

---

# The Hungarian ClusterGRID Project

---

**Péter Stefán**

research associate

NIIF/HUNGARNET

stefan@niif.hu

---

# What is it about?

Project background

Project goal

Technical construction, solutions applied

The grid in operation

Relationship with the institutes

Our users

Summary

---

---

# Background of the Project

2002 spring-summer

Ministry of Education procurement project

99 computer cabinets have been installed at  
Hungarian universities and public libraries

2002 summer-autumn

ClusterGRID Technical Board was set up

Pilot project is finished in December

---

---

# The Goal of the Project

The installed labs serve two purposes:

the institutes' own purposes (education, service),  
grid purposes.

The goal of the project is to build a countrywide,  
homogeneous grid system which is in production,  
and which is capable to solve computing problems  
of the real users.

---

---

# Technical Solution Applied

Main properties of the solution applied are as follows:

Temporal and spatial separation of the two functions.

i.e. separate OS, partition, network segment.

3-layer hierarchical architecture, with central entry point.

Easy to manage system.

In the current implementation the system is centralized, but on demand it can be de-centralized.

---

---

# Technical Solution Applied

The 3 “building blocks” are as follows:

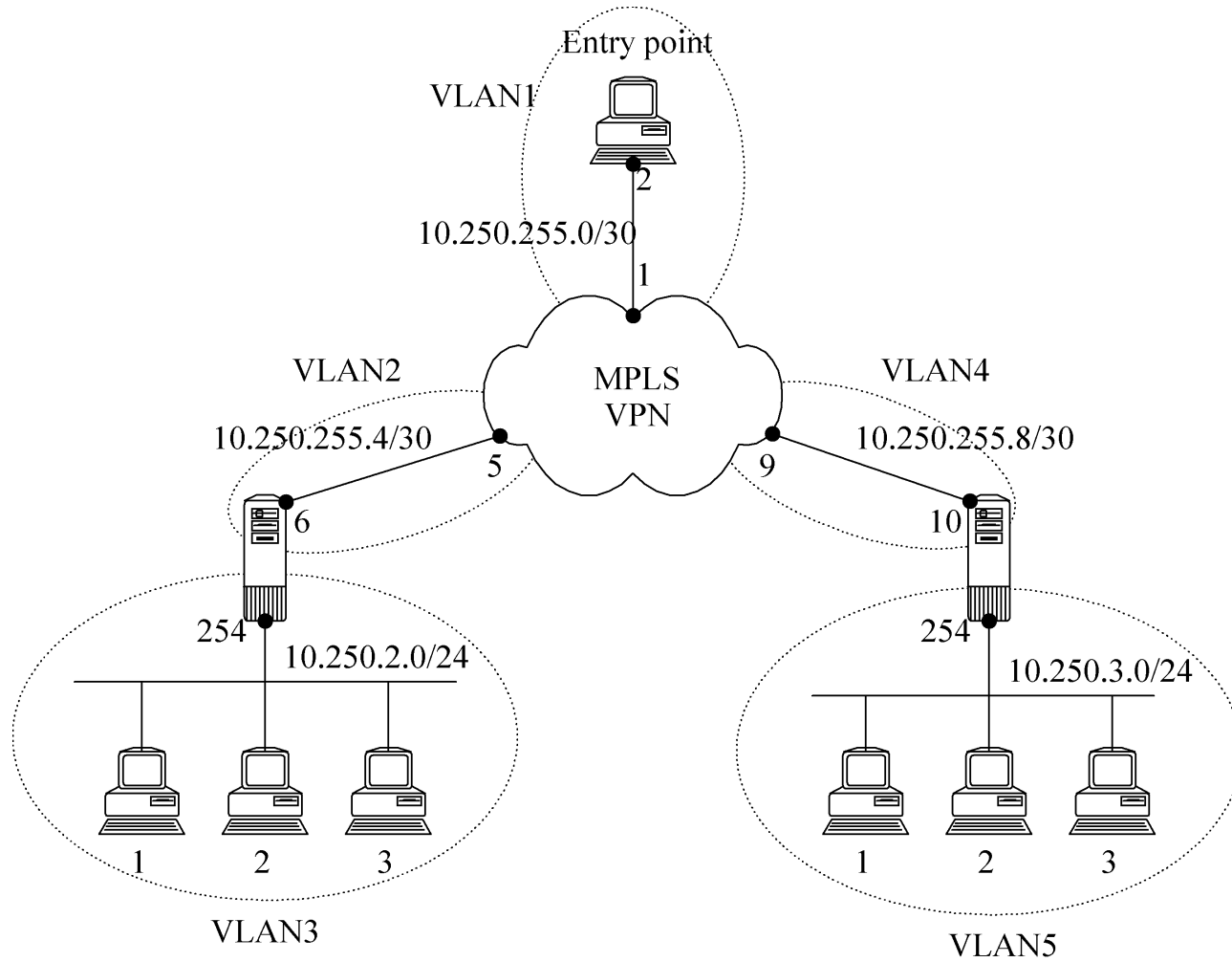
Private network structure in grid mode using MPLS VPN, and VLAN techniques.

