XP Online Exam

Interim Report on Project Management

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Contents

1 Software Project Business Case

1.1 Background

With the rapid development and wide popularization of the Internet, network education represents a development direction of education reform, has become a feature of modern education, and forms a new driving force for the development of education. Distance education has become one of the important directions of the future development of modern educational technology. As a subsystem of distance education, examination and testing has become an important research field. The background of XP online exam is the trend of today's education informatization and the construction of China's higher education informatization system.

1.2 Business objectives

XP's business purpose contains lasting growth and profit by providing stable and flexible service for the customers.Besides, this aims to make full use of the existing computer software, hardware and network resources to realize paperless examination, so as to avoid the shortcomings of traditional manual examination, and carve out a place in the online examination fields.

1.3 Current situation and issues / opportunities

There have been some online examination systems in the market, for example, our school use canvas as our exam system during the period of the epidemic.

However, this project has some functions that canvas does not have. According to the users, canvas can't view the test results and analyze the questions, which reduces its sense of experience. XP online examination system has this function.

1.4 Key assumptions and constraints

The deadline must be met, that is, to complete all development, testing, deployment, and delivery by the deadline.

Budget constraints must be met.

The product must be reliable and meet the acceptance standards. As an examination system, this project has strict requirements on robustness, security and response time.

The architecture must be open so that other modules can be added later.

The product must meet the customer's hardware requirements. The vast majority of students will choose to test online on PC or mobile, so the system needs to adapt to PC and mobile web.

The product must be user-friendly, especially for some older teachers who are used to the traditional paper examination, the product should meet the needs of this kind of people to quickly start using.

1.5 Selection and suggestion analysis

Continue to use traditional paper form for examination

Use the existing online examination system for examination

Independently design and develop a new online examination system, according to the needs of stakeholders to improve the function.

Based on the discussion of stakeholders, we believe that option 3 is the best choice.

1.6 Preliminary requirements of the project

The initial requirements of XP online examination system include the following:

It can meet the basic functions of account information management, teacher's examination and question bank module management, students' examination, view history examination and so on.

On this basis, to meet some specific needs, such as the design algorithm, according to the type of students' previous wrong questions, from the question bank to provide students with suitable questions for practice.

Ensure that the administrator permissions are within the company, while other users can only have specific permissions.

Provide charging information. Some information or functions in the system are provided to users in the form of charging. The mode of payment can be paid online by WeChat and Alipay. After the system confirms the payment, users can browse or download the information they need.

1.7 Budget estimation and financial analysis

The preliminary estimate of the cost of the entire project is $181600. This project is calculated on the basis that all members of the project work 8 hours a day, seven days a week, and work for a total of 3 months, and the customer representatives are not paid. The preliminary cost also includes server rental fees and other software costs.

1.8 Progress estimate

The complete source code and documents will be delivered within 13 weeks after the start of the project, but there is also some flexibility. The version delivered this time is version 1.0, which will be updated continuously according to user feedback.

1.9 potential risk

The first risk is the lack of interest in the project by our target audience, followed by the user experience, so user feedback is crucial. In addition, there are some technical risks in safety inspection, payment processing and other functions, but these risks will be eliminated one by one during the test and inspection. Therefore, the main risk is that time and money are invested in the project, but the actual benefits consistent with it are not realized.

2 Project plan

2.1 Project Charter

The following chart is our project charter.

2.2 Team contract

2.2.1 Code of conduct

As a project team, we will:

Work in a forward-looking way, predict the possible problems, and do a good job in prevention

Project Title: XP Online Exam
Project Start Date: 2021.3.1 **Projected Finish Date:** 2021.6.1
Budget Information: The limit management team has allocated $140000 for this project. Most of the cost of the project will be paid to the company's internal staff. According to the preliminary estimation, the working time per week is 50 hours.

Project Manager: Yujiu Jiang,19941365285,1854067@tongji.edu.cn
Project Objectives:
An online examination system is developed on the local area network of Tongji University, which enables teachers to publish examination information and participate in the maintenance of question bank. Through this online examination platform, students can answer the questions raised by teachers, participate in the examination and view the analysis, view the details of previous examinations, and export the examination list and other files. It allows the administrator to manage the user rights. Some of the websites are free to students, some are free to charge, and some are only open to teachers.

Approach:
A survey needs to be conducted to identify the key features of the new LAN website and to seek advice from company consultants and customer service.
Develop software to ensure website security, handle user input, provide topic retrieval and examination services.
The iterative method is used to develop, and the feedback information of users is collected in the iterative process.
Identify ways to reduce costs and generate benefits during and after the project.

Roles and Responsibilities

Role	Name	Organization/ Position	Contact Information
发起人，CFO	Tianyu Shen	财务部门	1851521@tongji.edu.cn
项目经理，CEO	Yujiu Jiang	极限管理小组高级顾问	1854063@tongji.edu.cn
项目小组成员，CTO	Jie Yu	信息技术部门	1853081@tongji.edu.cn
顾问	Zheng Kuang	客户代表	1852554@tongji.edu.cn

Sign-off: Tianyu Shen, Yujiu Jiang, Jie Yu

Comments:
这是一个非常好的项目，有了它我们就可以打开电脑随时随地练习考试，而不用担心没有复习资料。希望开发小组能尽快开发出来。

——Zheng Kuang

Figure 1: Project Charter

Let other team members know about the project

Focus on the overall interests of the project team

2.2.2 Participation

We will:

Be honest and open in all project activities

Encourage diverse teamwork

Providing equal opportunities for participation

Open to new approaches and new ideas

Regular discussion

When a team member fails to attend the meeting or complete the work on time, inform the project manager in advance

2.2.3 communicate

We will:

Determine the best way to communicate with the group. Considering that the group members usually have inconsistent curriculum arrangements, the combination of offline and online is considered.

Provide convenience for project manager to hold meeting, help arrange telephone and video meeting when necessary.

Specify the project schedule together, and record the actual situation at 8pm every Friday.

When expounding ideas, be clear and concise.

Don't stray from the subject in the discussion.

2.2.4 solve the problem

We will

Encourage people to participate in problem solving.

It's just constructive criticism and commitment to solving problems, not accountability.

Try to improve each other's ideas.

2.2.5 Conference policy

We will:

A face-to-face meeting is planned every Friday afternoon.

Schedule meetings regularly in the first month.

Arrange telephone or video conference for project participants when necessary.

Hold other meetings as needed.

Focus on the resolutions and specific action items in the meeting, make minutes of the meeting, and send them to project members by email within 24 hours after the meeting.

2.3 Project scope statement

2.3.1 Project scope triangle

The following picture shows the project scope triangle.

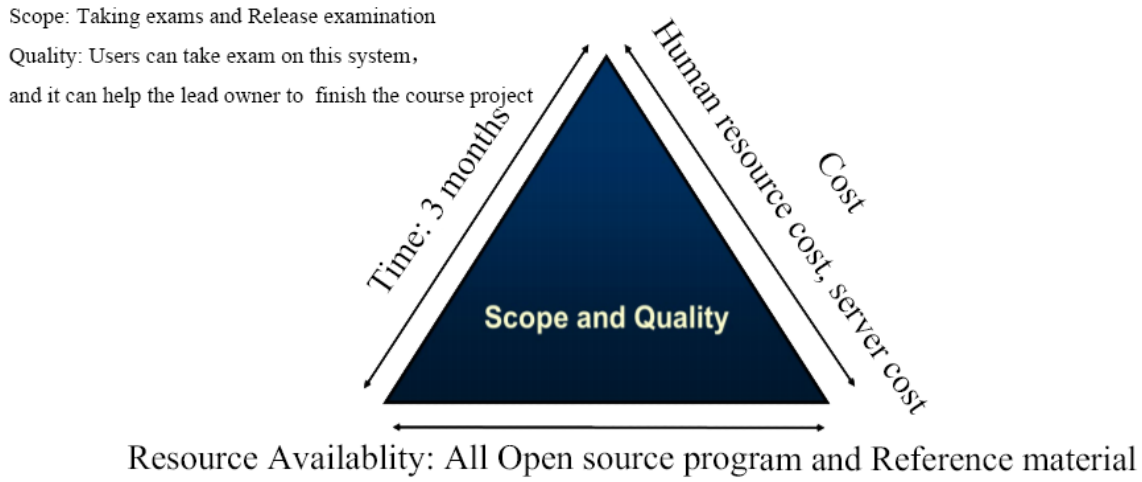


Figure 2: Project scope triangle

2.3.2 Project Name

XP Online Exam

2.3.3 Date

2021.4.23

2.3.4 Writer

Jie Yu, CTO, 1853081@tongji.edu.cn

2.3.5 Reasons for project approval

Yujiu Jiang, CEO of XP, asked that the project could basically meet all the needs of school teachers and students for online examinations. It can provide a professional online examination platform for existing and potential users, provide practical opportunities for the company's new technology, increase the company's

development and management experience, and help to improve the company's business level. The budget of the project is $181600.00, and the annual cost of running and maintaining the server is $40000.00. It is estimated that the annual benefit of the project is $250000.00, and it is important that the cost can be recovered one year after the completion of the system.

