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Grid cluster at the Institute of High Energy Physics of TSU

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Introduction to GRID

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- **Grid computing** is the combination of computer resources from multiple administrative domains for a common goal. Grid computing is applying the resources of many computers in a network to a single problem at the same time - usually to a scientific or technical problem that requires a great number of computer processing cycles or access to large amounts of data.

Grid cluster at the HEPI TSU

Project started in 2008.

Grid cluster at the Institute of High Energy Physics contains:

- 7 worker nodes
- Computing element
- User interface
- BDII
- Storage element

Interconnection Scheme

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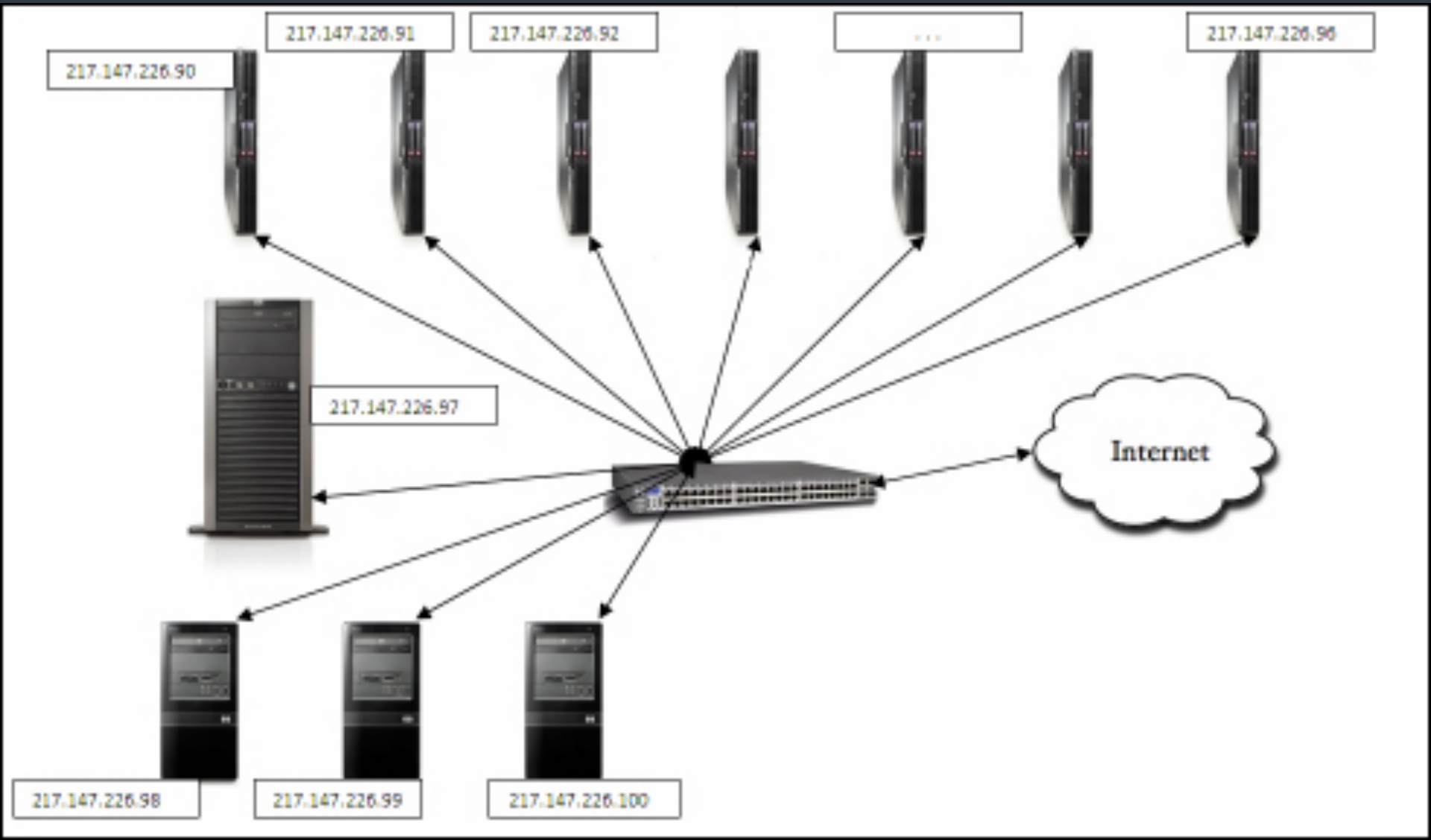

