

Modified Random Select Algorithm To Fulfill Conditional Execution Via Cloudsun Simulator – A Comparative Study With Conventional Technique

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Abstract

Quality of exam paper and examination produce quality life to a student and also shows the quality of the academic institutions. Hence exam question paper play vital role in student's life in the academic institutions. It is used to measure student's knowledge and quality of teaching. In the academic era question paper preparation give lot of challenges and difficulties to the academic institutions. In this work we are implemented exam question bank software with help of cloud computing technique (SaaS) software as a service. Today cloud computing provide high quality output in all area. This question bank software using a modified random select algorithm for find the unique questions and it is completed with help of CloudSun simulation tool which is already developed and successfully implemented by us [1]. Aim of this paper produce quality of exam paper with help of cloud computing technology.

Keywords: *random select algorithm, cloud computing, cloudsun, exam question paper setting, question bank*

1. Introduction

An academic institution getting the questions and answer keys from the staff members and keep the hardcopies in safety lockers. This kind of paper based question paper system staff members need to spend huge time and effort. Handwritten question details should be keep very safe otherwise the question maybe a chance to leaks. The question answer keys need to verify and scan then it will take number of copies depending on the requirement. Sometime the answer key wrongly filed with valuation bundle, this type of situation the staff member come and get the correct answer key. We are facing following problems in the question process unclear printout, unreadable, wrongly wrote the subject code, unclear diagrams and unmatched questions. This question process chance to leaks and waste the papers and staff member valuable time. Hence we go for question bank system to avoid the problems with help of cloud computing technique (SaaS) software as a service.

2. Related Works

They proposed an architecture for cloud based online examinations system. The old examinations system is being changed this new system due to cloud advantages [2]. They used an algorithm for generating the question paper with pattern defined and similar questions may not be picked in two subsequent exam [3]. They presented a feedback tool with help of an Intelligent Automatic Questions Generation System and compared this system with human generated questions [4]. In this paper they use randomization technique to generate the question papers with several modules like Login, Professor, and Administrator [5]. They created AQG prototype system and tested in a real time application with high-school students and compared with manually generated questions [6]. They generate the questions according to user defined hardness levels [7]. They developed web based online examination system and uses t B/S model and support to upload the resources [8]. In this paper they proposed online examination systems by using a smart forms distribution algorithm for

eliminating repetition of questions [9]. They proposed JAVA based online test with question management and question paper generation system [10].

3. Existing System

In the earlier days of Kalasalingam University, we are getting the question paper from the question course handling staff members and external experts. The COE office provide question paper typing schedule to the concern department. Staff members prepare question paper and answer key by hand written copy. If the staff members once completed the hand written copy then evaluated by the concern department course coordinator and HOD. They provide suggestion and fine tune the question paper. After this quality checking the concern staff come and type the question paper at COE office's Data Centre and submit the hand written copy. Completed question papers send to question printing press and take printout as per COE given schedule. The printed question papers keep in question safe locker. The answer key scanned and take printout then give to the concern evaluator. This process following each examination.

4 Bench Mark Problem Identification

a) *Version and Font miss match:*

We are using Microsoft word for the question process. Some external type the question paper in older or newer version of Microsoft word and they are using variety of fonts. Especially we facing lot of trouble in Tamil and Hindi fonts in the printing press.

b) *Alignment problem:*

Question alignment take more man power and time to COE office. Hence we allocate more desktops and different version of Microsoft word software to align the words, equations and images of the question papers. Some mathematical equations can't able to align without the concern question typed staff members. If we done some major alignment again shows that question to the staff member. This process take extra time if the staff member in leave, attend conference and other medical reason.

c) *Virus Attack:*

The word document attacked by any virus, that document convert to unknown format of symbols or unable to open. Hence we again get the question from concern staff.

d) *Portability Problem:*

The internal staff members prepare the hand written copy at any secure place and only type the question paper at COE Data Centre due to some security purpose. So staff spend extra time to take and type the questions and staff members wandering from place to place.

