Data, Computing and Network Research Infrastructures and Services in Armenia

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Outline

ASNET-AM
- Brief information
- Mission
- Vision

E-INFRASTRUCTURES
- Mission
- Vision
- Future

DIGITAL SERVICES
- Network
- Data
- Computing

USE CASES
- Life Science
- Earth Science
<table>
<thead>
<tr>
<th>Year</th>
<th>Event</th>
</tr>
</thead>
<tbody>
<tr>
<td>1994</td>
<td>Founded</td>
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<tr>
<td>1998</td>
<td>Connectivity to the universities</td>
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<tr>
<td>2002</td>
<td>Nato Virtual Silk Project</td>
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<tr>
<td>2008</td>
<td>Black Sea Interconnection</td>
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<tr>
<td>2015</td>
<td>EaPConnect Project</td>
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- Direct Con. 1Gb/s
- Optical network to Geant
- Satellite conn. to Geant

**ASNET-AM – networking infrastructure**
# ASNET-AM Computational infrastructure

## Collaboration

|-----------------|------|------|------|------|------|

## Funding

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<tbody>
<tr>
<td>French Supercomputer</td>
<td>Openstack – 620vCPUs and GPUs</td>
<td>ArmGrid – 512CPUs</td>
<td>Armcluster – 128 CPUs</td>
<td>Networking servers - 10</td>
</tr>
</tbody>
</table>

![EaPConnect](image)
e-Infrastructure – mission

Digital economy

R&D focused on ICT and their application
Creating ICT inspired innovations

Digital science

To provide an advanced einfrastructures to academia
R&D Environments

25 September, 2019
Connecting Armenia

Fostering communities

Advancing technologies

Empowering knowledge

01 E-infrastructures
- HPC, networking & data facilities

02 Applications
- Scientific challenges
- Societal challenges
- Industry

03 Technologies
- HPC and cloud
- Data
- Networking

04 Education
- AI/ML
- Data science
- Scientific computing and computational science

e-Infrastructure – vision
e-Infrastructure – at a glance

National Data Center
- Digital libraries
- Digital museum
- Astrophysics
- Meteorology

National Research and Educational Network
- ASNET-AM: >65 organizations
- Eduroam, videoconference, etc.
- Direct connectivity with GEANT

National HPC Center
- Iass Cloud providing CPU cores,
  GPU cloud (ongoing): Tesla V100 devices
e-Infrastructure – future

- Data Science
- Artificial Intelligence
- HPC
- Cybersecurity

122400 CPU cores
274GFlop/s performance

HPC resources

Industry  Academia  State
Digital services – overview

1. Connectivity & network management
   - Network monitoring
   - Virtual private networks
   - Point-to-point services

2. Trust, identity & security
   - eduroam
   - eduGAIN
   - Network security

3. High-Performance Computing
   - Parallel programming
   - Modelling
   - Code customization

4. Cloud Computing
   - IaaS Virtual machines
   - Cloud storage
   - FileSender
   - On-demand GPUs for ML

5. Data Management
   - Big data
   - Metadata management
   - Repositories
   - Digitization

6. Real time communication & learning
   - Online broadcasting
   - Moodle
   - Lola
eduroam (education roaming) is the secure, world-wide roaming access service developed for the international research and education community. eduroam allows students, researchers and staff from participating institutions to obtain Internet connectivity across campus and when visiting other participating institutions by simply opening their laptop.
Digital services – digital libraries online

We are moving to the new platform based on dLibra system.

The new portal offers the users many powerful possibilities such as searching the content of the collected resources, searching bibliographic descriptions using synonyms dictionary, grouping digital publications and navigating their structure.

dLibra enables creating professional repositories of digital documents and sharing them with other people and systems on the Internet.
Digital services – data repository

**Primary country mirror - mirrors.asnet.am**

- Faster downloads for users
- Saving bandwidth
- Reproducible package installation

Additional packages:
- Turnkeylinux
- Raspbian
- Dotdeb
- ...

Archive Mirror at the Academic Scientific Research Computer Network of Armenia (ASNET-AM)
Digital services – streaming

A Low Latency, High Quality Audio/Video Transmission System (Lola) for Network Musical Performances and Interaction

Estonian Academy of Music and Theatre

Fondazione Università Ca' Foscari. Cà Dolfin

National Academy of Sciences of Armenia
Digital services – computing

- Users dynamically choose a CPU, memory and storage configuration
- Easy access to vast computing power (520 virtual CPUs)
- Freely available open source infrastructure based on OpenStack software
Use cases - societal challenges

- Off site monitoring
- Atmospheric modeling
- Hydrological modeling
- Water resources management
- Air pollution
- Env. protection
- Weather prediction
- Severe weather
- Drought, desertification
- Climate modelling
- Seismology and geology
- Hazardous geological and seismological phenomena
Use cases - societal challenges

**Supporting weather ‘nowcasting’ to prevent damage in Armenia**

**Monitoring the environment with Earth observation in Armenia**

Armenian State Hydrometeorological and Monitoring Service

http://datacube.sci.am
Use cases - scientific challenges

- Materials, chemistry
- Quantum chemical simulations
- Life science & medicine
- Archeology and social sciences
- 3D modelling
- GIS, GPS
- Astrophysics and high energy physics
- LHC CERN, IVOA
- Genomics, molecular dynamics
- Earth science
- Engineering
- Scientific computing & modelling

Scientific challenges
Use cases - scientific challenges

Supporting the multiwavelength monitoring of the bright Blazars

**International Centre for Relativistic Astrophysics**

Enabling computational materials discovery and atomic scale simulations

**Faculty of Radiophysics, Yerevan State University**

Empowering the Armenian Genome Project with HPC resources

**http://armeniangenome.am**

Enabling laser physics and quantum computing simulations

**Institute for Physical Research of NAS RA**
Thank You!