Discouraging Against Certificate Falsifications by Implementing a Cloud Based Certificate Validation System

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A certificate is a document that verifies that a student has reached specific level of education usually offered by institutions of higher education. Although the number of students graduating in the universities are highly increasing, Verification of certificates became a major concern in organization, academic institutions, and recruiters. Most recruiters have been suffering for a high rate of fake certificates because there is no way they can authenticate those certificates instantly this reveals to use the traditional verification method based on paper or using email. The methodology used by the researchers to solve the above mentioned problem was to develop a prototype which is used cloud computing model to provide online certificate verification (OCV). OCV is an automatic web-based certificate verification that allows digitally to verify the accreditation of the submitted certificates. It's also on-demand, for allowing institutions to quickly, easily and accurately manage their certificates, Finally, this research work is an effort towards elimination of fake certificates in learning institutions and reduces instances of academic fraud.

Keywords: Cloud Computing, Certificate, Verification, Academic Fraud, Falsification.

I- INTRODUCTION

The Internet has grown rapidly and become one of the most frequently used for sharing information in many ways for satisfying people with various services related to various different fields. The electronic data transmission breaks the distance barrier and almost everything is now available over internet [9].

Generally, Certificate is a document that certifies that a person has received specific level education or complete a profession or completion of a program of study in a certain period of time. Certification helps recruiters evaluate potential new hires, analyze job performance, evaluate employees, select contractors, market services, and motivate employees to enhance their skills and knowledge. [12].

Over the years there have been a great need of easy and fasted means of verify certificate to reduce the level of certificate forgery and to ease the stress and also save the time of certificate verification which is done manually today, an employer or anybody concern will have to come or send delegate to institution to verify a particular certificate, some employer never did and this has resulted on accepting a forge certificate [9].

Verification is the process of establishing the truth, accuracy, or validity of something such as the verification of official documents. Most of applicants falsify their educational credentials. What's more, industry experts cite academic fraud as the most common lie on resumes. This poses the greatest dander to organization [8].

In this study we will focus an academic certificate that offers by the tertiary institutions.

So, we proposed to develop a prototype which is used cloud computing model to provide online certificate verification (OCV), This study will concentrate on the development of a central platform for academic institutions in order to have the ability to quickly approve the provision of the certificates.

According to [7], Academic degree is a qualification awarded to students upon successful completion of a course of study in higher education, normally at a college or university. These institutions commonly offer degrees at various levels, typically including diploma's, bachelor's, master's and doctorates, often alongside other academic certificates, and professional degrees. The most common undergraduate degree is the bachelor's degree, although in some countries lower qualifications are titled degrees.

There are two words that often make confusion and that is Certification and Qualification, Qualification is either the process of qualifying for an achievement, or a credential attesting to that achievement. And Certification refers to the confirmation of certain characteristics of an object, person, or organization. This confirmation is often, but not always, provided by some form of external review, education, assessment, or audit [13].

According to the Higher Education Qualifications Sub-Framework stated that a qualification is the formal recognition and certification of learning achievement awarded by an accredited institution.

In quality control, registration, monitoring, verification and validation are key factors that will help maintain good quality products or services. The term "verification" is a control process that is used to evaluate whether or not a product, service or system compiles with regulations, specifications, or conditions imposed at the start of a development phase [7].

Verification and validation (V&V) are independent procedures that are used together for checking that a product, service, or system meets requirements and specifications and that it fulfills its intended purpose [1]. The distinction between the two terms is largely to do with the role of specifications. Validation is the process of checking whether the specification captures the customer's needs, while verification is the process of checking that the software meets the specification [5].

So that we are not only validating the certificates but also, we are verifying the details of the certificate.

Cloud computing is a new area that is not fully adopted in many institutions and organizations. Cloud computing technology can be used to solve problems whose solution will be of use to those institutions and organization [8].

The term cloud has been used historically as a metaphor for the Internet. Cloud computing is the use of computing resources (hardware and software) that are delivered as a service over a network (typically the Internet). The name comes from the use of a cloud-shaped symbol as an abstraction for the complex infrastructure it contains in prototype diagrams [6].

This cloud model promotes availability and is composed of five essential characteristics and three service models.

There are five key characteristics of a cloud computing environment [4]:

- On Demand Self-Service: allows for provisioning of computing resources automatically as needed.
- Broad Network Access: access to cloud resources is over the network using standard mechanisms.
- Resource Pooling: assigning of resources is done based on the changing needs of clients or consumers.
- Rapid Elasticity: allows for rapid capability provisioning, for quick scaling out and scaling in of capabilities.
- Measured Service: allows monitoring, control and reporting of usage. It also allows for transparent between the provider and the client

