The Time Management Framework Research of Software Project Based on Cloud Computing Platform

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Abstract: This paper focuses on the project case, which is based on the project time management theory, combined with the software project, especially the characteristics of the software project based on cloud computing platform. We show the general process of software project progress management. For different processes, we propose schedule arrangement for better management. Through the project activity decomposition, activity sequencing, activity duration estimating, project plan and schedule control analysis of each process, this research applies the method of time management science to the implementation process of software project, and provides a reasonable theoretical basis and effective decision-making reference for the project team.

Keywords: Cloud computing, Schedule arrangement, Software project, The time management.

1. INTRODUCTION

Project management is the application of scientific theories and methods. It implements the project objectives with project plan, organization, command, controlling and coordination. The project management is a project as the research object of a discipline, and it includes the financial management, decision-making, benefit for the integration of organization, process and methods of the collection [1,2]. Project progress management is an important aspect of project management. Project progress management, as referred in the project implementation process, includes various stages of progress and project deadline for management. Its purpose is to ensure that the project can meet the time constraints on the premise of achieving goals. Project progress management's ultimate goal is to establish a realistic project progress plan that can provide a basis for monitoring the progress of the project [1, 2].

Schedule Management has become one of the most important field and the focus of customer and administrator. Schedule Management focuses on how to effectively complete all the needed tasks, based on the premise that the project should be sure to finish within the schedule and limited resources [3]. And in the system software development project, it is necessary to combine it with the characteristic of software engineering to finish the planned tasks in time and push the schedule control. In the actual project management, schedule management contents consist of schedule plan's establishment and schedule plan's implement. Schedule plan's establishment is based on historical data, project management experience and effective methods, and gives reference to the actual project management [4].

During the implementation of project, the difference between schedule plan and actual result occurred because of

team member's low capability, experience, potential risks and so on [5]. So tracking the schedule status, analyzing the reason are becoming very necessary in the schedule plan. After coming into the information time, with the development of information technical skill, more and more wonderful management softwares emerge. These management softwares make the management visual, and improve the reliability and stability [6, 7].

According to the development of information technique and closer international corporation, more and more transferred industry modules have been and will be located to the BEST cost center area in China which will bring more benefit of development cost and productivity effectiveness. More than 280 companies of the TOP 500 are pulled in the above area. With the fast development speed, there are some of quite important things, and they still need to be fixed along with the development phase [8, 9]. In general, the schedule of 70% software projects have been overdue than the original plan. The complex system usually exceeded 20% to 50% of time than the time of original plan. This brought a severe impact on both the critical competence and business target of the corporation.

The 21st century is the era of knowledge-based economy. The application software is a major business mean of knowledge-based economy. So the quality of the application software will directly affect the business application, and how to do a good job in the application software management is becoming an important aspect of a social management and corporate modernization management [10, 11]. One of the main features of the project is that there are strict time limits; therefore, it determines the importance of project management.

In the process of developing the software, because of the impact of uncertain factors, such as many changes in demand and unexpected events, the development of a reasonable schedule of the project is very difficult. In addition, how to

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complete the project in accordance with the plans is also a problem.

In response to fierce competition, and complex and changeable information age, software project management is very important [12, 2]. As a means of achieving organizational strategic objectives, the project is the completion of a stated objectives, organizing the uniqueness of one-time effort. Project management is the completion of the project activities, *i.e.* the application of various kinds of knowledge, skills, tools and techniques to effectively integrate human, material and financial resources, information, science and technology and market resources to achieve the stakeholders' requirements [13]. Projects are widespread, so project management as a generic management technique has been widely used in building, information, manufacturing, agriculture, national defense, scientific research, government management and other industries. Especially software project management applications attracted attention, and the effectiveness has been improved greatly. The concepts of project management and methods of control are becoming more and more popular among agencies due to the enterprise's core competitiveness.

