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JORANIA: LEADING RECREATION FISHING IN THE DIGITAL ERA

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Abstract: Science and technology are developing rapidly in the digital or information era. The development of this technology greatly affects various lives and changes the way of life and daily human activities, including in the recreation sector. The digitisation of fishing locations is considered relevant to the passage of time and the development of information technology. Thus, based on a mobile application, the Jorania Fishing Location Information Management System application was developed to ensure that fishing location management is of high quality and better than manual systems. This Jorania application was inspired and developed to provide a more optimal recreational environment for amateur and experienced anglers to share fishing knowledge specific to fishing locations while making recreational fishing activities more efficient and productive. This application focuses on managing useful information for anglers according to fishing locations. This Jorania application is developed with an integrated system to reduce the workforce and minimise data repetition and loss of recorded data. Agile methodology is used in the development of this application. In addition, this Jorania application is developed with the Flutter framework technology, which uses the Dart programming language and Firebase as a database to store data. The existence of this application can make it easier for anglers, especially amateur anglers to further develop their interests by revealing a variety of useful information from experienced anglers as well as fishing-related services available around them.

Keywords: Recreational fishing, sustainable, digitisation.

Introduction

In this era of globalisation, the Internet has become a necessity for humans in general. The development of information technology is increasing rapidly day by day. As a result, all information can be obtained at the fingertips with facilities such as Internet networks, smartphone devices and computers, and mobile application technology. With facilities such as the Internet and mobile application technology, sharing information and communication has become easier and more efficient. The sharing of information is now faster than before and there is no doubt that users will benefit from its use. Along with the development of this technology, it was found that more and more activities were not connected to the Internet. However, now it is the other way around. The activity highlighted in this study is fishing. Fishing is a recreational activity that benefits a person's physical and mental health. According to Fedler and Ditton (1994), the father of "angler motivation", anglers go out fishing not simply to get fish but to get "recreation". Most anglers themselves are not aware of this. Every year, tens of millions of individuals are significantly impacted by recreational angling, which holds a substantial and crucial place in their lives (Arlinghaus *et al*., 2021). Recreation means spending free time with friends doing outdoor activities, finding peace, enjoying the environment, and having fun landing fish. This recreation is not as easy to carry out as expected. It requires the proper knowledge and techniques to get fishing satisfaction. Satisfaction is the reward that recreational anglers receive from their experiences and it constitutes a relevant management target (Birdsong *et al*., 2021). Those interested in this activity often received exposure and guidance from acquaintances, family members, or friends. The factors that can be considered before and during fishing activities

are weather, tides, fishing location, time, type of bait, and fishing technique. Any change in the factors mentioned will determine whether it is successful and the type of fish caught.

Sustainability within the fishing industry aims to achieve and uphold the fishery at its maximum sustainable yield (Noor Azzah, 2020). Prioritising effective and sustainable fisheries management is crucial to ensure that future generations benefit from available resources. According to Moe (2024), achieving sustainable fisheries is possible through proper management practices in specific areas with particular attention needed for trawl fisheries. Efforts are being aimed at fostering sustainable tourism development by promoting recreational fishing (Anjumin, 2022). The existing data, monitoring, regulation, and institutional support in the Malaysian recreational fisheries industry are insufficient to facilitate sustainable management for this activity (Nagaraj, 2021).

From a technology point of view, it can be seen that many uses of technology can be linked to this activity, for example, the development of a website by the Survey and Mapping Department of Malaysia (JUPEM), which records real-time data on tidal information of waters around Malaysia. The data can guide anglers in planning the fishing activities to determine the appropriate time to carry out the activity.

