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TRIPTALLY: BUDGETING TRAVEL SYSTEM

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TripTally: Budgeting Travel System

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TRIPTALLY: BUDGETING TRAVEL SYSTEM

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JANUARY 28, 2025

STUDENT DECLARATION

I certify that this thesis and the project to which it refers is the product of my own work and that any idea or quotation from the work of other people, published or otherwise, are fully acknowledged in accordance with the standard referring practices of the discipline.

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ABSTRACT

The Internet has significantly transformed the travel industry by providing extensive information and resources that simplify trip planning. Digital tools allow travellers to explore destinations, compare accommodations, and make informed decisions. However, despite these conveniences, budget-conscious travellers face challenges in identifying options that align with their financial constraints and personal preferences (Trapani et al., 2019). The overwhelming number of choices often complicates the decision-making process, increasing the risk of overspending. Existing travel platforms frequently lack comprehensive budget management tools. Many do not allow users to filter results based on specific financial constraints, requiring manual effort to compare multiple options. This limitation makes it difficult for travellers to find affordable yet meaningful experiences (Lin et al., n.d.). To address these challenges, this study proposes TripTally, a travel planning platform designed to enhance budget management and provide personalized recommendations. TripTally integrates real-time budget monitoring, Google Maps functionality, and Street View features while offering user-specific hotel and attraction recommendations within financial limits. The system is developed using the Waterfall Model, beginning with requirement gathering, followed by system design, implementation, testing, and maintenance. By addressing the shortcomings of existing travel planning systems, TripTally assists users to create customized travel plans efficiently without exceeding their budgets. This platform enhances decision-making capabilities and financial control, contributing to a more seamless and cost-effective travel planning experience.

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LIST OF ABBREVIATIONS

CSS   Cascading Style Sheet

API   Application Programming Interface

HTML   HyperText Markup Language

SQL   Structured Queries Language

PHP   Personal Home Page

CHAPTER 1 : INTRODUCTION

The main topics of the first chapter are discussed about the background study problem statement, research questions, research objectives, project scope and project significance. It gives an overview of this travel budgeting system, which is intended to assist travellers in identifying reasonably priced accommodation, activities to do, and transportation options.

1.1. Background of Study

The Internet has transformed the travel industry by providing extensive information and resources that simplify the planning process for travellers. From exploring destinations to booking accommodations, travellers now rely on digital tools to make informed decisions. However, while these tools offer convenience, they also present challenges, particularly for budget-conscious travellers. With the overwhelming number of choices available, many travellers struggle to identify options that align with their financial constraints and personal preferences (Trapani et al., 2019).

Existing travel systems often lack comprehensive tools to assist users in managing their budgets effectively. For instance, many platforms fail to filter results based on specific budgetary needs, leaving users to manually sift through a multitude of options. This lack of targeted solutions complicates the decision-making process and increases the risk of overspending (Lin et al., n.d.). Budget-conscious travellers face significant challenges in finding affordable and meaningful travel experiences that meet their expectations. To address these challenges, the proposed system introduces a travel planning platform that prioritises budget management and personalised recommendations. Users can input their budget and receive tailored suggestions for accommodations and attractions that fit their financial goals. The system also provides real-time feedback on budget usage, alerting users when their selections exceed the set budget. By incorporating features like dynamic budget tracking and interactive recommendation tools, the system simplifies decision-making for travellers with financial constraints (Trapani et al., 2019).

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In addition to budget management, the system leverages powerful tools such as Google Maps, Google Street View, and Google Reviews to enhance the user experience. Google Maps and Street View allow users to visualise the exact location of accommodations and attractions, providing valuable insights into their surroundings and accessibility. Meanwhile, Google Reviews offer authentic feedback from previous visitors, helping users assess the quality, reliability, and overall value of their choices (Aboushouk & Elsawy, n.d.). These features enable travellers to make informed decisions confidently, improving satisfaction and reducing uncertainty. By integrating budget-focused recommendations with user-generated content and location-based tools, the proposed system addresses a critical gap in the travel industry. It empowers budget-conscious travellers to efficiently plan their trips without compromising on quality or experience. This approach not only streamlines the planning process but also fosters confidence and satisfaction, ultimately making affordable travel more accessible to a wider audience.

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input their budget and receive tailored suggestions for accommodations and attractions that fit their financial goals. The system also provides real-time feedback on budget usage, alerting users when their selections exceed the set budget. By incorporating features like dynamic budget tracking and interactive recommendation tools, the system simplifies decision-making for travellers with financial constraints (Trapani et al., 2019).

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1.2. Problem Statement

According to Vishwajith et al. (2022) , extensive information available online has made travel planning become overwhelming. Users must traverse multiple platforms for varying choices like hotels, attractions, transportation methods, and reviews. Unstructured data creates information overload wherein users find it very hard to digest the great deal of information handed over to them. It is challenging to separate out that information which is useful from the endless irrelevant or redundant data, which leads to confusion, frustration, waste of time, etc. This learning process has overall added a lot of overhead, which has lowered decision-making efficiency and finally resulted in poor travel

decisions. Besides, several travel platforms do not readily address this issue by providing a suite of tools that organize and prioritize information seamlessly. Most of the time, users must filter manually through cumbersome lists, cross-verify prices across platforms, and check reviews from multiple sources, complicating one more step of planning. This is a tedious method and contributes to how travellers approach their trips with a sense of fatigue, discouragement, and a lesser confidence level toward their decisions. Such inefficiencies have huge implications for the user experience of travel planning and point toward the urgent need of systems that streamline information to promote informed, anxiety-free decisions.

Economic factors have a significant influence on the decisions surrounding travel, especially when it comes to more budget-oriented users. Increased costs for hotels, transport, and activities have raised the problem of planning a trip within the financial limits. In the observations of Kanakia and Eranjikal (2023) , users tend to emphasize lower costs and options that promise value for money, yet continuing increases in uncertainty about economic factors, inflation in particular, and fluctuations in the currency exchange marketplace increase the threats and compel the users to cut either the quality or breadth of the experience. Also, the problem becomes aggravated by the absence of cohesive, financial tools in most systems for travel planning. Current arrangements do not meaningfully integrate the notion of budgetary restrictions, so all other things remaining equal, it becomes necessary for users to work out their costs manually and how they will be compensated. Rising cognitive load may lead to either higher chances of overspending or even worse, a lost opportunity for a better deal. With poor fare recommendations from the systems and no acceptable budget tracking, several users face great obstacles toward a generally satisfactory and confident trip planning process (Dasari et al., 2023).

The current travel systems quite typically fail to address the specific preferences of an individual user. The systems rely on regular algorithms that suggest popular destinations according to no regard for individual preference factors like budget, time limitations, or interests. The ineptitude of these systems has forced users to wade through unwanted options, causing exasperation and

wasted time. Huang et al. (2021) argue that the failure to provide personalized recommendations means that an individual has no choice but to invest considerable effort in searching for such information, making the entire planning process ineffective. These systems often overlook other strong determinant factors such as seasonal demand, ethnic fairs/events, and real-time travel conditions that further inhibit them from best serving the targeted customer. Users depend on multiple sources of information, which results in incomplete or poorly planned trips. (Huang et al., 2021) emphasize that systems should be able to rank and blend user preferences like budget constraints and distance from the user's residence to enhance the recommendation scope of travel. Without these capabilities, existing platforms are unable to provide well-formed, educated, and gratifying travel decisions to assist users.

1.3. Research Questions

1. How do existing travel platforms cause information overload and inefficiencies in planning?
2. How can a travel planning system integrate real-time budget tracking, user reviews, and location-based insights to improve the planning process?
3. How effective are personalized travel recommendations in improving user confidence, decision-making, and satisfaction?

1.4. Research Objectives

1. To identify the challenges experienced by users in the planning of trips due to information overload by using the existing travel platforms.
2. To develop a centralized travel planning system that incorporates real-time budget tracking, user reviews, and location-based insights.
3. To evaluate the effectiveness of TripTally system to improve user satisfaction, confidence, and decision efficiency.

1.5. Project Scope

The project of the research, 'TripTally: Budgeting Travel System,' comprises the design, development, and evaluation of a web-based platform to address foremost challenges in the journey of a budget user. Various tools and technologies have been developed for a smooth-running system. The front end is created using HTML, CSS, and JavaScript, while PHP is used for back-end development, with a MySQL database for user data management. Integration of Google Maps API and other location-based services is used to facilitate navigation, reviews, and in-depth travel information to enhance the user experience. The platform caters to users on desktops, allowing users to plan and manage trips conveniently from any internet-connected device.

Usability testing is the main tool employed to assess the system's effectiveness. This approach requires users to interact with the system to evaluate how it meets their needs regarding budgeting, planning, and decision-making. Task completion time, navigation efficiency, and user-satisfaction levels are examined as part of the proxy metrics. There is also qualitative feedback

gathered through surveys to gauge how the system increased or decreased user confidence, improved or harmed the decision-making process, and impacted user satisfaction. Such a combination of technical evaluation and user feedback assures that TripTally does address issues of information overload, financial constraints, and lack of personalized recommendations, rendering a realistic solution for a budget user.

1.6. Project Significance

Through this project, a fully functional system has been developed to address the challenges faced by budget-conscious users. The system provides many large and significant values. In the view of the system, users will easily find, explore, and receive personalized travel recommendations such as hotels and attractions specific to their desired destinations and budget. TripTally will make travel planning easy, bridging all the vital information on a single platform rather than searching everywhere. Furthermore, it helps to be organized and stay updated as they plan for their trips within their budget.

The project aims to counter these issues by delivering a user-friendly platform for live budget tracking, location-based recommendations, and customized travel packages. The system further embeds tools like Google Maps, Google Reviews, and a bonus display price box that allows users to keep track of their expenditure. More than a platform, the system gives users the confidence to build trips properly, coupled with optimal resource and time management. By web-based technology, the project guarantees accessibility through desktop platforms, providing a smooth interface and a one-stop solution for budget-conscious users. This ensures that travel planning is efficient, cost-effective, and improves overall satisfaction that fits well with what the target audience requires.

1.7. Chapter Summary

The goal of the TripTally: Budgeting Travel System project is to transform the methods in which hemisphere users look forward to trips and settle expenses. A big number of users are currently facing significant challenges such as dispersed travel information, difficult-to-find affordable options, and lack of any tools which might monitor and track travel budgets. This project concentrates on developing a web-based platform particularly designed for the needs of budget-reserved users. The system helps to standardize key travel information, give personalized recommendations, along with features like real-time tracking of the budget, an "add-to-cart" booking facility, and Google mapping, Street View, and Reviews integration.

By solving these problems, the project aspires to promote the process of planning the trips, enhance management efficiency and ensure satisfaction among users. Though it is only accessible from a desktop, the platform is admiringly well-designed and simple to navigate for efficiency and ease while planning. The chapter concludes by emphasizing the project goals in carrying out an all-inclusive, easily affordable solution for users. The TripTally system is important in taking advantage of technology to address some key travel planning troubles, making the process organized, accessible, and fun for budget-only users.

CHAPTER 2: LITERATURE REVIEW

A review of current travel platforms is provided along with relevant software tools and essential technical components and concepts needed to develop trip budgeting systems. User-friendly and effective application development depends on analysing development methods and database solutions.

2.1. Budgeting Travel Systems

2.1.1. Introduction to Budgeting in Travel Planning

A good budgeting practice in travel planning requires planning ahead so that users can allocate their resources in a better way during the trip while maintaining a financial balance (Hartatik et al., 2022). With a proper budget made beforehand, such basics as transportation, accommodation, food, and activities can be planned with less chance of unexpected costs. Such a proactive look into the future will better the general travel experience while also granting financial confidence such that users will be more able to enjoy their travels without worrying about the overspending. Good budgeting would aid the users in making better choices pertaining to travel, such as prioritizing where one spends, avoiding impulsive purchases, and aligning financial goals with travel plans.

Adopting advanced technologies in travel planning has great potential to provide effective platform management for budgeting. For example, a travel budget predictor system, as reported at the 2023 International Computer Science and Engineering Conference, uses the Simple Additive Weighting (SAW) algorithm to provide cost-effective tourism options customized to one's preferences and constraints. Such applications would provide users with a more realistic expense estimation and help them make more informed decisions. Also, budget allocation and a proper statement of the needs might add to a good travelling experience. Recent research by Li et al., 2024) highlights the importance of optimizing routes whilst considering factors such as operating hours and stay durations to gain maximum experience with the least financial constraints. These methodologies are a good foundation on which honest and

affordable plans can be built to strike a balance between affordability and enjoyment.

2.1.2. The Features on Existing Projects

Budget Tracking: The review of the budgets or effective budget tracking is helpful for the traveling user to monitor and perform well in spending over the duration of the trip. The traditional way of tracking expenses, such as manual registration, could be tedious and prone to errors. To reduce those challenges, there need to be streamlined systems that automate the processes. Such is, for example, the Smart Budget Analyzer and Tracker (Smart BAT), which is the system that suggests easy expense tracking and automates the process of entering and analysing daily expenses(Shelke et al., 2023). It allows lower dependence on the manual methods of expense tracking, thereby reducing errors and improving the way of tracking the budgets.

Personalized Recommendation: Personalization in travel recommendations makes an enhancement to travel experiencing coordination of sites to travel, accommodation, and activities. Advanced recommendation systems have applied machine learning algorithms to evaluate user behaviour and preferences. For instance, this study proposed a travel recommendation model in integrating both long-term and short-term user preferences into a personalized recommendation: it enables capturing changing user's interests, and recommendations appear accordingly relevant and immediate (Cui & Wang, 2023).

Price Comparison: (Singh et al., 2023) state comparison in price gives users the power to consider costs from various suppliers and ensure selection of the least expensive. For pricing comparison to have sufficient efficiency, there is always a good way for data gathering and analysis techniques. Noteworthy is the approach can be used, which comprises group collective collection of price information across multiple e-commerce platforms along with some use of web scraping and machine learning to analyse the price information described on

each site. This mechanism presents a user with the reference for pricing comparatives that are complete for trusted decision making.

Filtering: A hybrid travel recommendation system that combines the use of content-based filtering with collaborative filtering techniques to increase the accuracy and relevance of travel suggestions. These systems utilize user data, preferences, and contextual factors in generating trips, hence balancing personalization with practicality. A hybrid system could recommend hotels based on user reviews and pricing trends or suggest activities near a users visiting a destination. However, most hybrid systems to date have not incorporated budgeting features, meaning that users often must calculate the feasibility of recommendations manually--which may lead to errors or overspending. Furthermore, hybrid systems tend to give higher priority to user preferences and ignore affordability, thus marginalizing the needs of budget-conscious users. It also limits real-time pricing integration, alerts about budgets, and other such functionalities, proving the hybrid systems ought to become more comprehensive in enabling user personal preferences and financial constraints (Garipelly et al., 2021).

2.1.3. Challenges in Budget-Friendly Travel Planning

One of the main challenges is the inability to use reliable tools for guessing travel-related expenses. The impediment makes it hard to come up with effective and honest estimates of the strengthened journey requirements. For example, the creation of mobile apps that can predict travel costs is based on user preferences and constraints to calculate finances accurately. One of the studies presented during the International Conference on Computer Science and Engineering 2023 discusses a travel budget prediction system that employs the Simple Additive Weighting (SAW) mechanism to allow users to know what tourism objects fall within their budgets(Hartatik et al., 2022). Various studies, such as "Budget and Experience-Based Travel Planner", suggest that users experience difficulties in constructing itineraries that fall within their budget constraints while still representing pleasurable experiences(Krishna M. et al., 2021).

Managing unexpected expenses while on a trip can be very difficult; even the better-planned travel budgets could take a hit from it. Last-minute transportation charges, extra luggage fees, or emergency medical expenses strain users' finances. This imports an extra layer of stress, particularly for budget users who are restricted in financial flexibility. Research highlights the fact that it is not uncommon for users to either overspend or cut back on undesired parts of their trip, like lodging or activities (Ruzicka, 2019). A system that allows a user to adjust a budget in real-time will significantly help the users by letting them set aside contingency funds and adjust budgets as new expenses arise so that no portion of their overall travel experience suffers. In addition to the unknown additional costs, the other constraint that users face when planning for interviews and conferences is the vastly fragmented information across multiple platforms. Most existing travel systems fail to bring accommodation, travel, and activity options together; hence, their users have no choice but to jump from one website or app to another to gather the information they need. The inability to consolidate options adds mental fatigue, making the whole planning process tedious and inefficient. Studies demonstrate that such a lack of centralized features upon platforms to track expenses and plan for trips not only increases cognitive load but also leads to lesser satisfaction by the users (Niu, 2022). The traveler must have a tool whose design focuses on the most relevant options; this will enable the traveler to plan smoothly for a trip within a budget, thus eliminating the stress associated with manually linking them together and enhancing their overall confidence in their travel plans.

Another challenge in planning budget-friendly travel is that there is no comprehensive tool that merges budgeting insight into a single medium(Sharma et al., 2024). Most systems do not tend to have some fundamental features such as tracking expenses in real-time, forecasting one's budget, or offering travel advice based on their individual requirements and preferences. Apart from that, it often urges users to make use of more than just one platform, rendering the task more inefficient and stress. Another study highlights that most travel services fail to introduce the dimension of predictive analytics through machine learning to recommend customized plans according to individual inclinations regarding financial and personal aspects, which invariably introduces room for

error in decision-making (Sharma et al., 2024). In addition to that, "Personalized Travel Itinerary Recommender System" pointed out the need for technology that merges features like itinerary planning or cost estimation (Narendran et al., 2024). Failing technology, therefore, leaves users to carry out this process manually, therefore rendering it heavy to process while extremely suboptimal for planning as compared to utilizing advanced tools.

2.2. Web-Based Travel System

2.2.1. Role of Web-based Platforms in Travel Planning

Web-based platforms have fundamentally changed the way users go about trip planning through superior ease of access and use. It serves as an online participant, where services connected with travel are offered-from accommodation booking, choice of transportation methods to itinerary creation-in one central embolism. With this, there is no sifting through multiple webs or applications by a user, and thus considerable time is saved in handling tasks involving travel arrangements. For example, smart travel planning systems using algorithms of any type such as A-star are used for optimizing the route planning between cities (Xu & Mou, 2020). In this regard, these algorithms can provide the best travel routes based on users' preferences and restrictions. This not only simplifies the planning but provides users with the chance to find cheaper and quicker alternatives.

Furthermore, developments such as AI-built trip planners with immersive street view options have brought even more usability to these platforms (Siva Sankar et al., 2023). Users can sit back and enjoy a virtual exploration of destinations, looking at nearby attractions and checking out places of accommodation-all done in a single interface. This kind of experience is reassuring to users, who can make informed decisions about their plans. Other than that, such platforms frequently update about real-time data on climate, traffic, or upcoming events while traveling, ensuring users are receiving appropriate and pertinent information for their trips. It is with these dynamic and interactive features that web-based platforms not only ease the travel planning process but also add

value to the whole travel experience, making them indispensable assets of modern tourism.

2.2.2. Benefits of Web-Based Travel Systems

Web-based travel systems make the planning and decision-making process relatively simple by way of various advanced technologies and real-time information. It offers interactive tools such as travel recommendation systems, route optimizers, etc. to create personalized, cheaper, and relatively efficient travel plans(Bapat et al., 2022). This reduces the difficulty of planning trips and allows for the consideration of various factors including user preferences, constraints, and past travel behaviours. For instance, some have algorithms such as AI that make suggestions about the optimal path that considers the means of transport, cost, estimated travel time, and so on so users can have convenient and timely decisions (Bapat et al., 2022). The smartness of this function not only puts great convenience but gives allowance for a smoother planning experience that is more specific to individual needs.

Moreover, introducing personalized travel route-recommendation systems using Long Short-Term Memory (LSTM) models makes this ability even better (Tsai et al., 2023). By analysing user-generated data from social media platforms like posts, reviews, and location images, these systems provide meaningful and contextually relevant travel suggestions (Tsai et al., 2023). The data-driven way of catering travel plans that express users' interests offers itineraries that show maximum enjoyment and satisfaction. The real-time updates offered by them for aspects like the weather, local events, or changes in transportation schedules provide the icing on the cake to decision-making by informing users about disruptions or opportunities therein. The combination of sophisticated algorithms, real-time updates, and personalized recommendations has transformed web-based travel systems into powerful planning tools that simplify the whole traveling experience while ensuring efficiency and satisfaction to the users.

2.3.   Existing Travel Web Based Systems

2.3.1.   Traveloka

Southeast Asia travelers choose Traveloka (Traveloka Malaysia - Everyday Best Travel Deals!, n.d.) as their preferred booking destination because they can reserve all their necessary hotel rooms, flights and leisure activities together on a single platform. Users benefit most from this configuration because it enables them to organize all their travel planning in one convenient platform. Travellers with limited budgets should take advantage of Traveloka's popular discounts and package offers. Users who use the platform experience limited assistance with spending-specific recommendations because the platform functions with basic financial requirements. Users using Traveloka cannot benefit from Google Reviews because the platform excludes external rating systems which limits their comprehensive review options. A fundamental drawback of Traveloka exists in its absence of a "shopping cart" element since users struggle to manage their complete budget because they cannot unite multiple items before seeing an aggregate price. This proposed system can enhance users value through aggregated pricing and personalized budget recommendations while showing how discounts and service bundling at Traveloka positively affect customers.

