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Research paper

Data Transmission Using Multiple Medium Concurrently

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Abstract

This article is an alternate way of data transferring using a new data transferring protocol. In conventional data transfer only one medium (either wired or wireless) is used, so other medium is idle. Thus by using both medium, the data transferring will be efficient, because the data is transferred in a parallel manner. In this method of data transfer the speed is increased by twice of the conventional method. This would be very helpful when a large file is to be transferred. In this project the wireless connection is established by socket programing and the wired connection is established by USB wire. The data is transferred by using apache java library that provides generic access to USB devices. In this technique the data is split into multiple chunks of particular size. The USB function and Wi-Fi function are threaded parallel .Thus the chunks are transferred in both medium simultaneously. The chunks are received through Wi-Fi and appended into a single file. Thus the data is transferred efficiently and accurately.

Keywords: *Wi-Fi; USB; Socket programming;Threads*

1. Introduction

This project is about a new transferring protocol to overcome the problems faced during transferring bulk data. This problem is solved by parallel data transaction. Through this method of data transmission the speed will be increase in twice the amount of speed that occurred in conventional method of data transmission. In this method the data is first converted into the basic representation of information then it is split into smaller chunks and transfer simultaneously then in the receiver end the smaller sequenced blocks are then combined to the original format then it changed to its original extension. This project contains four modules which splits the data, send the data, receive the data and append the data. These modules are written in c and java programming languages. First the data is spilt by using c programming language by using file handling concepts. Secondly the data is sent by using socket programming concepts this is written in java programming language. This sending module sends the data by establishing the socket connection and sends the data through wireless internet connection. The another section in the sending module sends the data through USB wire. This moves the chunks programmatically to the phone memory. Since these two functions are threaded the both functions are executed in a parallel manner. Thus the medium is used efficiently and the chunks are transferred to the receiver section. The receive module receives the data using socket receive program this program is written in java programming language which receives the data and arranges in a sequential order. The next append module appends the chunks into a single file. The two modules receive and append modules are written in java programming language which are built in an apk file and installed in a receiving mobile phone.

2. Literature Review

Andrew D. Birrell et. al 2010 proposed an functioning operating system in which some commercial ones include and also have recently included the support for concurrent programming. The mechanism followed is by allowing multiple lightweight "threads" within a single address space and it is used within a single program. It is very difficult even for the experienced programmer to handle with threads. Concurrent programming has various techniques and pitfalls that do not occur in sequential programming. Some of the pitfalls are comfortable (for example, deadlock is a sort of bug : it stops your program with all the evidence intact), but some take the form of insidious performance penalties.

This paper is gives an introduction to the programming techniques that deals with threads, and also provides the information about the techniques that give bad results with threads. It also should provide the appropriate information about the techniques that are followed and which works—correctly, efficiently, and with a minimum of surprises. A "thread" which mean that a single sequential flow of control. In a high-level language you normally program a thread using the procedures that are available. In a single thread, there is a single point of execution also. Having "multiple threads" in a program is that at any point of instant the program could have multiple points of execution in each individual threads. The programmer can view the threads executing simultaneously, as if the computer were executing with many processors in which there are threads.

The developer only knows how to create the multiple threads and where it gets executed. Additionally, the programmer must be

aware that the computer does not execute all the threads simultaneously.
Single address space which means that it allocated computer hardware addressing. When it is seen in higher view it usually corresponds to the fact of (global) variables that are shared among all the threads of the program. Each thread executes in a separate stack with its own allocated local variables. The developer only looks after the synchronization mechanism of the thread and ensure that the shared memory is accessed to provide the corresponding correct answer.

