EUROPEAN UNION
European Regional Development Fund

ICT

OPERATIONAL PROGRAMME
SCIENCE AND EDUCATION
FOR SMART GROWTH

"Centre of Excellence in Informatics and Information and Communication Technologies"

Project
BG05M2OP001-1.001-0003

Project implementation period:
03.08.2018 – 31.12.2023

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through Operational Programme
"Science and Education for Smart Growth" 2014-2020

CoE in Informatics and ICT
IICT-BAS, Acad. G. Bonchev str, Bl.25A, room 216, 1113 Sofia



Project BG05M2OP001-1.001-0003
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The total grant amount awarded to the project is 29 355 86lv out of which 24 952 482 lv (85%) are provided by the European Regional Development Fund and 4 403 379 lv (15%) come from national co-financing

More than 75% of the project funding is dedicated to building research infrastructure

Mission: Developing a research centre to facilitate advances in the field of Informatics and ICT in accordance with the best global standards and practices

Project goals

- Building an advanced infrastructure complex for digital transformation and high-performance computing
- Integrating the individual layers of the infrastructure
- Conducting research in accordance with the best global standards and practices.
- Stimulating scientific capacity building in Bulgaria
- Open data management
- Providing adequate support and training programs for users in Bulgaria.

The use of extremely parallel computing systems for scientific computations is becoming increasingly important on a global scale. The exponential increase in the size of scientific data collected using high-resolution instruments and coming from large-scale simulations necessitates the need for new storage and indexing methods and protocols, as well as an integrated approach to their processing. The Centre of Excellence in Informatics and ICT addresses public needs by integrating advanced research infrastructure and teams of highly qualified scientists and specialists to conduct fundamental and applied research with high social impact.

Partners

- Institute of Information and Communication Technologies - BAS (leading organisation)
- Institute of Mathematics and Informatics - BAS
- Institute of Mechanics - BAS
- National Institute of Geophysics, Geodesy and Geography - BAS
- Paisii Hilendarski University of Plovdiv
- Medical University of Sofia
- University of Library Studies and Information Technologies

