DESIGNING A WEB BASED E-LEARNING SYSTEM FOR THE FEDERAL UNIVERSITY OF TECHNOLOGY YOLA

BY

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BEING A THESIS PRESENTED TO THE DEPARTMENT OF STATISTICS AND OPERATIONS RESEARCH, FEDERAL UNIVERSITY OF TECHNOLOGY, YOLA IN PARTIAL FULFILLMENT OF THE CONDITION FOR THE AWARD OF MASTERS OF TECHNOLOGY DEGREE IN OPERATIONS RESEARCH

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DEDICATION

This work is dedicated to the Lord God Almighty, the giver of wisdom, knowledge and

life, for His grace, sustenance and provision throughout the period of this work.

ABSTRACT

During the last decade, the Web has changed from a simple hyper textual repository of documents to a powerful communication media. This shift has made Web applications highly suitable for the support of educational activities, which often include collaborative sessions. Although educational institutions are by nature conservative and can be resistant to reform, the collective influence of an increase in the number of networked computers, improved teacher training, and the impetus of a transformed culture in wider society are likely to lead to a reconsideration of the nature of education. The traditional emphasis on print in the educational system is likely to be challenged by a range of screen-based and telecommunications mediums. Thus, this thesis proposes the design of a web-enabled Learning Management System, built with the latest generation web technologies for FUTY. Modular, scaleable, and easy to implement and learn, one can track and manage any type of learning asset from online training, assessment, testing and corporate web sessions to classroom-based training.

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DISCLAIMER

All reasonable precautions have been taken to ensure the accuracy of information. Particular care has been taken to provide correct site addresses. The Internet being an electronic medium, the author cannot accept responsibility for any damages or inconveniences that may arise from incorrect information or inaccessible links. The author does not accept responsibility for content on listed sites. Numerous other good websites exist in the selected categories, with only a few being highlighted in this publication. Any website listed in this publication should not be seen to be endorsed in anyway by the author.

CHAPTER ONE

1.0   Introduction

Due to the opportunities provided by the Internet, more and more people are advantage of distance learning courses and during the last few years us research efforts have been dedicated to the development of distance systems. Educational institutions make wide use of technologies to support the collaboration between students and between students and teachers, in most cases tools that are developed specifically for teaching and purposes (Web-based e-learning platforms). Such tools can be seen as result of the last functional changes in the way in which the World Wide Web (www) is perceived and used. From a simple repository of documents, the Web mutated first into a provider of interactive services, and finally, into a collaborative instrument. Now, Web-based technologies allow people who are located in different places to interact with each other in synchronous and asynchronous and can therefore constitute a good support for collaborative learning

1.1   Problem Statement

The great abundance of different platforms and systems makes finding the right more and more difficult. So far, many e-learning systems are proposed and used practically. However, in these systems the e-learning completion rate is t 30%. One of the reasons is the low study desire when the learner studies the learning materials. Nowadays, the main issue is not the lack of the technology necessary to support certain activities, but the risk of focusing too much on technology without paying enough attention to its

relation with the leaning process and to the use students and teachers make of it. Also, there is a high risk of ending up using the wrong tool, or at least not using the most appropriate one. In order to reduce these risks, effective technology evaluation methods are necessary.

1.2 Study Objectives

In this thesis, our objective is to design an interactive Web-based e-Learning system. This system is a complete, secure, web-based training and e-learning solution that employs a simple user interface. This way both technical and non-technical training manager can easily create, manage, and track interactive training courses and learning programs for all levels of users. Thus, the purpose of our system is to increase the e-learning completion rate by stimulating learner's motivation. This Web system has three subsystems: the learning subsystem, learner support subsystem, and teacher support subsystem. The learning subsystem improves the learner's study desire. The learner support subsystem supports the learner during the study, and the teacher support subsystem supports the teacher to get the study material to the learner in the most appropriate way taking into consideration students' actual needs, and paying special attention to collaborative writing activities.

1.3 Study Overview

This provides the reader with the background information necessary to understand the work described in the following sections. The second chapter

contains a description of the recent changes in educational theories and of the concept of e-Learning. Then, an overview of the different research areas related to Computer Supported Cooperative Work (CSCW) is presented, including paragraphs dedicated to Computer Supported Collaborative Writing (CSC Writing) and to the impact which the Internet has had on collaborative technologies.

In order to provide a general framework for this study, the third chapter examines in some details the method, approach and platform to be used in designing the proposed interactive Web-based e-learning system. The third chapter is dedicated to the methodology adopted in identifying the collaboration and communication needs of a student group, and of the features a system should include to satisfy them. This process is conducted through a set of scenarios based on observations of real students' activities, including writing, sharing, annotations and discussion of documents.

Some classifications is a prerequisite for any evaluation (one must know what to evaluate, in order to evaluate it). Chapter three thus contains a description of the taxonomies of collaborative technologies (groupware) proposed by different scholars. Such groupings are analyzed in a chronological and comparative way that pays special attention to the different kinds of e-learning platforms. The last section of the chapter is dedicated to the possibility of customizing a computer application within its content of use (tailoring), a possible solution to the loss of focus that may characterize integrated systems.

The fourth chapter focuses on the systems design and implementation, its groupware evaluation and the different technologies used in the design of the system, also considering the problems which may arise from their application. Such evaluation constitutes the basis for the development of the systems content and structure. While the last chapter tries to summarize what has been done so far in this project, areas of further research and of course recommendations.

1.3   Research Background

During the last decades the world of education witnessed two major events: the shift from the educational theory of behaviourism to those of cognitivism and constructivism and the fast spread of Internet technologies that boosted the use of e-learning in both the educational as well as the academic environment. In this chapter, we will provide a more precise description of the changes just mentioned and of the concept of e-learning. Then, we will present an overview of the different research areas related to computer supported cooperative work.

As we will explain within this and the next chapter, the field of computer cooperative work can involve a rich variety of technologies.
In order to focus our attention on those supporting the real needs of students working together with documents, the last part of the chapter will be dedicated to the definition of such needs and of the features a system should include to satisfy them

1.4 Educational Theories and E-Learning

Behaviourism saw man as the product of his experiences, and his behaviour as the result of a stimulus-reaction mechanism. As a consequence of these principles, learning was seen as a change in behaviour in order to make a specific response follow a certain stimulus. Cognitivism, introduced by American scholars during the '50s, sees learning as an internal, creative process. According to this theory learning happens when the mind processes information to make sense of it, and learning is made possible by the connection between existing and new information. Constructivist theories, finally, see knowledge as actively constructed by individuals while working together to solve problems. Learning is considered to be a social activity, and has its natural environment in collaboration (Website #10).

As a consequence of these changes in the theories of education, the role of teachers has changed along the years. The people whose function was once to determine the desired behaviour in students are nowadays more often asked to provide a collaborative environment where students can make their discoveries and autonomously develop their knowledge (Website #1).

Together with the role of teachers, also the activities performed by students have changed greatly. Nowadays, learning through teamwork in projects and assignments is pervasive in high schools and universities, and 'learning in doing" together with peers is an important component of the overall learning process, also as a complement to lessons' attendance (Web site #2).

Using a broad definition, e-learning can be described as "formal and informal learning and training activities, processes, communities and events [taking place] via the use of all electronic media like Internet, intranet, extranet, CD-ROM, video tape, DVD, TV, cell phones, personal organizers et cetera" (Website #3).

From a practical perspective, what characterizes e-learning is its customizability: the fact that it can be adapted to best suit the needs of the individual. As a matter of fact, it has the flexibility to allow studying at the pace, time and location that best suits the student (Website #4). This contributed to the association of e-learning with a set of new, alternative didactical and methodological strategies, which focus greatly on the learner, assigning him an active role.

From an historical perspective, e-learning is the latest evolution of distance learning. Distance learning began in the first years of the 20th century, when printed material was delivered through postal service. At that stage, distance learning was an application of behavioural theories: the printed material was studied individually, and there was no interaction between students or between them and teachers (Spodick, 1995). The second stage of the evolution of distance learning took place in the '60s, when the widespread use of radio and TV made it possible for educational institutions to adopt them as new educational tools. Starting from the '80s, distance education also made wide use of video and audiotapes, followed by audio CDs and CD-ROMs. Communication between students and teachers was nonetheless still limited, and communication between students impossible, even though these new supports facilitated a more interactive approach to education.

The advent of the Internet made it possible for distance education to move towards the constructivist approach. "In modem on-line education, learners are seen as members of a wider learning community, and are able to communicate with each other and solve problems together. Furthermore, the activity of such a community is often open, meaning that there is some flexibility, some control in the hands of the learner as to when, where and how (s) he will learn, balanced by structure and support from a provider" (Website #5). This opportunity offered by e-learning technologies is nowadays also used in order to support traditional face-to-face meetings. These cases take the name of "blended learning" (Website #6).

1.5 Challenges of Adopting New Information and Communication Technology in Education

The difficulty in understanding the future implication of new technologies in society is seen in the growth of the Internet throughout the world, and in particular, in educational institutions. As factors such as convergence, increased bandwidth, "edutainment", multitasking and changes to traditional socialization modify everyday life; there is a corresponding need to consider the ways in which emerging practices and beliefs challenge traditional assumptions about the nature of tertiary education. Although educational institutions are by nature conservative and can be resistant to reform, the collective influence of an increase in the number of networked computers, improved teacher training, and the impetus of a transformed culture in wider society are likely to lead to a reconsideration of the nature of education.

The traditional emphasis on print in educational system is likely to be challenged by a range of screen-based and telecommunications mediums. The emphasis on what will appeal to students who have grown up in an environment saturated with images and ready access to information suggests those teachers' attempts to use print-based materials to present challenging concepts may be resisted. While there is no suggestion that print will abruptly disappear, it is likely that we are in what Birkets (1998) has referred to as an "overlap in communication modes." During this period, culture, literature and philosophy which are encoded in print will be less available to students unless they can be converted to mediums such as CD-ROMS, the World Wide Web or television.

Network computers will eventually become common place in schools and homes, but it is questionable if teachers will be able to use them regularly and effectively. Evidence the use of computers in classrooms to date is discouraging. Determinist views which computers as a revolutionary agent of educational reforms were disappointed in the 1980s and computers were not used regularly in classes in the USA when they were in the early 1990s. More recently, in the USA, a report by the ISTE involving institutions 416 involved in teacher preparation indicated considerable shortcomings in the ways that teachers are prepared for the use of technology in classes.

Such results are not surprising. Cuban (2002) argued that previous classroom technologies such as television have not been widely adopted because teachers need to be convinced that challenges to the rituals of everyday classroom life are in their interests. Educational systems are inherently conservative and resistant to change. Departure from conventional practices

and continuity are justified only if the intended innovation is simple, durable and reliable. Textbooks and chalkboards have been widely accepted, but networked computers may not be.

Some educational systems have assumed that the provision of computers for teachers or increased teacher training and professional development, would lead to more effective computer use. However, the existence of any technological artifact is no guarantee that it will be used for its intended purpose, and even if computers are found in classrooms, they may not be used to their frill potential.

CHAPTER TWO

2.0 Overview of the Research Areas Related to Computer Supported Cooperative work

The use of computer technologies in groups' activities goes under the name of Computer Supported Cooperative Work (CSCW). CSCW is "a field that covers anything to do with computer support for activities in which more than one person is involved" (Bannon and Schmidt, 1991, p.3). Section 2.1 will illustrate the scope of this discipline in more details.

Software and hardware products providing support for CSCW are called "Groupware," and the branch of this discipline considering the support computers can provide group of learners with takes the name of "Computer Supported Collaborative Learning (CSCL)." During a collaborative learning process, computers can support the collaborative reflection on information (sharing and annotating), the building of group knowledge (discussion from perspectives) and the determination of produced knowledge artifacts (since they are the result of discussions, we can talk in this case of knowledge negotiation) (Stahl, 2002). Section 2.2 and 2.3 will deepen these topics.

When supporting collaborative reflections and discussions, computers provide a support for communication. In section 2.4, we will consider the main issues related to "Computer Mediated Communication (CMC)." Furthermore, since in the academic and educational world, knowledge artifacts as well as annotations and discussions usually take the form of writing, we cannot omit to consider the factors related to "Computer

Supported collaborative Writing (CSC Writing)," with which we will deal in section 2.5. Finally, since the advent of Internet and the World Wide Web has changed greatly the technological landscape, we will consider its influences and relations with respect to groupware technologies (section 2.6).

2.1 Computer Supported Cooperative Work

Paul Cashman and Irene Grief coined the term "Computer Supported Cooperative Work" in 1984, in order to describe an interest shared by researchers from various disciplines on how technology can support people's work (Grudin, 1994). In Grudin's words (p.3), "the conditions encouraging this new interest were the relatively low cost of hardware, which made it available 'to all members of some groups', the technological infrastructure supporting communication and coordination, the widening familiarity with computers, and maturing single user application domains that pushed developers to seek new ways to enhance and differentiate products". Irene Grief further defined the term, as referring to "a set of concerns about supporting multiple individuals working together with computer systems" (Greif, 1988, p.191). Then, CSCW refers to the work of groups, which may vary in size between the two (not included) extremes of single individuals (supported by single-user applications) and organizations (supported by information systems) (Grudin, 1994b).

Its vague connotation made it possible for this field to become a meeting point for researchers with different backgrounds and techniques, where technologists could learn from "economists, social psychologists,

anthropologists, organizational theorists, educators, and anyone else who can shed light on group activity" (Grudin, 1994, p.19). If field, so described, is rather broad, analysing the words composing its definition individually will not help narrowing it. Nineteenth Century economists used the term "cooperative Work" to indicate work involving more than one person. Nonetheless, as Ehn (1988) points out, all work is essentially cooperative, since the success of its performance always depends on others. Even not taking into consideration Ehn' s point of view, we must observe that cooperative work can not be limited to that conducted collectively by a group whose members work in direct contact with each other. As a matter of fact, work conditions can emphasize the aspects of communication, coordination and collaboration at varying degrees (Rodriguez, 2003), and cooperative work can also be distributed and indirect. The activity of semi-autonomous workers who change their behaviour as a consequence of other members' actions is of cooperative nature, as well as that of people communicating with each other in an impersonal way (e.g. by changes in the work artefacts).

Considering the great variety of activities included in CSCW, its core issues are the articulation of cooperative work, the sharing of an information space and the reciprocal adaptation of technologies and organizations. In order to enhance cooperative work relations, computers should support cooperative ensembles' self-organization and help the retrieval of information filed by other workers, controlling the dissemination of information (Bannon & Schmidt, 1991).

Since its introduction, CSCW has influenced the development of everyday technologies computer-based work. Now that the Internet is a mass phenomenon, "technologies such as workflow' and groupware have moved out of the research laboratory and into everyday computational practice" (Dourish, 1999, p.16), and promise to "provide the kind of support to networked groups that individual productivity software like word processors and spreadsheets grant individuals" (Stahl, 2002, p.7).

2.2　Groupware

"Groupware" can be defined simply as the software that supports groups. More specifically, what differentiates this field of studies from CSCW is its technical focus: "Groupware addresses the technical problems of enhancing the human-computer interface by providing multiple-user facilities for, in principle, any application program" (Bannon & Schmidt, 1991, p.8). More precisely, in the software taxonomy groupware applications can be collocated between applications supporting a single user and information systems[2], designed to support organizations (Grudin, 1994b). As may be easy to imagine, such technologies can vary greatly, ranging from collaborative editing tools[3] (Figure 1) to electronic meeting rooms[4].

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[Figure 1: SubEthaEdit, a collaborative editing tool]

It is sometimes hard to decide whether a tool belongs to this field or not, and in the first half of the nineties this fact led to a dispute between different theorists about what should or should not be considered to be groupware. According to Crowley (in Ensor, 1990), network file servers belong to this category, since they are fundamental to the interaction across networked PCs, and therefore provide support for workgroup collaboration. On the other hand, Kraut (in Ensor, 1990) looked at e-mail and advanced groupware systems as the only successful CSCW applications and did not consider multi-user databases to be groupware technologies (regarded instead as so by Grudin and Poltrock, 1991: in their opinion they deserve this label because they multiple access to a shared content). Kraut suported his

statements saying that most databases do not support different roles or communication needs, and therefore cannot qualify as groupware. For similar reasons, Allen (1990) also excluded e-mail from groupware technologies, and took into consideration only tools specifically aimed at group support. In order to decide whether a specific product belongs to this category, it is often necessary to consider it in a particular setting. We should therefore begin by asking ourselves whether a certain technology was designed to support groups or not (Grudin, 1994); "there is no rigid line between systems that are considered groupware and those that are not" (Ellis et al., 1991, p.4.0).

Despite the aforementioned uncertainty as to what should or should not be regarded as groupware, there seems to be no controversy regarding the correctness of the system based on time and space used to classify these applications. De Sanctus and Gallup introduced it in 1987, and many other scholars applied it during the following years. Among these scholars are Grudin (1994), Johansen (1991) and Ellis et al. (1991). According to the criteria of this method, groupware products supporting synchronous and asynchronous interaction belong to different categories, as well as those supporting interaction between people in the same place or in different places. The matrix below in Figure 2 illustrates such classification.

Figure 2: Classification of interaction based on time and space criteria, from Ellis et al., 1991]

Of course other elements could be added to the matrix, such as the kinds of interaction supported, the groups' size or the predictability or unpredictability of different times/places (Grudin, 1994). Furthermore, other

taxonomies of groupware have been proposed by different scholars, based for example on the "strategic intent of the technology" (Wenger, 2001) or on the kind of collaboration or data supported (Coleman, 2002). Such taxonomies will be discussed further in the project.

2.2.1 Groupware Evaluation

When Grudin (1994b) enlisted some of the new challenges related to groupware technologies, he put among them its difficulty of evaluation. The complexities and subtleties characterizing group dynamics make these technologies' design and evaluation processes more sophisticated than those of single-user software; "A (groupware) system performance may depend on the varied behavior and personalities of the group members, the effect of social, motivational, economic and political dynamics, and the relevance time as a factor in understanding interaction changes" (De Arujo et al., 2002, p. 223).

Such complexity resulted in the wide variety of techniques applied nowadays to evaluate groupware systems. Both scientific, engineering and social science methodologies are being used, and there seems to be no agreement regarding which one has to be applied in a certain circumstance (Pinelle and Gutwin, 2000). Nonetheless, laboratory experiments and field studies, conducted predominantly through observations, interviews and questionnaires seem to be the most used types of evaluation (Pinelle and Gutwin, 2000). As Twindale, Randall and Bentley (1994) pointed out, what characterizes groupware evaluation is the importance that needs to be given to context. Also De Aruajo et al. (2002), stressed the importance of context,

and illustrated its influence on all other evaluation dimensions. Nonetheless, there may still be real value in out of context evaluation, if conducted early in the development phase (Pinelle and Gutwin, 2000).

Several inspection techniques traditionally applied to single user applications or Web pages have been modified and tested as instruments for the evaluation of groupware. For example, Ereback and Hook (1994) proposed the use of Cognitive Walkthroughs, while Baker et al. (2001) developed a set of heuristics. In cognitive walkthroughs, evaluators choose a set of representative tasks and go through the actions performed by a fictional user, comparing the user's goals and the actions expected from the interlace. Heuristic Evaluation, instead, defines a particular interface inspection process where evaluators examine an interface and judge its compliance with carefully selected usability principles called "heuristics". These and will be discussed further in the project.

