Integration of Information Technology in Engineering
Syllabus of National College of Technology

Hideo Takechi¹ and Seiji Miyashiro²

1. Associate Professor, Dept. of Mech. Eng., Anan National Coll. Of Tech., Aoki, Minobayashi, Anan, Tokushima, Japan 7740017, takechi@anan-nct.ac.jp.
2. Professor, Dept. of Control and Systems Eng., Anan National Coll. Of Tech., Aoki, Minobayashi, Anan, Tokushima, Japan 7740017, miyashiro@anan-nct.ac.jp.

Abstract

In the advent of Internet technologies, engineering syllabus all over the school curricula have inevitably been revised and transformed into more globally compliant courses suitable for modern engineers in future. In addition to the LAN technology in school campus, which is prerequisite of TCP/IP as well as security technologies among networking information, web design script language provisions are also essential. Computer literacy for information transactions in everyday life is also indispensable among many engineering courses as well as computer language workshops provisioned in former curriculum. More sophisticated measures for internet security are to be adopted in future among engineering courses in accordance with human rights acts together with the knowledge and intellectual property guidelines. Computer literacy subjects are introduced into 1st year curricula to substantiate awareness for internet crime and of it’s preventions.

Keywords: Computer Literacy, Network Technology, Computer Language, Net Security, Super SINET.

1. Syllabus Integration

In addition to the LAN technology in school campus, which is prerequisite of TCP/IP as well as security technologies among networking information, script language provisions for web design is also essential. Computer literacy for information transactions in everyday life is also indispensable among many engineering courses as well as computer language workshops implemented in former curriculum.

At the commencement of the 5 year course, a scientific calculator is introduced and tutorials for how to use are inclusive among the subject for introductory informatics. Fulfilling the gap between calculator arithmetic and computer programming, C script language course based on scientific calculator is provided at the 2nd year informatics. In addition to this C programming, JAVA script and programming tutorials are to commence consecutively at the beginning of 2nd semester. Numerical algorithms for scientific applications, are unified with FORTRAN programming tutorials in the 3rd year informatics.

Extensive programming and language tutorials for C are practiced in the final year informatics course.

2. Network Integration

Since 2007, new IP address system was introduced in our campus net, where used to prevailing severe address shortages for a long time. Instead of global address provisions, local address system was implemented extensively to minimize necessities of finite number of global addresses possessed already.

Every authenticated user is provided 100 Mb private disk space for campus network transactions. Authorization
and network accessibility are currently controlled by Windows operating system. In addition to this disk storage, every academic is furnished with 1 Gb files at network file server running on Linux operating system.

For those who require much bigger computing resources such as MPI computing or Gaussian application, new gateway to Super SINET is open to SSH online access and SCP file transfer for data transactions. Any local machines are eligible to open of these secured online transactions to the seven SINET centers open 7 days a week throughout the year. All of these secured access to the applications at SINET centers, are capable of interfacing X windows at any local machines running on MS-Windows.

In addition to local SAMBA file systems for students and staff, campus network server supports data storage system to encourage members to share academic information between the departments. Local network link is composed of 100 Mbps TCP/IP protocol upon optical and metal cable networks. Administration and Registrar office runs local message board applications for faster and effective means of management data transactions. Digital templates for typical office documents are provided electronically at specific folder of the message board. Even a part of student’s record is viewable from his/her laptop as long as permission provided to that folder. Upon completion of the current network, working committee compiled guidelines for security policies and enrolled supervisions for safeguard the system.

3. Security Integration

Against the current internet frauds, several of security measures are introduced and activated for preventing E-mail spam and virus attacks of various forms against local network computers. Every internet transactions initiated by students, are subjected to i-filter screening to prevent accesses for un-authorized sites. Provision of anti-virus software for every computer connected to our campus network is compulsory and 24 hours of monitoring for contaminated computers is implemented at network control console.

Except authorized SSH and X forwarding for specific resources among SINET, major sockets for internet services are inactivated to prevent unlawful attacking to our Demilitarized zone servers. For the convenience of our staff members away from office for a specific period, a limited number of VPN access is permitted for his/her own mailings or internet browsing from outside. So as to avert internet access to undesirable Web site for class room students, i-filter is installed and monitoring every transaction activated within the entire campus network.