2.3.2.   Booking.Com

(Booking.Com | Official Site | The Best Hotels, Flights, Car Rentals & Accommodations, n.d.)provides hotel rooms and apartments and diverse unique place-to-stay options. Users can choose hotel options based on services and location together with lodging types through Booking.com's simple interface. Booking.com poses limitations to its users who need to control their budgets. Users can perform cost filtering, but the vague categories limit the ability to discover precise budget-aligned recommendations. Travelers often end up paying increased amounts at checkout because their booking costs such as local taxes and service charges become clear only during this stage although they weren't obvious upfront. Since Booking.com blocks Google Reviews from their platform users must view reviews solely from the platform. Bookings do not support a shopping cart function which limits users from viewing the combined

costs of multiple reservations. The availability of understanding through Booking.com reveals that user-friendly interfaces and refined filters effectively work yet systems require additional clear pricing information and better budget recommendation precision to achieve better differentiation.

2.3.3. Airbnb

Airbnb (Airbnb | Vacation Rentals, Cabins, Beach Houses, & More, n.d.)allows users to connect with local hosts who present a wide range of house options extending to treehouses and villas along with standard apartments. Immersion and uniqueness stand as key characteristics which separate this platform from traditional booking systems. The budget constraints deter travellers from using Airbnb though the platform excels at hosting authentic local interactions. Limited budget users experience difficulties discovering their best accommodations because Airbnb provides only basic maximum price specification tools without advanced budget filters or customized recommendations. Every Airbnb listing follows different hosting standards so the quality and pricing differences may not present suitable options for budget management. The platform operates separate reviews without involving Google Reviews, so users only interact with Airbnb users. Without a shopping cart feature users cannot see combined prices of multiple accommodations or experiences during their travel program. Budget-conscious users stand to gain from this system because it enhances cost tracking capabilities and includes Google Reviews while Airbnb delivers exceptional personalized guest experiences and personalized service options.

2.3.4. Summary of Comparison Between Existing Travel Web Based System

An analysis of current travel systems appears in Table 2.1 to showcase their respective features and limitations. The comparison enables identifying improvement opportunities that direct both the development and enhancement of the TripTally system.

Table 2.1 Comparison between similar travel web-based system

Features	Traveloka	Booking.com	Airbnb
Accommodation Booking	Yes	Yes	Yes
Flights Booking	Yes	No	No
Local Activities	Yes	Limited	Limited
Budget Filtering	Basic	Broad Categories	Maximum price setting
Package Deals	Yes	No	No
Google Reviews Integration	No	No	No
Shopping Cart	No	No	No
User Interface	Overwhelming	User-friendly	Easy to navigate
Platform Availability	Android, iOS,Web	Android, iOS, Web	Android, iOS, Web

Advantages	The integration very convenience to users	User-friendly interface and has variety of accommodations	Easy to navigate

2.4. Example of Application Programming Interfaces

2.4.1. Google Review

Literature shows broad interest in Google Review as an influential platform because it shapes consumer interaction and travel decisions alongside brand recognition. The connected Google Maps features, Google Review as a central Electronic World of Mouth (E-WOM) platform for tourism prospects who can immediately review facilities and places and services (Wulandari et al., 2023). The significance of Google Reviews as fundamental E-WOM delivery tools because user-generated content strongly influences users' decision-making. Well-recognized positive evaluations that demonstrate excellent customer service or unique encounters make destinations more attractive because they build reliable connections between travel prospects (Wulandari et al., 2023).

For tourism-related businesses Google Reviews serve a dual purpose by providing feedback which service providers utilize to develop their products better. The essential data about user satisfaction together with preferences and complaints available through Google Reviews enables businesses to make direct client input responses and implement knowledgeable service improvements (Alam et al., 2024) . The interaction between customers who leave reviews plus management efforts to respond positively leads both to satisfied customers and improved reputations for businesses. The study by (Analysis on Review Data of Restaurants in Google Maps through Text Mining: Focusing on Sentiment Analysis, n.d.) shows that large numbers of Google reviews present a balanced review mix displaying favourable and unfavourable

remarks, so visitors receive unprejudiced reviews about places in the future. The researchers establish that users need to set appropriate expectations through various review resources to enhance their general happiness.

2.4.2. Google Maps API

The Google Maps API functions through integration feature sets and interactive location-based components to become a leading platform in travel applications. Travel applications show maps and discover spots and generate real-time route directions through the embedded Google Maps solution to enhance practical travel planning. User experiences benefit significantly from the Google Maps API's extensive location database that offers complete particulars about landmarks including dining options and accommodation facilities and transportation routes. The capability allows applications to simplify travel experiences by providing personalized location recommendations according to user preferences along with current distance data (Wahdiniwaty et al., 2019). Through its wide-ranging database the Google Maps API provides users detailed information about iconic locations together with path alternatives leading to improved navigation and informed choices. Real-time updates provided by the API give travellers essential access to current information vital for creating travel plans when they are on the road. The requirement of high bandwidth to obtain updated data and accurate maps poses problems specifically for users located in regions with weak internet connectivity (Vögt et al., 2023).

2.4.3. Google Street View

According to Meen (2019), Google Maps relies on Google Street View as its most crucial component. Through Google Street View users can explore destination views from different angles using its 360-degree panoramic mode. These panoramic 360-degree views available worldwide enhance the functional value of tourism sites. This technology uses visual data from streets and is continuously recorded through GPS and advanced imagery systems. The data is seamless integration of digital data produces virtual interactive worlds accessible worldwide to users all over the world. Users can use this function to

digitally explore destinations before planning their trips. Users obtain detailed distant examination through this feature which proves valuable for trip scheduling and property searching and academic research and conducting educational research. Through its machine learning operations, Street View enhances the quality of visual data collection.

Item recognition performance and image stitching operation benefits from this change which in turn improves the visual data quality. This cutting-edge technology provides precise, and the platform provides real-time visual information which can be accessed remotely to support diverse applications from disaster response to urban planning. On-site visits have decreased substantially consequently and data collection operations with drones eliminated the need for travel which removed costs during operation and delivered prompt results (Imadegawa et al., 2023).

2.5.   Existing Markup and Styling Language

2.5.1.   HTML

Web content creation and organization primarily happens through the standard coding language HTML. This language defines web pages through their fundamental blocks including headings and paragraphs along with links and images and forms. Web browsers show content with accuracy because HTML uses tags to group and describe page elements. Insights about headings come from tags while paragraphs derive their meaning from tags in HTML. Every web page needs an HTML design to organize structure and content.

2.5.2.   CSS

According to Adewumi et al. (2019) state that Cascading Style Sheets (CSS) function as a vital component of web applications. The stylesheet language CSS enables developers to define the presentation format of HTML elements together with their visual styling across web pages. The stylesheet language controls everything from visual appearance to layout structure to font selection and design spacing. Web developers create better structured and maintainable code through the CSS-HTML separation of design from content. Through select

functions HTML elements implement Cascading Style Sheets through property setting of values. Selective use of margin property controls how space surrounds elements while colour property modifies the text coloring functions. Web page aesthetics together with user experience reach peak improvement through CSS implementation. The major benefit from CSS arises from its ability to separate presentational elements from content components according to "separation of concerns" principles.

2.6. Database Software

2.6.1. MySQL

The database community views MySQL primarily through its status as Relational Database Management System (RDBMS) despite its position in the broader database framework. When applications need structures to manage their data and web applications exist MySQL is often selected. It is why many developers pick MySQL because this system applies SQL (organised Query Language) to handle relational data tables and execute queries for efficient data management (Taipalus, 2024). A key set of advantages for MySQL includes its medium application scalability as well as its strong community support features plus reputation for handling highly structured data. Transaction management together with ACID (Atomicity, Consistency, Isolation, Durability) compliance power MySQL's selection as a leading database solution enabling data integrity across simultaneous multiple process execution. MySQL stands out because it functions as an open-source system which provides firms significant cost savings against traditional paid solutions (Fink, n.d.). When MySQL tries to handle extensive transaction volumes and complex distributed frameworks it reveals its operating limitations (Taipalus, 2024). The operational architecture of MySQL maintains consistent efficiency for data-oriented applications and dependable computing environments like inventory management applications and trip budget platforms. Although simple and broadly adopted it remains friendly for users, yet complex distributed systems require enhancements or adaptations.

2.6.2. Microsoft SQL Server

The database management software Microsoft SQL Server which Microsoft built stands out due to its powerful data handling functions and solid reliability. Many businesses select this system when they need structed data management and basic integration with Microsoft software products. SQL Server keeps data organized through relational structures which operate under the Structured Query Language framework. The travel budgeting system benefits from relational database technology because it requires constant data storage to track budgets alongside spending plans. Through SQL Server Reporting Services (SSRS) and SQL Server Integration Services (SSIS) data transfer capabilities SQL Server delivers powerful reporting alongside efficient data transfer facilities. Such capabilities prove practical for business applications requiring heavy reporting tasks and complex data processing operations (Chesher, 2021).

2.6.3. Summary of Comparison between MySQL and Microsoft SQL Server

A summary of MySQL and Microsoft SQL Server comparison can be found in Table 2.2 which covers cost analysis along with integration, data management, security measures, setup complexity, market suitability, advantages, and disadvantages.

Table 2.2 Comparison between MySQL and Microsoft SQL Server

Features	MySQL	Microsoft SQL Server
Cost	Free	Paid and licence is needed
Integration	Works with variety of platforms	Only integrate on Microsoft products
Data Management	Good for medium-sized data requirements	Good for large and complex data requirements
Security	Basic security	Strong integrated security features
Setup complexity	Easier to set up	More complicated and needs specialised expertise
Suits For	Small to medium system	Large system

Advantages	Excellent for structured data and free	Has a strong data security
Disadvantages	Restricted for large, high-demand systems and lacks advanced security features	High cost, complex setup, may be too resource-intensive for smaller apps
Author	(Taipalus, 2024)	(Chesher, 2021)

2.7. Types of Operating System

2.7.1. Windows

The Windows operating system maintains popularity through its broad hardware and software compatibility which enables it to serve beginners and experts with ease. The system provides an intuitive interface which makes users handle their computers effectively. The wide software application range of Windows encompassing productivity tools and special programs elevates its widespread popularity(Adekotujo et al., 2020). Users benefit from this operating system because it provides excellent compatibility with third-party products and devices which enables operation of multiple connected instruments without essential performance compromises. Microsoft delivers periodic updates which improve system reliability through enhanced security and performance ensuring Windows maintains data protection compliance according to GDPR standards (Aridor et al., 2020). However, Windows has some disadvantages. Cyber-attacks along with malware commonly exploit vulnerabilities in Windows Microsystems. Windows operates resource

intensively which leads to deteriorating system performance when paired with aging hardware or minimal-spec equipped devices (Han & Anderson, 2021).

2.7.2. Android

Google developed Android which exists as a flexible platform that maintains broad usage among phones and tablets. Protection of source code enables product modification and application customization because developers can adapt it according to their business requirements. According to (An-Offline-And-Online-Based-Android-Application-Travelhelp-To-Assist-The-Travelers-Visually-And-Verbally-For-Outing_2, n.d.), Android features offline mapping functions together with GPS tracking and automatic real-time translation benefits specifically for the travel and tourism industry. The compatibility of Android includes supporting devices from basic smartphones through premium flagship phones which allows broad use access to its platform. Through its Google service integration developers can integrate Google Maps and Google Translate alongside other features which enhance user experience. The Android platform grants developers the ability to update apps without requiring substantial modifications to system infrastructure according to (Wahdiniwaty et al., 2019). The flexibility built into Android creates management issues that need to be addressed. The widespread adoption of Android by different devices with diverse screen sizes and resolutions and capabilities leads to substantial hardware fragmentation challenges.

2.8. Types of Programming Language

2.8.1. PHP

Afnarius et al. (2020) explain that PHP operates as a flexible server-side scripting language which assets numerous webs. The PHP system managed user requests through mosque data processing to automatically create web pages that helped Muslim visitors find up-to-date mosque service information during their Bukittinggi searches. PHP's Model-View-Controller (MVC) architecture that allows developers to fix application problems while also speeding up data

processing and user interface production and input management operations (Subari et al., 2021).

Multiple limitations exist within PHP beyond standard usage. PHP exhibits an interpretative functioning that produces efficiency problems which negatively affects web platform responsiveness particularly when handling extensive data collections or intricate computations as noted by (Subari et al., 2021). PHP becomes difficult to preserve when developers neglect proper management because its adaptability combined with ease-of-use results in unorganized code that creates maintenance issues at advanced application stages (Subari et al., 2021) . The failure to follow secure coding guidelines results in security vulnerabilities that create the potential risk of both SQL injection along with cross-site scripting attacks (Afnarius et al., 2020) .PHP maintains its position as one of the leading web development choices because it enjoys tremendous market penetration alongside extensive community backbone and database integration capabilities. The structural limitations in PHP can be overcome by developers building dependable user-friendly applications using PHP and by following strict coding practices to maximize their chosen language's capabilities which enable them to work on travel-oriented systems.

2.8.2. JavaScript

Web developers rely on JavaScript as a core developmental component which generates enhanced functionality and increased application interactivity (Afnarius et al., 2020) . JavaScript protected the GPWI web application from poor user experience by enabling real-time position tracking alongside interactive map features and continuous updates (Uzayr et al., 2019). The multiple uses of JavaScript including its ability to work with Node.js frameworks to include valuable dynamic features such as real-time flight tracking and route charting abilities. Through its asynchronous nature JavaScript allows effortless server connectivity which grants instant access to data and updates for users. The entire trip experience benefits from its

integration with third-party APIs which offer weather forecasting and mapping services.

Then, JavaScript presents additional challenges. Strong security protocols must be established to protect sensitive client data because security vulnerabilities are magnified when attackers target these systems most commonly through cross-site scripting attacks (bin Uzayr et al., 2019). Browser compatibility conflicts lead to application behaviour. Large-scale projects struggle to manage their complex JavaScript codebases primarily because code quality management and dependency preservation become essential. To compete effectively within the dynamic web development technology industry developers must track the quick advancements in JavaScript frameworks. With JavaScript strengths developers can develop exciting platforms which deliver optimal usability and functionality tailored for contemporary users.

2.9. Evaluated Testing

2.9.1. Usability Testing

The development of applications requires essential usability testing to understand user needs and preferences while research demonstrates application-specific findings. Through this testing methodology developers observe users during their application interaction to find out what difficulties or misconceptions arise. Research by Fun et al. (2021) argues that usability testing provides the means to find obstacles that create user experience problems. Through accurate observation developers obtain direction for improved innovations that adhere to user expectations and lead to enhanced satisfaction. The improvement of interfaces for navigation and functionality in mobile tourism applications would not be possible without usability testing. Testing helps developers make sure essential application features work properly for users who depend on travel-dependent apps while traveling. (Garcia-Lopez et al., 2021) . User testing reveals discovery disengagement and potential abandonment of the application due to confusing app features and complex navigation systems.

The ability to reach well-informed design choices for widespread apps becomes possible through usability testing where developers receive actual user interaction feedback. Through System Usability Scale (SUS) tools along with A/B testing methods developers can measure user satisfaction to identify interface preferences about navigation structure and color scheme choices. This research on usability testing in mapping applications demonstrates that such findings create substantial value when optimizing applications to serve diverse users(Siregar et al., n.d.). The existing constraints show that usability testing reaches its limitations. The process requires many resources because it needs testers who possess technical skills combined with real users who correctly implement usable solutions. The high cost of usability testing poses problems for small teams when paired with the need to conduct extensive application redesigns due to discovered fundamental functionality problems (Dahlan et al., 2022; Garcia-Lopez et al., 2021). Redesigns demand significant efforts because they require dedicated time to address applications featuring complex features and extensive data requirements.

2.10.   Chapter Summary

This chapter reviews relevant literature to describe this proposed system development through assessments of travel budgeting and industry problems and existing services such as Booking.com, Airbnb and Traveloka. This chapter examines how Google Maps API together with Google Reviews and MySQL and Microsoft SQL Server technologies will contribute to building functional travel programs. This proposed system intends to remedy the ongoing system fragmentation and inadequate budget planning capabilities of current systems according to the research. The chapter underscores the critical need for usability testing to develop a user-friendly experience which sets the foundation for this proposed system dynamic travel planning and budgeting system.

CHAPTER 3 : METHODOLOGY

The methodology describes how TripTally: Budgeting Travel System will be developed. The project uses the Waterfall Model as its primary methodology. It consists of a series of phases: requirement gathering and analysis, design, implementation, testing, and maintenance, wherein each phase needs to be finished before the next phase can begin, thus assuring an orderly and systematic approach. By using the Waterfall Model, this chapter will guide the reader in understanding how the TripTally system is developed stepwise in a clear and organized documentation process.

3.1. Overview of Waterfall Methodology

According to Rahmat et al. (2022), the Waterfall methodology is a traditional model of Software Development Life Cycle (SDLC) which deals sequentially and in a thorough manner with software development. This methodology prescribes separating the entire development process into distinct phases such as requirements analysis, design, implementation, testing and maintenance as illustrated in Figure 3.1. Each phase needs to be completed for the next one to begin so that all requirements and design permutations could be set at the very earliest possible stage. A linear model like Waterfall will have visible documentation, accessible milestone definitions, and established timeframes for predictable scenarios and therefore works well with projects when the requirements are well structured and stable. Whilst both authors reinforce that this method utilizes private discourses, detailed documentation, and utilization case trials altogether aimed to ensure that the final product extensively appeared to meet user needs and functional goals on a universal basis. For instance, this methodology in making systems like Online Travelling Planner offered that every aspect of user requirements was thoroughly and systematically attended to (Rahmat et al., 2022).

On the positive side, the Waterfall model is prone to failures in dynamic environments, where the incremental appearance of requirements may affect already-existing levels of project maturity. The revisiting of each preceding

stage once a phase has been completed leads to a rupture or breaking of the development flow. This methodology performs effectively on projects that stick to established objectives and limited scope revisions since it relentlessly focuses on extensive documentation together with thorough planning. The design process implements data flow diagrams together with flowcharts and entity-relationship diagrams that act as visual tools to understand system architecture effectively. By having clear requirements that need structured development processes then the Waterfall model creates essential documentation to deliver reliable software solutions for project activities success (Pargaonkar, 2023; Rahmat et al., 2022).
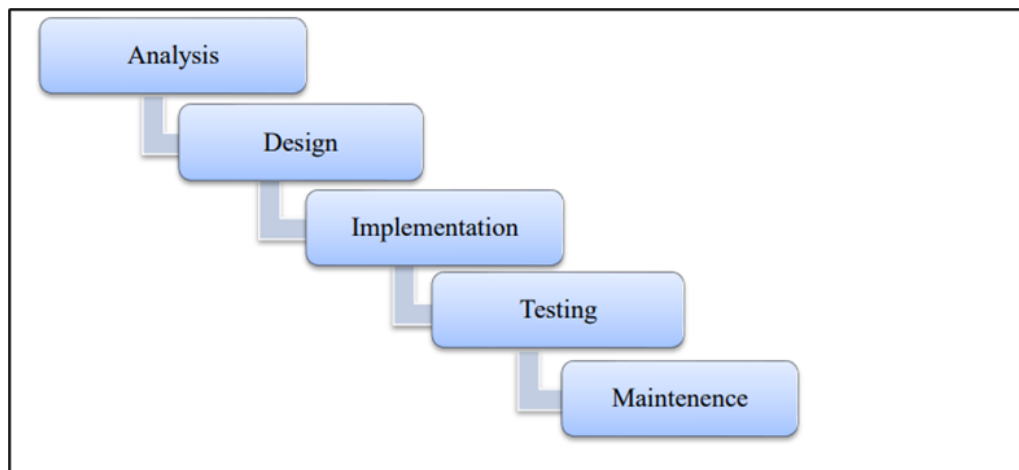
Figure 3.1 Waterfall Model (Source: Aroral, n.d.)

Table 3.1 provides details of the activities, deliverables, and objectives to perform in each phase of the Waterfall model as applied in the development of the TripTally system. The table clearly conveys systematic and organized efforts to ensure the success of the project-from identifying problems in travel planning through evaluating how well the system worked. Section 3.2 will describe every phase of the project in detail.

