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Enhancing Grid-FTP Protocol to Facilitate Full-Duplex Data Communication

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ABSTRACT: Today patients visit different hospitals and located at different places. Thus they need to carry their check up history with them. And also it is difficult to track this information. So to handle with such situation we proposed this system. In order to be efficiently and effectively manage, search, and display database information, going to define information package for doctors that provides data set of patient's medical information from each visit. This also helps to track the healthcare information of society to monitor and for survey. Above mentioned goal can be accomplished by connecting different hospital's databases which will use same their own storage system to store databases. The methodology for accessing various types of medical records will be provided also design web-based interfaces, display for many medical service purposes. This will be based on grid computing (grid build by using Glo bus toolkit). In addition to this, implementation is going to enhance the file transfer protocol in used in grid environment i.e. Grid FTP by enabling bidirectional data movement. Today's Grid FTP which is based on REST API web service which is unidirectional and which reliance on text-based protocols. The problem is synchronous communication protocol is based entirely on "request/response". That is, there is no easy way to open continuous communication between a client and a server. REST is always Request/Response "stateless" communication, by the nature of the HTTP protocol, lots of information must be sent in each Request and response. In short to solve two major problems of current system is overhead of HTTP (Network Throughput). The proposed system using web socket for data movement which provides full-duplex communication channels over a single TCP connection.

KEYWORDS: Grid FTP, FTP, Grid Computing, Socket, Web socket.

I. INTRODUCTION

Many web computing systems are running real time database services where their information change continuously and expand incrementally. In this context, web data services have a major role and draw significant improvements in monitoring and controlling the information truthfulness and data propagation. The proper collection, management and use of information within healthcare systems will determine the system's effectiveness in detecting health problems, defining priorities, identifying innovative solutions and allocating resources to improve health outcomes. There are very few system today in India for analysis of healthcare data and perform computation on it .There are many problems like database management and storage which has poor performance and extra data transfer time. Hence here objective is to provide grid computing service that can overcome above mentioned problems. Grid computing is the collection of computer resources from multiple locations to reach a common goal. The grid can be thought of as a distributed system with non-interactive workloads that involve a large number of files. In grid every node acts as both client and server depending upon request and response scenario. Currently grid uses FTP based protocol to transfer data between two nodes. This protocol is based on RESTful API.

II. RELATED WORK

Health information management (HIM) is information management applied to health and health care. It is the practice of acquiring, analyzing and protecting digital and traditional medical information vital to providing quality patient care. With the widespread computerization of health records, traditional (paper-based) records are being replaced with electronic health records. The tools of health informatics and health information technology are continually improving



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to bring greater efficiency to information management in the health care sector. Both hospital information systems and health human resources information systems are common implementations of HIM.

Grid computing is the collection of computer resources from multiple locations to reach a common goal. We can connect multiple hospitals from different location using grid computing environment. These interconnected hospitals and communicate with each other and share healthcare information among each other. This grid computing can be setup by using different middleware software such as Globus toolkit, BONIC and many more. Health care information can be managed by using grid computing environment where hospital uses local storage to store patient's information and share among each other using file transfer protocol. There is protocol to transfer file that is patient's health information using GridFTP protocol.

GridFTP is a high-performance, secure, reliable data transfer protocol optimized for high-bandwidth wide-area networks. The GridFTP protocol is based on FTP, the highly-popular Internet file transfer protocol. GridFTP protocol uses different TCP connections and single channel to transfer file between sender and receiver

III. EXISTING SYSTEM

Presently, there such systems available are either paper based or cloud based storage. There are many problems with

1. Paper Based System:

- Paper based systems are difficult to maintain, visual quality of paper reduces by time.
- Analysis in such system is difficult like finding no of file belong to particular patient.
- In this system physical copy of such system need to carry everywhere and every time.

2. Cloud or central storage based System:

Problem in these system are reduced by use of digital copy reports and other information. But there some problem still occurs such as:

- Expensive infrastructure: Cloud or other central storage based system required huge storage capacity as all hospitals use same storage facility to store these data.
- Communication overhead at server as every member communicates with common server for file sharing as well as file storage.

We can use Grid Computing Environment for Healthcare information management or Telemedicine database management system. Currently there is no such system available we can make use of storage capacity of every node (Hospital's own storage) to store visited patient information. And make use of GridFTP protocol to share file among these nodes (i.e. hospital). GridFTP based on file transfer protocol.

