

Framework for Developing Web (Text-Based) Teleconferencing System.

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ABSTRACT

The use of Internet and other high performance computing technologies are common among people around the globe. We develop a Web (text-based) Teleconferencing System (WTS) that is built using open standards with the vision to meet different scalability and security needs for conducting text-based conferencing among different people in different locations around the world. This system provides teleconferencing features which include support for hosting open and closed-type multiple conferences simultaneously as well as support administrative features like creating/deletion of conference rooms, creating/deletion of users and moderation of users. The research methodology used in this research is object-oriented. The platform of this system is J2EE (Java 2 Enterprise Edition) and it adopts four-tier architecture. We employ MVC (Model-View-Controller) framework to structure the problem-domain classes into model, view, controller components. The MVC framework is implemented using J2EE APIs (Java 2 Enterprise Edition Application Programming Interfaces)-Servlets for Controller, JSP (JavaServer Pages) and Servlets for View, and JavaBeans for Model. The functionality of this system is flexible and reliable.

LITERATURE REVIEW

Introduction

The need for transmitting of information to different people in different locations through the medium of versatile communication gadgets and software has no limited peak, as Teleconferencing remedies the need. It reduce cost, saves time and its flexibility among other merits make teleconferencing a unique system. Moreover, it can encounter technical failure and lack interpersonal communication. In spite of that, teleconferencing is a better alternative than face to face meetings. The service that allows conferencing events shared among remote locations through web is called web conferencing, which has admiring features, importance and benefits depending on the type. There are recommended standards of compatibility of the system technical features.

Definitions of Teleconferencing

(Teleconferencing, 2013) states that teleconferencing or teleseminar is the live exchange of mass information between people and machines that are remotely connected to each other through telecommunication systems. (Randall & Gary, 2004) point out that:

Carrol (2002) point out that “teleconferencing is one of the most effective and useful ways to communicate with several people about the same time. Teleconference involve one or more of the most common types of information transmitted which include audio, video and data information”(p. 130). Johnson, Vallee, & Spangler (2000) state that teleconference or teleseminar as the live exchange and mass articulation of information among several persons and machines remote from one another but linked by a telecommunications system.

Advantages and disadvantages of Teleconferencing

According to Teleconferencing advantages and disadvantages (2013):

Advantages of Teleconferencing:

- Reduce cost of group meeting is the major advantages of teleconferencing; the saving is primarily due to significant reduce in traveling cost.
- Teleconferencing allows people to participate in regional, national or worldwide meetings without actually leaving their local office.
- Greater communication and coordination between branches and worksite, as teleconferencing enables them to get in touch with each other closely.
- Meeting is more flexible as participants can join the conference whenever it's necessary.
- Conference can be scheduled minutes or hours ahead of time instead days or weeks.

Disadvantages of Teleconferencing:

- The occurrence of technical failure when trying to establish a conference or during a conference.
- Difficult for complex interpersonal communication, such as negotiation or bargaining.
- Impersonal, less easy to create an atmosphere of group rapport.
- Lack of participant familiarity with the equipment, the medium itself, and meeting skills.
- Socializing is less than a face-to-face meeting.

How to Minimize Teleconferencing Problems:

The following precautions will helps in reducing the occurrence of teleconferencing problems

- Users should carefully evaluate their meeting needs and goals to determine if teleconferencing is appropriate.
- Users should also assess their audience. For example, consider the size of the group, their level of experience with teleconferencing, and the extent of their familiarity with each other.

Teleconference a Unique Alternative

Randall & Gary (2004) state that:

Teleconferencing represents a unique alternative to the traditional face-to-face meeting. Every meeting is unique, with different goals, objectives, and purpose. Teleconferencing and face-to-face meeting involve different patterns of interaction and social codes of behaviour.

1. The system isn't the solution. The technology of teleconferencing has emphasized often at the expense of social and organizational structures that support communication. The medium of communication is only the means to carry information; the end to which the medium is used also must be considered.
2. Face-to-face interaction isn't always the best, although it's generally the standard to which media designers aspire. However, anyone who has been forced to sit through a boring meeting can attest to the fact that a face-to-face meeting is often both inefficient and ineffective.
3. More communication isn't always better. Consideration of teleconferencing media is often accompanied by an unexamined assumption that more communication would most certainly be better. Often, people have more information than they're able to absorb effectively, and introducing yet another means of communication could make things worse. Communication pollution and overload are real problems.

Teleconferencing has vast potential for increasing the efficiency of human communication. Yet, teleconferencing for all it's worth can never totally replace face-to-face meetings. Face-to-face interaction is an important part of human communication.

Furthermore, teleconferencing can only facilitate the linking of people – it does not alter the complexity of group communication. Although it may be easier for us to communicate with teleconferencing, it may also be easier for us to have miscommunication.

