



## **The OTH Regensburg computer centre through the ages**

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## **The computer centre supports the strong growth of the university - period 2008-2022**

### **Summary**

The Faculty of Computer Science and Mathematics (IM) was founded in the 1970s as one of the first departments at the then young Regensburg University of Applied Sciences. It celebrates its fiftieth anniversary in 2023! An important facility at OTH Regensburg - the central computing centre - will also be celebrating a round thirtieth birthday in June 2023!

There has always been a strong connection between the IM faculty and the university's computer centre. The scientific director of this centre has always been a member of the IM faculty. Professor Kopp managed the Computer Centre during the difficult start-up phase (1993-2008). Professor Tsakpinis accompanied the strong growth phase of the computer centre in connection with the increase in student numbers to over 11,000 (2008-2022). Professor Skornia took over the Computer Centre as Vice President for Digitalisation and Sustainability in winter semester 2022/23. Mr Skornia is to prepare the data centre for current developments in the areas of IT security and cloud use, among others, in the context of changed structures at state level ("Digitalpakt Bayern") and the greatly increased importance of ICT services.

The two former and current directors of the data centre have sought out documents and memories and interviewed (former) employees to gather some information about the origins, development and future direction of the data centre.

### **The university is growing strongly**

This phase of the computer centre's development is closely linked to a phase of strong growth at the university. The double Abitur cohort and the state government's goal of creating 38,000 new study places coincided with this period.

New buildings, a doubling of student numbers, the conversion of diploma courses to Bachelor's and Master's degrees and the creation of a wealth of new, specialised courses are the result.

The first applications of virtual teaching as part of the extra-occupational social work degree programme with - at that time - completely new technologies are tested. The computer centre at OTH Regensburg gains experience that would later prove valuable during the Covid pandemic.

## **Digitalisation in all areas has always been the focus of the university's activities**

During this time, the university management applied for IT projects on a considerable financial scale as part of the target agreements with the Ministry. This created the personnel and financial prerequisites for the utilisation of modern technologies and information systems.

### ***High-performance, fail-safe network infrastructure and hardware equipment***

During this time, the university has built up a high-performance network infrastructure that connects all faculties to the central backbone via redundant connections. The university's IT network was extended to the neighbouring TechBase building of the city of Regensburg and the Parsberg-Lupburg technology campus. In addition, the Abensberg, Cham, Tirschenreuth and Zwiesel campuses, which offer premises for the part-time Social Work degree programme, were also connected.

Back in 2011, the computer centre switched to virtualisation based on standard hardware components, thus creating the basis for a powerful, fail-safe and easily manageable server infrastructure. At the same time, a centralised storage system was put into operation, which is used for administrative procedures as well as for teaching and research.

The financing of both projects was subsidised by the federal government and the state of Bavaria via a large-scale equipment application.

### ***Conversion to commercial standard software***

For a long time, OTH Regensburg cooperated with the computer centre of the University of Regensburg and used Novell as the network operating system and GroupWise as the e-mail system. Software developed in-house was used to install the workstation and CIP computers.

Following a fundamental decision to rely on "industry standards", the newly established server infrastructure ran virtualised on vmware. The last Novell servers were switched off in winter term 2012.

The e-mail system was converted to Exchange and Outlook in the 2011 summer semester and the installation of end devices was professionalised with Microsoft's SCCM software distribution.

These steps were exciting, as the Rain Centre had to manage without any support from university colleagues for the first time.

## **Services for ... Study**

### *Student card*

The student card was introduced back in 2011. It is issued as part of enrolment and is equipped with an electronic payment function for the canteen and printing costs, a library card and a rewritable strip with information for the RVV ticket and any sports activities booked.

### *Online course catalogue, room reservation*

In summer semester 2011, a powerful university-wide timetabling system (Untis and WebUntis) was introduced, which enables joint planning of resources, particularly for cross-faculty courses (e.g. maths lectures). This results in the university's electronic course catalogue. Students can put together their timetable and call up cancelled or postponed lectures on a daily basis. In addition, free rooms can be reserved or used by groups for joint learning and project work.

## **... Teaching**

### *CIP software*

The use of commercial specialist applications that are widely used in industry is an integral part of education at a technical university. The computer centre operates around 300 specialist applications, which are updated, installed and distributed to the classrooms every semester. The smooth operation of these applications is essential for lectures.

### *eLearning*

The eLearning platform (Moodle) is available to students and teaching staff. For a long time, the university shared the university's installation. Since winter semester 2022/23, the university has been operating its own Moodle instance.

### *Electronic tests*

For some years now, the Computer Centre, in cooperation with the Technical University of Munich, has been providing the infrastructure for testing electronic examinations on the basis of special systems or Moodle instances installed specifically for this purpose.

