

SE252 Software Project Management Final Report

What I'm Eating Today: Your Best Diet Recommendation Partner

Group Member

<i>Fu, Zhanchao</i>	<i>1909853M-I011-0046</i>
<i>Yu, Mengke</i>	<i>1909853W-I011-0021</i>
<i>Liao, Weiyu</i>	<i>1909853G-I011-0138</i>
<i>Li, Yiran</i>	<i>1909853D-I011-0156</i>

Catalog

1	REQUIREMENT DOCUMENT	- 4 -
1.1	PROBLEM.....	- 4 -
1.2	BACKGROUND.....	- 4 -
1.3	FUNCTIONAL REQUIREMENT.....	- 5 -
1.4	NON-FUNCTIONAL REQUIREMENT	- 5 -
2	SOFTWARE PROJECT MANAGEMENT	- 7 -
2.1	PM-CMM	- 7 -
2.1.1	<i>Stakeholders</i>	- 7 -
2.1.2	<i>Team leaders</i>	- 7 -
2.1.3	<i>Software and Agile Team</i>	- 7 -
2.2	MEMBER' S CHARACTER.....	- 7 -
2.3	PROJECT MEASURES.....	- 9 -
2.4	COST ESTIMATION.....	- 10 -
2.5	WORK BREAKDOWN STRUCTURE.....	- 10 -
2.6	RESOURCE RATE	- 11 -
	<i>Staff cost per hour</i>	- 11 -
2.7	RISKS COST ESTIMATION	- 12 -
2.8	ANALOGOUS ESTIMATING.....	- 12 -
2.9	COMPUTERIZED TOOLS	- 12 -
2.10	COST ESTIMATING	- 12 -
2.11	SUPPORT DETAILS.....	- 12 -
2.12	COST MANAGEMENT PLAN.....	- 12 -
2.13	PNR CURVE	- 13 -
2.14	TASK NETWORK.....	- 14 -
2.14.1	<i>Project Analysis</i>	- 15 -
2.14.2	<i>Demand and Design</i>	- 15 -
2.14.3	<i>PBL</i>	- 15 -
2.14.4	<i>Sprints</i>	- 16 -
2.14.5	<i>Test and Deliver</i>	- 16 -
2.15	EVM(EARNED VALUE MANAGEMENT).....	- 16 -
2.16	RISK MANAGEMENT.....	- 18 -
2.17	FORMAL TECHNICAL REVIEWS	- 19 -
2.18	SOFTWARE RELIABILITY	- 21 -
2.18.1	<i>Reliability and Failure</i>	- 21 -
2.18.2	<i>Measures of Reliability and Availability</i>	- 21 -
3	DEVELOPMENT DOCUMENT.....	- 22 -
3.1	SCRUM FRAMEWORK.....	- 22 -
3.2	TEAM MEMBER ROLES	- 22 -
3.3	DESIGN MODEL	- 23 -
3.4	PROJECT SCHEDULE.....	- 24 -

3.4.1	<i>Sprint 1 - two weeks</i>	- 24 -
3.4.2	<i>Sprint 2 - two weeks</i>	- 25 -
3.4.3	<i>Sprint 3 - two weeks</i>	- 28 -
4	TESTING DOCUMENT	- 31 -
4.1	BLACK BOX TESTING	- 31 -
4.1.1	<i>Equivalence Partition</i>	- 31 -
4.1.2	<i>Boundary value analysis</i>	- 32 -
4.1.3	<i>Cause Effect Graph</i>	- 33 -
4.1.4	<i>Decision Table</i>	- 33 -
4.2	WHITE BOX TEST	- 32 -
4.2.1	<i>Dynamic White Box Testing</i>	- 32 -
4.2.2	<i>Static white box testing</i>	- 41 -
4.3	UNIT TEST	- 42 -
4.4	AUTOMATED TESTING	- 43 -
5	MANAGEMENT AND MAINTENANCE DOCUMENT	- 47 -

1 Requirement Document

1.1 Problem

Most of the young people nowadays have Choice Phobia, they will struggle with what to eat every day, and people are also very concerned about the health issues in their diet, they will care more about the nutrient content or calorie level of food, so our group decided to make a diet recommendation app.

1.2 Background

At present, there are already software on the market that has the function of recommending frequently ordered dishes for restaurants and takeaways, such as Dianping and Meituan. People have also worked out some ways to randomly decide what to eat for the next meal, such as using a pick box app or making their own carousel, but each app has a single function, and in our research, there is no app that has both a pick box and food recommendation function. Therefore, in order to facilitate the use of the user, we decided to develop such a small program, in the collection of the above-mentioned functions at the same time, the small program also has a light and simple, easy to use features, more users can enjoy a convenient recommendation service at anytime, anywhere.

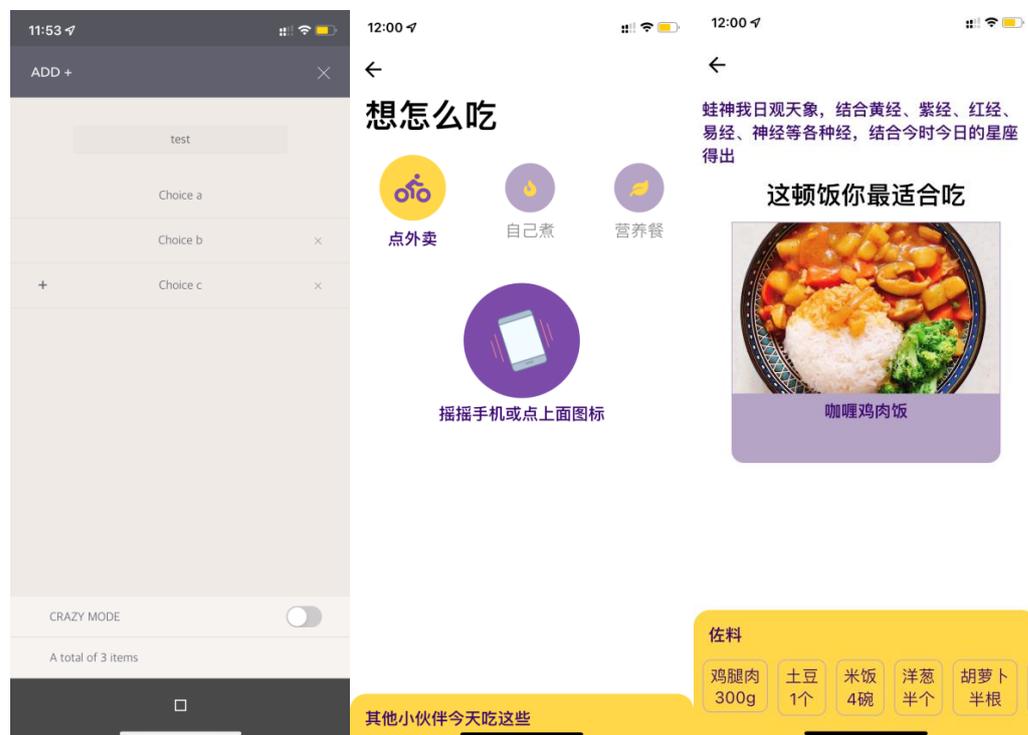


Figure 1 Pick Box Apps

1.3 Functional Requirement

According to the basic requirements mentioned above, the specific functions of this project are as follows:

- Random meal allocation on the turntable

Through the turntable, random selection is realized to get the user's meal today. The results of the meal will be displayed, and if the user is not satisfied, he can choose the meal again.

According to the meal, the applet will also recommend the corresponding recipes of the meals.

- Photo recognition

Users can upload or take photos of meals, and after clicking the button of “identify the dish”, the software can determine the name of the dish in the picture and the calorie or other nutritional content of the dish.

- Meal recommendation

Users can choose according to the labels provided, such as breakfast, lunch and dinner, cuisine, taste and other labels, the software will recommend the corresponding dishes according to the user's choice. If the user selects a dish, the software will also give the corresponding meal recommendations, so that users can make reference and choose. Users can also enter the ingredients they want to eat and the ingredients they don't want to eat. By this way, the software can achieve the purpose of advance filtering and better recommendation for users.

- Recipe

The user selects a certain dish, and the interface will show the ingredients and method of making the dish.

1.4 Non-Functional Requirement

- Response Time

At 95% of cases, the response time should not exceed 2 seconds during normal hours and 5 seconds during peak hours.

When the network is available, the time required for the localization system to display the first screen from the click to the first screen shall not exceed 300 ms.

In the recommended configuration environment: the response time for login is within 2 seconds, the response time for refreshing the page is within 2 seconds, the response time for opening each function entry is within 2 seconds, and the response time for refreshing personal data is within 2 seconds.

Searching for cities and campaigns based on number and name during off-peak hours can yield search results in less than 3 seconds.

- Throughput

The estimated number of users is 10,000, the number of logged-in users per day is about 1,000, and the bandwidth of the network is 100M.

The system can accommodate 10,000 simultaneous user requests and provide browsing capabilities for 20,000 concurrent users.

- Environmental requirements

Operating system: iOS or Android

Network: Broadband Internet connection

- Availability

Ensure the availability of the basic functions of the system under the conditions of poor network quality, small bandwidth and other poor network environment.

Provide data backup and recovery function for the database to prevent the loss of user data.

- Usability

The interface is simple and aesthetic, without redundant components, and each function entrance can be easily found by users without misleading them.

- Allowances for Maintainability and Enhancement

90% of the bugs will take no more than 1 working day to modify, and the original database content and all personal settings must remain unchanged after installing a new version.

2 Software Project Management

2.1 PM-CMM

People Management Capability Maturity Model developed by Software Engineering Institute to enhance their Capability through personnel development. The key practice areas include Recruiting, Selection, Performance Management and so on.

People involved in Software Process:

2.1.1 Stakeholders

Stakeholders can be categorized into one of following:

- Senior Managers
- Project Managers
- Practitioners
- Customers
- End Users

In our project, the stakeholder is categorized into Project Manager (PM).

2.1.2 Team leaders

The Team Leaders of our group follows the MOI model:

- Motivation: Encourage technical people (by “push or pull”) to produce.
- Organization: Apply, improve processes efficiently.
- Ideas or Innovation: Make people feel creative; Be Creative.

2.1.3 Software and Agile Team

- Democratic decentralized: No permanent leader; Communication is horizontal.
- Controlled decentralized: Defined leader; Horizontal communication; Problem solving is a group activity.
- Controlled centralized: Defined team leader; Problem solving; communication and management by team leader; Communication is vertical.

2.2 Member's character

Our team tested the project manager and other team members according to the DISC personality test recommended by Professor Zhang, and the results can only be said to be very characteristic. First of all, there are no leadership types in our group, namely D and I. Second, our project manager is a Type C, while all three team members are Type S.

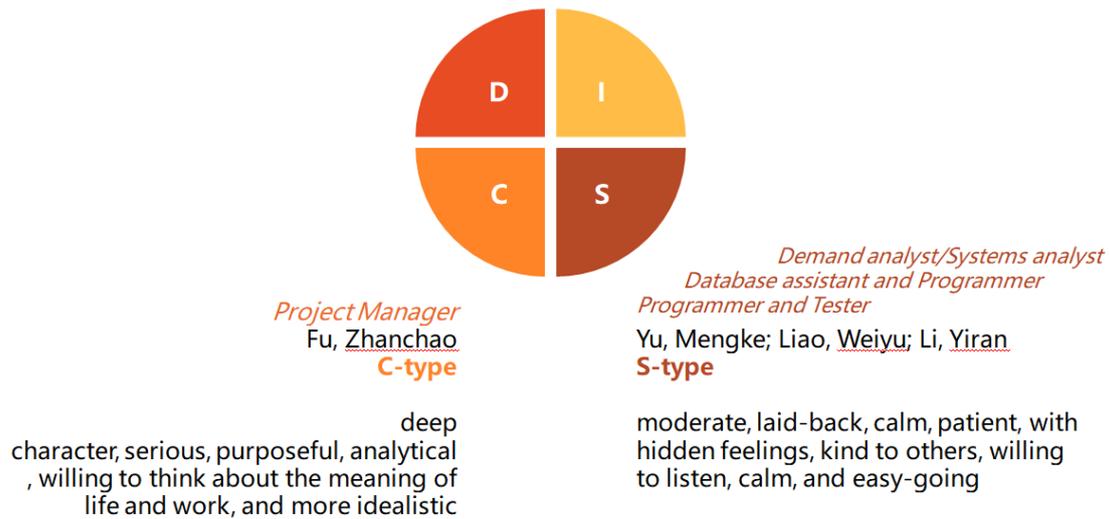


Figure 2 Member's Character

Type C is a person with deep personality, serious, strong purpose, good at analysis, willing to think about the meaning of life and work, relatively idealistic. However, Type C people tend to remember the negative, which means they tend to view events from a pessimistic perspective. In terms of work, Type C people are perfectionists with high standards and strong planning ability. They pay attention to details, are organized and neat. They can find problems and formulate solutions to problems. However, Type C people are also likely to be indecisive and need guidance and help in making important decisions.

