

## Seamless Selection of Printers and Printing using Cloud Computing

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**Abstract:** At present with a huge amount of data coming from IT and various industries, cloud computing provides an easy as well as efficient way of managing these data. In cloud technology we have various kinds of services like software as a service, platform as a service, infrastructure as a service, and security as a service and so on. The present paper focuses on a similar aspect of cloud namely the printing technology. The printing technique considered here is latest among all the existing techniques as it allows printing through web irrespective of the printer's location. Any device with internet access is able to send print jobs to a printer. It is a secure printing solution where the users can choose printers at their discretion from their remote desktop support. Only the users selected printer list is shown in the desktop. This kind of technique reduces the hurdle of installing print drivers compatible with the physical printer. In the proposed model of cloud printing the drivers for all the printers are pre-installed and the printing job is done on the basis of users' choice of printers.

**Keywords:** Cloud Computing, Cloud Printing, Cloud Security, Secured Printing.

### I. INTRODUCTION

By printing we mean a process of having any document (text or images) on paper which is called as the hardcopy of the concerned document. For any organization printing is an integral part. With the increasing emphasis on the BYO devices and mobile workforce, an easy and secure printing solution is needed. In this connection printing through cloud environment is taken into consideration. As we know cloud computing makes computing resources available or accessible from any device having internet connection regardless of its location. Similarly cloud printing connects a client to the printer by sending request to cloud print provider. This paper attempts to build a model in order to manage the connectivity between the client and the printer.

### II. MOBILE CLOUD COMPUTING

As mobile is a portable device the mobile cloud computing design to run stand alone or remote applications through wireless network. Here mobile network and cloud computing work together so that tasks and data can be kept on the internet and can be accessed whenever needed. But this technique will be realized only when data are kept on the internet rather than on individual devices. In the cloud

environment all the applications are run on the particular server and then sent to the users.

### III. CLOUD BASED OPERATING SYSTEM

Cloud based operating system is a small part of cloud computing. It manages the entire process and threads of a single or cluster of virtual machine and servers in a computing specific environment. Besides the whole service depends on the internet and there is no need of technical installations of the applications. The end users can access the pre-installed application through web browser. One can avail the usual services like email, calendar, document and photo editor and collaborative tools (chat and social networks) through this virtual operating system. Some of the available cloud OS are Glide OS, JoliCloud, iSpaces cloud computer, Slive OS, Zero PC, eyeOS etc., of which some are free and therefore open resource to use. For our purpose we consider Eye OS. It is an open source platform with all the features of cloud like computing from any devices such as desktop, laptop, tablet or mobile, accessing application and utilities, personal files and the like. Also any document can be uploaded from any device and the receiver can use word processor, pdf viewer or spreadsheet to view the work done. In this OS computing can be done flawlessly even with switching devices if needed without interrupting the current work.

### IV. TYPES OF PRINTERS

#### a. Cloud Ready Printers:

These are printers with new technology that allows printing through web. Unlike traditional printing methods the pre-installed print drivers are not prerequisite for getting print outs of the documents and also no PC connection is needed here. Direct printing is possible from the registered printers in cloud services. From the multiple printing services the users can choose one of their choices for their purpose.

#### b. Non Cloud Printers:

Non cloud printers include all traditional printers in existence. Here we have printers that are directly connected with PC as well as networked printers. For this kind of technology the PC is connected

with the printers via a connector and specific software compatible with the connected printer should run in the PC for accomplishing the printing job. The connector registered the printers with cloud services. It sends the demand for print jobs to the native printer software and also keeps update for the job status to send it back to the service.

#### V. BENEFITS OF CLOUD PRINT

Cloud computing provides a number of advantages over the existing printing techniques. So, it is a beneficial addition to the modern world where printing is a crucial medium of documentation with cloud printing no physical device is required to be carried and any users selected content can be printed given it is kept on the internet. One can get print out from anywhere in the world using only an internet enabled devices like a smart phone or tablet via cloud enabled printers.

