

E-Learning Services as a Recruitment Tool

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Abstract: - Networks expansion and Internet provide a good platform for e-learning in the idea of connecting learners with educational resources. The various systems that are already implemented consider the learning process as a remote task to gather knowledge in order to pass some exams. In the learning process evaluation represents a final step for a course. In general, two parties are involved: the learner and the instructor. Our approach introduces a third party, the industry, playing an important role in the learning process by setting the trends and motivating the learner by pre-recruiting tests. The development of the platform is based on arising technologies including those on mobile devices, provided that a major part of students use this kind of technology. Web services represent an added (middle-)layer on the traditional client-server architecture for a better expansion and scalability, delivering content for all kinds of traditional or mobile clients.

Key-Words: - e-learning, Web services, mobile testing

1 Introduction

As technologies face a rapid development and the number of students increases each year, learning today is no longer performed exclusively in classrooms with lectures as the only learning method. Education using a communication network has made learning possible from anywhere at any time by using the Internet, wi-fi networks, or local area networks. Specially, mobile learning even allows people to learn on the move using portable devices, such as cell phones, personal digital assistants (PDAs), or laptops.

The Internet had an overwhelming impact [12] on a number of industries [Evans and Wurster 1997] and the growth in Internet usage has created much interest in Web-based learning [Fong and Hui 2002]. The acceptance of the Internet within tertiary institutions has seen the surfacing of an endless amount of resources for students [Sheard *et al* 2000]. [Tian 2001, Fong and Hui 2002] agreed with this statement and argued that students can access resources globally through the Internet to assist them in their learning and that it has become an attractive alternative to traditional modes of communication. Technology-delivered e-Learning [12] is where the learner audience are never in physical proximity to the trainer and may be delivered via a blend of asynchronous and synchronous technologies. Its also know as "Distance Education", "Distributed Education" or "Distance Learning". For our proposed

architecture we can relax the condition by stating that audience can be or not in physical proximity to the trainer and may be delivered via a blend of asynchronous and synchronous technologies as described in what follows.

With the increased number of students in our University and mainly at Economics Faculty*, it is compelling that we build an early relation between the 3 actors in the education process: the school, who is the trainer and sets the academic level, the student who learns and the industry who sets the trend and offers continuity by employing the graduates. So we propose an involvement of the companies in the learning process, especially in the E-Learning one by means of a portal with special functionalities for 2 types of trainers: academic and industrial ones. The full functionalities and architecture of the system will be explained.

2 Mobile Testing in E-Learning

To make e-learning successful, the technology must have several characteristics [13] that make the learner's and the instructor's experience enjoyable.

On-line learning is not a "fancy add-on" but is certain to be an integral part of higher education for years to come. Several faculty report that administrators who previously ignored e-learning are now giving it their attention and full support.

As one online teacher from a virtual school in the Southeast states [09], “In the last two years, acceptance has grown, and many former skeptics believe that e-learning is here to stay and they might as well jump on the wagon.” To consider the overall growth of distance learning, the Sloan Consortium study cited “an annual compound growth rate of over 25% for the three year period,” when considering enrollment data from Fall 1999 and Fall 2002 .

Testing represents an important part of distance learning. Student evaluation process can have two forms: formative test, meaning that a student performs this type of testing to improve his knowledge and expertise by understanding the correct answers and possible confusions that were made; summative tests that have the role of benchmarking the level of the student in a certain moment in time.

In this paper we will focus on the second type of testing and underline its importance in the case of student – company relation where company wants to recruit a student observing the evolution in time not only as school performance but having results from some “real case” tests.

West and Lehman showed that task success and task satisfaction ratings were not different between remote and lab-based summative testing. This fact helps the educational process by allowing both lab tests as a normal step of education and remote (mobile) tests from other connected domains or real-life problems.

3 System architecture

E-learning system is based on client/server architecture. The client applications can be run on cell phones, PDAs, or laptops, and the server application can be on desktops or laptops. The communication media between the client and the server is Bluetooth, Wi-Fi, Internet, WAP. Fig.1 shows the 3 tier client/server architecture of the system.

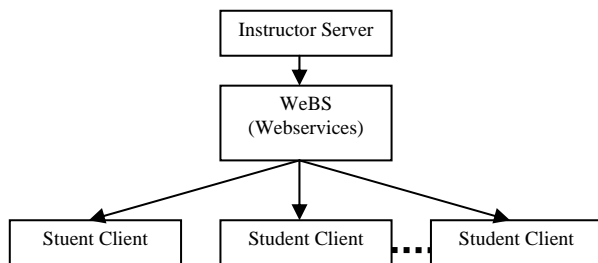


Fig.1: An E-Learning System

Usually, the trainer works on the server side. After initialization, the trainer will advertise the e-learning service by registering the e-learning service in the

service discovery database and wait for client’s connections. The students can use various portable devices to communicate with the trainer. To enter the e-learning system, students first need to run the client side application. After the application is started, it will automatically search the available e-learning services. Then the student can select one trainer (corresponding to one e-learning server) from the discovered trainer list. Chosen a specific trainer, the student can login the system with username and password. Once the student successfully logs in, the bluetooth connection is setup between the client and the server. The client and the server will be disconnected when the student exits the application or the trainer stops the e-learning service.

