Design and Development of Result Tool for University and College Exam and it's Performance Study

Samiksha Nikam

College of Computer Application for Women, Satara, Affiliated to S.N.D.T. university, Mumbai
nikam_samiksha@rediffmail.com

B.T. Jadhav

Department of Electronics and Computer Sciences,

Y.C. Institute of Sciences, Satara, Affiliated to Shivaji University, Kolhapur,

btj21875@indiatimes.com

***Abstract*- The result system tool is designed and developed for result sheet and mark sheet preparation with various report required at University level and College level. The system is useful for the exam department of the institute and college for handling various transactions of result preparation. System's task starts with registration of student and selection of subject. After that examination forms are filled for respective semester. Next steps of marks entry and result calculation are carried out respectively. Performance of the tool is measured with the help of windows XP performance tool.**

The tool developed has better performance with good scalability and resource sharing. Designed tool is tested on standalone machine and it is user friendly.

Keywords – System performance, Windows-XP, Result tool, Scalability, Resource sharing

I. INTRODUCTION

Exam depart of any institute or college plays very vital role .The increasing complexity in examination work in today's universities is due to number of students, various faculties, semester pattern and grading system. The increase in complexity means additional administrative work and data processing system. To meet the growing needs of exam department as a result formulated new innovations, techniques and methods and streamline the complexity of operations, there is a need of good software tool.

A tool is designed to computerizing existing result system. Existing system is prone to lot of paper work; therefore it is very difficult to quick generation and search for particular student's status. Thus objective is to reduce various problem by totally computerizing system. Designed tool helps to prepare result sheet as well as mark sheet and other various reports. It minimizes documentation, paper work and no duplication of records. Result tool improves speed of work, save time and money. It helps to generate accurate and quick result. The performance of tool is tested. It has good scalability and it gives less stress on system.

II. SYSTEM DEVELOPMENT

The study aimed to develop a computerized result tool to streamline complexity in existing university and college exam system. The problem areas are as follows:

- The analysis of the present exam system.
- The design of the result tool system.
- Selection of the computer system and performance study of the designed system.
- Analysis of designed system
- Improvement in designed system.

Following are the objectives of the system development.

- Reduced paper work
- Minimize documentation and no duplication of records.
- Improve speed of work
- Save time and money
- Store large amount of data
- Get desired result accurately
- Quick and exact result generation
- Making searching easy.

III. WORKING

Result tool is developed to prepare result and mark sheets. In the existing manual system there are chances of errors while calculating result. Presently instead of traditional result calculation system many universities adopted gradation system. New system required lots of calculation to get final grade of the student. Hence the entire result system is time consuming for manual work. But the most important requisite is that results are in time and accurate. Hence to fulfill the need of exam department computerized result tool is developed.

The main difficulties found in existing system are as follows.

- Large number of data redundancies.
- Information searching is difficult.
- Cannot recover dues effectively because no proper tracking.
- Less accuracy.
- No handy information available.
- Chances of data loss and data missing.
- Huge paper work.
- Difficult to maintain large number of registers.
- Difficult to find list of A.T.K.T. student appearing for exam subject wise.
- Any updating in previous record will affect those records that are based on previous one.
- Manual Grade, Grade Point (GP), Grade Point Average (GPA) and result status calculation is not always correct.

A. SYSTEM DEVELOPED

System development life cycle (SDLC) is a process uses during the development of any system. SDLC consists of four main phases: analysis, design, implement and testing. During analysis phase, context diagram and data flow diagrams are used to produce the process model of a system. In system development life cycle (SDLC), a system model can be developed by using Data Flow Diagram (DFD). DFD is graphical diagrams for specifying, constructing and visualizing the system. DFD is used in defining the requirements in a graphical view **[1],[2],**[11].

DFD's are easily understands by technical and nontechnical users. It shows the flow of data from external entities into the system, showed how the data moved from one process to another, as well as its logical storage.