Table 3.1 Research Methodology Structure

PHASE	ACTIVITIES	DELIVERABLES	OBJECTIVES
Phase 1: Requirement gathering & analysis	1. Reviewing existing documentation. 2. Identify areas for improvement. 3. Analysis and prioritise requirement and information.	Literature review of existing system.	To identify the challenges experienced by users in the planning of trips due to information overload by using the existing travel platforms.
Phase 2: Design	1. Design system database with Crow's Foot Model in an Entity-Relationship Diagram (ERD). 2. Design flowchart. 3. Design Unified Modelling Language (UML). For example, activity diagram, use case diagram. 4. Design user interface.	1. ERD diagram 2. Flowchart diagram 3. Use case diagram 4. Activity diagram 5. User interface	To develop a centralized travel planning system that incorporates real-time budget tracking, user reviews, and location-based insights.
Phase 3: Implementation	1. Write coding in Visual Studio Code.	1. Development of TripTally system.	To develop a centralized travel planning system that incorporates real-

	2. Store data in Database Management System (DMBS) which is phpMyAdmin. 3. Fetch data from Google APIs such as Google Maps API, Google Places API.		time budget tracking, user reviews, and location-based insights.
Phase 4: Testing	Conduct testing with System Usability Scale (SUS) approach.	Gather user feedback.	To evaluate the effectiveness of TripTally system to improve user satisfaction, confidence, and decision efficiency through usability testing.
Phase 5: Maintenance	Do the maintenance	Evaluated project	To evaluate the effectiveness of TripTally system to improve user satisfaction, confidence, and decision efficiency through usability testing.

3.2. Activities of Waterfall Methodology for Web-Based Development

3.2.1. Requirement Gathering and Analysis

Requirement gathering and analysis is markedly important in developing a system, especially in the Waterfall methodology. This stage involves small but critical steps such as determining the needs of users with respect to the challenges faced during budget management. Feasibility studies have been deemed necessary to determine whether the project is in any manner feasible and achievable within the given limitations and restrictions in general (Al Fajar et al., 2022) . Also, the analysation and prioritization of requirements ensure that the project remains on-point regarding key issues affecting user experience while planning a trip and information overload. Existing system reviews help identify gaps to work upon for improvement (Hidayati & Sismadi, 2020). This process establishes the clear requirements set down to match the project goals and user needs. The purpose of this phase, by analysing weaknesses of current travel platforms, is to create a solution that works well and is easy to use. The structured approach of the Waterfall model ensures that each requirement gets proper attention before being incorporated into the solution for the traveler's own good (Hidayati & Sismadi, 2020). Besides, to ensure that critical features, such as a real-time budget tracking and simplification of trip planning are prioritized in the sense of directly solving user problems and increasing satisfaction (Al Fajar et al., 2022). This clarity provides a solid foundation for the next phases of development. In order to complete this phase, project hardware and software requirements also need to be defined.

3.2.1.1. Project Hardware and Software Requirements

The hardware and software requirements lay the determining base for the successful development as well as operation of the TripTally. These are basically the tools as well as the resources required for system development and testing. While hardware includes devices suitable for developmental tasks,

software incorporates code-building tools, management of databases, and integration with APIs. Table 3.2 and Table 3.3 provided more details for these requirements.

Table 3.2 Hardware Requirements

Hardware	Specification
Laptop	Processor - 12th Gen Intel(R) Core (TM) i5-12450H 2.00 GHz
	Memory – 512GB
	RAM - 12.0 GB
	Windows - Windows 11

Table 3.3 Software Requirements

Software	Description
Operating System	Windows 11 Home64-bit
Microsoft Word	To create the documentation and report of project
Draw.io	To design ERD diagram, flowchart diagram and activity diagram
Lucidchart	To design use case diagram
Visual Studio Code	To write and edit the code for developing the TripTally system

Laragon	A local development environment for running PHP and managing databases during development

3.2.1.2. List of Identified User Requirements

Table 3.4 explains the user requirements that has been identified to develop a great travel system that can enhance user satisfaction and user needs.

Table 3. 4 User Requirements

Requirement ID	Requirement Description
R1	The system must allow users to register an account using a valid email and password.
R2	The system must allow users to login with their registered email and password.
R3	After login, user must be able to view the homepage of the system.
R4	Users must be able to input travel details and search for hotels and attractions based on their budget and needs.
R5	Users can view detailed information about hotels and attractions including Google Street View, rating and reviews.
R6	Users can add the hotels and attractions to their cart.
R7	The system shall provide users with real time budget tracking, showing their current spending and remaining budget.

R8	Users will be notified with red color budget tracking when they exceed their budget limit.
R9	Users can leave reviews and rating for hotels and attractions after their travel.
R10	The system shall integrate the Google Maps, Google Street View, Google Review for users getting better information.

3.2.1.3. Software Requirements Specifications (SRS)

Table 3.5 and 3.6 provided the functional and non-functional requirements of the TripTally system.

Table 3. 5 Functional Requirements

Functional Requirements	Requirements Description
Register Account	The system must allow users to create an account, log in with an email and password, and reset the password using their registered email.
Login Account	The system must allow users to login with their registered account using email and password.
View Homepage	The system shall allow users to access the homepage after successfully login into the system.

Search and View Hotels & Attractions	The system shall allow users to search for hotels and attractions based on their budget and preferences.
View Hotels and Attractions Details	Users must be able to access detailed information, including price, reviews and location-based insights from Google Maps and Google Street View.
Budget Tracking	The system must track users' spending in real-time and display alerts if the budget limit is exceeded.
Cart Management	Users can add hotels and attractions to their cart.
Leave Reviews	Users can leave and update reviews for hotels and attractions after their trips.
Update Account Settings	Users can update their information, including password and name.
Logout	The system must allow users and admin to securely log out of the system.

Table 3. 6 Non- Functional Requirements

Non- Functional Requirements	Requirements Description
Usability Requirements	The system has a simple and intuitive user interface (UI) to ensure easy

	navigation and user-friendly trip planning.
Security Requirements	The system implements strong security measures, including data encryption, to protect user data especially during password recovery process.
Performance Requirements	The system should be optimized for fast response times, even during peak usage.
Reliability Requirements	The system shall maintain high availability with minimal downtime

3.2.2. Design

The design phase follows requirement analysis and hardware and software identification. The design phase requires technicians to develop diagrams functioning as development blueprints for the TripTally system. These architectural plans serve to illuminate the system function while providing structure that ensures everything is properly prepared for development commencement. During this design phase, an Entity-Relationship Diagram (ERD) been created for database structure visualization along with activity diagrams for system workflow understanding and use case diagrams for user-admin system interaction depiction and flowcharts for feature step explanations. During development the essential diagrams serve as guides to steer the framework while assuring that the system operates according to the design blueprint.

3.2.2.1.   Flowchart
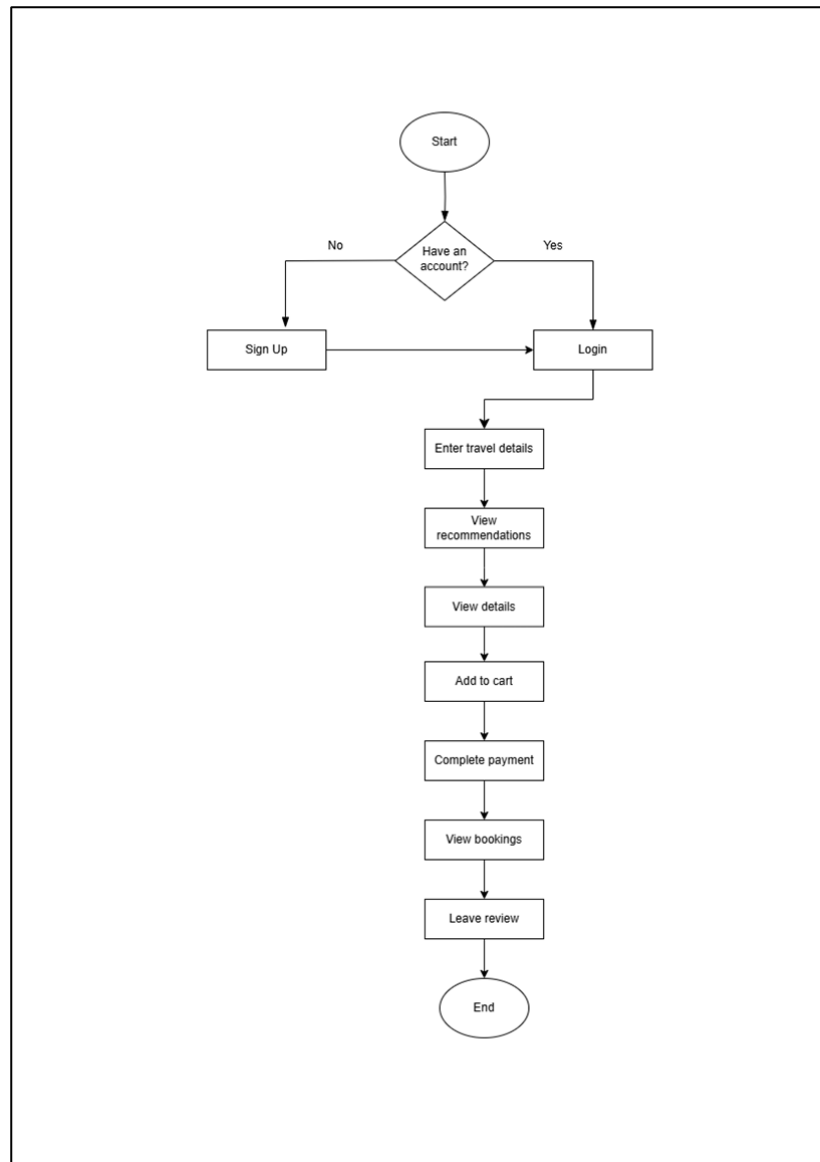
Figure 3.2 User's Flowchart

Figure 3.2 shows the TripTally system flowchart of the user journey through each functional step during program usage. The process begins at the starting point then directs users to assess their presence in the system through a decision node. The application sends users to join a new account if they lack one previously. The system directs users who already have existing accounts to perform the login procedure. Users with successful logins or accounts proceeding can enter travel information comprising their chosen destination along with dates and budget details. The system accepts input then presents customized travel suggestions based on the received details. Following the

recommendation visualization the user can expand details for various hotels and attractions with review insights in addition to both Google Maps location mapping and virtual experiences using Google Street View. Users who discover suitable options will move them into their shopping cart. After completing their selections, the user goes forward with the payment process. Lastly, users may leave reviews regarding their recent experiences for hotels and attractions they booked. The user interaction stops at the end point marking this journey through the system's structure.
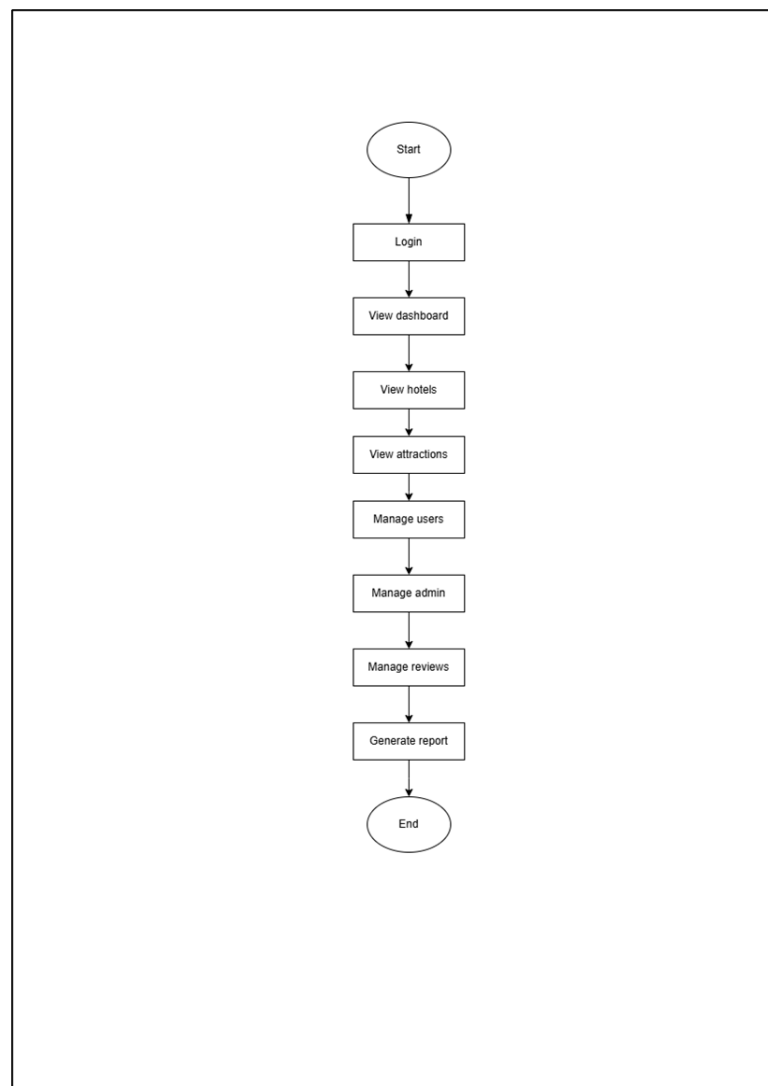
Figure 3.3 Admin's Flowchart

Figure 3.3 describes the flowchart of how the admin of the TripTally system conducts their management duties according to step-by-step procedures. After admin was logging into the system, admin can view the dashboard that shows an overview of system activities with added insights. When accessing the dashboard interface, the admin can initiate multiple system operations. Admin can view full hotel details alongside attractions' descriptions to verify ongoing accuracy of system content. User management enables admins to create new accounts alongside maintaining existing profiles through essential edits as well as user removal actions. The system security of access control is supported by admin account management functions that enable admins to take measures for proper access control. The admin can manage user contributions by editing or deleting any unsuitable content which maintains high-quality feedback across the platform. The admin can generate a report such as total sales by month and number of bookings. System interaction between the admin concludes when the process completes at the end node.

3.2.2.2. Entity Relationship Diagram(ERD)
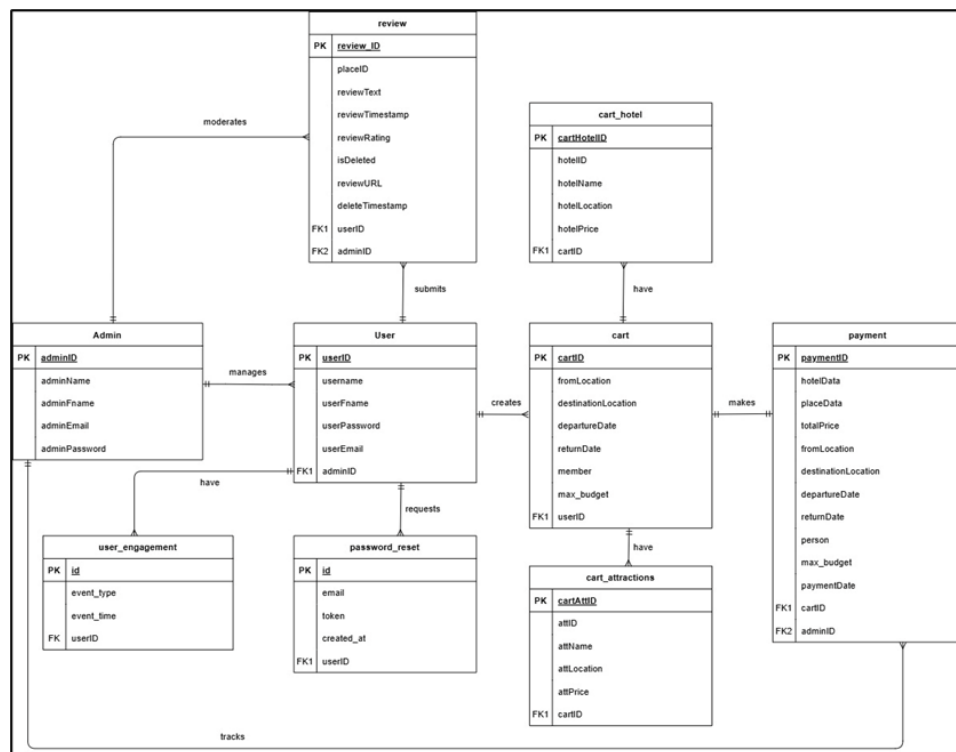
Figure 3.4 Entity Relationship Diagram(ERD)

Figure 3.4 shows the TripTally system's database structure is visualized by this ERD (Entity-Relationship Diagram) which demonstrates how application entities interact with one another. The fundamental data storage unit is user because it contains vital information about registered members while using their unique identifier 'userID'. Through the adminID foreign key, the admin entity connects to the system for managing user access and conducting review moderation. The cart entity functions as a travel planning interface for storing user-added hotels and attractions. This nexus of entities allows the application to process booking data through the cart_hotel and cart_attractions tables while storing comprehensive booking information details. Both cart and admin maintain connections with the payment entity that tracks user payments concerning selection representation. This association ensures proper payment management methods. The review entity records user feedback on hotel and attraction which connect to users that performed the feedback while the admin functions as observation point. Simultaneously, user_engagement records user system activities including sign-ins and site visits for complete performance monitoring. The password_reset entity allows users to recover their accounts by maintaining their associated tokens as well as timestamps. This ERD demonstrates how TripTally stores its entities for users and admin operations and travel planning and payments and reviews in a way that upholds efficient relationships among all entities to deliver a smooth user journey.
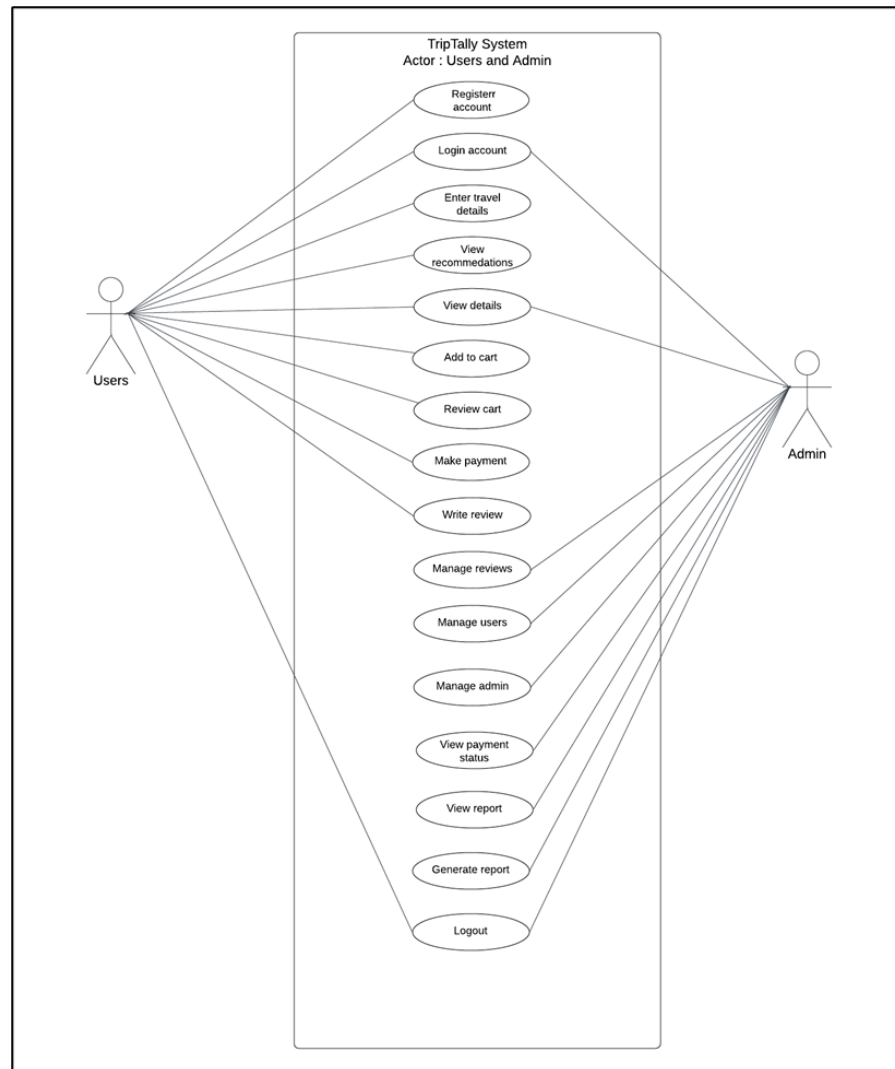
Figure 3.5 Use Case Diagram

Figure 3.5 illustrates the use case diagram for the "TripTally System", the interactions between two main actors: users and admin. Users access features which enable them to maintain an account and log in while entering their travel information to receive customized recommendations and complete their payments. Users of the system can get detailed hotel and attraction info while they add items to their cart and can review their purchases before finishing payments. Users can provide travel experience feedback about their trip's experiences for hotels and attractions they booked, and they can logout. Usability ranges from user management tasks to review administration through admin roles which enable system managing capabilities. The payment status

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overview together with reporting capabilities and sales and user engagement metrics are accessible to system administrators. Each actor in the TripTally system has unique access points into operations which are depicted in the diagram together with their shared task areas to display how the system works.