2.3   Computer Supported Collaborative Learning (CSCL)

Using the formula-style definition that Margaret M McManus (1997) gave of it: CSCL = CSCW + CL, where CL stays for Collaborative Learning.

Collaborative Learning happens when students work together in groups to achieve a common academic goal, such as the completion of an assignment, a worksheet, or a project (Glass and Putnam, 1998). Collaborative Learning differs from Cooperative learning in the way in which the task is divided. In the former the task is split into independent subtasks (and coordination is only required when assembling partial results), while in the latter there is a

continuous attempt to construct and maintain a shared conception of a problem (Roschelle and Teasley, 1995, quoted by Dillenbourgh et al., 1995). Examples of CL activities are peer learning, tutoring and project-based learning (Wasson, 1998). In peer learning, groups of people with similar roles and complementary learning needs in a particular area help each other with knowledge based on their own experiences (Website #7). Tutoring, instead, is the activity of a teacher supervising a (usually small) group of students learning together. Finally, project-based learning can be defined as a model of teaching/learning that "shifts away from the classroom practices of short, isolated, teacher-centred lessons and instead emphasizes learning activities that are long-term, inter disciplinary, student-centred, and integrated with real world issues and practices" (Website #8).

CSCL considers the use of computers in such activities (Koschmann, 1992) focusing especially on information and communication technology (ICT). In a collaborative learning environment, the role of technology is to help students learning together effectively. This goal is achieved through the provision of support to group processes and group dynamics in ways that are not achievable by face-to-face meetings (Website #9), aimed at facilitating the students in maximizing the use of their intelligence and knowledge.

2.4   Computer Mediated Communication (CMC)

A broad definition of Computer Mediated Communication (CMC) defines it as "any form of interpersonal communication that uses some form of computer technology to transmit, store, annotate or present information that has been created by one or more participants" (Wolz et al., 1997, p.51). Such

communication can be graphic, text-based, auditory and, in certain cases, tactile.

The major difference between CL and CMC is that the former often include a specific structuring of dialogue dynamics, to enhance interactions within the learning community. The first people to introduce such structuring, under the name of thinking types, were Scardamalia and Bereiter (1983), who did so in order to provide procedural facilitations in writing. Then, they developed them further into Scaffolds, and included them in their CSILE (then known as Knowledge Forum) system (Website #10, Figure 3). In Scardamalia's words (2004): "Scaffolds give ideas-defined roles in such processes as theory refinement and constructive criticism. Therefore, this opportunistic rather than the mandated use of scaffold support helps students embed these forms of discourse in their work with ideas. [...] The Scaffold support additionally serves as searchable parameter." This kind of organization is often achieved through the adoption of semi-structured interfaces, which allow users to communicate only through a set of predefined argumentative or communicative typologies. Such interfaces force students to focus on their assignment (Bonaiuti, Website #11), and are used for this purpose in several applications (e.g. Synergeia, Website #12, and Shadow Net Workspace, Website #13)

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jFigure 3: Examples of Scaffolds in Knowledge Forum]

What differentiates specific CL tools from generic e-learning instruments is that the former do not necessarily provide modules enabling teachers to manage teaching activities, supply didactic contents and evaluate students' performance through formal I evaluation tools. Collaborative Learning tools are also different from unspecific CMC environments.

Applying a criterion already used for the classification of Groupware, we can divide CMC into synchronous and asynchronous. In the former the receiver processes the message immediately, while in the latter he does so at a later point in time. Asynchronous communication minimizes time and space as barriers to interaction, and allows people to participate at the time and pace most convenient to them (Kerr and Hiltz, 1982). Contemporary asynchronous and synchronous CMC is mainly text-based. Typical tools for text-based CMC are e-mail and instant messengers (Figure 4). This fact makes it difficult (when not impossible) for participants to represent or transmit extra-linguistic attributes such as body language and gaze. Such attributes have both expressive and deictic functions; for example, somebody's gesture can emphasize her feelings or show what she is referring to during her speech.

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Figure 4: MSN Messenger, an example of instant messengerl

According to Galegher and Kraut (1990), the communicative constraints of written communication make it harder for participants to get to know each other and collaborate. As they observed (p.155), "tasks that involve ambiguous goals, multiple perspectives and information that is susceptible to multiple interpretations [...] are typically associated with high levels of direct, informal, face-to-face communication". The necessities to refer 1to and manipulate a shared artifact and to know other people's activity are among the reasons why people prefer personal meetings to CMC. Nonetheless, the formers are becoming harder to plan as contemporary educational and business environments tend to be more geographically and temporally distributed. Tools for CMC try to satisfy these conflicting needs by providing functions allowing people to interact with shared Document and supporting awareness.

Awareness, defined as "an understanding of the activities of others which gives a context 4our own activity" (Dourish & Bellotti, 1992, p.107), makes

it possible for individual contributions to be relevant to the group's activity. Moreover, it allows an examination of individual actions with respect to group goals and progress (Dourish & Bellotti, 1992). Information provided by awareness mechanisms can regard present or past activities, and be explicitly generated and kept separated from the shared work object or passively and distributed. In the latter case, such information is presented in the same shared workspace as the object of the collaboration. Examples of contemporary awareness systems are the symbols used by Instant Messengers to provide information about other users' status (Figure 5), or the different colors used by Synergeia inform about its users' activities (Stahl, 2002).

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Closely related to the concept of awareness is that of role. Role defines an individual's relationship with other participants, automatically implying a set of ions a person can or cannot perform. In such way, it provides information

about character of the person's activities, even though not informing about its content. It is important to note that during collaborative activities roles can be dynamically negotiated and reassigned. Therefore, role switching should be facilitated by CSCW stems. Roles are also one of the group issues emerging during collaborative activities.

2.5   Computer Supported Collaborative Writing (CSCW)

Collaborative writing is a complex activity. Its complexity is due, among other factors, to co-writers' different strategies, social interactions and personalities. In order for new technologies to support this activity, providing former single-user tools with functions for multiple users is not enough, and several cognitive and social issues should be considered. Such issues ca be divided into: Task issues, Group Issues, Communication Issues and External Representation Issues (Sharples et a!., 1993). Furthermore, since writing is an open-ended and recursive task, it can be accomplished in several different ways, depending for example on the interactions between the process of planning, translation (the transformation of plans and ideas into text) and reviewing (Flower and Hayes, 1981, cited by Sharples et al, 1993): "writing [can] bring new ideas, which may lead the writer to revise goals and to embark on a new phase of planning and translation" (Sharples et al., 1993, p.12).

Figure 6 illustrates possible interactions between planning, translation and reviewing.

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Planning Translating Reviewing

Generating ideas Reading

Organizing Editing

Goal setting

6: Illustrating possible interactions between planning, translating and reviewing, from eta!., 1993]

2.5.1 Task Issues

Collaborative writing task can be accomplished through different levels of collaboration, ranging single "shared mind", where the text's development is the result of group discussions, to a "division of labour", where each partner works alone on a part of the text (Sharples et al., 1993). These levels of collaboration can be coordinated in a different ways, as demonstrated by the empirical works of Sharples (1992) and Rimmershaw (1992). Most activities follow models called sequential and reciprocal by Sharples (1993).

In the parallel model, writing is divided into sub-tasks on which writers work synchronously and autonomously, informing the others of their work. In the sequential model, the main task is divided into sub-tasks that are carried out in sequence by different writers, so that the product of a writer is passed to the next author in line. Finally, in the reciprocal model the work is the result of a close collaboration, where individual activities are carried out synchronously and at the same level. These different models of coordination entail the need for computer tools aimed at supporting collaborative writing

to provide efficient coordination management functions. For example, they should offer different ways to schedule activities and monitor progress (Sharples et al., 1993).

2.5.2 Group Issues

Among the group issues emerging during writing activities are roles, conflicts and group divisions.

Roles have a fundamental importance, since an author's role may determine the subtasks he has to accomplish as well as his social status. In a collaborative writing session, though, one's role can change several times. It is therefore important that a tool aimed at supporting collaborative writing encloses the possibility to define precise roles without preventing them from being changed during the process.

Conflicts are other typical features of group work, and they can influence it in either a constructive or destructive way. in order to lead conflicts to a positive ending it is necessary to realise they are present, find their source and solve them in the appropriate way. This process is known as conflict management (Wall et al, 1987). A collaborative writing tool should provide support to conflict management, for example presenting arising conflicts to the co-authors for their discussion and providing functions for expressing conflicting viewpoints (e.g. allowing alternative documents to be developed or providing good annotation systems) (Sharples et al., 1993).

When working in groups, it can happen that a group decides to split itself into subgroups. Such coalitions can promote efficient working or act against the main activity of the group, depending on the reasons for their creation. An ideal computer system should therefore be able to distinguish between different kinds of coalitions, encouraging only the formation of sub-groups whose effect is positive for the accomplishment of the final task.

2.5.3 Communication Issues

For obvious reasons, collaborative writing requires effective communication between co-writers. More specifically, several types of conversations may occur, ranging from discussions defining the subject of a document to comments aimed at drawing the attention of others to a particular section of the text.

Some collaborative writing technologies provide support for communication between co-authors, while others rely on external instruments for it. Nonetheless, the use of different tools to communicate about a shared document can be frustrating, as a consequence of problems in establishing a shared context for conversation, which is critical to the successful interpretation of a message (Sharples et a!., 1993). For example, in order to establish a shared context in a separated text-based environment (e.g. an electronic bulletin board), users might have to paste the text is being discussed inside their communication tool. Furthermore, when discussing about specific parts of a document it is also necessary to know which section is currently under discussion. Always taking text-based communication as an example, co-authors would have to use the aforementioned copy-and-

paste technique or give navigation cues like "Section 5, line 20" (Churchill et al., 2000) or "title number 1" (Rodriguez, 2003) to their partners. Navigation cues are also used in non-textual (e.g. oral) communication, which does not allow "pasting" of information.

For these reasons, several collaborative writing tools provide communication in the form of annotation functionalities (e.g. Collaboracio, Website #14 and Microsoft Word 2000, Website #15), chats (e,g, Anchored Conversations, in Churchill et al, 2000) and threaded conversations (e.g. Microsoft Word 2000). In particular, the advent of the World Wide Web and the easiness of web publishing made annotation systems a popular form of distributed, asynchronous collaboration. As a consequence, many commercial products providing the ability to annotate any web page were developed, such as Hypernix's Gooey (Website #16), and Third Voice (the company producing the software closed in April 2001, Website #17) (Cadiz et al., 2000).

2.5.4 External Representation Issues

External representations help writers to free themselves from the burden of mental representations. In collaborative writing these representations acquire additional functions, since they are also used to communicate the different states of the writing task among co-authors. Information contained in such representations includes collections of ideas, outlines, plans and annotations.

When including representational facilities in collaborative writing tools it is important to keep them divided from the actual text of the document. Moreover, the effect different media can have on representations has to be

considered, as well as practical issues regarding the way in which changes made by one author to such artifacts are communicated to other authors (Sharples et al 1993).

2.6   Internet-based and Web-based Groupware Technologies

The first generation of complex groupware technologies was based on private Works and proprietary communication protocols and clients. Such technologies provided users within a limited area with rich user interlaces and customized functions. The advent of Internet has changed these characteristics, making it possible for groupware systems to be extended to users in different areas, countries even continents. Changes have been even bigger if we consider the tools that make use of Web technologies, which give potentially any PC equipped with a web access to advanced resources.

The World Wide Web itself can be considered to be a collaborative technology in a weak sense of the word (Dix, 1996). Tim Berners-Lee himself (the creator of the World Wide Web) declared that it was developed to be a "pool of human knowledge, which would allow collaborators in remote sites to share their ideas and all aspects of a common project" (1994, p.76). As a matter of fact, the Web gives users connecting from all over the world the means to share information (in the form of across what looks like a unique large file system (Greenberg, in Crow et al., p1997). Anyway, as Dourish (in Crow et al., 1997) noted, the main value that has made the Web a positive "allied" of groupware is not access, but its integrative aspects. In other words, the fact that even though the Web was not created for audio/video streaming, interactive applications, etc., it has the power of

delivering all of these services within a coherent context, which is a characteristic that is highly functional to the needs of complex groupware tools. For example, thanks to this aspect of the web structure, in order to start a chart session there is no need to know the address of a user's machine or of a chat server, since one can just navigate to the appropriate web page, click and connect (Dix, 1996).

Another aspect that positively characterizes the Web in relation to groupware is its innate deictic function. In the World Wide Web, every document is identified through an URL and this offers an ideal method to support the continuous deixis (the act of referring to external factors) characterizing communication and collaboration.

Also because of these assets, along the years the use of Web-based collaborative's increased fast, especially in the field of project teams support (Wheeler et al., 1999). Other reasons for this fast proliferation are the open network client standards characterizing Internet and the World Wide Web (Wheeler et al., 1999). Such standards enable any-place-any-time interaction, and make it possible to use standard browsers as clients (in the case of Web-based tools), freeing new users n the necessity to install new software. This interoperability is very useful to widely dispersed working groups, where the localization of people in different organizations and countries used to make deploying existing groupware technologies very hard (Bentley et al., 1997). Other positive consequences to the use of standard browsers are a reduction in the users' need for training and set-up costs, and the Web's suitability to be used as an interface. As a matter of fact, it

combines platform independence and rapid distribution, two factors that are highly appreciated as interface characteristics.

Despite all these assets, Internet-based and Web-based groupware tools also encounter a series of new problems and challenges. Among the disadvantages associated with Internet-based and Web-based groupware tools are slowness and unreliability, uncertainty and perceived insecurity. For example, the HTTP protocol does not guarantee any specific transmission rate between servers and client. As a matter of fact, this also depends on factors such as networks and server loading, which may vary greatly even during the same session (Bentley et a!., 1997). Problems were more evident with the first generation of Web-based collaborative tools. In fact, these technologies' slowness, partially due to the low permeation of geographical broadband connections, was combined with a lack of advanced functions due to the limitations imposed by the original standards and protocols. Advanced Web-based groupware has now partially overcome these last limitations, thanks to relatively new technologies such as JAVA, XML and CORBA (Wheeler et al 1999). Nonetheless, speed partially remains a problem, and several systems that work without any problem on broadband intranets suffer performance problems in n environments, which are still largely in use for occasional long distance connections. Problems associated with Web-based groupware technologies can also be strictly related to their assets. For example, the same interoperability factor which positively make Web documents available to people using different platform also generate uncertainty as to how a certain document will be displayed. The appearance of a document may change when it is viewed in different browsers, and users can also cunstomise their view by selecting different

options; elements that may be unwanted when discussing the layout of a document also perceived insecurity problems should be considered (Eklundh et al., 2003). Hackers' attacks to big networks and findings of security bugs in commercial products are everyday and poor security is in no doubt one of the major barriers to a wider adoption internet-based systems.

CHAPTER THREE

3.0 Scenario-based Design Approach

As previously mentioned, this part of the project aims at discovering the needs characterizing students working together with documents and their respective courses and teachers, in order to define which tools should provide support to them. In order to determine the abovementioned needs, we will make use of problem scenarios o develop this system. Object of the project's observations were the students taking part in their respective courses and the teachers of these courses, at the Federal university of Technology, Yola.

Before discussing the scenarios, we will illustrate the main characteristics of scenario-based design, and provide more specific descriptions of the project.

3.1 Scenario-based Design

The use of scenarios in the design process is based on the assumption that computer technologies are more than just functionality. As a matter of fact, they restructure human activities and are conversely constrained in their development and application by the context in which human activities take place. Scenarios explicitly describe and document user activities in different stages of the design process, in order to support reasoning about situations of use and the aforementioned mutual influence (Carroll, 1999).

Scenarios are basically stories about people and their activities: they have a setting, a situation state, actors with personal characteristics and several

tools these actors interact with. The outcome of such stories are directly related to the actions and events narrated in the scenario, which in turn depend on the goals, plans and reactions of the actors (Rosson and Carroll, 2002). They are a versatile tool, and can be used for several activities, such as the evaluation of a system or of its appropriateness in relation to a set of requirements.

When used to evaluate a system, scenarios are developed according to the types of capabilities and service the system is supposed to provide for. Instead, when used to valuate the appropriateness of a technology to certain requirements (as in this project) they are written according to the types of action the system needs to support (Cugini et at., 1997). Such scenarios are called problem scenarios, "narratives of current practice that synthesize actors, themes, relationships, and artefacts discovered in the field work" (Rosson and Carroll, 2002, p.1043). it is important to remind that scenarios are not requirements themselves, i.e. they are not a specification of the features required by a system. They just serve as criteria for the future selection of requirements.

Problem scenarios can be entirely synthetic or based directly on an observed episode. For this project, the scenarios will be based on the episodes observed within the FUTY Academic System Project.

3.2 The FUTY Academic System Project

The project, financed by Franklyn Chukwunonso as a Masters Thesis in Operations research, F.U.T. Yola for the year 2007, seeks to understand and

support "learning in doing" in student groups working on projects and assignments. More specifically, the project focuses on writing and programming activities, and sees student groups' as nomadic work. As a matter of fact, students' activities often take place in a variety of locations, over a variety of durations, with different member attendances, and various kinds of technological support. Of particular interest to the project is how this nomadic aspects of work affects coordination among group members, and how bareness of others' activities is achieved and maintained within a group.

During the first part of the project, research was carried out on ethnographic studies the student groups attending FUTY, alternating observations of the whole class and particular working group.

During the study, a wide range and vast amount of data were gathered using participant observations and interviews. The objectives of the study were the observation of students' work and coordination with special focus on 'nomadicity', peer learning and collaborative writing.

In the next phase of the project, we shall be focusing on how information technology can improve students group learning today, and on how to design technologies that can help student's group work and learning

Thus for this project, we shall approach this design as a community-oriented technologies tide a classification of them. In order to select the technologies to include in this, we considered the needs of communities of practice. Therefore, before discussing this taxonomy it is necessary for us to

understand what communities of practice are and a categorization based on their needs is suitable for our field of interest.

3.3 Communities of Practice (CoP)

The term community of practice describes a group of people who share an interest in a domain of human endeavor and engage in a process of interaction and collaborative that creates bonds between them (Wenger, 2001). Possible examples of communities of practice are a garage band, a team of teachers.

Nonetheless, not every community is a community of practice. The three factors characterizing the members of these groups are a common domain, the belonging to a unity and a shared practice (often originating from a shared goal). A community of ice has to be focused on a specific domain of shared interest, and in order to be a community a minimum knowledge of that interest is necessary. Members of a CoP interact with each other (e.g. through discussions, reciprocal help, information sharing,

etc.), establishing relationships that make them a community. Finally, communities of practice need a shared practice. In other words, they need to develop a shared repertoire resource such as experiences, tools or stories.

In order to better explain these principles we propose a series of examples;
-A group of friends (not sharing any specific interest) constitutes a community that shares stories and experiences but does not constitute a

community of practice. As a matter of its members lack a common domain of human endeavor.

-Students of a high school share an interest in the study of a set of subjects, and may also be characterized by common practices. Nonetheless, since they do not all interact with each other they do not constitute a single CoP.

-Members of a fan club share a common interest (e.g. a certain kind of music) and constitute a community by meeting and sharing their opinions and knowledge. etheless, as long as they do not engage in activities (e.g. organizing meetings) or productions of artifacts (e.g. a fanzine) in which they can develop a shared practice they not constitute a community of practice.

