

Integrating and scaling up **SLING**

Perspectives for Scientific Computing in Slovenia

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Consortium in 2020

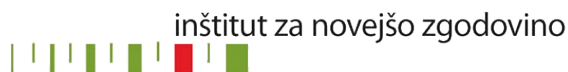
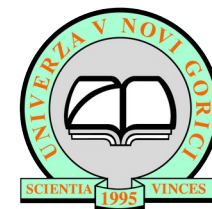
SLING



Univerza v Ljubljani



Engineering,
Informatics,
Mathematics,
Medicine



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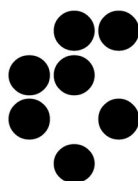


REPUBLIKA SLOVENIJA
MINISTRSTVO ZA JAVNO UPRAVO

ARCOTUR



XENYA



Jožef Stefan Institute



SLING Slovenian National Supercomputing Network



- DataGrid 2002-2004
- EGEE I-III, NorduGrid 2004-2010
- NorduGrid 2004/2011
- EGI 2010
- PRACE 2018



Some High Points

and interesting moments



- Early parallel support in compilers
Convex, **1996**
- First production 64-bit cluster
AMD + SUSE, **2003**
- Chrooted HPC user software **2003-2015**
- First national EGI OC **2008**
- aCT - the massive HTC task manager
2010
- Early HPC containers wt IB and GPGPU
Singularity HPC, -nv option, ATLAS deploy

Domains and Communities



- High energy physics
- Theoretical physics
- Computational chemistry
- Astrophysics
- AI / Machine learning
- Biochemistry
- Genomics
- Earth observation data
- Bioinformatics
- Cryo microscopy
- Medical image processing
- Robotics
- Meteorology
- Climate research

Current Set-Up



- Multiple combined grid/HPC sites
 - Login, CPU, GPGPU, adding FPGA
- Singularity containers
- HPC courses at universities + CC
- Central services:
 - LDAP, ICINGA, dCache
 - CVMFS for modules & images
 - NextCloud, GitLab, MkDocs

Current Projects

SLING



EuroHPC
Joint Undertaking



Current Projects



EuroHPC
Joint Undertaking



HPC RIVR



- Research Infrastructure in the Eastern Region
- April 2018 – March 2021
- 20 Mio EUR budget
- National, regional international collaborations



HPC RIVR



- Invested: 20+ 6 Mio
- Eastern region consortium
- Contracted to SLING
- EGI, PRACE, NorduGrid
- EuroHPC PetaScale Vega Q1 2021



EuroHPC
Joint Undertaking

The Atos logo, featuring the word "Atos" in a bold, blue, sans-serif font.

Atos BullSequana XH2000 6.8 Rmax 10PF peak
130k Rome 7H12 cores ~1k nodes
256 GB/node, 256 x 512 GB/node
60 GPU nodes with 4 x A100 GPU
HDR100 + 1000Gbps Ethernet + 500 Gbps WAN
23 GB CEPH + 1 PB NVMe Lustre

SI & EuroHPC



- Integrated effort:
 - with national SLING support
 - with EuroHPC VEGA PetaScale
 - with Leonardo consortium
 - Access, high-level support and docs with EuroCC



EuroHPC
Joint Undertaking

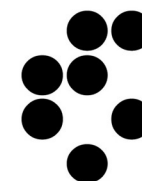
Not only Vega

Distributed effort:

- +2 HPC RIVR machines
- NREN massive upgrade
- JSI and KI upgrading
- Project infrastructure:
Clarín, Elixir



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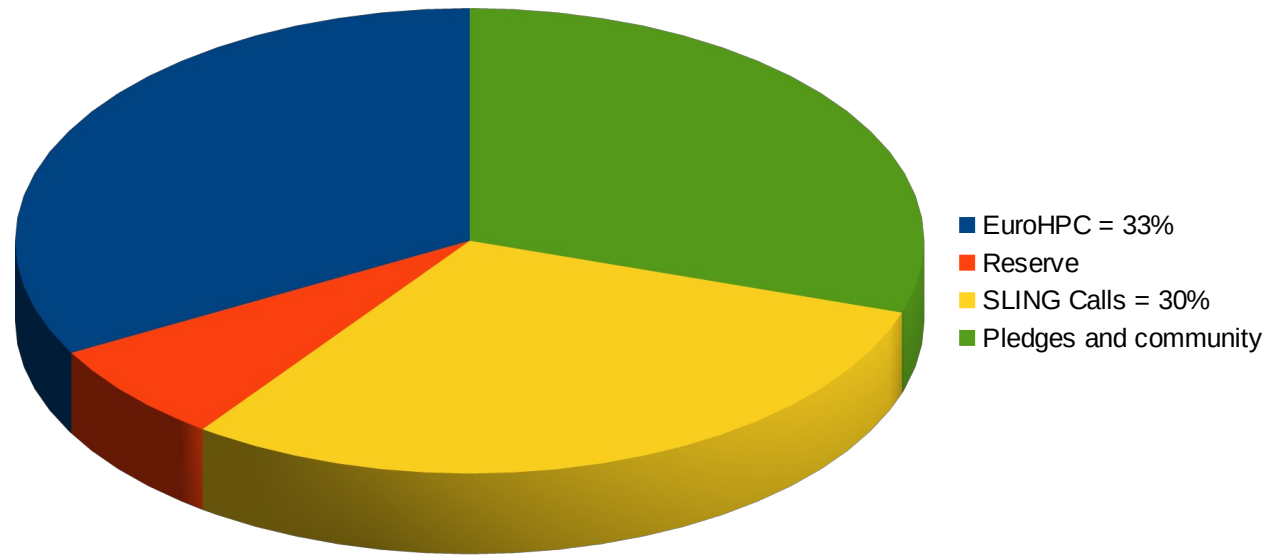


Scaling Up?



- Resources
- Allocation
- Accessibility
- Interoperability
- Reporting

Distribution and Allocation



- But how to scale in time?
- What access and accounting?
- Reservations and immediate use?
- Storage and service partition?

Accessibility



SLING clusters

Login node: SLURM/ARC

NorduGrid ARC:

client, API, aCT

dCache, CEPH

OpenScience storage

EUDAT B2suite

- SLING:

- Users

- **Projects**

- Organizations

- EGI, PRACE, EuroHPC

- Projects and infrastructures:

- ATLAS, PierreAuger, CTA, HBA

- ELIXIR, CLARIN, CERN, CECAM

Goals

member-oriented



- Unified access
(EduGain AAI + attributes/x509 + VOMS)
- Unified interfaces
(SLURM Login, ARC + aCT ...)
- Flexible environment
(HPC modules / ARC RTE → Singularity)
OpenMP, OpenCL, CUDA, interactive ...
- Flexible infrastructure
experimental environment, flexible network
- High-Level Support
integrated with user communities

Goals

future-proof



- Modern Architecture
parallel, data-intensive, network connected
- Advanced Software Support
hyperconverging architectures,
service+storage+compute, high-level support
- International Integration
PRACE, EuroHPC, EGI, EUDAT, projects
bi-lateral projects (as Hosting Entity)

SLING model:

compute + storage + service



- Containerized software
 - Managed services + compute
 - Consistent Environment
 - Persistent and Managed
 - Tested and Documented
 - Validated and Peer-Reviewed
 - Portable and Accessible
 - Open Container & Scientific File-system
- **combined workflows**

SLING model

compute + storage + service



federation of distributed resources

national + international

Zoran Ren (RIVR project, Uni MB)

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Dejan Valh (IZUM)

Aleš Zemljak (IZUM)

Peter Kacin (Arnes NREN)

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