

Fault Tolerant Distributed Meeting using Cloud

Sania Thomas*, Dr.E.R.Arun**

* Student of M.E(CSE), Noorul Islam Centre for Higher Education, Kumaracoil, Tamil Nadu, India

** Department of CSE, Noorul Islam Centre for Higher Education, Kumaracoil, Tamil Nadu, India

Abstract- Exploiting full potential of mobile computing is difficult because of the problems such as resource scarcity, mobility, frequent disconnections. To conquer these issues Mobile cloud computing can be used. Because of the mobile nature of the devices fault-tolerance is a highly important aspect in a mobile cloud, even more than a conventional cloud. Disconnection can happen due to user mobility as devices enter and leave a network. Running out of battery power, network signal loss, or hardware failures are the other common issues. In this paper introduces a fault tolerant distributed meeting system. In this users join a meeting. Each person or group joins from different location and device. Similarly many groups and users join the meeting from different locations using different devices. They interact with each other face to face via meeting. Each group or user may be replaced with alternate resource when it fails. When a person/cloudlet fails, another person can join taking the disconnected persons place from another location or the same person can join using another device or equipment. In the case of low bandwidth the data is compressed and then send to server. The proposed system of video conferencing over android smart phones will leverage the members to assign the conference to an alias member. There by preventing interruption to the conference. Also a member online in this conference can switch over to his other communication medium for continuation of the conference session in case there is some failure. An administrator can control who can join and who can be substituted. There by substituting an important user with an alias member.

Index Terms- Mobile cloud computing, Electronic meeting system, Fault tolerance, Video Conferencing, CODEC, H.264.

I. INTRODUCTION

Smart phones, tablets, and cloud computing are coming together in the new and quickly growing field of mobile cloud computing. The main aim of mobile cloud computing is to empower the mobile user by providing a smooth and rich functionality, regardless of the resource limitations of mobile devices. Utilizing full potential of mobile computing, is difficult due to the issues such as resource scarcity, frequent disconnections, and mobility. Mobile cloud computing can address these problems by executing mobile applications on resource providers external to the mobile device. Here service and application level issues are considered. Several methods for communication exist in which video conferencing are used in organizations for the betterment of decision making. Video conferencing has become a vital part of communication and technology advancement. Video conferencing is an interactive method of communication which allows two or more

people to communicate with video and audio transmissions at the same time at a different place with the help of web conferencing. Video conferencing is dedicated for large and small group of corporation and companies where it saves time and money by travelling and meeting up potential clients in another place. Video conferencing saves time and money by meeting clients virtually through web conferencing and video technology while broadcasting it live. It allows multiple conferencing all at the same time with the rest of the panel allowing constant communication and contact at the same time instead of going from one person to another. The effects of video conferencing and web conferencing are that people no longer communicate face to face directly in the real world but every conversation is done virtually through video conferencing without having to meet but it will provide the same effect of face to face meeting. Virtual conferencing changes the important basis of communication where face to face interaction and personal touch and gestures are important in making conversation meaningful and understood. Direct communication helps to uncover hidden body language and gestures made during conversation as they are right in front of us physically. The effectiveness of video conferencing depends so much on connection and the ability to stream video and sound simultaneously without failure in terms of direct streaming. If the connection failed then the failure of delivering the full speech and video may lead to miscommunication and wrong delivery of information. The existing systems are not fault tolerant enough. The objective of the proposed system is to overcome the issues faced by conventional meeting solutions. The proposed system of video conferencing over android smart phones will leverage the members to assign the conference to an alias member. There by preventing interruption to the conference. Also a member online in this conference can switch over to his other communication medium for continuation of the conference session in case there is some failure. An administrator can control who can join and who can be substituted. There by substituting an important user with an alias member.

