

Exhibit 5
Part 39
To Third Declaration of
Joseph N. Hosteny

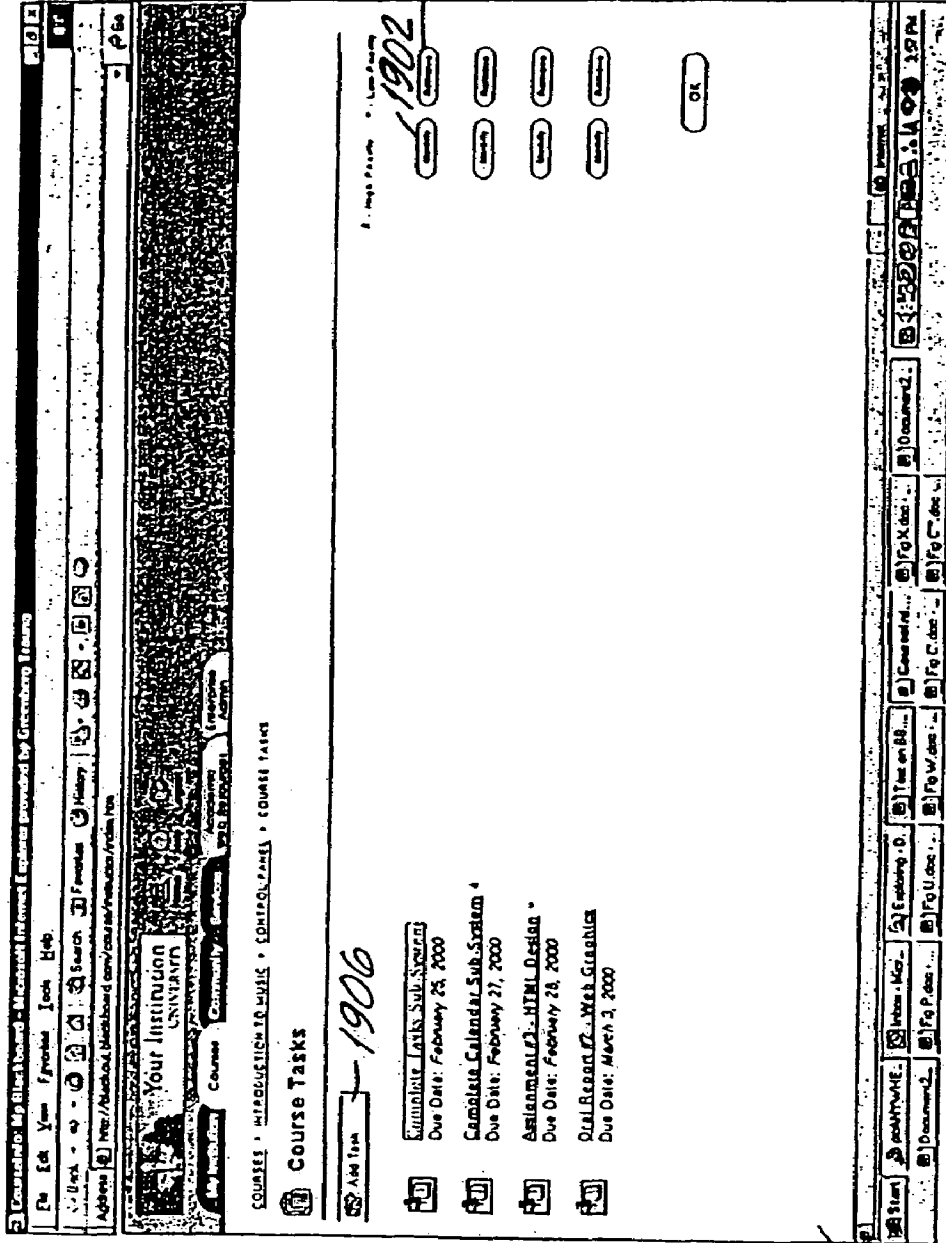


FIG. 19

1900

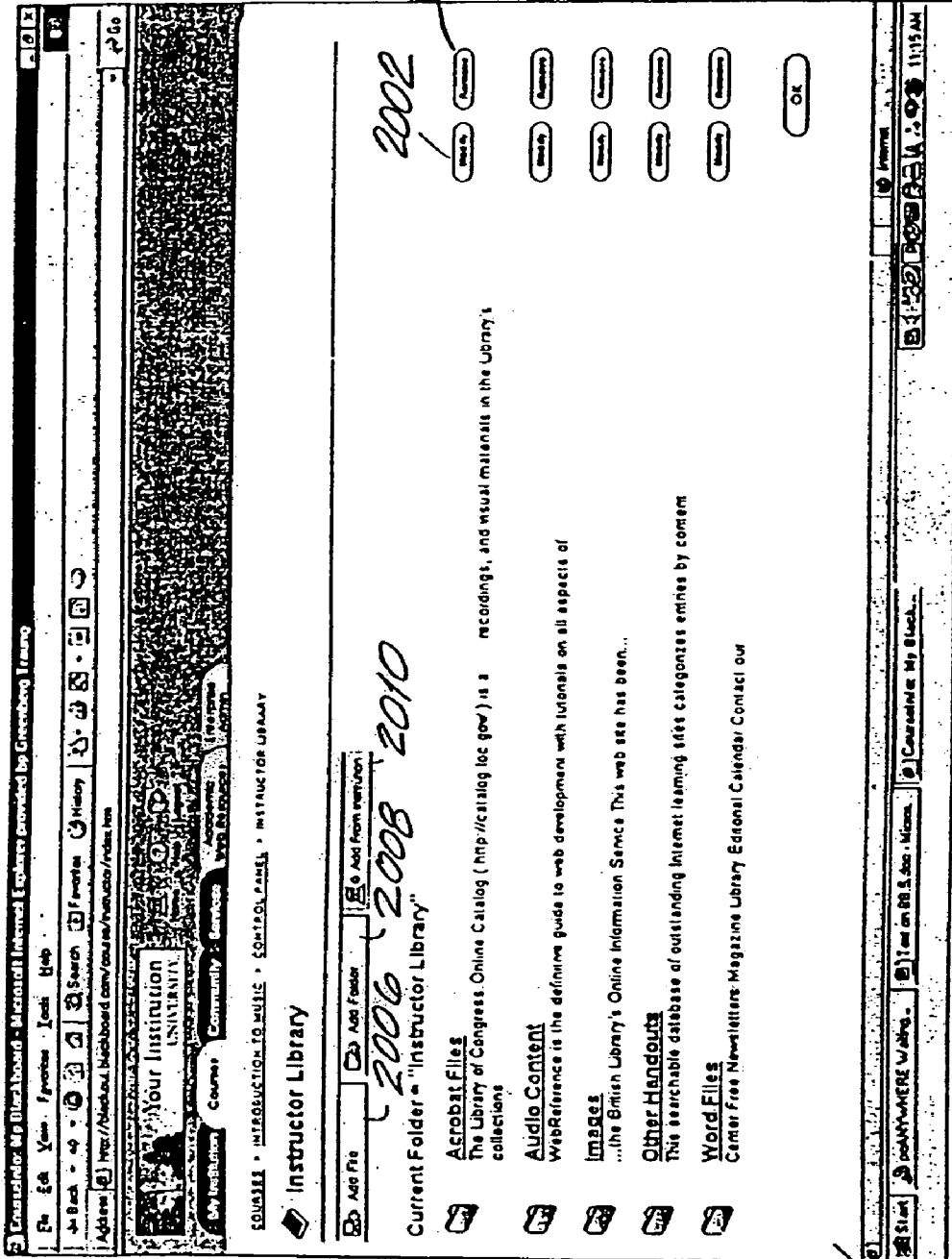
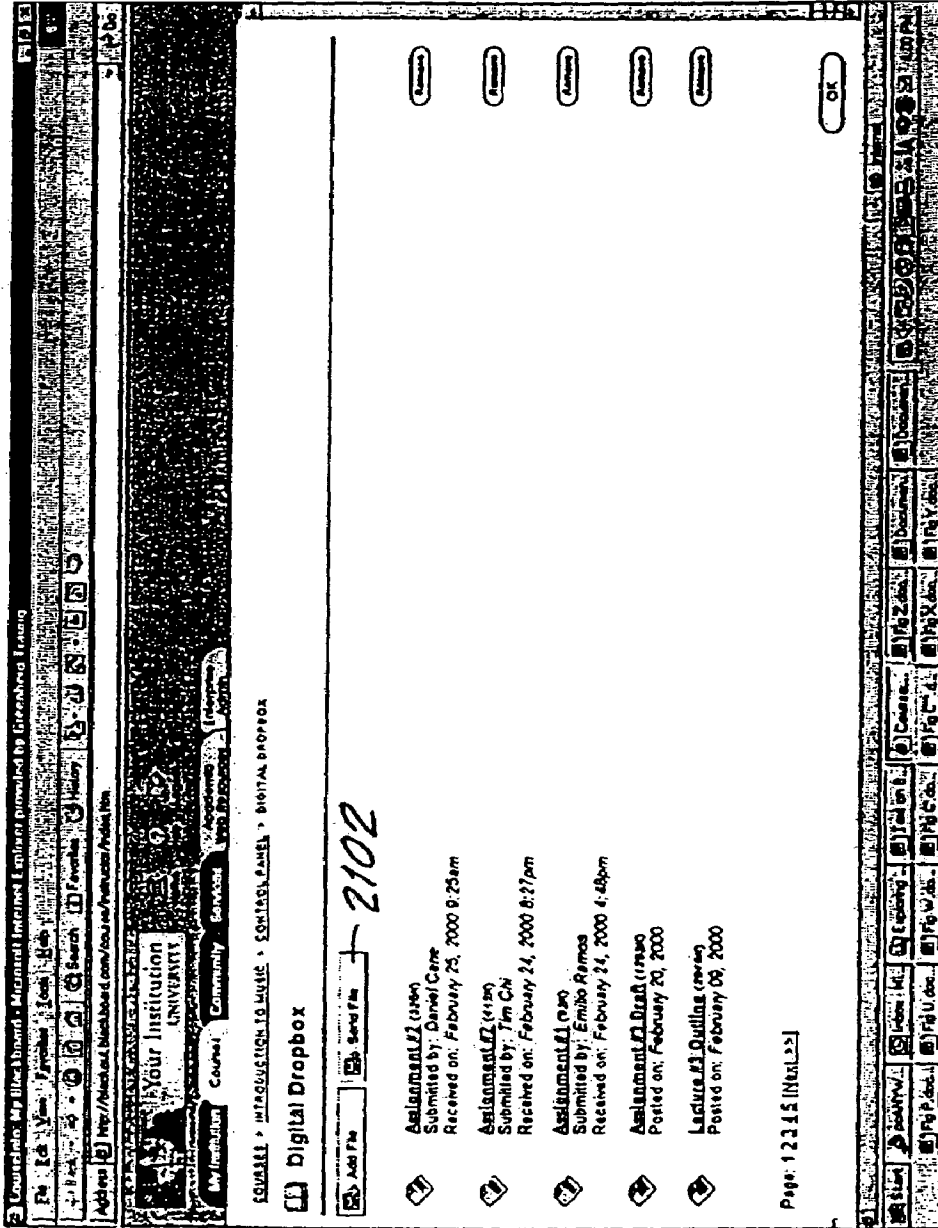


FIG. 20

FIG. 21



2100

Course Gradebook

Students whose last names begin with:

Items that are grouped by:

<input checked="" type="checkbox"/> completed	Participation	Space 301-c Quiz	Assignment #1	Total Points
<input type="checkbox"/> no info	Participation	Quiz	Assignment	
<input type="checkbox"/> Taken, but ungraded	Edit	Edit	Edit	
Arnold, Jeremy	Edit	-	-	0
Baggins, T.	Edit	60	50	315
Bell, Norman	Edit	-	10	10
Cane, Jon	Edit	72	25	251
Chasen, Michael	Edit	-	25	25
Chi, Timothy	Edit	92	35	311
Clark, Andrea	Edit	100	20	205
Clark, Jim	Edit	75	-	220
Cox, Meg	Edit	-	25	25
Davies, Greg	Edit	-	-	0
witkowski, francis	Edit	-	10	10
Points Possible		100	35	335

2200

FIG.22

COURSES > INTRODUCTION TO MUSIC > CONTROL PANEL > COURSE STATISTICS > REPORT

Course Statistics

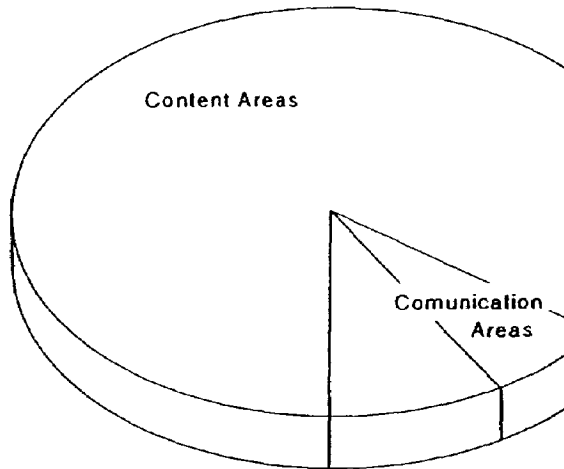
Statistics Generated on Thursday, February 24, 2000 11:26:28 AM

Note: You may have to reload/refresh this page for the images to be correct.

