
Global Communications Newsletter

March 2005

Computer Communications in Developing Countries

By Atli L. Gebretsadik, Ethiopia

Developing countries, unlike developed ones, have predominantly primary and secondary economies. The tertiary or service industry is picking up amid many difficulties and inefficiencies. The global trend — free market competition — makes it necessary for developing nations to develop productivity and quality in as many elements of their composite economies as possible. The tertiary economy, service production and rendering, is intimately linked with information collection, processing, communication, storage, and utilization. The latter activities have been practiced in primitive and original forms almost all over the world as different social cultures and traditions to supplement primary and secondary economic activities for centuries. For example, in Ethiopia the Afar people, predominantly nomadic and highly mobile, have an effective culture of information collection and communication that has been in use for millennia. A member of an Afar community passes important information, about pasture, water, strangers, and other facts, to every other member s/he encounters at all times and places. The information passed is nominally brief and focuses on changes. This example portrays that the use of information and its transmission have been part of different cultures in different societies for generations. So the study of such indigenous information processing and transmission methods may help a country set effective information and communication technology (ICT) policies and use of pertinent technologies in, for example education, research, and industry. The digital computer, as we all understand well, has impacted the culture of information processing, transmission, storage, and utilization of the developed countries since the 1970s, and revolutionized their education, research, and economic systems. In many developing countries, it may be encouraging that computer acquisition is high, particularly when compared to their GNPs. However, it is clear that the acquisition has little impact on their education, research, and economic activities, except possibly in a few countries such as India. For example, many public and private institutions in developing countries have acquired significant numbers of computers over the last 10 to 20 years. Nevertheless, the effective use of the computers when compared to the foreign currency spent is really poor. The main reasons for this, I think, are unplanned acquisition in terms of utilization capability, standalone (nonnetworked) use, and the perception that computers basically outsource human labor. I solely focus on the second issue, the economics of computer communication and networking.

Computer/Data Networks

The economics of computer acquisition and utilization shows that computers are maximally used when systematically networked to each other, accessories, and communication facilities. The interconnection of computers, accessories, and other equipment offers enormous benefits to dispersed and disorganized use. It can be shown that connecting even two computers makes at least economic sense. A network enables us to share expensive printers, computers, Internet and other communication links, and costly application and utility software. A network also supports voice/video/fax/data communications and sharing of valuable information, hence facilitating and supplementing office/factory automation, electronic learning/commerce, teleworking, and telemedicine. Thus, a network significantly reduces wastage of paper, work time, and many other perishables/consumables. More compelling, a network stretches the life cycle of computer and accessories by enabling sharing of computational resources of powerful but outdated computers. For example, a computer that may need to be replaced after five years can now be operated for more years by using the processor and memory of new computers through time pipelining hardware and/or software such as terminal servers.

The main causes of poor or no computer networks in institutions of developing countries are lack of expertise/awareness, perceived cost of network setup and operation, workplace security, and privacy. Concerning expertise, in Ethiopia a number of public and private schools, colleges, and universities have started relevant programs, such as in information systems, computer science, and computer engineering; some even offer specialized training, such as in data communication and networking. Besides, observations indicate that a large number of freshmen in the country are interested in studying electrical, electronic, communications, computer, telecommunications, and software engineering and/or technology. Many also want to study computer science and information systems. In sum, expertise/awareness about efficient and productive use and planning of computers, accessories, and other ICT will develop in the near future. Consequently, the deployment and effective use of data networks in public and private organizations may improve. However, the number and quality of experts or trained people alone may not be sufficient, especially in the third world. In these countries the financial aspect of data networks is equal in value to technical expertise. This is more so now than in the past as institutions

(Continued on page 4)

Siberian ITU Workshop on Simulation of Business Process in the Telecommunications Field

By Boris Krouk and Natalia Chupakhina,

Siberian State University of Telecommunications and Information Sciences

The International Telecommunication Union (ITU) effectively organizes workshops and conferences aimed at learning the most important issues for both operators and telecommunications administrations of various countries. Every year the plan of such workshops and meetings is drawn up. It is approved and supported financially by the Telecommunication Development Bureau of the ITU. In particular, a million Swiss francs has been allocated for this project for two years. These funds are devoted to the development of specialist retraining processes.