In terms of interpersonal relationships, Type C people care deeply about others, are good at listening to complaints and helping others to solve problems.

Type S is a moderate, laid-back, calm, patient, emotional, kind, willing to listen to others, calm, and take things as they come.

At work, Type S can manage things step by step, be competent and persistent. The middle way, gentle and amiable, on the one hand used to avoid conflict, on the other hand can be calm. Emphasize cooperation, sincerity and reliability.

However, Type S always seems to be slow, hard to motivate, lazy, sloppy, shiftless.

In terms of interpersonal relationship, Type S is an easy person to get along with, like to observe people, thinking about people, willing to listen, willing to support.

As a group, no leadership type may not be as professor Zhang introduced in the paper the team perfect configuration, but we can also get inspiration from the paper, in the practice of teamwork and interpersonal relationship, need to pay attention to and improve the place and discuss how we configure group character is more close to a successful project.

According to the paper, a good project manager is usually task-oriented, has strong opinions, has a clear idea of the project's objectives, and is able to tightly control each step of the

software development process. Although this is characteristic of Type D personality, Type C personality also has task-oriented elements and is very detail-oriented, able to identify problems and formulate solutions to them. Therefore, in order to foster strengths and circumvent weaknesses, the project manager of our group should take the initiative to control the pace of the project and keep sober in the process of realizing project goals, which also needs the help and encouragement of project members.

However, in the environment of personnel disposition in our group, C-type PMS should pay more attention to actively mobilize the enthusiasm of S-type members and guide clear task objectives and directions, because S-type individuals are highly stable and socially emotional oriented, emphasizing cooperation, sincerity and reliability. Ability to implement tasks well with clear objectives.

Interpersonal communication in the team is also very important, and the atmosphere of our group is very harmonious and friendly. Type C PMS care about everyone and are good listeners, which is also conducive to receiving favorable opinions. Type S members are also easy to get along with and are willing to give the most support to the team. Good team atmosphere is our advantage, and PM needs to pay attention to it. On the basis of unity and friendship, we need leaders who break the comfort zone and guide the direction of progress. We should not encourage the team to make progress for fear of destroying the friendly atmosphere.

From a scientific point of view, though, the disposition of our team was not the most conducive to achieving a successful project. However, we can still use scientific theories to guide us to approach this common goal, carry forward the advantages of our character, guard against and perfect the disadvantages of our character, and make full use of our strengths and circumvent our weaknesses. I believe we can finally complete a successful project.

2.3 Project Measures

Our team's small program development mainly has four pages, each page and each contains a component, so a total of eight pages and components, eight folders and each contains four files.

Its minimum size (a) averages 50 lines per file.

The maximum size (b) averages 200 rows.

The most likely size (m) averages 150 rows.

According to the formula:

$$L = \frac{\bar{a} + 4\bar{m} + \bar{b}}{6}$$

The scale of our software is 21.9KLOC.

Now that development is complete, the final amount of code is not much different from our estimate. We had a four-person development team, and the development time was estimated to be 3 months. We assume that each person's monthly salary is 20,000 yuan, excluding other expenses. So, the total team cost is 24W.

From this, we can calculate the cost of 24W /21.9=1096 RMB per thousand lines of code.

- Estimate the amount of work:

In 2019, the software development productivity of the software industry was 7.10 person hours / function point. According to the labour law, the daily working hours shall not exceed eight hours.

The amount of work: development productivity of the software industry*FP/daily working time. So, the amount of work = 7.1*88.29/8 = 78.36 day / person.

- Estimate the cost of software:

The benchmark person month unit price of software development industry in 2019 is 28767 yuan / person month.

The cost of software = the amount of work*software development industry per month/working time per month.

The cost of software = 78.36*28767/22 = 102462 yuan.

2.4 Cost Estimation

Input	Tools & Techniques	Outputs
Work breakdown structure	Analogous estimating	Cost estimating
The resource requirements	Computerized tools	Support details
Resource rates		Cost management plan
Risks cost estimation		

Figure 3 Cost Estimation

Our team will make cost estimates from nine aspects of the above three dimensions.

2.5 Work Breakdown Structure

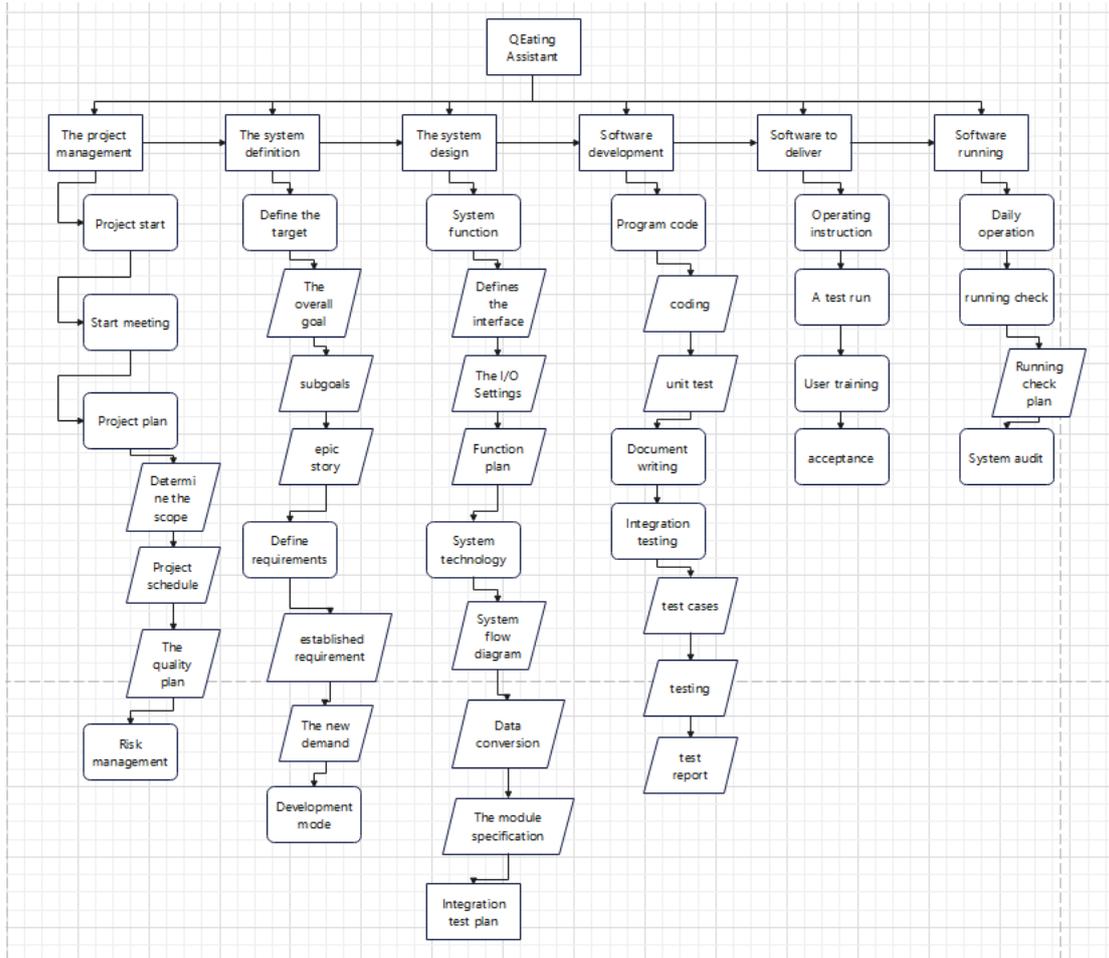


Figure 4 Work Breakdown Structure

The resource requirements

No.	Name	Function	Mount
001	PC	Essential goods for productivity	4 or more
002	Recipe interfaces	API Implement recipe functions and dietary recommendations	1(Two spare)
003	Keyboard and mouses	Input devices	4
004	Mobile phone	Run test equipment	2(An iPhone and an Android)

2.6 Resource rate

Staff cost per hour:

Working durations: 58 days

Working hours: $(58-7*2) * 4 = 176$ h

Staff number:4
Budget:240000
Cost/hour: 340 yuan
Material cost: 200 yuan (Equipment maintenance cost)
Overhead cost: 0 yuan

2.7 Risks cost estimation

Our budget for risk management steps is 2000 yuan. This reserve fund is used to maintain equipment and purchase unplanned network resources and access rights. When the risk management plan is triggered, the funds will be used to adapt the risk management options. In subsequent risk management programs, the amount of this fund will be increased accordingly.

2.8 Analogous estimating

We compared last semester's software engineering project, Weather Helper, because it has similarities to our current project. Development time, number of developers, code size, etc. We found that the cost of the project was relatively low, especially in the testing phase. WeChat mini program platform may reduce the related costs for us.

2.9 Computerized tools

IDE	The calculator	Trello	Google
WeChat	GitHub	OBS	

2.10 Cost estimating

We estimate that the cost of our project is about 24,200 yuan.

2.11 Support details

- WBS
- Salary per person per month
- Risk management budget
- Other hypothetical budgets

2.12 Cost management plan

- Conduct a weekly cost summary
- Check and adjust the huge cost
- Design a complete budget plan
- Establish a reserve fund

- Recalculate the overall cost when new technologies and resources need to be imported

2.13 PNR Curve

The PNR curve shows that the time to complete a project is highly nonlinear in relation to the amount of personnel involved in the project. The demo submission date set before is April 10th, but the actual submission date is April 25th. So, the expected working time is 42 days, the actual working time is 50 days.

According to the calculation formula of PNR curve, the regulatory factor M selected by us selected the interval 1.0 according to the maturity level of our group.

团队经验	取值
为本行业开发过类似的项目	0.8-0.9
为其他行业开发过类似的项目, 或为本行业开发过不同但相关的项目	1.0
没有同类项目的背景	1.1-1.2

Figure 5 Value of Factor M

$$E_a = m \left(\frac{t_d^4}{t_a^4} \right)$$

Where

- E_a = Effort in person months
- t_d = The nominal delivery time for the schedule
- t_a = Actual delivery time desired

Our group's daily workload $E_a = 0.49$. The expected daily workload was $E_d = 1$. Plug in our group's data on the PNR curve:

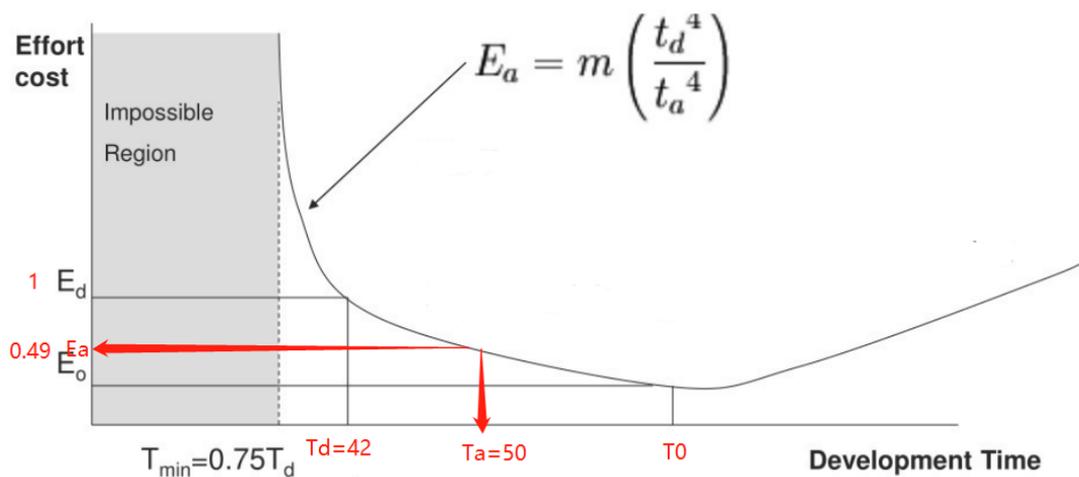


Figure 6 PNR Curve

It can be seen that although our team delayed the submission time, the cost was reduced. According to the information in the figure, the minimum working time is $0.75TD = 31.5$ days, which indicates that 31.5 days is the minimum for accelerating the work schedule by increasing the cost, and there is a great risk of failure if the working time is lower than this time.

