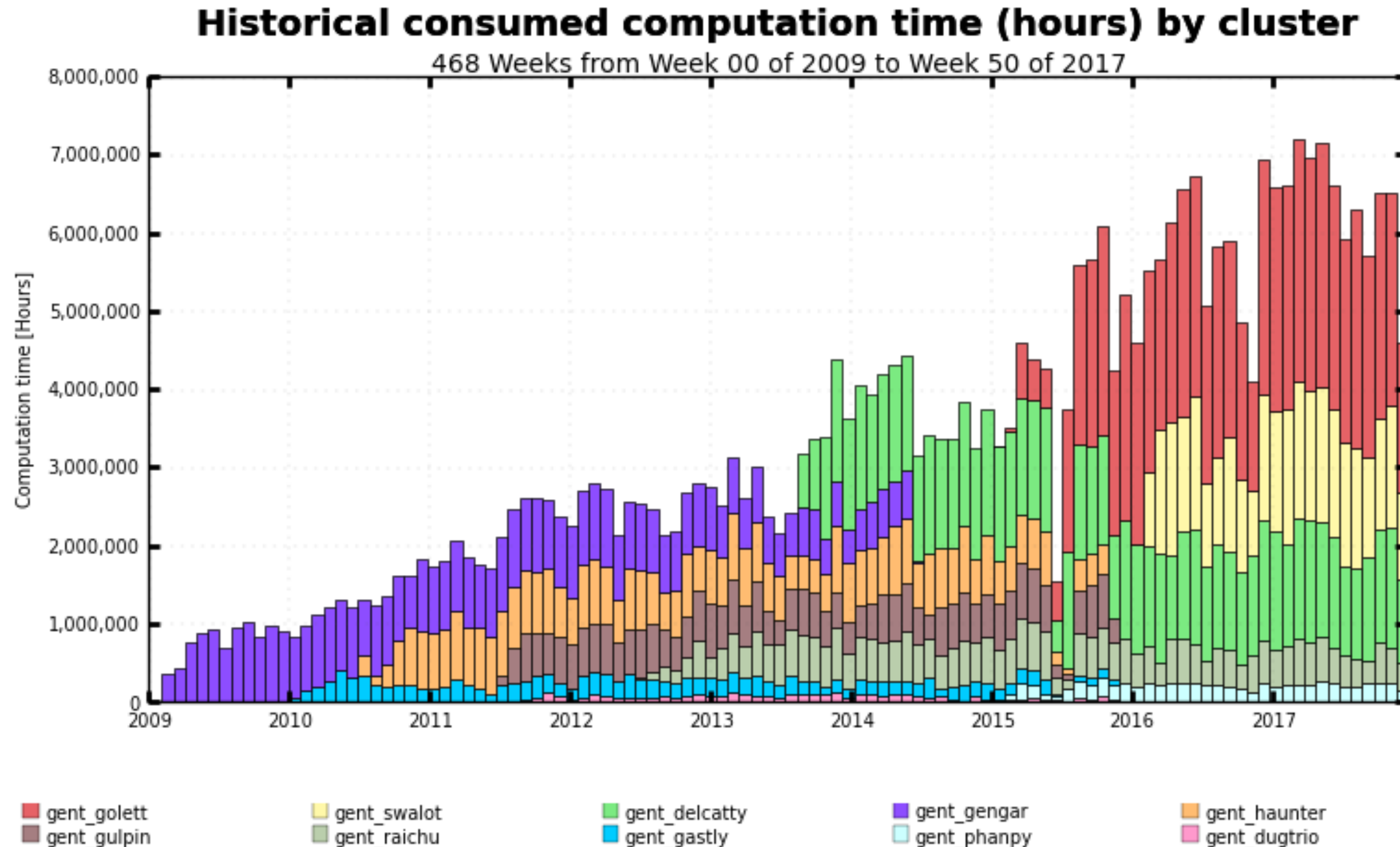


## Compute clusters



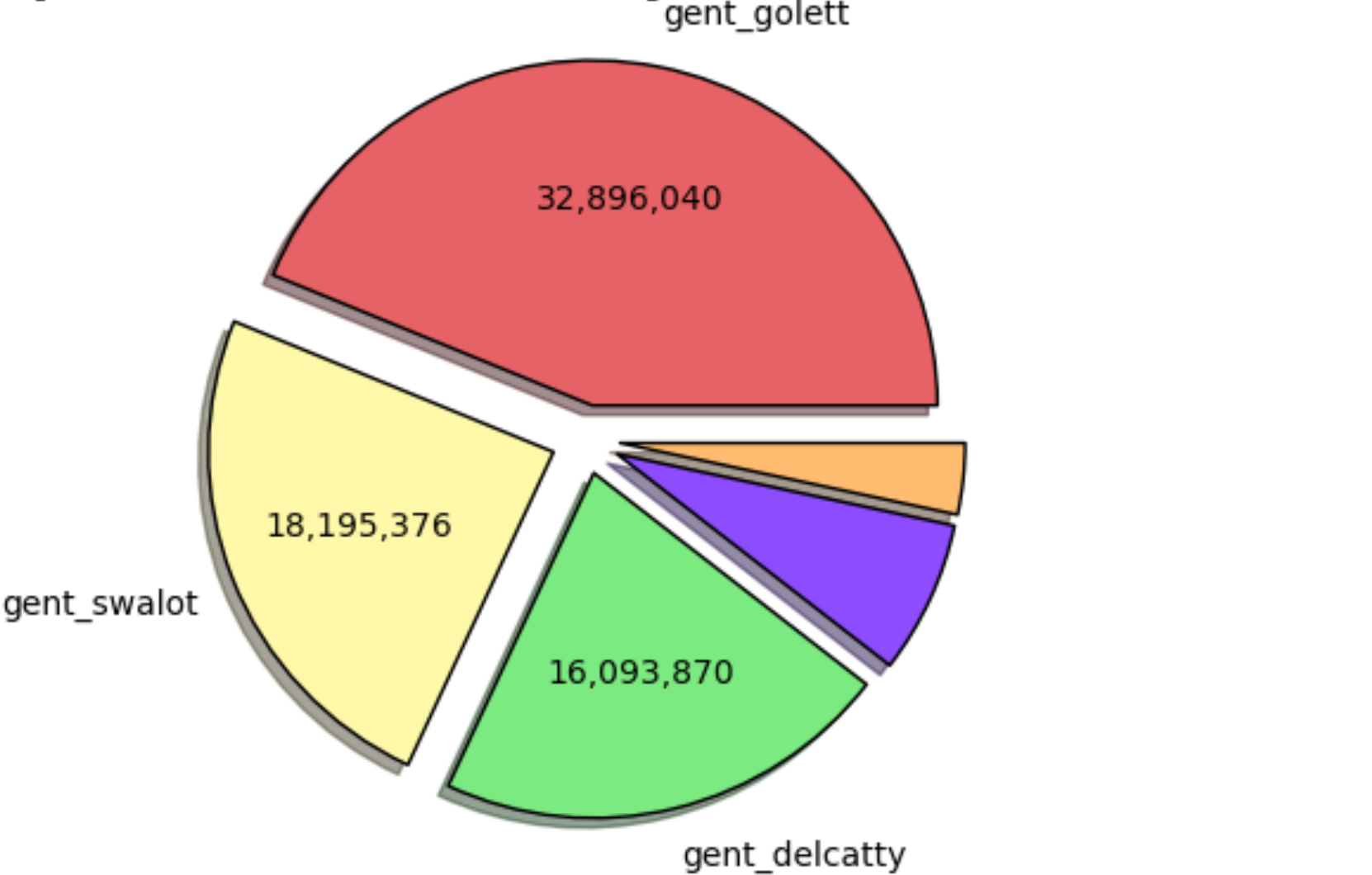
	#nodes	CPU	Mem/node	Diskspace/node	Network	
<b>Raichu</b>	64	2 x 8-core Intel E5-2670 (Sandy Bridge @ 2.6 GHz)	32 GB	400 GB	GbE	
<b>Delcatty</b>	160	2 x 8-core Intel E5-2670 (Sandy Bridge @ 2.6 GHz)	64 GB	400 GB	FDR InfiniBand	
<b>Phanpy</b>	16	2 x 12-core Intel E5-2680v3 (Haswell-EP @ 2.5 GHz)	512 GB	3x 400 GB (SSD, striped)	FDR InfiniBand	
<b>Golett</b>	200	2 x 12-core Intel E5-2680v3 (Haswell-EP @ 2.5 GHz)	64 GB	500 GB	FDR-10 InfiniBand	
<b>Swalot</b>	128	2 x 10-core Intel E5-2660v3 (Haswell-EP @ 2.6 GHz)	128 GB	1 TB	FDR InfiniBand	2016-Q3

# OVERVIEW OF HPC-UGENT USAGE



# OVERVIEW OF HPC-UGENT USAGE

Consumed computation time (hours) by cluster (Sum: 75,063,045 Hours) in 2017



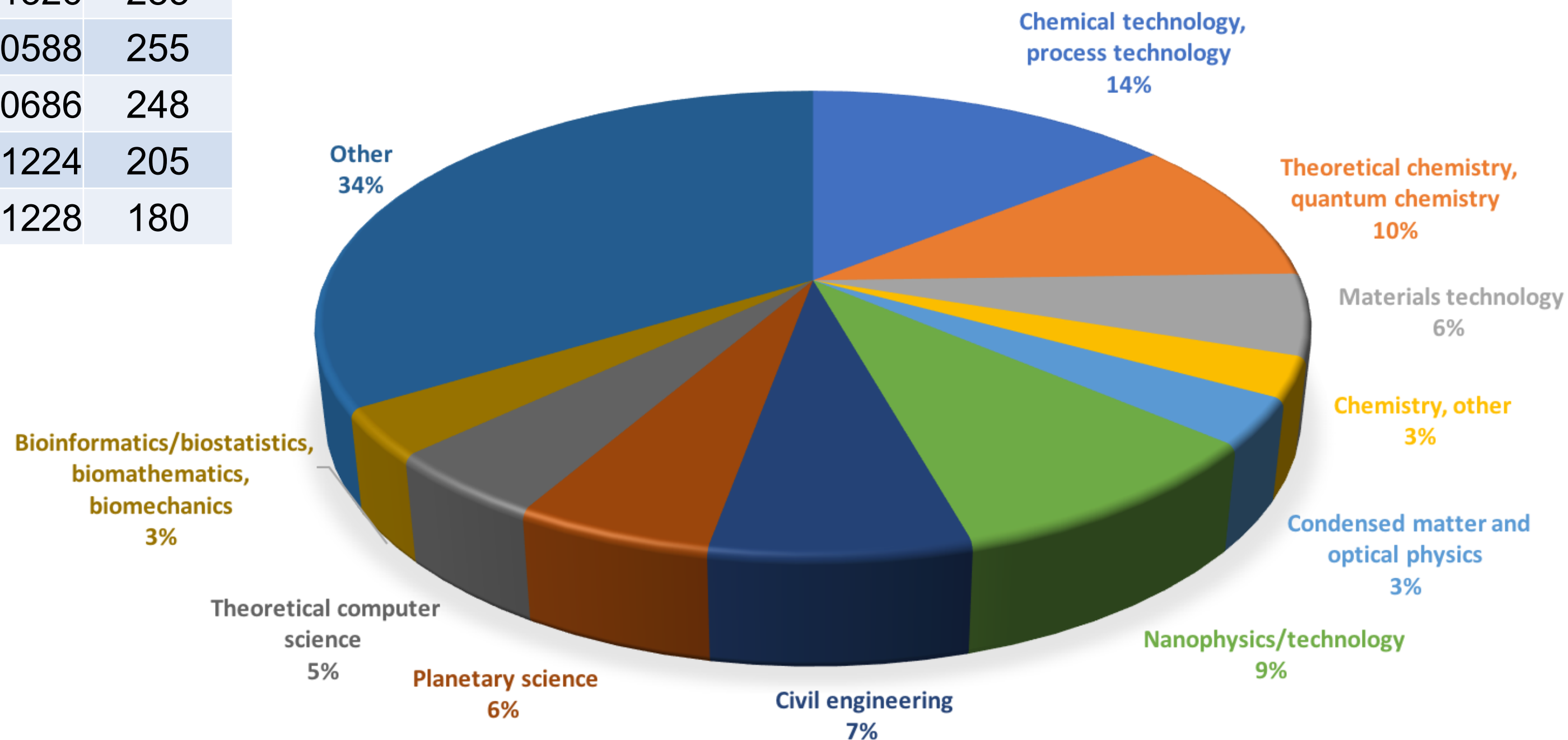
Consumed compute time in 2017		
	core years	use %
delcatty	1837	80%
phanpy	286	78%
raichu	614	72%
golett	3755	84%
swalot	2077	85%
	8569	82%

gent\_golett (32,896,040)    gent\_swalot (18,195,376)    gent\_delcatty (16,093,871)    gent\_raichu (5,374,988)  
gent\_phanpy (2,502,770)

