

Software Tools and Resources for Network-based Courses

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Abstract

Software Tools and Resources for Network-based Courses are created under the Asia IT &C programme. Its aim is to develop network-based courses on software production and wireless technology at university level. The project promotes transfer of know-how, e-based communication between the partners and individual university students of both the European and Asian continents. Asia Information Technology and Communication (Asia IT&C) is a European Union Programme that started in 1999. It is co-financed by both EU and Asian countries to promote information technology and communication between European and Asian non-profit organizations. It aims also, to find compatible solutions and standards in the field of ITC. This paper gives a description of the activities of the project and briefly introduces the activities that are developed by the partner universities. Some of the main tasks consist in creating software tools and resources for the IT&C. These resources should help students, teachers and researchers to gain knowledge and useful practical information in the field of information technology and communications.

1. Introduction

Asia IT&C is a EU financed programme. The European Commission co-finances projects in the IT&C (Information Technology and Communications) areas. Projects must be joint activities between non-profit institution partners and the institutions must be placed in at least two EU countries and one of the following countries or territories: Afghanistan, Bangladesh, Bhutan, Brunei, Cambodia, East Timor, India, Indonesia, Laos, Malaysia, Maldives, Nepal, Pakistan, Philippines, Sri Lanka, Thailand and Vietnam. China has been added later. The co-coordinator can be either Asian or European institution. The core idea of the programme is to strengthen links between both continents in the IT&C areas. The partners must be non-profit-making institutions; however, this does not mean that the programme is not open to the private sector; consideration is also given to projects that intend to strengthen the IT infrastructure for business. In 1999 the European Commission launched the Asia IT&C programme, with an initial budget of €19 million to fund about 100 projects. In line with the spirit of the programme, applicants must be part of a consortium of partners from at least two EU member states and one from Asia. This is a minimum. The programme wishes to encourage the broadest level of co-operation possible, building links between European and Asian countries as well as between the continents themselves, so the more partners, the better up to a point. Asia IT&C has already accepted proposals for a number of different types of project. All the projects are based around activities, not equipment or capital investment. Network Based Joint Venture Courses on Software Production is one of the projects that are approved by the EU. The organizations involved in the project are presented in Table 1. The aim of the project is to develop network-based courses on software production and wireless technology at university level. The project promotes transfer of know-how, e-based communication between the partners and individual university students of both the European and Asian continents. It will also stimulate resource and activities networking, and will result in a wide dissemination through participation in the professional course content. A further outcome is to facilitate the mobility of software developers thanks to teaching, learning and employing common working standards and methods of software engineering and production.

Name of the organization	Country	Web address
Espoo - Vantaa Institute of Technology (EVTEK) (Co-ordinator)	Finland	www.evtek.fi
Helsinki Polytechnic (STADIA)	Finland	www.stadia.fi
Vaasa Polytechnic	Finland	www.puv.fi
INHOLLAND University	Holland	www.inholland.nl
University Sains Malaysia (USM)	Malaysia	www.usm.my
Asian Institute of Technology (AIT)	Thailand	www.ait.ac.th
Sirindhorn International Institute of Technology, Rangsit Campus	Thailand	www.siit.tu.ac.th

Table 1: Organizations involved in the project

2. Structure of the project

The project is structured into five main activities. Starting with a survey on the needs of the participating universities, the partners carried out a study on a new educational and pedagogic methodology called Network Based Project Learning (NBPL) model. This model includes organization, facilitation and assessment of the NBPL, as well as adapting an existing NBPL model to the needs of the project. A framework of network-based learning models is established to support pilot courses using the NBPL model on software production. During this phase, the partners tested and validated the new pedagogical models, and developed specific resources and tools for the learning projects. Finally, the project will enter into the 'dissemination phase', where the information on the progress and results of the project will largely be made available for the main target groups, which are not only partner institutes, but also their partners in different contexts (i.e. industrial companies, UNESCO/UNEVOC network, other universities). This phase includes the development of a web-based user community to support teachers; trainers and course designers in using network based learning models, materials and tools. The whole project will be in continuous "monitoring and evaluation" mode, which will enable the partnership to create a monitoring and evaluation system, develop a methodological approach, tools and indicators to assess the effectiveness and the coherence of the different models within the contexts of higher education bodies.

3. Methods of Implementation and Responsibilities

This project represents network based learning tools and content to organise vocational and university learning. It takes into consideration the flexible and ever changing job requirements of the working life. It also promotes the learning of personal skills required in modern professions, and improves capabilities and preparedness for lifelong learning. All of these characteristics highly contribute to the quality and innovativeness of education. The concrete, innovative tools and models developed in the project can easily be adapted to different fields of education and to various kind of learning audiences (e.g. young and elderly people, highly educated and less educated).

