E-Ticketing System and Integration with Third Parties Scrum-Based

Jimmy Sentosa¹
Study Program
Technical Information
STIMIK Likmi
Email: sentosa.jimmy@yahoo.com

Maharina²
Study Program
Technical Information
STIMIK Likmi
Email: maharina@gmail.com

Candra Zonyfar³
Study Program
Technical Information
Universitas Buana Perjuangan Karawang
Email: candra@ubpkarawang.ac.id

Abstract—SCRUM is a software development life cycle that will work with collaboration to produce products quickly but still provide quality. By using SCRUM, it will increase productivity and increase mutual trust, togetherness, responsibility, ideas communication and creativity of team members. The stakeholder's expectation to build an e-ticketing system fits with the agile nature of SCRUM. Every process in SCRUM must run well starting from data collection, needs analysis, making product backlog, making sprint backlog, daily scrum meeting, sprint review until sprint retrospective must be carried out to achieve success. The applications built in this research will run on web browsers, android and API designs to be integrated with other applications. The research was conducted for two months by working on three product backlogs, then each product backlog would be broken down into three sprints. The results obtained in the study were able to answer the question of the problem that was built with the conclusion that the product owner's ability to communicate with stakeholders and daily scrum meetings was necessary in determining success in SCRUM.

Keywords—e-ticketing, Sinar Jaya, SCRUM, API, mobile, floor plan, seats, analysis, Traveloka, Redbus

I. INTRODUCTION

Information technology growing rapidly parallel with the development of internet. Indonesian government make some regulation for encourage companies to follow technology. Regulation Department Of Transportation Republic Of Indonesia Number Pm 15 Year 2019 informs every transportation company to issue electronic tickets and passenger manifests. Based on these regulations, each transportation company must have its own e-ticketing system or can cooperate with existing e-ticketing systems such as tiketux.com.

PT. Sinar Jaya Megah Langgeng is a transportation company that prioritizes long travek from city to city or island to island in Indonesia. PT. Sinar Jaya Megah Langgeng has 36 years of experience and is one of the biggest companies in the transportation sector. PT. Sinar Jaya Megah Langgeng has many agents from Lampung to Sampang Madura. PT. Sinar Jaya Megah Langgeng requires an e-ticketing information system starting from ticket sales to agent deposits. There are a lot of fictitious sales reports or ticket pricing outside the predetermined limits. The information system built is expected to minimize fraud in the field.

In this research also will design about API e-ticketing for collaborating with third party agents such as Traveloka and Redbus. E-ticketing system will use SCRUM method because of the needs of PT. Sinar Jaya Megah Langgeng who wants to create an e-ticketing system in a short time due to demands from the government. SCRUM is considered to be able to fulfill the request of PT. Sinar Jaya Megah Langgeng because of its agile and fast nature. In addition, the development team needs 9 people and have expertise in their respective fields according to the needs of SCRUM. Rapid project development requires continuous inspections that can be analyzed by daily scrum meetings. Based on this, SCRUM is considered to be the most feasible method compared to other software development methods.

The following are research about ticketing system that have been previously written which have similarities and became a reference in the preparation of this study. From previous search there not have any discussion about ticket sales by displaying mockups of seats. Seat mockups are needed so that passengers know the desired seat location.
II. METHOD

A. Software Development Life Cycle (SDLC)

SDLC is a process of designing a system that always moves like a wheel that goes through steps such as planning, analysis, design, implementation, and maintenance. Then the system will return to the planning stage if it is deemed inefficient to implement [9].

B. Agile

Agile is a collaborative technique between an iterative and evolutionary approach by using documents formal in relation to building software that is of good quality in terms of cost and at the right time according to changing needs [15].

C. SCRUM

SCRUM is a system development method technique that was first created by Jeff Sutherland in 1993. SCRUM is a framework or methodology for developing product management and is a work pattern where everyone in the team is faced with ways to solve complex adaptive problems and at the same time being challenged to create products with the highest value productively and creatively [20].

SCRUM also is a methodology that follows an Agile approach or principles. SCRUM is a framework of responsive software development for product management or application development that focuses on strategy, flexible product development where a team works and is divided into units to achieve common goals [13]. SCRUM is based on empirical process control theory or empiricism that is Transparency, Inspection, and Adaption [17].

