BOAT MANAGEMENT SYSTEM FOR TERENGGANU ISLANDS

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Abstract: Many tourism companies provide boat services to the Terengganu Islands, but most of them only advertise their boat services on social media or the company's website. Therefore, the Boat Management System to Terengganu Islands (BoatMSTI) was developed, and the main objective of this system is to create a one-stop center platform. Tourists can compare boat services provided by different tourism companies and find the best and most affordable services on one website. Tourists can check ticket availability and book ticket directly based on the selection of the boat service. BoatMSTI also enables the tourist to view other customer's feedback and rating. At the same time, this system can help the tourism company manage boat services and customer booking tickets. This system is developed using an Agile method which makes the system development more flexible. The general concept is to divide the development of the system into sequences of repeated cycles known as iteration. The system can be improved for every iteration to meet user satisfaction based on user feedback. This system is web-based and can be accessed anytime and anywhere with an internet connection. The web-based system also can ease users like tourism companies and customers to store important information such as booking tickets and payment receipts in the database. In conclusion, with this system, the tourist can save more time in finding the best boat service, and the management of customers by tourism companies will be more efficient.

Keywords: Terengganu Islands, Tourism Company, Tourism, One-Stop Center, Boat Service, Web-Based System.

Introduction

Terengganu is one of the interesting places to visit among local or overseas tourists. In 2018, the total arrival of tourists to the Terengganu was 4.79 million (TheStarOnline, 2019). The beauty of the Terengganu islands, such as Redang, Kapas, Lang Tengah, and Perhentian, became one of the main attractions to the tourists. These islands can be reached only by ferry or boats from various jetties such as Merang, Marang, Kuala Besut and Shahbandar Jetty. Many tourism companies have provided ferry and boat services. However, these companies advertise their services on social media or websites. As a customer, it is difficult to find the best and most affordable boat services because there need to find information about that company from different websites. Sometimes customers do not know the company's name to be searched, which can lead to the miss information. Most companies also did not provide the customer's feedback or rating for their services.

In this paper, a web-based Boat Management System to Terengganu Islands (BoatMSTI) is designed and developed as a one-stop platform for Terengganu tourism companies. The system herein includes not only boat service management and online ticket booking but also the customer's feedback and rating for the company services. Also, through the use of BoatMSTI, boat services from various tourism companies can be retrieved by the customer. Thus, the proper design and development of web-based BoatMSTI as a one-stop boat services platform could assist the customers in getting the best services and information. Customers can also save time searching boat service information from different websites.

The rest of the paper is organised as follows. The first section presents an overview of web-

based booking ticket services by a Tourism Company. Then, the system methodology is discussed in the following section. The proposed system design is discussed in detail next and followed by the implementation of the system. Finally, the last section concludes with a summary of this paper.

Related Works

The widespread use of internet technology as supporting tools for providing online services and accessibility to tourism companies. The review of literature is based on three (3) existing systems, namely DYG Travel (Dygtravel.com. my, 2019), MerangJetty.com (Merangjetty. com, 2019) and BusOnlineTicket.com (Busonlineticket.com, 2019). Table 1 shows the comparison of several existing boat services to Terengganu Island.

Based on the studies, the comparison has been carried out to look at the system functionalities such as user authentication, other company information, searchable trip services, customer feedback or rating, supporting language and location of the company.

Table 1: Comparison between existing Boat Services to Terengganu Islands

System Functionalities	DYG Travel	BusOnlineTicket.com	MerangJetty.com
User authentication	No	Yes	No
Display other company's boat service	No	Yes	No
Trip searching	No	Yes	Yes
Customer feedback	No	Yes	No
Language support	English	English, Malay, Chinese	English
Link company's address to Google Map	No	No	Yes

DYG Travel (Dygtravel.com.my, 2019) is a company's website promoting its services, including boat and ferry ticket booking. Information about the trip schedule, prices, and contact details is provided on one page. However, the booking form needs to be filled manually by the user and the system does not support the payment method. Next, the booking confirmation will be sent to the customer's email.

