A Full Lifecycle Oriented Examination Transaction Management System

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***Abstract*—on teaching practice in tertiary examination management problems in research, teaching for the university examinations in all of professional characteristics and main problems JBPM based on full life-cycle management. Object-oriented method of establishing a comprehensive information system Examination model and architecture, using xml technology to establish a test described in business process templates and using JBPM process control technology, using asp.net technology platform interface, using Ajax and TCP / IP to achieve remote communication, Develop a common, flexible and full life cycle for online examination management integrated platform management model in the college application Examination success.**

Keywords-examination management; full life-cycle management; object-oriented; jbpm; ajax

I. INTRODUCTION

Product Full lifecycle management (PLM) is a management starts from the demand of the product to the end of the product life. As PLM is being used, it comes to the users that it is nearly impossible to achieve the objectives by starting from the view of product data management and not considering the overall resources and actual operation procedures[1][2][3][4]. Hence a new concept of management –Business Process Management (BPM) becomes the better alternative. Base on different operation environment, BPM does data analysis and process regroup in areas between people and people, people and system also system and system. Process management includes process modelling, process operating, process monitoring and process improving [4][5][6] . BPM focus more on "port to port" processes, it can operate over department, system, and users while used inside and outside the organisation, employees, customers, suppliers and co-operators all have the access of the system. Workflow is used as the IT solution in BPM, it is using certain amount of logic and regulations to arrange tasks in projects in orders, build computing modelling for calculations. Workflow is a part of Computer Supported Cooperative Work (CSCW), it is commonly used to find out how computers can help in a group work, as workflow is mainly used between participants for information, files and tasks exchange which are done under certain pre set rules. The exchange process should be automatic hence to achieve the overall objectives. Workflow is mostly applied in project management and office automatic currently. JBPM is based on J2EE in workflow management techniques; it is a part of JBoss. By using JBPM, BPM can be defined and complete in a better level [7][8].

Currently every college is using some kind of teaching management system. As the information we gathered shown, although these platforms use different kinds of development tools, middle part model and database system, the core of these systems all include course plan, teaching process management, teaching resource management, individuals studying area and system management etc. But on the other hand, they all have very little about examination, areas like exam question design, paper design, exam arrangement, exam monitoring, grading and collecting and evaluations. Some systems do contain examination only focus on certain one or a few process. Processes such as teaching plan, teaching process, teaching arrangement, specialist monitoring and teaching quality evaluation should all be included while the system is being developed. The common teaching management systems focus more on planning, course, grade, result, course selection and course time setting, there isn't much about examination. In addition the system currently used is often about information & result management but on process management. PLM, BPM, WF and JBPM these theories and techniques have already shown their ability in manufacture, sales and logistic, but they are rarely used in teaching and exam section and very little documentary on topic [2][4][7][8].

Examination along with other teaching activities can also be seen as processes with complete life cycle. Therefore it is also necessary to have these under certain management. Analysis college resources and rearrange examination related task using workflow theory and technique in order to create an automatic, internalise and paperless management system. Due to the similarity between college and manufacture, using Internet and multi-media technique can create a full life cycle management system that is used in examination and its related matters. In this article, researches have been made on different exams in different colleges, using math as example subject. Applying PLM, BPM, WF and JBPM to create the

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management platform and used in college examination matters.

II. COLLEGE EXAMINATION SYSTEM DEVELOPING STATUS AND DISADVANTAGE

A lot of research has been done by many colleges, research institutions and software companies on this topic, according to reports and documented information they can be concluded and listed as below:

1, Focus on one single aspect, start with examination part instead of thinking over the whole product chain. As a result of this behavior, systems created are often too simple, they only focus on design exam questions, answers, marking and grading management. This separates examinations apart from the teaching system, hence limited the information and performance. In fact they are all apart of the whole system, single them out can not achieve their maximum performance and hence provide support.