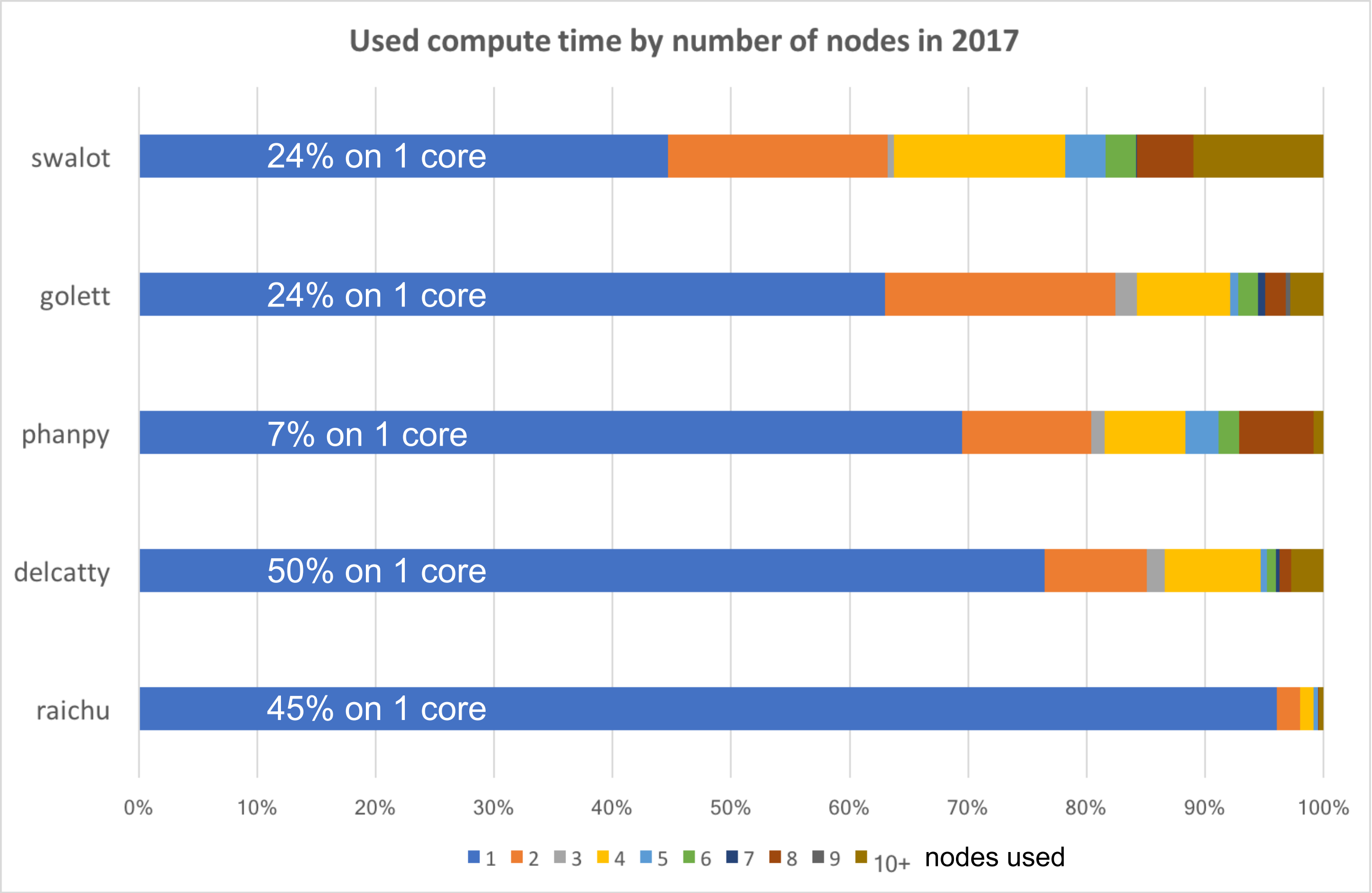
# OVERVIEW OF HPC-UGENT USAGE

Top 10 users

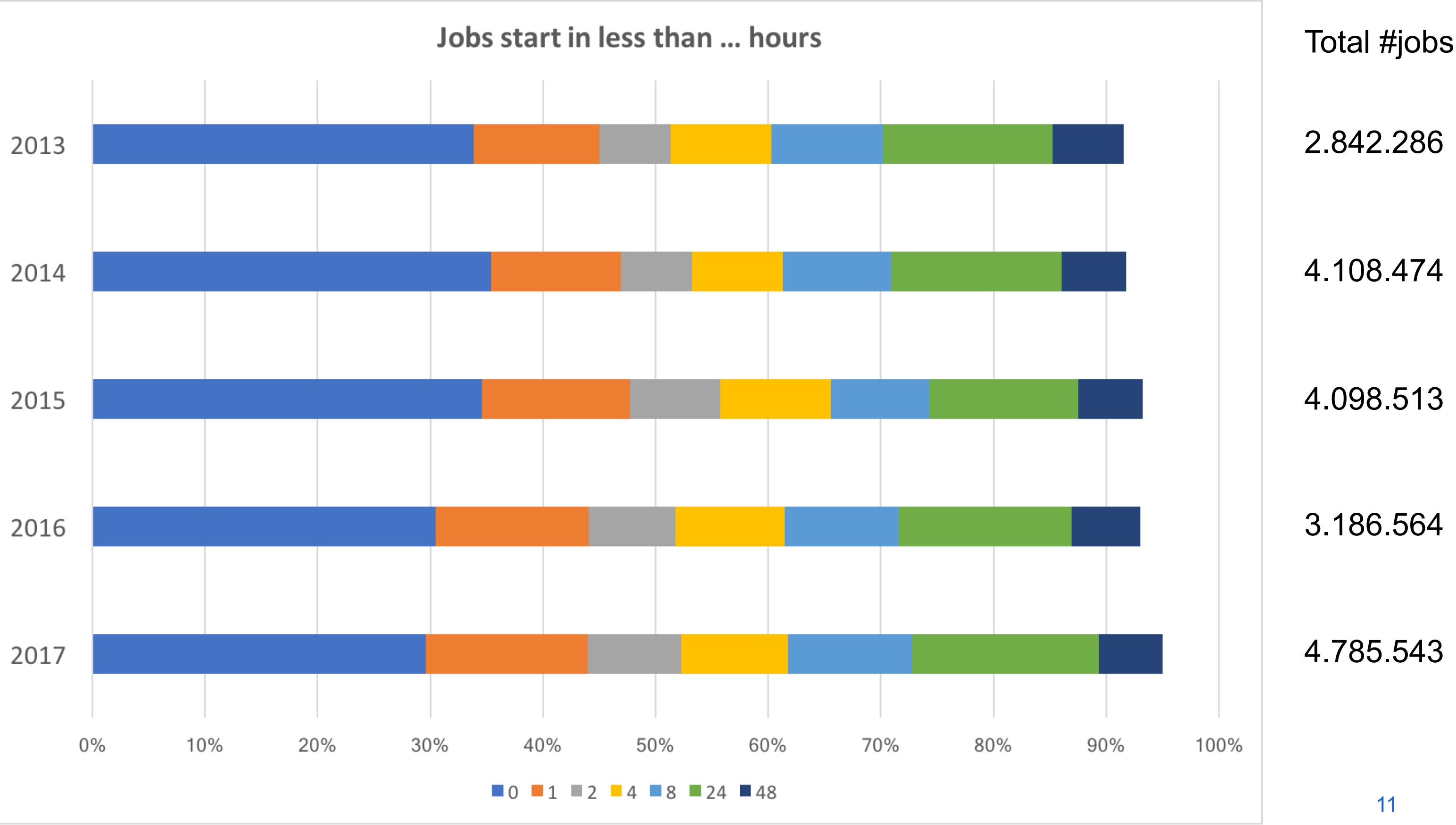
	core years		core years
vsc40941	477	vsc41326	285
vsc40944	473	vsc40588	255
vsc40484	470	vsc40686	248
vsc40309	398	vsc41224	205
vsc41948	301	vsc41228	180



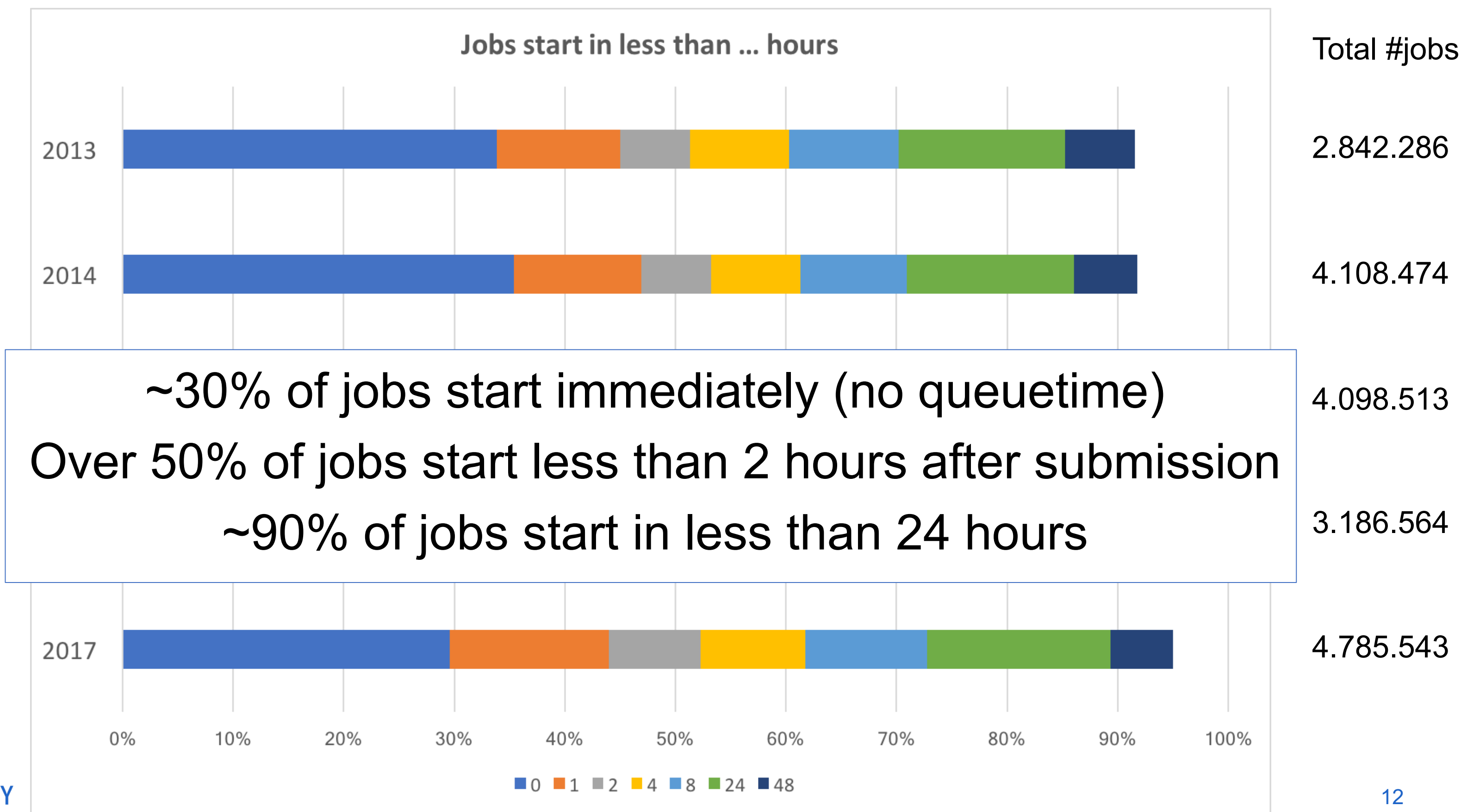
# OVERVIEW OF HPC-UGENT USAGE



# OVERVIEW OF HPC-UGENT USAGE



# OVERVIEW OF HPC-UGENT USAGE



# HPC-UGENT – NEW SERVICES

## Extra compute clusters



- 2.2M euro investment
- Production expected by summer 2018

#nodes	CPU	Mem/node	Disk/node	Network
72	2 x 18-core Intel Xeon Gold 6140 ( <b>Skylake</b> @ 2.3 GHz) 2592 cores in total	192 GB	1 TB 240 GB SSD	EDR InfiniBand
96	2 x 18-core Intel Xeon Gold 6140 ( <b>Skylake</b> @ 2.3 GHz) 3456 cores in total	96 GB	1 TB 240 GB SSD	10 GbE

