



THE CYPRUS  
INSTITUTE

RESEARCH • TECHNOLOGY • INNOVATION

*Support opportunities to Industry*



**EURO**

**HPC National Competence Center**

**CaSToRC - The Cyprus Institute**

*Kyriakos Hadjiyiannakou*

# HPC National Competence Center

CaSToRC

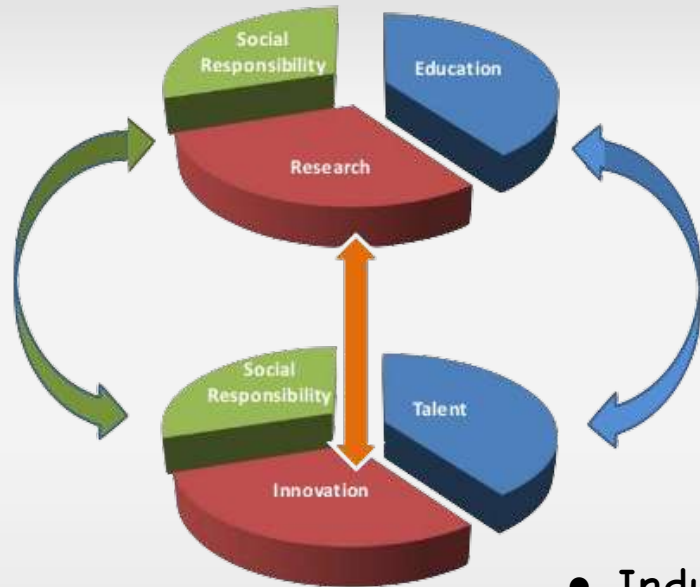
Support opportunities to Industry



## Academia

- Academic institutions contribute to education and knowledge production

- Government organizations support Academia and Industry but they need support to adapt to the digitalization transformation



- Industries take the knowledge and the talented graduates to promote innovation which is a key component for a developed society



## Industry



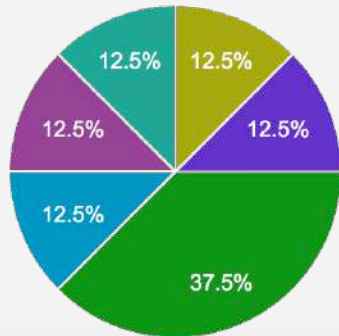
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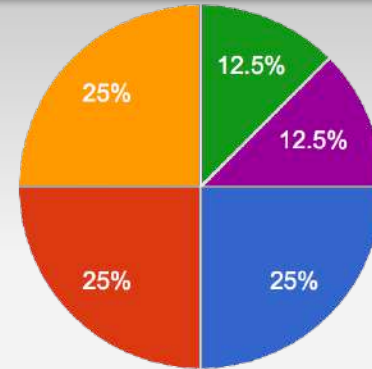
Identification of HPC and data analytics needs through a survey



Participation of companies in the survey for HPC and data analytics

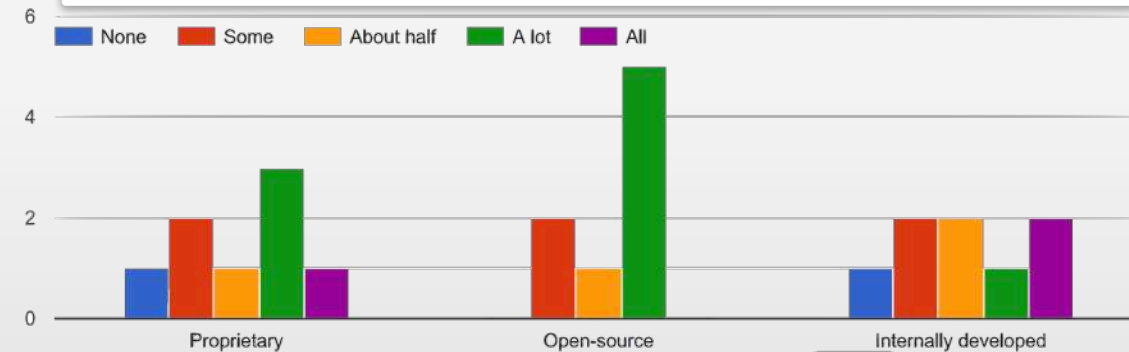
- Consumer products manufacturing
- Energy (oil/gas exploration, alternative...)
- IT systems and software manufacturing
- Consulting services
- Utilities (power generation, distribution...)
- Financial services
- Insurance
- Media/entertainment
- Gaming
- Retail
- Cheminformatics, Nanoinformatics, Data Analytics
- Data Analytics
- Marine and maritime research and development
- Pharmaceuticals