MerangJetty.com (Merangjetty.com) is an online reservation system that provides daily boat transfers from Merang Jetty to Redang Island, Lang Tengah Island, and Bidong Island. It also provides tour packages such as day trips and snorkelling packages to attract more customers. The map from Merang Jetty to the islands is provided to help the customers find Merang Jetty's location. Four (4) steps to complete the booking are search trips, add-ons, details, and payment. The first step is for the customer to search for a trip based on the trips from the drop-down. The customer must

also specify the booking date, time, and total ticket booking. The second step is optional. The customer can choose either want to add any add-ons or skip this step. Next, the customer must fill in personal details such as name, phone number, email, and address. Lastly, the customer needs to make a payment to complete the ticket booking. The payment can be done by using a credit card or online banking. MerangJetty.com does not provide user authentication. So, users can use the system without registering as new users. The disadvantage to this approach is that the user must always fill out the personal details form to make a new booking. The customer also cannot predict the quality of the services provided by MerangJetty.com because the customer does not have any basis for reference such as previous customer feedback.

BusOnlineTicket.com (Busonlineticket.com, 2019) is a one-stop online ticket booking portal to easy customer book bus, train, and ferry tickets. It also covers routes in Malaysia

and Singapore. Many ferry and boat service providers from different companies tied up with BusOnlineTicket.com such as Batam Fast Ferry Pte Ltd, Langkawi Ferry Sdn Bhd, Perhentian Trans Ferry Sdn Bhd, and Al Ameen Boat Service. The address for each company is included in the company's description or the ticket info. However, the address does not link to the Google Map, it can lead the customer to a different location because the customer needs to find the company's location manually. The BusOnlineTicket.com (Busonlineticket.com, 2019) website supports three (3) languages: English, Malay, and Chinese. Customers also can sign up and log in to the website to access the customer dashboard. The customer's booking tickets can be managed from the customer dashboard. Customers can make a booking ticket by specifying the departure date, starting point, and destination based on the location that has been provided to search the available ticket from different service providers. BusOnlineTicket.com also provides filters and five (5) star ratings to assist customers in choosing the boat and ferry services. BusOnlineTicket.com also support numerous payment methods such as credit card, online banking, e-wallet, PayPal, and Alipay.

The System Design Architecture

This section discusses the design architecture of BoatMSTI. The architecture as shown in Figure 1 consists of three (3) tiers: client tier, application tier, and database tier.
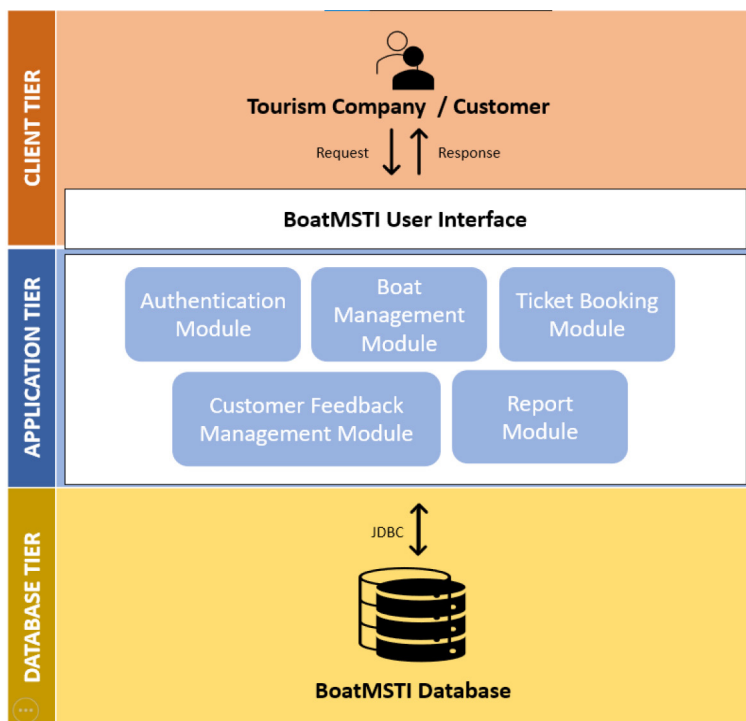

Figure 1: Three-tier architecture

The client tier is also known as the presentation layer where the interface is provided to the users, such as the BoatMSTI homepage, tourism company's management page, boat service booking page, payment page, and customer dashboard. The client tier primary function is to communicate with the business tier by sending information from user input to the business tier (Rajkumar, 2017). Then, the business tier will do the operation

process of the system. It will interact with the database tier or data layer and send the customer's request information to the client tier. The JSP, Servlet and JavaBean files have been uploaded to the webserver. Java Language will be used to develop this system and JDBC will be used to interact with the database. Next, the database tier role is to store and share data with the system. The BoatMSTI used MySQL as a database platform.