The development workload can be calculated according to the software equation derived from PNR:

$$E = L^3 / P^3t^4$$

L is the code line number, P is the productivity constant (we chose the moderate 8000) and t for our work time based on the team situation. When we came to the data, our development workload is 2.63 per man month.

2.14 Task network

Our group subdivided each part as follows:

- 1 Project Analysis
 - 1.1 Concept scoping
 - 1.2 Preliminary concept plan
 - 1.3 Technical risk assessment
 - 1.4 Proof of concept
 - 1.5 Market analysis
- 2 Demand and Design
 - 2.1 Problem
 - 2.2 Background
 - 2.3 Functional and Non-functional
 - 2.4 Software architecture
 - 2.5 Development mode
- 3 PBL
 - 3.1 User story
 - 3.2 Epic story
 - 3.3 Milestone
 - 3.4 Assignments and deadlines
- 4 Sprints
 - 4.1 Sprint 1
 - 4.1.1 Planning the overall interface.
 - 4.1.2 Create separate pages for each function that can be used.
 - 4.1.3 Create profile pages and allow users to make changes to their profiles.
 - 4.1.4 Planning for turntable recommendation, recipe display, photo recognition and other functions.
 - 4.2 Sprint 2
 - 4.2.1 Provide personalized suggestions for each user.
 - 4.2.2 Create a food spinner

- 4.2.3 Beautify the interface
- 5 Test and Deliver
 - 5.1 Black box test
 - 5.2 White box test
 - 5.3 Unit test
 - 5.4 User feedback

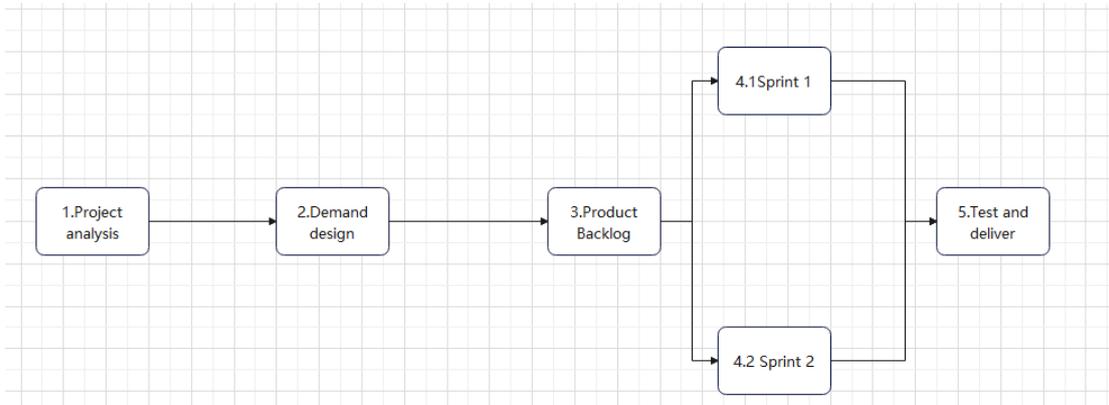


Figure 7 Task Network

2.14.1 Project Analysis

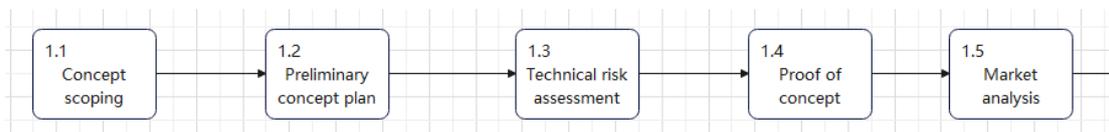


Figure 8

2.14.2 Demand and Design

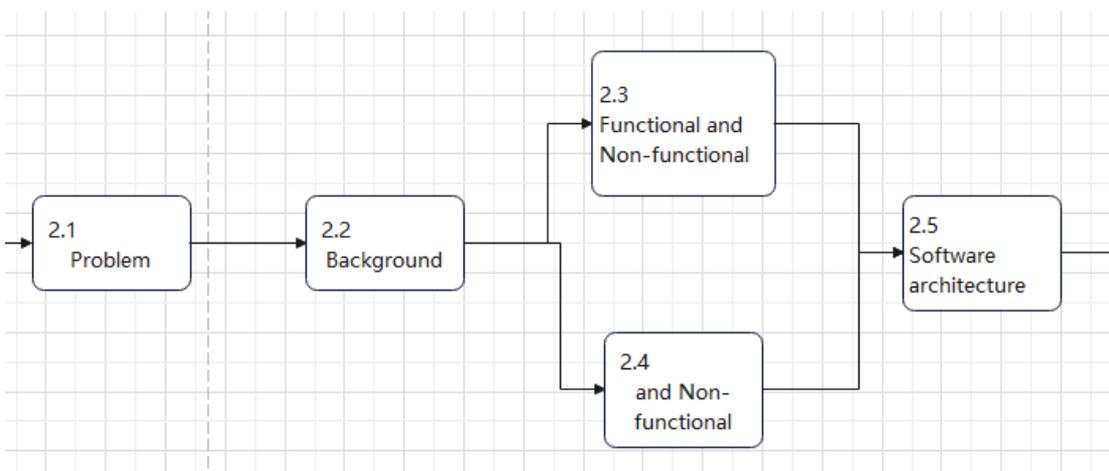


Figure 9

2.14.3 PBL

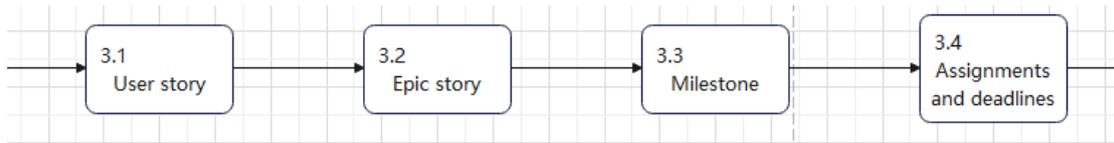


Figure 10

2.14.4 Sprints

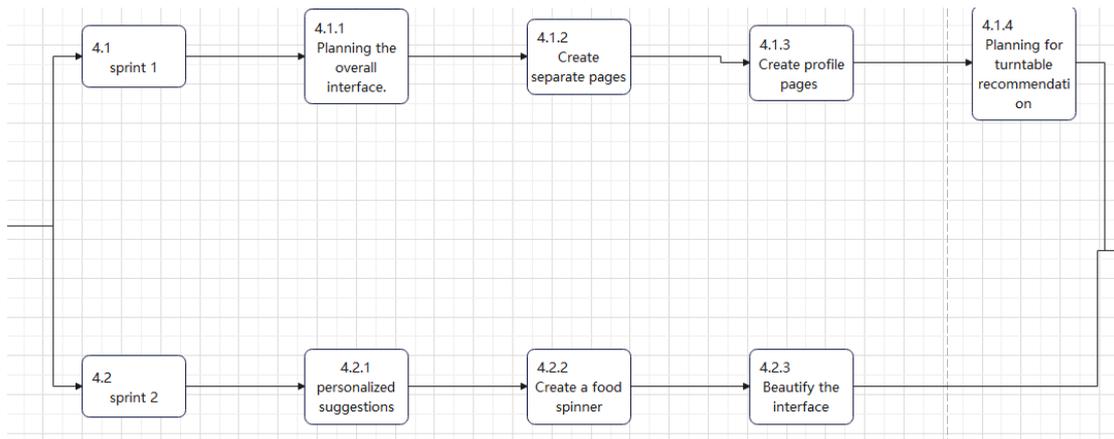


Figure 11

2.14.5 Test and Deliver

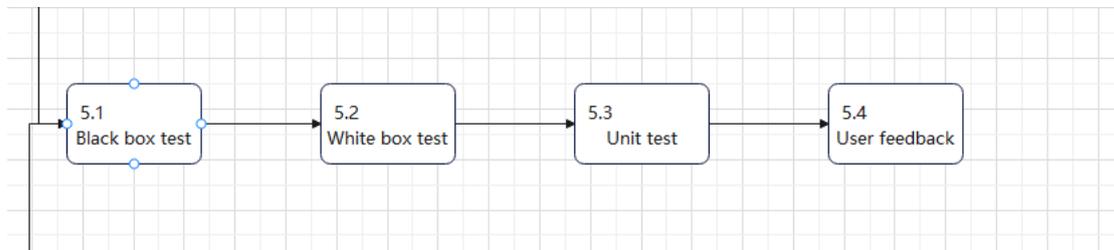


Figure 12

2.15 EVM(Earned value Management)

Earned Value Management (EVM) is an overall method that can comprehensively measure the progress and cost of projects. Its basic element is to measure the progress of projects by replacing the amount of money with the amount of projects. It does not reflect the progress of projects by the amount of invested funds, but by the amount of funds that have been converted into project achievements. It is a complete and effective project monitoring index and method.

Before calculating various evaluation indicators, we should calculate various basic parameters first. We allocate the budget according to the proportion of contributions from each stage. A recommended distribution of effort across software process is often referred to as 40-20-40 rule:

- 40% allocated to analysis & design

- 20% allocated to coding
- 40% allocated to testing

Our team's estimated development and testing time was 90 days, and 58 days have passed. And our expected total project cost BAC(including the current testing phase) is 24W. BCWP of completed work budget is $24*60\%+24*40%*(8/36) = 16.5$ W. BCWS of planned work budget is $24*60\%+24*40%*(4/36) = 15.5$ W. The actual cost ACWP of the work completed so far is 16W.

Evaluation indicators:

Cost deviation $CV=BCWP-ACWP= 0.5$ W.

When the cost deviation is negative, it means that the project operation exceeds the budget cost; otherwise, it means that the actual cost does not exceed the budget cost.

Progress deviation $SV=BCWP-BCWS= 1$ W.

When the progress deviation is negative, it indicates the progress delay, that is, the actual progress is behind the planned progress; If the offset is positive, the progress is advanced, that is, the actual progress is faster than the planned progress.

Cost performance index $CPI=BCWP/ACWP=1.03$.

When expense performance index < 1 , means overspend, that is, the actual cost is higher than the budget cost.

When the cost performance index > 1 , it means saving expenditure, that is, the actual cost is lower than the budgeted cost.

$SPI=BCWP/BCWS=1.06$.

When the schedule performance index < 1 , indicates progress delay, that is, the actual progress is behind the planned progress.

When the schedule performance index > 1 , the actual progress is earlier than the planned progress.