-The Impressionists were focused on their common interest for art, used to meet in cafés discuss their contributions to the movement and shared common practices (e.g. the use colors instead of pure lines in their paintings). They therefore constituted a community practice, even though they used to paint alone.

Going back to our specific case, it should now be easy to see whether a group of students working together at a project (e.g. writing a report together) constitute a CoP or not.

Students involved in a collaborative activity are focused on a specific domain of interest subject of their studies), interact with each other (constituting in this way a community) and become engaged in the development of a common practice working her for the project. We can

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therefore identify a group of collaborating students as a unity of practice, and discuss Wenger's classification in the context of this study.

3.4 Wenger's Classification

In wenger's opinion, 200 l's market of community-oriented technologies did not include perfect product for a general community-of-practice platform. Nonetheless, he found a member of products with several functions that may help this kind of group. According e author, typical features useful to a community of practice would be:

- A homepage (to communicate its existence and activities)
- A conversation space (to discuss topics related to its domain)
- An area for floating questions within the community
- A directory of members' expertise in the domain
- A shared workspace (for eventual synchronous collaboration or meetings)
- A document repository (for their knowledge base)
- A search engine (to retrieve what they need in their knowledge base)
- Community management tools (to monitor members' activity and documents)
- A function allowing the creation of sub communities

The classified technologies providing such functionalities at different levels in eight ones derived from the empirical study of the market. When classifying products he on their main strategic intent (i.e. their primary intention).

-Desktop of the knowledge worker

-Online project spaces for team work

-Website communities

-Discussion groups

-Synchronous meeting facilities

-Community-oriented e-learning systems

- Access to expertise

-Knowledge repositories

What follows is a more specific description of Wenger's categories, associated with their typical features:

3.4.1 Desktop of the knowledge worker

Complete portal-like applications for knowledge workers, they are meant to be their point f entry for their work and various projects as well as their source of information. Typical features of this kind of product are:

- Customizable desktop
- Management of multiple views
- Full- text search engine
- Notification system
- Conversation space (e.g discussion boards, instant messaging)
- Project management facilities (e.g status monitoring)s

3.4.2 Online project spaces for team work

Online spaces allowing a project team to conduct its work. They are characterized oriented technologies (e.g task assignment, task scheduling etc). Typical features of this kind of product are

- Workspace management (e.g access rights, customization
- Team management facilities (e.g access control, team calendar, etc)
- Project management facilities
- Task management facilities
- Folder structure for sharing documents
- Searching engine
- Check out and version control of documents
- Notifications
- Conversation
- Presence awareness
- Polling and voting

3.4.3 Website communities

System emphasizing communities' interactions, similar to empowered discussion groups later); they support groups such as customers, partners, employees, etc., and can de specific services for customer relationship management. Typical features of this of product are:

- Members' identification (directories and profiles)
- Conversation spaces

- Presence awareness

- Folder structure for sharing documents

- Customizable community space

- Feedback and rating mechanisms

- Sub communities' support

- E-commerce facilities

- Calendar of events

- Administration console

3.4.4 Discussion Groups

Products aimed at loose communities, focusing on conversational interactions; they can range from text-based electronic bulletin boards to complex simulated worlds. Typical features of this kind of product are:
- Members' identification (directories and profiles)
- Advanced invitation
- Minutes- taking and action-items facilities
- Recording/archiving
- Attendance report

3.4.5 Community-oriented e-learning systems

Systems designed specifically to support educational activities; they can emphasize a se of community at varying degree according to their approach to teaching, ranging m virtual classrooms to more community-based approaches. Typical features of this kind of product are:

- Storage of content material

- Open and directed ways for students to discuss content

- Support for synchronous or asynchronous content delivery

- Presentation facilities

- Recording and broadcasting of classroom sessions

3.4.6 Access to expertise

Systems providing an in-depth description of community members' knowledge; they help to better determine who can provide an answer to a determinate question and often collect past questions/answers in order to develop a knowledge database. They can be structured

- Advanced conversation spaces (e.g. bookmarks for messages)

- Customizable community space

- File upload with postings

- Search engines for topics and messages

- Different forms of e-mail support

- Advanced discussions administration features (e.g. profanity filters)

- Sub communities' support

3.4.7 Synchronous meeting facilities

Systems supporting synchronous interactions for groups of variable size; they often use a combination of different media and can provide facilities supporting one-to-one, one-toy and many-to-many meetings with or without moderation. Typical features of this kind of product are:

- Presentation facilities

- Application sharing

- Web tours (visiting sites as a group)

- Audio/Video streaming

- Shared whiteboard

- Chart

- User reaction indicators (e.g. mood indicators)

- Polling and voting

- Presence awareness

In different ways, supporting different forms of mentorship. Typical features of this kind product are:

- Question-asking facilities

- Profiles of experts

- Feedback mechanisms

- Reputation builder

- Automated ranking of responses and experts

- Automated access to FAQ database

3.4.8 Knowledge repositories

Systems focusing on information and knowledge artifacts management; they range from documents' sharing facilities to databases and search engines. Typical features of this kind of product are:

- Documents storage, classification and indexing

- Document check-out and version control

- Search engines

- Document previews

- Meta-data management

- Recovery of deleted information

- Integration of different data sources

- Document format conversion

- Administration facilities (e.g., usage, security and access control)

It is interesting to notice how also Wenger dedicated a special category to synchronous tools following the example of Descants and Gallup, as also Dix et al. and Coleman did. On the contrary, neither Coleman nor Wenger considered groupware technologies supporting co-located collaboration worth a category on their own. This confirms the shift in groupware technologies' main focus hinted in section 2.3; along the years, as a consequence to social and technological changes, groupware technologies moved their center of attention from synchronous, co-located activities to long term, distributed ones. Interesting is also the fact that not all the systems belonging to a certain category provide same features, and some tools can be more alike than others, or include functions that e them closer to those of other categories.

To describe these variables, Wenger illustrated the collocation of technologies in these groups using a bi-dimensional chart that showed which category a product belonged to, how close it was to similar products or different categories and how suitable it was for supporting communities of practice. He also indicated (with an arrow) the eventual trend of a product towards providing more forms of support for communities of practice. Wenger' s graph is reproduced in Figure 15.

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In his graph, the author intentionally counterpoised categories dealing with the same "dimension of the social life of knowledge", to illustrate the tension between the different requirements communities of practice need to integrate:

(i)   Social structuring of knowledge: groups VS markets (i.e. more or less group focused)

(ii)   Sharing knowledge: interactions VS documents

(iii)   Context of learning: instruction VS joint projects (i.e. more or less instruction based learning)

(iv)   Management of attention: multiple focuses VS momentary, single focus

Figure 16 illustrates these interrelated dimensions and their polar expressions in Wenger's graph.

Figure 16, interrelated dimensions in Wenger's graph, From Wenger, 2001, p.431

The small arrows in Figure 15 illustrate certain technologies' movement towards providing greater support to communities of practice. This inevitably means a higher balance between the extremes just discussed. Using the author's words: "as system designers become increasingly aware of these dimensions and their interdependence, e is a convergence in the market of community-oriented technologies, [and] systems focus exclusively on one dimension are becoming rare".

3.5   Different Categories of E-learning Platforms

Because of its empirical origins and relative recentness, we think Wenger's groupware classification system is the taxonomy that best suits the purposes of this study. Anyway, since this project focuses on the use of collaborative technologies in educational contexts, find a more in-depth classification of the systems supporting teaching and learning necessary.

Talking about e-learning platforms, Wenger (2001) clarifies that they can emphasize the sense of community at varying degrees. This depends on the balance of the attention a stem pays to the two main components of the learning process: contents and individuals.

According to this, teaching/learning tools can be divided in different categories. The most used are Content/Course Management Systems, Learning Management Systems and Learning Content Management Systems. Anyway, it is important to notice that just like the groups composing the taxonomies mentioned in the chapter, also the clusters in which c-learning systems have been divided have fuzzy borders and tend to overlap.

3.5.1 Course Management Systems

Content management Systems (CMS) aim mainly at managing the development and structure of contents. Basically, they are structured repositories of material presented to their user through Web pages with customizable layouts (sometimes other media are also possible) CMSs are built on a central database storing the audio, video and textual contents in a portable format and normally include content authoring and publishing tools as well as versioning systems.

Basing a Website on a CMS allows its structure and look to remain independent from each other. Therefore the site's content can be easily updated also y users without any special knowledge of the technical aspects of web site design and maintenance, and it can more than one web site (e.g.

the websites of two different courses with overlapping content), thus reducing the effort.

Because of these characteristics, generic CMS (e.g. PHPnuke - Website #21) became among teachers who had the need to make their resources available to student of their (distance, blended or even traditional) courses in a quick and easy way.

As a consequence to their popularity in the educational and academic world, several dedicated CMS have been developed, with the name of Course Management Systems. One of the main differences between them and generic CMSs is the fact that they distinguish between teachers and students, while traditional systems (e.g. PHPnuke do not content Management Systems are general groupware products providing good it to the necessities of the educational world, while Course Management Systems are products developed ad hoc for that world. Since they derive from groupware aimed at the management of content, Course Management Systems concentrate their attention on learning material, usually fragmented in (Reusable) Learning Objects (RLOs), chunks of instructional material" (Patron, 2003). Typically, Learning Object are composed of three elements: a performance goal (what the learner will stand/accomplish after the learning), the learning content to reach that goal (e.g. PowerPoint slides, etc.) and some form of assessment to know whether or not the I was achieved. Learning Objects can also include metadata, tags describing their content and purpose (e.g. author, language, subject and level) (Greenberg, 2002).

3.5.2 Learning Management Systems (LMS)

Learning Management Systems are software products aimed at planning, delivering and learning events. Among other things, they can control students' and teachers' access to a teaching/learning system and their actions within it, support administrative practices such as students' enrolment, and help to produce reports of students' activities.

In the field of e-learning, LMSs assist and track the interaction between students and content, students and students and students and teachers. For example, an LM'S can provide a single point of access to several learning sources and automate the administration of learning programs, identifying students who need a particular course and telling them how it fits into their studies and when and how it will be available 'Greenberg, 2002).

In short, while a CMS supports mostly activities related to on-line course materials, an LMS supports mostly activities related to on-line students and teachers.

Another factor distinguishing LMSs from CMSs is the fact that "the smallest self contained piece of instruction in the LMS is the course itself. Therefore, if there is to be any reusability, it would have to be at the course level" (Nichani, 2001). Tools belonging to these two categories also support different educational attitudes. Because of their focus on content, Course Management Systems' structure reminds that of an organization delivering traditional distance courses, while Learning Management Systems make the platform more oriented towards constructivism and collaborative learning

focusing on participants (see chapter 1.1). Examples of LMSs are docebo LMS (Website #22) and 13- LMS (Website #23).

3.5.3 Learning Content Management Systems (LCMS)

Learning Content Management Systems are the result of the integration of the two categories just described; using a formula: "LCMS = LMS + CMS" (Nichani, 2001).

Therefore, LCMS pay equal attention to contents and users, and aim at the creation and delivery of the right material to the right user in the right moment of the learning experience. These tools focus their attention on the integration of ready-made and active resources, which can range from asynchronous self study material (RLOs) to collaborative learning tools. From a technical point of view, Learning Content management Systems are content repositories integrated with software modules supporting the planning and delivery of events. Among the events supported are synchronous and asynchronous communication sessions (De Vita).An example of LCMS is Lecando (Website #24), developed in Sweden.

In a parallel way to the (relatively) recent shift of educational theories towards constructivism and the changing aspects of distance learning described in chapter 1. 1, temporary e-learning systems tend to converge towards the LCMS category.

Anyway, it is still possible to divide them into the "primitive" groups just described considering the importance they give to the production and

delivery of learning materials to interactive and collaborative activities. CMSs focus more intensively on the creation and presentation of content, in Wenger's (2001) taxonomy (see Figure 15), they would be close to the border with the "Knowledge Exchange" group. LMSs' and LCMSs' main goal remains the activity of students; in Wenger's taxonomy, they would be close to opposite border, separating them from "Fleeting Interactions". Computer Supported Collaborative Learning tools (see chapter 1.2.3) can be seen as the extreme product of the shift just mentioned: tools that may not even provide managing, teaching or content modules, and focus entirely on communication and collaboration activities (somehow crossing the border towards the "Fleeting Interactions" category.

3.6   Conclusions

As we have seen, different scholars proposed different ways to classify groupware technologies and their functions. Such methodologies are pointedly influenced by the technology available at the moment of their definition (as seen in section 2.3 and 2.6.2) and based on different criteria. Even when they are based on similar criteria (e.g. rent interpretations of space and time, in Ellis et al., Grudin and Dix et al.) or consider the same factors (e.g. data, interactions and functionalities in Dix et al,'s and Coleman's classifications), these taxonomies provide different final results.

Nonetheless, there are two concepts all the scholars felt the need to point out: groupware 3ories tend to overlap and this tendency is to be seen as a positive factor, since the demand for integrated systems is high and their development desirable.

Integrated systems, nonetheless, can be characterized by a loss of focus, not providing features that might be desirable in a certain context while providing unnecessary ones. Example, a generic platform's chat facilities may not include functions a chat client ad hoc would have provided (e.g. a ban list[24]), while providing functions exploiting other features of the system but often unnecessary (e.g. a calendar to plan chat meetings). A possible solution to this problem is tailoring, discussed in the next paragraph.

3.7   Tailoring

Tailoring is "the activity of modifying a computer application within the context of its (Mørch et al., 1998). In other words, it is the adaptation of a system performed by its while using it, in order to satisfy the needs that were not properly accounted for in original "version". A graphical representation of tailoring is proposed in Figure 17.

(Figure 17: Tailoring (in Morch et al., 1998, p.4)]

Tailoring can involve various levels of an application, ranging from changing some parameters and switches to changing its source code (Mørch et al., 1998). Considering the specific case of groupware systems, tailoring addresses the support required to generic systems in different projects or different project phases (Teege et al., 1999), and en takes the form of modules or features which can be added to or removed from the system by its administrator or final users.

For this project therefore, we shall adopt the use of tailoring thee two methods of classification for the development of FUTY Web Base E-learning system.

CHAPTER FOUR

4.0 Introduction

This chapter addresses the technicalities involved in the design of a web based e-learning system for F.U.T. Yola. It shows the program code and scripts used in developing the groupware (software).It displays sample runs of the web based e-learning system designed and the designed web based e-learning system for F.U.T. Yola, encoded in CD format. Before we refer your attention to the designed e-learning system, it is necessary to review some of those technicalities involved, as below.

4.1 Programming Language Used

A groupware, such as a web based e-learning system like this one, usually has dozens of applications running behind it. Groupware cab be defined simply as the software that supports groups. More specifically, what differentiates this field of studies from CSCW is its technical focus: "Groupware addresses the technical problems of enhancing the human-computer interface by providing multiple-user facilities for, in principle, any application program. A good way to begin is to understand and determine the programs that would be required. More precisely, in the software taxonomy, groupware applications can be collated between applications supporting a single user and information systems, designed to support organizations. As may be easy to imagine, such technologies can vary greatly, ranging from collaborative editing tools to electronic meeting rooms.

Thus for this project, new web technologies were used. Those used are Java, XML and CORBA. PHP and Java scripts, embedded in HTML were also used.

4.2 Content Management

Learning Content Management Systems (LCMS) was used for this project content management. LCMS are the result of the integration of the two categories, using a formula: "LCMS = LMS + CMS", where LMS - Learning Management Systems are software products aimed at planning, delivering and managing learning events. Among other things, they can control students' and teachers' access to a teaching/learning system and their action within it, support administrative practices such as students' enrolment, and produce reports of students' activities.

CMS-Content Management Systems aim mainly at managing the development and structuring of contents. Basically, they are structured repositories of material presented to their users through Web pages with customizable layouts (sometimes r media are also possible). CMS5 are built on a central database storing the video and textual contents in a portable format and normally include content authoring and publishing tools, as well as versioning systems.

Therefore, LCMS pay equal attention to contents and users, and aim at the creation and delivery of the right material to the right user in the right moment of the learning experience. These tools focus their attention on the integration of ready-made and interactive resources, which can range from asynchronous self study material to collaborative learning tools. From a

technical point of view, Learning Content Management Systems are content repositories integrated with software modules supporting the planning and delivery of events. Among the events supported are synchronous and asynchronous learning.

4.3 Client Side Features

Everything mentioned so far is on the server side; users never see any of it. Everything they see goes through the browser and that is the result of client side development. This includes information architecture, site design, page design, rending forms, navigation, HTML programming to make the pages, image)n to create the image files, sound and video conversion, navigational Java and PHP scripting (both add functionality and interactivity to a web and of course, good content management.

