Institute of Computer Science

Annual Activity Report 2002

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The Institute of Computer Science (ICS) of Masaryk University is the central service, research, and development provider at Masaryk University in the area of computer, information and communication technology. It is responsible for the operations and development of centralised computer equipment, information systems and the communication infrastructure of the university. It provides methodical assistance to Laboratories of Computer Technology and other specialised information and communication technologies locales within the faculties, and takes part in research and education. The major areas of the ICS activity and its fulfilled objectives in 2002 were as follows:

1. CENTRALIZED COMPUTER EQUIPMENT

The Institute of Computer Science of Masaryk University operates dozens of communication devices and central computing and data servers for centralized computer and library services, supercomputer systems, servers for automated management systems, web services for the university, administrative servers for operating and monitoring the university network, parts of the national academic network CESNET2, the metropolitan archive of medical and visual information, and many others. These facilities are operated in three air-conditioned and secured rooms that measure a total of 240 square metres. The central UPS units, which have a total output of 120 kVA and their own diesel aggregate of a total output of 250 kVA, provide a constant supply of electrical energy.

In 2002, the main focus was on how to increase reliability and safety. The main MU postal server was replaced by a pair of Intel servers which provide, apart from basic services, centralised university anti-virus protection of the electronic mail system; the licences for anti-virus systems for end user stations were also purchased. There was a purchase of new backup equipment with a capacity of 1.5 TB for the key data of the economic information systems. The new servers, which provide the public interface of the MU web pages, were purchased and installed, and now control the operation of the central servers and serve as the backbone of the network.

2. SUPERCOMPUTER CENTRE

The Supercomputer Centre Brno (SCB) of ICS is a cutting edge facility which operates very powerful computer technology, and takes part in national and European-wide research and development projects, mainly in the area of extensive distribution systems – i.e. Grids. In 2002, two extra disk fields with a total capacity of 3 TB were purchased to work with the existing SCB equipment: an SGI Origin 2000 supercomputer with 40 MIPS R10000 processors and 18 GB of memory, an SGI PowerChallenge XL supercomputer with 12 MIPS R10000 processors and 2 GB of memory and a tape library for data storage with a capacity of 12 TB on-line without compression. In co-operation with CESNET, ICS expanded its cluster of computers with 64 Intel Pentium III processors and 32 GB of memory.

In 2002, SCB (in conjunction with CESNET) as a member of extensive international teams took part in the competition *The High Performance Computing Challenge Award* and *The High Bandwidth Challenge Award*. The teams which we participated with won The High Performance Challenge Award in two categories. We succeeded in creating and maintaining a Grid with 70 computers with a total of 7700 processors, and we were also members of the winning team in The High Bandwidth

Challenge Award, where we managed to maintain a constant flow of 2 Gb/s for a period of two hours between Brno and Baltimore, USA.

3. UNIVERSITY COMPUTER NETWORK, COMMUNICATION INFRASTRUCTURE

The Network Department of ICS MU builds and operates the backbone of the metropolitan computer network and is also in charge of operating the main access to the main entry point of the national high speed network of research and development CESNET 2, with a direct link to Prague with a capacity of 2.5 Gb/s. At the end of 2002, the metropolitan network operated by ICS MU had 86 nodes and 90 km of optical cable. In 2002, 30 km of ground optical cable routes were built. Newly-built routes were built to Komárov (university halls of residence) and to the University Computer Room (Komenského) of the FoA. The existing routes for the Faculty of Education – Faculty of Arts – ICS plus the Faculty of Education – Faculty of Economics and Administration were expanded significantly, and the cable on the route Faculty of Arts – Sokolská was replaced with a new one. In four routes, the security of the connection was further increased.

Another important event in 2002 was the transfer of the MU backbone network to *gigabyte technology* (Gigabit Ethernet). Thanks to a grant from the Transformation and Development Programmes, necessary improvements to the optical cabling were made; the first active elements worth 20 million CZK were installed. The final network is over-abundant in that it provides gigabyte connection to all MU locations that are equipped with optical media (including the rails) and creates optimal conditions for the wider usage of multimedia applications.

In 2002, ICS MU was also responsible for the telephone communication network. An extensive survey was conducted with the objective to prepare a concept and to select suitable technology of a private MU voice communication network. On this basis, in 2003–2004, there will be a homogenous voice communication network that will make it possible to significantly reduce the costs of telephone calls with the use of new technologies.

4. UNIVERSITY COMPUTER ROOM

In September 2000, ICS MU opened its 24-hour/day computer facility in the newly-built *University Computer Room* on Komenského náměstí. In 2002, there were 109 CPS computers operated by 13,476 university students over a total of 382,346 sittings. Over the year, the computer room was open 349.5 days (for 24 hours/day), and the students spent a total of 421,825 hours at the computers.

Last year there was some expansion in the facilities and services provided in the computer room. The students can now use a scanner, CDRW technology, and an efficient network laser printer. The operating system MS Office XP has been installed in all the computers. Disk capacity for student directories was expanded on the server.

For access to the university automated information systems, secured areas (including CPS) as well as for general identification purposes, the ICS produces chip-based personal identification cards for students (ISIC cards) and for employees (ITIC and employee cards). In 2002, 5,982 new computer chip cards were made.

5. UNIVERSITY INFORMATION SYSTEMS

The departments of Automated Management Systems, WWW & Multimedia, and Library & Information Services are responsible for the development, maintenance and operation of several centralized and local information systems that support the day-to-day operation of the university in many key areas: study, research and development, finance and accounts, personnel and salaries, www presenta-

tion of the university (these are mutually linked to the IRIS MU integrated system), library services, and others.