II. LITERATURE REVIEW

Many meeting solutions are available in the modern era. Meeting systems are used years before for many purposes. NAMBA is a location-aware collaboration system for shopping and meeting. The system exchanges position information and users' situation to one another using a PDA with built-in PHS and a GPS receiver in real time. NAMBA is a two-way communication system that sends position information and messages to one another. Using NAMBA users can see other user's position on the screen of a PDA. NAMBA has two specially devised functions, a meeting point sharing function and

a self-assessment function of a position, for meeting mutually and for exchanging position information. Position information and chat messages were important for communication with separated users. NAMBA was effective for meeting other users anywhere. E-ONIGOCO consists of a PDA, a GPS receiver and a mobile phone. E-ONIGOCO supports a non-real time mutual position information service using electronic mail and a web browser. A user can see a person's position displayed on a map on the browser of a mobile phone. NAMBA exchanges users' position information and chat messages in real time, and then supports "meeting other people" in a city. That is, we think that NAMBA can be useful for communication between friends shopping in a city. Especially NAMBA is effective for the purpose of "meeting other people". The advantages of the system are, it provides two way communications. The word of two-way communication means that users of the system should move freely and get and present positioning data of other users easily. The disadvantages are the accuracy of the GPS receiver is only 15 meters and also it does not deal with the connectivity problems[1].

Then electronic meeting systems are emerged in to the technological world. Electronic meeting support contributes to the organization if it delivers more productive meetings by reducing process losses and/or enabling process gains. Key system features that are cited as enabling gains are use of public screens, Idea anonymity, and simultaneous participation. EMS provides the ability to have participation by several individuals at once since communication is through typing. A group member may engage in both typing and "listening" at the same time as all messages are recorded and displayed electronically. That is, production blocking can be avoided. Second, anonymity can help reduce self-consciousness and discussion domination. Anonymity can also help "level the field" and reduce hierarchical or social dominance that can limit participation. In EMS environments, report higher satisfaction in larger groups. The use of EMS in organizations has resulted in labor savings and reductions in project cycle time and it promotes participation equality. EMS generates more alternatives, and thus leading to better decisions. It also has some disadvantages, EMS is possible only over a LAN, Participants number is limited, Further increases in group size would yield negative net benefits [2].

If a comparison study done in the traditional meeting solutions such as FTF, audio desktop conferencing, video desktop conferencing via the Internet, and text-only (using Web Board in a semi synchronous manner). This study is rooted in several areas, including media richness, creativity and quality, and group development and process satisfaction. There are rich media and lean media, with FTF communication being the richest and other media being leaner, with slower feedback and fewer cues. A rich communication medium allows instantaneous feedback, clarification, and questioning and correction of errors by group members. Uncertainty and equivocality can be diminished by choosing the right medium. In terms of process satisfaction, combined groups were more satisfied with the group process than those using asynchronous or synchronous only. groups having higher bandwidth (such as asynchronous web-based conferencing following initial meetings with FTF, desktop audio conferencing, and desktop videoconferencing) should have higher levels of creativity and quality, compared to the lower

bandwidth groups (e.g., using asynchronous web-based conferencing following a text-only initial meeting using the same system). FTF teams may have a greater problem in developing a shared meaning because of communications breakdowns. These breakdowns appear to be less likely in virtual teams supported by CMC. Benefits of synchronous web-based conferencing (such as desktop audio conferencing or desktop videoconferencing) are that it helps companies save on travel costs by replacing FTF meetings and allows for closer collaboration and also video conferencing provides higher creativity and performance. But some disadvantages are there in the video conferencing system such as the video would "freeze" or appear jumpy, or the audio would break up and sometimes a participant was dropped from the conference and had to be reconnected [3].

