

An environment for didactics for first level university courses based on Eclipse technology

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Abstract

The introduction of CFU's into the national university system has imposed a strong acceleration to the creation and to the use of authorized capital to be shared between students and teachers. A social software is likewise wished for and the debate on the use of tools web 2.0 is extremely important. The study shows a heterogeneous environment which hosts a social architecture able to provide one of the first answers to this new requirement. The software is at present being used at the DIS laboratories of the Engineering Faculty of the Federico 11 University, and is at the moment undergoing a trial period.

1 Introduction

Since the beginning of the 2001/2002 Italian Academic year, the university system has undergone a profound restructuring in order to satisfy a European agreement signed in Bologna¹ in 1999, and which is aimed at improving and standardizing university studies in order to eliminate any hurdles which obstruct the free circulation of people and to the acquisition of a job which is connected to the type of education received, regardless of one's country of origin. To this aim, the agreement reached in Bologna introduces a kind of common currency for university studies based on the concept of European Space in Higher Education, in which a sequential training route, comprising three parts is outlined: the first part is of three years (degree), the second part of two years (specialistic degree) and the third part of three years (Phd). Following the new requirements, the concept of University Formative Credits (CFU) as a unity of measure to quantify the efforts a student makes to graduate. Based on the recommendations of the ECT (European Credit Transfer), a university student must acquire 60 CFU's a year. A CFU corresponds to 25 hours of studying. The concentration of time that the students can dedicate to the teachings and to the necessity of benefiting from the famous CFU's at the end of the course, discipline, constrain and condition the diffusion and learning processes of the students. The work becomes more and more collaborative because the continuous specialization of the courses and the ad hoc projects, which are often carried out during normal didactic activities, require more capital. This consideration arises from the observation of what happens when people communicate: important points to be taken into account when productive organization is concerned, is that people: (i) desire to have a place where they can co-operate and collaborate, (ii) they are interested in sharing common topics, (iii) they are continuously looking for important information, (iv) they like exchanging opinions, (v) they want to share presentations and media, (vi) they are in constant search of experts, (vii) they would like to obtain everything in an easy and convenient way. With these issues we can imagine a software which would consent to accelerate the creation and the use of capital: a kind of capital software. The Web 2.0 tools which will be used more and more in the near future, seem to be the answer to all the problems that arise in this context. One thing that is clear, is that the point of view of the applications, which at present have to take into account and follow the elements of the business process model, and therefore acknowledge the concepts with which these operate. The model of business process on which the web 2.0 paradigm is based, rests on four pillars. The first one is based on the different approach used: service orientated instead of product orientated,

¹ Bologna pan-European agreement, 1999, URL: <http://ec.europa.eu/education/policies/educ/bologna/bologna.pdf> (accessed on 31th July 2008).

in other words, web orientated instead of platform orientated. The second pillar directs its attention to group organization and on the engineering of the process which supports it during collaboration. The third pillar is supported by new concepts which introduce a new way of co-operating; concepts such as folksonomies, syndication, etc. which enable people to collaborate better. The fourth pillar is sustained by the technologies used to realize the model: AJAX, Eclipse², Rest, Jazz³ are an example. It is interesting to note that in this field, both industry and university have the same objectives, in that they meet at nearly all the requirements that the model displays. In particular, and only to cite the academic aims (the industrial ones are quoted dually), we can observe that (i) students/workers do not always live near their university/work; (ii) students/workers are constantly under pressure to conclude their studies/projects; (iii) for a student, to start work in a company, maybe by means of an internship, is a great advantage; (iv) to stimulate competition among people or groups. Of course, the question comes spontaneously; how much can the web 2.0 really help? There is no outright answer, but some positive results have began to appear. For example, observing how newsletters are about to be replaced by blogs, emphasizing the fact that the use of blogs give the community the opportunity to encourage the innovation. In other words, the use of web 2.0 tools does not mean to lose control, but it moves the control to a more distant point, collocating it in the dimension of the process and, in so doing, activates the intelligence of the mass. For this reason, this study has worked to develop an integrated environment of tools that can be used for didactic purposes (and not only) during the first three years of university (first level courses). All the tools are 'open source' and hosted on a more general and extensible architecture, such as Eclipse, which encourages and favors the creation of innovative solutions.

