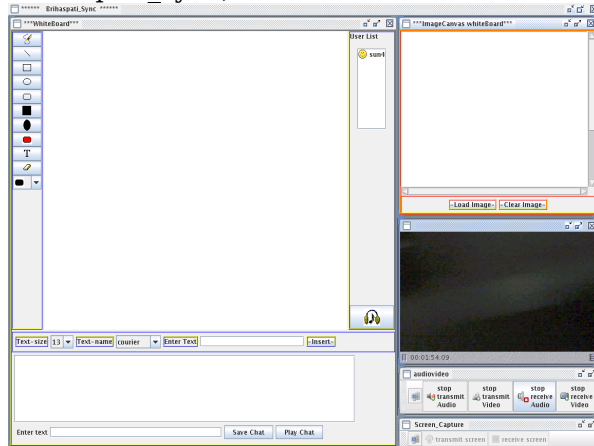## Objective

This project executed at IIT Kanpur, aims at developing a platform-independent highly scalable live lecture delivery and interaction tool for holding live classroom sessions over Internet using overlaid multicast technology (codename: Brihaspati_sync).


Architecture

The Brihaspati_sync has a client coded in Java which is fetched from web and run with the help of Java WebStart technology. There are five basic components in this system.

Server: The server module manages the authentication process, source of list of least loaded reflectors (or MCUs[1]) which is given to new clients for receiving the feed from overlaid multicast network. The clients can connect to reflectors using TCP, UDP tunnelling or http-tunnelling. It uses mysql database which is common to Brihaspati. Consequently, the instructors', students' and guest logins and passwords are same across both synchronous and asynchronous system.

Client: The client module manages the session announcements by interacting with indexing server, setups and manages the overlaid multicast tree by interacting with other clients over unicast/http tunnel, delivers/recieves various media types in live lectures, provides control panel for instructors and interaction request panel to students. It also contains modules to facilitate live group discussion, raising a query, transmission of audio, video, text and screen capture. It can also act as recorder to record the lectures which can be played back latter on. One can also add, remove and share study materials. Monitoring student activity, can also be done by the instructor. As the clients installed on machines behind firewall, NAT and proxies cannot act a overlaid multicast p2p node (reflector), connect to other reflectors for participating in the lecture sessions.

Functions (Instructor)

Session: Instructor can announce one or more sessions for delivering the lectures.
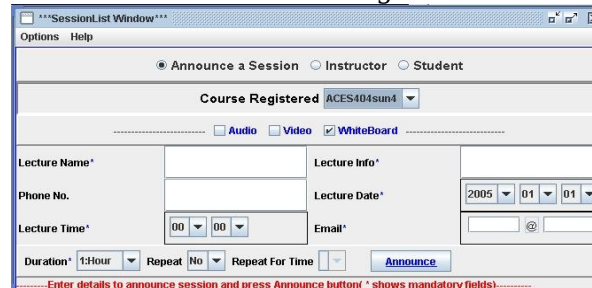
Whiteboard: The instructor can make drawings using freehand as well as predefined graphic components along with the text chatting. This makes live discussion over internet more effective.

Chat: The users can communicate online. Of course, they have to be logged on at the same time for this.

Audio/Video: The Instructor can capture and receive unicast audio/video from separate terminal and multicast it to other clients over overlaid multicast network through reflectors.

Screen-capture: The Instructor can capture and receive unicast desktop screen activities and transmit it other clients.

Hand-raise: when students raise their hand for asking anything, instructor can permit him to transmit audio for the purpose.

Functions (Student)

Session: Student can view a list of lecture sessions as well as the information about that lecture session announced by Instructor.

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[1] Multi conferencing unit
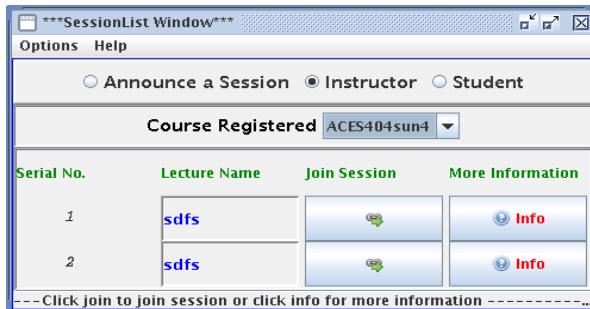
Whiteboard: student can only view the drawings on whiteboard that are made by instructor, and others if permitted by instructor.

Chat: The users can communicate online via text chat

Audio/Video: Student can only receive multicast audio/video data transmitted by instructor, and other if permitted by the instructor.

Screen-capture: Student can receive instructor's desktop activities.

Functions (guest)

Guest can only passively view all activities, if permitted by the instructor. He cannot participate in any interaction.

Features List:
- Platform independent technology
- Instructor interface with full control
- Shared electronic whiteboard
- Text chat
- Audio video communication
- Desktop sharing
- Http tunnel support
- Recorder for important Lecture

Future Enhancement:
- Peer-Peer communication
- Indexing server concept
- Web-based
- Integration with Brihaspati (The virtual classroom) asynchronous tool.
- Multi-server Clustring

For support services/ customization you can Contact

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Bug report, feature requests, suggestions and discussion can be posted at moderated group
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Alternatively one can send an email to ynsingh@iitk.ac.in

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