Interest in accessing HPC and data services in the near future



- Now
- Within 6 months
- Within 1 year
- Between 1-2 years
- Resources will not be required within the above timeframes

Proprietary, open-source or internally developed software



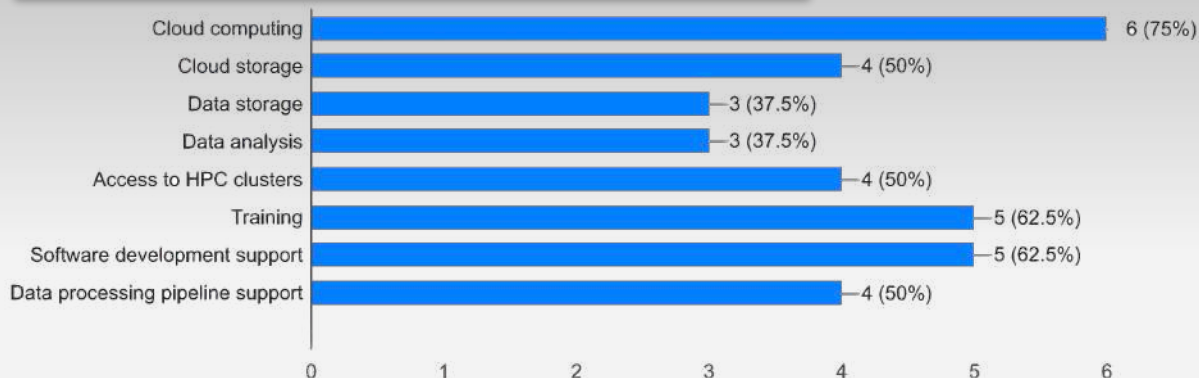
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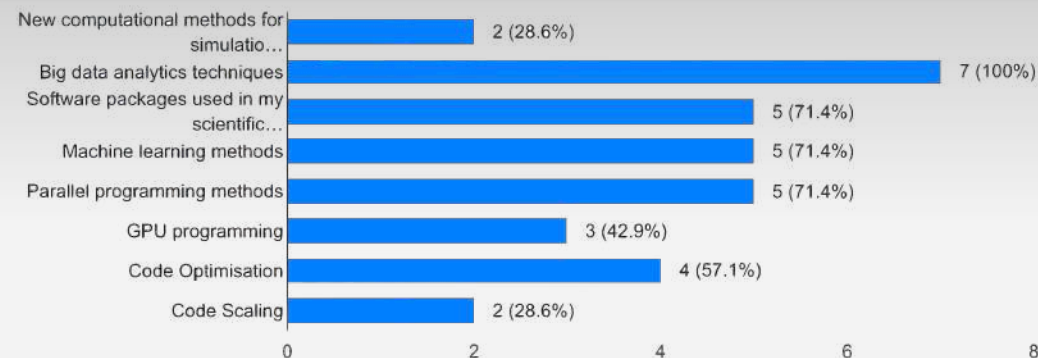
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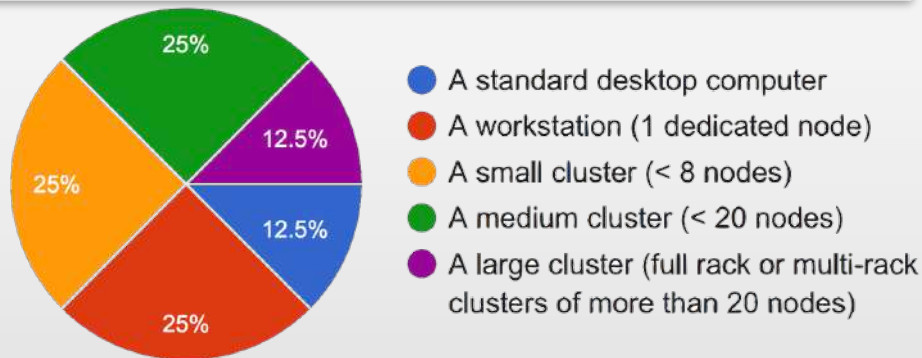
## Type of services industrial organizations need