EVTEK is the co-ordinator and monitor of the project. The other activities of the project are shared with the partner universities. The development of learning tools and software was done at the AIT in Thailand and EVTEK in Finland. The developments of the network-based learning courses were mostly in the responsibility of Vaasa Polytechnic and EVTEK. The other professors from other partner universities are responsible for systems specification and conducting evaluation of the pilot systems as well as to the dissemination phase. Each partner has co-operated with the effort of his own competence. This co-operation has increased the mutual understanding and established a link between the two continents and we hope it will also increase the technology cross-flow.

4. Learning Tools and Software

4.1 Question-and-Answer (Q&A) System

The basic idea of Q&A system (Figure 1) was to develop a software framework with reusable components to support a specific teaching/learning (the Question-and-Answer) model. It demonstrates how such a software framework can be used for building educational software systems on top of Internet/Intranet and Web technologies, which can be easily adapted to different levels and subjects of education. The developed educational environment is called distance-less, allowing students to have instant support from teachers and to be active participants in the educational process. The applied approaches three main features:

a) The choice of an appropriate teaching/learning model; Question-and-Answer (Q&A) model is applied and

implemented. It is flexible enough to be embedded into various computer-assisted teaching/learning environments due to (1) questioning strategy and (2) up-to-date software development technologies.

b) Applying Internet and Web technologies as a foundation for building a single virtual classroom; we call this a distance-less learning environment to emphasize the permanent connection, although virtual in nature, between teachers and learners and eliminating the constraints that are inherent in traditional distance learning environments.

c) Paying special attention to the approach, methods and techniques used to develop the supporting educational software tool. The development methodology uses state-of-the-art object-oriented components and frameworks, which allow building of highly adaptive, flexible, easy to use and maintain systems. See more at <http://qa.evtek.fi>.