With the development of the modernization, object-oriented large-scale projects, project management has become extremely complicated. The server-side of the enterprise project management system is confronted with unprecedented challenges in the capabilities of information storage and processing. Appearance of cloud computing provides the better solution to the problems such as inadequate storage and information processing capabilities of the server-side, reducing the cost of constructing the server. This paper tries to apply cloud computing to the large-scale projects management [14]. It proved to be an effective way to solve the problems of the information storage and processing during the development of the project management system.

Scheduling Management of Software Development Project is the management process to implement software under restrictive conditions and required timeframe, as well as manage the schedule and implementation details of the project activities in the project life cycle. The process of Scheduling Management includes two aspects: project planning and project schedule management. Scientific planning and schedule management determines whether a software development project can meet the time and quality requirements. With the rapid development of information technology, modern software development projects augment both in scale and complexity, in the meantime the bars on project cycle, on time completion rates and cost are higher. In an increasingly competitive software market, project delay is likely to affect the enterprise market. Therefore, in order to shorten project cycle and increase stability, the traditional software development management has been difficult to meet their needs both in theory and the technical tools when guiding the implementation of the project.

2. CLOUD COMPUTING

Over the last decade, Internet technology has been developing rapidly. However, the speed of the Internet to bring new services lags far behind the increasing demand for it. In the Web 2.0 environment, the needs of the people on the Internet gradually turned to the high volume of business Internet services from traditional portals. At the same time, for Internet companies, the relative cost of storage resources and computer hardware is increasing, there is continuous improvement of data center construction, maintenance costs are on the rise, and people management and energy consumption is also increasing. To solve these problems, there must be a new platform and mechanism for coordination and scheduling of limited resources, and more rapid and effective data collection and processing. In this context, based on distributed computing, a new type of service computing model came into being; it is the Cloud Computing [15].

With the cloud computing concepts, terminology and technologies are emerging, a lot of reports greatly increase the peoples' enthusiasm for the adoption and implementation of cloud computing technology in enterprise. Cloud computing concepts and techniques are relatively new, the meaning is quite broad. The application and involvement of cloud computing in Internet is increasing with a continuous pace. Microsoft, IBM, Google, Amazon, Alibaba and other major companies have put forward their own cloud computing infrastructure to the outside world to provide their own cloud computing platform and service.

The emergence of cloud computing is a new change to the IT field with the upsurge of global cloud computing research. International and domestic major IT companies have launched their own cloud computing products, which, without exception, are providing services to users through the network [16]. So there are challenges to data security, reliability, and cloud computing service robustness. With cloud computing to a wide range of applications, software architecture will also be challenged and data services will change.

Cloud computing is a new network calculation mode. It is the further development of distributed computing, parallel computing and grid computing. Based on the Internet computing, it serves as a system that provides hardware services, infrastructure services, platform services, software services and storage services to a variety of Internet applications [17]. This is beneficial for enterprises to set up competitive information services, resources sharing and collaborative applications with lower cost and higher efficiency, thus making it one of the tendencies of computer science. The rise of cloud computing and its five major advantages, namely, high scalability, high reliability, on-demand service, low cost and easy to use, provides enterprises a competitive intelligence service with the most advanced technical means and new solutions which have been adapted to competitive intelligence. Therefore, it is possible to achieve the competitive and dynamic management of the competitive intelligence service in different organizations.

Cloud computing, as a new kind of business model, is developing rapidly and becoming research focus of commercial organizations or research institutes gradually. Generation of cloud computing will impact the traditional software industry, the Internet business model, enterprise management, in order to promote revolutionary industry changes.

With the advance of "cloud computing" concept, more and more enterprises have begun to pay attention to the implementation and application of software project based on cloud computing platform. Compared with the traditional manufacturing and construction projects, software project development is multidisciplinary and technical comprehensive system engineering. It needs to invest the massive manpower resource, capital cost and design time; arid is a typical intelligence intensive production activity. Currently, although software project faces less technology problems, it lacks scientific management. The implementation of software projects is often not under well-established project plan and control, as well as time schedule, which lead to high risk for delivering it on time [18]. How to apply the theory and method of project time management into software projects, so that they can be delivered to customers on time, is a problem to be solved for software project management.