Database Architecture

Figure 2 shows the Entity-Relationship Diagram (ERD) for BoatMSTI. There are ten (10) entities: customer, feedback info, feedback topic, booking ticket info, payment info, boat service info, boat info, tourism company, address info and report info.
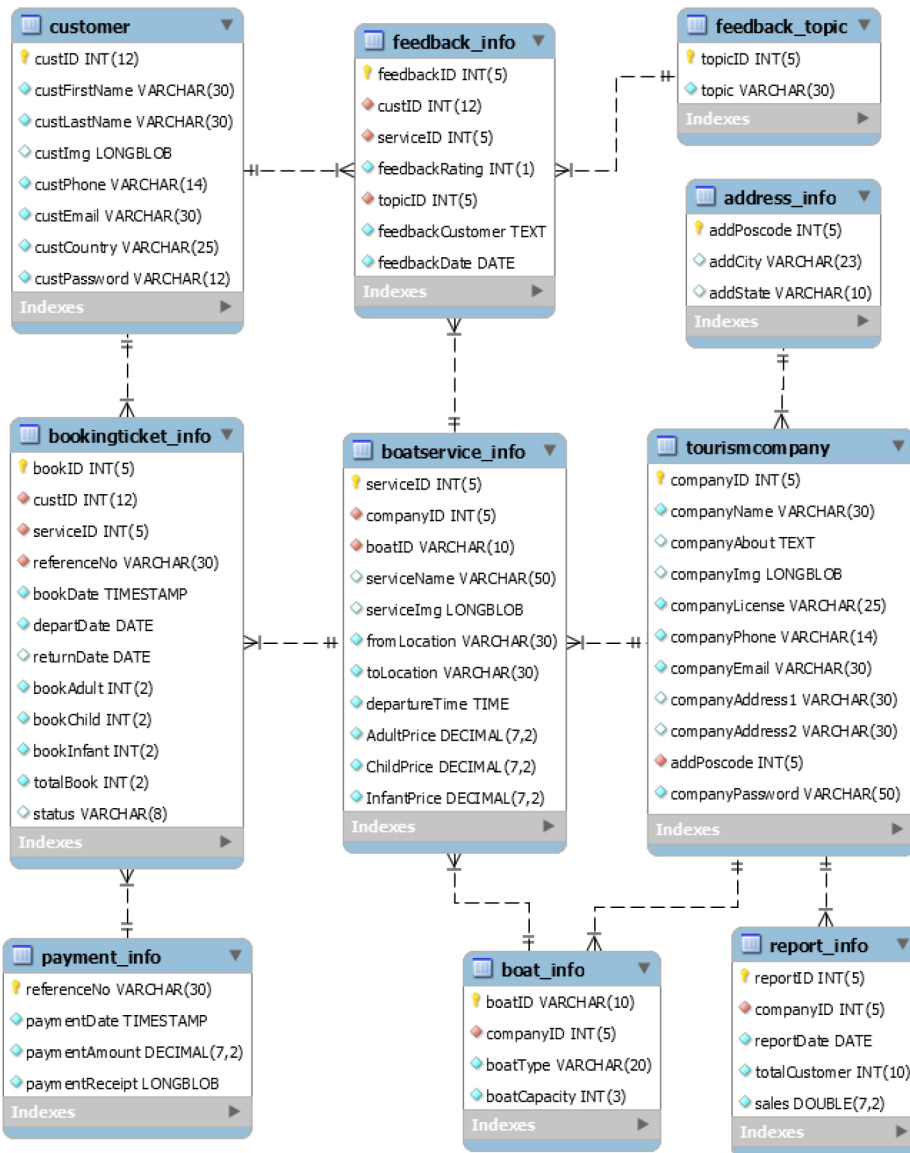

Figure 2: Entity-Relationship Diagram for BoatMSTI

Software Requirement

Table 2 shows the client-side and server-side of the BoatMSTI software specification. The BoatMSTI is a web-based application. It can be accessed using Google Chrome, Internet Explorer, and Mozilla Firefox. The operating system used for the BoatMSTI is Microsoft Windows 8 and above. The BoatMSTI is developed using NetBeans IDE 8.2 with JAVA as the programming language. Besides that, the webserver used for the BoatMSTI is Apache Tomcat and MySQL Workbench 8.0 CE platform is used to design and manage the database.

