COMPUTING CLUSTER/GRID DEVELOPMENTS AT HEPD

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Computing Systems Department (**CSD**) is responsible for computing infrastructure of High Energy Physics Division (**HEPD**) at the institute. That was the reason why **CSD** took active participation in the Grid developments and testing from early beginning. Our first thoughts on how and which computing architectures might be used in Russia to take participation in physics analysis in future data taking on Large Hadron Collider (**LHC**) at **CERN** can be found in [1]. Later on the relatively new technology for distributed computing was shortly described in context of future **LHC** needs [2]. **PNPI Grid** test configuration has been deployed in 2000/2001 [3] (one of the first in Russian Grid) in particular together with institute of High Performance Computing and Data Bases (**HPCDB**) in St.Petersburg (Russia) [4]. The test Globus registration facility has been created in 2000 to get first experience in registration procedure.

Initial tests have been performed on very poor network conditions. Even in such the conditions the Globus toolkit shown attractive features especially in batch mode. Aftermath we did several presentations at the Institute and at Department of Physics of St.Petersburg University. Thanks to our testing and many discussions after we have found out that Grid technology is really prospective method to perform really large volume of distributed computing.

Our Grid activity was (and is) based on the running computing cluster (project Batch Computing Facility based on PCs – **BCFpc** (came into operation in February 1998). Many physicists from HEPD and other Institute divisions use the cluster every day (in total 170 users; about 60 persons have used the cluster in first half of October 2005). Main OS in 2000-2004 was RH-7.3 (with GCC-3.2.3 in 2004, SL3.05 in 2005). **AFS** client service is available. **SGE** is used as local batch system. Main hardware parameters (in 2005) are: 1 Gbit internal network based on 1 Gbit network switch, about 4 TB of disk space; one CPU power is in between 2.0 and 3.4 GHz, 11 machines (13 CPUs). Total power is 35.1 GHz. Regular hardware upgrade is implemented as a replacement of out of date machines by new modern hardware (we do not keep old machines in the cluster). Such regular procedure helps to keep the cluster up to date with distributed in time money spending.

We assume that contemporary approach to the Grid architecture does not push a user to use Grid. When a user needs more resources (data volume, CPU power, other) than available locally he (only in this case) needs to be registered as the Grid user. Such the approach has been adopted for example at **BNL** (ttp://www.bnl.gov), at **SUNYSB** (http://ram3.chem.sunysb.edu/ramdata), Teragrid (http://www.teragrid.org), University of New Mexico (http://www.hpc.unm.edu/) and other organizations.

In nearest future (2–3 years) we need to upgrade CPU power, disk space and I/O bandwidth approximately by the order of magnitude.

Our nearest plan is to join the cluster to large scale distributed computing project to get significant support for operation and development.

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2. **Шевель А.Е.** //Открытые системы, №2, 2001. http://www.osp.ru/os/2001/02/036.htm.
3. **Шевель А.Е., Корхов В.** //Открытые системы, №5–6, 2001. http://www.osp.ru/os/2001/05-06/034.htm.
4. **Shevel A., Korkhov V.** //CHEP-2001. http://www.ihep.ac.cn/~chep01/paper/10-004.pdf.