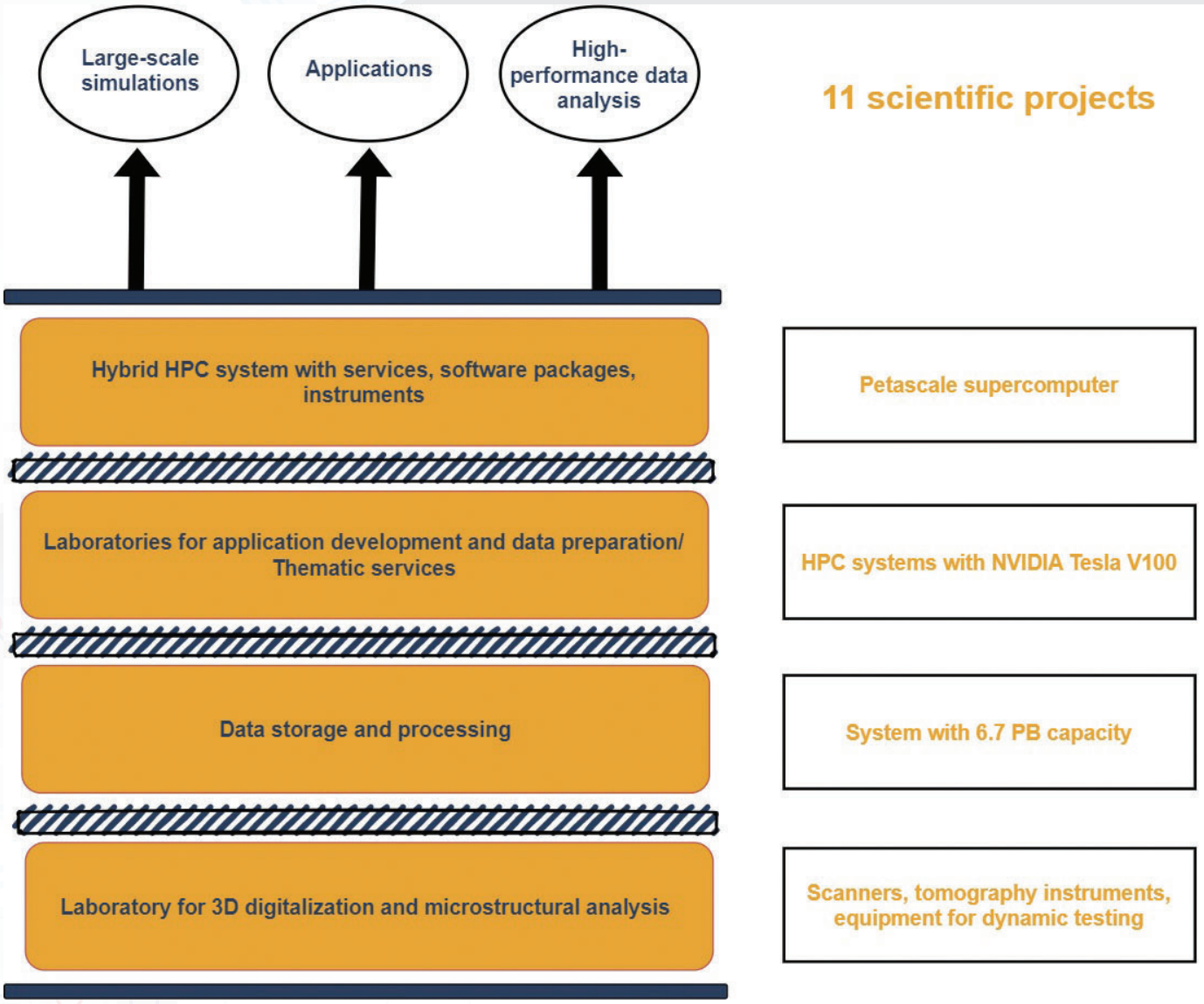
Associated Academic Partners

- The Institute of Statistics and Mathematical Methods in Economics – TU Vienna (Austria)
- Fraunhofer Institute for Industrial Mathematics in Kaiserslautern (Germany)

Associated Industrial Partners

- Ontotext AD
- Interconsult Bulgaria Ltd
- AMET Ltd
- TechnoLogica EAD
- Biodit Global Technology AD
- Orak Engineering EOOD

Infrastructure Complex for Digital Transformation and High-Performance Computing

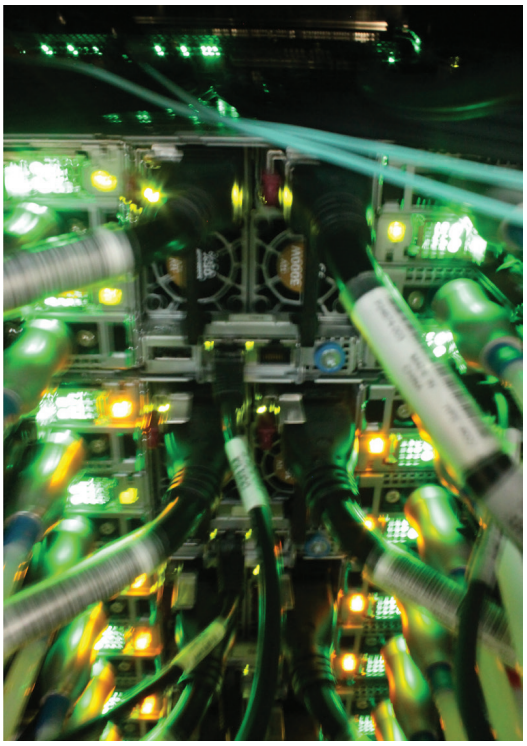


The infrastructure developed by the CoE is a complex that comprises 4 main layers, including supercomputing resources, a data storage system, local application development centres and digitization facilities. A platform was developed that integrates all layers of the computing ecosystem, including network, computing resources and data, software, services and tools, to facilitate the work of multidisciplinary scientific communities.

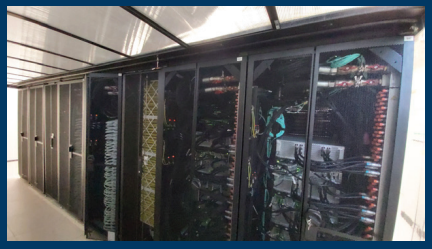
PETASCALE SUPERCOMPUTER







The HEMUS supercomputer has a peak performance of over 3 PetaFlops, 148 servers (distributed in two subsystems) and non-blocking InfiniBand connectivity. The multi-core CPU-based subsystem consists of 128 dual-processor HPE ProLiant XL220n Gen10 Plus servers with direct liquid cooling. The GPU-based subsystem with multi-core CPUs and GPUs consists of 20 HPE ProLiant XL675d dual-processor servers with direct liquid cooling.