Table 2: Software Specification for BoatMSTI

Software	Specification
Client Side	
Web browser	Google Chrome, Internet Explorer, and Mozilla Firefox
Operating system	Microsoft Windows 8 and above
Server Side	
Web browser	Google Chrome, Internet Explorer, and Mozilla Firefox
Operating system	Microsoft Windows 8 and above
Web server	Apache Tomcat
Framework	NetBeans IDE 8.2 with JAVA
Database server	MySQL Workbench 8.0 CE

Hardware Requirement

Based on Table 3, the client and server sides for the BoatMSTI hardware specification are specified. For the client side, the Random-Access Memory used in the BoatMSTI is 4.00 GB DDR4. After that, the specification for hard disk is 1000 GB with processor Intel Core i5. The speed of the processor is 2.3 GHz.

For the server side, the specification for Random Access Memory is 1.00 GB, while the disk is 25 GB. The Solid-State Drive is used to make sure the system is smooth and faster. The processor on the server side is Intel Xeon Platinum 8168, with a speed of 2.7 GHz. This server bandwidth is 1000 GB.

Table 3: Hardware Specification for BMSTI

Hardware	Specification
Client Side	
Random access memory	4.00 GB DDR 4
Disk	1000 GB HDD
Processor	Intel Core i5
Processor speed	2.3 GHz
Server Side	
Random access memory	1.00 GB
Disk	25 GB SSD
Processor	Intel Xeon Platinum 8168
Processor speed	2.7 GHz
Bandwidth	1000 GB

The Development of BoatMSTI

This section discusses in detail the BoatMSTI functionalities and services. Figure 3 shows the home page interface of BoatMSTI. In the header section, users can see a list of the tourism companies registering with BoatMSTI. Users can also set their language in English, Chinese or Malay at the header. Users can search for available boat service tickets by selecting the destination and date for the boat ticket section.
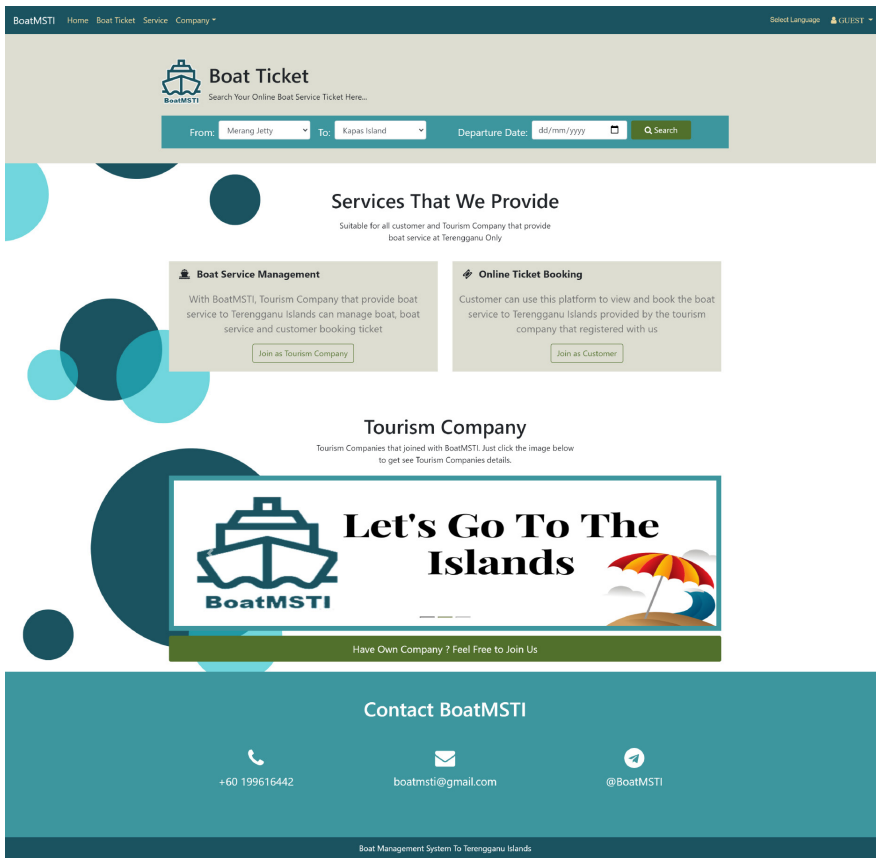

