Disaster Management for Distributed Systems

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Abstract- The main idea behind implementing such a project is to secure and safeguard the important and confidential data of an institution in case of an emergency like fire using minimum applications and at the least cost. The purpose of the project is to create a system which the user feels safe and confident while using. The user can rely on the tool anytime without any second thoughts. The accuracy of the device has to be as high as possible because a large amount of data and money of the institution is at stake. Thus giving the utmost data security to the client is the main aim of the project.

Index Terms- Cloud Computing, Data backup, LAN, Remote FTP Server

I. INTRODUCTION

The project will be divided into two parts: hardware and software. The hardware part is for smoke detection and will be linked to a smoke sensor through a micro controller. The software part will help in taking the backup of the data and storing it at a distant location. The backup will be totally automated and will be done by the server at the location.

In the market there are technologies that are being used to transfer data constantly over the cloud or on the remote server. This process is not only complex and unsecure but also expensive as the data needs to be refreshed time to time in order to keep the data up to date. The project that we want to propose will be for the small scale firms which have fewer investments for setting up the complex mechanism for the backup of their data. The system will be best suited for small offices, schools and colleges, companies, hospitals where the data is on computers which never take the backup of the data.

The project will be using LAN connections to gather the data from all the client PC's in the office, the data will then be transferred to the cloud through the drop box installed in the server PC. The data can then be retrieved from any computer. The data backup process will be using LAN connections for major part of the process and thereby reducing the cost of setting up another network connection for the file transfer. The speed of file transfer will be good also because of the fact that client-server architecture is used in transferring files.

The hardware of the project is divided into two parts:

Smoke detector: The smoke detector will be active throughout; the detector will keep on sensing for the smoke in case there is any fire outbreak in the premises. The smoke detector will give a positive signal to the micro controller in case such an outbreak occurs. This will be the first triggering element in the entire process of the backup process.

Micro controller: The micro controller used will be programmed to give the signal to the server to start the backup process if the smoke detector gives a positive signal. The micro controller will be connected to the server; through USB; which is waiting for the response signal from the smoke detector to carry out the backup. This is the second stage of the process.
Software:

The software part of the project is related to the backup process of the files. The server will send a message to each of the client PC's to start the process of backup. TCP/IP protocol will be used in sending the message. Then the client will start sending all the pre-selected files to the server through LAN using FTP protocol. The server will then upload the documents on the cloud using the drop box installed on it.

II. LITERATURE SURVEY

The purpose of data backup and recovery strategy is to protect the files and the databases against data loss and recover the files after data loss. Data should be backed up on regular basis and ideally in an automated manner. Backup administration includes following tasks:

- Planning and testing responses to different types of failure.
- Configuring the files for backup and recovery
- Set up backup schedule
- Monitoring backup and Recovery Environment
- Trouble Shooting backup problems
- Recovering from data loss if need arises.

One of the methods of data backup is automatic backup of previously selected data on the PC's connected in the LAN to a remote FTP server. The software of the system will be installed on the client as well as server PCs. The server PC will continuously monitor the signals coming from the hardware and will initiate the data backup process of all the PCs. The backup will be taken to a remote FTP server on the internet. Our variation of the
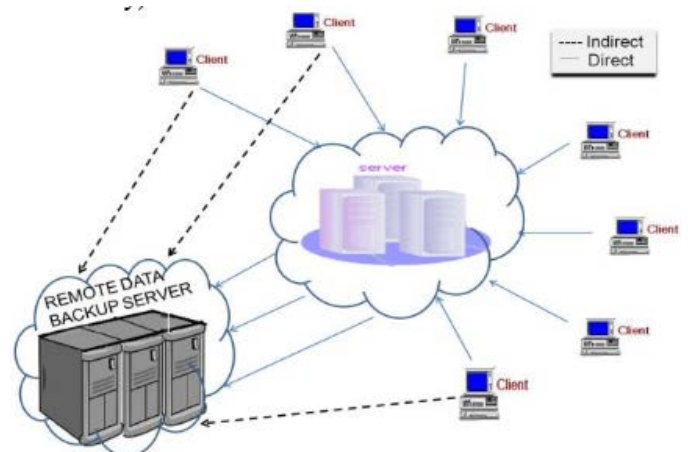
Remote Data backup Server and its Architecture[2]
system will be that cloud computing will be used in our project. Over the last few years, cloud computing has emerged as an effective solution for our data backup needs. There are many benefits of using cloud computing for data backup. It is cost effective, flexible,involves less risk at the cloud service providers have to go through a number of security audits and optimised quality of services is provided by the service provides. However there may be some instances when the cloud itself gets destroyed. In such situations an algorithm called Seed Block Algorithm is used. Seed Block Algorithm (SBA) can be also used for remote data backup. The two main objectives for using SBA are: 1) To gather information from any remote location 2) To recover the files that maybe destroyed because of cloud destruction. The algorithm also aims at reducing the time required for recovery process.