3.2.2.4. Activity Diagram
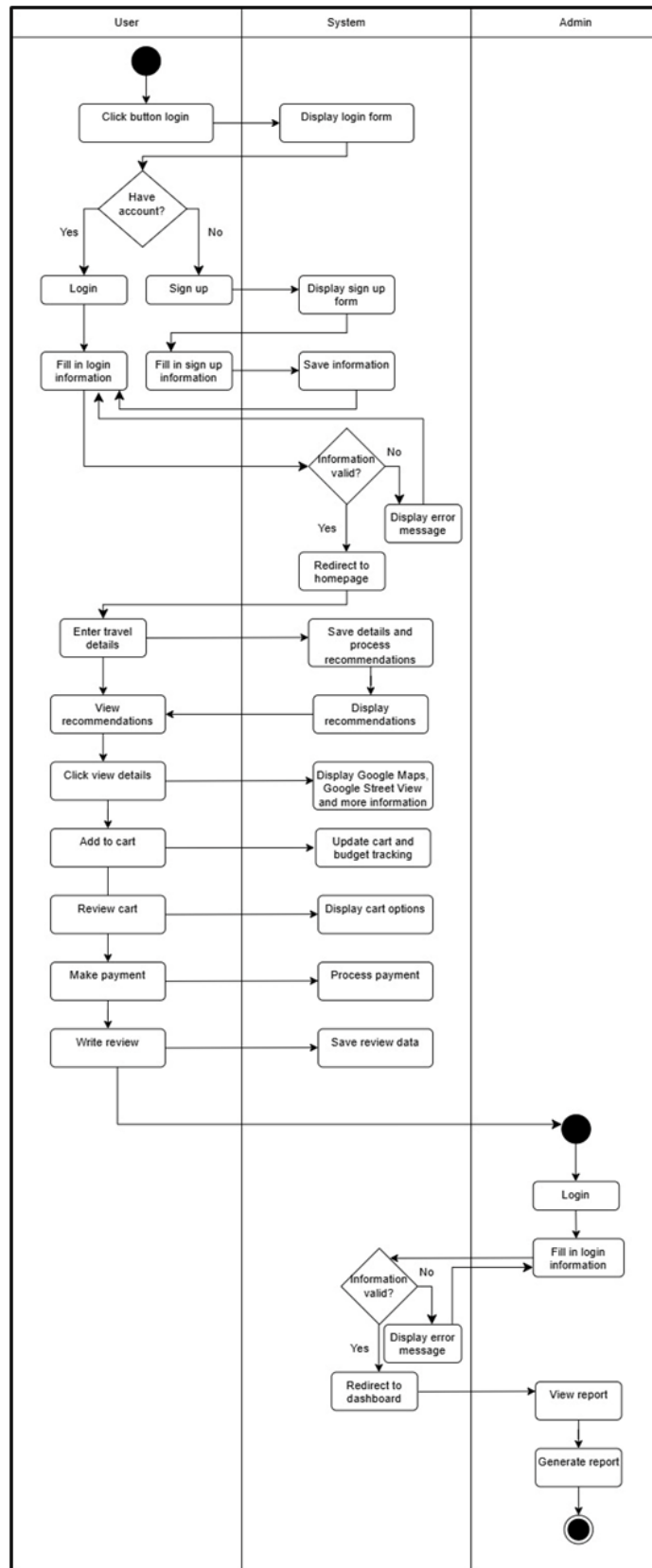
Figure 3.6 Activity Diagram

Figure 3.6 shows the activity diagram for interaction between users, admin and system in the TripTally system. User action starts when they click the login button on the system. System lets existing users access their account through login but allows new users to create their profiles by entering necessary account information. When the system verifies users' data it either returns them to the homepage following successful validation or shows an error notice when input verifies incorrectly. Users access the system through their login credentials to enter destination information and budget parameters which triggers system-generated recommendations. Users have access to view hotel and attraction details which include Google Maps, Google Review and Street View features. Users can add their options to a cart before examining their choices through a payment process. For users who finish their payment they can create reviews through the system that automatically saves their input. The administration section starts when users connect and verify their login information. Once administrators successfully authenticate, they can simulate reports and produce extensive summary data representing system activities as well as bookings and multiple statistical records. Through activity diagrams the system displays how actors connect with the system to facilitate smooth operational sequences between them.

3.2.3. Implementation

The execution of TripTally development happens during this implementation phase. The development includes frontend and backend applications along with APIs and database components in this implementation phase. The code is done systematically to make sure that this system functions as intended.

I. Visual Studio Code (Users and Admin Website Development)
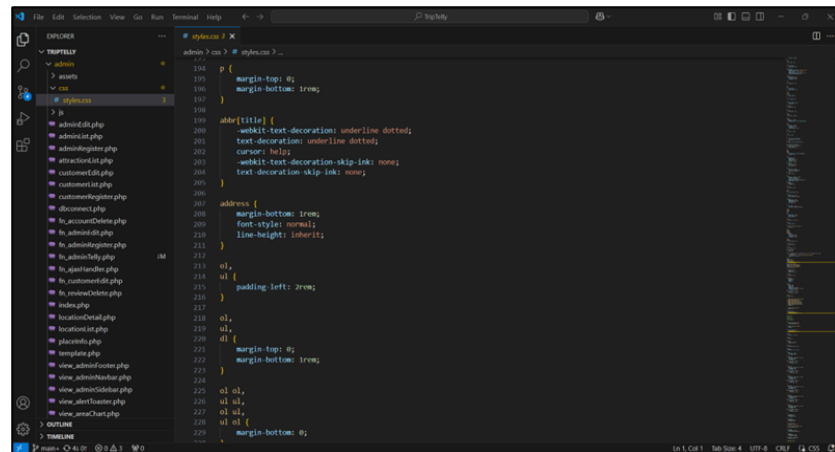
Figure 3.7 Coding Front-end Development

Both users and admin interfaces within the TripTally system utilize front-end development in the Visual Studio Code (VS Code) environment for implementation as shown in Figure 3.7. The interface design by front-end combines user-friendly design with visual appeal together with responsiveness for premium user experience. HTML delivers the front-end structure that arranges web page content while providing logical organization to ensure users can access important information. CSS and its visual design features enable to add consistent colors and typography while designing layouts that yield a professional polished appearance. The programming language JavaScript delivers interactive capabilities to websites through its features which include dynamic content updates form validations and navigation menus. These technologies together enable the front-end to offer users and administrators both an easy interface and an aesthetically appealing surface that encourages system interaction. Through VS Code's capabilities including live preview and debugging users can verify that their design and functionality quality reaches industry standards which creates smooth efficient interfaces.
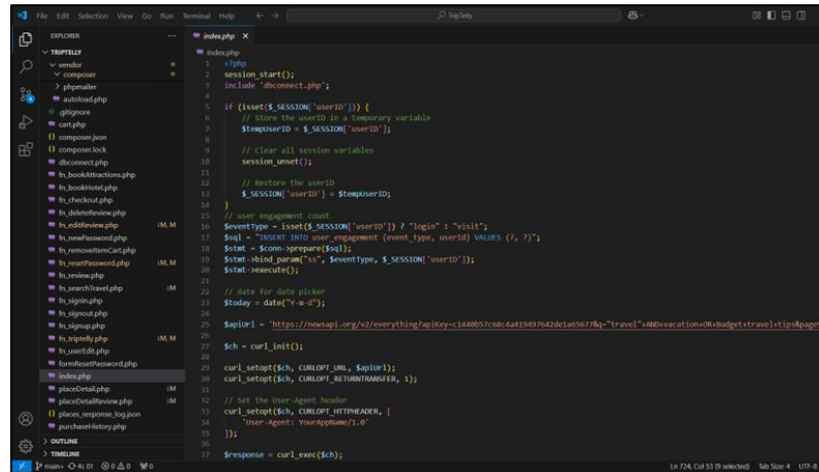
Figure 3.8 Coding Backend Development

Figure 3.8 demonstrates a PHP document displayed within Visual Studio Code editor to show backend development of TripTally. The backend of the TripTally system depends on PHP for two main functions: session handling and server-side logical execution and MySQL database communication through PhpMyAdmin. The system uses this setup to preserve both data security along with dynamic system operation. The backend application employs PHP to accomplish both visitor activity monitoring and database operation management and external API connectivity purposes. The TripTally system relies on this script to handle secure saving and update functions and retrieval methods for its data. The system processes user interactions efficiently through the combination of PHP to support core backend operations and deliver travel-related content reliably and with responsiveness.

II.   Laragon (Backend Server Setup)
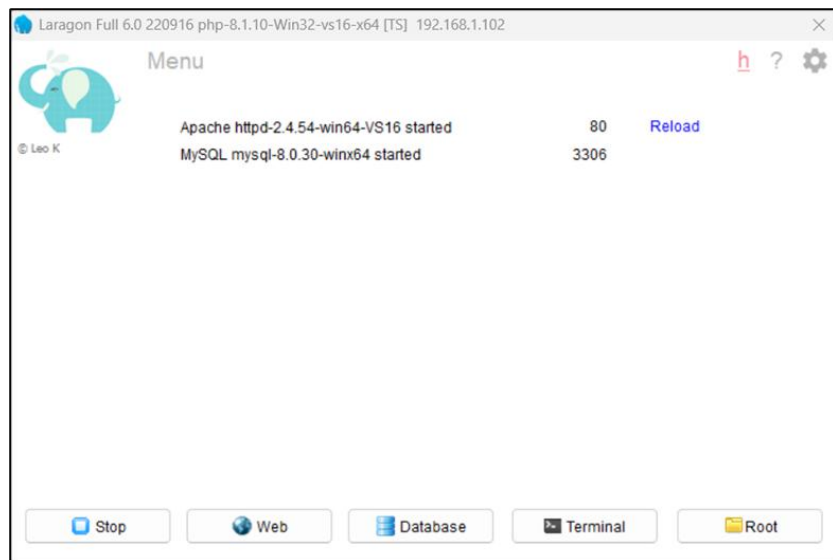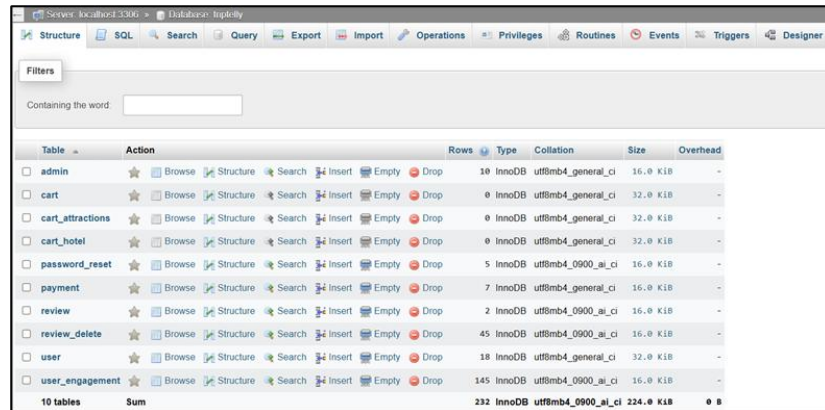
Figure 3.9 Laragon Server

Figure 3.9 demonstrates the Laragon control panel that enables TripTally system backend server management. Through its user-friendly interface Laragon enables quick operation of fundamental service nodes including Apache as a web server and MySQL functioning as a database management system. The relational connection pairs the HTTP request handling component to Apache then forwards database storage to MySQL for the TripTally system. The Laragon system provides users with convenient control tools that help to start, stop and control services enabling a reliable application development and running process. Through an easy-to-use interface developers get fast access to essential tools for database management and terminal sessions plus additional server operation elements transforming this platform into a practical solution for building backend systems. When developed using Laragon the TripTally system results in dependable platform performance and optimized data management capabilities.

III. PhpMyAdmin (Database Management)

Figure 3.10 Database Management

Figure 3.10 presents a phpMyAdmin interface managing database management activities on the TripTally system's MySQL database. The graphical user interface of phpMyAdmin simplifies user operations like database table browsing while allowing SQL query execution and record management. The database contains many core tables including the admin and user sections alongside cart and payment entries besides the review entity. These tables act as critical elements for managing system data organization. The TripTally system includes different tables built for individual purposes including user details management and payment tracking and review storage. The TripTally system benefits from phpMyAdmin's user-friendly database management that creates efficient handling of operational tasks.

IV. Budget Filtering for Hotels and Attractions


```
$hotels[] = [
    'name' => $place['name'],
    'place_id' => $place['place_id'],
    'address' => $place['vicinity'] ?? 'test',
    'rating' => $place['rating'] ?? 'N/A',
    'price' => generateHotelPrice($max_budget),
    'user_ratings_total' => $place['user_ratings_total'] ?? 0,
    'photo_url' => $photoUrl
];
```

Figure 3.11 Hotel Search's Code Logic

```
$attractions[] = [
    'name' => $place['name'],
    'place_id' => $place['place_id'],
    'address' => $place['vicinity'] ?? 'N/A',
    'rating' => $place['rating'] ?? 'N/A',
    'price' => generateAttractionPrice($max_budget),
    'user_ratings_total' => $place['user_ratings_total'] ?? 0,
    'photo_url' => $photoUrl // Add the photo URL to the array
];
```

Figure 3.12 Attractions Search's Code Logic

The functionality of TripTally system through enables users to search available hotels and attractions within their accepted budget limit. The code logic for user budget based on hotel search appears in Figure 3.11. Hotel prices are dynamically computed through the generateHotelPrice () function within the system. The system maintains recommendations that fully adhere to user-defined financial limitations by presenting hotels within budgetary levels. The system extracts vital information about hotel names and addresses ratings and user reviews while displaying this information in a user-friendly and organized format. Similarly, the code logic behind attraction filtering appears in Figure 3.12. The budget-based rule in generateAttractionPrice () ensures attractions within the price specifications specified by users. Furthermore, the system retrieves detailed information about attractions such as their names together with addresses along with ratings and user reviews to deliver a great experience budget-friendly process. The system incorporates budget tracking across recommendations as its main objective is to personalize travel suggestions that improve user satisfaction.

V.   **API Key Identification**

```
// $apiKey = 'AIzaSyBpHdMS0pMIrrjewOeEpo5z-ykG0FMYbiQ';
$apiKey = googleApiKey();
```

Figure 3.13 API Key

Figure 3.13 shows the code line assigns a Google API key needed to unlock access to Maps and Geocoding and Places Application Programming Interface (API) usage. The function googleApiKey() retrieves the API key through secure means from an alternate location

such as database or configuration file. The security seal arises through this method by protecting the key from direct code exposure. Through the API key, TripTally system enables features which consist of location data retrieval together with mapping integration and street view display. Through its implementation of the key the application retrieves server data and services from Google which results in dynamic travel recommendations. Mapping interactivity and location information alongside visual enhancements represent vital parts of this integration therefore improving user engagement.

VI.   API Integration for Hotels and Attractions


```
$placesUrl = "https://maps.googleapis.com/maps/api/place/nearbysearch/json?location=$latitude,$longitude&radius=$radius&type=$type

// Make the API request for nearby places
$placesResponse = file_get_contents($placesUrl);

if ($placesResponse === FALSE) {
    die("Error occurred while fetching data from Google Places API");
}

$placesData = json_decode($placesResponse, true);

if (!empty($placesData['results'])) {
    // Initialize an array to store hotel details
    $hotels = [];

    foreach ($placesData['results'] as $place) {
        $photoUrl = null; // Default to null if no photos are available
        if (!empty($place['photos'][0]['photo_reference'])) {
            $photoReference = $place['photos'][0]['photo_reference'];
            $photoUrl = "https://maps.googleapis.com/maps/api/place/photo?maxwidth=400&photoreference=$photoReference&key=$apiKey"
        }
        $hotels[] = [
            'name' => $place['name'],
            'place_id' => $place['place_id'],
            'address' => $place['vicinity'] ?? 'test',
            'rating' => $place['rating'] ?? 'N/A',
            'price' => generateHotelPrice($max_budget),
            'user_ratings_total' => $place['user_ratings_total'] ?? 0,
            'photo_url' => $photoUrl
        ];
```

Figure 3.14 Code Logic Fetching Nearest Hotels


```
$attractionPlacesUrl = "https://maps.googleapis.com/maps/api/place/nearbysearch/json?location=$latitude,$longitude&radius=$radiu
$attractionPlacesResponse = file_get_contents($attractionPlacesUrl);

if ($attractionPlacesResponse === FALSE) {
    die("Error occurred while fetching data from Google Places API");
}

$attractionPlacesData = json_decode($attractionPlacesResponse, true);

if (!empty($attractionPlacesData['results'])) {
    $attractions = [];
    foreach ($attractionPlacesData['results'] as $place) {
        $photoUrl = null; // Default to null if no photos are available
        if (!empty($place['photos'][0]['photo_reference'])) {
            $photoReference = $place['photos'][0]['photo_reference'];
            $photoUrl = "https://maps.googleapis.com/maps/api/place/photo?maxwidth=400&photoreference=$photoReference&key=$apiKe
        }

        $attractions[] = [
            'name' => $place['name'],
            'place_id' => $place['place_id'],
            'address' => $place['vicinity'] ?? 'N/A',
            'rating' => $place['rating'] ?? 'N/A',
            'price' => generateAttractionPrice($max_budget),
            'user_ratings_total' => $place['user_ratings_total'] ?? 0,
            'photo_url' => $photoUrl // Add the photo URL to the array
        ];
```

Figure 3.15 Code Logic Fetching Nearest Attractions

Both hotels and attractions depend on the Google Places API to power their recommendation system through their functionality. The system

fetches destination latitude and longitude from the Google Geocoding API to find local hotels and attractions as visible in Figures 3.14 and 3.15. The hotel recommendation API retrieves results through location-based filters which target lodging types across a 50 km radius around user locations. For attractions, the API filters for specific categories such as museum, tourist_attraction, or point_of_interest. This integration both breaks down essential details which include names and addresses and ratings to generate visual image URLs. Users need complete information at their disposal to make informed decisions. Both hotel_data and attraction_data data sets are saved in session variables ($_SESSION['hotel_data'] and $_SESSION['attraction_data']) to enable smooth transitions from search to results pages. The website uses live API data to provide specific recommendations which match each user's tastes and financial needs.

VII. Google Maps and Google Street View Integration


```
<div class="map-container w-100 mb-3">
    <iframe loading="lazy" allowfullscreen referrerpolicy="no-referrer-when-downgrade"
        style="height: 350px"
        src="https://www.google.com/maps/embed/v1/place?key=<?= $apiKey ?>&q=place_id:<?= htmlspecialchars($placeID) ?>">
    </iframe>
</div>
<div class="street-container w-100">
    <div id="street-view" style="width: 100%; height: 350px;"></div>
</div>
```

Figure 3.16 Google Maps and Google Street View's Integration

The above Figure 3.16 explains the code integration of Google Maps along with Street View features that enable TripTally users to view their selected locations, hotels or attractions. The `<iframe>` element generates a Google Map through its `place_id` input which includes the API key to display precise hotel and attraction positions. The htmlspecialchars($placeID) ensures both safety and security of the input data. Users can access Street View features from the div tag with id="street-view" to observe the local surroundings through a virtual view. The system provides visual mapping features which give users improved location knowledge enabling more reliable and interactive trip preparation.

VIII.   Password Reset Process

```html
<div class="input-box">
    <input type="text" name="email" placeholder="Enter your email" required>
</div>
<div class="input-box button">
    <input type="submit" value="Send Email">
</div>
```

Figure 3.17 Form Reset Password

Figure 3.17 shows the user interface which lets users kickstart the password reset procedure through their email entry. The user interface presents an email input section together with a "Send Email" submit button. Users can send emails by completing the form which then moves the emails to the backend for validation. Users can open the password reset process through this key code.

```php
<?php
// Display success message if it exists
if (isset($_SESSION['successMsg'])) {
    echo '<div class="alert alert-success alert-dismissible fade show" role="alert">'
        . $_SESSION['successMsg'] .
        '<button type="button" class="btn-close" data-bs-dismiss="alert" aria-label="Close"></button>
    </div>';
    unset($_SESSION['successMsg']); // Clear the message after displaying
}
if (isset($_SESSION['errorMsg'])) {
    echo '<div class="alert alert-danger alert-dismissible fade show" role="alert">'
        . $_SESSION['errorMsg'] .
        '<button type="button" class="btn-close" data-bs-dismiss="alert" aria-label="Close"></button>
    </div>';
    unset($_SESSION['errorMsg']); // Clear the message after displaying
}
?>
```

Figure 3.18 Code Logic Notification Message

This code demonstrates how notification messages update after users request to reset their password. Based on backend systems an interaction page shows feedback information to users about the status of email sending along with alerts for errors related to incorrect emails. Figure 3.18 contains the key code required for managing these messages. With this code, users automatically get real-time feedback which leads to better system usability and enhanced transparency.

Figure 3.19 Password Reset Request

The Figure 3.19 presents the PHPMailer-enabled backend implementation for password reset email functionality. Upon user submission of their email address the system validates its authenticity before creating a secure token. A password reset message with the token embedded as a link travel to the user's email address. The pivotal part of code consists of SMTP authentication security which enables the transfer of reset instructions to users in a secure manner.