When one hears the idea of storing data through the cloud, the main doubt which arises in their mind is: How safe is the data stored in the cloud space? When Cloud Computing had just been introduced in the cyber market there were several misconceptions about the security aspect of the data and people for a very long time believed that any data stored in the cloud can be openly accessed by outside parties too. Although these misunderstandings surrounding the field has been slowly eliminated over time they have not been completely uprooted from the minds of the people because of the prevalence of few cases of storage mishaps, data loss and misplacement. These issues are faced both by cloud service providers and customers. When an overwhelming amount of data is being accessed from the cloud through compound servers it often leads to overloading conditions that cause severe damage of stored data. These minor cases however, hasn't deterred the ascent of Cloud Computing over prominent sectors such as E-Banking, Networking, Healthcare, education and the manufacturing industry. There has been a steady rise in Cloud's influence over the cyberspace as it has slowly begun to overthrow conventional method of data computing. With the onset of cloud in the e-commerce market, the entire retail process has been made extremely consumer-friendly by increasing the access rate of a product and reducing the overall price of the same. Penetration of Cloud into aspects of manufacturing has been rapid over the past few years and by 2021 computer scientists have predicted that cloud will become an inseparable part in each and every step of the manufacturing process. This year alone we have witnessed the birth of 50+ mass online courses websites that have come to existence only because of the integral role played by Cloud in their data storage processes. By creating awareness and empowering the patient's about their own medical condition, cloud data storage has created a massive breakthrough in the medicinal field by providing a thorough history of patient's record and thereby improving the accuracy of the overall treatment.

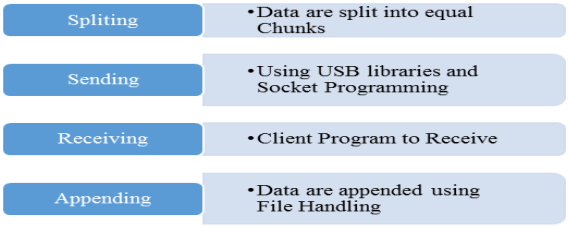
When it comes to Cloud hosting there are two main categories, one is the private cloud hosting used by global IT giants within their secure office spaces. These private cloud spaces are usually accessed with a nominal fee paid by the owning company which varies with the intended storage size. The other category of cloud hosting is something all of us are quite familiar with, this the public hosting cloud facility provided by various social media networks such as Google+, Facebook, Twitter, Instagram , Yahoo and Youtube.

Feature selection is the approach of choosing subset of given dataset based on some feature. It can be used to minimize dimensions of the huge data set. In the selection algorithm process it is implemented for text categorization using the algorithms and ant colony optimization (ACO) and artificial neural network (ANN). With the help of this selection process one can able to find the nearest data present in the subset.

Artificial intelligence is the mechanism which makes human work very easy by making the devices to process from the perspective of a human being. Predictive text is a feature in smart phones, which runs on Operating Systems such as iOS, Android, Windows etc. This feature plays a major role in helping the individual to select the word that succeeds the current word of their text message or statement. The prediction algorithm is used here for the development process. Thus, the system automatically does the mathematical calculations in the middle of a chat, without making the user switch to the calculator application; and also finds chronological data such as date and day, without having to switch to the calendar application

3. System Architecture

The below figure 3.1 shows the system architecture of the proposed system. With the help of this architecture diagram the flow of the process and can able to implement the development process according to the details provided.
In this architecture diagram the working of the four modules is clearly shown split module, send module, receive module and append module.



A. Split Module

This module splits the data into equal chunks by using filestream. In this module the data is to be sent is made into equal number of smaller chunks .Here this module is written in C program .The size of the chunk file is set as 512 kb thus the bigger file is chunked into smaller pieces of each file size 512 kb. fseek() function is used to move the pointer to each 512kb from one place to another thus the whole data is split one by one and creates a file for each 512 kb.

```
int fileIndex = 0;
while(1)
long chunkSize = 512*1024;
fseek(fp,chunkSize*fileIndex,SEEK_SET);
fread (buffer,chunkSize,1,fp);
fwrite(buffer , chunkSize , 1 , fw );
fileIndex++;
```

The above snippet the chunk size is assigned as 1024*512 bytes, thus for each 1024*512 bytes the chunk files are created.