The use of cloud printing is also more economical apart from its others commercial aspect. For example, instead of printing by themselves the users can make the print option available for the website readers who can then get the prints as per their need and even get the document at their door steps. Thus the website viewer can get the printable content which is easy to read and it is also beneficial for the website owners as they can commercialize their contents even without installed printing infrastructure at their site, thus make commercialization possible in an efficient way benefiting both the users and owners.

Above all the newer cloud enabled printing techniques are proved to be eco-friendly since it economizes the uses of papers by reducing the wastages. Most the times organizations go for huge amount of printing for saving time as well as cost. But all the printed outputs are not used, thereby wasting the money spend on these. This problem has an easy way out in cloud technology as cloud printing allows the users to print the material without delay and extra spending thereby reducing the overall time and cost for printing.

#### VI. RELATED WORKS

Various authors have researched on secured printing technology in a cloud environment. In a paper titled "Cloud Pinter: A Survey; International Journal of Information and Computation Technology" authored by DishaSaraswat, et al., the basics of cloud printing technology is explored. While cloud printing itself is a subject that has attracted interest from researchers working in the domain of cloud computing, two forms of alternative printing methods have been researched extensively by Yuqing Zhu, et al. [2]. One of the two methods that have been discussed in their paper titled "A Cloud

Print System for Office, Mobile Ad-hoc and Sensor Networks (MSN)" examine the issue of improvement of short print jobs and other complex jobs that are reliant on a multiple factors. In addition to that, the authors expound on how such factors can range from decision algorithms that involve multiple attributes, to spatial information. In exploring a design paradigm that bridges mobile connectivity with cloud computing, DebabrataSaraddar, et al. focuses attention on the use of mobile devices as a novel approach to scale back extensive resource-hungry operations by sharing and routing processing requirements in cloud-based networks[3]. The authors achieve in combining mobility in their proposed model with EyeOS, a cloud-based operating system [4].

The paper mainly focused on secure storage of data using different cloud networking node. Their proposed model concerned with easy reading, writing, managing and storing any file in the web enabled networking system so that the users can easily collaborate and communicate his work in a private cloud network. The security of the proposed architecture is maintained in terms of user validation and proper authentication. Francois Lablanc, in his paper on cloud computing focused on 3-D printing technology based on cloud platform in order to make easy application of such technology in the field of architecture [5]. He considered Additive Management (AM) process for the construction of architectural designs. Unlike this paper where the focus of cloud enabled printers is limited only on the design purpose in architecture our paper is concerned with a more general application of cloud printing and application of it in a greater sphere.

The OCLC research program paper [6] focused on the use of cloud printing technology for a better management of mass digitized books reducing the complications of traditional printing technologies. This paper revolves around the management of mass digitized books by Hathi Trust Digital library. The study aimed at saving both library space and cost through the maintenance of digitized books and allows its access to the concerned users. TecEsq in their paper [7] provides the development of traditional printers in a chronological manner and viewed cloud printing as a latest and upcoming printing method in this sphere.

In connection with the on-going depression within the printing industry the paper [8] analyzes the scope of using cloud computing in printing industry and creating a new market in addition to raise sales. Like several other services of cloud computing such as Platform as a Service, Service as a Service the concerned study focused on beneficial use of cloud computing in printing industry. The application of

cloud technology will also help the publishers of different printing industry (books, newspaper and magazine) to increase their profit margin by providing them a cost effective way of storing, accessing and printing any document.

The widespread use of mobile computing along with cloud technology has now become a most prominent way of raising profit of the business houses. This is discussed in the paper [9] in detail considering different aspects of cloud. In addition of mentioning the existing mobile printing methods this paper viewed the future of mobile printing using cloud. Print-as-a-service in cloud is the center of discussion in the paper named “Cloud printing for managed service provider” [10]. This paper discusses problems in existing printing technologies which include high cost, poor performance, proper security, compliance, mobility and also environmental hazards. All these problems have a solution in cloud computing which offers printing service with some additional features and function such as Pull Printing (Follow-me Printing), End-to-end security at different levels, Accounting, also covering copying, Client billing, Scan-to-me, Business Intelligence, Rules for help and optimization, Printing from mobile devices, Guest Printing and the like. Several issues on mobility of printing including mobile printers and others wireless techniques are discussed in paper [11].

