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Certificate Generation System

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***Abstract*: This paper presents an e-certificate generation system with elegant template designs that contributes to the environment by saving trees and organizational resources with concise planning and effective management of records. The system is not only designed and developed to save paper but also to organize the distribution in an effective way to minimize aberration and speed up the process 100 times it usually takes with a simple and user-friendly design interface. This research work enables an end-user to choose their desired certificate template and template format without any prerequisite knowledge just by clicking a few buttons and typing from the system GUI.**

***Keywords*: Certificate, Certificate generation, Certificate template, Certificate verification, Participant, Template format.**

1. Introduction

The usage of computer software is widespread. Several organizations perform their daily activities more efficiently using applications founded by the use of computer science knowledge. Certificate Generation System can be used in various universities to automate the distribution of digitally verifiable mark sheets of students to ease the work. This system verifies the participants' information from the access database and generates the certificates of all the participants in a portable document format.

The paper [2], elaborates research which aims to simplify the work of clerks working in different sectors that do not have any knowledge in database management, they could still use this application to get vast amounts of different reports generated from data stored in databases. This can be implemented in numerous places where databases are used for storage and where various unpredictable reports need to be generated. Using this ASGRT application it becomes very easy to make a template for a new report without making a change in the application logic, also this can be used in various sectors where database data gathering needs to be automated.

The system is also designed and developed to dynamically generate certificates based upon the user's entered information. Information of the participants can be imported, deleted, and added for effective customization. It also provides the availability of elegant built-in templates to meet user needs and enlivening the participants for their mesmerizing talent and innovative ideas. The certificates generated in bulk would be downloadable in a compressed format. The system provides user interface design for user experiences to achieve great results.

Such primitive systems are highly scalable and developed for medium cap and large-cap industries with a large horde of employees working in the industry. A login and signup system are available to authenticate the access to the users for the accounts. The user needs to enter the organizational details and create the event for the generation of certificates. The user is asked to select the templates amongst the available template designs. The participant details would be entered by the user and the generated certificates can be imported in bulk in zip format.

In this paper [1], they have proposed an application called Automated Batch Certificate Generation and Verification System ABCGVS which has been developed based upon client-server technology which can also be used in many other works. With the coming of client-server technology, many frameworks are being developed leading to a phenomenally decrease in the expense and the time for building up an application. The main focus is on improving the processing time needed for the generation of a certificate and verification systems by enabling multiple certificates. It allows the end-user to define their desired template and template format.

2. Literature Survey

In this paper [3], they have presented research reviewing a certificate generation system that is flexible for the generation of report-cards and mark sheets of students. The system is mainly based upon database technology for fetching data of students and the credit-based grading system (CBGS) which makes the report more understandable to the users. This paper has also elaborated that the development of the system focuses on describing the tables with columns/rows & sub-columns, sub-rows, rules of data selection for calculating credits, and summarizing exam data. The developed system mainly targets various enterprises, schools, colleges, and universities for the generation of certificates in bulk. The system accesses the student's information related to exams and their performances in various events from the university database and generates the gadget-sheet and mark-sheets which defines the overall performance of the student in each sector. The system generates it in a portable document format which can be verified easily and provides the authenticity of the document.

The paper [4] presents a survey reviewing Digital Vault

facility, by applying the concept of Digital signatures that employs asymmetric cryptography. This paper proposes a system that consists of a DigiVault [Digital Storage] website that can be linked with different websites of various government departments. They have also elaborated that, the documents generated by the government can be digitally signed and can also be verified by government authority entitled for the same purpose. It implemented the concept of Public Key Infrastructure. The certificates serve as an identity of an individual for a certain purpose, e.g. a driver's license which identifies someone who can legally drive in a particular country. Document Validation will be provided at the user end where he wants to apply for certain government documents like Pan Card and Licenses or if one wants to apply for Visa.

This paper [5] elaborates on a survey about the Blockchain, it is a distributed database that is widely used for recording distinct transactions. It is the fundamental technology underlying the emerging cryptocurrencies which also includes Bitcoin. The key advantage of the blockchain is that it can help establish a disintermediary peer-to-peer (P2P) transaction. The transaction is added to a block when a certain consensus among different nodes is reached, this block already holds records of several transactions. Each of these blocks contains the hash value of its respective last counterpart for the connection. All the blocks are connected and together they form a blockchain. Data are distributed among various nodes (the distributed data storage) and are thus decentralized.

This paper describes a new blockchain-based system that reduces the certificate forgery. Automated certificate-granting is open and transparent in the proposed system. Companies or organizations can rely on the information on any certificate from the system. This paper presents a system that saves on paper, cuts management costs, prevents document forgery, and provides accurate and reliable information on digital.