4.4 Program Code

Below is the program code used to design this web based e-learning system for F.UT. Yola. It's a combination of Java, XML and CORBA. The Protégé 2000 phonology editor was used to create the e-learning ontology classes and properties. Please note that the Java and PHP scripts embedded in HTML will be displayed under the sample run of the web based e-learning system later on in this chapter.

```
/* *rdgversion 7.2.4 */
/* ReadyGo generated stuff based on settings */

BODY {color:#000000;}
```

```
BODY A {color:#0000a0;}
BODY A:visited {color:#8484ff;}
BODY A:hover {color:#0000a0;}
BODY.bulletpage {font-family:arial;color:#000000;}
BODY.tell {font-family:arial;color:#000000;}
BODY.test {font-family:arial;color:#000000;}
BODY.try {font-family:arial;color:#000000;}
BODY.exit {font-family:arial;color:#000000;}
BODY.gloss {font-family:arial;color:#000000;}
BODY.subpage {font-family:arial;color:#000000;}
BODY.sbspage {font-family:arial;color:#000000;}
BODY.chapter {font-family:arial;color:#000000;}
BODY.trypage {font-family:arial;color:#000000;}
BODY.help {font-family:arial;color:#000000;}
BODY.instr {font-family:arial;color:#000000;}
BODY.faqs {font-family:arial;color:#000000;}
BODY.map {font-family:arial;color:#000000;}
BODY.main {font-family:arial;color:#000000;}
BODY.quiz {font-family:arial;color:#000000;}
BODY.cert {font-family:arial;color:#000000;}
BODY.sst {font-family:arial;color:#000000;}
BODY.side {font-family:arial;}
BODY.glossidx {font-family:arial;}
DIV.side {font-family:arial;}
DIV.glossidx {font-family:arial;}
BODY.side {color:#000000;}
BODY.side A {color:#ffffff;}
BODY.side A:visited {color:#ffffff;}
BODY.side A:hover {color:#80ffff;}
BODY.glossidx {color:#000000;}
BODY.glossidx A {color:#ffffff;}
BODY.glossidx A:visited {color:#ffffff;}
BODY.glossidx A:hover {color:#80ffff;}
DIV.side {color:#000000;}
DIV.side A {color:#ffffff;}
DIV.side A:visited {color:#ffffff;}
DIV.side A:hover {color:#80ffff;}
```

DIV.glossidx {color:#000000;}

DIV.glossidx A {color:#ffffff;}

DIV.glossidx A:visited {color:#ffffff;}

DIV.glossidx A:hover {color:#80ffff;}

BODY.menu {font-family:arial;}

DIV.menu {font-family:arial;}

BODY.menu {color:#000000;}

BODY.menu A {color:#ffffff;}

BODY.menu A:visited {color:#ffffff;}

BODY.menu A:hover {color:#80ffff;}

DIV.menu {color:#000000;}

DIV.menu A {color:#ffffff;}

DIV.menu A:visited {color:#ffffff;}

DIV.menu A:hover {color:#80ffff;}

#logo {display:block;}

.sidetitle {display:block;}

OL.bullet1 {list-style-image:url("images/bullet.gif");}

OL.list {list-style-image:none;list-style-type:disc;}

OL.numlist {list-style-image:none;list-style-type:decimal;}

OL.letlist {list-style-image:none;list-style-type:upper-alpha;}

OL.bullet2 {list-style-image:url("images/smbullet.gif");}

.bulletimg1 {display:none}

OL.bullet3 {list-style-image:url("images/bullet3.png");}

.bulletimg2 {display:none}

OL.bullet4 {list-style-image:url("images/bullet4.png");}

.bulletimg3 {display:none}

OL.bullet5 {list-style-image:url("images/bullet5.png");}

.bulletimg4 {display:none}

OL.bullet6 {list-style-image:url("images/bullet6.png");}

.bulletimg5 {display:none}

.bulletpage span.true .linkdiv{background-color:#ffffff}

.bulletpage span.tip .linkdiv {background-color:#ffffff}

.bulletpage span.step .linkdiv {background-color:#ffffff}

.bulletpage span.try .linkdiv {background-color:#ffffff}

.sbspage TR.sbsheadrow {background-color:#ffffff}

.bulletpage span.step span.linkdiv TABLE {background-color:#ffffff;border:1px solid black;width:80%;}

.bulletpage span.try span.linkdiv table {background-color:#ffffff;border:1px solid black;width:80%}span.step span.linkdiv table td.firstcol {width:10%;}

.menu .homeimg {display:none}

.menu .glossimg {display:none}

.menu .helpimg {display:none}

.menu .tocimg {display:none}

.menu .faqimg {display:none}

.menu .exitimg {display:none}

/* *rga --------------------- */

/* *en:classic site No page border, Fwd/back buttons on right, uses images for navigation
 */

/* Course wide properties*/

BODY {padding:0em 1em 0em 1em;}

IMG {}

TABLE {}

  .bulletpage TABLE { }

  .tmmpage TABLE {}

  .glosspage TABLE {}

  .sbspage TABLE{}

  .chapter TABLE{}

  .main TABLE{}

#pagediv{}

.baseline {border-width:0 0 0 0; border-color:gray;border-style:outset;width:100%;margin-top:1em;}

/* Course wide navigation forward, backward, and up buttons - changes here will overwrite WCB settings*/

.fwdbackbtns {position:absolute;right:1em;} /* location for fwd and back buttons */

#backbtntop {}   /* button for back page - top of page */

#backbtntopalt {display:none} /* text for back page - top of page */

#fwdbtntop {}   /* button for fwd page - top of page */

#fwdbtntopalt {display:none}   /* text for fwd page - top of page */

#backbtnbottom {} /* button for back page - bottom of page */

#backbtnbotalt {display:none} /* text for back page - bottom of page */

#fwdbtnbottom {}   /* button for fwd page - bottom of page */

```
#fwdbtnbotalt {display:none}   /* text for fwd page - bottom of page */
.upbtn {position:absolute;right:1em;} /* location for up button*/
#upbtntop {}        /* button for up page - top of page */
#upbtntopalt {display:none}    /* text for up page - top of page */
#upbtnbot {margin-top:0pt;}    /* button for up page - bottom of page */
#upbtnbotalt {display:none}    /* text for up page - bottom of page*/

/* Global settings for all title lines */
.titleline {margin-left:15pt; margin-top: 10px;}
.title{ color: #224597; margin-top: 10px; font-weight:bold;}
SPAN.titleimg {}

/* Global settings for all summary text */
#summarydiv{margin-left:15pt}
#summaryspan{}

/* Global settings for header and footer */
.header {}
.footer {margin-bottom:0pt;}

/* Global settings for all page text */
.txtblk {margin-top:1em;vertical-align:top;margin-left:15pt} /* text block */
.txtcenter {text-align:left;}
.txtright {}
.txtleft {}
#audiobtn {}

.graphicleft{float:left;}
.graphiccenter{text-align:center;}
.graphicright{float:right;}

.summaryspan {display:inline;}
.fwdbackbtns IMG {border:none;}
.upbtn IMG {border:none;}
#fwdbtnbot IMG {border:none;}

TD {vertical-align:top;}
```

```
TR {vertical-align:top;}
IMG {vertical-align:top;}
IMG .audio {vertical-align:top;}
.fwdbackbtns IMG {vertical-align:bottom;}
.upbtn IMG {vertical-align:bottom;}
SELECT {vertical-align:text-top;}
#logo A {vertical-align:top;}
#fwdbtnbot IMG {vertical-align:top;}
#fwdbtnbotalt {vertical-align:top;}
#backbtnbot IMG {vertical-align:top;}
#backtnbotalt {vertical-align:top;}
.main #fwdbtnbot IMG {vertical-align:baseline;}
.main #fwdbtnbotalt {vertical-align:baseline;}
TABLE.menu TD.menu {text-align:center;}
BODY.side TABLE IMG {border:none;}

TABLE.side {width:100%;}
TABLE.side TD {padding:1px;margin:1px}
.linkdiv TD.firstcol {width:10%;}
TABLE.subtext {border:1px solid black;width:80%;}
.linkimg IMG {border:none;}
TABLE.glosstable {border:none;width:90%;}
#save IMG {border:none;}
#goto IMG {border:none;}
#report IMG {border:none;}
.menu A IMG {border:none;}.nm2let {display:none; margin-right:1em;}
.nm3let {display:none; margin-right:1em;}
.titlelet {display:none;}
/* *rge -------------------- */
/* *dk: base1 dk
*en:classic: Course title is large, bold, italic, centered;
summary is left aligned with a 15pt margin;
continue is left aligned
copyright is centered
*fr: base1 fr
 */
```

```
/* main page */
.main .title {font-size:250%;color:black;text-align:center;font-style:italic;font-weight:bold;  margin:20pt 0
20pt 0;}/* course title */
.main summarydiv{}
.main #summaryspan{display:block; margin:20pt 0 20pt 20pt} /* course summary */
.main .coursetitle {color: #224597;}
.main .coursename {font-style:italic;margin-right:3pt} /* course name in copyright line */
.main .continue {margin:20pt 0 20pt 90pt} /*continue with course text*/
.main .copyright {margin:20pt 0 10pt 90pt;font-size:80%;} /* text in copyright line */
.main #fwdbtnbottom {display:inline;} /*continue with course button*/
.main #fwdbtnbotalt {}
.main .footer {}
/* SST registration form */
.main FORM {margin-top:20pt; margin-left:20pt} /* registration form block */
.cookiemsg {font-style:italic; margin-left:30pt;} /* Student instructions for SST registration */
.formtitle {font-size:120%;} /* registration form title */
/* *rgc --------------------- */
/* *en:classic:
title is large, bold, italic,  left aligned with a 15pt margin;
summary is large, left aligned with a 15pt margin;
includes graphic before title
chapter index is numbered
 */


/* Chapter table of contents page */
.chapter .titleline {margin:15pt 0 15pt 25pt} /*chapter title line */
.chapter .title {font-size:150%;font-weight:bold;font-style:italic} /* chapter title */
.chapter .titleimg {margin-right:10pt; display:none;} /* image before chapter title */
.chapter SPAN.titlenum {} /* chapter number before chapter title */
.chapter #summarydiv {font-weight:bold;margin:10pt 0 10pt 25pt;width:60%;} /* chapter summary, to add
border: border:black solid;border-width:.5pt 0 0 .5pt*/
.chapter .tocdiv {} /*TOC listing as numbers*/
.chapter .toc {display:block;font-size:100%;margin-left:15pt;list-style-type:none;}  /*TOC  listing  as
bullets*/
.chapter OL.toc {} /*TOC listing as numbers*/
.chapter LI.toc {} /*TOC listing as bullets*/
.chapter .fwdbackbtns {}
```

.chapter #backbtntop {}

.chapter #backbtntopalt {}

.chapter #fwdbtntop {}

.chapter #fwdbtntopalt {}

.chapter #backbtnbottom {}

.chapter #backbtnbotalt {}

.chapter #fwdbtnbottom {}

.chapter #fwdbtnbotalt {}

/* *rgb -------------------- */

/* *vertical=0

*en:classic

title is large, bold, left aligned with a 15pt margin

summary is left aligned with a 15pt margin

sub pages are on bottom, with graphics

 */

/* Bullet page - subpage links can be placed left or right + hack for IE 5 */

#bulpagediv{} /* surrounds bullets + text-box subpage links */

#bulpagediv55{}

#buldiv {} /* surrounds just bullets */

#buldiv55 {}

/* If page has no Test, TellMore, NetLinks or Subpage without text */

#bulpagediv_no{} /* bullet page border */

#bulpagediv55_no{}

/* If page has no True, Tip, Try-this, SBS or Subpage with text */

#buldiv_no {}

#buldiv55_no {}

.bulletpage .titleline {margin: 15pt 0 15pt 15pt;} /* title line control */

BODY.bulletpage .titleimg {float:left;} /* graphic before page title */

.bulletpage SPAN.titlenum {font-size:110%;}/* chapter and page number before page title */

.bulletpage .title{font-size:110%;} /* page title */

.titletable {} /* border around title line */

.bulletpage #summarydiv {margin: 20pt 0 20pt 20pt; font-size:100%}/* page summary*/

/* So we can put subpage links right or left. This includes a hack for IE 5 */

.bulletdiv {display:block;} /* surrounds all bullets */

.bulletimg1 {display:none;} /* bullet graphic level 1*/

```
.bulletimg2 {display:none} /* bullet graphic level 2*/

.bulletimg3 {display:none} /* bullet graphic level 3*/

OL.bullet1 {list-style-type:none;}/* bullet list style - list e.g. numbering scheme */

LI.bullet1 {margin:10pt 0 10pt 0;}  /* individual bullet properties, e.g color, margin */

OL.bullet2 {list-style-type:none;}

LI.bullet2 {}

OL.bullet3 {list-style-type:none;}

LI.bullet3 {}

OL.bullet4 {list-style-type:none;}

LI.bullet4 {}

OL.bullet5 {list-style-type:none;}

LI.bullet5 {}

OL.bullet6 {list-style-type:none;}

LI.bullet6 {}


/* For older browser (NS4.x) using OL above doesn't work.  Also for classic ReadyGo format, the items
below are used instead of OL above.  */

.bullettable{width:90%;}/* block around bullet list */

.bullet0 {}

.bullet1 {}/* actual bullet text */

.bullet2 {}

.bullet3 {}

.bullet4 {}

.bullet5 {}

.bulletimg1 {margin-left:10pt; margin-top:10px;} /* actual bullet point graphic - identifying a graphic here
will overwrite WCB chosen bullets */

.bulletimg2 {margin-left:10pt; margin-top:10px;}

.bulletimg3 {margin-left:10pt; margin-top:10px;}

.bulletimg4 {margin-left:10pt; margin-top:10px;}

.bulletimg5 {margin-left:10pt; margin-top:10px;}

.bulletimg6 {margin-left:10pt; margin-top:10px;}


/*Global settings for drill down elements */


#subpagelinkstext {margin: 10pt 20pt 5pt 20pt; text-align:left;}/*location for drill down bars */

.linkdiv {width:80%; } /*background for drill down bars */

.linkdiv2 {} /* location for drill down links */
```

#subpagelinksbtn {display:block;padding-right:2pt;width:100%} /*location of drill down buttons */

.linktabl {margin-left:4pt}/*text within drill down bars */

.linkimg { float:left;}/*graphics for all drill down titles */

.linkimg2 { vertical-align:middle;}/*mouse over graphics for all drill down titles */

.linkalt   {display:none;float:left;vertical-align:middle;font-size:80%;   font-weight:bold;margin-top:10px;}/*all drill down titles as text */

.link { display:block;margin-left:75pt; font-size:90%;}/*drill down bar text */

#subpagelinksbtn {margin-left:15pt}/* block for links to drill down pages */

/*Settings for individual drill down elements */

.tipdiv {} /* tip border - will overwrite WCB */

#tiptabl {border: solid #000000 1px;} /* tip background-color - will overwrite WCB */

.tipimg {float:left;} /* tip graphic - will overwrite WCB */

SPAN.link SPAN.tip {} /* tip text*/

.truediv {border: #000000 solid 1px;} /* true border - will overwrite WCB*/

#truetabl {} /* true background-color - will overwrite WCB*/

.trueimg {} /* true graphic - will overwrite WCB */

SPAN.link SPAN.true {padding-left:50px;} /* true text */

SPAN.step DIV.linkdiv {} /* Step border - will overwrite WCB */

.linktablstep {} /* Step background-color - will overwrite WCB */

SPAN.linkimg SPAN.step {} /* step graphic - will overwrite WCB */

SPAN.linkalt SPAN.step {} /* step rollover graphic - will overwrite WCB */

SPAN.link SPAN.step {} /* step text */

SPAN.subtext DIV.linkdiv {} /* Sub page as bar border - will overwrite WCB */

SPAN.subtext .linktabl {} /* Sub page as bar background-color - will overwrite WCB */

SPAN.linkimg SPAN.subtext {} /* sub page as bar graphic - will overwrite WCB */

SPAN.linkalt SPAN.subtext {} /* sub page as bar rollover graphic - will overwrite WCB */

SPAN.link SPAN.subtext {} /* sub page as bar text */

SPAN.try DIV.linkdiv {border:gray double;} /* try this border - will overwrite WCB */

.linktabltry {} /* try background-color - will overwrite WCB */

SPAN.linkimg SPAN.try {} /* try graphic - will overwrite WCB */

SPAN.linkalt SPAN.try {} /* try rollover graphic - will overwrite WCB */

SPAN.link SPAN.try {} /* try text */

SPAN.netlink DIV.linkdiv2 {}/* netlink border - will overwrite WCB */

SPAN.netlink .linktabl {} /* netlink background-color */

SPAN.linkimg SPAN.netlink {} /* netlink graphic - will overwrite WCB */

TABLE.netlink {margin-right:3em;} /* netlink linkto location */

TABLE.netlink TD {} /* netlink linkto location */

#groupnetlink TABLE, #groupnetlink TD {font-size:80%;} /* netlink linkto location */

TD.netlink {}

#groupnetlink {} /* border around linkto */

SPAN.linkalt SPAN.netlink {} /* netlink text instead of graphic */

#link.netlink {text-align:left;margin-left:0pt;width:20%} /* netlink linkto text */

SPAN.tell DIV.linkdiv2 {} /* Tell Me More border - will overwrite WCB */

SPAN.tell .linktabl {} /* Tell Me More background-color */

SPAN.linkimg SPAN.tell {} /* Tell Me More graphic - will overwrite WCB */

SPAN.linkalt SPAN.tell {} /* Tell Me More rollover graphic - will overwrite WCB */

SPAN.link SPAN.tell {} /* Tell Me More text */

#linkdiv2.test {} /* Test border - will overwrite WCB */

.linktabltest {} /* Test background-color */

SPAN.linkimg SPAN.test {} /* Test graphic - will overwrite WCB */

SPAN.linkalt SPAN.test {} /* Test rollover graphic - will overwrite WCB */

SPAN.link SPAN.test {} /* Test text */

SPAN.quiz DIV.linkdiv2 {} /* Quiz border - will overwrite WCB */

SPAN.quiz .linktabl {} /* Quiz background-color */

SPAN.linkimg SPAN.quiz {} /* Quiz graphic - will overwrite WCB */

SPAN.linkalt SPAN.quiz {} /* Quiz rollover graphic - will overwrite WCB */

SPAN.link SPAN.quiz {} /* Quiz text */

SPAN.subbtn DIV.linkdiv2 {} /* Sub page bottom border - will overwrite WCB */

SPAN.subbtn .linktabl {} /* Sub page bottom background-color */

SPAN.linkimg SPAN.subbtn {float:left;vertical-align:middle;font-size:100%; font-weight:bold;margin-top:10px;} /* Sub page bottom graphic - will overwrite WCB */

SPAN.linkalt SPAN.subbtn {} /* Sub page bottom rollover graphic - will overwrite WCB */

SPAN.link SPAN.subbtn {} /* Sub page bottom text */

```
SPAN.test DIV.linkdiv2 {}
TABLE.testtable {}
.bulletpage .nm3 {display:none;}
.bulletpage .nm3let {display:none;}
.scoreinstr {display:block;}
/* *rgd --------------------- */
/* *en:title is large, bold, left aligned with a 15 pt margin
text has a 15 pt margin
 */


.tell .titleline {margin-left:15pt; } /* title line control */
.tell .title{font-size:120%;font-weight:bold} /* page title */
.tell .titletable{} /* title line background */
.tell .txtblk {margin:10pt 0 10pt 10pt;margin-left:10pt;margin-left:15pt; } /* page text */
.try .titleline {margin-left:15pt; } /* title line control */
.try .title{font-size:120%;font-weight:bold} /* page title */
.try .titletable{} /* title line background */
.try .txtblk {margin:10pt 0 10pt;margin-left:15pt;} /* page text */


/* Step by Step (sbs) */
.sbspage .titleline {margin-left:15pt;} /* title line control */
.sbspage .title{font-size:120%;font-weight:bold} /* page title */
.sbspage .titletable{} /* title line background */
.sbspage #summarydiv {margin-left:15pt;} /* page summary */
.sbspage TABLE.sbstable {margin-left:15pt;border:solid 1pt gray;width:80%} /* border around sbs table */
.sbspage  TABLE.sbstable  TR.sbsheadrow  {background-color:#cfffcf;  font-weight:bold}  /*  sbs  table
heading */
.sbspage TABLE.sbstable TD,TH {border:outset 1pt gray;} /* border around cells in a sbs table */
.sbspage TD.sbsnum, TH.sbsnum {font-weight:bold;text-align:center;width:10%} /* numbers column (first
column) in an sbs table */
.sbspage TD.sbsinstr, TH.sbsinstr {} /* instruction column (second column) in an sbs table */
.sbspage TD.sbsgraph, TH.sbsgraph {} /* content column (third column) in an sbs table */
.sbspage #summarydiv {margin:10pt 0 10pt; } /* page text */
.sbsgraphic {} /* graphic in content column (third column) in an sbs table */
.sbsgraphictxt {} /* text in content column (third column) in an sbs table */
.sbsmore {margin-top: 8pt;margin-left:15pt;} /* text under sbs table */
```

```css
.quiz .titleline {} /* title line control */

.quiz .title{font-size:120%;font-weight:bold} /* page title */

.quiz .titletable{margin:10pt 0 0 10pt} /* title line background */

.quiz #summarydiv{border:none; margin:10pt 0 10pt 15pt;} /* summary border */

.quiz #summaryspan{font-size:100%} /* summary text */

.quiztable {width:90%;font-size:100%;} /* quiz question and choice block */

.quiz TD.quiztable {margin-left:25pt} /*table cells for quiz choices */

.quizimg {margin-left:15pt;} /* quiz question graphic e.g."Q" */

.quiznum {font-weight:bold;font-size:120%} /* number before quiz question text */

.quizquest{display:block;display:table-cell;vertical-align:top; } /* quiz question number and text*/

.quizans1 {display:table-cell;vertical-align:top;font-size:90%} /* Quiz choice text for choice and first column */

#quiza {display:block;}

.quizanum1 {font-weight:bold;display:table-cell;vertical-align:top;} /*quiz choice number for choice and first column */

.quizalet1 {display:none} /* quiz choice letter for choice and first column */

.quizans2 {vertical-align:top;display:table-cell;} /* quiz choices text for second column*/

.quizanum2 {} /* quiz choice matching columns - second column number */

.quizalet2 {font-weight:bold;display:table-cell;vertical-align:top; } /* quiz choice matching columns - second column letter */

#quizcov1 {margin-left:10pt; display:block;} /* quiz cover */

#quizcov2 {margin-left:10pt;display:block;} /* quiz cover*/

#quizcov3 {margin-left:10pt;display:block;} /* quiz cover*/

#quizcov4 {margin-left:10pt;display:block;} /* quiz cover*/

#quizcov5 {margin-left:10pt;display:block;} /* quiz cover */

#quizcov6 {margin-left:10pt;display:block;} /* quiz cover */

#quizcov7 {margin-left:10pt;display:block;} /* quiz cover */

#quizcov8 {margin-left:10pt;display:block;} /* quiz cover */

#quizcov9 {margin-left:10pt;display:block;} /* quiz cover */

#quizcov10 {margin-left:10pt;display:block;} /* quiz cover */

#quizright1 {margin-left:20pt;display:none;height:207px;font-weight:bold;width:80%;text-align:center} /* quiz roll-over */

#quizright2 {margin-left:20pt;display:none;height:207px;font-weight:bold;width:80%;text-align:center} /* quiz roll-over */

#quizright3 {margin-left:20pt;display:none;height:207px;font-weight:bold;width:80%;text-align:center} /* quiz roll-over */
```