### VII. PROPOSED WORK

The objective of our proposed work is to make printing easy and it is done by making printing possible from any internet enabled gadgets irrespective of printers’ location which was not possible earlier. The framework of our current model is as follows. Suppose a user want to print from his office to home. For this his home printer should be registered in cloud service when he configured for the concerned printing service. No need to say the power must be on and the device should be connected with internet. At the time of registering the printer in cloud providers give an ssl link to the user which the user should enter at the time of printing. This link connects to our proposed model on the basis of proper authentication. The proposed service is secured as it provides the users a unique desktop view or VM. Only the authentic users can view all the printers that he registered. Then the users just need to select the document that they want to print and upload it to the proposed model and also have an option of choosing printers from those available. Certain parameters which include Status of current printer, Printer queue status, Channel capacity to reach the printer easily and also the document size is examined before the proposed model process the printing request and

once all the parameters are found compatible the printing is done easily.

The presently used model is based on a cloud based web operating system namely Eye OS and the printing framework in cloud mentioned earlier is supported here easily. The designed algorithm for the model is presented below. This model helps any single user, organization or industries to print from any location. The only requirement here is a connector which connects to each printer servers and decrypts the document before printing.

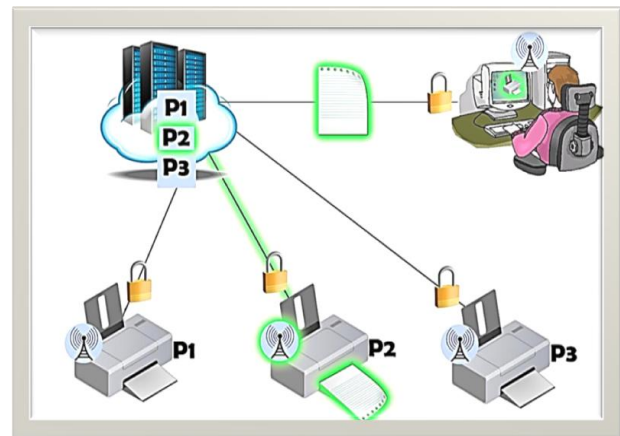


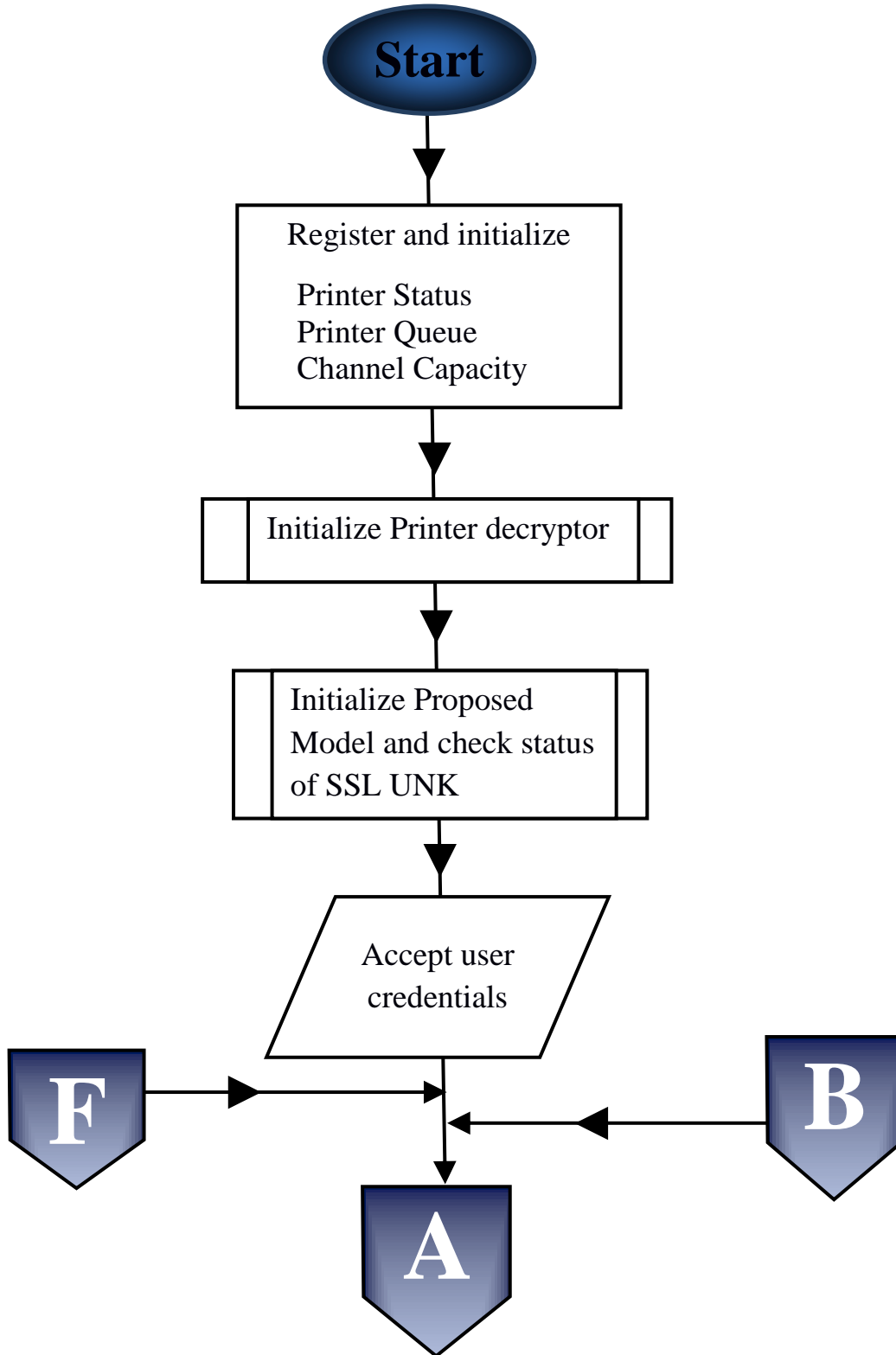
Fig. 1. Proposed Model

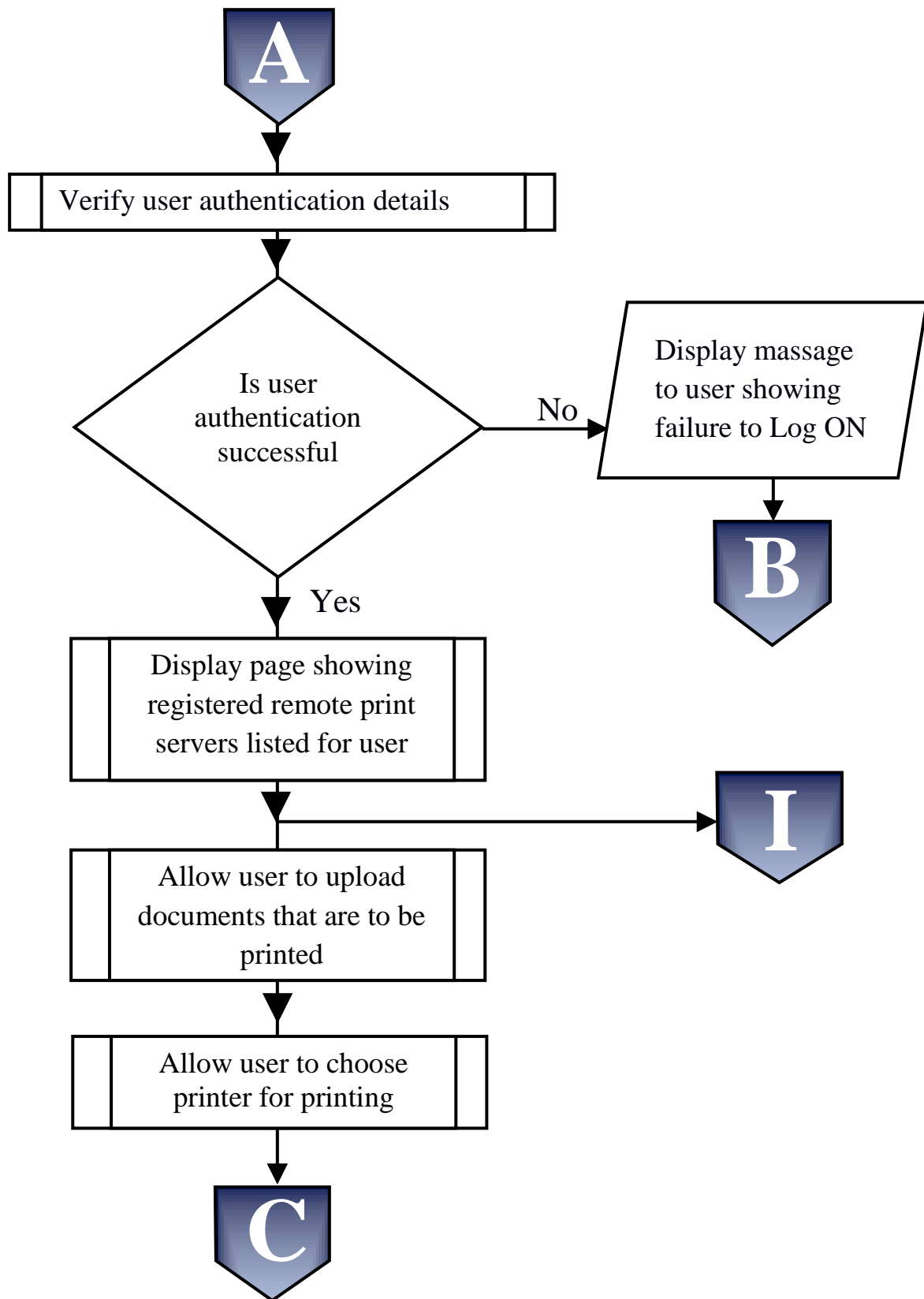
### VIII. PROPOSED ALGORITHM

1. The proposed model maintains the following information on all print servers that are registered in its catalogue:
  - a. Status of current printer.
  - b. Printer queue status.
  - c. Channel capacity.
2. Each of the print servers must be connected to the internet. A connector is attached to each print server which functions to decrypt documents sent to it before printing.
3. A user connects to the Proposed Model through a SSL link.
4. The user authenticates by providing a user identification and the corresponding password.
5. Following successful authentication, a user is able to view the page that contains the registered remote printer server listed for the user.
6. In order to print documents, the user has to upload these.
7. The user then selects the remote printer where the documents are to be printed.
8. It is the job of the proposed model to check for the proper software driver for the printer make and model before mapping the documents to that printer.
9. After concluding the mapping procedure successfully, the proposed model goes back to step