Figure 3.20 Tokens Recovery Password

This Figure 3.20 presents the system protocol for verifying tokens included in recovery emails. The backend system verifies both the database-based presence and current validity of the token before processing any requests (freshness period = 15 minutes). The system verifies only acceptable tokens that have not expired during the password reset operation which increases security measures.

3.2.4. Testing

The testing phase of the TripTally system demonstrates that the system fulfils its specification requirements and operates precisely as designed. Testing will be conducted using laptop devices and the System Usability Scale (SUS) approach. Supervisor, students, siblings and friends from programming background will conduct the evaluation process. The objective for testing phase is to validate system usability, functionality and system performance to confirm the system delivered according to user needs. Below are the results of the testing phase:

I.   Register\Login Function:

Figure 3. 21 Password Requirements

This Figure 3.21 shows a test of registration functionality using an incorrect password entry. Users viewing an invalid password attempt get a red notification from the system because their password entry fails to satisfy security parameters. The password validation mechanism ensures proper functionality by asking users to develop more secure passwords. Testing showed that the systems correctly display error messages under incorrect input conditions.

Figure 3.22 Strong Password

Figure 3.22 shows the testing phase for the registration page with an accurate password generated. The system validates passwords correctly when entered and alerts users through a "Strong password!" message displayed in green. The test verifies that the system validates secure passwords which enables users to continue their registration. The system functionality testing checked additional features which comprise password visibility and accepting terms of service to confirm proper functioning.

Figure 3.23 Sign-in Process

The Figure 3.23 represents testing the sign-in process against the successful completion of user registration. Registered users must use the login page to input their email and password. Testing completed to validate the system enables registered users to authenticate their login successfully. Additional testing proved the accessibility of the "Show Password" option alongside the functional assessment of navigation

elements including "Sign Up Now" and "Reset Password." The functionality of user login with its interactive capabilities is evaluated through this test.

II. Forgot Password Function

Figure 3. 24 Email for Password Recovery
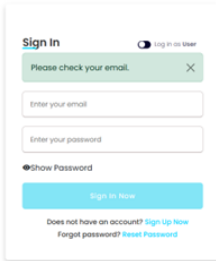
Figure 3. 25 Password Reset Delivering Processing

Figure 3.24 and Figure 3.25 show the password reset functionality of the system. The reset password process starts when users put their registered email address into the reset password form which appears as Figure 3.24 shows. After submission the system automatically delivers a password reset email to the email address supplied during registration as shown in Figure 3.25. The email delivers a protected link which steers users to execute the reset password procedure. The password reset facility protects both account security and sensitive information because it operates exclusively for authorized account owners.
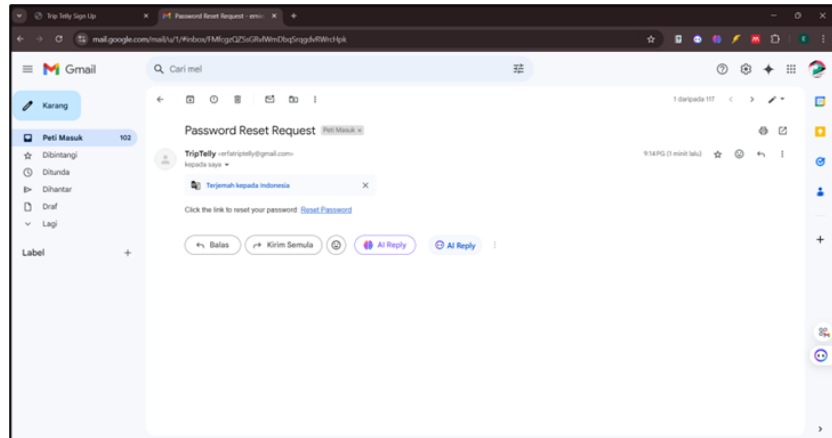
Figure 3.26 Password Recovery through Registered Email

As shown in this Figure 3.26 the user receives an email containing a password reset link after making their request. Through the link the email sends users directly to the password reset interface. The identification process function ensures both user identity and account protection through this stage.
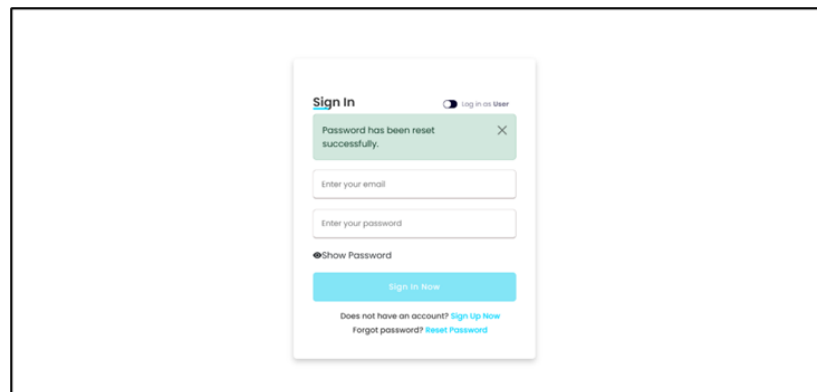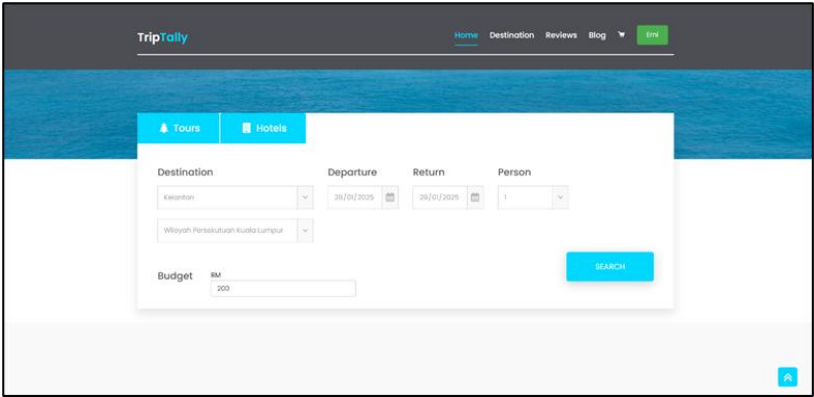
Figure 3.27 Password Reset Successfully

Figure 3.27 displays after users reset their password successfully, the system presents this notification message to them. After the password change, users receive notification that the update was successful, and they can use the new password to access their account. A success message appears which demonstrates the process has been successfully executed.

Figure 3.28 Travel Details Interface
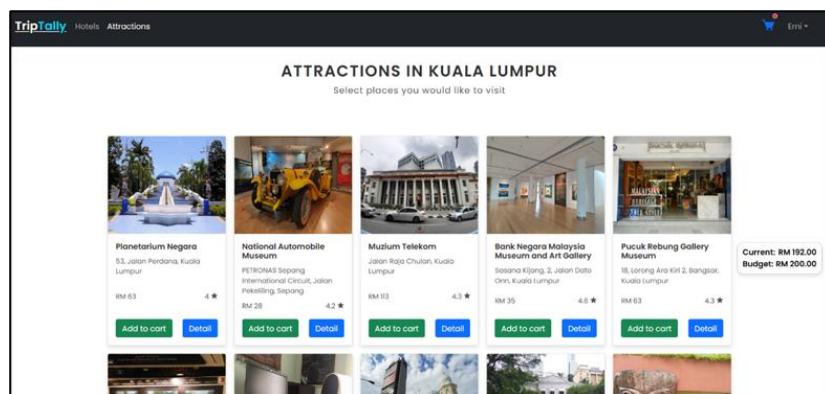
Figure 3.29 Attractions List Interface

The testing process evaluated the search capabilities along with the budget filtering features of the TripTally system. Users can enter travel information into Figure 3.28 before initiating their search by clicking "Search." The system can generate personalized recommendations by effectively receiving precise user data. As displayed in Figure 3.29 the result page shows Kuala Lumpur attractions which align with user preferences and financial limits. The interface displays the current user spending amount and available budget to assist effective trip planning. Tests confirmed that the system provides precise along with user-friendly budget-driven recommendations.

IV. Budget Tracking Function:
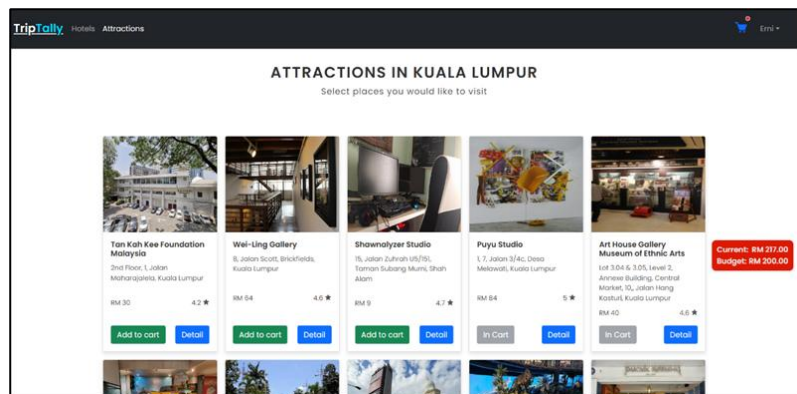
Figure 3.30 Budget Tracking

The Figure 3.30 shows how the budget tracking feature works on the attractions selection page within TripTally system's interface. The "Current" spending total changes in real-time while users put attractions into their cart to keep track of expenses relative to their budget total. Users can add attractions to their cart beyond their budget, yet the system displays red indicators in the "Current" budget section. Users receive real-time alerts through the system to maintain financial awareness during activity planning without compromising their flexibility for selecting attractions. The system functionality underwent testing to both confirm its total calculation precision and its right execution of alert displays.

3.2.4.1.   System Usability Scale (SUS)

System Usability Scale (SUS) represents a popular instrument for assessing screen usability across websites, software applications and other service interfaces. The survey contains 10 statements measured by a five-point type scale which users rate on a scale from "Strongly Disagree" to "Strongly Agree." Users achieve quick reliable usability assessments through this scale which

reveals system effectiveness and efficiency alongside satisfaction evaluations. The SUS remains among the most used tools in usability testing due to its demonstrated power to diagnose usability problems and enhance system designs throughout diverse industries. SUS provides quantitative assessment for user satisfaction evaluation while detecting design weaknesses in systems (2019 International Seminar on Research of Information Technology and Intelligent Systems (ISRITI), 2019). This project used SUS to obtain significant feedback on system functionality for optimizing user experience elements. A SUS questionnaire uses the following questions:

1. I think that the TripTally system helps reduce challenges in trip planning compared to existing systems.
2. I found TripTally system unnecessarily complex to use for planning trips.
3. I thought the TripTally system was easy to use for planning and managing travel.
4. I think I would need the support of a technical person to fully utilize the system's features.
5. I found the real time budget tracking, user reviews and location-based insights to be well integrated.
6. I thought there was too much inconsistency in how the TripTally handled planning features.
7. I would imagine that most users would learn to use this system quickly and effectively.
8. I found the TripTally system cumbersome to use for managing trip budgets and insights.
9. I felt confident in using the TripTally system to plan and organize my trip.
10. I believe I would need to learn a lot of things before I could start effectively using this TripTally system.

3.2.5. Maintenance

The maintenance phase serves as an indispensable component of the system development lifecycle to preserve the system's dependability along with performance and user need compliance. System functionality and user satisfaction remain active through prompt solutions for reported user issues during this phase of maintenance. The system receives periodic updates to refine features while increasing security standards and achieving optimal performance thus enabling users to benefit from both enhanced capabilities and modern system capabilities. The system benefits from constructive user feedback obtained through testing and deployment cycles as organizations enhance its functionality and operational capability. The system's sustainability during the maintenance phase depends on dedicated efforts to achieve continuous advancement together with system stability and user-friendly performance.

3.3. Gantt Chart
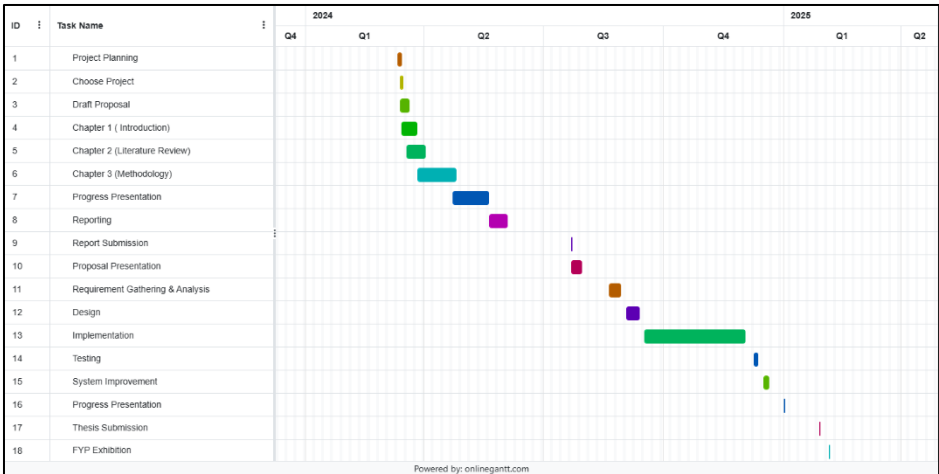
Figure 3.31Gantt Chart

The Gantt chart in figure shows project completion duration running from late 2024 through to mid-2025. Project planning and topic selection along with

proposal drafting occur during the fourth quarter of 2024. The research component with writing from Chapters 1 to 3 occurs at the beginning of 2025 followed by progress presentations followed by reports. The project adopts requirement gathering along with design and implementation phases through mid-2025 before initiating testing and system development phases. The project ends with a thesis submission followed by a Final Year Project Exhibition after completing two progress presentations. The planned tasks maintain an established order to deliver uninterrupted project execution and meet deadlines.

3.4. Chapter Summary

This chapter explains the development process of The TripTally: Budgeting Travel System. This system used the Waterfall Model to complete its life cycle in requirement gathering and analysis followed by design then implementation and testing before maintenance. The requirements phase both highlighted trip planning difficulties for users and specified necessary hardware elements and software capabilities. During the design phase the project developers created flowcharts and Entity Relationship Diagrams (ERDs) to provide structured development guidelines. The program required developers to code and integrate main features through implementing key features alongside Google API budget tracking tools and personalized recommendation capabilities. Users tested system functionality and usability and performance levels using SUS usability testing which confirmed system satisfaction. During the maintenance phase the system achieves reliability alongside security updates through continuous improvements made based on user feedback.

CHAPTER 4: RESULT AND DISCUSSION

This chapter details the research work together with analytical assessments and evaluation measures that guided the TripTally system's creation. The system contains essential functionalities that combine real-time budget tracking with user-friendly recommendations as well as location-based details which support project targets. The chapter presents testing phase outcomes which demonstrate system functionality alongside user evaluation results to validate the system's operational performance and usability for users. The System Usability Scale (SUS) constituted the primary measure for examining the efficiency of use and operational effectiveness alongside the system's ability to create a smooth and satisfying experience for users. The extensive evaluation demonstrates that TripTally delivers everything users expect while it reaches all original project targets.

4.1. The Accomplishment of Objective 1: To identify the challenges experienced by users in the planning of trips due to information overload by using the existing travel platforms.

This section will discuss the analytical findings from the requirement-gathering phase as solutions to user obstacles that hinder trip planning activities. A study of vacation platforms including Traveloka, Booking.com and Airbnb found three main issues including overwhelming traveler information and inadequate budget management aids beside ineffective recommendation engines. Research of existing travel sites like Traveloka and Booking.com and Airbnb resulted in TripTally developing live budget monitoring together with private destination recommendations and complete platform integration of review data and destination intelligence. User satisfaction together with decision-making efficiency will improve through TripTally by analyzing gaps and accumulating user feedback.

4.1.1. Comparison Between Existing Systems and TripTally

Table 4. 1 Comparison Between Existing Systems and TripTally

Features	Traveloka	Booking.com	Airbnb	TripTally
Real-Time Budget Tracking	**No**	**No**	**No**	**Yes**
User Reviews Integration	**Yes**	**Yes**	**Yes**	**Yes** (with prioritization)
Location-Based Insights	**Limited**	**Yes**	**Yes**	**Yes** (with Google Maps, Google Street View and Google Reviews)
Comprehensive Travel Planning	**Yes** (limited to flights and hotels)	**Yes** (hotels and attractions)	**No** (mainly accommodations)	**Yes** (hotels and attractions)

A summary of TripTally's comparison with the Malaysian travel industry such as Traveloka, Booking.com and Airbnb appears in Table 4.1. The existing platforms carry essential features for reviews and location-based features, yet their functions do not meet essential user needs regarding real-time budget management and individualized recommendations. As a company Traveloka concentrates exclusively on flights combined with accommodation services and Airbnb caters to the accommodation sector exclusively. The unique combination of features in TripTally includes real-time budget tracking and Google Maps integration and personalized suggestions deliver a multi-dimensional and user-focused travel planning experience. This research analysed market gaps which showed consumers experience information overload while facing challenges finding deals that suit their budgets. Users benefit from TripTally's seamless interface and special features that resolve common travel planning obligations. User-preferences and budget restrictions direct TripTally's recommendation system toward offering optimal travel

choices to users. TripTally planning system calculates itineraries that remain affordable according to user budgets. Contrary to existing platforms TripTally showcases superior functionality in line with the project's functional requirements as revealed in Table 4.1. The analysis shows that the fundamental design requirement was successful by implementing solutions which address travel challenges and boost both decision quality and user experience.

4.1.2. Finalized Requirements of TripTally

The TripTally platform seeks to revolutionize trip planning through built-in capabilities that track budgets in real-time alongside user evaluations and site-specific details. TripTally delivers an improved planning process with friendly interfaces to minimize complexity during travel preparations and enhance user contentment. Below are the finalized features and requirements for the TripTally system:

1. **Login and Register:** Through the platform users can create an account with their designated credentials to access system functions.
2. **Search and Recommendations:** Travel recommendations are available within the system through personalized options matched to users' budgets and personal preferences.
3. **Budget Tracking:** The system enables real-time financial tracking for users to prevent budget limits.
4. **Hotel and Attraction Details:** Users can access extensive hotel information combined with attraction listings, and they are able to view along with ratings, reviews from other users, and utilize Google Maps, Google Street View, Google Review features for hotels and attractions.
5. **Cart Management:** Users can enhance their planning experience by placing hotels and attractions in a cart area for easy organization.
6. **Booking and Payment:** The system facilitates bookings and payment for selected hotels and attractions.
7. **Leave Review:** Users can leave their reviews for hotels along with attractions which maintains its credibility.

8. **Admin Management:** Through the administration side, admin can handle user accounts alongside system reports for reviewing purposes and maintain operation efficiency.

9. **Reports and Analytics:** Admin of the system can generate reports containing sales data and booking summaries to support system monitoring.

10. **Logout:** Users and admins maintain secure system logouts through available procedures.

4.2. The Accomplishment of Objective 2 : To develop a centralized travel planning system that incorporates real-time budget tracking, user reviews, and location-based insights

The objective 1 completion transitioned development efforts toward constructing the TripTally system which functions as a unified travel planning solution. The core features of real-time budget tracking and user reviews and location-based insights were implemented during this phase together with database setup and interactive prototype development for user feedback. The next phase focuses on Objective 3, which will test how successfully the system enhances user satisfaction coupled with confidence levels and decision capabilities through usability assessments.

4.2.1. High Fidelity Prototype

4.2.1.1. Login and Registration Interface
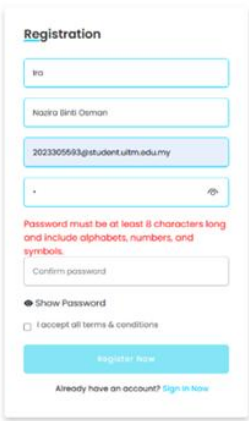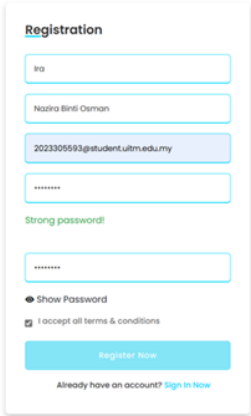
Figure 4.1 Secure Password Requirements
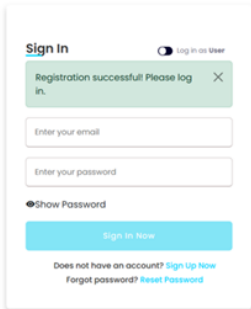
Figure 4.2 Strong Password Created

The figures display the process for registration and login in the TripTally system. During registration users need to fill in their name along with email and secure password on the page displayed in figure 4.1. Users are alerted about password requirements through the system which uses a red warning system for weak passwords. A successful password entry in figure 4.2 prompts the system to display a green notification revealing a "Strong password" status to guarantee safe account generation. The system requires users to read and agree to terms of service before their registration will finalize.