#quizright4 {margin-left:20pt;display:none;height:207px;font-weight:bold;width:80%;text-align:center} /* quiz roll-over */

#quizright5 {margin-left:20pt;display:none;height:207px;font-weight:bold;width:80%;text-align:center} /* quiz roll-over */

#quizright6 {margin-left:20pt;display:none;height:207px;font-weight:bold;width:80%;text-align:center} /* quiz roll-over */

#quizright7 {margin-left:20pt;display:none;height:207px;font-weight:bold;width:80%;text-align:center} /* quiz roll-over */

#quizright8 {margin-left:20pt;display:none;height:207px;font-weight:bold;width:80%;text-align:center} /* quiz roll-over */

#quizright9 {margin-left:20pt;display:none;height:207px;font-weight:bold;width:80%;text-align:center} /* quiz roll-over */

#quizright10   {margin-left:20pt;display:none;height:207px;font-weight:bold;width:80%;text-align:center} /* quiz roll-over */

.test .titleline {} /* title line control */

.test .title{font-size:120%;font-weight:bold} /* page title */

.test .titletable{} /* title line background */

.tstinstr {margin:10pt 0 10pt 15pt;font-size:100%} /* summary at top of page */

.test TABLE.testtable {width:90%;margin-left:10pt;} /* test question and choice block */

.test TABLE.testtable TD {}

.test TD.testqimg {vertical-align:top;} /* image before test question */

.test TD.testquest {vertical-align:top;} /* test question text */

.test TD.testans {border:none;}

.testq {}

.testqnum {font-size:90%;vertical-align:top;display:table-cell;} /* test question number text */

/* doesn't make sense for > 100 quest #testqlet {display:none;} */

.testquest {font-size:90%;margin-bottom:5pt;display:table-cell;}/* test question text */

.testansgrp {margin-left:0em;display:block;width:100%;}

.testa {display:block;font-size:90%} /* grouping for each possible answer */

.testansgrp.testpref {border:black 2pt double; width:60%}

.testanum {display:none;font-weight:bold;font-size:100%;vertical-align:top;} /* test choices numbers (1 2 3) */

.testalet {font-weight:bold;font-size:100%;} /* test choices letters (A B C) */

.testans {font-size:100%;} /* test choice text */

SPAN.testansgrp SPAN.testpref {margin-right:1em;} /* preference question choice text */

.testquestimg {}

.testansimg {}

.test TABLE.testpref {width:100%;border:none;}

#result {font-weight:bold;margin:5pt 20pt 20pt 20pt;} /* scoring instructions "your score will ..." */

#result.instr {}

#result.quest {}

#result.rightans {}

#result.wrongans {color:red}

#result.img {}

#testbutton {margin-left:20pt;margin-top:10pt;} /* test button */

DIV.testans {display:inline;}

.testans .rankseq {} /* Individual answer in sequence/rank question */

.testans .matchsrc {} /* Source in drag/drop matching colum */

.testans .matchtgt {} /* Target in drag/drop matching colum */

.matchdrop {}

.testans .dragimgsrc {} /* Source in drag/drop to image */

.testans .linesrc {} /* Source in line-drawing matching colum */

.testans .linetgt {} /* Target in drag/drop matching colum */

.testans .selmult {} /* Selection box for multiple select from pulldown */

.testans .select {} /* Selection box for single select from pulldown */

.sst #summarydiv {} /* Most text from SST is in the summary */

.sst #summaryspan {}

.sst TABLE.testtable {} /* Table that controls layout of test pages */

.sst TD.testqimg {} /* "Q" image next to each question */

.sst TD.testquest {} /* text of a question on the question page */

.sst span.testansgrp span.testpref {} /* group of selection titles for preference questions */

.sst span.testans span.testpref {} /* text of individual preference/likert selection */

.sst TD.testpref{} /* table cell for preference questions */

.sst span.submit span.test {} /* "Submit" button for all test/forms */

BODY.sst SPAN.titleline {} /* Title line when SST generates */

BODY.sst SPAN.titleimg {vertical-align:top;float:left;} /* Title image for SST-generated page */

BODY.sst SPAN.title{} /* Title text for SST generated page */

BODY.sst SPAN.form {} /* Any forms such as registration generated by SST. Test forms are handled separately */

SPAN.formtitle {} /* Title above form for registration */

/* The following are used for feedback/results pages with SST */

span.resultblk span.txt {} /* For text "feedback:" and "Question Number"*/

span.resultblk span.rightans {color:green;} /* If displaying correct answer to question */

span.resultblk span.wrongans {color:red;} /* If displaying student's answer when it is wrong. */

span.resultblk span.rightquest {color:green;} /* If displaying question text - student answers right */

span.resultblk span.wrongquest {color:red;} /* If displaying question text - student answers wrong */

span.resultblk span.youans {} /* For text "You answered:" */

span.resultblk span.corrans {} /* For text "Correct answer: " */

span.resultblk span.num {margin-left:1em;width:3em;} /* Question number */

span.resultblk IMG {} /* Any images such as "Q", check, and "X" that appear in feedback */

span.resultblk span.select {} /* For multiple-selection feedback */

.testbnum {}

.testblet {display:none}

/* *rgh -------------------- */

/* *en:classic

bookmark buttons are centered, 15pt's below last chapter listing

 */

BODY.side {padding:0em; background: #5F84DC url(images/sidebar.gif) no-repeat;}

.sidetitle {text-align:center;margin:20pt 0 10pt;} /* course title */

.side #logo {text-align:center;} /* sidebar graphic - will overwrite WCB */

/* to float bottom add: ;margin-bottom:1pt;position:fixed;bottom:2pt;} */

.side #pagediv {margin-left: 10px;} /* sidebar border*/

.side {margin:0;padding:0}

.side TABLE TD,TH {}

/* For button-style links: .side TABLE TD.sidebut {border:gray outset medium;font-weight:bold;} */

.side .sidetri {}

.side {font-weight:bold; text-decoration: none;}

.side A {font-size: 14px; text-decoration: none;}

.side A:visited {color: #FFFFFF; text-decoration: none;}

.side A:hover {color: #80FFFF; text-decoration: none;}

.side .savegoto {margin-top:25pt;text-align:center}

.side #save {}

.side #goto {}

.side #report {}

.trigger{cursor: pointer;}

.sublevel1 {position:relative;left:10pt;display:none;}

```css
.layer1 {font-size:8pt;background-color:blue;}
.sublevel2 {position:relative;left:10pt;display:none;}
.layer2 {font-size:8pt;background-color:red;margin:0;}
#trigger1{cursor: pointer;}
.side .sub1 {}
.side .sub2 {}
.side .nm1 {}
.side .nm2 {}
.side .nm3 {}
#sidebktxt {}
#menubktxt {}
/* *rgf --------------------- */
/* *en:classic
sidebar has indentation, text-based links on menu,
services bar text is bold, centered
 */


/* services bar */
BODY.menu {margin-left: 50%;padding:0em;}
.menu #menupagediv {padding-top:  50px;} /* services bar border*/
.menu {}
.menu A {font-size: 12px; color: #FFFFFF; text-decoration: none;}
.menu A:visited {color: #FFFFFF; text-decoration: none;}
.menu A:hover {color: #80FFFF; text-decoration: none;}
.menu  TABLE{width:100%;font-weight:bold; vertical-align: bottom;}  /* menu  page  table - used for
spacing */
.menu IMG {}
.menu TD, TR {}
.menu .hometxt {} /* text for the home button */
.menu .homeimg {} /* graphic for the home button */
.menu .faqtxt {} /* text for the FAQ button */
.menu .faqimg {} /* graphic for the FAQ button */
.menu .glosstxt {} /* text for the glossary button */
.menu .glossimg {} /* graphic for the glossary button */
.menu .helptxt {} /* text for the help button */
.menu .helpimg {} /* graphic for the help button */
.menu .toctxt {} /* text for the TOC button */
```

```
.menu .tocimg {} /* graphic for the TOC button */
.menu .exittxt {} /* text for the EXIT button - used for LMS's */
.menu .exitimg {} /* graphic for the EXIT button - used for LMS's */


.help .titleline {margin:5pt 0 10pt 15pt;width:90%;border:solid black;border-width:0 0 0pt 0;} /* Help title
line (graphic and title)*/
.help .title{font-size:120%;} /* help title */
.help .titletable{}
.help .titleimg {display:none;margin-right:10pt;}
.help #summarydiv {display:block;margin:10pt 0 20pt 15pt;} /* summary text */
.help #summaryspan {}
.help A {}
BODY.help DIV.txtblk {width:80%;margin:5pt 0 5pt 0;}
BODY.help DIV.txtleft {font-size:90%;display:block;float:left;width:60%;}
BODY.help DIV.txtright {font-size:90%;display:block;}
.faqs .titleline {margin:5pt 0 10pt 15pt;width:90%;border:solid black;border-width:0 0 0pt 0;} /* FAQ title
line (graphic and title) */
.faqs .title{font-size:120%;} /* FAQ title */
.faqs .titletable{}
.faqs .titleimg { margin-right:10pt; display:none;} /*graphic before FAQ title */
.faqs #summarydiv {margin:10pt 0 10pt;} /* border around summary */
.faqs #summaryspan {margin-left:15pt;display:block} /* summary text */
.faqs H1.cat {text-align:center;font-size:140%} /*category title */
.faqs H2.cat {margin-left:20pt;font-size:100%;} /* category title before question listing and Q and A */
.faqs H2.ans {text-align:center;font-size:120%;} /* answer title */
.faqs H1.quest {text-align:center;font-size:120%} /*question title */
.faqs OL.quest {list-style-image:url("images/q.png");list-style-type:none;} /* question answer text */
.faqs LI.quest {margin-left:20pt;font-size:90%;}
.faqs .anstxt {font-style:italic;font-size:100%;margin-left:15pt;margin-top:5pt;margin-bottom:5pt} /* the
word answer before the answer */
.faqs .ans {margin-left:30pt;font-size:90%;} /* faq answer */


.map #outerdiv {}
.map .titleline {margin-left:15pt;width:90%;margin-top:2em;} /* map title line */
.map .title{font-size:120%;} /* Map Title */
.map .titleimg {display:none; margin-right:1pt; } /*graphic before Map title */
.map #pagediv{}
```

.map A {text-decoration:none;font-size:90%;} /*all linkto text in map*/

.map OL {list-style-image:url("images/bullet.gif")} /* chapter listing bullet points - to display as a bullet point use ;list-style-image:url("images/bulletpoint.gif"); to list as numbers: list-style-type:decimal;margin-left:15pt*/

.map OL LI {} /*page listing bullet points */

.map OL OL LI { list-style-image:url("images/smbullet.gif")} /*sub-page listing bullet points */

.map OL OL OL {list-style-image:none;list-style-type:upper-alpha;}

.map OL OL OL LI {}

/* support for older browsers */

.map .nm1 {display:none;} /*chapter listing as a number */

.map .nm2 {display:none;} /*page listing as a number */

.map .nm3 {display:none;} /*sub-page listing as a number */

BODY.glossidx {background: #5F84DC none;}

.glossidx {}

.glossidxitem {} /*term listing on sidebar */

.glossidxitem:before {} /* bullet point before term listing on sidebar */

BODY.glossidx .sidetri {display:none;}

BODY.glossidx .sidetri {display:none;}

.glossidx a {color: white; text-decoration: none; font-weight:bold;}

.glossidx a:visited {color: white; text-decoration:none;}

.glossidx a:hover {color: #80FFFF; text-decoration: none;}

.gloss .title{margin-left:15pt;margin-top:15pt; font-size:120%;} /* main glossary page - glossary title */

.gloss #summarydiv {margin-top:50pt} /* main glossary page - glossary summary statement */

BODY.gloss SPAN.titleimg {display:none; list-style-type:none;} /*graphic before main glossary page title*/

.gloss H2 {margin-left:15pt} /* glossary word on definition sheet */

.gloss H2:before {}

.gloss #pagediv {margin-left:10pt;margin-bottom:10em;} /* definition block */

BODY.gloss DIV.txtblk {clear:both;} /* term definition text */

BODY.gloss DIV.txtcenter {}

BODY.gloss DIV.txtright {}

BODY.gloss DIV.txtleft {}

.gloss #audiobtn {} /* audio button location */

.gloss .graphicleft{} /* graphic locatin left */

.gloss .graphiccenter{} /* graphic locatin center */

.gloss .graphicright{} /* graphic locatin right */

```
/* *rgg -------------------- */
/* *en:classic

Instruction page has a 15pt left margin
 */


/* Instruction page */
.instr .titleline {margin-left:15pt;} /* title line */
.instr .title {font-size:120%;} /* page title */
.instr .titleimg {position:relative;top:-.1em;display:none;}
.instr #summarydiv {margin-top:15pt; margin-bottom:15pt;margin-left:15pt} /* page summary */
BODY.instr SPAN.txtblk {font-size:90%;} /* top of page instructions*/
.instr H1 {font-size:120%; margin-left:15pt} /* sub titles - e.g. course structure */
.instr DL {margin-left:15pt;} /* services and side bar names and services bar instructions */
.instr DT {font-weight:bold;} /* services and  side bar names */
.instr DD {margin-left:10em;position:relative;top:-1em;} /*services and side bar instructions */
.instr B {font-weight:bold;} /* highlights within text */
.instr .linktxt {margin-left:15pt;display:block; font-size:83%} /* instructions in sub-page table  */
IMG.instr {display:none} /* buttons in sub-page table */
.instralt {font-size:100%;font-weight:bold;} /* sub-page button lables */
.instrimg {} /* sub-page buttons */
TABLE.instr   {margin-left:15pt;border:solid   0pt   black;border-collapse:collapse;clear:both;}   /*border
around sub-page table */
TR.instr, TD.instr {margin-left:15pt;border:solid 0pt gray;border-spacing:0pt;} /* cells in sub-page table */
.instr P {margin-left:15pt;display:block;} /* page text (includes top of page instructions) */
.cert .titleline {width:90%;border:solid black;border-width:0 0 1pt 0;}
.cert .title{}
.cert .titletable{}
.cert #pagediv{}
.cert {}
```

4.5   System Design

In this section, we shall take a look at some of the designed web based e-learning system as it will appear on your PC.

After you start this Web based e-learning system, an Open/Create dialog box opens.

- You can create a new course or open a course you already created.
- The last ten courses you edited are listed. To load a course you were working on, click the button with the course's name.

4.5.1 Adding Course Content

This Web based e-learning system provides a WYSIWYG text editing capability for every course content text box. Full RTF support enables you to copy from MS Word Excel and PowerPoint and maintain the formatting.

- As you add content to your course, you will notice that each text box has four tabs on the right side. The blue tab shows which is the current editing mode.

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Visual Edit - Use this tab if you want to change the text color, font, size, weight, style, alignment, or to create lists. Use the toolbar buttons at the top of the dialog box to make changes to your text, as shown below.

- Text/HTML - Use this tab to add unformatted text. Text you add in this tab is displayed using either the style sheet formatting instructions or the default formatting for the course. You can also use this tab to paste any web readable code (HTML/JavaScript) into the content area.
- Original Text - Restores your content to what was available when the page dialog box was opened.
- Done - Restores the text box to its original size and hides the tabs from view. Click Done when you have finished working in one text box and want to move to another.
- Copy text from Word, Excel, and PowerPoint documents, click the Visual Edit tab and choose Paste. This preserves the formatting and the text is completely editable.
- You can also copy from Word, Excel, and PowerPoint documents and paste into your course as a graphic. Web Course Builder will automatically convert the content to a web readable graphic (JPG or PNG).

Note: To undo your most recent text edit, press Ctrl-z.

4.5.2   Specifying General Course Properties

Once you select a course or choose to create a new course, the Course Properties dialog box opens.

- You can specify the text and graphics for the course's introduction page.
- You can change the course colors, the course font, the course template, and the course graphics.
- You can change the standard words in a course by clicking Labels and Text.
- You can change this information at any time.

  Note: When you open an existing course, the Course Properties are displayed. You can edit this information at any time by choosing Edit> Course Properties from the menu bar. (Please see screen shot of course properties module on the last page).

4.5.3   Adding a Chapter

You use the chapter dialog box to set up each chapter. The fields in this dialog box include:

- Sidebar name - This name is displayed on the sidebar.

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- Chapter Title - This title is displayed on the chapter introduction page.
- Chapter Summary - This text is displayed on the chapter introduction page. This should be a one to two sentence paragraph that explains the goals or content in the chapter.
- To create a series of linked tests or surveys with no other content between the pages, select Show Only Tests from this Chapter.
- To hide the chapter introduction page in the generated course, select Omit Chapter Introduction Page. The student will go straight to the first page in the chapter.

  Note: This option is only available when you have pages in your chapter.
- To hide the table of contents (links to each page in the chapter) on the chapter introduction page, select Omit Table of Contents on Chapter Introduction Page.
- To add a graphic or sound to the chapter introduction page, click the Graphic/Audio button.
- To create a bullet page, click the New Page tab on the right side of the dialog box.

4.5.4 **Generating and Viewing a Course**

When you finish entering your course content into Web Course Builder, you build the course (convert it into a web site) by clicking Generate Course on the toolbar (or choosing Publish> Generate from the menu bar).

- By default, the web version of the course is saved in a directory in your installation directory. The default directory is courses/your-course-name/.

- You can generate a course that contains test and survey pages only. You select either all chapters or selected chapters that will display included tests only. If this button is highlighted, at least one of your courses is set up for tests only.