2.3.6 Product features and requirements

File transfer:

Users can export the test results in the form of files, and the file format can be the mainstream file format, such as Excel, docx, PDF, etc.

Link:

Test the external links in the system every week, remove or modify the invalid links.

User feedback:

The website encourages users to submit system bugs to administrators in the form of e-mail.

Compatibility:

The website must be able to browse with mainstream standard browser, and users do not need to install other software to use the system.

usability:

The website must be available 24 hours a day, seven days a week. If possible, the system should be maintained one hour a week and other forms of regular maintenance.

2.3.7 Project management related deliveries

Business case, charter, team specification, work breakdown structure (WBS), schedule, cost benchmark, status report, final project statement, final project report, experience summary report, and other documents needed to manage the project.

2.3.8 Criteria for project success

Our goal is to complete this project within three months, and the cost does not exceed $181600.00. The project sponsor Tianyu Shen emphasized the importance of recovering the cost of the project one year after its completion. To meet this goal, a website needs strong user involvement. We must also develop a set of methods to gain revenue during the website development, testing, and completion stages. If the project can get a higher return, help the company improve its image, improve its business and management level, even if it takes more time and cost, we think the project is a success.

2.4 Product breakdown structure (PBS)

Here shows the PBS diagram.

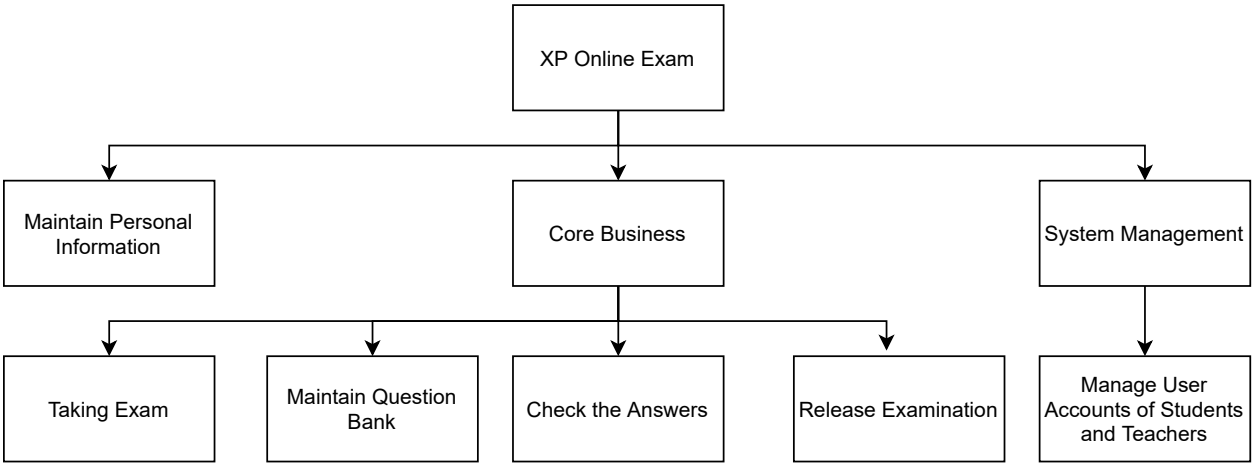


Figure 3: PBS

2.5 Work breakdown structure (WBS)

Here shows the WBS diagram.

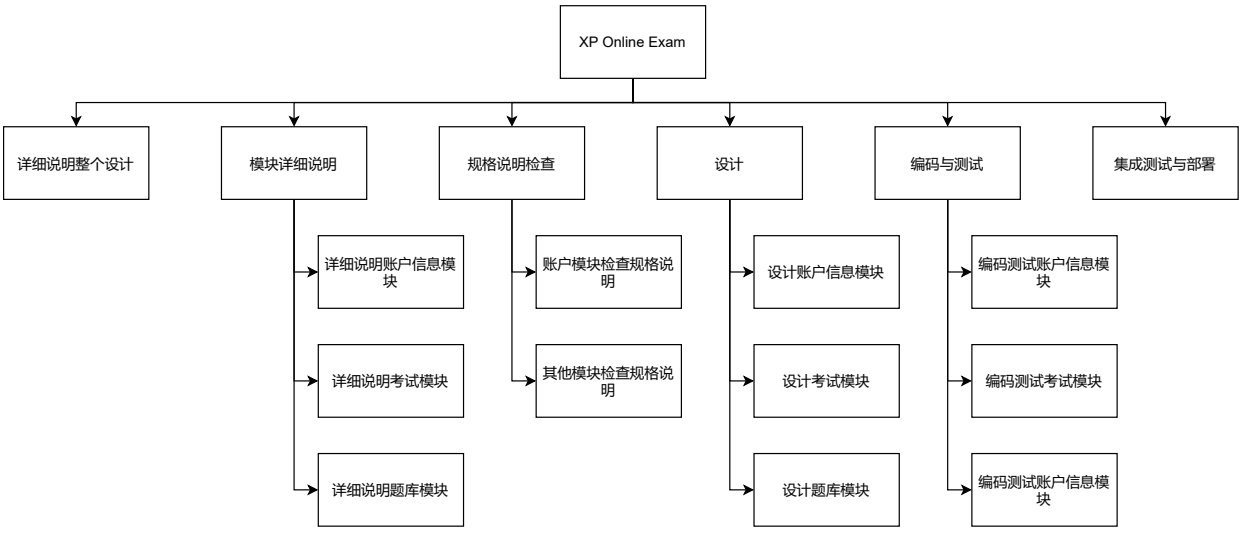
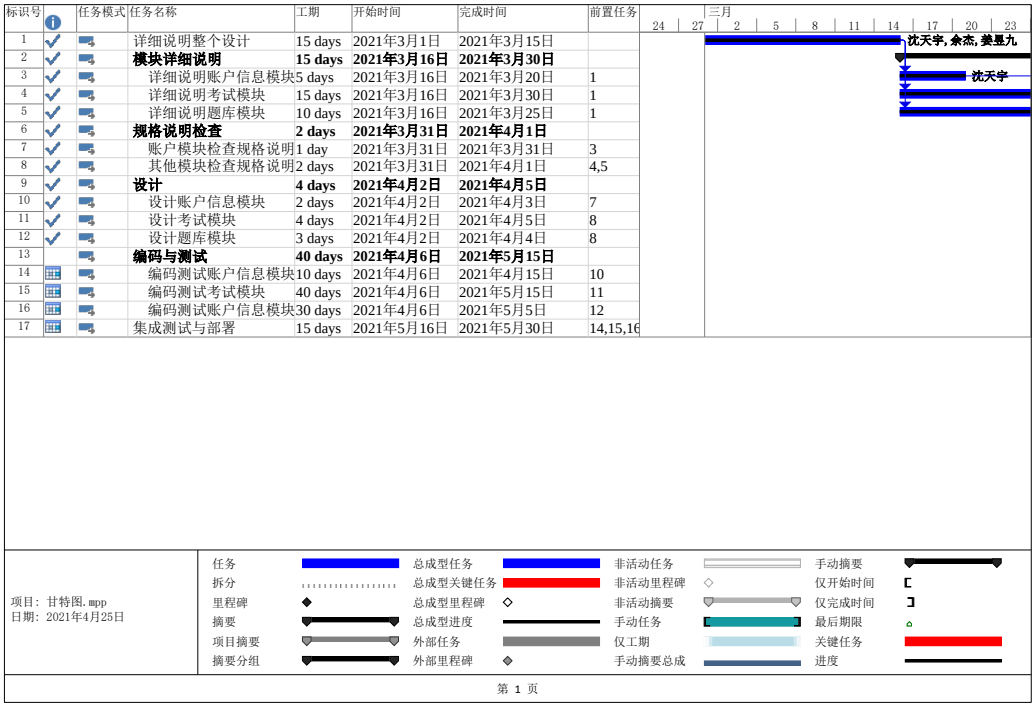


Figure 4: WBS

2.6 Project timetable (Gantt chart)

Shown below is the Gantt chart, the red arrow indicates the critical path.