Figure 4.3 Successfully Registered
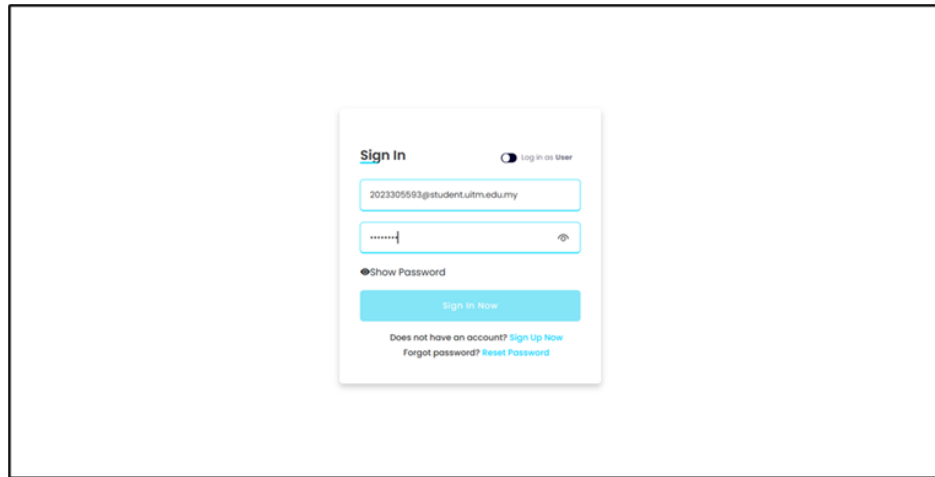
Figure 4.4 Login Interface

A successful registration process produces a confirmation screen that users can see in figure 4.3. A green notification follows completion of registration to prompt users into the login screens for their understanding. Users use the interface shown in figure 4.4 to access the system by entering their registered email followed by their password. Users can verify their password entry by using the "Show Password" option which appears in both the registration process and login interface.
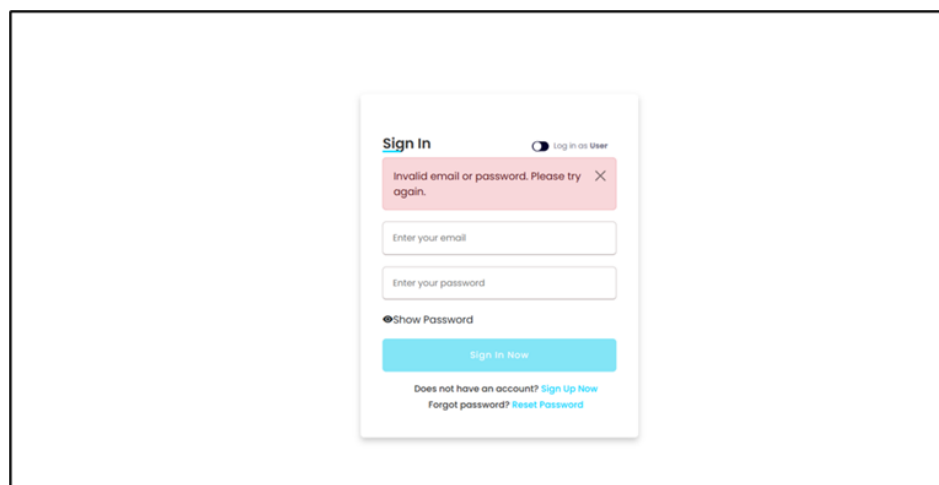
Figure 4.5 Invalid Password/Email

The figure 4.5 presents the error message system shows to users who use incorrect password information or an invalid email for login authentication. The system quickly generates a red message displaying "Invalid email or password. Please try again." Please try again." User experience improves through this

interface which directs users toward correcting their entries without confusion. The illustrative representations emphasize how the system implements user-friendly authentication mechanisms within its registration flow and login process.
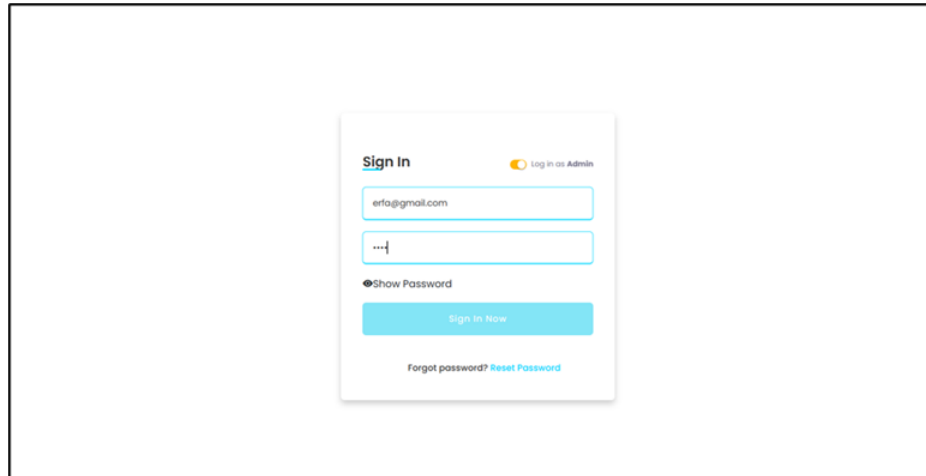
Figure 4.6 Admin 's Login Interface

The figure 4.6 presents TripTally system's administrative login interface. Through the system's interface admin can access the platform after entering their registered email along with their password. A simple toggle switch enables administrators to select "Log in as Admin" thus differentiating between administrator and regular user access. The system allows authorized administrators to enter specified administration areas through this login interface to perform their specified duties including user management. Admin can easily access the system through an interface that combines secure operation with an intuitive design and simple features.

4.2.1.2. User Interface
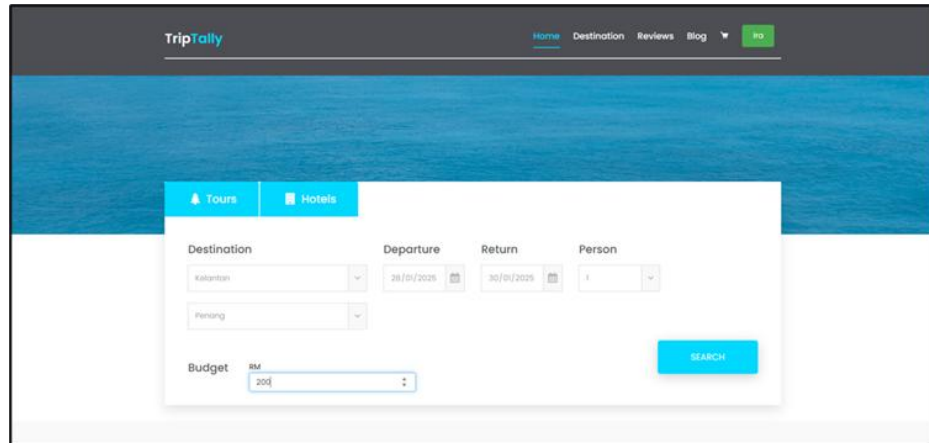
Figure 4.7 Travel Details Form

The TripTally System allows users to perform searches and get recommendations through an interface shown from Figure 4.7 which requires input of travel preferences including destination choice and date selection along with person numbers and budget parameters in a single search field. The system offers an uncomplicated design to enable quick customization of user travel options. Users can submit their search parameters to receive individually tailored suggestions which correspond to their selected budget together with personal preferences.
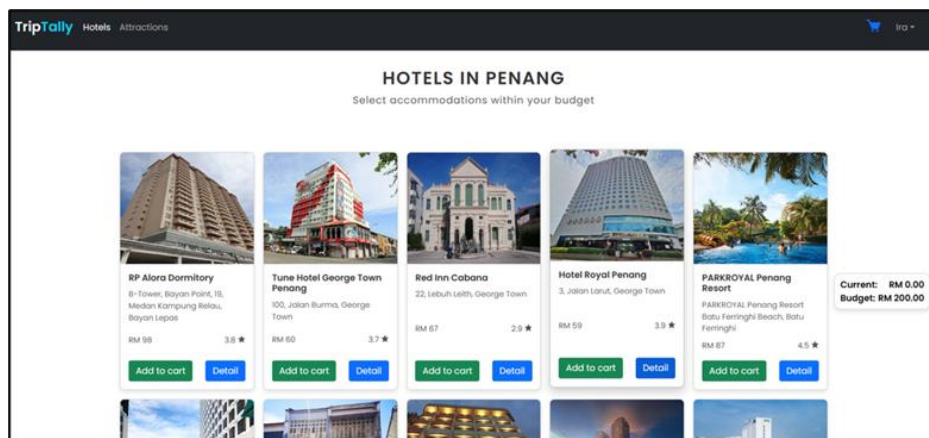
Figure 4.8 Hotels Recommendations

Figure 4.8 shows the system presents hotel suggestions to Penang through matching past travel preferences and budget constraints entered by users. The system shows hotels located in Penang featuring price information alongside

their rating standings. Users can check multiple accommodation prices to choose the best hotel that matches their needs through this interface. Users can easily locate economic hotels which match their specifications through an interface optimized for simple user management.
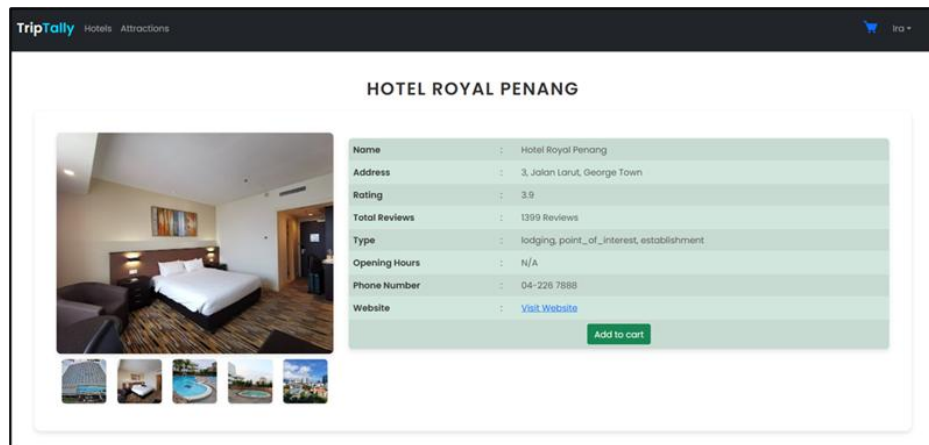
Figure 4.9 Detailed Hotel Information

Users who wish to see detailed hotel information can access it through the "Details" button seen in figure 4.8. When users press the "Detail" button, they will be taken to an exclusive page presenting comprehensive hotel information as shown in figure 4.9. Users can view the hotel's images as well as vital facts such as its location and ratings alongside review numbers and type while obtaining contact information and the official website destination on this page.

Figure 4.10 Google Maps and Google Street View

Figure 4.10 shows users can navigate the hotel surroundings through the Google Street View system which provides 360-degree visual experiences of the actual

location. This system also provides Google Maps for users to precise hotel directions and location information and makes it easier for them to make plans to go to this hotel.
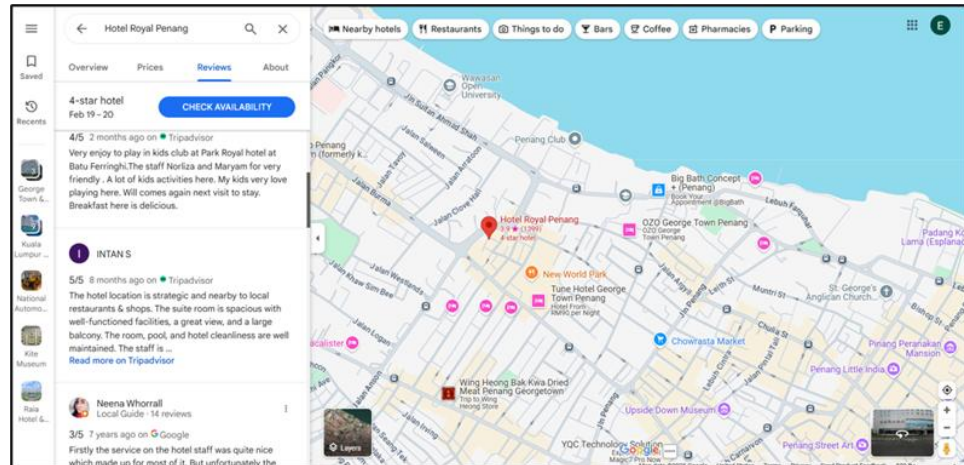
Figure 4.11 Google Review

Figure 4.11 connects users to real-time hotel reviews from Google Reviews with a wide range of comments and user ratings contributed by prior visitors. The review system provides instant hotel metrics so users can access authentic quality information about hotel operations.
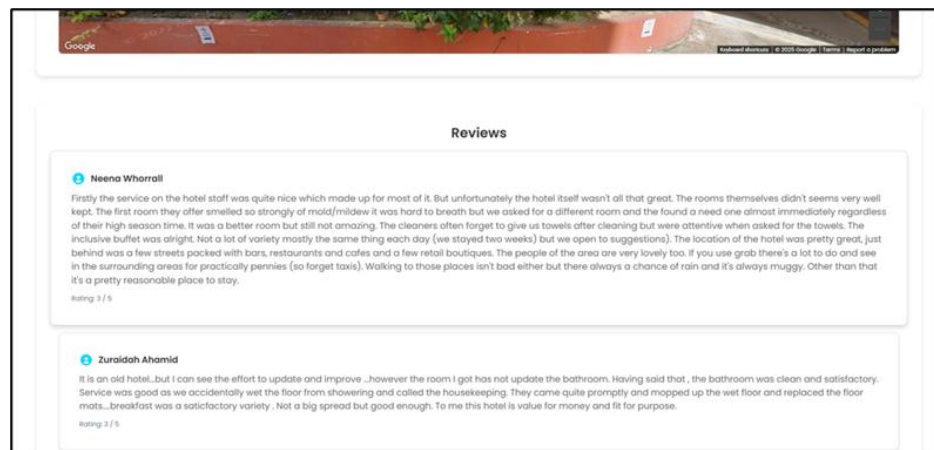
Figure 4.12 Users Review

TripTally system generates and presents reviews through its review-based interface shown in figure 4.12. The supplementary review system is created exclusively for TripTally users who seek customized assessment options. Through their consolidated platform, users no longer need to visit different

websites to collect hotel information. By presenting detailed information in a quick and convenient manner, TripTally system gives its users confidence to choose wisely and facilitate prompt educated choices.
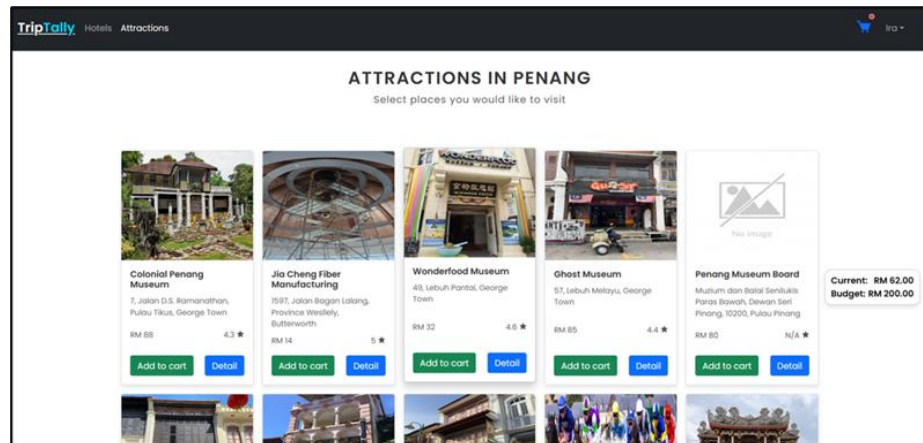
Figure 4.13 Attractions Recommendations

The results displayed in figure 4.13 present Penang attractions recommendations which follow the user's travel input specifications along with their budget limit. The system recommends many attractions while providing users with essential information about their names and locations and prices and user ratings. When users click the "Detail" button they can access full attraction information or select tour options directly and add them to their shopping cart. The ongoing operation monitors both the user's current expenses and their remaining budget which appears on the right side to enable them to select attractions while adhering to their financial boundaries. Users receive a streamlined and pleasant system for selecting attractions due to this clear interface design.
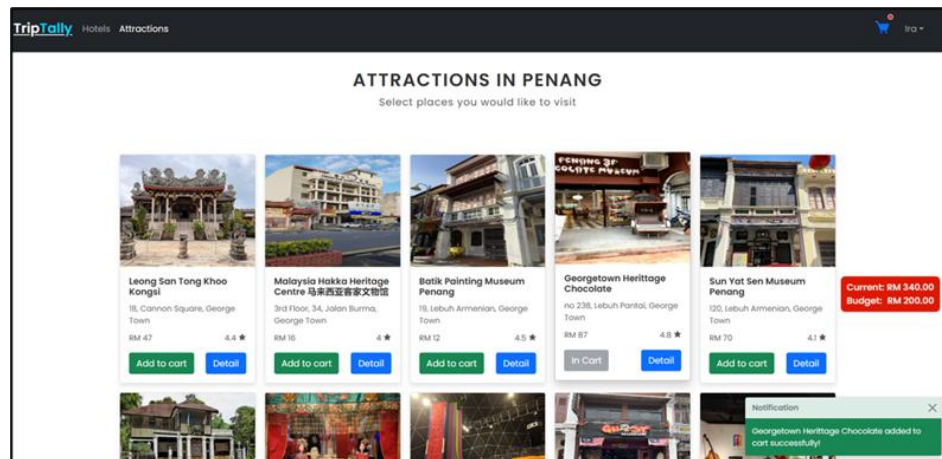
Figure 4.14 Budget Tracking Functionality

Figure 4.14 shows the system tracks the user's current spending and they can see their spending exceeds their budget limit because the display price box uses red markers to warn them of the overspending. This warning system helps users control their expenses. The system delivers a verification message to notify users when they add attractions like "Georgetown Heritage Chocolate" to their cart. This notification provides both clarity and convenience throughout the planning journey.
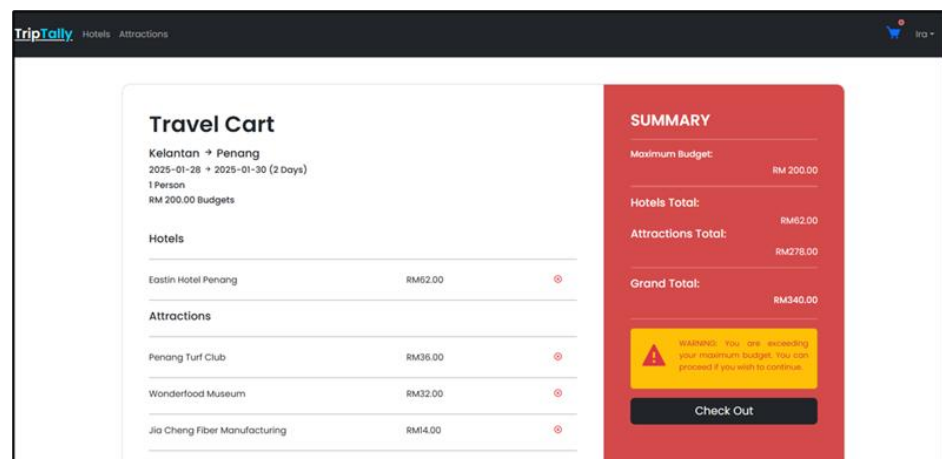
Figure 4.15 Travel Cart Exceed Limit

The "Travel Cart" interface in figure 4.15 presents the user-selected hotels and attractions for Kelantan to Penang travel as a summary. Travel details including dates and budget and visitor count reveal through this interface. The interface displays expenses through a straightforward system which details the selected hotel and tourist destinations together with their price point. Right of the

76

summary contains two elements. The first section reveals how much hotels and attractions will cost together, and the second section displays this amount against the budget set by the user. A warning appears as a red message, but users can continue with checkout even if their total cost exceeds their budget.
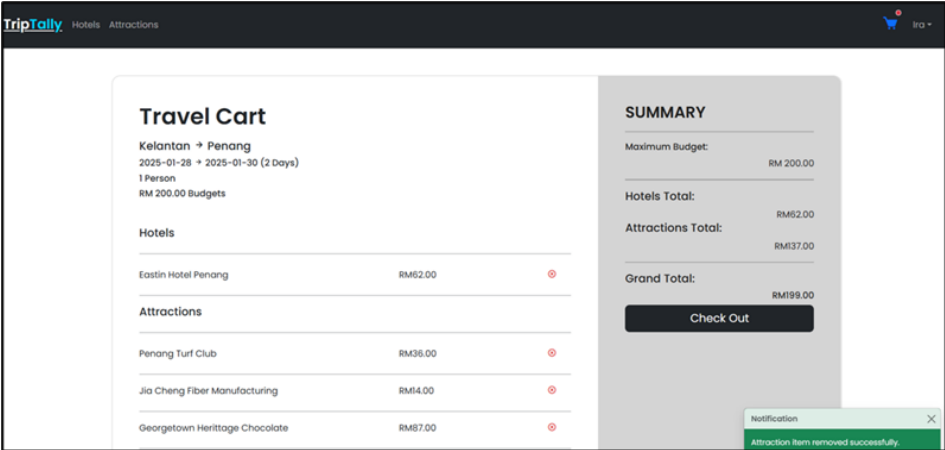
Figure 4. 16 Updated Travel Cart