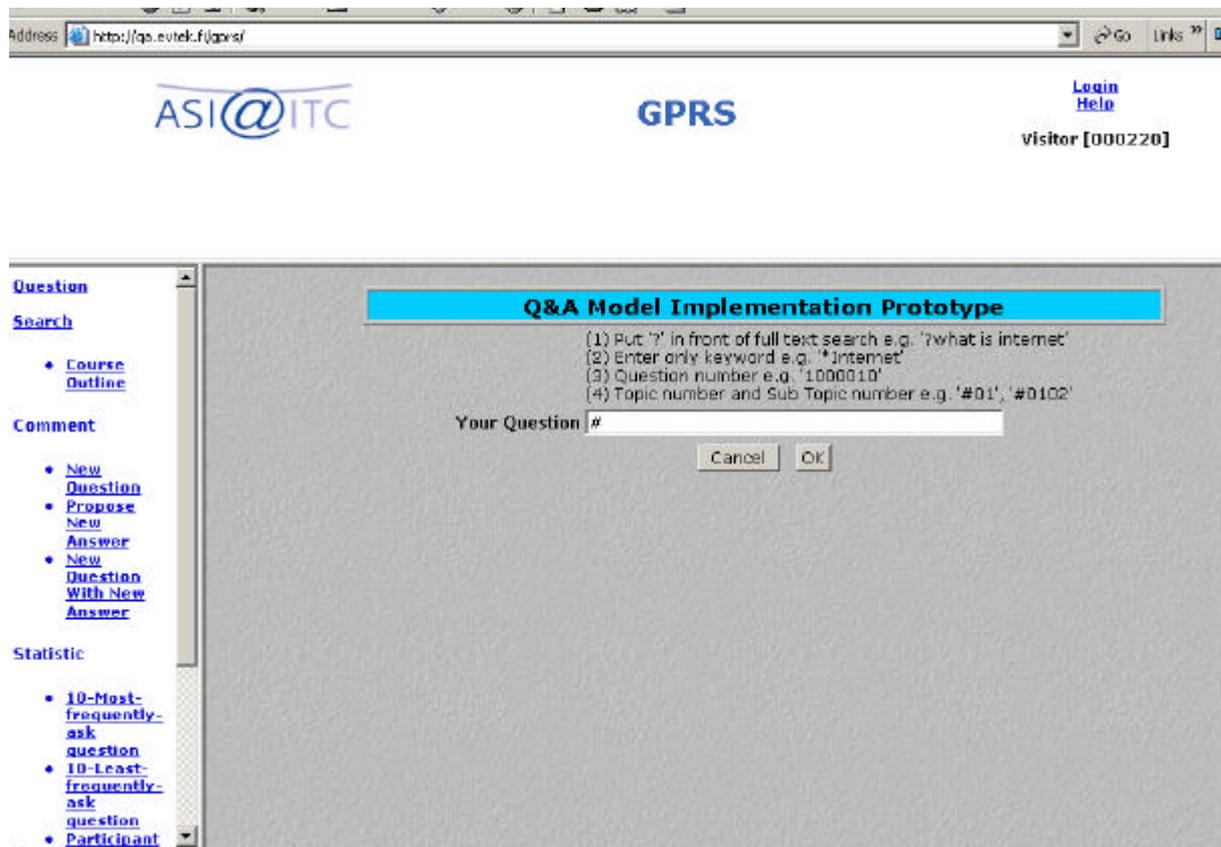


Figure 1: Q&A System. A prototype

4.2 NetPro - Network Based Project Learning in Engineering Education

The NetPro project that developed innovative methodologies (See figure 2) and Web tools for collaborative project learning was carried out with the support of the Commission of the European Communities under the Leonardo da Vinci programme. The participants of the NetPro project came from Bulgaria, Finland, France, Holland, Italy and United Kingdom. The tools simplify the management of project-based learning activities, saving time for staff and students. The NetPro tools support collaboration in cross-institutional learning communities. The tools facilitate publishing, accessing and monitoring of project deliverables, as well as collaborative activities such as peer reviewing. The tools are discipline independent.

With the NetPro tools, instructors can set-up collaboration space on the Web and link it into their course site. The collaboration space is a database application with user specific interfaces. The Project Deliverables Centre (PDC) is the core component of NetPro tools. It has two primary purposes: to support knowledge of sharing between students, and to ease the tutor's workload in high-level project management.

The PDC is an interactive database application that is used through a standard Web browser. User does not need any knowledge of Web authoring or special tools to use the application. The system has been implemented with MySQL and PHP, which run e.g. on an inexpensive Linux server. See more at <http://netpro.evtek.fi>.