标识号	任务模式	任务名称	工期	开始时间	完成时间	前置任务
1		详细说明整个设计	15 days	2021年3月1日	2021年3月15日	
2		**模块详细说明**	**15 days**	**2021年3月16日**	**2021年3月30日**	
3		详细说明账户信息模块	5 days	2021年3月16日	2021年3月20日	1
4		详细说明考试模块	15 days	2021年3月16日	2021年3月30日	1
5		详细说明题库模块	10 days	2021年3月16日	2021年3月25日	1
6		**规格说明检查**	**2 days**	**2021年3月31日**	**2021年4月1日**	
7		账户模块检查规格说明	1 day	2021年3月31日	2021年3月31日	3
8		其他模块检查规格说明	2 days	2021年3月31日	2021年4月1日	4,5
9		**设计**	**4 days**	**2021年4月2日**	**2021年4月5日**	
10		设计账户信息模块	2 days	2021年4月2日	2021年4月3日	7
11		设计考试模块	4 days	2021年4月2日	2021年4月5日	8
12		设计题库模块	3 days	2021年4月2日	2021年4月4日	8
13		**编码与测试**	**40 days**	**2021年4月6日**	**2021年5月15日**	
14		编码测试账户信息模块	10 days	2021年4月6日	2021年4月15日	10
15		编码测试考试模块	40 days	2021年4月6日	2021年5月15日	11
16		编码测试账户信息模块	30 days	2021年4月6日	2021年5月5日	12
17		集成测试与部署	15 days	2021年5月16日	2021年5月30日	14,15,16

Figure 5: Gantt chart 1

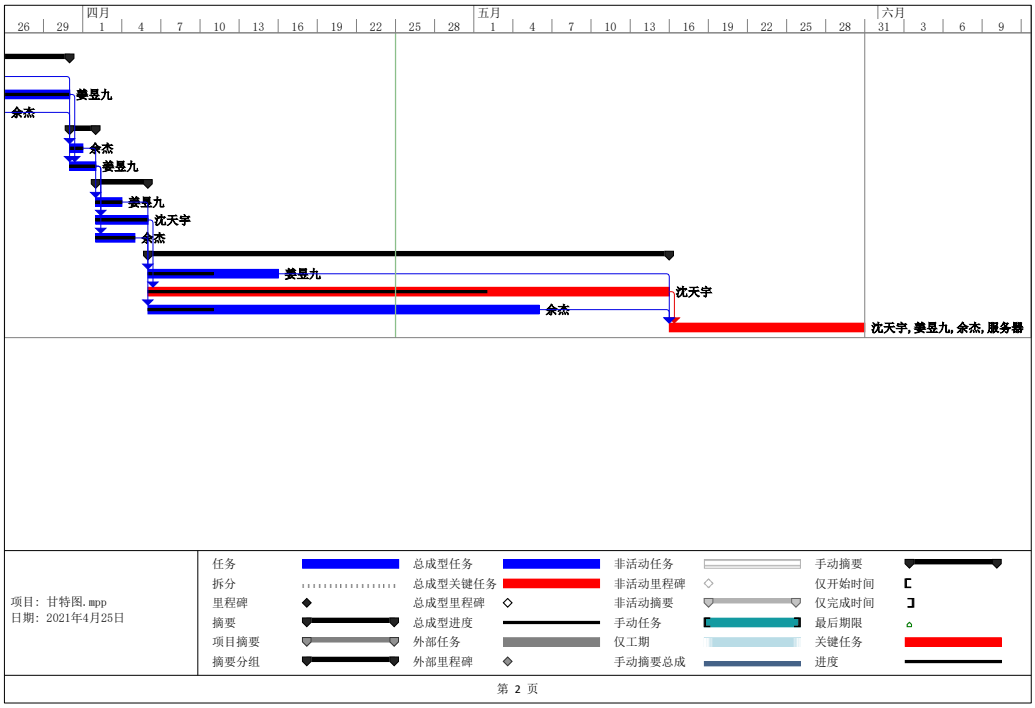


Figure 6: Gantt chart 2

2.7 Activity network diagram

Shown below is the activity network diagram, the red arrow indicates the critical path.

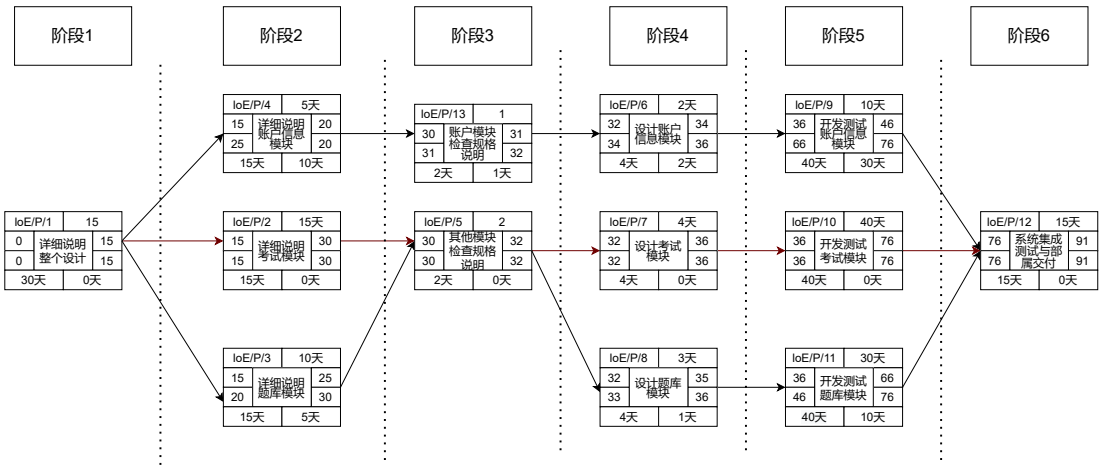


Figure 7: activity

3 Project management approach

3.1 Build or Buy?

For building an online examination system, we have two options for building and purchasing off-the-shelf software.

The construction is internal development and outsourcing development, where internal development means that developers and users belong to the same organization, and outsourced development means that developers and customers belong to different organizations.

We first analyzed the advantages and disadvantages of buying off-the-shelf software:

advantage:

1.The cost of software development is shared by a large number of customers, so the cost of software is reduced for each customer.

2.Because it is a spot, the software has been tested and verified before purchase, so there will be no delay.

3.Since it may have been used by many users, most of the defects have been reported and corrected, thus ensuring the reliability of the software.

Disadvantages:

1.Since other customers may also obtain the same system, obtaining this system will not increase competitiveness.

2.The current off-the-shelf software is becoming more and more customized, and the properties of the application system can be set through the configuration parameter table, but this flexibility is still limited, and it may eventually need to change the workflow to adapt to the software system.

3.Without access to the software source code, the software cannot be modified according to changes in the organization and environment.

4.Once the off-the-shelf software is used, the organization will rely on this software, and it will be difficult to use other application software, which will cause the license fee to continue to increase.

For shortcomings 3 and 4, we agreed that it was unacceptable, so we set out to consider the construction.

We then analyzed the advantages and disadvantages of internal development and outsourcing development.

Internal development:

advantage:

1.The internal personnel of the organization are easy to manage and communicate.

2.Can reduce the work of creating and managing contracts.

Disadvantages:

You need to face the risks and uncertainties in the development process yourself. There may be a shortage of people who can lead this work.

Outsourcing development:

advantage:

1.Outsourcing companies have technical and project experts that are not easily available within the client's organization.