Total Number of Accesses per Area — 2302
 Number of Accesses over Time — 2304
 User Accesses per Hour of the Day — 2306
 User Accesses per Day of the Week — 2306
 Total Accesses by User — 2310 2308

Total Number of Accesses per Area — 2302

Area Name	Hits	Percent
Content Areas	139	83.2 %
Communication Areas	10	5.98 %
Group Areas		0 %
Student Areas	15	8.98 %
Total	167	100 %



Number of Accesses over Time — 2304

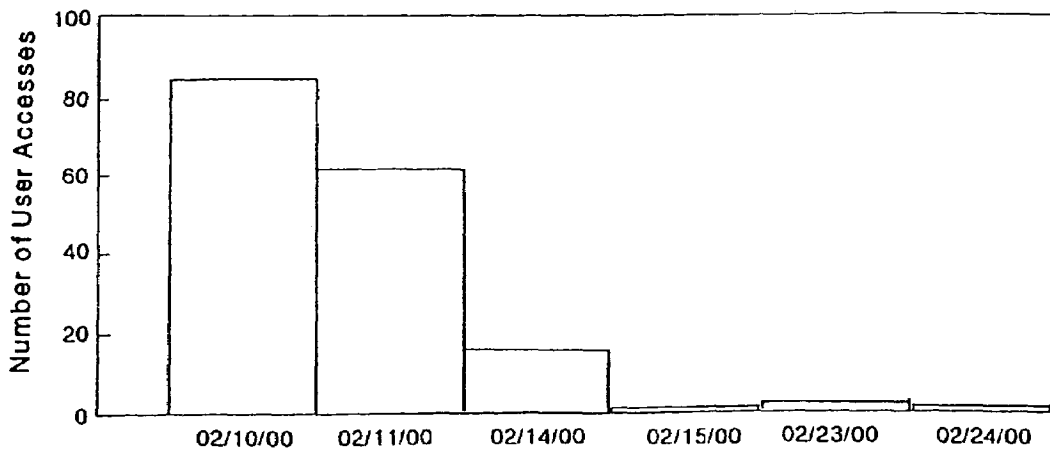
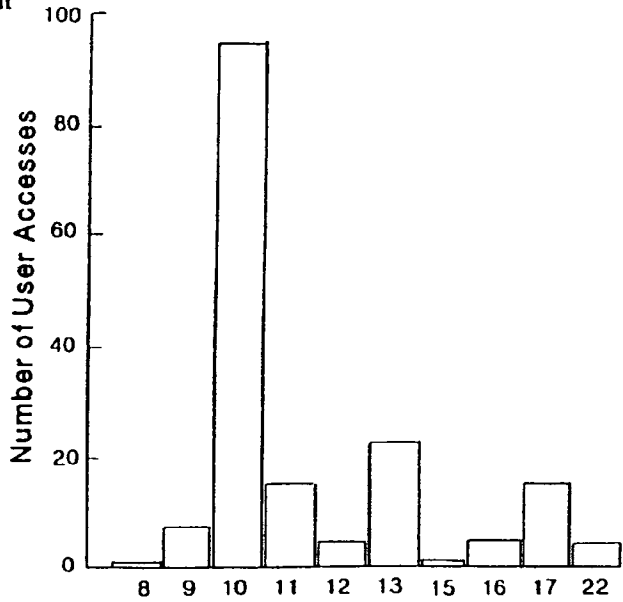


FIG.23A

User Accesses by Hour of the Day *2306*

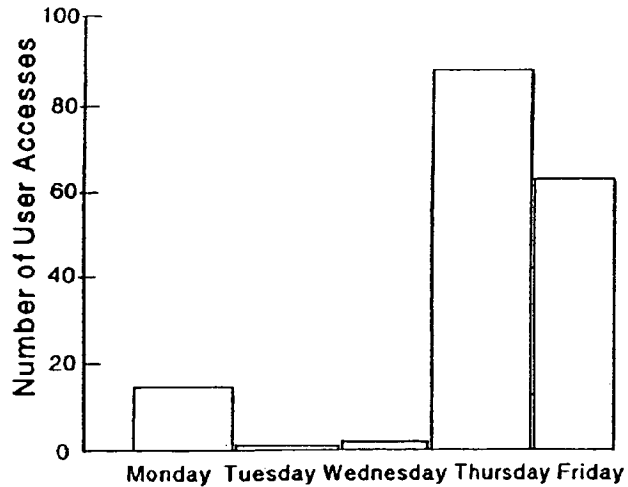
Hour of The Day	Hits	Percent
8	1	0.59 %
9	7	4.19 %
10	94	56.2 %
11	15	8.98 %
12	4	2.39 %
13	22	13.1 %
15	1	0.59 %
16	3	1.79 %
17	14	8.38 %
22	3	1.79 %
23	3	1.79 %
Total	167	100 %



User Accesses by Day of the Week *2308*

Day of The Week	Hits	Percent
Monday	16	9.58 %
Tuesday	1	0.59 %
Wednesday	2	1.19 %
Thursday	86	51.4 %
Friday	62	37.1 %
Total	167	100 %

Hour of the day (24h Format)



