

The background of the slide is a photograph of server racks in a data center. The racks are filled with server units, and the perspective is looking down a long aisle. The lighting is somewhat dim, with some highlights on the server units. A dark blue horizontal band is overlaid across the middle of the image, containing the title text.

Shared Services for Science – Example GWWDG

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DigiMed Bayern
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Göttingen Campus

University Göttingen

- Integrative Model

Georg-August-Universität

- 25.000 students
- 6.000 staff

University Medical Centre (UMG)

- Full clinical care provider
- 7.500 staff, 1.530 beds

Total 13.500 staff

In addition on Göttingen Campus

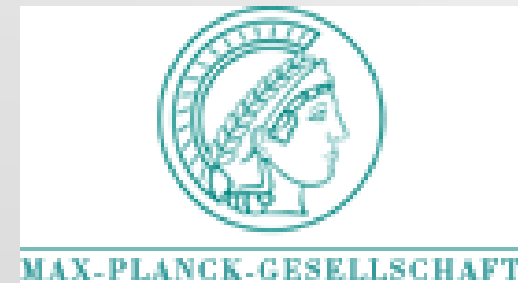
- 4 Max-Planck Institutes
- Leibniz Institute DPZ
- HAWK
- SUB, GWGD
- Other partners



About GWDG

Gesellschaft für Wissenschaftliche Datenverarbeitung mbH Göttingen

- Compute and competence center for the University of Göttingen and the Max Planck Society
- Founded in 1970
- Non-profit organization (gGmbH)
- Serving about 150.000 customers
 - scientists and students
- Mission
 - IT infrastructure for science
 - eScience-Support for research
 - Research on innovative services



Key Stats

- Core funded: 72 FTE
- Current staff level: 200 FTE

- Core Budget:
 - 50% Max-Planck-Society
 - 50% University Göttingen

- Plus third-party funding:
 - research projects like DFG, BMBF, EU
 - NHR, DLR funding
 - Individual agreements

- Certified by ISO9001 and ISO27001
- 3 data centers, 120 Petabytes, 8000 servers, 6 clusters

National Supercomputing and AI-service center

GWDG hosts several HPC systems

- 2018: North-German Supercomputer for 7 states (HLRN)
- 2020: One of the nine National Supercomputing Centers (NHR)
- 2021: HPC-Host für Germany Aeronautic and Space Center (DLR)
- 2022: Selected as National AI Service-Center (KISSKI)

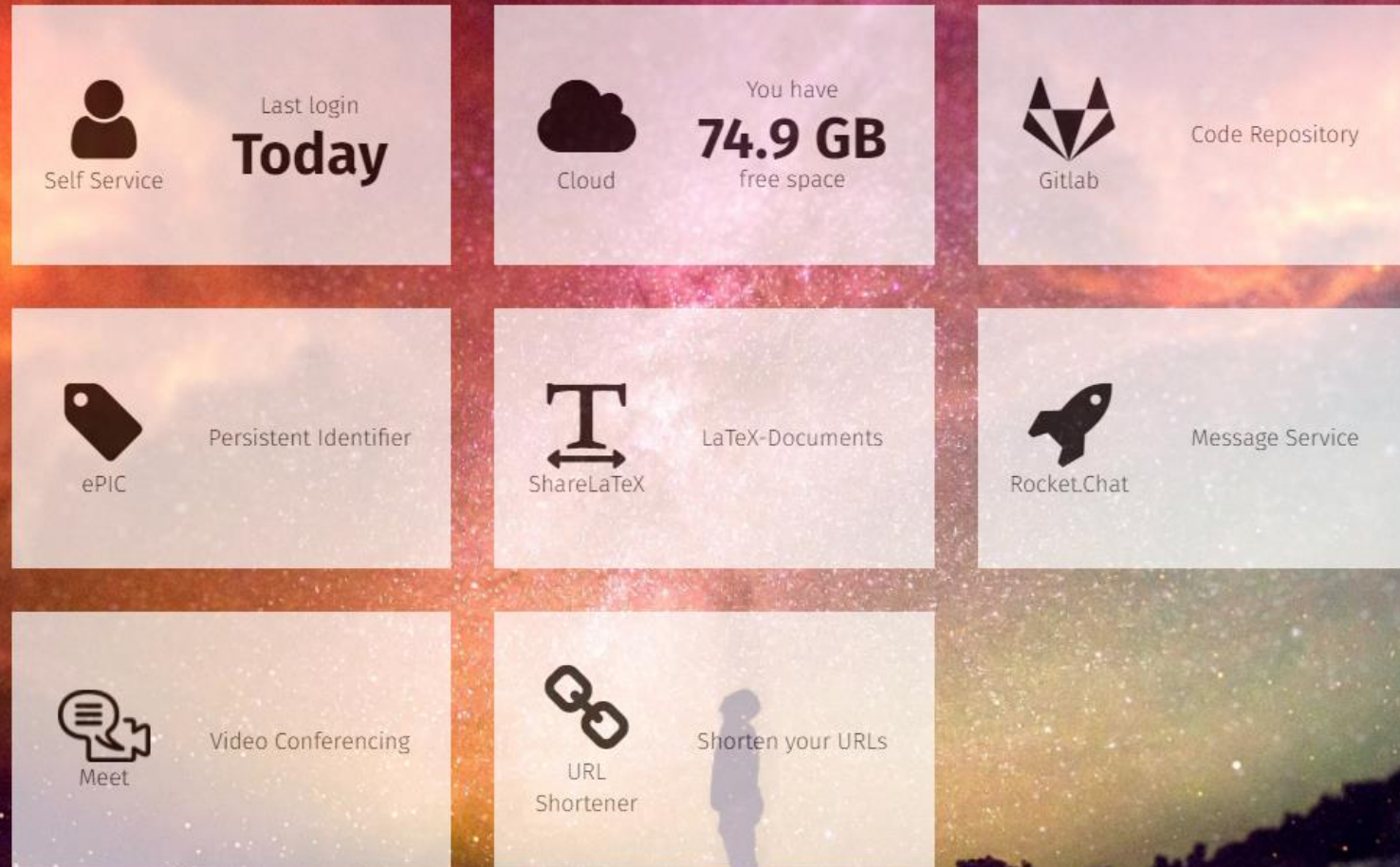
Selected Systems:

- Emmy: CPU, 5,95 PFlops, #47 TOP500 in 11/2020, 15 Mio. Euro
- Grete: GPU/AI, 1,83 PFlops, #12 Green500 in 05/2022 7 Mio. Euro
- DLR Caro: CPU, 3,46 PFlops, #135 TOP500 in 11/2021, 10,5 Mio. Euro

Partner Amazon AWS:

- AWS Trusted Research Environment





The dashboard features a grid of service tiles on a starry space background. Each tile contains an icon, a title, and a brief description or status.

- Self Service**: Last login **Today**
- Cloud**: You have **74.9 GB** free space
- Gitlab**: Code Repository
- ePIC**: Persistent Identifier
- ShareLaTeX**: LaTeX-Documents
- Rocket.Chat**: Message Service
- Meet**: Video Conferencing
- URL Shortener**: Shorten your URLs

**Example:
AcademicCloud**

**for Lower Saxony,
MPG and national
initiatives**



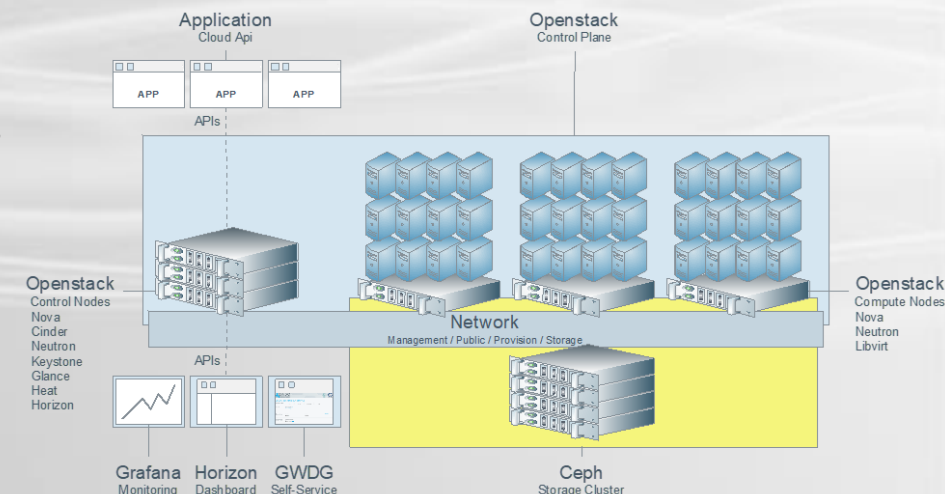
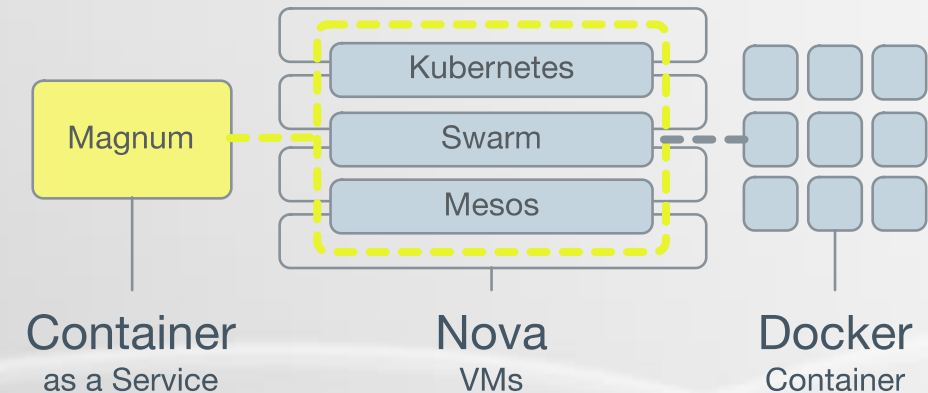
Current Services offered on AcademicCloud