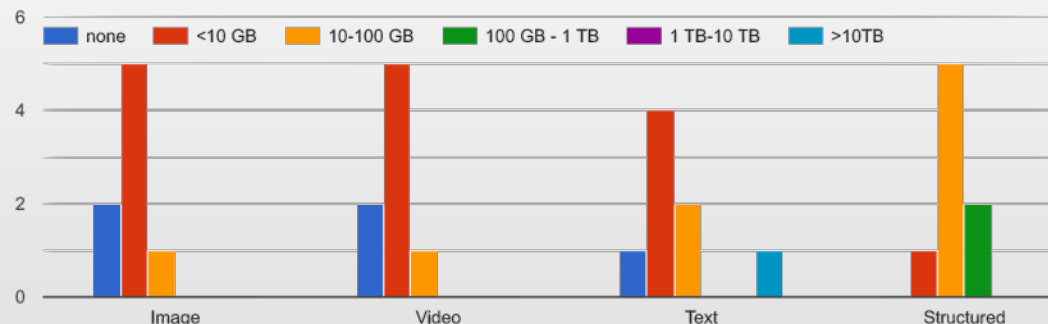
## Provided training on the following, will increase comp. resources consumption



## Max size of a computer industrial organizations used



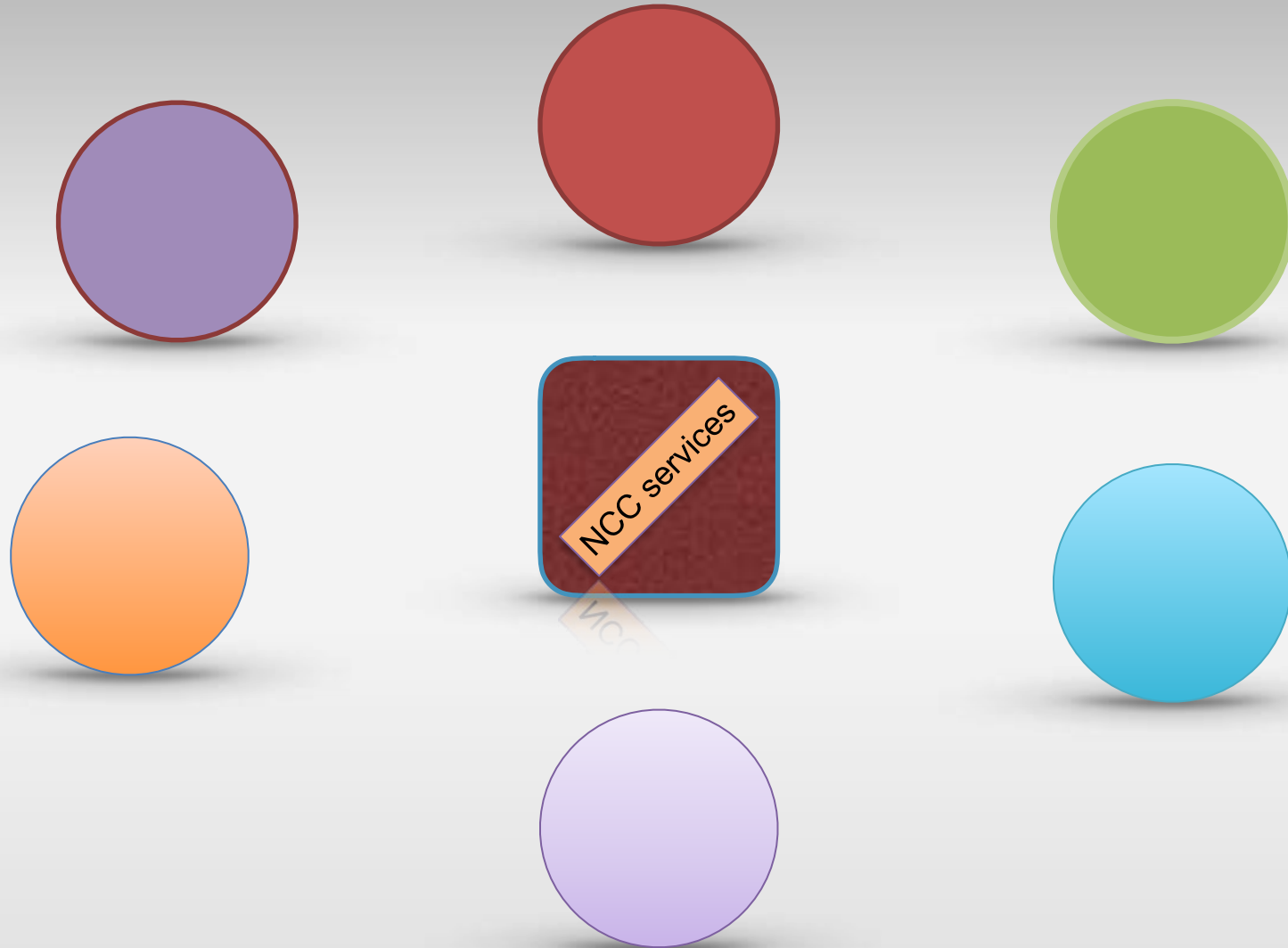
## Monthly storage requirements for various data types



