Vienna Scientific Cluster

Operating Regulations

Preamble

The Vienna Scientific Cluster (VSC) is a jointly used group of high-performance computing resources designed to meet the needs of the cooperation partners[1] (Annex 2).

A Steering Committee (SC) is set up for all decisions concerning the VSC. The SC decides on access to the VSC, discusses strategic issues relating to the operation and development of the VSC, and advises the Rectorates of the partner universities (Annex 2) on the decisions affecting the VSC.

Access to the VSC is based on projects that have gone through a peer-review process and, in addition to scientific excellence, demonstrate the need for extremely high computing power. Projects are approved by the SC.

Definitions

The definition of individual terms of the present Operating Regulations is provided in the Definition Section (Annex 1).

Operational Responsibility

TU Wien (TUW) is responsible for the operation of the VSC. TUW will seek to ensure the interruption-free and trouble-free operation as much as possible. However, it is expressly stated that there are no safeguards against possible malfunctions (such as loss of power or cooling). In the event of a power, cooling, or essential hardware failure, the VSC may need to be shut down immediately, regardless of the impact on running jobs in a project. TUW is liable for damages only in the event of gross negligence or deliberate damage on the part of its employees. Liability for consequential damage is excluded.

The on-going operation of the VSC is carried out by the VSC team – these are authorised experts of the participating universities – under the direction of the Technical Manager of the VSC – this is the responsibility of the corresponding head of service unit in the TUW department in charge of IT Solutions.

System Administration

All projects have the same priority in accordance with the resources allocated, whereby the priority of the project is greatly reduced after consumption of allocated resources. To facilitate development work, jobs with shorter run times can be assigned an increased priority. Block reservations are made – if approved – by the VSC team upon request and according to available resources.

The maximum uninterrupted run time of a job for each system is specified in Annex 3. Users are responsible for checkpointing their own job.

Through introducing appropriate heuristic rules into the queuing system, appropriate staggering of block reservations and extreme-scale jobs (jobs requiring more than 20% of cluster resources), as well as taking into account feedback from users, the VSC team will ensure the smooth running of the jobs and a fair distribution of resources between users and participating universities. Fair distribution means that

[1] The cooperation partners involved in the VSC are specified in the Letter of Understanding of 13.11.2008 (LOU) and in the Memoranda of Understanding (MOU) of the universities with the cooperation partners TUW (TU Wien) and UW (University of Vienna): TU Wien (together with the University of Natural Resources and Life Sciences) and University of Vienna (LOU); University of Innsbruck (MOU, 10.06.2013), Graz University of Technology (representative for the universities of the South region: University of Graz, Montanuniversität Leoben, and University of Klagenfurt; MOU, valid as of 01.10.2012).

the individual projects that have jobs in the VSC system at a given time achieve throughputs corresponding to their computational time quota.

Project

A project is an undertaking for which resources are provided at the VSC. As a rule, a project is scientifically evaluated (peer-review process). There are several types of projects (for details, see Definitions in Annex 1). Projects are requested by the project manager and go through an approval process, which is defined in the document "Access Control".

Access Authorisation

The access rights for users, i.e. project managers and project staff, are assigned by the project manager under their own responsibility in accordance with the rights and role concept of the project manager's institution. Additional access authorisations, for example for system administration and maintenance purposes, are assigned by the VSC team.

Service site

Projects, access authorisations, and resources are managed with a web-based software on the Service Website https://service.vsc.ac.at. Project managers use the Service Website to apply for projects and create access authorisations. Members of the SC use it to approve project applications. The Service Website contains an internal database. This allows the on-going monitoring and statistical evaluation of resource consumption.

User education and training

Users have to to acquire the knowledge necessary for the efficient use of the VSC systems. For this purpose, the VSC offers courses that are announced on the VSC website. Announcements are also sent to users via e-mail. Furthermore, a wiki for users is also available.