# HPC-UGENT – NEW SERVICES

## Extra compute clusters

- 2.2M euro investment
- Production expected by summer 2018

		#nodes	CPU	Mem/node	Disk/node	Network
	<b>skitty</b>	72	2 x 18-core Intel Xeon Gold 6140 ( <b>Skylake</b> @ 2.3 GHz) 2592 cores in total	192 GB	1 TB 240 GB SSD	EDR InfiniBand
	<b>victini</b>	96	2 x 18-core Intel Xeon Gold 6140 ( <b>Skylake</b> @ 2.3 GHz) 3456 cores in total	96 GB	1 TB 240 GB SSD	10 GbE

These clusters will replace delcatty and raichu

# HPC-UGENT – NEW SERVICES



## **Cloud testbed ‘grimer’**

- 16 hypervisors - 256 CPU cores – 200 TB storage (Ceph)
- Reuse of decommissioned muk (old Tier-1) hardware
- For users with specific requirements
  - Public cloud infrastructure
  - Graphical user interface
  - Software with wallclock > 72h ? (But checkpointing is far more advisable)
- VM(s) managed by user! Currently free of charge
- Testbed to gather expertise – underlying technology may change

# HPC-UGENT – NEW SERVICES



## Cloud testbed ‘grimer’: example application

Galaxy / Galaxy @ VIB-UGent

Analyze DataWorkflowShared DataVisualizationAdminHelpUser

Using 55.5 GB

Tools

search tools

RNA-SEQ ANALYSIS

Summarization

Quantification using lightweight alignment

Read Mapping

FastQ Quality Control

CHIP-SEQ ANALYSIS

Extract motifs from peak data

Binding and Expression Target Analysis (BETA)

Model-based Analysis of ChIP-Seq

CRISPR ANALYSIS

Genome editing

STATISTICAL ANALYSIS

Differential expression

DATA MANIPULATION

Samtools

Bedtools

DeepTools

Picard tools

DEFAULT OPERATIONS

Get Data

Send Data

Collection Operations

Text Manipulation

Filter and Sort

Join, Subtract and Group

Convert Formats

Extract Features

Fetch Sequences

Fetch Alignments

Statistics

Graph/Display Data

Workflows

All workflows

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How to use Galaxy ?

**Tools:** In the left panel of this page you will find the list of available tools, you can see this page at any point by clicking 'Analyze Data' in the top menu.

**History:** The history of your current data analysis is shown in the right panel. A good practice when running multiple analysis in parallel is to create several histories and give each one a unique name. You can click on 'View all histories' button (upper right corner in histories panel) to get an overview and switch between the current histories.

**Input Data:** Every analysis starts with getting the input data into your current history (right panel). To do this you can upload your own input files or use shared datasets. To upload files from your computer or instruct Galaxy to download files from the web you have to use of the upload tool: Get data (tool panel on the left) -> upload file. Please DO NOT UPLOAD LARGE FILES (~GB), but contact the administrator to create a central data repository! To use available shared data you have to click on Shared data (top menu) -> Data Libraries. You can then browse the available libraries and select the file/s you want to use. By clicking 'to History' button and choosing the desired History name you will import these files and make them available to use as input for future analysis.

**Execution:** To run a job select the tool from tool panel on the left, then the corresponding interface will be loaded and you will be able to select corresponding input data and (re)define parameters. Please read carefully the labels and help text next to the input fields. After clicking Execute you will be able to see entries for each in your history. The color of a dataset designates the current status of the underlying job

- Grey: The job is being evaluated to run (new dataset) or is queued. Allow this to complete.
- Yellow: The job is executing.
- Green: successful processing
- Red: The job has failed.
- Light blue: The job is paused. This indicates either a problem with an input (a previous step in the workflow may have failed) or that you have exceeded disk quota set by the administrator of the Galaxy instance you are working on.

**Workflows:** You can automate your analysis pipeline by using workflows composed of several tools linked by their input/output data. In the Workflows section (upper menu) you can see a list of current workflows and also create your own ones. It is also possible (and highly recommended) to use the shared, and widely tested, workflows available under Shared Data (top menu) -> workflows. To use one of these you first need to import it to your workflows list by clicking on the name and selecting Import. To execute any workflow listed under your workflows first click on it and select run, then choose the input data as with any tool.

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VIB

Welcome to the Galaxy Instance of VIB-UGent

History

search datasets

Salmon strandedness test

115 shown, 12 deleted, 1 hidden

50.97 GB

127: Salmon on data 1 (SAM format)

126: Salmon on data 1 (Gene Quantification)

125: Salmon on data 1 (log)

124: Salmon on data 1 (Quantification)

123: Salmon on data 1 (SAM format)

122: Salmon on data 1 (Gene Quantification)

121: Salmon on data 1 (log)

120: Salmon on data 1 (Quantification)

119: Salmon on data 1 (SAM format)

118: Salmon on data 1 (Gene Quantification)

117: Salmon on data 1 (log)

116: Salmon on data 1 (Quantification)

115: Salmon on data 1 (SAM format)

114: Salmon on data 1 (Gene Quantification)

113: Salmon on data 1 (log)

112: Salmon on data 1 (Quantification)

110: Salmon on data

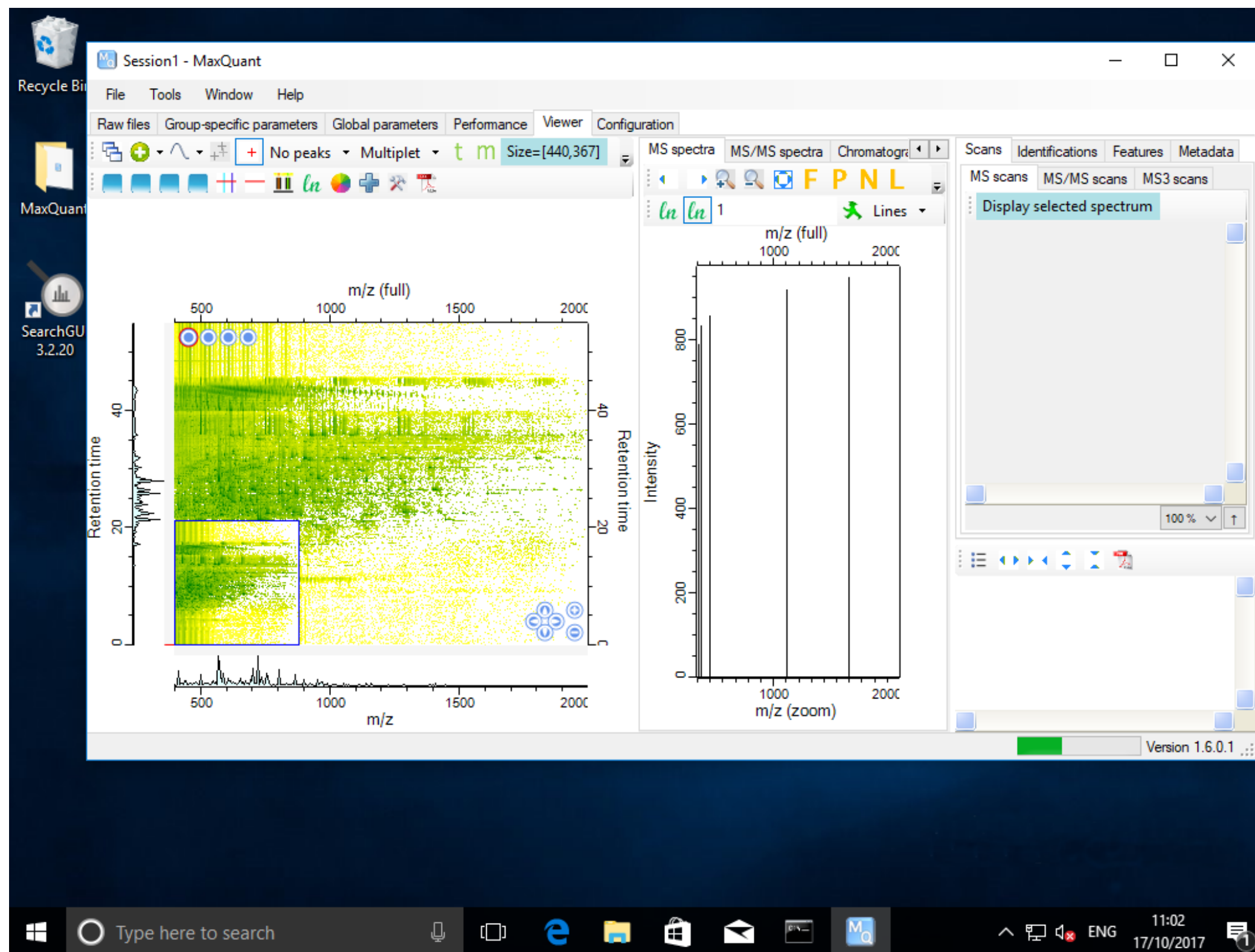
Galaxy is an open, web-based platform for data intensive biomedical research. The Galaxy team is a part of BX at Penn State, and the Biology and Mathematics and Computer Science departments at Emory University. The Galaxy Project is supported in part by NHGRI, NSF, The Huck Institutes of the Life Sciences, The Institute for CyberScience at Penn State, and Emory University.

