

Transforming Collaborative Working in Educational Institutions with Groupware Technologies

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Introduction

“Effective and efficient data communication and networking facilities are vital to any enterprise. Three different forces have consistently driven the architecture and evolution of data communication and networking facilities.

1. Traffic Growth
2. Development of new services
3. Advances in Technologies

Communication Traffic, both local and long distance has been growing at a high and steady rate for decades. The increased emphasis on office automation, remote access, online transactions, and other productive measures means that this trend is likely to continue. Any business or a service rely on information technology, the range of Service expands. Finally trends in Technology enable the provision of increasing traffic capacity and the support of a wide range of service.”

(William Stallings)

When we are designing a Virtual University we have to clearly give the details of its Organisational Structure, its Technical Infrastructure and the different Contents. We could take these three as three layers for the Virtual University.

1. Organisational Layer
2. Infrastructure Layer
3. Content Layer

The Organisational Layer would be having the following

- Structure
- Copyright
- Quality policy
- Quality Assurance

The Infrastructure Layer would be dealing with

- Virtual Campus

- Registration
- Finance
- Student Support Service
- Staff Support Service
- Staff Recruitment
- Implementing IT system and Networking
- Assessment Mechanism
- Discussion Mechanism
- Student Tracking

The Content layer will have the following

- Static HTML
- Learning Environment
- Assessment Techniques
- Security
- Portal Access
- Authentication
- Document Management

Architecture Review

Educational Institutions will be using a multi-tiered network architecture incorporating the following activities.

- Software development and testing
- Student academic records and accounts receivable (invoices and payments)
- A document management system with appropriate security
- Teaching and learning systems offering delivery of instruction, opportunities for feedback and discussion as well as resources for study and self-testing
- Coursework submission and online examinations with results feedback to students
- Email and directory services for staff and students
- Support for staff collaboration including online meetings

Some Facts on Educational Institution

- Admin headquarters with Software development and Support team who builds and maintains the system on which the Educational Institutions will depend
- Will have Vocational and highly attractive degree Subjects
- No entry Requirements
- Failures will leave
- First Exam in six weeks
- Fees paid by Direct Debit
- No Resit (other than documenting good cause)
- Part- time Courses
- A Lecturer will be associated with more than one dept which might change with time.
- Authenticated Exam Centres with high level of identity check

Proposed Features of the IT Infrastructure for Educational Institution

The university IT Infrastructure should have the following features

1. Document Management
2. Web Content Management
3. Record Management
4. Image Management
5. Content Repository
6. Application Management
7. Knowledge Management
8. Security Management
9. Technical Support / Help Desk
10. Library Management
11. Email / IM
12. Compliance
13. Advance Search
14. Data Management and Transformation
15. Usability Management
16. Groupware Applications Management

Different Types of Servers to be used by Educational Institution

Servers may be defines as a high speed device which is capable of providing the required service to the client.

The different types of servers that should be used by the Educational Institutions are the following.

1. Application Server
2. Database Server
3. Communication Server
4. Home Server
5. File Server
6. Audio/Video Server
7. Chat Server
8. Print Server
9. Fax Server
10. FTP Server
11. Groupware Server
12. IRC Server
13. List Server
14. Mail Server
15. News Server
16. Proxy Server
17. Telnet Server
18. Web Server
19. Sound Server
20. Client Server

Details about the different Servers used by Educational Institution

Educational Institutions has to use a Server platform which could be Software or a Hardware which is always synchronised with the operating system which will act as an engine that drives the different Servers.

- Application Server is one in which runs all the applications required by the client and creates a link between the Server and the clients.
- Database Server may be defined as a server which gives database services to the computer services or the computer itself.
- Communication Server helps communication getting linked to different communication networks.
- Home Server is one which is used by the Educational Institutions to keep the Data's related to the university.
- File Server is one which provides all the file services.
- Audio / Video Server is one which provides multimedia capabilities to the website helping in live streaming and sharing different audio and video files.
- Chat server helps user to exchange data through IM services.
- Print Server is the one which is used by the Educational Institutions to provide the entire printer Services.
- Fax Server is one which helps the clients providing Fax services.
- FTP Server helps clients to exchange and manipulate data or the internet.

- Groupware Servers are those which will help people to work together irrespective of where they are from.
- IRC Servers (Internet Relay Chat) helps clients take part in a real time discussion.
- List servers are those which help clients to maintain a better mailing list so that they can keep their contacts in a well arranged and orderly manner.
- Mails Servers are used to Store and Transfer mails between two people over the LAN, WAN or through Internet.
- News Servers help the clients updated with the mails from various newsgroups and mailing list by the university.
- Proxy Server acts as a mediator to different client programs and any external servers to access different resources.
- Telnet Server is the one used for remote login and access different resources or to execute any programs.
- Web Server helps loading data's from any server's disk and display the contents on client's browser.
- Sound Servers helps in multimedia broadcasting and live streaming.
- Client Server separates a client functions from a server function.