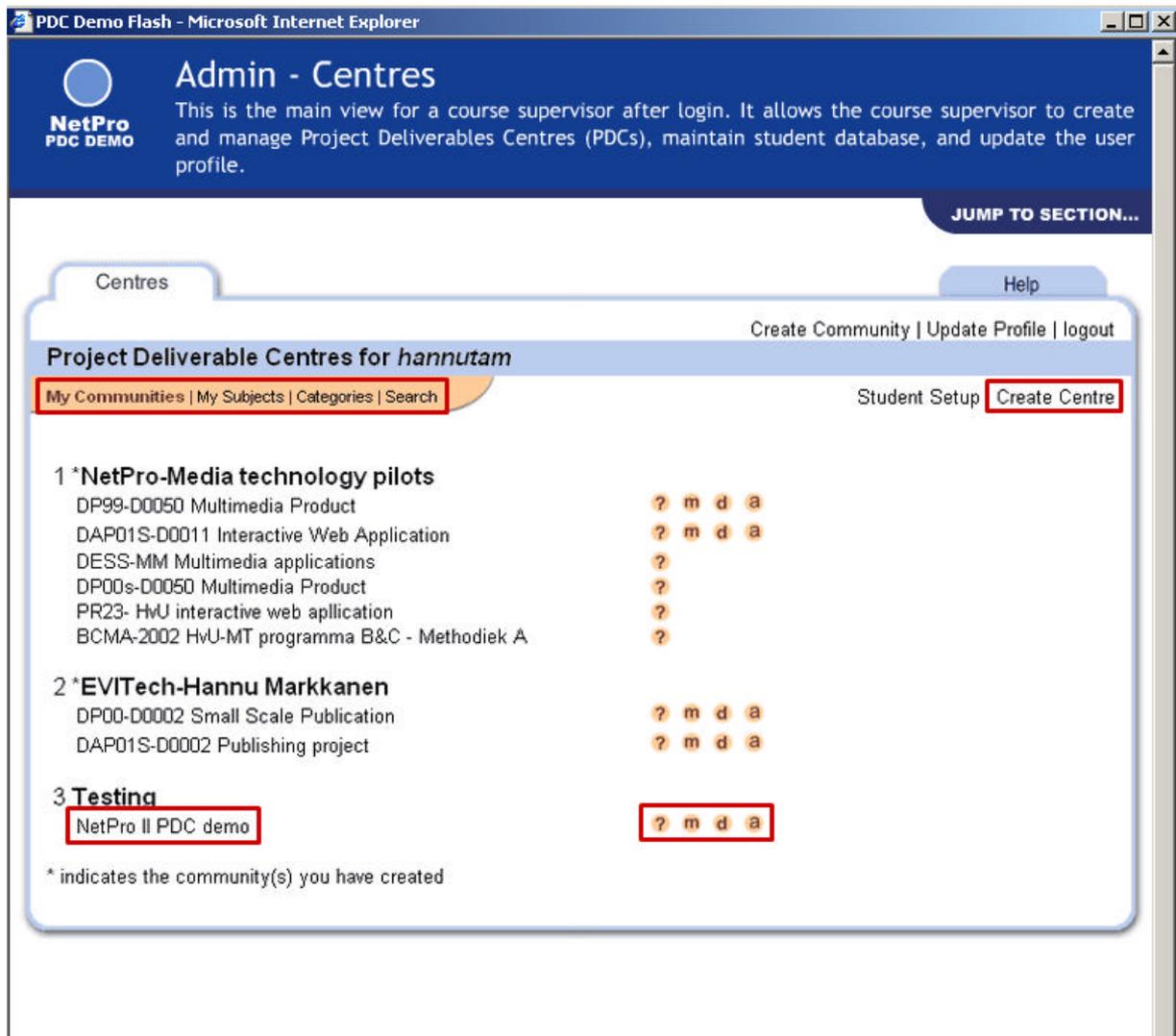


Figure 2: Netpro. The main view for a course administrator

5. Learning Content and courses

5.1 GPRS Technology

A course on GPRS Technology introduces General Packet Radio Service (GPRS) technology based on packet switched cellular system. The goal of this course is to provide understanding about the structure and operation of the GPRS network. A few high technology courses like General Packet Radio Services (GPRS), 3rd Generation Mobile Technology (3G) were provided in this institute under this project. Finland is one of the leading countries for mobile radio technology. EVTEK has a long-term tradition to provide various courses to contribute in this technology by teaching mobile radio technology. See more at <http://gprs-course.evtek.fi>.