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# HPC-UGENT – NEW SERVICES



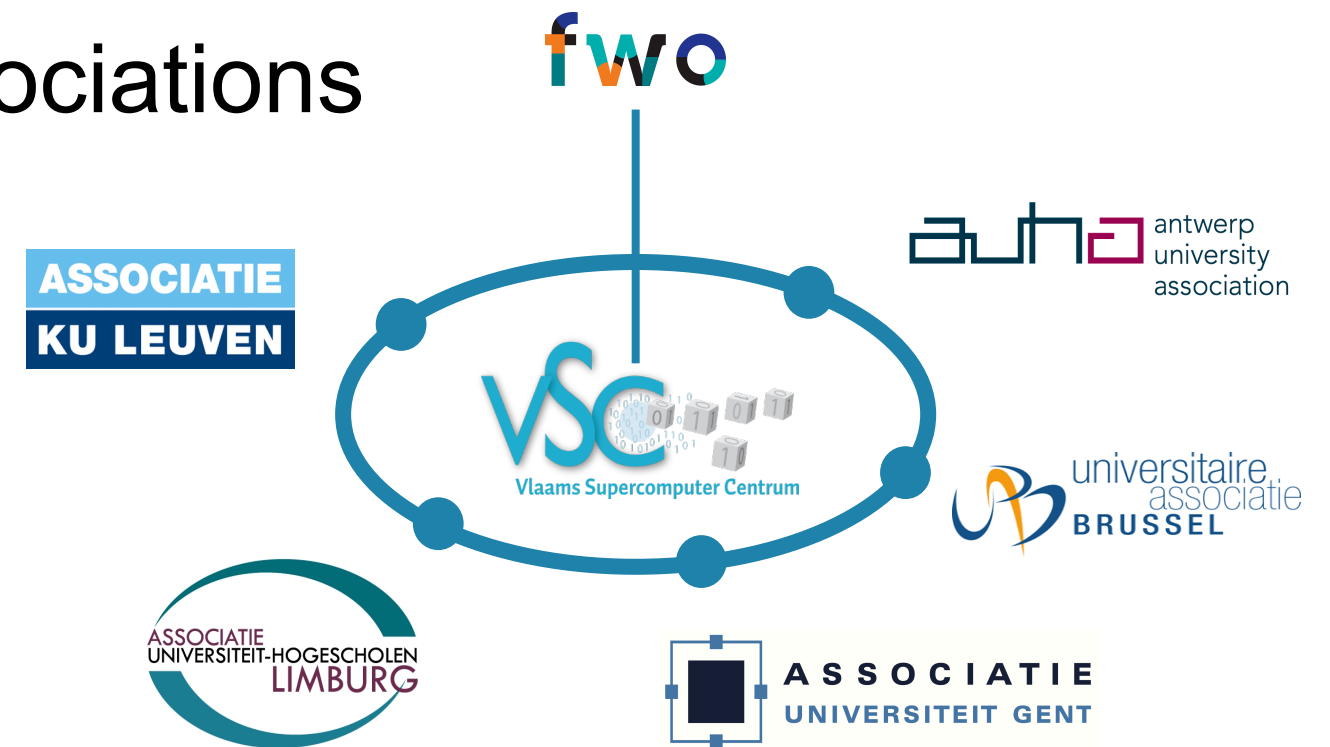
## Cloud testbed 'grimer': example application



# ABOUT VSC

## VSC – Flemish Supercomputer Center

- Partnership between Flemish university associations
- Infrastructure in four hubs
- Managed by FWO



## Mission

The VSC encourages the use of scientific and technical computing in the Flemish academic and industrial landscape. To this end, it offers infrastructure, training and services. In addition, VSC acts as a lever to promote the importance of scientific and technical computing and its added value to society.

# ABOUT VSC – GOVERNING BODIES

## VSC steering group

Daily (monthly) management of VSC, consensus

UGent representative: Ewald Pauwels

## Users committee

Map user needs, advise on Tier1/2 operation, VSC user day

UGent representatives: Veronique Van Speybroeck, Marie-Françoise Reyniers

## Tier1 evaluation committee (non-Flemish experts)

Technical evaluation of Tier-1 applications

## Industrial board

Advise to increase involvement of industry

## FWO

Funding, final governance

# ABOUT VSC - GOALS

1. Offer its target audience **access to diversified ICT infrastructure** that is tailored to the needs of scientific/technical computing.
2. Provide a **common user environment** on the computing infrastructure, which is available in the local hubs.
3. **Support** its users so that they can lift their research and development to a higher level by using scientific/technical computing.
4. **Inform about the capabilities and achievements** of scientific/technical computing and its potential added value.
5. Actively **promote scientific/technical computing in Flemish industry** and foster the exchange of ideas and expertise between research institutions and industry.
6. Offer a diverse and coordinated **training program** across the VSC consortium to stimulate and advance the uptake of scientific/technical computing in new and existing users.
7. Engage and actively participate in **international initiatives** such as PRACE and Horizon 2020, and cooperate with other centers focusing on scientific/technical computing.

# VSC INFRASTRUCTURE

<https://www.vscentrum.be/infrastructure/hardware>

## Available hardware

### Tier-1

- Our [current Tier-1 system is BrENIAC](#), operated by KU Leuven. The system is aimed at large parallel computing jobs that require a high-bandwidth low-latency interconnect. Compute time is again only available upon approval of a project. See the [page on Tier-1 project access and links in that page](#).
- Our [first Tier-1 system is muk](#), was operated by UGent but is no longer in production.

### Experimental setup

- [There is a small GPU and Xeon Phi test system](#) which is can be used by all VSC members on request (though a project approval is not required at the moment). [The documentation for this system is under development](#).

Free of charge

→ <http://hpc.ugent.be/userwiki/index.php/Tips:Software:GPGPU>

### Tier-2

Four university-level cluster groups are also embedded in the VSC and partly funded from VSC budgets:

- [The UAntwerpen clusters \(hopper and leibniz\)](#)
- [The VUB cluster \(hydra\)](#)
- [The UGent local clusters](#)
- [The KU Leuven/UHasselt cluster \(ThinkKing and Cerebro\)](#)

Free of charge

Not free of charge, but heavily discounted

# VSC INFRASTRUCTURE

## Using other VSC infrastructure

- Don't hesitate
- If unsure about pricing, ask KULeuven for quote
- Feel free to ask support at another VSC site, e.g.
  - Error reporting
  - Trouble with credit system
  - Software installation
- **Always** put [hpc@ugent.be](mailto:hpc@ugent.be) in cc

# VSC INFRASTRUCTURE – TIER-1

Muk @ UGent



BrENIAC @ KULeuven



PEAK PERFORMANCE  
**600<sup>+</sup>**  
TERAFLOPS

**x3**

**EDR**

**x2**

**GPFS**  
**600<sup>+</sup> TB**

**x2**

**16,240** cores  
Intel ES-2600 V4

**x2**

**Memory per node**  
128GB  
256GB

**x2**

**x4**

- 580 nodes
- 2 Intel Xeon Broadwell → 16.240 cores
- 128/256 GB RAM
- InfiniBand EDR interconnect
- 634 TB storage

# TIER-1 ACCESS – STARTING GRANT

<https://www.vscentrum.be/en/access-and-infrastructure/tier1-starting-grant>

- Purpose = explore, do scaling tests of your software, prepare for project
- 100 node days ( $= 100 \times 28 \times 24 = 67.200$  core hours)
- Available for 2 months
- Personal grant
- Fast submission procedure, very short proposal
- Constantly reviewed
- Success rate = 100%
  
- FREE OF CHARGE

# TIER-1 ACCESS – PROJECT ACCESS

<https://www.vscentrum.be/en/access-and-infrastructure/project-access-tier1>

- 500 - 5000 node days (= 336.000 – 3.360.000 core hours)
- Available for 6 months
- Can be granted to multiple researchers
- Reviewed 3x per year by Tier-1 Evaluation Committee
  - Next deadline = 5 February 2018
- Success depends on quality of your proposal
  - Send your proposal to [hpc@ugent.be](mailto:hpc@ugent.be) for prior review
- FREE OF CHARGE