In data flow diagram, the highest-level view of the system is known as context diagram[7], [10]. It is common practice for a designer to draw the **context level DFD** first, which shows the interaction between the system and external agents which act as data sources and data sinks. Components of a System Context Diagram are shown in Figure 1.

Context Diagram represents entities such as**,**

- **University**
- **Principal**
- **Clerk**
- **Student**
- **Exam Department**
- **Teacher**

These entities interact with result system. Entities on the left hand side supply information to the system and after processing that information result is send to specific entities mentioned on the right hand side. It represents highest level view of the system. [1], [2].

The context diagram shows the entire result system as a single process, and gives no clues as to its internal organization. The purpose of a result system context diagram is to focus attention on external factors and events that should be considered in developing a complete set of system requirements and constraints.

System context diagram can be further expanded to detailed designing of result tool.

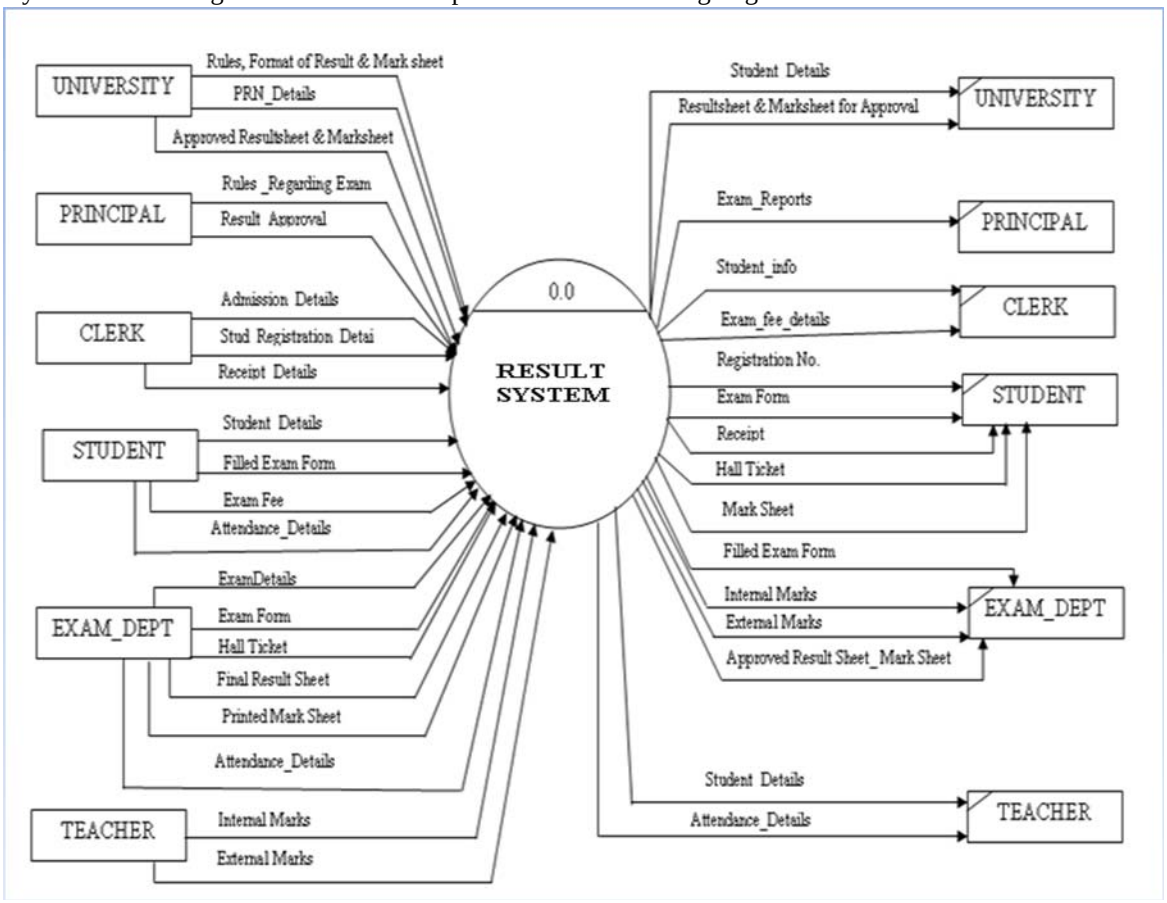

Figure 1. Context Level Diagram

B. MODULES DESIGNED

Following are the different ten modules designed for result tool according to System Context Diagram (SCD) shown in fig.1. There is a provision for inclusion of additional modules if required.

- **Student registration**: - This module is used to collect all required information about student.
- **Exam_Code_master**:- It is used to enter details such as semester, month, year, no. of student appear for exam.
- **Subject_master**:- It is used to entre subject details. For example there are six subjects for each semester with particular code given by the university. Therefore Subject_master will record subject names with their codes.
- **Exam_form**:- This module is used to accept student and exam details for which student are going to appear.
- **Hall Ticket**: - This module is used to prepare examination hall ticket according to exam form filled by the student. Hall ticket contains student's name, exam seat number, subjects names with code and rules regarding exam.
- **Receipt**: - Receipt is generated after payment of exam fee by the student.

- **Attendance Sheet**: - This module generates subject wise or semester wise list of students going to appear for exam.
- **Mark Entry**: - This module is used to enter internal and external marks of the student given by respective examiner.
- **Result sheet calculation**: - After entering internal and external marks this module calculate total marks, grade point (GP) for each subject, average grade point (GPA), percentage, final grade and result status like pass fail or A.T.K.T.