The following is a diagram of our group as a whole:

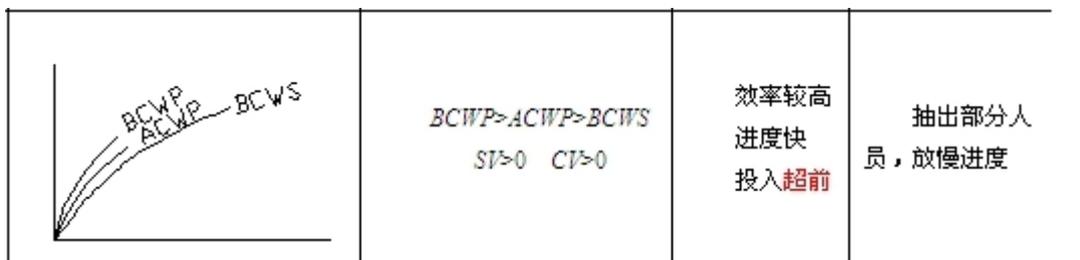


Figure 13 Evaluation Indicators Diagrams

2.16 Risk Management

Risk Information Sheet			
ID:001	Date:20/3/2022	Prob: 70%	Impact:middle
<p>Description:The EXAM risk.During the exam week (including midterm and final exams), the staff involved reduce their working hours and efficiency, which affects the mentality of the members. If the two sides can not balance, it will also lead to the withdrawal of students, not conducive to the smooth progress of work.</p>			
<p>Refinement/Context:</p> <p>Subcondition 1: The work schedule conflicts with the review schedule, forcing the working hours to be reduced.</p> <p>Subcondition 2:In the review week members of the study pressure, coupled with the usual work pressure, will lead to mentality affected, reduce work efficiency .</p>			
<p>Mitigation/Monitoring:</p> <ol style="list-style-type: none"> 1. Delay work, reduce assignments, and return to normal assignments after the exam 2. Pacify member mentality, encourage member 3. Stop development when productivity is low to avoid too many bugs 			
<p>Management/Contingency Plan / Trigger:</p> <ol style="list-style-type: none"> 1. Collect our team members' exam week schedules in advance and avoid exam intensive periods when assigning work tasks. 2. Plan the tasks that follow 3. According to the different examination arrangements of different members, arrange the work of members in turn, and keep the progress at a certain speed 			
<p>Current Status:</p> <p>22/3/2022.The mitigation steps initiated.</p>			
Originator: Zhanchao FU		Assigned: Zhanchao Fu	

Risk Information Sheet			
ID:002	Date:05/4/2022	Prob: 40%	Impact:high
<p>Description:<u>Sudden interface failure.</u>Wechat applet call interface can reduce costs and increase utilization. The average applet calls many interfaces. Once the interface fails, the program cannot run normally, and the stability of the program will be greatly reduced.</p>			
<p>Refinement/Context:</p> <p><u>Subcondition 1:</u>The network connection is abnormal.</p> <p><u>Subcondition 2:</u> The API owner shut down the server.</p> <p><u>Subcondition 3:</u> When the same request is accessed for the second time, it will first detect whether <u>redis</u> has the sign. If it does, it will prove that it has submitted the sign repeatedly, and the interface will not continue to call, and directly return an error or the result of previous processing. If sign is deleted from the cache server due to the expiration time, when the URL requests the server again, the expiration time of token is the same as the expiration time of sign. The expiration time of sign also means that token expires. In this case, the same URL accessing the server will be blocked due to token error.</p>			
<p>Mitigation/Monitoring:</p> <ol style="list-style-type: none"> 1.Check the network connection and communication with the interface immediately 2.Contact the API owner for details 3.Enable alternate API interfaces 4.Then the connection with the API is detected and the working status of the API is recorded 			
<p>Management/Contingency Plan / Trigger:</p> <ol style="list-style-type: none"> 1. Prepare a standby API interface in advance. When the active interface fails, ensure that the standby interface can meet the current progress immediately 2. Keep in touch with the API owner 3. When looking for an API, filter it by looking for the number of times the API has been used, the date it was maintained, and even user reviews 			
<p>Current Status:</p> <p>07/4/2022.The mitigation steps initiated.</p>			
Originator: <u>Zhanchao Fu</u>		Assigned: <u>Zhanchao Fu</u>	

2.17 Formal Technical Reviews

Check list:

- Whether the startup speed of small program is fast enough
- Whether the contents of the turntable fan are clear
- Whether there are any bugs when using
- Whether the code to implement the function is concise
- Check whether data can be synchronized in time

- Is page switching smooth enough
- Is the main interface beautiful

Review Panel's Views:

- The startup speed of small programs is slow
Suggestion: Shrink some file memory.
 Found cause: Too many images loaded at one time, too many pages
- Producer opinion: Accepted
Suggestion: Compressed images, declare the project subpackage structure in the app.json subpackages field load the main page first, other interfaces can load on demand.
- The contents of the small fan of the turntable are not clear. Comment Change the color scheme.
 Producer opinion: Accepted
Solution: Increase the text size, fan color was selected choose not dazzling not gorgeous color.
- Sometimes the software icon is not displayed as a box
 Suggestion: Using local ICONS is more stable
 Reason: The official online reference provided by Ali icon library is unstable and sometimes makes mistakes
 Producer's opinion: Accept for the time being
Solution: Directly download the icon link to the local for application.
- The code of the turntable page is too redundant and complex which is not conducive to the reusability and maintainability of the code
 Comments: Some undetailed functional codes can be put forward separately
Producer opinion: Accepted
Solution: Abstract the code part of the turntable into a custom component of WeChat applet and use it as a common component in the page. The code becomes easy to maintain and update
- Personal physical data are sometimes out of sync with health indicators
 Comments: Continue to improve page data manipulation function
 Cause: Data is updated but UI is not updated
Producer opinion: Accepted
Solution: Change page. Data to page. Set data to update the UI synchronously.
- During page switching the icon on the bottom TAB bar does not change
 Advice: Read the official documentation and component code for improvements
Producer opinion: Accepted
Solution: Add index index to corresponding jump page to make the jump more stable

2.18 Software reliability

2.18.1 Reliability and Failure

Because of the specific nature of the program our team developed, we assumed that users would use the program once per meal, which would result in 33 days of use at 100 times of computation.

So, we let $n=33$ day, then we get $F(33) = 1 - R(33) = 0.9911$.

2.18.2 Measures of Reliability and Availability

MTBF = 108 hours

MTTR = 2.4 hours

Availability = $(\text{MTBF}/(\text{MTBF}+\text{MTTR})) * 100\%$
=97.826086%

3 Development Document

3.1 Scrum Framework

In each iteration, we organize four meetings, sprint planning, daily stand-up meeting, sprint review, and sprint retrospective, to make our agile development process more efficient.

3.2 Team Member Roles

Project Manager – Fu Zhanchao

- Plan
 - A) Confirmation of project scope, project quality, project time and project cost.
 - B) Standardization and standardization of project processes/activities.
 - C) Make the overall planning and phase plan of the project based on the comprehensive consideration of the project scope, quality, time and cost.

- Organization
 - A) Organize various resources required for the project.
 - B) Set up various roles in the project team and assign the responsibilities and permissions of each role.
 - C) Handle the relationship between various roles and members in the project team.

- Leadership
 - A) Ensure that the objectives of the project team are clear and consistent.
 - B) Create the development environment and atmosphere of the project team and ensure that project team members are not affected by other aspects of the project within the scope of the project.
 - C) Improve team morale and strengthen team cohesion.
 - D) Reasonably arrange the work of each member of the project team.
 - E) Timely find and deal with problems in the project team.

Demand analyst/Systems analyst - Li Yiran

- Main responsibilities
 1. In the requirements phase, the software architect is responsible for understanding and managing non-functional system requirements, such as software maintainability, performance, reusability, reliability, effectiveness, and testability.
 2. In the design stage, the architect is responsible for the design of the entire software architecture, key components and interfaces. Assist system analyst to complete system Outline Design Specification.
 3. During the coding phase, the architect becomes a consultant to the programmer.
 4. During the testing and implementation phase, integration and test support will become the focus of software architects as the software begins to be tested, integrated and delivered.
 5. Conducted customer demand research according to the Demand Research Plan in the early stage of the project.

6. Collected and sorted out customer requirements and was responsible for compiling user requirements Specification.
7. Model the system according to system Architecture Specification.

Database assistant - LiaoWeiyu

1. Work with system architect and system analyst according to system Architecture SpecificationRow database modeling.
2. Draw database CDM and PDM graphs according to the database modeling results.
3. Build database according to database PDM diagram.
4. Maintain, backup, restore and synchronize the database.
5. Responsible for import and export of customer data.
6. Initialize the database.
7. Assist the software designer to complete the phase with the database in the System Detailed Design Manual.

Programmer - LiaoWeiyu& Yu Mengke

1. According to the System General Design Specification, compile the system Specification by module.
2. Responsible for explaining system Detailed Design Instruction to software engineers.
3. Assist the software engineer to implement the code according to the System Detailed Design Specification.
4. Control the development progress of this module.

Tester - Yu Mengke

1. Independently write test plans.
2. Independently write test cases.
3. Coordinate the work within the test team and with the development team.
4. Complete the "Test Execution" task.
5. Master in-depth testing methods, testing techniques and complex business processes.
6. Responsible for the research, promotion and maintenance of test process tools and test database maintenance.

3.3 Design Model

We chose the waterfall model for our development. The core idea of the waterfall model is to simplify our development problems by process and to separate the implementation of software functions from the design, which facilitates the division of labor in our group.

According to the waterfall model, our group divides the software life cycle into six basic activities: planning, requirements analysis, software design, program writing, software testing and operation and maintenance, etc. In each part, our group members will complete the required documentation in order to ensure the high quality and productivity of the software development, and review the documentation to discover the problems of the phase as early as possible to make corrections and ensure the quality of each phase. The required

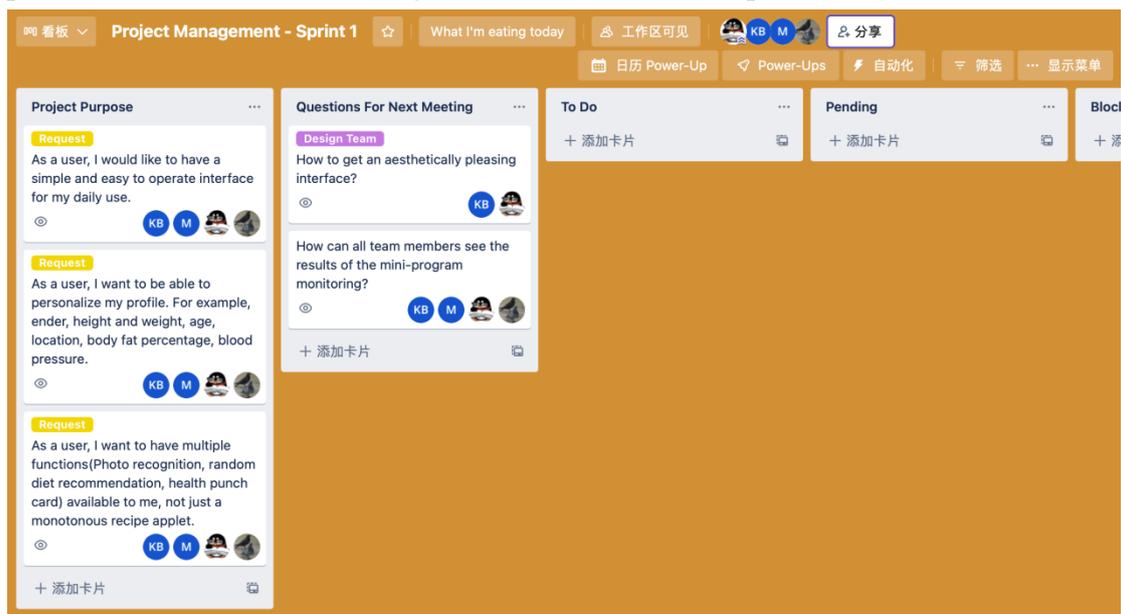
documentation is also beneficial for the team members to adopt a unified and standardized approach, which facilitates the sum of the later stages.

Since our project is a small to medium-sized system with a low budget and limited manpower, and the waterfall model is a document-driven model, adhering to this constraint can make software maintenance easier and thus significantly reduce the software budget.