Additionally, information about fishing locations is often a hot topic among amateur anglers. Details regarding fishing ground locations and effective efforts are essential components of effective fishery management (Natsir *et al*., 2019). Although information can be obtained on the Internet, it has been found that most of the information on a website is posted for a long time, which reduces the relevance of any information obtained. Therefore, digitising fishing location information is crucial to provide anglers with up-to-date geographic data about nearby fishing spots (Neil, 2023). Digital transformation can support and meet the expanding needs of the fisheries industry. Although technology development is increasingly rapid, the application system or any computerised system specific to fishing activities to record information on the location of local waters suitable for recreational purposes is still lacking. This causes fishing activities to become more closed only to those who know about certain places, which will reduce interest for those new to this recreation.

In addition, as an amateur angler with no experience and knowledge in choosing a fishing location, fishing-related services such as boat rental and raft houses are difficult to find. Also, amateur anglers often question knowledge such as the type of fish found in the fishing location and the suitable bait. Furthermore, the location of fishing equipment shops, the appropriate time to do fishing activities, and the type of fish found are also important. All this information can be obtained on the Internet. However, searching and evaluating the information will be time-consuming and fussy because not all of the information specifically refers to the location to be fished.

Along with the current development of technology, if observed in Western countries, it was found that there are mobile applications that record life in a certain water area that the local community can access. However, in Malaysia, especially in Pahang, no such applications can be downloaded from Google Play or the App Store for users to show their life records in the local waters. Pahang is the largest state with an area of 35,965 square kilometres (km^2) (State Government Portal Pahang, 2017) in Peninsular Malaysia. Jorania is expected to be an attractive element, especially for anglers fishing in the Kuantan district.

Methodology

Jorania is developed using an agile model. The agile model is one of the most widely used models in the software industry because of its flexibility in building software projects. The agile model has six phases: The planning phase, requirements analysis phase, design phase, coding phase, unit testing phase, and acceptance testing phase. This model was chosen because

the project's requirements are not fixed and the agile method is easier to adapt to changes in its requirements as the project evolves. There will be no problem if the user wants to add any requirements during the design phase, which is the development phase. Agile methodology allows the design and development phases to run concurrently because users may want to change the design and see the results simultaneously (Anis Adillah *et al*., 2021).

Next is the acceptance testing phase, where users can test the system. They can provide feedback and developers can use it to make live changes as soon as they are provided. This allows all project phases to run simultaneously and makes agile methodology a robust and cost-effective design platform.

Requirements Analysis

Analysis of the research problem is carried out to identify the weaknesses and shortcomings of the existing system. The activity of gathering user needs is done to find out the system's functions. Functional and non-functional requirements have also been identified to facilitate system process modelling (Matthew, 2018).

Jorania's application requirements were studied by distributing questionnaires among fishing groups using Google Forms (Muhammad Shah Raziq, 2022). The feedback results have been examined and summarised in a table according to the type of user. Table 1 shows the functional requirements for the Jorania application for all types of users: Regular members, panel members, and administrators.

The regular member is an amateur angler, who has no experience and knowledge in choosing a fishing location. Regular member users can get detailed information about nearby fishing locations. In addition, regular member users can also set favourite locations and use other functions provided when the users registered and logged into the Jorania application. The panel members are experienced and knowledgeable anglers in recreational fishing activities, especially for a fishing location. Panel members have access to the same modules as regular members. However, panel members also have access to some additional modules. The system administrator is responsible for uploading fishing services to the Jorania application. System administrators do not need to log in to access their responsibility modules.

Table 1: User requirements

Regular Members	Panel Members	Administrators
1. Users can get information about fishing locations near them.	1. Users can add new fishing locations.	1. Users can add fishing services to the system.
2. Users can see detailed information on the fishing location they are interested in.	2. Users can edit existing fishing location information.	2. Users can edit existing fishing services.
3. Users can save information on fishing locations of interest for future use.		
4. Users can see the fishing services available near them.		

System Analysis and Design

The design phase is the phase to translate from the problem domain to the solution domain. System design is important because it affects system quality and significantly impacts coding activities during system development. This phase is also done to identify the system

architect design, database design, and system interface design. The Software Design Specification is also a reference document in the implementation phase.