Figure 3: Home page

Tourism Company's Management Page

Figure 4 shows the tourism company's management page. Tourism companies can add boat and boat service details such as destination, time departure, and price. The information and details about boat services that are already added to the system will be displayed on the boat service booking page. Besides, tourism companies also can navigate to the customer list page and report page from the drop-down list.
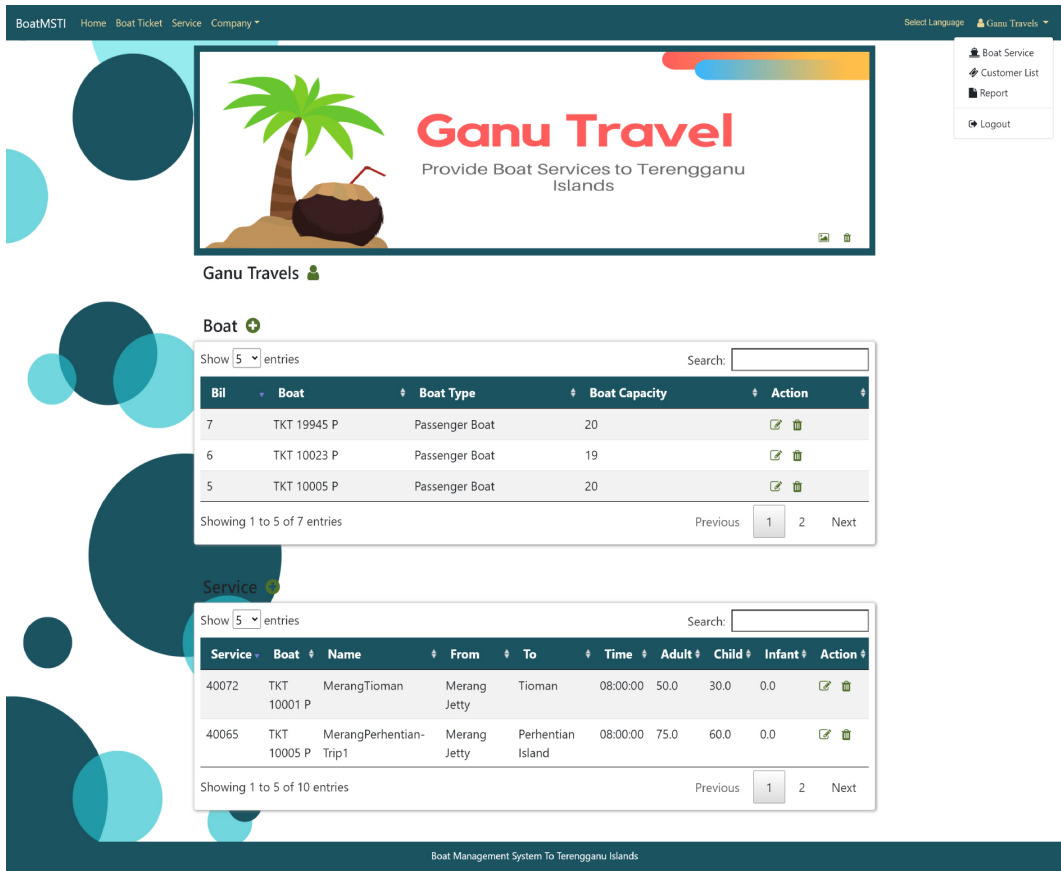
Figure 4: Tourism company's management page