ANALYSIS AND DESIGN

Introduction

This chapter is the software development stage, that the functions of model, view and controller design. The system is built to allow three kinds of users, which include Conferee, Guest and Administrator. Permitting two types of conference to participate either Open-conference or Closed-conference, and can allow multiple users participating at different conferences at the same time. These features make this proposed system unique from other existing teleconferencing software. This is done by combining the usage of single-server mode and hierarchical-server mode to accommodate few and many users. **3.1 Analysis of an Existing System**

Web-Crossing is a typical text-based teleconferencing system that is functional with features as follows:

- ❖ It is supported on the platforms of UNIX, Windows and Mac OS.
- ❖ It is also run in a "single server mode" when the participants are few. When it needs to scale. It uses several web-servers and fan-out servers, and a single control-room server. The control-room server is the central point which manages all the connections. It connects all the web-servers and fan-out servers in "ring architecture".
- ❖ It can be deployed only on a "Web-Crossing server".
- ❖ It uses its own proprietary object-relational Web-Crossing database for persistence.
- ❖ The development environment of Web-Crossing consists of Server-side WCJS (Web Crossing JavaScript) and WCTL (Web Crossing Template Language).
- ❖ It also supports open and closed conference types.
- ❖ It supports four role types: conferee, guest, moderator and administrator. An administrator responsible for creating/deleting conference rooms and creating/deleting role of conferee, guest and moderator. A moderator is in-charge of administering a conference room.
- ❖ In Web-Crossing, a moderator controls the floor of a conference by changing the privileges of the users.

- ❖ It has a built in SMTP server that can provide email capabilities to support meta-conference features.
- ❖ It supports both synchronous conferencing (intended for simultaneous users interacting in real-time) as well as asynchronous conferencing (non real-time message board based communication).

Analysis of the New-System

The new-system is a functional, reliable, and consistence real-time teleconferencing system that transmits text-data over the web. The underlying features are as follows below:

- ❖ It is built on top of J2EE environment that is platform independent. It can be supported on all major platform including Windows, UNIX, Mac OS and Linux.
- ❖ When there is less number of participants, it's run in a "single server mode" wherein a single web-server hosts an entire conference. When the number of participants is large, it uses several web-servers and fan-out servers arranged in a "hierarchical fashion" to serve a large number of requests.
- ❖ It is build on open standards and can be deployed on any J2EE complaint server.
- ❖ It can use any relational database that provides a JDBC 2.0 complaint driver for storing persistence information.
- ❖ Its development environment includes J2EE APIs – JSP (JavaServer Pages), Java Servlets, RMI (Remote Method Invocation), JavaBeans and JDBC (Java Database Connectivity).
- ❖ It supports open conference and closed conference types. The closed conference types are password protected.
- ❖ It supports three role types; conferee, guest, and administrator. An administrator is in charge of creating/deleting conference rooms, creating/deleting conferee and guest roles, and administering the conference rooms.
- ❖ An administrator controls the floor of a conference by changing the privileges of the participants from read-write to read-only and vice-versa.
- ❖ It relies on third party hosted SMTP servers for email capabilities to support meta-conference features like inviting participant to the conference.