1.1 Architecture of the system

In fig.1 the architecture of the Eclipse system, Eclipse learning Eclipse-L, which gathers together another three sub-systems, is shown. The first one is called Eclipse learning and cooperative environment (Eclipse-LCE), the second is called Eclipse Italian Community⁴ with Second Life⁵ project (Eclipse-IT-SL) and the third one is called Eclipse-Lab&Exams (Eclipse-L&E). The first sub system enables the students to collaborate during project development, homework and lab, without ever having to leave the environment that has been proposed to them; the second enables the students to interact with other mem-

2 Eclipse, URL : <http://eclipse.org> (accessed on 31st July 2008).

3 Jazz, URL : <https://jazz.net/pub/index.jsp> (accessed on 31st July 2008).

4 Eclipse Italian Community, URL : <http://eclipse.dis.unina.it> (accessed on 31st July 2008).

5 Second Life, URL : <http://secondlife.com/> (accessed on 31st July 2008).

bers of the Eclipse community, that is, it enables interaction with that practice community and with that ecosystem and the third, enables the students to direct their attention to didactic activities which are aimed at obtaining CFU's. The third subsystem, in particular, enables the students to conduct remote, multi-platform and multioperative laboratory activities and to carry out both mock exams as well as the real exams.

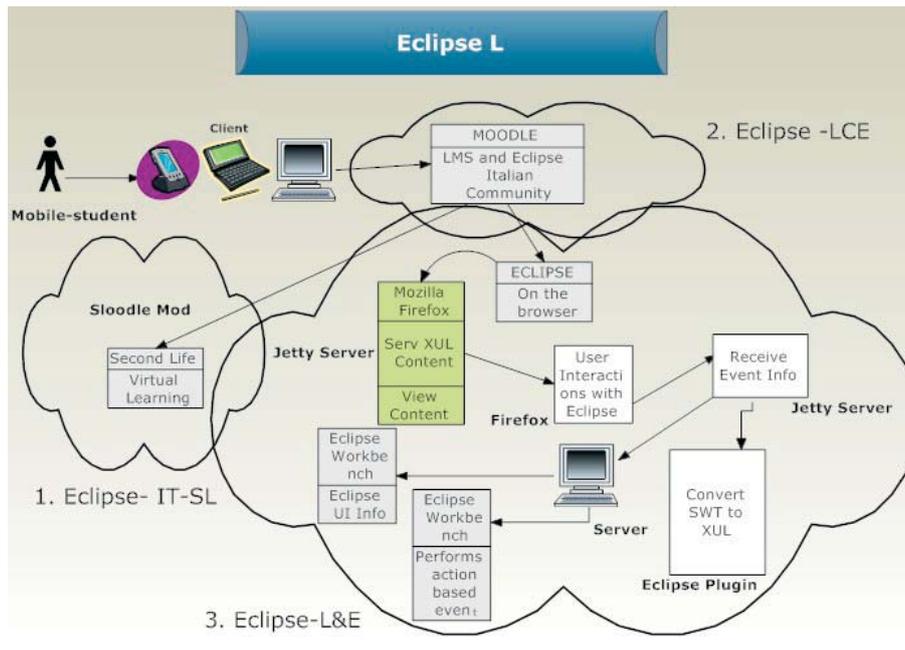


Fig. 1 Architecture of system Eclipse -L

The effort put into this work has been that of being able to offer different didactic services to the user, who is totally independent from the platform used to access such services, to the type of connection used, to the place in which they are, etc. However, the knowledge of rendering student formation centric and no longer teacher centric, asks for the transformation of the teaching paradigm, which, of course, must be able to reach the user anywhere, regardless of where he/she is or of the operative that he /she uses. Therefore, the advantages of such a student, who automatically becomes a Mobile-student, are numerous. Among these advantages, when the university formation field is taken into account, the aspects that deal with the possibility of being able to move freely among the various campus structures; of being able to use the didactic services available in the time given and therefore far from the strict restrictions due to the study of numerous subjects that can be found in any degree course. It is at this point that the definition of Mobile student has more meaning. A Mobile-student will

not be forced to use Internet connections or prefixed technology in order to access the didactic services; will not have to be physically present in a particular structure, but he/she will be able to comfortably access formation processes to satisfy his/her needs even from home or any other place (train, bar). In figure 1, the interaction that exists between a Mobile student and the applications that are part of the project and which permit the above mentioned conditions, which have so far been discussed is shown. The most utilized technologies are Moodle, Eclipse and Second Life. The choice of a platform which can easily host formative processes which can be engineered and re-engineered rapidly, is of vital importance. In this case, the choice necessarily fell on Eclipse. Eclipse is an Open Source development platform, which is extensible and comprises tools and runtimes for the construction, implementation and the management of software in all its circle of life. The possibility that Eclipse possesses a practically infinite extensibility has allowed the structuring of such a project in the most easy and professional way possible and according to our needs. It also needs to be noted that, thanks to the use of Eclipse, as shown in the diagram above, it has been possible to correctly report all the applications that make up the project. In this way, the environment created for the final user, is completely free from the type of platform used; in fact, to use these services, the only thing necessary is a simple browser, that is, Mozilla Firefox. Therefore, the Mobile -student has only to possess an Internet connection and use Firefox from any terminal, be it a desktop, a laptop or a smartphone. In the paragraphs that follow, all the possibilities offered to the user and the cases in which it is used the most are illustrated.

