



**SCHOOL OF ELECTRICAL ENGINEERING & COMPUTING
DEPARTMENT OF COMPUTING**

**A Master's Thesis Research on:
Cloud Based Platform Design for Court File Sharing**

**SUBMITTED IN PARTIAL FULFILLMENT OF THE REQUIREMENTS
OF THE DEGREE**

OF

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Declaration

This Research thesis is my original work, and it has not been presented for a degree in any other university. The researcher acknowledged all sources of materials that are used to finish this thesis.

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The thesis has been submitted for examination with my approval as university advisor

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Acknowledgment

When I start writing this acknowledgement I became confused because it is a very difficult task, this is because there are so many people who have helped along the way. My first thank is for my almighty GOD. The authors' greatest fear is forgetting someone, so I start off by saying thank you to all. If your name is not mentioned, please forgive me! Thanks go to Dr. Ravindra Babu at school of computing, at Adama Science and Technology University, who served as my advisor supervisor during the course of writing this dissertation. Thanks all my best friends for their help all the way in this thesis writing especially (Elifenesh Yitagesu).

Abstract

Courts are very important organization over the whole world they have a vital roles for countries to make this organization secure reliable and flexible this organization must be related with information technology (IT).Information technology has many alternatives like we can make desktop application for the court or we can make web based application these all technologies can make the organization modernize but they have some drawback they need maintenance that can be complex for user, need very skilled person, and there will be other problems so to be over came over this problems information technology gives us another new technology that is cloud computing.

In courts there are a lot of files all these files are shared by different employers in the institution. But this process has a lot of problems like there is a security problem when they share files, the sharing is not fast, user cannot get the file when they need and there are a lot of complain that raised by user sometime file cannot available or there is a duplication of file so, for making this file sharing more secure, fast, on time and having a file at any time when they need the study use cloud computing technology to design a platform. To do these first the researcher choose the best cloud computing service delivery models those are Paas, Saas and Iaas from those by using Paas the researcher develop the application for the court file sharing system. For these purpose the researcher use Open Shift Online 3.5 platform that is provided by red-hat which is best platform for sharing activity. So to develop the application first we must have an account of open shift so first we should register the after registering creating our project then select the programing language after that the provider give the platform and we create our application and we can develop the design. After that the end user can use the application they can store, share, view and download their file easily and in fast way

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List of Abbreviation and Acronyms

Saas.....	Software as a service
Paas.....	Platform as a service
Iaas.....	Infrastructure as a service
VM.....	Virtual Machine
ICTs.....	Information Communication Technologies
IT.....	Information Technology
CBPDFS.....	Cloud Based Platform Design for file sharing
CFS.....	Court File Sharing
APC.....	Akaki Primary Court
KHC.....	Kality Higher Court
CCRA-----	Cloud Computing Reference Architecture

Chapter One

1. Introduction

1.1 Background

In now a day most things are became more wonderful because of the technology. This technology can perform different things or activities in our life the first and the most activity that became easy by technology is sharing. We can share so many things like file, resource, information, knowledge and experience. We can share those things easily with low cost and within a little minute or second this make life easy and modernized. We can apply technology anywhere and anytime so the author applies Information Communication Technology (ICT) for the Ethiopian courts for sharing different file or information. ICT can give the ability for the courts officer to posting, accessing and sharing of file through the world electronically. This thing can increase the productivity of courts file sharing, we can handle the file in good manner means court file are need confidentiality the file is all about privacy of people or the government so this file need more security so to do this technology is the good way because cloud computing has some security mechanism like authorization of the user only an authorized person can access or share file.

Cloud systems can be used to enable data sharing capabilities and this can provide an abundant of benefits to the user. There is currently a push for IT organizations to increase their data sharing efforts. According to a survey by InformationWeek, nearly all organizations shared their data somehow with 74 % sharing their data with customers and 64 % sharing with suppliers. A fourth of the surveyed organizations consider data sharing a top priority. The benefits organizations can gain from data sharing are higher productivity. With multiple users from different organizations contributing to data in the Cloud, the time and cost will be much less compared to having to manually exchange data and hence creating a clutter of redundant and possibly out-of-date documents. [1] The importance of data sharing and the need to ensure privacy and security is discussed in a number of existing articles. A reliable and accurate file sharing is fundamental to the effectiveness of day-to-day court operations and fairness of judicial decisions. [2] The explosion of sophisticated information and communication technologies (ICTs) creates new opportunities as well as challenges for the whole service delivery systems, particularly to fulfill the ever increasing demand of citizens who are mostly having high level of information technology (IT) literacy and advanced in knowledge and awareness of their rights.

To remain competitive, government record must progress in line with IT advancement, without compromising the existing strict government principles and regulations set through acts and policies [2]. Cloud computing is one part of information communication technology system. Cloud computing is a model for delivering IT services. Instead of a direct connection to the server, the resources are retrieved from the Internet through web-based tools and applications. Therefore this research will try to make a cloud computing framework for court case management system to make the system efficient, effective and secure. Cloud computing technology is garnering success and wisdom-like stories of savings, ease of use, and increased flexibility in controlling how resources are used at any given time to deliver computing capability. [3] The cloud computing adoption framework defines the two intersecting dimensions that should be considered when developing a cloud computing strategy the delivery model and the type of service or services being delivered. When these two primary considerations are combined, a basic adoption framework for examining cloud implementation requirements and options emerges. Understanding these requirements can help organizations select the optimum combination of delivery model and service type for each workload they want to deploy in a cloud environment. Workloads are the kind of work that an organization needs to accomplish. Each workload has characteristics that make it more appropriate for public or for private cloud delivery, and more appropriate for a specific service type. [3]

So our study is to design a cloud based platform for file sharing of Ethiopian courts to create effective and good file sharing for the employer of the institution and this technology can help the worker to share file easily, to share knowledge, to share different experiences and also for having an information in a time all employer in any courts of the country can have an information about the same things.

1.2 Motivation of the thesis

The researcher need to do this research because as we know the name research indict that finding a new solution for different problems or making some change on the research that are done before. So there are a lot of problems in current court file sharing that the researcher observed around the courts.so this research is done to solve that different problems in the court file sharing to make it easy, flexible, and to make it accountable, secure, the file be available anywhere at any time when it needed by users and to find other solution that will prevent and control the problems of the organization.

1.3 Statement of the problem

Organizations today not only have to comply with regulations, but also have to maintain a balance between operational record keeping requirements, minimizing liability of storing Private information and customer privacy preferences. International Records Management Trust reveals several key issues identified by legal and judicial record case studies: the need to raise the status and priority of record keeping; the need to allocate greater resources to supporting record keeping infrastructure, for example, storage facilities and equipment (for paper and electronic records); the need to develop records management policies and standards, for example, in relation to access to and long-term preservation of paper and electronic records; the recognition that computerized case management systems have the capacity to improve case flow management and access to information. [2]

In order to minimize the risks and costs of regulatory and legal non-compliance, litigation, discovery, business inefficiency and failure, courts need to remove the human element by automating records management via the technology. This transformation means removing freedom of choice, enforcing electronic record creation; indexation; classification; naming conventions (thesaurus and taxonomies); creation and preservation of meta-data; minimizing duplicate records by creating a central information repository which will also facilitate knowledge and content management; systematically archiving and tracking records and amendments; applying retention schedules to purge redundant ones; but preserving their access logs, audit trails and meta-data. The major issues in implementing electronic records in courts are regarding access, security and interoperability. [4]

The researcher try to read a lot of paper so as I understand from that there are a lot of problems in different countries courts on file sharing system and also in Ethiopian court file sharing there are

several problems. Sharing of file is the main activity in court offices therefore this process must have qualities like, files should be shared securly,the sharing should be fast,the employers should get the file easily when they need it so to do these using of Information Technology is the best way. but most of court institution have no potential to provide these service because of some technical and economical problems. That is the high cost that required different tools to share and access these files, documents and different resources. Many court systems in developing countries like Ethiopia do not have the capacity to allocate their files an documents equitably and manage their different resources optimally due to lack of well-skilled managers and professionals. Evenif there are alot of files that are hold by different organization the problem is, there is no means to access and use them because some organizations restrict dissemination of their files and other organizations have not published these files. Even electronically there are some available files but they are not readily and widely available to many users because existing virtual or physical libraries are not comprehensive because of the confidentiality of the documents or files. employers do not consistently use a single site to share their materials, successes, and challenges with their peers around the world because there is no noteworthy site. Hence, a file exchange network that creates partnership and collaboration among court employer is clearly needed.

Therefore, this thesis would focus with the development of cloud based court file sharing architecture that provides sharing of files and different resources to the court workers in the court institutions which would be cost effective, accessible and deliverable. Also it makes the court files and documents available electronically; it creates common place or site in which court workers can share their files.

1.5 Objectives of the research

1.5.1 General objective

To develop cloud based court file sharing architecture that enables court workers and other knowledge users to access and share files and different resources from one place to have the same file and to have the same knowledge about the same thing and to make good environment.

1.5.2 Specific Objectives

The specific objectives are:-

- To review literatures on concept of cloud computing and platform for cloud computing that give deeper understanding to conduct this research work.
- To asses and understand the existing Court file Sharing and methods that are the domain area of the study.
- To Analysis the use of cloud computing platform in Court File Sharing.
- To Design a cloud based platform for File Sharing among the courts.
- To evaluate the performance of the platform.
- To identify and recommend future research directions for further investigation on the benefits of Cloud Computing for Ethiopian courts.

1.6 Scope and limitation of the research

1.6.1 Scope

This research is only focus on designing cloud based platform for File sharing of the Ethiopian courts. And this research focus on: sharing the file in concurrent manner, having backup for the file, making available the file all the time they are needed by the litigant or lawyer or court employers and Supporting the officer and the client in handling, manipulating and sharing document. And also investigate ways how File should be sharing among Ethiopian court .This could be enhanced through the use of cloud technology. Making the file secure b/c there are private or governmental files that can affect the privacy of people and country, if there is any new information all courts have information in a time, the file can be access in all courts that are found in the country and which have internet access. The authorized person can access, share any file in the cloud.

1.6.2 Limitation

The research is not study about case management, about the judicial process and other activities which found in the court system. The research only focused on the File Sharing because of the shortage of time and the system is very broad system, means it need more time to develop the platform for the whole system. The other reason are there will not a sufficient researches that are done on the same area b/c the area is very sensitive and need confidentiality, so researches can have restriction they did not put all the information on internet.

If multiple courts provide any updating on the files, the design would not consider the integration of these file providers which will be headache to manage for the cloud service providers. But they can share their file in this common place to make it accessible by other courts. This research do not have full implementation of the design because it need more time, fund and other resource and also the design is not support different language so the study focus on to design a cloud based platform for file sharing of Ethiopian courts only by using English language.

1.7 Significance of study

The significance of this study is to implement an efficient and cost effective cloud based platform design it has different vital role for the area. The most beneficiaries of the research are the court institution, the employers of the courts, the researcher, ICT organization and the whole public society. Now we discussed the beneficiaries and what benefit that they can get from the thesis.

Merit for Court institution

- All the courts offices can access the design means can share their entire file anywhere at any time.
- This thesis will make the file sharing easy because all information is stored on the cloud and any one can access it.
- Finding of information is will not be difficult, data losing and redundancy of data cannot happen.
- One court can receive any file that is provided by other court and also it can send any important file for the other court cloud.
- It will help the institution to make some partnership they can communicate each other without any physical interaction they can share file or to do this no need of physical contact.
- It will initiatives the organization to develop and implement other ICT systems and also to provide supportive supervision to the staff throughout the organizations.
- The file sharing could be cost effective, interactive and deliverable for the whole court institutions.

Merits for the Employers of the institution

- It will help for the workers to share their file and document easily.

- To save their time that can be loss by searching a file.
- To have evidence about anything which have related idea with their job.
- It used to create some modernized file sharing environment by using information Communication Technology

Merits for the researchers

This thesis can help for the researchers from the court and computer science and other related fields as an input study and it will initiate to design a better architecture by using this new technology. This research can show the way how to use cloud computing in courts and it gives future works for the researcher to do best solution for the area by using cloud computing technology.

Merits for ICT organization

- This study can give work or market opportunity for ICT organizations by providing communication services to those institutions that would implement cloud computing platform design for file sharing.

Merits for other public society

- Public society can get important information about the courts
- They can have confidence on the work of the court b/c if this design is implement the data can be secure, no loss of file or there is no redundancy of file so they should have confidence on the effective, reliability, security and efficiency of the file sharing.

1.8 Research Question

The most questions that can be requested in this research are the following:-

- Is the current Court File Sharing service delivery strategy efficient??
- Does cloud computing platform make the Court File Sharing service accurate?
- Does the Designed cloud based platform is suitable for File sharing?
- How to evaluate the performance of the platform?
- Is the performance of the design scalable?

1.9 Methodology Overview

To accomplish this thesis work the author used different methodology that methodologies are used to collect data, to analyzed data, to implement the design and to test the platform. For data gathering we used primary and secondary method. As primary method the author used interview

of the court employers and observation. In this part the author directly asking different question for different person like the Judge, the lawyers, the president of the courts and different people that are concerned for the research idea. Interview is useful for better understanding of the current ICT utilization in courts, Effectiveness and efficiency of file sharing, and their recommendations for better file sharing because interviewing is the process of asking question for person who directly know the activities of the organization.

this can help the author to do qualitative research and the second method that the researcher used as primary data collection is by observing what is going on the area for this purpose the author take two court offices (kaliti Higher Courts and Akaki Primary courts) that found in Addis Abeba sub city of Akaki kaliti and by observation means the author observe the activities of the courts which are found near to the village.

As secondary source the study use analyzing of documents which are written in related areas and To get additional knowledge and understanding about the existing system we must use secondary data collection method like by searching different books which have an information about the court file sharing, by searching from internet and also by looking research paper that have the same idea about court file sharing.

Data Analysis tool contains hardware and software which is used to develop the proposed platform in proper ways. In order to become success with the Architecture, the Development of the system use Hard Ware like:- laptop Toshiba computer with appropriate speed, 760GB hard disk size and For analyzing the research we must use different analyzing tools and techniques. The analyzing tools the researcher used Window 10 operating system, Microsoft office13 for preparing the documentation, snipping tool and painting for making some snapshot of images and pictures, and also E draw Max tools are used for drawing use case and other diagrams which are show the modeling of the research.

The platform implementation is designed by using Red-Hat Open Shift online platform and Open Shift Online 3.5 application with the help of PHP programing language on the base of web server. The prototype that is used to demonstrate the architecture implemented using Open Shift online platform has been developed and tested.

1.10 Organization of the Thesis

This section describes the organization of the rest of the thesis. Chapter one of this thesis is discussed about the background of the organization, statement of the problem, objectives, scope of the thesis, methodologies and other related issues are discussed in this section.

Chapter two is about the literature review and related works are discussed in this chapter. And this chapter is all about what does it mean cloud computing, the characteristics of cloud computing, the delivery model of cloud computing, the deployment models of cloud computing, about related technologies, the relation b/n the cloud and cloud computing and literature which have the same idea with this research are reviewed in this chapter

Chapter three has an issues about Methodology this topic include the data collection method that the study used to gather different information about the research, data analysis after gathering the data's we must make some analysis for doing some action or for solving the problems, data models and also this topic discussed about the research design.

Chapter four is about selection of cloud computing platform and service provider in this topic the research discussed all about different cloud platform and there are a lot of service provider that provide a cloud computing service. After discussing those providers the researcher chose one service provider to design the platform that is Red-hat which provides a service called open shift online that used in this study to develop the platform. .

Chapter five is about designing the proposed architecture and related issues and in this chapter after selecting the platform it show the design goal and constraint of the architecture, the requirements which are needed to complete the research this are functional and non-functional requirements and also it discussed about the security issues of the architecture.

Chapter six is the practical part of the thesis or it used to change the theoretical or the documentation of the research to practice or reality.it discussed about the algorithms, the software, the electrical hardware and mechanical hardware of the system.is discusses about testing of the software after done the implementation the testing help to check whether the platform do it work perfectly or if there is an error, and it include the test method like, unit test cases, integration test and usability test and finally it has the discussion part of the study.

Chapter seven this chapter is the last chapter and it is about the summary and recommendation part of the whole research it has summary of initial situation, summary of proposed approaches/solutions, summary of major own contributions evaluation of the results and give some future work for other researcher which have the same idea with this research.

Chapter Two

2. Literature Review and Related Work

2.1 Definition of Cloud computing

We can define cloud computing in different way that is the part of Information communication Technology (ICT) that help to store huge amount of data and can communicate by using this technology whenever we want, at any time and with any one if there is Internet access. Cloud computing as a model for enabling convenient, on-demand network access to a shared pool of configurable computing resources (e.g., networks, servers, storage, applications, and services) that can be rapidly provisioned and released with minimal management effort or service provider interaction. [6]. Cloud computing has the potential to change how organizations manage information technology and transform the economics of hardware and software at the same time. Cloud computing promised to bring a new set of entrepreneurs who could start their venture with zero investment on IT infrastructure. [7]. Cloud computing provides a distributed computing environment comprising of heterogeneous facilitating components like hardware, software, firmware, networking as well as services. Cloud computing is a paradigm shift to traditional computing technology. It provides on demand storage, application execution, information processing, data availability, analytics and other services. This kind of model of metered usage of infrastructure, application, data and services bring about economy of scale, reduced computing and storage cost. [8]. Cloud Computing aims to provide scalable and inexpensive on-demand computing infrastructures with good quality of service (QOS) levels and provides a compelling value proposition for organizations to outsource their Information Communications Technology (ICT) infrastructures (Hayne, 2009). [9].cloud computing is a model for delivering IT services. Instead of a direct connection to the server, the resources are retrieved from the Internet through web-based tools and applications. Data and software packages are stored in servers. The cloud computing structure allows access to information as long as an electronic device has access to the web. This allows employers to work remotely.