The customer list page is shown in Figure 5. The tourism company can manage customer booking tickets to check the customers' details and the ticket validation. The list is divided into two sections: new ticket list and used ticket list.
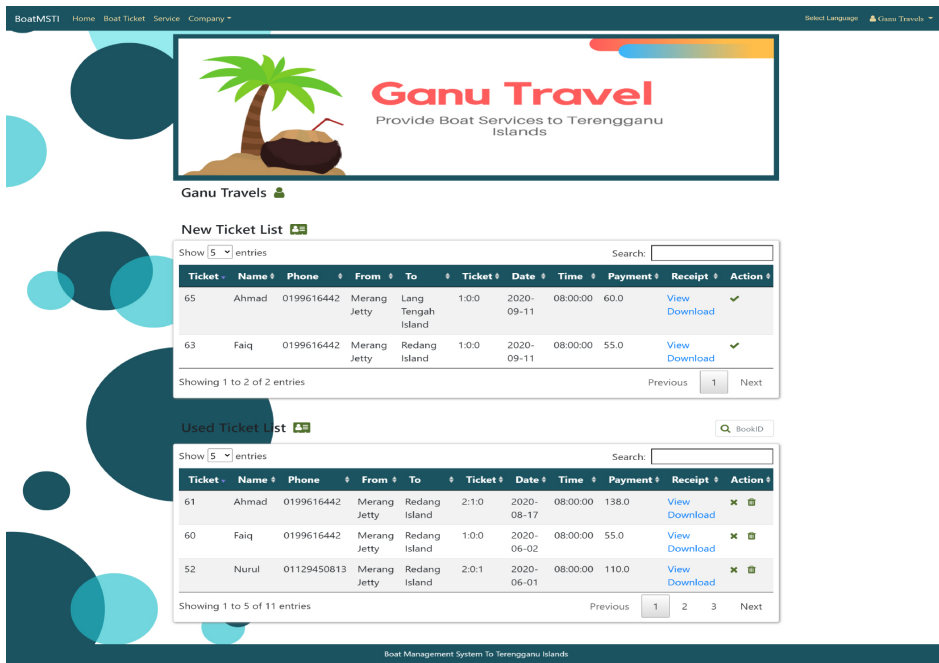

Figure 5: Customer list page

Figure 6 shows the report page. The report can help the tourism company to analyse the monthly sales report. Based on the bar chart and customers' feedback, the tourism company can plan some strategies to improve their services and sales.
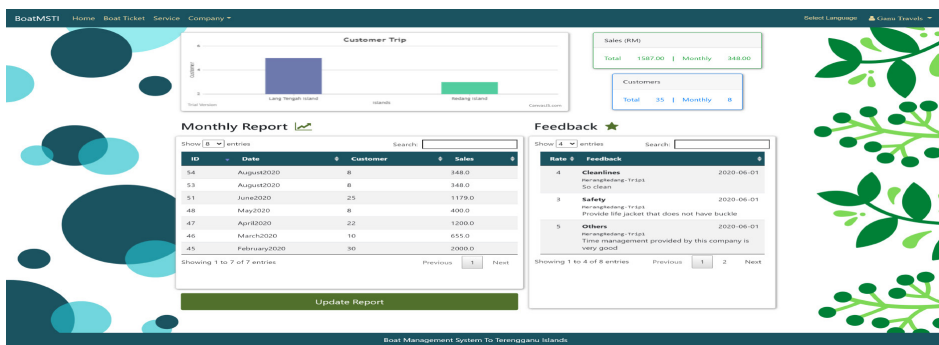

Figure 6: Report page

Boat Service Booking Page

Figure 7 shows the boat service booking page. Customers can set the destination and date for the trip. Only available tickets will be displayed to the customer. Filter and rating functions are provided to the customer to ease customer's comparisons and decisions when choosing boat service tickets.
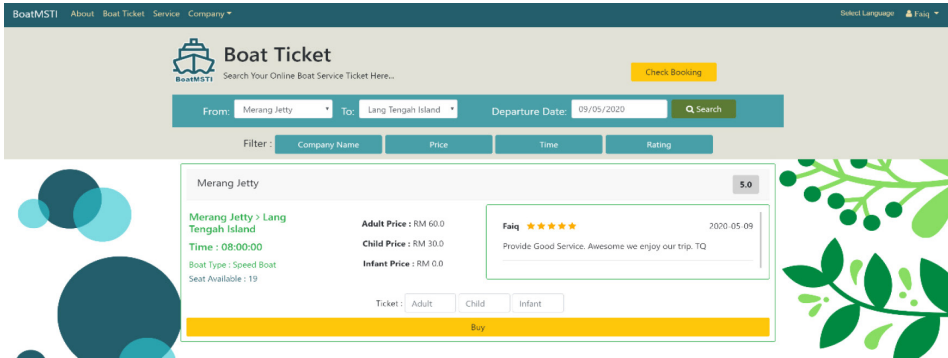

