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Integrated ICT Systems Over Sustainable Cloud Environment

Ashima Narang[1], Shalini Bhaskar Bajaj[2], Priyanka Vashisht[3], and Aman Jatain[4]

[1,4]Assistant Professor, Department of Computer Science and Engineering, Amity School of Engineering and Technology, Amity University, Gurugram, Haryana, India
[2]Professor, Department of Computer Science and Engineering, Amity School of Engineering and Technology, Amity University, Gurugram, Haryana, India
[3]Associate Professor, Department of Computer Science and Engineering, Amity School of Engineering and Technology, Amity University, Gurugram, Haryana, India

Correspondence should be addressed to Ashima Narang; ashimanarang04@gmail.com

ABSTRACT- In the traditional education management systems, records of current or former users are maintained by public or private organizations. And these records are in the institution or ministry that students attend or attended. And these records are maintained conventionally. If a user wants to transfer from one organization to another, the candidate's records may transfer along with the organization, but some education records may remain at school or education department. Or when they apply for further delegation, the process of applying and verification of the certificate takes too much time. In the traditional education management system, every educational department maintains data with their own database for keeping the records. Now it is very difficult to know the complete previous or present record of a student in the different organizations. And if we want to, then we retrieve their entire data from their concern educational departments, which takes a lot of time.

For better management, there are such software which are available in the market, but schools or institutions find it difficult to retrieve the exact information from the system and managing the system with tons of student records, technical management of the software and the more users makes the system more complicated. The purpose of this paper is to describe the design of a cloud base digitized academic system for improving current traditional education system.

KEYWORDS- Digitization, Cloud, Verification, Tracking, Academic records

I. INTRODUCTION

In the conventional education system, education records concerning current and former candidates are maintained by public, private, and parochial schools/Boards/Institution. Education records contain details of a candidate under certain fields, like candidate's name, address, contact information, grades, discipline reports, attendance report, school attended, courses taken, awards bestowed, and degrees earned.

Education records can be used for several different purposes. For example education records can be used when candidates apply for college or want to apply for any scholarship program, or even sometimes it needed to verify their educational documents. Generally, education records are settled at the school/Institution the candidate attends or attended. In the conventional system these records maintained in paper. If a candidate transferred from one institution, the candidate's education records could transfer with the candidate, however some education records may stay at Institution the candidate attended within the past. Or perhaps once a candidate needs to use for any sort of scholarship or job, they once more raise the candidate to verify and attest these papers that make the method terribly time consuming.

With the evolution of the Internet, mobile phones, mobile apps, tablets, laptops, and alternative fashionable devices, things are getting more digitalized in today's world. The rise of technology, which began in the late half of 20th century has brought some serious changes into education and learning. After the revolution of technology automation conception came in education conjointly. It's been discovered that for keeping the records each board/Institution maintains their Own data in very serious size. This is often thanks to the very fact that the data not simply holds the candidate mark sheet, however, also maintains attendance, achievement, Migration certificate and so on.

In conventional education management each board or department maintains their own information for keeping the records. It's very troublesome to grasp the entire previous record of the current candidate in the Institution. If we wish, then we tend to retrieve their information from their concern Board or department and its time taken process. Although such software is available in the market, institutions or educational boards find it difficult because the software does not cover or match the functional requirements of each board.

The planned work tries to bridge this gap, it aims at planning general purpose software package for obtaining complete education records of the candidate from the establishments wherever a student studied supported single distinctive number, and the student may be tracked and verified simply based on single unique QR- Code.

II. LITERATURE REVIEW

The EMIS (Education Management data System) department of Ministry of Education is accountable to supply statistics reports of the present scenario of the education sector. Mr. Irfan Safi,Kabul, who is accountable of EMIS department said that "base on their analytical report from the central EMIS database presently over nine million children are registered at school in year 2021(including over 3.5 million girls)". On an average every year around 300,000 students are graduating from schools and only on an average around 55,000 students are graduating in the capital of the country. Now these students need graduation certificate on time so that they can apply for scholarships or private colleges, but unfortunately these documents do not process on time. On an average every year only Indian government gave 1000 scholarships for higher studies for foreign students but due to late document circulation and verification most of the candidates can not apply for these scholarships.