e) *Human Errors:*

Staff members don't update higher authority's given corrections, wrong images, typographical mistake, repetition of question in the consequent exams, incomplete question and prepare the question unsecure place (prepare at in front of student) affect the quality of question paper.

f) *Unreadable:*

The answer key scanned and give the Xerox copy to the evaluator. Some unreadable or unclear hand written answer key affect the student's marks. The answer key scanning process take extra time and hardware resources.

g) *Question Repeat:*

We are conducting 3 internal exams (Sessional-I, Sessional-II, Sessional-III) for 50 marks and 1 external exam (Endsem) for 100 marks examination. Hence we need 4 questions for regular and 1 question arrear examinations. The staff members repeat the questions in the subsequent examinations.

h) level of Question:

The level of question is denote the question hardness like Easy, Medium and Tough. We are following 30% (Easy) + 40 % (Medium) + 30 % (Tough). But some questions not satisfy the above rule.

i) Course Outcome (CO)

We are using course outcome based system. Hence we need to ensure the CO in the question paper whether properly applied or not. This checking process take lot of time for the staff members so they can't able to complete the question paper as per given schedule.

5. Proposed System

In the proposed system we overcome the above mentioned problem with help of cloud computing software as a service (SaaS).The proposed system we mainly focus the following criteria quality, security, portability, availability and simplicity.

Quality:

Staff type the question and answer key at the same time with course outcome (CO) and Programme outcome (PO) details. Staff can insert questions to the question bank with units and question mark wise (2, 8, and 16 marks...).

Security:

The users can access and modify the question as per the given wrights. There using four wrights, that is Read, Write, Modify and Delete. All the question bank's activities are recorded and can be restored if required.

Portability:

Users can access question software anywhere and anytime and it is developed with the technology of responsive web design for automatic screen resizing. Hence the user can use Desktop PCs, Tablet PCs and Smart Phone.

Availability:

All type of fonts, equation and default alignment available with online word processor textbox. It is automatically aligned if the staff past the content from other resources such a Microsoft word and PDF.

Simplicity:

Minimize the staff's valuable time and energy. Minimize hardware utilization to promote the green computing and save electricity. Maximize the utilization in smart way.

a) Architecture:

Question architecture contain following components. Question View: the question view forward the end-user request to the question controller and shows the requested result. Question Controller: this controller provide the data as per the security norms with help of question model. Question Model: it is get the data from the data base as per the controller guidance. Database Server (Name-Dell PowerEdge T440, Processor- 2.10GHZ Intel XEON 4110 CPU *2, RAM- 128GB, HDD-10TB raid): it is contain question bank datum with firewall production. Web Server (Name-Lenovo MT-M:7X10, Processor- 1.37GHZ Intel Bronze 3106 CPU , RAM- 32GB, HDD-2TB raid): it is contain application of question software with firewall production. Database and Web server connected with public, local and WIFI networks with generalized Sophs firewall.

