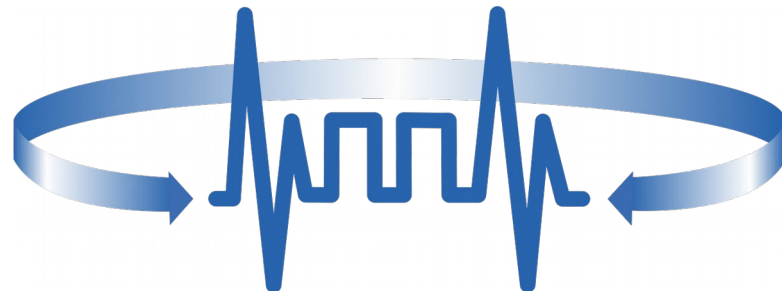


Using EGI Resources with Everest Platform

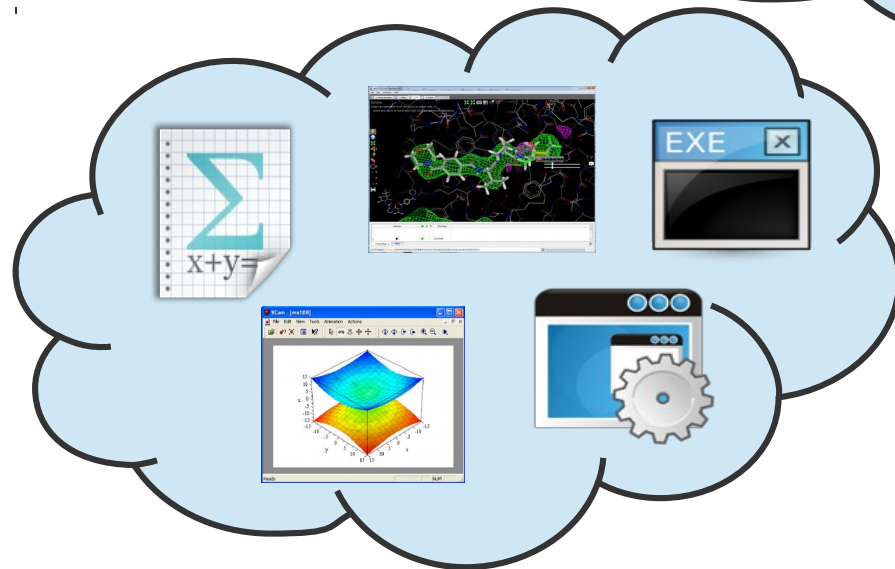
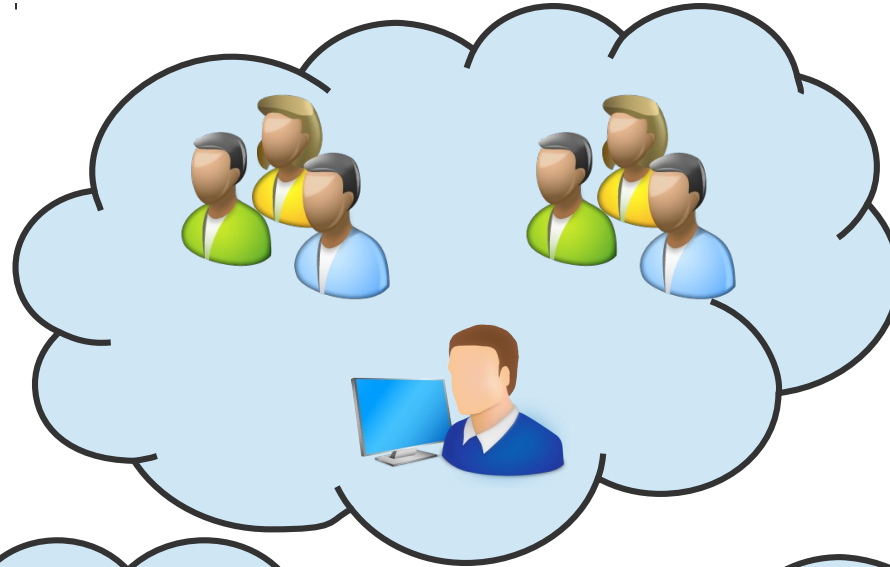
Oleg Sukhoroslov, Sergey Volkov