2300

Day of the week

FIG.23B

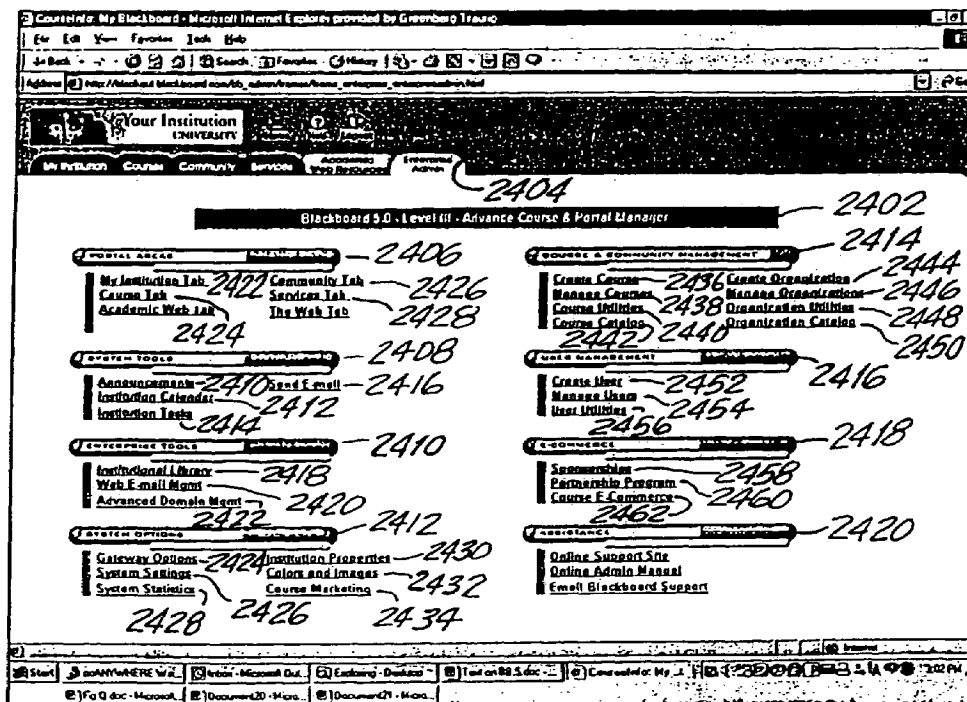


FIG.24

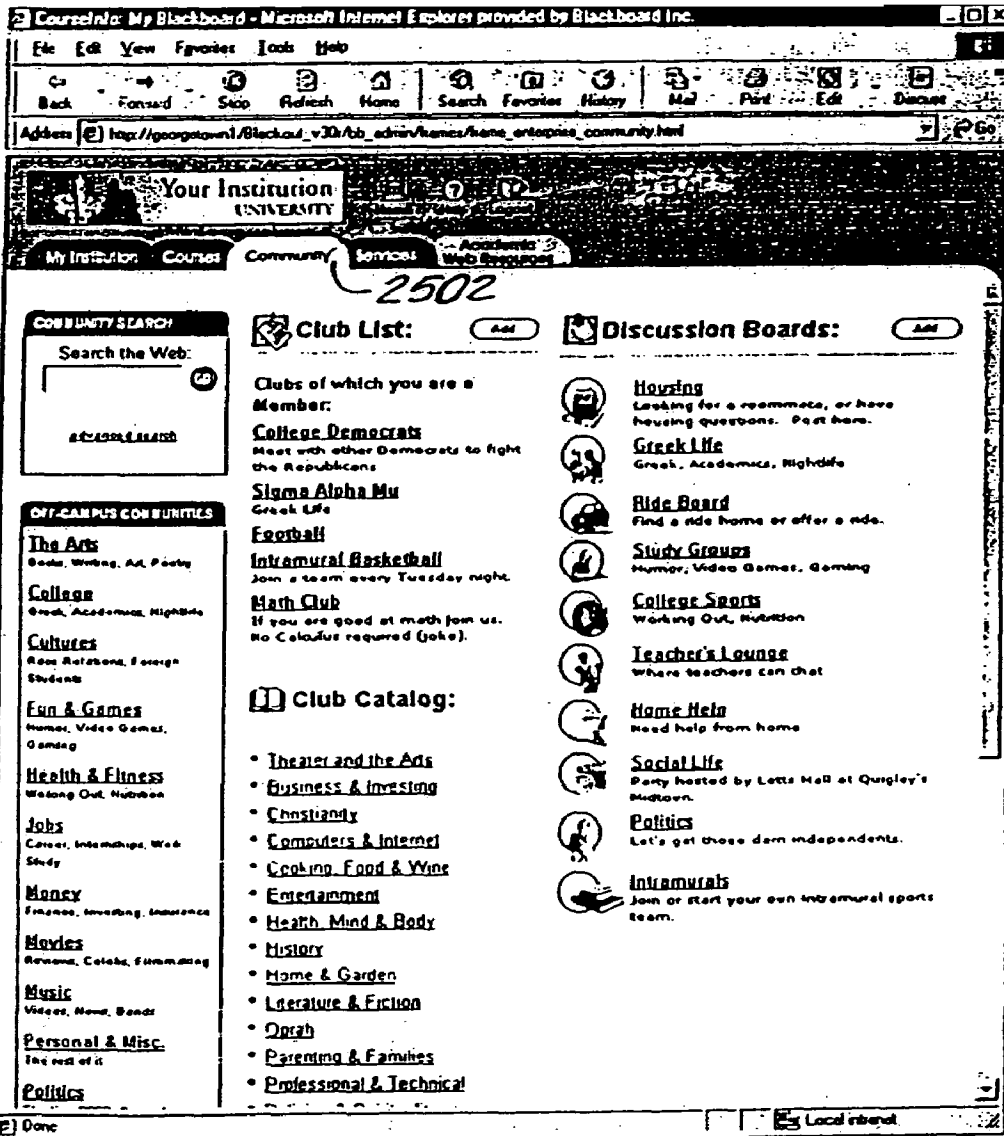


FIG.25

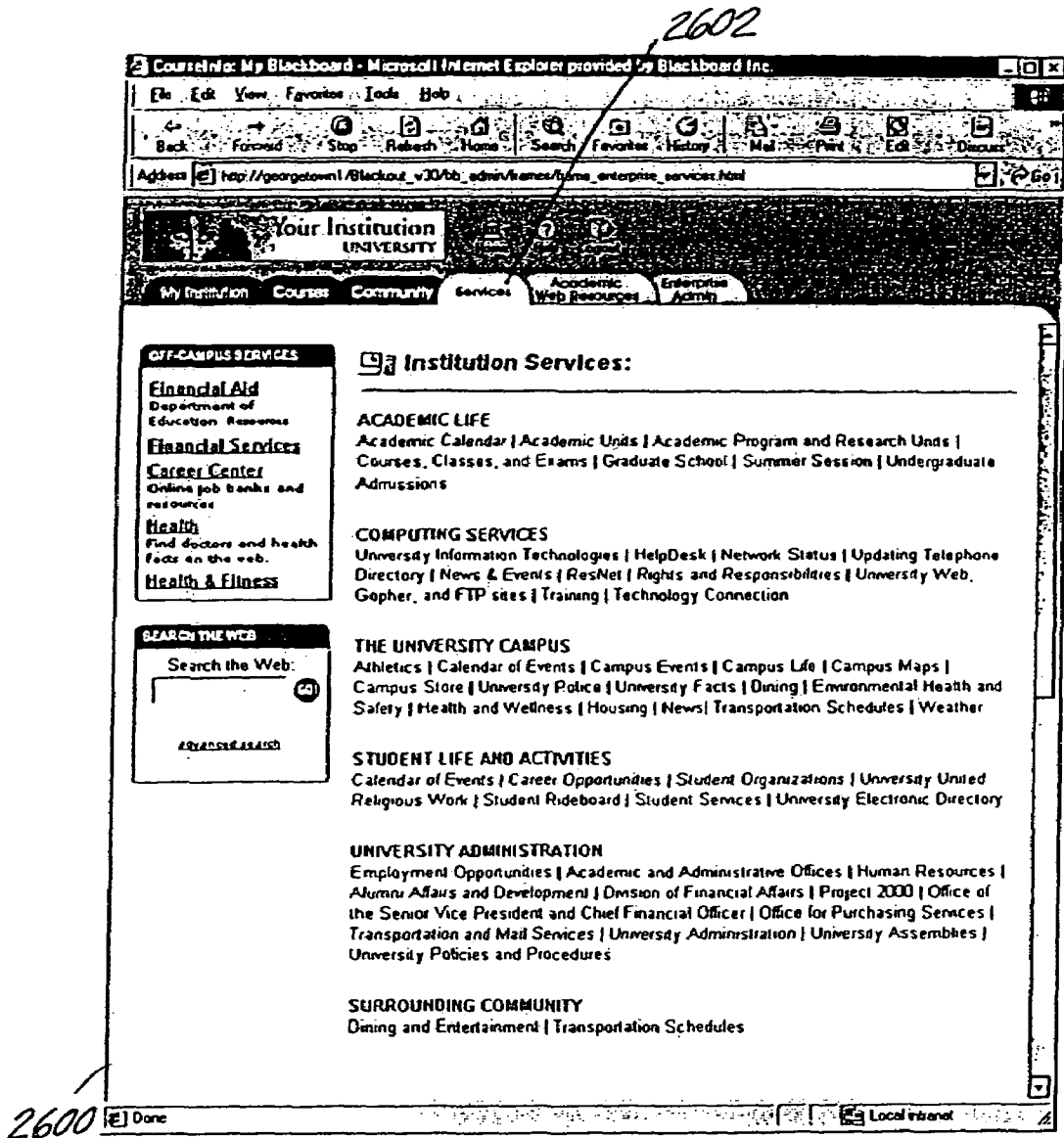


FIG.26

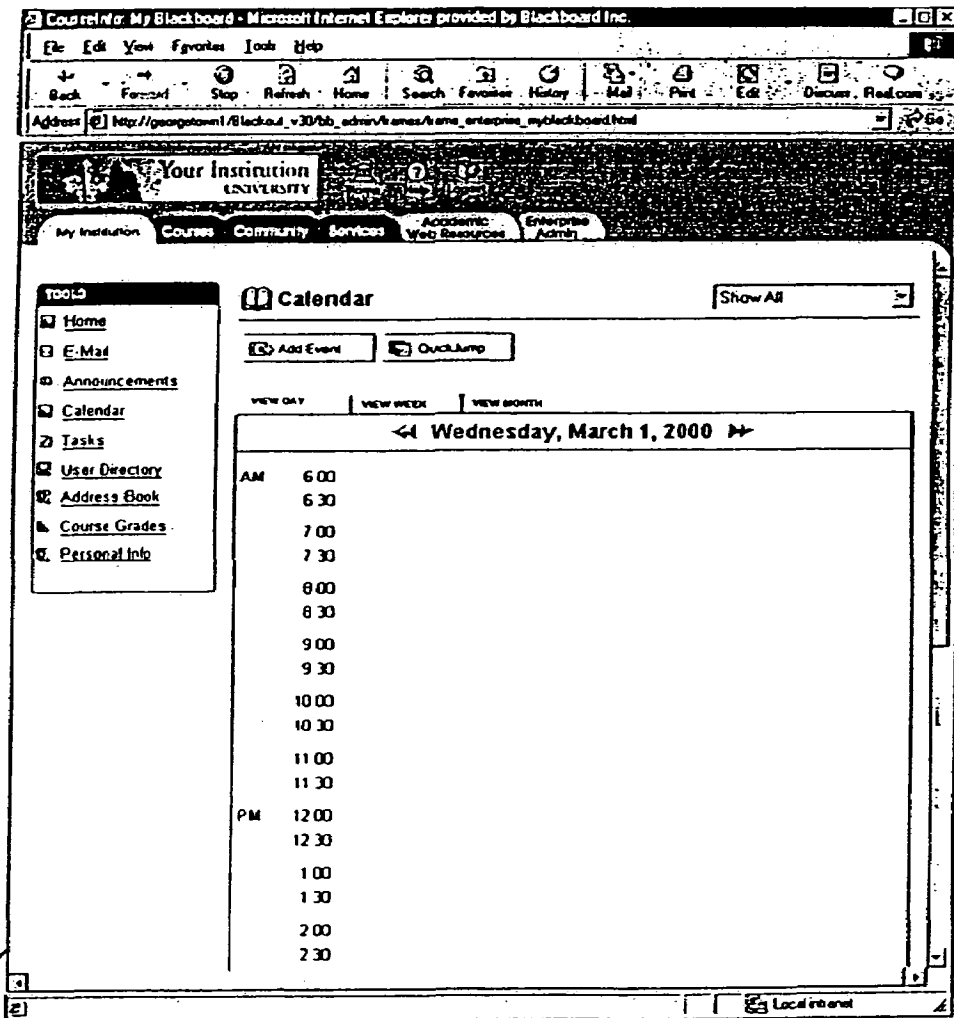


FIG.27

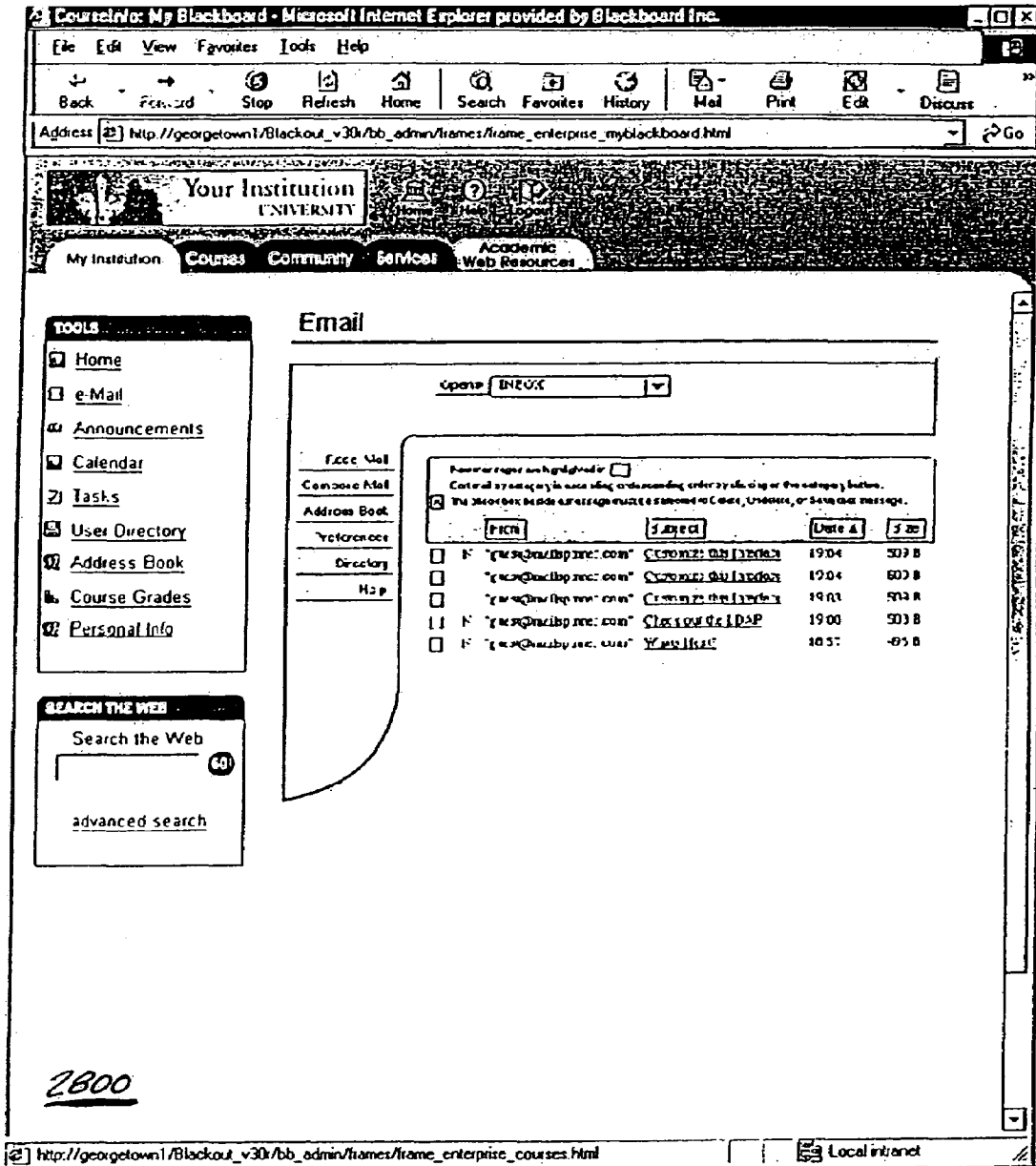
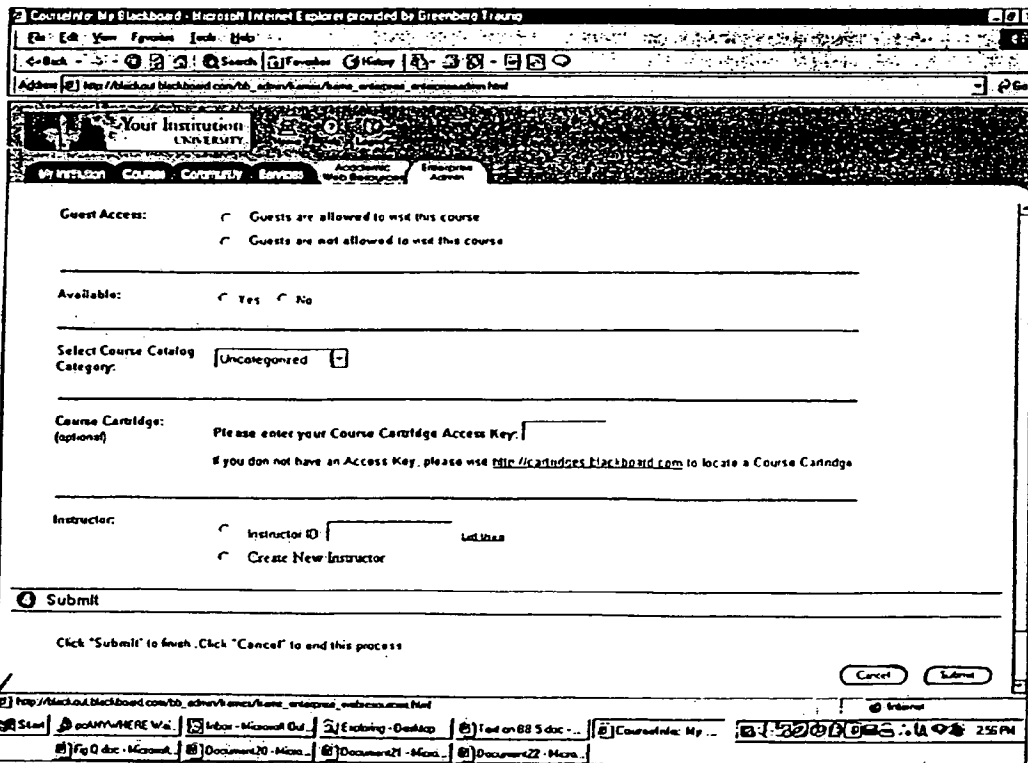
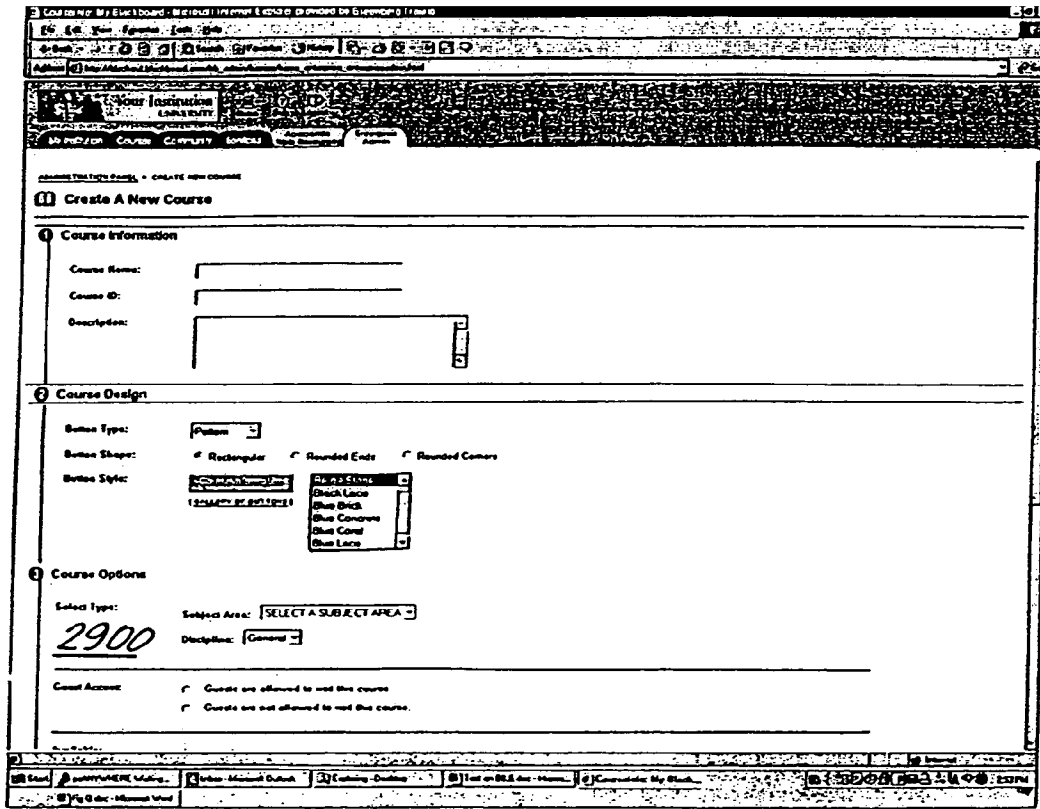