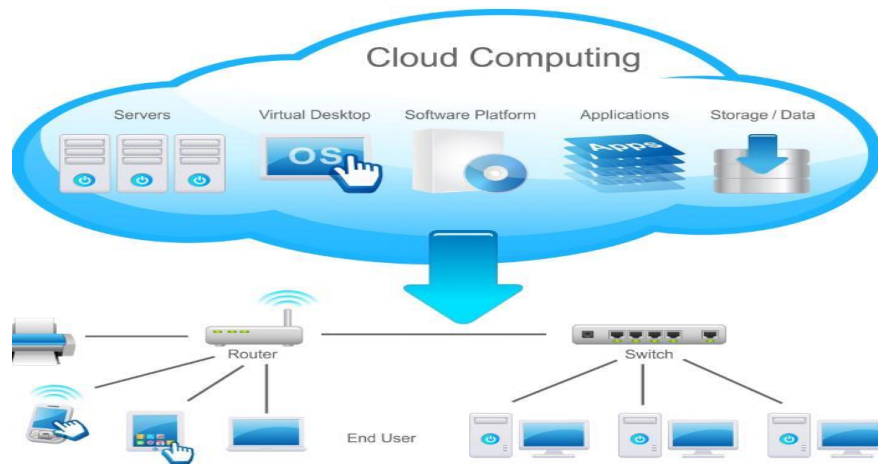


Figure 1 : definition of Cloud computing

2.2 Cloud Computing Characteristics

There are different characteristics of cloud computing like; shared / pooled resources, broad network access, and on-demand self-service, scalable and elastic and metered by use.

2.2.1 Shared/Pooled resources

This character is used to sharing different type of materials we can share file, document, video, audio or images, software's or different things. It is the ability to deliver computing resources whenever the customer needs them.it is the ability to share information at anytime and anywhere if there is internet access.

2.2.2 Broad Network Access

If there is Internet access we can access cloud computing as we went. Anytime and anywhere can search or find anything on cloud is possible

2.2.3 On-Demand Self-serviced

It is one of the most desired capabilities for a large number of enterprises because it eliminates the need for planning ahead, purchasing, and installing the resources they will require at some point in the future. This enables the customer to avoid making an unnecessary upfront investment in servers and computing resources. This enables the customer to avoid making unnecessary upfront investment in servers.

2.2.4 Scalable and elastic

Resources dynamically-allocated between users and Additional resources dynamically-released when needed. It is fully automated. Based upon the specific of a service level agreement, the cloud provider scales up or down the resources that are provided to meet the customer's changing needs.

2.2.5 Metered by use

It is new aspect of cloud computing is application of usage based billing model. Customers simply pay for the services they use while providers bear the costs of hardware and software provision. Pricing may vary depending on the time of day due to peaks in demand or varying electricity costs and institutions may therefore carry out certain activities when costs are cheaper.

2.3 Cloud computing Service Delivery Models

There are three types of service delivery models in cloud computing:-

Software as a Service (SaaS)

Platform as a Service (PaaS)

Infrastructure as a Service (IaaS)

2.3.1 Software as a Service (SaaS)

Software that is deployed over the internet With SaaS, a provider licenses an application to customers either as a service on demand, through a subscription, in a -pay-as-you-go|| model, or (increasingly) at no charge when there is opportunity to generate revenue from streams other than the user, such as from advertisement or user list sales. [10].this services include outsourcing the platform, the application or the software and the infrastructure. SaaS provide complete service for the end user the user do not worries about anything about the service they can use the service as they went and all things are hind from the user. Also the user do not worries about the maintenance or they have no idea if there is any change of the service.

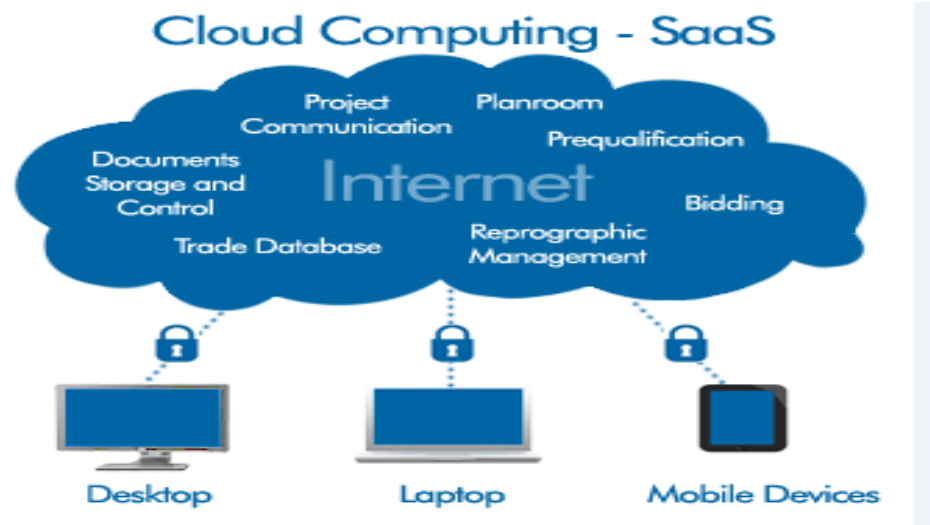


Figure 2: cloud computing service delivery model SaaS

2.3.2 Platform as a Service (PaaS)

This service delivery model provide not only the hardware also it provide toolkits or programing language that the user can provide an environment to develop cloud-based application. Platform as a Service (PaaS) brings the benefits that SaaS brought for applications, but over to the software development world. PaaS can be defined as a computing platform that allows the creation of web applications quickly and easily and without the complexity of buying and maintaining the software and infrastructure underneath it. [10].It supplies all the resources required to build applications and services completely from the Internet, without having to download or install software. **This** services delivery model include application design, development, testing, deployment, and hosting. Other services include team collaboration, web service integration, database integration, security, scalability, storage, state management, and versioning.

2.3.3 Infrastructure as a Service

Infrastructure as a Service do not provide an application it simply provides the infrastructure and the organization put or run whatever they went they can control the software, the application, the data and other things except the operating system, the network, the storage and the server. The infrastructure can be dynamically changed depend on the need of application resource.



Figure 3: show the three service delivery models (SaaS, PaaS and IaaS)

2.4 Cloud Computing Deployment Models

Cloud computing has four deployment models such as private deployment model, public deployment model, community deployment model and hybrid deployment model. All this deployment models are related to cloud computing service delivery models.

2.4.1 Private Deployment Model

This environment is the first step for deploying public cloud. And in this case the deployment is started from the central data center to the local server and to the end user. Private model is a model that operated by single organization because the organization has its own data center and all data's are stored and transferred through this data center. Private clouds has the ability to manage and control sensitive data remains within the organization and confidence is higher

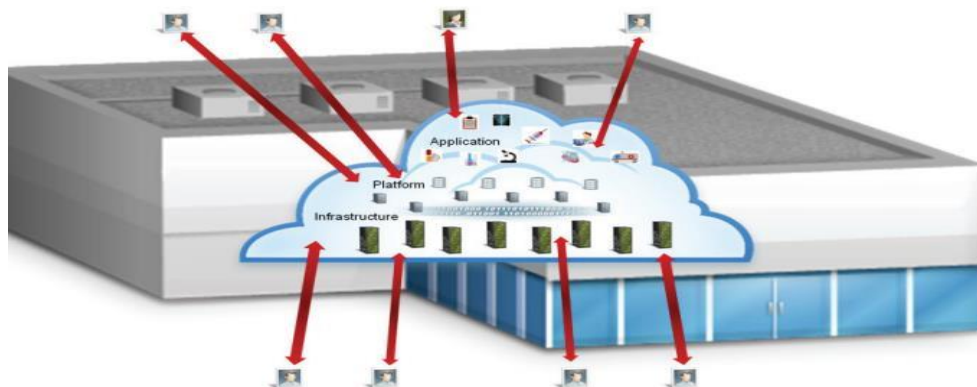


Figure 4: Private Cloud Deployment Model

2.4.2 Public deployment model

In Public cloud deployment resources are shared or we can get the information through internet. Anybody can see, share or download the data. Confident data should not be on public cloud because anyone can take the data or the organization can lose its data. It is cost effective means public cloud is open to the general public and is completely managed by the cloud service provide. It is more risky because it is open for anyone.

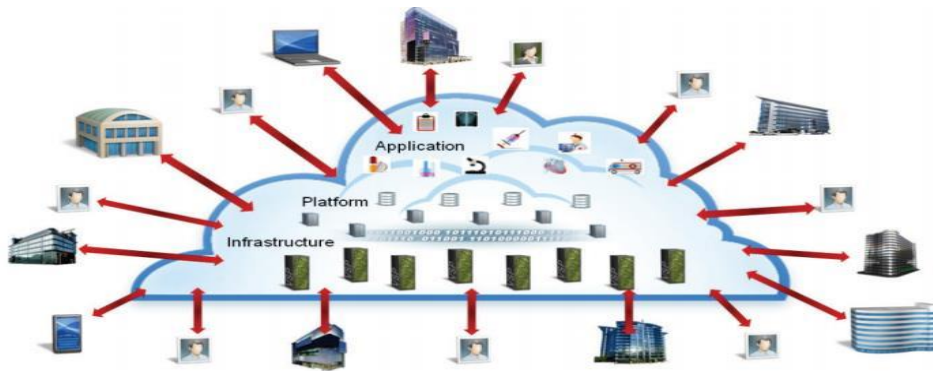


Figure 5: Public Cloud Deployment Model

2.4.3 Hybrid Cloud Deployment Model

Hybrid cloud is a combination of two or more cloud. Information or application can shared among different peoples but it keeps apparently.it introduces less risk to organizations, as participants are more aware of who is utilizing the services increased levels of control over the data,so . it is better for court file sharing because courts has file that must remain in the organization/to be secure and it need to share other files.

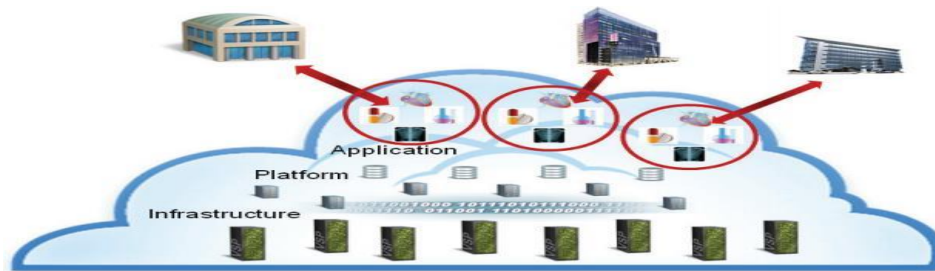


Figure 6 : Hybrid Cloud Model

2.4.4 Community Cloud Deployment Model

A community cloud is a public cloud on a smaller scale. It will serve several organizations that support a particular community of users. The organization would not need to outlay the capital that would otherwise be required to purchase a traditional software license and they would only pay for the use of the software as it was used by the developers. The same risks are associated with community cloud as with public cloud, so consideration of security and privacy are important with community clouds. [11].



Figure 7: Community Cloud Deployment Model.



Figure 8: figure that generalize cloud computing

2.5 Related technology

2.5.1 Grid Computing

Grid computing is infrastructures that involve the integrative and collaborative of computer, network and database scientific instrument owned and manage by multiple organizations. Grid computing can mean different things to different individuals. The grand vision is often presented

as an analogy to power grids where users (or electrical appliances) get access to electricity through wall sockets with no care or consideration for where or how the electricity is actually generated. In this view of grid computing, computing becomes pervasive and individual users (or client applications) gain access to computing resources (processors, storage, data, applications, and so on) as needed with little or no knowledge of where those resources are located or what the underlying technologies, hardware, operating system, and so on are. [12]

Grid computing is an environment that provides the ability to share and transparently access resources across a distributed and heterogeneous environment not only requires the technology to virtualize certain resources, but also technologies and standards in the areas of scheduling, security, accounting, systems management, and so on. [12]

2.5.2 Computer Clusters

Computer Clustering is a process that classifying a set of computer that has interconnection as a cluster requires software that makes the computer works together. Computer clustering has two importance that are importance and high availability. Performance clustering is a natural way to add performance if one node configuration is not enough. High availability configuration adds reliability by avoiding a single point failure.

2.5.3 Service Oriented Architecture

A service-oriented architecture service exposes a clearly defined activity—like credit card validation—to consuming business applications that might need to perform that function (such as an order processing application). At the core of the service-oriented architecture philosophy is the modularization of business functions for greater flexibility, manageability, and reusability. SOA offers positive benefits which are:-

A. Language-Neutral Integration

The foundational contemporary Web Services standards use Extensible Markup Language, which is focused on the creation and consumption of delimited text. Regardless of the development language used, these systems can offer and invoke services through a common mechanism. Programming language neutrality is a key differentiator from past integration approaches.

B. Component reuse

Given current Web Service technology, once an organization has built a software component and offered it as a service, the rest of the organization can then utilize that service. With proper

service governance, emphasizing topics such as service provider trust, service security, and reliability, Web Services offer the potential for aiding the more effective management of an enterprise portfolio, allowing a capability to be built well once and then shared. Multiple components can be combined to offer greater capabilities in what is often termed –orchestration.||

C. Organizational agility

SOA defines building blocks of software capability in terms of offered services that meet some portion of the organization's requirements. These building blocks, once defined and reliably operated, can be recombined and integrated rapidly.

D. Leveraging existing systems

One common use of SOA is to define elements or functions of existing application systems and make them available to the enterprise in a standard agreed-upon way, leveraging the substantial investment already made in existing applications. The most compelling business case for SOA is often made regarding leveraging this legacy investment, enabling integration between new and old systems components. [13]

2.5.4 Virtualization

It is "a technique for hiding the physical characteristics of computing resources from the way in which other systems, applications, or end users interact with those resources. This includes making a single physical resource (such as a server, an operating system, an application, or storage device) appear to function as multiple logical resources. Virtualization is a broad term that refers to the abstraction of computer resources.

2.6 Cloud Computing and Court

Courts are big sector in any country over the whole world it is very important for countries.it has vital rule for Please, to reduce crime, for people to get justice, if people do something wrong or bad that affect other people or the society or the country the court give some punishment that is equivalent their action. It consist different players like the judge, lawyer, Police, the public, other workers. Also in the court there are different duties like checking criminal activities, give decision/judgment for crimes and also there is file sharing, different file are shared through different parts of the court. So this sector must be fast, reliable, secure and available therefore to make this the researcher decide to court design a cloud based platform for the file sharing by using cloud computing technology. This technology is a new technology and it makes things easy. In cloud computing files are shared through the internet if there is an access. To make file

available/accessible data are stored on the cloud data base and any one can access it but to make it secure cloud have different methods like encryption, cryptography, giving access permission and other techniques.

2.6.1 Court and IT

As we know IT/information technology is a technology which makes different things smart and it also can change the life style of people it makes things easy and modernized and it has vital role for different organizations. One of the organizations which can get different advantage from IT is courts. This sector can be modernized, flexible, secure and fast and this sector can get different benefits. This all things are coming true by using Information technology.

2.6.2 Role of Technology in the courts

The vital role of technology in the courts are:-in courts there are many jobs like managing and control cases, looking different case and give some decision, and also have different duties so for all this activities needed technology it is difficult for performing all activities by using man power because it need more and more man power, it need more budget for salary or to do other activities, in case of file sharing this manual activities is not powerful, the file will not be reach for the person who is concerned at a time, there will be losing or duplication of information, people can have some complain for the performance of the courts and also the justices will be in question mark therefor technology is used for fixed all problem that are written above.

2.6.3 Challenges in the Present courts

One of the biggest challenges for courts today is providing information in real time to constituents and justice partners (e.g., attorneys, law enforcement, and judicial officers). At the same time, courts need to be able to minimize the cost of acquiring and maintaining information technology (IT) systems that run efficiently. [14]

In present courts there are a lot of challenges mostly in file sharing. There are a problem of file availability, file can be loss by human or other problem or file can be duplicated, customer not get satisfaction by the courts, file will not be shared at a time, the employer must present to the court if there is some error or to make some decision, cases are not looking and give some decision at a time, the employer also has a problem because they becoming respect less for their job, they do not think about the public only they focused on money, in this case government also not give some decision and so on.....

2.6.4 Cloud computing in the court sectors

Cloud computing, according to Gartner is a, -style of computing in which scalable and elastic IT-enabled capabilities are delivered as a service using Internet technologies. Cloud computing offers different models to choose from – Software-as-a-Service (SaaS), Platform-as-a-Service (PaaS), and Infrastructure-as-a-Service (IaaS). These models can be implemented as private, public, and community clouds.

Courts today are plagued with rising upfront software licensing costs and operational expenditures that make it difficult to take the next step to modernize their information systems, mainly the case management system. Cloud computing, more commonly known as the cloud, provides alternative solutions to address this issue while providing easy access of information for citizens and judicial officers in a secure and efficient manner.