To analyze the meetings meeting analyzer system can be used. The system is designed to recognize "who is speaking what" automatically in an online manner and then provide assistance at meetings. Meeting analyzer recognizes "who is speaking what" using speech recognition and speaker diarization, and detects the activity of each participant (e.g., speaking, laughing, watching someone) and the circumstances of the meeting (e.g., topic, activeness, casualness) by integrating results obtained from several processing modules. All the analysis results are continuously displayed on a browser. Most of the existing systems generate only one enhanced speech signal even though there are multiple participants. Therefore, they cannot separate overlapping utterances. System performs source separation and thus can appropriately handle overlapping speech. ASR system designed for transcribing meeting speech in real time. The system is based on SOLON, which is a speech recognizer based on Weighted Finite-State Transducers (WFSTs). SOLON employs an acoustic model consisting of a set of hidden Markov models (HMMs), a pronunciation lexicon and language models represented as WFSTs that can be composed on the fly during decoding. The decoder efficiently finds the best-scored hypothesis in a search space organized with the given WFSTs. The input signal to the ASR system is spontaneous speech uttered by meeting participants, recorded with distant microphones, and enhanced by the audio processing techniques. In visual processing it uses a tabletop device has two cameras with two fisheye lenses. From high-resolution omni-directional images captured with the cameras, we estimated the position and poses of people's faces using a Sparse Template Condensation Tracker (STCTracker), which realizes the real-time robust tracking of multiple faces by utilizing Graphics Processing Units (GPUs). The face position/pose data output from the face tracker were used to estimate the focus of attention in the group. We also incorporated a memory-based particle filter (M-PF) into the STCTracker for more robust tracking. M-PF is a novel particle filter that can visually track moving objects with complex dynamics. The method is robust with respect to abrupt object movements, and provides quick recovery from tracking failures caused by such factors as occlusions [4].

III. PROPOSED SYSTEM

Several methods for communication exist but aren't fault tolerant enough. In existing meetings, a camera is used to connect a person/ team with another. If any equipment on either

side fails, the meeting will be spoiled. To overcome this disadvantages we can utilise these mobile cloud based fault tolerant meeting. The existing system of video conferencing over web or mobile operating system suits for one to one and one to many user with simultaneous updates from all members. The important point to note here is that one may leave the communication cannot continue the session. There is no answer to questions like

- What happens when the user losses communication?
- What happens when an important user needs to substitute?
- What happens when any one user's device fails?

ie, if a member is not available for communication due to any reason, he cannot assign an alias member to take up his position in the conference.

In the proposed system users join the meeting from their location and mobile device. Similarly many groups and users join the meeting from different locations using different mobile devices. They interact with each other face to face via this distributed meeting. Each group or user may be replaced with alternate resource when their device or connection fails.

The objective of the proposed system is to overcome the issues faced by conventional meeting solutions like teleconferencing. This project mainly focuses on the issues like frequent loss of connectivity, low computational resources and low bandwidth. It also addresses the issues like loss of Communication and failure of device

The proposed system of video conferencing over android smart phones will leverage the members to assign the conference to an alias member. There by preventing interruption to the conference. Also a member online in this conference can switch over to his other communication medium for continuation of the conference session in case there is some failure. An administrator can control who can join and who can be substituted. There by substituting an important user with an alias member.

IV. IMPLEMENTATION

The client side of the project requires an android smart phone with a front camera, microphone and an internet connection. The device should have a unique id. For that the MAC address of the device can be considered or can provide a unique id manually.

In the client side two types of members are there

1. Viewing members
2. Participating members

The viewing members can only view the live meeting and cannot have any control over the meeting. The participating member can participate the meeting and can have control over the meeting. An authentication based system is used to authenticate the participation of a member and the device. Request and response mechanism is used to verify the participating member is active in the meeting. In a fixed time interval a request is passed to the participating member .If he failed to response within three system times .The participant is considered to be inactive and the system get notification that the

failure occurred. In the server side it does the management and administration.

a. User management

The user management includes inviting the participating and viewing members, adding alternate resources. For the user management email and other communication mechanisms are used.

b. Resource management

Resource management includes verifying unique resource id, authenticating the device and if failure occurs then allocates alternate device to the meeting.

c. Recording the meeting

The meeting is recorded and the user can send request to the administrator for the recorded meeting. The recorded meeting helps for the detail study and the decision making process.