2.Ability to transfer part of the risks in software development.

Disadvantages:

1.The required cost is higher.

2.Communication is not as convenient as within the organization.

3.There will be a lot of work to create and manage contracts, and there may be legal disputes.

Considering both, we decided to develop and build this system internally.

3.2 Choosing methodologies and technologies

3.2.1 Identify project drive type

The purpose of constructing the online examination system is to improve the shortcomings of the existing examination system and improve the experience of teachers and students. We identify this system as **goal-driven**.

3.2.2 Other project characteristics

Data-oriented: This system is an information system composed of actual databases.

Application field specific: This system is specially developed to solve the online exam problems of teachers and students.

Concurrent processing: When multiple students take online exams together, there will be concurrency, and it is necessary to consider technologies suitable for this type of scenario.

Used to perform defined services: The system will be used for practical applications, not for interest and entertainment.

Operating environment characteristics: system operation and small server, the carrying capacity is relatively limited.

Combining the above characteristics and considering past experience, we choose USDP (Unified Software Development Process) as the methodology we follow in the development process.

3.3 Choice of process models

We choose scrum in agile methods as the process model.

Scrum is an agile development framework, an incremental and iterative development process.

In this framework, the entire development cycle is divided into several small iteration cycles. Each small iteration cycle is called a sprint. The length of each sprint is generally recommended to be 2 to 4 weeks. In Scrum, the product Backlog is used to manage the requirements of products and projects. The Product Backlog is a list of requirements sorted by business value. The manifestation of the list items is usually called a user story.

The Scrum development team always first develops the needs of customers with higher value. In each sprint. The Scrum development team selects the most valuable requirements from the product Backlog for development. The requirements selected in the Sprint are analyzed, discussed and estimated in the Sprint planning meeting to obtain a Sprint task list, called the Sprint Backlog. At the end of each Sprint iteration, the Scrum team will deliver potentially deliverable product increments.

4 Risk management

4.1 Risk Identification

4.1.1 Risk identification overview

Risk identification is the first step of risk management and the foundation of risk management. Only on the basis of correctly identifying the risks faced, can we actively choose suitable and effective treatment methods. Project risk identification means that the project undertaker uses various methods to systematically

classify and fully identify the potential risks that have not yet occurred and various objective risks based on the collected data and investigations. Risk identification is not done all at once. It should be carried out regularly and plannedly throughout the project. In the process of project risk identification, the most important thing is to avoid missing risk factors, especially factors that have a significant impact on the overall project objectives. There are various risks in software project development, including current risks and future risks; both internal risks and external risks; both static risks and dynamic risks, and so on. Our task of risk identification is to find out the main risks faced by the project in a complex environment.

4.1.2 RBS

First, we identify the potential risks in the project. We divide risks into external risks and internal risks. For external risks, they are further divided into irresistible and common types according to the attribution of responsibility; for internal risks, they are further divided into technical and non-technical categories according to the degree of technical relevance. The specific risk breakdown (Risk Breakdown) is shown in the figure below.

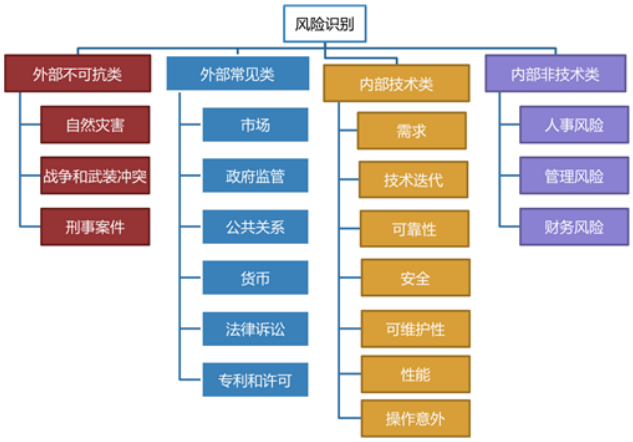


Figure 8: risk

4.2 Risk Registry

4.3 Risk Analysis

In order to quantify the degree of harm of the risk, we evaluate the likelihood of the risk and its severity after it occurs.

4.3.1 Delphi method

In order to analyze the degree of each risk, we decided to use the Delphi method, which means that we do not discuss with each other, nor establish horizontal connections between team members. We determine

Types of risks	ID	Risk name	Risk description
External irresistible class	R1.1	natural disaster	Server physical damage caused by irresistible natural disasters, such as earthquake, tsunami,
	R1.2	War and armed conflict	War or armed conflict that seriously endangers people and property
	R1.3	Major criminal cases	Criminal cases causing loss of key personnel or property
External common classes	R2.1	market	The impact brought by the change of supply and demand in the market, such as the
	R2.2	Government regulation	The impact of government regulation on project development, such as content review
	R2.3	public relations	The impact of accidents on the external image of the project
	R2.4	currency	Due to currency depreciation or appreciation, or exchange rate fluctuations
	R2.5	legal proceedings	The project is subject to legal action, such as being sued by the right party
	R2.6	Patents and licensing	Additional costs arising from patent or license issues, such as accidental use of another
Internal technology	R3.1	Requirement change	Demand changes the development plan
	R3.2	Technology iteration	The increased cost of using new technology, such as the use of a new third-party library,
	R3.3	reliability	The reliability of the developed tools is insufficient, such as the code loss caused by
	R3.4	Security	The cost of security defects, such as data loss caused by database rights management
	R3.5	Maintainability	Cost caused by insufficient maintainability of code, such as incompatibility caused by
	R3.6	performance	The performance index can not meet the impact caused by.
	R3.7	Operation accident	The unexpected loss caused by human operation, such as accidental deletion of UN
Internal non-technical	R4.1	Personal risk	Personnel changes bring about the change of development schedule and the increase of
	R4.2	Managing risk	Project development is affected by management decision-making mistakes
	R4.3	financial risk	Financial situation problems, such as broken capital chain

Figure 9: Risk Registry

that the risk manager will use communication to develop the system. The risk to be assessed is sent to each member individually. Each member analyzes and evaluates each risk in the risk list through probability assessment and impact assessment to obtain the risk level. Risk management personnel conduct multiple rounds of investigations on members. Repeated solicitation, summary, and revision of risk level views, until the opinions put forward by everyone stabilize. In the end, the conclusion is that the members are basically unanimous. Due to the high level of risk, this method is widely representative and the results are more reliable.

4.3.2 Possibility assessment

The probability of occurrence of each risk is estimated according to the evaluation criteria, and the average risk occurrence interval (MTBR) is used to measure it.

平均风险发生间隔	说明	等级
• 一天一遇 (<1d)	• 非常可能发生	• 10
• 一周一遇 (1~10d)	• 很大可能发生	• 9 - 8
• 一月一遇 (10~30d)	• 较大可能发生	• 7 - 6
• 一年一遇 (30~300d)	• 较小可能发生	• 5 - 4
• 十年一遇 (300~3000d)	• 很小可能发生	• 3 - 2
• 百年一遇 (>3000d)	• 几乎不可能发生	• 1

Figure 10: Possibility assessment

4.3.3 Severity estimate

The probability of occurrence of each risk is estimated according to the evaluation criteria, and the mean time to risk recovery (MTTR) is used to measure it.

平均风险恢复时间	说明	等级
• ∞ (长期)	• 灾难性后果	• 10
• 年 (120~360d)	• 影响严重	• 9 - 8
• 季 (30~120d)	• 影响中等	• 7 - 6
• 月 (7~30d)	• 影响较小	• 5 - 4
• 周 (1~7d)	• 后果可以容忍	• 3 - 2
• 日 (<1d)	• 后果可以忽略	• 1

Figure 11: Severity estimate

Since there are positive and negative risks, we use the positive and negative severity to distinguish the two.

4.3.4 Probability and influence matrix

The chart below is the probability and influence matrix.