Cloud computing able to accommodate growing demands without any performance degradation – whether they be increases in user base, increased storage, or computing power (especially in a state wide system). The third thing cloud computing is used for reliability – being able to keep applications and systems running 24-hours-a-day, 7-days-a-week. [14]

2.6.5 Risks of cloud in the court sectors

There are different risks of cloud computing in court sector. the most and the first one is privacy because the file in the court mostly they are confidential and they need carefulness or the risk is security cloud is for the all for those use internet therefore any one can access or delete or update or they can use for other bad thing. The other thing it need internet connection if there is no internet connection any one can not to access it. We cannot manage the cloud computing resource, storage and some activities and if the provider need to stop it service we can loss all data's we didn't know where the data's are stored.

2.6.6 Future of courts with cloud technologies

The future of courts with cloud computing will be bright because if all activities of the court enter into cloud or courts use cloud computing application there is no problem of storage, about the reliability of courts file sharing, security and to get information when we needed. Or getting the right information at the right time and place. File sharing will be simple easy reliable secure and so on.

2.7 Cloud computing for Ethiopian court file sharing

Cloud computing has different characteristics like Shared/Pooled resources which is used to share any file through internet at any time, Broad Network Access accessing the system at any time or anywhere if there is internet access, On-Demand Self-serviced it is a capabilities for a large number of enterprises, Scalable and elastic and Metered by use the user pay for what they used. There are three service delivery models in the cloud this are software as a service, platform as a service and infrastructure as a service, by using such models cloud computing deliver different resources through the internet. Because of the above reason cloud computing is better for Ethiopian courts file sharing. The file can share in time and the other reason is cloud computing has a characteristic that metered by use so it is cost effective so for the organization it is better.it also new solution for most of problem in the court.

2.8 Related works

In related works we were discussed or tried to review different literature that are written by other researcher and have an idea related with this study. The researcher review at most 3 literature that can give clear idea about cloud computing, how cloud computing is give a solution for different business organization problems, how it make things clear, secure, available and flexible and how any organization became beneficial by Appling or design cloud computing architecture, how to design architecture and how the architecture done. The researcher cannot get exact literature about the thesis but get some important ideas about the thesis.

2.8.1 A Conceptual Architectural Framework of Cloud Computing for Higher Educational Institutions in the Sultanate of Oman

Cloud Computing introduces many benefits for Educational Institutions like rapid decrease in hardware cost and increase in computing power and storage capacity. The Cloud Computing trend of replacing software traditionally installed on computers with applications delivered via the internet. Cloud Computing provides a set of tools to help students, faculty, researchers and developers to use applications without installing the mouthier computers and allows access to saved files from any computer with an Internet connection which makes learning tools accessible for a large number of students. [15]. Cloud computing technology is garnering success and

Wisdom-like stories of savings ease of use, and increased flexibility in controlling how resources are used at any given time to deliver computing capability. [17] There are three main benefits for Cloud Computing [Singh & Hemalatha, 2012] [Saidhbi, 2012]: a. Rapid decrease in hardware cost and increase in computing power and storage capacity, and the advent of multi-core architecture and modern supercomputers consisting of hundreds of thousands of cores b. The exponentially growing data size in scientific instrumentation/simulation and Internet publishing and archiving c. The widespread adoption of Services Computing and Web 2.0 applications. [15]

2.8.2 A Cloud Security Framework for Data Sharing in Dynamic Group

Cloud computing is a recent paradigm that is creating high expectations about benefits such as the pay per use model and elasticity of resources. However, with this optimism come also concerns about security. In a public cloud, the user's data storage and processing is no longer done inside its premises, but in data centers owned and administrated by the cloud provider. This may be a concern for organizations that deal with critical data, such as medical records. We show that a malicious insider can steal confidential data of the cloud user, so the user is mostly left with trusting the cloud provider. [16].

One of the most fundamental services offered by cloud providers is data storage. Let us consider a practical data application. A company allows its staffs in the same group or department to store and share files in the cloud. By utilizing the cloud, the staffs can be completely released from the troublesome local data storage and maintenance. However, it also poses a significant risk to the confidentiality of those stored files. Specifically, the cloud servers managed by cloud providers are not fully trusted by users while the data files stored in the cloud may be sensitive and confidential, such as business plans. [16]

Saradhy and Muralidhar review the impact of the Internet on data sharing across many different organizations such as government agencies and businesses. They classify data sharing into data dissemination, query restriction, and record matching. They also provide a framework for secure and useful sharing of data on the internet. Butler describes the issues of data sharing on the Internet where sharing information can allow users to infer details about users. [1]

2.8.3 Cloud Computing for the Court

One of the biggest challenges for courts today is providing information in real time to constituents and justice partners (e.g., attorneys, law enforcement, and judicial officers). At the same time, courts need to be able to minimize the cost of acquiring and maintaining information technology (IT) systems that run efficiently. Courts today are plagued with rising upfront software licensing costs and operational expenditures that make it difficult to take the next step to modernize their information systems, mainly the case management system. Cloud computing, more commonly known as the cloud, provides alternative solutions to address this issue while providing easy of access to information for citizens and judicial officers in a secure and efficient manner. However, cloud computing comes with some inherent challenges that need to be addressed in implementing a cloud solution. [14]

Chapter Three

3. Methodology

Methodology is the steps to complete the study so, to do this study the first step should be selecting of research area after that the next step is literature review this step help to have a deep knowledge about cloud computing platform, how we can design architecture, the implementation of the architecture and more knowledge about cloud computing platform on file sharing in courts then the next step is conducting of data from the employer of the organization such, Judges, Lawyers and other employers to have a clear idea about the organization file sharing how they share files through the whole courts that found in the country that the author select to design the cloud computing platform. so to do this the author use interview for getting information, after performing this step we must design and implement the concept architecture practically therefore the last step is selecting tools that can help the researcher to design and implement the architecture perfectly and lastly evaluate the implementation, writing the general idea of the research (conclusion) and give some recommendation for other researchers.

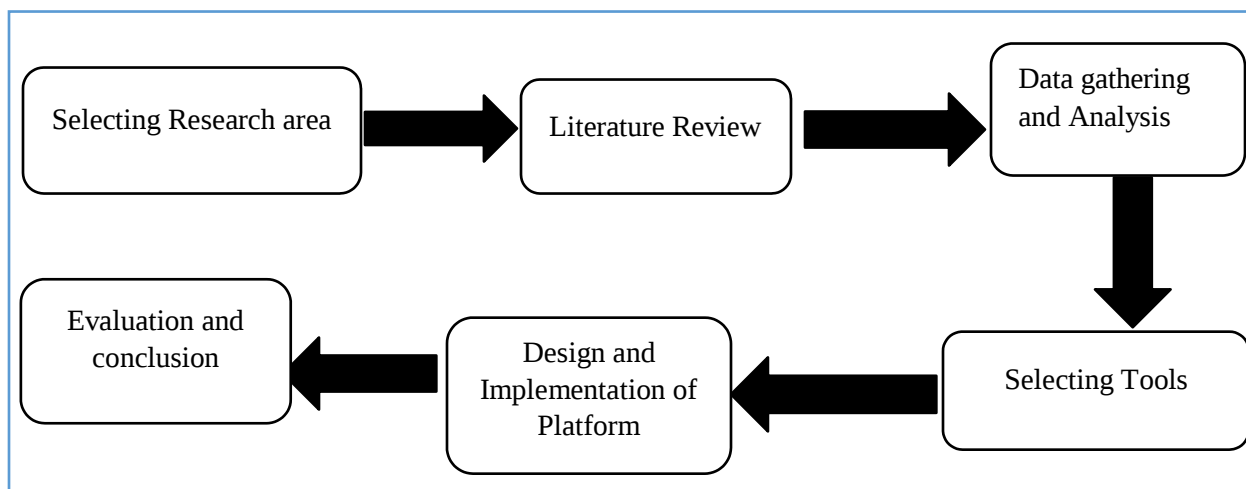


Figure 9: Research developmet procces

3.1 Research Design

A research design is the systematic plans and procedures that a researcher develops to study a scientific problem. For most research study there are three type of research design this are Qualitative, Quantitative and Mixed research design. Research design are the plan or proposal to

conduct research Involves the intersection of philosophy, strategies of inquiry, and specific methods to translate the design into research practice. It helps to explain why we choose qualitative, quantitative, design oriente and mixed methods. It help to clarify how the world view shape the approach to research, as they are a basic set of beliefs that guide actions They are shaped by the discipline area, the academic supervisor and prior experience to research.. [17]

Quantitative research design approach is an approach that Testing objective theories by examining the relationship among variables, Replicable, generalizable, Manipulation and control Results verified by sense data and statistics and the inquiry of this approaches experimentally that control and manage the study, Non experimental that include survey research, Longitudinal Cross sectional, Structured interview and other. The other one is Qualitative research design approach exploring for insights and understandings about individual perception of events by subjects Inductive data analysis from patterns and themes, from particular to general Interpretative Tendencies. On the other hand it is good for Narrative research (life story research) Phenomenology (Focus on human experiences about a phenomenon) Ethnography (cultural group in natural settings). Grounded theory studies (derives a general abstract theory of a process, action or interaction grounded in the views of participants) Case studies (explores a program, event, activity, process or individual) Historical (Identification, Location, Evaluation and Synthesis of data from the past to connect past happenings to the present and future). The last one is mixed method research design approach Combine both forms for data collection, it use both approaches in tandem to strengthen the study by data triangulation. And the strategic inquiry of this approach is Sequential (Elaborate or expands on the findings from one method with another method) Concurrent (merge quantitative/qualitative methods to provide a comprehensive analysis simultaneously) Transformative (The use of a theoretical lens as an overarching perspective). [17]. So to select the design type there are three criteria for selection the first one is depend on research problem if the problem is about Identification of factors that influence an outcome utility of an invention, Understanding the best predictors of outcome, Evaluating the usefulness or successes of and intervention. Then a quantitative approach is best, If the problem is about understanding a concept or phenomenon explore a field uncertain about which are the most important variables to be examined therefore for such thing a qualitative approach is best.

and if the question is need to be sublemented by the other the second criteria is Audience Acceptance from all involved Editors, Readers, Scientific ,community, ethical comities and research boards the last one is Personal experiences, Training experiences, Beliefs and Personality. [17]. **Qualitative research** methods are usually associated with **inductive** approaches (based on empirical evidence). [18] Qualitative research usually requires Boolean measurements only. Suitability of a solution can be studied qualitatively.so depend on such reason the researcher is done this research by using qualitative research design approach for doing perfect study. In this study, a combination of qualitative and design oriented research method were used for data manipulation and to evaluate the functionality of the prototype. Due to qualitative approach focuses on involving quality and helps in having insight in to problems, more tasks in the study were qualitative. To show the usefulness of the proposed cloud based court file sharing architecture for court organizations and their workers, design-oriented research methodology was used in this study. Design-oriented research method is basically a problem-solving model. The five steps of design oriented method followed in this thesis work are identification of problem, architecture design, architecture evaluation, revaluation and improvement of architecture and communication and discussion of research.

3.2 Process Model

Cloud computing system architecture presents the task to large scale computing centers that shared by all users on internet. User can share the resources of computer, hardware, software and other computing resources, and service resources like installation, configuration and maintenance for those resources. [19] The cloud computing model has designed for the purpose of managing and coordinating the execution of supply chain by different activities.[19]. In software Engineering, process model is a description of the sequence of activities carried out in the software project and the relative order of these activities. There are several process models which include prototyping, unified process, incremental and agile. We can rarely combine process models or use together in software development process [20]. In this study, prototyping and Unified process models were used together to accomplish the overall objectives. Prototyping is about creating some parts of the system being developed. It is not a standalone and complete development methodology rather it is a model to test specific features in the situation of complete methodology like unified process [21] .

Prototyping is a process model that offers a solution to the problem and it is the practice of building an early version of a system which shows particular features of the actual system. There are two types of prototyping which are throwaway and evolutionary prototyping. In throwaway prototyping the different parts of the system are developed and then will be ignored after demonstrating the basic functions that the system will carry out. Thus the final deliverable system will differ from the prototype. But evolutionary prototyping technique implements the prototype of the system that demonstrates its basic features and finally it will be part of the final deliverable system. The unified process (UP) or rational unified process (RUP) is the most recent software development process model which provides overall plan and strategy to be used as part of it. It has two purposes, the first one is meeting user's need by the use of techniques like use cases, iteration and emphasis on the architecture of the software. The second purpose is accommodating risks by making use of iterative technique. UP consists of four phases: inception, elaboration, construction and transition. Inception phase consists of a feasibility study to establish whether the proposed system is worthwhile. In elaboration phase, the creation of general architecture of the system and requirements lists is completed. In construction phase, the development of the actual system, in this case the prototype of the actual system is performed. The transition phase involves making the system in to use by installing and running this system. Generally, the unified process model importantly uses use cases, iteration and software architecture techniques; and the prototyping model is concerned with the development of incomplete version of the system. Therefore these are the reasons to select these models for this study.

3.3 Data Source

In this research the researcher used two types of data collection methods those can help to get a deep knowledge about the research; this are primary data gathering and secondary data gathering method. For the primary data gathering method we use interview and observation and for secondary data gathering method we use analyzing of documents.

- ❖ workers from court offices which includes court judges, lowyers and other workers which are working in the court. In this way two court offices were selected namely Akaki Primary Court(APC) and Kaliti High Court(KHC).

- ❖ The second data source in this work is comprehensive literature review and document analysis from the internet.
- ❖ The other source of data in this work was observation. During this study observation were used as a means to collect the required data specially to find court worker problem related to file sharing

3.4 Sampling Techniques

Sampling involves the selection of individuals, units, and/or settings from a defined study area. There are different sampling techniques in qualitative research to sample the research participants. This includes purposive sampling, snowball sampling, quota sampling, typical case sampling, convenience sampling and others. In this study, purposive sampling technique was used to collect the qualitative data. So data collection was started by identifying the employers using purposive sampling technique. Purposive also known as judgment or selective sampling technique is mostly used technique in qualitative research due to the qualities the informant possesses. Court employers from different court office institutions were chosen directly through personal contact. The court officer and other concerned bodies were selected based on appropriateness for the study; the knowledge they have and technology used, because this technique uses appropriateness principles in place of random sampling.

3.5 Data Collection and Analysis

For collection and analysis of data this study is focus on two courts this are Akaki Primary Court (APC) and Kality Higher Court. In these offices the researcher interviews the professionals in the area because this enable us to collect data correctly as well as it makes the data collection procedure easier. In this study as we describe before there are two data collection methods and in the first method we interview 20 court Employee to understand the idea of them about file sharing of the court. From the 20 employers 4 are judges, 4 are lawyer and the rust are employer which are work in record office because those people have deep knowledge about file sharing because their daily work activities are related with sharing.the questions that are asked for the worker are, what is the current situation of the court, what are the problem of file sharing in the court, about the solution, if they have some idea about cloud computing and asking their that they have a welling if cloud based platform is implement for their organization.

The basic focus of this data collection is concerning about file sharing and cloud computing, understanding cloud based file sharing, the benefit of cloud based file sharing, how this design deliver, what is the effectiveness of this design with in the current situation, to know their understanding about cloud computing, ICT give brightness for every activities of our life so what is the importance of ICT, so to have a clear idea and to design the architecture we collect data and analysis it. The specific areas that the researcher covered to gather important data's about the Ethiopian court file sharing were Akaki Primary Court and Kaliti Higher court which found in Akaki Kaliti that is the sub city of Addis Ababa.

To summarize, this study conduct different information and data by using interview and observation. To conduct data by using interview first we prepare the question that contain about how in the court files are shared from one office to other, what are the problem during file sharing , during storing file , does the file are secure, does they have some knowledge about cloud computing, can ICT give some benefits, if what are the benefit of ICT, does they used other related technology and other related questions are asked by the researcher directly. This interview is mainly focus on the importance of cloud based file sharing for Ethiopian court file sharing system. How the employers are share their file, what are the difficulties and efforts of the employer during file share and bout the use of technology.

For the first time the researcher making interview for the employee that are working in Akaki Primary Court and as they explained even if some other researcher implemented different technology for their organization all systems are not in practice and the other system are used only to store data and file in data base and the employers can search on files from data base this systems are not that much important for file sharing they are using manual system for sharing and to have file, this thing is very difficult, it need more efforts of the worker, it take time, the sharing may not be secure so because of this thing the confidentiality of file will in risk ,the privacy of public will in question mark, things can not working in time, there will be the loss of data or duplication of data, for having some information the employer like police man or others should be appear and meet physically, people cannot appear on a time this thing will make the public or the employer uncomfortable by the existing system. They list so many problems and they tell us it will be better if these cloud computing platform design be implement for giving some importance for the court file sharing.

For the other hand the researcher interview 10 workers of Kality Higher Court and they tell us all thing that listed before they have almost the same problems on file sharing. As we know This file sharing is the main and very important activities of the court it should have some support by ICT these can make the sharing very fast, secure and modernized therefore they give an idea it will be better this file sharing is performed by cloud based system.

All interviewer are telling us they need a modernized system or computerized system that make the file sharing environment to be easy and secure so, to make change on any area technology has very important impacts so by using the technology we can do things better.

The other thing that include in the interview is about cloud computing and the researcher ask a question for worker about cloud if they have some knowledge about cloud but they have no any knowledge about it they did not know anything about cloud technology, before this interview they did not listen about it, but they tell us may this cloud computing increase the availability, security, confidentiality of court file sharing and decrease the time and money that take before so it is good to use cloud computing technology.