# VSC INFRASTRUCTURE TIER-1

## BrENIAC: A year celebrating curiosity

3  
calls



81  
users



59  
projects



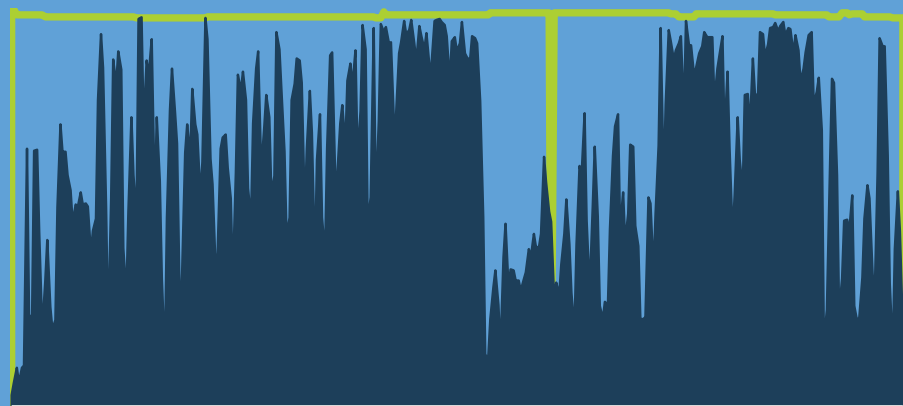
72,000  
jobs



87M  
core hours



98%  
uptime



30 Oct 2016

12 Oct 2017

61%  
usage

Technology  
25%



Molecular Modelling  
35%



Earth Science  
1%



Computational Science  
0.5%



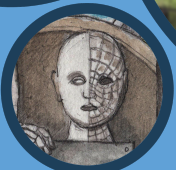
Chemistry  
3%



Psychology  
5%



Physics  
12%



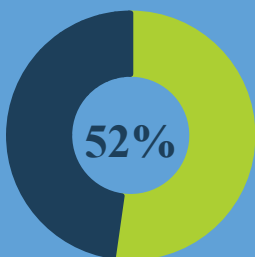
Life Science  
10%



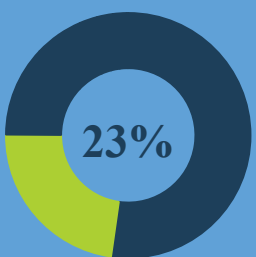
Astronomy and Astrophysics  
9%



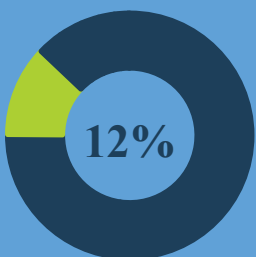
U Gent



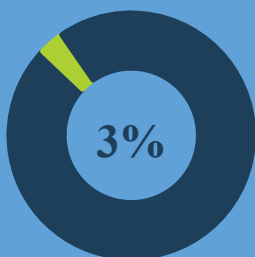
KU Leuven



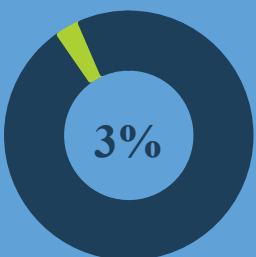
U Antwerpen



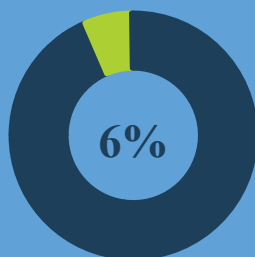
U Hasselt



VUB



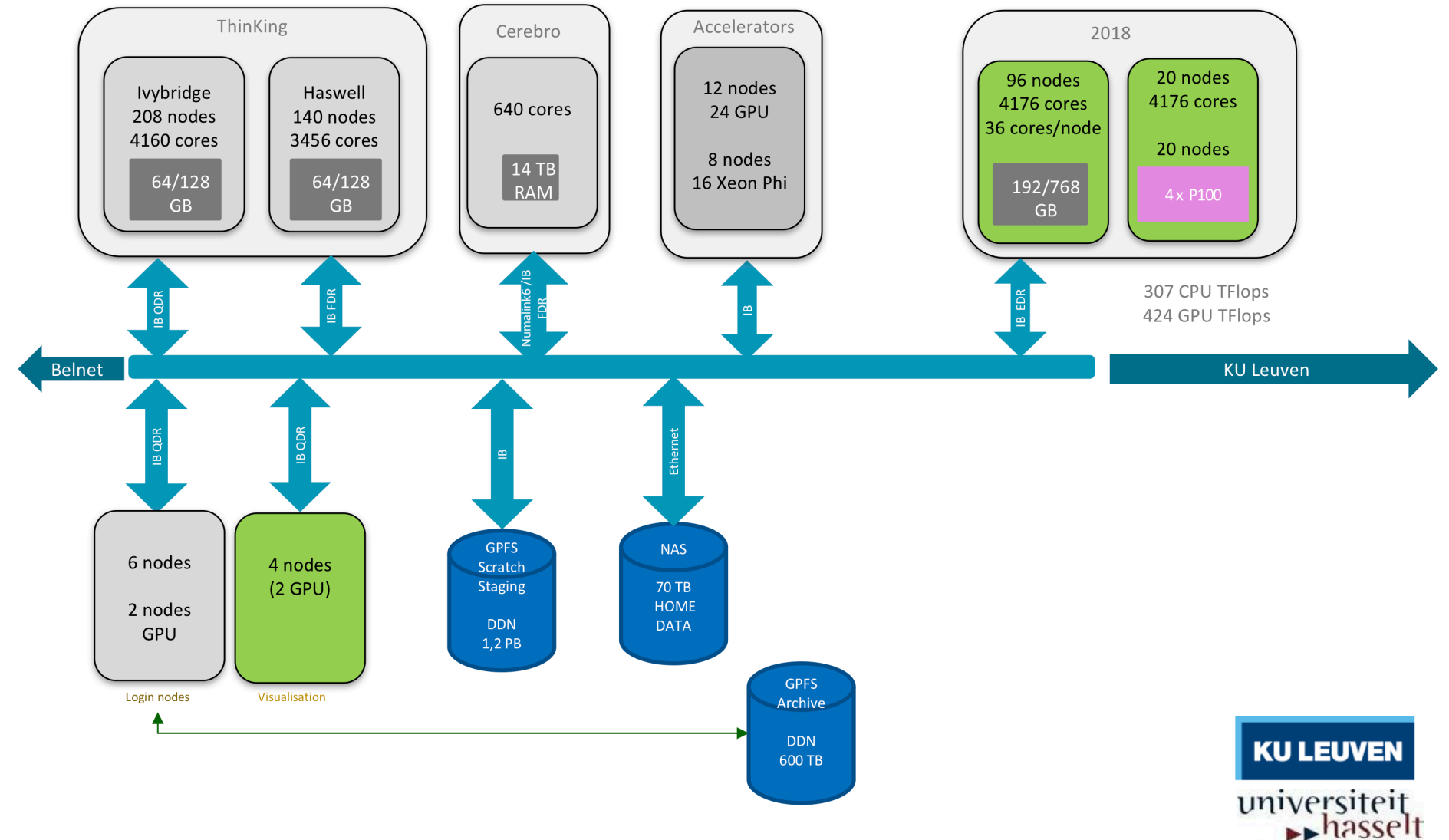
Others



# VSC - FUTURE PLANS

## New GPU cluster at KULeuven

- 20 nodes with each  
4 x Nvidia Tesla P100



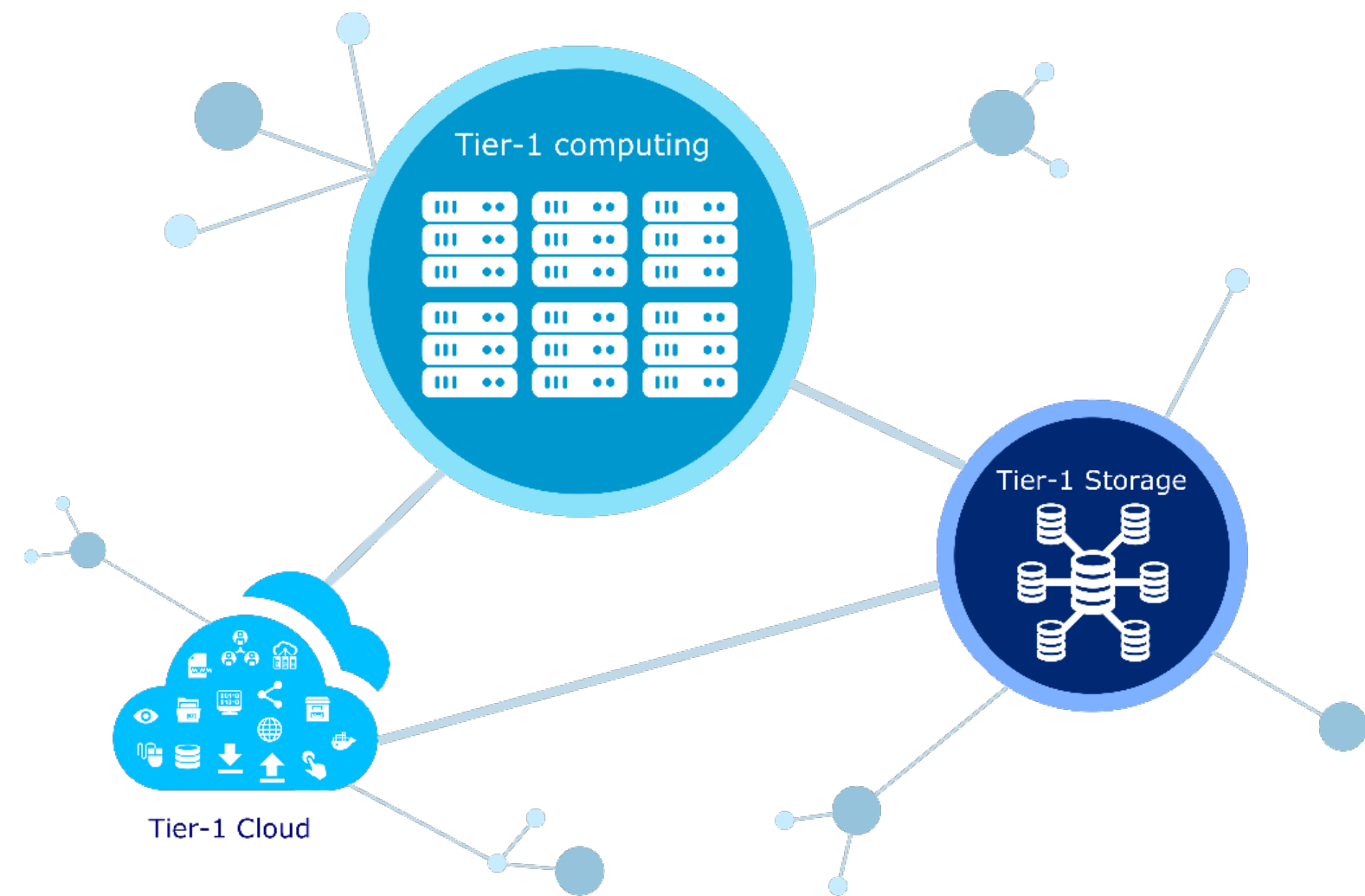
- KULeuven will likely open (free) pilot access to GPUs
- Let us know via [hpc@ugent.be](mailto:hpc@ugent.be) if you would like to use these GPUs

# VSC - FUTURE PLANS

## **New Tier-1 supercomputing platform**

*(Subject to final approval by government)*

- Intention to be structural
- Complementary programs
  - Cloud
  - Storage
  - Compute: extending current Tier-1 service
- First developments proposed starting 2018

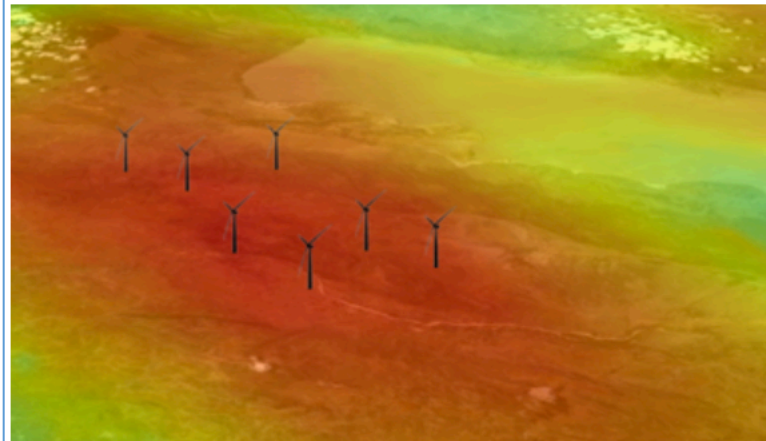


# VSC – CALL FOR SUCCESS STORIES

## Cases and projects

## Achievements on our infrastructure

## Industrial use cases



### Wind energy simulations at 3E NV

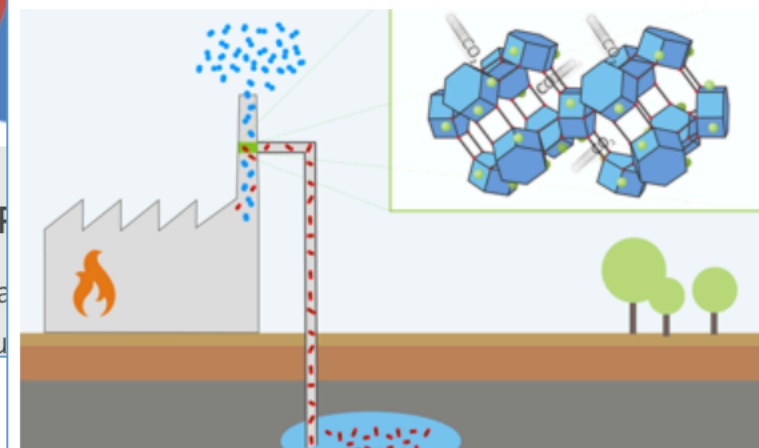
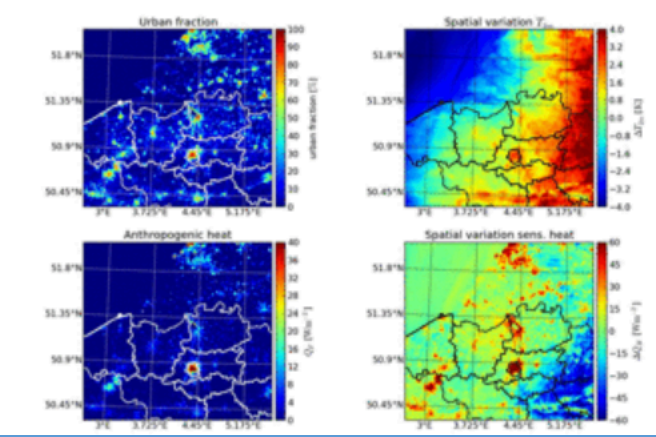
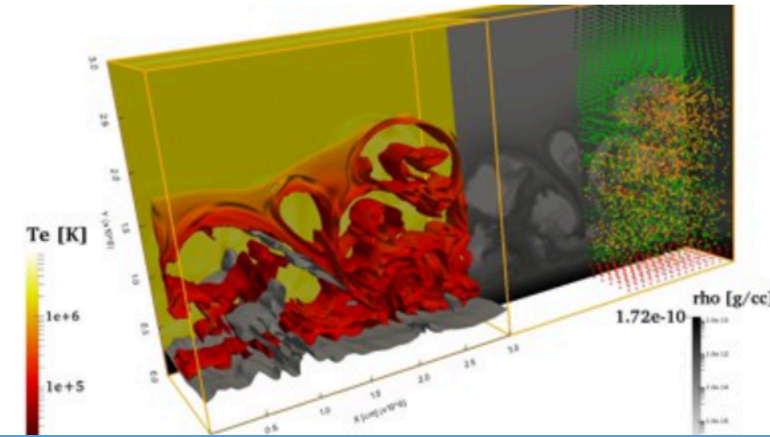
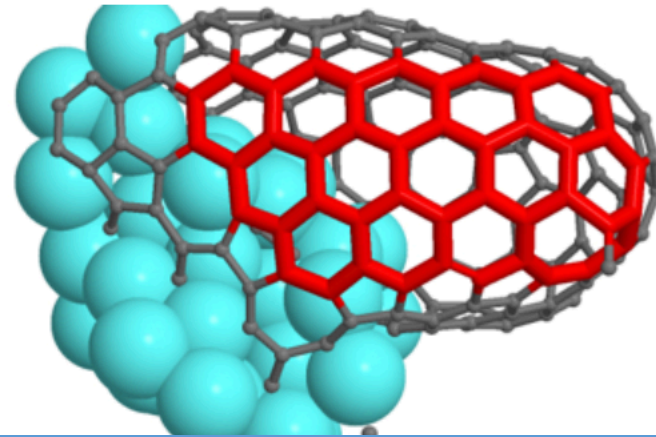
3E NV, a Belgian renewable energy consultancy firm, makes use of the VSC infrastructure and