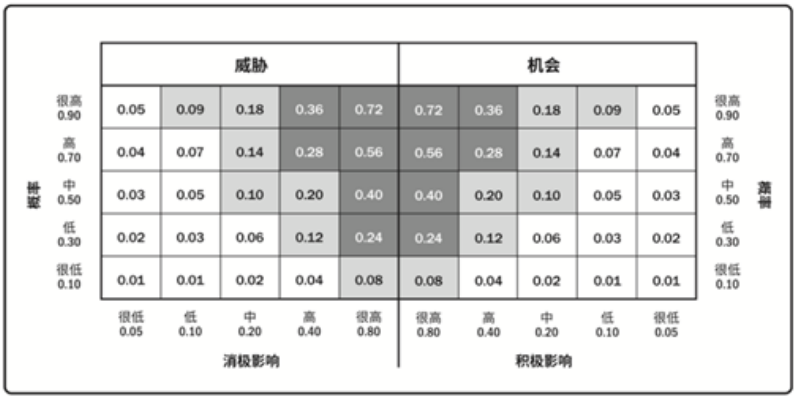


图 11-5概率和影响矩阵示例（有评分方法）

Figure 12: Probability and influence matrix

4.3.5 The impact of risk

Risk impact is a measure of risk impact. For risk, the impact of risk is also very important. If the degree of risk impact is large, even if the probability of occurrence is small, it will have a very large impact on the project and cause serious consequences. Therefore, these risks must be strictly controlled. Certain risk effects are easy to measure. For example, cost risk can be measured through financial data. Progress risk can be measured in days. Some risks cannot be directly measured by numbers, such as technical risks. Therefore, we have set the standard of the degree of influence, and determined the degree of risk influence of a certain risk through analysis and judgment.

4.3.6 Risk level

Risk level is the most important data obtained in risk assessment work. According to the risk probability and the degree of risk impact, the risk is classified according to the severity through the risk level. This is an important basis for formulating and implementing risk response measures

4.3.7 Calculation method

In order to visually express the degree of influence of the risk, we classify the hazard value into the following three categories:

风险评级	描述	危害值范围	颜色标识
高	不可接受，可能会带来严重破坏; 需要优先管理的注意事项； 需要多种处理方法;	20以上	红色
中	可能会影响项目，可能需要不同的方法，可能需要额外的管理方案	15-20	黄色
低	风险危害性小，需要的监管力度少	15以下	绿色

Figure 13: Calculation method

4.4 Risk level conversion

The table below shows the risk level conversion.

Risk probability level exchange table		
possibility	**Grade**	**Range**
serious	5	More than 50% chance of accidents
high	4	30-50% probability of occurrence
secondary	3	10-29% probability of occurrence
low	2	Less than 10% of the time

Figure 14: Risk level conversion

4.5 Risk register

4.5.1 Positive risk

The table below shows the positive risk.

类别	风险	可能性				严重性（正面）				危险性
		乐观	最可能	悲观	加权	乐观	最可能	悲观	加权	
B.外部常见类	1.市场	4	2	1	2.2	-9	-6	-1	-5.7	-12.3
	2.政府监管	4	3	2	3.0	-5	-4	-2	-3.8	-11.5
C.内部技术类	1.需求变更	5	4	3	4.0	-6	-5	-1	-4.5	-18.0
	2.技术迭代	6	4	1	3.8	-8	-4	-1	-4.2	-16.0
D.内部非技术类	1.人事变动	7	4	1	4.0	-6	-4	-2	-4.0	-16.0
	3.财务状况	7	3	1	3.3	-9	-6	-4	-6.2	-20.6

Figure 15: Positive risk

4.5.2 Negative risk

The table below shows the negative risk.

类别	风险	可能性				严重性				危险性
		悲观	最可能	乐观	加权	悲观	最可能	乐观	加权	
A.外部不可抗类	1.自然灾害	3	2	1	2.0	10	7	4	7.0	14.0
	2.战争和武装冲突	3	2	1	2.0	10	8	3	7.5	15.0
B.外部常见类	1.市场	7	5	3	5.0	9	6	1	5.7	28.3
	2.政府监管	7	4	2	4.2	8	6	2	5.7	23.6
C.内部技术类	1.需求变更	9	6	3	6.0	7	5	1	4.7	28.0
	7.开发人员操作意外	6	4	1	3.8	8	4	1	4.2	16.0
D.内部非技术类	1.人事变动	7	4	1	4.0	7	4	2	4.2	16.7
	3.财务状况	7	3	1	3.3	9	6	4	6.2	20.6

Figure 16: Negative risk

4.6 Risk matrix

Draw the risk matrix for the calculated likelihood and severity, as shown below:

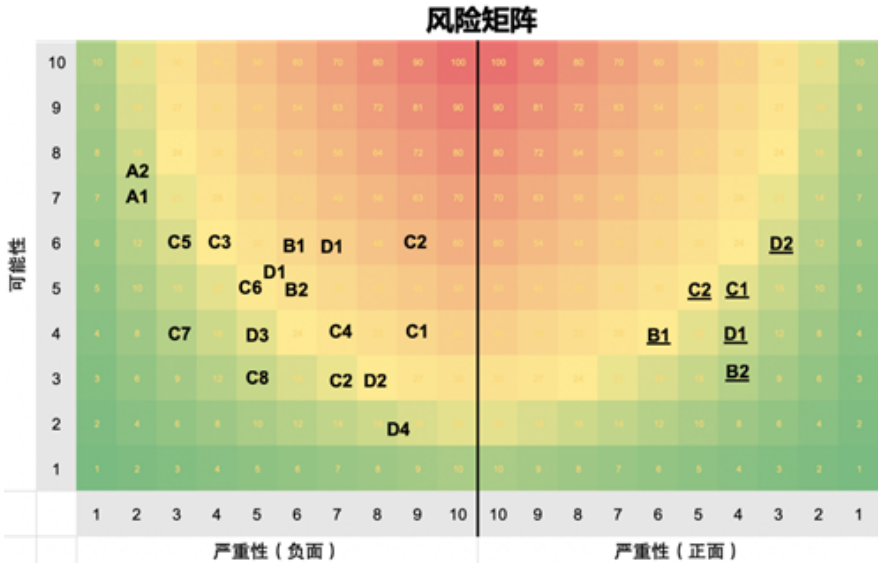


Figure 17: Risk matrix

4.7 Risk response

Risk response refers to the corresponding countermeasures taken in response to risks. Commonly used risk countermeasures include risk utilization, avoidance, mitigation, acceptance, transfer and their combination strategies. For example, it is a measure to transfer the risks that are difficult to control when insuring the insurance company.

4.8 Risk classification

Firstly, risks are divided into:

Positive risk

Negative risk

Each type of risk is divided into two situations: before the risk is realized and after it is realized, as shown in the following figure:

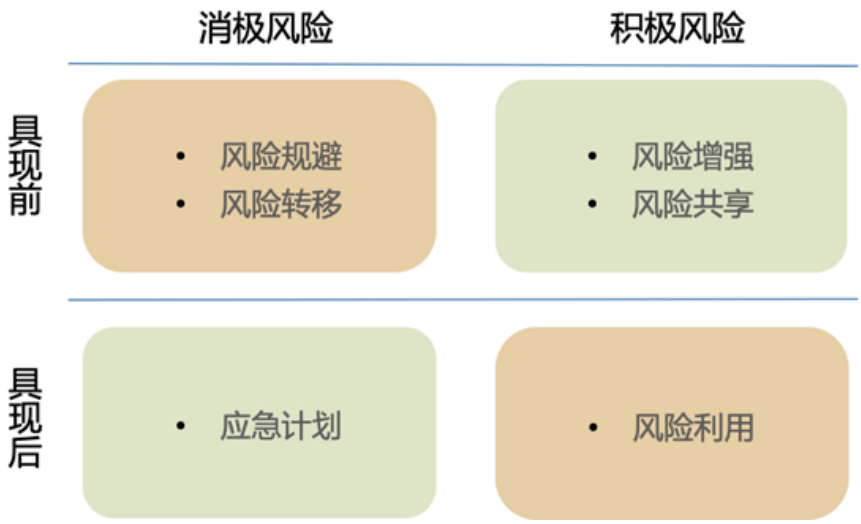


Figure 18: Risk classification

For each different situation, there are the following strategies,

Positive risk:

1.Enhancement: An action that aims to increase the chance of a risk occurring when a risk increases.

2.Utilization: Risk utilization refers to the use of resources available when the risk occurs.

Negative risk:

1.Avoidance: Before a risk occurs, take measures to reduce the possibility of occurrence.