Sayed Rahman Salamzai who is in charge of Directorate of Results & Certificates said that "Mostly candidates miss the opportunity because of their name is misspelled in the documents from the beginning and when all the documents comes to our directory, at the end of our domain experts match the hard documents and they sees candidates name are misspelled, so now the student must correct all the documents from zero to the end from school and repeat the process and because of the bureaucracy in the offices it takes time and that's one of the case where a candidate miss the opportunity for applying scholarship". And he also mentioned that because of the bureaucracy and conventional education management candidate's documents does not come on time to their directory so it happens each year the number of documents printed are does not match to previous year but its accurate that every year around 300,000 students are graduating from schools. In 2020 they printed 250,000 certificates but it happens that in past they also printed around 500,000 certificates.

Fake faculties or establishments are another problems that offer fake certificates to candidates in line with **(M. T. Ahemad, 2018)** mentioned in his paper that UGC publicize an inventory of faux universities and institutions that were operational round the country.[1] Nine universities in Uttar Pardesh and Dehli with sixty six fake facultieswhich offered courses. And there have been total of 279 such institutes listed. He conjointly mentions that not only faux universities however also well-known institute can value around seven to eight hundred thousand to produce fake documents to candidate. There are connected FOSS systems that are most relevant to the planned automated student record management system. Though it's open and free, customization of the system would be troublesome considering that every institute operates uniquely. Among these connected systems are the following:

(M. D. C. Saquin and D. E. Marcial, 2016) Many software are available in the market for students records management and Fedena is one of the them.[2] Fedena is multi-purpose faculty management software package utilized by thousands of educational establishments worldwide for all administration, management, And learning-related activities. Moreover, Fedena is a free and open faculty management software package developed by Ruby on Rails framework. Its web-based application that's being developed by Foradian Technologies. Fedena is used by the Education department of Kerala state to modify the system and method over 15,000 colleges within the state and later named as Sampoorna.

(OpenSIS, 2021) The system referred to as openSIS is one in every of many free and open-source student info systems offered for the K-12 program and for education institutions.[3] The answer was on the verge of development for several years, showing to possess the practicality that very long time business versions even have today. This type of solution could be a 100% web-based application, features a polished look, a good deal of needed functionality and seems to be user friendly as is discovered on its on-line demo website. The system is developed and maintained by Open Solutions for Education; it is written within the PHP programming language and uses the MySQL for backend system to store information.

(C) (Njamu O & Ugwu C, 2013) mentioned a web-based application, this software system was used for management and processing of data/information for each student in the school during a seamless and interactive manner.[4] It soles the necessity of chase student's tutorial performance progress at every level furthermore as alternative managerial activity. The look of the system adopted a client/server technology. The client side was developed with Visual Basic.NET and therefore the server side was designed with MYSQL. This method provides a three-year performance analysis for college kids of a given program.

The development of the proposed system also included to implement the system within cloud computing environment, during development of the proposed system agile methodologies are used to speed up the development process.

III. USING AGILE METHOD IN CLOUD COMPUTING

(G. G. Miller) Agile development is based on iterative and incremental approach, where each iteration is expressed within a time frame with usual duration of 2-4 weeks, and increment is functional product that is delivered at the end of repetition [5].

Agile software development helps us in continuous form, and cloud computing continuously delivers products to buyers. Cloud computing helps us to provide tools and infrastructure in very short period for teams which are working in agile mode, while team provides continuous value to the buyer using the cloud.

(K. Beck et al) Agile manifesto says: "Individuals and interactions over processes and tools" [6].

It means that tools don't limit the interaction. But the goal is to minimize focus on tools, which is one of the main advantages of cloud computing. In traditional approach, it requires to coordinate efforts and preparing user, installation process, then assuring certain number of administrators who have local installations of product to upgrade their environment and after that, transitioning to often exact process of upgrading. Connecting agile methods with cloud is combination which lowers development time, expenses, and improves productivity.

