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Qubus computation

Joint research No.10

Ethernet Strategy using VLAN for PC Clusters Michihiro Koibuchi (NII)

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//Special Article

Ethernet Strategy using VLAN for PC Clusters

1. High Cost-Performance Computing Systems

A PC cluster, which consists of personal computers connected with Ethernet, has received attention as a high-performance computing environment. To build such a PC cluster using low-bandwidth Ethernet links, a link aggregation is desirable and a large number of switches are essentially required.

Thus, switch topology and routing are a crucial factor to the system performance. However, PC clusters using Ethernet have employed simple tree-based topologies, which tend to create traffic congestion around the root, because Ethernet topology is originally limited to acyclic trees.

In this study, by using VLAN technology which allows cyclic topologies, we develop an Ethernet topology and its routing suitable for parallel and distributed systems in collaboration with Amano Lab at Keio University, Japan, whose specialty is to design and implement a high-end dedicated cluster network.

2. VLAN Routing Methodology

VLAN routing methodology assigns each VLAN id to all hosts, and different link sets are assigned to each VLAN topology. Although each VLAN topology is logically a tree, by introducing multiple VLANs, each of



which consists of a different set of links, a flexible physical path set can be employed. However, the VLAN routing methodology introduces new problems in the case of PC clusters: 1) a deadlock of frames occurs; 2) the MAC address registration at a switch is complicated; and 3) system software usually supports no VLAN technology. To resolve these problems, VLAN tags are removed between a switch and a host, and a deadlock-free routing we had developed is employed. We are implementing and evaluating this strategy on real PC clusters.

3. Conclusions and Future Works

The proposed VLAN strategy, which improves the network performance, can be easily used in current PC clusters without a software update. In order to further improve the network performance, the proposed VLAN strategy requires a large number of theoretical research topics, such as a generation algorithm of VLAN trees, a path assignment to VLANs. Thus, I am planning to research into them in collaboration with universities, and research institutes in order to make this concrete area of the study.

(Michihiro Koibuchi, Assistant Professor, Infrastructure Systems Research Division)



Research on cryptosystems with provable security

The developments in open networks such as the Internet allow us to realize various novel services on networks, e.g. electric commerce, electric government etc. However, these services can be useful only when their security is guaranteed against possible attacks. Cryptographic technology provides the functionalities of secrecy and authentication, and so is the most fundamental element in proposing secure services. In fact, various services on networks have been able to be realized as cryptographic technology advanced, and so it is plausible that new services will also be realizable due to future cryptographic technologies.

With the ever growing importance of the cryptographic technology, it is essential that its own security has been rigorously proved. We, seeking "provable security", study the foundations of the security notions and develop cryptosystems with provable security.

The security of cryptosystems in practice is typically based on computational assumptions such as the computational difficulty of solving an integer factorization problem or a discrete logarithm problem. However, as the power of computers and the art of algorithms ad-



vance, it becomes more difficult to guarantee such computational security for a long time. Further, the computational security will be completely broken if a quantum computer is ever realized, or a problem in NP is found to be solvable in polynomial time, a prospect of little likelihood as conjectured by most researchers. However, the quantum cryptography aims at achieving strong security against an adversary with unlimited resource of computation, and so such security is often called "unconditional security". We study the security of quantum key distribution schemes in order to support their rigorous implementation. The quantum key distribution schemes proposed so far have not been guaranteed to be unconditionally secure unless the devices of the sender and receiver are almost perfect. We are now proposing a new quantum key distribution scheme whose unconditional security is guaranteed in more practical situations. Improvement of its performance and further extensions to more general situations will be the subject of future work.

> (Yodai Watanabe, Assistant Professor, Cryptography, Infrastructure Systems Research Division)

Message from NII Researcher

Infrastructure Systems Research Division, Project Researcher

Mika Matsumoto

1998 San Francisco State University (California, U.S.), Creative Arts, B.A. in Cinema 2000 University of East Anglia (Norwich, U.K.), English&American Studies, M.A. in Cinema Studies

Since May this year, I have been working here at NII as a member of "Research and Development of the DRM Related to Digital Cinema Distribution" working group for Digital Cinema Common Specification Development Project (DCCSDP), assigned by the Ministry of Education, Culture, Sports, Science and Technology, whose aim is to cover the whole spectrum of digital moving image distribution network from production to exhibition by exploring common specifications regarding distribution/exhibition quality, rights/license management and so on. My research focuses on development of P2P moving image content exchange system utilizing metadata through the operation of a network system called Digital Cinema Gate.