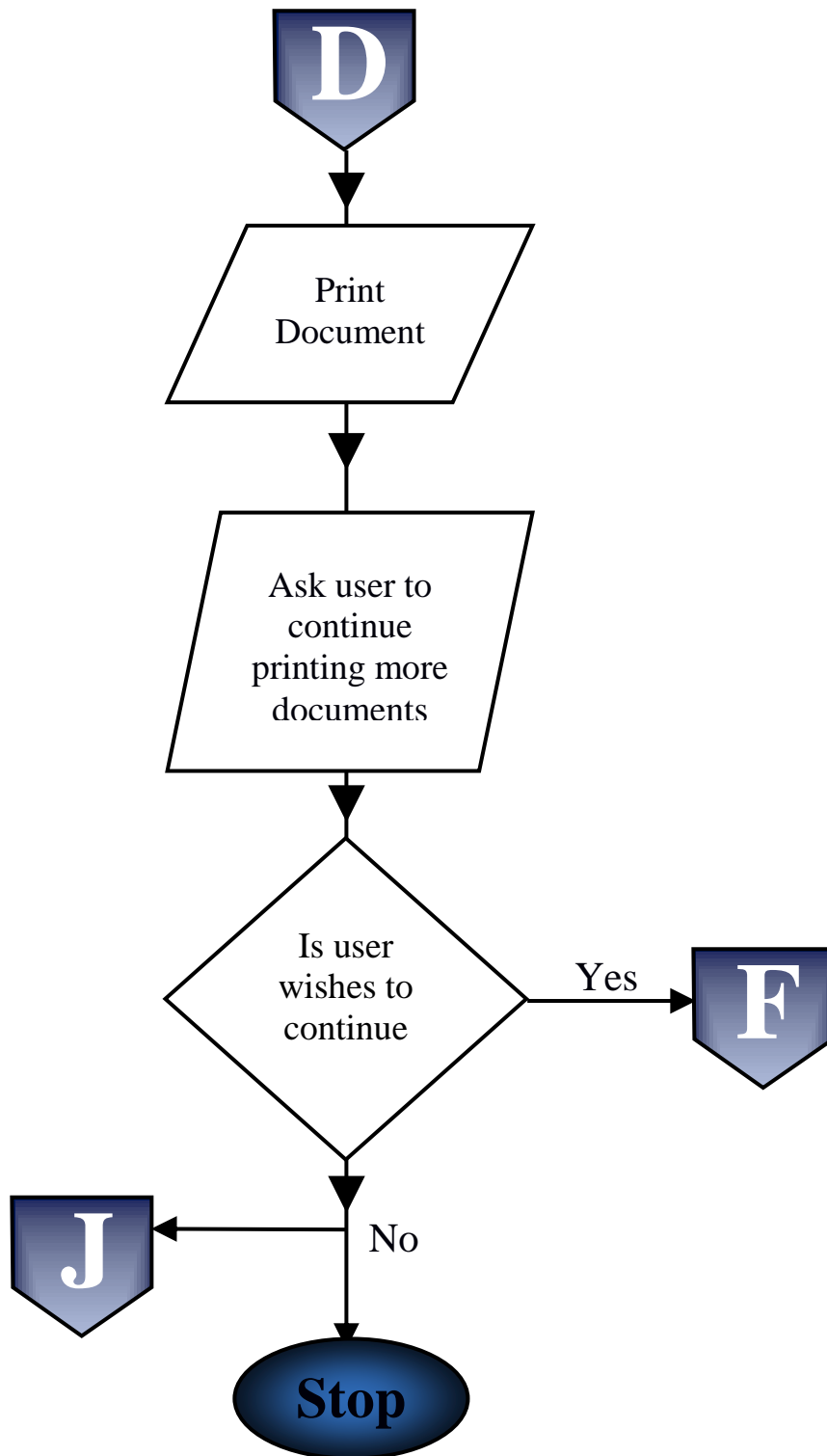
#1 to make sure that all the parameters are within acceptable range and values.  
 10. If all the parameters checked in step #1, and the size of the documents that can be accepted for printing,

are found suitable, the proposed model processes the job. Otherwise, it holds for a pre-set duration before discarding the print job requested.









