Towards the clouds, together
The IaaS framework

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@ DI4R
Brussels
There is work to be done

Europe is largest producer of scientific data in the world

Europe adopts clouds slower than other regions

Education, Research and government adopt clouds slower than other sectors

TOWARDS THE CLOUDS TOGETHER
Clouds, opportunities for research

- Lift and shift VMs, from on-premise to the cloud: flexible scaling
- Rich feature set, new and quickly evolving toolset
- High Performance Computing in the cloud
- SaaS, including collaboration and communication tools
- New cloud areas
- Machine learning and Artificial Intelligence
Drones will watch Australian beaches for sharks with AI help

They’ll spot sharks with greater accuracy than humans alone.

Humans aren’t particularly good at spotting sharks using aerial data. At best, they’ll accurately pinpoint sharks 30 percent of the time -- not very helpful for swimmers worried about stepping into the water. Australia, however, is about to get a more reliable way of spotting these underwater predators. As of September, Little Ripper drones will monitor some Australian beaches for signs of sharks, and pass along their imagery to an AI system that can identify sharks in real-time with 90 percent accuracy. Humans will still run the software (someone has to verify the results), but this highly automated system could be quick and reliable enough to save lives.

The detection AI is a quintessential machine learning system. The team trains the system to both look for sharks based on aerial videos as well as distinguish them from other life on the water. That approach doesn’t just help it identify sharks, though. It can also flag dolphins, whales and other sea creatures of interest, which could give researchers an additional way to track populations.

Artificial intelligence identifies plant species by looking at them

Machine learning algorithms have successfully identified plant species in massive herbaria just by looking at the dried specimens. According to researchers, similar AI approaches could also be used to identify the likes of flies, larvae, and plant fossils.

From Nature:

There are roughly 3,000 herbaria in the world, hosting an estimated 350 million specimens — only a fraction of which has been digitized. But the swelling data sets, along with advances in computing techniques, enticed computer scientist Erick Mata-Montero of the Costa Rica Institute of Technology in Cartago and botanist Pierre Bonnet of the French Agricultural Research Centre for International Development in Montpellier, to see what they could make of the data.

Researchers trained... algorithms on more than 260,000 scans of herbarium sheets, encompassing more than 1,000 species. The computer program eventually identified species with nearly 80 percent accuracy: the correct answer was within the algorithms’ top 5 picks 90% of the time. That, says (Penn State paleobotanist Peter) Wilf, probably outperforms a human taxonomist by quite a bit.

Such results often worry botanists, Bonnet says, many of whom already feel that their field is undervalued. "People feel this kind of technology could be something that will decrease the value of botanical expertise," he says. "But this approach is only possible because it is based on the human expertise. It will never remove the human expertise." People would also still need to verify the results, he adds.

"Going deeper in the automated identification of Herbarium specimens" (BMC Evolutionary Biology)
Google’s AlphaGo AI beats the world’s best human Go player

Google DeepMind supercomputer learns 3,000 years of human knowledge in 40 days

Jie said that AlphaGo’s performance left him “shocked” and “deeply impressed” in post-match statements, noting that the moves the computer played “would never happen in a human-to-human match.”

http://www.telegraph.co.uk/science/2017/10/18/alphago-zero-google-deepmind-supercomputer-learns-3000-years/

Analyse audio, pictures and video with machine learning algorithms from IBM, Google and Microsoft
Online machine learning chat bot

The QnA Maker lets you create a knowledge base of questions and answers from online and editorial sources.

Microsoft QnA Maker is a free, easy-to-use, REST API and web-based service that trains AI to respond to user's questions in a more natural, conversational way. Integrate Microsoft Cognitive Services to enable your bot to see, hear, interpret and interact in more human ways.

https://qnamaker.ai
it is important to ensure that...

GET IN
Data is handled safely and meets European and national regulations

Services can be acquired through the institutions’ structures:
- Affordable and predictable cost and purchasing models (prevent bill shock)
- Limit network traffic costs and provide network integration
- Log in with institutional account

GET OUT
Data can be moved (to another provider)
... it is important to ensure that ...

GET IN
Data is handled safely and meets European and national regulations.

Services can be acquired through the institutions' structures:
- Affordable and predictable cost and purchasing models
- Limit network traffic costs and provide network integration
- Log in with institutional account

GET OUT
Data can be moved (to another provider)

This should not be an issue!

A readily available foundation for researchers is required

Enable researchers to focus on using and benefiting from cloud services
BRING THE CLOUD ON THE GROUND

Making cloud services accessible: easy and safe to use through pan-European collaboration and agreements
40 European National Research and Education Networks (NRENs)

Collaborate in their European association GÉANT: Network, Identity Management, Clouds

Deliver to 10,000 organisations with 50 million users

Collective hybrid multi-cloud approach, build and buy
Public clouds: procure from commercial suppliers
Community clouds: develop and operate sector specific solutions

One digital single market, with many cloud services
Scale up national community cloud solutions to a European level

Greek IaaS cloud built and operated by GRNET

Accessible by whole European Research and Education community
Single sign-on
Log-in with institutional account