Groupware Applications

Groupware could be called as software that facilitates a group of people working within the same system or application, regardless of where they are and what they are doing.

Groupware applications could broadly be divided into the following.

1. Communication tools
2. Conferencing tools
3. Collaborative Management tools

Email, FAX, and voice mail are the most commonly used Communications tools, where as voice and video conferencing, message boards and chat rooms are the commonly used Conferencing tools. The most commonly used Collaborative management tools are electronic calendars, project management system and workflow systems.

The main advantages of Groupware Applications are the following

- Groupware increase effectiveness and efficiency of the communication system

- Groupware helps developing creativity among the people involved in the communication
- Groupware provides structure the process that we are doing
- Groupware helps understand the information flow and also helps in the documentation

Groupware Applications to be used by Educational Institution

The groupware applications which are used by the Educational Institutions should offer features like

- Communication.
- Conferencing.
- Collaborative Management.

These Groupware applications should be tailored according to the needs of the Educational Institution.

The broad alternatives those are available

- Microsoft Online Services
- TikiWiki
- Lotus Notes
- Media wiki
- Google Apps

The above mentioned would be having all the below mentioned features which will help the Educational Institution.

1. Electronic calendars
2. Project management systems
3. Workflow systems
4. Social software
5. Online spreadsheets
6. Online chat
7. Instant messaging
8. Telephony
9. Videoconferencing
10. Web conferencing
11. Data conferencing
12. Application sharing
13. E-mail
14. Web publishing

Suitable Groupware applications that could be used by Educational Institution

The most helpful and suitable groupware application that could be used by the Educational Institutions could be **Microsoft Online Services**.

This includes

- Microsoft Exchange Online
- Microsoft Share Point Online
- Microsoft Live Meeting
- Microsoft Communication Online

Microsoft Online Services provides and streamlined and communication services with a very high business class security and reliability and a simplified management.

The reason for this suggestion is because Microsoft Online Services has the following features.

- Integrated Applications
- Easy to use
- Single sign on capability
- Anywhere access
- Secure access
- Virus and Spam filtering
- Latest Technology
- Direct Synchronisation
- Accelerated Time to Value
- Email Coexistence
- Provision for Intranet Portal
- Document Sharing
- Content and Workflow management
- Site search
- Collaborative meetings
- Training and events
- Integrated Media presentations
- Interactive Meeting
- IM
- Integration with Microsoft Outlook, Word and Excel
- Global address book access
- Security

Source:

<http://www.microsoft.com/online/demo/demo.aspx>

University Specific Groupware Applications

We have to programme the entire package to make the following specific to the university and which could be used by all the registered members of the university.

Electronic Calendar is one which gives an electronic version of the calendar. This also helps in creating appointments, maintaining address book or a contact list. The software has to be designed for individual use.

Project Management System helps plan, organise and manage resources to the best output.

Workflow system helps the users understand the step by step process to achieve a definite goal.

Social Software's could be used to proper data management. This will help the users to upload and download data files from and to the internet.

Online Spreadsheets will help multiple users use a single data file and that could be edited and modified by all the people online.

Online Chat may be any kind of text based communication over the internet. This could make the users more close to each other.

Instant Messaging is also another kind of communication technique in which typed text is used as the medium to communicate.

Telephony is one of the most important medium of communication in which telephones are used to communicate among two people from a distance.

Videoconferencing is the mode of communication in which two or more people exchange both video and audio at the same time. This is one of the most important and widely used techniques.

Web Conferencing is used when have to take up a live meeting or a presentation or a training on a particular topic. This is very important in a university point of view.

Application sharing is the concept which is mainly used by people when they work remotely to share or to access an application online. This is useful to the university as each department in the university will be having its own applications and those need to be accessed by the users.

Email could be considered as the most important means of communication when all the people who take up a course with Educational Institutions is expected to have a dedicated internet and in such a case Email could be used for exchange of data and information.

Web Publishing has to be a mail tool when we are looking after an online university. All the particulars if the university and the details of the course have to be made available in the university websites. Students should have access to their portals where in they can create there on pages, access there portals, read mails and so on. If the course is demanding any kind of Course works we can have provision to submit the course work and the credentials for the submission can also be assigned.

Customised Application for the Educational Institution

Microsoft Online services could be used and we should give importance in one of it features, the Internet Portal. We have to customise it according to the needs of the university. WEB PUBLISHING should include all the details pertaining to the university and the different courses.

We have to take into account many features when we design a Website for such an online university. It has to have the following features.