FIG.28



2900

FIG.29

3000

3000

Control Panel - My Blackboard - Microsoft Internet Explorer provided by Greenberg Training

File Edit View Favorites Tools Help

Back Forward Stop Search Favorites History Print

Address http://blackboard.com/ibb_admin/areas/home_enterprise_enterpriseadmin.html

Your Institution UNIVERSITY

My Institution Course Community Services Academic Web Resources Enterprise Admin

ADMINISTRATION PANEL - CREATE USER

Create User

1 Personal Information

First Name:

Middle Name:

Last Name:

Email:

Student ID:

2 Account Information

User Name:

Password:

Verify Password:

3 Other Information

Start | goANYWHERE Web | Inbox - Microsoft Out... | Exploring - Desktop | Test on 88.5.doc... | Connected to My... | 3:18 PM

Fig 9.doc - Microsoft... | Document20 - Micro... | Document21 - Micro... | Fig P.doc - Microsoft... | Fig 5.doc - Microsoft...

Control Panel - My Blackboard - Microsoft Internet Explorer provided by Greenberg Training

File Edit View Favorites Tools Help

Back Forward Stop Search Favorites History Print

Address http://blackboard.com/ibb_admin/areas/home_enterprise_enterpriseadmin.html

Your Institution UNIVERSITY

My Institution Course Community Services Academic Web Resources Enterprise Admin

Gender: Male Female

Birthday:

Education:

Company:

Department:

Job Title:

Address:

Address (work):

City:

State / Province:

Zip / Postal Code:

Country:

Web Site:

Home Phone:

Work Phone:

Start | goANYWHERE Web | Inbox - Microsoft Out... | Exploring - Desktop | Test on 88.5.doc... | Connected to My... | 3:18 PM

Fig 9.doc - Microsoft... | Document20 - Micro... | Document21 - Micro... | Fig P.doc - Microsoft... | Fig 5.doc - Microsoft...

FIG.30A

3000

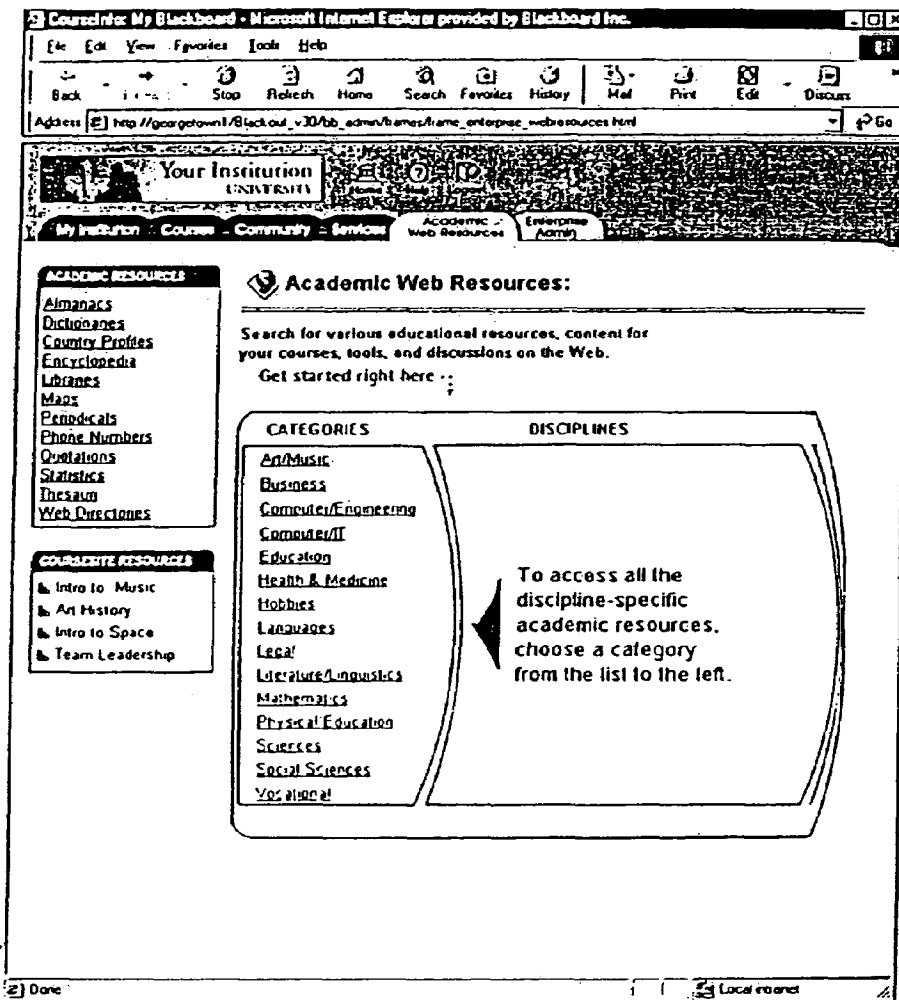
The screenshot shows a web browser window with a navigation bar at the top containing links like 'Home', 'About Us', 'Contact Us', 'Privacy Policy', and 'Terms of Service'. Below the navigation bar is a header area with the text 'Your Institution UNIVERSITY'. The main content area contains several sections:

- Contact Information:** Three input fields for 'Work Phone:', 'Work Fax:', and 'Mobile Phone:'.
- Role and Availability:** A section with a dropdown menu for 'Primary Institution Role:' set to 'Student'. Below it is a section for 'Administrative User Role:' with a list of roles: 'None', 'System Admin', 'System Support', 'Course Creator', and 'Account Administrator'. Each role has a radio button.
- Submit:** A 'Submit' button and a 'Cancel' button.

At the bottom of the browser window, the status bar shows the address bar with a URL, the page title 'Your Institution', and the system clock showing '1/17/2006 3:19 PM'.