French web conferencing service built and operated by RENATER
On behalf of 36 NRENs and their institutions, GÉANT conducted a pan-European tender for Infrastructure as a Service offerings (IaaS).
GÉANT applied
EU procurement directive
2014/24/EU

Which enables the NRENs and their institutions to run a tender together via one central purchasing body: GÉANT
IaaS tender outcome: Framework Agreements awarded, valid until end of 2020

- AWS
  Cloud for Higher Education
  Whether you need to facilitate teaching and learning, better manage your university's operations or access via resellers

- ITSoft
  ITSoft provides Croatian companies IaaS rental of CPU, RAM, DISK space, network and security devices in a self-service portal that

- Dimension Data
  Dimension Data provides hybrid cloud-enabled by data centres, networking, collaboration and security offering 99.999 % availability SLA, IPV6 support, cloud

- Vancis
  Vancis specializes in data centre services, IaaS / cloud services, managed services and value-added platform services. Vancis operates from its

- Microsoft Azure
  Microsoft Azure – the perfect choice for Education and Research Microsoft Azure is the perfect choice for research and education via resellers

- Cloud Sigma
  CloudSigma is a leading European infrastructure-as-a-service (IaaS) provider with a focus on flexibility, performance and excellent customer support. Everything is

- Lattelecom Cloud Services
  Lattelecom | Cloud is a service that provides companies with computing resources – Virtual Machines and Virtual Data Centers including

- KPN
  KPN offers institutions in the Netherlands Managed Hybrid Cloud Services, an application-centric service

- Sparkle
  Sparkle's cloud automation offer for Research & Education
  Sparkle provides GÉANT with cloud solutions to support pan-European research and education community. Cloud services will be offered by

- Interoute
  Interoute From the ground to the cloud Today people and customers across the globe rely on Interoute’s cloud based services and

- T-Systems
  T-Systems Cloud Service Scientific computing: cloud support for science Digitization provides fresh impetus and inspiration across all scientific fields. In particular, scalable, rapidly
Why use the IaaS services?

- Discounted prices for all institutions, large and small.
- Invoice billing, no credit card needed, accommodating capital expenditure through upfront commitments.
- Transfer existing educational licenses to the cloud.
- Manage usage and spending.
- Sign your contract under local law.
- Reduced traffic costs, through suppliers’ connections to the GÉANT network.
- Single sign-on support (SAML2).

Benefits of the framework agreements
How can institutions use the services?

*Use directly*

EU institutions can buy the offerings directly

There is no need to run your own tender
Online Cloud Catalogue: ‘IaaS service matrix’ - Displaying providers’ capabilities
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<thead>
<tr>
<th></th>
<th>Aggregated Spend</th>
<th>Capital Expenditure</th>
<th>Contract Term</th>
<th>Cost Recovery Fee</th>
<th>Data Center Setup</th>
<th>Licensing Requirements</th>
<th>Migrating Existing OS</th>
<th>Post-paid Billing</th>
<th>Pricing</th>
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AC14 – Migration of existing contracts (Awarding Criteria)

Institutions may already have running contracts with Tenderers who also may be awarded framework agreements under this tender. These Institutions are likely to be interested in migrating their existing contracts in order to be able to make use of the (expected) improved conditions and avoid future discussions on conditions resulting from two contracts.

Q. Please provide information on the following:

A. Will you accept or facilitate customers who are entitled to procure the services via their country’s NREN to migrate their existing contracts into this GÉANT framework agreement? Thereby pricing and conditions of the existing contracts are effectively replaced by the pricing and conditions from the GÉANT framework agreement.

B. If so, please describe the procedure and expected duration to have this completed.
Quality & Qualifications institute (QQI) in Ireland achieves substantial savings with GÉANT Cloud Framework

Average daily spend Nov 2016 – Oct 2017

33% cost reduction

after QQI worked with the Irish NREN, HEAnet, to transfer their Microsoft Azure workloads to the GÉANT framework agreement, from July 2017 onwards
### Data Type

<table>
<thead>
<tr>
<th>Data Type</th>
<th>On-premise (at the institute)</th>
<th>In country</th>
<th>In EU + EEA</th>
<th>Anywhere, in non-EU non-EEA</th>
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</thead>
<tbody>
<tr>
<td>public</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
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<tr>
<td>unrestricted</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
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<tr>
<td>restricted</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>N</td>
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<tr>
<td>confidential</td>
<td>Y</td>
<td>Y</td>
<td>Y, but only in community cloud</td>
<td>N</td>
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<tr>
<td>secret</td>
<td>Y</td>
<td>Y</td>
<td>Y, but only in community cloud</td>
<td>N</td>
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### Low Risk

- **Data for public use**
- Loss of confidentiality, integrity, or availability of the data or system has no significant impact

### Medium Risk

- **Personally Identifiable data**
- Data is not generally available to the public
- Loss of the data or system could have a mildly adverse impact

### High Risk

- **Sensitive (Personally Identifiable) data**
- Loss of the data or system could have a significant adverse impact on our mission, safety, finances or reputation.
DIGITAL SINGLE MARKET FOR CLOUD SERVICES

https://clouds.geant.org
clouds@geant.org