Institute for Information Transmission Problems
of the Russian Academy of Sciences (Kharkevich Institute)



Motivation

Researchers



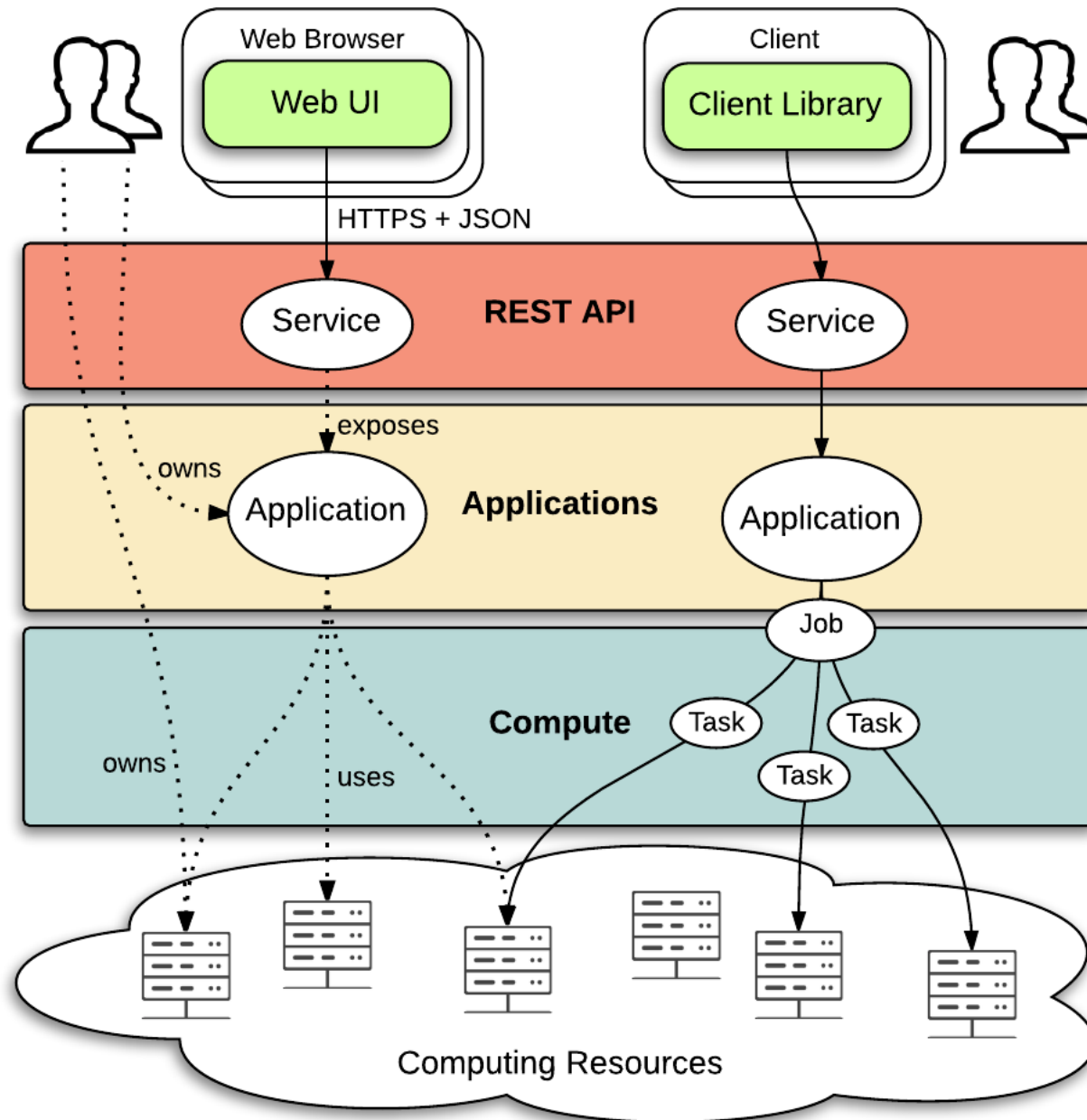
Applications



Computing Resources

- Web-based platform supporting
 - Publication of computational applications as services
 - Binding applications to external computing resources
 - Running applications on arbitrary sets of resources
 - Sharing applications and resources with other users
- Platform as a Service
 - Remote access via web browser and REST API
 - Single platform instance can be accessed by many users
 - No installation is required
- Public instance with open registration
 - <http://everest.distcomp.org/>