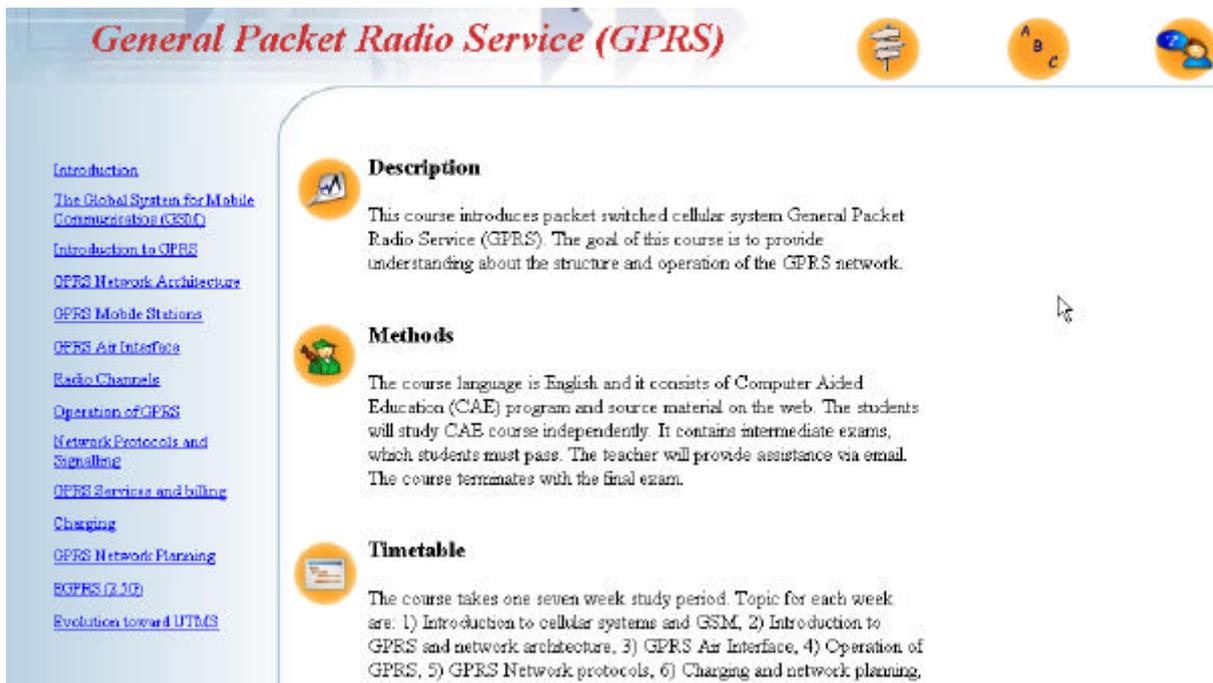


Figure 3: An example of the main presentation of the course information

5.2 Internet Programming

The Internet Programming course is divided into three parts. The first covers the OSI model, including standards and protocols used in data communication, network models and descriptions and design needs of network-based services. The Second part show the TCP/IP protocol, architecture and technologies, comparing it with the OSI model, and describing the operation and mechanisms of the Internet entities. The last part covers the design and implementation of a client side network application and of a server hosted network applications and the design and implementation of simple Embedded TCP/IP network applications.

5.3 Wireless Internet Programming

The Wireless Internet Programming is divided into five parts, starting with an overview of the hardware of wireless networks and its main characteristics, and differences between wired and wireless network and their influence in the coding procedure. The second part covers a vision of wireless devices, their hardware restrictions and problems when using wireless Internet, as well as their operative systems and graphical user interface. The third part goes through the special Internet languages prepared for wireless networks. These last two parts concentrate on how to program different mobile services/devices using Java. The fourth shows different options of programming languages for wireless devices and giving special emphasis on Java and how to program applications that would run in every wireless device with Java support. Finally, there is a special chapter dedicated to Nokia Communicator 9210i. This chapter teaches how to make applications in Java for that device, beginning from the mythical "Hello World" to more complicating programs accessing Internet services and special functionalities of the device. Since wired and wireless Internet programming have many items in common, we added a special annex about Java networking, how to program ports and sockets and the most important command in Java for this task. A set of Java programs including source code and compiled classes are developed and tested and ready to be re-used with the courses. Instructions on how to install the programs in the emulators and devices are provided as well.

All courses are in English and consist of Computer Aided Education (CAE) program and source material on the web (See figure 3). The students will study CAE course independently. The courses contain intermediate exams, which students must pass. The teachers or tutors will provide assistance on a forum. The courses are terminated to the final exam.

All courses materials are available from the web and they consist of the CAE courses on web and additional material available from the courses web site as well. If additional information is needed, a list of reference material is attached to the end of each course section.

6. Impact on Target Groups

The universities are the major organisations in their regions to spread further new technologies and practices for the local working life. This project has permitted contacts between Asian and European universities and polytechnics. This Inter-university co-operation will surely impact on academic exchanges and improve the technology transfer between the two continents. Such an example is the Universiti Sains Malaysia whose role is crucial in evaluating and helping in the development of the project.

Universiti Sains Malaysia, one of the leading universities in Malaysia, is in the midst of a campaign to internationalise its programmes and to attain world standard. Thus the idea of working together with European universities on a joint research project was well accepted by the School of Computer Science, Universiti Sains Malaysia (USM). The first step taken by USM was to identify good learning management tools to facilitate learning and management of course materials developed at both ends of the continents. USM itself has developed a couple of learning management tools but later it was found that the tools were not suitable for the purpose of this joint project. The role of USM was then to assist in getting Asian side of the student requirements for the courses that we have agreed to develop. One important aspect of this collaboration is the exchange of ideas that occurs through multi-way communication in the form of forum, email and document sharing between the partner institutions. These activities will lead to the more important facet of this project, i.e. the transfer of technology between both continents. Another role of USM is in the dissemination phase where the courses will be used and tested by USM students. A problem arises if the courses are not in the syllabus of USM Computer Science degree programme, making it difficult to persuade the students to seriously go through them.

7. Conclusion

This paper presents background information as well as description of the Asia IT&C Programme and one of its projects, Network Based Joint Venture Courses on Software Production. It goes through the special features and unique challenges of e-based learning.

One of the main objective of the ASIA-ITC project includes the development of a web-based user community to support teachers, trainers and course designers in using network based learning models, materials and tools. Anyone is willing to send or receive these teaching or learning materials without sitting in front of the fixed computers. Newly developing mobile technology can provide that opportunity.

These kind of joint projects are essential in building sustainable networks between Asian and European academic institutions. Without funds coming from some external sources (from EU in this case) it would not be possible to carry out these activities and exchange of staff and students between institutions. The most important outcome is not only real courseware developed here but also the trust and acceptance between partners. Academic world is normally so open that we hope our achievements will easily have sustainable effect while these new pedagogical models are used outside the partner institutions. Networking of facilities and remote working of manpower have been challenging to all partners.

8. References

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