For Staff

1. Access to the individual portal
2. Access to the mailbox
3. Access to the student database
4. Access to the Library
5. Access to the Finance
6. Access to the Department and The University Database as a whole.
7. Access to the Newsgroups
8. Access to the Chat Rooms

For Students

1. Access to the individual portal
2. Access to the mailbox
3. Access to the Library
4. Access to the Finance
5. Access to the Department Resources
6. Access to the Newsgroups

7. Access to the Chat Rooms

Challenges faced by the developers

The main challenged faced by the developers would be for

- Security
- Customisation
- Compatibility
- Acceptance

Solution

Microsoft Online services have the different features which supports the security. It has the following

- Comprehensive business class security
- Multiple anti spam and virus filtering
- High level of communication privacy which will allow us to access data from anywhere
- Data centers are highly protected.
- The Software Packages have to be highly customised based on the university needs.
- It has to be compactable in all the PC's which uses the university recourses. Hence developers have to design in a simple way.

We can a unique identifier to each and every person in the university and to give access permission to each and every one accordingly. The unique identifier could be either a number probably an ID number which is linked to the particular person and all the data's pertaining to that particular person should be linked to this particular ID number.

SSH could be additionally to the one provided with the Microsoft package to add to the security. Web Sense can also be employed.

Groupware Applications to Support Course Team

The different Groupware Applications that could be used for team work could be the following.

- a. Online spreadsheets

- b. Online chat
- c. Telephony
- d. Video and Voice conferencing
- e. Application sharing
- f. E-mail

Online Spreadsheets will help multiple users use a single data file and that could be edited and modified by all the people online. All the team members would be able to access the online spreadsheet and can add data's the same could be viewed by others.

Online Chat may be any kind of text based communication over the internet. This could make the users more close to each other. Users will be able to exchange their idea in real time.

Telephony is one of the most important medium of communication in which telephones are used to communicate among two people from a distance. Anyone can talk to anyone from anywhere and share their thoughts.

Video and Voice conferencing is the mode of communication in which two or more people exchange both video and audio at the same time. This is one of the most important and widely used techniques. This is really helpful in team work as both the participants can see each other and talk.

Application sharing is the concept which is mainly used by people when they work remotely to share or to access an application online. This is useful to the university as each department in the university will be having its own applications and those need to be accessed by the users.

Email is one among the most important means of communication. It could be used for exchange of data and information.

Differences between Groupware Design and Traditional User Interface Design

The main differences between groupware design and traditional user interface design are

1. Groupware is a special type of software that helps users to work in groups. It better understands the needs of a group and acts accordingly.

2. Groupware takes into account of millions of users where as User Interface takes into account of a limited number of people in the group.
3. Groupware design is more challenging than User Interface as it is designed for a larger group of people. Hence groupware involves a thorough study if human factors, usability issues and networking technology.
4. Groupware offers a much faster and a clearer communication.
5. Groupware helps to cut down the time and cost and also helps in group work.
6. Groupware can't be successful when all the target groups have not adopted the system, but in the same time Traditional User Interface design could work even if few of the target groups accept it.

Classification of Groupware System using the space-time matrix

The Basic Matrix

	Same place	Different place
Same time	Face-to-face conversation	Telephone
Different time	Post-it note	Letter

(Dix, A., Finlay, J., Abowd, G., Beale, R. 1998 "Human-Computer Interaction" 2 Ed Prentice Hall)

A CSCW Matrix

	One meeting site (same places)	Multiple meeting sites (different places)
Synchronous communication (same time)	Face to Face Interactions <ul style="list-style-type: none"> • Public computer display 	Remote Interactions <ul style="list-style-type: none"> • Shared view desktop conferen

	<ul style="list-style-type: none"> Electronic meeting rooms Group decision support systems 	<ul style="list-style-type: none"> Desktop conferencing with collaborative editors Video conferencing Media spaces
Asynchronous communication (different time)	Ongoing Tasks	Communication and Coordination
	<ul style="list-style-type: none"> Team rooms Group displays Shift work groupware Project management 	<ul style="list-style-type: none"> Vanilla email Asynchronous conferencing bulletin boards Structured messaging systems Workflow management Version control Meeting schedules Cooperative hypertext & organisational memory

(Johansen, R. 1988 "Groupware: Computer Support for Business Teams" The Free Press)

Hera X-axis represents the Space and Y-axis the Time.