Figure 7: Boat service booking page

Payment Page

Figure 8 shows the payment page to pay for boat service tickets. The details such as ticket price and destination will be displayed to the customer. In addition, customers need to enter the receipt reference number and upload the receipt as proof of completing the payment.
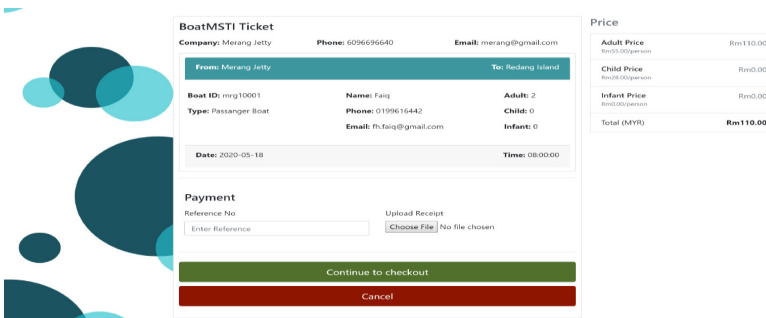

Figure 8: Payment page

Customer Dashboard

Figure 9 shows the customer dashboard page. All booking tickets made by the customer will be displayed on this page. The customer's ticket will be displayed in the booking history table. The review column shows the customer's feedback. Customers can give feedback, delete, or edit their feedback in the review column.
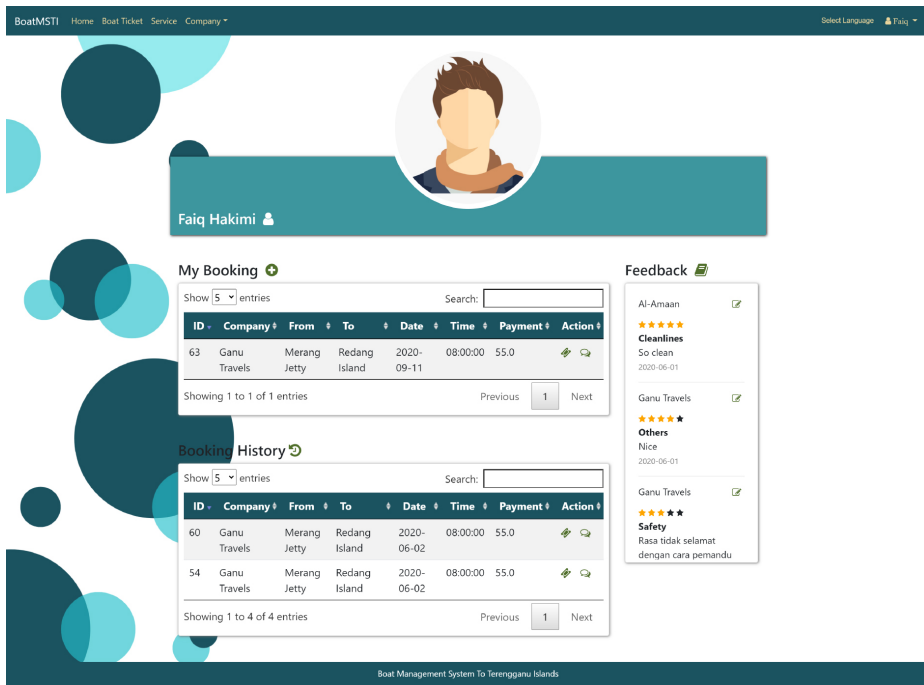
Figure 9: Customer dashboard

The BoatMSTI uses the five-star rating system to rate the tourism companies' boat services as shown in Figure 10. One (1) star represents the least satisfied while five (5) stars represent the most satisfied customers. The five-star rating system has been used by many websites such as Amazon.com (Amazon.com, 2020), Booking.com (Booking.com, 2020), and Freelancer.com (Freelance.com, 2020). The rating system is important to help customers trust the sellers (Pranata et al., 2013). The five-star rating system is suitable to be used for purchasing tasks compared to the thumbs-up rating (binary rating system), which only can provide two (2) sides of information such as good or bad (Chen, 2017). Customers rate the services based on service quality and customer satisfaction.