Our e-learning system mainly provides five functionalities for the trainer:

- Assists the academic trainer to lecture. The system provides the trainer a visualized graphic user interface (GUI). Through the GUI, the trainer can easily know how many students are currently in the system. He/she can upload the lecture notes or questions and navigate between them. The system also presents visualized feedback information and statistic information, which can help the trainer adjust his lecture according to the responses of the class instantaneously.
- Allow industrial trainer to propose some summative test on some predefined directions of study (the main directions the students can take classes at the university)[16]
- Interactions between academic trainer and students. These interactions include two parts: get students’ answers to the questions and response back the results to students right away. In addition to that, the trainer can also get instant comments from students.
- Provide statistic information for the academic trainer. The statistic information can help the trainer to know how well the students perform in the class.
- Automatic evaluation to provide results for summative tests so that the employer can set the employment test levels for the new generation of graduates.

Server	Assist academic trainers to lecture
	Interact with students
	Provide statistics for academic trainer
	Propose summative tests
	Automatic evaluation and statistics
Web services	Connection for different platforms
Client	Submit answers
	Send comments for the lecture

Table 1. Summary of functionalities

In order to accommodate more students in the system, i.e. to make more clients to talk to the server directly, the communication between client and server is established only when the client and server want to talk to each other and closed once the interaction is finished. To allow connections from different platforms there is a middle-layer represented by the web-service.

4 Web services for e-learning

A Web service is a collection of remote procedure calls (RPCs) hosted on a Web site and exposed via SOAP over HTTP and can be made securely accessible over the public Internet.

Web services are application components, communicate using open protocols, are self-contained and self-describing, can be discovered using UDDI, can be used by other applications, XML representing the basis for Web services.

Web services platform [11] elements:

- SOAP (Simple Object Access Protocol) which is a communication protocol, used for communication between applications, a format for sending messages, designed to communicate via Internet, platform and language independent, based on XML, allows you to get around firewalls
- UDDI (Universal Description, Discovery and Integration) is a directory service where businesses can register and search for Web services.
- WSDL (Web Services Description Language) is used to describe Web services, written in XML, is an XML document, is also used to locate Web services.

A Web service provider registers a Web service. This can be done either manually or automatically through code.

A user requests a Web page as in Fig. 2.

The Web application accesses a Web service. If the service client already knows about the Web service, it directly accesses the Web service. However, if the Web service cannot be found, the service client can query to discover/rediscover an appropriate Web service to use. Once done, the client can re-query a Web service with the revised information.

The Web service processes the request.

The results of the execution of the Web service are sent back to the requesting client.

The Web service results are incorporated into the final page.

The client receives a Web page, not realizing that the application ever used a Web service.

We use 2 protocols In this application: is also used to locate Web services HTTP (Hypertext Transfer Protocol) and WAP is not yet a W3C standard (Wireless Application Protocol)

In this case the access is from the interior and from the campus area, we use a HotSpot Proxim AP2000 with an external Omnidirectional antenna in 2400-2485 MHz for the area campus and for external area a Linksys WAP55AG with an Exterior Omnidirectional antenna 5725-5850 MHz, both works as a DHCP (Dynamic Host Control Protocol) server, allocating ip-s from the wireless network within the limit of about 300 connections simultaneous. This allows connections only from those whose MAC-s have been registered, other type of security are not installed, considering that a simple registration is enough for students who own equipments that can support a wireless connection, considering the fact that one needs a new identification with user name and password.

In order to establish such a connection at a distance within a 802.11 b/g standard, the following rules must be followed:[03]

- Direct visibility is obligatory; Maximum 20 dB performance of sending EIRP (Equivalent Isotropic Radiated Power);
- At least 60% of Fresnel-Zone (the area around the visual line-of-sight that radio waves spread out into after they leave the antenna) should be free;
- To every external antenna belongs one lightning protection, which will grounded;
- For long distances, earth flexion has to be taken into account.