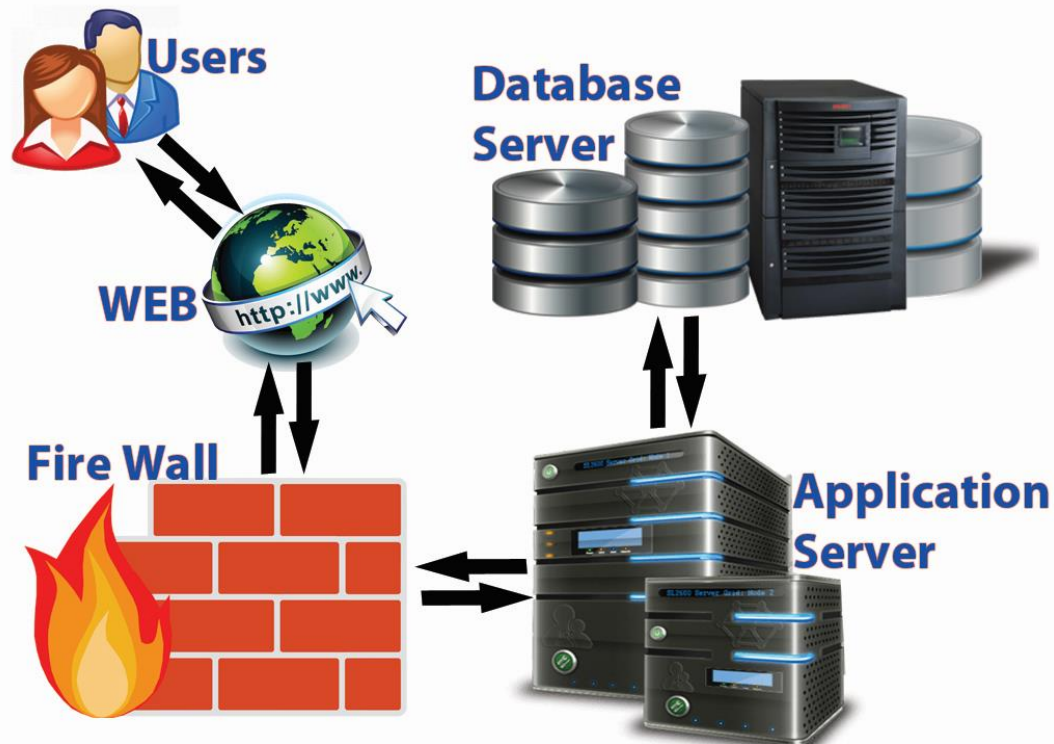


Figure 1. Architecture

b) Implementation:

Level of access rights provide for Admin, Curriculum PC, Course Coordinator, Module Coordinator, Programme Coordinator and Question Printing Officials. The admin assign the Question Printing Officials and Curriculum PC. The Curriculum PC assign Course Coordinator, Module Coordinator and Programme Coordinator. There are two type of approval process followed I. Individual Question Approval and II. Exam Wise Question Approval.

I. Individual Question Approval:

The course coordinator type the questions as per the bloom taxonomy. Each question contain following details 1.Topic, 2.Pattern, 3.Level of Question, 4.Marks, 5.Question, 6.Answer key. 1. Topic contain CO (Course Outcome) number, Unit number and Topic details. The CO and Topic details feed from the separate module from the user. 2. Pattern contain Remember, Understand, Apply, Analyze, Evaluate and Create details as per bloom taxonomy. 3. Level of Question contain Easy, Medium, and Tough. 4. Marks contain mark details like 2,8,16...etc. 5. Question and 6.Answer key contain text file to feed the question and answer key. The word processor support all kind of mathematical equations and fonts. The user can attach images and copy, past the data from some other Microsoft word, PDF sources. Once the course coordinator completed a question which send to module coordinator approval. If module coordinator approved then its send to programme coordinator approval. If module or programme coordinator rejected that question again send to course coordinator for correction work then continue the approval process.

II. Exam Wise Question Approval

The course coordinator select the exam and fill the following data 1.Question Part Name, 2.Question Number, 3.Question Sub. Number, 4.Question Topic and 5.Marks.For example course coordinator generate question for Sessional-I

Table 1.Exam Mark Details

Marks	No.s	Total
2	5	10
16	2	32
8	1	8
Total		50

Once the course coordinator generated a question which send to module coordinator approval. If module coordinator approved then its send to programme coordinator approval. If module or programme coordinator rejected that question again generate by the coordinator then continue the approval process.

Algorithm Selection:

Here we are using CloudSun tool for chose the best algorithm for generating the question papers. We test random select algorithm and modified random select algorithm and compare the result. For the simulation work we use 140 questions with following parameters course code, question no, question, topic, pattern, level of question and marks. Hundred 2 marks, twenty five 16 marks, fifteen 8 mars questions used Out of 140 question. As mentioned earlier, we used CloudSun simulation tool to select the finest algorithm for question bank software. Here use two VMs (D1_H4_VM1, D1_H2_VM1) and use 140 question data for simulation input. CIS: The cloud registry catch the question information of available resources such a parameters course code, question no, question, topic, pattern, level of question, marks data center, VMs and task details. The Task Scheduler obtain information from cloud registry (CIS) then assign the task to VMs (virtual machines). The Task Scheduler complete the given algorithm tasks and the question data store to database.