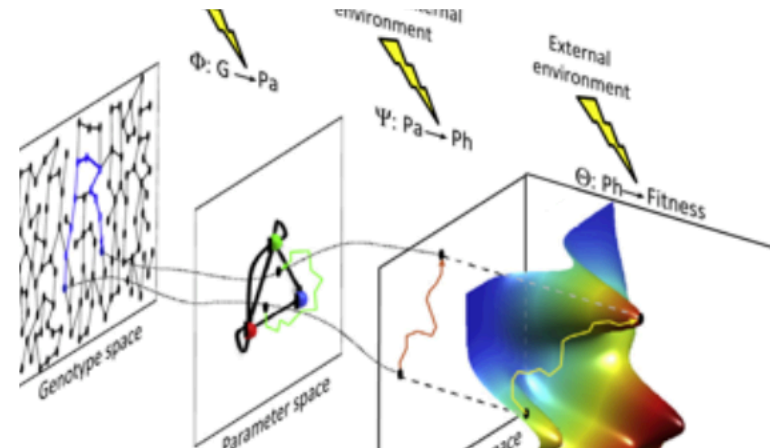
### Janssen P

Janssen Pharma  
infrastructure

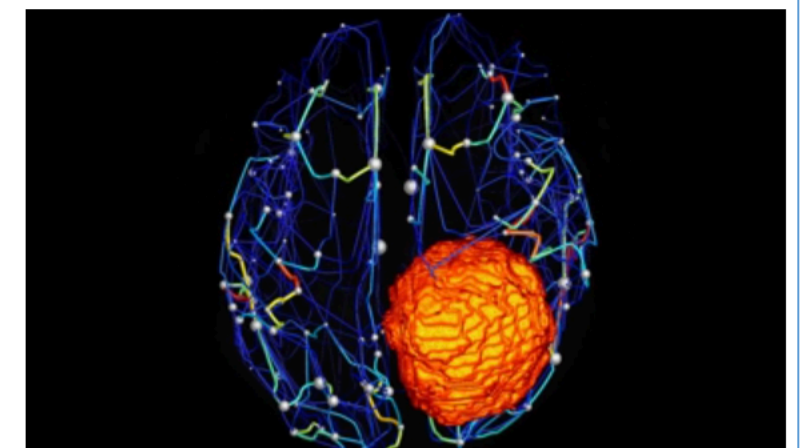
## Academic use cases



Molecular modeling spurs innovative technology against global warming



Mechanistic modeling and in silico evolution of gene regulatory networks



Modeling brain dynamics in health and disease using supercomputing

Prof. Daniele Marinazzo (UGent) uses

<https://www.vscentrum.be/en/project-and-cases>

Contact [hpc@ugent.be](mailto:hpc@ugent.be) if you could contribute

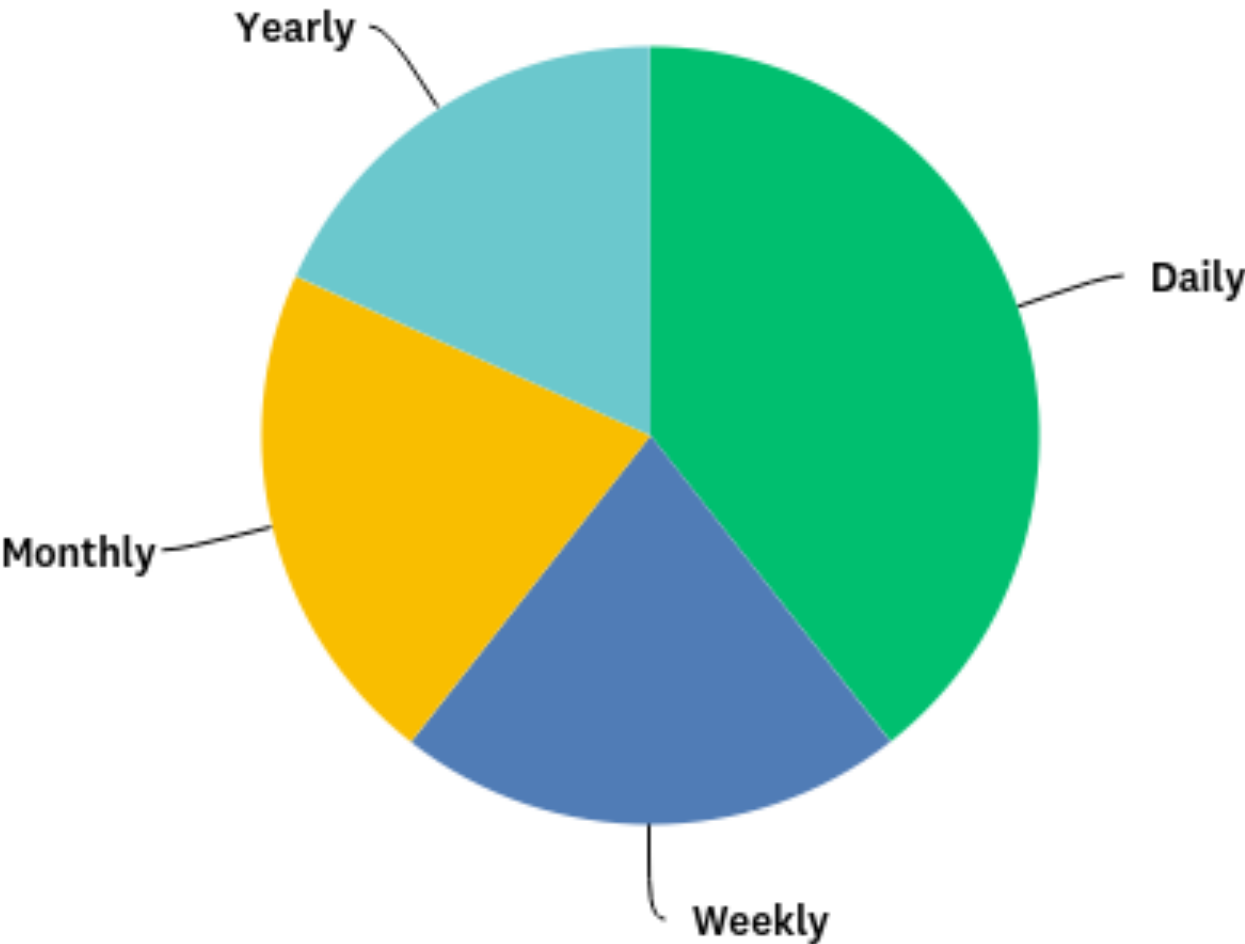
# REVIEW OF USER POLL RESULTS

- 104 respondents
- ~8 questions
- Average completion time: 5 minutes

# REVIEW OF USER POLL RESULTS

**How often do you use the HPC-UGent scientific computing infrastructure?**

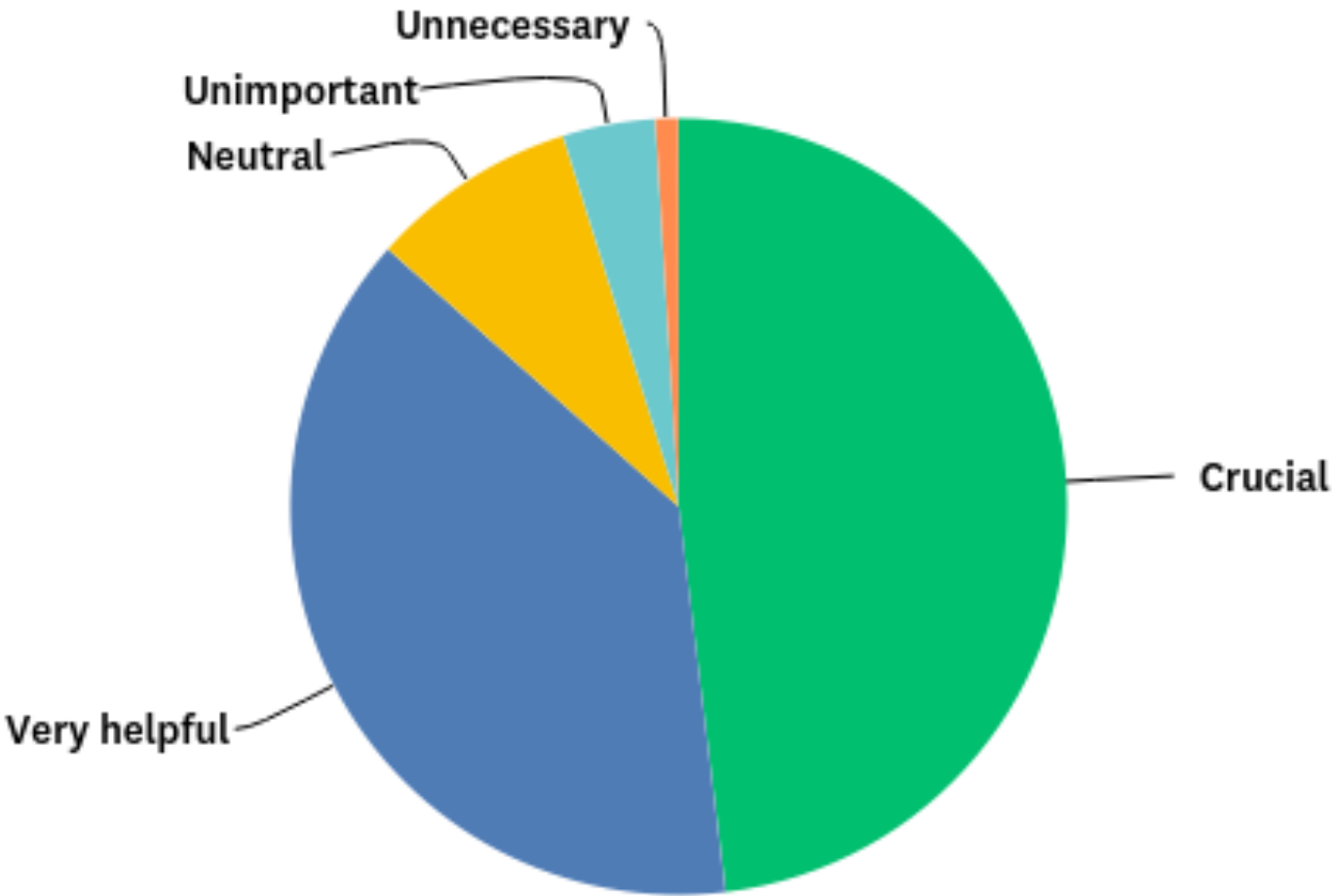
	#resp
On a daily basis	41
Usually once per week	22
Once per month	22
1-2 times per year or less	19



# REVIEW OF USER POLL RESULTS

## How important is HPC-UGent for your research?

<b>Crucial.</b> I can't do my research without.	#resp 50
<b>Very helpful.</b> It allows me to do my research at a faster pace and at a higher level.	40
<b>Neutral</b>	9
<b>Unimportant.</b> I can just as well do my research in another way.	4
<b>Unnecessary.</b> I don't need it at all to do my research.	1