Growth of broadband and digital image encoding technology in recent years highlighted the need for developing an efficient digital moving image content distribution model based on IT. With spread of blog and SNS, content distribution network has become much more individual-based and is no longer a oneway process where content is delivered from the creator to the user, but a two-way process where the user



takes an active role within the cycle. To vitalize digital moving image content distribution market, common specifications regarding use/reuse of moving image content has to be established, and a system, in which those specifications are smoothly and efficiently transacted, has to be developed.

As a first step in realizing such a system, we have developed Digital Cinema Gate - a network system that interconnects film schools across Japan for archiving, distribution, and evaluation of student films. My job is to develop a guideline for selecting a common set of metadata by examining various metadata necessary for storing, managing, delivering, searching, and viewing moving image content on the web. Through this experiment, I aim to develop a globally interoperable and sustainable common specification of metadata-set, and ultimately to propose a new active form of the web-based digital moving image content distribution network. Problems and challenges abound, but I am encouraging myself believing that the real thrill of research is overcoming obstacles one by one toward the ultimate goal.

Research & Education

Message from Foreign Researcher

Dominique DEUFF

Dec.1999	PhD in informatics for education
Dec.2002	University of Rennes 1
Oct.1998	One year PhD in informatics for archaeology
Sep.1999	University of Marseille III
Oct.1997	Diploma of advanced studies in informatics for archaeology
Sep.1998	University of Marseille III
Sep.1997	Certificate taken after one year of architecture- multimedia advanced studies
Sep.1998	Architecture school of Marseille
Sep.1994	Engineering degree en informatics (digital imagery)
Sep.1997	University of Rennes 1 - IFSIC
Sep.1992	Diploma taken after two years at university in mathematics, physics and informatics
Jun.1994	University of Brest

After graduating from the computer sciences engineer school (IFSIC, Institute of Further Studies in Information Technology) (major: digital images), I joined Marseille III University to work on informatics applied to wall-paintings. While working with researchers from various domains (architecture, history, conservation, photogrammetry) and managed to link information from database to 3D models, restore mosaics in a 3D digital villa, set up a tool for restorers to decide which restoration is needed on a wall-painting. Then I joined a France Telecom R&D (National France operator) laboratory of research specifically concerned by education and training. I worked there for three years and obtained my PhD in July 2003. My PhD dealt with a tool based on multimedia MPEG 4 technology, enabling teachers to create contents for their classroom. Since November 2003, I am undertaking post-doctoral researches (JSPS) in the Digital Silk Roads (DSR) team currently led by Pr. Kinji Ono and Dr. Asanobu Kitamoto.

My research concerns interactive environments for human learning. Works in this domain mostly deal with children learning, leading the object of my research at the crossroad of education sciences and computer sciences and in teachers' working-environments.

As member of the DSR team, I concentrate my research in NII on providing a suitable environment for History teachers, letting them access digital resources of DSR archive and prepare their lessons. To reach this goal, we think that it is necessary to provide teachers with specific tools fitting their



needs, their way of working and their skills in computer sciences (only few teachers work with computers). To understand teachers' needs and how teachers work, we realized interviews with Japanese high schools teachers. Thanks to these interviews, we understood how Japanese teachers prepare lessons and we got information on how they write card-index notes in relation with their lessons. From interviews results, we conceptualised an environment composed of three specific tools: one tool for creating card-index references (reusable documents), one tool for creating card-index notes (teachers' own documents) and one tool for producing educational material used in classrooms.

This project doesn't aim at proposing an environment enabling the creation of automatic contents, it should be seen as the introduction of a tool that is a mirror of current teachers' work. Making teachers switch from paper work to digital environment, this tool is not just proposing a copy of their works. More than that, it would enable them to create lessons, archive lessons, share lessons, access to larger resources database, share information, discuss with other teachers, etc. Regarding courses creation and documents selection that is currently time-consuming, teachers would also and definitely save time.

My current research is dealing with the representation, by metadata, of the digital card-index notes' contents. It is aiming at choosing standard and pertinent descriptors to describe digital card-index notes.

I am also contributing to other pieces of DSR project: I am particularly working with Tomohiro Ikezaki on the ASPICO portal for experts to annotate digital resources on the silk roads. Moreover, I am currently taking part in a project concerning a DSR website for children, with Eka Sato, Takako Muramatsu and Makiko Onishi.