Jorania application uses Business Logic Component (BLoC) architecture to help separate business logic from the presentation layer and allow developers to reuse code more efficiently and effectively. The provision of libraries such as BLoC and flutter_bloc makes it easier to develop Jorania applications using this architecture. In addition, support or assistance in using BLoC is extensive and constantly updated because it is introduced and regulated by Google. There are four main layers of BLoC architecture: User Interface (UI), BLoC, Repository, and Data sources, as shown in Figure 1.

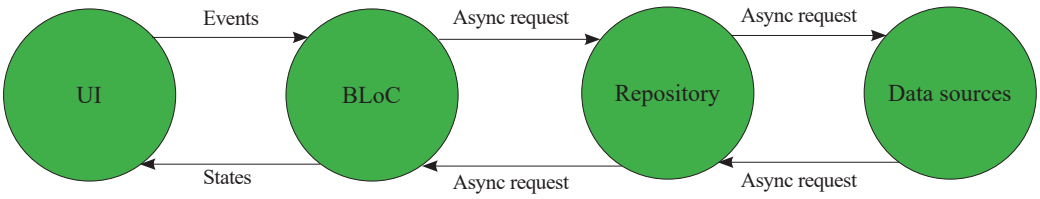


Figure 1: BLoC architecture design
Source: Author

Coding and Testing

The functions of the Jorania application will be developed from the design built in the previous phase. After the system functionality is built, code testing will be performed if necessary after some part of the coding has been completed. If a system defect is found, repairs can be carried out immediately.

The Jorania application uses the black box testing method by applying use case testing techniques. At the end of the testing phase, the test results were formulated into a test log and all system functions passed the use case testing. The iteration result will be presented to the users at the end of each step. Feedback from users will be collected and if there are any new changes in terms of system requirements, planning for the next iteration step will address those issues. In addition, the short system development period is also very suitable for using the Agile model.

Results

The Jorania application is developed using the Dart programming language and the Flutter framework. The database for this project is Firebase and the software used is Visual Studio Code as a code converter. There are eight main modules in Jorania: Authorisation Module, Fishing Location Management Module, Favourite Location Setting Module, Add Fishing Location Module, Fishing Location Information Update Module, Fishing Service Management Module, Fishing Service Add-on Module, and Fishing Service Edit Module. Users can use the system to make a registration application under the registration module. As a new user, they can first register an account by entering the required details. Figure 2 shows the display of the account registration interface.

Figure 2: User account register interface
Source: Author

Successfully registered users can log in using the registered email and password and can log out under the Authorisation Module. Figure 3 is the log in interface of the main page interface with a log out button.