The benefits and gains of agile development with cloud computing can be seen in many phases of agile development. These benefits can affect many parts, steps

and characteristics which are connected to agile development, so it could develop application faster and the quality of the application is better. The benefits can be seen through:

a) Infrastructure
b) Model sharing
c) Frequent communication
d) Application development lifecycle
e) Testing and Integration
f) Prototyping and demo versions

(A. Sayeed, N. Hassan, and M. Muttoo) Cloud computing and agile methodology are very suited to each other because it lets you get valuable functionalities to your customer very quickly, collect customers feedback, and make quick changes base on those feedbacks. This fast-track development cycle, is a basic benefit of cloud computing, areimpossible to implement in the conventional development mode because of the huge costof distribution. [7].

When using agile methods without cloud, high and ongoing capital expenses are required in advance, which includes software licenses, upgrade of current software, purchasing ofhardware, improving of network infrastructure, tools for testing, security products etc. But when we connected to cloud, the need for risky infrastructure investment plan is removed, software and hardware infrastructure is supported, where developers can implement application 11 directly without exceeding the software and hardware infrastructure. This mean that resources allocation can get bigger or smaller depending on demand. Since one of the main reasons of project failure is lack of communication between all participants caused by non-existing of tools, where cloud can solve this problem. During early development stages, different projects participants have differentrequirements which leads to communication gaps. Cloud based situation enables group sharing, commenting and it helps to improve different models what significantly leads to lowering gaps between duplication.

(Avison, D. & Fitzgerald) Until 1960 systems were developed lacking any clear information system development methodology. And these practices had number of challenges including user satisfaction, cost, time and scope perspective. [8]

After this era Systems development life cycle have been introduced to understand the software development process. And these attempts were mainly done to improve the quality and standards of a software during and after its development by referencing challenges of the previous ordinary era.

Flow of agile development for whole project is shown in as below (figure 1):

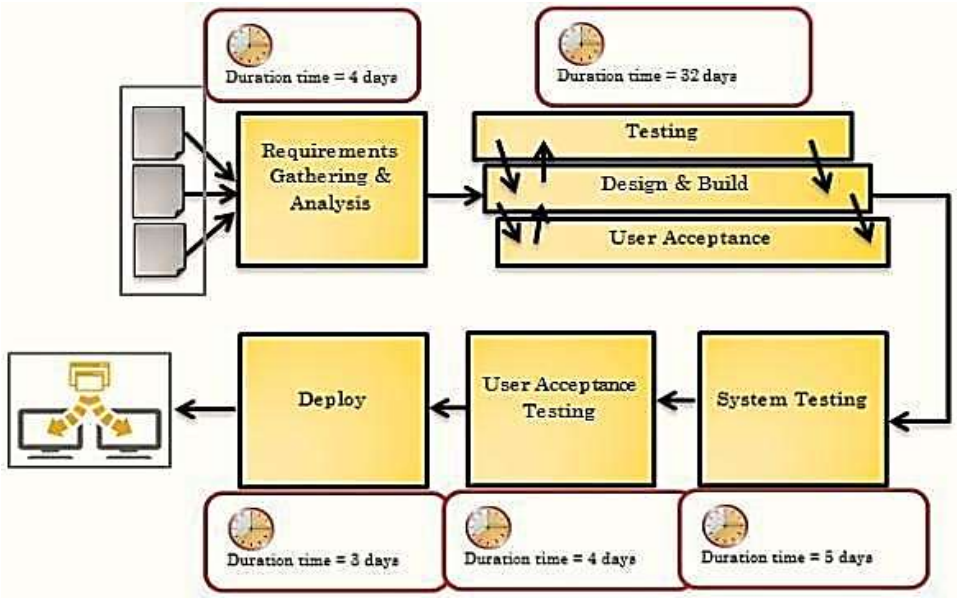

Figure 1: Agile Development for whole project[6]

a) It shows phases of agile development with specific time and fig. 2 show the difference between applications which are developed with and without cloud computing.
b) Shorter duration in agile development with cloud are result of utilization of all possible benefits of this concurrence. The benefits are:
c) It improves communication using cloud based software or tools like Skype, Zoom, when during holding a meeting regarding some functionalities of the application, since maybe client wasn't able to attend the meeting. And sharing documents or performing different questionnaires, Google Docs and Google Forms can be used.
d) Using Visual Studio, Atom or other IDE as working environment, development of the system is made easier. There are various plugins available in each IDEs which helps the developers to work in short time.
e) Due to tools incompatibility, it happens to stop the project in the beginning until the problem was solved. This cause delay of project and it increases the project expenses.
f) Since the implementation is done on the cloud

automatically so the expenses, time and effort is lowered rather than the traditional system implementation.