a) Random Select Algorithm

The 5 set of questions generated for Sessional-I exam with random select algorithm. We are facing two major problems when using the random select algorithm. They are I. Repeat Questions and II. Level of Question

Table 2.Repeat Questions

I. Repeat Questions			
S. No	Question Set	Question	Marks
1	5,2	Question37	2
2	2,3	Question67	2
3	1,3	Question110	16

In this table Question37 repeats in 5, 2 question sets, Question67 repeats in 2, 3 question sets and Question110 repeats in 1, 3 question sets.

Table 3.Level of Question

II. Level of Question				
S. No	Question Set	2 Marks	8 & 16 Marks	Question Type
1	1	Easy 1, Medium 2, Tough 2	Easy 0, Medium 1, Tough 2	Tough
2	2	Easy 4, Medium 0, Tough 1	Easy 2, Medium 0, Tough 1	Easy
3	3	Easy 3, Medium 2, Tough 0	Easy 0, Medium 1, Tough2	Tough

4	4	Easy 2, Medium 2, Tough 1	Easy 1, Medium 1, Tough 1	Medium
5	5	Easy 2, Medium 2, Tough 1	Easy 1, Medium 1, Tough 1	Medium

In this table there is no one question as normal. It is totally not satisfy the level of question's aim.

b) Modified Random Select Algorithm

From the last simulation results and studies we modified the Radom Selection Algorithm for select unique question with Topic + level of Question wise. The topic contain CO and Units details. This algorithm not show last 5 exam printed question to the user.

Where GQ is Generated Question, T is Topic, LQ is level of Question, Pattern is P and NLP is last 5 exam not print Question.

$$LQ = 30\% (\text{Easy}) + 40\% (\text{Medium}) + 30\% (\text{Tough})$$

$$GQ = \text{Random} (\text{NLP} + \text{T} + \text{P} + \text{LQ})$$

Here we generated 5 set of questions for Sessional-I exam with modified random select algorithm. Compare to previous results there is no problem found in the modified random select algorithm. It is fulfill our all requirements in generation of question paper.