- **Mark sheet**: - This module is used to prepare mark sheet of the student.
- Various reports can be generated according to the need of the user.

IV. PERFORMANCE MEASURE

Performance is one of the most important aspects concerned with the quality of software. It indicates how well a software system or components meet its requirement for timeliness [5], [9]. Performance is the degree to which a software system or components meet its objective for timeliness. Performance is an important quality attribute but unfortunately it is give less attention during development [8], [9].

There are two important dimensions to software performance timeliness; **Responsiveness** and **Scalability.** Responsiveness is ability of software to meet its objective for response time or throughput .The response time is the number of events processed in some interval of time. Scalability is the ability of software to continue to meet its response time or throughput objective as the demand for the software function increases [5]. The scopes of performance include responsiveness and scalability [8].

In software engineering, performance testing is testing that is performed to determine how fast some aspect of a system performs under a particular workload. It can also serve to validate and verify other quality attributes of the system such as scalability, reliability and resource usage [14].

Resource sharing is very common in computer system. Resources are any physical or logical entity that software needs for its execution [4]. Processor, memory and hard disk are the three basic components which affect the performance of a computer system.

Developed Result tool's response time or throughput is considerable. Here we concentrate on scalability and resource usage parameter. To check scalability and resource usage capability of developed tool consider three basic resources of computer system that is,

- **Processor,**
- **Memory**
- **Hard Disk.**

To measure scalability and resource sharing parameters we use have used performance tool of windows XP. The windows Task Manager provide a quick snapshot of system performance. A more robust system tool, the **performance console**, allows us to monitor a much longer list of performance metric than is available in windows Task Manager [13]. We log performance data to disk files and export it to programs like Microsoft Excel for detailed analysis we set "alerts" that causes windows XP to take specific actions when performance threshold are crossed, and monitor remote systems as well as local machine.

Windows xp tools for monitoring performance are,

- **System Monitor snap–in -** To track resource use and network throughput.
- **Performance logs & Alerts snap-in** - To collect performance data over time from local or remote computer.