# REVIEW OF USER POLL RESULTS

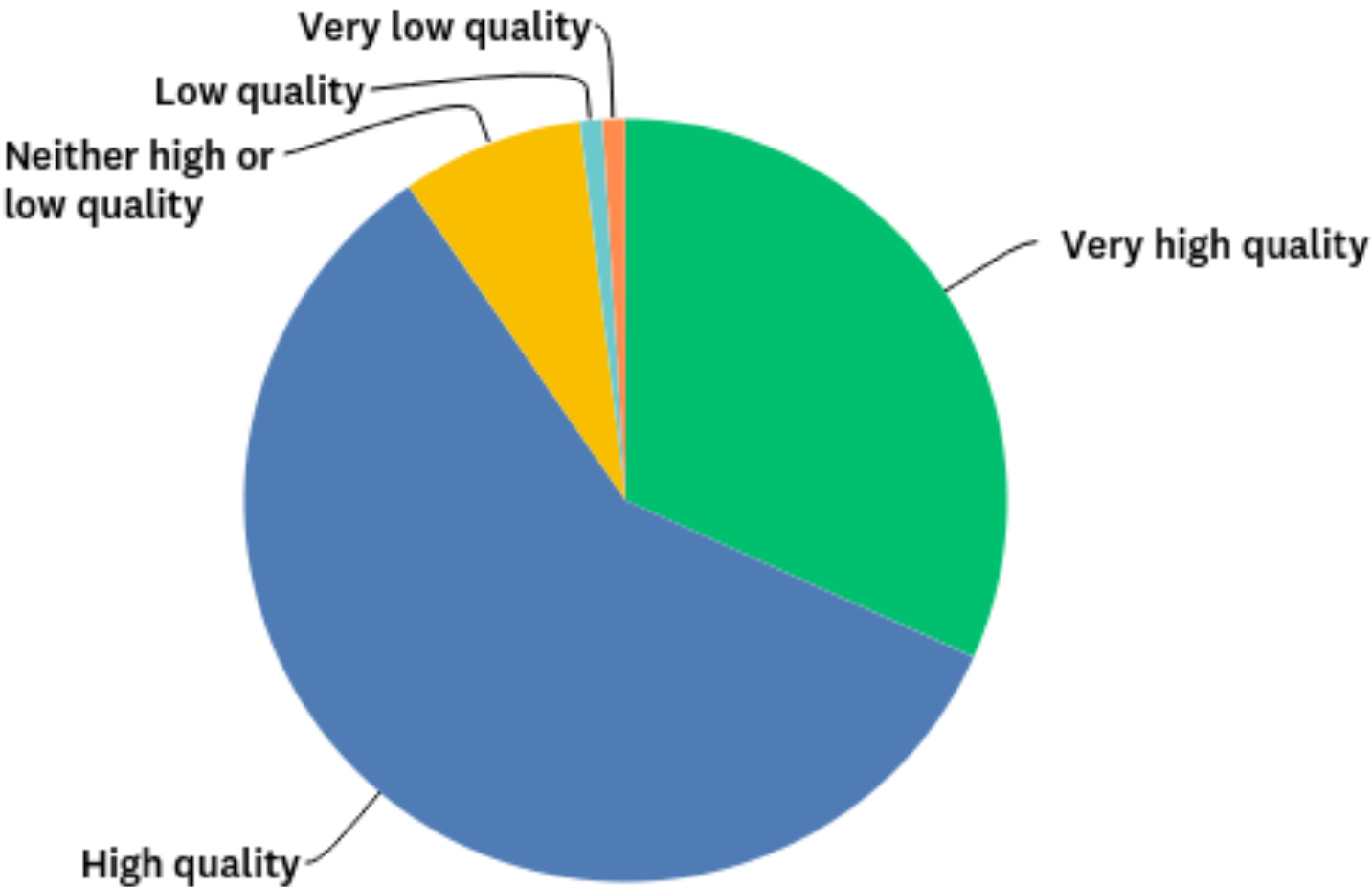
## How often / How important?

	How often do you use?				
How important for your research?		Daily	Weekly	Monthly	Yearly
	Crucial	32%	7%	7%	3%
	Very helpful	7%	14%	13%	5%
	Neutral	1%	0%	2%	6%
	Unimportant	0%	0%	0%	4%
	Unneccesary	0%	0%	0%	1%

# REVIEW OF USER POLL RESULTS

**How would you rate the services that HPC-UGent provides?  
(compute clusters, login nodes, training, user support, website)**

	#resp
Very high quality	33
High quality	61
Neither high or low quality	8
Low quality	1
Very low quality	1



More than 90% of poll participants rate our services as ‘high quality’ or above.

# REVIEW OF USER POLL RESULTS

## How often / Your rating?

	How often do you use?				
Your rating of our services?		Daily	Weekly	Monthly	Yearly
	Very high quality	15%	8%	7%	2%
	High quality	21%	12%	13%	13%
	Neither high or low quality	2%	2%	0%	4%
	Low quality	1%	0%	0%	0%
	Very low quality	0%	0%	1%	0%

# REVIEW OF USER POLL RESULTS

**Is there a particular service that stands out or you care to comment about?** 😊😊😊

#comments	Service	
16	User Support	<i>excellent, fast, friendly</i>
8	Training	<i>regular, hands-on</i>
6	Infrastructure	<i>diverse, reliable, updated</i>
5	Software	<i>fast installation, version flexibility, module system</i>
4	Documentation	<i>good, excellent, usable by newbies</i>

# REVIEW OF USER POLL RESULTS

**Is there a particular service that stands out or you care to comment about? 😊😊😊**

“The clusters in Ghent are still the best managed systems I've been working with. Keep up the nice work guys!”

“The Helpdesk is extremely supportive and helpful! Thank you!”

“The consistent use of the system status page in the User Portal of the VSC website is much appreciated. It is good to have this page as the single point of information for cluster related updates and during upsets.”

→ <https://www.vscentrum.be/en/user-portal/system-status>

# REVIEW OF USER POLL RESULTS

**Is there a particular service that stands out or you care to comment about? 😞😞😞**

#comments	Service	
5	Infrastructure	<i>long queues, wallclock, regular downtimes</i>
1	Training	<i>software-specific training sessions</i>
1	Documentation	<i>spread out, no overview of basic commands</i>

# REVIEW OF USER POLL RESULTS

## How could we further improve HPC-UGent services?

- 62 responders
- 92 suggestions
- Detailed follow-up in future
- Recurring suggestions in next slides



# REVIEW OF USER POLL RESULTS

## **How could we further improve HPC-UGent services?**

### Documentation (21)

More structured wiki/website that is SPOI (6)

Documentation better geared towards new users (9)

- Checklist for starters
- Different clusters + storage locations
- Frequently used commands

More examples: scripts, software (3)


Updated documentation (2)

Newsletter

# REVIEW OF USER POLL RESULTS

## How could we further improve HPC-UGent services?

### Documentation (21)



200 YEARS  
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Home Ghent University

HIGH PERFORMANCE COMPUTING INFRASTRUCTURE

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Centralised scientific computing services, training, and support for researchers and industry.

### Support and services


- Documentation
- Training and lectures
- User support
- Publications

### Access to infrastructure


- Access for staff & academics
- Access for industry
- Infrastructure overview



### Focus on



12 December 2017  
**Vacancy relationship manager VSC and industry @ FWO**



Vlaams Supercomputer Centrum

### News

12 December 2017   [PRACE Digest 2017](#)

6 December 2017   [Machine Learning and Deep Learning recordings](#)

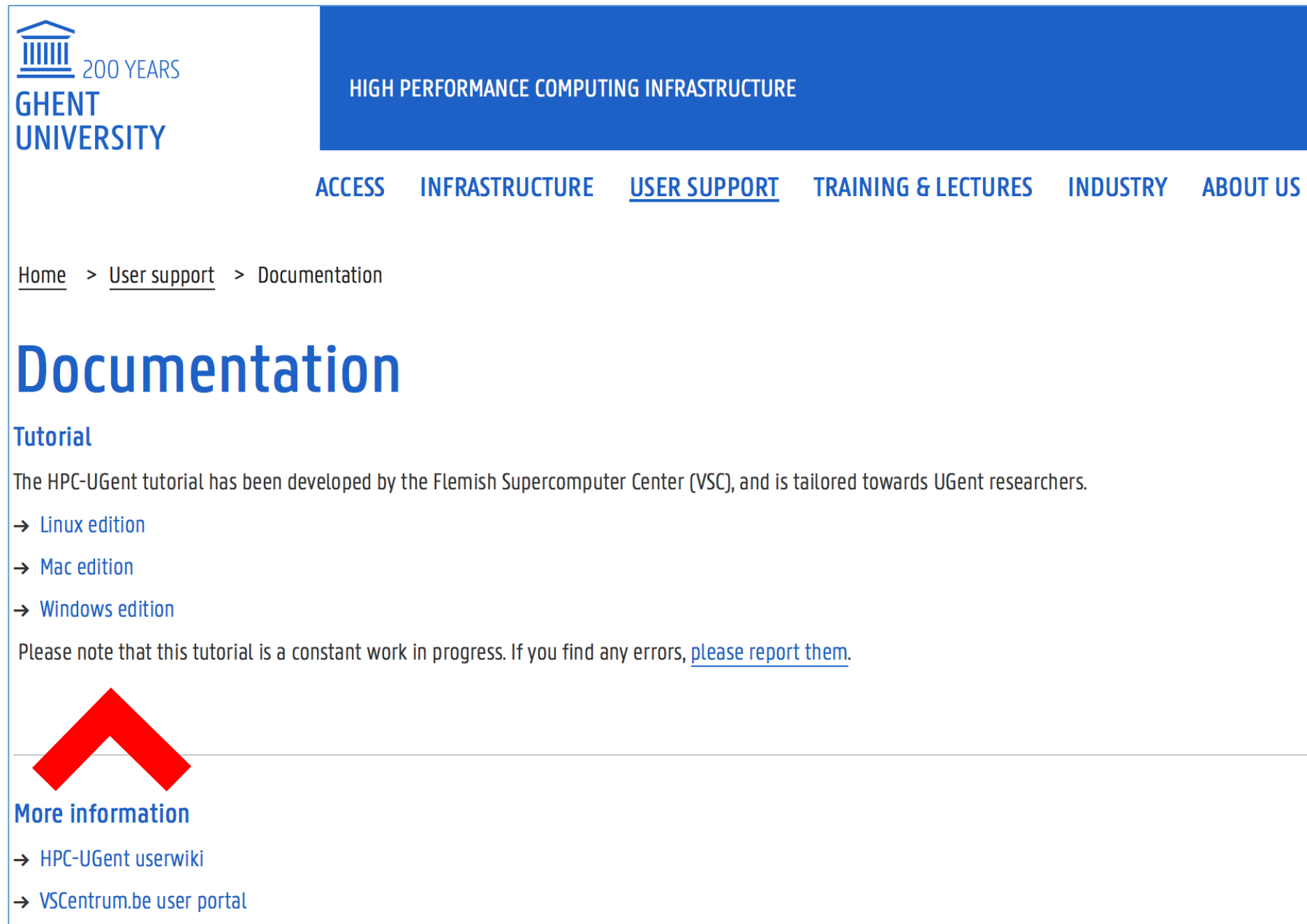
→ More news

VSC looking for 'relationship manager industry', employed by FWO


# REVIEW OF USER POLL RESULTS

## How could we further improve HPC-UGent services?

### Documentation (21)



The screenshot shows the HPC-UGent website. The top left features the Ghent University logo with '200 YEARS' and 'GHENT UNIVERSITY' text. A blue header bar contains 'HIGH PERFORMANCE COMPUTING INFRASTRUCTURE'. Below this is a navigation menu with links: ACCESS, INFRASTRUCTURE, USER SUPPORT, TRAINING & LECTURES, INDUSTRY, and ABOUT US. The breadcrumb trail reads 'Home > User support > Documentation'. The main heading is 'Documentation'. Under the 'Tutorial' section, it states the tutorial was developed by the Flemish Supercomputer Center (VSC) and is tailored for UGent researchers. It provides links for 'Linux edition', 'Mac edition', and 'Windows edition'. A note mentions the tutorial is a constant work in progress and asks users to report errors. A large red arrow points to the 'More information' section, which includes links for 'HPC-UGent userwiki' and 'VSCentrum.be user portal'.

 200 YEARS  
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[Home](#) > [User support](#) > Documentation

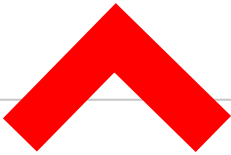
## Documentation

### Tutorial

The HPC-UGent tutorial has been developed by the Flemish Supercomputer Center (VSC), and is tailored towards UGent researchers.

- [Linux edition](#)
- [Mac edition](#)
- [Windows edition](#)

Please note that this tutorial is a constant work in progress. If you find any errors, [please report them](#).



### More information

- [HPC-UGent userwiki](#)
- [VSCentrum.be user portal](#)

# REVIEW OF USER POLL RESULTS

## **How could we further improve HPC-UGent services?**

### User experience (21)

Shorter queue times (7)

Way to estimate queue time (4)

Longer wallclock time (4)

<http://hpc.ugent.be/userwiki/index.php/User:Checkpointing>

contact [hpc@ugent.be](mailto:hpc@ugent.be) if you have checkpointing issues

Feedback on efficiency of specific job (4)

### Infrastructure (17)

Larger compute power (7)

GPU (4)

 Debug infrastructure, remote visualization (2)

# REVIEW OF USER POLL RESULTS

## **How could we further improve HPC-UGent services?**

### Data (10)

More storage

Easier sharing of data

- Between VOs

VSC\_DATA\_SHARED in <https://account.vscentrum.be/django/vo/edit>

- Public → VMs ?

Staging in/out data

Archive data of inactive users

# REVIEW OF USER POLL RESULTS

## **How could we further improve HPC-UGent services?**

### User support (3)

More HPC-UGent staff

### Training (7)

More (5)

### Policy (4)

Collaboration within VSC

Keep services free of charge

### Security (6)

ftp connectivity (5) ?