Second open forum for FY 2005 held

Held August 30, 2005, the second open forum for FY 2005 featured two lectures on the subject "Ideal Academic Information Services for Users." First, I spoke on "Usability Design for Academic Information Services, From the User's Perspective," discussing the significance of academic information services to users and features likely to be in demand in the future. I then touched on community-oriented information-sharing systems, which have attracted considerable attention in recent years, and discussed their potential application to academic information services. Next, guest Andrea Kravets from Elsevier, a wellknown company in the field of academic information services,



Ikki Ohmukai, Assistant Professor

spoke on "Role of User-centric Design to Help Ensure User Understanding." She described Elsevier's methodical research on how anticipated users are likely to use the services it provides and what they seek from such services, and reflects the results of this research in its services. I and many of the other attendees agreed with Ms. Kravets that although such research is very costly, "usability determines the value of a service." The question and answer session that concluded the forum featured lively and meaningful discussions on the day's topics.

> (Ikki Ohmukai, Assistant Professor, Research Center for Testbeds and Prototyping)



Ms. Andrea F. Kravetz

Graduate Education

Message from Graduate Students

Takaaki Kamogawa

Second year, Department of Informatics, School of Multidisciplinary Sciences, Graduate University for Advanced Studies



I currently work at a foreign-owned software company, where I'm responsible for looking into issues involving client businesses and for proposing optimal information systems solutions. While working full-time, and before entering the Graduate University for Advanced Studies, I earned an MBA from the University of Tsukuba, with a focus on specialized fields related to information engineering consulting, particularly for the manufacturing industry clients I work with in a professional capacity and on information systems integration. I understood then that the information systems that contribute to corporate competitiveness would become major management issues. My field of research basically fuses management and information technology. As part of my MBA studies, I worked on enterprise modeling, analyzing the relationships between information systems and

competitiveness. I've continued examining these issues in the GUAS doctoral program—now I'm examining the effectiveness of enterprise architecture (EA). EA is seen as a way to design and administer both the operations and the systems of an entire organization, and EA efforts are underway now not just in the public sector but in the private sector as well. I'm working to resolve issues related to the effectiveness of EA applications.

I decided to enter GUAS after a colleague in my MBA studies introduced me to the school and to NII. The school's proximity to my workplace, the highly flexible scheduling of classes, and the opportunity to communicate with instructors motivated my decision to study here. Another important characteristic of GUAS is the large number of overseas students, which gives it a strong international flavor and gives students the opportunity to take part in cross-cultural discussions. The company I work at is a global firm, so I'm comfortable in this environment.

I'm moving forward with my research under the oversight of Professor Tohkura, Professor Yamada, and Assistant Professor Okada. I plan to participate energetically in international conferences, including presenting papers.

Graduate Education

The National Institute of Informatics' Ceremony for Presentation of the Ph.D. Conferment Commemoration Medal

The Department of Informatics at the Graduate University for Advanced Studies conferred Ph.D. degrees to graduating students in September 2005, with a Ceremony for Presentation of the Ph.D. Conferment Commemoration Medal held September 29 at the National Center of Sciences.

In this ceremony, four graduating Ph.D. candidates all among the first graduates of the international graduate school course—were awarded medals commemorating conferment of their degrees.

At the ceremony, Director General Masao Sakauchi, core NII personnel, the graduates, and instructors all wore academic gowns. A presentation on the program's performance was followed by the granting of a commemoration medal to each graduate by Dr. Sakauchi before family members, NII personnel, and current students. Dr. Sakauchi concluded the ceremony with a congratulatory address. From start to finish, the ceremony took place in a stately atmosphere.

(Research Cooperation Division)



Ceremony for Presentation of the Ph.D. Conferment Commemoration Medal at the National Center of Sciences.

Eight new students enter the Department of Informatics at the Graduate University for Advanced Studies

On Wednesday, October 12, the Department of Informatics at the Graduate University for Advanced Studies welcomed eight new students entering the program as of October 2005. The students participated in guidance for students entered from October 2005 at the National Institute of Informatics.

The guidance session included self-introductions and orientation. After the session, the students were taken on a tour of the Research Center for Information Resources and the Ph.D. student' study room. This was followed by a welcoming party for the new students in the tea room on the third floor, where new students were welcomed by Director General Sakauchi and other faculty members, as well as by current students.

On the following day, Thursday, October 13, the entrance ceremony for new students was held on the main campus of the Graduate University for Advanced Studies in Hayama Town in Kanagawa Prefecture.

With the enrollment of the new students, the Ph.D. program now enrolls a total of 59 students, 19 of whom are from overseas.

(Research Cooperation Division)



Guidance for students of Department of Informatics entered from April 2005

総合研究大学院大学 入学式 THE GRADUATE UNIVERSITY FOR ADVANCED STUDIES

Entrance ceremony of the Graduate University for Advanced Studies on April 2005

Development & Operations

Academic Portal Training Course and Karuizawa Information Processing Seminar

As part of the training programs of the National Institute of Informatics, Academic Portal Training was held for 70 trainees at two venues: Nagoya University (held jointly with NII, August 31–September 2) and NII (September 26–28). The purpose of this training is to provide specialized knowledge and techniques to personnel managing the construction and administration academic portals at universities and other institutions.