Network root file system on the workers.

Network wake-on LAN technique.

---

# Network Structure



---

# Function of Different Elements

Workers:

carry out computation,  
memory,  
NFS root clients.

Local masters:

DHCP, TFTP, NFS services,  
routing within the private network,  
local scheduling.

---



---

# Function of Different Elements

Central entry point:  
authentication service,  
DNS service,  
front-end service.

Grid OS: RedHat 7.3, Debian Linux

---

---

# Function of Different Elements

The central machine and the local masters operate continuously.

The boot of the workers is an interesting process!

The worker boot can be done from any kind of media, such as CD-ROM, floppy disk. The preferred is the network boot opportunity.

Switching between different modes must be as automated as possible.

---

---

# Grid Software

Job scheduler: Condor vs. SUN Grid Engine (SGE).

Parallel Virtual Machine (PVM) support.

Globus system is not used!

---

---

# Current Implementation

There are 8 Hungarian Institutes involved in the system: 5 is outside of Budapest.

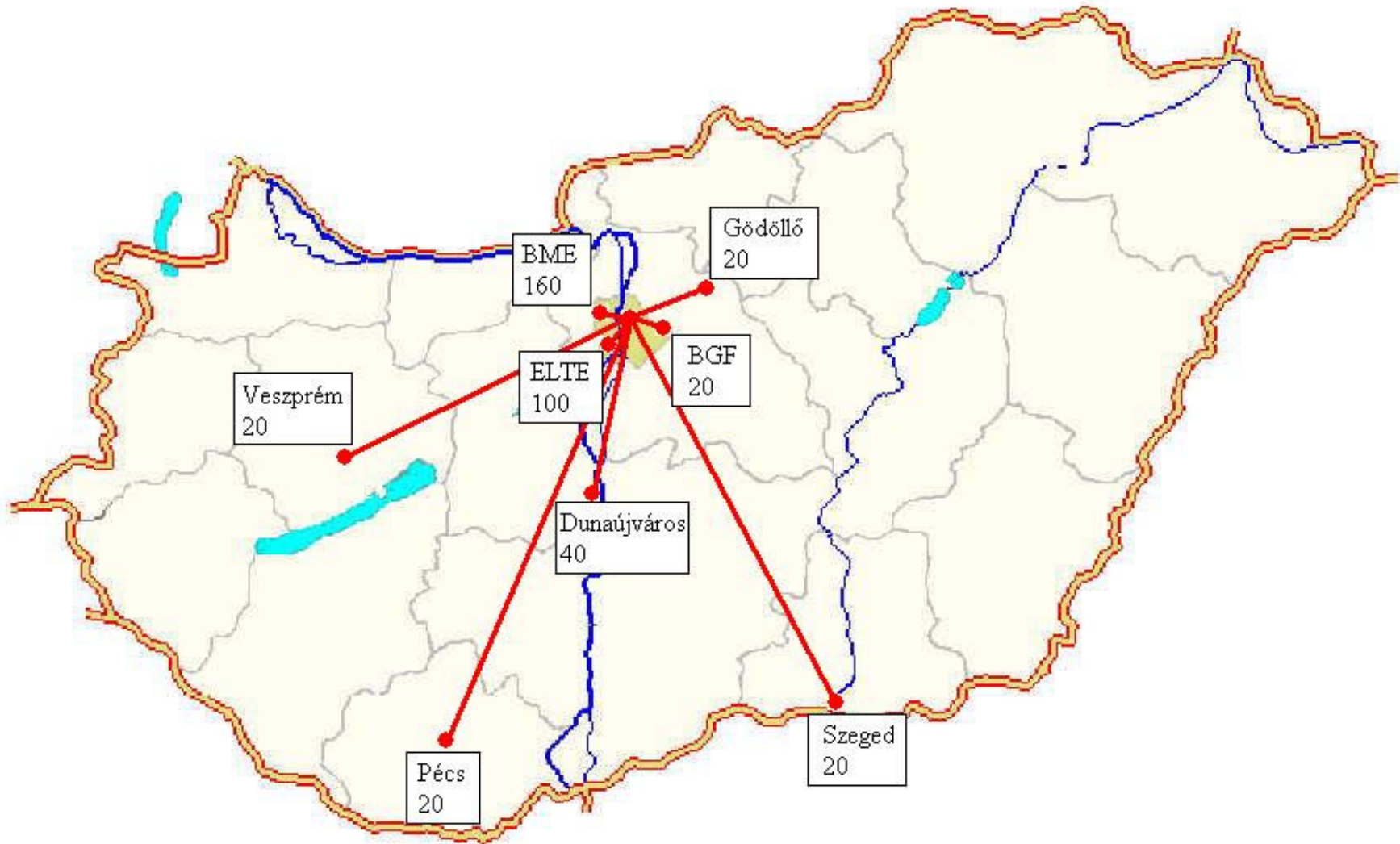
400 nodes are enabled for grid operation.