Node sharing, data visible to other users

### Software (3)

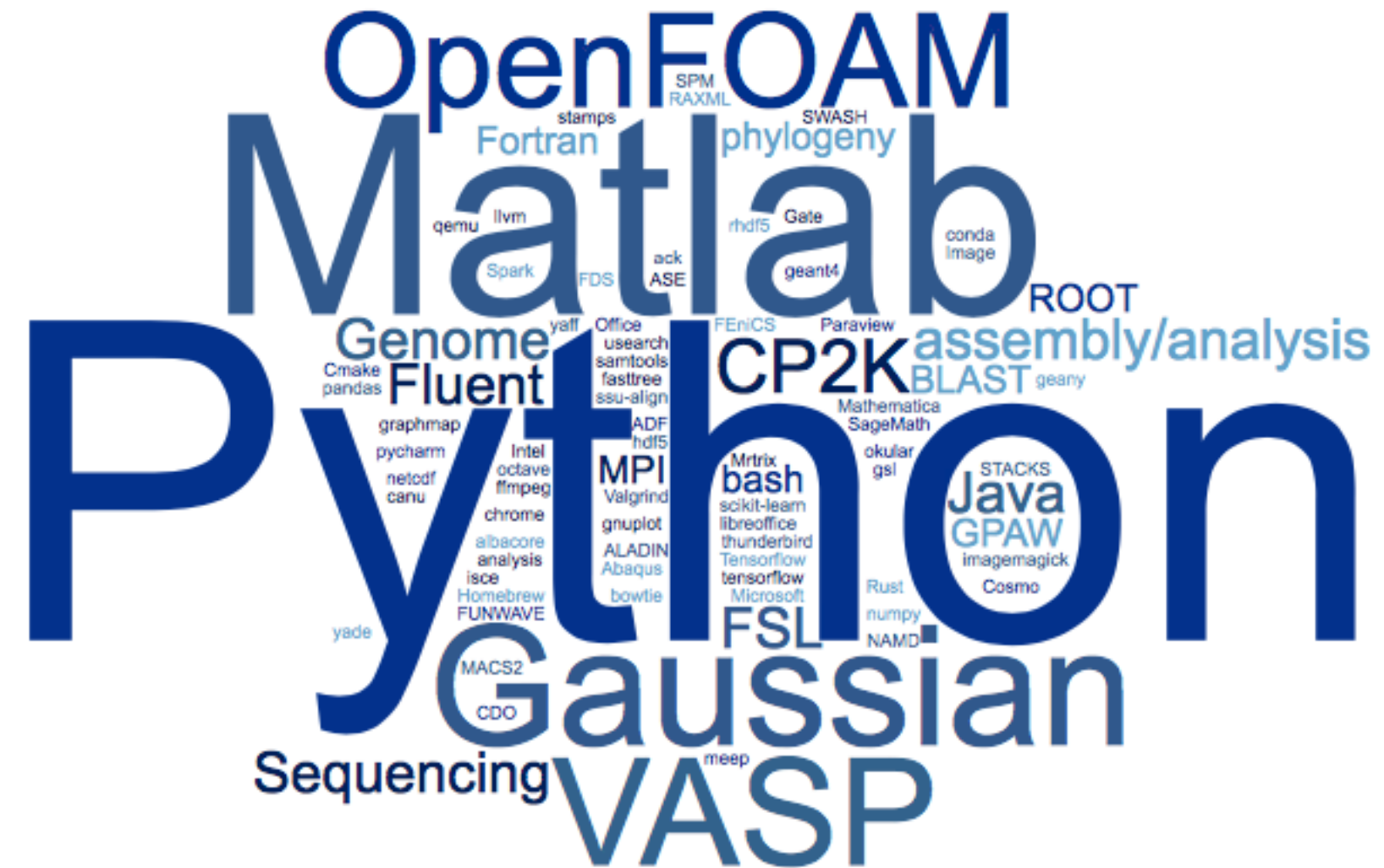
Form to request software install/update

# REVIEW OF USER POLL RESULTS

# Which software do you typically use?

Python	24
Matlab	15
R	14
Gaussian	9
VASP	8
OpenFOAM	7
C, C++	7
CP2K	4
Own code	4
FSL	3

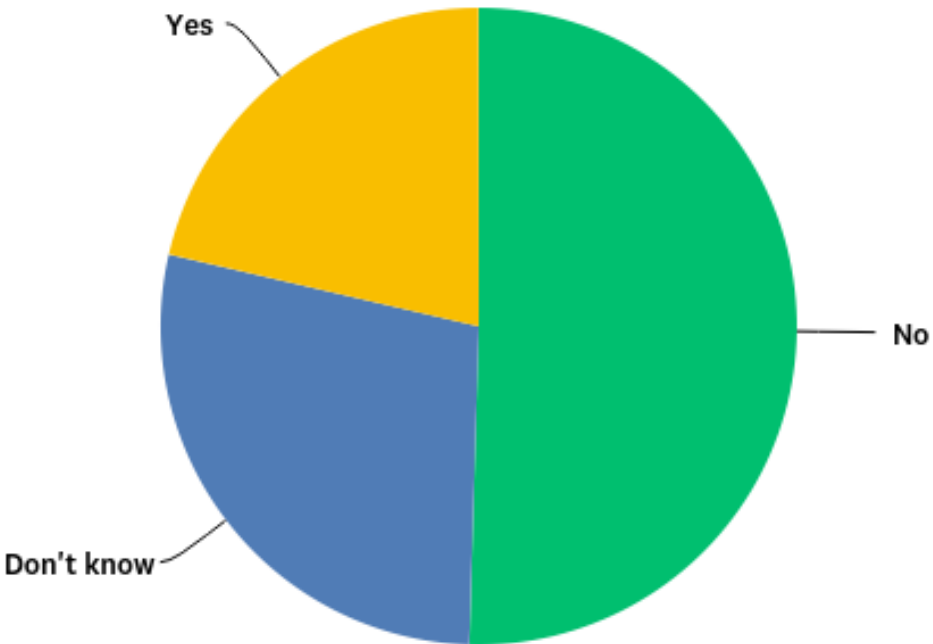
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# REVIEW OF USER POLL RESULTS

**Would your research benefit from specific IT hardware or services that HPC-UGent currently does not provide?**

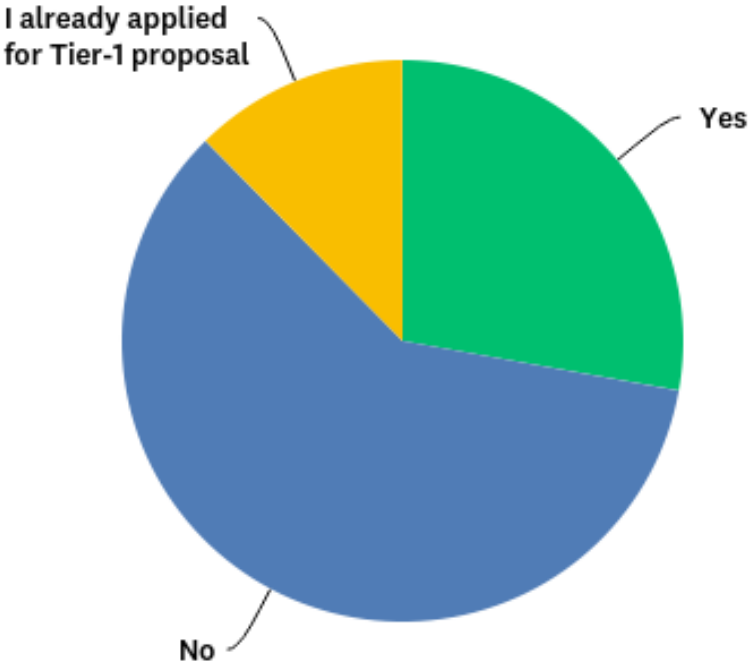
	#resp	<u>Specific hardware/services suggested</u>
<b>No</b> The current compute platform suffices	52	Bigdata cluster with fast I/O Large, shared storage (many TB) Very high memory machine (1 TB)
<b>I don't know</b>	29	GPU
<b>Yes</b> I need specific hardware/services	22	More cores / node  Other compilers than Intel Longer wallclock time Personnel to support coding design Additional personnel for software installs



# REVIEW OF USER POLL RESULTS

## Would you be interested in applying for a Tier-1 proposal?

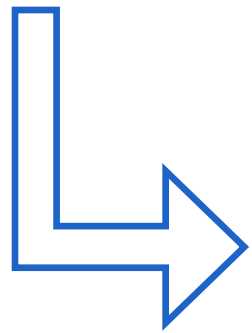
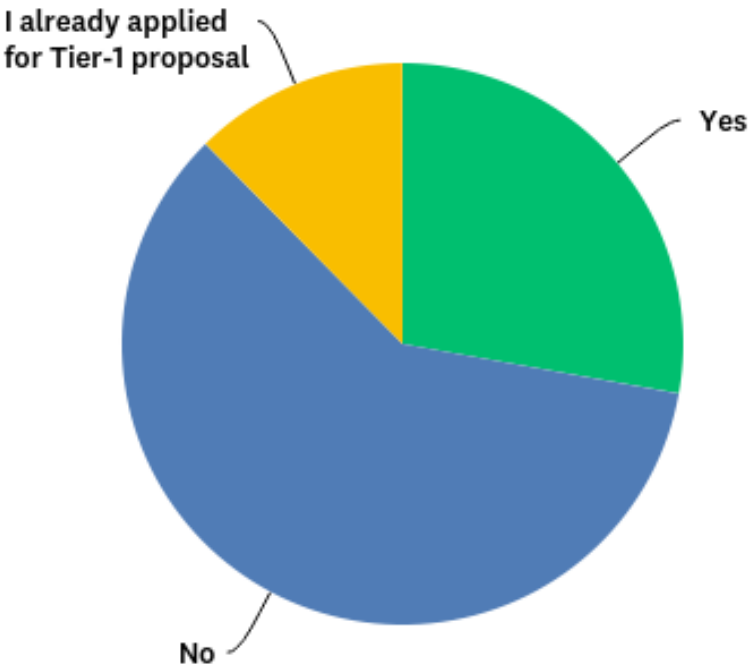
	#resp
Yes	27
I already applied for Tier-1 proposal	22
No	58



# REVIEW OF USER POLL RESULTS

## Would you be interested in applying for a Tier-1 proposal?

	#resp
Yes	27
I already applied for Tier-1 proposal	22
No	58



## What is holding you back to submit a Tier-1 proposal? Why do you consider Tier-1 not suitable for your research?

Tier-2 suffices (33)	Too much work (1)
Lack of experience (3)	Gaussian does not scale (1)
Don't know what Tier-1 is (3)	Additional cost (1)

Dr. Ewald Pauwels

Scientific coordinator HPC @ Ghent University

Vice-coordinator VSC

HPC-UGent

E     [hpc@ugent.be](mailto:hpc@ugent.be)

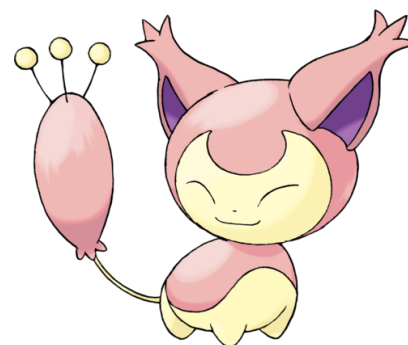
[www.ugent.be/hpc](http://www.ugent.be/hpc)

# RECEPTION: BEERS



## **Pils 13 Fresh Hop**

The Ministry of Belgian Beers  
Pils (4% Alc. Vol)



## **Zwaluw**

Siphon Brewing  
Session IPA (3,3% Alc. Vol)



## **Cendre**

Siphon Brewing  
Black saison (6.5% Alc. Vol)



## **Huldra**

Brouwerij Totem  
Session IPA (2,7% Alc. Vol)



## **Kornkråke Double Dry Hopped**

Brouwerij Totem  
Chili IPA (5,3% Alc. Vol)



## **Narvi**

Brouwerij Totem  
Mandarine Radler (2,1% Alc. Vol)