Next Generation Operating System in Cloud Computing (DiminutOS)

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Abstract: Microcomputers takes a lot of time to load operating system. This is happening because operating system in hard disk drive copies every startup modules to memory along with presentation module. Microcomputer suffers latency problem, insufficient memory, less processor power problems and so on. Our idea is to develop an operating system called DiminutOS to solve these problems. Here the concept is to execute the programs, processes, threads in server while presentation is send to client machine. Server machine will load and execute operating system along with startup modules. Input and output from and to user will be transmitted from and to client and server machine. It will reduce boot time of user machine while operating system along with startup modules loads in server machine. Along with programs, processes and threads management, DiminutOS also provides file management to create access, manipulate and delete files.

Key words: Operating system • Cloud Computing • Cloud Operating system • DiminutOS • File and Applications Management

INTRODUCTION

Microcomputers allows the user to execute the programs by the means of allocating memory space, CPU usage, input and output drivers includes resource as well as API’s, presentation programs and so on. The idea is to bring the users only the presentation programs to them while programs, algorithms will be executed in the server and sends the output to the client machine. The memory utilized for presentation will be comparatively very low [1-3].

The off-the-shelf cloud services available today has be also doing the same but the difference that each service are provided by different vendors in different location of cloud. Diminut OS, the cloud operating system will be also helpful in integrating the different services in the cloud [2].

DiminutOS, the Cloud operating system is a simplified operating system that runs just in a web browser, providing access to a variety of web-based applications that allow the user to perform many simple tasks without booting a full-scale operating system. From Cloud the user can quickly boot into the main OS, because Cloud proceeds booting the main operating system in the background. DiminutOS can be installed in any operating system where browser and network adapter are essential. DiminutOS also allows multiuser access because it is in cloud [2, 4].

Cloud Computing: In the term ‘cloud computing’ the word 'cloud' is a metaphor for the Internet. By using cloud computing, we can gain access at any time through any machines, via the Internet, to data and files which you have uploaded, or to software applications which we need to use for personal or professional use. In computer science by ‘cloud’ is understood a network of computing devices which work together to provide services. More specifically, in web hosting cloud computing means that all web hosting services (web, ftp, mail, etc.) run on many different servers ensuring that a failure in one device will not cause a service failure [3, 5, 6].

Any type of computing where unused processing cycles of all computers in a network are harnesses to solve problems too intensive for any stand-alone machine. Cloud computing uses networks of large collection of servers typically running low-cost consumer PC technology with specialized connections to spread data-processing chores across them. The only thing the
user’s computers want to be able to execute is the cloud computing system’s interface software, which can be as easy as a Web browser and the cloud’s network takes care of the rest. Cloud computing said to the delivery of computing services and resources over the Internet.

Cloud services allow individuals and businesses to use software and hardware that are organized and managed by third parties at remote locations by the means of Internet. Some of the characteristics of cloud computing includes on-demand self-service, broad, network access, resource pooling and elasticity measured service.

Cloud services are famous because they can decrease the cost and complexity of owning and operating computers and networks. Some of the Uses of Cloud Computing are Rapid Service, Secure Service, Satisfying User Experience, Lower Costs, Multi-User Access, Infinite Storage and Development Platform. Cloud computing security challenges fall into three main categories which are, Data Protection, Securing your data both at rest and in transit, User Authentication, Limiting access to data and monitoring who accesses the data, Disaster and Data Breach, Contingency Planning [2, 4, 6, 7].

Cloud Computing Infrastructure: Cloud infrastructure can be built by the means of business logic used, request handling and response transmission of the server. Cloud Infrastructure provides an absolute selection of storage, servers, networking fabric, virtualization software, operating systems and management software to support diverse public and private cloud applications. Flexible cloud infrastructure provides elastic scalability, dynamic resource pooling and rapid application deployment [2, 4].

![Cloud Computing Infrastructure Diagram](image)

**Fig. 1: Cloud computing infrastructure**

Four things that need in a cloud computing infrastructure. They are transparency, scalability, intelligent monitoring and security. Transparency, the ability of the algorithm to make the user ease to use which have to make two important aspects. First one is making user to understand the basic operation for the appropriate action and secondly, make user not to worry about the business logic used.

Scalability, the ability of the system to expand or shrink as per the need of the user. System should be able to accept the changes for development for new module at any time. System should also able to remove the unwanted module at any time without any major change to the needed and working modules. Intelligent Monitoring, the ability of the system to track user’s action to avoid any damage to user data and the system built.

Security, the ability of the system to make sure that the user is accessing to their data while other’s kept safely. Apart from that, the process of keeping the data inaccessible for unauthorized users at any time. Infrastructure as a Service is a model in which an organization outsources the material used to support operations, including storage, hardware, servers and networking components [4, 5].
In order to be functional, the infrastructure should be reliable and flexible to enable easy implementation and operation of applications executing within the cloud. Other characteristics of infrastructure as a service includes Delivery of resources such as servers, storage and network components as a service, Lower cost of holding, full scalability, reducing the need for administration and maintenance of hardware, enterprise level infrastructure for all subscribers and Cloud computing environment enables developers to entirely control the provisioning, configuration and deployment of virtual machines.