Any academic staff in charge of computer workshop, is granted to modify the level of strength for i-filtering during his/her assignment.
4. Media Integration

Every lecture and tutorial notes in the next generation should be viewable with the internet Web browsers. In this sense, media contents of all documents and display figures are to be integrated into Web compatible languages like XML or Java scripts. Taking account of E-learning and distant learning in future, every contents intended for educational schema should have the compliance with Web documentation.

The other document integration is assembled into PDF, which is very much serviceable for class room presentations and but also for the printed materials like tutorial sheet or exam papers. Even a graphic figures or photos are convertible to PDF format, which is competent with zoom in capability for projector presentation. TeX format documents were produced extensively in the past, but later by using dvipdfmx, almost all TeX contexts are transported into PDF form, which in this sense, still being very much compatible with TeX documentation and GNU graphics made in Linux system.

The Encapsulated PostScript for graphics is of the highest resolutions obtainable in connection with the TeX although the actual size is relatively large when it compared with other format like JPG or GIF. As a result, all of these PDF documents are embedded into Web pages for internet browsing, where with the aid of Acrobat Reader plug-in support, zoom in or out feature is available for displaying detailed textures on the Web.

Internet documents in future are anticipated to be compiled with Flash as well as Real video format of streaming media layout. In this sense, media revolution is definitely progressing everywhere and breaking down all sort of documents ever existed before.

Graphic format like JPG, GIF, TIFF or EPS can be integrated into TeX document, then it compiled out to DVI style, which is transportable into PDF layout. All of these graphic files are importable into Microsoft Office applications of course. As of the audio visual supplements for class rooms, MP4 or FLV files are employed for projector demonstration. All of these multi-media files are to be integrated with XML scripts for internet browsing in the near future. In this connection, internet hyper-text server is under construction with Apache for Web administrations and Oracle for database managements.

![Figure 4 Graphics and media integration](image)

5. Conclusion

As long as the teaching materials concerned, above mentioned media integration is still under way accumulating every bits to be fully compliant with Web browsing. Provision of Plug-ins or media converter is seemingly available in future, however so far a large number of content exchangers required for the integration, is nearly impractical to manipulate them all by hand.

However, the ultimate objective of presenting teaching documents is very much clear and already having been focused on that of the Web. Therefore, that disposition will be accelerated further in the near future and design refinement of the pages will begin later.

So far the Microsoft’s Power Point is predominant for many years in almost all kind of presentations. But it has the frames squeezed to a very specific ratio and expelling any other styles not match with computer screen. This is the huge enforcement and restrictions when designing the layout of Web documents. This is a kind of our pitfall confusing computer screen with Web layout for the browser, which preferably being equipped with zoom in facility.

Tutorial sheets and exam papers are set initially in a TeX style and after having been compiled to DVI format, dvipdfmx transforms it into PDF records. So far it is compatible with Microsoft Office applications, with which the highest resolution graphics are interchangeable easily.

Up to the moment, campus network system has expanded vastly to provide services for about 500 PCs as well as security measures required and provisioned for every terminal, which needs enormous amount labour and communications demanded 24 hours a day for a whole year. In addition to the complexity of running software in local network, hardware also has reached tremendously being complicated and very hard to maintain and update them in a preferable shape continually. In this sense, human resource shortage has already been prevailing and very hard to
overcome this problem in the near future.

References

Biography
1st author Hideo Takechi is in charge of an Associate Professor at the department of Mechanical Engineering for the Anan National College of Technology. Postgraduate of The City University London with the degree of Master of Science in October 1976. Programming Advisory for Cyber-media Center for many years and served Technical Committee Board in 2006. Representative for the 6th regional assembly of the Super SINET governed by the National Institute of Informatics in Tokyo. Member of JSME and JSDE.

2nd author Seiji Miyashiro is a Professor at the department of Control and Systems Engineering for the Anan National College of Technology. Earned his Doctorate in March 1977 at University of Aachen in Germany. Currently in a chair of Pro-vice president of the college and Committee Member of Tokushima Prefecture Office for Commerce and Industries. Member of JSME and JSASS.