According to Nunkoo et al. (2019), customer satisfaction is measured between the customer's expectations before purchasing the services and their evaluation after using them.
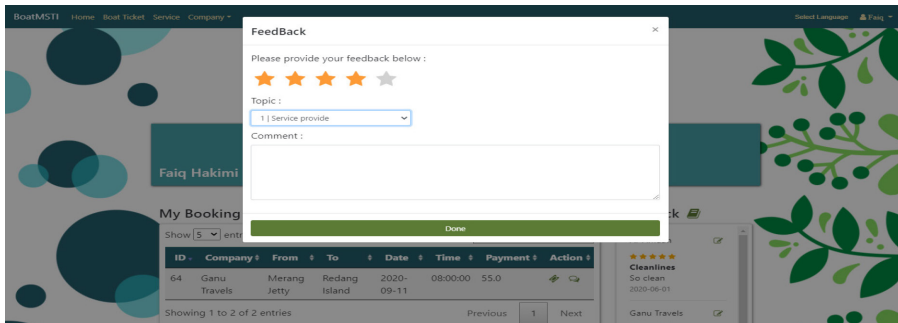

Figure 10: Customer feedback

Conclusion and Future Work

In conclusion, BoatMSTI is a web-based system that provides a one-stop center platform for tourism companies and tourists. The development of BoatMSTI eases the tourists to compare and find the best and most affordable boat services provided by different tourism companies. Besides, BoatMSTI also can help the tourism company to manage boat service and customer booking tickets. Tourism companies that can use BoatMSTI are companies that are located at Terengganu and provide boat services to the Terengganu Islands

BoatMSTI still has limitation functions. One limitation function is that BoatMSTI does not support the Simple Mail Transfer Protocol (SMTP). So, BoatMSTI cannot provide users with the ability to send notifications to email clients. After that, BoatMSTI also does not support a third-party payment gateway. The customer must pay the ticket via online banking and upload the transaction receipt to the system. So, tourism companies cannot accept refund requests from customers online.

Based on the limitations stated earlier, BoatMSTI can be improved in future work by supporting SMTP. Due to this improvement, BoatMSTI can offer new features that provide a one-time password when registering as a new user, and users also can request a password change via email if the user forgets the old password. BoatMSTI will be integrated with third-party payment gateways such as online banking and PayPal for future development.

References

Amazon.com (2020). Retrieved August 24, 2020 from https://www.amazon.com.

Booking.com (2020). Retrieved August 24, 2020 from https://www.booking.com.

Busonlineticket.com (2019). Retrieved June 10, 2019 from https://www.busonlineticket.com.

Chen, C. (2017). Five-star or thumbs-up? The influence of rating system types on users' perceptions of information quality, cognitive effort, enjoyment, and continuance intention. *Internet Research, 27*(3), 478-494. doi:10.1108/intr-08-2016-0243.

Dygtravel.com.my (2019). Retrieved June 10, 2019 from https://www.dygtravel.com.my/boat-ticket.

Freelancer.com (2020). Retrieved August 24, 2020 from https://www.freelancer.com.au.

Merangjetty.com (2019). Retrieved June 10, 2019 from https://www.merangjetty.com.

Nunkoo, R., Teeroovengadum, V., Ringle, C. M., & Sunnassee, V. (2019). Service quality and customer satisfaction: The moderating effects of hotel star rating. *International*

Journal of Hospitality Management, 102414. doi:10.1016/j.ijhm.2019.102414.

Pranata, I., Skinner, G., & Athauda, R. (2013). A survey on the usability and effectiveness of web-based trust rating systems. *2013 IEEE/ ACIS 12th International Conference on Computer and Information Science (ICIS)*. doi:10.1109/icis.2013.6607882.

Rajkumar. (2017). Software Architecture: One-Tier, Two-Tier, Three Tier, N Tier. Retrieved October 01, 2019, from https://www. softwaretestingmaterial.com/software-architecture/.

The Star Online. (2019). Terengganu targets 6.5 million tourists. Retrieved June 10, 2019, from https://www.thestar.com.my/ metro/metro-news/2019/07/12/terengganu-targets-65-million-tourists.