The updated cart in figure 4.16 shows how the user interface changes after removing an attraction for expense adjustment. A fresh summary calculation reveals the revised figures which maintain their position below the user's spending limits. The system confirms the removal of the attraction through a notification thereby showing live updates and ensuring transparency for the user. Users can use this capability to control their travel itinerary effectively while staying within their budget.
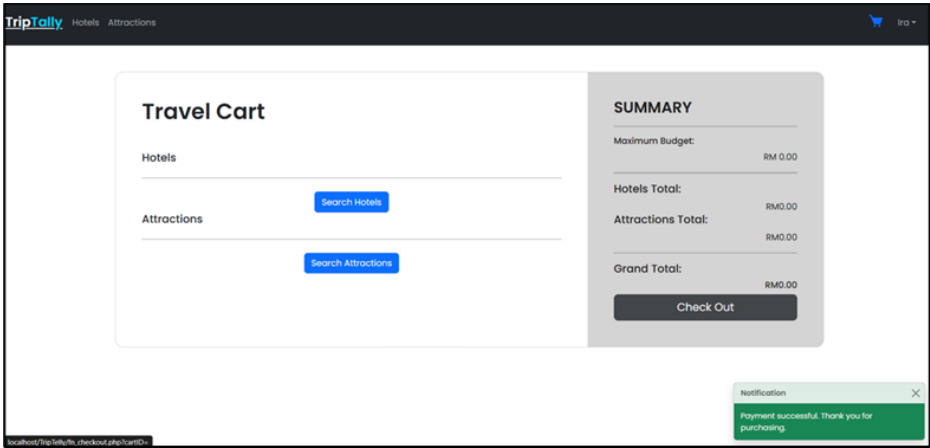
Figure 4.17 Payment Notification

The payment confirmation process within the TripTally system is represented through figure 4.17. Users who finalize their travel selection may choose to proceed with payment by clicking the "Check Out" button. A verification notification displayed after successful payment informs users that their payment was successful through the message "Payment successful. Thank you for purchasing."
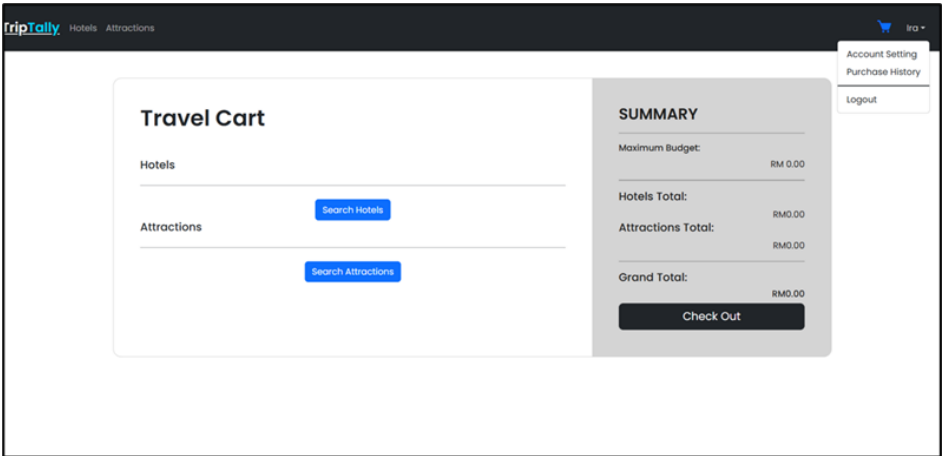
Figure 4.18 Purchase History Button
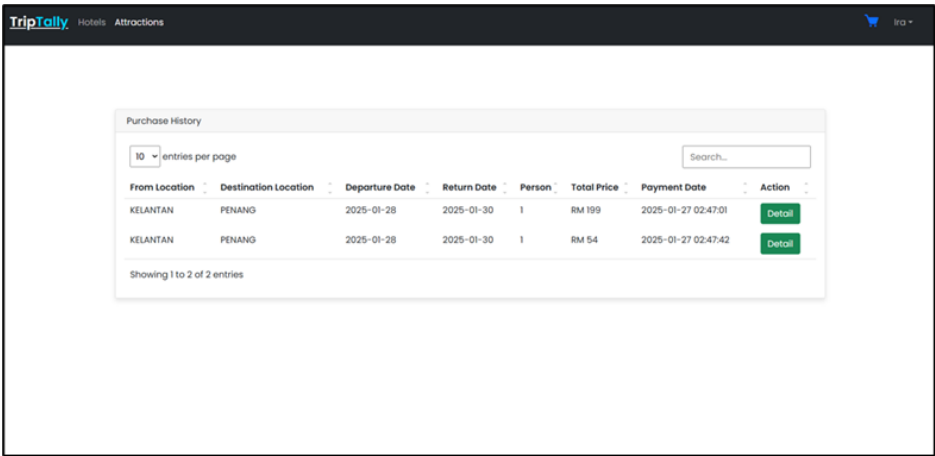
Figure 4.19 Completed Booking Information

The "Purchase History" feature of the TripTally system appears in figures 4.18 and 4.19 to let users review their completed bookings following their travels. The navigation bar contains a dropdown menu from where users can choose "Purchase History" as demonstrated in figure 4.18. Users can find complete booking documentation under "Purchase History" which shows departure date alongside return dates and features destination listings with total price

information and payment timestamps. Users can start the booking review process by clicking the "Detail" button that appears in Figure 4.18. Users can submit vital feedback for hotels and attractions through this feedback option. Users enhance future travel decisions through their reviews since they add valuable feedback to built-in system databases. The integrated process enables users to reflect on their experiences through assessment components for helping future users make well-informed choices.

Figure 4.20 Purchase History
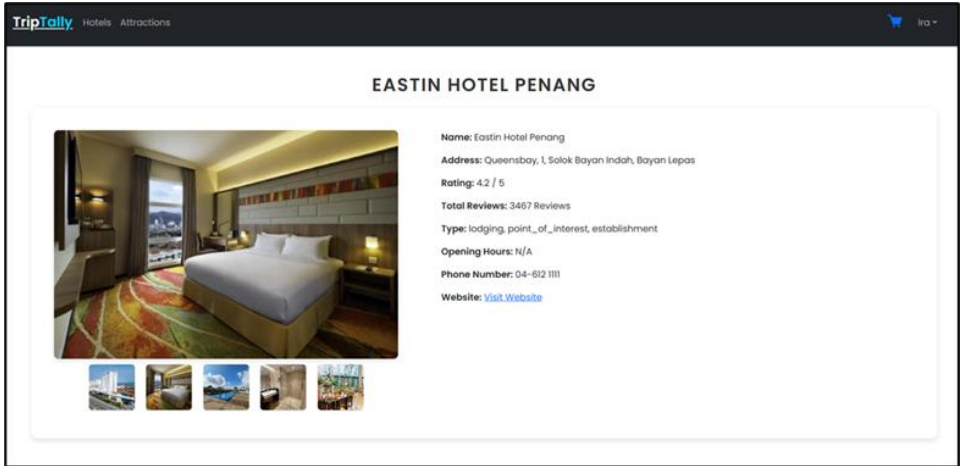
Figure 4.21 Specific Hotel Review

Figure 4.22 Reviews and Rating Interface

Figure 4.23 Review Has Been Sent
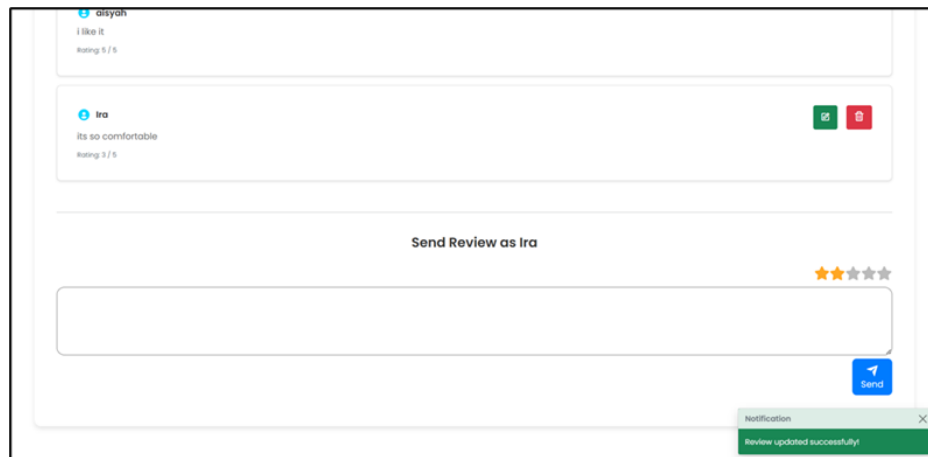

Figure 4.24 Editing Reviews or Rating Interface

Figure 4.25 Reviews and Rating Successfully Edited

In the "Purchase History" section as shown in figure 4.20, users may check out detailed information regarding their previous trips, together with hotels and attractions. When they hit the "Review" button next to Hotel Eastin Penang as per figure 4.21, the users could see the hotel's detailed page, displaying necessary information such as name, address, rating, reviews, and facilities. In figure 4.22, users can provide feedback by filling in their comments and giving a star rating in the review section. For instance, a user could state his impressions like "its so comfortable" while giving a rating of 5 stars. After submission, the review appears in the list of other reviews, as shown in figure 4.23. This option is also available for modification or deletion of their reviews. As depicted in figure 4.24, the edit option allows users to alter their review or rating (for instance, revisit their 5-star rating and change it to 3 stars), and on the successful update, a notification shows in the system quite like in figure 4.25. This entire process permits users to share, modify, or delete reviews effortlessly thus ensuring their ease of use.
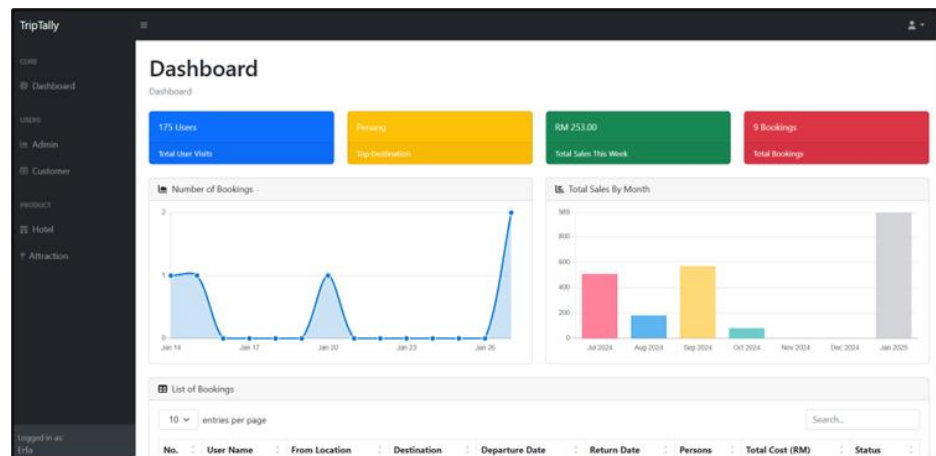
4.2.1.3.　Admin Interface

Figure 4.26 Admin Interface

Figure 4.27 List of Bookings

Figures 4.26 and 4.27 present the admin dashboard interface of the TripTally System, providing critical insights and management tools for administering the platform. Figure 4.26 provides the dashboard view, which shows important information such as the total number of user visits (e.g. 175 users), the most popular destination (e.g. Penang), a week's total sales (e.g. RM253.00), and the bookings rendered (e.g. 9 bookings). The dashboard also shows two visual reporting analyses: a line chart showing the trend of bookings per day and a bar chart summarizing monthly sales. These two visual aids allow the admin to quickly gauge the performance of the system and spot trends. Figure 4.26 provides the admin with a detailed table on all bookings, including usernames, travel information (e.g., departure and location), dates, total cost, and payment

status. The admin can also search through the table and making it easy to find certain bookings. This interface is allowing the admin to monitor and manage bookings easily, thus assuring that the operations of the platform run smoothly.
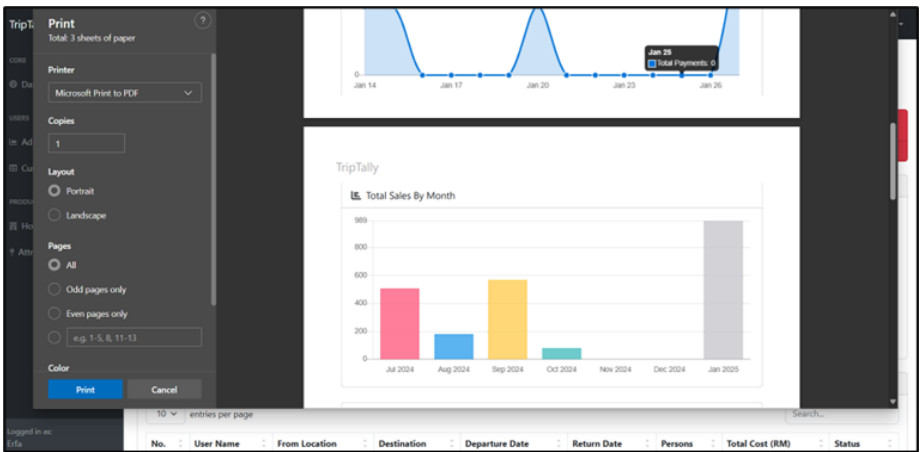

Figure 4.28 Reporting

The reporting feature of TripTally system shows in figure 4.28 as it becomes accessible through the system's admin interface. The reporting feature of the admin interface gives the admin the ability to obtain downloadable reports that show analysis alongside data summaries including totals for sales and bookings along with user activity records. The built-in report generation system in the TripTally system produces comprehensive records for enhanced decision-making and performance tracking and future planning capabilities. The system allows administrators to streamline work through easy reports accessibility.

Figure 4.29 List of Admins

The admin interface of Figure 4.29 shows a complete list containing all registered administrators for TripTally system. The list contains Admin ID together with Full Name, Short Name, Email and detailed edit and delete functions for modifying admin records. The platform features an efficient administrator management system which enables system owners and super admins to maintain platform security and organization.

Figure 4.30 Admin Registration

The registration form as shown in Figure 4.30 enables a system owner or existing administrator to create new administrators within the platform. Users must enter a short name and full name and provide an email address and create a password followed by a confirmation of the password to register an account through the form. The "Register" button shifts saved administrative records into the system database and the "Reset" button empties out the form content. Through this feature, the TripTally owner achieves flexibility to build their team of platform managers who correctly delegate tasks for smooth operations.

Figure 4.31 List of Customers

Figure 4.32 Update Customers Information

The TripTally system enables admin to view and manage customer account functions as shown in figures 4.31 and 4.32. According to Figure 4.30, the admin system includes an option for creating new user accounts to help users who encounter registration difficulties. Figure 4.32 demonstrates how admin can update existing user information when users report errors which require modifications. Before applying any updates or changes to the system, the admin need to confirm the situation with end-users first for accuracy purposes and authorization. The system operates with security measures that protect customer data during all business processes.

Figure 4.33 Hotel List

Figure 4.34 Specific Destination Hotel List

The TripTally admin user interface for hotel and attraction management can be seen in Figures 4.33 and 4.34. Admin can navigate both categories using a consistent interface structure which enhances operational simplicity. For example, the "Hotel List" display section presents admin with hotel details including location and sales figures along with trips made and user reviews and ratings. The detail screen appeared when the admin clicks the "Detail" button on each individual hotel or attraction entry. The standardized interface design aids administrators in both managing these service types as they can easily access and control all relevant details correctly.
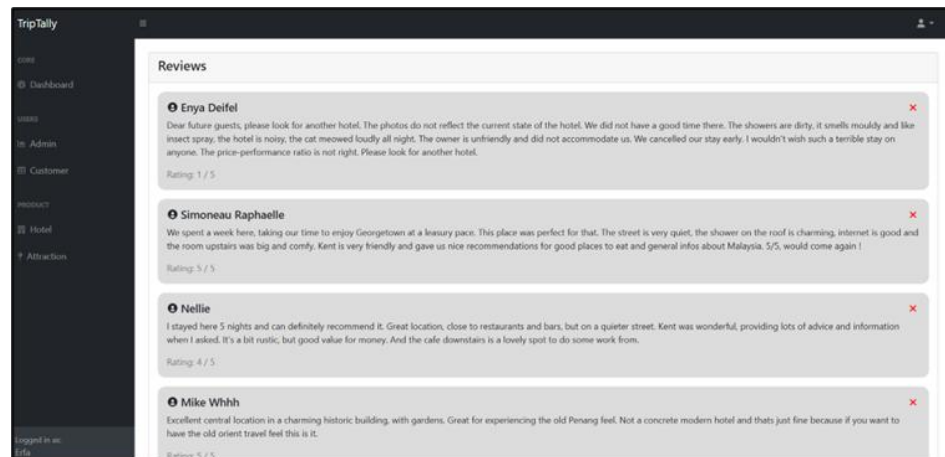
Figure 4. 35 Deleting Reviews

Figure 4.35 shows the "Reviews" section within the admin interface of TripTally system. Through this section, admin can gain control over hotel and attraction user reviews. In the "Reviews" section, it displays of each review in the admin panel that shows the username combined with their posted comments and assigned rating. Each review comes with a red "X" button through which admins can remove inappropriate or irrelevant content. The platform maintains both quality and accurate feedback due to this feature.

4.3. The Accomplishment of Objective 3 : To evaluate the effectiveness of TripTally system to improve user satisfaction, confidence, and decision efficiency

4.3.1. Requirement Traceability Testing

As seen in Table 4.2, all major features of the TripTally system have been tested and work successfully. Users can sign up, log in, search for hotels and attractions, track their spending in real time, and add items to their cart. They get notified for being over budget and can review their experiences. Admins can manage users and reviews and generate reports. Both have been tested that confirm the logout feature is working properly for both users and admins. The system meets all its requirements and performs as expected.

Table 4. 2 Requirement Traceability Testing

Requirement ID	Requirement Description	Use Case	Test Strategy	Status
1.1	The system shall process user registration	Login and Register	Testing on account registration functionality	Completed
1.2	The system shall authorize user login	Login and Register	Testing the user login validation process	Completed
2.1	The system shall provide recommendations (hotel and attraction) based on user's detail and budget	Search	Testing the recommendati on accuracy	Completed
3.1	The system shall track users' spending in real time	Budget Tracking	Testing real time tracking of spending	Completed
3.2	The system shall display alerts in red colour when the budget limit is exceeded.	Budget Tracking	Testing alert visibility	Completed
4.1	The system allow user to add hotels and attractions to their cart	Cart Manageme nt	Testing by adding attractions and hotels to the cart	Completed
4.2	The system shall display the cart contents for review	Cart Manageme nt	Testing by reviewing cart functionality	Completed

5.1	The system allows users to leave reviews and for hotels and attractions	Write Review	Testing the process of submitting review by leaving comments for hotels	Completed
6.1	The system shall allow admin to manage customers, review and report	Admin Management	Testing user and review management	Completed
7.1	The system shall allow admin to generate reports	Generate Reports	Testing report generation functionality	Completed
8.1	The system allows users to logout	Logout	Testing the logout functionality	Completed

4.3.2. System Usability Scale (SUS)

The respondents given System Usability Scale (SUS) to rate TripTally system according to the table 4.3 provided below because it stands as an industry standard measurement method for system usability. Six respondents took part in the evaluation which included individuals from supervisor, university students alongside working professionals. Participants scored their experience across a scale ranging from 1 ("Strongly Disagree") to 5 ("Strongly Agree"). This evaluation aimed at measuring both usability and functionality and user satisfaction levels within the TripTally system. A graph below demonstrates the outcomes generated from the survey procedures.

Table 4.3 SUS's Scale value

Scale Value	Description
1	Strongly Disagree
2	Disagree
3	Neutral
4	Agree
5	Strongly Agree

Result of System Usability Scale:

Question 1: I think that TripTally system helps reduce challenges in trip planning compared to existing systems.
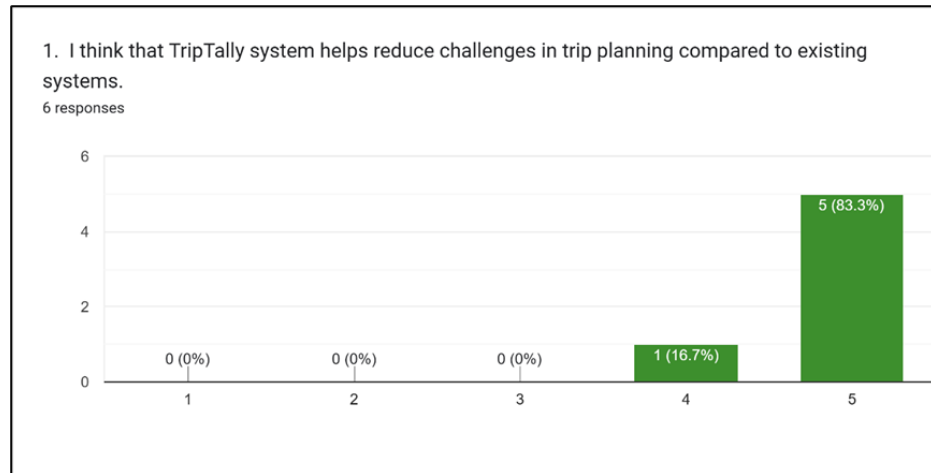
Figure 4.36 Question 1

Figure 4.36 illustrates the graph bar from which most respondents (83.3%) strongly agreed, while 16.7% agreed, that the TripTally system significantly reduces challenges in trip planning compared with existing platforms. This shows that users believe the TripTally system assists them well in coping with problems like budget management and decision-making by making the overall travel planning smoother and more user-friendly.