In the world there are six ITU Centres of Excellence. Two of them are in Africa for English and French speaking participants. There are Centres in Arabic countries, Latin America, and the Pacific region. The sixth Centre functions for CIS countries, Baltic countries, and Eastern Europe.

This Centre of Excellence consists of two "branches": English and Russian speaking. Mr. Artem Adjemov is a coordinator of the Russian speaking branch that is directed toward CIS countries. The English speaking branch is directed toward the Baltic region and East European countries.

Since the establishment of Centres of Excellence has been international, its goal is propagation of knowledge, accumulated by the international community in telecommunications, among countries that participate in the ITU.

We try to cover geographically as many places as possible in holding events. Last year five workshops were held in Russia (Moscow), Kazakhstan (Alma-Ata), Azerbaijan (Baku), Byelorussia (Minsk), and Ukraine (Kiev). Seven workshops have been scheduled for 2004. Two of them are to be held in Russia: the Novosibirsk Workshop and a forthcoming meeting



representative of the ITU, and Professors Tatiana Solodova and Evdokia Zueva of SibSUTI. They covered such topics as new trends in planning processes in a liberalized environment, customer-oriented business, optimization problems of marketing, financial modeling of business processes, and many other topics.

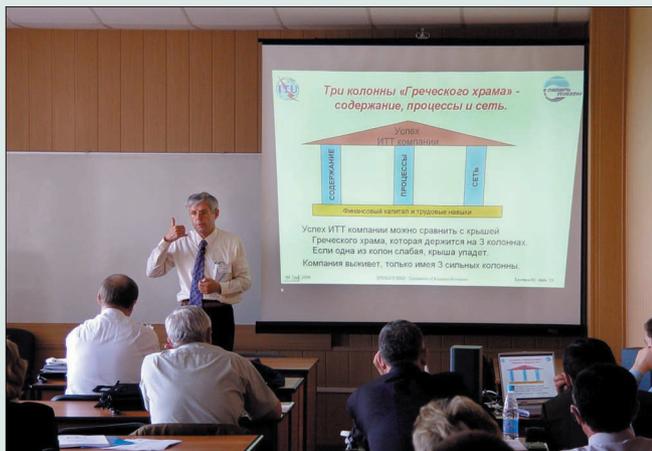
Why did the workshop take place in Novosibirsk? For the first time the workshop was held quite far over the Urals. It was done advisedly. First, it is necessary to know what processes go on in such a huge country as Russia, and not only in its central part, but in the periphery as well. Second, Novosibirsk is geographically close to the states of Middle Asia. Therefore, among the participants were representatives from Kazakhstan, Kirgizstan, AND Tadjikistan, as well as top managers from Novosibirsk, Kemerovo, Irkutsk, Chita, Abakan, and Gorno-Altai telecommunication enterprises.

On 1 June, the rector of SibSUTI Valery Bakalov welcomed workshop participants at the official opening. He spoke about the history and traditions of the university: "SibSUTI is a unique profile university in telecommunications that trains specialists in the fields of communications and information sciences." The rector described the university as a powerful complex that includes three branches and four colleges, and trains 25,000 students. Also, the university carries out scientific research on hot problems in communications and information science. In conclusion, Mr. Bakalov wished effective work and maximum realization of the planned program to the participants.

Mr. Dadikin, commercial manager of the Sibirtelecom company, proceeded with the workshop opening and announced a welcome from Mr. Nikulin, general director of Sibirtelecom. In his speech, Mr. Dadikin noted that the workshop under the patronage of the ITU took place only in Novosibirsk. As the capital of Siberia, it is a distinguished center of telecommunications science in Russia and CIS countries, and SibSUTI is a forge for future specialists of Sibirtelecom.