2 Simulated environments in Eclipse for e-learning

One of the present challenges is to conjugate new formative models with today's technology. In other words, our reports and formative activities are entrusted, even today, exclusively, to word of mouth. However, the experience of understanding the problems and to recontextualize them, to perceive the reality of the world that surrounds us and to react accordingly, remains an important instrument of knowledge and learning. Someone once said that experience is the best teacher: at first it examines you and then it teaches you the lesson. Learning from experience from the real world, demands the possibility to simulate a reality, abstracting the essential traits and placing the student in situations that allow him/her to participate in the choices that condition his/her experience. The simulations do not allow for learning through language but through doing: it is a kinesthetic learning. The student can move through different frozen and simulated experiences; that is by learning through doing in an active way, personally creating and managing their own knowledge (knowledge management), but at

the same time giving life to an effective and meaningful process of knowledge sharing (Knowledge Sharing). The 'lingua franca' is no longer the language, but a collection of experiences vehiculed through a virtual environment, in which every thing can be simulated and in which every thing represents an example of virtual laboratory which can be shared and also gives the possibility of learning to other people. It is the 'collaboratory' phenomenon (collaboration+laboratory), which has no limits either in disciplines that can be simulated, or in the vastness of the phenomena and it is available to the whole community which belongs to the Eclipse platform. We are dealing with 'experiences' offered to the user. The double purpose is that of diffusing it both in typical learning contexts (school, university, company training, training and re-qualification), and in those of scientific divulgation. In this direction, the interaction among the technologies which enable the simulation of small didactic contexts, is of vital importance. Among the most interesting, the Sloodle⁶ module is relevant because it permits the interaction between Moodle and Second Life. Sloodle is an Open Source project which aims at developing and sharing tools to support instruction in virtual worlds, making teaching easier. Second Life is a multi-user, online, three-dimensional virtual world, which was invented by the American company, Linden Lab. The system provides its users (defined as 'residents') with the tools to be able to add and to create new graphic contents; objects; depth; character phisionomy; audiovisual contents, etc in the 'virtual world' of Second Life. This permits, when using Second Life and Sloodle, to report into the virtual world, the courses available on the teacher's Moodle site, or whoever provides the teaching services, inside virtual classes, provided with buildings that have the job to supply didactic services. The Mobile-student, who will be known as the user from now, will be able to enter Second Life's virtual world and interact with Moodle. Putting aside the technical details that allow for the interaction, let us take a look at the tools made available to the Second Life user, through the use of images which will help to understand what has been said so far. Once you have entered Second Life with your own avatar and you have been teleported into the Sloodle Sandbox, we can start to use Sloodle and take vision of its functioning. Among all those available, which can all be directly linked to the Moodle website, we will take a look at one in particular, Sloodle Webintercom. This object makes it possible to interact with chat in Moodle. In figure 3 the communication between Second Life and Moodle is emphasized; in other words, it is sufficient to write the desired text from your local Moodle chat. The potential these tools offer is therefore more than evident. It suffices to think that in this way you are able to chat with the other users that are logged onto Moodle and who are not actually present in Second Life, but are, maybe, just using a browser. Figure 2 illustrates an example of chat, relative to the Programme 1 course.

⁶ Sloodle, URL : <http://sloodle.org/> (accessed on 31st July 2008).