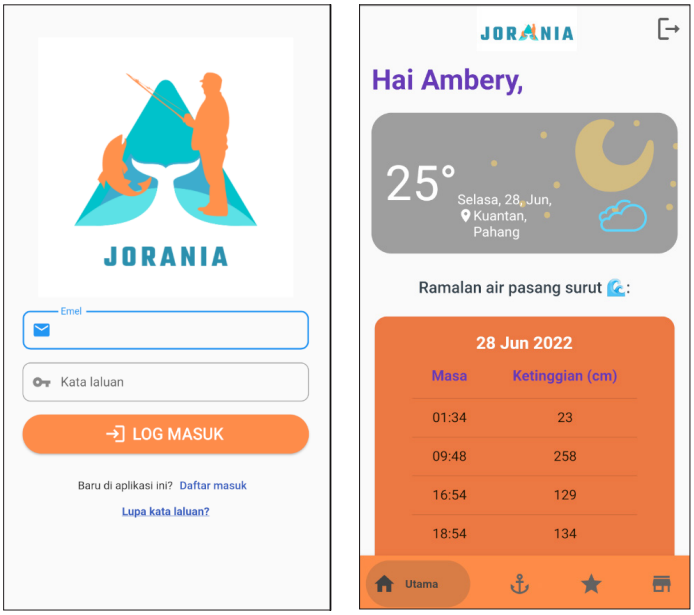
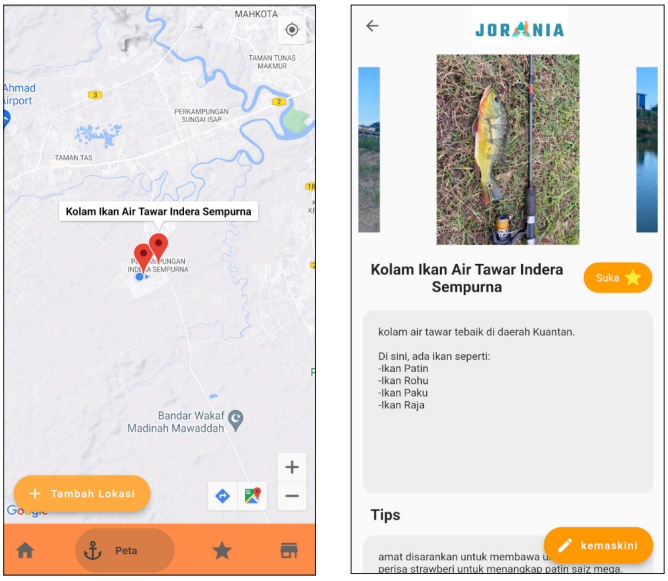


Figure 3: Authorisation interface
Source: Author

Figure 4 (a) refers to the map interface displaying nearby fishing locations for the Fishing Location Management Module. In contrast, Figure 4 (b) refers to the user-selected fishing location information interface.



(a) (b)

Figure 4: The fishing location management

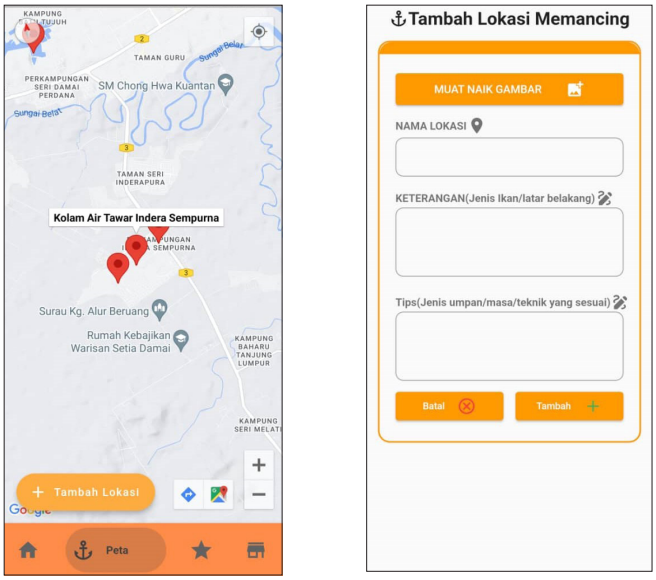
Source: Author

In addition, users can also set a favourite location by pressing the "star" icon button and the location will be added to the user's favourite location list, as shown in Figure 5.

Figure 5: The favourite location setting

Source: Author

Panel member users can add a new fishing location by pressing the "+ Add Location" button as in Figure 6 (a) and are required to fill in the additional details of the fishing location as in Figure 6 (b).

