

ANALYSIS AND ENHANCING OF CLOUD SECURITY ENVIRONMENT

Snehlata Kothari¹ and Shaloo Dadheech²

Assistant Professor, Pacific University, Udaipur, Rajasthan, India

Email: ¹skothariudr@gmail.com, ²shaloo154@ymail.com

ABSTRACT

Cloud computing has brought new changes and opportunity to IT industry. Cloud computing security has become a hot topic in industry and academic research. Cloud computing is set of resources and services offered through the Internet. Cloud services are delivered from data centers located throughout the world. Cloud computing facilitates its consumers by providing virtual resources via internet. Security has remained a constant issue for Open Systems and internet, when we are talking about security cloud really suffers. Lack of security is the only hurdle in wide adoption of cloud computing. Cloud computing is surrounded by many security issues like securing data, and examining the utilization of cloud by the cloud computing vendors. The wide acceptance www has raised security risks along with the uncountable benefits, so is the case with cloud computing. The boom in cloud computing has brought lots of security challenges for the consumers and service providers. How the end users of cloud computing know that their information is not having any availability and security issues? Every one poses, Is their information secure?

The aim of the research is to identify the most vulnerable security threats in cloud computing, which will enable both end users and vendors to know about the key security threats associated with cloud computing and find out the benefits and drawbacks in regards with cost, data security and data availability.

*“There was a time when every household, town, farm or village had its own water well. Today, shared public utilities give us access to clean water by simple turning on the tap; cloud computing works in a similar fashion. Just like water from the tap in your kitchen, cloud computing services can be turned on or off quickly as needed. Like at the water company, there is a team of dedicated professionals making sure the services provided is safe and secure. When the tap isn't on, not only are you saving water, but you aren't paying for resources you don't currently need.” **Vivek Kundra, Federal CIO, United States Government.***

INTRODUCTION

What is the Cloud?

Cloud computing is latest trend in IT world. It is Internet-based computing, whereby shared resources, software and information, are provided to computers and other devices on-demand, like the electric grid. This technology has the capacity to admittance a common collection of resources on request. It is proving extremely striking to cash-strapped IT departments that are wanted to deliver better services under pressure.

Importance of the Cloud Computing

The word cloud computing has become very famous today and has been adopted by most of the IT infrastructure management firms. Cloud computing is actually an internet based computing technology where centralized remote servers and internet is required. This technology allows the businesses and users to share and save their files and applications without installing on their own computers and it can be done in many ways.

Essential Characteristics of Cloud Computing

As described above, there are 5 essential characteristics of Cloud Computing which explains their relation and difference from the traditional computing.

- **On-demand-self-service**

Consumer can provision or un-provision the services when needed, without the human interaction with the service provider.

- **Broad Network Access**

It has capabilities over the network and accessed through standard mechanism.

- **Resource Pooling**

The computing resources of the provider are pooled to serve multiple Consumers which are using a multi-tenant model, with various physical and virtual resources dynamically assigned, depending on consumer demand.

- **Rapid Elasticity**

Services can be rapidly and elastically provisioned.

Cloud Service Models

There are 3 Cloud Services Models and these 3 fundamental classifications are often referred to as “SPI model” i.e. software, platform or infrastructure as a service.

- **Cloud Software as Service**

This is a capability in which the consumer can use the provider’s applications running on the cloud.

- **Cloud Platform as Service**

Cloud Computing effect on Enterprises In this type of service, the consumer can deploy, the consumer created or acquired applications created by using programming languages or tools provided by provider, on the cloud infrastructure.

- **Cloud Infrastructure as Service**

This is a capability provided to the consumer by which, it can provision processing, storage, networks and other fundamental computing resources where the consumers can deploy and run the software (i.e. operating systems, applications) (Cloud Security Alliance, 2009, p16).

Cloud Deployment Models

- **Public Cloud** -The cloud infrastructure is available to the general public.
- **Private Cloud** - The type of the cloud, that is available solely for a single organization.
- **Community Cloud** - In this type of cloud deployment model, the infrastructure of the cloud is shared by several organizations and supports a specific community with shared concerns.
- **Hybrid Cloud** - This is a cloud infrastructure that is a composition of two or more clouds i.e. private, community or public.