User information

The VSC team informs users about significant news, such as newly installed software or software versions, disruptions and/or restrictions of operations via the VSC website, via login messages and, if necessary, via e-mail. The users must ensure accessibility under the e-mail address provided in the access authorisation and to retrieve incoming messages at appropriate intervals.

User communication with the VSC team

The communication on the part of the users with the VSC team should always take place via the ticket system of the VSC by sending an e-mail to service@vsc.ac.at. Tickets will be promptly answered by a member of the VSC team if possible.

User obligations

The holder of an access authorisation is fully responsible for its use. Passing on the access data to other persons or sharing an access authorisation is prohibited. The user is obligated to keep his/her access data secret and to protect it from access by third parties. The user is obligated to immediately inform the VSC team about any unauthorised access known to him/her using his/her access authorisation and, if necessary, to arrange for immediate blocking.

Software with server functionality, which allows access to the VSC from the outside may only be installed with the approval of the VSC Technical Manager. The storage of illegally produced copies of programs and data at the VSC is forbidden. The user is liable to the licensor or the owner of the respective license or data for unlawfully made copies of software or data.

Users have to take the necessary care in using the VSC to reduce the impact on other users to the unavoidable minimum and agree to cooperate with the VSC team to the extent necessary and reasonable to investigate improper use and other interference.

Otherwise, the statutory provisions as well as the regulations of the respective universities and the ACOnet must be observed (operating and user regulations, acceptable use policy, security guideline, etc.).

Data protection

The VSC is professionally operated and maintained so that the level of security expected of a LINUX system in a university environment is achieved. The technical and organisational measures (TOMs) set out in Annex 4 will be implemented. Administrative data processed with the help of the Service Website and public data on the VSC website are subject to TUW regulations. The processing of this data is included in the TUW processing list.

Personal administrative data will be deleted by TUW after the end of the project, unless the latter is legally obligated to process this data after the end of the project. Excluded are the user name and the unique number of the user, which are not re-assigned depending on the system. If an assignment between user name or number and personal data is required after the end of the project, the project manager must secure this suitably outside of the VSC.

For the storage and processing of personal data within the meaning of the GDPR in the course of a project, a special agreement is required between the institution of the project manager and TUW. Such a project is marked accordingly on the Service Website by the project manager and is then considered a data protection relevant project. The personal data is entered exclusively by project staff under the responsibility of the project manager. Therefore, these are processings of the institution of the project manager. This institution is also to be regarded as Responsible as defined under Art. 4 p 7 GDPR.

If users intend to use software and/or data on the VSC for which special license and non-disclosure agreements are required or for which such agreements have already been signed, the legal conditions before the transfer of such data and programs must be clarified with TUW by the respective project manager. As soon as the legal framework has been clarified, TUW authorises in writing the transfer of such data and programs as described above. The transfer is forbidden without such authorisation.

The participating universities are liable for damages only in cases of gross negligence or intent of their employees. Liability for consequential damage is excluded.

Data backup

In view of the financial restrictions, a central user data backup is carried out only to a very limited extent. The users are therefore in principle responsible for backing up their data. In principle, backups must be carried out by means of local facilities of the participating universities.

If the backing up of certain data at the VSC is not desired, e.g. for reasons of privacy, this must be clarified with the VSC team before the start of the project. It should be noted that due to technical reasons it might be impossible to delete individual data areas from a backup copy.

Data transfer and storage

1. The project manager is responsible for all issues concerning the protection, transfer, provision, and permanent storage of the data generated in the course of the project.
2. The project manager undertakes the necessary steps to comply with the guidelines and requirements of his/her institution, as well as any of its contractors and funding agencies.
3. The VSC team provides technical support accordingly. The VSC team performs changes and blocking of access authorisations, deletion of data, etc. only with the agreement of the project manager.
4. The project managers may appoint a substitute who represents in their absence.
5. The project manager is obligated to notify the VSC team without delay of any withdrawal from the project (e.g. by moving to another institution) and to appoint a successor.

In disputed cases and in case of ambiguity (for example, in orphaned projects), the SC decides on how to proceed further.