Cloud infrastructure, the application runs the browser or client will gather the information about the task or data. The application then sends the request to the appropriate program running in the server through network interface. Server will accept the request from client and execute the program as the service. Server collects the output from the program executing in the server and sends that to the client browser through network interface [2, 3, 5].

Cloud Operating System: DiminutOS, Cloud Operating Systems are nothing but a set of applications and programs running on a system much like your personal computer. DiminutOS, Cloud operating system is kind of a system which offers service on the go such as, office suit, music, video and numerous other services with enough storage space required. Cloud Operating System is designed to execute a single application within a single browser: by making much of the functionality in a general purpose operating system is simplified.

Cloud Operating Systems are also suited to run on micro servers. As the Language runtime for Cloud Operating System is simpler than in the case of a general purpose OS, an attack through the Language runtime is harder and less likely. Here operating system is designed to operate within cloud computing and virtualization environments. [4]. It also manages the operation, execution and processes of client machines in cloud servers using cloud infrastructure, also the back-end hardware and software resources. Operating system brings user reliability, security and scalability [3, 9]. A cloud operating system developed to be used within a computing-specific platform will manage the processes and threads of a single or group of client machines and servers.

Implementation of Cloud Operating System: The cloud services have to be hosted in the Internet service provider server. The server provides the develop storage space for storing server side scripts for program execution.
The cloud operating system is developed using PHP: Hypertext Processor as the script running in the background of the server machine. PHP is chosen for some of the important aspects that it is open source application development programming language mainly used for cloud computing. It is free to use. It provides maximum reliability to the users and most important thing is that it is easy to use. The development of cloud operating system is done in the local machine of Ubuntu with HTTPD, Apache and LAMP engine. The database used for development of operating system is MySQL. MySQL is also open source which makes it free to use. Apart from that, it also provides a very good support for database connectivity to PHP [10].

PHP and MySQL will be executed on the server machine. While discussing about the client machine, we used HTML4 (Hyper Text Markup Language) for basic design and development of the operating system. HTML alone won’t work better without Cascading Style Sheets. We used CSS3 for giving good look and feel effect to the operating system. For developing interactive cloud system, we also used jQuery, which is also an open source client side scripting language. jQuery 1.9 is used in the operating system. jQuery very obviously supports Asynchronous JavaScript and XML which is very much useful in developing content update in operating system without reloading every time.

The users can take part in operating system by making a registration in the DiminutOS. The newly registered users will be sent with a user verification code associated with a link to the mail address that is provided by the user while registering. Registered users have to verify his or her identity by click on the link. After that, the new user will be allowed to use the operating system [10, 11].

Once the users have been registered and verified, then users have permission to use operating system by logging in with the user name and password provided by user in the time of registration. After logging in, user will be provided with a desktop as user’s workspace.

The user presentation program will be executed in the form of window. The window size is very flexible while it can be used in any resolution and customizable. The applications are listed in the menu bar of the operating system. Basically, menu bar will be shown while application list won’t be shown. By click on application menu in menu bar shows up the list of application that are installed on the operating system. Even the applications are running in the server. Single click in the application will leads to opening of particular application. The tasks that are currently running can be shown in the task bar which is very similar to any other operating system.

The minimization of application running can be done through the help of jQuery. The minimize button in the right hand top side performs the action very similar to other operating system. The minimized applications can be reopened at any time clicking on the task in task bar. Application that can be closed at any time by clicking on the close which is located near the minimize button [12-14].
Maximize is the option which provides the facility to expand the size of the application. In every right bottom, there is a provision for resizing the application is provided. Show desktop in the left bottom will provide the function of showing desktop while application is shown up by minimizing them and restoring those while it is minimized. Application management is the feature that is used to install and uninstall the application as per the user desire.
The next important part of file management. User will be provided with a Files and Folders icon in the desktop by default. User can double click on it to open the file management application. Another method to open file management program is to opening the desired folder form the places menu in the menu bar. There, list of folder location such as documents, music, video and so on are available. System menu provides functionalities such as viewing the information about operating system, machine, configuration, logging out, shutting down and so on. System menu also provides feature of changing the desktop background as per the user desire.
The basic requirement of server is to have fault tolerant feature which is important and so it is done by using algorithm. Server has to execute for 24 x 7.
Fig 12: Application Installation and Its Effect

Fig 13: IDE’s and Calculator

Server should have very high storage capacity for storing user files. Client can have minimum power, memory and speed to execute a browser.

Cloud Operating System and its Features: The important feature in cloud are Rapid Elasticity, On demand self-service, Measured service, Everywhere network access,
Utility computing, Resource pooling, Web services in the sky, platform as a service, Internet integration managed service providers and so on.