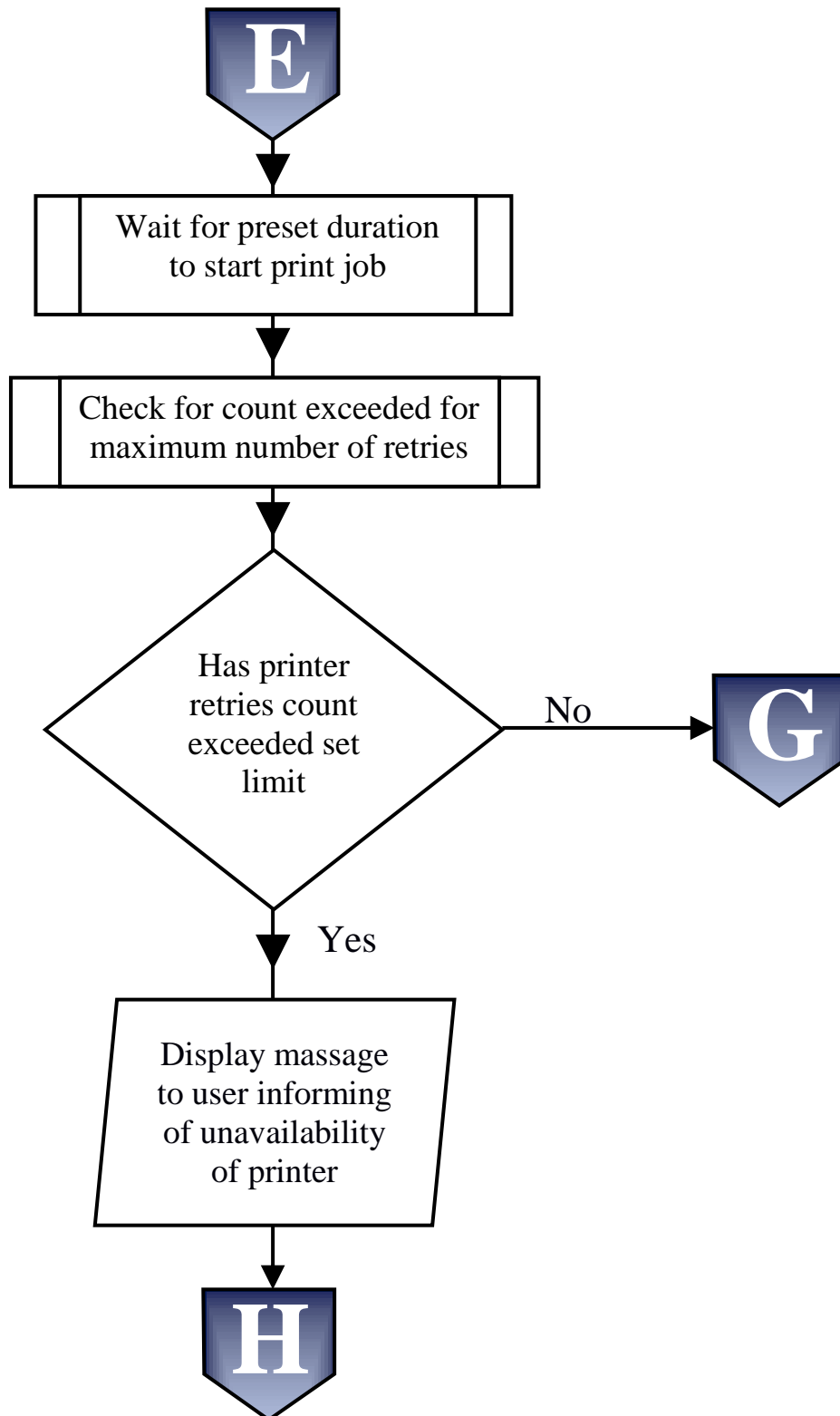