Sibirtelecom is the largest operator of telecommunications services in Siberia. The company covers a vast territory (about 5 million km²) with a population of more than 20 million. An obvious priority of the company is an extensive infrastructure of networks and service provisioning over the whole territory.

(Continued on page 4)



in Moscow. Moreover, workshops will take place in Uzbekistan (Tashkent), Kazakhstan (Alma-Ata), Byelorussia (Minsk), and two in Ukraine. One of the workshops took place in June. The problems of spectral management were considered there.

Simulation of Business Process in the Telecommunications Field

This workshop took place 1-4 June, 2004, at the Siberian State University of Telecommunications and Information Sciences (SibSUTI). At the workshop a wide range of problems in the telecommunications field were discussed. The primary lecturers of the workshop were Mr. Christian Carrier, the rep-

Technical Report on ECOC 2004 Workshop on Optical Networking for Grid Services

5 September, 2004, Stockholm, Sweden

By Anna Tzanakaki and Ioannis Tomkos, Athens Information Technology Center (AIT), Greece,
and Dimitra Simeonidou, Essex University, United Kingdom

Workshop Organizers: Dimitra Simeonidou, Anna Tzanakaki, and Ioannis Tomkos

The Workshop on Optical Networking for Grid Applications was held in conjunction with ECOC 2004 in Stockholm, Sweden (<http://www.ecoc.se/>). It took place on Sunday 5 September, was a half-day event, and gathered about 100 attendees.

The motivation of the workshop was based on the fact that distributed computing using the concept of a computational grid is proposed as the solution to increasing computational demands that cannot be supported by local resources. However, distributed computing on a global scale could not be realized since the bandwidth and speed of networks was a limiting factor until recent advances in optical networking. Therefore, the workshop focused on novel optical networking concepts and technologies to support future global grid services. It aimed to identify the features and properties of global grid networks and the characteristics of a suitable network infrastructure able to support grid computing applications.

Nine presentations in total were given (<http://www.ecoc.se/87965.asp>) focusing on the following issues:

- Applications and requirements for global grid networks
- Photonic grid network characteristics: functional requirements, network architecture, transport protocols, and so on
- Control, management, and signaling for photonic grid networks
- Standardization activities on photonic grids
- Experimental showcases

More specifically, the “Welcome and Introduction” presentation by Dimitra Simeonidou gave a summary of the variety of applications introducing the need for global grid connectivity and the potential of optical networking to offer the required network infrastructure. It also presented a list of the existing activities on optical network infrastructures serving the grid community and the global lambda integrated facility (GLIF) linking together a variety of grid networks. The second presentation, “Optical Networking Technologies to Host Grids” by Anna Tzanakaki *et al.*, focused on a grid network scenario based on an optical infrastructure where the grid resource discovery, allocation, and path setup are performed by the optical layer either in a self-organized manner or by users. The features that differentiate grid networks from traditional telecommunications networks were discussed. Optical burst switching (OBS) was proposed and discussed as an appropriate switching paradigm. The third paper, “Towards Consumer Oriented Networks” by P. Thysebaert *et al.*, discussed the adoption of grid technology beyond the e-science community and the potential usage of grid-aware applications by home-users that imposes the requirement for developments toward more scalable and distributed resource management schemes. OBS was proposed as an enabling technology, and a suitable example algorithm was discussed. The fourth paper, “A Distributed Testbed for a User-Controlled Lightpath Provisioning System Using Jini-JavaSpaces Technologies” by Hanxi Zhang *et al.*, presented a user-controlled lightpath provisioning (UCLP) system implemented using SUN’s Jini/JavaSpaces technologies. The system design and feasibility of Jini/JavaSpaces were verified through a distributed testbed. The fifth paper, “Just in Time