The main objective of this study was, to use the current technology for sharing and accessing file in Ethiopian court office to solve the problem of file sharing, confidentiality of file, security, knowledge sharing and networking and collaboration center. Cloud computing based platform architecture was proposed to solve the problem through sharing of all files to all courts employer at all level. Cloud computing has a solution for storing and processing large amount of documents , for sharing and accessing these resources with cost effective, flexible, scalable and multi-tenant way. This will help the court workers to develop ability, experience and knowledge, problem solving skill and technology adaption in their profession by accessing the shared resources using their existing ICT infrastructures ubiquitously.

The second one is observation in this method the researcher try to observe what is going in the organization, the employer adaption of technology, how they can store, share, search and update file and how can they make secure their data. To understand the ability, the confidentiality of the files and the whole performance of the court in file sharing the researcher try the best, because to know and understand all things about file sharing in the court by observation is very difficult.

and the last method is document analysis in this method the researcher try to review different literature and books which have related idea about cloud computing, court system, file sharing and related idea.

CHAPTER FOUR

4. Selection of Cloud Platform and Service Provider

4.1. Introduction

This chapter is discussed all about the platforms and the service providers that are selected in this study and in these case the researcher look over more 8 service provider and from this the research is most discussed about open shift online platform because in this research the researcher is performed the research by using open shift platform.to choose the best platform the researcher searches a lot of service provider out of them we will have more description about only 5 service provider. At first, a relevance selection based on availability (open source or commercial) was conducted to remove obviously commercial tools because only freely available tools were needed for this study as an academic purpose.

4.2. Analysis and Comparison of Cloud Application Development and Hosting

Platforms

In this research the researcher was selected platform as a service provider by comparing the different service such as software as a service, dedicated IT, hosting provider and infrastructure as a service by the following figure we can consider the difference and we can compare them and we can select one of the best service that is suitable for this research.

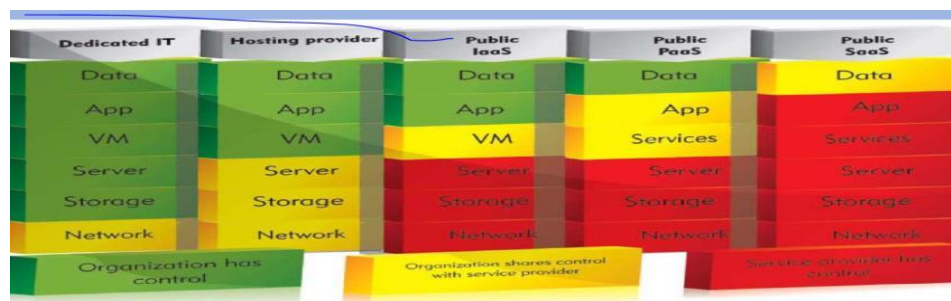


Figure 10: comparison among cloud services

According to the figure we can compare the service when we take the first service dedicated IT this service provider can control only the network of the service the other all thing data, app, VM, server and storage are under control of the organization this is not good for security of the data, the application also under control of the organization, when we look the second one is hosting provider in this case service provider can control the data, app and VM is controlled by the organization and the other is controlled by both the provider and organization ,IaaS is type of service provider and in IaaS the data and app are controlled by the organization and the left are under controlled with service provider, and VM is controlled by both and It simply offers the hardware so that your organization can put whatever they want on to it. Rather than purchase servers, software, racks, and having to pay for the data center space for them, the service provider rents those resources. IaaS allows you to –rentl such resources as Server space Network equipment Memory, CPU cycles, Storage

Paas was supplies all the resources required to build applications and services completely from the Internet, without having to download or install software. PaaS services include application design, development, testing, deployment, and hosting. Other services include team collaboration, web service integration, database integration, security, scalability, storage, state management, and versioning. PaaS generally offers some support to help the creation of user interfaces, and is normally based on HTML or JavaScript. Because PaaS is expected to be used by many users simultaneously, it is designed with that sort of use in mind, and generally provides automatic facilities for concurrency management, scalability, failover, and security. And in this service only data are controlled by the organization, service and app are controlled by the organization and service provider the others all are managed by service provider,

SaaS is the last service provider and it is the model in which an application is hosted as a service to customers who access it via the Internet. When the software is hosted off-site, the customer doesn't have to maintain it or support it. On the other hand, it is out of the customer's hands when the hosting service decided to change it. all thing except data are under control of the provider only data was managed by the organization and service provider so by comparing all the above thing the researcher choose paas for provide this architecture.

There are a lot of tools available for the application developers in the cloud environment and we try to describe the most popular platform providers and their development and hosting tools. So we have identified around more than 8 tools, after rejecting some tools due to license and poor feature, we have selected the eight tools such as Open shift, Cloudsim, Microsoft Azure, Amazon AWS (Amazon Web Service), IBM cloud service, opennebula cloud, Google App Engine, green cloud and Aneka. Out of these tools, we are picked only the five tools for comparison and analysis.

4.2.1. Red Hat-Open Shift

Red Hat-Open shift is a much known open source project when we compare it among all open source projects which have Platform-as-a-Service, Open Shift has a massive and strongest development communities. Others consider it to be the leading open source PaaS. Red Hat-Open Shift can make it possible to write code in a variety of languages and deploy applications to public or private clouds.it is also evolving extremely fast. One month after the release of Cloud Foundry, on May 4, 2011, Red Hat announced their own open source cloud platform, Open Shift. The PaaS is developed and supported by Red Hat and its community. From the beginning, Open Shift was treated as the main core for Red Hat's Platform-as-a-Service. Currently, several options exist: open source Open Shift Origin (distributed under the Apache License and is a downloadable version that can be used for private PaaS deployments.), Open Shift Online (a commercial PaaS for hosting applications in a public cloud and it is a paid service however, in addition to paid plans, it provides a free account that includes three small gears, each with 512 MB of RAM and 1 GB of storage. The Silver Plan costs \$20 per month, providing 3 small gears with a possibility to add more for \$0.02 to \$0.10 per hour.) And the Enterprise version for private clouds in this the price is up on the request. [20].

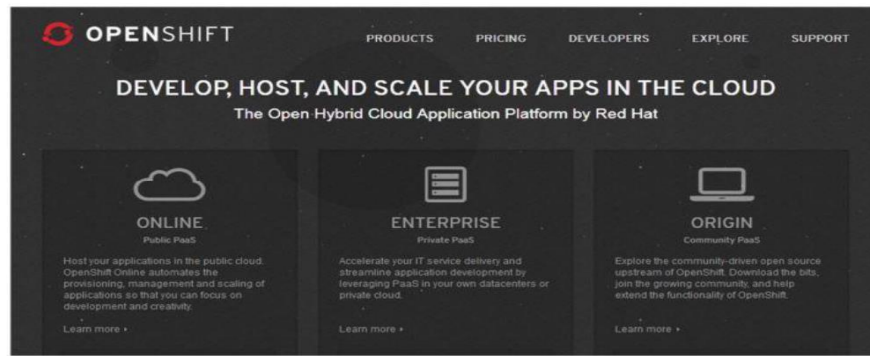


Figure 11: The three Open Shift offerings

The architecture of open shift has three main components those are Gears, Brokers, and Cartridges. Gears are implemented as lightweight containers with separate namespaces and SELinux modules. Designed to run applications, they have separated access to shared resources; Cartridges provide the actual functionality necessary to run a user application. They add support for programming languages and access to various databases. In fact, cartridges are add-ons that contain binaries, setup, and control scripts that make it possible to deploy and maintain the functionality of applications. They are also responsible for setting up environment variables to bind gears with the necessary resources and Brokers are the point of contact for all application management activities and traffic. They are implemented as daemons responsible for managing user logins, DNS, and application status. The Open Shift cloud platform always works through a broker using a REST-based API.

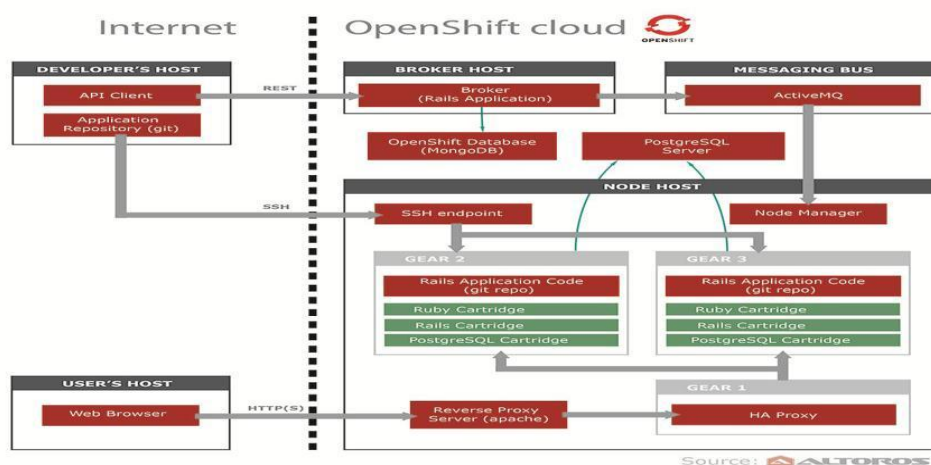


Figure 12: Open Shift Components and their interaction

4.2.2. Cloudsim

It is basically a library for simulation of cloud computing Scenarios. It has some features such as it support for modeling and simulation of large scale cloud computing infrastructure, including data centers on a single physical computing node. It provides basic classes for describing data centers, virtual machines, applications, users, computational resources, and policies.

CloudSim supports VM Scheduling at two levels: First, at the host level where it is possible to specify how much of the overall processing power of each core in a host will be assigned at each VM. And the second, at the VM level, where the VMs assign specific amount of the available processing power to the individual task units that are hosted within its execution engine. It has some Characteristics such as Low Cost Software, Virtualization Service Orientation, Advance Security, Massive Scale, Resilient Computing, Geographic Distribution, Homogeneity, Broad Network Access, Rapid Elasticity, Resource Pooling etc. [21]

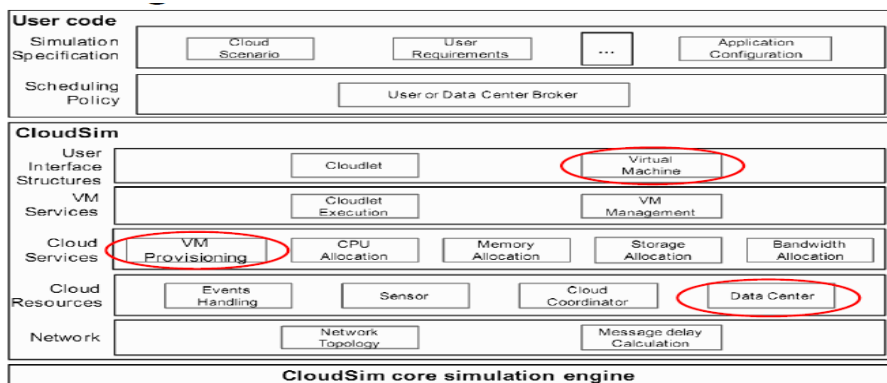


Figure 13: layered cloudsim architecture

4.2.3. Amazon Web Service Cloud

The Amazon Web Services (AWS) cloud provides a highly reliable and scalable infrastructure for deploying web-scale solutions, with minimal support and administration costs, and more flexibility than you've come to expect from your own infrastructure, either on-premise or at a data center facility. [22].

That offers compute power, storage, content delivery, and other functionality that organizations can use to deploy applications and services cost-effectively— with flexibility, scalability, and reliability. AWS self-service means that you can proactively address your internal plans and react to external demands when you choose. [23]. Today, Amazon Web Services provides a highly reliable, scalable, low-cost infrastructure platform in the cloud that powers hundreds of thousands of businesses in 190 countries around the world. AWS is available in multiple locations worldwide. These locations are composed of regions and Availability Zones. A region is a named set of AWS resources in the same separate geographic area. Each region has multiple, isolated locations known as Availability Zones. AWS enables the placement of resources, such as instances, and data in multiple locations. Resources aren't replicated across regions unless you chose to do so. [24] Each region is completely independent and is designed to be completely isolated from the other regions. This achieves the greatest possible fault tolerance and stability. Each Availability Zone is isolated, but the Availability Zones in a region are connected through low-latency links. Availability Zones are physically separated within a typical metropolitan region and are located in lower risk flood plains (specific flood zone categorization varies by region). In addition to utilizing discrete uninterruptable power supply (UPS) and onsite backup generators, they are each fed via different grids from independent utilities to further reduce single points of failure. Availability Zones are all redundantly connected to multiple tier-1 transit providers. [24]

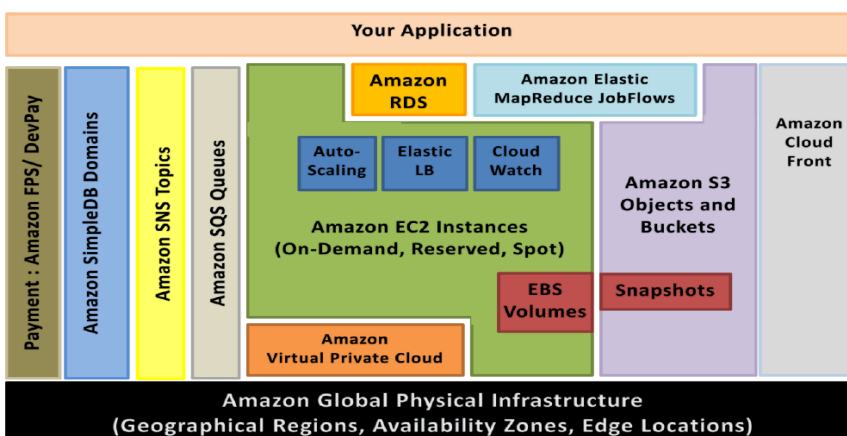


Figure 14: Amazon Web Services

4.2.4. Green Cloud

Modern data centers, operating under the Cloud computing model are hosting a variety of applications ranging from those that run for a few seconds (e.g. serving requests of web applications such as e-commerce and social networks portals with transient workloads) to those that run for longer periods of time (e.g. simulations or large data set processing) on shared hardware platforms. The need to manage multiple applications in a data center creates the challenge of on-demand resource provisioning and allocation in response to time-varying workloads. Normally, data center resources are statically allocated to applications, based on peak load characteristics, in order to maintain isolation and provide performance guarantees. Until recently, high performance has been the sole concern in data center deployments and this demand has been fulfilled without paying much attention to energy consumption. Data centers are not only expensive to maintain, but also unfriendly to the environment so to overcome that are listed above cloud computing uses green cloud computing service provider. Green Cloud computing is envisioned to achieve not only efficient processing and utilization of computing infrastructure, but also minimize energy consumption. This is essential for ensuring that the future growth of Cloud computing is sustainable. Otherwise, Cloud computing with increasingly pervasive front-end client devices interacting with back-end data centers will cause an enormous escalation of energy usage. To address this problem, data center resources need to be managed in an energy-efficient manner to drive Green Cloud computing. [25]

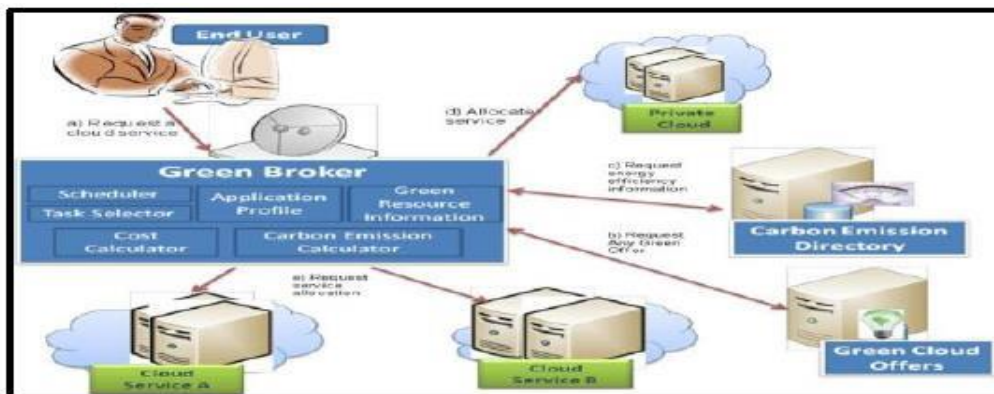


Figure 15: Green cloud architecture

4.2.5. Window azure

At a high level, Windows Azure is simple to understand: It runs Windows applications and stores data in the cloud. There are four component of window Azure the first one is Compute The Windows Azure compute service runs applications on a Windows Server foundation. These applications can be created using the .NET Framework in languages such as C# and Visual Basic, or they can be built without .NET in C++, Java, and other languages. Developers can use Visual Studio or other development tools, and they're free to use technologies such as ASP.NET, Windows Communication Foundation (WCF), and PHP. The second is Storage This service allows storing binary large objects (blobs), provides queues for communication between components of Windows Azure applications, and even offers a form of tables with a simple query language. (Windows Azure applications that need traditional relational storage can also use SQL Azure.) Both Windows Azure applications and on-premises applications can access the Windows Azure storage service, and both do it in the same way: using a Restful approach. The third is Fabric controller: As the figure suggests, Windows Azure runs on a large number of machines. The fabric controller's job is to knit the machines in a single Windows Azure data center into a cohesive whole. The Windows Azure compute and storage services are then built on top of this pool of processing power. The fourth component of window Azure is Content delivery network (CDN): Caching frequently accessed data closer to its user's speeds up access to that data. The Windows Azure CDN can do this for blobs, maintaining cached copies at sites around the world. The last component is Connect: It's often useful for organizations to interact with cloud applications as if they were inside the organization's own firewall. Windows Azure Connect allows this, making it easier for, say, a Windows Azure application to access an on-premises database. [26]

4.2.6 Aneka Cloud

Aneka is a platform and a framework for developing distributed applications on the Cloud. It harnesses the spare CPU cycles of a heterogeneous network of desktop PCs and servers or data centers on demand. Aneka provides developers with a rich set of APIs for transparently exploiting such resources and expressing the business logic of applications by using the preferred programming abstractions. System administrators can leverage on a collection of tools to monitor and control the deployed infrastructure. This can be a public cloud available to anyone through the Internet, or a private cloud constituted by a set of nodes with restricted access. [27]

Aneka is based on the .NET framework and this is what makes it unique from a technology point of view as opposed to the widely available Java based solutions. While mostly designed to exploit the computing power of Windows based machines, which are most common within an enterprise environment, Aneka is portable over different platforms and operating systems by leveraging other implementations of other specifications such as Mono. This makes Aneka an interesting solution for different types of applications in educational, academic, and commercial environments. The Aneka based computing cloud is a collection of physical and virtualized resources connected through a network, which could be the Internet or a private intranet. Each of these resources hosts an instance of the Aneka Container representing the runtime environment in which the distributed applications are executed. One of the key features of Aneka is the ability of providing different ways for expressing distributed applications by offering different programming models; execution services are mostly concerned with providing the middleware with an implementation for these models.