D. Scrum Flows

SCRUM has complex stages that can affect the final result of system development. The stages in SCRUM are as follows product owner create product backlog, then product owner and scrum master will create sprint planning based on product backlog. Every member in tim scrum then will develop the product called as sprint. The sprint will be closed with a sprint review to see if the sprint was successful or not [13]. To monitor sprint development team must organize daily scrum meeting that has a time limit of 15 minutes. This event is held every day during the sprint. In this event, the development team makes a work plan for the next 24 hours [17].

E. Application Programming Interface (API)

Application Programming Interface or commonly called API is a collection of commands and functions that allow a system to interact with other systems. The API also functions as a bridge to make it easier for developers to use software infrastructure to rebuild the infrastructure [16]. APIs are used to build distributed software systems whose components are interrelated but separate [1].

F. Representational State Transfer

Representational State Transfer or commonly referred to as REST is a form of web standard architecture that uses the HTTP protocol to exchange data. REST is often used in building multiplatform applications using APIs. This is because in addition to having good performance, the use of REST is fast and easy in data exchange and communication [2]. The output of REST common called as JavaScript Object Notation or s JSON which is a format that consists of structured information and is generally used to transmit data between the server and the client [10].

G. E-ticketing

E-ticketing is a way to document the travel process of passengers without issuing ticket papers. All information regarding passenger and travel data is stored digitally [6]. E-ticketing is made to make it easier for passengers to book tickets and to help admins and drivers with their daily tasks. The e-ticketing system runs online to make it easier or easier to buy bus tickets or travel information [14]. E-ticketing also an application on the web that allows passengers to check seat availability, purchase tickets, and pay for tickets online [11].

III. RESULTS AND DISCUSSION

In making the system for PT. Sinar Jaya Megah Langgeng, first a SCRUM team must be formed with roles and tasks performed by the SCRUM team in developing the e-ticketing system as follows

| Role       | Position   | Task                                                                 |
|------------|------------|----------------------------------------------------------------------|
| Product    | Owner      | Receive requests from clients and make a priority scale on the product backlog that is made to be carried out by the SCRUM team, establish good relationships with stakeholders. |
| Scrum      | Master     | Train, educate and manage the Scrum team so that the rules in SCRUM can be applied during the system development period and arrange for the daily scrum meeting to run |

![Creative Commons License](https://i.imgur.com/3vQ5z5K.png)
In designing the e-ticketing system at PT. Sinar Jaya Megah Langgeng, the author uses the research method in the picture as follows:

![Research Methodology](image)

The e-ticketing system developed aims to create an effective management of ticket sales transactions carried out by agents of PT. Sinar Jaya Megah Langgeng, which previously still made sales transactions using manual tickets. The modules that will be developed are the schedule and departure planning module, the ticket sales module and the deposit module as well as cash inflows.

Each module will be done in 1 product backlog and each product backlog will be done in 1 sprint. Product backlog departure schedule planning will be carried out for a duration of two weeks with a sprint goal of being able to make a schedule based on the selected filter for one calendar month. Product backlog of ticket sales will be done within one month with the sprint goal API function for third party agents has been completed and sales can operate on and one month with the sprint goal of receiving money from agents and browsers to printing electronic tickets. Product backlog of ticket sales will be done in 1 sprint. Product backlog will be done in 1 sprint. Each module will be done in 1 product backlog and each module will be done by backend developers.

### TABLE 2 SPRINT SCHEDULE AND DEPARTURE PLANNING

| ID  | Description                               | Days | Programmer     |
|-----|-------------------------------------------|------|----------------|
| J01 | Master permission function                | 1    | Backend Developer 1 |
| J02 | Master permission view                    | 1    | Backend Developer 1 |
| J03 | Master user function                      | 1    | Backend Developer 1 |
| J04 | Login function                            | 1    | Backend Developer 1 |
| J05 | Master terminal function                  | 1    | Backend Developer 1 |
| J06 | Bus class master function                 | 1    | Backend Developer 1 |
| J07 | Bus type master function                  | 1    | Backend Developer 1 |
| J08 | Tripcode master function                  | 1    | Backend Developer 1 |
| J09 | Departure generate from tripcode function | 3    | Backend Developer 2 |
| J10 | Departure list and update function        | 2    | Backend Developer 1 |
| J11 | Function to get departure data            | 2    | Backend Developer 2 |
| J12 | Function for export departure data        | 2    | Backend Developer 2 |
| J13 | Report loadfactor view                    | 1    | Backend Developer 2 |