3.4 Project Schedule

3.4.1 Sprint 1 – two weeks

In the first sprint we intend to complete the overall interface of the applet first, so that more features can be added later. The main interface will display today's randomly recommended meals. And the bottom of the main interface is used to display the recipe module which will display the picture and name of meals. Then we will make the recipe interface of all food items, so that it is easy to call out in the recommendation interface. The recipe screen will show the steps and ingredients needed to make the dish. In sprint 1, we will also finish the personal interface. Users can change their nickname and other personal information.



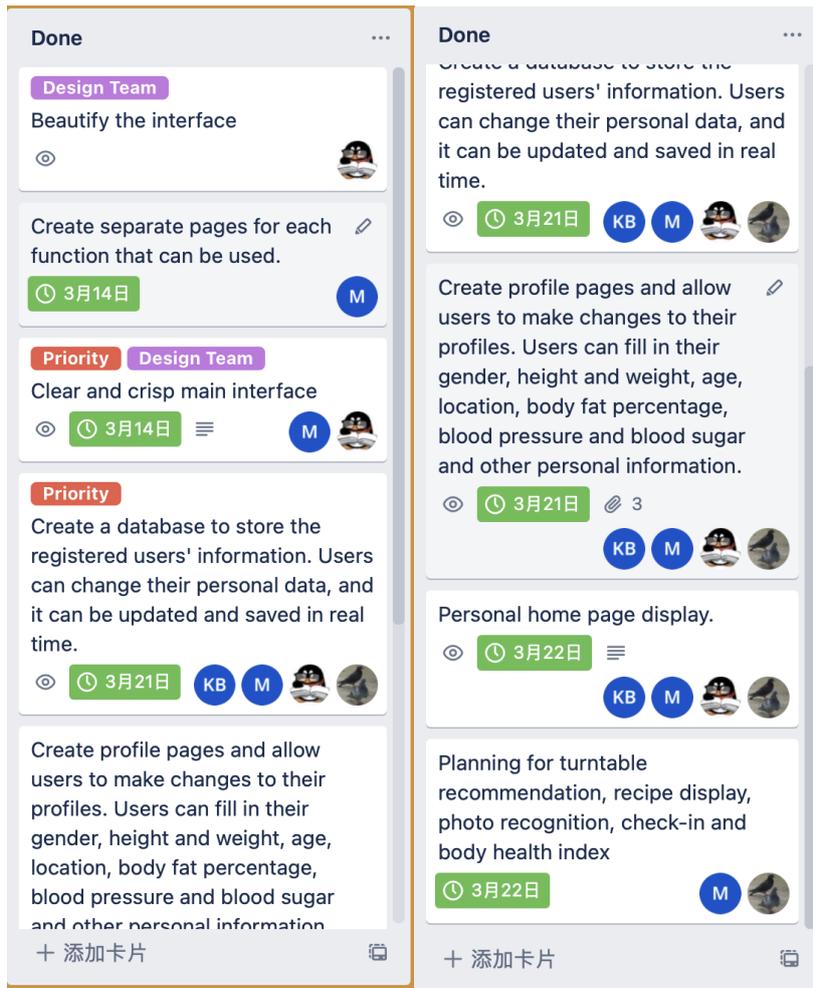


Figure 14 Sprint 1

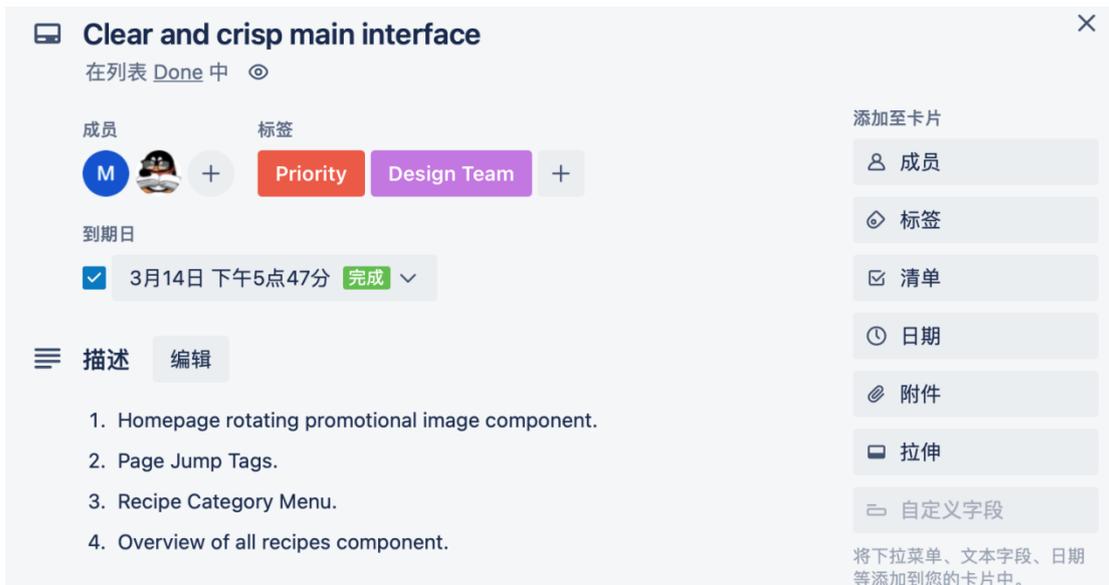
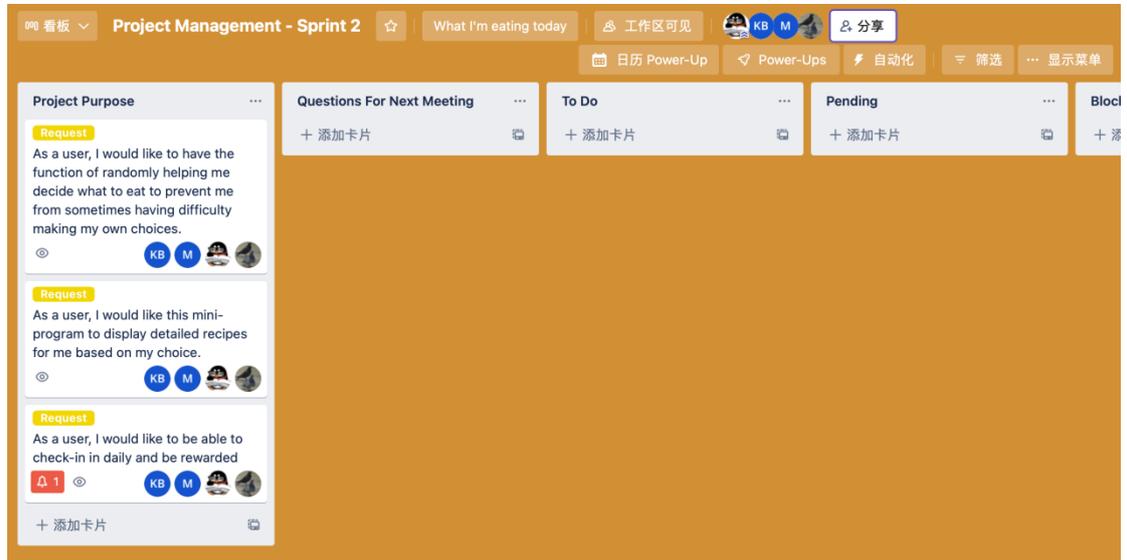


Figure 15 Details Of Main Interface

3.4.2 Sprint 2 – two weeks

In the second sprint, we intend to create a random spinning wheel so that users can draw a random food to help them make a decision. A variety of popular dishes will be displayed on the wheel and the user will click the start button and the pointer will randomly stop on a sector of the dish. Users can also reselect if they are not satisfied. In addition, the personalized recommendation of recipes will also be done in this sprint.



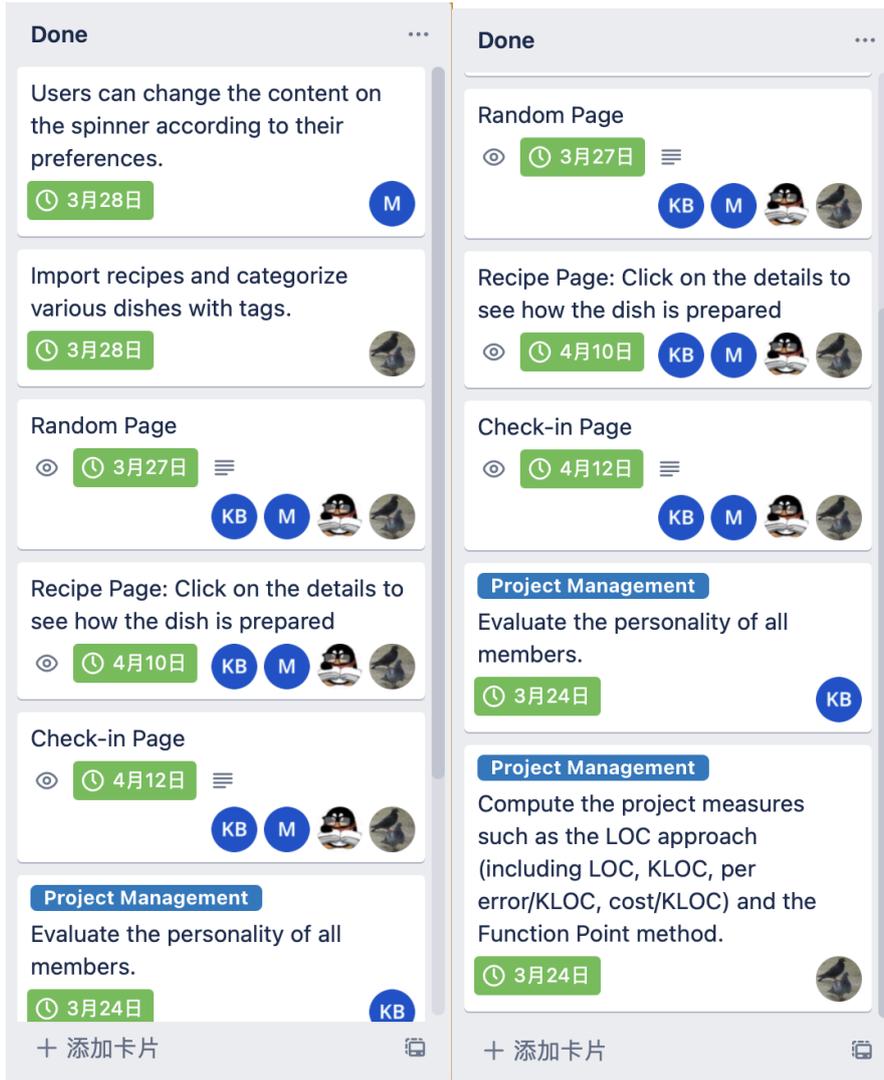




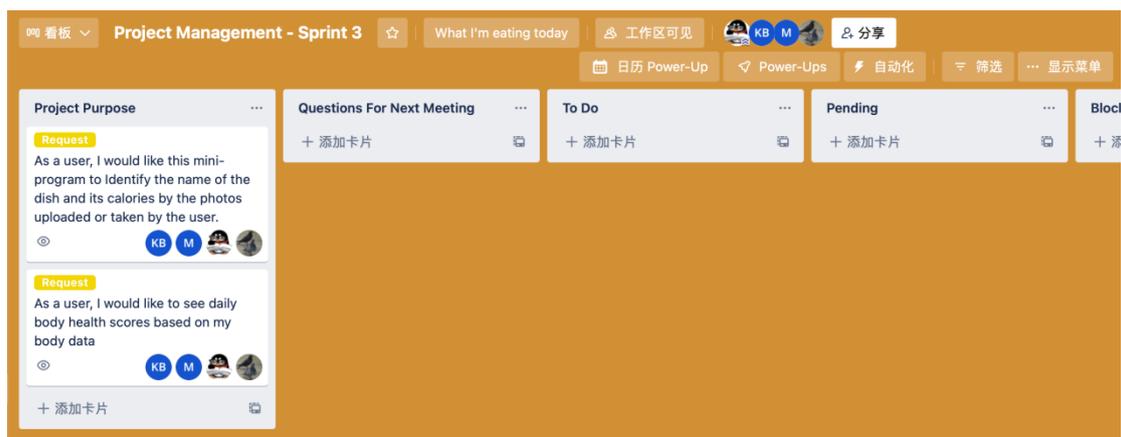
Figure 16 Sprint 2

Firstly, we finished the carousel recommendation page, the function includes: 1. carousel component; 2. set carousel content according to college students' preference; 3. carousel can be reset; 4. the bottom of the carousel shows the content pointed by the pointer; 5. carousel add rotation sound.