3. PROJECT FRAMEWORK DESIGN

The software schedule can be tested by work progress unit method. It is a way to check whether the task is done, not concerning inner information.

By measuring budgeted cost of work completed, actual cost of work already completed and budgeted cost of work plan, implementation schedule and cost variances are gotten, to analyze the project budget and implementation schedule.

Task completion rate =

$$\frac{\text{The number of completed works}}{\text{The number of planned projects should be completed}} \quad (1)$$

$$SPI = \frac{BCWP - BCWS}{BCWS} \quad (2)$$

$$CPI = \frac{BCWP - ACWP}{ACWP} \quad (3)$$

$$BCWS = Planned\ effort * Fixed\ budget \quad (4)$$

$$BCWP = \text{Completed work * Fixed budget} \quad (5)$$

ACWP is the actual cost for work. BCWP is the budgeted cost for work.

If CPI>1, the actual costs are lower than budgeted costs.

If CPI<1, the actual costs are higher than budgeted costs.

If CPI=1, project costs will be in line with plan .

If SPI>1, project is ahead of schedule.

If SPI<1, project schedule delays.

If SPI=1, actual and planned progress match.

The emergence of software engineering is to solve software crisis in development of software. The concept of software crisis is a series of serious problems, which are met in the process of software development and maintenance.

Software process models are very important in software engineering. Software process model is the framework of all the activities of software development. It can express all the processes of software development clearly and prescribe the main task and role that need to be done. It is the basis of software project development. Software process model provides the relationship among all phases of software development [19, 20]. It is the generalized and important content of software engineering. It provides the management of software engineering with milestone schedule and also provides the process of software development with principle and methods. In the process of software development, requirement, design and coding often change. There are many factors that contribute to it. If requirements change, design and coding must make corresponding modification to meet the needs of the system.

Depending on the circumstances of the project, the work structure for the project is broken down. There are 6 stages: the system initiation stage, the system design stage, the system configuration and development stage, the system training and UAT stage, the system training and UAT stage and the system commissioning and project delivery stage, as shown in Fig. (**1**).

The system initiation stage is the first stage of the project. It is very important containing project team building, customer demand research, report writing, needs confirmation, launching ceremony and equipment procurement, as shown in Fig. (**2**).

After the system initiation, program has been confirmed. In the system design stage, there are 5 steps: system total design, system detailed design, prototype building plans development, preparation of system design specifications and sign of system solutions, as shown in Fig. (**3**).

When the system is configured and developed, there are several steps: configuration and preparatory work, the object associated configuration, system development and historical data importing, as shown in Fig. (**4**).

When system development ends, it is important to carry out the user acceptance test. These procedures are required: key user training tasks, administrator training, system UAT testing, test question modify the "User Test Report", test data cleaning, overall system deployment and user training, as shown in Fig. (**5**). At last, system commissioning, system online, apply for acceptance and systems delivery are the final steps, as shown in Fig. (**6**).
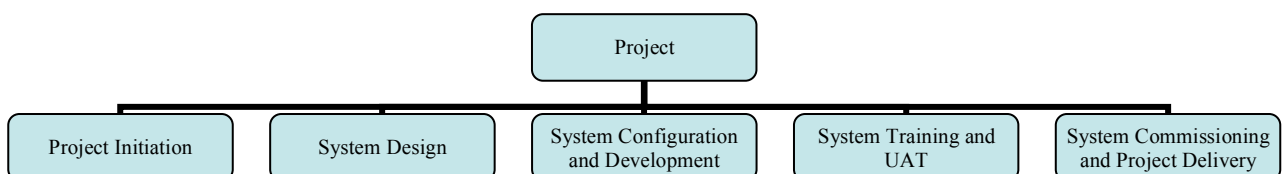

