



# EURO

Emanouil Atanassov: HPC Facilities in IICT

BG UK Twinning, Sofia, 20 July 2022

# Diverse HPC hardware at a glance



- Avitohol supercomputer (top500 system)
- Big Data servers with 3TB RAM each, connected with 5PB of HDD and SSD storage
- NVIDIA V100-based servers
- EuroHPC system Discoverer operational at Sofia Tech Park
- Various HPC clusters

# The Avitohol supercomputer



System from Top500 list  
>200kW at max capacity



# The Avitohol supercomputer

Peak Performance CPU	50 Tflop/s
Pear Performance Accelerators	362 Tflop/s
Total Peak Performance	412 Tflop/s
Real Measured Performance	264 Tflop/s
Max Power	250 kW

The system consists of 4 dual racks of type HP MCS 200. Each one provides power and cooling for up to 50 kW of equipment, cooled by water. Last on Top500 List on 389 place (Nov 2015)

<http://www.top500.org/system/178609>



# The Avitohol supercomputer – hardware features



Servers	150 x Dual CPU HP ProLiant SL250s Gen8
CPUs	Intel Xeon E5-2650v2 2.6GHz – 8 cores /16 HT
RAM	64 GB per node
Coprocessors	300 x Intel Xeon Phi 7120P(x86) – 61 cores / 244 HT
Total CPUs	2400 cores/4800 HT + 18300 cores/ 73200 HT
Total RAM	14400 GB (9600 + 4800)
Disk Storage	100 TB
Interconnect	Non-blocking FDR Infiniband
Latency	1.1 $\mu$ s
Bandwidth	56 Gbps

# Software environment



- RHEL HPC
- Torque+maui scheduler, slurm
- Intel Cluster Studio SDK, Intel One API
- Boost, CMake, CP2K, CPMD, Dalton, FFTW, Gromacs, gsl, HDF5, MVAPICH2, NetCDF, NWChem, Octave, OpenFOAM, PETSc, Python, Quantum Espresso, R, RegCM, Score-P, SLEPc, SPRNG5, WRF, etc.

# GPU computing servers

- Fujitsu Primergy RX 2540 M4 with configuration:  
128 GB RAM
- CPU 2x Intel Xeon Gold 5118 2.30GHz 24 core
- 2x800GB SSD  
3\*12TB HDD
- NVIDIA Tesla V100 on each node (32GB RAM per GPU)
- Infiniband interconnection
- RHEL
- Nvidia GRID software
- Intel Cluster Studio SDK, Intel One API, Alinea Forge



# System for Big Data storage and analysis



- 8 Servers with capability for in-memory processing - 4 x Intel Xeon Gold 6238L 2,1GHz with 22 cores
- 3TB RAM
- 32TB SSDs per server
- Non-blocking Mellanox InfiniBand HDR @200 Gbps



# System for BigData storage and analysis



Lustre MDS server (2 servers), HPE ProLiant DL380 Gen10:

- 2x Intel® Xeon® Gold 6244 Scalable processor (Gen2) with 8 cores and memory speeds of up to 2933 MT/s
- 192GB DDR4, 2933 MHz
- 2x 480GB SSD for boot
- 4x 1GbE; 2x 10Gb Ethernet; 2x 100Gb IB HDR100
- RHEL, RHEL HA
- HPE MSA 1050 shared storage
- 12x 800GB 12G SAS Mixed Use SSD

Lustre OSS servers (8 servers):

- 2x AMD EPYC 7272 with 12 cores each
- 512GB DDR4, 2933 MHz
- 2x 480GB SSD for boot
- 30.72 TB internal SSD pool
- 2x 1GbE; 2x 10Gb Ethernet; 2x 100Gb IB HDR100
- RHEL, RHEL HA
- 2x HPE D6020 disk enclosures; total of 1680TB (140x 12TB 12G SAS 7.2K LFF)



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# Acceptable Use Policy



Acceptable Use Policy of computing infrastructure resources in the framework of the Center of Excellence in Informatics and ICT

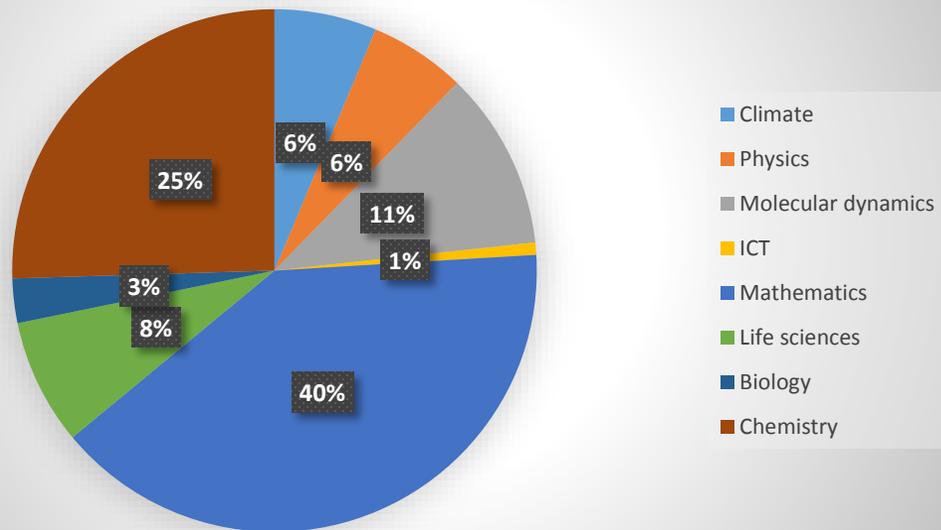
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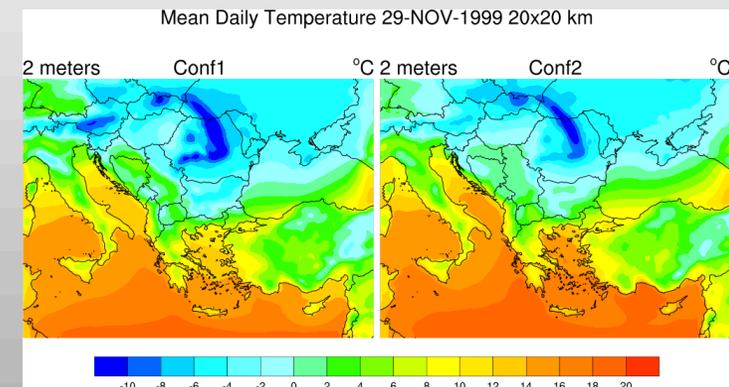
# Distribution of usage by scientists

Usage by science domain



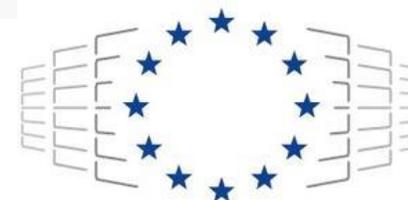
Scientists expressed interest in:

- Cloud-based access to HPC
- Long-term data preservation
- Access to GPU-enabled HPC resources



# Thanks!

<http://eurocc-bulgaria.bg/bg/>



**EuroHPC**  
Joint Undertaking

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