Then the check-in interface is completed with 1. simple interface; 2. check-in function; 3. display the number of days to check-in. The recipe layout is to click on the details to see how the dish is made.

3.4.3 Sprint 3 – two weeks

In the third sprint, we mainly intend to implement the photo recognition function, which recognizes the type of food in the photo and feeds the calorie and other information to the user. Users can provide pictures by selecting photos from albums or by taking photos.



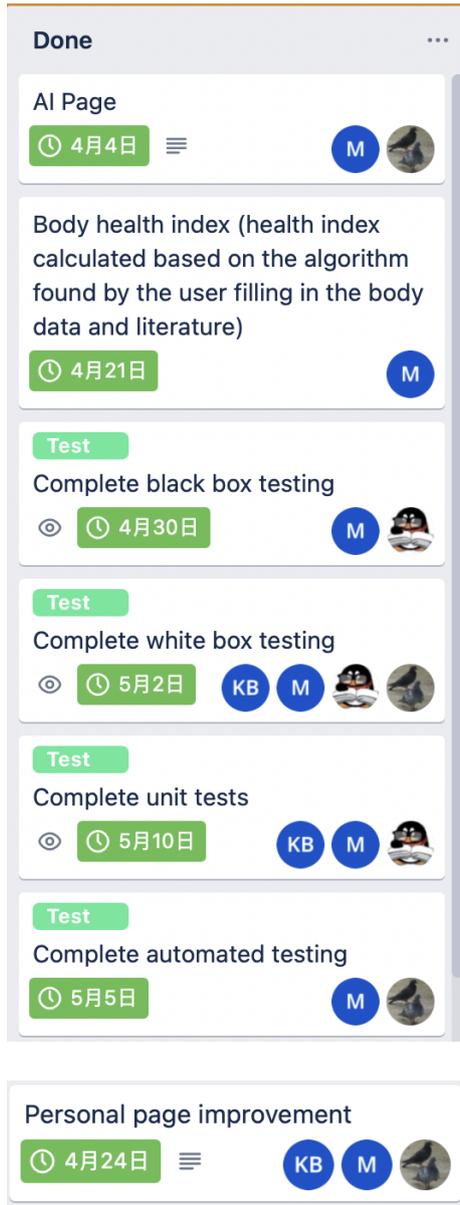


Figure 17 Sprint 3

In our group's subsequent discussion, we thought we could add a health index function (calculate the health index according to the algorithm that the user fills in the body data and the literature).

For AI recognition page, we mainly have the following requirements: 1. clear and simple interface; 2. users can choose photos through photo albums or shooting; 3. ai identify the dishes and calories of the pictures.

Finally, the personal page is improved, which has: 1. display the current user health index; 2. display the number of days to sign in; 3. display the gold coins obtained by signing in.

4 Testing Document

4.1 Black box testing

For the black box testing part, we mainly used the equivalence partition method, the cause-effect graph method, and the decision table method to test all three functions.

Test Case 1: Search test

Input	Output
Upload a picture of a food	Show menu name and calories
Upload a picture not a food	Not a food

Test Case 2: User data test

Input	Output
Birthday	Save successfully
Weight	Save successfully
Body fat ratio	Save successfully

4.1.1 Equivalence Partition

We used the equivalence partition to test the normality of the input values (length of input characters, format, etc.) in the first functions mentioned above in a more comprehensive way.

The following are the equivalence classes and test cases that we tested:

Test 1: Search test

i. Equivalence class

Input	Valid Equivalence	No.	InvalidEquivalence	No.
Picture	Picture of a food	1	Blank	2
			Picture not a food	3
			Not a picture	4

ii. Test case

No.	Input	Expected Output	Coverage equivalence class
1		Valid	1
2	(Blank)	Invalid	2

3		Invalid	3
4	File(Food.excel)	Invalid	4



Figure 18 Equivalence Partition

4.1.2 Boundary value analysis

For the user data test, we use boundary value to analyze the data which can influence the health score.

Test 2: User data test

Input	Equivalence	No.	Expected output	If bugs
Birthday	1900-01-01	1	success	No
	2020-01-01	2	success	No

Weight	0 200	3 4	success success	No No
Body fat ratio	0 50	5 6	success success	No No

4.1.3 Cause Effect Graph

After testing the equivalence classes, we considered that although most of the cases were covered, the logical relationships between the components were not yet complete, so we conducted cause-and-effect graphs tests for login and registration, and the following are the test cases.

Test case 1: Search test

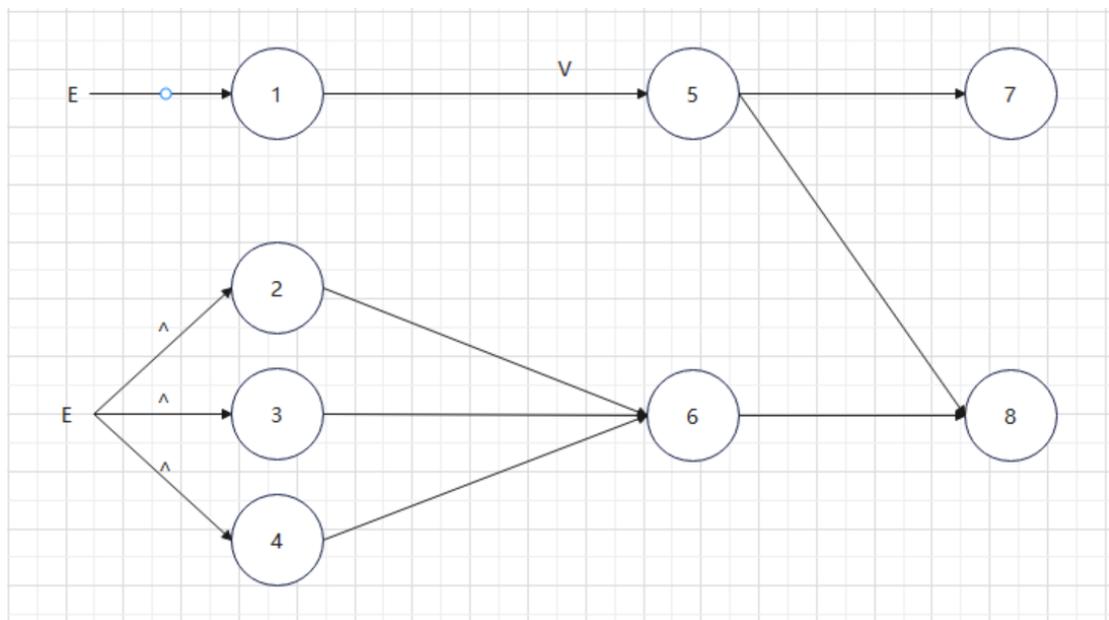


Figure 19 Cause Effect Graph

- | | |
|-----------------------|----------------------------------|
| 1. picture of a food | 5. click analyze button |
| 2. empty input | 6. click analyze button |
| 3. picture not a food | 7. return food name and calories |
| 4. not a picture | 8. return error |

4.1.4 Decision Table

Test Case 1: Search Test

	1	2	3	4	5
C1	F	T	T	T	T
C2	-	F	T	T	T
C3	-	-	F	T	T
C4	-	-	-	F	T

A1					√
A2	√				
A3		√	√	√	

C1: Whether the information is not completed?

C2: Whether the birthday is entered correctly?

C3: Whether the weight is entered correctly?

C4: Whether the body fat ratio is entered correctly?

A1: Search successfully.

A2: Information is not completed.

A3: The birthday or weight or body fat ratio is invalid.

4.2 White box test

In the white-box testing section, we divided into static white-box testing and dynamic white-box testing.

Dynamic white-box testing: mainly test the statement coverage of the password and username part of the registration, draw control flow diagrams and graph matrices based on the code, then generate independent paths, calculate the loop complexity, design test cases, and test according to the designed cases. Make each statement of the core code part run once to get the complete test results.

Static white-box testing: Our team performs desktop checks, code reviews and walk-throughs to:

- Checking code and design conformance
- Code adherence to standards, readability
- Correctness of code logic expression
- Reasonableness of the code structure
- Conformity of the program writing with the writing standards
- Unsafe, unclear and ambiguous parts of the program
- Programming style issues

4.2.1 Dynamic White Box Testing

Test 1 carousel option function

```
//切换转盘选项
switchZhuapan(e) {
  //当转盘停止时才执行切换转盘
  1 if (!this.data.zhuanflg) {
    var idx = e.currentTarget.dataset.idx, zhuanpanArr = this.data.zhuanpanArr, obj = {};
    for (let i in zhuanpanArr) { 3
      4 if (this.data.option != zhuanpanArr[i].option && zhuanpanArr[i].id == idx) {
        obj.option = zhuanpanArr[i].option;
        obj.awards = zhuanpanArr[i].awards; 5
        this.setData({
          awardsConfig: obj 6
        });
        break; 7
      } 8
    } 9
  } 10
},
```

Figure 20 Code for the Password Part

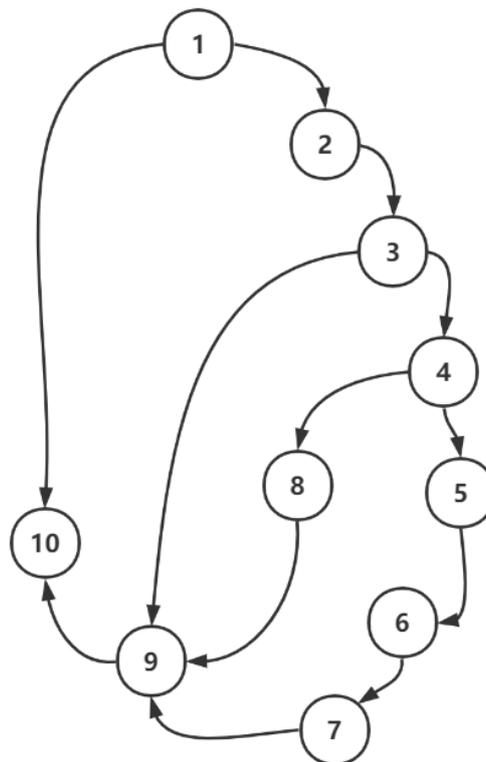


Figure 21 Control Flow Diagram

	1	2	3	4	5	6	7	8	9	10
1	0	1	0	0	0	0	0	0	0	1
2	0	0	1	0	0	0	0	0	0	0
3	0	0	0	1	0	0	0	0	1	0
4	0	0	0	0	1	0	0	1	0	0
5	0	0	0	0	0	1	0	0	0	0
6	0	0	0	0	0	0	1	0	0	0
7	0	0	0	0	0	0	0	0	1	0
8	0	0	0	0	0	0	0	0	1	0
9	0	0	0	0	0	0	0	0	0	1
10	0	0	0	0	0	0	0	0	0	0

From the diagram, we obtain the following independent paths:

1. 1→10
2. 1→2→3→9→10
3. 1→2→3→4→8→9→10
4. 1→2→3→4→5→6→7→9→10

The complexity is 4 since there are 10 nodes and 12 sides, so the ring complexity is: $(12 - 10) + 2 = 4$

Therefore, combining the independent path and the code, we designed the following test cases:

Test Case	Input	Overlay path	Expected Output
1	!Object.data.zhuanflg	1→10	No output
2	Object.data.zhuanflg, i=1,Object.data.option="食物",zhuanpanArr=2	1→2→3→9→10	No output
3	Object.data.zhuanflg, i=1,Object.data.option="食物",zhuanpanArr=0	1→2→3→4→8→9→10	No output
4	Object.data.zhuanflg, i=1,Object.data.option="点聚",zhuanpanArr=1	1→2→3→4→5→6→7→9→10	Return right