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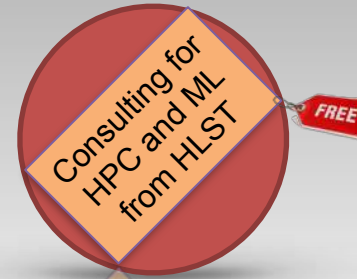
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On a mutual agreement between your company and our center we gain access to your software. Source code is needed in order to be able to inspect it.



We discuss advanced computing architectures which are suitable for your needs such as multi-core CPUs and accelerators such as GPUs

We perform a battery of tests in order to identify bottlenecks in the implementation of the software and suggest solutions to improve the performance.



The algorithms are examined to assess if it is possible to introduce machine learning algorithms to boost the predictive power of your software

The algorithms and the workflows in the code are examined in order to identify sections which allow parallelism. Parallelization strategies are suggested to scale-up and speed-up the software.

For software with high data needs we examine the possibility to use distributed computing to access large amounts of memory

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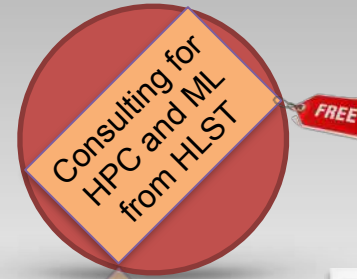
## Example of our success stories



Wealth Management  
for Individual and  
Institutional Investors

Fund Management  
for Professional Investors  
and Fund Promoters

Advisory  
for Insurance Undertakings,  
Investment Firms and Institutional Clients



They had an internally developed software which provides predictions for the liability of insurance policies

Each run was taking 3 hours on a personal computer and it was not acceptable for the company's requirements

After code inspection bottlenecks had been identified and part of the software was rewritten at low level programming languages

Multithreaded support to utilize many CPU cores has been added with prospects to move to GPU when bigger datasets are available

From 3 hours now it takes 15 minutes to run

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We organize training events in order to enhance awareness about HPC and machine learning



Free of charge, three levels have introduced to allow users with different levels of experience

First event took place 15-17 of February

<https://castorc.cyi.ac.cy/events/hpc-beginner-training-event-02-2021>

About 50 people have participated to the event and the training sessions have been recorded and are available through Youtube



In the near future we will have two additional training events for more advanced users

★ HPC Intermediate Training Event (19-24 April)

<https://castorc.cyi.ac.cy/events/hpc-intermediate-training-event-04-2021>

★ Training event for Industry (28-30 June)

<https://castorc.cyi.ac.cy/events/training-for-industry-06-2021>

We would like to have a feedback about what kind of training you might need





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The industries express their interest to work on a collaborative project with our center

[https://docs.google.com/forms/d/e/1FAIpQLSd\\_NK89BLFD\\_1PcXPOgaDbxWnt4OeY9WSY3TZbe\\_QBfasIEQ/viewform](https://docs.google.com/forms/d/e/1FAIpQLSd_NK89BLFD_1PcXPOgaDbxWnt4OeY9WSY3TZbe_QBfasIEQ/viewform)

Identify a project in collaborations with industry and/or government organizations



Collaboration agreements are signed between our institute and the other organizations

Industrial partners suggest participants from their staff to our program. Financial support is provided from our side until our budget is exhausted.