The training included an introduction of academic portals from Division Director Ojiro of the Contents Division at NII, and a report on related case studies at university libraries, as well as an introduction to the technologies used in NII's GeNii academic content portal a description of associative search technologies from Prof. Takano, and, on the final day, preparation and presentation of academic portal plans as group projects. The wide range of opinions and questions raised by trainees in each session testified to the high level of interest in this and related issues.

Held September 26–October 1, this year's Karuizawa Information Processing Seminar addressed the theme "Building an Academic Portal." The seven attendees took part in the Academic Portal Training Course at NII on the first two days of the seminar, then moved to the National Women's Education Center on September 28, where they stayed on for intensive academic portal site design and experimental activities. The knowledge and understanding gained by the attendees in this seminar promise to be reflected in future activities at their respective institutions.

(Planning and Coordination Division)



Academic portal managers preparing materials for group presentations as part of their training at NII



Group photo of Karuizawa Information-Processing Seminar attendees and instructors

Acceptance of English-language applications for CiNii use begins

Beginning Friday, August 5, 2005, an English-language interface for CiNii user registration will be available, in addition to the Japanese interface.

CiNii (http://ci.nii.ac.jp/), a site for gaining access to Japanese academic papers, makes it possible to trace literature citations (i.e., both papers citing and the papers cited in a paper) and refer to the text of the original documents. (Citation information is available for 10% of all records, while full text are available for 25% of all records.) Although an English interface for queries and display has been available since the service was launched, the screen for applying to use the service had been available in Japanese only. For this reason, researchers have asked for a feature that would permit application in English.

The addition of this English-language application interface will allow researchers from around the world to apply to use CiNii, with a credit card payment feature allowing rapid user registration. **Development & Operations**

Additionally, overseas institutions applying to use the Institutional fixed-price service can now conclude service agreements through agents. These changes make it considerably easier for overseas researchers to apply to

Attendance at IFLA 2005

The International Federation of Library Associations and Institutions (IFLA) held its 71st annual meeting in Oslo, Norway from Sunday, August 14 through Thursday, August 18. Attending from the National Institute of Informatics were Atsushi Suzuki, Director of the International Affairs Division in the International and Research Cooperation Department, Takashi Koga, Assistant Professor in the Research Center for Information Resources, and Jun'ichi Uemura of Academic Information Management Section I of the Contents Division. Shigeki Sugita, Manager of the Library Information System Section of the Hokkaido University Library (formerly Manager of Academic Information Management Section II of the Contents Division) also attended.

NII made two presentations at this annual meeting.

First, in his presentation "Innovation Beyond Institutions: New Projects and Challenges for Government Information Service Institutions in Japan," given Monday, August 15 in the government libraries subcommittee, Assistant Professor Takashi Koga provided an overview of the Japanese government's information services in recent use the service. As of November, six overseas institutions had subscribed to CiNii with Institutional fixed price contract.

(Contents Division)

years, then proceeded to discuss the need for cooperation transcending the boundaries of libraries, archives, and government institutions to develop government information services in numerous countries.

On Wednesday, August 17, in "NII-IPR: National Portal to Nation-Wide University Institutional Repositories Network Utilizing Open Source Software," a presentation authored jointly with Professor Noriko Kando from the Software Research Division and given in the information technology subcommittee, Shigeki Sugita (Manager of Library Information System Section, Hokkaido University Library) reported on an experimental project for implementing software to build academic-institution repositories. The project discussed was undertaken in FY 2004.

Next year's 72nd IFLA annual meeting is to be held in Seoul, South Korea. The location of the venue in a neighboring country should provide a good opportunity for NII to be active presenting the results of research activities in Japan to an international audience.

(Contents Division)

NII attends EAJRS annual meeting

The annual meeting of the European Association of Japanese Resource Specialists (EAJRS) was held from Wednesday, September 21 through Saturday, September 24, 2005 in Lund, Sweden. Akira Miyazawa, Director of the Research Information Research Division, Assistant Director Modeki of the Contents Division, and Academic Portal Section Chief Sakashita attended from the National Institute of Informatics.

The EAJRS is an association intended to promote the exchange of information on Japanese research in Europe and access to information on Japan. Each year, some 70 members from more than 10 countries take part in the conference.

