

Computing Resources at Vilnius Gediminas Technical University

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Outline

- Brief history of parallel computing at VGTU
- Physical resources of:
 - PC cluster, IBM SP, cluster of IBM RS/6000 workstations
- Parallel Computing Lab
- Future plans

Brief history

- 1996 - first PC cluster (2 PC) was build based on PVM
- 1997 - project for obtaining resources for parallel computing was supported by Lithuanian Government, Ministry of Finance and IBM.
- 1998 - IBM SP2 was installed and IBM RS/6000 cluster was build.
- 1999 - first PhD theses on parallel computing was defended and Tool for sequence code parallelisation was developed.
- 2000 - Parallel computing Laboratory at VGTU was established.
- 2002 - PC cluster (20 CPUs) was build ($R_{\max} = \mathbf{28}$ GFlops).
- 2004 - Expansion of PC cluster till 36 CPUs ($R_{\max} = \mathbf{96}$ GFlops)

IBM RS/6000 SP

- **4 Thin nodes with High Performance Switch**
- **Configuration of the Node:**
 - IBM POWER2 120 MHz processor
 - 128MB RAM
 - 4,5 GB SCSI-2 HDD
 - 110 MB/s Enhanced Switch Adapter
 - 100 Mb/s Ethernet adapter
 - 36.4 GB SSA disks array
 - AIX v.4.3.3 and POE



Cluster of IBM RS/6000

- **7 nodes of IBM RS/6000 43P-140**
- **Configuration of the Node:**
 - IBM POWER2 120 MHz processor
 - 224MB RAM
 - 11 GB SCSI-2 HDD
 - 10 Mbps Ethernet Adapter
 - AIX v.4.3.3 and PE

IBM SP and cluster software

- Compilers
 - C/C++, Fortran (IBM, GNU)
 - HPF (IBM)
- Parallel engineering and scientific subroutines library **PESSEL** (IBM):
 - PBLAS,
 - Linear Algebraic Equations,
 - Eigensystem Analysis and Singular Value Analysis,
 - Fourier Transforms and other.
- Modeling software
 - ANSYS (IBM RS/6000 43P), GAMESS, NWCHEM

PC cluster

- **10 dual CPU nodes**
- **Configuration of the Node:**
 - Dual Intel Tualatin Pentium III 1.4 GHz
 - 1 GB DDRAM 266 MHz
 - 80 GB HDD ATA/133
 - Gigabit Ethernet
 - Linux Mandrake 9.0
 - OSCAR, PBS, Ganglia Toolkit

Max performance **28** Gflops (**16.8** Gflops HPL benchmark)

Computing resources at VGTU are open for academic society of Lithuania

More information vilkas.vtu.lt (in Lithuanian, English version – under construction)

PC cluster load monitor

Ganglia Cluster Toolkit: Cluster Report - Microsoft Internet Explorer

File Edit View Favorites Tools Help

Address http://vilkas.vtu.lt/ganglia/index.php?m=load_one&r=year&s=descending&c=Vilkas&h= Go Links

Ganglia Cluster Toolkit <http://ganglia.sourceforge.net>

Cluster Report for Wed, 6 Oct 2004 20:09:21 +0300

Get Fresh Data

Metric Last Sorted [Physical View](#)

Vilkas >

Overview of Vilkas

There are **10 nodes (20 CPUs)** up and running.
There are no nodes down.

Current Cluster Load: 29.32, 33.21, 30.48

Vilkas CPU last year

Percent

Nov Dec Jan Feb Mar Apr May Jun Jul Aug Sep

■ User CPU ■ Nice CPU ■ System CPU ■ Idle CPU

Vilkas LOAD last year

PROCESSES

Nov Dec Jan Feb Mar Apr May Jun Jul Aug Sep

■ 1-Minute Load ■ Nodes ■ Total CPUs ■ Running Processes

Vilkas MEM last year

Bytes

Nov Dec Jan Feb Mar Apr May Jun Jul Aug Sep

■ Memory Used ■ Memory Shared ■ Memory Cached
■ Memory Buffered ■ Memory Free

Snapshot of Vilkas | Legend

Done Internet

start Ganglia Cluster Toolki... EN 20:09

Expansion of PC cluster (Nov 2004)

- **16 nodes**
- **Configuration of the new Node:**
 - Intel Pentium 4 3.2 GHz HT Northwood
 - 1 GB DDRAM 400 MHz
 - 200 GB HDD SATA
 - Gigabit Ethernet
 - Linux Mandrake
 - OSCAR, PBS, Ganglia Toolkit

After cluster expansion:

- Max performance 96 Gflops;
- 4 TB total storage

PC cluster software

- Compilers
 - GNU C/C++ v.3.2
 - GNU FORTRAN v.3.2
 - LAM-MPI C/C++
 - LAM-MPI FORTRAN
 - MPICH C/C++
 - MPICH FORTRAN
- Libraries
 - LAM-MPI v.7.0
 - MPICH v.1.2.4
 - PVM v.3.4
 - ATLAS v.3.4.1
- Modeling software
 - GAMESS
 - NWCHEM
 - GROMAX

Parallel computing laboratory

- **Staff**

- Head of lab, system administrator, 2 scientific workers, programmer.

- **Activities**

- Researches in parallel computing
 - **Parallel Adaptive Integration Methods;**
 - **LU factorization parallel algorithm;**
 - **Parallel Finite Difference schemes for flows modelling in multilayered structures;**
 - **Implementation of DEM in solid mechanics**
- User's support;
- Administration of parallel computing resources;
- Education (lectures, books)
 - Parallel Algorithms
 - Architecture of Parallel Computers and High Performance servers
 - R.Čiegis "Parallel Algorithms", Technika, Vilnius, 2001 (in Lithuanian)

Future plans

- To create Lithuanian academic institution GRID based on clusters in Lithuania (VGTU, VPU, VU TFAI, BI, KTU)
- To join Lithuanian GRID with the existing European GRID and participate in EU projects.
- Expand computing resources and services of clusters.
- To build relations with the partners in parallel computing and GRID.