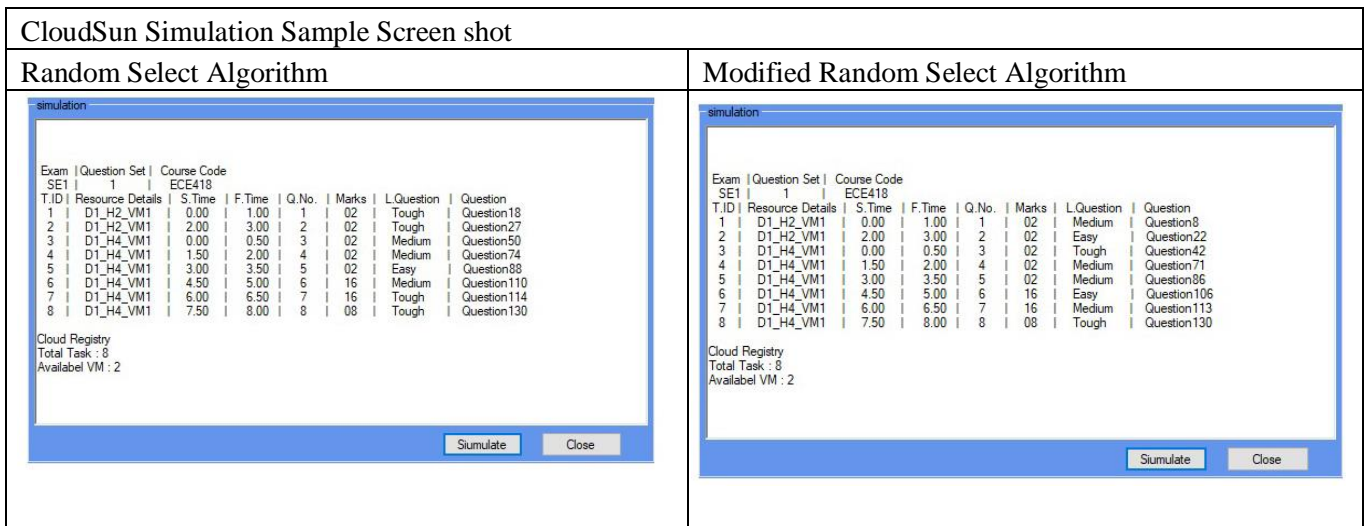


Figure 2. CloudSun Simulation Sample Screen shot

The above two figures (CloudSun Simulation Sample Screen shot) show the simulation output results of Random Select Algorithm and Modified Random Select Algorithm.

The COE provide exam schedule for the university exams. The course coordinator compile the question from the question bank followed by the bloom taxonomy with Modified Radom Selection Algorithm. After the question compilation the user can view the print preview of printing press's view screen. Compiled questions send to module and program coordinator for approval. If they not approved the compiled question it is not send to printing press and again send course coordinator for the correction work.

The COE office printing press have lot of security features in hardware as well as software. Printing press desktops are USB, internet blocked and the browser only support the question printing URL. The Question Printing Officials only view the compiled questions before 1 hour from the exam start. Printed Questions packed with secure cover and sealed then keep in the question locker in the exam schedule manner then question transport official get the question from question locker and keep in briefcase. The briefcase send to the exam centre with security guard by secured vehicle. The above

process monitoring by COE and his team by straight as well as CCTV. After reached exam centre the exam center in-charge give the question to invigilators. The invigilators open the sealed questions in front of students and distribute the question as per COE given schedule.

c) Work flow:

In time work is the motto of the COE office for the quality of examinations. The COE office following three strategy to successfully complete the examination that is Planning, Allocating and Executing. *Planning:* The COE and his team planning the examinations and exam schedule for the academic semester. Provide the schedule for Sessional-I, Sessional-II, Sessional-III, End-sem, Makeup and arrear examination. *Allocating:* Allocating the course coordinators, module coordinators, programme coordinators, invigilators, exam halls, transport vehicles, security arrangements, hardware-software-team, exam centre heads and flying squad for above planned work. *Executing:* upload the exam schedules and student's seating arrangement to web and collect the questions from the staff member as per given schedule for the corresponding exams. In very exams grooming the question bank with help of internal and external staff members.

d) Pseudo code:

1. Find request
2. Find auth
3. Find approve
4. If auth& approve! = 0
5. Print Question
6. Else
7. Exist
8. End if
9. Return

In the pseudo code if the request occur then the controller find the level of authentication and approved question status whether true or false. If true print question else return to index page.

6. Comparison Metrics

The comparison metrics contain 4 parts (1) Old Approach (2) New Approach (3) Comparison Results (4) New Approach with CloudSun. For the comparison we take 768 questions in the Sessional-I examination August-2019. Old approach typed 334 at data centre and get 50 questions from external expert. New approach completed 384 questions.

(1) Old Approach:

The old question paper system the staff members type the question paper at Data Centre with hard copy. They also bring required images by pen drive then our system admin scan & upload the image to question typing desktop. 9 clerks are allotted 5 in Data Centre with 25 desktops and 4 in printing section. In the Sessional-I exam faced some troubles as per the Table-1 Old Approach. There are 62 problems Out of 384 questions entries. In the external question 3 version, 1 alignment and 6 fond miss matched out of 50. From the 334 internal question 23 alignment problems and 2 scanned answer keys attacked by the ransomware (GEROSAN and ACUTE). 7 staff members not get the module or programme coordinator sign hence they again went to them department and get sign due to portability problem. From the 18 human errors 7 staff members bring incomplete question, 5 staff members not intimate the additional requirement like clerk's table or graph sheet, 6 staff member not bring answer key, 2 staff members answer key not readable (some words), 3 question papers repeat the questions in 2 and 8 marks section. In the level of question 5 question papers not compromise the procedure. The course outcome system not followed by 2 questions.