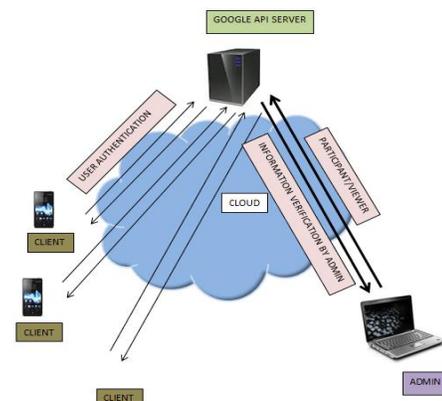


Figure 1: System Architecture

A. AUTHENTICATION MODULE

There are two cases:

- a. Already Available User
 - Admin assigns the role of the member as participant or viewer
- b. New Member
 - User registers using google id and the admin verifies the account.
 - If the member is a valid member then assigns the role as participant or viewer

The **Sign in with Google+** button authenticates the user and manages the OAuth 2.0 flow, which simplifies user integration with the Google APIs.

B. VIEW MODULE

View module determines whether the user is a viewing member or participating member. The viewing member only can view the meeting and a participating member can participate in the meeting actively. The following flow chart shows the viewing module control flow.

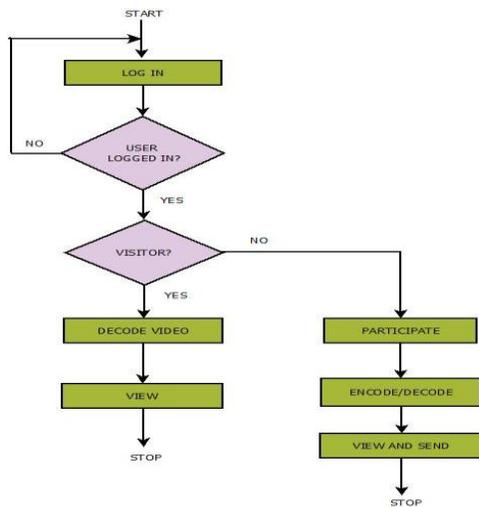


Fig: Flow chart of viewing module

C. MANAGEMENT AND ADMINISTRATION

The administrator manages the meeting. Administrator decides whether the member is a viewing member or a participating member ie .Administrator assigns roles to the users in the meeting. The administrator authenticates the user and the devices. Administrator does the user management. When a participating member is failed to continue the meeting then another user can join the meeting in the place of the failed participant. Administrator does the resource management .When a participant failed to continue the meeting due to the device failure then that member can continue the meeting using another device. The meeting can be recorded for the efficient decision making purpose .The failed user can get the recorded meeting and can analyze the meeting. The flow chart shows the control flow of the administration module.