Link working condition is that the total:

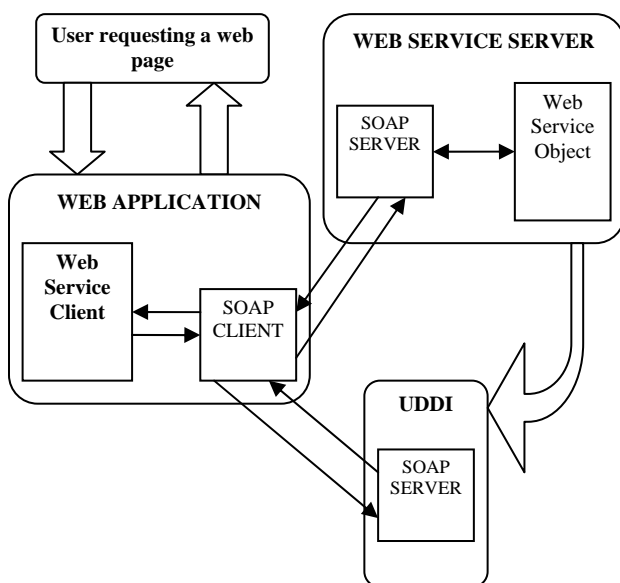


Fig.2: Web Services for E-Learning

$$TT + TP + TR > 0$$

where:

TT is Total Transmit in dBm, provided that:

$$TT = TPW - CL + AG,$$

where TPW is transmitter power [dBm], CL is cable loss [dB] and AG is antenna gain [dBi]

TP is Total Propagation[dB] and is represented by Free space loss in dB

TR is Total Receive

$$TR = AG - CL - RS,$$

where RS is receiver sensitivity in dBm.

These rules are theoretical, in reality we will have interferences (other WLAN networks, bluetooth), industrial noise (microwave ovens), atmospheric losses (air moisture, scattering, refraction), badly pointed antenna, reflexions, that will affect performances.

As hybrids of mobile phones and PDAs, Smartphones have many similarities with PDA devices and use some of the same technologies.

As it is known, Smartphones allow wireless connection to the Internet through the data-enabled aspects of the mobile phone network. GPRS (General Packet Radio Service) is the standard technology for accessing high speed data through the mobile phone networks and all smartphones support this protocol. This is a different technology to that of WiFi wireless networking. The GPRS system is packet-based, like the Internet's basic TCP/IP protocol, it is always on,

technologies which offer data speeds of up to 384kb/s. This was recently only supported by the 3 network, but other networks such as Orange and Vodafone are now bringing 3G services online. Smartphones also come equipped with Bluetooth.

As you can see from fig3, a major part of students uses smart-phones and pc-s from home.

Currently the application is in a testing phase. There are a lot of students involved in this process, along with some trainers and partner companies as shown in Table 2.

Students	E-trainers	Companies
460	10	4

Table 2: The 3 parties involved in e-learning process

Facts state that in the first 3 month after graduation the average of recruited students is around 57 %. We hope that, by means of the mobile testing and the improvements in the educational process as consequence of the collaboration with major players in the industry to increase this percentage each year. Relevant results can be delivered only after inspecting values for few consecutive graduations. The system can be accessed from the URL: <http://www.econ.ubbcluj.ro:8081/iel/>

5 Conclusions

We consider that e-learning is critical to the success of the faculty and also of the students. It is a strong belief that a Learning Content Management System will improve academic results and the direct involvement of the industry will bring a higher rate of employment for graduates in the first 3 months of graduation. The success of a college can be very well measured not only by academic results on the research and publication side but also on the success rate of its students.

As result of the tight cooperation between Faculty of Economics and associated companies, we observed that the main opportunities on the job market on mid and short term are: IT on economics, accounting, banking and stock markets and marketing.

These observations can help both to develop a good strategy for the educational process regarding the number of accepted students on each department and to enforce the curricula with optional courses prepared together with high qualified consultants from industry.

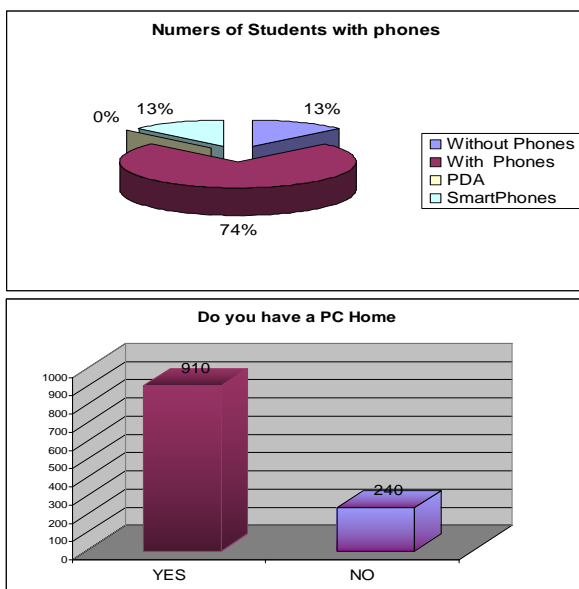


Fig.3: Pc and mobile phones usability

and offers speeds of up to 24kb/s. Phones being released in 2004 include support for 'next generation' data calls using third generation (3G) data

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