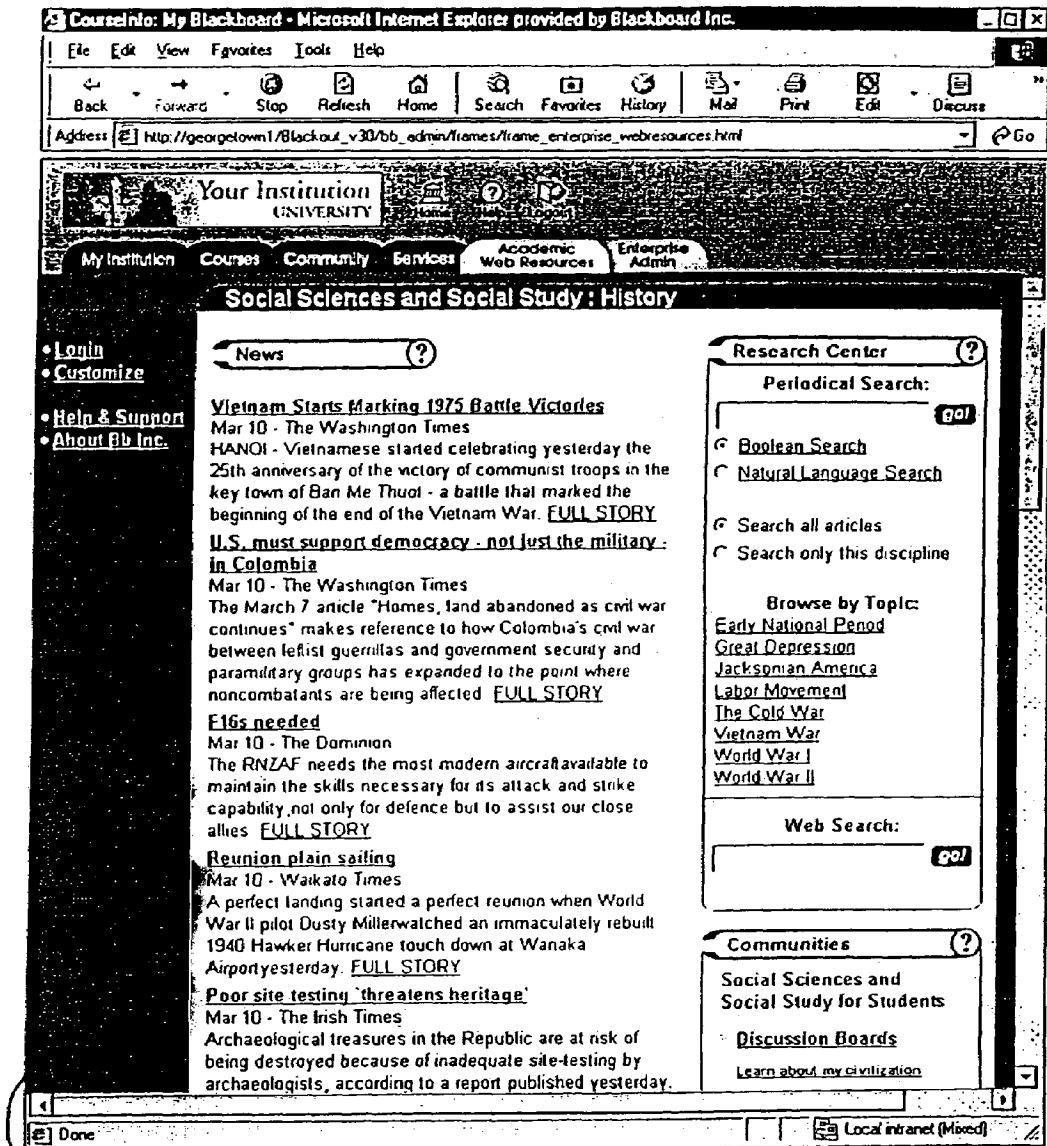
3000

FIG. 30B



3100

FIG.31



3200

FIG.32

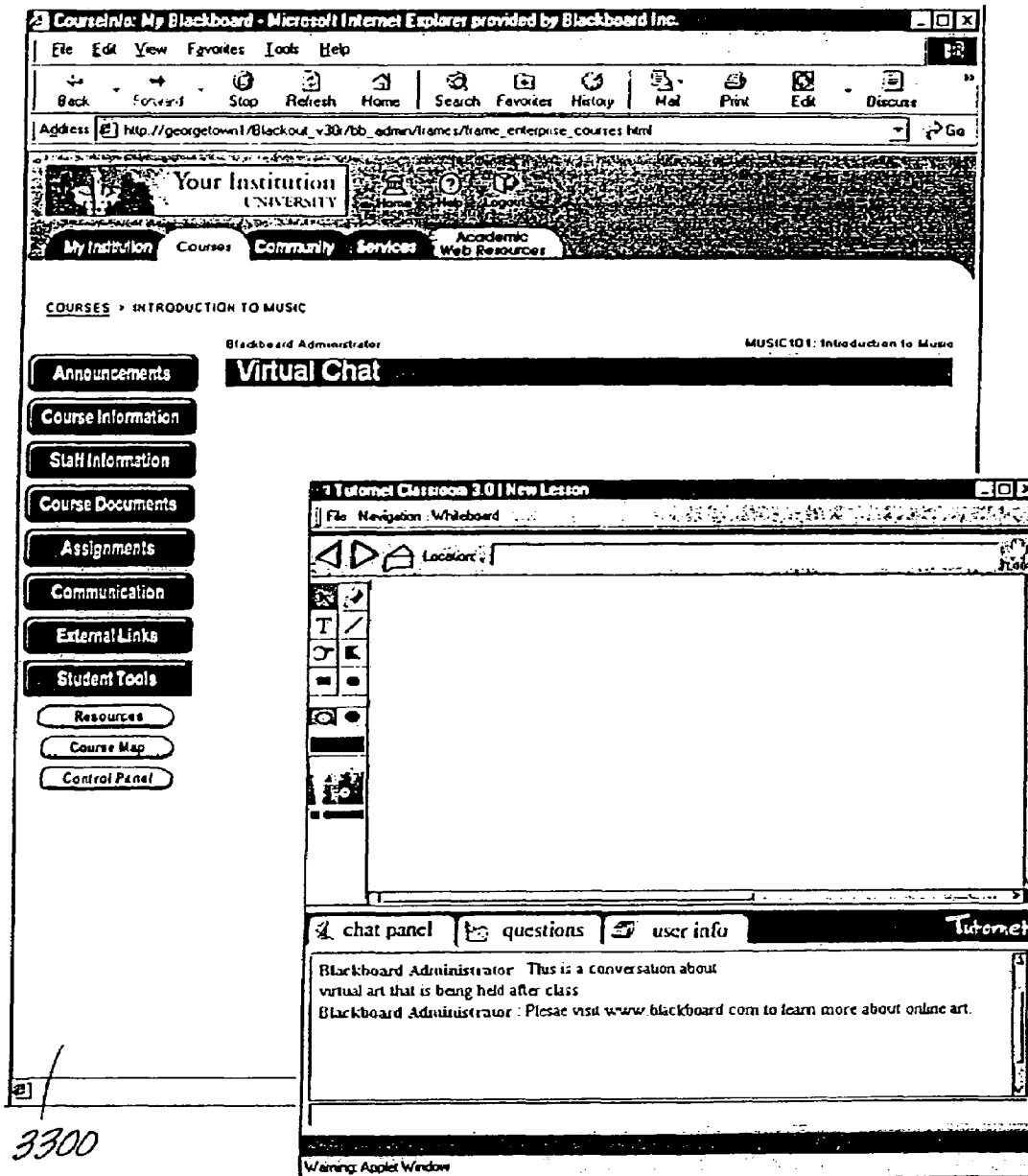


FIG.33

Linking to the E-Commerce Server

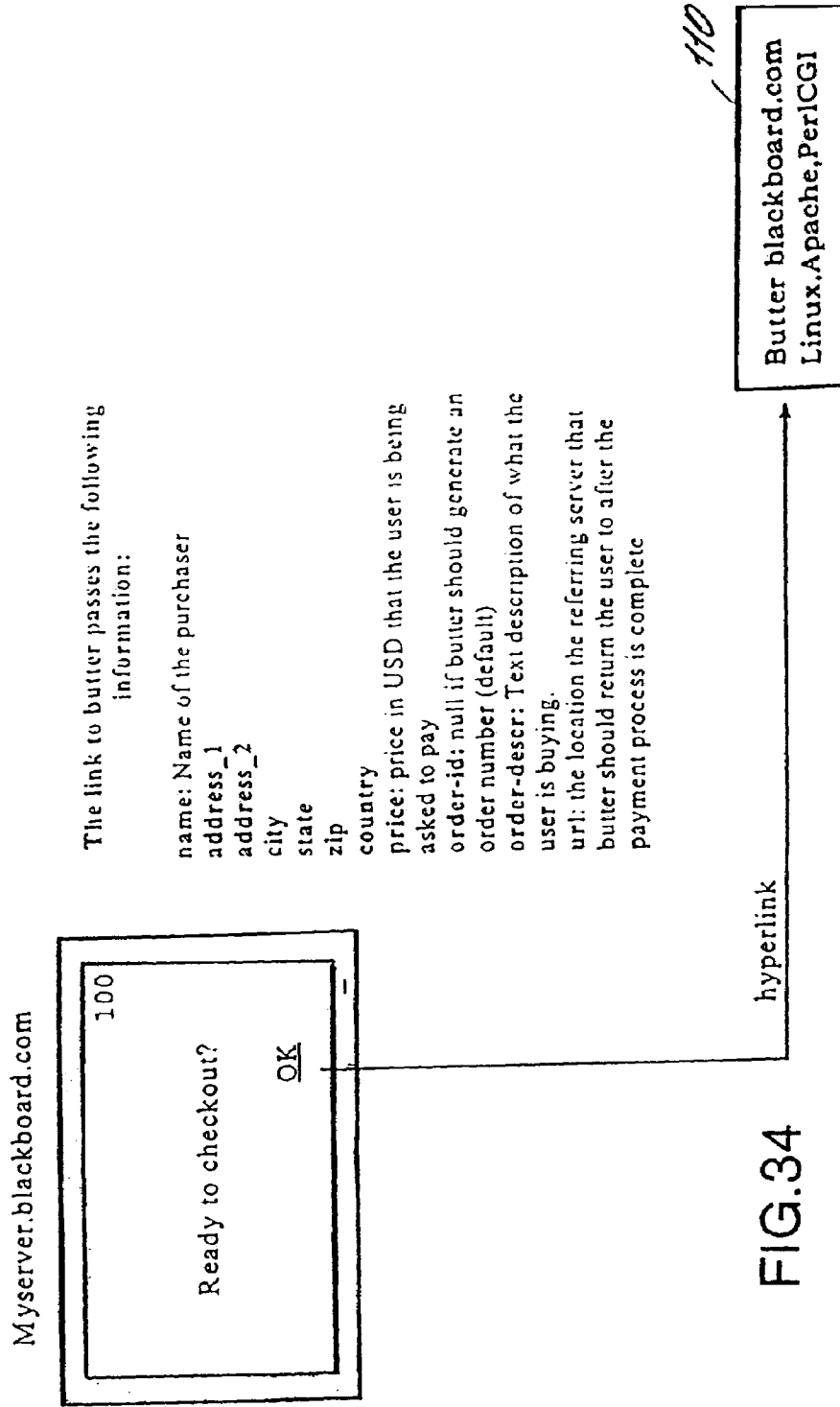
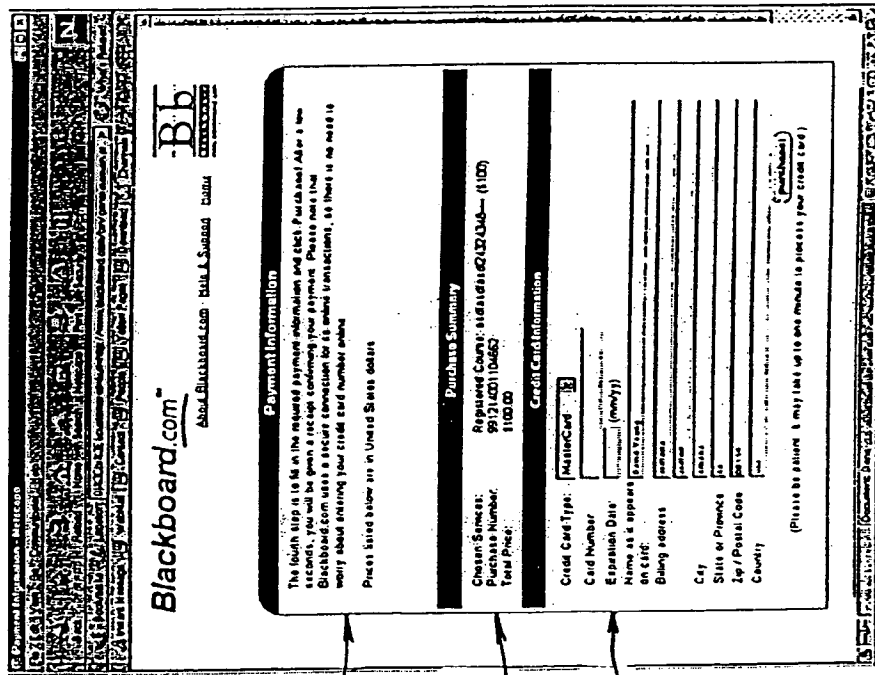


FIG.34

First E-Commerce Screen Display

Butter.blackboard.com



210

220

230

Accepts VISA, MC, Diner's Club, JCB and Carte Blanche (but not Amex)

Whatever user info is available is populated from the data passed from the previous page.

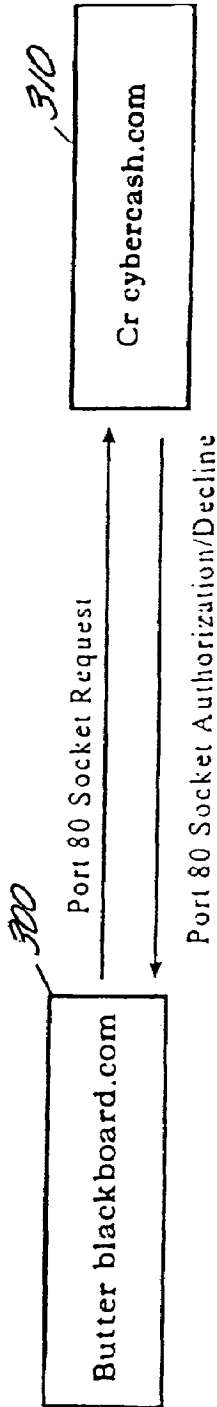
The unique order number displayed is dynamically generated by the server.

The Chosen services and price displayed are passed in from the previous screen.

The look and feel of this plate (and all butter e-commerce pages) can be modified by an HTML template. This template is selected as one of the script parameters.

FIG.35

Authorization Process



- The authorization process takes a minute or so.
- If the card is rejected, a page like the one at right is displayed.
- If the card is accepted, the payment goes through, and the page on the next slide is shown.

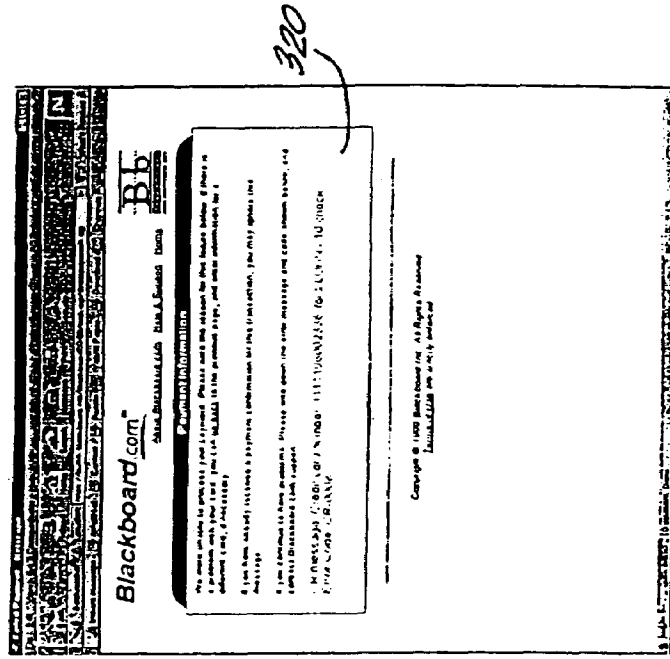
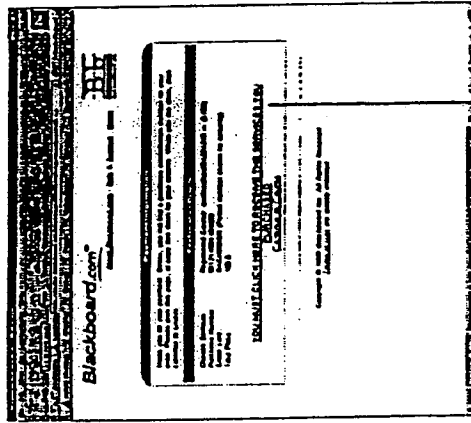


FIG.36

Returning to the Originating Server

Butter.blackboard.com



- The link at the bottom of the page points back to the referring server using the location passed in the URL parameter to the first butter script.
- The authorization code, the order_id and a subset of the credit card digits (show_card) are passed back as parameters.
- The authorization code should be checked upon return by making an identical hash calculation. If the two hash values match, the order should be fulfilled, otherwise, an error should be shown.