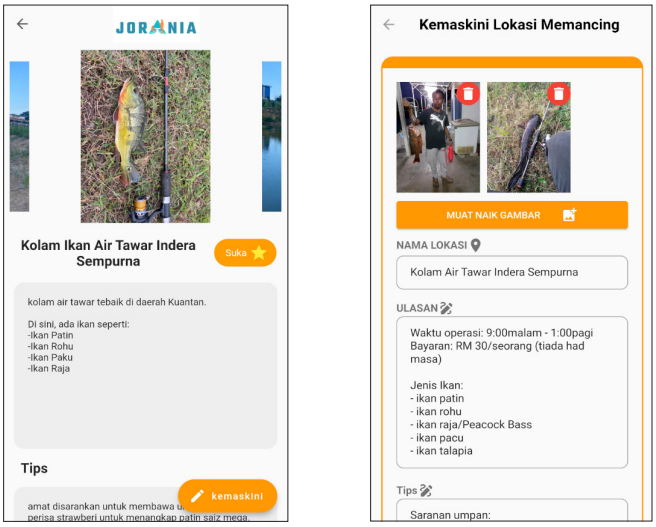


(a) (b)

Figure 6: Add fishing location

Source: Author

Panel member users can also edit existing fishing location information by pressing the "update" button, as shown in Figure 7 (a). They will be taken to the fishing location update interface, as shown in Figure 7 (b).

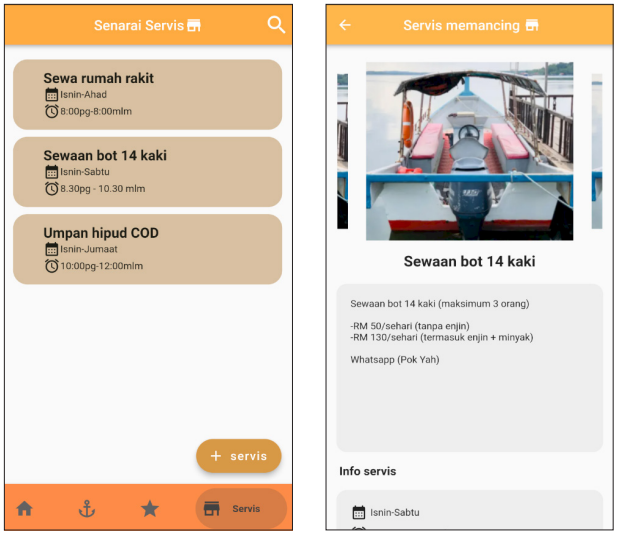


(a) (b)

Figure 7: Fishing location information update

Source: Author

Regular members, panel members, and administrators can see the list of services for the Fishing Service Management Module, as shown in Figure 8 (a). It will take users to a detailed service interface based on the selected service, as shown in Figure 8 (b).

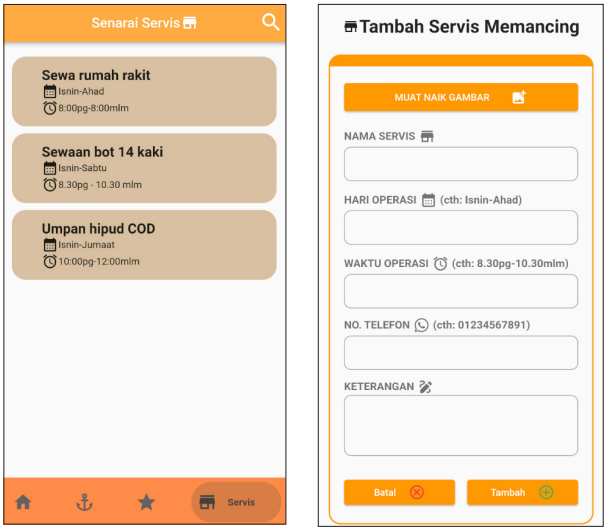


(a) (b)

Figure 8: Fishing service management

Source: Author

For the Fishing Service Add Module, administrator users can press the "+ service" button, as shown in Figure 9 (a) and are required to fill in the new service details completely, as shown in Figure 9 (b).