At this year's meeting, NII participated in a series of programs intended to introduce and exchange views on the activities of participating researchers and institutions, as well as describing, under the title NII's New Portal Service "GeNii," the details of the GeNii service formally launched in April and describing how to apply to use the CiNii service. The number of specific questions



regarding conditions for Institutional fixed-price service, application methods, and other information was evidence of high interest.

The fifth SPARC/JAPAN seminor held: "What should researchers do in E-journal era?"

As noted in a previous edition of NII News (No. 29), as part of the activities of the International Scholarly Communication Initiative, SPARC/JAPAN hosts a series of seminars whose purpose is to introduce the latest issues related to distribution of scholary information and to share technical and systemic information and know-how on the publication of electronic journals. The seminars target individuals active in publishing scholary journals in Japan, centerd on journals selected by SPARC/JAPAN.

Held jointly with the Zoological Society of Japan as part of its 76th annual meeting, the fifth in this series of seminars (held at Epochal Tsukuba) addressed awareness and trends among researchers involved in the gathering and distribution of scholary information in the age of electronic journals. The event featured presentations by individuals active in the field on a wide range of issues, such as the inappropriate use and traditional significance of impact factors as well as institutional repositories. Held as part of the annual meeting of an academic society, the seminar welcomed the participation of large numbers of front-line researchers, who generally find it difficult to attend such seminars. It was generally regarded as a success in expanding discussion of the latest trends and issues related to scholary communication and electronic journals.

Details of this series of seminars are available on the International Scholarly Communication Initiative Web site (http://www.nii.ac.jp/sparc/).

(Contents Division)

Wide-area LAN connectivity service and regional IP access service have been started

As part of the environment for establishing connection with the Science Information Network (SINET), the following two access methods have been added and made available since November 2005:

- Wide-area LAN connectivity service
- Regional IP access service

The wide-area LAN connectivity service uses the NTT Communications' e-VLAN service. To use the wide-area LAN connectivity service, a SINET member institution must subscribe to an access circuit for getting connected with a Point of Interconnection (POI) at NTT Communications' premises instead of a SINET node. Since there is in principle at least one POI in each prefecture, a SINET member institution, especially when it is distant from the nearest SINET node, has a chance to

establish connection with SINET more affordably.

The regional IP access service uses the Flet's Office Wide service, one of the B Flet's family of services provided by NTT East and NTT West. To use the regional IP access service, a SINET member institution must conclude a B Flet's user agreement with NTT East or NTT West. Since it does not require an expensive dedicated circuit, this service will allow SINET member institutions throughout Japan to establish connection with SINET at low cost.

Please visit the following URL for more information on these new services:

http://www.sinet.ad.jp/sinet/seibi17/index.html

(Network Division)

Future Goals for Informatics Forum marks fifth anniversary of National Institute of Informatics founding

The Future Goals for Informatics forum was held on Friday, October 28, 2005, at the Hitotsubashi Memorial Hall, National Center of Sciences marking the fifth anniversary of the founding of the National Institute of Informatics.

The forum welcomed approximately 390 participants, including related parties from both inside and outside

NII. Following remarks by Director General Masao Sakauchi welcoming participants, guests Kiyoshi Shimizu, Director of the Research Promotion Bureau of the Ministry of Education, Culture, Sports, Science and Technology, and Atsuko Toyama, President of the New National Theater Foundation (and former Minister of Education, Culture, Sports, Science and Technology) de-



livered personal messages of congratulations.

After a lecture by Director General Sakauchi on the current state of NII's activities and future plans for a next-generation academic-information infrastructure and informatics research infrastructure through three major alliances with universities and other institutions, a panel discussion was held featuring Dr. Hideo Miyahara, President of Osaka University, Prof. Norihisa Doi of Chuo University, Setsuo Arikawa, vice president of Kyushu University, Prof. Masaru Kitsuregawa of the University of Tokyo, and Yuji Inoue, a Director of NTT. The range of issues covered by this lively discussion covered future directions in the field of informatics and other key issues, as well as expectations for NII.

For a reception for the approximately 170 guests, the venue shifted to the Josui Kaikan. Following welcoming remarks from Director General Sakauchi and former Director General (now Advisor) Suematsu, Professor Emeritus (and former Consultant) Michiko Tenma of Tsuda College greeted the guests in turn, and Toshiharu Aoki, an NTT Data Director and Consultant (and member of the Board of Councilors, NII) delivered a toast. The reception was marked by the meaningful exchange of views and high spirits.

(General Affairs Division)



Panel discussion

National Institute of Informatics holds symposium on computational science technologies

Over the three-day period September 26 - 28, 2005, the National Institute of Informatics and the Ministry of Education, Culture, Sports, Science and Technology jointly sponsored a symposium on computational science technologies, entitled "Innovations in Next-Generation Supercomputers and Simulation," held at the Hotel Laforet Tokyo's Gotenyama Hall and welcoming a total of 1,000 participants over its three days.