In this paper [6], we discuss database security and how to handle it. This paper has described a new method that protects the database using dynamic certificates that works for each query to be sent to the database. This paper has truly focused on the conceptual and logical design, also it has described the implementation of a graphical user interface for the stages of the database life process.

. The dynamically generated query is more secure as the query is not sent to the database in its pure form it is sent in a very long and encrypted string. Thus semantically and syntactically equivalent queries generated using the Dynamic certificates have proven to be much more efficient than the pure queries fired by the user. This method can be run on any database. If the attacker attacks the database he/she will get the encrypted schemas that make the query processing for them a complicated process. Dynamic certificates not only provide data and query confidentiality but also make the database system secret and secure.

3. Block Details

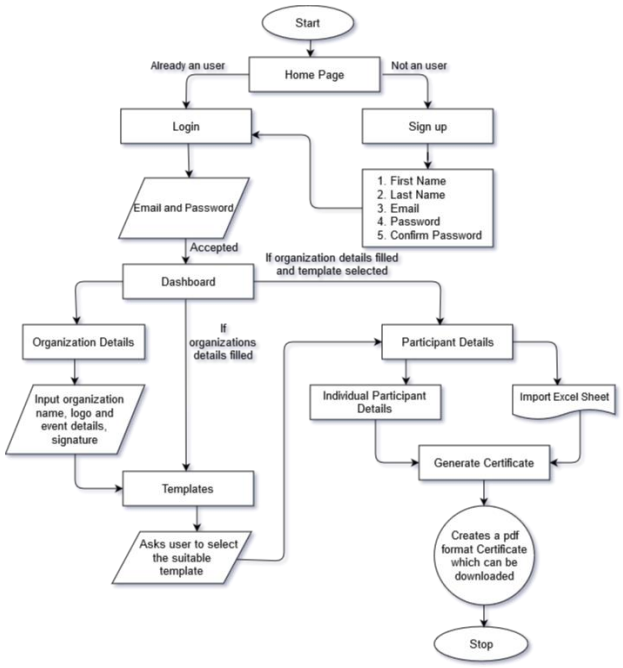

Fig. 1. Block diagram of the system

4. Implementation

The proposed system provides the facility to either upload the details of the participant in the form of a CSV file or add the participant details manually. The system consists of an amazing, elegant certificate template designs to appreciate the participants with enlivening content. The certificates can be downloaded in the compressed format based on the entered information. These certificates can be saved (in PDF format) and exported in bulk based on inserted information the participant. The implementation of the project of the certificate generation system is majorly divided into three main phases.

1. UI/UX design
2. Designing and Modeling of a database structure.
3. Development of backend.

A. Website Design

The first step of implementation for our project is designing the user interface for a fluent and seamless user experience with simplicity. The functional elements of the web design are navigation, speed, animations, user interactions, site structure, and cross-browser and cross-device compatibility and are highly scalable with 5ms of loading speed.

The UI/UX design of the web application is designed using the bootstrap four libraries in CSS and its awful components such as mobile responsive navigation bar, modals, cards, and carousels.

The functional elements of the web design are navigation, speed, animations, user interactions, site structure, and cross-device compatibility.

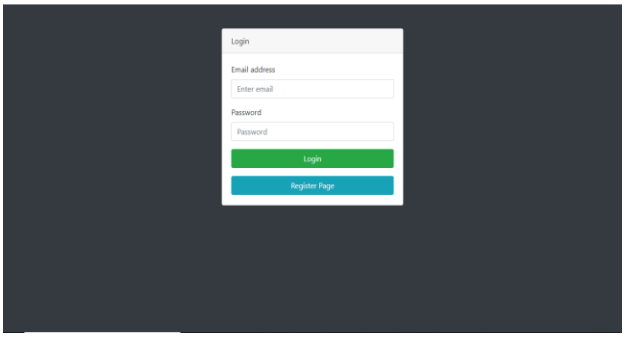

Fig. 2. Login Page

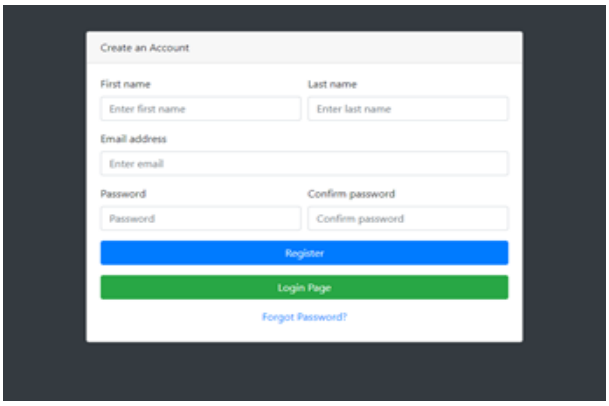

Fig. 3. User Registration Page

Templates of these certificates may vary to different organizations and can be provided at the end of a given contract, project, and desired objective or certain intervals of the project, contract, or achievement of the desired goal.