myserver.blackboard.com

FIG.38

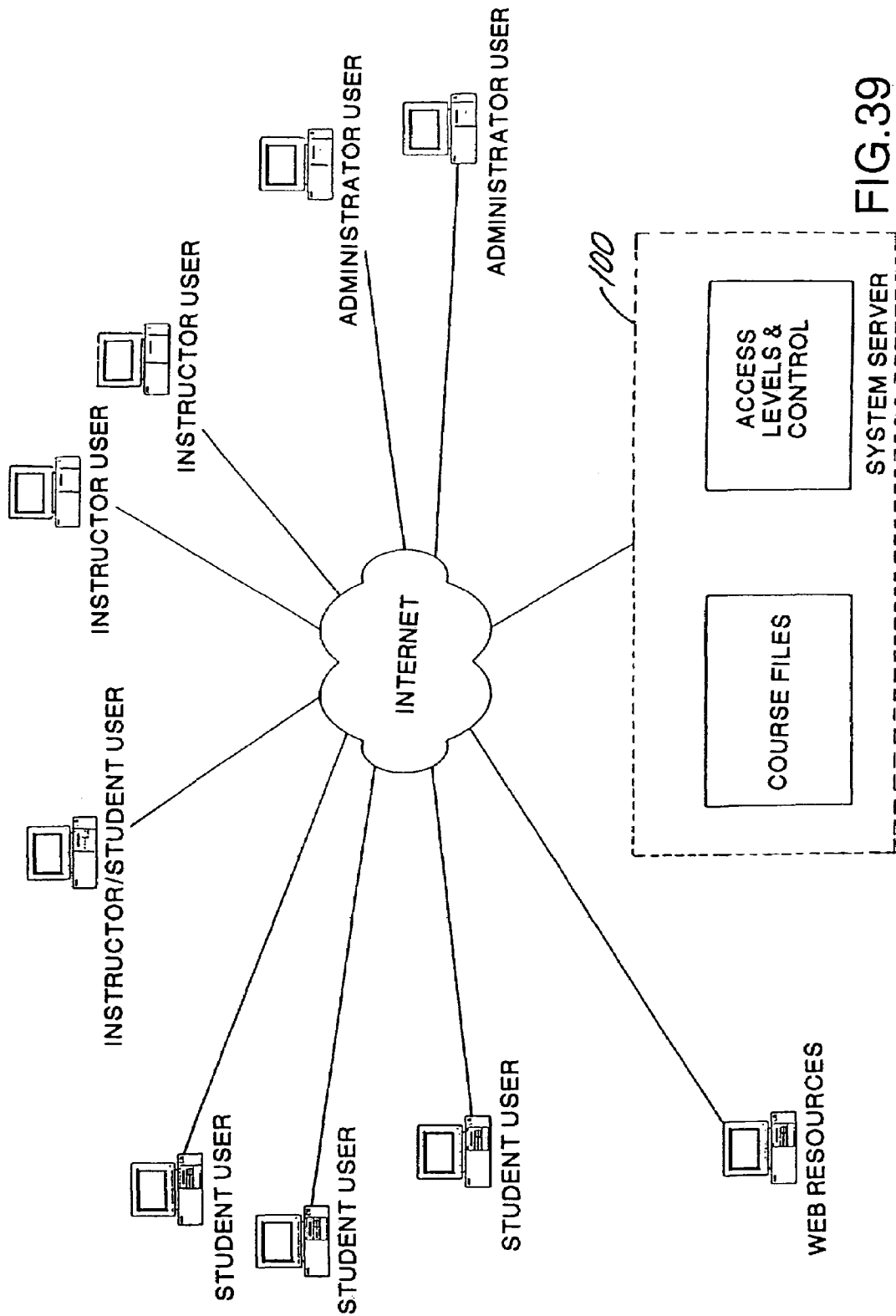


FIG.39

INTERNET-BASED EDUCATION SUPPORT SYSTEM AND METHODS

CROSS REFERENCE TO RELATED APPLICATIONS

This patent application is based on and claims filing priority from co-pending U.S. provisional application Ser. No. 60/141,283, filed on Jun. 30, 1999; co-pending U.S. provisional application Ser. No. 60/141,864, filed on Jul. 1, 1999; and co-pending U.S. provisional application Ser. No. 60/187,890, filed on Mar. 8, 2000, all of which are incorporated herein by reference.

BACKGROUND OF THE INVENTION

The present invention relates generally to systems and methods for the exchange of information between instructors and students in an educational context. More specifically, the present invention relates to systems and methods in which an educational instructor interacts with one or more non-collocated students by transmitting course lectures, textbooks, literature, and other course materials, receiving student questions and input, and conducting participatory class discussions using an electronic network such as the Internet and World Wide Web. The present invention also relates to the provision of an infrastructure that allows for on-line registration and tuition payment of educational courses.

The ability of educators, including educational institutions, private corporations, and institutions of higher learning, to reach potential students has generally been limited by geography. In most instances, a potential student must physically move to within commuting distance or onto a campus in order to have access to course instructors, classes, and materials. Furthermore, potential students and persons seeking knowledge of all sorts are generally limited to proximate sources of courses of instruction, tutoring, or training. Due to these limitations, a prospective student must either seek to learn a given subject from whatever local means of instruction is available to her or move her household in order to be able to access her preferred sources of instruction. Many prospective students are deprived of receiving instruction from other, possibly better-qualified instructors or institutions located outside of their immediate locale. Similarly, educational institutions have been limited to serving only those students located within commutable distance of their campuses.

The advent of networked computers and communications has afforded a partial solution to these limitations. In particular, the widespread use and availability of electronic networks such as the Internet and the World Wide Web have made it possible for students and educators to overcome geographic dispersion and physical location as a barrier to education. Using this electronic medium, students and instructors are able to exchange information including (live or transcribed) classroom lectures, homework assignments, texts and materials, grading, (live or transcribed) question and answer interaction sessions, and other related information to effect a traditional learning or educational experience regardless of physical location.

However, electronic networks, including the Internet, are complex technological systems requiring the user to have or acquire specialized knowledge in order to use them effectively. Even graphical user interfaces (GUIs) designed to enhance simplicity of use, such as that provided by the World Wide Web, may require specialized knowledge of

network terminology and technical aspects. For example, an Internet user's ability to access information using that medium is significantly reduced if the user lacks understanding of how to use Uniform Resource Locators (URLs) to traverse (i.e., navigate) web pages. Slow adoption of new technology and lack of technological sophistication have a chilling effect on the widespread use of the medium in general. Applied specifically in an educational context, these chilling factors apply to instructors who, while possessing high expertise in their respective intellectual or educational fields, would be required to further attain technological knowledge necessary to effectively use the Internet to educate non-collocated students.

Furthermore, the complexity of using the Internet for educational purposes is compounded as the number of user choices required at the user interface increases because not only must the instructor and students acquire technological competency in the use of the medium, but they must in addition understand the presentation and consequences of a plethora of choices required by a particular user interface (e.g., a web page). The design of the user interface therefore can be critical in enabling widespread use of the medium in an educational context. Solutions other than the present invention may be characterized as having relatively complicated and confusing user interfaces. Users, including both students and instructors, of these other solutions are confronted with one or more web pages that typically require the user to review and select a subsequent web page or function from among a large array of potential user choices, thereby complicating the user's task of interacting with the system.

Further, many educational institutions have existing or legacy network-based systems which students access to obtain various types of information (e.g., class schedules). The addition of yet another network-based system requires the host or sponsoring institution to incur implementation and maintenance costs associated with the installation, integration, administration, and maintenance of a new network-based system. These costs place limits on the achieving the widespread use of the medium for educational purposes.

Further, access, presentation, and aggregation of information contained in existing networks are provided from the institution's perspective and not an individual student's perspective. Typically, a student must access different locations or web pages of an institution's network for each datum she wishes to inspect. Further, a student may have to log-on to multiple networks in order to access different items of data. For example, a student may wish to view his financial aid status before registering for an upcoming course or semester. In existing networks, the student will have to traverse multiple web pages and possibly log-on to multiple networks in order to access his current financial aid status, assess that information, and then register online taking into account his particular information. Many similar situations are commonplace involving access to grading information, class schedule, exam materials, student group meetings, and other such information. Existing systems, in short, aggregate course, institution, and student information in an institution-centric manner. This imposes a time cost upon each student/user of the existing systems in order to reduce complexity from the institution's implementation and maintenance perspectives. However, given that these time costs are imposed on all students, the sum of these distributed costs outweigh the cost savings realized by the institution in the institution-centric approach, resulting in a net loss.

Further, instructors' teaching techniques are greatly variable, based on personal preference and the subject matter

being taught. Network-based systems that do not provide for a significant degree of customization are ill-suited to address to this need to accommodate diverse teaching modes in a single system.

Further, a general concern with use of the electronic network medium is that response time tends to slow as more users are added to the system. As response time becomes prohibitive, the time- and cost-effectiveness associated with using the medium for educational purposes is greatly reduced.

Many colleges and universities have stayed away from allowing on-line registration and tuition payment for a number of reasons, including high initial setup costs and incompatible billing practices.

The exception to this rule are so-called virtual schools. Virtual schools traditionally charge an enrollment fee, and then offer free courses. In lieu of paying for each course taken, a student is subjected to advertising while viewing on-line course material. While such billing and income generation methods may be acceptable for companies providing on-line training, such methods are not consistent with traditional college and university billing practices. Colleges and universities typically charge a low enrollment fee and bill students on a per-credit or per-course basis.

Therefore, it is a general object of the present invention to provide a system and methods that allow users to interact with a computer network-based education support system through means of a simplified, easy-to-use user interface.

A further general object of the present invention is to provide a system that can be easily integrated with existing computer network and backend systems with minimal disruption to existing operations and systems.

A still further general object of the present invention is to provide a system that is scalable in order to accommodate increasing numbers of users, such that system responsiveness is not materially degraded as the number of users of the system grows to an increasingly large number.

A still further general object of the present invention is to provide a system and methods that can accommodate a variety of diverse teaching modes without requiring substantial modifications to the system.

A further object of the invention is to provide such a system that allows multiple types of users to access the features of the system as a function of their predefined role within the framework of the system (e.g. student, teacher, administrator).

It is a further object of the invention to provide such a system that integrates with the education platform provided therein value added services and control such as calendar, task, contact and communication functions.

These as well as other objects of the present invention are apparent upon inspection of this specification, including the drawings and appendices attached hereto.

SUMMARY OF THE INVENTION

In accordance with these and other objects, provided is a system for providing to a community of users access to a plurality of online courses, comprising a plurality of user computers and a server computer in communication with each of the user computers over a network. Each user computer is associated with a user of the system having predefined characteristics indicative of a predetermined role in the system. Each role provides a level of access to data files associated with a course, and a level of control over data files associated with a course. The server computer has means for storing data files associated with a course, means

for assigning a level of access to each file, wherein the level of access is associated with the ability of a user to access the file, means for determining an access level of a user requesting access to a file, and means for allowing access to a file associated with a course as a function of the access level of the user.

The user roles comprise a student role associated with a student user, an instructor role associated with an instructor user, and an administrator role associated with an administrator user (roles may be mixed; for example when an instructor of one course, is also a student in another course). The instructor user is provided with an access level to enable the creation and editing of a plurality of course files associated with a course. The course files include an announcement file, a course information file, a staff information file, a course documents file, an assignments file, a dropbox file, an asynchronous communication file, and a synchronous communication file.

The student user is provided with an access level to enable reading of course files associated with a course. The student user is also provided with an access level to enable modification of some of the files associated with a course. Also, the user may be provided with an access level to enable creation of a student file associated with a file for which the student user is able to read. The file that the student is able to read may be an assessment file created by the instructor user, and the student file created by the student user is a response to the assessment file. The assessment file may be a plurality of examination questions selected by the instructor user to assess the ability of the student user. The examination questions may be selected by the instructor user from a predetermined pool of available examination questions. The examination questions also may be created by the instructor user substantially at the time of the creation of the assessment file and optionally added to the pool. The student file may be reviewed by the instructor user and assigned a grade, which would be made available online to the student user. The instructor user may collate the grades obtained from reviewing a number of student files, and the collated grades may be made available online to all student users associated with the course (e.g.: an average for the class, a pie or bar chart, etc.).

The student will also be able to read an assignment file created by the instructor user, and the student file created by the student user is a response to the assignment file.

The "digital dropbox" may contain a plurality of files transferred to the server computer from one or more student users associated with the course. The instructor user may be provided with access to the files in the dropbox file, whereby the instructor user may download, edit and upload the files in the dropbox.

A user may be required to enter a login sequence into a user computer in order to be provided with access to course files associated with that user. The user is then provided with access to all courses with which the user is associated after entry of the login sequence. The user is provided with a web page comprising a plurality of course hyperlinks, each of the course hyperlinks associated with each course that the user has been enrolled either as an instructor or as a student. Selection of a course hyperlink will provide the user with a web page associated with the selected course; the web page having content hyperlinks and buttons to various content areas associated with the course. The content hyperlinks and/or buttons include an announcement area hyperlink, a course information hyperlink, a staff information hyperlink, a course documents hyperlink, an assignments hyperlink, a communications hyperlink, and a student tools hyperlink.