(JIT), A Novel Optical Platform for Global Grid Computing” by Gigi Karmous Edwards, focused on the grid control plane requirements, the JIT control plane, and its features and challenges. It also gave a comparison between generalized multiprotocol label switching (GMPLS) and JIT, and discussed JIT’s suitability for grid applications. The sixth presentation, “Potentials and Constraints of Optical Network Services in Grids” by Volker Sander, focused on the grid computing infrastructures that provide standardized, reusable, compassable, and dynamic services, and discussed the relevant challenges and potential solutions. It covered concepts such as the open Grid Services Architecture (OGSA) and the Open Grid Services Infrastructure and introduced some control plane and signaling issues and solutions. The seventh presentation, “Experimental Optical Grid Networks: Integrating High Performance Infrastructure and Advanced Photonic Technology with Distributed Control Planes” by Joe Mambretti, dealt with innovative lightpath provisioning services for dynamic optical networks based on a novel control plane to serve grid applications. The experimental demonstration of an optical dynamic intelligent network (ODIN) on a wide-area advanced photonic testbed in the Chicago metro area was discussed. The testbed includes four interconnected core nodes utilizing dense wavelength-division multiplexing (DWDM), micro-electromechanical system (MEMS)-based optical switches, optical amplifiers, transponders, and high-performance layer 2/3 (L2/L3) routers/switches connecting grid clusters at multiple sites. Each node supports 12×10 Gb/s channels. The eighth presentation, “EU Grid and eInfrastructure Activities” by Nicolas Nicholson, focused on the European initiatives in the area of eInfrastructures (GÉANT and Grid), the impact already achieved, and the joint activities carried out with partners around the world. Some specific collaborative projects were also discussed, including EGEE led by CERN, SEE-GRID led by GRNet expanding through EGEE to southeastern Europe, and DEISA led by CNRS; work on relevant testbeds was also covered. The presentation concluded with some information on future calls. The ninth presentation, “GIGA Project High-Speed Optical Network Testbed” by Miriam Regina *et al.*, focused on a high-speed optical network testbed of the Brazilian Project GIGA. The activity is led by the R&D Center for Telecom and Information Technology (CPqD) and the National Research and Education Network (RNP) and aims to promote knowledge and development in technologies and services for IP/WDM networks and to boost the Brazilian telecom industry. The testbed is currently static, but is expected to grow in size and capacity, and allow for dynamic provisioning, restoration, and reconfiguration of optical paths to support grid applications efficiently. Finally, in the “Concluding Remarks” presented by Ioannis Tomkos, a summary of the workshop was given highlighting the tremendous potential grid applications offer in the use of optical networks as the underlying infrastructure. This, of course, imposes the requirement for appropriate consideration in the design of novel concepts in terms of control and management, transport protocols, and switching paradigms as well as technologies.

(Continued on page 4)

Mr. Christian Carrier, representative of the ITU, from France, said of the main point of the workshop and his visit to Novosibirsk, "The goal of my visit is to share experience in business management. There are many highly qualified teachers with knowledge of new trends and business evolution at SibSUTI. Therefore, I don't have a mission to introduce new information, only to share the experience gained over many years.

"Francetelecom has been in the market of telecommunications for 20 years. Gradually we have evolved our services in the market, and changed the company status and management method. Our activities are aimed mainly at customers. The conception of knowledge introduced by our telecom fits today's information era. It means that currently both top managers and officials take part in decision making. Such a system is directed toward the efficiency of the company, as officials have to figure out the company strategy and be responsible for the company functioning. With such an approach it is easier to satisfy the customer's demands."

The International workshop was over on June 4th. The participants, guest from other countries, noted an excellent organization of the workshop and its high effectiveness. Mr. Adjemov, Programme Coordinator of ITU Centre of Excellence for EUR & CIS Russian-speaking Branch, assured that all forthcoming workshops will face practical problems: "International experts have significant information of ongoing telecommunication processes in the world. Experience exchange is of great importance, as every company needs to coordinate its management activities with the world practice."

In Russia, the next meeting on efficient experience exchange takes place in Moscow.

are becoming of necessity increasingly cost conscious due to free market competition. Thus, planning for low-cost data networks — with suitable performance — is the prime concern.