2.Transfer: reduce the loss caused by the risk by transferring the risk to a third party.

3.Emergency: Take measures after the risk occurs to reduce the loss.

4.9 Risk response strategy

We have formulated corresponding response strategies for the risks most likely to be involved in this project, as follows:

Types of risks	ID	Risk name	introduce	Response strategy
External common classes	R2.1	market	Whether the function of the product is expected by the market and whether it can attract users;Whether there is competition from other similar products;The user may be very enthusiastic	1. Avoidance: invest resources to conduct research, predict market changes, and avoid high-risk 2. Transfer: outsourcing part of business to a third party 3. Emergency: adjust market strategy and development direction
Internal technology	R3.1	Requirement change	The inapplicability of some functions was found in the development process	1. Circumvention: using prototype development to obtain accurate requirements;Use agile development 2. Emergency: adjust development plan and developer in time
	R3.2	Technology iteration	Common or classic technologies are not easy to have problems or solve problems;When using new technology, there may be problems in operation, environment configuration, integration and so on	1. Circumvention: formulate development specifications and processes;Strengthen the education 2. Transfer: Use reliable and safe tools for development; 3. Emergency: if there is a major error in the product that cannot be repaired, it will go back to the previous version
	R3.3	reliability		
	R3.4	Security		
	R3.5	Maintainability	In the development process, the maintainability may be reduced due to the nonstandard technology or operation.	1. Circumvention: formulate development specifications and processes;Reduce dependence on 2. Transfer: use reliable products and third-party libraries 3. Emergency: if there is a major error
	R3.6	Operation accident	Problems caused by improper human operation	1. Evasion: back up the key data;Formulate development specification and process;Strengthen 2. Transfer: Using automated processes instead of manual operations 3. Emergency response: In case of data loss, data recovery
Internal non-technical	R4.1	Personnel risk	Team members may not be able to develop within development time	1. Avoid: strengthen the welfare treatment, improve the ability and motivation of team members 2. Emergency: if a member is unable to carry out development for some reason, the task should be reasonably assigned to other members
	R4.2	Managing risk	The inappropriate task allocation or personnel arrangement leads to the slow development process	1. Avoidance: group members conduct regular discussion and research;Reasonable distribution 2. Emergency response: In case of major decision-making mistakes, emergency strategies should be formulated to correct them.

Figure 19: Risk response strategy

5 Resource allocation

5.1 Resource Scheduling

5.1.1 XP precedence network diagram

The diagram below is the activity diagram.

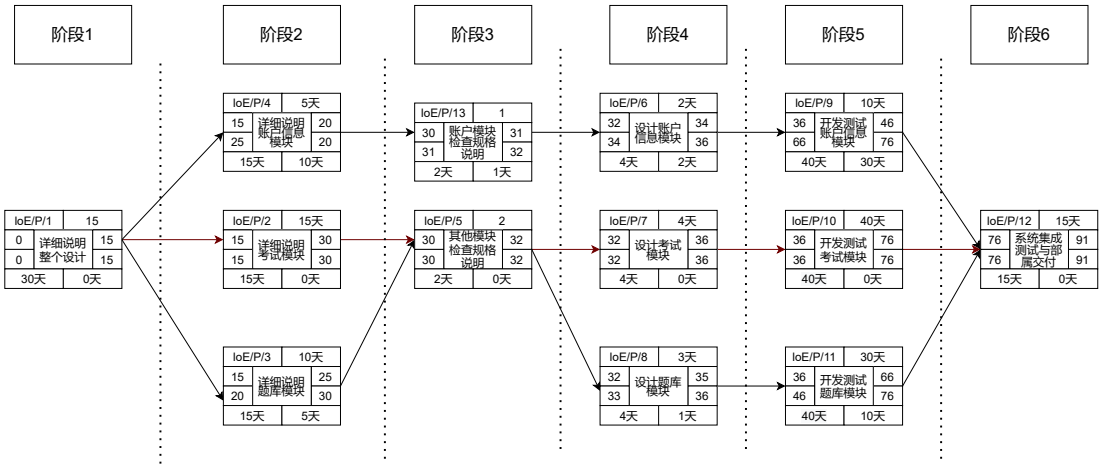


Figure 20: activity

5.1.2 Gantt chart

The chart below is the Gantt chart.

5.2 Cost schedule

5.2.1 Weekly project costs for XP

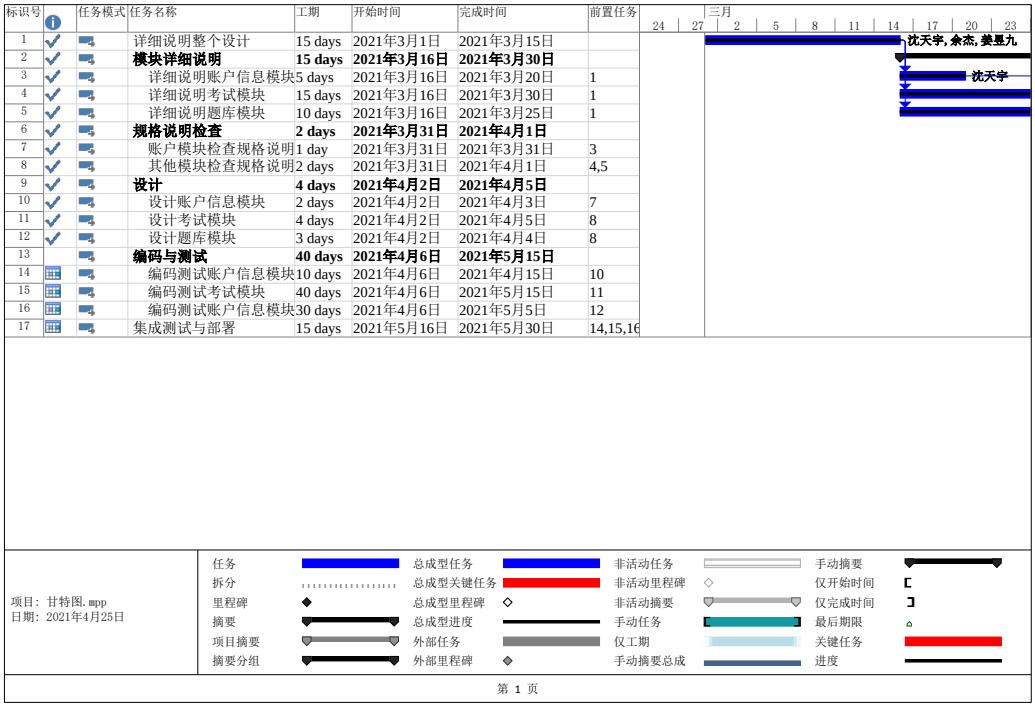
Weekly project cost Cumulative costs and has been reflected in the earned value table in supervision and control

5.2.2 Task cost

The chart below shows the task cost.

5.2.3 Resource cost

The chart below shows the resource cost.



标识号	任务模式	任务名称	工期	开始时间	完成时间	前置任务
1		详细说明整个设计	15 days	2021年3月1日	2021年3月15日	
2		**模块详细说明**	**15 days**	**2021年3月16日**	**2021年3月30日**	
3		详细说明账户信息模块	5 days	2021年3月16日	2021年3月20日	1
4		详细说明考试模块	15 days	2021年3月16日	2021年3月30日	1
5		详细说明题库模块	10 days	2021年3月16日	2021年3月25日	1
6		**规格说明检查**	**2 days**	**2021年3月31日**	**2021年4月1日**	
7		账户模块检查规格说明	1 day	2021年3月31日	2021年3月31日	3
8		其他模块检查规格说明	2 days	2021年3月31日	2021年4月1日	4,5
9		**设计**	**4 days**	**2021年4月2日**	**2021年4月5日**	
10		设计账户信息模块	2 days	2021年4月2日	2021年4月3日	7
11		设计考试模块	4 days	2021年4月2日	2021年4月5日	8
12		设计题库模块	3 days	2021年4月2日	2021年4月4日	8
13		**编码与测试**	**40 days**	**2021年4月6日**	**2021年5月15日**	
14		编码测试账户信息模块	10 days	2021年4月6日	2021年4月15日	10
15		编码测试考试模块	40 days	2021年4月6日	2021年5月15日	11
16		编码测试账户信息模块	30 days	2021年4月6日	2021年5月5日	12
17		集成测试与部署	15 days	2021年5月16日	2021年5月30日	14,15,16