Reimbursement of costs

Payments for external projects as well as payments from authorised institutions, which are not partner universities, are made to the corresponding account of TUW or a subsidiary of TUW (currently TU_GIB). In the future, the SC will decide on the use of the incoming amounts. Unless decided otherwise, the funds raised will be used to cover future investments of the VSC.

When deciding how to use the funds raised, it is important to remember that these funds benefit all users and all participating universities alike.

VSC website

The VSC operates a publicly accessible website (http://vsc.ac.at). This website contains information and announcements about the VSC as well as a presentation of the ongoing and completed projects at the VSC and the resulting scientific publications. The internal database of the VSC website is derived from the database of the Service Website.

For each project, the project title, name and institution of the project manager, number, duration and type of the project and the publications resulting from the project are made publicly visible.

Reports on project progress

All project managers are required to enter the details of publications resulting from work at the VSC on the Service Website. Project managers may be required to submit a written progress report. This can also be used in mutual agreement with the project managers involved to prepare a public documentation of the work at the VSC.

Credits/Acknowledgement

In publications for which computations have been carried out at the VSC, the users have to mention this fact in the acknowledgement, such as: "The presented results were [partially] achieved at the Vienna Scientific Cluster (VSC)."

Complaints

Complaints concerning the operational management must first be directed to the Technical Manager of the VSC. If no amicable settlement is reached, the SC should be informed in order to find a solution with the affected users and members of the VSC team. If no consensual solution can be found, the SC has the power to decide on this matter. The affected users and members of the VSC team must follow this decision and implement it accordingly.

Final provisions

These Operating Regulations were issued in the German version by the resolution of 07.09.2009 and in the present version by the resolution of 04.06.2019 and can be updated by a further resolution of the SC.

Annex 1

Definitions

Vienna Scientific Cluster (VSC)
A cooperation of Austrian universities for providing high-performance computing resources. TU Wien (TUW) is entrusted with the operation of the computer systems of VSC.

Steering Committee (SC)
A Steering Committee (SC) is set up for all decisions regarding access to the VSC. The SC also discusses strategic issues related to the operation and development of the VSC and advises the Rectorates of the partner universities on the decisions affecting the VSC.

Partner University
University which finances a part of one or several high-performance computers (systems) of the VSC under its performance agreement and has seat and vote in the SC.

Authorised Institution
A university or other research institution whose members are authorised to use the VSC systems. These are partner universities and other institutions, which may use the systems of the VSC through appropriate agreements.

External user
Member of a scientific institution, who does not belong to the institutions entitled to access, but who uses the VSC system.

VSC team
A group of scientific and technical specialists who administer the systems of the VSC, support the users and carry out training programs in the field of high-performance computing.

Technical Manager of the VSC
Operational manager of the VSC team responsible for the operation of the VSC systems.

User
Project manager or project staff, who has access authorisation.

Project Manager
A member of an Authorised Institution, who has applied for a project and who is also responsible for the project management. The project manager is a physical person who is authorised and authenticated through the appropriate mechanism of their institution.

Project staff
A person who is consulted by the project manager for participation in the project. There is no restriction on the affiliation of this person to an institution.

Access Authorisation
The access authorisation generally refers to a particular project and provides access to one or more systems of the VSC and the use of the resources provided for the project. Access authorisations are created by the project managers for themselves and for project staff.

For the exercise of the access authorisation a user name and a password as well as another means of authentication are necessary. Currently, this is either an additional one-time password that is sent via SMS or the use of a hardware that generates one-time passwords.

Members of the VSC team have privileged access authorisations.

Employees of third-party companies receive temporary access authorisations for carrying out commissioned work.

System (of VSC)
A computer system operated by the VSC. A system usually consists of several nodes, which are connected via a high-performance network, as well as infrastructure components. A system generally has access to one or more storage servers on which file systems are set up. The following types of system are distinguished:

> **Production System**
> High-performance computer on which jobs of projects are processed. Access authorisations are set up via the Service Website.
>
> **Test System**
> Smaller computer system, which is used to test certain aspects, such as new hardware. Access authorisations are set up by the VSC team upon request.

