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NEWS

LRZ services: Continuing to be reliable and secure

Verifyable processes and reliable IT services: in 2019, the Leibniz Supercomputing Centre (LRZ) was for the first time certified in accordance with the ISO/IEC standards **IT service management (20000-1)** and **information security (27001).** Now the data centre has completed its first official recertification – again with great success and praise from the auditors: "Overall, the integrated management system shows a high degree of maturity," the DEKRA auditors concluded, adding: "The continuous improvement of the information and security management system was again demonstrated in this audit cycle." Customers of the LRZ enjoy greater security thanks to the **certification:** they can rely on the fact that services for IT and technical support are carried out in a reliable way based on clearly defined processes and that the information processed and stored there is kept safe. It also means that in the event of technical problems or failures, appropriate countermeasures are taken and alerts are issued. "Standards provide orientation and help professionalise management processes," says Stefan Metzger, CISO at the LRZ and part of the team coordinating the work for the certification process. "Now all the work steps are documented, which is very helpful when it comes to training new colleagues. Above all, however, security and technical incidents are processed in a structured way so that IT services are back in operation as quickly as possible."

In that case, certification means that work processes and results have to be assessed by external experts. This requires processes to be scrutinised, changed if necessary, and also optimized. Above all, however they have to be set down in writing, which poses a challenge for every organisation. In 2017, the preparatory work for the initial certification in 2019 began at the LRZ, after which the LRZ was audited every year: In this way, the auditors ensure that organisations continue to improve management and understand the requirements of recertification. "With the current recertification, we will no longer be treated with kid gloves; from now on, the auditors will take a closer look at how measures and processes are implemented just in everyday life," says Metzger. The auditors praised the communication among employees and between departments, as well as the efficient, comprehensible description of work steps. In addition, the auditors provided valuable suggestions on how the management system can be further improved. The LRZ has time to implement these until its next recertification audit in 2025.

The LRZ is **the first scientific supercomputing centre** to have its IT service management and information security certified. While the initial focus was on the operation of the supercomputing centre and on its IT and support services, its research departments have now also been included in the certification process and other departments will gradually follow as well. The LRZ is setting a precedent: more and more computer centres of universities and research institutions are realising the benefits of undergoing a certification audit – and they ask the LRZ for advice and practical help in terms of preparation and implementation.

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Anniversary sees growth in range of services

The Leibniz Supercomputing Centre (LRZ) is going to throw another party: after celebrating its 60th birthday this summer, the **Centre for Virtual Reality and Visualisation (V2C)** is now marking its tenth anniversary. Since 2012, the V2C has been supporting researchers to visualise research data. Over the years, fascinating, three-dimensional, outstanding images have been created: The detailed images of the largest cosmic turbulence flow ever recorded, for example, highlight the processes involved in the birth of stars, and they led to the discovery of the sound barrier. Together with medical experts and biologists, the V2C also provides insights into the human body and shows how blood pulsates through the arm and brain. And in collaboration with art historians, the media specialists of the V2C will recreate the Kaisersaal (Emperor's Hall) of the New Residence in Bamberg virtually and make inaccessible works of art or rooms accessible to the public. "Art history, archaeology, natural sciences such as astrophysics and geophysics, engineering and environmental sciences, human and veterinary medicine – the potential fields of application for virtual reality and visualization are highly diverse," **reports Thomas Odaker in a interview,** who holds a PhD in computer science and is the head of V2C. "History and the arts are strongly represented at the

V2C because researchers here traditionally deal with interiors, because image data and other information are usually readily available, and because the benefits of visualisation and virtual reconstructions become apparent very quickly. Engineers come to us less often. They probably lack practical experience of what is possible with VR."

According to Odaker's observations, low-cost head-mounted displays in particular have advanced the visualisation of research results in recent years. These special glasses make 3D image worlds accessible, without complex technology and beyond **the five-sided LRZ CAVE.** In general, visualisations allow researchers new, different perspectives on their models and simulations, making it possible for them to expand their knowledge and insights. For ten years, the LRZ has been offering a wide variety of services and technologies for this purpose and has been supporting scientists in setting up virtual reality (VR) or even (learning) apps featuring augmented reality. "Scientists are experts in their respective fields, but not necessarily in the use of graphics programmes or game engines, i.e. software that can be used to build virtual worlds for games or academic research," says Odaker. "The V2C therefore shows them what is technically feasible, and we also explain what data is needed for visualisation, what programmes are used to process it and what problems arise when dealing with large data sets.