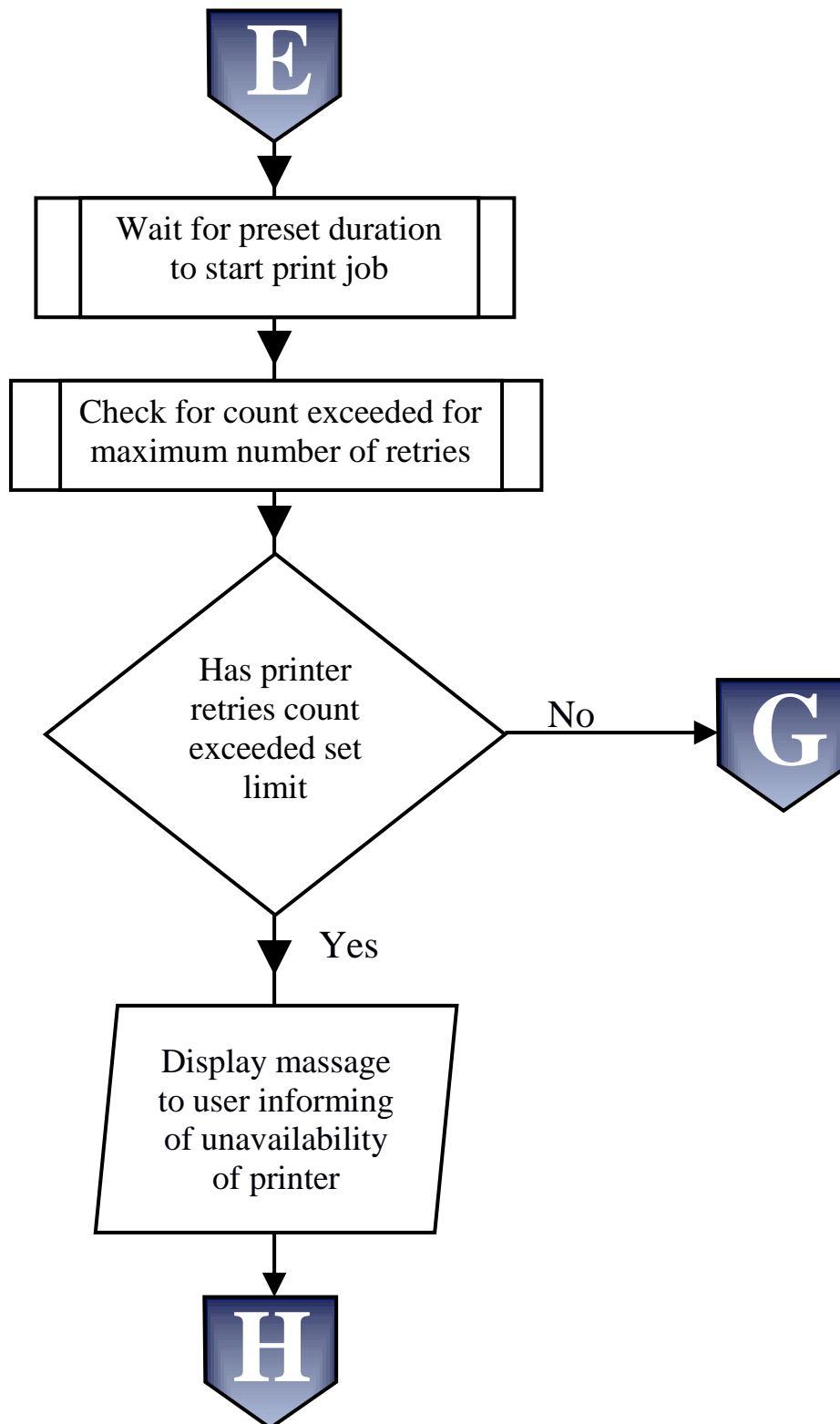