Figure 16: Overview of the Aneka framework.

Based the above topics we can do some comparison and analysis, so we have choose to used Red hat's Open Shift for our study to design the application of the proposed architecture. In Open Shift, the basic tasks of systems administrator like virtual server provisioning, configuration, and scaling are automated. Furthermore, Open Shift allows a wide variety of choice of environments (UI, command line, IDE), flexibility, accessibility of different programming languages including PHP will benefit us greatly

And for file sharing there should be an algorithm which used to make a sharing secure, fast and concurrent. there are a lot of file sharing algorithm like, Distributed File System(DFS), Global File System(GFS), Network File System(NFS), Andrew File System(AFS), Block Star File System and so on all the above file sharing algorithm has their own advantage for file sharing but out of them open shift online used their own file sharing algorithm which is called Global File System(GFS). red hat GFS is a cluster file system that is available with red hat cluster suiet. red hat GFS nodes are configured and managed with red hat cluster suiet configuration. red hat GFS provides data sharing among GFS nodes in red hat cluster and GFS provide single, consistent view of the file system name space across the GFS nodes in red hat cluster.

GFS allows application to install and run with out much knowledge of the underline storage infrastructure. GFS is fully compliant with the IEEEPOSIX interface, allowing applications to perform file operation as if they were running on a local file system. Also, GFS provides features that are required in interprize environments, such as quotas, multiple journals, and multipath support. we can deploy GFS in a variety of configurations to suiet our needs for performance, scalability, and economy. For supurior performance and scalability, we can deploy GFS in a cluster that is connected directly to a SAN. For more economical needs, we can deploy GFS in a cluster that is connected to a LAN with servers that use GNBD(Global Network Block Device). We can obtain the highest shared-file performance when applications access storage directly. "GFS with a SAN" provides supurior file performance for shared files and file systems.

GFS provides the following main functions:-

- Making a file system
- Mounting a file system
- Unmounting a file system
- GFS quota managment growing a file system

- Growing a file system
- Adding journals to a file system
- Direct I/O
- Data journaling
- Configuring a time updates
- Suspending activity on a file system
- Desplying extended GFS information and statistics
- Repairing a file system
- Context/ dependent path name(CDPN)

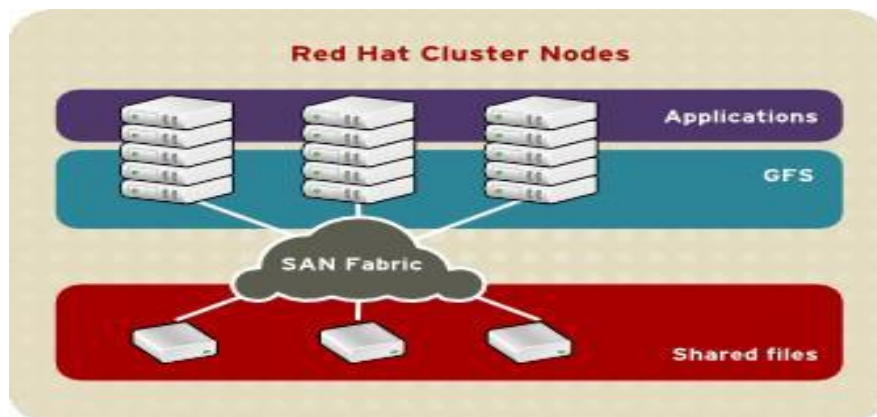


Figure 17: GFS with SAN

Finally most algorithm except GFS are used for peer-to-peer data change because of these reason inthis study we us GFS file sharing algorithm that has support on red hat.as result, Red Hat open shift online is the best framework for us to spend more of our time on code and less time on setting up development environments such as configuring operating systems and installing libraries and packages. As we have discussed in section 4.2.1 of this chapter, Open Shift is offered in or versions and our focus is on Open Shift online development platform which is public platform and the version used by startup program freely. It creates a file system layout and provides disk space, CPU resources, memory, network connectivity, and an Apache or JBoss server to create, deploy, and manage applications in the cloud. Hence, we can easily and quickly develop our Court file sharing prototype, we can push the code to build and run on Open Shift through the git (software version control solution), then Open Shift online orchestrates where application containers will run and manages our application to ensure its availability for end users, that means it creates universal and unique URL for our application in order it to be accessible globally.

4.3.OpenShift Online

4.3.1. Overview

Open Shift Online by Red Hat is a Platform as a Service (PaaS) provides developers and IT organizations an auto scaling cloud application platform for deploying new applications on secure scalable resources with minimal configuration and management overhead. Open Shift Online supports a wide selection of programming languages and frameworks, such as Java, Ruby, and PHP. Integrated developer tools, such as Eclipse integration, JBoss Developer Studio, and Jenkins support the application life cycle. Open Shift Online provides disk space, CPU resources, memory, network connectivity, and an Apache or JBoss server to create, deploy, and manage applications in the cloud. For most types of applications, Open Shift Online creates a file system layout that you can use as a template for building an application. It also generates a limited Domain Name System (DNS) so your application is accessible online. [28]

Table 1: The features and benefits of Open Shift Online

Feature	Benefit
Self-Service and On-Demand Application Stacks	By enabling Developers with the ability to quickly and easily deploy application stacks, the Open Shift platform can increase productivity and faster innovation in application design and delivery. New ideas can be prototyped quickly and mission critical projects can be brought to market faster
Standardized Developer Workflows	With Open Shift as the cloud application platform, the Application Development organization can standardize the Developer workflow and create repeatable processes for application delivery in order to streamline the entire process.
Polyglot - Choice of Programming Languages and Frameworks	The ability for Developers to choose between Java, Ruby, Python, PHP, Perl and other languages on the Open Shift platform allows them to choose the right tool for the job, and make a different choice for each project as needed. In addition to these and other open source language runtimes, many of the popular supporting open source Frameworks are included within Open Shift as well. Examples include Rails, Django, EE6, Spring, Play, Sinatra, and Zend.
Built-in Database Services	With a choice of database technologies available in Open Shift automatically connected into the application stacks as needed, developers and enterprise architects can choose between classic relational and modern No SQL data stores
Extensible Cartridge System for Adding Services	In addition to the built-in languages and services, Developers can add other language, database, or middleware components that they need via the customizable Open Shift Cartridge system. This unique Cartridge-based extensibility allows developers (and Operations) to extend the PaaS to support specific enterprise standards or requirements.
Multiple Environment Support Dev/Test/Prod	With the Open Shift platform's ability to support multiple application Development Lifecycle stage environments (such as Dev, QA, Pre-Prod, and Prod), the Enterprise can adopt and implement the Open Shift PaaS platform without changing their current methodologies or processes.

Dependency and Build Management	The Open Shift platform includes Dependency and Build Management for many of the popular programming languages including Bundler for Ruby, NPM for Node.JS, and Maven for Java. These tools automate the process of identifying dependencies in source code, pulling in the required libraries, and building the complete application. This both increases productivity and reduces the chance of error. These tools become critical in a cloud application platform like PaaS.
Continuous Integration and Release	The Open Shift platform includes Jenkins for Continuous Integration and Release Management. Jenkins can perform tests upon code check-in, orchestrate the build process, and automatically promote or cancel an application release based on results of the tests or build. This automated release management becomes a critical part of streamlining the application development.
Source Code Version Management	The Open Shift platform includes the Git distributed version control and source code management system. The Git protocol secured with SSH is used by developers to check code into the secure git repository Residing within their application container with Open Shift. Git allows both fast, secure and controlled management of application source code versioning.
IDE Integration	With the Open Shift platform's built-in integration with Eclipse, Jboss Developer Studio, and Titanium Studio, many developers can stay entirely within the IDE that they are comfortable with when working with Open Shift. Optionally, developers can work entirely in the cloud by utilizing the Cloud 9 web-based IDE and Open Shift.
Application Portability	The Open Shift platform includes unmodified open source language runtimes. This means that applications developed on Open Shift can be easily moved to other environments supporting the same open source languages. For example, Ruby or JBoss applications running on Open Shift can be move to stand-alone implementations of Ruby or JBoss in the datacenter.

4.3.2 Gears and Cartridges

As we discussed in section 4.2.1 in this chapter open shift online has two common components this are Gears and cartridges.

Table 2: Basic component of open shift

System Component	Description
Gears	Resource-constrained containers for application code where cartridges run. Gears determine the amount of RAM and disk space available to a cartridge.
Cartridges	Cartridges provide the functionality to run applications. Numerous cartridges are currently available to support languages such as Perl, PHP, and Ruby, as well as many database cartridges, such as PostgreSQL and MySQL.

The above table describes the components Gears are Resource-constrained containers for application code where cartridges run. Gears determine the amount of RAM and disk space available to a cartridge. Gears have different size the following gear sizes are available with Open Shift Online:

- Small gears provide 512MB of RAM, 100MB of swap space, and 1GB of disk space
- Medium gears provide 1GB of RAM, 100MB of swap space, and 1GB of disk space
- Large gears provide 2GB of RAM, 100MB of swap space, and 1GB of disk space

By default, there are three small gears available with a total of 1.5GB of RAM and 3GB of disk space. Open Shift Online can assign these three gears to a single application and its cartridges (Cron, MySQL, etc.), use each gear for a separate application, or use the gears for scaling an application. Cartridges provide the functionality to run applications. Numerous cartridges are currently available to support languages such as Perl, PHP, and Ruby, as well as many database cartridges, such as PostgreSQL and MySQL. [28]

4.3.3 User Interaction

Developer or user must interact with the application there for Open Shift use two way for the interaction this are Management Console or the Client Tools.

The Management Console is best suited for:

- Setting up, administering and managing accounts
- Launching new applications
- Managing and monitoring applications

While, the Open Shift Online CLI tools/ rhc client tools are used to manage a cloud environment using a command line interface, and provide features that are not currently available in the management Console. The client tools are best suited for:

- Coding
- Debugging
- Advanced application management.

To work with Open Shift online client tool, we must install the rhc client tool in our machine and because we have developed this thesis work using windows operating systems; we have described the steps of installing Open Shift Online client tools on Windows operating systems. There are three general steps, these are: step1: installing Ruby programming language step2: installing Git software and step3: installing the client tool. The first two steps are pre-request software's to install the rhc client tool. So before going to the client tool installation, we must install the two required software's Ruby and Git. Git is a software configuration management (SCM) that keeps track of changes to software source code. With git, we can manage the Open Shift application source repository by running three simply commands: **git add**, **git commit** and **git push**.

Chapter Five

5 .Design of the proposed architecture and Related Issue

5.1. Underling concept

This chapter describes the architecture of court file sharing system. In order to design this architecture to provide sharing of files/documents as a service, we have taken inspiration or concepts from IBM CCRA. NIST cloud reference architecture and available literatures on software architecture approaches for cloud based systems. In the CCRA reference architecture, cloud business models and corresponding architectures have been categorized based on seven cloud adaption patterns. It identifies common architectural patterns for each cloud adaption pattern which describes the technology that underline each type of cloud implementations. The reason why we have used these two reference architecture is:

- 1) It shows clear way of how we construct the architecture across all deployment models by providing the steps we follow and the required components which saves time.
- 2) It meets necessary cloud requirements like elasticity, self-service and flexible sourcing.
- 3) It exploits comprehensive architectural principles to ensure design scalability for efficiency, security, service management and virtualization as well as to reduce errors throughout the entire development process.

Our work intends to introduce cloud based court file sharing architecture with two essential parts: the front-end and back-end; that are usually connected via internet. The first part is to illustrate the different court institutions and client's infrastructures like computers, laptops, mobile phones as well as the network that is used for accessing the cloud based court file sharing system. Simply, the first part consists of the visible interface and applications (example web browser like chrome, IE or Mozilla Firefox) required to access cloud based court file sharing architecture from the cloud providers. The second part is to illustrate the basic components and services of court file sharing platform which are the cloud part of the architecture. It consists of all the required resources to access and share different files and documents to the end users. So it includes various servers, middleware, storages, virtual machines, programming languages, platforms, the cloud based court file sharing system itself, security and management mechanisms, deployment models and other pool of resources.

5.2. Design Goal and constraints

The general goal of this cloud computing platform design is to develop a file sharing architecture for court office which are found in the country. This architecture can help the worker to share file in a time, to achieve this goal the architecture should be secure, flexible , in a time and must have coherence of file .and also as a design goal we will discussed about the scalability, the cost and the well-defined interface of the design on the next section of this chapter. When we look the constraint of the design first we can define the word constraints so, constraints are a limitation or they are the factor that can restrict our design to be unsuccessful. When we make software architecture design there are two types of constraints the first one is technical constraint and the second one is Non-technical constraints. In this study the first technical constraint is choosing of programming language so, we have chosen php programming language to design the prototype of the architecture because it is easy to code and debug and more templates are available freely to use as a starting resource also we are more familiar with php than other languages. The second constraint is platforms architecture supported; this design is work on windows operating systems with the support of Open Shift Online Platform in good manner. The third constraint is use of framework, in this study we have used Drupal framework to design the prototype. The second type of constraint is Non-technical this are including the Schedule. Schedule is the time frame for the submission of the final thesis. This thesis finished out of its time frame because it need more time. Budget is the money that provided to finished this thesis work but it is very fixed and have little amount, so it restricts us for collecting the required data and tools extensively. the other Non-technical constrain is Software licensing restrictions it is very difficult to get or find free/open source or license free software this thing restrict us for doing the thesis with in the given time.

The last constraint is Internet Base that means cloud based software are mostly they are internet based means they are working properly on a very fast internet connection because of this when the internet connection became low that may affect the accessibility or availability of the architecture.

5.3. Design Requirements

This design requirement is include the requirement that should be included in this thesis. Design requirement have two parts this are functional requirement and nonfunctional requirement.

5.3.1 CBPDFS Features as a Requirement

Feature requirement is the functional requirements of the platform design that indicate this design should include. Unless this design and its objective and the aim of this design cannot meet its objective and this design cannot work at all. therefore in this portion we discussed about the functionality of the architecture.

- ✓ There should be the analysis of cloud computing use on court file sharing
- ✓ File should be share to different part of the court at time
- ✓ All file should be store on the cloud /they should available at any time when the user find to access it
- ✓ All information must be important and current information
- ✓ The system should be test all part of the design by using different software testing methods
- ✓ If two or more person update the file at the same time the design should have some concurrency mechanism
- ✓ The design should be secure because court file are very confidential therefore file sharing should be secure.
- ✓ There should be adding and creating or removing user account.
- ✓ There should be giving privileges to each user.
- ✓ There should be changing password.
- ✓ Only authorized user must perform tasks

5.3.2 CBPDFS Quality Requirements

This requirement is the nonfunctional requirement of court file sharing platform design give additional support for the architecture design. Such as scalability/ Flexibility, availability/accessibility, cost, performance, Accuracy, Reliability, Speed of response time and Error handling method.

- **Scalability/ Flexibility:** in cloud base system scalability is the main characteristic that indicate the ability of the framework that can handle the load increasing without any effect on the architecture. Or it is the behavior that the new architecture design can perform different activities at the same time without doing wrong things.
- **Availability/ Accessibility:** this availability can define as the proportion of time that the system is functional and working. It can be measured as a percentage of the total system downtime over a predefined period. So according to this definition our system is always available every time, everywhere on any device.
- **Cost:** as we discussed in the first chapter in cloud computing the cost is depend on demand per use, so cloud is cost effective because there is no initial investment cost to build and run the system which is done by cloud providers.
- **Performance:** it is the indication of the responsiveness of a system to execute any action within a given time interval. According to this definition, our cloud based file sharing system is highly responsive because the resources are put on distributed and high performance servers. So the client can share the resources in fastest way.
- **Accuracy:** The framework must be accurate. at any time it must give the same result and correct answer without felling tiredness.
- **Reliability:** the designed platform gives correct and trusted results, we must trust on the design.
- **Speed of response time:** the speed of this platform is better than other system that is used in court file sharing currently.
- **Error handling method:** in this research error will be happen during when the file update and the file shared among different parts at the same time so the platform framework have concurrency method to handle the problem.