Time V ^ V ^	Same Location	Remote
Space <<><>>		
Synchronous		IRC Video / Audio Conferencing
Asynchronous		E-mail Online Spread sheet

Building High Performance Team

It's quite difficult to build a high performance team when the participants of the team are in different corners of the world. We could employ the use of Groupware applications to make this possible. Few of them are

- Social Software's
- Audio and Video Conferencing
- Instant Messaging
- Email
- Virtual Presence
- Online Spreadsheet

Social Software's could be used to proper data management. This will help the users to upload and download data files from and to the internet. Instant Messaging is also another kind of communication technique in which typed text is used as the medium to communicate. Videoconferencing is the mode of communication in which two or more people exchange both video and audio at the same time. This is one of the most important and widely used techniques. Email could be considered as the most important means of communication when all the people who take up a course with Educational Institutions is expected to have a dedicated internet and in such a case Email could be used for exchange of data and information. Virtual Presence means being present via a technology which could be radio, telephone or internet. Online Spreadsheet could be used so that each member could update their day to day work which will be shared among other users.

To improve the performance we should first improve the interaction level of the participants of the university

Tips to Improve Interaction

1. University should have its own community in all the networking sites. All the new joiners should be made a member in the community by default so that all can interact with one another. Privacy should be given importance and should be authenticated with sufficient joining steps and interaction technique.
2. University should have its own portal where in there should be facilities for Instant Messaging and Audio / Video Conferencing to all those who have logged in.
3. All the common Instant Messaging applications like AOL Instant Messenger, Google Talk, ICQ, Meebo, MSN Messenger, Skype and Yahoo! Messenger should be made accessible from the university portal.
4. All the common social sites like MySpace and Facebook should have links from the university portal.
5. The advanced technology which is catching up these days is a concept of Virtual World. In that we could see Avatars floating around the world where we are. Each person in the university should be given an Avatar which could be customized according to the user's needs and could interact with others. Such a concept is really good as we really get a feel of being in the university and to meet different people and can interact with people.

Outcome of the Measures

As the students who will get to know each other a barrier for interaction will be gone and they will be able to form groups by there on or according to the university standards. If we are going to make a team which has people who really know each other and who really wants to work together we can improve the productivity and the efficiency of the work in which they are involved in. These will also improve the interaction level of a student and a lecturer as well.

How to improve Motivation and prevent Splits among the Team

The ways by which we can increase the motivation among a team and to reduce the

number of splits would be through using the following steps

- Providing with common goals than individual goal. This will make the participants work for the team.
- Regular updation of day to day activities on an online spreadsheet which is accessible by all the members in the team
- A moderator who facilitates and looks for the working of a group as a whole
- Regular interaction
- Scheduled meetings on the progress of work
- Including the common day today news items on the portal for a fun discussion among the members.
- Team Goals
- Team Assessment
- Individual assessment has to be reduced and assessment has to be done for the team.

How to create highly motivated team with unselfish Members

We can ensure the team is highly motivated and unselfish by adopting the following methods.

- Team Goals
The team should have common goals so that the entire team will have to work as whole rather than individual goals.
- Team Assessment
The assessment should be done from the output of the team as a whole so that one person even if he finishes his job he will have to co- ordinate and help his co members.
- Online Spreadsheet
All the members of the team has to update their works individually on an online spread sheet which will be shared with all the others members so that all can keep a track of what others are doing
- Regular Scheduled Meetings
Regular Scheduled meetings have to be done so that the members in the team can interact with one another and can share their ideas. Brainstorming could also be done.
- Penalty on individual Submission for Team work

Security

We will have to give extra importance to security when we are dealing with a Virtual university where everything happens over the internet and there are quite a lot of chances for hacking our system.

We will be concentrating on the following

- Security and control
- Unparallel Security Expertise
- Committed Employees
- Third Party Integration
- Email Security and Control
- Web Security and Control
- Enterprise Security and Control
- Support Service
- End Point Security and Control

We should employ the following

- Spam Protection
- Virus Protection
- High Performance Content Scanning
- Compliance
- Enterprise Management Tools
- Mail Flow Centre
- Email Security Management
- Content Scanning

Current security threats to a groupware infrastructure

The main security threats to a groupware infrastructure are

1. Targeted Phishing
2. Operating Systems Kernel Vulnerability
3. Client Side Vulnerability
4. Web based Worms
5. Spyware
6. File Attachment Attacks

Conclusion

This report has introduces a model with different layers which will support the university in its working. It would be a solution for the different problems that could be faced when dealing with people who are in different time zones and who rarely meet. The Educational Institutions has incorporated all the different applications and techniques to improve the networking among the participants and to build a better bond among the participants.

When considered about a collaborative working of people who never meet each other and who even belong to different time zones, the advancements in Human Computer Interaction and Artificial Intelligence can give a better solution for this.

The main objective of this report is to set an IT infrastructure for Educational Institution's Virtual University. All the data and information in the report is based on the author's knowledge on groupware systems and the knowledge acquired from the lectures.

It's sure that the concept of Virtual University is going to help a person who has difficulties to commute and it's also a starting step for a lifelong learning process.

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