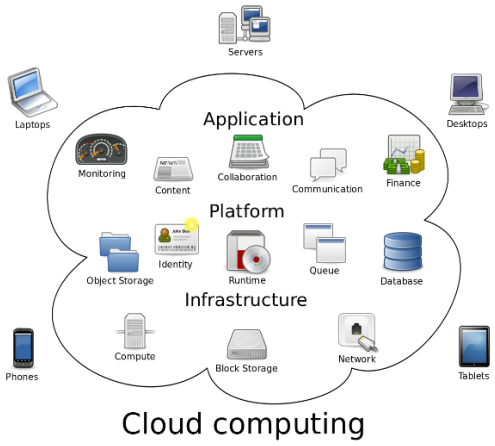

Figure 1 Cloud Computing

There are three common service models for offering cloud computing services [10]:

- Software as a Service (SaaS). The capability provided to the consumer is to use the provider's applications running on a cloud infrastructure.
- Platform as a Service (PaaS). The capability provided to the consumer is to deploy onto the cloud infrastructure consumer-created or acquired applications created using programming languages and tools supported by the provider.
- Infrastructure as a Service (IaaS). The capability provided to the consumer is to provision processing, storage, networks, and other fundamental computing resources.

In recent years, cloud computing has emerged as one of the fastest-growing segments of the information technology industry. The ability to leverage economies

of scale, geographic distribution, open source software and automated systems to drive down costs makes cloud computing an attractive option for businesses [4].

Obviously, cloud computing environments have IT risks in common with any externally provided service. There are also some unique attributes that require risk assessment in areas such as data integrity, recovery and privacy, and an evaluation of legal issues in areas such as e-discovery, regulatory compliance and auditing [6].

Several researchers have used cloud computing for verification. According to YogeeeshA.C, Roopasharee H.R, anjan Punith B.G,Rajesh.B ,they developed a model foe authorization of certificates in Government sectors using cloud computing Environment. They designed and developed a model where a user can request and administrator can authorize certificates through online several sectors [8].

II- METHODS AND MATERIALS

In this study the methodology we used was to develop a prototype which is used cloud computing model to provide online certificate verification (OCV). OCV is an automatic web-based certificate verification that allows digitally to verify the accreditation of the submitted certificates and it is available system for companies and government institution such as ministries and the project areas that require verification services. It's also on-demand, for self-managing the evidences of certificates by providing an automated platform, allowing institutions to quickly, easily and accurately manage certificates.

The proposed system can overcome all the limitations of the existing system to reduce the time involved in verification of certificates by utilizing the unique certificate serial number provided by the student and in return the original details of the certificate are displayed as text form.

A- System requirements

The system requires many different materials including hardware material and software programs, the most important requirements are the following

1- Hardware requirements

i. Personal computer (Minimum: dual core 1.4 GHz (x64 processor), 2 GB RAM or more, 10 GB or greater of HDD free space, SVG Color Monitor).

2- Software requirement

i. Operating System: Windows 7 and More
ii. Dependencies: JavaScript
iii. Browser: Internet Explorer 9 or high, Firefox or Chrome.
iv. Web Server: Apache 3.2.2 (Xampp Server)

B- Current system and limitations

Certificate verification method that is prevalent today is a manual process, in this process the institution or organization that want to verify a certificate will have to travel or trip to the university or send a written request so as to verify certificate.

The limitations we have in traditional method is complex manual processing and a lot of time consuming to get feedback regarding a request for certificate verification, in some cases no feedback is provided at all.

The proposed system provides proper security, reduces the manual work and saves a lot of time. This system is an automated secure verification that is available for anyone who wishes to verify the accreditation of certificate.

OCV system offers convenience to the users and considerable ease to employers as they can get provision of certificate easily and more quickly than conventional methods of manual verification.

C- Development environment

A front-end is responsible for implementing visual elements that users see and interact with in a system. Front-end web development will be used hypertext preprocessor (PHP), Hypertext Transfer Protocol (HTML), Cascading Style Sheet (CSS) and JavaScript (JS). A back-end web developer is responsible for server-side web application logic and integration of the work front-end developers do. The back end will be used MySQL which is used to design the databases.

So, the OCV system will be an online application using webserver to be developed in PHP as front end and MySQL server as back end.

III- SYSTEM ANALYSIS AND DESIGN

The figure shown below describes the general overview of the system with the most important entities in the system beginning from employee information generating to end point of calculating data and print reports.

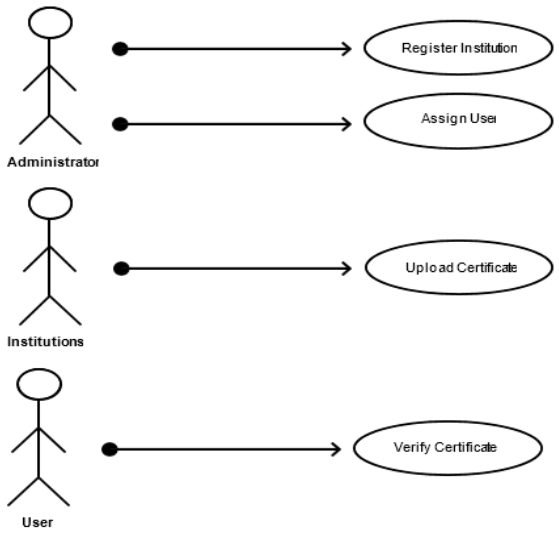

Figure 2 UML Diagram of Use case diagram

The administrator can add a new Institution and assign a new user with proper privileges.