5

Selection of the announcement area hyperlink provides a web page including a group of course announcements. Selection of the course information hyperlink provides a web page including information regarding the associated course. Selection of the staff information hyperlink provides a web page including data regarding the instructors of the associated course. Selection of the course documents hyperlink provides a web page including a listing of documents associated with the course, which may be active hyperlinks to the documents. Selection of the assignments hyperlink provides a web page including a group of course assignments. Selection of the communications hyperlink provides a web page including hyperlinks to a group of communication tools including an asynchronous communication tool and a synchronous communication tool.

In another aspect if the invention, provided is a system for providing to a community of users access to online courses, including a server computer in communication with user computers over a network, wherein the server computer has means for creating course user accounts from a file of existing user accounts associated with an external computer. In this manner, existing legacy systems having large members of user accounts stored in memory may be integrated with this system without having to re-enter user data into the system (so-called batch enrollment).

In yet another aspect of the invention, provided is a method for providing online education, which includes the steps of establishing a course to be offered online, offering the course to be taken online to a group of student users; and providing access over the network to the course files to a student user who has enrolled in the course. The establishment of the course includes an instructor user generating a set of course files for use with teaching the course, then transferring the course files to a server computer for storage thereat, and then making access to the course files available to a predefined community of student users having access to the server computer over a network.

Preferably, at least one of the course files comprises a course assignment, and the student user creates a student file in response to the course assignment and transfers the student file to the server computer. The instructor user accesses the student file from the server computer, reviews the student file to determine compliance with the course assignment, and the instructor user assigns a grade to the student file as a function of the determination of compliance with the course assignment. The instructor user may post the grade to a file on the server computer accessible only to the student user with which the grade is associated. The instructor user may repeat these steps for a number of student users that are enrolled in the course, and then perform a statistical analysis on the grades assigned to the student users. The results of the statistical analysis may be made available to the student users enrolled in the course.

An asynchronous communication tool accessible to student users enrolled in the course may be provided for enabling asynchronous communication amongst the student users. Likewise, a synchronous communication tool accessible to student users enrolled in the course may be provided for enabling synchronous communication amongst the student users.

The present invention also enhances the prior art by providing a flexible infrastructure for colleges, universities, and other institutions wishing to facilitate on-line registration and tuition payment. More specifically, the present invention can accommodate different billing methods, including, but not limited to, billing on a per-credit-hour basis, and billing on a per-registrant basis. Tuition may be

6

paid by credit card, debit card, check, or other verifiable payment method. Payment verification may be performed by the present invention, or the present invention may interface with third-parties providing payment verification services. In addition, the present invention allows on-line billing information to easily interface with a college, university, or other institution's standard billing practices. Integrating with existing billing practices simplifies transition to automated systems.

In addition, the present invention may be configured as an open system wherein anyone can connect to a server over the Internet and create a course online that may be taken by anyone else connected over the Internet. Thus, anyone may create a virtual classroom available to anyone else, regardless if they are affiliated with a particular institution such as a University. For example, a lawyer may create a course in patent law online, and configure the system to require entry of a password to enroll. The lawyer may then disseminate the passwords to desired students who can enroll in the course. Alternately, the lawyer can request the system to require payment to enroll in the course such as by credit card.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is an architectural block diagram of a preferred embodiment of an education support system according to the present invention;

FIG. 2 describes a preferred embodiment implementing load balancing to achieve scalability;

FIG. 3 illustrates the functioning of a preferred embodiment of an engine/registry model according to the present invention;

FIG. 4 shows a preferred user interface according to the present invention;

FIG. 5 shows a screen shot of the home page that a user will view;

FIG. 6 is a screen shot of a web page showing the course list and course catalog available to student users;

FIG. 7 is a screen shot of the default view for a course web site;

FIG. 8 is a screen shot of the announcements provided to a student user;

FIG. 9 is a screen shot of the course contents window;

FIG. 10 is a screen shot of the assignments web page;

FIG. 11 is a screen shot of the course documents web page;

FIG. 12 is a screen shot of the communication center web page;

FIG. 13 is a screen shot of the asynchronous discussion board web page;

FIG. 14 is a screen shot of the student tools web page;

FIG. 15 is a screen shot of the student drop box web page;

FIG. 16 is a screen shot of the instructor's control panel web page;

FIG. 17 is a screen shot of the announcements web page;

FIG. 18 is a screen shot of the course information web page;

FIG. 19 is a screen shot of the course tasks web page;

FIG. 20 is a screen shot of the instructor library web page;

FIG. 21 is a screen shot of the digital dropbox web page;

FIG. 22 is a screen shot of the course gradebook web page;

FIGS. 23A and 23B are a screen shot of the course statistics web page;

FIG. 24 is a screen shot of the advanced course and portal manager web page;

FIG. 25 is a screen shot of the community web page;
 FIG. 26 is a screen shot of the services web page;
 FIG. 27 is a screen shot of the calendar web page;
 FIG. 28 is a screen shot of the email web page;
 FIG. 29 is a screen shot of the create a course web page;
 FIGS. 30A and 30B are a screen shot of the create user
 web page;
 FIG. 31 is a screen shot of the web resource web page;
 FIG. 32 is a further screen shot of a web resource web
 page;
 FIG. 33 is a screen shot of the virtual chat web page;
 FIG. 34 is a block diagram illustrating information passed
 from a course registration server to a payment server;
 FIG. 35 is a sample of a payment form;
 FIG. 36 is a block diagram illustrating interaction
 between a payment server and a payment validation server;
 FIG. 37 is a sample of a payment information page;
 FIG. 38 is a block diagram illustrating post-order pro-
 cessing;
 FIG. 39 is an overall block diagram of the system.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

Referring to FIG. 39, the present invention comprises a
 system and methods for the exchange of course content and
 related information between non-located instructor users
 and student users. An instructor user interacts with one or
 more non-located student users by using the system and
 methods of the present invention to, without limitation,
 transmit course files including course lectures, textbooks,
 literature, and other course materials, receive student ques-
 tions and input, and conduct participatory class discussions
 using an electronic network such as the Internet or World
 Wide Web. Access to the course file is controlled by access
 levels and control logic, to ensure integrity and security of
 the system. Also, administrator users have access to the
 system to perform administrative tasks as defined herein.

System Architecture

The system architecture of a preferred embodiment of an
 education support system 100 according to the present
 invention is presented in FIG. 1. Referring now to FIG. 1,
 education support system 100 comprises application sub-
 systems 110, a web browser 120, a web host server 130, a
 database subsystem 140, and core subsystems 150. Web host
 server 130 further comprises a shell service 131. Applica-
 tions subsystems 110 further comprise a content registry
 111, a tool registry 112, a course registry 113, one or more
 content engines 114, one or more tool engines 115, and one
 or more course engines 116. Core subsystems 150 further
 comprise a core engine 151, an access manager 152, a user
 interface (i.e., UI) manager 153, a user manager 154, a group
 manager 155, an event manager 156, a log manager 157, and
 a connection manager 158.

In a presently preferred embodiment, education support
 system 100 is implemented in a client-server network topol-
 ogy. Users (who may have one or several roles such as a
 student, instructor, teaching assistant (TA), or administrator)
 access and interact with education support system 100 via
 web browser 120. More specifically, a user accesses appli-
 cation subsystems 110 and core subsystems 150 through
 shell service 131 servlet providing a standard Internet inter-
 face including, but not limited to, TCP/IP, HTTP, SMTP, and
 FTP to the user via web browser 120 running on a standard
 computing platform such as a personal computer or work-
 station. Specifically, shell service 131 servlet uses the URL-

encoded information contained in HTTP requests received
 from web browser 120 clients to invoke the corresponding
 requested application subsystem 110 or core subsystem 150.
 Shell service 131 servlet also provides user authentication
 and session management.

Application subsystems 110 function in conformance
 with an engine/registry model 300 as described in FIG. 3.
 Generally, engine/registry model 300 comprises one or more
 engines 301, a registry 302, and a context factory 303.
 Engines 301 include, but are not limited to, content
 engine(s) 114, tool engine(s) 115, course engine(s) 116, and
 core engine 151. Registries 302 include, but are not limited
 to, content registry 111, tool registry 112, and course registry
 113. Course engine(s) 116 creates a course by associating
 together a set of educational materials to which a student
 user has access, by organizing references to these informa-
 tional items as contained in content registry 111. Specifi-
 cally, course engine(s) 116 queries content registry 111 for
 an index to the content engine 114 associated with a par-
 ticular resource being requested by a user.

Content engine(s) 111 includes an assessment engine that
 generates quizzes to assist and instruct users in the use of
 education support system 100. For example, one such quiz
 provided by an assessment engine of education support
 system 100 provides step-by-step instructions to an instruc-
 tor for building a course. The quiz is then administered
 online to the instructor to allow him to build a customized
 course to be provided using education support system 100.

Unlike content engines 111 which represent actual course
 content, tool engine(s) 115 generally comprise installable
 programs that provide capabilities available for use with a
 plurality of courses and not fixedly associated with any
 particular course or courses.

Instructors have different preferred modes of teaching.
 Further, the same instructor may emphasize different modes
 of teaching depending upon the subject being taught. For
 example, some instructors emphasize individual homework
 while others prefer a group or collaborative approach. Edu-
 cation support system 100 supports a variety of teaching
 methods. By invoking a particular set of tool engines 115
 during interaction with the assessment engine, an instructor
 can customize a course offering to conform to her preferred
 mode of teaching. An example of a tool engine 115 is the
 chat/whiteboard communication tools (synchronous and/or
 asynchronous) provided by education support system 100
 that allows for student group interaction and collaboration
 associated with a given course. Other tools include, but are
 not limited to, announcements for broadcast of group-
 oriented messaging, a calendar mechanism for storing date-
 related events and information, a discussion board for post-
 ing questions and answers in a threaded discussion format,
 notes-editing, group pages, and email services. Further capa-
 bilities provided by education support system 100 include,
 but are not limited to, a catalog listing of all courses
 available, means for student users to enroll in either open
 enrollment or closed enrollment situations, means for course
 creation including course templates and course themes, a
 course/page editor and viewer, a site page editor and viewer,
 means for making and disseminating announcements, a
 calendar function, a chat board in the nature of an online
 discussion, a white board allowing group interaction and
 display of free-form information using, for example,
 Microsoft Paint™, means for sending email between
 instructors and students and groups of students, a list of
 course members and links to their web pages, a list of groups
 and links to their web pages, a file sharing area, means for
 providing assignments to student users, means for conduct-

ing a variety of types of student assessments (i.e., testing), means for providing lesson material in sequential format, means for adding and removing users, help documents, maintaining a grade book and progress tracking, links to personal web pages or home pages, and a resource library containing references to all uploaded content. Course templates allow instructors to easily reuse a course structure for subsequent courses. Course themes allow the instructor to affect the look and feel of the course site.

Further, a presently preferred embodiment of education support system **100** supports a plurality of environments **400** in a single application. Examples of different environments **400** supported include the personalized web page of student-centric information accessed by a student user and the administrator's environment used for maintenance of the system. Certain parts of the education support system **100** application are consistent across all supported environments **400**, while the appearance to the user may vary for different environments **400**. An environment **400** is defined by console frames that surround the application areas. An example of an environment **400** defined by a four-frame page as shown in FIG. 4 comprises a console navbar **401**, and console top **402**, a toolbar **403**, and content **404**. Console navbar **401** and console top **402** are controlled by a console frameset, while toolbar **403** and content **404** are controlled by a separate frameset. For example, toolbar **403** "buttons" are always located in the top frame of an application area, regardless of the environment **400**. This approach allows users, and especially instructors, the ability to customize their course offerings while conforming to consistent user interface features that allow application areas to be shared across environments **400**. Student users and instructors interact with education support system **100** via the same basic environment **400** format.

Context factory **303** contains information mapping a user to one or more courses associated with that user.

Access control manager **151** creates an access control list (ACL) for one or more subsystems in response to a request from a subsystem to have its resources protected through adherence to an ACL. Education support system **100** provides multiple levels of access restrictions to enable different types of users to effectively interact with the system (e.g., access web pages, upload or download files, view grade information) while preserving confidentiality of information.

User manager **154** integrates the student-centric information with existing network-based systems of an associated educational institution. In a presently preferred embodiment, user manager **154** comprises a runtime component and a batch component that periodically access and extract information contained in external institution databases in order to maintain current student-centric information. User manager **154** facilitates integration of education support system **100** with existing or legacy network-based systems, including proprietary institutional electronic networks and systems related to grades, registration, course schedules, financial aid, etc. without requiring modifications to existing systems or security procedures.

In a presently preferred embodiment, application subsystems **110** and core subsystems **150** interface with database subsystem **140** via the Java Database Connectivity (JDBC) standard interface to allow use of any relational database including, but not limited to, SQL and DB2 Universal Database standards.