### *Course allocation*

Students can register for courses offered by the faculties via a course registration system that was implemented as part of WebUntis. Students have the opportunity to indicate their preferences. The available places are allocated via a multi-stage process.

## **... and research**

### *Shibboleth*

University members can use the Shibboleth protocol to authenticate themselves throughout Bavaria (and beyond) with their university ID and use services from other institutions. More and more applications are using it to control their user administration.

### *Virtual server*

Research groups can use virtual machines and the central storage for their projects without having to provide their own resources. The servers are provided in the desired basic configuration.

### *Collaboration*

The computer centre operates the Microsoft SharePoint collaboration platform. It can be used as part of research projects and administrative processes for work organisation and documentation purposes.

### ***Information systems for university administration***

#### *Core processes*

The core processes at OTH Regensburg are supported by university information systems. These include typical administrative processes (financial accounting, cost accounting, personnel administration, time recording), but also applications that are common in the industry (application and admission, as well as student and examination administration, research administration). These applications are provided, among others, by HIS eG, which is organised according to the cooperative model. The background to this is the limited market, for which the development of commercial systems is not lucrative enough. Around 250 German universities are involved in HIS eG.

The computer centre has actively participated in the committees of HIS eG and, in cooperation with all HIS universities in Bavaria, has actively helped to shape the further development of the processes. The project began back in 2011 with the introduction of applicant administration and admission and is currently being finalised with the introduction of research administration.

In addition, the dialogue-oriented service procedure (DoSV) must be used as part of the nationwide coordination of the allocation of study places.

#### *Digitisation in the library*

The library has equipped the entire book collection with RFID tags. This means that students can borrow books themselves from the lending machines and return them via a return machine without having to use the staff. Access to electronic books and journals has increased massively. Authentication is partly carried out via Shibboleth.

#### *University elections*

For several election periods, university members have been able to cast their votes electronically in elections.

#### *Electronic student file*

OTH Regensburg has a digital student file. A paper file no longer exists. The project was launched in summer semester 2015 with the digitisation of the old files. The data was stored in a long-term archive and can be used by the student administration workstations. Finally, the

files of current students were also digitised. From winter semester 2022/23, the entire cycle from application/matriculation to exmatriculation will be fully digitised.

The HIS eG systems are involved in the solution, as is a connected archive system that can record and manage scanned and electronic documents (d.3 archive).

#### *Electronic purchasing file*

The university has an *electronic purchasing file*. It was also implemented with d.3 and contains all electronic and paper documents generated during a procurement process.

#### *Electronic file plan*

The d.3 archive is used to digitise incoming and outgoing mail. Some of these are electronic documents that are transferred directly, while others have to be digitised in the original and with handwritten notes at the end of the process.

#### *Information system for central training and the Communications department*

Continuing education is an important pillar of our university's programme. Since 2012, the Centre for Continuing Education and Knowledge Management (ZWW) has been using an information system developed by the Computer Centre on the basis of Microsoft's customer relationship solution (CRM Dynamics). The system is used for customer contact management, but also for student administration and invoicing. In a second step, an information system for the Communications department was implemented on the same technical basis.

#### *Employee application portal with the BiTE applicant management system*

The university has recognised the growing importance of recruiting staff via new media and has launched an application portal. A commercial solution is also used here. OTH Regensburg was the manufacturer's first customer in the university sector. As many other universities followed suit, it was only logical that special functions were implemented for appointment procedures. Our university introduced this portal as part of the "Digitalisation of administration" target agreements in 2021.

#### *Basic components of the Free State of Bavaria*

During this time, time recording was introduced for the first time at a college/university in Bavaria, as well as the authorisation workflow and accounting of business trips. The software was provided by the State Office of Finance (Regensburg site).

Electronic time recording has replaced the stamping machines installed at each location, which "stamped" the current time on a sheet. All those involved in time recording had to calculate the balance at the end of the month, which then had to be repeated by an administrative employee to avoid errors...

#### *Campus management systems: cross-university cooperation utilises synergy effects*

The first attempt in 2011 to introduce the new HIS procedure for applicant management and admission and to link this to DoSV already demonstrated the effort involved.

In February 2012, the idea of a joint project implementation was presented to the chancellors of HIS universities in Bavaria and representatives of the ministry at a meeting of chancellors. The "DoSV introduction" project was the birth of the Coordination Centre for Data Processing at Bavarian Universities (KDV) in its current form.