2, Different exam system cannot be used on the others, one system can only operate over one subject instead of all. Although the system did improve performance on one subject but create barriers on information sharing and management.

3, some course like accounting, mechanism, material, math, physics and mechanics are a bit more complicated while doing online test. Online table design, equations and diagram drawings should be put in to the system but what the system can do is simply text writing. As a result of techniques problem, the variety of the test is limited to text question only. Certain kinds of questions can not be given in those exams.

4, the model, operating mode and the interface of the management system are not flexible enough, may not be able to cope with the traditional model of examination and its contains. Although some system can put up the questions in the way they want but the presentation is set. This brings up the difficulties while the questions are designed.

5, some examination system in teaching management process did not cover the over all view of teaching management. ERP and EAI are the theories in manufacture and sales are still in developing phase in education business. This is because these examination systems cannot perfectly and objectively relocated resources and arrange tasks.

6, the automatic processing level in every type of exam and its related system is still quite low. There are still amount of process needs to be done by people, such as question design, time table arrangement, and marking etc.

III. COMPREHENSIVE EXAMINATION SYSTEM DESIGN

3.1 Exams and its related Workflow Design

In the areas of teaching and examinations, task such as recruiting, teaching, question design, exam, marking, result, test analysis, question analysis, teaching quality analysis and teaching feedback can be put together in to an comprehensive management system by using PLM and BPM. The designed diagram is shown below (Figure 1). It manages all aspects in the examination and its related matters' life cycle, join tasks together without flaws and the resources are shared. The system contains a big volume of data and complicate tasks, in the traditional

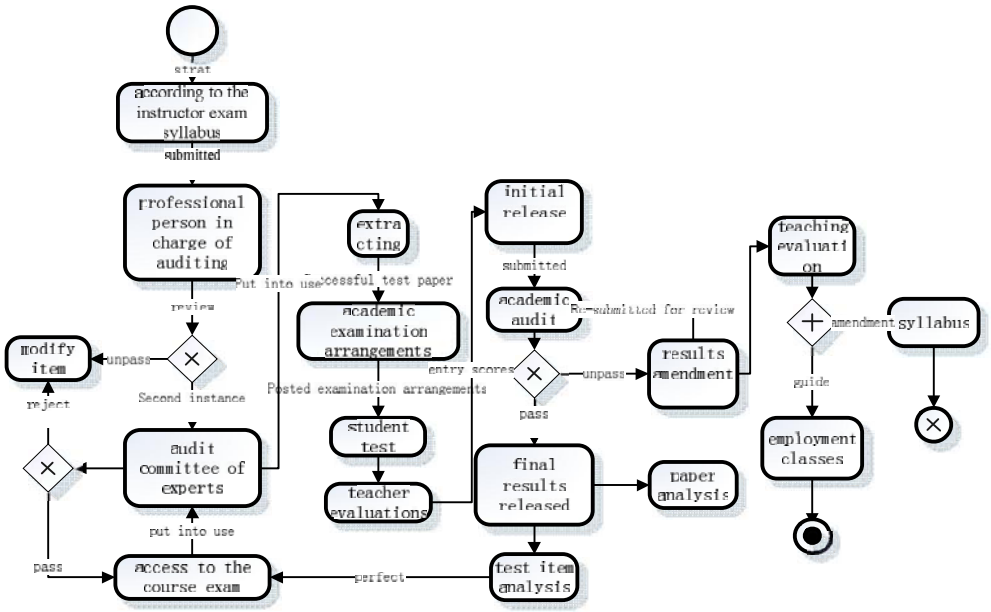

Figure 1. Integrated Process Examination Management

management process some tasks need to be done by people in hands. Because of the huge workload, the process may not be monitored and documented well. This general process management unite college resources, teaching

staff/student information, professional teaching plan and actual dates, the exam place, date, monitoring staff names will be generated automatically and send to people via text message.