Test 2 open function test

```

isOpen: function (e) {
  var that = this;
  var idx = e.currentTarget.dataset.index;
  console.log(idx);
  var memberList = that.data.memberList;
  console.log(memberList);
  for (let i = 0; i < memberList.length; i++) {
    if (idx == i) {
      memberList[i].hiddena = !memberList[i].hiddena;
    } else {
      memberList[i].hiddena = true;
    }
  }
  this.setData({ memberList: memberList });
  return true;
},

```

Figure 22 Code for the Password Part

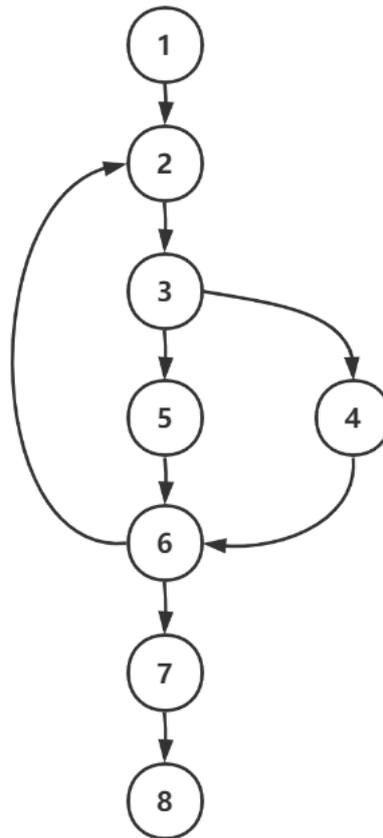


Figure 23 Control Flow Diagram

	1	2	3	4	5	6	7	8
1	0	1	0	0	0	0	0	0
2	0	0	1	0	0	0	0	0
3	0	0	0	1	1	0	0	0
4	0	0	0	0	0	1	0	0
5	0	0	0	0	0	1	0	0
6	0	1	0	0	0	0	1	0
7	0	0	0	0	0	0	0	1
8	0	0	0	0	0	0	0	0

From the diagram, we obtain the following independent paths:

1. 1→2→3→5→6→7→8
2. 1→2→3→4→6→7→8
3. 1→2→3→5→6→2→3→5→6→7→8

The complexity is 3 since there are 8 nodes and 9 sides, so the ring complexity is: $(9 - 8) + 2 = 3$

Therefore, combining the independent path and the code, we designed the following test cases:

Test Case	Input	Overlay path	Expected Output
1	i=1,idx=2	1→2→3→5→6→7→8	memberList[1].hidden = true
2	i=1,idx=1	1→2→3→4→6→7→8	Return right
3	i=1,idx=1	1→2→3→5→6→2→3→5 →6→7→8	Return right

Test 3 Physical health rating function test

```
getEva: function (s) {  
  var eva = "Bad"; 1  
  2 if (s >= 2) { eva = "Limit" } 3  
  4 if (s >= 4) { eva = "Normal" } 5  
  6 if (s >= 6) { eva = "Good" } 7  
  8 if (s >= 9) { eva = "Excellent" } 9  
  return eva; 10  
},
```

Figure 24 Code for the Password Part

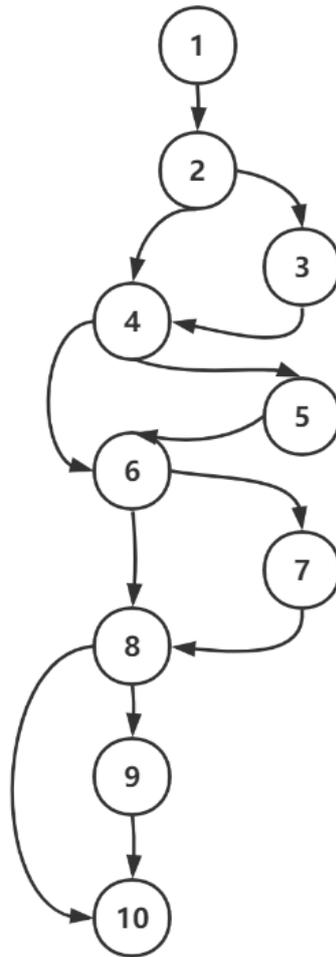


Figure 25 Control Flow Diagram

	1	2	3	4	5	6	7	8	9	10
1	0	1	0	0	0	0	0	0	0	0
2	0	0	1	1	0	0	0	0	0	0
3	0	0	0	1	0	0	0	0	0	0
4	0	0	0	0	1	1	0	0	0	0
5	0	0	0	0	0	1	0	0	0	0
6	0	0	0	0	0	0	1	1	0	0
7	0	0	0	0	0	0	0	1	0	0
8	0	0	0	0	0	0	0	0	1	0
9	0	0	0	0	0	0	0	0	0	1
10	0	0	0	0	0	0	0	0	0	0

From the diagram, we obtain the following independent paths:

1. 1→2→4→6→8→10
2. 1→2→4→6→8→9→10
3. 1→2→3→4→5→6→8→10
4. 1→2→3→4→5→6→8→9→10
5. 1→2→3→4→5→6→7→8→9→10

The complexity is 5 since there are 10 nodes and 13 sides, so the ring complexity is: $(13 - 10) + 2 = 5$

Therefore, combining the independent path and the code, we designed the following test cases:

Test Case	Input	Overlay path	ExpectedOutput
1	s=1	1→2→4→6→8→10	Eva="Bad"
2	s=10	1→2→4→6→8→9→10	Eva="Excellent"
3	s=3	1→2→3→4→5→6→8→10	Eva="Limit"
4	s=5	1→2→3→4→5→6→8→9→10	Eva="Normal"
5	s=7	1→2→3→4→5→6→7→8→9→10	Eva="Good"

Test 4 Physical health score calculation function test

```
onLoad() {  
  wx.showLoading({  
    title: '数据加载中',  
  })  
  var array2=this.data.array2; 1  
  var array3 =this.data.array3;  
  var array4 = this.data.array4;  
  var array5 = this.data.array5;  
  var multiArray = this.data.multiArray;  
  for (var i = 100; i <= 250; i++) { 2  
    array2.push(i); 3  
  } 4  
  for (var i = 0; i <= 200; i++) { 5  
    array3.push(i);  
    multiArray[0].push(i); 6  
    multiArray[1].push(i);  
  } 7  
  for (var i = 0; i <= 50; i++) { 8  
    array4.push(i); 9  
  } 10  
  for (var i = 0; i <= 15; i+=0.1) { 11  
    array5.push(i.toFixed(1)); 12  
  } 13  
}
```

Figure 26 Code for the Password Part

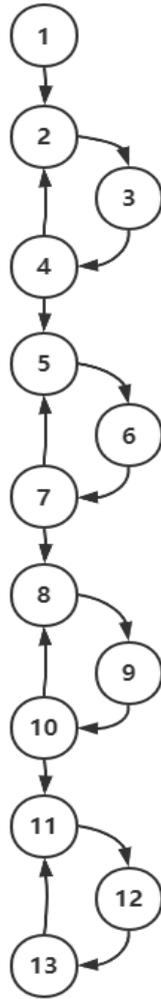


Figure 27 Control Flow Diagram

	1	2	3	4	5	6	7	8	9	10	11	12	13
1	0	1	0	0	0	0	0	0	0	0	0	0	0
2	0	0	1	0	0	0	0	0	0	0	0	0	0
3	0	0	0	1	0	0	0	0	0	0	0	0	0
4	0	0	0	0	1	0	0	0	0	0	0	0	0
5	0	0	0	0	0	1	0	0	0	0	0	0	0
6	0	0	0	0	0	0	1	0	0	0	0	0	0
7	0	0	0	0	0	0	0	1	0	0	0	0	0
8	0	0	0	0	0	0	0	0	1	0	0	0	0
9	0	0	0	0	0	0	0	0	0	1	0	0	0
10	0	0	0	0	0	0	0	0	0	0	1	0	0
11	0	0	0	0	0	0	0	0	0	0	0	1	0
12	0	0	0	0	0	0	0	0	0	0	0	0	1
13	0	0	0	0	0	0	0	0	0	0	1	0	0

From the diagram, we obtain the following independent paths:

1. 1→2→3→4→5→6→7→8→9→10→11→12→13

2. 1→2→3→4→2→3→4→5→6→7→8→9→10→11→12→13
3. 1→2→3→4→5→6→7→5→6→7→8→9→10→11→12→13
4. 1→2→3→4→5→6→7→8→9→10→8→9→10→11→12→13
5. 1→2→3→4→5→6→7→8→9→10→11→12→13→11→12→13

The complexity is 5 since there are 13 nodes and 16 sides, so the ring complexity is: $(16 - 13) + 2 = 5$

Therefore, combining the independent path and the code, we designed the following test cases:

Test Case	Input	Overlay path	Expected Output
1	i=15	1→2→3→4→5→6→7→8→9→10 →11→12→13	Return right
2	i=100	1→2→3→4→2→3→4→5→6→7→ 8→9→10→11→12→13	No output
3	i=199	1→2→3→4→5→6→7→5→6→7→ 8→9→10→11→12→13	Return right
4	i=49	1→2→3→4→5→6→7→8→9→10 →8→9→10→11→12→13	Return right
5	i=14	1→2→3→4→5→6→7→8→9→10 →11→12→13→11→12→13	Return right

4.2.2 Static white box testing.

i. Testing

Fu Zhanchao as the presenters first learns to understand the whole program code so that he can present different views and interpretations in the inspection meeting of this group. The rest of the group members Li Yiran, Yu Mengke and Liao Weiyu acted as examiners to review the code of this applet from different perspectives (users, testers, and product supporters).

Li Yiran was appointed as the meeting coordinator and meeting recorder to ensure the inspection process was carried out efficiently and in compliance with the rules.

ii. Colleague review

Two programmers and testers, Yu Mengke and Liao Weiyu, were responsible for reviewing each other's code to find problems and errors.

iii. 3.Walkthrough

Yu Mengke and Liao Weiyu make a formal presentation to the other team members, introducing the end-use of the applet and the implemented functions, and explaining the code logic and core code ideas. The other panelists received copies of the software before the review, checked and wrote notes and questions as they went along, and asked questions during the review.

4.3 Unit Test

Our WeChat mini program follows the database developed last semester with some new related functions, so we still choose to have a unit test for the database in this development. Unit testing in our group is done throughout the development of the database and accompanies the creation of new features. It does not cost our group much more time than it takes to improve code efficiency and reduce the number of bugs.

In this section, we first write a simple driver that can call the methods that communicate with the server, then test each method provided by the server, and finally complete the test by checking that the return value is correct.

```
import java.util.LinkedList;

public class UnitTestDatabase{
    static Quene<String> data = new LinkedList<String>();
    public static void main(String[] args){
        DataTransfer dt = new DataTransfer();
        UnitTestDatabase ut = new UnitTestDatabase();
        String name = "UnitTest01";
        String password = "UnitTest01";
        String operation;
        //insert id/password
        operation="Insert";
        ut.isData("MUST");
        System.out.println(dt.send(name, password, operation, data));
        //delete id/password
        operation="Delete";
        ut.isData("MUST");
        System.out.println(dt.send(name, password, operation, data));
        //set age
        operation="SetAge";
        ut.isData("MUST");
        System.out.println(dt.send(name, password, operation, data));
    }
}
```

```

//set gender
operation="SetGender";
ut.isData("female");
System.out.println(dt.send(name, password, operation, data));
//set height
operation="SetH";
ut.isData("167");
System.out.println(dt.send(name, password, operation, data));
//set weight
operation="SetW";
ut.isData("50");
System.out.println(dt.send(name, password, operation, data));
//daily check-in
operation="DailyCheck";
ut.isData("5");
System.out.println(dt.send(name, password, operation, data));
}
}

```

Figure 28 Code for Unit Test

4.4 Automated Testing

In software testing, automated testing refers to the process of using other software, independent of the software to be tested, to automatically execute tests, compare actual results with expectations, and generate test reports. After the testing process has been defined, test automation can automate some of the repetitive but necessary testing tasks. It can also perform tests that are almost impossible to perform with manual testing.