IV. PROPOSED SYSTEM

Grid FTP is performance can be increased when working in real time environment or grid project. Grid FTP needs to be enhanced with bidirectional data flow between client and server over a single TCP connection.

Web Socket solves a few issues with REST, or HTTP in general:

Bi-directional: HTTP is a uni-directional protocol where a request is always initiated by client, server processes and returns a response, and then the client consumes it. Web Socket is a bi-directional protocol where there are no pre-defined message patterns such as request/response. Either client or server can send a message to the other party.

- **Full-duplex:** HTTP allows the request message to go from client to server and then server sends a response message to the client. At a given time, either client is talking to server or server is talking to client. Web Socket allows client and server to talk independent of each other.
- **Single TCP Connection:** Typically a new TCP connection is initiated for a HTTP request and terminated after the response is received. A new TCP connection needs to be established for another HTTP request/response. For Web Socket, the HTTP connection is upgraded using standard HTTP Upgrade mechanism and client and server communicate over that same TCP connection for the lifecycle of Web Socket connection.

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A GridFTP with Full Duplex Communication using WebRTC

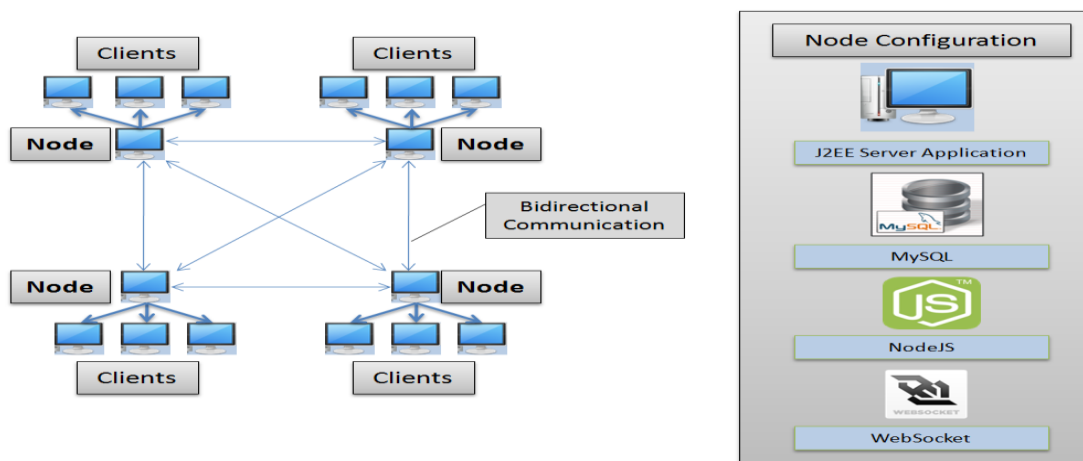


Figure 4.1: Setup of Proposed System

The above figure 4.2 shows the setup of proposed system. The description for the above figure is given below.

- **Distributed Databases**
Records of all Patients are stored on servers of respective hospitals which are shared and sent to other hospital servers on demand.
- **Web Socket based Duplex Communication**
User data is transmitted between servers over single socket using Web Socket Protocol over Node.js. It enables sending and receiving on the same channel.
- **J2EE based Healthcare System**
For visualization of the System, a Healthcare system is deployed to enable communication between various hospitals using the system to store and fetch patient data and records.
- **Records Management and Data Portability**
Patient data including reports and prescriptions are managed and are portable to be sent to any other hospital if needed, enabling data portability.

V. SIMULATION RESULTS

5.1 Registration Page and login page

User of this application must be registered to system. User can be either Hospital or Patient. User needs to provide various information. User name and password provided during registration are used to login in to system.



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The screenshot shows a web browser window with the URL `localhost:8080/GridFTPWeb/pages/user_registration.jsp`. The page has a blue header with 'LOGIN' and 'REGISTER' links. The main content is a registration form titled 'REGISTRATION'. The form includes radio buttons for 'REGISTER AS' (Doctor and Patient), and input fields for 'FIRST NAME', 'EMAIL ADDRESS', 'USER NAME', 'LAST NAME', 'PHONE NO', 'PASSWORD', and 'CONFIRM PASSWORD'. There are 'REGISTER' and 'RESET' buttons at the bottom right of the form.