Open Issues in Cloud Computing

There are many open issues are known in implement the cloud computing, few of them are outlined here:

1. Latency in performance
2. Data Synchronization with Off-line modifications had done while unavailability of the network connectivity.
3. Programming Scalability Issues
4. Issues concerning management of data storage.
5. Failure issues in services in terms of Cloud based hardware, software, connectivity or personal.
6. Safety critical processing.
7. Economic goals.
8. A risk of business continuity.
9. SLA (Service Level Agreements) evaluation.
10. Probability of workloads.
11. Interoperability between cloud providers.
12. Disaster Recovery
13. Physical Data Location
14. Information Security
 - A. Risk of unintended Data disclosure
 - B. Data Privacy
 - C. System Integrity
 - D. Browser Support
 - E. Hardware support for trust
 - F. Network sniffing

G. SQL injection

15. Legal issues

There are few other known issues which also exist. To avoid them, strategies are requiring. To conceive strategies for the secured Cloud Computing, following may be thought:

Insecure and Incomplete Data Deletion

When a request to a cloud resource is made, as with most operating systems, this may not result in true wiping of the data. Adequate or timely data deletion may also be impossible (or undesirable from a customer perspective), either because extra copies of data are stored but are not available, or because the disk to be destroyed also stores data from other clients. In the case of multiple tenancies and the reuse of hardware resources, this represents a higher risk of the customer than with dedicated hardware. As you can see the attacks are very similar to that a standard network. Other attacks which may not be specific to the cloud are lack of physical authentication such as biometrics and swipe cards.

Misconfiguration may also contribute to the loss of data or allow a hacker to gain entry. Others may include a patched operating system software, use of un-trusted software and tools within the cloud.

PURPOSE OF RESEARCH

The purpose of the research is to finding cloud computing security issues and challenges, and cloud computing is useful to new generation and cloud is also useful for out the benefits and drawbacks in regards with cost, data security and data availability and creation of public, private and hybrid cloud and enterprise can have by the use of Cloud Computing for the implementation and management of their information system. Finally concluding the factors in terms of cost and data security, enterprises should keep in mind while adopting Cloud Computing for the effective and efficient use of their information system.

Security is one of the people's peak concerns on all grounds. People are more concerned of the security especially when using the gadgets or technologies that involve internet. Because the internet has many loopholes that can crash the application or hack the application to gain access to the users or company details by hackers worldwide. Cloud technology is now incorporated with many latest technologies to provide more provision and reduce the complexity from traditional methodology to their users.

Proposed Enhancement in Cloud Security

My Suggestions

URL to be displayed of the server and entered by the user however the URL of database access should be different. This can be implemented by server side scripting.

Implementation of 6.1.1

We have developed a method in an application. The web application allows download of notes on payment basis. At the time of authenticated user click on download link, which is displaying in **Action** Header of the table in the following figure, the notes starts downloading. While downloading, the URL displays in Address bar of the browser is not, where the physical files of notes are located. The application internally opens that location and start downloading file for the user.

**Fig. 1.** Download link of the application

The application is implemented successfully and put online. The user cannot know the location of physical files, and security becomes enhance.

To implement this following method is used:

Link of Download

```
<a href="my_download_file.php?id=f&f=<?php echo $filenm ?>">Download</a>
```

in “my_download_file.php”

```
header("location:download_file.php?f=http://www.securelocation.com/files/demo/docs/"
$_GET["f"]);
```

```
header("location:main.php");
```