In the tenth year of its existence, the V2C is expanding its range of services: While researchers were already able to remotely access graphics programmes and useful tools to illustrate data and results, they will soon also be able to access technology, i.e. graphics cards or computer resources: "In many collaborations, we have realised that university departments and institutes often lack powerful graphics cards and corresponding tools to post-process visualisations or VR applications or to process very large data sets," Odaker says, explaining the expanded **RemoteVIS.** "Large data sets can thus be processed and rendered remotely, and the result in turn can be stored on local systems - provided there is sufficient storage space." These services are still running in test mode with selected LRZ users, but they will soon be available to everyone.
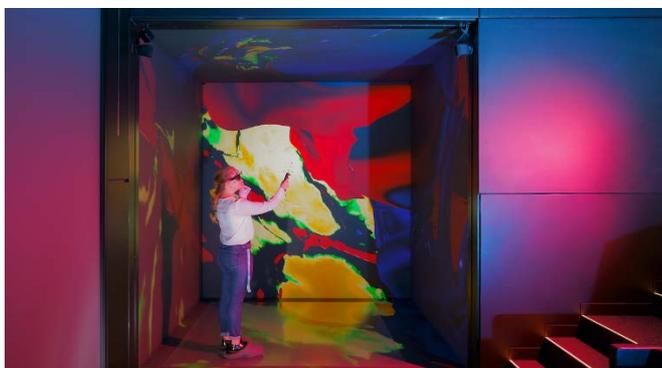
Targeted search

An online search engine designed specifically for scientific research, for economic indicators and environmental statistics or for art and culture: anyone who has ever failed to find answers to specific questions on Google, Bing, Baidu or Yandex, or in social media channels, would be happy to have alternatives. But they do not exist. At least not yet: over the next three years, the European research project **OpenWebSearch.EU** will develop an open web index and a decentralised IT infrastructure that will run on the systems of at least five independent organisations. "An open index provides the basis for a new ecosystem for search and discovery applications," **Michael Granitzer** states. He is a computer science professor at the University of Passau and is coordinating the various efforts on OpenWebSearch.EU. "Free, open and unbiased access to information – we have lost these basic principles when it comes to web searches and we urgently need to restore them. As a user, I would like to choose my search engine the way I choose my newspaper: on the basis of my personal preferences and needs." For OpenWebSearch.EU, 14 research organisations from seven European countries are cooperating, including the Leibniz Supercomputing Centre (LRZ). The project received 8.5 million euros in funding from the Horizon2020 programme (project number: 101070014) and is set to begin its work now after a virtual kick-off meeting of all participants. Read more about the project and its tasks on **the LRZ website.**

Computing with qubits

From theory to practice: On 14 September, the **Bavarian Quantum Computing eXchange (BQCX),** a community of quantum specialists, met again for the first time after the summer break at the Leibniz Supercomputing Centre (LRZ) – and the lecture programme offered many practical insights into quantum computing. The Munich-based company **Nextnano** for example explained the benefits of flying qubits. The Innsbruck-based start-up **ParityQC** presented ideas for an operating system for quantum computing and how the differences between processor types can be overcome. Finally, the Quantum Integration Centre (QIC) of the LRZ discussed their initial experiences in dealing with quantum processors and hybrid systems. Would you like to know more? You can find a **brief summary here**.

More diversity for the city

Most sculptures in Munich show men. Using augmented reality, the art project **Make us Visible x DenkFEmale** wants to make women or trans people more visible. From 1 to 31 October 2022, virtual sculptures of female scientists, politicians, artists, activists or symbols of diversity can be discovered all over Munich and Garching: among them are the women's rights activist Anita Augspurg, the writer Audre Lorde, the mathematician Ada Lovelace, the pilot Rita Mainburg, the actress Romy Schneider and the personifications of human rights, of unity and of reason. The picture left shows the monument of the psychotherapist Marie-Louise von Franz, designed by Carla Gannis. An international artists' collective is responsible for the virtual artworks. At the Leibniz Computing Centre (LRZ), the virtual reality pioneer Carolina Cruz-Neira, who developed the CAVE technology, can be seen – she is put into the spotlight by LRZ media specialist Elisabeth Mayer. **All locations** of Make us Visible x DenkFEmale are marked with stickers on the ground or signs on lampposts, and the artworks become visible via QR codes and smartphones: a wonderful initiative designed to draw attention to the importance of walking through Munich with open eyes this October. The exhibition opens on 30 September at the Monacensia.