(2) New Approach:

In the new approach almost overcome the problems of old system. 4 clerks used in printing section and it's just contain 11 human errors. 1 staff using Windows XP with older browser hence trouble to see the submit button, 5 staff get error message due to poor network connectivity from them home, 2 staff submit without attach an image, 3 staff members wrongly give approval without seeing the print preview.

(3) Comparison Results:

Table 4. Comparison Results

Sn	Parameter	Old Approach	New Approach
1	Exam	Sessional-I	Sessional-I
2	No of Questions	384	384
3	Resources	25PC/9 clerks	(not provide at COE office)./4clerks
4	Version Miss Match	3	-
5	Font Miss Match	6	-
6	Alignment problem	24	-
7	Virus Attack	2	-
8	Portability Problem	7	-
9	Human Errors	18	11
10	Unreadable	2	-
11	Question Repeat	3	-
12	Level of Question	5	-
13	Course Outcome	2	-
14	C Time	13440min	2304min
15	CU Time	930min	33min
16	W Time	3840min	-
17	T Time	18210min	2337min

In the Table-1 contain 14 parameters to compare the old approach and new approach, where C Time: Actual completed time, CU Time: Correction Updated Time, W Time: Wandering Time, T Time: Total Time.

$$C \text{ Time} = AQCT * TQ$$

$$CU \text{ Time} = ACQCT * TCQ$$

$$W \text{ Time} = AWT * TQ$$

$$W \text{ Time} = C \text{ Time} + CU \text{ Time} + W \text{ Time}$$

Where AQCT is Actual Question Completion Time, TQ= Total Questions, ACQCT is Actual Correction Question Completion Time, TCQ= Total Correction Questions, AWT is Actual Wander Time.

From the chart new system provide optimized and desirable results. Compare to the approach Resource 30 %, Human error 34%, C Time 12%, CU Time 2%, T Time 11% and other parameters are 0%. The new approach provide better results in all aspects.