V. EXPERIMENTAL STUDY OF DEVELOPED TOOL

Processor, memory and physical disk are essential components of computer system for performance measure. These factors influence structural characteristics of any software. To carry out an experiment we use a computer system with specifications Intel Core™2 CPU4400 @2.00 GHz, 500 MB of RAM with result tool

installed on it. Other essential software is installed on system. We create a counter log file which contains counters shown in TABLE I.

TABLE I. COUNTER TABLE

OBJECT	COUNTER SELECTED	PURPOSE
Memory	Available MBytes	It is the amount of physical memory available to processes running on the computer, in Megabytes.
Memory	Pages/sec	It is the rate at which pages are read from or written to disk to resolve hard page faults.
Processor	%Processor time	It is the percentage of elapsed time that the processor spends to execute a non-Idle thread.
Physical disk	Avg. Disk Queue Length	It is the average number of both read and writes requests that were queued for the selected disk during the sample interval.

During experiment counter log file stores values at the interval of five second for defined counters. We record following performance data for 300 sec duration in 61 readings as shown in Table 2.

TABLE II. EXPERIMENTAL PERFORMANCE DATA

OBSERVATION NO.	DATA SAMPLES TAKEN	AVAILABLE MEMORY(MB)	PAGES/SEC	AVG. DISK QUEUE LENGTH	% PROCESSOR TIME
1	12:31:34	160	99.31912	1.08E-08	99.99993
2	12:31:39	163	94.44935	0.069219	2.180685
3	12:31:44	149	393.8175	0.671829	4.53125
4	12:31:49	153	806.4365	0.292487	5.46875
5	12:31:54	152	5.000222	0.007521	0.15625
6	12:31:59	152	34.60151	0.04472	0.3125
7	12:32:04	151	36.20165	0.031891	0.3125
8	12:32:09	151	0	0.000165	0
9	12:32:14	151	0	0.000194	0.3125
10	12:32:19	151	88.60386	0.025732	2.34375
11	12:32:24	152	0	0.000191	0
12	12:32:29	152	0	0.00013	0
13	12:32:34	152	0	0.000149	0
14	12:32:39	152	5.600247	0.005384	0.15625
15	12:32:44	152	0	0.000191	0.3125
16	12:32:49	152	276.0122	0.067286	2.34375
17	12:32:54	152	19.20084	0.002012	0.15625
18	12:32:59	152	0	0.000156	0.3125
19	12:33:04	151	34.80152	0.027768	0.46875
20	12:33:09	152	0	0.000142	0.3125
21	12:33:14	152	0	0.000148	0.3125
22	12:33:19	152	244.0107	0.082848	2.5
23	12:33:24	152	0.800036	0.002096	0.3125
24	12:33:29	152	0.600026	0.001604	0.3125
25	12:33:34	152	0.400018	0.003532	0.15625
26	12:33:39	151	12.00054	0.037948	0.3125
27	12:33:44	151	1.800078	0.004911	0.46875

28	12:33:49	151	290.6133	0.084318	2.65625
29	12:33:54	152	0	0.000139	0.46875
30	12:33:59	152	0	0.000205	0.46875
31	12:34:04	151	7.800344	0.030728	0.15625
32	12:34:09	150	3.80017	0.026356	1.25
33	12:34:14	150	0	0.000145	0
34	12:34:19	150	260.2115	0.099532	2.65625
35	12:34:24	150	0	0.0002	0.15625
36	12:34:29	150	0.200009	0.002558	0
37	12:34:34	150	0	0.00017	0.46875
38	12:34:39	150	0	0.000153	0
39	12:34:44	150	0	0.000229	0
40	12:34:49	150	380.2166	0.110025	2.5
41	12:34:54	150	0	0.000193	0
42	12:34:59	150	5.200234	0.011098	0.3125
43	12:35:04	150	0	0.000211	0
44	12:35:09	149	0	0.000166	0
45	12:35:14	149	0	0.000141	0
46	12:35:19	147	348.0157	0.153861	2.5
47	12:35:24	149	0	0.000226	0
48	12:35:29	149	0	0.000145	0.15625
49	12:35:34	148	1.400063	0.005025	0.46875
50	12:35:39	148	0	0.000151	0
51	12:35:44	148	0	0.000201	0
52	12:35:49	144	272.4117	0.073419	1.09375
53	12:35:54	148	132.8062	0.097166	2.34375
54	12:35:59	147	0	0.000166	0.46875
55	12:36:04	147	0.400018	0.002141	0.625
56	12:36:09	146	0.200009	0.002525	0.15625
57	12:36:14	146	0	0.00015	0.3125
58	12:36:19	146	0	0.000157	0.3125
59	12:36:24	134	710.2293	0.539386	13.59375
60	12:36:29	133	1098.652	0.43791	34.84375
61	12:36:34	131	297.4128	0.417214	32.1875