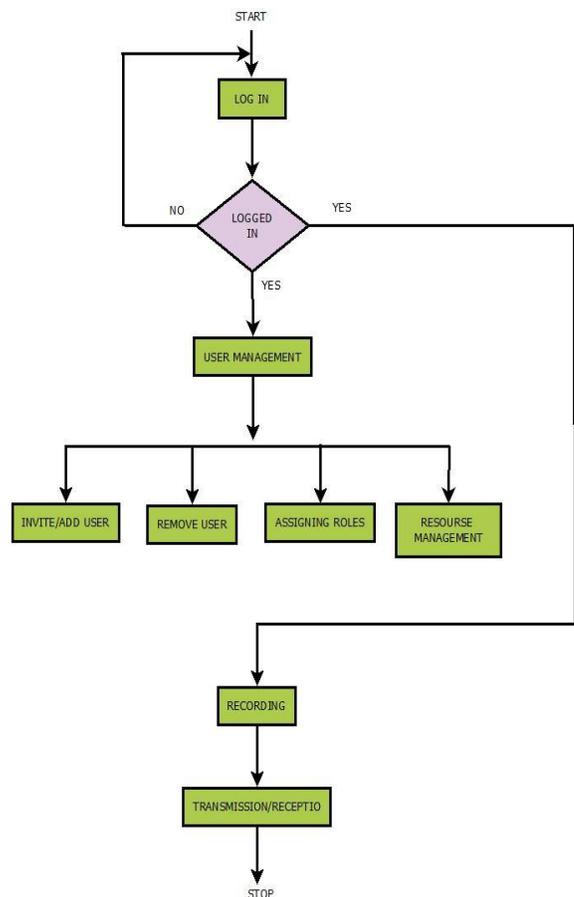


Fig: Flow chart of Administration module

D. TRANSMISSION AND RECEPTION OF VIDEO STREAMS

For transferring data, streaming (media streaming) technique is used so that it can be processed as a steady and continuous stream. Streaming technologies are becoming important with the growth of the Internet. Most of the users do not have fast internet access to download large multimedia files quickly. With streaming, client browser or plug-in can start displaying the data before the entire file has been transmitted. For streaming technique to work, the data received by the client side must be able to collect the data and send it as a steady stream to the application that is processing the data and converting it to sound or pictures. If the streaming client receives the data more quickly than required, it needs to save the excess data in a buffer. If the data doesn't come quickly enough, then the presentation of the data will not be smooth and effective.

H.264 [7] is an emerging video coding standard. This was proposed by the Joint Video Team (JVT). The H.264 is aimed at high-quality coding of video contents at very low bit-rates. H.264 uses the hybrid block-based transform coding and motion compensation model. The motion compensation model used in H.264 is more flexible and efficient than those in the early standards. Multiple reference frames for prediction is supported in the standard, and more choices of motion compensation block sizes and shapes are provided for each macroblock (e.g., 16x16, 16x8, 8x16,8x8, 8x4, 4x8, 4x4). High motion vector resolution is specified, where sub-pel interpolation could provide higher spatial accuracy at fractional positions. In addition, a well-designed in-loop deblocking filter is used to reduce visual

artifact. The new methods provide a more precise model for motion compensation, which can dramatically minimize the impact of the difference of predicted blocks, and yield a much better perceptual quality for the decoded video stream. The working of the CODEC is as follows[8].

(1) The raw data of *Img0* is read in and pre-processed in the main thread. After that, *Img0* is ready to be encoded.

(2) Once the working threads get the ready message, they select candidate macroblocks and encode them subsequently.

(3) While *Img0* is being encoded, reconstructed images should be prepared in advance for temporal predictions for *Img1*. If half of *Img0* have been encoded, these encoded macroblocks are used to perform partial deblocking filtering, partial quarter-pel interpolation, and partial frame reconstruction.

(4) When these preparations are finished, *Img1* and *Img0* can be concurrently encoded.

(5) The working threads encode these two adjacent images according to the following sequential order: If there is no more ready macroblock to be encoded in *Img0*, the ready macroblock in *Img1* will be encoded.

(6) When all the macroblocks in *Img0* have been encoded, the main thread will take over the macroblock encoding process and start the post-encoding procedure---generating the final VLC & output bitstream and finishing the residual deblocking filtering, quarter-pel interpolation, & frame reconstructions.

(7) After (6), *Img0* is released. Another new image is read and pre-processed.

The above procedure continues until all candidate images are encoded.