GRID Cluster

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Glite components

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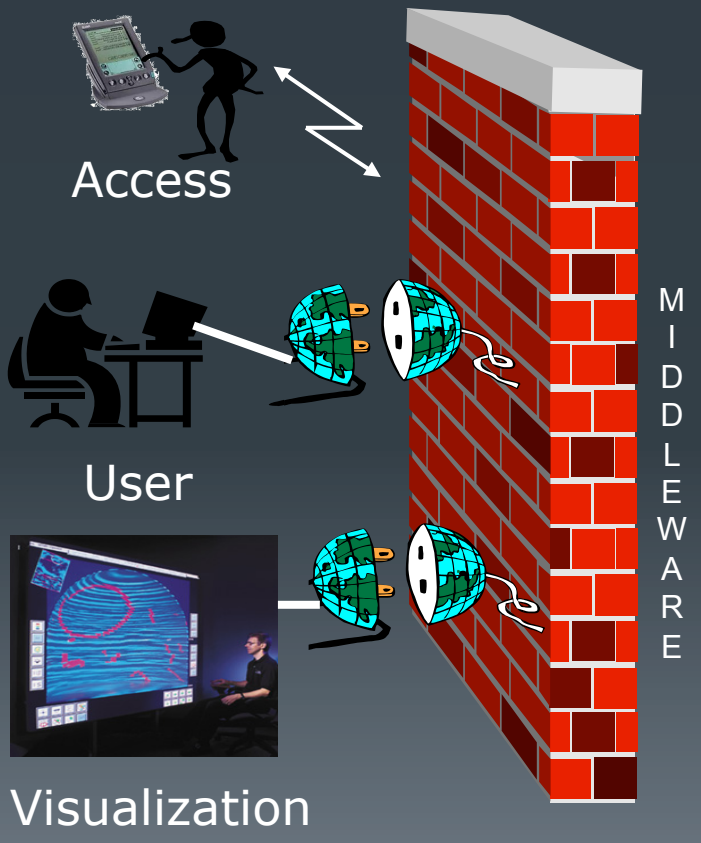
- **Glite** is the middleware stack for grid computing used by the CERN LHC experiments and a very large variety of scientific domains.



Glite components

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- The Worker Nodes are the machines on which the job is actually executed. They are linked with the CE through a local batch system, to which at last the jobs are submitted

- The User Interface (UI) is the package on the user's machine. It is the submission entry point of the system. UI lets:
  - Run and remove tasks
  - Get information about Grid resources, status of active tasks and their history, etc..
  - Copy, remove files from the Grid

Glite components

- A Storage Element (SE) provides uniform access to data storage resources. The Storage Element may control simple disk servers, large disk arrays or tape-based Mass Storage Systems (MSS).
- The Computing element (CE) is the entry point in the Local Batch Systems of the resources. It can be an executing machine itself or simply the entry point for the local cluster managed by a batch system.
- Grid information systems are mission-critical components in today's production grid infrastructures. They provide detailed information about grid services which is needed for various different tasks. The fundamental building block used in this hierarchy is the Berkley Database Information Index (BDII).

Performed work on grid cluster at the HEPI TSU

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- On all nodes except CE is installed Scientific Linux 5.3
- On CE is installed Scientific Linux 4.8
- On all hosts is configured ntp time and Synchronized with ntp-server on glite-se.hepi.edu.ge
- On Glite-SE host is configured no password ssh login for all other hosts
- On Glite-SE is configured yum repository for linux and Glite 3.2
- On all hosts are installed Glite 3.2 packets, except s3.hepi.edu.ge, there is installed Glite 3.1 packets
- In our DNS server, (Domain hepi.edu.ge) are added this names (Glite hosts Names)

Description of the hardware equipment

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- Worker nodes: HP DL160 G6
- CPU - 2 Intel Xeon Processor E5520 - 2.27 GHz
- RAM - 8GB
- HDD - 250 GB SATA

- Storage Element: HP Proliant ML 150 G6
- CPU - 2 Intel Xeon Processor E5520 - 2.27 GHz
- RAM - 2 GB
- HDD - 2TB (3 x 1TB SATA) Raid5

- Glites:
- CPU - Intel Core 2 Duo Processor E7400 – 2.8 GHz
- RAM - 2 GB
- HDD – 250 GB SATA

Advantages

- Much more efficient use of idle resources. Jobs can be farmed out to idle server or even idle desktops. Many of these resources sit idle especially during off business hours.
- Grid environments are much more modular and don't have single points of failure. If one of the servers/desktops within the grid fail there are plenty of other resources able to pick the load. Jobs can automatically restart if a failure occurs.
- Upgrading can be done on the fly without scheduling downtime. Since there are so many resources some can be taken offline while leaving enough for work to continue. This way upgrades can be cascaded as to not effect ongoing projects.
- Jobs can be executed in parallel speeding performance.

Future Plans

- Increase access speed to internet
- VO registration
- Users training for working in VO – virtual organization
- Finalize certification procedure
- Increase number of worker nodes

Thank you for attention