After getting the account, the institution will now be able to upload and manage their certificates. This part of uploading function allows the institution to add new certificates.

The user can either be recruiters, institution, and any other organization. This part of verification function allows the user to check validity of the certificate.

IV- IMPLEMENTATION AND TESTING ENVIRONMENT

The system has user identification and access control functionalities so as to guard against sniffing and hacking. Also, these features would help to prevent anyone without the proper authorization to gain access into the system.

The figure shown below is the first page that the user can visit when entering the system, user can either be recruiters, institution, and any other organization. This includes part of verification form allows the user to check validity of the certificate.

To verify the validity of the certificate user should select the institution from the list of institutions in the dropdown, and type serial of the certificate in the input box then submit the verification button.

If the certificate is valid, the system replies the confirming message and some information about the certificate to the user.

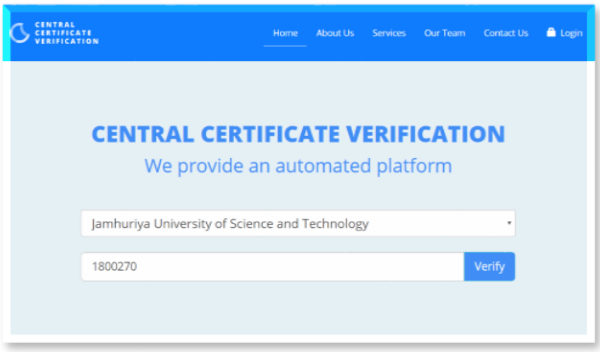

Figure 3 Verification Section Screen

If the certificate is not valid, the system replies by displaying the certificate number and error message of the validity of the certificate.

Figure 4 Invalid Certificate Screen

The system has another feature of upload a new certificate(s) by allowing institutions to upload a new certificate(s) in order to verify others.

If the uploaded certificates have already existed in the system, the system shows an error message. Then the system displays the upload form of the Institutions, and the user goes to step two.

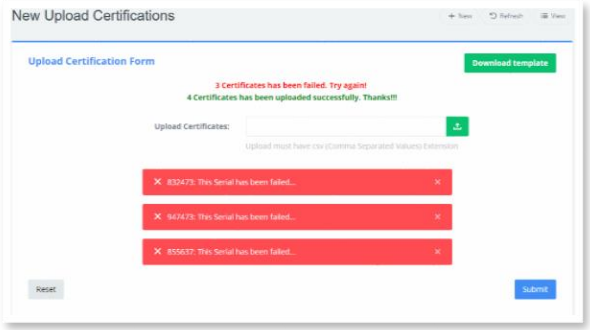

Figure 5 Upload Certificate Screen

Here is some implementation code as shown the following figure.

```
extract($_POST);
if(isset($submit))
{
  if (!empty($_FILES['upload'])) {

    $file_name = $_FILES['upload']['name'];
    $extension = explode(".", $file_name);

    if(strtolower(end($extension)) == "csv") {
      $file = $_FILES['upload']['tmp_name'];
      $handle = fopen($file, "r");
      $info = "";
      $display = "";
      $bool = false;
      while ($data = fgetcsv($handle, 1000,",")) {

        If ($bool != false) {
        $date = strtotime($data[6]);
        $addt = date('Y-m-d', $date);

        $date = strtotime($data[7]);
        $grdt = date('Y-m-d', $date);

        $query="insert into certificates(Ser_No, Student_Name, Degree_Type, Faculty, Department, CGPA,
          Admission_Date, Graduation_Date, Ins_ID) values ('$data[0]', '$data[1]', '$data[2]', '$data[3]', '$
          data[4]', $data[5], '$addt', '$grdt', '" . $_SESSION['insid'] . "')";
        If(!$con->query($query))
        {
```

Figure 6 Implementation Code

V- CONCLUSION & DISCUSSION

Finally, this research work is an effort towards elimination of fake certificates in learning institutions and reduces instances of academic fraud.

The main objective was to develop an automated secure verification system to overcome all drawback consequences about student certificate in terms of confidentiality, availability and security and also minimize the consequences of using manual processing about the time taken to approve accuracy of certificates.

VI- RECOMMENDATION FOR FUTURE WORK

It is recommended that a more elaborate and extensive research be conduct by including other kinds of certificates such as primary and secondary certificates, professional certificates, and birth certificates. Features to be include are follows:

- Institutions to be verified before they use the system by certification authority.
- To explore and store all information about students to keep track in past records.
- All the academic certificates to have scanned to provide link of image to the database.

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