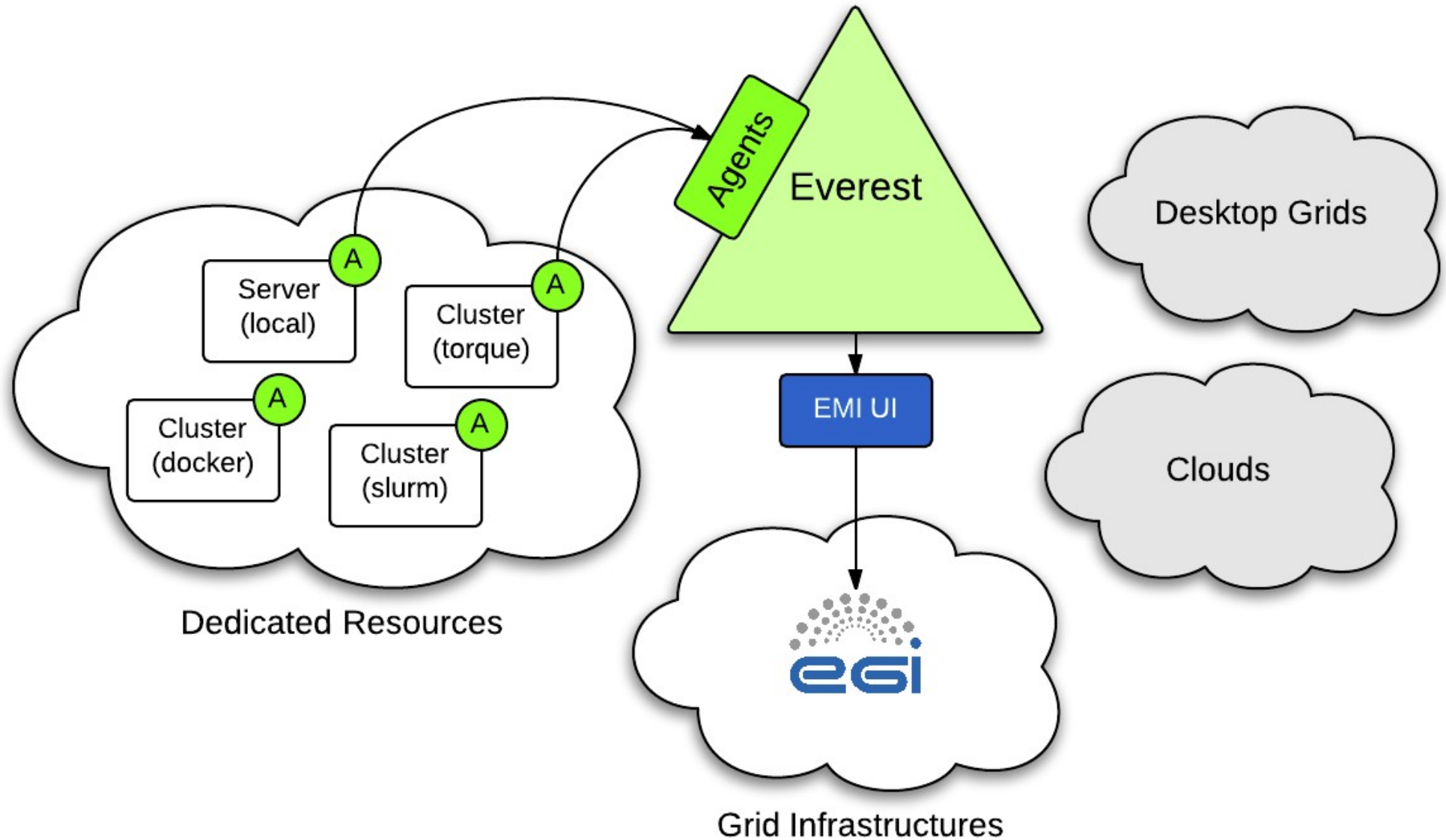
Everest Architecture



Supported Application Types

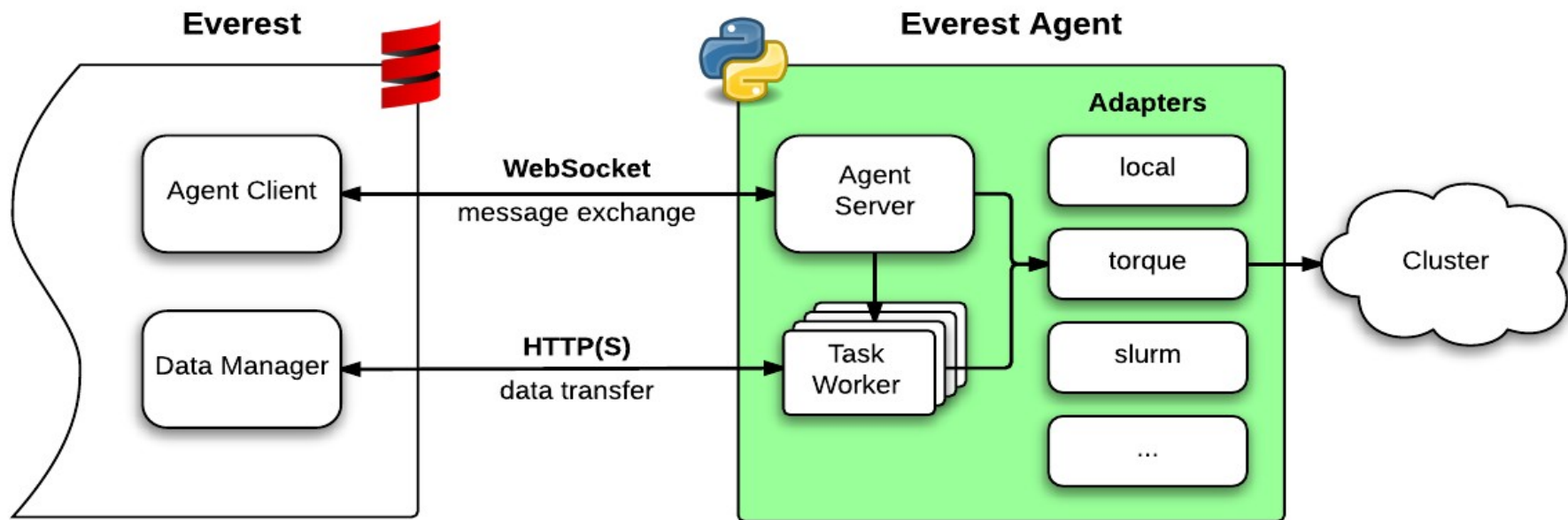
- Command
 - Generic template for applications with command-line interface
 - Single compute task
- Parameter Sweep
 - Generic service for running parameter sweep experiments
 - Large number of independent compute tasks
 - Experimental support for coordination between tasks
- Workflow
 - Composition of multiple applications
 - Multiple jobs with dependencies (described using Python API)
 - Can be published as a new application