Screenshot 5.1 Registration Page

Login Page:

The user name and password used mentioned while registration are used to login in application. The user may be either doctor or patient who is going to login. If user name and password matches in database then depending upon his profession mention while registration redirected to his page enabled with his functions.

The screenshot shows a web browser window with the URL `localhost:8080/GridFTPWeb/`. The page has a blue header with 'LOGIN' and 'REGISTER' links. The main content is a login page with a background image of medical professionals. Overlaid on the image is a login form with fields for 'USERNAME' (Enter User Id) and 'PASSWORD' (Enter password). There are 'REGISTER', 'LOGIN', and 'Learn more' buttons.

Screenshot 5.1.2 Login Page



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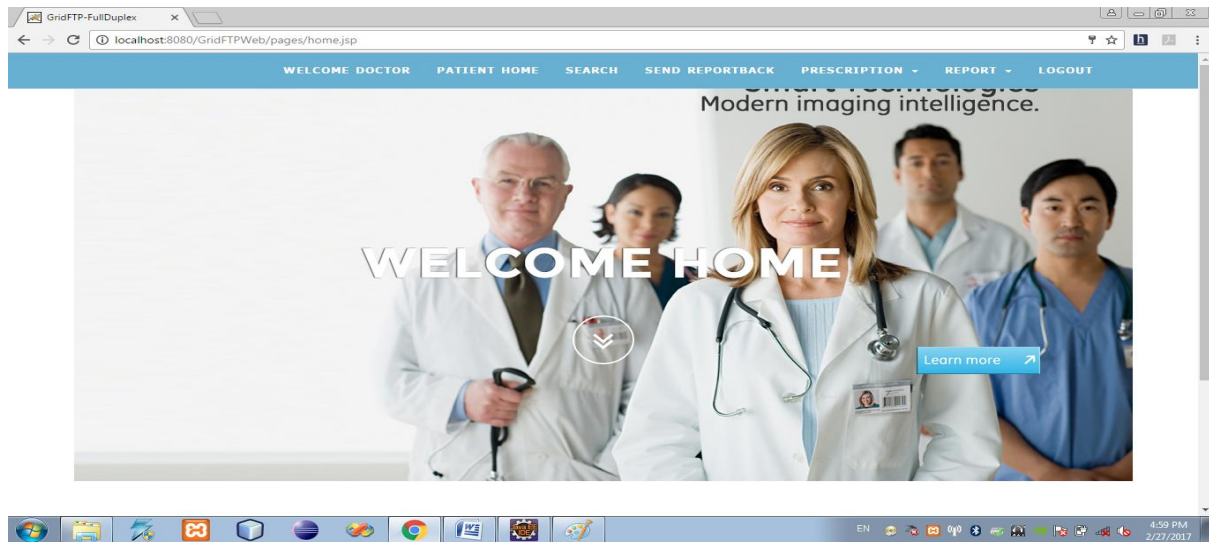
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Doctor Home Page:

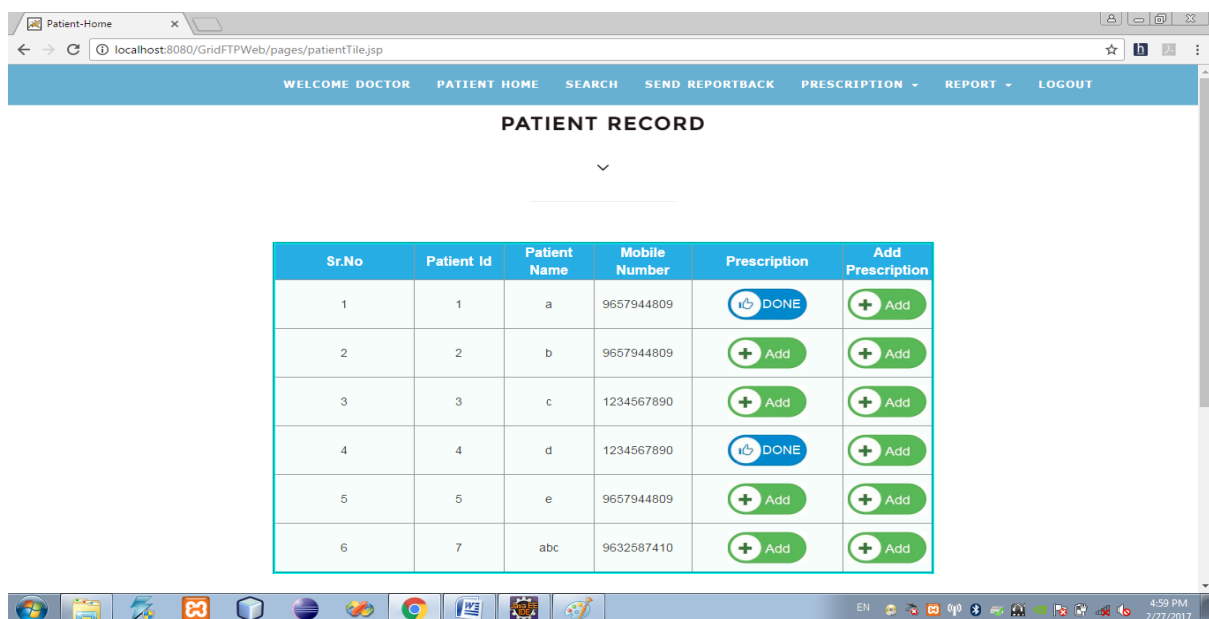
User with valid username and password who is registered as doctor in Registration redirected to this page.



Screenshot 5.1.3 Home Page

Patient Home:

Doctor who login with valid username, password, when click to Patient home tab then redirected to this page. This page contains all patient information such as Patient id, Patient Name, mobile number, also shows prescription whether added or not. This also gives facility to add prescription to any patient when click to add prescription redirect to other page.



Screenshot 5.1.4 Patient Home



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Prescription Page:

This page involves two options:

1. View Prescription

This shows every patient's prescription added by logged hospital. Prescription views tabular format which contains patient name, test performed, tablets, syrup, injection, prescription date automatically gained when prescription added, prescribed by i.e by which doctor.

2. Add prescription

This facilitates to add prescription of particular patient by logged user. To add prescription user need to fill form which asks information like prescribed by (doctor), patient name, patient id, test to be performed, tablets, syrup, injection, comments. When doctor click add button then this record get stored in database.

Sr.No	Patient Name	Test Performed	Tablets	Syrup	Injection	Prescription Date	Prescribed By
1	a	blood test,sugar	abc,abc,abc	bca	none	2016-07-01 17:36:25.0	Dr.Parvez
2	d	blood test,sugar	abc,abc,abc	bca	none	2016-07-01 17:36:52.0	Dr.Parvez
3						2016-07-21 11:26:55.0	

Screenshot 5.1.5 View Prescription

PRESCRIBED BY
Doctor Name

PATIENT NAME
Enter Patient Name

PATIENT ID
Null

TEST TO BE PERFORMED
Enter Test To Be Performed

TABLETS
Tablets Prescribed

SYRUP
Syrup Prescribed

INJECTION
Injection Prescribed

COMMENTS
Comments

ADD RESET

Screenshot 5.1.6 Add Prescription



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Report :

This involves two option like view report and add report.

1. **addreport.jsp:**

This page allow logined user to add report of particular patient. This page takes two input patient id i.e. patient whoes record need to be added and patient type either primary or secondary. If patient firstly visiting hospital then he is primary patient of that hospital and if he coming from another hospital then consider him as secondary patient.

User also need to select hospital where report is going to added. Last opting browsing file from computer ie. Report of patient. This report file get stored in appropriate folder associated with Patient.

Screenshot 5.1.7 Add Report

2. **ViewReport.jsp**

This page shows all reports added with particular patient. This page takes two parameters:

1. Patient id: Id of Patient whose report needed to be viewed.
2. Type of Patient: Patient can be either primary or secondary depending upon his typing of visit to hospital as above mentioned.