**Total**

9 | Backend Developer 1
8 | Backend Developer 2
9 | Backend Developer 1
9 | Backend Developer 2

### Table 3. Sprint Sales

| ID  | Description                               | Days | Programmer     |
|-----|-------------------------------------------|------|----------------|
| T01 | Price rate master function                | 4    | Backend Developer 2 |
| T02 | Price rate master view                    | 4    | Backend Developer 2 |
| T03 | Display from access                       | 3    | Backend Developer 1 |
| T04 | Departure schedule for agent function     | 2    | Backend Developer 2 |
| T05 | Departure schedule for agent view         | 3    | Backend Developer 2 |
| T06 | List available seat plan function          | 2    | Backend Developer 2 |
| T07 | Sketch and list available seat view        | 5    | Backend Developer 2 |
| T08 | Function to get ticket prices              | 3    | Backend Developer 1 |
| T09 | Display departure information and prices from search combinations | 3 | Backend Developer 2 |
| T10 | Functions for sales                       | 4    | Backend Developer 2 |
| T11 | Display for sales of spare tickets and seats | 5 | Backend Developer 2 |
| T12 | Function to get ticket data               | 2    | Backend Developer 1 |
| T13 | Automatic display and print when opening ticket view | 5 | Backend Developer 1 |
| T14 | Third party agent master function          | 2    | Backend Developer 1 |
| T15 | Third party agent master display and menu | 3    | Backend Developer 1 |
| T16 | Function for departure info based on parameters sent | 2 | Backend Developer 1 |
| T17 | Function to place order on API            | 2    | Backend Developer 2 |
| T18 | Function to cancel booking tickets that have expired | 2 | Backend Developer 2 |
| T19 | Function to view seat availability         | 2    | Backend Developer 2 |
| T20 | Function to change order status when there is a payment request | 2 | Backend Developer 2 |
| T21 | Function to cancel ticket                 | 3    | Backend Developer 1 |
| T22 | Function to cancel ticket                 | 8    | Backend Developer 1 |
| T23 | Create application with default browser   | 6    | Mobile Developer |
| T24 | Bluetooth printer settings                | 5    | Mobile Developer |
| T25 | Bluetooth printer settings                | 4    | Backend Developer 1 |
| T26 | Print the printer if the url contains the word print_ticket | 8 | Mobile Developer |
At this stage the Scrum team begins to create applications based on the sprints that have been set. In the development process using the Trello application to control the tasks that have been done. In Trello, a sprint panel and a develop, checking, need to change, question and discussion, commit and completed panel will be created. Programmers can move items in the sprint panel into the develop panel when they are in progress. If the programmer has finished creating a function, then the programmer is obliged to move the finished item into the checking panel to be checked by the tester after deploying the work to the development server. If it passes the check, the tester can move the item to the commit panel.

### TABLE 4 DEPOSIT SPRINT AND CASH INFLOW

| ID | Description                              | Days | Programmer               |
|----|------------------------------------------|------|--------------------------|
| S01| Ticket claim function                    | 2    | Backend Developer 1      |
| S02| Ticket claim display                     | 2    | Frontend Developer 1     |
| S03| Close sales function and create manifest | 4    | Backend Developer 2      |
| S04| Display close sales and manifest strook  | 3    | Frontend Developer 2     |
| S05| Display of deposit print and autotest    | 3    | Backend Developer 1      |
| S06| Printer format API for manifest          | 1    | Backend Developer 1      |
| S07| Print manifest if the url contains the word print_manifest | 5 | Mobile Developer |
| S08| Function get deposit list for resume     | 1    | Backend Developer 1      |
| S09| Function to export deposit and resume    | 1    | Backend Developer 1      |
| S10| Display for deposit data and resume      | 2    | Frontend Developer 2     |
| S11| Display for commission data              | 2    | Backend Developer 2      |
| S12| Display for commission data report       | 2    | Frontend Developer 1     |
| S13| Function to get passenger data           | 1    | Backend Developer 1      |
| S14| Function to export passenger data        | 1    | Backend Developer 1      |
| S15| Display for passenger data               | 2    | Frontend Developer 2     |
| S16| Function to get loadfactor data          | 1    | Backend Developer 1      |
| S17| Function to export loadfactor data       | 1    | Backend Developer 1      |
| S18| Display for loadfactor data report       | 1    | Frontend Developer 2     |
| Total |                                             |      |                          |