Figure 21: Gantt chart 1

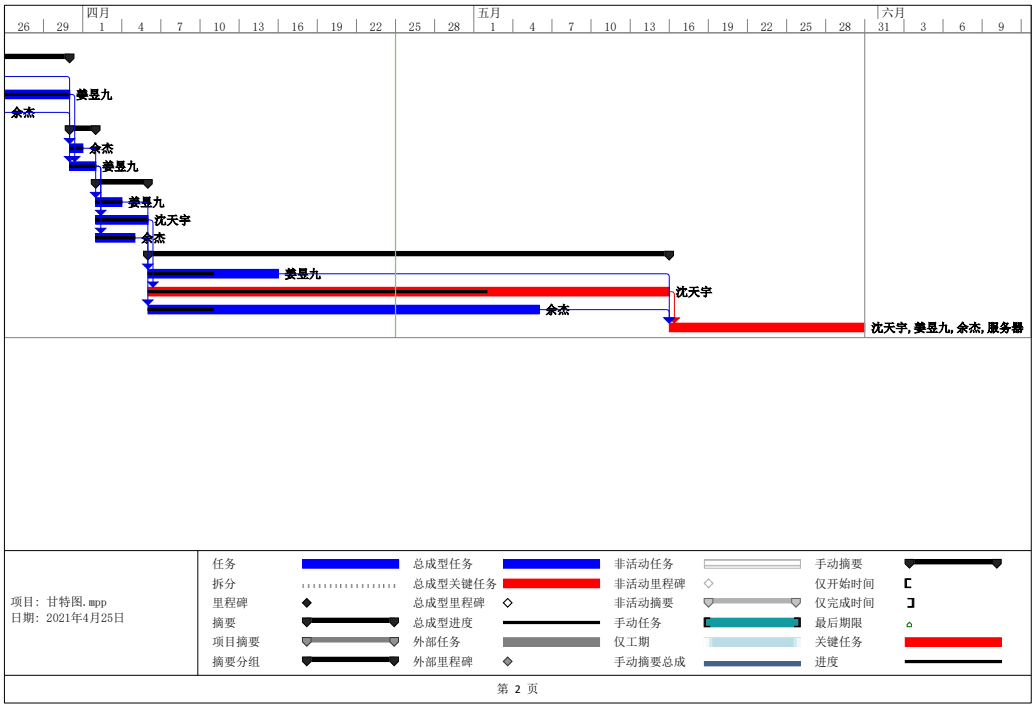


Figure 22: Gantt chart 2

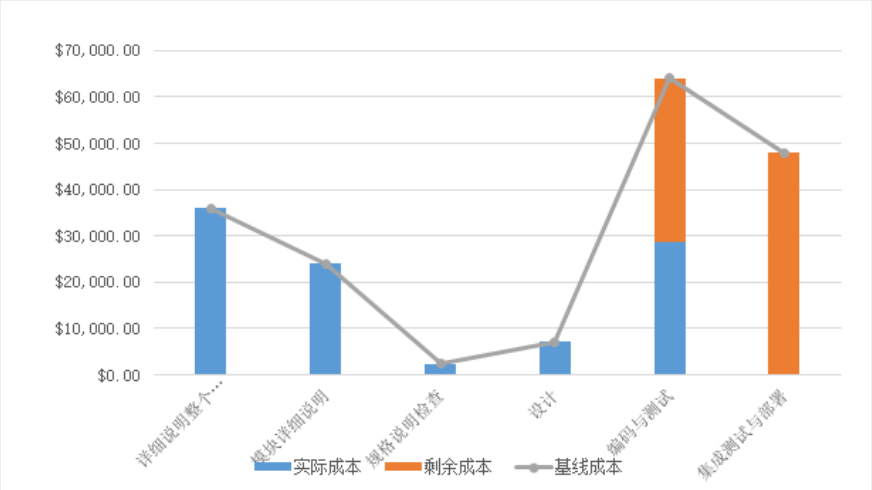


Figure 23: Task cost

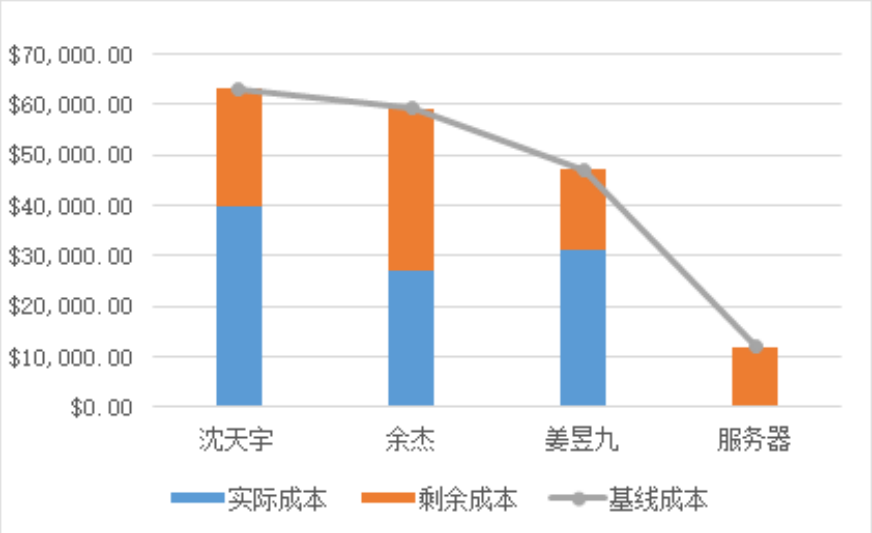


Figure 24: Resource cost

5.2.4 Resource allocation timeline

From the timeline, we can see that the resources are allocated reasonably and there is no overuse.

Figure 25: Resource allocation timeline

6 Monitoring & Control

6.1 Monitor the project on progress.

6.1.1 Responsibility

The Chart below is the responsibility of out group.

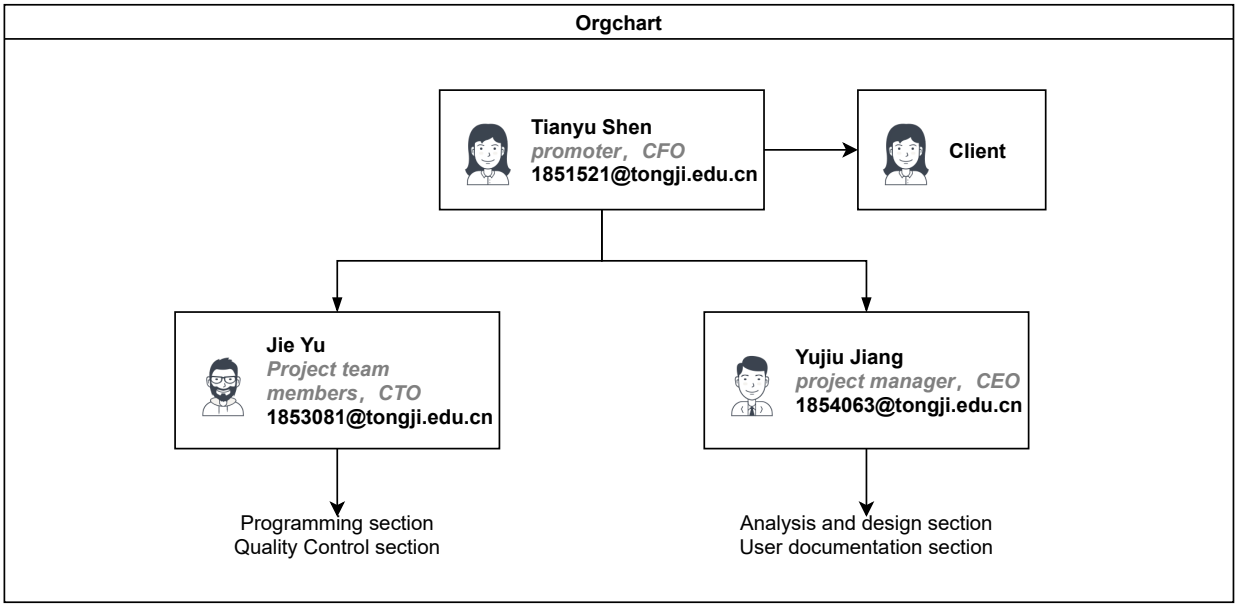


Figure 26: Responsibility

6.1.2 Cost monitoring

Chart below is the cost monitoring.