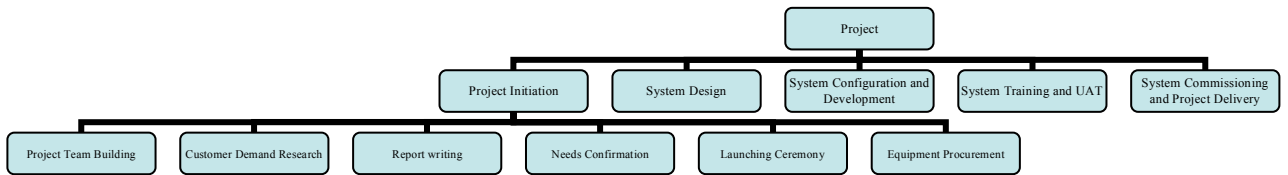**Fig. (1).** Work breakdown structure (WBS) for project.

Fig. (2). Work breakdown structure (WBS) for the project initiation stage.
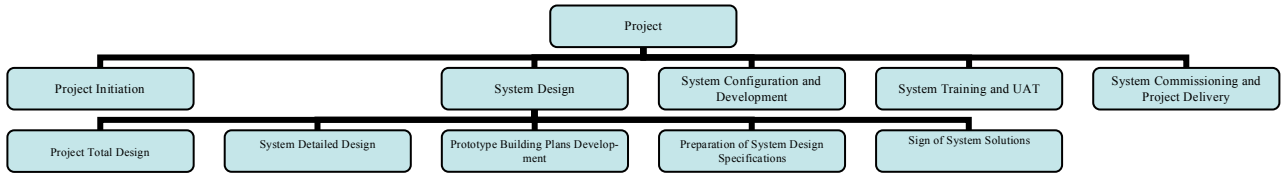

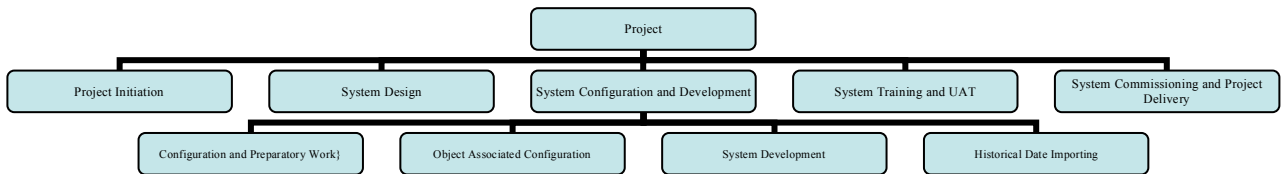**Fig. (3).** Work breakdown structure (WBS) for the system design stage.

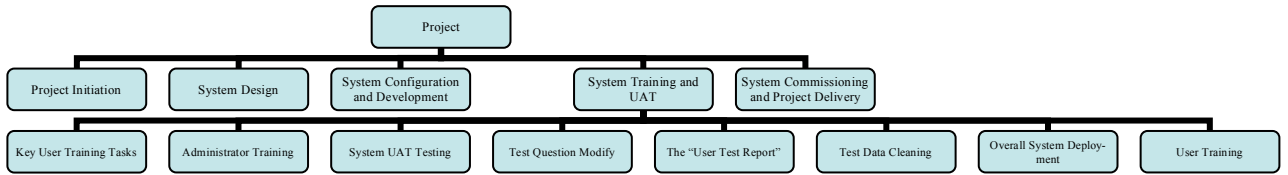**Fig. (4).** Work breakdown structure (WBS) for the system configuration and development stage