The KDV was founded to support Bavarian universities with the introduction of the first-generation HIS systems. From the outset, the group was administratively based at Regensburg University of Applied Sciences. Since 2009, the scientific director of the computer centre has also been the scientific director of the KDV. The group was expanded in terms of personnel and in 2009 took over the operation and introduction of the CEUS platform, a data warehouse system with data and analyses for the domains of students, examination performance and later cost and performance accounting and finance.

The cross-university co-operation "Campus Management" was initially founded by four universities and currently has seven members. The "DoSV introduction" project was a success, with the result that the participating universities have also jointly introduced or are introducing the remaining modules of the HiSInOne campus management system from HIS eG.

KDV operates the data warehouse systems of all 17 universities in Bavaria and the campus management systems of 7 universities. The necessary technology is housed in the computer centre. The KDV is managed by Dr Wiedermann, a graduate of our faculty.

### *Electronic transaction processing*

The last target agreements 2018-2022 with the ministry entitled "Digitalisation of administration" included the introduction of the HiSInOne campus management system as well as the implementation of electronic transaction processing in some areas.

The projects were defined and prioritised in coordination with all administrative departments. SharePoint from Microsoft was used to implement the defined workflow. Here are a few examples:

- Final theses: A complex workflow that must be approved by the supervisor and chair of the examination board after the student has applied for a thesis, including loops in the event of errors. At the end, the electronic submission takes place by uploading the thesis, confirmation from the secretariat that it has been submitted on time and that the documents are complete, the entry of grades by the supervisor and confirmation of these by the examination board. Here, too, loops are not excluded.
- Recruitment of student assistants: A complex workflow that is initiated by a faculty employee. Students fill out the necessary forms and upload documents if necessary. The process must then be approved by the project manager and the dean of the faculty.
- Management of locking authorisations.
- Preparation of references for employees.
- Application for and, if necessary, approval of relief hours from third-party funded projects
- Documentation "low-income employees": The process is started by the project manager. He/she enters the students participating in the project. This authorises the students to enter their working hours. The project manager is involved within the framework of the legal requirements in order to confirm the hours worked in a timely manner.

## ***The pandemic - a boost for new technologies and their use in teaching, research and administration***

In many respects, the pandemic has brought about a turning point in the world of work, including at universities. Although many processes were already digitalised, the university had a locally installed video conferencing system and a media platform, and there were plenty of end devices available that could also be controlled remotely, we were faced with major problems and challenges: Our video conferencing system was good for 30 participants, but not for 11,000 students. The use of the Windows remote desktop was explicitly excluded in the nationwide Microsoft contract.

On 11 March 2020, the university postponed the start of the semester by one week. On 18.03.2020, the university had doubled the bandwidth of its internet connection, had a campus licence for Zoom, had rolled out local recording software, multiplied the capacity of the media server to record and manage the wealth of recorded lectures and created the necessary links on the eLearning platform.

In close cooperation with the lecturers, the software packages that absolutely had to be offered remotely so that lectures/exercises were not cancelled were identified. A limited number of students were given access to CIP computers via remote desktop using a solution legally agreed with the IT law advice centre. It was tricky, time-consuming and very exciting...

As early as July 2020, it became clear that the following semester would also take place virtually. This time, the semester was to run "regularly" according to the timetable and, if possible, provide all 300 specialist applications for all 11,000 students. This made it clear that the solution used in summer semester 2020 was not legally possible. As a result, the computer centre turned the Windows end devices into terminal servers and reinstalled and distributed the specialist applications in seven weeks with the help of seven employees. As the software distribution was not designed for this either, improvisation and a lot of additional work was required.

The new Microsoft contract was activated in April 2022. It contains attractive conditions for the use of cloud services. Regensburg University of Applied Sciences was one of the first universities to connect to the cloud and use Azure Virtual Desktop to virtualise software. The university should not be surprised again if face-to-face teaching is not possible for whatever reason.

### ***Closing words***

The computer centre has provided our up-and-coming university with services that have been recognised many times in rankings, but also in the assessment of the university's IT structures by Professor Bode (Technical University of Munich, former head of the Leibniz Computer Centre of the Bavarian Academy of Sciences and Humanities) and Professor Yahyapour (Georg August University of Göttingen, Managing Director of the Gesellschaft für wissenschaftliche Datenverarbeitung Göttingen mbH (GWDG)).

A central department of a large institution cannot do everything right. But even if it does a lot of things right, not everyone sees it that way.

*I would like to take this opportunity to thank my colleagues at the University of Regensburg's Computer Centre and in particular the heads of the facility, Dr Bernd Knauer, Dr Martin Wimmer and Dr Christoph Bauer, for their support over all these years. This co-operation was not a matter of course and has contributed significantly to the positive development of our university!*

I would like to thank my colleagues who have worked hard and shown great courage at critical times. It was a lot of fun to be part of this team.