Cloud computing is an IAAS type service which allows you to create an infrastructure with one or more machines, increase or reduce in real time based on your needs, simply and without any initial investments, paying just for the resources that you use without any waste whatsoever. Moreover, the additional features are simple, flexible, affordable and safe. An important feature of cloud computing is its ability to let the business owner decide on his current and future needs. Cloud operating system will deliver business services faster. Cloud Manager fully automates complex facilities the work flows from requests and approvals to creating and deploying new business services \[5, 8, 15\].

**Benefits of Cloud Operating System:** Only very few benefits of cloud computing operating system are listed. Firstly, Cost Efficient is achieved in cloud operating system. The client runs only the presentation program while algorithm executed in server, which makes the client can have relatively less memory space, processor speed and so on. But, the efficiency will never be decayed. Client machine suffers less storage space for storing files and folders. Server provides Almost Unlimited Storage to users which enable users to store more data than before. Apart from that, user can access his or her files from almost any location in this world.

The process of making backup and recovery is mostly difficult task for end users. It makes them fail to do so. Server provides an effective way to Backup and Recovery the user data. The traditional operating system’s existing problem is that the application developed in a platform may not execute on another platform. The cloud operating system rectifies the problem of integrating the software’s available. Cloud operating system makes the user to access the information in the manners of ease. The applications for cloud operating system can be developed in rapid manner and can be installed within few seconds. Single click is enough for installing and uninstalling the applications \[2-4\].

**Traditional Operating System Versus Cloud Operating System:** Traditional operating system will be booted from the hard disk to memory. The system loads each and every module algorithm, logic, back end process, database (if needed), presentation programs and libraries files. The memory occupied for the programs are too high and olden machines suffers lot of insufficient problems. Cloud operating system will reduce the burden of loading of the modules by allowing only loading presentation program in the client machine. Traditional operating system executes in single machine, if it is portable device, allows user to use and access the data in any place of this world. Cloud operating system can be used in any place of this world; even the user doesn’t have any own machines. User can log on to cloud anytime anywhere, even in the publicly used computers.

Files cannot be accessed if the device is not portable. But, cloud operating system allows authorized user to access the user data anywhere. Traditional operating system has another problem that is additional application installation by the end users. The application has to be purchased from the genuine vendor or has to be downloaded from the official website. The application then has to be installed in the machine, which will consume comparatively higher time then we assume as per the capacity of machine and the size of the application installing. But, the cloud operating system, the application installation is very much easier. The users have to open application management program in their desktop using menu bar. In application management program, the user has to select the application to install. The application will be installing for your use. The un-installation process is also similar which we have to make a single click. Some of the traditional is operating system is much costly. But, cloud operating system can be available free to the users. \[2-4, 8\].

**Challenges in Cloud Operating System:** Hardware Requirements for Cloud Computing are dedicated, GUI-based desktop, or a browser or a client machine with network adapter for exploring the network, file server with storage for compliance purposes, or accessing the data, dedicated server which provides the services to the client machine by executing the business logic, an SSL certificate connection for the page which makes the connection secure and enables the data transmission a safer one.

The requirements of the system are a dynamic workload for the application executing, resource management, reliability for the user data and applications, availability of the system and security for the user data and privacy. Administrator interface for monitoring the overall system operation such as bandwidth usage, memory, process and so on, developer interface for allowing the develop to scale the system to any extend and end user interfaces for the end users to access
application and user data. System should provide heterogeneous systems support, making it to available in any kind of machines [3, 4].

CONCLUSION

The cloud operating system will reduce the capacity requirement for the client machine effectively. Cloud operating system will decrease the memory requirement by only loading the presentation layer to the client machine. The user registration follows a secured way such that the user will get a mail from cloud operating system with the verification code embedded URL, in which user can click or access to verify the identity of the user. After that, user is allowed to use the operating system.

Cloud operating system will also reduce the storage requirement of the client machine, because, the cloud operating system will provide the user file management create, store, rename, edit, alter, update, manipulate, delete, upload, download the files from anywhere in this world. Cloud operating system will execute C, C++, Shell Script files belongs to the user from the remote server based on the demand of user. The result or output from the source code will be forwarded to the client machine. User can customize their desktop as per user’s desire. The wallpaper can be changed at any time. The size of the window can be altered at any time which is very easy to perform in the cloud operating system. Cloud operating system supports many applications like Audio, Video player, Calculator, Image Viewer, many IDEs and so on which can be installed and uninstalled instantly with Application Manager. Thus the cloud operating system provides valuable service to the user.

Future Work: We are planned to improve the cloud operating system in the future in the means of providing extended and more feature in the file management. User can download a full folder with the files and folders within it. We are also planned to extend the options provided for the IDEs and the editor in Rich Text Document. Along with that, we are planned to make a web browser inside the cloud operating system. The planned web browser will allows the user to browse the internet from the cloud operating system. The options for the Audio and Video player will enhance in the future. In overall statement, the future improvement in the cloud operating system will serve the user in really better and enhanced manner.

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