Scalability is provided by the modular system architecture described in FIG. 1, and, in a preferred embodiment, through use of a load balancing server **200** as shown in FIG. 2. As

users are added to the system and access the system as web browser **120** clients, additional web server hosts **130** may be added to the overall system to provide a matching increase in system capacity. Load balancing server **200** allocates new web browser clients **120** to the least-busy web server host **130** for servicing. By thus balancing the load across all web server hosts **130**, education support system **100** prevents response times from become unacceptably long for any one given user. In a presently preferred embodiment, load balancing server **200** maintains one or more metrics concerning the percent utilization for each web server host **130** and selects the least-busy web server host **130** based upon application of a load balancing algorithm to these utilization metrics.

In a presently preferred embodiment, upon logging onto education support system **100**, shell service **131** servlet renders and presents to the user (via web browser **120**) a personalized web page comprising a student-centric aggregation of data that may include, without limitation, personal class schedules, grades, a rolled-up or consolidated calendar, links to related tools, student group events for groups of which a particular student is a member, and class announcements.

Education support system **100** executes on a variety of computing platforms including, but not limited to, UNIXTM servers, NTTM servers, SolarisTM, HPTM, and LinuxTM. Education support system **100** supports popular web browsers including, but not limited to, Netscape NavigatorTM and Microsoft Internet ExplorerTM, and, in a preferred embodiment, does not require plug-ins at the web browser client.

In a presently preferred embodiment, an automated upload or import capability is provided in which a user may upload a file to the system and system presents or displays the information contained in the uploaded file in a manner that preserves the grouping of the information, including fields and other categorization, based on the file type. Education support system **100** provides a standard import file format to accomplish this preservation of native grouping of information. In a presently most preferred embodiment, the automated upload capability imports an uploaded file in both native and HTML formats, maintaining the file formats associated with the native format for the native formatted file and converting the native format into HTML formats for the HTML formatted file.

Education support system **100** supports a variety of business models. For example, an institution may charge each student for courses taken via education support system **100**; or, an instructor may use education support system **100** to process individual student tuition payments by providing links to e-commerce facilities.

Thus, a system and methods have been shown that that allow users to interact with a computer network-based education support system through means of a simplified, easy-to-use user interface, and that can be easily integrated with existing computer network and backend systems with minimal disruption to existing operations and systems. The disclosed system and methods is scalable in order to accommodate increasing numbers of users, and can accommodate a variety of diverse teaching modes.

Three Tier Functionality

The present invention will now be described in further detail. The invention is embodied in four embodiments that represent three levels of functionality of the system that can be provided to and by an institution, and one embodiment that can be offered to anyone on the Internet. One embodiment embodies a "first tier" functionality and incorporates

the basic system, referred to as the Course Manager. The Course Manager provides course management system tools that enable instructors to provide their students with course materials, discussion boards, virtual chat, online assessments, and a dedicated academic resource center on the Web. As explained further below, the Course Manager includes personal information management tools, course content management tools, course communication and collaboration tools, assessment tools, academic Web resources, course management tools, and system management tools.

A "second tier" embodiment incorporates all of the functionality of the basic embodiment in an epicentric or portal model, also known as the Course & Portal Manager. This embodiment expands beyond the first tier Course Manager, and provides customized institution-wide portals for faculty, students, staff, and alumni with access to numerous personalized news and information services from across the Web. The platform can be customized with institutional branding and a tailored look and feel. It enables institutions to develop online communities, Web-based email, calendar, announcements and tasks. It also allows for a central access point to all of the institution's online services. In addition to the features of the Course Manager, the Course & Portal Manager includes enterprise database support, customizable portal modules and information services, web-based e-mail system, community management, institutional services management, extended customization for institutional branding, institution-wide content sharing and management, and course e-commerce management.

The third embodiment is a third tier system, known as the Advanced Course & Portal Manager. This embodiment incorporates the complete end-to-end "e-Learning" solution. In addition to the Course and Portal Manager, this third tier provides advanced Java-based API's for unifying diverse online campus systems into one integrated platform allowing for user-driven single log-in service delivery, as well as capabilities that allow each school, department or campus within the institution to maintain its own customized environment. Thus, this is the fully functional embodiment that includes all the features and functionality of the first and second tiers and adds certain integration technologies that allow integration of the invention with existing enterprise systems, such as for downloading student databases, etc. as defined further below. This includes a snapshot user management API, an event-driven (real-time) user management API, an end user authentication (security) API, and a network protocol for passing user authentication data.

It is contemplated that each tier would be offered to institutions in a licensing program that would best suit the needs and budget of the institution.

A fourth embodiment of the invention is operated as a publicly available web site on the Internet, that may be accessed by anyone, whether they are affiliated with an institution or not. In this embodiment, anyone on the web can create a course, enroll in a public course, etc. as explained further below. This provides for widespread dissemination of tools and utilities that enable anyone to generate his own course that can be taken by virtually any student.

As further explained herein, the course management tools featured in the present invention allow instructors to monitor, control and customize their course web sites from a web browser interface. The Course Control Panel provides a robust and easy-to-use interface for such course management. The system allows instructors to customize the names of course web site navigation buttons to suit their needs and requirements. The system also allows the instructor to add or

drop individuals or groups of students from a course as required. The system features extended student enrollment option, such as a limited-time self-enrollment (e.g. certain dates only for the self-enroll feature), password-protected enrollment, and defined course duration (e.g. for self-paced study). Courses may be recycled between academic terms by automatically resetting discussion boards, assessment, and other content areas. In addition, the instructor can track student progress, grades and content usage through the system.

As further explained herein, the content management tools featured in the present invention allow instructors to post course documents, staff information, assignments, etc. Text may be typed directly into a form, or existing files may be accessed and uploaded automatically. Documents such as word processing files, spreadsheets, slide presentations, graphics, audio and video clips, etc. may be uploaded in this manner. Streaming multimedia may provided interactivity between the student and the course. Pop-up maps provide easy course site navigation, thus enriching the teaching and learning environments.

The communication and collaboration tools enhance the interaction between the students and instructors with asynchronous discussion boards as well as synchronous chat tools. Online discussions may be managed wherein messages are sortable by date, author, title, etc., and may be archived and printed. A digital dropbox is a file sharing utility that allows sharing of documents between users. Virtual office hours may be held, and even field trips conducted online with these tools.

The assessment tools in the present invention increase student preparedness, measure student progress, and customize lessons by creating and administering quizzes and surveys. Provided is an easy to use, step by step process to create the quizzes and surveys, wherein the instructor may mix and match multiple question types such as multiple choice, multiple correct, true/false, matching, ordering, fill in the blank, and essays. Multimedia or other attachments may easily be included with the assessment questions. Questions may be randomized and re-used from assessment pools. Tests provided to students may be password protected and timed, and may provide instant feedback to students. Advantageously, statistical reports may be created from the assessments and student answers.

The personal information management tools in the present invention allow students, instructors, administrators and all other users to access basic course, personal, and institutional data through a user-centric "My Institution" screen. The user may view announcements from multiple courses in one central location, and maintain personal calendar, address book, user directory and to-do lists.

The present invention also provides for access to a plethora of academic resources that supplement the student's online education experience. The user may browse discipline-specific information, resources and communities linked to each course website. These academic resources may be customized and personalized to fit the users' needs.

The system management tools available with the present invention allow system administrators to monitor, control and customize an institution's online teaching and learning environment from the web browser. The system administrator may control security permissions and enable/disable features for numerous user roles. Batch user enrollment (and unenrollment) may be performed system wide. Preferences and options may be managed on multiple courses, all from within a central system administrator panel. The system administrator may also track and report faculty, student and

course statistics, may plan and manage system hardware requirements by assigning instructors with pre-assigned disk quotas for content storage, and may employ system-wide announcements to broadcast messages to users about system maintenance or institutional announcements.

In the Course & Portal Manager embodiment, the enterprise database support provides support for tens of thousands of users across an entire institution or system of institutions. User and course data may be managed efficiently and effectively. Moreover, large volumes of transactions may be managed efficiently and effectively. The “My Institution” interface includes portal and community functionality along with quick access to web email, course and institutional announcements, and links to other campus departments. Administrators may enable or disable portal modules and establish required and optional modules from the portal options menu bar. Administrators may also assign different portal default settings to different user roles (e.g. students get different portals than instructors).

Course e-commerce management functionality allows institutions to set prices and charge fees for course enrollment directly through the “e-Learning” platform.

In the Advanced Course & Portal Manager embodiment, the snapshot user management tool allows scheduling of one-time or periodic (i.e. hourly, daily, weekly) data integration from existing student information systems, automating course population and keeping the “e-Learning” environment synchronized with administrative and student data. Moreover, the end-user authentication enables a single login environment for the institution portal for all students, instructors, administrators and staff, which streamlines all campus services into a single web portal environment.

The present invention will now be described in further detail and embodiments. FIG. 5 shows a screen shot of the home page 500 that a user will view, which is customizable in accordance with the requirements and desires of any user. The home page may also be institutionally branded, so that the “Your Institution” logo 504 shown in FIG. 5 would display the name of the institution that has licensed the product (i.e. “New York University”). The home page also provides the user with direct access to personal, course, and institutional tools. As an added feature, the system enables each user to select from a large number of news and information services, so that everyone who uses the system will have access to the most recent and relevant information for them. All of this functionality is provided in one place—the home page—so that the institution can provide a sense of community on campus, with courses, and with a view to the external information sources.

By selecting the “Courses” tab 502 shown in FIG. 5, the user will be linked to a Course page 600 as shown in FIG. 6, which provides direct links to the courses that they teach (602, 604) and/or are enrolled in (606, 608, 610). To access the course website, the user will click on the course title (and 602, 604, 606, 608 or 610), he is automatically linked to a web page associated with that course. The user also has the opportunity to browse the course catalog 612 by selecting the links on the right side of the page 600, where courses are listed according to category. The user may also search through the course search engine by selecting the Browse Course Catalog Link 614.

For example, by selecting the link 602 for the Introduction to Music course, which the user in this example is teaching, the user is shown the web page 700 illustrated in FIG. 7. The default view for the course web site 700 in this embodiment is the Announcements page 702, as shown in FIGS. 7 and 8. As seen at the lower part of the screen in FIG. 8, the user has

the option of selecting various types of views by filtering out certain time-based announcements (i.e. today, last 2 weeks, last month, or all) by selecting button 802. The Announcements section can also be linked to after the user has left that page (i.e. is viewing another part of the course web site) by simply clicking the Announcements button 804 on the navigation toolbar 806 on the left of the web page.

Within the course website environment, the user is able to access all of the relevant course material and communication features as shown herein. The entire course outline may be displayed in a separate browser window 900, wherein the course contents are available for perusal and hyperlinking as desired. FIG. 8 shows the entire web page for Introduction to Music in two parts (an upper part and a lower part, which of course is scrollable as desired). As can be seen, one of the function buttons provided is labeled “Course Map” 808, which upon being clicked will popup the Course Contents window 900 shown in FIG. 9 (in an expanded browser window). As can be seen, the user will be able to expand or collapse the various headings provided in order to drill into the entire course contents as currently configured. So, for example, the user can expand the Assignments section 902 and get a linkable list of all the assignments that have been created for the course to date. Any of the assignments may then be clicked for easy access thereto. This separate window 900 is especially advantageous since it allows users to browse the entire course, regardless of their current location in the web site.

Thus, by selecting any of the Assignments links 902, the user would be linked to the web page 1000 set forth in FIG. 10. This web page lists each assignment that has been compiled for the course, each of which can be linked to web pages that contain the full details of the particular assignment. The assignment page 1000 shown in FIG. 10 may of course also be viewed by clicking the “Assignments” button 804 on the toolbar at the left of the course home page shown in FIG. 8. In general, any of the functions that are provided by toolbar buttons on the navigation bar at the left of the course home page will be available in any page accessed for that site, so that easy navigation may be had and the user may jump around and visit any desired portion of the course web site no matter where the user is currently located. Likewise, the Course Contents window provides similar functionality as described above.

As shown in FIG. 10, folders that have quizzes and surveys may be linked to by viewing the assignments web page. Clicking on these folders will present the student and/or instructor with a quiz that may be taken online, wherein the answers may be graded automatically, in real-time, as soon as the student has finished the quiz. This assessment functionality will be explained in greater detail below.

In general, assignments may be provided in virtually any type of media that the instructor has at his disposal. For example, shown in FIG. 10 is a link 1002 to a multimedia presentation for “Physics in Music”, which will give the student a content-enriched lesson that will be useful, prior to the next lesson. Assignments may also be as simple as a text based file that the student would read in preparation for the required class session.

In addition to selecting the Assignments page 1000 or the Announcements page 700, the user may select the Course Information button 1004 on the toolbar. This will link the user to a web page that will list information provided by the instructor that is useful to the student, such as an introductory welcome message, links to helpful resources, etc. Resources otherwise found on other parts of the course web