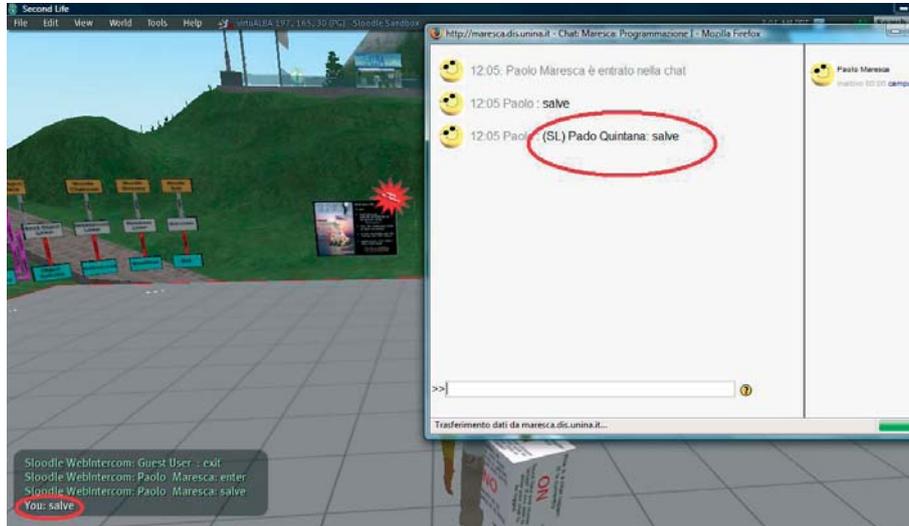


Fig. 2 A student that interact through Sloodle, with a student in Moodle

3 Eclipse- Lab&Exams (Eclipse-L&E)

The interaction between Eclipse and Moodle comes about thanks to a plug-in purposely created, and which permits to offer useful services for formation and to the verification of the user towards a particular course in a didactic environment. A practical example is the possibility to erogate an exam simulation or a guide to the use of the Eclipse platform, related to, for example, Programmation 1 or Elements of Computer Science or any other course regarding the applicatory- computer science field. The plug-in that has been developed, rests on the IBM EclipseWebEnabler application, which enables to use Eclipse directly from the Mozilla Firefox browser. The plug-in supplies a series of tools necessary for interaction between the user and the application.

In the following figure, we will see how an Eclipse interface presents itself, opened through Firefox browser. In the diagram, the tools available to the user have been emphasized, and, as long as they remain in the didactic field afore mentioned, can, in this case, decide whether to deliver its elaboration, simply by clicking the Delivery button, or whether to withdraw, choosing Withdrawal, from the Eclipse Server menu (fig.3).The student who carries out the test, can be anywhere and can carry it out by using a smart-phone (which is not really advisable for this activity).In figure 4 an exam session is illustrated, in which the student carries out a compilation of a c++ programme.