SBA makes use of OR (XOR) operation. For example, there are two files A and B. The can be stored in X by ORing them i.e X=A OR B. The file A can be recovered using the XOR operation i.e A= X XOR B. Also, how SBA is more efficient than the current available techniques like HSDRT[], PCS[], ERGOT[], Linux Box[], Cold /Hot Backup Technique[], SBBR[] etc. These techniques have several issues which can be overcome by Seed Back Algorithm. [1]

III.   REQUIREMENTS

1.1   Functional Requirements
Following are the functional requirements of the project:

Sr. No	Method	Merits	Demerits
1	ParityCloud Service[2]	- Reliable - Privacy - Low cost	- Implementation - Complexity is high
2	HSDRT[1]	-Used for movable Client such as laptop,smart phone	- Costly - Increase redundancy
3	Linux Box[4]	-Simple -Low cost for implementation	-Require higher bandwidth - Privacy -Complete server backupAt atime
4	ERGOT[3]	-Perform exact match retrieval Privacy	-Time complexity -Implementation complexity
5	Cold /Hot Backup Strategy[5]	-Triggered only when failure detected	-Cost increase as data increase
6	Shared Backup Router Resources[6]	-It concerns with cost reduction works even if router fails	-Inconsistencies laeds to problem which reduce performance -Unable to includes optimization conceptwith cost reduction

C omparison between ways of backup and recovery [2]
- Does not require installation of sensors as it uses the pre-installed smoke sensors.
- The response time should be quick.
- User should have freedom to select the files whose backup is to be taken.

- The Server initiates trigger for all the clients connected in the network and hence hardware needs to be connected with the server only
- Having data in the cloud will allow your customers to have access to their data anytime and anywhere.
- The solution for disaster management should make sense and should not incur capital cost.
- The sensor should be connected to the server (cloud).
- The access to the internet should be continuous.
- The sensor should be audible enough for the server to detect.
- Any type of files can be uploaded.
- Large file support can be integrated.
- Data transfer rate can be increased.

1.2   Non-Functional Requirements
Following are the non-functional requirements of   the project:
- The response time of the system should be quick.
- The system should be robust.
- The system should be cost-efficient.
- Ease of availability.
- Easy maintenance.
- High productivity should be provided.
- There should be minimum error rate.

1.3 Constraints
Following are some of the constraints of the   system:
- System should be continuously connected to the internet because without connection to the internet, back up is not possible.
- Only selected files and data would be backed-up.
- The PC's or Clients should be connected in LAN.
- Client and Server must be connected to each other all the time.

1.4 Hardware and Software Requirements:
For Embedded System
- Embedded Technology
- 8051 Family Based Controller
- Embedded C - Keil Compiler
- USB interfacing
- Eagle Software for PCB Designing

For PC System
- VB.net 2008 Based Application Software
- File Handling
- Server-Client Architecture
- USB Port Handling
- Cloud desktop software

IV.   SYSTEM DESIGN

1.   System Overview
The system will consist of multiple LAN PCs. There will be one hardware device attached to one of the LAN PCs. Client software will run in all PCs in LAN. Server software will run in backup PC which is located in remote location.

Initially, all client softwares will have pre-selected files for backup in emergency. Once the smoke is detected by the sensor then this client PC will send immediately backup commands to

all the client PCs. Every PC will start sending files to the server automatically.
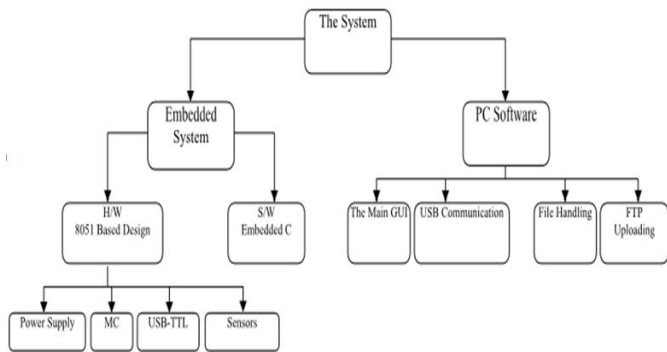
Overview of Proposed System [3]

2. Block Diagram
A. Explanations of Blocks

The following are the brief explanations of the working principle of the various major blocks or sections used in the system…

- **Power Supply**

This unit is the power house of the system. It can provide voltage of varying range. It basically   consists of transformer, rectifier, filter and regulator. Bridge Rectifier is used here which will convert 230VAC into desired 5V/9V DC.