On September 26, keynote lectures were given by Yoichi Iwasaki, President of the University of Tsukuba, on "The Promise of Projects to Develop Next-Generation Supercomputers" and by Mariko Takahashi, Deputy Editor in the Science and Medical News Section of The Asahi Shimbun, on "The Next-Generation Supercomputer as Social and Industrial Infrastructure." These speakers emphasized the need for a supercomputer development effort spearheaded by the Japanese government. An enthusiastic panel discussion on the theme "The Next-Generation Supercomputer as the Core of the Science Infrastructure" followed, hosted by Prof. Norihisa Doi of Chuo University and featuring eight participants: Toshiba Executive Managing Director Mutsuhiro Arino-



Yoichi Iwasaki, President of the University of Tsukuba



Panel discussion

bu, Riken Discovery Research Institute Director Koji Kaya, Japan Automobile Research Institute President Toshio Kobayashi, University of Tokyo President Hiroshi Komiyama, NII Director General Masao Sakauchi, Executive Member of the Council for Science and Technology Policy Ayao Tsuge, Ministry of Education, Culture, Sports, Science and Technology Secretariat Councilor (Research and Development Bureau) Akihiro Fujita, and NEC executive Tadashi Watanabe.

On September 27 - 28, lectures were given by 24 specialists from industry, the academy, and government. These covered topics such as the importance of simula-

Database Tokyo 2005 held

The National Institute of Informatics exhibited at Database Tokyo 2005 over the three-day period from Tuesday, October 25 through Thursday, October 27, 2005. The annual event was held in the Tepia Exhibition Hall.

Organized by the Database Promotion Center, Japan (DPC) and the Japan Database Industry Association (DINA) Database Tokyo seeks to help introduce database and digital information-provision services for use in business and research and development, and provide related solutions.

NII exhibits at Database Tokyo annually. This year's exhibit was focused on introducing GeNii (NII academic contents portal) and NetCommons.

In addition, Prof. Akihiko Takano of NII lectured on the Generic Engine for Transposable Association (GETA) at the solutions seminar held October 25.

Of the approximately 3,600 attendees at Database To-

tions using supercomputers and the technologies for realizing the development of such, and were followed by lively discussions. The final lecture, by Ministry of Education, Culture, Sports, Science and Technology Research and Development Bureau Director Kiyofumi Shimizu, concluded the seminar with a discussion of the future prospects of a Japan-wide initiative led by the national government for the development, use, and application of general-purpose supercomputers that will lead the world in terms of technological advancement and high performance.

(Publicity and Dissemination Division)

kyo 2005, more than 900 people visited the NII booth. (Publicity and Dissemination Division)



Scientific Open-Source Software Day

On September 30, 2005, the National Institute of Informatics held a Scientific Open-Source Software Day jointly with France's Institut National de Recherche en Informatique et en Automatique (INRIA).

The purpose of this forum was to promote use of opensource software.

Prof. Claude Gomez of INRIA introduced Scilab, an advanced software package for linear computations that can be used for various simulation and optimization applications, among other uses, and introduced other applications. Japanese researchers reported on their eyepiece using Scilab in Japan.

Also introduced was the Scilab Toolbox Contest Japan 2006, which is intended, through the preparation of Scilab Toolboxes, to help spread the use of Scilab in Japan by promoting its use among Japanese students.

Prof. Takano of NII introduced the GETA system, an open-source associative retrieval and general associa-

tive computation system for document classification. Researchers participating in the forum took part in a lively question and answer session.

(International Affairs Division)





In a conference seeking to introduce scientific research grants held September 9, Assistant Manager hideho Yoshida of the Academic Research Grant Department of the Ministry of Education, Culture, Sports, Science and Technology's Research Promotion Bureau was invited to speak. Held via a teleconferencing system connecting the National Institute of Informatics (including headquarters and Center for National University Finance and Management personnel) with the National Institute of Polar Research and the Institute of Statistical Mathematics, the meeting was attended by a total of approximately 80 individuals at all three venues.

Topics

Following an introduction by Deputy Director General Yoh'ichi Tohkura, Mr. Yoshida gave an overview of the scientific research grant system and detailed an analysis of recent trends, key points in grant application evaluations, measures to prevent fraud, and other information. The presentation given from a slide projector was closely followed by attendees. The event concluded with a lively question and answer session.