(M. Mousaei) stated that there is some delay in availability to cloud platforms, but using agile methods and cloud computing we can overcome these delays and we can increasethe speed of the continuous integration with release cycles because there are many available of resources in the cloud.[9].

Cloud computing speed up the development process with agile methodology using virtual machines, cloud base services also provide processes to software where it created with automated testing. There are many different benefits and opportunities to boost agility in the software development process with using cloud computing.
The following features of cloud computing boost global agile development:

Software testing support: **(M. Manuja and Manisha)** cloud can provide multiple of test servers [10]. It helps the developers to get tension free from the availability of a server for testing purpose.

a) Virtualization: **(I. Inayat, S. S. Salim, and Z. Mk,)** It is a characteristics of cloud which enable a user, to set services of cloud infrastructure as per their requirements. Agile development is based on small iterations so it facilitates parallel development [11]. Scalability of cloud allows a user of the cloud to change the size of the cloud e.g space and processing.

b) Feedback: **(A. Nazir, A. Raana, and M. Fahad Khan)** The main aim of agile development can be achieved very easily using cloud computing. Team members can communicate and share the code among each other when it needed. [12]

c) Performance: **(Salesforce.com)** Agile method support decentralized environment so the decision can be taken at the different level of development [13].It helps to increase performance and also provide parallel processing environment for development.

d) Build & other services: Virtualization help a developer can test and build at anytime. Cloudforce.com, google app engine or even amazon web services provides infrastructure to develop, test and deploy.

e) Transparency: Pre-integrated cloud services help team members to share resources, these services repetitively receive and save the data and avoid lapses.

f) Traceability: A minor change in code will be reflected globally, because cloud provide central traceability. These changes can be viewed and overserved in each and every level of the organization and the customer can also get update due to instant deployment.

g) Prototype: cloud provides instant deployment and it makes it easy to share prototype with customers and receive the feedback.

IV. PROPOSED WORK AND SYSTEM IMPLEMENTED

In this digitalized world within the education sector there's a challenge before of the government, its vital get the entire candidate education details. During this affiliation each government is giving a lot of importance and inspiring with all style of support to adopt and use of ICT applications in their respected departments and areas.
This software will demonstrate how to get complete educational records of any student. This will be done by developing a public portal on the internet which is linked to the central digitized database of the software. System will assign a unique QR-code to each candidate's record to retrieve the candidate's information in the online portal.

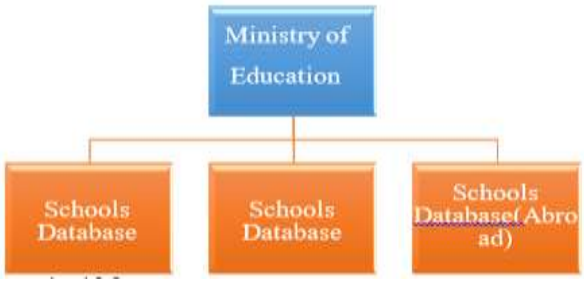

Figure 2: Data Flow and connection

Mostly in every country nowadays electronic ID card system is implemented and inside ID card for every citizens of the country a unique is given which they carry forward for their rest of life. Now during creating the profile of the student this unique electronic ID card number will be saved in the system which will prevent duplications in the system will also stop fraud in the education system. The mentioned proposed system are have different filtering options, by entering the unique electronic number or roll number, the system will search that number in the database and will get only specific result which isrequested in the search bar.
A user-interface could be a set of commands or menus through that a user communicates with a program. Screen layout is one among the various attributes of the system once it involves its user-friendliness. It ought to be designed in such the simplest way that the users will navigate through the system quickly and easily. It should conjointly give a transparent recognition of the task that users ought to perform.