- When you generate a course, you can choose to create a compressed archive file (zip) of the generated course. You also have the option to pause before the zip archive is created to manipulate your generated course files.

- You can choose to automatically number your course chapters and bullet pages in an outline numbering style. For example, the bullet pages in chapter 1 are labeled 1.1, 1.2, and so on.

- You have the option of UTF-7 (7-bit: Standard English and most European Languages), UTF-8 (Multi-byte character set - accepts most languages), or UTF-16 (Double-byte: covers all languages) Unicode for your course. US & Europe customers can use the 7-bit. For true internationalization (e.g. multiple languages in a single course or Japanese, Tamil, Vietnamese, Chinese, etc.) on Win2K and later, customers can use UTF-16.

- If your course uses SCORM for tracking, you will need to create an XML packaging manifest file that describes all the resources needed to transfer a course to a LMS, and identifies the titles and URLs of the component lessons for the course syllabus.

- You can create an XML manifest file that complies with the Instructional Management Systems Global Learning Consortium (IMS) specifications or an IMS packaging manifest with SCORM- or Oracle-specific extensions.

  Note: You must specify the appropriate tracking you are using. See the Tracking section for more information.

- The first time you generate a course, it is important to generate it to a new directory so that it does not overwrite files from another course.

- After you generate a course, you are asked if you want to view it in a browser. The new course is displayed in a web browser on your desktop.

- At any time, you can return to Web based e-learning system to update and modify the course.

- After you make changes to a course in the Web based e-learning system, save the course and generate the course again.

4.6   Sample Runs of the Web Based E-Learning System for FUT Yola As Displayed By A Web Browser and Its Supporting Program Code (HTML, PHP lid Java Scripts)

Here we shall take a look at some of the sample runs of the designed web based earning system for FUTY along with its supporting code as will be displayed on the bent (or user's) computer.

Please go to the last pages under Appendix to view the printed sample runs of the signed Web based e-learning system for FUTY.

4.6.1 Supporting Program Code (HTML, PHP and Java Scripts) for Sample Runs of the Web Based E-Learning System

E 10 7.2.4

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s of Shared Web Server

504 - WEBSERVER ADMIN

Federal University of Technology Yola

9

There are different types of shared website hosting, which can cover different areas and services that a site may require to be able to run. The owner of a website might choose to disperse the hosting of the services which they require for their website for extra redundancy; Shared website hosting is where multiple websites are hosted on the same server; each website is contained within its own folder or location on the server to keep it separate from other websites which are hosted on the same server.

```
*ELE 54 -1 -1 0 0 0 0 0
Iogo.jpg
*ELE 45 1.000000 0.500000 0.000000 1.000000 100.000000 1.000000 0.500000 0 0
*ELE 43 0
```

var picborderColoro='blue; var picborderWidtho=2px'; var picborderColorl red; var picborderWidthl '2px; var picborderColor2='green'; var picborderwidth2='3px'; var hotColorl red'; var hotBorderWidthl '4px'; var hotHeight = '20'; fIpx var hotWidth = '20'; /Ipx var ranklnner = * ; var rankBgColoro = "#8888FF"; var rankBorderWidtho = 'ipx';

dropBordero = 2px dashed red'; dropZindex3 = '0; dropZindex0 '4'; drag Width0 = '40%; bordercolor = new Array('blue,'green',yellow','lime,teal,'purple',pink','black','lime,'navy'); borderstyle = new Arrayçsolid,dotted','groove,'double,dashed','ridge','inset','outset',solid','double'); hneBorderl = 3px solid

red'; IineBorder2 '3px solid'; bneBorder0 = 3px solid transparent'; ne2Border2 = '3px solid'; hne2Border3 = 3px dashed purple'; ne2Border0 = 3px dashed orange';

reclick position:absolute;borcfer:2px red solid;cursor:pointer;z-index:5;background:URL'blank.png);font-size:2pt;} iestansgrp {position:relative; width: 100%;)

{position:absolute;background:URL("blank.png");font-size:2pt}

olce {width:2Opt;height: 16pt;backgroundcolor:#8888FF;border:1 px solid #4444FF;margin-top:2pt;margin- :2pt;padding-left:5pt;padding-right:2pt; cursor:pointer;}

set {width:6Opt;height:2Opt;background-color:#AAAAAA;border:2px black outset;margin-top:5pt;margin-bottom:5pt;text- center;cursor: pointer;)

.match DIV.testansgrp {position:relative;width: 1 00%;}

rop ipx

}

target {background:URL("blank.png');z-index:4;display:block;border:2px orange dashed;margin-right:1 0%)

roup 0

{display:inline;}

reset {wicith:6Opt;height:2Opt;background-color:#AAAAAA;border:2px black outset;margin-top:5pt;margin- :5pt;text-align:center;cursor:pointer;}

roup {margin-left:50%;position:absolute;top:Opt;}

p ipx

et {background:URL("blank.png");z-index:4;display:block;border:2px red dashed;position:absolute;)

:surcegroup {display:block;}

dragreset {width:6Opt;height:2Qpt;backgroundcolor:#APAA.AA;border:2px black outset;margin-top:5pt;margin-bottom:5pt;text- ign:center;cursor:pointer;}

4ragtargetgroup {position:relative;display:block;}

f matching columns with drawn lines */

inedrop {background:URL('blank.png);cursor:pointer;z-index:2;display:block;border:solid 2px transparent;marginI ht: 1 Opx;padding:5px 2Opx 5px 5px;margin-bottom:2px;}

me {display:inline;}

Jinetarget {background:URL('blank.png');z-index:4;display:block;border:2px orange dashed;padding:5px;padding-

Ieft:2Opx;margin-bottom:2px;}

SPAN.line DIV.testansgrp {position: relative;)

ilnesource {width:40%;position:absolute;top:Opx;}

.Iinedraw {position:absolute;top:Opx;Ieft:44%;border:Opx solid blue;width:1 5%;margin-right:Opx;)

Jinetargetgroup {margin-left:58%;position:absolute;top:Opx;}

.Iinereset {width:6Opt;height:2Opt;background-color:#AAAAAA;border:2px black outset;margin-top:5pt;margin-bottom:5px;text- align:center;cursor:pointer;}

.likertodd {background-color:transparent;}

Jikerteven {background-color:#aaaaff;}

TABLE.testprefgroup {border:double 3px black;width:90%;border-collapse:collapse;)

TD.testprefo {text-align:left;background-color:#aaaaff;width:20%;}

TD.testprefl (text-align: right;background-color:#aaaaff;width:20%;)

TD.testprefno {text-align:center;background-color:#aaaaff;padding-left: 1 em;)

TRtestprefhead {}

.hintReset {width:7Opt;height:2Opt;background-color:#AAAAAA;border:2px black outset;margin-top:5pt;margin-bottom:5pt;text- align:center;cursor:pointer;display:block;}

hint {display:none;background-color:#CCCCFF;border: ipx solid #AAAAFF} SPAN.testquest {vertical-align:text-top;)

SPAN.testqnum {vertical-align:text-top;}

SPAN.testq {vertical-align:text-top;}

TABLE.testprefgroup TD.testquest

SPAN.testprefquest {border-right:solid white 3px;)

.tpO {border-left:solid white 3px;text-align:center;}

-&Etestprefgroup TD.testans {text-align:center;}

0'

E2A2

_template_front.png

def_template_inside.png

tdueshades-hand

Default template

Hand graphic set

Logo size is 50 x 128 with a 1 pixel black line on the right side Services bar on the top and sidebar on the left

ELE 51 5716777215001 001 00

0

1 backbtno.gif

1 backbtnl.gif

1 nextbtno.gif

1 nextbtnl.gif

1 tellbtno.gif

1 tellbtnl .gif

1 trybtno.gif

1 trybtnl.gif

1 quizbtno.gif

1 quizbtnl .gif

1 tstbtn0.gif

1 tstbtnl .gif

lsrvbtno.gif

1 srvbtnl .gif

1 stepbtno.gif

stepbtnl .gif

bnkbtn.gif

1 circle.gif

1 bullet.gif

1 goldtri.gif

1 true.gif

1 tip.gif

1 dcpshad.gif

1 mainbkg.gif

1 q.gif

1 qzcovO.gif

1 Icap.gif

1 audio.jpg

1 sidebar.gif

1 save_btn.png

1 goto_btn.png

1 smbullet.gif

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sswd

'reg_tit

Registration Accepted

reg_instr

Your registration has been accepted. Please store the following user ID in your records: <l>%s</l>

Click on the Next icon to continue.

iegvertit

Registration Verified

Ieg_verinstr

Your registration has been verified. Please store the following user ID in your records: <l>%s</l>
Click on the Next icon to ntinue.

Hfail_tit

Processing Error or Failure

survtit

Your Survey Answers have been Stored

survxt

Thank you for answering our survey questions.

 Please click on the "Next" links to continue with the course.

*storetimtit

Timeout Error

*storetimtxt

Unfortunately there has been a timeout error while trying to store your answers on the server. Please try submitting your results again.

lf this problem persists, please contact the course administrator.

'score_tit

Your Test Results

score_txt

Your test responses have been stored.

Please click on the "Next" links to continue with the course. score_info

Your score is

*mastery

Congratulations, you have mastered the subject!

missed

Unfortunately you missed the following questions:

*Iasttxt

Last/Family Name:

'first_txt

First/Personal Name:

*user text

User ID:

*passtxt

Registration Password:

*cookt

You must enable cookies in your browser for test storage to work.
This test stores your User Identifier and your registration password so that your test results can be stored properly.

*reg_txt

Course Registration

*submit<t

bct

bt

the Test

txt

-pw

—en

e

CTYPE HTML PUBLIC "-/)W3C//DTD HTML 4.0//EN'"http://www.w3.org/TRJREC-htmI4O/strict.dtd"> tno

tion No.:

youans

You answered:

corrans

Correct Answer:

'Ieedback

Feedback:

*regretitle

Course Restart

*regretext

Your name matches an existing value for this course or there is a need to re-register.

*regreinstr

—se select an existing name or select to register as a new learner.

'jenew V.

Registration

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e

- how

Hint

- hide

Hint

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Ext

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eLimit

.ne limit between registration and test completion exceeded: Your responses have not been stored.

attemptLimit

Exceeded limit on number of attempts on this test.

Thtml

hthl

Thad

head

body

body

sidebktxt

*menubktxt

Copyright

by

by

rightsreserved

*noframes

Sorry but your browser does not support frames.

*trythjs

Try This...

I E 00

ave

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ar rankBorderColorO = '#4444FF'; war rankBorderStyleO solid; war rankBgColori = transparent; var rankBorderWidthi = 'ipx;

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*clickforans

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Enable JavaScriptlActiveXScript for a more interactive experience.

*tstscorehere

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whatitlooks

What it looks like

*coursemap

Course Map

*freqquest

Frequently Asked Questions

*faq intro

Do you have a question? We may have already answered it. Check below to see if you can find the answer to your question.

*categories

Categories

*faqquestions

Questions

*faqanswers

Answers

answer

Answer

*contact

Contact/Help Information

*constdtitle

The following are links to resources where you can get help and more information on the topics discussed in this course:

*clickhere

Click Here

*mousehere

Place mouse here for answer

*commit

Report Progress

*optional

Optional

*exitau

Exit Course

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Certificate of Competence

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Introduction

Types of Shared Webserver

Shared website hosting is where multiple websites are hosted on the same server; each website is contained within its own folder or location on the server to keep it separate from other websites which are hosted on the same server. Shared hosting is seen as the most economical type of website hosting since the cost of server maintenance as well as other server related costs re spread across a large amount of customers, meaning that the cost of hosting for each customer is low; generally the more customers that can be fitted onto a high performance server, the less the website hosting package or packages will cost. hared hosting is normally where most webmasters begin, and then work their way up the chain to eventually owning a dedicated server; this is because shared hosting packages are generally every cheap, and the amount of skilled needed to begin with is very low. Shared hosting is normally only available on two different types of operating system: Linux and Windows; this is because most web applications are built to suite either one of these platforms, and hosting control panels are)nly mainly made for Linux and Windows. One thing to

note though is that there are a few hosts who do offer shared hosting on 3SD based systems, although BSD operating systems are only normally available on dedicated servers.

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Types of Shared Web Hosting

Types of Shared Web Hosting

There are different types of shared website hosting, which can cover different areas and services that a site may require to be able to run. The owner of a website might choose to disperse the hosting of the services which they require for their website for extra redundancy; in most cases this is done because the website is 'mission critical' and they want to minimize the amount of downtime as much as they possibly can - but might not be able to afford a dedicated server or a clustered website hosting package. These different types of shared hosting also allow for people to only host what they need to host; for example a customer might only require email hosting, and not actual website hosting - this means that all they have to do is choose a shared email hosting plan that matches their specifications. One thing to note is that most shared hosting plans, whatever the type, provide some sort of DNS hosting in some way or another; without the use of a DNS server or servers, any service related to your website won't be able to run - for example, you won't be able receive any emails without the use of DNS because the email servers for your domain won't be findable since your MX (mail exchanger) DNS records can't be found since you don't have any DNS servers attached to your domain. Examples of different types of shared website hosting are the following sections.

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Types of Shared Web Hosting

Application Specific Web Hosting

Application specific web hosting is the term that is given to web hosting which caters for specific website applications, or categories of website. In most cases, application specific web hosting covers categories such as blogging, image and video (multimedia) hosting, and in some cases specific applications have their own web hosting packages. This type of shared hosting can be of benefit for those who are looking to host a website which makes use of one of the three categories that are hosted for; those with little technical knowledge on how to get their website running with certain applications might also find themselves interested in application specific website hosting. Application specific can also take the form of free web hosting as well as paid web hosting; for example Blogger is an online service that allows you to create and write your own blog - it allows you to do this for free, on the other hand there might be a web host that is

offering a hosting plan which has Word press already installed on it so that the customer is able to start their blog straight away. Both the free and paid types have their advantages, but the free versions tend to have adverts plastered all over them which can spoil both the environment and look of your website.

*ELE 143 11
Game Server Hosting

Game server hosting is used by players to host league table matches; most games that are played over the internet require a connection to some sort of game server. Game server hosting rarely comes as a type of shared web hosting because of the bandwidth and CPU requirements of a game server to allow it to run; in most cases a host would advise a customer to go with a dedicated server to allow them to host their online gaming community. Game servers are also referred to as 'listen servers' and are run of the same machine as the gaming client; the server is normally shut down when the client is since both are hosted together. The gaming server has software built into it to limit the number of players that are allowed to play on the server at one time; this is because of the bandwidth and CPU restraints that even face a game server that is hosted on a dedicated server. Game servers that are hosted within a shared environment are normally placed on a server cluster; this can help ease the strain on both the CPU and bandwidth of each server and can ensure that the game can be played effectively without any problems. Game server providers, such as eUKhost, offer many titles for their customers to choose from when ordering their dedicated gaming server; this game will then be installed for them on receipt of the server so that they can get on with the thing that matters to them most straight away - gaming.

*ELE 143 11
File Hosting

File hosting is a common type of shared hosting which people use mainly to backup data either on their home PC or that which is contained within either their shared hosting account, or on their VPS or dedicated server. File hosting normally doesn't require the user to have a domain since the file transferring is done either through a web based control or via FTP (file transfer protocol). The amount of storage that you are assigned for hosting your files in is normally measured in gigbytes (GB) because of the size of files that we wish to store of backup these days; a few years ago the amount of space allocated to you would have been measured in megabytes (MB). With backup or file storage solutions that have been designed for use by large corporations or people who need to access the files whenever without any trouble, caches are normally deployed; caches ensure that the data can still be accessed even if there are bandwidth or connection problems on the host's network. Open file hosting services are ones which don't require users to register before they are able to upload any type of file - instead they only have to visit one page of the

website and they are able to upload any file more or less instantly, services which take this form are normally free but plastered in adverts; this kind of service is preferred by people such as shareware authors since they are able to host the files for their free products without having to pay a penny - millions of people are also able to download the files in most cases, although with some premium services may have a restriction on something like this. File hosting is sometimes referred to as 'off-site backup'; this is because the files are being backed up from the server and then transported over to the file hosting service where they are then stored - or in other words, backed up.

*ELE 143 11
E-Mail Hosting

Email hosting is standard shared hosting, but without the ability to host a website; instead it only allows you to setup and configure email accounts for the domain which you have purchased the hosting for. Email hosting is normally purchased by a user who doesn't require a website but needs email, or if the customer wants to host their website somewhere else for more redundancy. Another reason for the uptake of separate email hosting might be to take advantage of extra mail services provided by another company which aren't available on your current hosting plan; for example someone might take up separate email hosting so that they could use Exchange Server 2007 email services which their current host doesn't provide - however, this scenario is highly unlikely since if a business did need to take advantage of an enterprise email system such as Exchange server then they would most likely have it installed on their own servers. If you don't need a website at the time you purchase your domain, then email only hosting will be perfect for you since the DNS servers will be provided for you to point your domain to, and you will be provided with a control panel which you can use to setup and configure email accounts for your domain; any good host will allow you to upgrade your account to one which does have support for a website at a later stage. There are already some free separate emails hosting services that are available for you to use; two of the best known ones are based on the GUIs of two of the worlds most popular web mail interfaces - GMaiI and Windows Live Mail. Both Microsoft and Google have developed their own systems to allow members of the public to utilize the company's services under their own domains, this has been a blow for the email hosting market since these systems also incorporate other enterprise class features such as calendar and contact sharing, as well as document storage.

*ELE 143 11
DNS Hosting

DNS stands for domain system and is the name which generally brands the technical working of domains; each domain has ifs own 'zone' on a name server which it has been delegated to, this zone contains all the

data which other computers and servers on the internet use to communicate with the servers that host the domain in question to allow people to view a website and to allow for email to be delivered. DNS hosting is a type of shared hosting only the DNS records for a domain are held, and no other services such as the hosting of a website or email are involved. A DNS zone hold the DNS records for a domain, which control the location of the website as well as where the email for the website is routed to One may choose to you separate DNS hosting to ensure extra redundancy in the current DNS setup, or so that they are able to control their DNS zone without having to be stuck to one host if they want to have all their hosting services dispersed amongst several different companies. DNS hosting is normally provided by domain registrars to allow their customers to take control of their domain without having to purchase a hosting account with them, and to allow them to utilize hosting that they might already have with another company; there are also some free services out there which can provide you with free DNS hosting if you are not able to provide your own or are not satisfied with the DNS hosting which is provided by your hosting provider or domain registrar. Your current DNS setup may not be that reliable, so you might choose to use an external DNS hosting company to ensure that if the DNS service with your web host does pack up, you have backup to ensure that your website is still reachable. If you have your hosting and DNS with one host, then the chances of your website going down are highly likely; if the DNS service on the server fails then your website will be completely inaccessible, and since most host's use the single point of failure, they will have no backup which your domain can use - one thing to note though is that other services such as email and web services might still be running. If you utilize another DNS provider then your website will still be accessible if it is only the DNS service that had failed on the server, other services such as email might not be affected either.

