Electronic culinary reservations based on Android with the Scrum methodology and Firebase database

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Abstract. Culinary reservation activities in the process of ordering food or drinks in restaurants are the initial process in restaurant or café activities, the problem that occurs is the buildup of orders on the order note, and sometimes customer order errors or changes to orders by customers. The purpose of this study is to make electronic Android-based culinary reservations using Firebase as a realtime integrated database between tables, kitchens, and cashiers. The research method used is Agile Scrum with the product backlog, sprint, daily scrum, and sprint review stages with modeling using Unified Modeling Language diagrams. This study took a sample in one restaurant in Garut Regency. This research resulted in a prototype of a reservation application that can be used on Android smartphones for customer tables, kitchens section, and cashiers. This culinary reservation application can help improve service to customers by increasing order times faster, reducing the occurrence of booking errors, and reducing paper usage.

1. Introduction

Speedy technological developments are currently widely used to help meet the needs of completing organizational work [1–3], but the rate of technological development is unpredictable, like smartphone technology [4]. A smartphone is a device that allows communication as well as a PDA (Personal Digital Assistant) function and has the ability like a computer. Android is the most popular smartphone operating system, with 85% of smartphone users in the world [5] and 94% of users in Indonesia [6]. The impact of the use of Android smartphone technology in various aspects has now been felt. Without exception, restaurants/cafes can utilize this technology to provide optimal services to customers, including by facilitating activities in restaurants, especially in ordering activities [7,8].

Restaurant ratings not only from the taste of the cuisine but also from the service can also be used as an indicator of restaurant customer satisfaction assessment [9,10], in evaluating customer satisfaction several things such as reducing waiting time, maintaining high-quality service become the demands of restaurant service. Long waiting times and serving wrong orders is a common mistake in every restaurant that ultimately leads to customer dissatisfaction [11]. The purpose of this research is to design an Android application to improve restaurant services in serving food and beverage reservations.

Several previous studies have succeeded in making applications for restaurant reservation activities with various web technologies [12], Android base [13–15], the addition of algorithms [16], and
different methodological approaches [17]. In this study, the application is synchronizing as a whole between the customer, chef, management, and cashier.

2. Methodology
The research methodology used is Scrum, which is one of the Agile methodologies. Scrum is a recurring workflow methodology that has an innovative and popular product development approach (fig. 1). Scrum starts with making product guarantees, registering features or capabilities, and prioritizing the features most needed. By setting priority features on product guarantees, it can make the developer teamwork in priority order [18,19], besides, based on the Scrum methodology user survey, ranks third in the user survey results with 20.3% of respondents using the Scrum methodology in the process software development [20].

![Figure 1. Scrum framework [20].](image)

In describing the activities and objectives in this study, this research base on a research scrum framework (fig. 2), with stages:

- **Preliminary**: the preparation phase of the activity begins with collecting data about system requirements, observing, interviewing, and studying the literature. This phase also determines the business processes agreed with the product owner and determines the system architecture and technology architecture that tailor to the needs.

- **Product Backlog**: The activity carried out is to identify the actors depicted using the use case diagram, determine the structure of the system, and determine the needs of the application to be developed, which will be illustrated by the product backlog item table.

- **Sprint**: After completing the running business process and explained in the use case, activity diagram, and item backing guarantee table. The next activity is to make an application development plan and develop a system (coding) by determining the agreed time limit [2]. Sprint consists of work units needed to achieve the specified requirements and must be completed within the specified time (usually 30 days) [21,22].

- **Scrum Meeting**: Are short meetings (usually 15 minutes) that are held daily by the Scrum team. At this stage, it will determine whether the sprint can proceed to another stage by conducting a system test as a reference for evaluation.

- **Sprint Review**: This is the stage for providing software that is built following the Function Review and is evaluated by the product owner.

3. Results and discussion

3.1. Preliminary
In this section, describing the results of the research conducted at the time of data collection starts from interviews, observations, and literature studies. The interview conducted with the restaurant as
the Product Owner, where the interview results concluded that the restaurant requires an application for ordering food and drinks so that there is no accumulation of booking memorandum. Furthermore, observations made by direct observation in restaurants.

After designing the business process that will be building, the next step is to identify the actors. Because the use case diagram illustrates what actors can do with the system, so the culinary reservation application has four systems and each system has one different actor or user, while the actors identified are: Customers, Chefs / Kitchens, Cashiers, Admins, and Servants, with the activities carried out in the use case diagram (fig.3).

In principle, the ordering activity that designing is no different from the manual activity. It is just that the process uses smartphone technology and adding to the order status made by the chef.

The next activity is determining the technology architecture that will use to support a stable and fast system process used by the Firebase database. Firebase is a technology that allows creating web applications without server-side programming, making development more comfortable and faster. One Firebase node offers up to 100 connections per second; besides, Firebase provides up to 10 Gigabytes of data transfer across the entire database with one additional Gigabyte as a storage option [15,23,24], Figure 4 illustrates how the technology architecture plan using the Firebase database.

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**Figure 3.** Use case diagram system.
3.2. **Product backlog**

In table 1 is a list of Products Backlog that has been arranged in order of priority business values according to application needs. The estimated time shown in the table is the estimated time spent creating the application.

| No  | Product Backlog feature                                | Estimated (Day) | Priority | Degree of difficulty |
|-----|-------------------------------------------------------|-----------------|----------|----------------------|
| 1.  | System Specifications                                 | Two days        | High     | High                 |
| 2.  | Building a database of Culinary Reservation Application systems | Three days     | High     | High                 |
| 3.  | Establish a sign-up function                          | One day         | High     | High                 |
| 4.  | Establish a sign-in function                          | One day         | High     | High                 |
| 5.  | Build functions see food and beverage categories      | One day         | High     | High                 |
| 6.  | Build a food and beverage list function               | Two days        | High     | High                 |
| 7.  | Build order functions                                 | Three days      | High     | High                 |
| 8.  | Establish food and beverage detail functions          | One day         | High     | High                 |
| 9.  | Build view order functions                            | One day         | High     | High                 |
| 10. | Building functions added categories of food and drinks| Three days      | High     | High                 |
| 11. | Build functions plus add food and drink lists         | Two days        | High     | High                 |
| 12. | Build rating and comment functions                    | One day         | High     | High                 |
| 13. | Builds edit and delete functions                      | Three days      | High     | High                 |
| 14. | Establish a sign out function                         | One day         | High     | Moderate             |
| 15. | Making a mock-up system                               | One day         | Moderate | Moderate             |
3.3. **Sprint**

Activity on the sprint is the implementation of the product backlog with an estimated quality per day for 8 hours. Based on table 1, the duration of the system work is 26 days by carrying out the Sprint Meeting for four times.

3.4. **Sprint review**

The final stage is the sprint review, where a list of successfully created Product Backlog is then presented to the product owner and the Scrum team to find out whether the application is made correctly or not. In Figure 5, an example of the appearance of a culinary reservation application that has been completed.

![Figure 5. Display culinary reservation system.](image)

4. **Conclusion**

Based on the results of research that has been done, it can be concluded, this research produces an Android-based culinary reservation that provides more detailed information about cuisine, can solve the problem of ordering memorandums so that it can reduce the use of paper (paperless). With this system, it can also cut food ordering activities faster so that customers do not wait long.

**Acknowledgments**

Acknowledgments are given to the STT-Garut, which has fully supported the publication of this article.

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