Applications	Foundational Services
Sync and Share (ownCloud/NextCloud)	Portal
Gitlab	Dokumentationsserver
ShareLaTeX/Overleaf	IDM + SSO
DataVerse Repository	2FA
BigBlueButton Video Conferencing	
PID-Service	
Rocket Chat	
OnlyOffice	
JupyterNotebook	
CollaBoard	

Multiple Cloud Offerings available

Multiple solutions in place for Infrastructure as a service:

- High-available VMware vSphere environment
 - VMware vSphere
 - Follows VMware Validated Design
 - Focus on security and automation
- Openstack-based Cloud
 - Self-service for virtual machines and containers
 - Cost-efficient, direct access to end-users
- GWDG is partner for Microsoft Azure and Amazon AWS
 - Handling resource allocation, accounting, billing for public cloud projects
 - Collaboration with Amazon on Trusted Research Environment



Data Analytics and Management

- **Jupyter-HPC**
 - notebooks can be run as HPC jobs
 - <https://jupyter-hpc.gwdg.de>
 - Support for IPython parallel
 - Own instances available as Singularity-Containers
- **TensorFlow**
 - Integration in user python environments
 - Use of GPU nodes through CUDA possible
- **Apache Spark**
 - Spark-Clusters can be configured on demand
 - Interactive sessions e.g. for Scala
 - Monitoring of cluster status through webinterface
- Over 200 Bio-informatics services
- Long-term archiving, persistent identifiers, repository services



Example: AI Service Centre



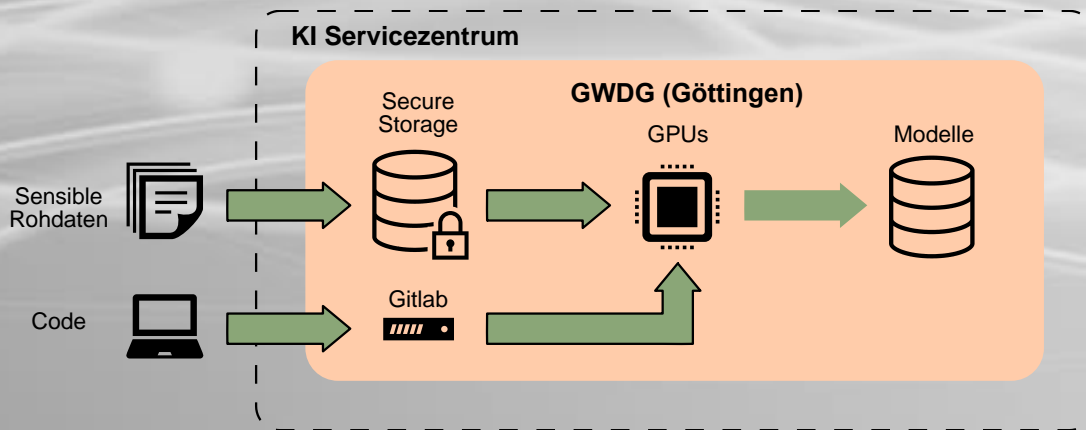
- One of four BMBF funded AI service centers
- For Research and Industry
 - Access to infrastructure as national resource
 - Commercial use possible
- Specialization:
High available, suited for critical applications
- Focus: **Energy and Medicine**
- Training and inference of large AI models
- Supporting large datasets
- Data and model catalogue