Figure 3: System Layout

System layout shown in Fig. 3, shows the main menus and icons of the system. It would be used for creating students profile, including marking, shows percentage, total amount of the students base on gender, look up table configuration, user and role management.

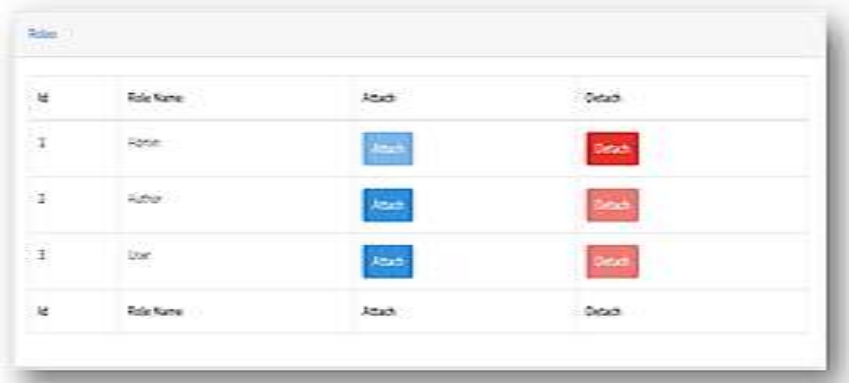

Figure 4: Users Role

V. CONCLUSION

After an intensive analysis of the matter and design, the planned digitizing academic records over cloud was successfully developed. The system is usable and acceptable by the users as manifested within the usability and acceptance testing. However, there's a requirement to enhance the performance of the manual system specifically on the requirement to improve interval of the processes. The planned system will improve the performance, management and security of the registrar's services, alternative modules are often additionally supplementary to the system by rising and simplifying current ancient record management. The planned system is efficient, effective, and user-friendly. it's excellent in terms of usability and accessibility.

By adopting technology and my proposed work in education sector then we will simplyget complete academic records of the candidate; we can easily determine faux institutions, fake certificates, and additional significantly it scale back verification time.

CONFLICTS OF INTEREST

The authors declare that they have no conflicts of interest

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ABOUT THE AUTHORS

Dr. Ashima Narang has completed her Btech, Mtech and PhD in the field of computer Science from various prestigious institutes of India. Her areas of expertise include Cloud Computing, Security, Software Engineering and Virtualization. She has rich teaching experience of 11 years. She has published numerous research papers in reputed international journals and conferences and has guided students for projects from undergraduate and graduate courses. She is also an active member in the various professional bodies like IAASSE, internet society, SCIEI etc. She is the reviewer to various journals from her expertise field.

Dr. Shalini Bhaskar Bajaj completed her Ph.D, from IIT Delhi, M.Tech ,from Delhi College of Engineering, Delhi University. She has more than 20 years of experience in teaching. She has authored numerous technical research papers and book chapters in international conferences and journals of repute. Her research interest are Databases, Data Mining, Predictive Analytics, Pattern Recognition, Cloud Computing. She is Member of IEEE, CSI and IAENG

Dr. Priyanka Vashisht has received her Ph.D from Thapar University, Patiala, M.Tech from Banasthali Vidyapeeth, Rajsthan. She has 20 years of teaching and industry experience. Her areas of expertise include Cloud Computing, Fog Computing and Virtualization. She has authored numerous technical research papers and book chapters in international conferences and journals of repute. She has authored a book. She has 4 patents in her name. She is member of IETE, CSI and ACM.

Dr. Jatain has received her Ph.D from NCU (formely ITM) University, M.Tech from Thapar University, Patiala and B.Tech from M.D U Rohtak. She has more than 14 years of teaching and industry experience. Her research area includes software engineering, Data Mining, Networking, Machine Learning and Optimization techniques. She has authored numerous technical research papers and book chapters in international conferences and journals of repute. She is member of CSI, IETE, IEEE and ACM.