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Screenshot 5.1.8 View Report

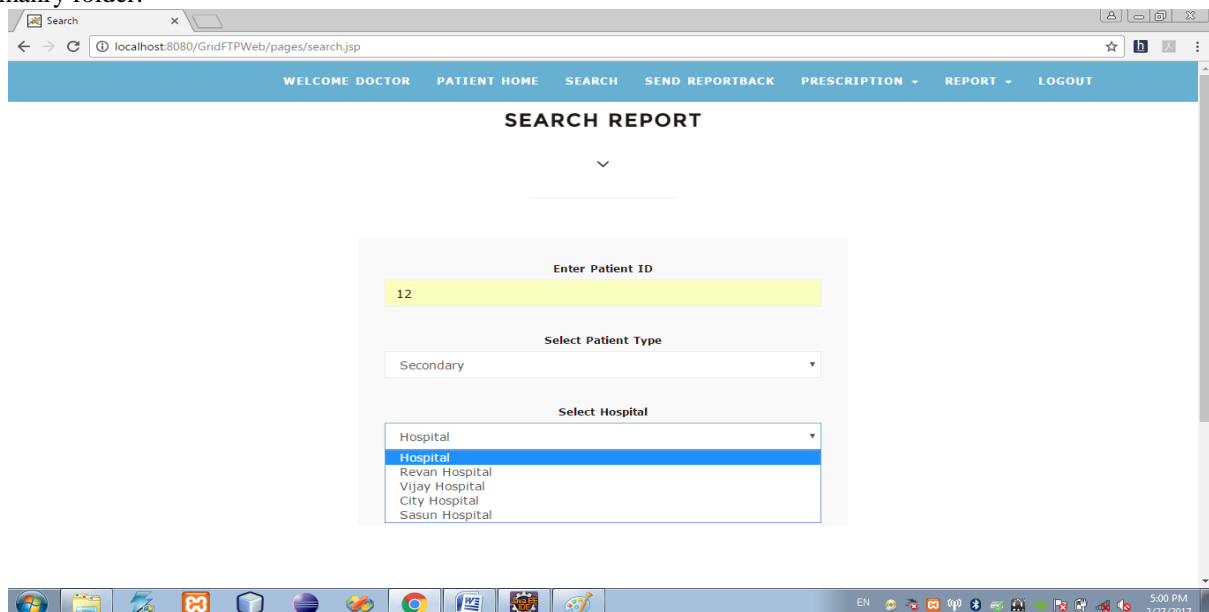
Search Page:

This page allows user to search report of particular patient. This takes two report such as patient unique identification i.e. Patient Id ,patient type either primary and secondary depending upon his hospital visit. This also needs to mention hospital from where to get reports. When you press search then request send to that hospital along with Patient's id.

When user press search button then request goes to another interconnected hospital mention using ip address mention in database associated with hospital name.

This makes downloading of all reports associated with Patient from remote computer and store these report in folder associated with that Patient's secondary.

If patient type mentioned is primary then system search report on local machine i.e. folder associated with Patient's primary folder.



Screenshot 5.1.9 Search Report i.e. file request

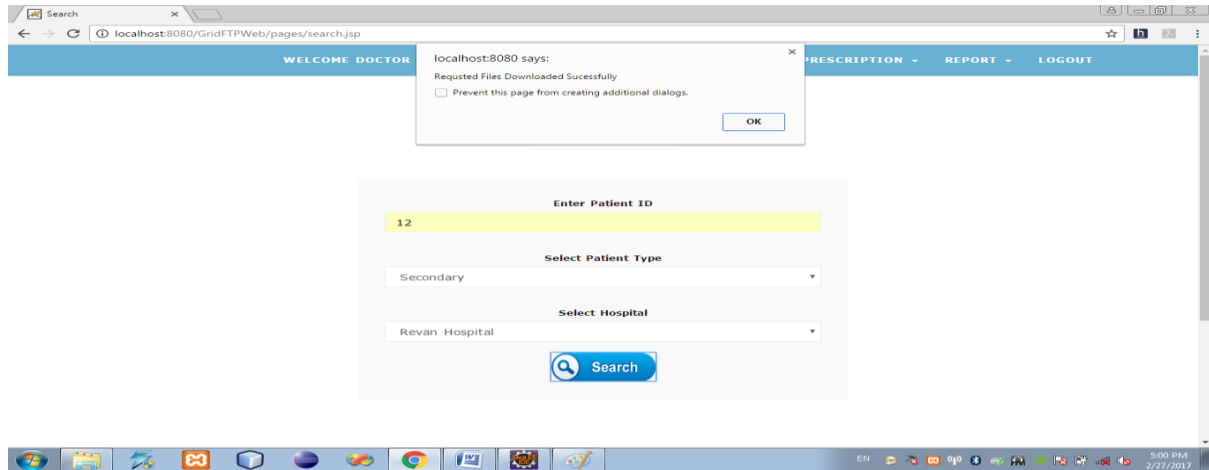


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Screenshot 5.1.10 file downloaded alert(Response)

VI. CONCLUSION AND FUTURE WORK

After testing, here is time of conclusion so we compared product with ftp and gridftp.