WORKSHOPS & EVENTS

Improving and transforming Websearch

Open, transparent Internet search without tracking will be the focus of the fourth, international Open Search Symposium #OSSYM2022, **October 10-12, 2022,** at the CERN supercomputing center in Switzerland. The event will be broadcast online and will bring together specialists from around the world who want to improve the way information is searched for online. In addition to presentations on search algorithms, the program will address ethical issues surrounding search and the business done with the data collected from it, as well as educating students and citizens about the Internet and search. This is currently being compiled..
Information und registration

Téchne Summerschool at LRZ

Data scientists will meet for the Téchne Summer School from **October 10 to 14, 2022** at the LRZ and will focus on language data. Workshops and lectures will show how to filter out sentiments or other important topics, and there will also be lots of advice on describing and storing research results using language data. Lectures will discuss issues related to copyright and open licenses. And of course, participants can visit the LRZ's supercomputers and virtual reality and visualization center and learn about other (data) projects. The Summerschool is organized by the Campus Network for Digital Social Sciences and Humanities of the Ludwig-Maimilians-University Munich, the University of Regensburg and the Friedrich-Alexander-University Erlangen, **Information und registration**

Data Analytics & Artificial Intelligence

Handling data, programming smart analysis tools, processing Big Data: During the Data Analytics, Big Data & AI training week from **October 10 to 14, 2022,** researchers will be introduced to the basics of data analysis. The LRZ's first hybrid-hosted course will describe the data center's technical resources, its cloud, and access options. There will also be an introduction to key toolkits for developing artificial intelligence and deep learning techniques. **Information and registration**

Introduction to LRZ systems and flow simulations

Simulating gases, liquids, flows: These are tasks that are carried out particularly frequently on SuperMUC-NG and the LRZ's High Performance Computers (HPC). On **October 12, 2022**, Master's students and doctoral candidates can get an idea of the possibilities, get to know the Linux cluster, the LRZ supercomputer and software and algorithms for computational fluid mechanics or computational fluid dynamics. And of course it's also about the workflows - how to access and use the resources and plan or organise your own work. **Information and registration**

Machine learning in science

Classifying images and data, recognizing patterns in pictures - artificial intelligence also simplifies such tasks in science and research. In a practice-oriented bootcamp from **October 24 to 25, 2022,** researchers can get an idea of the possibilities. Practitioners will introduce the structure of neural networks and training methods for machine learning. **Information and registration.**

Programming Software with C++

Object-oriented (OO) software design with the C++ programming language: **This October 26-28, 2022** training focuses on the essential principles, concepts, idioms for software development, and also presents best practices on professional, high-quality

code. The course is aimed at advanced users and provides rules and guidelines for developing mature and robust C++ code that can also be maintained and adapted to new requirements. **Registration and information**

ANSYS Fluent for Computational Fluid Dynamics

Consisting of 13 lectures and about 6 practical exercises, this seminar, which runs from **October 27 to December 8, 2022,** introduces the use of the fluid dynamics software package ANSYS Fluent. This supports computations and simulations of computational fluid dynamics in particular. Participants will learn about typical CFD workflows for ANSYS and application examples. In addition, they learn how ANSYS works and is integrated on the LRZ Linux cluster. For this they will receive the Linux Primer. Participants should know the basics and numerical methods of fluid mechanics and have completed first calculations. **Information & Registration**

OneAPI-Training

The oneAPI initiative (www.oneapi.com) is a cross-industry, open, standards-based programming model for different vendors' CPU and accelerator architectures. It enables supercomputing researchers to accelerate application performance and get more productivity out of computers. oneAPi and, more importantly, the toolkits Intel has released for it, will be the focus of a three-day course at **November 8 to-10, 2022.** Participants will learn how to use and exploit the programming standard for their projects**. Information and registration**

Improving and accelerating supercomputing

Arrived in the exascale era: The latest supercomputers from the U.S. and Japan can already perform a trillion calculations or FLOP per second, and their performance and new exascale systems are the focus of SC2022 from **November13 to 18, 2022**, the international conference on high-performance computing (HPC), networks, storage and data analysis, which is being held this year in Dallas. Of course, it's all about innovative supercomputing technology, but above all it's about how supercomputers can compute and work even faster with the help of quantum computing and artificial intelligence (AI) methods. Speed is also a form of energy efficiency in computing, and ways to achieve more economical cooling will also be discussed at SC2022. **Information und registration**