This process model contains question design, paper design, exam, storage, monitoring, marking, grading analysis. Many processes are different from before, take marking as an example. System itself will judge on the level of completing on each test and draw information to generate new pictures hence to achieve marking objective questions by computer and subjective questions by teaching staff online. All marking details will be recorded as proves in future. This process system also cut times on deliver questions, printing paper, acquiring paper, delivering paper, documenting and storage management process.

3.2 Calculation Design

Since the full life cycle of the exam and its related matter system contains so many tasks, the related calculations are paper design calculation, test arrangement calculation, collision check calculation, resource arrange calculation, staff locating calculation, equipment arrange calculation and retake test calculation. Now we take test arrangement calculation as an example, it is designed and shown in table below (Figure 2).

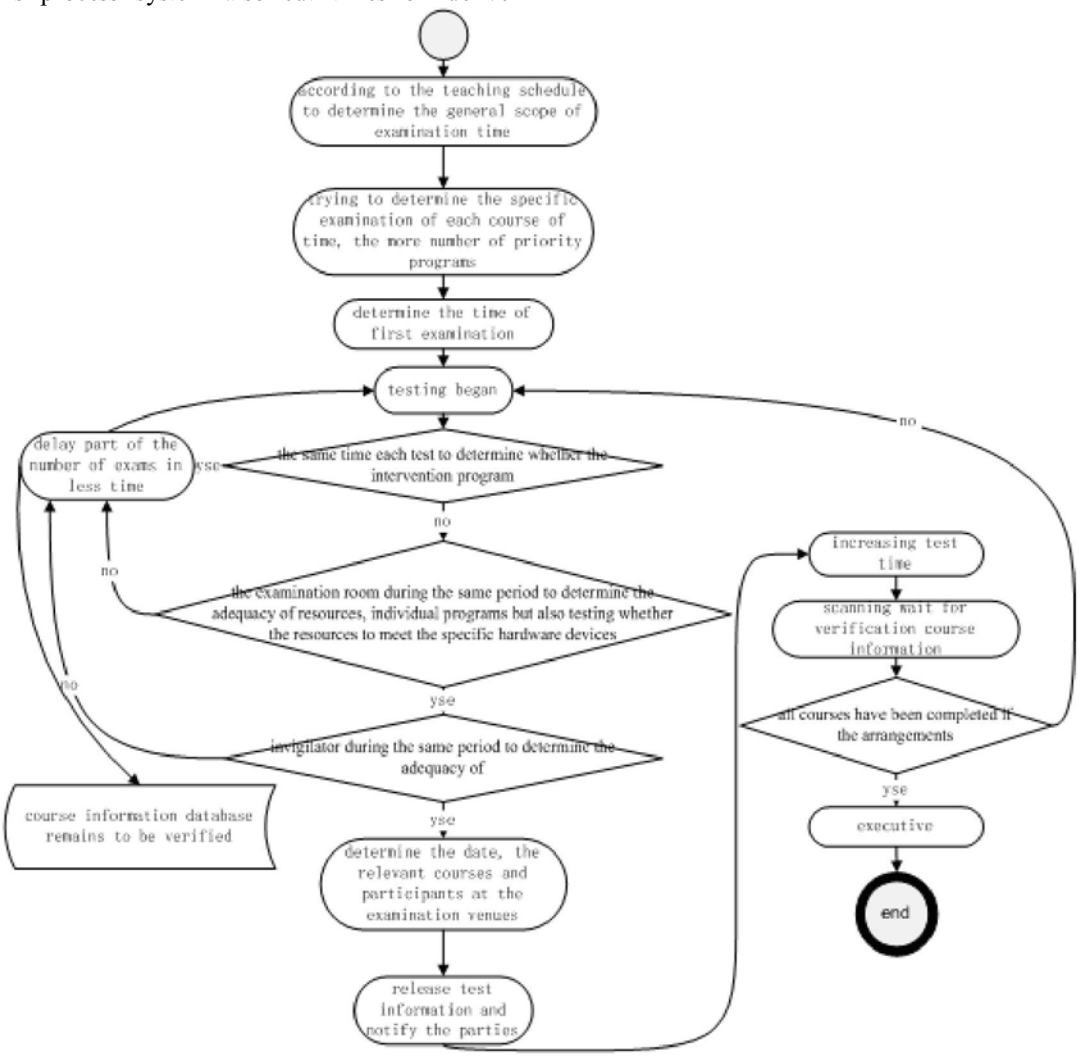

Figure 2. Emission Test method Senate

This calculation is done in two rounds, first round check if certain time has exam arranged, if yes then start the arrangement. There are quite a few checks need to be done during the arrangement process such as course overlap, resource availability, staff and equipment etc. If any checks don't pass, using priority order to rearrange and delay the least matter exam. Keep repeat this until all exams are arranged.

This is the priority equation for exam class:

$$\xi = \max\{50, 25 + \kappa * 10 + T_w * 5 + \mathrm{P_n}\}$$

k is defined as the number of classes waiting for the same test, hence under the same condition, the bigger class has

the priority to have the test first. T_w Is the waiting time, it is the time difference between the first attempt and the current attempt of arranging the test. Under the same condition, the longer time has the priority. P_n is the adjustment constant, it is set by teaching staff and used under permit. It is used to alter the time of the exam.

In the calculations, number of students taking the course and absent status needs to be taking into account as well as the equipment and teaching staff availability. In order to make sure nothing can go wrong the exam days, extra resources must be left out in case for unexpected situations.