File Transfer Protocol: The File Transfer Protocol (FTP) is a standard network protocol used for the transfer of computer files from a server to a client using the Client-server model on a computer network.

FTP is built on client-server model architecture and uses separate control and data connections between the client and the server.^[1] FTP users may authenticate themselves with a clear-text sign-in protocol, normally in the form of a username and password, but can connect anonymously if the server is configured to allow it. For secure transmission that protects the username and password, and encrypts the content, FTP is often secured with SSL/TLS (FTPS). SSH File Transfer Protocol (SFTP) is sometimes also used instead, but is technologically different.

FTP protocol is used to send and receive file between two machines. FTP uses different channels and connection to send files. FTP establishes two channels to send single file data channel and control channel in addition to handshaking of HTTP and TCP connection.

FTP send file over single data channel and takes time as compared to GridFTP.

GridFTP is an extension of the File Transfer Protocol (FTP) for grid computing. GridFTP is a high-performance, secure, reliable data transfer protocol optimized for high-bandwidth wide-area networks. The GridFTP protocol is based on FTP, the highly-popular Internet file transfer protocol.

Current **GridFTP** is **modified** and socket.IO and Websocket is used to transfer file. We are using node.js as server side scripting. Node.js uses an event-driven, non-blocking I/O model that makes it lightweight and efficient. As an asynchronous event driven JavaScript runtime, Node is designed to build scalable network applications.

While transferring file this uses single TCP connection and multiple data channels to transfer data simultaneously and one control channel.

We can transfer multiple files at same time through multiple data channels which ultimately increased network efficiency.

In case of standard GridFTP used different TCP connection to send multiple files. And it also uses multiple data channel and multiple control channels.

But in case of return communication or repeated communication the GridFTP need to establish another connection and send data.

In short,

- Modified GridFTP is faster as compared to FTP and also efficient in working.



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- Modified GridFTP reduces communication overhead when need to send small amount of data repeated between sender and receiver. Proved efficient when frequent communication required between two machines.
- Multiple data channels makes parallel file transfer which speedup file movement time.
- reusing existing persistent connections make better TCP performance
- pipelining makes asking for multiple files from the same server faster
- (automatic) compression makes less data get sent
- no command/response flow minimizes extra round-trips

REFERENCES

- [1] Kettimuthu, R.; Lacinski, L.; Link, M.; Pickett, K.; Tuecke, S.; Foster, I., "Instant GridFTP," in Parallel and Distributed Processing Symposium Workshops & PhD Forum (IPDPSW), 2012 IEEE 26th International , vol., no., pp.1104-1112, 21-25 May 2012
- [2] Postel, J. and Reynolds, J. File Transfer Protocol. Internet Engineering Task Force,RFC 959, 1985
- [3] Allcock, W. GridFTP: Protocol Extensions to FTP for the Grid. Global Grid ForumGFD-R-P.020, 2003.
- [4] Whai-En Chen, Chia-Yung Su, and Yi-Bing Lin, " A Socket-layer Translator for IPv4-IPv6 Translation ", IEEE COMMUNICATIONS LETTERS, VOL. 9, NO. 10, OCTOBER 2005
- [5] Frank Zhigang Wang, Sining Wu, Na Helian, Michael Andrew Parker, Yike Guo, Yuhui Deng, and Vineet R. Khare, " Grid-Oriented Storage: A Single-Image, Cross-Domain, High-Bandwidth Architecture", IEEE TRANSACTIONS ON COMPUTERS, VOL. 56, NO. 4, APRIL 2007
- [6] Shruti M. Rakhunde, " Real Time Data Communication over Full Duplex Network Using Websocket", *IOSR Journal of Computer Science (IOSR-JCE)*
- [7] GridFTP
<http://toolkit.globus.org/toolkit/docs/latest-stable/gridftp/>