III. Preliminaries

The project uses the standard scrum for development and management. The implementation of the scrum process in the project is based on an iterative and incremental process framework. The team firstly confirm project theme and requirements (which is API Test Tool) and evaluates each members' technologies and capabilities. Then implement the function by sprint process, hold daily meetings every day to deal with new complex problems, difficulties and emergencies.

* 1. Scrum Roles

3.1.1 Scrum Master

The Scrum Master is responsible for the scrum process, supervising all members to follow scrum rules and ensure that the project is completed within the expected timeframe. Help scrum members achieve the highest level of performance. Through the guidance of the scrum master, our project successfully completed the iteration and incremental of the scrum.

3.1.2 Product owner

The Product owner is responsible for prioritizing the backlog and supervise the team to do the tasks with the highest priority. In this project, the product owner assigns the following priorities to the backlog (the following items are ranked from highest to lowest): design test cases and user stories, drawing product prototypes, function development, and testing.

3.1.3 Team

Team is responsible for developing software features. Our project team size is 7 people, completing subtasks with self-management, self-organization and cross-functional work.

* 1. Scrum Implementation Process

All work is done during the sprint cycle. Before each sprint starts, scrum master holds a 1-2 hours' sprint plan meeting. The user story for each sprint plan is selected based on priority. At the sprint plan meeting, the entire user story and functional requirements according to the flow chart are showed to the group members, then team members jointly split into subtasks. After splitting the task, all members discuss and evaluate the difficulty and time consuming of each subtask, finally the scrum team members respectively pick the subtask.

Throughout the sprint process, scrum master holds a daily online meeting via WeChat every day. The time-consuming is controlled within 10 minutes, each group members are asked to simply state the tasks that have done, the tasks are in processing, and the difficulties we are currently experiencing.

We use the online tool Leangoo to track tasks. Leangoo is a online project scrum tool which provides an end-to-end project management and team collaboration platform to help achieve efficient and visual collaboration and management. Different from the traditional tabular project management tools, Leangoo supports multi-person collaboration and real-time information synchronization. In addition, a variety of project templates are built in Leangoo, covering different application scenarios such as agile development, phased projects, lightweight collaboration, and problem tracking. All subtasks are uploaded to the Leangoo's task board and labelled different time mark. These subtasks are assigned to the team members by the scrum master. Through the product backlog, burndown chart and task board, we can clearly analyse the current progress of the project and make corresponding plan. The estimated time of the task, the actual execution time, and the time required for completion are recorded in the tracking table. According to the tracking table and burndown chart, the completion of the task can be visually displayed. The task board allows the scrum master to keep track of each subtask and the current project status.

When the project member completes the subtask, it is submitted to the scrum master for checking. If there is no problem, then the subtask card would be moved to the done group. At the end of each sprint, the scrum master holds a sprint review meeting. The main purpose is to summarize the completed tasks, record happened difficulty, and develop a next sprint to-do list.

* 1. Scrum Tools

3.3.1 Product Backlog

The product backlog lists all the features desired for our projects. The product owner determines the content, priority, and availability of the product backlog. This list is constantly changing as the project progresses.

3.3.2 Sprint Backlog

The sprint backlog is a list of tasks to complete during the sprint. The team design a preliminary task list in the sprint planning meeting. In this process, our team uses the way of discussion to estimate the duration of the task. In the event of a dispute, the scrum master makes the final decision. Only subtask responsible personnel have the right to change the sprint backlog.

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Tasks | Members | Status of progress | Day1 | Day2 | Day3 | Day4 | Day5 | Day6 | Day7 |
| Build the server | Wang/Zhao | In Process | 80 | 80 | 80 | 60 | 60 | 60 | 40 |
| Draw the UML flow chart | Li/Du | Done | 12 | 12 | 6 | 0 | 0 | 0 | 0 |
| Draw the Timing diagram | Sun | Done | 12 | 6 | 6 | 6 | 0 | 0 | 0 |
| Draw the Use case diagram | Zou | Done | 12 | 12 | 0 | 0 | 0 | 0 | 0 |
| Draw the State transition diagram | Lan | Done | 12 | 12 | 6 | 6 | 6 | 6 | 0 |
| Paper Writing | Sun/Li/Du/Zou/Lan | In Process | 60 | 60 | 50 | 50 | 50 | 40 | 40 |
| Video | Team | To do | 30 | 30 | 30 | 30 | 30 | 30 | 30 |

The above table is an example of a sprint backlog in the API Test Tool project. The horizontal axis represents the pending task of the sprint, and the vertical axis represents the period of the sprint (15 days). After the tasks are determined, the relevant responsible person can mark the estimated time of completing the task on the backlog. During the sprint meeting, the scrum master encourages every member to choose tasks that they prefer or be good at. For example, the task "Building the server" is assigned to the members Wang and Zhao. This task is in progress and the remaining workload is 40 hours. All the tasks about drawing diagrams are already completed and the remaining workload is zero.

3.3.3 Release burndown chart

The release burndown chart is a work chart used for indicating the remaining workload and tracking progress on a project. The horizontal axis represents time and the vertical axis represents workload. This chart can be used to visually predict when work will be completed and team efficiency at each stage. Through the release burndown chart, when the slope of the open estimate curve has an upward trend, scrum master needs to focus on this stage, track the member's work efficiency, find the difficulties in technical implementation and communicate. If the open estimate curve tends to be stable, it indicates that the project is progressing favourably.