6.1.3 Earned Value Analysis

baseline budget

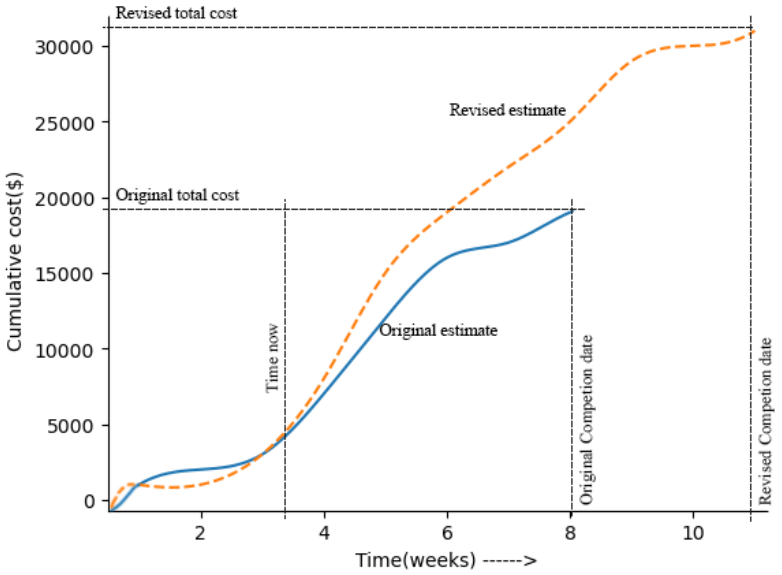


Figure 27: Cost monitoring

The table below is baseline budget.

Earned Value Analysis Table

The table below is Earned Value Analysis Table.

Earned Value Analysis Chart

The chart below is Earned Value Analysis Chart.

任务名称	基线工期	基线开始时间	基线完成时间	基线工时	基线成本
1 详细说明整个设计	15 days	2021年3月1日	2021年3月15日	360 hrs	$36,000.00
2 模块详细说明	**15 days**	**2021年3月16日**	**2021年3月30日**	**240 hrs**	**$24,000.00**
2.1 详细说明账户信息模块	5 days	2021年3月16日	2021年3月20日	40 hrs	$4,000.00
2.2 详细说明考试模	15 days	2021年3月16日	2021年3月30日	120 hrs	$12,000.00
2.3 详细说明题库模	10 days	2021年3月16日	2021年3月25日	80 hrs	$8,000.00
3 规格说明检查	**2 days**	**2021年3月31日**	**2021年4月1日**	**24 hrs**	**$2,400.00**
3.1 账户模块检查规格说明	1 day	2021年3月31日	2021年3月31日	8 hrs	$800.00
3.2 其他模块检查规格说明	2 days	2021年3月31日	2021年4月1日	16 hrs	$1,600.00
4 设计	**4 days**	**2021年4月2日**	**2021年4月5日**	**72 hrs**	**$7,200.00**
4.1 设计账户信息模	2 days	2021年4月2日	2021年4月3日	16 hrs	$1,600.00
4.2 设计考试模块	4 days	2021年4月2日	2021年4月5日	32 hrs	$3,200.00
4.3 设计题库模块	3 days	2021年4月2日	2021年4月4日	24 hrs	$2,400.00
5 编码与测试	**40 days**	**2021年4月6日**	**2021年5月15日**	**640 hrs**	**$64,000.00**
5.1 编码测试账户信息模块	10 days	2021年4月6日	2021年4月15日	80 hrs	$8,000.00
5.2 编码测试考试模	40 days	2021年4月6日	2021年5月15日	320 hrs	$32,000.00
5.3 编码测试账户信息模块	30 days	2021年4月6日	2021年5月5日	240 hrs	$24,000.00
6 集成测试与部署	15 days	2021年5月16日	2021年5月30日	480 hrs	$48,000.00

Figure 28: baseline budget

任务名称	计划值 - PV (BCWS)	挣值 - EV (BCWP)	AC (ACWP)	SV	CV	EAC	BAC	VAC
1 详细说明整个设计	$36,000.00	$36,000.00	$36,000.00	$0.00	$0.00	$36,000.00	$36,000.00	$0.00
2 模块详细说明	**$24,000.00**	**$24,000.00**	**$24,000.00**	**$0.00**	**$0.00**	**$24,000.00**	**$24,000.00**	**$0.00**
2.1 详细说明账户信息模块	$4,000.00	$4,000.00	$4,000.00	$0.00	$0.00	$4,000.00	$4,000.00	$0.00
2.2 详细说明考试模块	$12,000.00	$12,000.00	$12,000.00	$0.00	$0.00	$12,000.00	$12,000.00	$0.00
2.3 详细说明题库模块	$8,000.00	$8,000.00	$8,000.00	$0.00	$0.00	$8,000.00	$8,000.00	$0.00
3 规格说明检查	**$2,400.00**	**$2,400.00**	**$2,400.00**	**$0.00**	**$0.00**	**$2,400.00**	**$2,400.00**	**$0.00**
3.1 账户模块检查规格说明	$800.00	$800.00	$800.00	$0.00	$0.00	$800.00	$800.00	$0.00
3.2 其他模块检查规格说明	$1,600.00	$1,600.00	$1,600.00	$0.00	$0.00	$1,600.00	$1,600.00	$0.00
4 设计	**$7,200.00**	**$7,200.00**	**$7,200.00**	**$0.00**	**$0.00**	**$7,200.00**	**$7,200.00**	**$0.00**
4.1 设计账户信息模块	$1,600.00	$1,600.00	$1,600.00	$0.00	$0.00	$1,600.00	$1,600.00	$0.00
4.2 设计考试模块	$3,200.00	$3,200.00	$3,200.00	$0.00	$0.00	$3,200.00	$3,200.00	$0.00
4.3 设计题库模块	$2,400.00	$2,400.00	$2,400.00	$0.00	$0.00	$2,400.00	$2,400.00	$0.00
5 编码与测试	**$64,000.00**							
5.1 编码测试账户信息模块	$8,000.00							
5.2 编码测试考试模块	$32,000.00							
5.3 编码测试账户信息模块	$24,000.00							
6 集成测试与部署	$48,000.00							

Figure 29: Earned Value Analysis Table

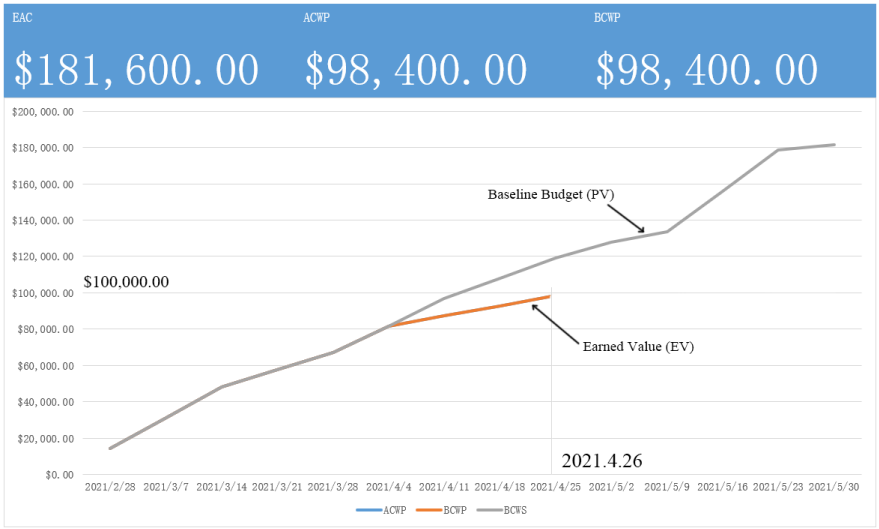


Figure 30: Earned Value Analysis Chart