Question 2: I found TripTally system unnecessarily complex to use for planning trips.
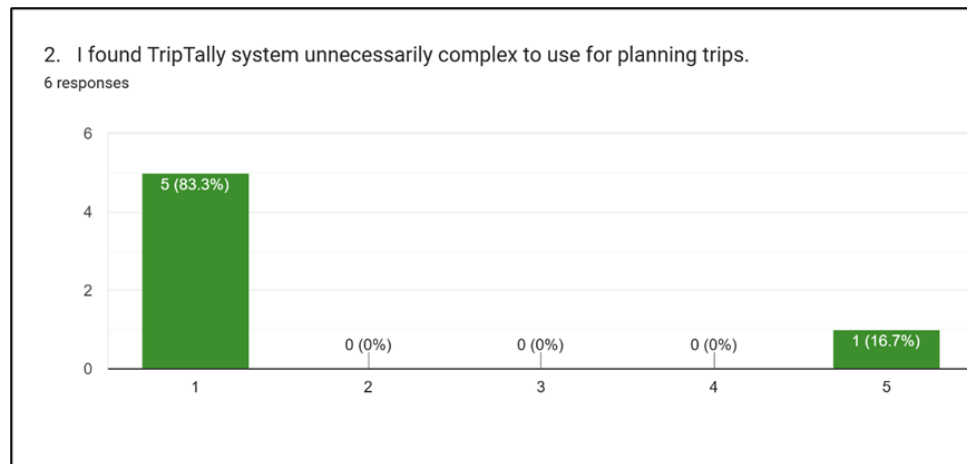
Figure 4.37 Question 2

Figure 4.37 displays the graph bar from among respondents' 83.3% strongly disagreed while 16.7% opposed the claim that TripTally's planning interface was complicated to utilize for trip arrangements. The TripTally system achieves a streamlined and user-friendly design that minimizes familiar difficulties found in travel planning systems according to user feedback.

Question 3: I thought the TripTally system was easy to use for planning and managing travel.
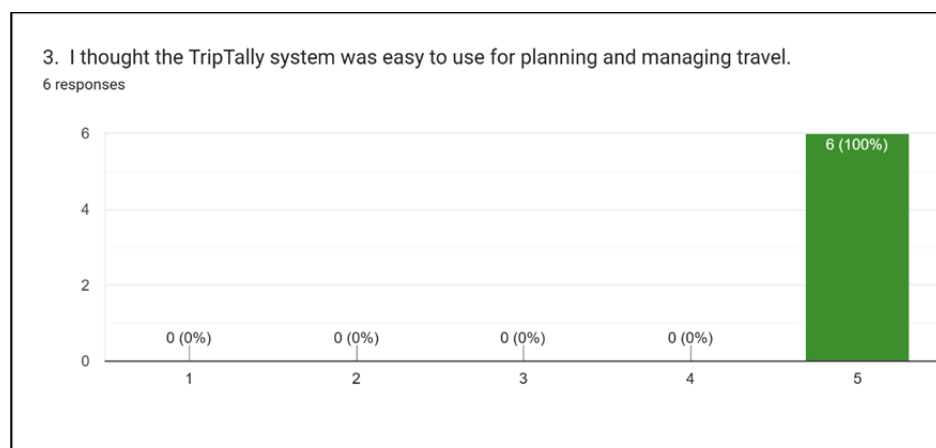
Figure 4.38 Question 3

Every respondent in the survey 100% strongly agreed, stating that TripTally's planning and managing capabilities showed easy usage as shown in figure 4.38. Excellent usability combined with smooth navigation and efficient design

allowed all users to track budgets and manage shopping carts and create trips using the platform without encountering any difficulty.

Question 4: I think I would need the support of a technical person to fully utilize the system's features.
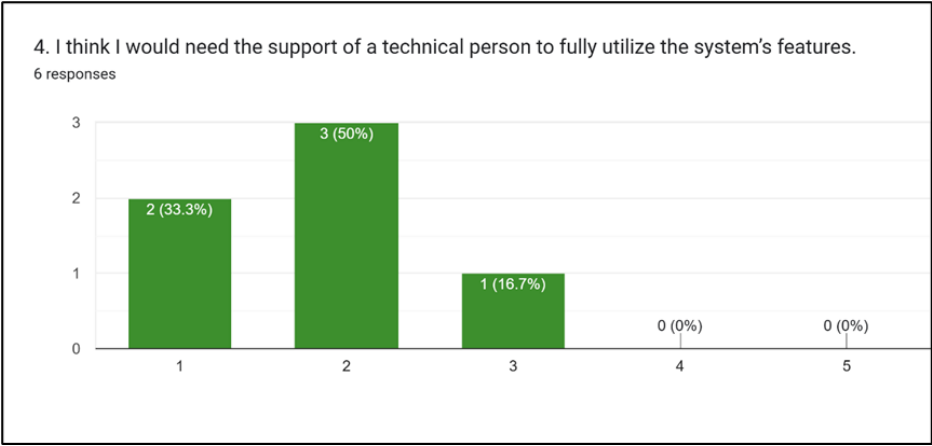
Figure 4.39 Question 4

Figure 4.39 illustrates most users which demonstrated no need for technical assistance when using the system through their strong disagreement with or disagreement about requiring support to operate it. The platform's user-friendly features enabled most users to perform tasks autonomously and demonstrated the TripTally system's design approach that targets user needs and presents straightforward instructions specifically for novice tech users.

Question 5: I found the real time budget tracking, user reviews and location-based insights to be well integrated.
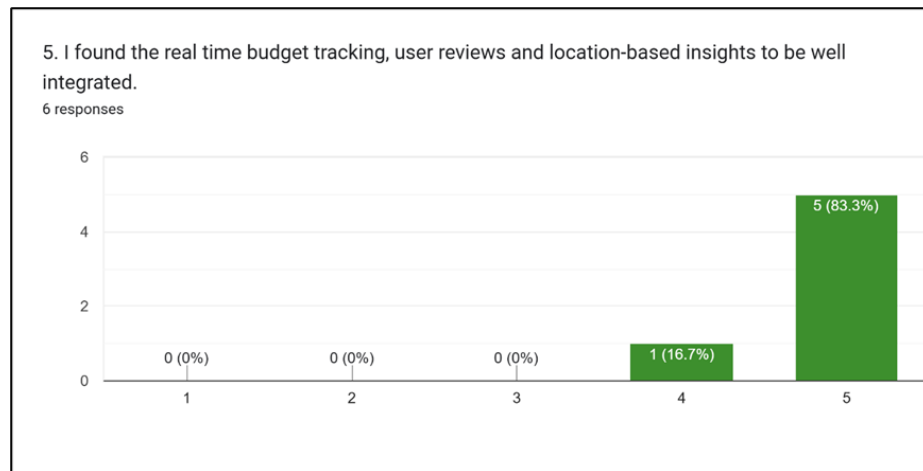
Figure 4.40 Question 5

Figure 4.40 display multiple users (83.3%) firmly proclaimed they liked how TripTally combined real-time budget monitoring with user ratings and location data in its system. Users said they valued the integrated features because they created more effective planning solutions through trustworthy personalized recommendations.

Question 6: I thought there was too much inconsistency in how the TripTally handled planning features.
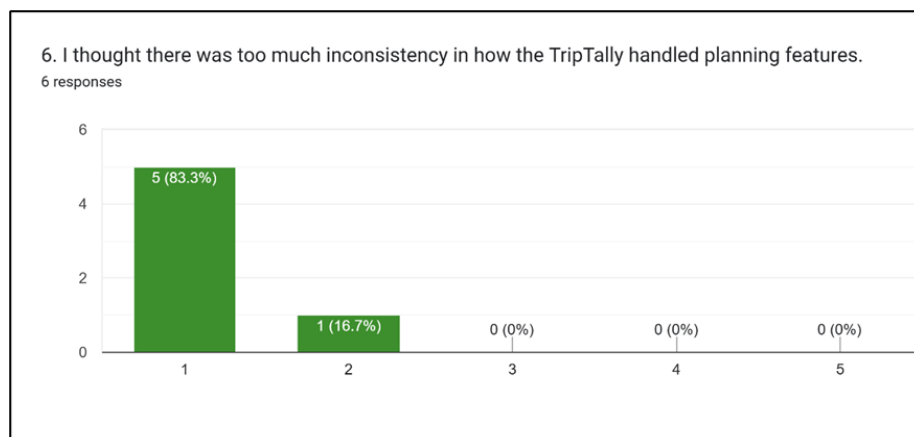
Figure 4. 41 Question 6

Figure 4.41 describes the majority (83.3%) of users strongly disagreed along with 16.7% who disagreed about system planning inconsistencies. Study participants documented their satisfaction with TripTally since the system

delivered reliable functionalities without interruptions which provided consistent performance across all features.

Question 7: I would imagine that most users would learn to use this system quickly and effectively.
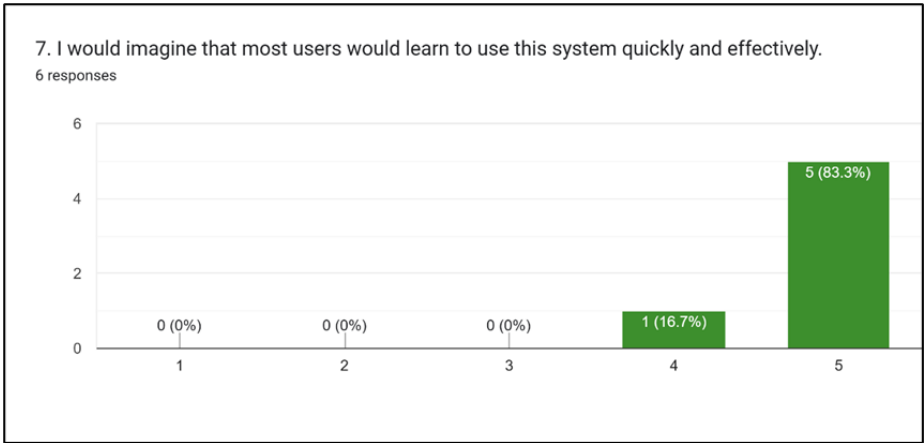
Figure 4.42 Question 7

Figure 4.42 explain user survey results revealed strong endorsement from 83.3% of individuals alongside agreement from 16.7% that TripTally's system can be learned and used efficiently by most people. The platform shows intuitive design options and user-friendly interface, so it becomes adoptable for users from a vast spectrum of backgrounds.

Question 8: I found the TripTally system cumbersome to use for managing trip budgets and insights.
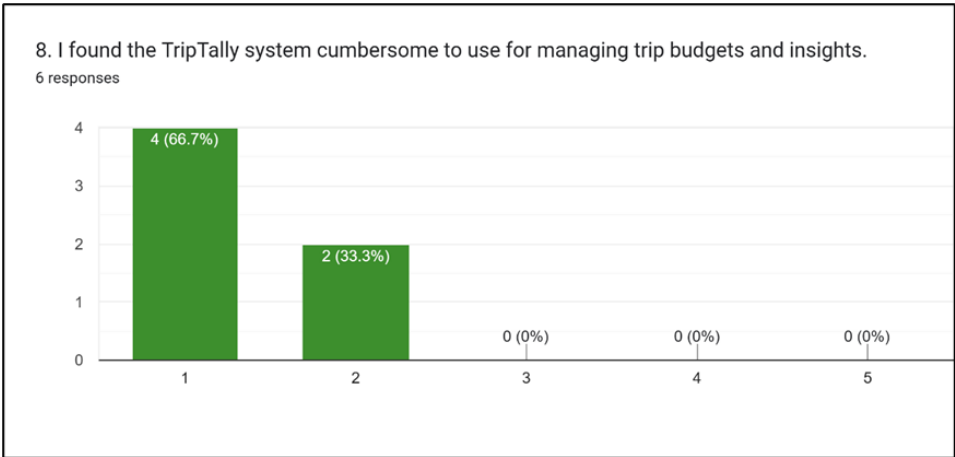
Figure 4.43 Question 8

Figure 4.43 found that a significant majority of respondents (66.7%) indicated strong disagreement with concurrently expressed the opinion that the TripTally system required unnecessary complexity for budgeting and gaining trip management insights. The findings demonstrate that users found TripTally operational for budget management together with its expense tracking features that enabled improved planning experiences.

Question 9: I felt confident in using the TripTally system to plan and organize my trip.
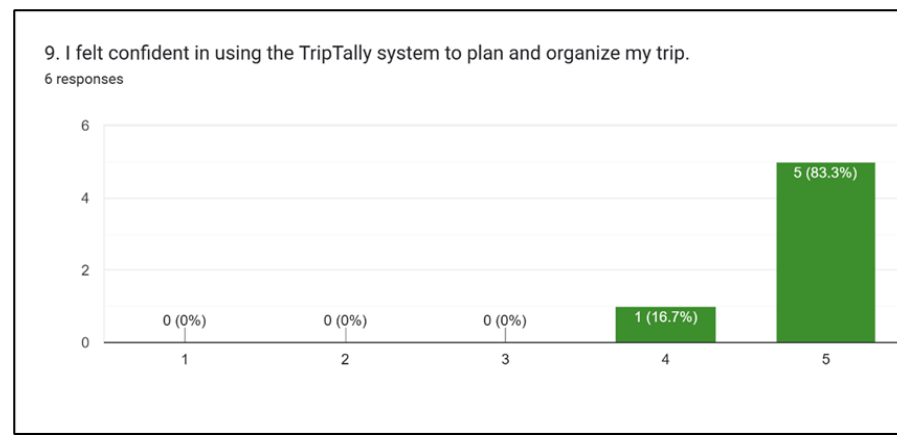
Figure 4.44 Question 9

Figure 4.44 shows when planning their travels with TripTally's system users displayed strong confidence according to the responses of 83.3% who agreed and 16.7% who also agreed. Users experience enhanced travel decision confidence because TripTally provides them with suitable tools and features which enable improved planning abilities.

Question 10: I believe I would need to learn a lot of things before I could start effectively using this TripTally system.
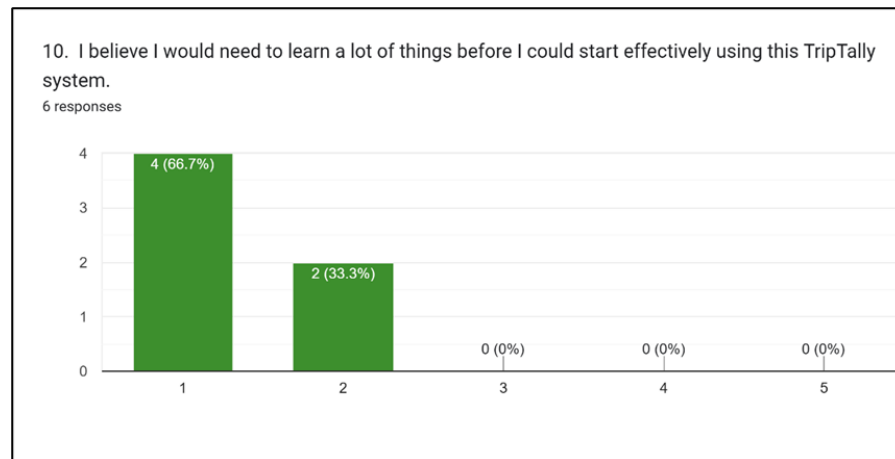
Figure 4.45 Question 10

Most (66.7%) respondents together with a third segment (33.3%) disagreed that the system would require extensive learning to work effectively as illustrated in figure 4.45. Feedback demonstrates that the TripTally system provides an intuitive user experience and minimal learning barriers thus ensuring new users can utilize its capabilities right from initial navigation.

4.4.   Chapter Summary

This chapter describes the development of the TripTally system to handle existing user problems in trip preparation. The review reveals unmatched features in current platforms because users have to manage excessive information while lacking money management and need better customized recommendations. TripTally integrates key features including budget real-time tracking alongside personalized decisions and location-based understanding to enhance both user satisfaction and their decision-making ability. The system underwent requirement traceability testing and system usability scale (SUS) evaluations to verify its performance. Testing revealed the system fulfilled its functional plus non-functional requirements in delivering a user-friendly consistent experienced-based travel planning solution for users. The system achieves its goal of simplifying travel planning through a user-friendly interface which develops user confidence and achieves satisfaction.

CHAPTER 5 : CONCLUSION AND FUTURE WORKS

This final chapter summarizes all research findings from this research paper while concluding every chapter presented in the document. The research objectives of TripTally system led to successful implementation while clarifying the project's inherent constraints. The chapter presents future-oriented recommendations focused on advancing the system alongside a plan for handling identified development and testing challenges.

5.1. Conclusion

In conclusion, the TripTally system is successfully developed as one-stop central platform for trip planning focusing on budget management, personalization of recommendations, and user-friendly functions. According to this document, the identification of the challenges existing in the platforms was achieved through integration of options such as real-time budget tracking, Google Maps integration, and user-generated reviews. The decision-making process was easier with these features, solving some of the common problems like information overload and lack of personalization. The second objective of developing a web-based platform was achieved by employing technologies like PHP, MySQL, and Google APIs during the implementation and testing of the system. The third objective has been accomplished with user feedback regarding the usability of the system using the System Usability Scale (SUS) method. Users were satisfied, finding the system a user-friendly one that is dependable and addresses their travel planning needs. The system meets non-functional and functional requirements meant to improve user confidence and satisfaction to make trip planning easy.

5.2. Project Limitations

The TripTally system has some limitations that can be addressed in the future. While the system directly connects with hotels to provide users with details such as pricing, location, and reviews, it does not include real-time information about room availability. This means that users cannot see whether rooms are available on their chosen dates through the system, which may require them to verify availability through other platforms or directly with the hotels. For attractions,

TripTally only provides general ticket prices for one adult and does not offer options for child rates, group pricing, or real-time availability. Additionally, the prices shown in the system may vary due to factors like seasonal changes, promotions, or discounts, as these details are not updated dynamically. These limitations exist because the current focus of TripTally is on testing the effectiveness of its budget tracking feature before incorporating more advanced functionality. Finally, since the system relies heavily on Google APIs for features like mapping and recommendations, it requires a strong and stable internet connection to function properly, which could be challenging in areas with limited or slow connectivity.

5.3. Future Works

In order to enhance the TripTally system and make it a little more user-friendly, suggestions for improvements beyond that include the introduction of a chatbot functionality to assist users by answering questions, providing travel suggestions, and directing them through the platform. The platform will become more engaging and will offer a great interactive experience. Also, it would be very helpful to establish direct channels with hotels and attractions to know the room or ticket availability in real time. That way, the user can make an informed decision without going backstage to check availability through other platforms. In addition, TripTally might incorporate recommendations with regard to affordable nearby restaurants or trendy eateries within travel destinations. This would enhance the travel experience overall by exposing users to local cuisine and dining possibilities.

Other potential future enhancements include developing a mobile application that allows users to plan their trips anytime on Android and Apple devices. The introduction of multilingual support would mean being more inclusive towards tourists of different backgrounds. AI-based recommendations could give highly personalized travel advice based on the user's preferences and traveling patterns. The ability to work offline would allow access to necessary information, such as itineraries and budgets, without an active internet connection. Notifications for price drops, promotions, or local events near the destination could also be

evolved to keep the user updated. Features such as group travel planning and tracking the impact on the environment would bring additional value in that they foster collaborative trip management and eco-anxiety-friendly travel choices. These change requests would make TripTally a more all-encompassing travel solution and versatile to suit all types of travelers.

5.4. Chapter Summary

This concluding chapter reviews the TripTally project by summarizing both its accomplished objectives and its areas of restriction together with post-project optimization possibilities. The project developed an easy-to-use platform which solved standard trip planning obstacles by offering budgetary control features and tailor-made suggestions and quick decision assistance. TripTally demonstrates significant value to travelers who now plan their trips with better ease because of its simplified design and improved satisfaction levels. The system requires additional enhancements through the integration of real-time booking capabilities together with expanded functionality to fulfill diverse user requirements. Several improvements are proposed to advance the application and maintain TripTally's position as a dependable innovative budget-friendly travel planning solution.

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