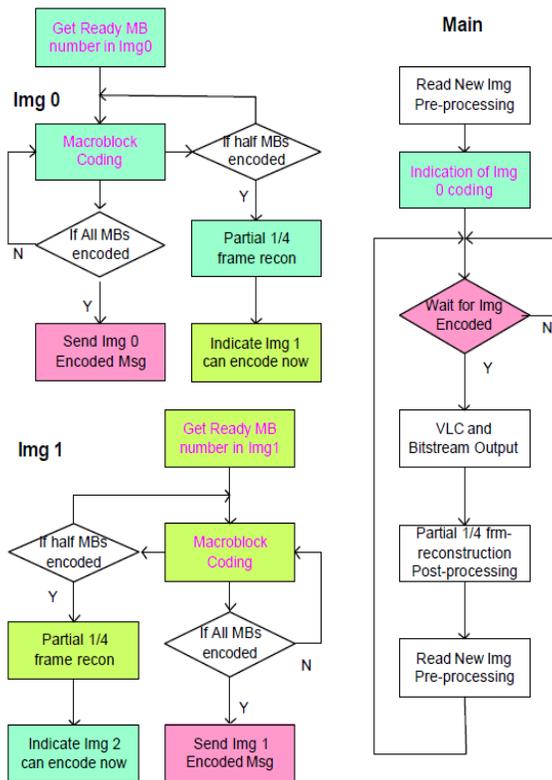


Fig:The outline of the scheme

V. CONCLUSION AND FUTURE WORKS

The proposed system is mainly focuses on the corporate meetings. Using this fault tolerant system the organization can conduct successful meeting which will save time and cost and also the meeting will leads to better and efficient decision making process. In future, this work “FAULT TOLERANT DISTRIBUTED MEETING USING CLOUD” will be playing vital role in transforming meeting and video conferencing. This distributed fault tolerant meeting can be utilized efficiently and its performance can be improved in future works.

With real-time video captured from the client’s conference device, location of the device can also be controlled. The future researches can be used for creating not only fault tolerant but also mobile conferencing abled devices. Further exploring this work leads to huge prospects of development into gesture based remote presentation and meetings as well. Adding audiences or viewers for a meeting, adding multiple groups and managing them individually with a local group admin. Admins with multiple roles can also be added in future works.

REFERENCES

- [1] AbdulNasirKhan,M.L MatKiah,Samee U.Khan,Sajjad A Madani,(2012),”Towards Cloud Computing:A Survey”,pp1-22.
- [2] Takashi Yoshino, Tomohiro Muta and Jun Munemori:(2002)“namba: location-aware collaboration system for shopping and meeting”*iee Transactions on ConsumerElectronics*, Vol. 48, No. 3,
- [3] James R. Marsden and SathasivamMathiyalakan:(1999) “A Multisession Comparative Study ofGroup Size and Group Performance in an Electronic Meeting System Environment”, *iee transactions on systems, man, and cybernetics*—part c: applications and reviews, vol. 29, no. 2,
- [4] Hyo-joohan, Starr roxannehiltz, Jerry fjermostad, and Yuanqiong (kathy) wang(2011),“Does Medium Matter? A Comparison of Initial Meeting Modes for Virtual Teams”, *iee transactions on professional communication*, vol. 54, no. 4.
- [5] Takaaki Hori, Shoko Araki, Takuya Yoshioka, Masakiyo Fujimoto, Shinji Watanabe, Takanobu Oba, ,AtsunoriOgawa,KazuhiroOtsuka, Dan Mikami, Keisuke Kinoshita,TomohiroNakatani,Atsushi Nakamura, and Junji Yamato(2012),“Low -latency real-time meeting recognition and understanding using distant microphones and omni-directional camera”*iee transactions on audio, speech, and language processing*, vol. 20, no. 2,
- [6] developers.google.com/+mobile/android/sign-in
- [7] International Standard Organization, “Information Technology-Coding of Audio-Visual Objects,Part10--- Advanced Video Coding”, ISO/IEC 14496-10.
- [8] Kumar, Mandal, and Panchanathan,” Implementation of H.264 Encoder and Decoder on Personal Computers”, Submitted to Special Issue on Emerging H.264/AVC Video Coding Standard,Journal of Visual Communication and Image Representation.

AUTHORS

First Author – Sania Thomas was born in Idukki in 1990. She graduated in B.E- Computer Science and engineering from James College of Engineering & Technology, Nagercoil under Anna University Tirunelveli in 2011. Currently she is pursuing M.E Computer Science and Engineering in Noorul Islam University, Thuckalay. Her research interest includes Wireless Communication, Mobile Computing, Cloud Computing, Image processing. Email id:saniathomas.angel@gmail.com
Second Author – Dr.E.R Arun received the BE degree in Computer Science and Engineering and ME degree in Computer

Science and Engineering from Anna University, Tamil Nadu, India. He achieved PhD degree from Anna University, India. His research interests include Wireless networks, Mobile

Computing, Cloud Computing, Grid Computing. Email id: arunres2005@gmail.com