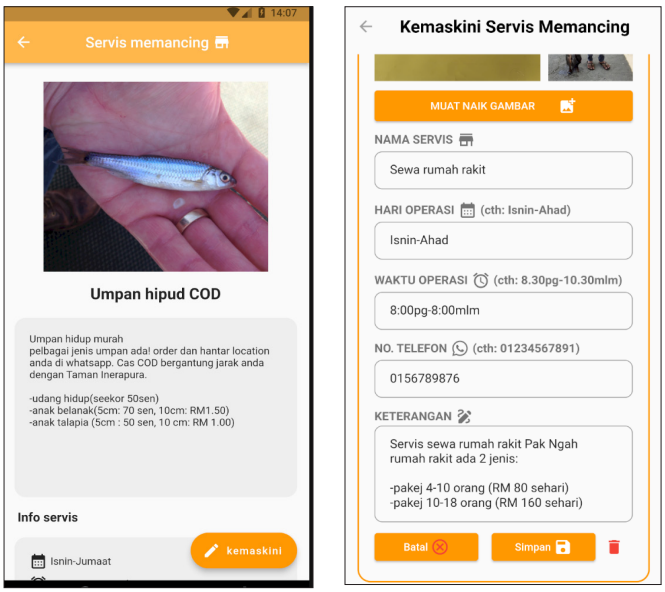


(a) (b)

Figure 9: Fishing service add-on

Source: Author

Administrator users can press the "update" button for the Fishing Service Edit Module, as shown in Figure 10 (a). They will be taken to the service information details interface of the existing fishing service to update the information, as shown in Figure 10 (b).



(a) (b)

Figure 10: Fishing service edit

Source: Author

Usability Assessment

Interface usability testing was conducted to obtain feedback on the functionality of the Jorania application design. 10 items regarding the ease of use dimension were measured to identify the application's usability level with a scale of 1 to 5 referring to strongly disagree to strongly agree. This test prioritises interface functionality and the system's effectiveness in delivering information. Table 2 shows the results of testing the usability of the Jorania system interface. A total of 15 respondents gave feedback on using the Jorania application system on their smartphone devices.

The usability testing results found that 93.3% of all respondents strongly agreed that the Jorania system is an easy-to-use and easy-to-understand.

Table 2: Usability testing results of the Jorania system interface

Questions	1	2	3	4	5
1. I found it easy to learn to use this system.	0	0	0	0	100%
2. I found getting the system to do whatever I wanted easy.	0	0	0	6.7	93.3%
3. My interaction with the system is clear and understandable.	0	0	0	0	100%
4. I find this system flexible to interact with.	0	0	0	0	100%
5. I found that it was easy for me to become proficient in using the system.	0	0	0	0	100%
6. I found that the system is easy to use.	0	0	0	0	100%

7. I feel comfortable while using this system.	0	0	0	0	100%
8. I found it easy to find the information I needed.	0	0	0	0	100%
9. The organisation of information displayed on the system screen is clear.	0	0	0	0	100%
10. The system interface is pleasant.	0	0	0	0	100%

Conclusions

In conclusion, developing the Fishing Location Information Management System, Jorania can help amateur anglers prepare more efficiently and systematically before and during recreational fishing. In addition, this system is also considered to have successfully achieved the objective of a specific study to instil interest in the recreational fishery so that this industry continues to grow and can contribute to the local community's economy. Despite this, the improvement of the system needs to be taken into account to continue facilitating the affairs of anglers.

Collaboration with key agencies and industries is essential to encourage the use of the Jorania. The Department of Fisheries Malaysia can provide expertise in fishery management, regulations, and licensing specific to recreational fishing, ensuring compliance and sustainability. Tourism Malaysia can play a pivotal role by promoting Malaysia as a prime destination for recreational fishing, thereby attracting both international and domestic tourists. Additionally, engaging local fishermen associations is crucial; they can promote sustainable practices among recreational anglers and foster community involvement, enhancing the application's effectiveness and reach. These collaborative efforts support the Jorania and bolster the recreational fishing industry in Malaysia.

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Conflict of Interest Statement

The authors declare that they have no conflict of interest.

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