CPU-based subsystem

Servers	128 x HPE ProLiant XL220n Gen10 Plus
CPUs	2xIntel Xeon-Platinum 8352Y 2.2GHz 32-cores/64 HT (64 cores / 128HT per node)
RAM	16x16GB = 256 GB DDR4-3200 MHz per node
Total CPUs	8 192 cores/16 384 HT
Total RAM	32 TB
Interconnect	Non-blocking NDR Infiniband
Bandwidth	200 Gbps
Storage	2 x 480GB NVMe Gen3 SSD = 960 GB per node Total: 120 TB



GPU-based subsystem

Servers	20 x HPE ProLiant XL675d Gen10 Plus
GPUs	2 x AMD EPYC 7742 (2.25GHz/64-core/225W) 64 cores/128 HT (128 cores / 256 HT per node)
GPU	8 x NVIDIA A100 TENSOR CORE 40GB SXM Peak 64-bit floating point performance - 19,5 Tflops Memory bandwidth - 1,555GB/s Interconnectivity within node NVLink: 600GB/s (8 x 20 =160 in total, 160x40 GB = 6,25 TB RAM)
RAM	16x32 GB = 512 GB DDR4-3200 MHz per node
Total GPUs	2 560 cores / 5 120 HT
Total RAM	10 TB
Interconnect	Non-blocking HDR Infiniband
Bandwidth	200 Gbps
Storage	2 x 480GB SATA SSD - 960 GB 4 x 3.84TB NVMe Gen3 SFF SC U.3 SSD = 15.36 TB Total: 16.30 TB per node 20 x 16.30 TB = 320 TB total



Laboratories for application development and data processing

40 Fujitsu Primergy RX 2540 M4 servers

with the following configuration:

NVIDIA Tesla V100 32GB

128 GB RAM

CPU 2x Intel Xeon Gold 5118 2.30GHz 24 core

2x800GB SSD

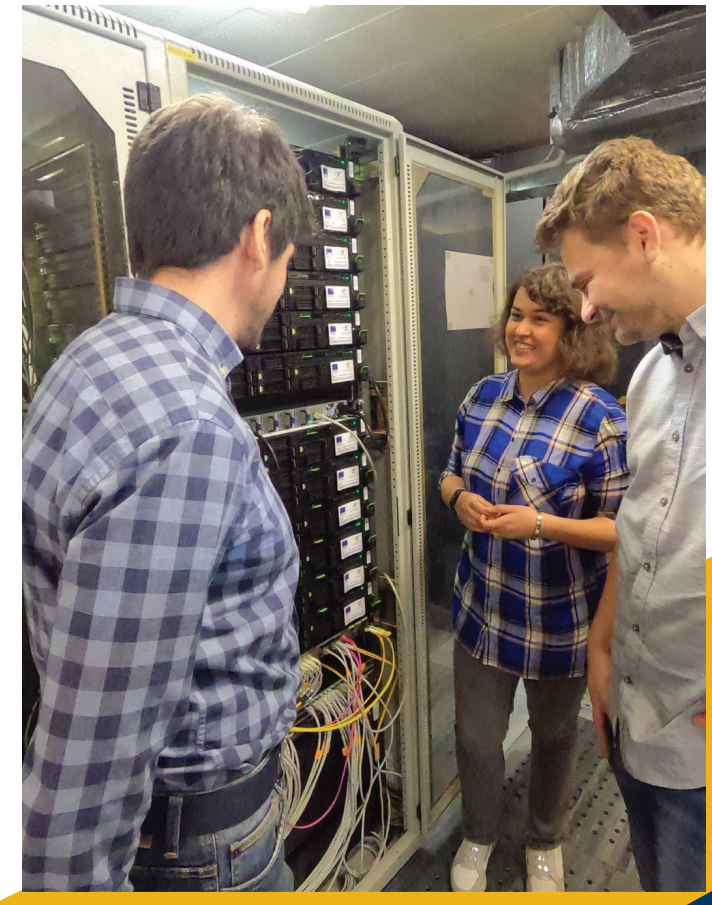
3*12TB HDD

Installed software:

RHEL Server 7.6

nVidia GRID





The servers are located on the premises of the beneficiary and its partners

A system capable of storing and processing petabytes of data (Data Centre)



- A system capable of storing and processing 6.72 PB of data, with 5 dual-redundant Lustre file system management servers.
- A system capable of processing big data with 8 servers, each with 4 processors and total operating memory of 24 TB.
- Communication between each of the servers of the two systems, as well as external connectivity implemented on the basis of InfiniBand 100 and 200 Gbps, Ethernet 10 Gbps and Ethernet 1 Gbps interfaces.



Laboratory for 3D digitization and microstructural analysis



Go!SCAN SPARK portable color 3D scanning system

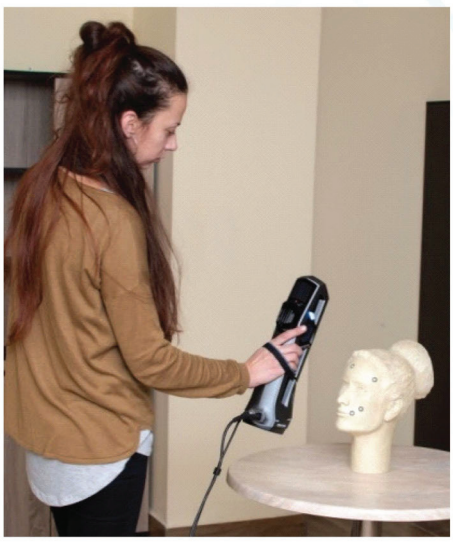
HandySCAN Black Elite portable 3D Laser Scanning System

A system for laser scanning and probing combining MetraSCAN 750 with HandyPROBE Next|Elite

Portable system for 3D laser scanning of large objects
FARO Focus S 150 Plus

A system combining an electromagnetic oscillation generator with a non-contact laser vibrometer









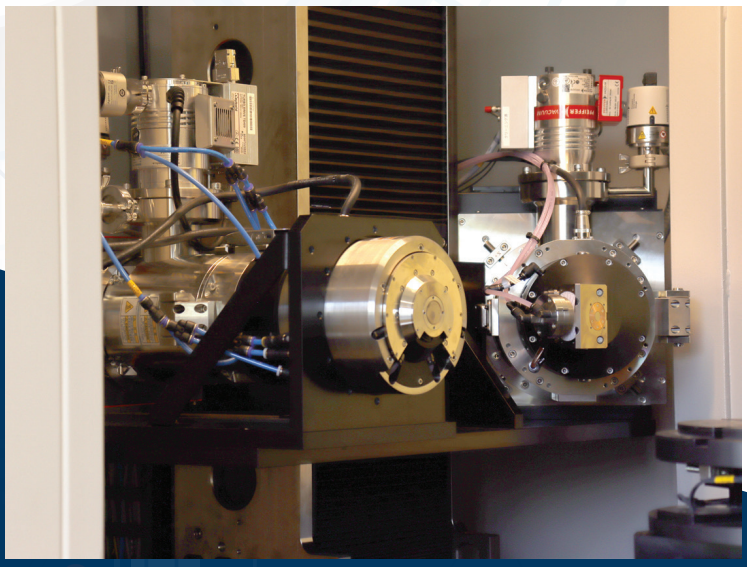


TOMOGRAPHY

Industrial Computed Tomography System with capabilities for in situ studies CT-ALPHA duo



- wo x-ray tubes (nano-focus and micro-focus)
- 16-bit detector with 2560 x 2048 pixels and 124 μm pixel size
- Maximum scanning volume: Ø 350 x H 500
- Maximum weight of the sample: 80 kg.



The system is equipped with a set of devices that allows for the following in situ tests to be carried out:

- Cooling down to -20 degrees Celsius
- Heating up to + 300 degrees Celsius
- Tension and compression with a maximum force of up to 5 kN
- Fluid flows in porous materials




IICT


IMI


Institute of Mechanics
Bulgarian Academy of Sciences


NIGGG




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Project coordinates

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