Node
A single computer, which is part of a system.

Private node
A node which is financed from funds of a project manager and is available to the latter with preference.

Project
A project for which resources are provided at the VSC. As a rule, a project is scientifically evaluated (peer-review process). The resources provided are usually computation time and storage space. Projects usually have a limited duration, but this can be extended. There are different types of projects:

> **Funded Project**
> A Funded Project is funded in full or in large part by a funding agency. The condition for funding by a funding agency is the positive evaluation by independent experts within the framework of the funding guidelines. The project manager of the VSC project must be the same person receiving funding from the funding agency. In exceptional cases, a different procedure can be discussed with the SC.
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> **Application Project**
> An Application Project (application for a planned funded project) grants computer resources prior to project application for a specific funded project in the event that this project is approved by the funding agency. Upon approval by the SC, a resource commitment will be issued confirming that the resources needed will be available on the VSC for the duration of the project and that the underlying application at the funding agency will be supported. Resource commitments will only be awarded to the extent that a maximum of 50% of the capacity of the VSC is pre-reserved for any given time.
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> **Internal Project**
> An Internal Project is not funded by a funding agency. It is therefore subject to a peer review by the SC prior to the commitment of resources.
>
> **External Project**
> An External Project will not be peer-reviewed, but may be approved by the SC against reimbursement of all costs incurred. In case of limited resources, funded and internal projects have priority over external projects.
>
> **Test Project**
> A Test Project is approved by the VSC team, but has a maximum duration of two months and a very limited allocation of resources, typically 100,000 core hours. Overall, test projects should not consume more than 5% of the available resources of the VSC. The purpose of such a project is typically the testing of the software and the consumption of resources to develop the information required for the project application.

Private Project
A Private Project is set up such that private node owners have access to their nodes. A Private Project is not peer-reviewed and will be approved for a long period of time.

Data protection relevant Project
This is a project that processes personal data within the meaning of the GDPR. A data protection relevant project is marked as such by the project manager on the Service Website. Any type of project can simultaneously be a data protection relevant project.

Job
An order that the VSC systems process automatically. Jobs have a serial number, a job script containing the commands to be processed and an assignment to a particular user and thus to a specific project.

Checkpointing
Storing information of a running job at a given time, allowing to resume the job at this point.

Block Reservation
A Block Reservation means booking a certain number of nodes for a specific time for a project. It can be made for technical reasons or for time-critical applications. A Block Reservation should not block more than 30% of the existing capacity of the VSC at any time and will only be made if the project still has unused, allocated resources. The reserved computing time is charged to the project regardless of the actual use of the reserved resources.

Billing and Scheduling Unit
Jobs are assigned to the respective system of the VSC in predetermined units according to the project proposal and also charged, regardless of whether all cores of the unit are actually used. These units are provided in Annex 3 of the Operating Regulations.

Service Webseite (formerly: "Vergabeassistent")
A web-based software for managing projects as well as the provided resources and created access authorisations. The Service Website contains an internal database (https://service.vsc.ac.at).

VSC website
Publicly accessible presentation of the VSC (http://vsc.ac.at), the systems and the processed projects with project title, name of the project manager and institution as well as scientific publications from the respective project. The VSC website is based on a database that contains a subset of the data in the Service Website's database.

Administrative Data
Data required to operate the VSC computers, such as the Service Website and VSC website databases and other data such as log files. Administrative Data are only partially accessible to project managers and project staff.

Work Data
Data stored on VSC systems for the implementation of a project.

File System
Storage area on a storage server, which is used to store data, in particular Work Data. A project usually has access to several file systems. With the exception of the HOME file system, file systems are used by several projects.

HOME File System
A persistent data storage area, which is exclusively made available to a project. This area can either be a separate file system or part of a larger file system.

Data Protection Provisions
Regulations on the handling of personal data, such as GDPR, relevant laws and regulations as well as other relevant regulations of individual institutions or funding agencies. Thus, the applicable privacy policy may differ for individual projects.