The number of nodes has been increasing.

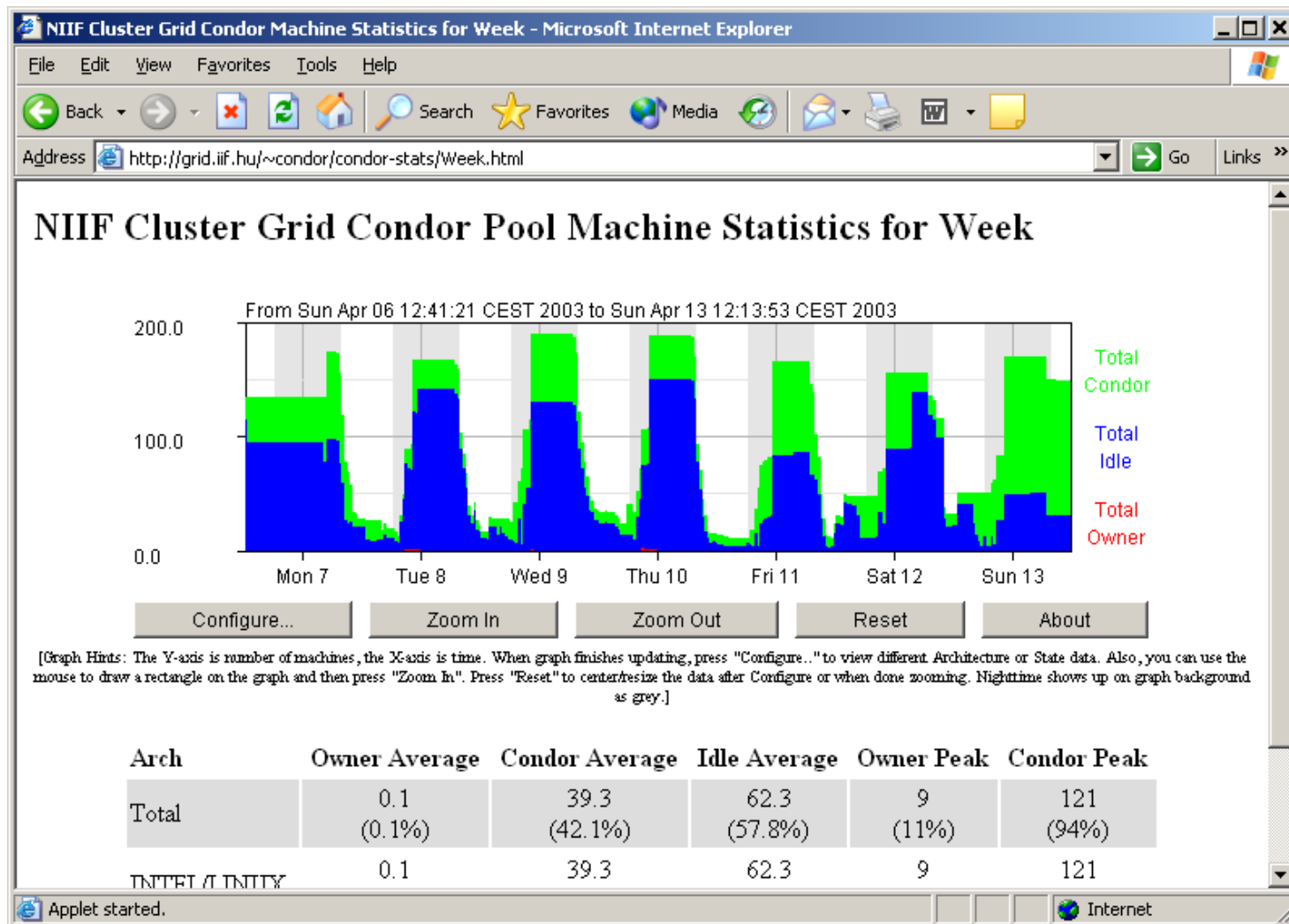
About 200 workers in continuous operation.

---

# Current Implementation



# Current Implementation



---

# Relationship with the Institutes

Each institute must provide three responsible persons:  
IT manager, UNIX admin, network admin. The whole process is controlled by contract.

Physical conditions:

Capability of continuous operation without supervision.

VLAN handling capability.

8 GB disk partition on each worker.

Dedicated server machine.

---

---

## Our Users

There are four users so far.

The environmental conditions are not as sophisticated as in the case of supercomputers, but the system is usable.

The first scientific international journal paper has been created in the field of chemistry.

Anybody within the Hungarian Academic Community and foreign partners are welcomed to the system.

---



---

# Further Information

<http://www.clustergrid.iif.hu>  
[grid@ki.iif.hu](mailto:grid@ki.iif.hu)

---

---

# Summary

Project background

The goal of the project

Technical construction, solutions applied

The operating grid

Relationship with the institutes

Our users

Future plans

---