The SCRUM Master is then tasked with deploying the commits to the production server. If it does not pass the check, the tester will enter the item into the needs to change panel and the programmer can move the item to develop to be reworked. A sprint is declared successful if the sprint panel is empty and all items have entered the completed panel. If there are still items hanging, then the sprint will be declared failed. After the sprint is successful, the SCRUM team can repeat the same process on the Sprint 2, Sprint 3 panel. Trello is an option for monitoring work besides being free, Trello can also be viewed via a browser and can contain information, both text, attachments and images. So that the items in the work panel can be fully described in Trello. The flow of the development process can be seen below.

The daily scrum meeting process is carried out by holding a meeting using google meet between the SCRUM team and the SCRUM master at 4 pm every day. Meetings are held virtually because WFH is often applied within the company. The duration of the meeting is approximately 15 minutes. The things that were discussed in the meeting were:

1. What has been done on the D day. In this discussion, it can be seen the work carried out by each member of the SCRUM team, whether they meet the deadline in Trello or not, also know what features can be tested by the tester.

2. What obstacles are encountered in the execution of the task. This is intended to provide information to the SCRM master about what obstacles are encountered. The SCRUM master is then tasked with finding ways to minimize the obstacles that occur. The existing constraints are not discussed in detail in the daily scrum meeting because of course it will take time and make the work ineffective.

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![Trello application](image1.png)

**Fig. 2.** Trello application

![Development process](image2.png)

**Fig. 3.** Development process
3. Questions to be discussed for working on the next day's task. If it can be answered quickly, it will be discussed in the meeting. However, if it is technical and feels time consuming, it will be discussed personally with the SCRUM master.

In a sprint review, everyone on the SCRUM team gets together and discusses the results of the sprint. Users are also invited to take part in a sprint review to discuss what has been completed. From the sprint review, ideas or opinions will usually appear that might add to or adjust existing functions. All opinions will be recorded and may be entered into the next sprint.

The duration of the sprint review can last as long as 3 hours. In the sprint review, Scrum team members will directly provide demos directly through the application or the users themselves who use the application. All features that are completed and can be used according to what the user wants will be recorded as increments.

Fig. 4. ERD system

Fig. 5. Result of program

An API will be designed which has the following scheme to make sales

Fig. 6. API Process
### IV. CONCLUSION

From this research, the following conclusions can be drawn:

1. Development of the e-ticketing system of PT. Sinar Jaya Megah Langgeng can be done using the SCRUM method. This study uses 3 product backlogs with each product backlog being carried out in one sprint duration. During the development stage, the development team used the Trello application as a project management application and for the deployment process, the author used the GIT application. With this application, the product owner can monitor the performance of the SCRUM team and the SCRUM master can see problems if there are tasks that are past the deadline.

   The author uses his own human resources consisting of one product owner, namely the author himself, one SCRUM master, two backend developers, two frontend developers, one mobile developer, one UX designer and one tester in system development.

2. To support the planning carried out in this research, all needs and goals must be understood by the SCRUM team. Needs analysis with user stories is quite helpful because the purpose of the application can be seen from there. Daily scrum meetings must always be held to monitor the performance of the SCRUM team and daily scrum meetings will minimize obstacles in the work because things that slow down can be analyzed by the SCRUM master to be minimized. The daily scrum meeting must run effectively with a duration of around 15 minutes so that the time used can be focused on project development. A sprint retrospective at the end of the sprint also needs to be done to analyze problems that arose during the previous sprint to be able to work on the next sprint better. The product owner's ability to seek information and liaise with stakeholders by conveying ideas and confirming needs during sprint work are skills that are needed to achieve increments.

### ACKNOWLEDGMENT

To implement SCRUM in software development requires commitment and responsibility and the product owner must know the capabilities of everyone in the development team. During the sprint review process, the most effective way to determine whether a sprint was successful or not is to involve the user directly. So that users can provide suggestions or input for the features being worked on.

For further research, it is expected to take user subjects who have many wishes and comments and can answer any plans that can be used to minimize risk and whether development techniques using SCRUM can deal with such stakeholder characteristics.

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