- **Microcontroller**

Microcontroller is the base of the system. It controls all the important operations in the system. Thus microcontroller performs all the intelligent tasks. The controller here user will be of 8051 family. The code will be burned or programmed into the code memory. This unit requires +5VDC for it proper operation.

- **USB-TTL**

This section converts TTL logic into USB logic and vice-versa. This unit uses serial communication link for communicating microcontroller with USB based devices. The CP2102 IC is dedicated for the logic conversion. This unit is also called as Logic Convertor.

- **Smoke Sensor**

A smoke detector as the name suggests is used for detecting smoke in case of fire. The smoke detectors give a fire alarm of varying intensity depending on the need of the customer. For example in households
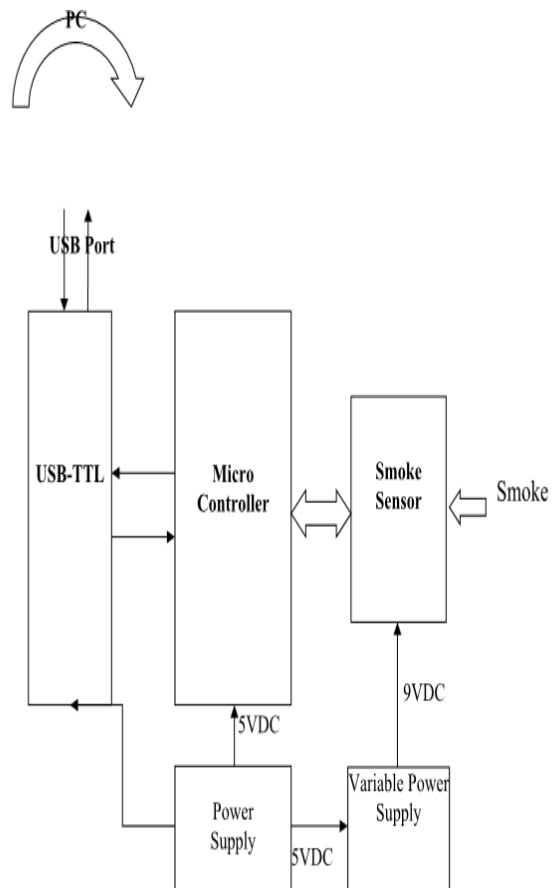
Block diagram of the Proposed System [4]

the sound intensity is less while in offices it is more. Smoke detectors are disk-shaped plastic enclosure, but the shape can be changed by manufacturer or product designer. Smoke detectors work by optical detection or by physical process, some even use both detection methods. Sensitive alarms can be used to prevent smoking in prohibited areas. Smoke detectors are mainly used in commercial, industrial, and residential buildings. They are usually powered by a battery backup. Many a times it is powered by a single backup.

V. CONCLUSION

Considering the fact that data is very crucial; to all the companies, offices and institutions; the proposed system will be of beneficial to them. The system has an edge over other systems available in the market due to the following reasons:

Affordable: The cost of maintenance of the system is as low as few dollars per year. Thus, small industries; having low budget; will prefer this solution.

Anytime, Anywhere Access: Having data on the cloud allows the person to access the data from any place at any time.

Off-Site: It's important to keep an offsite files copy. Again if the files are backed up on a server, natural disasters could destroy the computer and backups.

Automatic: The main reason why companies don't do a backup of their data is time constraint. Cloud backup doesn't require an additional time commitment from user it is automatically backed up whenever there is a disaster.

Apart from the present benefits of the system the system also has further enhancements which are possible:

- The system can be updated to extend the recovery system for various other calamities like earthquakes, electric shot circuit etc.
- File transfer can be done by users who are offline as well.
- Integrated encryption system can be used to avoid the treat of confidentiality.
- Files which have not been pre-selected for the backup process can also be uploaded using modified and upgraded algorithms.
- The sensors used in the backup process can be updated and better sensors can be used to sense fire before its intensity increases.
- The speed of restoration of the files can be improved to save all the data in the computer within the small time span available.

Thus with all the above mentioned advantages and further enhancements the project can be successfully implemented in any of the small scale industries.as

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