Integration with Computing Resources



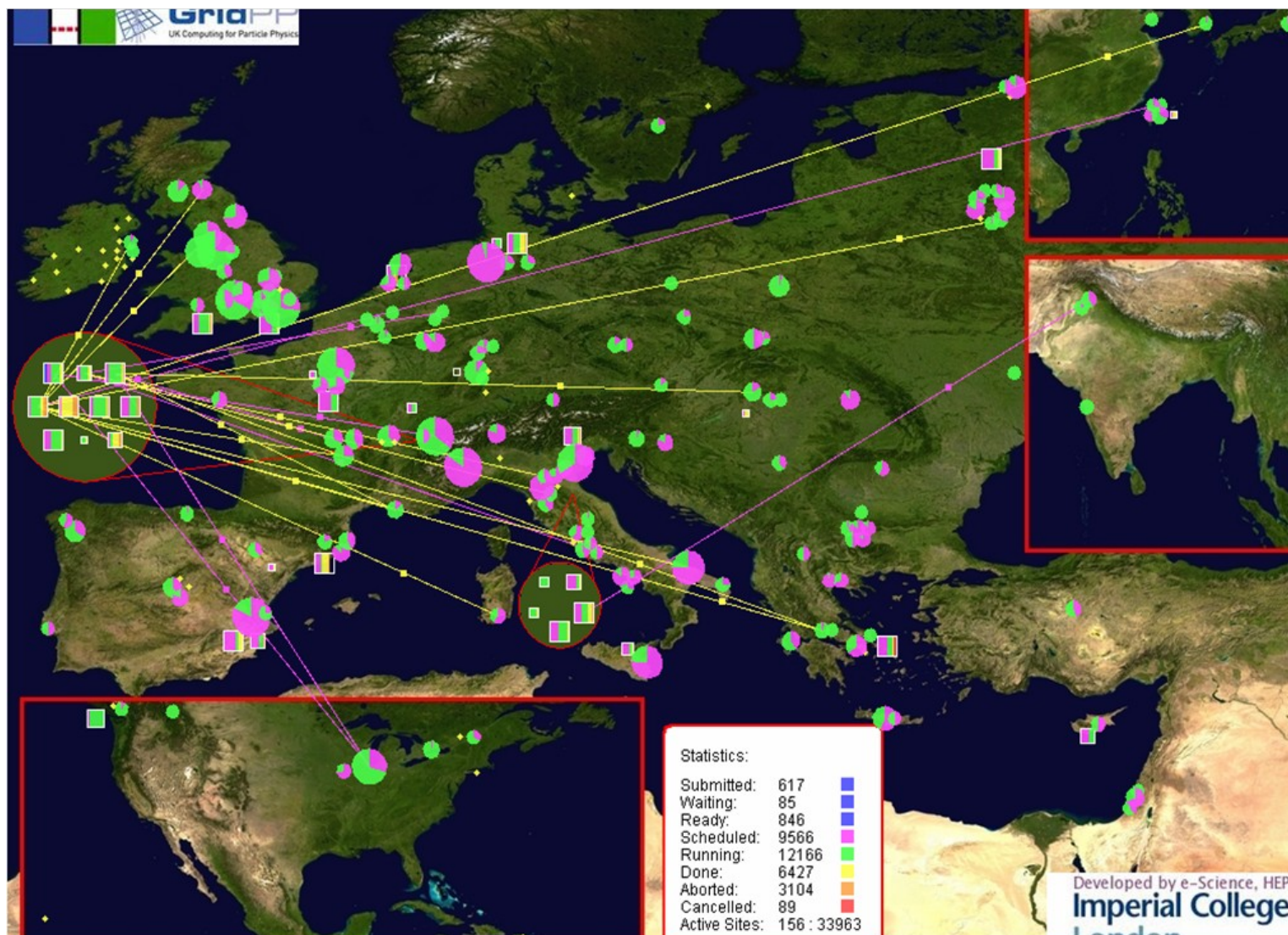
Everest Agent

- A mediator between the resource and the platform
- Supporting servers, clusters and resources behind a firewall
- Security mechanisms: white list, execution of tasks in Docker containers
- Open Source: <https://gitlab.com/everest/agent/>