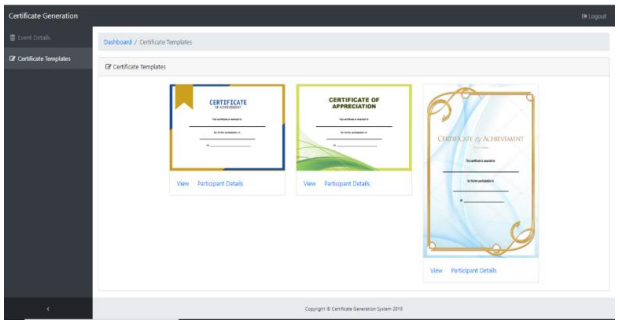

Fig. 4. Certificate Templates Page

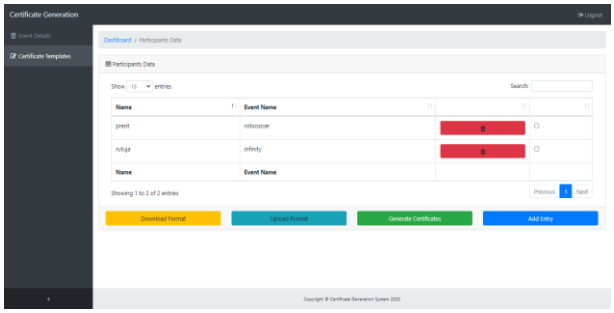

Fig. 5. Participant's Detail Page

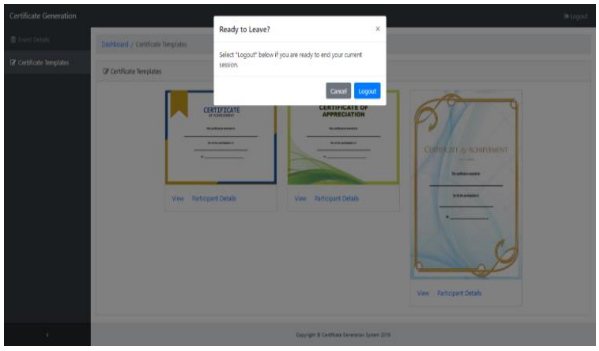

Fig. 6. Logout Confirmation Modal

B. *Database Design*

The next most crucial step of this project is designing the database. There are three entities of the database structure that are Account Details, Organizational Details, and Participants Details.

The following are the snapshots of each of the entities with their structural properties and their codes in SQL to design the structure.

```
CREATE TABLE `organization` (
  `id` int(11) NOT NULL,
  `org_name` text,
  `event_name` text,
  `auth1` text,
  `auth2` text,
  `auth3` text,
  `desig1` text,
  `desig2` text,
  `desig3` text,
  `email` varchar(356) DEFAULT NULL
) ENGINE=InnoDB DEFAULT CHARSET=latin1;
```

Fig. 7. The query of Organization table

The reason behind creating the organization table/entity is to store the data of the events/organizations created by the registered users to dynamically generate certificates. The credentials asked the user by the system at the time of creating an event/organization are first organization name (org_name), event name (event name), authorization 1 (auth1), authorization 2 (auth2), authorization 3 (auth3) and their respective designations (i.e., desig1, desig2, desig3).

C. *Backend Design*

Back-end development refers to the server-side of an application and everything that communicates between the database and the browser. The primary focus in backend development is on the working of the website.

The back-end architecture designed for the proposed system of certificate generation is based upon the synchronous request handling send by the clients to the server. The back-end is designed and developed by using the language PHP in an object-oriented module with the MVC (Model View Controller). Now, let us first explore the MVC coding pattern and then will know how the MVC pattern is implemented in back-end development.

We have used the concept of PDO i.e., PHP data objects

which is useful in preparing secured database queries. Also, the basic secure validation for the users has been done with the help of the concepts of session and cookie. A session creates a file in a temporary directory on the server where registered session variables and their values are stored. This data will be available to all pages on the site during that visit. A session ends when the user closes the browser or after leaving the site, the server will terminate the session after a predetermined period.

Fig. 8. Generated e-Certificate

5. Conclusion

We have generated an e-certificate generation system which gets the information regarding the event such as event name, organization name, organizing authorities, and their designations by the user. All this essential information with proper algorithm design and architecture leads to the successful result of the enlivening certificate to appreciate participants and students. The system saves on paper, cuts management costs, prevents document forgery, and provides accurate and reliable information on digital certificates.

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