Developing algorithms with Fortran

Software design and object-oriented programming with Fortran: At the four-day online workshop from **November 21 to 24, 2022,** participants can deepen and professionalize their knowledge of Fortran. They will learn good examples of robust code, as well as the tricks of combining Fortran. programs with applications in C languages, plus how to optimize their algorithms for parallel computer systems**. Information and registration**

OpenFOAM for Supercomputing

OpenFOAM is an open source C++ framework of solvers and tools for numerically solving partial differential equations using the finite volume method. It is embedded in the Linux Bash script workflows and interfaces with the Paraview analysis tool for pre- and post-processing and debugging. Using openFOAM is the focus of this tutorial course from **November 23 to December 1, 2022.** After an introductory day of self-study, the course mixes self-study with two additional online tutorial sessions where participants can clarify comprehension questions and deepen their use of openFOAM. **Information and registration.**

Working with OpenMP

Since its introduction, the OpenMP programming model has proven to be the driving force behind parallel programming for shared memory architectures. These are gaining relevance with the proliferation of multicore processors: Good reason to take a closer look at OpenMP and programming in the three-day course from **November 29 to December 1, 2022.** The instructors will provide theory and background in lectures, and participants will practice what they have learned in practical tasks. **Registration and information**

Dealing with processors and nodes

Even application developers who are familiar with OpenMP and MPI often don't know exactly how much performance their code can achieve. Parallelism is not everything for good computing performance. That's why this three-day online course from **December 5-7, 2022,** hosted by PRACE, provides the necessary understanding of how software and hardware interact and work together. Participants will learn to address the core, socket, and node levels with their codes already, and architectural features and the bottlenecks of processors and compute nodes will also be discussed. **Registration and information**

Introduction to LRZ systems and flow simulations

Simulating gases, liquids, flows: These are tasks that are carried out particularly frequently on SuperMUC-NG and the LRZ's High Performance Computers (HPC). On **December 14, 2022,** Master's students and doctoral candidates can get an idea of the possibilities, get to know the Linux cluster, the LRZ supercomputer and software and algorithms for computational fluid mechanics or computational fluid dynamics. And of course it's also about the workflows - how to access and use the resources and plan or organise your own work. **Information and registration**

Programming for parallel HPC systems

How can scientists develop programs and algorithms for SuperMUC-NG, CoolMUC and other parallel high performance computers and implement their applications on the systems? This three-day online course, March 7-9, 2023, introduces the basics of high performance computing (HPC) and provides practical tricks as well as information on funding programs for HPC work**. Information and registration**

USED THINGS FOR FURTHER SERVICE

The LRZ is always getting rid of used hardware and furniture - a constantly updated list of things we want to give away can be found **online.** Here you can also read where to direct your interest. The equipment and furniture are free of charge for institutes, chairs and other research institutions.

JOB OFFERS

You will find an international and diverse team in Garching, which is constantly growing. If you don't find a suitable job profile below, please visit the **career page** of the Leibniz Supercomputing Centre or send an **unsolicited application.** We are LRZ - and curious about you!

IT-specialist for More-Factor-Authentifications
IT specialist or It consultant for IT-Security
Programming expert for HPC und parallel computing, especially for applications accelerated by GPU
Software engineer HPC fort he development of a Quantum software stack
DevOp for IT service management tools
Senior system engineer for storage services
IT-soecialist for the expansion of hosting environments
IT-Spoecialist sysstem integration for the client management Mac and mobile Devices

Scientific employee for web development in Confluence
Scientific employee for system administration
Scientific employee,or IT engineer for Windows-Server und collaboration
Scientific employee for Managed Security Services

Administration staff for reception and more tasks
Assistent for the board of directors / main secretary
CRM-Manager in part time (20 hrs)

Student assistent für die Entwicklung von NV-Tools und serverbetrieb
Student assistent PR und Content
Student assistent für ITSM-Entwicklungen
Student assistents für den Servicedesk

MORE TO READ

Here you will find links to latest information from the german-european supercomputing community and our cooperation partners
• The **newsletter** of the Bavarian Academy for Science and Humanities
• **PublicationS** of the Gauss Centre for Supercomputing (GCS): GCS-News und Inside
• **Infoletters** of the Gauß-Alliance
• Publications of PRACE: **PRACE Digest, Jahresbericht**

INFORMATIONS & IMPRINT

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Editor:
Leibniz-Supercomputing Centre (LRZ) of the Bavarian Academy of Science and Humanties
Boltzmannstraße 1
D-85748 Garching