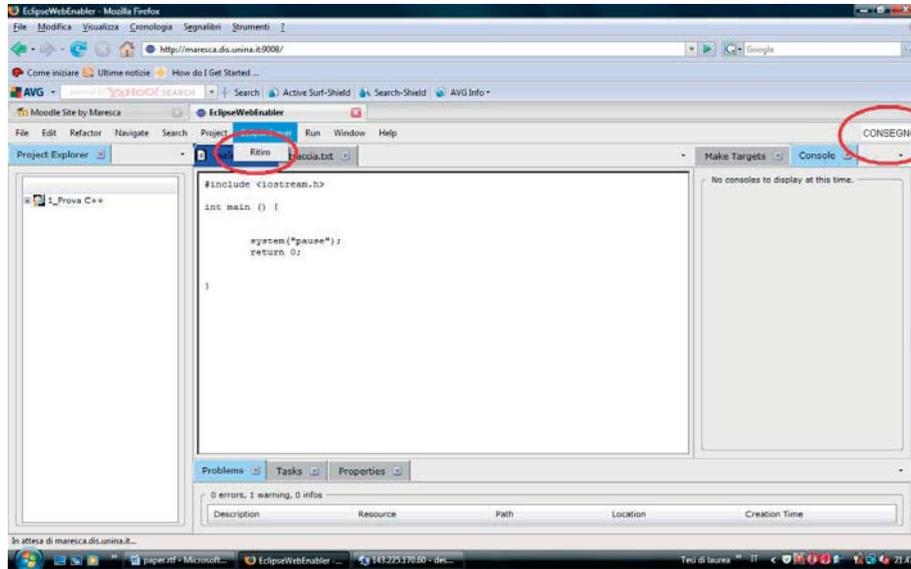


Fig. 3 Eclipse-L&E: mode of delivery and withdrawal of developed

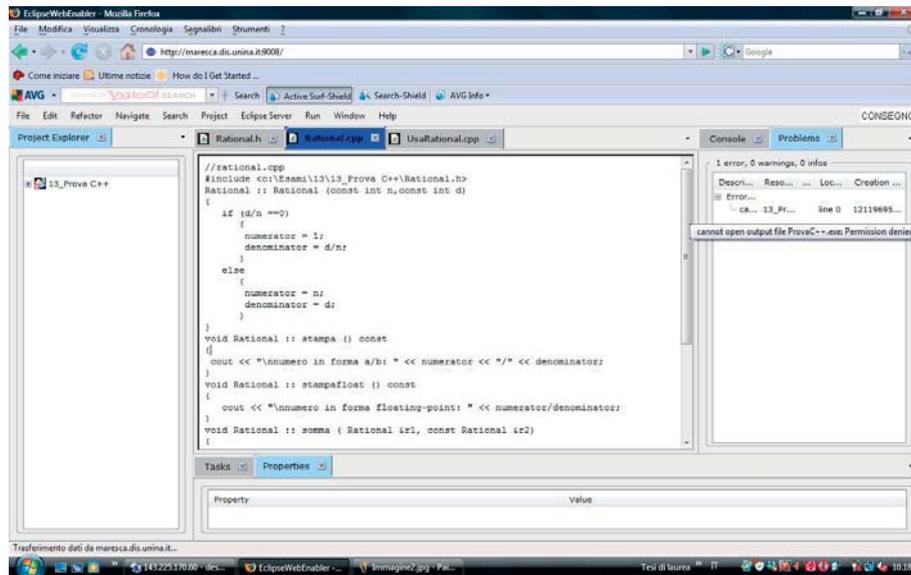


Fig. 4 Example of use of Eclipse-L&E for the compilation in the C + +

Obviously, the illustration has taken into consideration, the development of a C++ programme, but, it is to be born in mind that with the Eclipse platform, one can decide to use any type of programming language, for development or

modeling (java, python, php, UML, XML, etc.) as all the compilers are present and the student can use the same interface. It is to be noted that in order to withdraw from the following figure, which a general student can do from Moodle, through a simple link, using Eclipse without having to install the application onto one's machine. Let's imagine, therefore, how any user, using a wi-fi connection or wired less technology or xDSL, enters Moodle and uses Eclipse exclusively from a browser, and he/she is comfortably sitting at home or is simply in the university gardens. One understands, therefore how Eclipse is able to, through the only help of a server, be available to a client. Differently to what was thought before, the Mobile-student could even use Eclipse exclusively to understand its use and could therefore, visualize in real-time what the teacher or the expert is actually doing on Eclipse on his/her machine. So, can you imagine, for example, the disbursement of some programming, modelling, development, management software courses etc, created in Eclipse, supplied at a distance and which enable a deep comprehension of the subject. It is to be noted how it is possible to obtain a virtualization of such a platform, which can be used by the use as if it were installed on his or her own machine. Therefore, everything takes place in remote, without having to occupy memory or cpu resources in the user' calculator.

4 Experimentation and valuation

The whole system has been used by the students belonging to the Electronics and Computer Science degree course (Faculty of Engineering) of the Federico 11 University in Naples for the exams in the Fundamentals of Computer Science and Programmation 1 directed by DR.Paolo Maresca. The students were able to use Eclipse L to carry out their algorithms written in C++ and they were also able to verify its carrying out. It was noticed that the students found it innovative to work directly from the browser. As we are dealing with an innovative system, it was necessary, during exam sessions, to supply a mini-guide which explained the general application of the system to the students. Thanks to the guide, the students were able to use the application correctly and simply. The trials were carried out on a maximum of fifteen students at a time. In the first versions of the project, a slowing down was observed between the client and the server, precisely in client-server communication of the XUL tags, which were corrected in the successive version and then presented. The impact with the students to interface with the system was enormously positive, above all because it gave them the possibility to carry out the whole exam remaining on the same platform, and not having to move from one place to another. From the teacher's point of view, they were able to verify the students' algorithms at the same time in which they were being written. Obviously, as this is a system

that is being tested, faults will be found which will be corrected as the course develops. Among these, it is important to understand the maximum number of client instances that can be opened towards the server and, above all, some quantitative measures will have to be taken both on the role of the server, and that of the work load of the system, and also on the software extensibility towards other didactic subjects and other university courses.

5 Conclusions

In this study the integration between a number of technologies has been demonstrated, some Open Space of other properties, for the purpose of creating a multi-platform and multi-regulating environment useful to the mobile user. It is clear that in this project, more importance has been given to the possibilities offered by Eclipse, above all, as regards the virtualization via browser of the whole platform. At this point, a strong tie between Eclipse and Second Life is prospected, which thanks to the interaction of Moodle and Sloodle, will make the didactic and formative process exclusively ad hoc for any type of need, and it will also consent to develop a number of simulative approaches, besides consenting to be reached by a great number of users. It is also clear how future developments this type of technology can offer are clearly, and potentially infinite and how one can think of creating services which are more and more performatory for the user, who is no longer bound to places, time or predefined resources, but he/she is continuously on the move and the environment that surrounds him/her is supplied with the uttermost of possible points of access for his/her professional formation.

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