(Research Cooperation Division)



Karuizawa Saturday Salon 2005

On July 9, July 30 and September 3, 2005, the third, the forth and the fifth lectures of the Karuizawa Saturday Salon were held at the International Seminar House for Advanced Studies in Karuizawa, Nagano.

Third Lecture: July 9, 2005

Changes in traditional music of Japan

Professor: the University of the Air Professor emeritus: Ochanomizu University

Prof. Yoshihiko Tokumaru

The big misunderstanding that Japanese people have about traditional Japanese music is that each genre has been handed down without any changes for generations since it was established. Therefore, people tend to believe that music over the years has "stuck to tradition" or become stagnant.

In this lecture, I will discuss the genre called sankyoku as an example of the traditional music, and discuss how it has been changed in terms of its specific sounds. The genre sankyoku is a kind of chamber music that was established in the Edo period, and it combines syamisen (shamisen), koto and syakuhati (shakuhachi), instruments with voices.

The Association for International Exchange of Japanese Music has been making an effort to disseminate Japanese music in Europe and Japan, and we are delighted to have invited four musicians from the Association to



this lecture. (Excerpt quoted in leaflets handed out at the seminar)

(Publicity and Dissemination Division)

Forth Lecture: July 30, 2005

Global warming problem and its response measures

Research Institute of Innovative Technology for the Earth Director General

Prof. Dr. Yoichi Kaya

The global warming problem is one of the most difficult issues that future generations must face. Even though the "Framework Convention on Climate Change" aims to stabilize greenhouse gas concentrations in the atmosphere at a level that would not be dangerous for the human race, a scientifically acceptable answer to the question of what constitutes a safe level is extremely unclear at present.

In this lecture, I will discuss the arguments over this point. Then, I will talk about what we should do to stabilize greenhouse gas concentrations at the targeted level.

Although various scenarios on this issue have already been discussed, efficient use of energy and decarbonization of primary energy sources have become central ideas, and the latter one especially requires various measures to increase our use of natural energy that has a low density.

To be successful, we need practical technologies to store exhaust carbon dioxide so that it is not released to the atmosphere. The relevant question here is, what is



the present state of this development?

In explaing these issues, I will comprehensively outline what human civilization should be like in the future. (*Excerpt quoted in leaflets handed out at the seminar*)

(Publicity and Dissemination Division)

Fifth Lecture: September 3, 2005

Eternity of Learning

President of National Institute of Information and Communications Technology, Former President of Kyoto University

Prof. Makoto Nagao

The lecturer resigned the president of Kyoto University in December 2003 after six years of service. During that time, he had written more than 500 papers. He put 30 selections from these 500 papers into one volume, and he published the book entitled " Eternity of Learning " (not for sale). This book not only contains encouraging words for new students or graduates, but also discusses the essence of learning in the 21st century, differences and characteristics in Western and Japanese notions of academy, and the importance of beauty or art. Also, it makes some mention of philosophy. Furthermore, in the midst of transformation of national universities, it takes up the conception of university revolution and the future of universities. He will talk such issues which have been discussed since 1997 with his own philosophy. (Excerpt quoted in leaflets handed out at the seminar)



(Publicity and Dissemination Division)

National Institute of Informatics Public Lectures 2005, "Eight words to discuss Informatics"

Scond Lecture: Thusday, August 25, 2005

Topics

Natural Language Information Processing How far will computers get in understanding languages?

Professor, Office for Research Coordination and Promotion

Akiko Aizawa

Ph.D. in Engineering, University of Tokyo, 1990 1990 Research Associate at National Center for Science Information Systems 1990-1992 Visiting Researcher at University of Illinois at Urbana-Champaign 1995 Associate Professor at National Center for Science Information Systems

2000 Associate Professor at National Institute of Informatics 2003 Professor at National Institute of Informatics

2003 Professor at Graduate University for Advanced Studies

I got a perfect hit in my Internet Search, but so many words came one after another.

What should I do? It is great to have so many sources of information like newspapers, dictionaries, blogs, theses, and novels, but it is as if they are out of control. In other words, I need someone to read all them in place of me! So, let me introduce "Language Processing" by computer. Do you think a computer can replace people for reading sentences that people write? The computer can read a row of



character code. We call these codes "Text". A current computer, which does not have a body like human being do, can not learn from experiences like we do; however, it can recall words instantaneously through the rules and examples in dictionaries and words which it memorized. In this lecture, we consider various levels of text manipulations from how to retrieve a large amount of text at high speed to the interpretation of an ambiguous Japanese sentence.