European Grid Infrastructure (EGI)

~300 resource centers, ~500K CPU cores, ~200 virtual organizations



Integration of Everest with EGI

- Challenges
 - Some users don't have access to grid UI
 - Job submission requires a valid proxy certificate with VO attributes
 - Unpredictable delays while scheduling jobs in grid
- Approach
 - Using hosted docker image with configured EMI UI
 - Enable user to pass plain proxy certificate to Everest
 - Provide a portable Java tool for proxy certificate generation
 - Create a single Everest resource per VO
 - Generate VOMS proxy on-demand from supplied plain proxy
 - Use “pilot jobs” strategy to allocate grid resources before scheduling
 - Reuse agents as pilots (a single resource is backed by many agents)

Creating Resource for EGI VO

BIOMED

Name

Connector

Virtual Organization

Proxy Certificate

Allow List


Comma-separated list of users and groups allowed to use the resource, eg. "userA, @groupB".

Viewing Resource

Resources

[Update](#) [+ New resource](#)

Filter by state ANY ONLINE OFFLINE My resources

Name	Type	Total Slots	Free Slots	Max Tasks	Total Tasks	Running Tasks	Owner
 BIOMED	EGI	421322	23576	0	0	0	sol

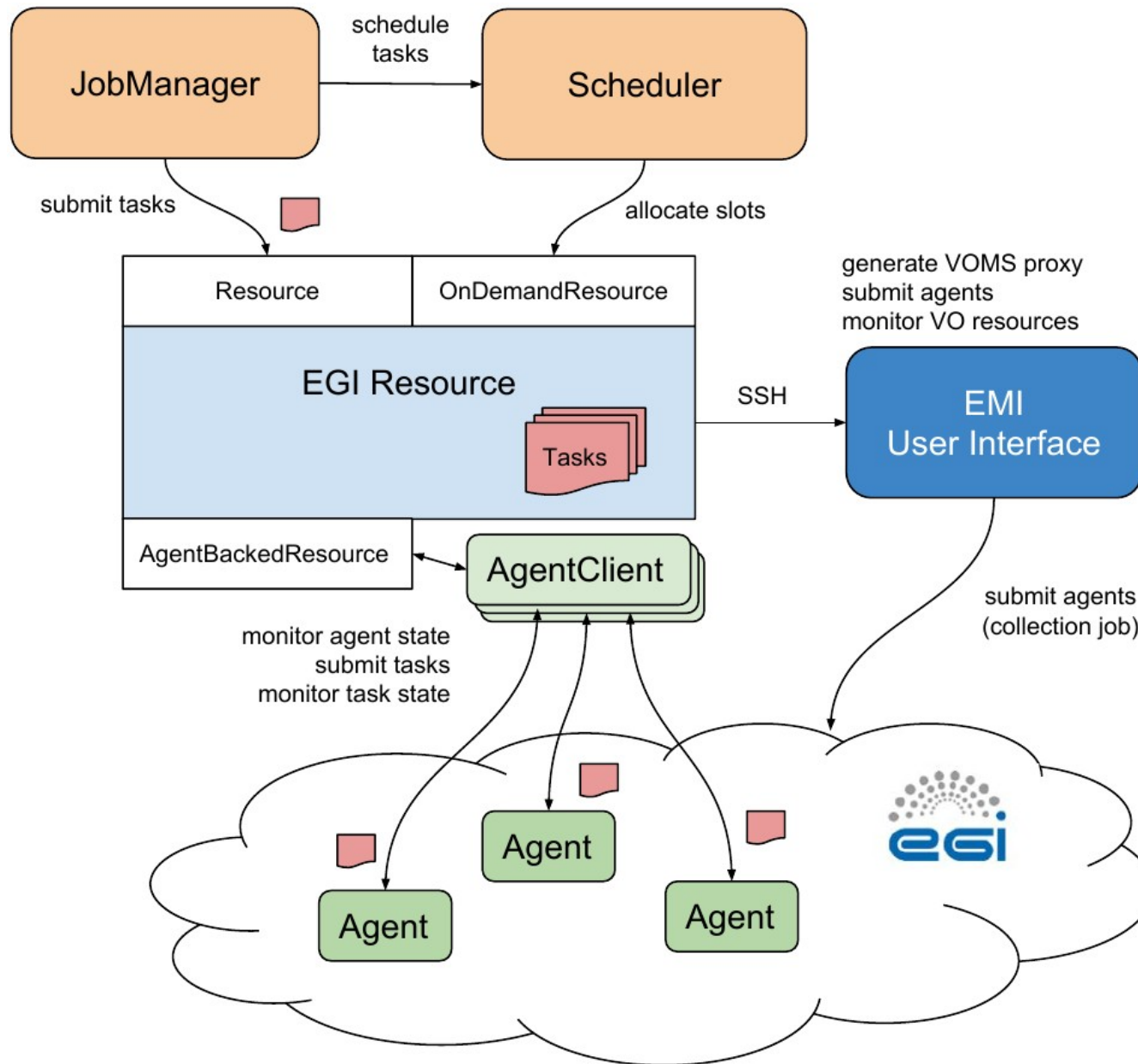
BIOMED

ID	577c027e2c00008a08d9325e
State	ONLINE
Owner	sol
Allow List	sol

Connector

Type	EGI
VO	biomed
Proxy	<pre>subject : /C=RU/O=RDIG/OU=users/OU=isa.ru/CN=Oleg Sukhoroslov/CN=1540468229 issuer : /C=RU/O=RDIG/OU=users/OU=isa.ru/CN=Oleg Sukhoroslov identity : /C=RU/O=RDIG/OU=users/OU=isa.ru/CN=Oleg Sukhoroslov type : RFC 3820 compliant impersonation proxy strength : 1024 bits path : /home/user/.everest/577c027e2c00008a08d9325e/proxy timeleft : 146:48:25 (6.1 days)</pre>

Implementation



Agent Pool Management