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Clustered Website HostingClustered website hosting is a type of hosting which involves multiple servers for the same task, and is generally seen as a more reliable type of hosting over standard shared website hosting. With clustered web hosting, all website services are 'load balanced' across multiple servers to ensure that the best redundancy possible is achieved; security resources and other standard features are also spread across multiple servers. No human interaction is required for the clustered hosting system to work; this is because most clustered hosting platforms are data driven in some way or another. Most clustered hosting services suffer no downtime because if one server within the cluster fails, there is multiple servers to takeover it role; if down time is ever experienced with clustered website hosting, the reason is normally because there has been a major problem with either, the power or the network at the data centre in which the clustered setup - although both instances of fault are very rare. Most clustered setups are normally continually monitored, so if a server does happen to malfunction or face an error of sorts, an on- site network team or support team from the web host will be quickly dispatched to ensure that the problem is fixed quickly and effectively; there are also normally automated systems in place to ensure that the cluster isn't affected if it is missing a server or two, but in most cases the end-users will not see any problems.

Clustered hosting is seen as a solution for businesses and large corporations who require an update percentage which is near to or equals to 100%; this is because although clustered hosting does come at a cost, it is one that is cheaper than a dedicated server - one other thing to note is that the reliability of dedicated servers is not as good as clustered hosting, although some individuals think the opposite.

*ELE 143 11
Virtualization

Clustered hosting could also be seen as a type of virtual website hosting; this is because the actual system is in a sense virtualized' because of the number of servers that are clustered together. To ensure reliability, and to allow clustered website hosting to achieve its job, websites and services related to the hosted websites are always spread across multiple servers; the systems are 'load balanced' to ensure that websites are always available since load balancing makes the use of the server which is being used at the given time of the request for any service - it goes one step further from redundancy since normal redundancy just makes the use of several servers, but does not spread the information out to ensure the maximum reliability is achieved. An example of load balancing would be an end user requesting a page on a website which is hosted on a clustered hosting service; all the web servers within the cluster are too busy serving other websites, so the user is served the web page from a server which is currently free and not serving too many visitors, it also has a low CPU usage at this point because it is not being utilized much. Some web hosts allow you to purchase power for your website; what is meant by power is 'CPU' or 'RAM', this is because a clustered server pool is a more or less infinite source of resources, and is perfect if you are unable to afford a dedicated server which can match the specifications and reliability of clustered website hosting.

*ELE 143 11
Security

With standard shared website hosting, the security which is provided on both the hosting node and the network is pretty poor when compared to that of a standard clustered website hosting network. In most cases, a standard shared hosting network incorporates a basic hardware firewall as the main line of security to keep a number of server secure; after that layer of security it is then down to security software installed on the servers to fight back any attack or to stop any intruder from accessing the server and compromising any information that it hosts. With a clustered hosting network, the security is normally much more stronger as a series of hardware firewalls as well as redundant proxy, routing and switching technology to ensure that the network is both fast and secure; intelligent routing can help load balance information across multiple servers, along with the use of VPN5 and proxies the intelligent routing is also able to bind more than one server to just one P address to ensure that if one server on one IP does go down, there is a number of other servers to take over its role. This type of network architecture can benefit both the servers and their

users / websites that they host during a DDos attack; this is because the attack is being dispersed amongst a large pool of servers in which it is having no effect, when the attack is aimed at one piece of equipment, that piece automatically stops serving traffic because it is unable to take the strain.

*ELE 143 11

High Availability Cluster

A high availability cluster is one that makes use of several physical hosting nodes with a goal of achieving a reliable network for a certain service which it has been built to host. High availability clusters are normally deployed for things such as file sharing, business class enterprises, customer services (specifically e-commerce websites) and mission-critical databases; all these types of business related IT activities are of the utmost importance for some companies and it is important that the information for them can be accessed when needed, this is the reason for deploying a high availability cluster to host them - albeit at a high cost. The automation processes involved are fairly complicated; nodes have the ability to start services on each other if the service concerned has gone down on another node - they can also carry out the appropriate processes automatically in order to start a service if needed, such as the importing and mounting of file systems. However 'good' this high availability may seem, the automation processes involved in it can easily cause problems; for example if the private 'heart beat' connection between the nodes goes down, then each node could think that every other node is down when in fact they aren't and lead to an instance of a service being started although that service is the responsibility of another node - this could lead to data corruption, or even worse: data loss. Implementations of high availability clusters are sometimes put in to increase the reliability of a regular cluster; via the use of things such as storage area networks (SANs) and the eradication of single points of failure; multiple network connections are also used to ensure that there is always at least one connection route available, even if one does fail. Most nodes take advantage of a number of technologies to ensure that they can provide the utmost best reliability. Hard disk wise, they take advantage of disk mirroring meaning that if one internal disk does fail, another internal disk which is a mirror of the main one can take over to ensure that the server carries on running - the technical term for this is RAID ('Redundant Arrays of Inexpensive Disks'). Redundant network connections are also utilized to ensure that if one switch or network interface card fails, there will be another one network switch or network interface card available to ensure that the node stays connected to both the network and the Internet. Most of the storage on a clustered network is taken care of by networked storage devices; multiple connections to the storage area network are also used to ensure that files can always be accessed. Multiple power connections are also available for servers via the use of UPS and diesel generators which can be used in the event of a power outage of sorts. The use of multiple connections and other devices ensures that even in the event of connections going because of a fault, the cluster will still be able to operate.

*ELE 105

Collocation

Collocation is a type of hosting where customers pay to have their own servers hosted within a data centre; colocation services are available via some web hosts through the use of their private cages, or you can pay a data centre directly to have your server located in a cage which is run by the datacenter itself. Other equipment such as networking equipment and storage equipment can also be collocated within server racks. Collocation is seen as a more enterprise level alternative to dedicated server hosting since the equipment hosted is owned by the person or business that is paying the lease. More and more businesses are starting to realize the benefits of collocation hosting; the main reason for this being that with regular dedicated server hosting you don't receive the level of support or technical know how that you do with collocation hosting. Collocation hosting has many advantages above ordinary dedicated server hosting, such as the fact that most data centers provide a 'remote hands' service if your server needs a task doing such as an OS reinstall which can only be done from the console; also, the connectivity that your equipment receives will probably be better than that you would receive on a dedicated server, the reason being that your equipment is surrounded by your own equipment meaning that you don't have any other customers around you that could be a burden on your connection speed. Colocation is often abbreviated as 'cob'; the colocation centers themselves are often referred to as 'carrier hotels' because of the number of internet carries that the host, as well as the number of businesses which have their servers located within a colocation centre.

*ELE 143 11
Standard Features of a Colocation Centre

Collocation centers are often built in a certain way for the maximum benefit of the servers and equipment which they host. Coloration centers are more or less ordinary data centers, and so always have some sort of fire suppression system that makes use of pipes to ensure that the fluid used to put fires out can spread across the building rapidly to ensure that the fire doesn't damage too much of the building - that is if the fire can be controlled. Regular internet equipment is around 19 inches wide - the same can be said for an ordinary server, this means that both colocation and data centers have a large collection of 19 inch wide data racks to cope with customer demand; most also carry a collection of 23 inch wide data cabinets which is used to hold any telecoms equipment that customers may wish to have hosted at the location concerned. Most 19 and 23 inch wide data cabinets are lockable to ensure the safety and security of the equipment that is contained within; this is perfect for large corporations or business's whose servers contain highly sensitive information since they are able to leave their equipment there with peace of mind. Because of the nature of both colocation and data centers, they both contain alot of cables (both data and power) to ensure that the equipment that they host is able to be powered and connected to the internet; it is because of this that you will always find overhead cable racks in both to ensure that more cables for more equipment can be easily set out. One thing that you might also come across is the fact that the power for the equipment is contained in another rack - sometimes referred to as the power distribution rack; this is done to ensure that

the most can be made from the space contained within both data and telecoms racks. One main feature of either a colocation or a data centre is air conditioning to ensure that the hosted equipment is kept at a cool temperature; the air conditioning within both types of centre is normally pushed through the raised floors that both contain and then released from under the cabinets that hold the equipment to ensure that every piece of equipment receives cool air to keep its temperature down. The amount of cooling that is available in both a colocation and data centre and restrict the amount of servers or how much equipment can be hosted within the facility; this is because if there isn't enough cooling available then a fire hazard can be created - some think that it is the floor space (sometimes referred to as square footage since it is measure in square foot) that determines how much equipment can be hosted within a facility. Another idea used to ensure that the temperature of equipment is kept to a minimum is to ensure that the data floors used contain little or no windows; this helps since sunlight cannot reach the equipment or floor itself which can help keep the temperature down, especially on hot summer days.

*ELE 143 11
Security

Because of the nature of the equipment that is hosted within both a colocation and data centre, both require that a member of staff escort a customer across the data floor to the cage in which their equipment is hosted; in this case the member of staff is also required to stay with the customer whilst they do what they need to do to their equipment. This is done because in most cases the equipment of other customers is normally contained within the same rack; if a customer has their own rack or cabinet within the colocation or data centre then they are normally provided with some type of access card which they can use to gain access to the data floor, and then use their own set of keys to unlock the cabinet in which their equipment located. Some colocation and data centers used the biometrics of clients as a pass key, as that ensures that person entering the data floor is the customer that they have on file. Both types of centre also contain many CCTV cameras and staff to monitor them to ensure that no unauthorized personnel manage to gain access to the data floor. In terms of technical security, the use of equipment such as firewalls is down to your own specification, since you are more or less hosting your own equipment; in some colocation and data centers where you are sharing a rack with other customers, the host company will in most cases provide the rack with some sort of security device or firewall to ensure the safety of all hosted equipment. However, if you do have your own rack then you will most likely have to provide the firewall or a device of similar standards yourself.

*ELE 143 11
Power

Power sources within a modern day colocation or data centre are normally redundant, meaning that if some power supply gives way then there is another source available to keep the hosted equipment running. The method used by most facilities is to deploy diesel generators to supply the power to the servers and other equipment that may be hosted in the event of a mains power black out; some facilities employ UPS (uninterruptible power supply) between the event of a blackout and the diesel generators - a UPS in a simple context is a backup battery which stores power which can be used in the event of a blackout, which can then be recharged when the power is restored. In some cases, large corporations with their own equipment racks or cages deploy their own UPS amongst their equipment to compliment those power services of the hosting facility as well as to ensure the best redundancy for their equipment can be achieved in the event of a blackout. For additional redundancy, most colocation and data centers have multiple connections to different locations within the local power grid to ensure that if one feed does go down, there is at least one other available to power the equipment; this method is good since it means that the diesel generators or UPS supply banks don't have to be relied on.

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Connections

Most colocation and data centers have multiple feeds to different bandwidth carriers to ensure the best redundancy; this means that if one connection was to fail then there would be at least one other connection to the internet or service provider, to ensure that the hosted equipment was still connected and online. Some facilities contain rooms known as 'meet me rooms'; this is because most peer points are contained with in data centers and colocation facilities to ensure that corporate customers are able to achieve the best possible connections. The idea of a 'meet me room' is to enable all carriers at the data or colocation centre to efficiently transfer data. In some cases, there may be a large internet exchange hosted within the facility where customers are able to link up for peering.

*ELE 105

VPS and Dedicated Server Hosting Terms and Their Meanings

VPS and dedicated server hosting are two types of dedicated hosting; VPS is also a partially a type of shared web hosting since the CPU on the node is shared amongst all the VPS on the server unequally in some cases. Due to the technical nature VPS servers and dedicated servers, there are many different terms which you will come across when searching for either a VPS or dedicated server package. Before purchasing either, it is important that you know the meanings of these terms since Ney could end up effecting your final decision when you come to purchase either; if you don't know the meanings of these

complicated terms whilst looking for or when you have purchased either a VPS or a dedicated server, you could end up with something that you don't want because it isn't what you need since they might not actually fit your requirements. One thing to note is that some web hosts don't offer a money back guarantee on dedicated servers due to the costs of setting them up; this could mean that if you have ended up with a dedicated server that doesn't fit your requirements because you didn't know the meanings of some technical terms originally, you will not be able to get your money back. However, the story is different with VPS since many hosts do offer a money back guarantee on VPS servers since they are a type of shared hosting as well as dedicated hosting meaning that there are no costs involved in setting them up; this means that if you do not know the meanings of some VPS and dedicated server related technical terms to begin with, you can start with a VPS because if you find out about something that you don't understand or receive something that turns out not to fit your requirements, you are able to get your money back.

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Bandwidth

Bandwidth is something referred to as traffic, and is the amount of data that can be transferred between your website and the client computers which visit it. Bandwidth is normally measured in gigabytes (GB), but used to be measured in megabytes (MB) before the internet became the busy traffic exchange that it is now. In dedicated server times, bandwidth also refers to the data transfer rate (normally both up and down) that the server will receive; in most cases dedicated servers are connected to 1GB/ps internal networks and then fed through to the internet via 100mb/ps uplinks - the same can also be applied to virtual private servers, but the MC (network interface card) on the host node is shared between all VPS which are hosted by the machine. When looking for a VPS, you should always consider the amount of bandwidth that you will receive on the package concerned since this will effect how many visitors your website can receive; if you are a web host or a reseller then the amount of bandwidth assigned to you could effect how many clients that you are able to host on your VPS.

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Disk Space

Disk space is the amount of space that you are able to use to host your files, or clients. Disk space is a valuable resource, and since the amount of disk space the host node has is 'limited', you are in most cases unable to purchase extra disk space, and your only choice if you do want more disk space is to upgrade to the next VPS hosting plan that your web host offers. The amount of disk space that you have can dictate how much you are able to host; for example, if you had an account with 200MB (megabytes) of disk space then you will not be able to host many images or videos for your website, one another thing to note is that emails take up a certain amount of disk space, thus reducing the amount that you are able to use.

*ELE 143 11

RAM

RAM stands for 'Random Access Memory' and is the amount of usable memory which is assigned to your VPS. RAM for VPS comes in two different forms: guaranteed RAM and burs table RAM. Guaranteed RAM is the amount of RAM which has been uniquely assigned to your VPS, and will always be available for your VPS to use - in other words this is the amount of RAM which you 'own' and cannot be touched by other VPS that are hosted on the same node as you; burs table RAM (sometimes referred to as swap RAM) is left over RAM on the physical node which can be accessed by any VPS which may have run out of guaranteed RAM and just needs a bit more so that it can get it's activities back on track - this type of RAM is shared amongst all the VPS on the host node meaning that it might not always be available for your VPS to use. The amount of guaranteed RAM that you have assigned to your VPS is crucial for your the performance of it; this is because if you don't have enough RAM then certain programs might not be able to run at all, and if your VPS runs out of free RAM at a certain point and there isn't any burstable RAM available, then your VPS might just crash or be shutdown by the VPS daemon software.

*ELE 143 11

Root Access I Remote Desktop Access

Root access is the name given to the ability of being able to access a Linux VPS over SSH using the root account; Remote Desktop access is its Windows counterpart. This is one important feature of VPS hosting over other types of hosting which fall below it; for example with root / administrator access to your VPS you are able to administer any part of it you want since you are able to access any part of it, the most crucial point though is that you are able to install any program you want since the actions of the program will not have any effect on the other VPS that are hosted on the same node as you. With the ability to install any program that you want, you are open to a whole load of idea on what you could use your VPS for; if your VPS is powerful enough then you might want to run several different programs or services off it to make the most of it, or even sell hosting on it so that you can make a return on your investment within a VPS.

*ELE14311

Virtuozzo / Open VZ

Virtuozzo is the software produced by SWS0ft to enable web hosts to host VPS servers in physical nodes; the program is available for both Linux and Windows. Virtuozzo adds a virtualization layer to the main node to ensure that the VPS which will come to be hosted on it do not interfere with each other in any way. Open VZ is an open source alternative to Virtuozzo for Linux; it has most of the features that Virtuozzo

has, but does not have the Virtuozzo Power Panel which is used by customers to manage the basic needs of their VPS. There are however other panels which can be used alongside Open VZ to enable customers to manage the basic needs of their VPS, an example of which being Hyper VM which is made by LXLabs.

*ELE 143 11
Private Name Servers

Private name servers are name servers that can be created under the branding of a domain of your choice. For example, wit private name servers you are able to have 'nsl.yourdomain.com' and 'ns2.yourdomain.com', both of which should point to separate Ps - most VPS come with at least two individual IP addresses anyway. If you are a web host or website designer, then using private name servers is a big 'must' since it can help improve your corporate identity, as well as extend it. Private name servers are only achievable on VPS hosting and dedicated servers due to the nature of IP address assigning; however. in some cases it is achievable on reseller hosting but never on standard shared website hosting.

*ELE 143 11
Control Panel

Most VPS web hosts offer some sort of control panel as such with their VPS packages - some offer one for free, others you have to pay to receive a control panel. Most VPS control panels give you the ability to create multiple 'client' accounts and host multiple domains along with many features such as email account creation and managements, FTP account creation and management as well as file manager so that you can manage the contents of the web space of the domain concerned whilst you are on the road as well as an auto-script installer to help get your website started. A control panel is the perfect solution for you if you are new to VPS hosting and have no or little knowledge of server administration since they give you a web basic graphical interface which you are able to use to administer your server and websites; if you have a good level of serve' administration knowledge then you might not need a control panel since you will probably have the skills to set your VPS up to the way you want it to be.

*ELE 105
How Web servers Work?

Every time, you open a browser and type in http://eukhost.com, have you ever thought about the process which helped the browser display the website? Has it every crossed your mind that there is a complex

system which supports this activity? Here is a brief explanation of the methodology behind this easy-to-use, but difficult-to make-it-work process.

More often than not, users access a website by typing in the domain name in their browser, or from a hyperlink that brings them to the website. Let's take eukhost.com as a case-study. You open a browser and type http://eukhost.com. Your browser then initiates a connection to the webserver in which the eukhost.com files are stored. The browser does this using the internet connection you have. The request for http://eukhost.com is first converted into an IP address using the name servers which have been assigned to eukhost.com and then locating the server which has eukhost's files.

Once communication has been established between the browser and the web server; request for the files of eukhost.com to be displayed is made. This is done using the hyper text transfer protocol (http). All the files which the web server sends back to the browser is then converted into human readable format by the web-browser itself. Using this very process, the server can send files to multiple client computers at the same time allowing viewers across the globe to access the website.

A webserver typically stores all the files necessary to display eukhost. Com's pages on your desktop. This includes all the text files, images, graphics, video files, audio files and any other script that enables the dynamic elements of a website to function. The number of such simultaneous requests which can be serviced depends entirely on the robustness and configuration of the webserver.

The most popular open-source webserver in use today is Apache while windows servers generally use lls (Internet Information Services) as the webserver application.

4.7   System Requirements

This web based e-learning system is a server side program that can be installed on UNIX, WINDOWS Operating system and can be accessed on any PC, Laptop or mobile device with a web-enabled browser and connected to the web server where the software is installed through an Internet connection.

The hard disk size, processing power of the CPU or the RAM of the computer or handheld device is not significant as long as the device or computer can browse the Internet.

4.8   Web Based E-Learning System for FUTY Software

The software for this project has been encoded in CD format and is attached with the - project hardcopy.

4.9   Web Based Groupware Product Evaluation

Like every other web based e-learning system, constant evaluation of the system is a very important part of the system design and implementation. Assessing web based groupware products is more difficult than assessing traditional software, because of a series of challenges related to the peculiar nature of these products. Such challenges derive from a series of additional issues that should be considered during the evaluation (e.g. different group contexts, individual and group tasks, teamwork, etc.), and entail several methodological problems. Because of these peculiarities, the field of CSCW is characterized by a high demand for user-based, groupware-specific evaluation methodologies that are both time and cost-effective. As an answer to this demand, we have developed an evaluation manual considering the systems' groupware-specific functionality and usability as well as their general usability and their impact on the context of use (especially on collaborative writing activities).