Fig. 2. Flowchart of the Proposed Model



### IX. HOW DOES GOOGLE CLOUD PRINT WORK?

From the previous discussion it is clear that cloud printing work through web. With Google cloud printing

the location of the printers are no longer a problem and one can send any document or images to the selected printers from anywhere in the world. If for example, the concerned user needs to print a letter at home while he is in the office then he can use the cloud print service to



send the letter to the home printer and get the print out immediately on returning back home. This kind of facilities with traditional printing technology previously require a cumbersome and time consuming network configuration but Google cloud print make it possible with only just few clicks. This modern service also include printing of web pages and documents in PDF format and by saving the documents in Google docs account it reduces the pressure on the hard disc. Also for securing the privacy of a user especially when his account is synced with a third party intervention called In-sync, Google cloud print proved to be beneficial.

#### X. BENEFITS TO USE OUR MODEL FOR CLOUD BASED PRINTING AS COMPARED TO GOOGLE CLOUD PRINT

Although there are similarities in printing techniques considered in the current model and that of Google cloud print but the additional edge of our proposed model is that it provides the users a unique link for his remote desktop session for uploading the printing documents. The remote desktop support system has the print drivers for the printers and connected with the printers. The users just need to select the printers and then then they can get ready their printouts.

#### XI. CONCLUSION

Printing through cloud technology is an interesting aspect of newly introduced cloud computing service. Here we try to build a model that enable printing through internet connection in a lesser time and lesser cost, thus making printing more efficient and also economic. It allows printing from any internet enabled portable devices like mobile phones or tablets. In the newly introduced framework there are no complexities of checking compatibility of the printer with the hardware of the PC unlike the traditional printing methods and also no need of installing print drivers as cloud have drivers for all the printers. For the final printouts only prerequisites are - the documents must be saved on the internet and the device used for printing should have internet connection. Once the users registered themselves in cloud print service they can avail the printing service from any location of the world. Lastly, the proposed model is compared with the existing Google cloud print service. The uniqueness of our model is established in terms of providing a unique SSL link to each user. These links are given by the cloud provider to the users and at the time of printing theusers must enter this link. Therefore, the proposed model is able to provide a secure and quick printing solution to the mostly service oriented modern world.

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