- Agents are allocated in batch using collection grid jobs
- Experimental: allocating multiple cores per agent
- The number of total allocated agents is limited (currently 100)
- The agent is automatically released if idle more than 5 minutes

Future Improvements

- Prefer “responsive” computing elements to minimize wait time
- Prestage next task data to optimize resource usage
- Enable users to update proxy certificates

Ad-hoc Computing Infrastructures

- Combination of available resources/infrastructures
 - Local servers and clusters, shared supercomputing centers, grid infrastructures, clouds, volunteer resources
- Suitable for
 - HTC and MTC applications (parameter sweep, workflows)
 - Load balancing
- Personal (user-level) or shared (project-level) ad-hoc infrastructures
 - Should be easy to setup and manage
 - Should support different resource types
 - Should not require admin privileges or complex middleware installation
- Everest
 - Provide necessary middleware as a service
 - Users attach their resources and combine them for running applications

Combined use of HPC cluster and EGI

- Geophysical parameter sweep experiment running on HPC cluster and EGI VO

Name	State	Type	Total Slots	Free Slots	Max Tasks	Total Tasks	Running Tasks
ESR	ONLINE	EGI	136579	4897	51	51	51
My Cluster	ONLINE	torque	216	0	216	216	216



Conclusion

- The integration with EGI enabled Everest users to seamlessly run applications on grid resources via a web browser
- In contrast to classic grid portals, the presented solution supports additional use cases such as
 - combined use of EGI and other resources
 - running of parameter sweep experiments
 - composition of applications via REST API

<http://everest.distcomp.org/>