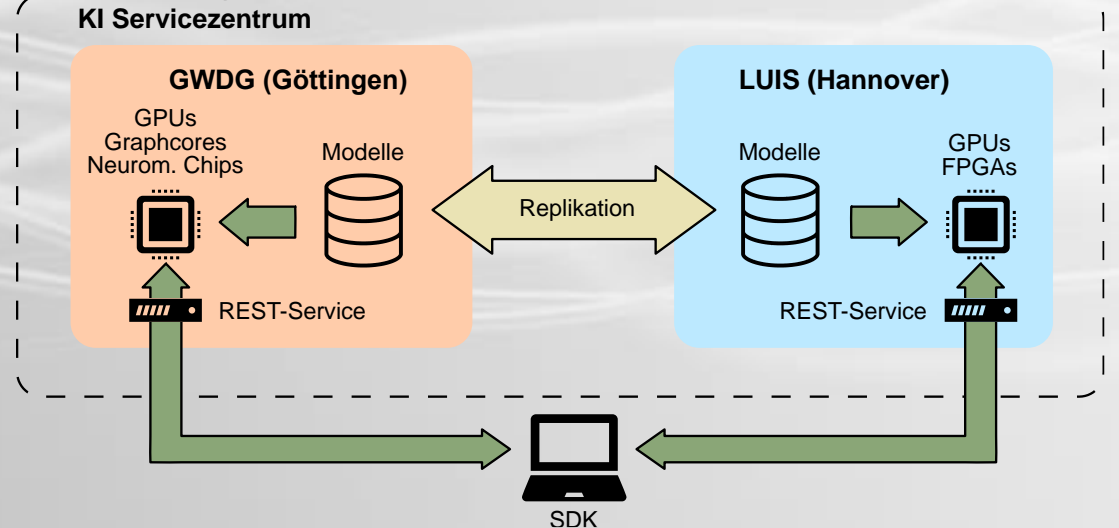
KISSKI Use-Case: Secure training and inference

- Training
 - Encrypting trainings data during non-use
 - Establishing a key service for on-demand decryption
 - No storing of unencrypting data
- Inference for time critical applications

Training with sensitive data



Geo-replicated Inference



KISSKI: Automated Workflow for MRT Brain Scan Analysis

Resource-intensive image processing

- FastSufer (Segmentation)
- FreeSurfer (Surface Detection)

Use of our HPC Clusters

Considering Data Protection Requirements

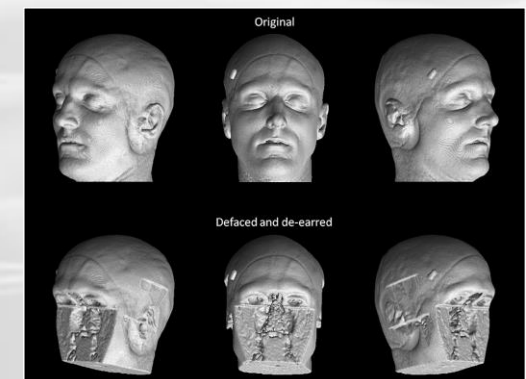
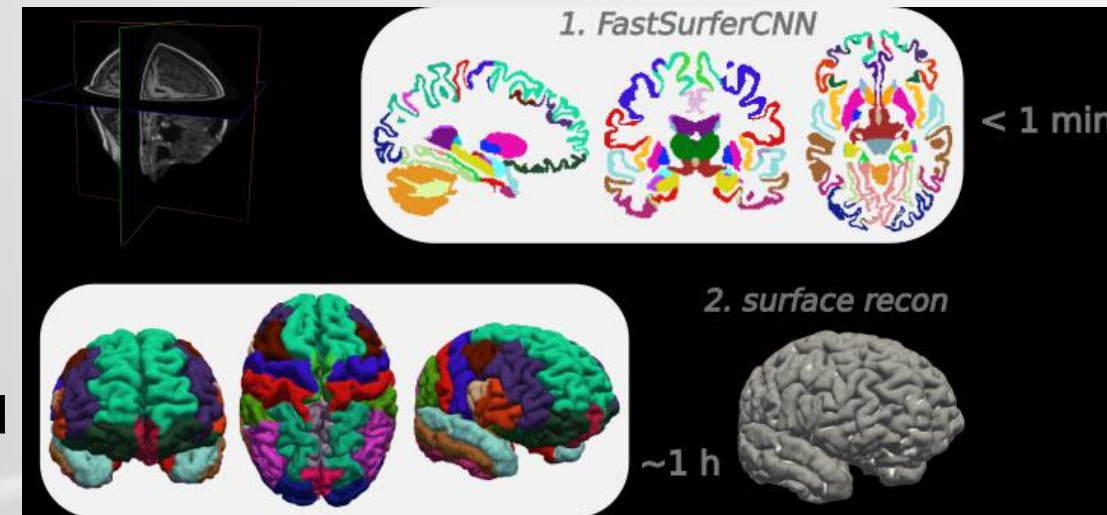
- Patient data cannot be completely anonymized
- Requires isolated and secure partition