Our group's automated testing was carried out with the help of Airtest software, which partially replaced the manual process of testing and improving the efficiency of the small applications we developed. The automation software we used is based on a strict set of test rules and evaluation criteria, with a complete automated testing process. Therefore, it can avoid testing oversights caused by the inertia of our team's testers and reduce human errors caused by the tedious repetition of work in manual testing. Thus, the testing aspect of our software can be improved.


```

Log viewer
"C:\Users\VP\Desktop\AirtestIDE-win-1.2.14\AirtestIDE\AirtestIDE" runner "C:\Users\VP\Desktop\win\airtest.air" --device Windows:/// --log
"C:\Users\VP\AppData\Local\Temp\AirtestIDE\scripts\Sdf4e925e94d62ba57846cf0211ad"

[Start running..]
save log in "C:\Users\VP\AppData\Local\Temp\AirtestIDE\scripts\Sdf4e925e94d62ba57846cf0211ad"

[22:16:35][INFO]airtest.core.api> Try finding:
[22:16:35][DEBUG]airtest.core.api> try match with MultiScaleTemplateMatchingPre
[22:16:35][DEBUG]airtest.aircv.multiscale_template_matching [MSTemplatePre] threshold=0.7, result={'result': (278, 506), 'rectangle': ((195.88, 423.84000000000003), (195.88, 589.84), (361.88, 589.84), (361.88, 423.84000000000003))}, 'confidence': 0.99999251396179}
[22:16:35][DEBUG]airtest.aircv.utils> find_best_result() run time is 0.00 s.
[22:16:35][DEBUG]airtest.core.api> match result: {'result': (278, 506), 'rectangle': ((195.88, 423.84000000000003), (195.88, 589.84), (361.88, 589.84), (361.88, 423.84000000000003))}, 'confidence': 0.99999251396179, 'time': 0.0049828616338078}

[22:16:36][INFO]airtest.core.api> Try finding:
[22:16:36][DEBUG]airtest.core.api> try match with MultiScaleTemplateMatchingPre
[22:16:36][DEBUG]airtest.aircv.multiscale_template_matching [MSTemplatePre] threshold=0.7, result={'result': (714, 484), 'rectangle': ((693.72, 469.64), (693.72, 498.64), (735.72, 498.64), (735.72, 469.64))}, 'confidence': 0.2112726676464888}
[22:16:36][DEBUG]airtest.aircv.utils> find_best_result() run time is 0.00 s.
[22:16:36][DEBUG]airtest.aircv.template_matching [Template] threshold=0.7, result={'result': (1487, 541), 'rectangle': ((1386, 527), (1386, 556), (1428, 556), (1428, 527))}, 'confidence': 0.999992847442627}
[22:16:36][DEBUG]airtest.aircv.utils> find_best_result() run time is 0.00 s.
[22:16:36][DEBUG]airtest.core.api> match result: {'result': (1487, 541), 'rectangle': ((1386, 527), (1386, 556), (1428, 556), (1428, 527))}, 'confidence': 0.999992847442627, 'time': 0.08676743507385254}

[22:16:37][INFO]airtest.core.api> Try finding:
[22:16:37][DEBUG]airtest.aircv.multiscale_template_matching [MSTemplatePre] threshold=0.7, result={'result': (221, 57), 'rectangle': ((195.27999999999997, 32), (195.27999999999997, 83), (247.27999999999997, 83), (247.27999999999997, 32))}, 'confidence': 0.9999468577964783}
[22:16:37][DEBUG]airtest.aircv.utils> find_best_result() run time is 0.06 s.
[22:16:37][DEBUG]airtest.core.api> match result: {'result': (221, 57), 'rectangle': ((195.27999999999997, 32), (195.27999999999997, 83), (247.27999999999997, 83), (247.27999999999997, 32))}, 'confidence': 0.9999468577964783, 'time': 0.06482625967620395}

[22:16:38][INFO]airtest.core.api> Try finding:
[22:16:38][DEBUG]airtest.core.api> try match with MultiScaleTemplateMatchingPre
[22:16:38][DEBUG]airtest.aircv.multiscale_template_matching [MSTemplatePre] threshold=0.7, result={'result': (291, 126), 'rectangle': ((270.36, 187), (270.36, 146), (313.36, 146), (313.36, 187))}, 'confidence':

```

```

Log viewer
0.4023907733917236328

[22:16:51][INFO]airtest.core.api> Try finding:
[22:16:52][DEBUG]airtest.core.api> try match with MultiScaleTemplateMatchingPre
[22:16:52][DEBUG]airtest.aircv.multiscale_template_matching [MSTemplatePre] threshold=0.7, result={'result': (323, 561), 'rectangle': ((220.03999999999996, 533.6), (220.03999999999996, 589.6), (427.03999999999996, 589.6), (427.03999999999996, 533.6))}, 'confidence': 1.0}
[22:16:52][DEBUG]airtest.aircv.utils> find_best_result() run time is 0.21 s.
[22:16:52][DEBUG]airtest.core.api> match result: {'result': (323, 561), 'rectangle': ((220.03999999999996, 533.6), (220.03999999999996, 589.6), (427.03999999999996, 589.6), (427.03999999999996, 533.6))}, 'confidence': 1.0, 'time': 0.21439488781551176}

[22:16:53][INFO]airtest.core.api> Try finding:
[22:16:53][DEBUG]airtest.core.api> try match with MultiScaleTemplateMatchingPre
[22:16:53][DEBUG]airtest.aircv.multiscale_template_matching [MSTemplatePre] threshold=0.7, result={'result': (658, 779), 'rectangle': ((612.44, 755.48), (612.44, 803.48), (689.44, 803.48), (689.44, 755.48))}, 'confidence': 0.9999942779541016}
[22:16:53][DEBUG]airtest.aircv.utils> find_best_result() run time is 0.00 s.
[22:16:53][DEBUG]airtest.core.api> match result: {'result': (658, 779), 'rectangle': ((612.44, 755.48), (612.44, 803.48), (689.44, 803.48), (689.44, 755.48))}, 'confidence': 0.9999942779541016, 'time': 0.003983974456787189}

[22:16:54][INFO]airtest.core.api> Try finding:
[22:16:54][DEBUG]airtest.core.api> try match with MultiScaleTemplateMatchingPre
[22:16:54][DEBUG]airtest.aircv.multiscale_template_matching [MSTemplatePre] threshold=0.7, result={'result': (223, 61), 'rectangle': ((193.72000000000003, 42), (193.72000000000003, 80), (252.72000000000003, 80), (252.72000000000003, 42))}, 'confidence': 1.0}
[22:16:54][DEBUG]airtest.aircv.utils> find_best_result() run time is 0.04 s.
[22:16:54][DEBUG]airtest.core.api> match result: {'result': (223, 61), 'rectangle': ((193.72000000000003, 42), (193.72000000000003, 80), (252.72000000000003, 80), (252.72000000000003, 42))}, 'confidence': 1.0, 'time': 0.044882774353827344}

[22:16:55][INFO]airtest.core.api> Try finding:
[22:16:55][DEBUG]airtest.core.api> try match with MultiScaleTemplateMatchingPre
[22:16:55][DEBUG]airtest.aircv.multiscale_template_matching [MSTemplatePre] threshold=0.7, result={'result': (389, 699), 'rectangle': ((288.12, 677.36), (288.12, 722.36), (410.12, 722.36), (410.12, 677.36))}, 'confidence': 0.999959468841553}
[22:16:55][DEBUG]airtest.aircv.utils> find_best_result() run time is 0.19 s.
[22:16:55][DEBUG]airtest.core.api> match result: {'result': (389, 699), 'rectangle': ((288.12, 677.36), (288.12, 722.36), (410.12, 722.36), (410.12, 677.36))}, 'confidence': 0.999959468841553, 'time': 0.18662595748901367}

[22:16:56][INFO]airtest.core.api> Try finding:
[22:16:56][DEBUG]airtest.core.api> try match with MultiScaleTemplateMatchingPre
[22:16:56][DEBUG]airtest.aircv.multiscale_template_matching [MSTemplatePre] threshold=0.7, result={'result': (670, 117), 'rectangle': ((649.0799999999999, 91), (649.0799999999999, 143), (691.0799999999999, 143), (691.0799999999999, 91))}, 'confidence': 0.974491536617279}
[22:16:56][DEBUG]airtest.aircv.utils> find_best_result() run time is 0.02 s.
[22:16:56][DEBUG]airtest.core.api> match result: {'result': (670, 117), 'rectangle': ((649.0799999999999, 91), (649.0799999999999, 143), (691.0799999999999, 143), (691.0799999999999, 91))}, 'confidence': 0.974491536617279, 'time': 0.01850780758876051}

```

figure 30 Log for Automated Test

Airtest 报告 [运行成功]

2022 / 06 / 03 22:16:35-22:17:04

步骤数: 23 时间: 29s 242ms

Log: [log.txt](#)

执行者

- 作者: HP
- minitest.air

顺序	耗时	状态
✓ # 1 点击	1s 54ms	成功
✓ # 2 点击	1s 202ms	成功
✓ # 3 点击	1s 149ms	成功
✓ # 4 点击	1s 234ms	成功
✓ # 5 等待目标出现	1s 98ms	成功
✓ # 6 滑动	3s 66ms	成功
✓ # 7 点击	1s 151ms	成功
✓ # 8 点击	1s 133ms	成功
✓ # 9 点击	1s 120ms	成功
✓ # 10 点击	1s 182ms	成功
✓ # 11 点击	1s 106ms	成功
✓ # 12 点击	1s 87ms	成功
✓ # 13 点击	1s 137ms	成功
✓ # 14 点击	1s 337ms	成功
✓ # 15 点击	1s 84ms	成功
✓ # 16 点击	1s 136ms	成功
✓ # 17 点击	1s 278ms	成功
✓ # 18 点击	1s 129ms	成功
✓ # 19 点击	1s 162ms	成功
✓ # 20 点击	719ms	成功

Passed Step 1: 点击 目标图片

结果: Passed ✓

时间: 2022-06-03 22:16:36

耗时: 1s 54ms

动作: touch

Args:

```

resolution: 1920,1080
kwargs: {}
kwargs: {}
匹配度: 0.9999992251396179

```

顺序	耗时	状态
✓ # 1 点击	1s 54ms	成功
✓ # 2 点击	1s 202ms	成功
✓ # 3 点击	1s 149ms	成功
✓ # 4 点击	1s 234ms	成功
✓ # 5 等待目标出现	1s 98ms	成功
✓ # 6 滑动	3s 66ms	成功
✓ # 7 点击	1s 151ms	成功
✓ # 8 点击	1s 133ms	成功
✓ # 9 点击	1s 120ms	成功
✓ # 10 点击	1s 182ms	成功
✓ # 11 点击	1s 106ms	成功
✓ # 12 点击	1s 87ms	成功
✓ # 13 点击	1s 137ms	成功
✓ # 14 点击	1s 337ms	成功
✓ # 15 点击	1s 84ms	成功
✓ # 16 点击	1s 136ms	成功
✓ # 17 点击	1s 278ms	成功
✓ # 18 点击	1s 129ms	成功
✓ # 19 点击	1s 162ms	成功
✓ # 20 点击	719ms	成功

Passed Step 6: 滑动操作

结果: Passed ✓

时间: 2022-06-03 22:16:44

耗时: 3s 66ms

动作: swipe

Args:

```

resolution: 1920,1080
kwargs: {}
vector: [0,1802,0,013]
v2: null
匹配度: 1

```

Figure 31 Report for Automated Test

The report shows that all parts of our applet passed the automated testing of the software, and that part did not find any bug.

5 Management and Maintenance Document

Our team manages and maintains the software after development and testing, hoping to provide a better system environment for our customers.

Also, we draw a Gantt chart present the start and end dates of each software engineering task. According to the Gantt chart, we can easily get out development progress such as: The project lasted 10 weeks in total. We have 3 Sprints in total, each of them took two weeks. Our testing started from the 7th week throughout, and the final maintenance started from the 9th week, our review took two weeks and the presentation preparing and report writing all took one week each.



Figure 32 Gantt Chart