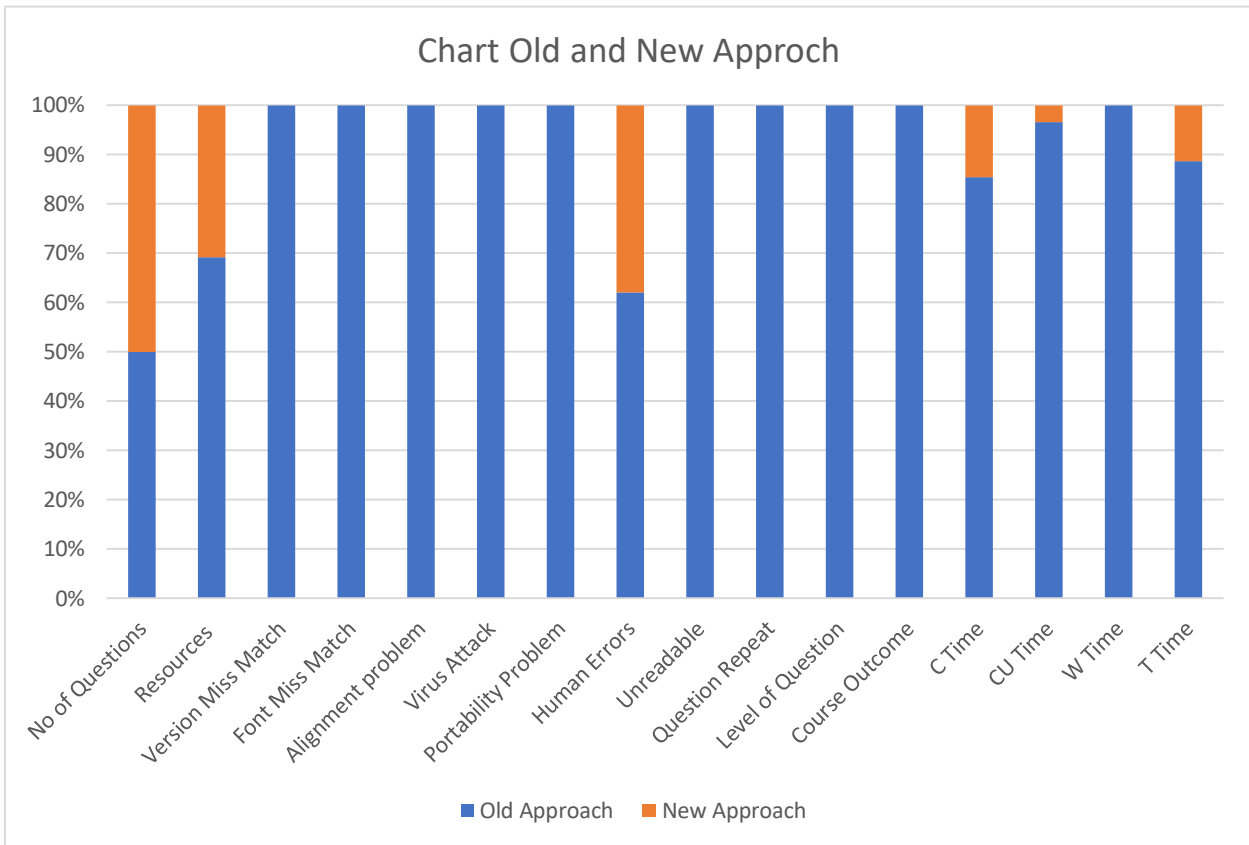


Figure 3. Old and New Approach

7. Conclusion

The question bank software successfully implemented and presently it's working very well. The CloudSun tool used to select the modified algorithm and it is very useful for find the customized unique random questions. This software provide quality questions within time and reduce the time and manpower. Now totally avoided the paper based question preparation hence we save trees, money and promote the green environment. The level of verification and approval process fine tune the question paper. Some of our staff members complete the question bank with their mobile phone so the user don't need a desktop, this kind of approach save the power, hardware resources and promote the green computing. Presently we are conducting the examinations smooth, error free and securely. In the future we are going to implement this system in amazon cloud.

References:

1. A.Sundar, Dr.B.Sankaragomathi, Dr.M.PallikondaRajasekaran "Development and Experimentation of New Indigenously Developed Algorithm to Handle Virtual Nodes to Simulate the Cloud Tasks" 2017 International Conference on Advanced Computing and Communication Systems (ICACCS -2015), Jan. 06 – 07, 2017, Coimbatore, India.
2. Prasad, Arunasish Acharya "An Architecture of Cloud Computing based Online Examination System ijct_2012-Tarkeshwar "ISSN : 0976-8491 (Online)
3. Ashok Immanuel, Tulasi.B "Framework for Automatic Examination Paper Generation System" ISSN : 0976-8491 (Online).

4. Ming Liu MING.LIU@SYDNEY.EDU.AU Rafael A. Calvo, VasileRus "An Intelligent Automatic Question Generation System for Academic Writing Support" doi: 0.5087/dad.2012.205.
5. RasikaDhondibhauDhavale, Dr. M.Z.Shaikh "Automatic Test Paper Generator with Shuffling Algorithm" ISSN (Online): 2320-9801.
6. Laszlo Bednarik, Laszlo Kovacs "Implementation and assessment of the automatic question generation module" CogInfoCom 2012 • 3rd IEEE International Conference on Cognitive Infocommunications • December 2-5, 2012.
7. Rahul Singhal, ShubhamGoyal, Martin Henz "User-defined Difficulty Levels for Automated" 2016 IEEE 28th International Conference on Tools with Artificial Intelligence
8. Zhang Yong-sheng, Feng Xiu-mei, Bao Ai-qin "The Research and Design of Online Examination System" DOI 10.1109/ITME.2015.96.
9. Hussein Al Bazar "Forms distribution algorithm for online examination systems" 2017 8th International Conference on Information Technology (ICIT).
10. M. Mojesh, J. Aravind Reddy, N. Anudeep "Research on Online Examination System " E-ISSN : 2348-2273.