(Publicity and Dissemination Division)

Third Lecture: Thursday, September 15, 2005

Visual Media Retrieval —How far can we go in retrieving image / video media ?—

Professor, Multimedia Information Research division

Shin'ichi Satoh

Ph.D. in Information Engineering, University of Tokyo 1992 1995-1997 Visiting Researcher at Carnegie Mellon University, Pittsburgh, PA, USA

1998-2000 Associate Professor at National Center for Science Information Systems

2000-2004 Associate Professor at National Institute of Informatics

2004 present Professor at National Institute of Informatics 2005 Visiting Professor at University of Nantes, France

Because of the dissemination of home digital cameras, video cameras, cell phones with cameras, provision of pictures and image information on the web, innovation



of broadcasting-image environments such as cable TV, digital broadcasting, data broadcasting, and the harddisc recorders, the age in which individuals are able to access a large amount of pictures and image information has come. These visual media have made it possible to get a lot of information and understand it easily; they are excellent sources of information.

From these large amounts of pictures and image information if we were able to extract the information that we wanted freely like a search engine, the environment for the usage of these pictures and image information would become much more convenient. However, this is technically very difficult.

One of the biggest reasons is that we can understand the contents immediately, but that is very difficult for a computer. Then what should we do? And what is possible? In this lecture, I explained what technology was necessary to retrieve media images and why doing so was difficult. I also explained what would be examined in our latest research and what has become possible lately.

(Publicity and Dissemination Division)

Presentation of Length-of-Service Award at the National Institute of Informatics

The Length-of-Service Award was presented at the General Director's Office on November 22 (Tue.) 2005 at the National Institute of Informatics.

This award is presented annually on Labor Thanksgiving Day to a clerical staff member employed for over twenty years at the Institute, including years at the National Center of Science Information System (NII's predecessor).

Director General Sakauchi recognized the long-term services and offered words of thanks to Ohshima Director of the Budget and Accounts Division, Ishimura Director of the Publicity and Dissenmination Division, Ojiro Director of the Contents Division, Aihara Assistant Director of the Planning and Coodination Division, Modeki Assistant Director of the Contents Division, and Yamanishi Assistant Director of the Contents Division, who won the award of current year. This year's recipient received a certificate of commendation and a commemorative gift.



A commemorative photograph of Length-of-Service Award winners

Intellectual Property Center News

The intellectual-property seminar "Processing Copyrights on Visual Works" attracts 80 participants

Inter-University Research Institutes hold large volumes of data on research results and other materials, much of which available in databases or other media. Many of these archives contain materials in moving or still-picture data, and such materials are likely to proliferate.

Against this background, the National Institutes for the Humanities and the Research Organization of Information and Systems on November 30 held an intellectual-property seminar entitled "Processing Copyright on Visual Works" at the National Center of Sciences Building. Hosted by Prof. Aiba of the International Research Center for Japanese Studies, the seminar began with a talk on the significance and importance of the use of copyrighted materials within the intellectual property holdings of Inter-University Research Institutes by Masao Sakauchi, General Manager of the Intellectual Property Center of the Research Organization of Information and Systems. This was followed by a lecture on "Processing of Copyrights on Visual Works" by Toshiro Iba of the Copyright Research and Information Center. Prof. Noboru Sonehara of NII then lectured on "Copyright Distribution Technologies in the Digital Era," including the results of the latest research in the field.

The venue was mostly full, as this significant event welcomed 80 enthusiastic attendees active in the intellectual property field from inter-university research institutes, universities, and private companies.

(Intellectual Property Center)

Description of the cover

Qubus computation

Quantum information processing has attracted much attention as a future technology for more secure communication and even faster computation. For secure communication, quantum key distribution (QKD) has been developed enough to be commercially viable. Some quantum technologies like QKD do not require the full power of quantum information processing. In contrast to such "special" cases, our QIS group focuses on "general" quantum information processing, which is applicable and capable to perform universal quantum computation.

In 2005, our QIS group at NII in conjunction with coworkers from HP Labs in Bristol proposed a new theoretical scheme as a fundamental technology for quantum information processing. This scheme is named "qubus compu-

tation", where qubus is from a quantum bus which carries information between qubits making two-qubit processes possible. The scheme has an advantage in the flexibility with respect to computational models, physical systems, and size scales. This scheme is also useful in quantum communication because it provides an interface between light and matter qubits and is inherently distributed in nature.

The top figure from the front cover shows the computational circuit for a twoqubit logic gate. The four diamond figures below it show how the two-qubit logic operation can be done via qubus. The state of qubus takes different trajectories (showed in the figures) dependent on the state of the qubits, and the difference in the area of the four diamonds generates the effect of the logic gate on the two qubits.





Detailed information on the research and projects of NII is available at our Website.

http://www.nii.ac.jp/

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