5.4. General Cloud Platform Architecture for the CBPDFS

The main objective of Designing this cloud computing platform design of file sharing for Ethiopian courts is to create a good environment of file sharing through the courts those are found in the whole country (Ethiopia). This can help the whole worker to share files without physical contact, they can have almost the same information about something that are happened through the courts b/c there is a file sharing in a time and any one can access that at any time. In addition to these the design can make the process more easy, comfortable, secure, in time file sharing, accessing anytime and anywhere, good handling of file that make easy for searching any file and different things for employers. These generic designs contain the following components:-

File Sharing: It includes different type of files. our file can be text, photo, videos or audios so all this file are pooled through the network without considering their type of file and their size any type and size of file can store and can share by using these cloud computing platform.

Infrastructure as a service (IaaS): the organization has the right to control the data and the application by itself and they can control the virtual machine by cooperating with service provider and the others are fully controlled by service provider.

Platform as a service (PaaS): In paas service provider have full control over the server, storage and the network, the provider and the organization can control the app and the service and the organization have full control for the data.

Software as a Service (SaaS): in this service the end user are requesting application software service that are deployed by service provider. the service provider can do file sharing environment, manage payment depend on usage and other activities through the network.

Red-Hat Open Shift: It is Paas service delivery model that provided by red-hat. There are three types of red-hat open shift such as, open shift container, open shift enterprises and open shift online. for our study we choose open shift online because it support both private and public deployment model and our study aim is to develop an application which is used for sharing court files to perform this action we need both deployments, there will be private files which should be

sharing with in one office so, to manage those file we use private deployment and to share file for all user we can use the public one.

5.5. The suggested Architecture

Based on the above stated underline concepts, the description of client and cloud side parts and the general framework. this study suggests the following architecture to implement cloud computing as a tool to provide, access and for sharing all the file of the court. Furthermore, it is designed to realize about the file sharing and to provide worldwide resource sharing services for the court offices which found in different area of Ethiopia. The proposed architecture integrates court offices and cloud using dedicated internet connection and it contains four layers and two modules to manage the user access and File Sharing. In the hybrid cloud **CBPDFS**, the users can request any file or to share file from the cloud provider. The details of **CBPDFS** layers are described below.

5.5.1 Generic User Interface Layer

The generic user interface layer is the top layer of the **CBPDFS** architecture which is connected with the front-end part of the architecture via internet and act as an interface between the end users and the cloud services. It provides support for the court file sharing platform to handle request from multiple types of end user devices, tracking requests to the correct end users and adjusting the file sharing materials and resources according to the specific need of the users. So it is also used for authentication and authorization mechanism. It contains two sub-components. **User Log** which is used to store user information and their access level such as user name, password, user type and others. Also it manages and supports the file utilization by keeping notes about the file requirement and their status; **Service Repository** which contains different services and their detail.

5.5.2 Software as a Service (SaaS) Layer

Software as a Service layer is the second layer of the architecture below the generic user interface layer which allows access to the hosted court file sharing system and any third-party application software to run on the cloud platform. Services provided in the PaaS layer can be utilized by sending request messages through Web APIs. So court institutions and users can access the court file sharing system and other third-party software's through web interface.

5.5.3 Platform as a Service (PaaS) Layer

Platform as a Service layer is the third layer of the architecture which is deployed on cloud provider that can support requirement of the designed platform. It consists two sub-layers called File sharing layer and service layer

5.5.3.1 File sharing Layer

It is the main layer of the platform for file sharing services which includes File sharing services and other services. The File sharing services are a service that available for user for sharing files .The file can be hold different cases that can be divide in to two civil case (ftabhir) and criminal case .ftabhir file include family case file, gender case files, resource cases, children and adults file, financial cases etc., shared tools and approaches and shared-experience and knowledge.

5.5.3.2 Service Layer

It provides basic services such as development environment like operating system and programming language, operational support, database management system, user management, middleware and other platforms.

5.5.4 Infrastructure as a Service (IaaS) Layer

Infrastructure as a Service Layer is the bottom layer of the architecture in which the cloud based Court File sharing system is implemented. It contains the physical and virtualized infrastructure.

5.5.5 Security and Management Mechanisms

Security is the most important thing in any system and it is the measure of the capacity of the system to prevent accidental action of an unauthorized user. In cloud computing there are a lot of mechanism that used to protect the system. service provider use different mechanism to protect the system they should first to make sure who is accessing the data and who is maintaining the server so that it enable the provider to protect the customer's personal information. After that they can use different mechanism such as cloud computing service provider should have the complete access to the server with all rights for the purpose of monitoring and maintenance of server. So this will prevent any malicious user from uploading any infected application onto the cloud which will severely affect the customer and cloud computing service.

And cloud computing has different algorithm and techniques that used to solve security problem like, key logger examining XEN, The Cloud Security Alliance (CSA), Open Web Application Security Project (OWASP), Verify the access controls, Control the consumer access devices means Be sure the consumer's access devices or points such as Personal Computers, virtual terminals, gazettes, pamphlets and mobile phones are secure enough, The loss of an endpoint access device or access to the device by an unauthorized user can cancel even the best security protocols in the cloud, Monitor the Data Access, Share demanded records and Verify the data deletion, Security check events, Encryption Security algorithm it has four type of algorithm, (RSA Algorithm (Rivest, Shamir, and Adleman), DES Algorithm (Data Encryption Standard), AES Algorithm (Advanced Encryption Standard) and Blowfish Algorithm), Cryptographic algorithms used with cloud applications usually reduce performance and such reduction must be restricted to acceptable levels and also it used to solve reliability problems by using three trust models this are Basic Trust, General Trust and Situational Trust.

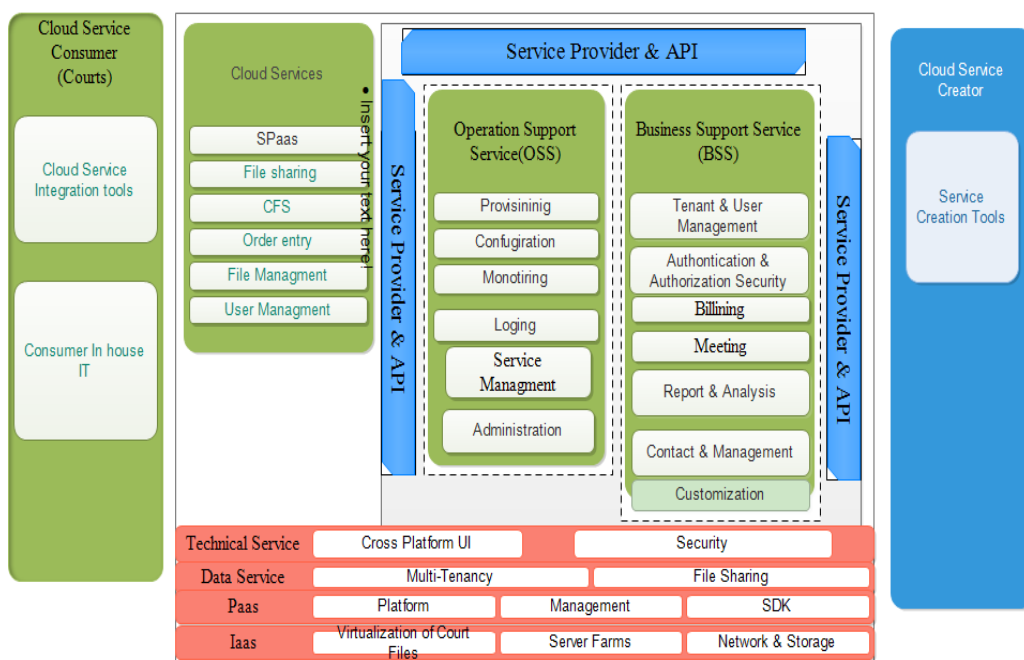


Figure 18: Overview of functional view of CBPDFS

As shown in the above diagram, the cloud based CBP system will work by logging into the service provider's portal and by ordering court file sharing service through the courts. This service has been created by the cloud service provider or simply by Open Shift online and it is a web based application accessible using web browser. Then the Open Shift Online which is a cloud service provider in this case, will validate client request through the BSS, and if the validation is okay, it will provision the request through the OSS. In this case, the OSS is used to provide the service; the BSS is used to validate the request; and the two components found in the left and right side of the diagram which are cloud service consumer and cloud service creator, will provide interfaces and tools for the end users and service creators. The infrastructure where the cloud based CBP will be implemented will support the different types of cloud (IaaS, PaaS, SaaS, BPaaS).

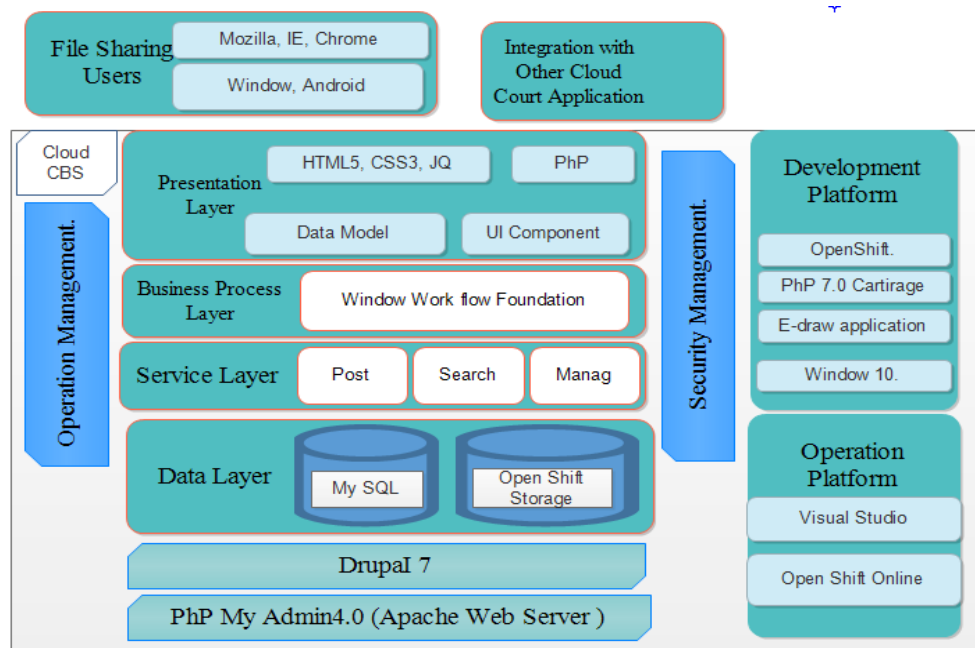


Figure 19: overview of development view of CBPDFS

The above figure illustrates development view of the proposed architecture. In the CBPDFS, the court file sharing service users can access the application using different operating systems and web browsers. The UI of cloud based CBP system was created using HTML, CSS, JS, IQ and PHP as a main language, we have considered window work flow foundation for business process management. The integration of this CBFS system with other current court system can be operated using JSON or other programming technologies. Different services including sharing file, posting of files, searching of files and other file sharing system was included as a services. For the purpose of managing and storing the court files, we have used MYSQL database, openshift storage, drupal web content management and apache server. The development platform is open shift online with php 7.0 cartridge, the different views of the architecture was developed using E-draw application.

Chapter Six

6. Development of Prototype, Discussion and Finding

6.1 Development of prototype

This chapter is discussed all about the implementation of the suggested architecture that is elaborated on all the previous chapters which is cloud base court file sharing. This chapter include all about the prototype of the implementation. these prototype is the front end web application interface development on Open Shift online cloud platform, sharing of different files that contain different cases and documents which are found in the organization, searching and accessing of these shared file that is used to improve in time file sharing , having the same file or knowledge about same cases, the accessibility of this web based interfaces from the Open Shift providers using URL of the system, workability of the linkage in between each menus, the portability of the design that work on desktop or laptop layout. For developing the prototype of the architecture and to explain the implementation details, we use 4+1 view model of software architecture as an architecture description approach, which have presented by Kruchten. According to 4+1 view model of software architecture we discussed about the description approach of the architecture. This architecture description approach followed by use case of the system and described different view of the court file sharing system.

6.2 Architecture Description Approach

Software architecture description is the collection of ways for expressing, communicating and analyzing the architecture, often arranged into various views of the architecture. Using these views to describe the architecture of software-intensive systems, Kruchten have created the 4+1 view model of software architecture. The views are logical, development, process and deployment and the scenario or use case that indicates the plus one dimension which are briefly explained as follows.

Logical View: This view represents the functionality of the system which is provided to the users as a service. It can be presented by sequence diagrams, class diagrams and collaboration diagrams.

Development View: This view denotes the details and organization of modules and subsystems or library that makes the system and concerned with software management. It illustrates the system from programmer point of view which is represented by component diagrams and package diagrams.

Process View: This view considers some non-functional requirements to describe the dynamic behavior of the system by elaborating activities of the system using UML activity diagrams.

Deployment View: This view represents the software to hardware mapping which is the physical topology of the system and represented by UML deployment diagrams.

Use Cases: This dimension is denoted using UML use case diagrams and represents sequence of interaction between systems features and their actors. We have chosen specific parts of court file sharing architecture to provide implementation details of different services of the architecture and interaction between applications and services that are provisioned using the architecture.

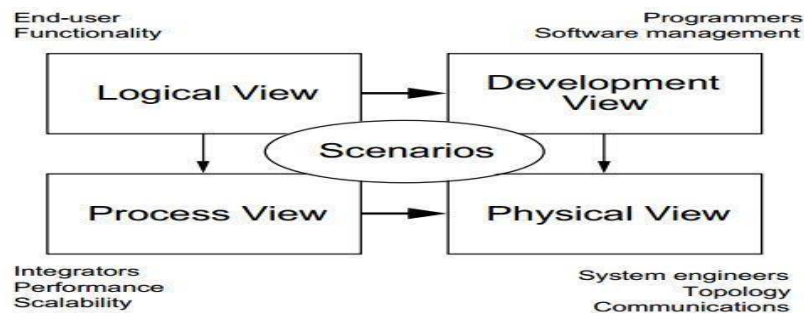


Figure 20: Kruchte 4+1 view model

6.3 Use cases

The use case diagram or architectures description is that used to show the interaction of the actors on the application. This section show the selective use case of the architecture.

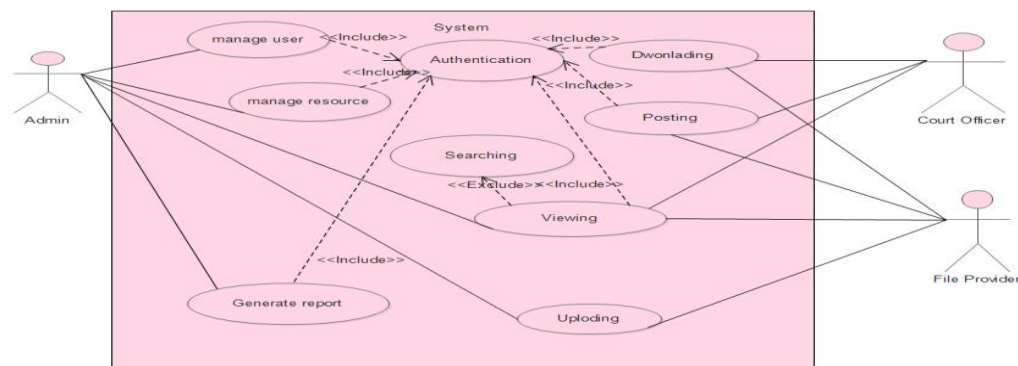


Figure 21: Use case diagr

6.3.1 Authentication

Use-Case ID: UC-1

Use-Case Name: Authentication

Description: first the system should be authenticated by the provider before different resource, files, and other associated material are provided to the end users from the Open Shift online cloud service provider. Upon requesting the cloud based court file sharing system, the system asks the users to register. After registering to the system, the user will have User Name and password which is used to access the requested services.

Precondition: Open the cloud based court file sharing system web interface by writing the URL on the browser.

Post Condition: User added to the system and has user name and password.

Actor: Users

Basic course of action:

1. The user indicates, he wants login
2. The system displays login screen
3. The user enters username and password
4. The system identifies the authentication of the user
5. The system displays main features if the user is authenticated otherwise it back to step 3
6. The use case ends

6.3.2 Posting and sharing of file and documents

Use-Case ID: UC-2

Use-Case Name: posting

Use Case Description: different file, documents, experience and other activities submitted to the site should be able to post for other office and employers.

Precondition: Login in to the system

Post Condition: The files and other posted resources are pushed as they created.

Includes: -UC-1: Authorization

Actor: file provider and court officer

Basic course of action:

1. The user indicates, he wants posting and searching files, experiences and other activities
2. The system displays the requested features
3. The user posts and search the file
4. The use case ends

6.3.3 Downloading Files

Use-Case ID: UC-3

Use-Case Name: downloading Files

Use Case Description: The cloud based court file sharing should support viewing and downloading of provisioned files to utilize the features of the system.

Precondition: The available resources provided by the cloud service provider must authenticate the users.

Post Condition: After successful verification, viewing and downloading of the corresponding cloud based court file sharing is done.

Includes: -UC-1: Authorization

Actor: file provider and court officer

Basic course of action:

1. The user indicates, he wants to download resources
2. The system displays the requested features
3. The user downloads the resources
4. The use case ends

6.3.4 Searching the available files and document

Use-Case ID: UC-4

Use-Case Name: Searching

Use Case Description: This use case used to find the files without wasting more time by visiting the entire list of files to select their required one.

Precondition: User inputs the keyword (name or title) to find the available file

Post Condition: The searched resources will be displayed for the users.