Annex 2

Authorised institutions

Partner universities

University of Vienna
TU Wien
University of Natural Resources and Life Sciences Vienna
University of Innsbruck
Graz University of Technology

Additional authorised institutions

University of Graz
Montanuniversität Leoben
Alpen-Adria Universität Klagenfurt
Medical University of Vienna
Johannes Kepler University of Linz
Free University of Bozen-Bolzano
eurac research Bozen-Bolzano
Materials Center Leoben
AC^2T research GmbH (AC^2T)
Earth Observation Data Center
Complexity Science Hub
A2C2 Virtual Vehicle
VRVis
Institute of Science and Technology Austria (IST)

Annex 3

Production systems of the VSC

VSC-1/VSC-2

These systems are decommissioned. Information about these systems can be found on the VSC website.

VSC-3

System Description:
2020 nodes, 32320 cores (Intel E5-2650v2, 2.6 GHz), InfiniBand QDR80 (dual rail), 900 TB of mass storage.
Main memory per node: 64 GByte.
The nodes have 16 cores, which results in 4 GB per core. In addition, 128 and 256 Gbyte nodes are available.
Location: TU Wien, Science Center Arsenal, Object 214
Minimum job size: 16 cores (1 node)
Billing and Scheduling Unit: 16 cores (1 node)
Maximum runtime of a job: 72 hours, on request up to a week

Extensions:
Bio-Informatics, GPU-Nodes

VSC-3+ (VSC-3 extension)

System Description:
864 nodes, 17280 cores (Intel E5-2660v2, 2.2GHz), InfiniBand FDR and QDR, mass storage shared with VSC-3.
Main memory per node: 64 GByte.
The nodes have 20 cores, which results in 3.2 GB per core. 48 nodes have 256 GB.
Location: TU Wien, Science Center Arsenal, Object 214
Minimum job size: 20 cores (1 node)
Billing and Scheduling Unit: 20 cores (1 node)
Maximum runtime of a job: 72 hours, on request up to a week

VSC-4

System Description:
790 nodes, 37920 cores (Intel E5-8164, 3.1 GHz), OmniPath 100 Gbit/sec, 6 PByte mass storage.
Main memory per node: 96 GByte.
The nodes have 48 cores, which results in 2 GB per core. 78 nodes have 384 GB, 12 nodes 768 GB.
Location: TU Wien, Science Center Arsenal, Object 214
Minimum job size: 48 cores (1 node)
Billing and Scheduling Unit: 48 cores (1 node)
Maximum runtime of a job: 72 hours, on request up to a week

Annex 4

Technical-organisational measures (TOM)

TUW, as the operator of the VSC, ensures the availability and security of the systems, and implements the following technical and organisational measures in order to ensure, if possible, the protection of the systems and in particular of the data stored on them.

Site Security

- The building has a TUW-wide uniform electronic locking system and video surveillance in the entrance area.
- All auxiliary VSC rooms (storage and work rooms) are equipped with the TUW locking system.
- All VSC server rooms can only be reached from within the building, have WK3 security doors, and are secured with another electronic locking system.

Access Control

- The VSC employees have electronic and physical access and have demonstrably signed a confidentiality agreement.
- Employees of third-party companies only receive electronic or physical access with the individual approval of a member of the VSC team responsible for the work.

Access

- The computer systems are accessible within the ACOnet and only from the network areas of the authorised institutions and, if required, from individually configured external network addresses.
- The connection to the VSC systems is secured by a firewall, which only allows access via SecureShell (SSH).

Transfer

- Using SSH, every connection between the VSC and the users is encrypted end-to-end.
- The connection to the VSC is only possible with two-factor authentication (2FA). A password (first factor) and a token (second factor) sent via SMS (Short Message Service, mobile telephony) are used here. If necessary, a hardware key can be used as the second factor instead of the SMS token.

Separation Rule

- Each project uses its own HOME file system. This file system is only accessible to members of the project. This limit can be changed by project staff at the file level at their own risk.