Development of WTS

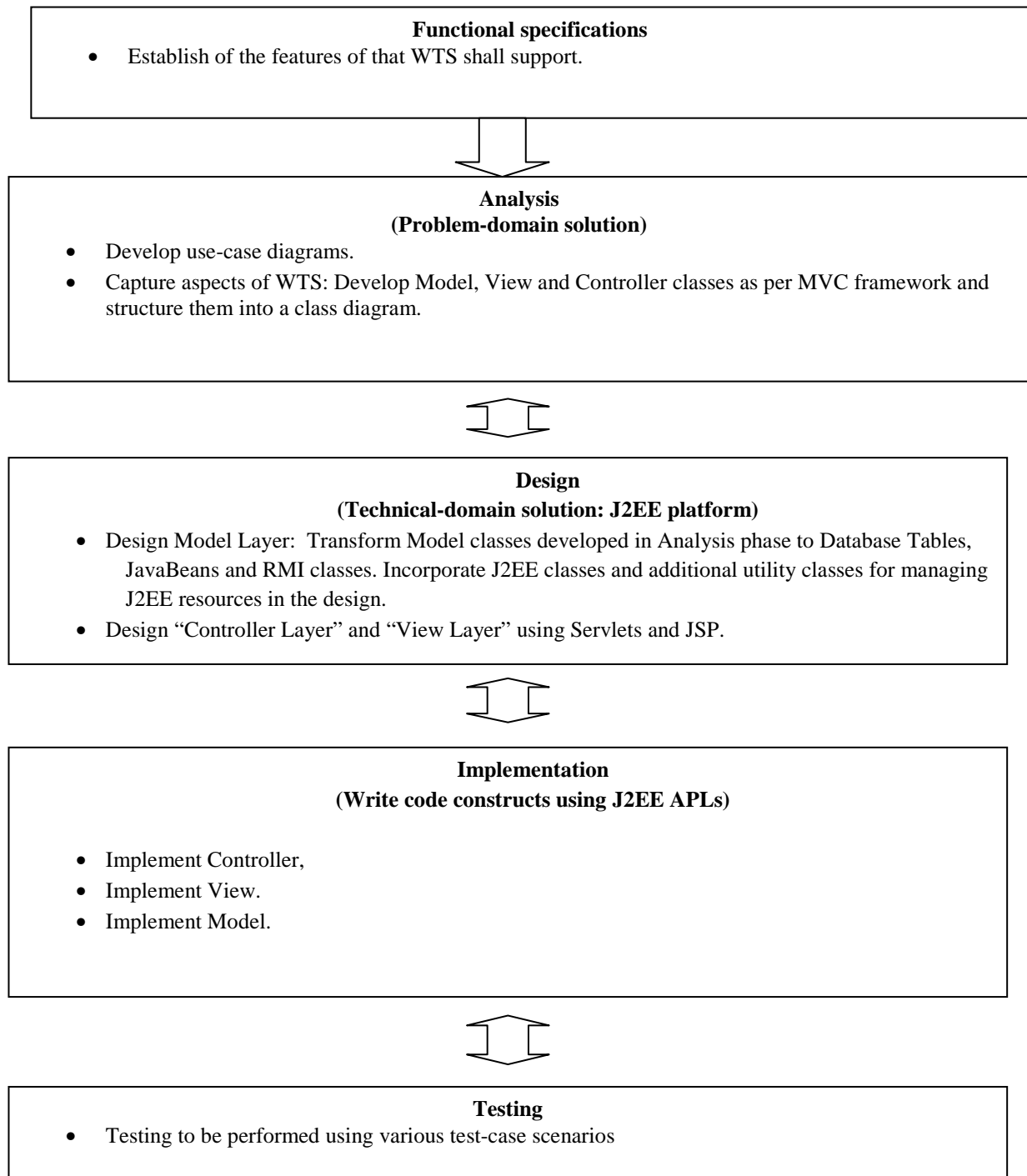


Figure 1: Development stages of WTS.

SUMMARY, CONCLUSION AND RECOMMENDATION

Introduction

Web (text) conferencing system support the role of administrator, conferee and guest, and enable hosting of multiple conferences simultaneously. There consist of four-tier architecture namely client, presentation, business and data. This software is unique for academic conferences, seminar, business presentation, governmental and non-governmental meeting presentation for users around the globe.

Summary

This thesis provides detailed design and implementation of a Web-based Teleconferencing System (WTS). WTS is built using open standards on J2EE platform for conducting text-based conferencing on the web.

WTS provides various teleconferencing features to support different role types – administrator, conferee and guest. The functionality that WTS provides to an administrator includes creation/deletion of conference rooms, creation/deletion of users, and moderation of users in a conference. WTS can host multiple conferences simultaneously. WTS allows conferences (by providing login credentials) or open conferences (by registration). WTS comprises of four-tier architecture: client-tier, presentation-tier, business-tier and data-tier. The presentation –tier and business-tier, commonly referred as middle-layer, are either hosted on a single web-server or a cluster web-severs and fan-out servers. For low scalability requirements, WTS is run a single web-server; however for large number of users, WTS adopts a hierarchical architecture at the middle-tier wherein the cluster of web-servers and fan-out servers are arranged in a tree-topology. WTS uses web-browser for the client-tier, IBM's Web sphere and RMI objects for middle-layer, and IBM's DB2 database for the data-tier.

WTS uses model-view-controller (MVC) framework that structure classes into controllers (classes that intercepts user's requests, invoke necessary model classes, and then dispatch the request to view), model (classes that encapsulate the conference/business logic of WTS) and view (classes that render s the contents to user). The MVC framework is implemented using J2EE APIs – Servlets for controller, JSP and Servlets for View, and JavaBeans for Model.

Since WTS is built on an open platform like J2EE, it can be supported on major operating systems – Windows, UNIX, Mac OS X. WTS combines several of the current best practices for creating teleconferencing software. The corporation of MVC framework as the software architecture coupled with the adoption of J2EE APIs for the implementation provides a very flexible mechanism for extending the functionality of WTS in the future. Apart from the use of multiple fan-out servers arranged in a hierarchical fashion for WTS, further scalability can also be achieved by adopting a distributed database design wherein several database servers located at various locations hold and replicates the conference's persisted data in a clustered manner.

Conclusion

We vote for the use of this software for academic conference presentations, students' seminars/projects presentations and professional body's business presentations. The software have been found efficient, consistence, reliable, friendly and error-free for proper usage of clients. The operations are available for simultaneous users which processes are authorize by an administrator, which has the privileges of creating, deleting and moderating the users and conference rooms. These will enable foreigners and local academicians, inventors, experts and business guru around the globe to share and exchange knowledge, ideas, opinions, facts and skills that will enhance human existence and sustainability in different ramifications of life.

Recommendation

For further study, we recommend that the implementation of such desirable features as support of graphics, audio and video media types can be accomplished in the future by adhering to the MVC framework and incorporating additional Java API such as Java 2D graphics API and Java Media Framework. Strict adherence to MVC framework ensures s the manageability and extensibility of code base of WTS.

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