Includes: -UC-1: Authorization

Actor: users

Basic course of action:

1. The user indicates, he/she wants to search files
2. The system displays the requested features
3. The user searches the files or documents
4. The searched resources viewed by users
5. The use case ends

6.3.5 Viewing files

Use-Case ID: UC-5

Use-Case Name: Viewing

Use Case Description: This use case displays all the available files or documents for the users.

Precondition: The user searches the files or documents.

Post Condition: The files or documents displayed to users.

Includes: -UC-1: Authorization

Extends: -UC-4: Searching

Actor: users

Basic course of action:

1. The user indicates, he/she wants to view files/documents
2. The system displays the requested features
3. The user opens the files
4. The opened files are viewed by users
5. The use case ends

6.3.6 Uploading files/documents

Use-case ID: UC-6

Use Case Name: Uploading

Use Case Description: The Admin prepares the required files to share and categorizes these all files and documents for easy of accessibility. During this process the Admin share the files using the system and these files should be provisioned to the remote servers.

Precondition: Login to the system

Post Condition: The files and document are available online.

Includes: -UC-1: Authorization

Actor: Admin

Basic course of action:

1. The user indicates, he/she wants to share files
2. The system displays the requested features
3. The user shares/uploads the resources
4. The use case ends

6.3.7 Generate Report

Use-case ID: UC-7

Use Case Name: Generate report

Use Case Description: The administrator of the cloud based court file sharing system prepares the report based of the available file/document and its accessibility. During this process the administrator generates the reports using the system and these reports should be provisioned to the remote servers.

Precondition: Login to the system

Post Condition: The reports are available online.

Includes: -UC-1: Authorization

Actor: Admin

Basic course of action:

1. The Admin indicates, he/she wants to generate report
2. The system displays the requested features
3. The admin generates the report
4. The use case ends

6.3.8 Managing files/documents

Use-case ID: UC-8

Use Case Name: Managing files

Use Case Description: The administrator of system manages the court files and documents using the provided interface for files managing purpose. The administrator of the system can update files if there is some changes or if there is new thing.

Precondition: Login to the system

Post Condition: The files are updates on the system.

Includes: -UC-1: Authorization

Actor: Admin

Basic course of action:

1. The Admin indicates, he/she wants to manage files
2. The system displays the requested features
3. The admin update the files/documents
4. The use case ends

6.3.9 Managing Users

Use-case ID: UC-9

Use Case Name: Managing users

Use Case Description: The administrator of the system manages the users using the provided interface for user management purpose. The administrator of the system can delete or deactivate the users if the user changes his/her position.

Precondition: Login to the system

Post Condition: The users de-activated or deleted from the system.

Includes: -UC-1: Authorization

Actor: Admin

Basic course of action:

1. The Admin indicates, he /she wants to manage users
2. The system displays the requested features

3. The admin delete, deactivate or update the users
4. The use case ends

6.4 Logical View

This view can be indicated by sequence diagram of our system which is cloud based court file sharing system. In this case three diagrams can show the court file sharing files posting, sharing and managing users of the system. The first diagram shows how the admin post different files and documents which are accessed by other user, the second diagram shows how the user of the system are sharing the file and documents which are posted by the admin and the last diagram shows how the service provider or in this architecture the admin manage all users of the system. In our research we use HTTP for making an association b/n the web browser and cloud based court file sharing system, this is b/c of the ability of HTTP to pass information in the fastest way and also it is best because almost all modern browsers understand this protocol and it fulfills accessibility requirement.

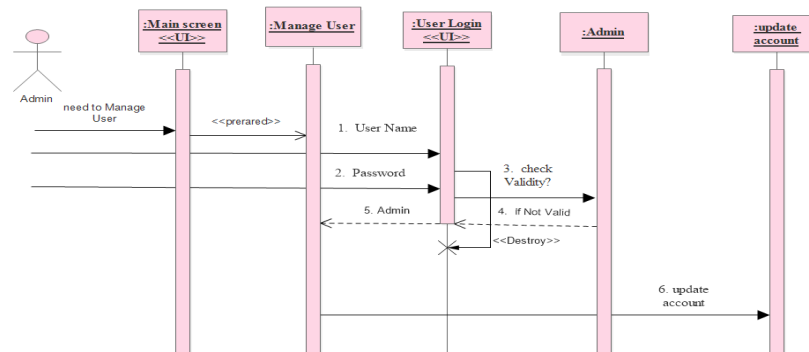


Figure 22: Amine Sequence diagram for Updating user account

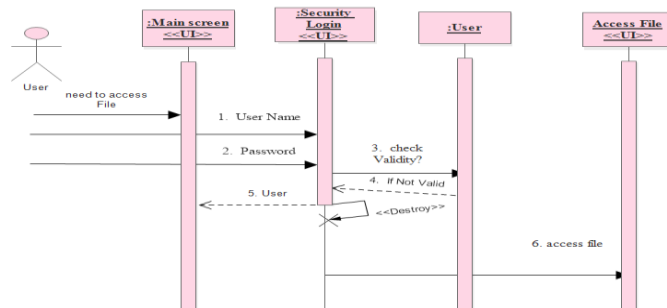


Figure 23: User sequential diagram for access

6.5 Process View

Process view can indicated by activity diagram according to this we can show the registration and login into the cloud based court file sharing system. Figure 22 and 23 shows the registration and login process to be part of our system then users can have access privilege to the system. The activity begins by requesting the registration and login through the Registration and Login features of the system. This process or the registration form is available to users and if they fulfill it correctly, the users can registered to the system. But if the user fulfill the registration form in incorrectly way, then the error message is displayed for them and they fulfill the registration form again and again until they fulfill the form correctly and the process will be finished. In the login form of the activity diagram, the user enters the User Name and Password after requesting the login and login form will be checked the validation. If the validation is true, the process will end otherwise the invalid login notification will be displayed and they request login again until they fulfill the valid user name and password to the login form. And the other Activity diagram shows the overall CBCFS system. In this case the user selects the service that he/she went to perform on CBCFS system interface and they read the details of the selected service. If the user is not interested with the selected service, he/she will select another service. However, if the user wants the selected service, he/she starts to access the service, finish their task or activities associated with the selected feature and the process will end. On the additionally, if the user has file or document to share for others, they prepare their file or document, they select the browse menu, they provide their files and they finish the process by uploading their file to others.

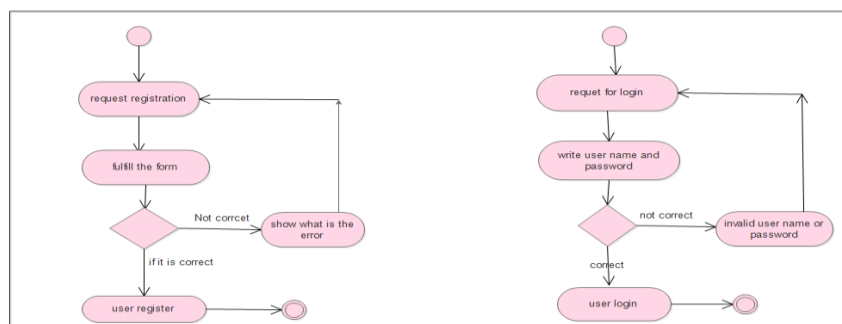


Figure 24: activity diagram for registration and login

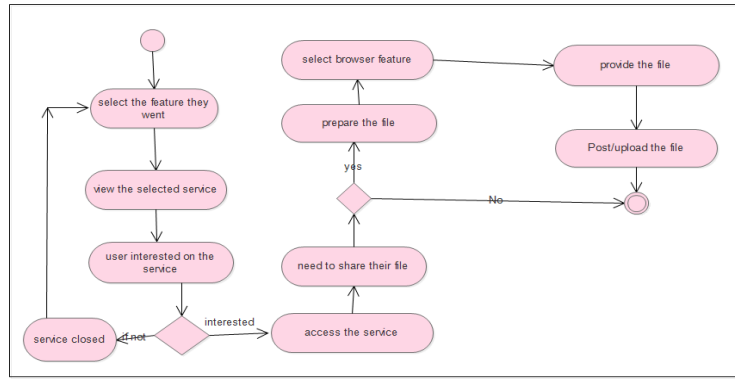


Figure 25: activity diagram for access the overall system

6.6 Data Model

A data model is a conceptual representation of the data structures that are required by a database and that primarily supports the functional requirements and they define the services that the system should provide to the users. The data model used for the CBPCFS system is shown in figure 26 that indicates the entity relationship of the data's in order to avoid unnecessary complexities; we are not providing more details of the entities inside each entity. Inter entity relationships are logical relations maintained in form of aggregation and composition of services corresponding to the entity whereas the relationship between entities is maintained at services level, i.e. relation between entities inside entity is maintained at database level in form of referential integrity constrains. The CBPCFS system has from one to several users. And the CBPCFS system has one to several repositories / databases. The repository has zero to several files stored in the database.

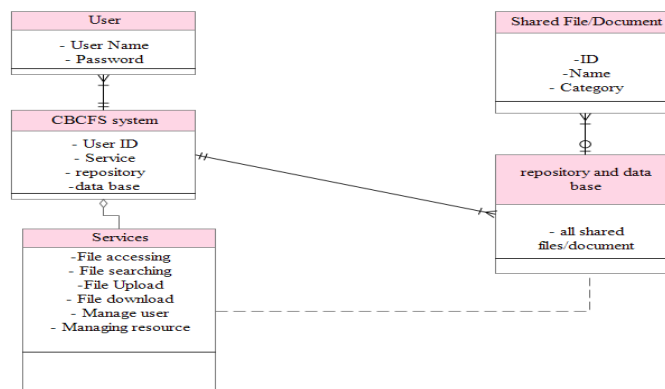


Figure 26: Data model of CBCFS

6.7 Implementation Overview

The CBPCFS system is designed to be simple/smart to look at and easy to access the available files and documents, the user can have user friendly r/ship with court file sharing providers and other employers who share their file and knowledge for others. The technologies that were used for development of the prototype are:

- JS, JQ, HTML and CSS for designing the web interface of the web application
- PHP language for backend side of the prototype
- Open Shift online platform for creating and testing the CBPCFS application
- Web and embedded cartridges to support languages and databases on the Open Shift online
- RHC client to manage the code
- Git repository to clone and deploy locally developed prototype on Open Shift online

The prototype is designed for both desktop and Laptop devices. Figure 25 shows the developed application in Open Shift online web console with the associated gears and cartridges. A screenshot or web interface of the homepage for desktop or laptop view are displayed on the next diagram.

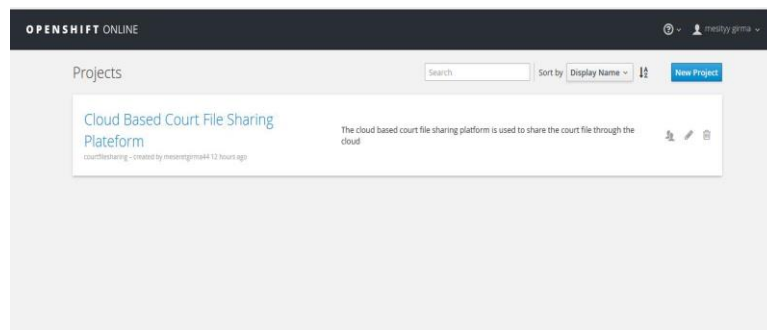


Figure 27: The developed cloud based court file sharing application on the cloud

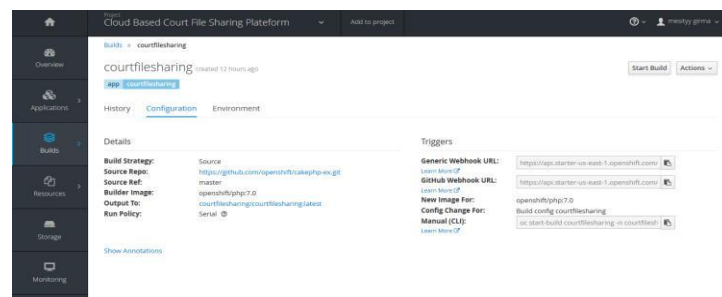


Figure 28: Build description of court files haring



Figure 29: Home Page of CBCFS

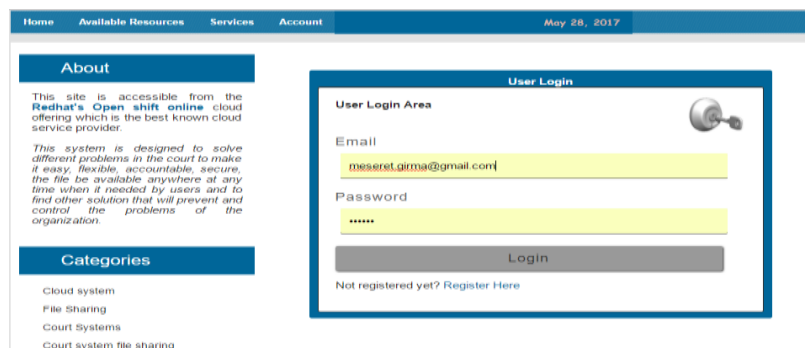


Figure 30: Login page

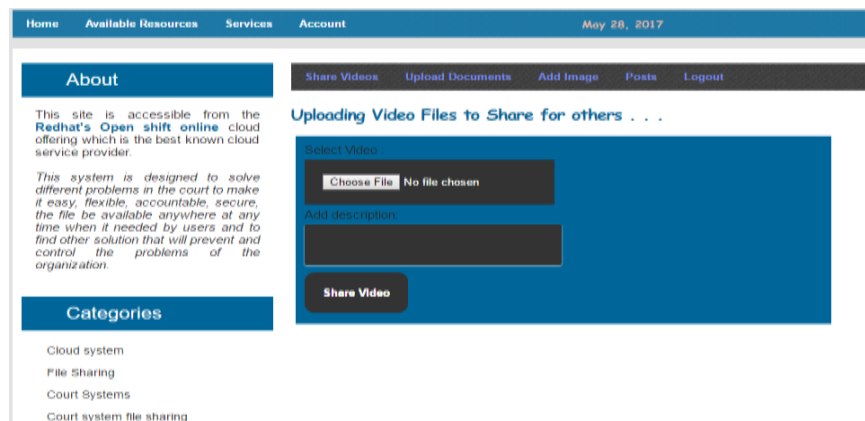


Figure 31: File upload page of CBFS

6.8 System Evaluation

System evaluation is the evaluation or checking of the performance, the quality and other things of CBPFS architecture. That was evaluated by the end users or court employer at the early stage of the design check to its functionality and usefulness of sharing and accessing the files/documents. The evaluation criteria this study is depend on availability, scalability, cost and performance b/c our study is qualitative. The availability of CBPCFS system we can access the system anywhere any time principle using any browser and is automatically scalable with reduced cost and good performance. To evaluate the workability of the CBPCFS system we discussed about three type of testing this are unit testing, integration and usability testing.

6.8.1 Unit Testing

The CBPCFS file and document sharing center has been tested in perspective of file sharing and gaining access to those files/documents. Both files sharing and files accessing were tested in Open Shift online Red hats platform after it has been implemented using different web and cloud technologies. All the concerned bodies including the shared File providers, Court Officer and ICT professionals are the participant of the testing. Each CBPCFS system interface is tested independently.

UT ID	UT Objective	UT description	Expected output
1	Registering users by identifying their level	Click on registration form ; provide information	User information sent to database
2	Get access to the file sharing	Click on login from the front page and provide information	Users login to the system
3	Storing files/document on Open Shift online	Point on Browse menu and click on upload files/document link	Store the resources to the Open Shift online database
4. searching files/documents and point to resource			

Table 3: Sample unit test case

6.8.2 Integration Testing

This integration testing is performed by combining different components and testing that are based on unit testing, after completing the unit test of each user interface and by creating an integrated test condition for all interfaces. The following integration test conditions were used

- Files and documents storing and retrieving test, file search test were checked. Each interface is validated based on providing input and using output.
- CBPCFS system were checked on Open Shift online
- Resource were sent from the web portal and stored in the Open Shift online server and transactions were managed accordingly.
- Integration was done for files accessing, sharing and management.

ITes ID	ITes objective	ITes description	Expected output
1	Check the link between resources and services	Click on resources link and then service link	To be directed to services from resources
2	Check the link between login and Browser	Enter username and password and click on login	To be directed to Browse feature

Table 4: Sample Integration Test case

6.8.3 Usability Testing

Our architecture CBPCFS were deployed for court offices, Shared File providers, ICT professionals working in the court office's, researchers and any respective organization. Therefore the Usability test was done on the perspectives of those users that are listed above. This test was performed how the users use CBPCFS cloud architecture and the attractiveness or simplicity of the interface of the system for the user to use. They practiced/used the designed user interface and other features of the developed prototype. Finally, they suggest different additional issues that are to be included in the system. Therefore, usability testing was done with 20 court employers, 3 ICT professionals working in the court offices. To test the CBPCFS system, each group of the users uses their own pages that created for them. And evaluate the

result in terms of usability of the CBPCFS system on the cloud. To test the quality, performance and other issues of our system CBPCFS by using usability testing we grouped in to two categories which are interface rate and technical issues. for interface rate we give a value as good, very good and excellent . The user interface of the prototype is interactivity rated as, good, very good and excellent. The Ease of use in all provided features(register and login, access and share files, searching and viewing files) is rated as Easy, Easy to use and Very Easy. The court employers can successfully access and share their files electronically is easy, easy to use and very easy. Implementing cloud computing solutions to share resources for cost-effectiveness is also rated as fair, good, very good and excellent. The time required to have the files of court file sharing improvement is rated as, good, very good and excellent. Sharing of resources using cloud computing technologies to improve the ability of court employers is rated as fair, good, very good and excellent.