VI. PERFORMANCE ANALYSIS

Performance analysis of the developed tool is divided into three basic steps: Data Collection, Data Transformation and Data Visualization. To perform these steps windows XP's performance tool is used. Data is collected in log file during execution of the result tool for specified counters shown in Table.1. Log file can be manually on or off. Performance data is stored at the location C:/PertLogs. Collected performance data can be export to the Excel file. Built in Excel data transformation techniques are used to reduce size of experimental data. For Data visualization Microsoft Excel built in graph tool is used. Experimental performance data is presented in graphical format against sampled interval.

By observing graphical representation of memory object we can mentioned from Fig 1 that during execution of result tool approximate 150 MB memory is available for use of other processes.

From fig 2 the conclusion is that size of pages /sec is approximately remain same. Additional bits are required while starting & ending a process. So we can see the spike at the start and end of operation. Graphical representation in fig 3 depicts disk performance. Average disk queue length value is negligible so there is no excessive paging and bottleneck while result system executes.

Cup performance is evaluated using a counter % processor time. This counter indicate the duration for which processor is busy in execution. Fig4 shows that % processor graph is approximately equal to zero. That means processor is not overloaded.

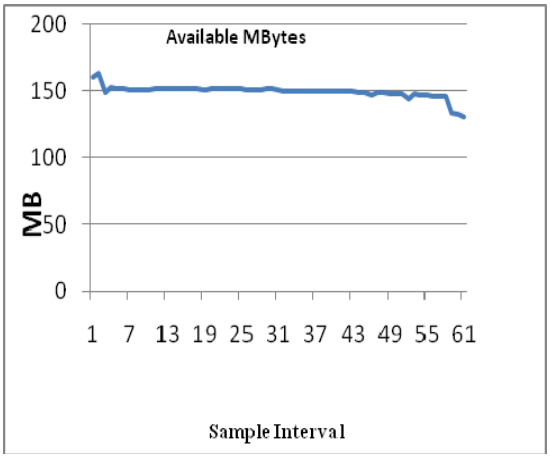

Figure1. Available Bytes In RAM

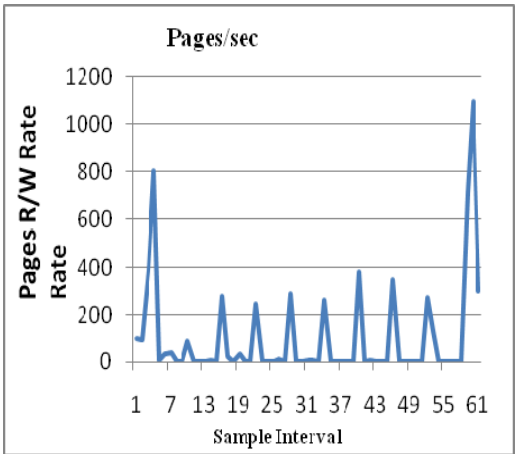

Figure2. Pages Transfer During Operation

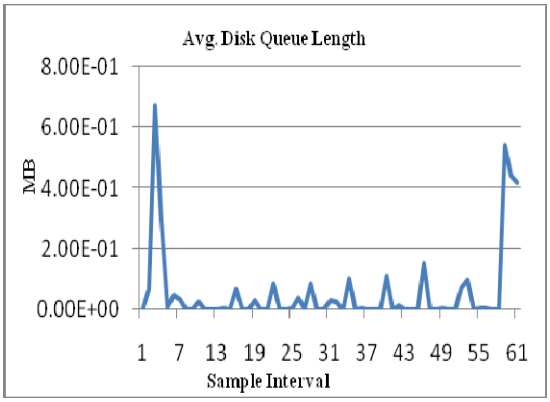

Figure3. Average Disk Queue Length For Hard Disk Drive

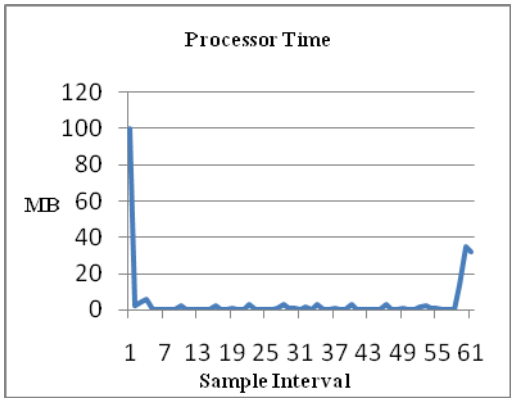

Figure4. Processor Execution Time

VII. CONCLUSION