Information on MU scientific activities is recorded in the *wwwdata MU intranet system*, which is developed by ICS. Scientific projects and objectives are recorded centrally with links to departments and people (in the last three years 200-250 new projects were launched at MU); approval processes for associate and full professorship appointments are also recorded. Finance and accounts are operated using a Magion Vsetín finance system, which is integrated with a personnel-salary system developed by ICS and preset with an MU intranet Inet, also developed by ICS MU. In 2002, the Magion system was extended by *Management of Capital Goods*, and the extension of *Tangible and Non-tangible Assets* is being prepared. In 2002, in the financial part of Inet (which is used by 35% of employees and 18% of students), access to accounting statistics was expanded. The electronic recording of business trips abroad and the possibility for electronic payment (non-cash) of student housing fees were implemented. A comprehensive system of electronic recording of MU employee attendance linked to the monthly calculation of salaries was also implemented. All users have access to their particular personal data files for easy maintenance.

Bilingual internet presentation of MU (web and wap) make it possible to access general background and detailed information on all MU matters (university management and its background, structure, study programmes, and departments; employees and students; scientific projects and objectives; publishing activities; calendar of important events; job opportunities; legal norms; etc.) based on the principles of a unified information system, unified presentation format, and the automated transfer of information from the MU IRIS databases. In 2002, the average weekly frequency of searches in the university web pages reached a total of almost 6000 various IP addresses (1.5 times more than that of 2001). In 2002, it was possible for the first time to verify this frequency on the cluster of web servers. The presentation of web pages were completed with a comprehensive collection of information about university history (academic dignitaries, graduates, and others) and detailed information on study programmes being offered (study programmes, field of study and subjects, section committees, training centres, etc.).

The most significant change in library activities was the purchase of the new modern Aleph 500 automated system, which in the following year will replace the insufficient TINLIB systems. This will make it possible to integrate and centralise the library system, which so far is dispersed throughout various faculties. It will thereby integrate into the university information systems.

Apart from the information system for the university as a whole, ICS MU develops extensive information systems for the support of its own activities. The most significant of these is the Information System of the Brno Academic Computer Network (ISBACN) designed for the administration of information on BACN, especially for the support of decision-making concerning the use and construction of the metropolitan network. The system uses technology for geographic information systems (GIS) and thereby enables precise visualisation of the position of elements of the network in a map. In 2002, the application was completed; it includes the basic functions of a system for recording, administration, and the presentation of elements on a map. The collection of data in the database was begun. Currently, the system includes extensive information on approximately 200 cables, 2000 devices, and 4000 interlinked cables. Upon the completion of a mass data collection in 2003, the information will be recorded on approximately 250 cables, 15,000 devices and 25,000 connecting cables.

6. ELECTRONIC INFORMATION SOURCES FOR RESEARCH AND EDUCATION

Acquiring professional electronic information sources for research and development, and ensuring access to these sources are relatively recent but very significant activities of the ICS MU. Most of these financially demanding resources are provided through the participation of MU in the Czech Ministry of Education – LI projects (information sources for research and development), providing financing from external (non-university) sources. In 2002, 8 new significant information sources were acquired. Over 25 "mega sources" offering MU students and employees access to tens of thousands of

full text professional and scientific journals, proceedings of conferences from all scientific fields, hundreds of bibliographical and factual databases, and other types of information sources are currently available at http://library.muni.cz/e_zdroje.html.

7. RESEARCH AND PROJECTS

In 2002, 11 ICS researchers and 6 external scientists participated in the fourth year of the ICS MU research project "Digital Library", which covers Institute research and development activities of a wide spectrum. Results were published in 24 scientific and academic texts, and presented at 16 national and international conferences.

One important activity that was dealt with and co-ordinated within the research activities is the project *MeDiMed*. It represents a series of co-ordinated activities and projects with the aim of constructing a metropolitan archive of medical visual information obtained from medical diagnostic institutions via new digital technologies.

In 2002, the central computer and archive centre MeDiMed at ICS MU was provided with new necessary equipment. By the end of the year, the central archive held a collection of 17,000 visual studies, e.g. examining a patient with a particular piece of equipment, which represents 0.5 TB of archived data. More than 20 modalities from five Brno hospitals were connected to the system. Some non-Brno hospitals showed interest in participating in MeDiMed activities as well.

Within the framework of European research activities, the ICS took part in three international projects within the 5th EU Framework Programme:

- GridLab – building and developing Grids to support highly demanding computations,
- DataGrid – the creation of a vast international Grid infrastructure for the needs of high energy physics institutions,
- StraDiWare – the modelling of information strategies.

Apart from the above-mentioned activities, the ICS researchers participated in some significant Czech projects:

- MetaCentrum – the development of a national Grid infrastructure,
- WebArchiv – the archiving, and providing access to the Czech web archive,
- InInVaV – the analysis and design of a data model and data flow model for Czech national research and science infrastructure.

In 2002, the ICS MU budget totalled 137 million CZK, a half of which was a direct subsidy from the MU budget, a quarter came grants and a quarter from the Reproduction of Property Investment Fund and ICS business activities. Over 43% of the total funds were used in the form of investment activity (mostly for the construction of the university network and the transfer to Gigabyte Ethernet technology).

At the end of 2002, ICS MU administered property of an overall purchasing value of 214 million CZK.