IV. System Development and Application

The development of the system is made based on the analysis and designed talked above. Interface is using ASP.NET techniques, using MS SQL Server 2005 as data server; IIS as files sever on FTB sever. The logic tasks include search engine, workflow control and online editing. The system combines VML, JBPM and mimeTex. Web

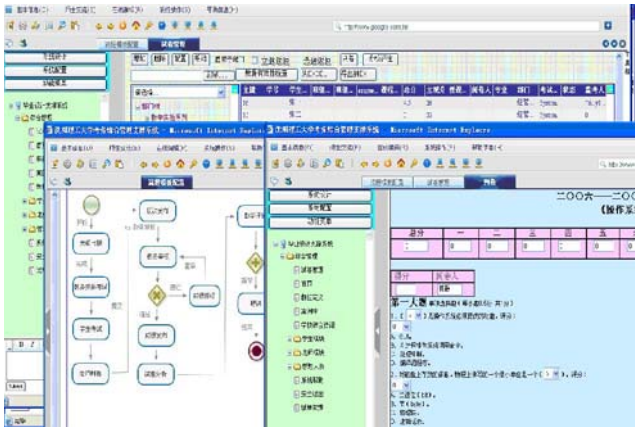

Figure 3. System, a typical Interface

sever is using Tomcat6.0, IIS6.0 and Apache2.5. Using ASP.NET, Eclipse and VC as developing tools for the system and the classic interface is shown below (Figure 3).

The system and other system differences manifested in the following several points:

1) This platform can according to existing doc-format for templates, direct generated the exam papers online. It makes work connect with the traditional test easily.

2) The subjective topic part of the tests, support online mapping, online editing formula and online design forms, etc. Make answer way more flexible.

3) After the system sentences the volume, the result enters the statistical appraisal link directly, reduced each kind of mistake which inputs many times causes.

4) the most crucial is this system is a general structure platform, does not limit to a course, and all the other existing exam system do not have this feature. Traditional exam papers questions content, testing types and the examination paper page layout is basically given in the programming environment, but this system in these aspects are effectively overcome these limitations.

V. Conclusion

As the transition logo of a series of process and the task, it is clearly defined the process change in parallel process management through data maturity. In the concurrent engineering, the concept of data maturity used to identify a certain process stage which controls the decomposition and control of the process in development cycle. At the same time, the idea of data maturity will realize quantitative analysis and overall control of the management of the development process, and then realize the concurrent and collaborative in the product development process truly.

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