For this purpose, the GWDG developed the Secure HPC Workflow

- Solution: HPC systems need extra hardening to support such clinical use cases

Current practice:

In Göttingen, MR images of hospital patients can be processed on the GWDG's HPC system in a secure partition in which the computing nodes are highly isolated.

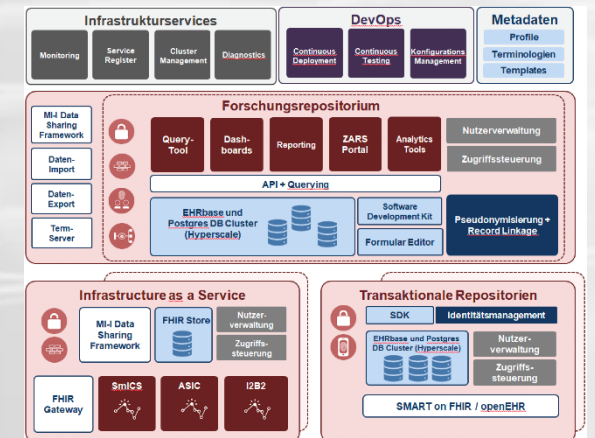
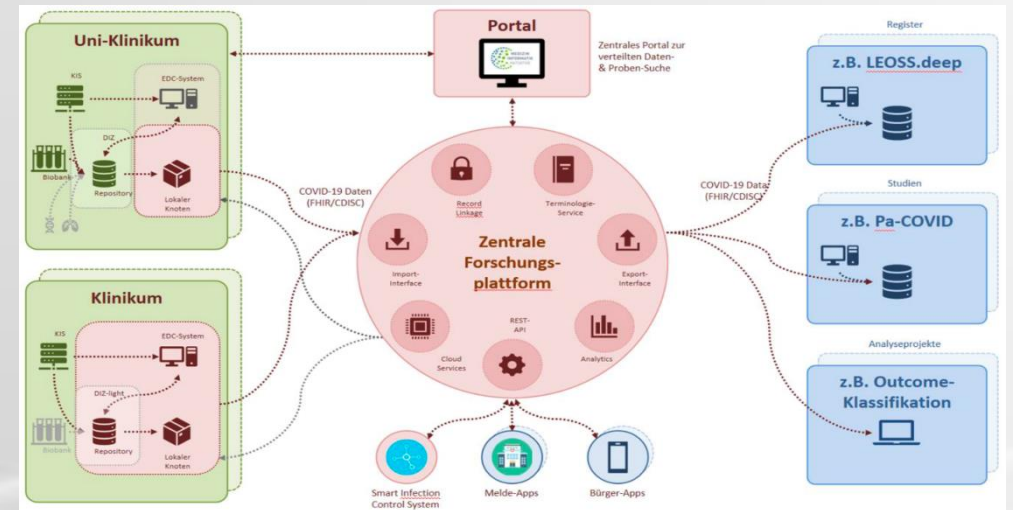


NUM Research Data Platform

Network of Academic Medical Centers



- Development of a national research data infrastructure for Covid-19 and future pandemics
- Hosting of the central platform on GWDG infrastructure
- 20 University Medical Center, 3 Industry partners



Summary

- GWDG is a shared services center for research in Germany
- Combining services with research

- Offering:
 - off-the-shelf basic services,
 - specific eScience services,
 - develop customized and individual solutions,
 - participation in projects if a technology partner is needed or long-term service perspective is sought.

- Leveraging synergies and economy of scale since 1970

Thank You!

More information about
GWGD
in our publications and on
www.gwdg.de



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