Cost-Effective Networks

The standard networks based on the client/server model require huge investments in cabling, servers, connectivity equipment, setup, maintenance, and operations. As the data/computer network industry advances, competition intensifies globally and regionally, and prices of network hardware and software go down. Also, the development of wireless technologies will significantly reduce the fixed cost. Regardless of all these, there are a few basic factors that institutions, particularly in developing countries, must thoroughly consider in network planning/design. First is whether an institution needs a narrowband or broadband network; second, if the organization is able to maximally use the network it plans to set up; and lastly, if the institution can possibly reengineer its existing communication systems, such as intercoms and radio networks. The ultimate assortment depends on the cost-to-performance trade-off desired. If and when the actual work activities in an organization do not call for or justify use of broadband networks, a couple of narrowband (cheap) options must be sought and reengineered.

An example of a narrowband data network option for small to intermediate size organizations is the private automatic branch exchange (PABX) switched LAN. A PABX-switched voice network is common in many institutions, used mainly for call forwarding and intercom. In contrast, a commercial PABX supports hundreds of configurable functions, such as data transport. The functions can be activated and controlled using a computer program effectively converting a PABX to a switch, which can then be used for narrowband computer networking. For example, my students and I have developed a C/C++ program that controls a PABX-switched LAN for our faculty. The PBX-switched LAN option is practicable and more economical for narrowband operations than conventional high-speed alternatives such as standard Ethernet (IEEE 802.3).

Conclusion

The necessity and merits of data networks for an institution, particularly in developing countries, considering expertise/awareness, capital investment, and reengineering, are considered. The possibility to improve productivity through resource and information sharing, communications and training, work flow facilitation, and elongated life cycle of computer/accessories is elucidated. The possibility of a cost-effective computer network for narrowband applications is illustrated. In summary, the inefficient use of computers and accessories — and hence their contribution to productivity — in developing countries can be significantly improved through networking along with other factors such as advancement of ICT expertise and awareness.

TECHNICAL EPORT FROM ECOC 2004/(cont'd from page 3)

The workshop organizers would like to thank the ECOC organizing committee for hosting this event. Also, we would like to thank the invited speakers for their participation and very high-quality contributions as well as the workshop attendees.

The next workshop, organized in conjunction with GLOBE-COM 2004 in Dallas, Texas, on 3 December, 2004 was entitled High Performance Global Grid Networks (http://www.globecom2004.org/workshop_w05.html).

Global Communications Newsletter

NICOLAE OACA
Editor

Calea Mosilor No. 241
Bl. 47, Sc. 3, Ap. 71
Sector 2, Bucharest 020874
Romania
Tel: 00 40 766 505 784
Fax: 00 40 21 210 12 24
E-mail: nicolae_oaca@yahoo.com
gcn@comsoc.org

OCTAVIAN FRATU AND SIMONA HALUNGA, Associate Editors
octavian.fratu@elcom.pub.ro, simona.halunga@elcom.pub.ro
Email:

JACOB BAAL-SCHEM, Chapters Corner Editor

Regional Correspondents

HOSSAN AFIFI, France • BORHANUDIN MOHD ALI, MALAYSIA
JACOB BAAL-SCHEM, Israel • DINKO BEGUSIC, Croatia
OMAR CHERKAOUI, CANADA • PAULO DE SOUSA, European Union
VOULA GEORGIOPOULOS, Greece • SILVIA GIORDANO, Switzerland
RAM G. GUPTA, India • CARLOS HIRSCH, Mexico
LIANG XIONG JIAN, China • HENRICH S. LANTSBERG, RUSSIA
ARTUR LASON, Poland • JOSÉ MARIA MALGOSA-SANAHUJA, Spain
NICOLAE OACA, ROMANIA • IRADJ OUYEYSI, AUSTRALIA
ALGIRDAS PAKSTAS, UK • GIANCARLO PIRANI, Italy
K. R. SUBRAMANIAN, Singapore • HELIO WALDMAN, Brazil



A publication of the
IEEE Communications Society