The scalability of our result tool is considerable. Resources like memory, processor and hard disk are used while executing result tool. We noted that these resources are not used up to optimum level. But as data size is going to increase resources will be used optimally. We can add additional module to our system to handle growing needs. The developed result tool is user friendly.

REFERENCES

[1] K.S.R Anjareyuly., John.R. Anderson,"The advantage of Data Flow Diagrams for Beginning Programming",[2008]. Department of psychology. *Paper 19.* http://repository.cmu.edu/psychology/19
[2] Awad Elias M. -Structured System Analysis and Design – Second edition: Galgotia
[3] V.Babka,"Influence of Resource Sharing on Performance, Master Thesis.Charles University, 2007.
[4] V. Babka. , "Resource Sharing in QPN-based Performance Models ", WDS'08 Proceedings of Contributed Papers, Part I, 202-207, 2008.
[5] Xiang Gan,"software Performance Testing",Seminar Paper ,University of Helsinki,26-9-2006.
[6] Ibrahim K. El-Far and James A. Whittaker," Model-based Software Testing", Encyclopedia on Software Engineering (edited by J.J. Marciniak), Wiley, 2001.
[7] Jalani Atif A.A, Usman Mohammad , Nadeem Amer,"Comparative Study on DFD to UML Designs Transformations", world of computer science and information technology,ISSN 2221-0741,vol 1,No 1,10- 16,2011
[8] Omer Nauman Mirza,"Software Performance Evaluation using UML-PSI ", Master Thesis, IT University of Goteborg, 2007.
[9] Pressman Roger s. – Software Engineering: A Practitioner's Approach – Sixth edition;McGraw- Hill.2005.
[10] Rosziati Ibrahim, Siow Yen Yen," An Automatic Tool for Checking Consistency between Data Flow Diagrams DFDs)", World Academy of Science, Engineering and Technology 69, 2010.
[11] Rosziati Ibrahim and Siow Yen Yen," Formalization of the data flow diagran rules for consistency check",International Journal of Software Engineering & Applications (IJSEA), Vol.1, No.4, October 2010.
[12] Thomas Thelin,"Automated Statistical Testing Suite for Software Validation"
[13] Walter Glenn, Tony Northrup Installing, Configuring and administering Microsoft WINDOWSXP PROFESSIONAL – self paced training kit 2005 edition,
[14] Wikipedia, the free encyclopedia.