CHAPTER FIVE

5.0 Summary

Starting from a general framework for web based an e-learning system that is based on an abstraction layer model; this thesis presented a tailored modeling approach, which captures the modeling of learners, the modeling of courses, the presentation of courses, and the management of data in e-learning systems. Courses were modeled by outline graphs, which were further refined by some form of process algebra. The linguistic analysis of word fields referring to an application domain helped set up these course outlines. Learners were modeled by classifying value combinations for their characteristic properties. Each learner type gives rise to intentions as well as rights and obligations in using a learning system. Intentions can be formalized as post conditions, while rights and obligations lead to demonic constraints. The intentions can be used for the personalization of the learning system to a learner type. Finally, the management of data in an e-learning system was approached on two different levels dealing with the content of individual learning units and the integrated content of the whole system, respectively. This leads to supporting databases and views defined on them.

5.1 Conclusion

The main contribution of this study was our outline framework, design and development of an interactive web-based e-learning system for the Federal University of Technology, Yola, using the tailoring groupware web technology. Our architecture included various services and tools in the

context of a semantic portal, such as: course registration, uploading course documents and student assignments, interactive tutorial, announcements, useful links, assessment and simple semantic arch. A metadata-based ontology was introduced for this purpose and added to our model. The OWL language was used to develop our ontology. In this ontology, e actual resources and properties specified in the RDF models are defined. The protégé 2000 ontology editor was used to create the e-learning ontology classes and properties.

5.2 Recommendation

We recommend as follows:

1. The University/Department should implement this project especially in its Distance Education programme.
2. Staff should be trained on how to develop web based courses.
3. The University/Department should employ a technical staff to provide technical support for its implementation and maintenance (to students and staff that use it).

5.3   Areas of Further Research

This thesis, the first of its kind in any Nigerian tertiary institution, is an educators' resource for delivery and management of education via the Internet, It focused on web based learning for higher education, especially for at-distance, adult learners but has application for web based learning in general.

Thus, further research can be carried out in the area of Wireless Application Programming (WAP) using the web access protocol to connect users (students and teachers) to the Web Based E-Learning System for FUTY via wireless device using GPRS connectivity.

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APPENDIX I

Glossary of Technical and Distance Education Terms ADL: Advanced Distance Learning. The ADL initiative, originally established by the U.S. Department of Defense, is now collaboration between government, industry, and academia. The purpose of the ADL initiative is to ensure access to high-quality education and training materials that can be tailored to individual learner needs and made available whenever and wherever they are required. The ADL maintains a set of test guidelines under the acronym SCORM to accomplish their purpose. (See SCORM.)

AICC: Aviation Industry CBT Committee. The AICC is an international association of technology-based training professionals that develops guidelines for the aviation industry in the development, delivery, and evaluation of CBT and related training technologies. Because of their vanguard work and participation in other specifications and standards bodies, their work has influence far beyond the airline industry. (See CBT.)

Andragogy - pedagogy of adult learning; closely related to accelerated learning, andraqoqy is the art, philosophy, and science of helping adults learn. See research by Malcolm Knowles

Application sharing. A feature that allows two or more people in different locations to work together in a single live software application. In application sharing, one user launches the application and it appears on all participants' computers simultaneously. Both users can input information and otherwise control the application using the keyboard and mouse. Although it appears that the application is running on both PCs, it actually is running on only one. The person who launched the application may have the

option to lock out the other person from making changes, so the locked-out person sees the application running but cannot control it.

Asynchronous. A type of communication that occurs with a time delay between steps in the dialog, allowing par1cipars o respond a their own convenience. Literally "not synchronous"; in other words, not at the same time. Asynchronous capabilities give learners access to course materials, including readings, embedded and streamed multimedia, and external Web sites. They also let learners participate in facilitated discussions, and complete assignments individually and collaboratively. A more narrow definition is offered by the ALN Network.

Audio Conferencing - In the context of a web-delivered technology, this term generally refers to voice conferencing over the internet. The equivalent of a telephone conference using dial-up internet services, generally through software installed in a web browser. Implementations range from half duplex to full duplex. The term may also be used to refer to standard telephone conferences.

Authoring software/tools. High-level computer programs designed for creating computer-based training, interactive presentations, and multimedia. Commands are often presented as simple terms, concepts, and icons. Authoring software translates these commands into programming code.

Browser Interface - Denotes that the host software allows use of most product features through Java-enabled browser such as Internet Explorer or

Netscape Navigator/Communicator. There is often implied an assumption that some additional software (generally referred to as a "java applet" or a "plugin") has been added to the browser to increase selected functionality.

CD: Short for CD-ROM or Compact Disc-Read Only Memory.

CDI: Compact Disc Interactive. Similar to CD-ROM technology that was introduced by Philips and Sony and has not been widely accepted.

CMS: Content Management System. Software that manages media assets, documents, and Web pages for delivery and maintenance of traditional Web sites. May also refer to a Course Management System, an early term for academic LMS systems.

CRM: Customer Resource Management. Software that enables the enterprise management of clients and client information.

Chat. Generally refers to real-time, text-based conversation between two or more individuals connected online. As you type, everything you type is displayed to the) their members of the chat group. Some implementations provide for private communications between individuals, most packages provide for a group chat (i.e. everyone sees everything). Some chat software now features voice-enabled chat.

Chat Logs - Software has the ability to save and optionally post transcripts of chat sessions.

Computer-based training (CBT). An interactive instructional approach in which the computer, taking the place of an instructor, provides a series of stimuli to the student ranging from questions to be answered to choices or decisions to be made. The CBT then provides feedback based on the student's response. More generally can refer to all training that is delivered through a personal computer or workstation.

Desktop videoconferencing. Videoconferencing on a personal computer equipped with a fast Internet connection (at least 28.8 Kbps modem), a microphone, and a video camera. There can be two-way or multi-way video and audio depending upon the hardware and software of participants. Most appropriate for small groups or individuals.

Distance Education. See Distance learning. This term is often used synonymously with distance learning. However, "distance education" seems to be preferred in undergraduate and graduate academic settings.

Distance Learning. A system and a process that connects learners and instructors who are in different locations. Distance learning has historically involved correspondence courses, video, or satellite broadcasts. With the connectivity of the Internet and a new generation of software applications, distance learning has evolved into a new model, which provides higher quality and more flexibility and which is more appropriately called "distributed learning."

Distributed learning. A system and process that uses a variety of technologies, learning methodologies, on-line collaboration, and instructor

facilitation to achieve applied learning results not possible from traditional education in a truly flexible, anytime/anywhere fashion.

E-learning - A term referring broadly to technology-based learning. Seems to focus on web-based delivery methods but often used in a broader context. Used initially by corporate universities, now being embraced by academia. EML: Educational Modeling Language. EML is a comprehensive notational system that allows one to codify units of study (e.g. courses, course components and study programs) in an integral fashion. EML describes the content of a unit of study (texts, tasks, tests, and assignments) and the roles, relations, interactions and activities of students and teachers. EML uses XML for the structured description of documents and data. (See XML.)

EPSS: Electronic Performance Support System. A formal model for a branch of learning that places more emphasis on small, instantly available chunks of learning delivered to the learner at their point of need.

ERP: Enterprise Resource Planning. Refers to large enterprise databases with application programming for account and process management functions.

HTML: Hyper Text Markup Language. The universal language used for delivering Web pages across the Internet.

IEEE: Institute of Electrical and Electronics Engineers. The IEEE ("eye-triple-E") is a standards body that helps advance global prosperity by promoting the engineering process of creating, developing, integrating,

sharing, and applying knowledge about electrical and information technologies and sciences for the benefit of humanity and the profession. The IEEE Learning Technology Standards Committee (LTSC) approves and adopts standards for the learning industry.

Instant Messaging - a system allowing users to know when others in their "group" are online and to interact with them via text, voice chat and or other synchronous or asynchronous modes of communication.

Instructor-led training (ILT). Training in which learners are taught by an actual Person: an instructor, teacher or faculty member. Instructor-led training can occur synchronously or asynchronously.

Java. A programming language developed by Sun Microsystems that creates code for interactive applications that is executable on web pages by web browsers. Java applications can theoretically execute on any platform: Macintosh, PC, UNIX, etc.

"Just in Time" (JIT). A term used to describe a system or information that is available for the user at the exact time the user needs it.

Learning Object (a.k.a. reusable learning object). a discrete, reusable collection of content and assessment used to present and support a single learning objective. Akin to programming subroutines, the learning object is the controversial core of industry standards for interoperability.

LCMS: Learning Content Management System. Multi-user enterprise software that allows organizations to author, store, assemble, personalize, and maintain learning content in the form of reusable learning objects.

LMS: Learning Management System. Enterprise software used to manage learning activities through the ability to catalog, register, deliver, and track learners and learning.

Meta-tagging. A series of descriptive labels, often embedded as software tags in HTML/XML code, applied to learning objects that describe or provide parameters about the object so it can be managed more effectively.

Multimedia. A very general term that usually refers to computer programs that use a combination of sound, video, animation, pictures, and/or text.

Multipoint. Communication configuration in which several terminals or stations are connected. This differs from point-to-point, where communication is between two stations only.

Open Enrollment - The ability to enroll in a course or program of study at any time. Contrasted with the typical term-based enrollment and lock-step cohort programs of traditional schools, "open enrollment" is frequently requested by adult learners. Correspondence courses are traditionally offered as "open enrollment" delivery systems, although logistical issues and faculty concerns (especially workload) often block its implementation.

Parsing: A term that describes interpreting a document, translating it into a different format, and breaking it up into smaller, relevant pieces.

Pedagogical. Of, relating to, or befitting a teacher or education, especially with regard to a process of learning.

PDA: Personal Digital Assistants. Small computing devices generally capable of being held comfortably in your hand used to record and retrieve selected data. Made popular by Palm Pilot and Microsoft Pocket PC/Windows CE.

RDF: Resource Description Framework. The RDF integrates a variety of applications from library catalogs and worldwide directories to syndication and aggregation of news, software, and content using XML as interchange syntax. (See XML.)

Real-time. The processing of information that returns a result so rapidly that the interaction appears to be instantaneous. Telephone calls and videoconferencing are examples of real-time applications. These kinds of real-time information not only need to be processed almost instantaneously, but it needs to arrive in the exact order it's sent. A delay between parts of a word, or the transmission of video frames out of sequence, makes the communication unintelligible. See also Synchronous.

Repurpose. To create new learning opportunities from older media or material.

SCORM: Sharable Content Object Resource Model. ADL's SCORM defines a Web based learning Content Aggregation Model and Run-time

Environment for learning objects and references interrelated technical specifications to bring together diverse and disparate learning content and products to ensure reusability, accessibility, durability, and interoperability.

Self-paced learning. Education in which the learner is on their own, studying without interaction with others. Sometimes used to refer to asynchronous modes of delivery. CBT has been the most common form of self-paced learning, but web- based asynchronous systems are catching up quickly.

Shovel ware - a pedagogically-critical term used when traditional courseware is repurposed for the Internet without full consideration of the quality of the new learning experience. Essentially "Shoveling" content onto the internet for better or worse.

SOAP: Simple Object Access Protocol. A World Wide Web Consortium protocol for exchange of information in a decentralized, distributed environment. An XML based protocol that consists of four parts: an envelope that defines a framework for describing what is in a message and how to process it, a set of encoding rules for expressing instances of application-defined data types, a convention for representing remote procedure calls and responses and a binding convention for exchanging messages using an underlying protocol. Being studied by IMS as a protocol for handling Learning Objects.

Synchronous. A type of two-way communication that occurs with virtually no time delay, allowing participants to respond in real time. Also, a system

in which regularly occurring events in timed intervals are kept in step using some form of electronic clocking mechanism. Synchronous capabilities add a living, breathing dimension to online learning. Generally includes tools supported by standards-based data, audio, and videoconferencing — like whiteboard, application-sharing, and question-and- answer. See also Asynchronous.

UDDI: Universal Description, Discovery, and Integration (UDDI) specification. UDDI a protocol that will enable businesses to quickly, easily and dynamically find and transact business with one another using their preferred applications. Being studied by IMS for use with Learning Objects. **Voice-over-lP**. (VOIP) Uses the internet to allow phone-like voice interaction over dial-up internet connections. Typically implemented as a browser add-in or external piece of software. Some systems are full-duplex, other voice-over-ip systems use "push-to-talk" half-duplex systems.

Video Conferencing. In the context of web-delivered learning, refers to "Talking" head, small size video over IP networks. Generally requires additional hardware for implementation. Generally implemented as an optional feature, due to its significant bandwidth requirements.

WAP: Wireless Access Protocol. A protocol for transmitting and displaying content on wireless devices like cell phones and personal digital assistants. (See PDA.)

WBT: Web Based Training. Refers to all training that is delivered over the Internet via the World Wide Web. Refers to individual and group

(classroom) training over the Web. Also a form of computer-based training in which the training material resides on pages accessible through the World Wide Web. Typical media elements used are text and graphics. Other media such as animation, audio, and video can be used, but require more bandwidth and in some cases additional software. The terms "online courses" and "web-based instruction" are sometimes used interchangeably with WBT.

White boarding or Shared Whiteboard. A term used to describe the placement of shared documents or material on an on-screen "shared notebook" or "whiteboard." Desktop videoconferencing software often includes "snapshot" tools that enable you to capture entire windows or portions of windows and place them on the whiteboard. You work with familiar tools - such as "colored pens" and "erasers" to mark up the electronic whiteboard much like you do with a traditional wall-mounted board.

Workgroups - allows subletting of learners into on-line workgroups. Implementations vary from simply email group lists to virtual voice enabled on-line collaborative workgroups.

XML: Extensible Markup Language. The next generation of HTML, that extends Web capabilities especially around the storing, labeling, and exchanging of content across environments that do not share common platforms. (See HTML.)

APPENDIX II

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Introduction

Shared website hosting is where multiple
websites are hosted on the same server; each
website is contained within its own folder or
location on the server to keep it separate from
other websites which are hosted on the same
server. Shared hosting is seen as the most
economical type of website hosting since the cost
of server maintenance as well as other server
related costs are spread across a large amount of
customers, meaning that the cost of hosting for
each customer is low; generally the more
customers that can be fitted onto a high
performance server, the less the website hosting
package or packages will cost. Shared hosting is

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There are different types of shared website hosting, which can cover different areas and services that a site may require to be able to run. The owner of a website might choose to disperse the hosting of the services which they require for their website for extra redundancy; in most cases this is done because the website is 'mission critical' and they want to minimize the amount of downtime as much as they possibly can - but might not be able to afford a dedicated server or a clustered website hosting package. These different types of shared hosting also allow for people to only host what they need to host; for example a customer might only require email

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1. Types of Shared Web Hosting

Application Specific Web Hosting

Application specific web hosting is the term that is given to web hosting which caters for specific website applications, or categories of website. In most cases, application specific web hosting covers categories such as blogging, image and video (multimedia) hosting, and in some cases specific applications have their own web hosting packages. This type of shared hosting can be of benefit for those who are looking to host a website which makes use of one of the three categories that are hosted for; those with little technical knowledge on how to get their website running with certain applications might also find themselves interested in application specific website hosting. Application specific can also take the form of free web hosting as well as paid web hosting; for example Blogger is an online service that allows you to create and write your own blog - it allows you to do this for free, on the other hand there might be a web host that is offering a hosting plan which has Wordpress already installed on it so that the customer is able to start their blog straight away. Both the free and paid types have their

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Clustered website hosting is a type of hosting which involves multiple servers for the same task, and is generally seen as a more reliable type of hosting over standard shared website hosting. With clustered web hosting, all website services are 'load balanced' across multiple servers to ensure that the best redundancy possible is achieved; security resources and other standard features are also spread across multiple servers. No human interaction is required for the clustered hosting system to work; this is because most clustered hosting platforms are data driven in some way or another. Most clustered hosting services suffer no downtime because if one server within the cluster fails, there is multiple servers to take over its role; if downtime is ever experienced with clustered website hosting, the reason is normally because there has been a major problem with either the power or the network at the data centre in which the clustered setup - although both instances of fault are very rare. Most clustered setups are normally continually monitored, so if a server does happen to malfunction or face an error of sorts, an on-site network team or support team from the web host will be quickly dispatched to ensure that the problem is fixed quickly and effectively; there are also

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Colocation is a type of hosting where customers pay to have their own servers hosted within a data centre; colocation services are available via some web hosts through the use of their private cages, or you can pay a data centre directly to have your server located in a cage which is run by the datacentre itself. Other equipment such as networking equipment and storage equipment can also be colocated within server racks. Colocation is seen as a more enterprise level alternative to dedicated server hosting since the equipment hosted is owned by the person or business that is paying the lease. More and more businesses are starting to realize the benefits of colocation hosting; the main reason for this being that with regular dedicated server hosting you don't receive the level of support or technical know how that you do with colocation hosting. Colocation hosting has many advantages above ordinary dedicated server hosting, such as the fact that most data centres provide a 'remote hands' service if your server needs a task doing such as an OS reinstall which can only be done from the console; also, the connectivity that your equipment receives will probably be better than that you would receive on a dedicated server, the reason being that your equipment is surrounded by your own

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4. VPS and Dedicated Server Hosting Terms and Their Meaning

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VPS and dedicated server hosting are two types of dedicated hosting; VPS is also a partially a type of shared web hosting since the CPU on the node is shared amongst all the VPS on the server unequally in some cases. Due to the technical nature of VPS servers and dedicated servers, there are many different terms which you will come across when searching for either a VPS or dedicated server package. Before purchasing either, it is important that you know the meanings of these terms since they could end up effecting your final decision when you come to purchase either; if you don't know the meanings of these complicated terms whilst looking for or when you have purchased either a VPS or a dedicated server, you could end up with something that you don't want because it isn't what you need since they might not actually fit your requirements. One thing to note is that some web hosts don't offer a money back guarantee on dedicated servers due to the costs of setting them up; this could mean that if you have ended up with a dedicated server that doesn't fit your requirements because you didn't know the meanings of some technical terms originally, you will not be able to get your money back. However, the story is different with VPS since many hosts do offer

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5. How Webservers Work?

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Every time, you open a browser and type in http://eukhost.com, have you ever thought about the process which helped the browser display the website? Has it every crossed your mind that there is a complex system which supports this activity? Here is a brief explanation of the methodology behind this easy-to-use, but difficult-to make-it-work process. More often than not, users access a website by typing in the domain name in their browser, or from a hyperlink that brings them to the website. Lets take eukhost.com as a case-study. You open a browser and type http://eukhost.com. Your browser then initiates a connection to the webserver in which the eukhost.com files are stored. The browser does this using the internet connection you have. The request for http://eukhost.com is first converted into an IP address using the nameservers which have been assigned to eukhost.com and then locating the server which has eukhost's files. Once communicaton has been established between the browser and the webserver; request for the files of eukhost.com to be displayed is made. This is done using the hyper text transfer protocol (http). All the files which the webserver sends back to the browser is then converted into human readable format by the web-browser itself.