B. Send Module

This module sends the chunks through the two mediums i.e. both Wi-Fi and wired connection, the each file is sent though the algorithm mentioned below which uses multithreading. By using socket programming the data is sent through Wi-Fi to send the files using socket programming the socket is created by using ip address and port number, the chunks are sent to FileInputStream. In sending program the socket's getOutputStream( ) is assigned to DataOutputStream, Thus by writing the DataOutputStream's object using write( ) function.

```
DataInputStream dis = new
DataInputStream(clientSock.getInputStream());
FileOutputStream fos = new FileOutputStream(Filename);
fos.write(buffer, 0, length);
```

The above write function sends the chunks through Wi-Fi parallely another function sends the chunks through USB to transfer the chunks the apache library is used. org.apache.commons.io.FileUtils is imported to use the function FileUtils.copyFileToDirectory() this copies the chunks and

transfer it through the USB this function creates a directory in the receivers memory.

These chunks are sent through two functions USB function and Wifi function these two functions are multithreaded and maintained a common status table which can be accessed by the both functions thus the sent chunks are managed efficiently. This common variables are created by using the control features in java programming this control features are used in threading concepts which can be accessesable in any part of the class program.

```
static class Wifi extends Thread{
public void run(){
    wifi();
    }
}
static class Usb extends Thread{
        public void run(){
                usb();
        }
}
```

The above snippet is the two classes Wifi class and Usb class which are multithreaded to execute the classes parralelly on both sides thus the chunks are sent at same time in an efficient manner.

C. Receive Module

This module is a client program which receives the data and arranges in an order, This Receiving module is written in java programming language which is built in an apk file. This modules opens a socket client program to receive the contents that are sent through the socket server program .The Socket Receiving programs opens for the socket connection by the accept() function. The Received chunks are stored in the local storage device by using file handling concepts. The apk android application opens a socket connection and waits until a connection is established after the connection is established the chunks are received through Wi-Fi. The received files are named sequentially in a correct order thus appending operations takes the files easily to append

D. Append Module

This module appends every chunk files that is received from the previous module into a single file, This append module is written in java programming languages. This modules uses data handling concepts to append each chunks into a single file. It takes the bits of data from each chunks and merges the bits into a single file by using data handling concepts and writes it into a single file

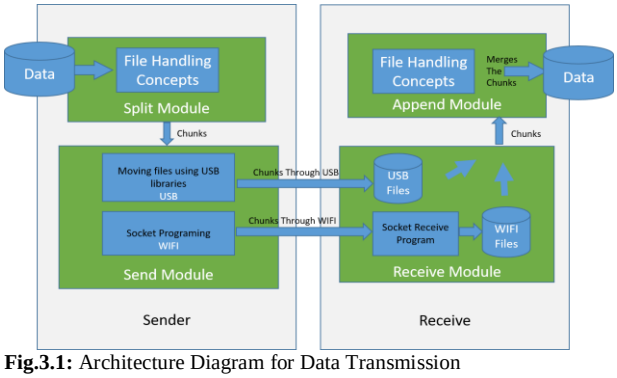


Fig.3.1: Architecture Diagram for Data Transmission

4. Results

The below table 4.1 shows the difference in the speed of the conventional transfer speed and the speed achieved through parallel transmission through multiple medium concurrently. It describes the difference in the speed of the new data transfer method and the conventional data transfer method. The results shows that the speed of the new data transmission method is nearly twice the speed of the conventional method. Therefore by increasing the speed of the transmission the time consumption is reduced to the twice the time consumed in the conventional transaction. Each modules are written in different languages such as java, c programming languages.

Table 4.1: Testing of different data transfer technique

File Size (MB)	Transfer time through Wi-Fi and USB (Seconds)	Transfer time through USB (Seconds)	Transfer time through Wi-Fi (Seconds)
105	10	21	47
210	23	46	60
612	72	141	174

5. Conclusion

As stated by this above method, it results a faster data transfer than the conventional data transfer method. We propose an efficient transferring technique which transfers both efficiently and accurately. This project can be used for commercial uses. This will be very helpful in transferring the bulk data from one system to another system.

This project can be extremely improvised by making the algorithm simpler and by making the user interface more user friendly. The Steps of execution can be reduced to make it further efficient.

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