Participants are co-located for duration 3-6 months depending on the needs of the project

Participants are assisted in their projects by members of the NCC High Level Support Team

- Gain access to HPC resources for the completion of their project
- Gain technical expertise in the fields of HPC, Artificial Intelligence and Big data analytics

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Email address \*

Your email

Project lead from company / government organisation \*

Provide name of project lead and name company / government organisation

Your answer

The staff members to be engaged in this project

Please provide: Name - Email. The staff members need to have some computational expertise.

Your answer

Description of the proposed project \*

Please describe the proposed project and the goals. If known include information on the expected computational requirements, data volume and expertise involved. If possible, please describe algorithms and computational approaches used in your work. List also the programming languages.

Your answer

Short description of the technical aspects \*

Your answer

**Financial support**

The appointment can be done full time or part time. Full-time salary is 2000 (Gross) for those who hold at least a Master's degree and 1000 (Gross) for people without a Master's degree at the time of application.

Support requested \*

- Financial support for one person at the NCC (3 to 6 months). Name the intern in the participant list
- Consultancy for project co-development
- Training in the fields of HPC, Big Data and AI
- Professional application profiling and analysis on Cyclone
- Other: \_\_\_\_\_

# HPC National Competence Center



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• Peak Performance (double precision)

~ 600 TFlop/s

• Number of nodes

- 17 CPU nodes, 40-cores each
- 16 GPU nodes, 40-cores + 4 GPUs

• GPUs

Nvidia Tesla V100, 32 GB

• Memory/node

- 96 GB per CPU node
- 192 GB per GPU node

• Scratch storage

135 TB NVMe Storage

• Disk storage

3.2 PB Storage

• Node-node interconnect

HDR 100 InfiniBand

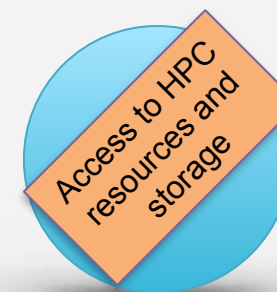


Cyclone



• Both CPU and GPU partitions. Depending if your software supports GPUs you can choose the partition for your needs

• GPU nodes have  $32 \times 4 = 128$  GB. If you have large datasets we can support distributed computing on many nodes



• V100 GPUs are equipped with tensor cores, ideal for machine learning applications

• A lot of storage that you can use for low cost

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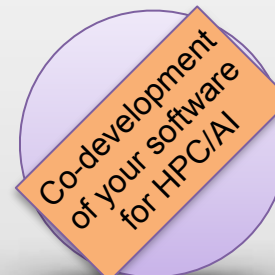
## Example of an on-going co-development project

Identify projects in collaborations with industry and/or government organizations

Collaboration agreements are signed between our institute and the other organizations with details about the duration of the project and the cost of this service

If the industrial partner has personnel capable of working on the project they can take advantage of our paid internship program

Members from our High level support team are chosen in order to match the needs of the project in order to devote person months for the co-development of the project



<https://prace-ri.eu/hpc-access/shape-access/>

Co-development of a software to reduce the cost in fuel consumption for the maritime sector

The core of the software was using a CPU code which was very slow for long journeys

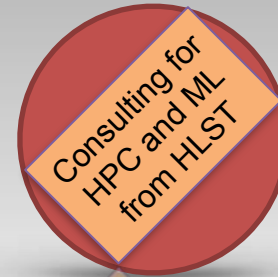
We are working to integrate a GPU implementation which provides x100 speedup

# HPC National Competence Center



Overview of the services we provide

We need your feedback in order to improve the services we provide.

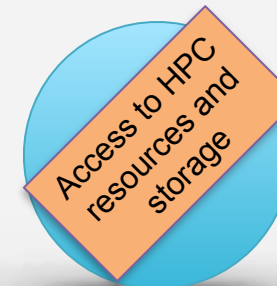


Please give us your feedback in order to improve our training events

Pure consulting is for free and we encourage companies to make the most use of it to promote their Apps for HPC and AI

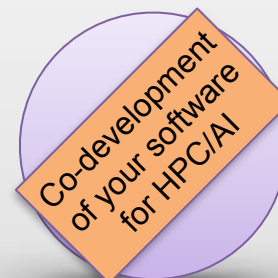


# THANK YOU!



In the near future we will have a dedicated supercomputer for industrial projects. Preparatory access on Cyclone can be used.

Internships to work on your project are paid until the budget is exhausted



We are open to co-develop your project for HPC exploiting AI methods.