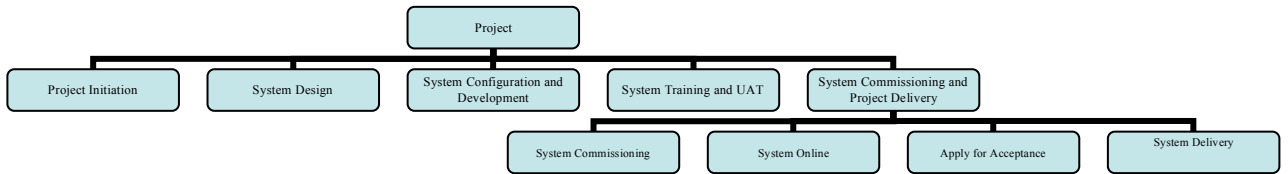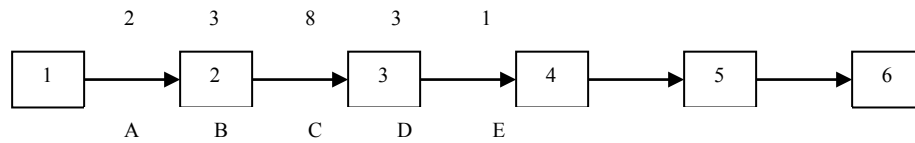**Fig. (5).** Work breakdown structure (WBS) for the system training and UAT stage.

Fig. (6). Work breakdown structure (WBS) for the system commissioning and project delivery stage.

A. Preparation of System Design Specifications
B. System Total Design
C. Sign of System Solutions
D. Prototype Building Plans Development
E. Sign of System Solutions

Fig. (7). Critical path diagram for the system design stage

4. PROJECT SCHEDULE MANAGEMENT

As illustrated in Fig. (**8**), system design phase program of activities is strictly a serial arrangement. There is only one critical path. Expected total duration is the total duration of the five key activities A, B, C, D, E. So, the expected total duration is 17 days. In project duration planning and control process, these five activities need to be tightly controlled.
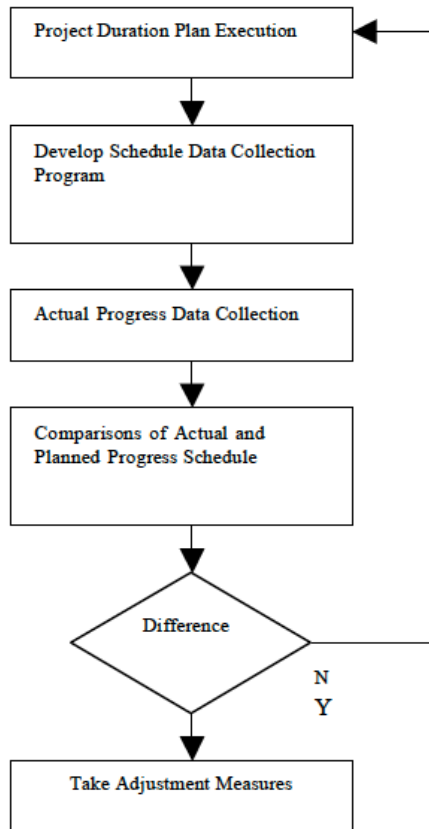

Fig. (8). Schedule control process for project.

Table 1. Week Work Report for the Project

Time	YYYYMMDD to YYYYMMDD
Project name	
Project member	
Project Actual progress	Work that has been completed this week
	Work to be completed next week
Gaps	
Problems and solution	
Writer	

The key of schedule planning control is to record the actual start date and completion date of activities accurately. Because of the long total duration and lots of events, it is necessary to collect and analyze the actual progress data of related activities every week, as shown in Table 1. If there is delay, some solution needs to be carried out.

CONCLUSION

This paper starts from the theory and method of project management, first elaboration theory and method of project management, the background knowledge of software project management, to further statement the method and skills of schedule management. This paper focuses on the project case, which is based on the project time management theory, combined with the software project, especially the characteristics of the software project based on cloud computing platform. Through the project activity decomposition, activity sequencing, activity duration estimating, project plan and schedule control analysis of each process, this research applies the method of time management science to the implementation process of software project, and provides a reasonable theoretical basis and effective decision-making reference for the project team.

CONFLICT OF INTEREST

The authors confirm that this article content has no conflict of interest.

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