“download_file.php” file contents following code:

```
<?php
define('ALLOWED_REFERRER', '');
define('BASE_DIR',getcwd());
define('LOG_DOWNLOADS',true);
define('LOG_FILE','downloads.log');
$allowed_ext = array (
'zip' => 'application/zip',
'txt' => 'application/text',
'rtf' => 'application/rtf',
'pdf' => 'application/pdf',
```

```
'doc' => 'application/msword',
'xls' => 'application/vnd.ms-excel',
'ppt' => 'application/vnd.ms-powerpoint',
'exe' => 'application/octet-stream',
'gif' => 'image/gif',
'png' => 'image/png',
'jpg' => 'image/jpeg',
'jpeg' => 'image/jpeg',
'mp3' => 'audio/mpeg',
'wav' => 'audio/x-wav',
'mpeg' => 'video/mpeg',
'mpg' => 'video/mpeg',
'mpe' => 'video/mpeg',
'mov' => 'video/quicktime',
'avi' => 'video/x-msvideo'
);
if(ALLOWED_REFERRER !== "
&&                                (!isset($_SERVER['HTTP_REFERER'])                                ||
strpos(strtoupper($_SERVER['HTTP_REFERER']),strtoupper(ALLOWED_REFERRER))
=== false)
)
{
    die("Internal server error. Please contact system administrator.");
}
set_time_limit(0);
if (!isset($_GET['f']) || empty($_GET['f'])) {
    die("Please specify file name for download.");
}
$name = basename($_GET['f']);
function find_file ($dirname, $name, &$file_path) {
    $dir = opendir($dirname);
    while ($file = readdir($dir)) {
        if (empty($file_path) && $file != '.' && $file != '..') {
```

```
if (is_dir($dirname.''.$file)) {
    find_file($dirname.''.$file, $fname, $file_path);
}
else {
    if (file_exists($dirname.''.$fname)) {
        $file_path = $dirname.''.$fname;
        return;
    } } } }
} // find_file
$file_path = "";
find_file(BASE_DIR, $fname, $file_path);
if (!is_file($file_path)) {
    die("File does not exist. Make sure you specified correct file name.");
}
$fsize = filesize($file_path);
$fext = strtolower(substr(strrchr($fname, "."), 1));
if (!array_key_exists($fext, $allowed_ext)) {
    die("Not allowed file type.");
}
if ($allowed_ext[$fext] == "") {
    $mtype = "";
}
if (function_exists('mime_content_type')) {
    $mtype = mime_content_type($file_path);
}
else if (function_exists('finfo_file')) {
    $finfo = finfo_open(FILEINFO_MIME); // return mime type
    $mtype = finfo_file($finfo, $file_path);
    finfo_close($finfo);
}
if ($mtype == "") {
    $mtype = "application/force-download";
}
}
```

```
}
else
{
    $mtype = $allowed_ext[$fext];
}
if (!isset($_GET['fc']) || empty($_GET['fc'])) {
    $asfname = $fname;
}
Else
{
    $asfname = str_replace(array("'", '"', '\\', '/'), "", $_GET['fc']);
    if ($asfname === "") $asfname = 'NoName';
}
header("Pragma: public");
header("Expires: 0");
header("Cache-Control: must-revalidate, post-check=0, pre-check=0");
header("Cache-Control: public");
header("Content-Description: File Transfer");
header("Content-Type: $mtype");
header("Content-Disposition: attachment; filename=\"".$asfname."");
header("Content-Transfer-Encoding: binary");
header("Content-Length: " . $fsize);
$file = @fopen($file_path, "rb");
if ($file) {
    while(!feof($file)) {
        print(fread($file, 1024*8));
        flush();
        if (connection_status() != 0) {
            @fclose($file);
            die(); }
    } @fclose($file);
} if (!LOG_DOWNLOADS) die();
```



```
$f = @fopen(LOG_FILE, 'a+');  
if ($f) {  
    @fputs($f, date("m.d.Y g:ia")." ".$_SERVER['REMOTE_ADDR']." ".$fname."\n");  
    @fclose($f);  
}  
?>
```

Description of Code

Above code will create a download link and when user will click on that, he/she will refer to **my_download_file.php**. In this file system will change the location **download_file.php**, execute this with parameters of file name and its secured location, open a dialogue box to save file and then redirect to **main.php** file.

In this internal process, location of file kept secured.

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