No_	Activities	Interface rate	Technical issue
1	Register and login to CBPCFS system	Good	Easy to use
2	Accessing different files	Very Good	Very easy
3	Searching and viewing files online	Very Good	Very Easy
4	Uploading/downloading files	Good	Easy

Table 5: Sample Usability test case

Technical system design was checked by Court officer, ICT professionals, colleagues and experts from software engineering and related fields and they provide their comment and suggestions about the developed CBPCFS system. They give a comment that, the system should be more users friendly, smart and easy to use to make it more effective. Hence, the feedback was positive and those comment and recommendation have been left to respective shared file provider and professionals to play their roles then developing full implementation will be easy for software engineers. After all, this architecture to share court files/documents and to create file

sharing network was found to be effective and important when it is fully implemented with those comments given by all stakeholders.

6.9 Finding and Discussion

The Current trained of court file sharing in Ethiopia is through manual method where the documents, files are used by the whole employees in manual way and also those documents and best files are not published or electronically available for other organizations and other users. The manual methods of this file sharing through the whole country need high cost and more time. Furthermore, the court officers did not access the file as they need and could not collaborate to share those files with their peers. The proposed cloud based platform architecture and the implemented prototype creates common way to share different type of court documents and files. This cloud base platform architecture is not only cost effective and interactive but also it is easy for collaboration, sharing and accessing the files and documents to have the same knowledge and same materials on their professions. In addition, the court officer can conduct online discussion by raising specific issues and forwards their challenges and solutions. When we Compared our CBPCFS system with the current manual method, it is resource full, interactive and supported by current technologies and tools but it does not mean it replaces the whole manual resource usage rather it is used as a bridge by supporting and increasing availability and collaboration with other shared file provider's, court officer and other worker. Therefore, the proposed cloud based platform architecture increases availability and resource sharing of the court resources, files and knowledge among the provider to other officers. This reduces cost of providing and distributing of court files that reduces losing of file, lack of having the same knowledge about the same case and lack of technologies. It increases ability of the officers by using the system as knowledge gaining network and self-learning environment. The proposed architecture and the implemented prototype seems to have capability of sharing and accessing resources of all types such as documents (word document, PDF files, text files, excel files), pictures, audios, videos and other types of court information. Also the prototype is customizable and managed by the cloud provider which reduces management overhead, the interactive user interface allows to easily registering and login to the system to access all available files and to share their files and data to others, therefore increases interaction of all court officer. The tools selected to design the prototype is based on open source technologies,

which allow future development with less effort, which can be affordable and manageable by the economy of the country. The prototype has been developed from the open source cloud tool (Open Shift online) selected after evaluating several available tools. In Open Shift online, the applications are typical web applications that will run on Open Shift. At this time, Open Shift is focused on hosting web applications. When a new application is created, a URL (<http://https://api.starter-us-west-2.openshift.com>) with name of the application and the name of the domain is registered in DNS. A copy of the application code is checked out locally into a folder with the same name as the application. With each new application that is created with the client tools, a remote Git repository is populated with the selected cartridge, which is then cloned to the current directory on the local machine. There are four components that make up an Open Shift online application: domain (file sharing), application name (court file sharing), Alias and Git-repository. Most of Open Shift online application life cycle has four processes: code, build, deploy and manage. The code involves the development of application code with the desired language and tools. The build process builds applications, Open Shift online supports various build mechanism for this purpose. The application deployment process involves making any required changes to the application code, committing those changes to the local repository, and then updating the remote repository, deploying to Open Shift online and managing.

Chapter Seven

7.1 Conclusions and Future work

7.1.1 Conclusion

In this study, we have presented the community cloud platform architecture and prototype implementation of court file sharing program named CBPCFS for sharing and accessing of files and document which are found in the court area. Hence, this study introduce the concept of Designing of cloud computing in the court sectors to share and access court file and documents to make the court officers more capable in their profession and technology adaption. CBPCFS were designed based on CCRA reference architecture and Kruchten's 4+1 architectural view model as a baseline. This CBPCFS architecture focused on sharing and accessing of different files and document to increase availability with low cost and to create a good file sharing network the courts. It facilitates equal sharing of any files that help the user to have the same knowledge about the same thing where ever they are and also they can have a file whenever the user needed it. High level conceptual architecture and different views of the architecture are shown. Red hats Open Shift online cloud computing platform as a service technology was used to develop the prototype as well as to share and access files and documents of courts. So the CFS cloud portal prototype was developed to test usability of the architecture. Then the court officers and other users can easily share and access any files and document through the portal using their desktop computer and laptops to develop ability, skill and experience. Consequently, the CFS users are capable not only to handle or manage their file sharing of files but they can learn, adapt the technology and they can share experience.

7.1.2 Future Work

CBPCFS was developed for court institutions to share and access the court resources that resources are the files among court officers in the country which includes different components and some of them are implemented. However, the architecture presented and prototype implemented in this thesis need to be further enhanced and evaluated for more comprehensive and noteworthy file sharing system. In future, extending the architecture to prepare and deliver not only file that may include different training of their profession using virtual world with the help of cloud computing is needed.

The training can be delivered from one service provider to all court offices to create worldwide court system learning environment and to implement more robust, interactive and effective system. In current architecture and prototype, the users can search, post and view file online but using such features to support different local and international language translation is not included. Hence extending the architecture to support translation of languages to expand accessibility of the system by different speakers for sharing and accessing files, documents and experiences is indispensable, in some cases the user of the system may share unwanted or out of the systems purpose files or videos. Such files may cause security threats on users resources, busy servers by processing these unwanted large size files and distrust by users. In future, this must be handled by specifying intermediated actions to process files before it is stored to the Open Shift server and transmitted to users, lastly for future other researcher can do the research on this area by including deep searching about the concurrency and security of files during sharing process.

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Appendix

Sample Code

The prototype of the proposed architecture was developed and the sample php code includes:

Php code for database connection with Open Shift online platform

```
<?php //start of php code
$dbhost=getenv("OPENSIFT_MYSQL_DB_HOST");
$dbport=getenv("OPENSIFT_MYSQL_DB_PORT");
$dbuser=getenv("OPENSIFT_MYSQL_DB_USERNAME");
$dbpwd=getenv("OPENSIFT_MYSQL_DB_PASSWORD");
$connection=mysql_connect ($dbhost, $dbuser, $dbpwd);
if (!$connection)
{ //checking the Open Shift database host, port, user and password
die("Database Connection Failed" . mysql_error());
}
$databaseconnection=mysql_select_db('court file sharing');
if (!$databaseconnection)
{ //checking the database connection and exit if not connected
die("Database Selection Failed" . mysql_error());
}
//end of php code
```

Php code for home page CBPCFS

```
<!DOCTYPE html>
<!--[if lt IE 7 ]><html class="ie ie6" lang="en"> <![endif]-->
<!--[if IE 7 ]><html class="ie ie7" lang="en"> <![endif]-->
<!--[if IE 8 ]><html class="ie ie8" lang="en"> <![endif]-->
<!--[if (gte IE 9)|(IE)]><!--><html lang="en"> <!--<![endif]-->
<head>

<!-- Basic Page Needs
===== -->

<meta charset="utf-8">
<title>Cloud based court file sharing</title>
```

```

<meta name="description" content="cloud based court file sharing system">
<meta name="author" content="Court system">

<!-- Mobile Specific Metas
===== -->
    <meta name="viewport" content="width=device-width, initial-scale=1, maximum-
scale=1">
<!-- CSS
===== -->
    <link rel="stylesheet" href="css/zerogrid.css">
    <link rel="stylesheet" href="css/style.css">
    <link rel="stylesheet" href="css/responsive.css">
    <link rel="stylesheet" href="css/responsiveslides.css" />
    <link rel="stylesheet" href="css/stylelogin.css">
    <link rel="stylesheet" href="css/stylevideo.css">
    <!--[if lt IE 8]>
    <div style=' clear: both; text-align:center; position: relative;'>
        <a
                                href="http://windows.microsoft.com/en-US/internet-
explorer/products/ie/home?ocid=ie6_countdown_bannercode">
            
        </a>
    </div>
<![endif]-->
<!--[if lt IE 9]>
    <script src="js/html5.js"></script>
    <script src="js/css3-mediaqueries.js"></script>
<![endif]-->
<link href='./images/icon.jpg' rel='short cut icon' type='image/jpeg'/>
<script src="js/jquery.min.js"></script>

```

```

        <script src="js/responsiveslides.js"></script>
        <script>
$(function () {
    $("#slider").responsiveSlides({
        auto: true,
        pager: true,
        nav: true,
        speed: 500,
        maxwidth: 800,
        namespace: "centered-btns"
    });
});
</script>
</head>
<body>
<!-------Header----->
<header>
    <div class="zerogrid">
        <?php include('include/logo.php')?>
    </div>
</header>
<!-------Navigation----->
<nav> <?php include('include/header.php')?> </nav>
<!-------Content----->
<section id="content">
    <div class="zerogrid">
        <div class="row block">
            <div class="main-content col11">

<div id="ad" style="width:100%">
<?php

```

```

//session_start();
//if(!isset($_SESSION["username"])){
//header("Location: user_login.php");
//exit(); }
?>
</div>

<p style='margin-left:440px;'><b><u>Hello <?php echo
$_SESSION["username"];?></u></b></p><br />

<div class="heading">
<b><font color=#0f2e4e face="Comic Sans MS,Lucida Console"><h2><marquee>Welcome to
the cloud based court file sharing system.</marquee></h2></font></b>
</div>

<h3>Now, You can access shared resources and tools from this site.
You can also share your knowledge and experience for others .... </h3>
<p>Visit the following table to access the available resources!</p>
<?php
    $con=mysqli_connect("localhost","root","","court_file_sharing");
    // Check connection
    if (mysqli_connect_errno())
    {
        echo "Failed to connect to MySQL: " . mysqli_connect_error();
    }
?>
<div id='box'>
    <?php
        $q="select count(*) \"total\" from documents";
        $ros=mysqli_query($con, $q);
        $r=(mysqli_fetch_array($ros));
        $total=$r['total'];
        $dis=5;
        $total_page=ceil($total/$dis);
        $page_cur=(isset($_GET['page']))?$_GET['page']:1;

```

```

    $k=($page_cur-1)*$dis;

    $query = mysqli_query($con, "SELECT * FROM documents ORDER BY uploaded_date
DESC limit $k,$dis");
?>

    <div style ="overflow-x:auto;">
        <table border="1" width="100%">
            <tr>
                <th colspan="3"><font color=#f9e7f5>Available Documents</font></th>
            </tr>

            <tr style ="color:#69f566;">
                <th text align="left"><u>File Name</u></th>
                <th text align="center"><u>Description</u></th>
                <th text align="right"><u>Download</u></th>
            </tr>

        </table>
    </div>

<?php
    $sql="SELECT * FROM documents ORDER BY uploaded_date DESC limit $k,$dis";
    $result_set=mysqli_query($con,$sql);
    while($row=mysqli_fetch_array($result_set))
    {
        ?>
        <div id='url'>
            <div style ="overflow-x:auto;">
                <table border="1" width="100%" cellpadding="1">
                    <tr>
                        <td width="auto" text align="left"><?php echo "<font color='#96d5f5'>".
$row['document_name']."</font>"; ?></td>
                        <td width="auto" text align="center"><?php echo "<font color='white'>".
$row['description']."</font>"; ?></td>

```

```
 <a title='Click to open/download this document.' href="uploaded/documents/<?php echo $row['url'] ?>" target="_blank"><b><u>View File</u></b></a></td> |
```

```

</tr>

```

```

</table>

```

```

</div>

```

```

</div><?php }?>

```

```

<div id='url'><div style ="overflow-x:auto; vertical-align:middle;">

```

```

<?php

```

```

    if($page_cur>1)

```

```

    {

```

```

        echo ' <a href="download.php?page='.$page_cur-1.'"
style="cursor:pointer;color:#006699 ;" ><input style="cursor:pointer;background-
color:#006699;border:1px black solid;border-
radius:5px;width:120px;height:30px;color:white;font-size:13px;font-weight:bold;vertical-
align:middle" type="button" value="Previous"></a> ';

```

```

    }else

```

```

{
    echo ' <input style="background-color:#006699;border:1px black solid;border-
radius:5px;width:110px;height:20px;color:black;font-size:13px;font-weight:bold;"
type="button" value="Previous"> ';

```

```

    }

```

```

    for($i=1;$i<$total_page;$i++)

```

```

    {

```

```

        if($page_cur==$i)

```

```

        {

```

```

            echo ' <input style="background-color:#006699 ;border:2px black
solid;border-radius:5px;width:20px;height:30px;color:black;font-size:13px;font-weight:bold;"
type="button" value="p'. $i.'"> ';

```

```

        }

```

```

        else

```

```

        {

```

```

        echo '
        <a href="download.php?page='.$i.'"
        <input
style="cursor:pointer;background-color:#006699 ;border:1px black solid;border-
radius:5px;width:33px;height:30px;color:white;font-size:13px;font-weight:bold;" type="button"
value="p'.$i.'"> </a> ';

```

```

    }
}
if($page_cur<$total_page)
{

```

```

        echo '
        <a href="download.php?page='.$page_cur+1.'"><input
style="cursor:pointer;background-color:#006699 ;border:1px black solid;border-
radius:5px;width:90px;height:30px;color:white;font-size:13px;font-weight:bold;" type="button"
value="Next"></a>';

```

```

    }
else
{

```

```

        echo '
        <input style="background-color:#006699 ;border:1px black solid;border-
radius:5px;width:90px;height:30px;color:black;font-size:13px;font-weight:bold;" type="button"
value="Next"> ';

```

```

    }
?>

```

```

</div>

```

```

</div>

```

```

</div>

```

```

<div id='box'>

```

```

<?php

```

```

$q="select count(*) \"total\" from videos";
$ros=mysqli_query($con, $q);
$r=(mysqli_fetch_array($ros));
$total=$r['total'];
$dis=5;
$total_page=ceil($total/$dis);
$page_cur=(isset($_GET['page']))?$_GET['page']:1;
$k=($page_cur-1)*$dis;
$query = mysqli_query($con, "SELECT * FROM videos ORDER BY uploaded_date
DESC limit $k,$dis");
?>

<div style = "overflow-x:auto;">
    <table border="1" width="100%">
        <tr style = "color:#69f566;">
            <th>Video name</th>
            <th>Description</th>
            <th>Size</th>
        </tr>
    </table>
</div>

<?php
while($row = mysqli_fetch_array($query))
{
?>

<div id='url'>
    <div style = "overflow-x:auto;">
<table border="1" width="100%" cellpadding="1" cellspacing="1">
    <tr>
        <td text align="left"><a href="watch.php?video=<?php echo $row['url']; ?>"><?php
echo $row['video_name'];?></a></td>

```

```

        <td text align="justify"><?php echo "<font
color='white'>".$row['description']."</font>";?></td>

        <td text align="right"><?php echo "<font color='white'>".$row['size']."
MB</font>";?></td>

    </tr>

</table>

</div>
</div><?php }?>
<div id='url'><div style ="overflow-x:auto; vertical-align:middle;">
<?php

    if($page_cur>1)
    {
        echo '<a href="view_all_videos.php?page='.$page_cur-1.'"
style="cursor:pointer;color:#006699 ;" ><input style="cursor:pointer;background-
color:#006699;border:1px black solid;border-
radius:5px;width:120px;height:30px;color:white;font-size:13px;font-weight:bold;vertical-
align:middle" type="button" value="Previous"></a> ';
    }

    else
    {

        echo '<input style="background-color:#006699;border:1px black solid;border-
radius:5px;width:110px;height:20px;color:black;font-size:13px;font-weight:bold;"
type="button" value="Previous"> ';

    }

    for($i=1;$i<$total_page;$i++)
    {
        if($page_cur==$i)
        {

```

```

        echo '<input style="background-color:#006699 ;border:2px black
solid;border-radius:5px;width:20px;height:30px;color:black;font-size:13px;font-weight:bold;"
type="button" value="p'. $i.'"> ';

    }
    else
    {
        echo '<a href="view_all_videos.php?page='. $i.'"> <input
style="cursor:pointer;background-color:#006699 ;border:1px black solid;border-
radius:5px;width:33px;height:30px;color:white;font-size:13px;font-weight:bold;" type="button"
value="p'. $i.'"> </a> ';

    }
}
if($page_cur<$total_page)
{

    echo '<a href="view_all_videos.php?page='.( $page_cur+1 ).'"><input
style="cursor:pointer;background-color:#006699 ;border:1px black solid;border-
radius:5px;width:90px;height:30px;color:white;font-size:13px;font-weight:bold;" type="button"
value="Next"></a>';

}
else
{

    echo '<input style="background-color:#006699 ;border:1px black solid;border-
radius:5px;width:90px;height:30px;color:black;font-size:13px;font-weight:bold;" type="button"
value="Next"> ';

}
?>
</div>

```

```
</div>
    <?php
        mysqli_close($con);
    ?>
</div>

    </div>

        <div class="sidebar col05">

            <?php include('include/leftbar.php')?>
        </div>
    </div>
</div>
</section>
```

<!-------Footer----->

<footer>

<div class="copyright">

<p>Copyright © 2017 - Cloud Based Court File Sharing Platform</p>

</div>

</footer>

</body>

</html>

