**Back Yard Adventure System Design Report**

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## Back Yard Adventures System Report Introduction

In today’s day and age, sufficient information technology systems are required for modern business to operate to their full potential while opening the door for scalability and innovation. Without the proper system, business are essentially held back from reaching their full operational and financial potential. As such, proper system design, along with testing and implementation, is the difference between a successful information technology system, and a subpar system. Often times businesses may have a hybrid model of digital and manual systems to complete a certain task.

Although operational, these hybrid models are not always optimal, leaving room for improvement. Such is the case with Back Yard Adventures. A successful sports rental company with optimal opportunity to grow. The current system they have in place follow the above-mentioned hybrid model. As such, glaring constraints are introduced with the current system at the present time. However, with the implementation of a new system, these issues will be address, allowing Back Yard Adventures to continue to provide their services to their current market, as well as future markets.

**Problem Scope & Feasibility Study**

Backyard Adventures is in the business of rentals and tour guides. The company consists of 3 individuals. Harry Weaver, Shawn Weaver, as well as Melissa Smith. All three individuals have a hand in the daily operation of running Backyard Adventures. After analyzing their current system, optimal improvements can be made to assist the company with efficiency, scalability, and insight on their market. With these improvement’s, the business as a whole will have the opportunity to thrive.

However, before project initiation, it is always standard practice to conduct a feasibility study on whether or not the project will yield a positive result. This study is conducted by answering three important questions. The first is whether or not the project is technically possible? Indeed, it is, there are a myriad of technologies at our disposal to implement and maintain this project. The second question is if this project is achievable within the budget? Again, this project is indeed achievable within the allotted budget. With the variety of technologies available to us, the cost of implementing and using these technologies are inexpensive. And lastly, will the system do what it is supposed to do? This will be a yes as well, proven working models are already implemented on a larger scale with other businesses.

The objective of this project is to replace the current system with a system that is easily manageable, flexible, customizable for the staff of Back Yard Adventures, as well as easy to use, simple and intuitive for its customer base. This is being completed to eliminate various issues such as manually logging information into a database for daily schedule reporting, and conflicting schedule times between customer requests and staff availability. This is also being completed in order to introduce new data points for customer and sales analytics, to streamline the current financial bookkeeping process, to introduce online scheduling and payment options for customers and to provide a technological foundation for Back Yard Adventures to scale off of in the future.

Stakeholders include Harry Weaver, Shawn Weaver, Michelle Smith and Morrese Morrison. Major deliverables include a revamped modular system that Back Yard Adventures may utilize that will eliminate paper or manual processes in order to fully conduct business. Milestones will be broken down in months for ease of trackability and management. Constraints with this project may include time as the implementation and development of this project will require a certain amount of time to ensure quality. Another constraint that may occur is resources, specifically human resources as a competent programmer will need to be onboarded for the development and maintenance of the new system. The budget of this project will have a technology limit of $2,500. This includes anything hardware, software or online service related. The budget will also have a personnel budget of $4,500 to hire a computer programmer staff member to assist with the development of the new system as well as the future maintenance of the system. The $4,500 cap will be the maximum wage total that the new hire will receive for one month, which is the overall duration of the project. In total, the budget will be $7,000.

Potential risks include overall maintenance of the system which may be time consuming. With multiple parts integrated together, support and maintenance will require a skilled computer programmer to ensure operational use. Benefits include increased scalability and insight with the digital system. The website can introduce Back Yard Adventures to a larger customer base and perhaps a second location. Insight will be introduced through new data points linked to customer profiles, in regard to their time of reservations, their reservation type, and the frequency of their reservations. This insight can shed light on new marketing campaigns and techniques that Back Yard Adventures may implement in order to gain more customers.

**Functional Requirements & Requirement Gathering**

Before functional and nonfunctional requirements are set, requirements in general first need to be gathered. Requirement gathering is necessary so we may “know what it is supposed to do” (*Webber, n.d).* “It” of course meaning the system.For confirmation, meetings and live system observations will be held to confirm the proposed solution. However before then, after reviewing the current system on paper, a mockup of a proposal has already been set in place. As such, functional and nonfunctional requirements have been identified.

Specific functional requirements are required to accurately outline and depict what the system should be able to accomplish. Such functions “need to be necessarily incorporated into the system as a part of the contract” (*Functional vs Non Functional Requirements, 2022).* These requirements need to satisfy the customer’s needs. These needs have to be accurately depicted and expressed so the design of the system can meet these needs. Functional requirements for this system are to include the ability to eliminate scheduling conflicts, to provide daily booking information to the staff, to record customer information such as age, sex, race, email, and phone number. As well as the ability to provide data for business opportunities via analytics. This includes rental patterns, customer profiles and advertising effectiveness. The system should also contain the ability to effectively handle financial transactions and records. This includes receiving payments online, in person and for overall financial bookkeeping. Lastly, the system should allow the staff to have full control over bookings. Changing, adding, or cancelling if needed.

Not only are functional requirements necessary, but nonfunctional requirements are needed as well. This includes the “quality constraints that the system must satisfy according to the project contract” (*Functional vs Non Functional Requirements, 2022).* These nonfunctional requirements include maintainability, scalability, performance, reusability, and flexibility. With the overhaul of the new system, these non-functional requirements will be met. The front end will be a website that is forward facing, allowing users to log in and schedule their booking. These reservations will then be synched to the Back Yard Adventure Staff’s reservation calendar for the week through the website as well as text message and email alerts. Online booking payment will be handled via apple pay, Google Pay, Debt or Credit.

These payments will be funneled to Back Yard’s Adventure’s MySQL database for record keeping. From there, that data will be synched to Quick Books for anything related to accounting. Because of the information that will be stored in Back Yard Adventure’s MySQL database, a Customer Relationship Manager application can be tied to the database as well to provide insight on customer information. Also, various reporting method’s such as the use of Power BI can also be utilized by tying into the company’s MySQL database to create custom reports.

This was a brief overview of the proposed system, however both nonfunctional and functional requirements are met with these specifics. However, with any system, limitations and constraints still exists. One of the main limitations or constraints is the technical know-how in order to effectively navigate, support and maintain the system. All though not extremely complex, a competent individual with proficient computer programming training should be in place to manage the new proposed system. Another possible limitation is the technologies itself. Because this system is modular in design, all of the pieces need to line up for the system to flow optimally. What happens if one of these services are down? That can cause an issue with daily operation. These possible limitations will be properly addressed and planed for to mitigate any reputational or monetary loss if any of these constraints or limitation occur.

**Design Specifications & Cost**

The overview of the system was briefly mentioned in the previous section, along with the functional and nonfunctional requirements. However, a more in-depth analyzation will be needed in regard to the technical layout, cost, software, hardware, and benefits involved with the new system and its implementation. Specifications can be broken down into two sections. specifications for the customer, and specifications for the Back Yard Adventures Staff. For starters, we will take a look at the necessary specifications for the customer’s that will have a hand in using the new system.

There specifications include the ability to view bookings for the week, to book either a tour guide or rental. To utilize a website to view their current bookings, past bookings, and future bookings. With their booking’s, they should be able to utilize an online payment system integrated with the website upon check out to pay for their reservations. This includes the utilization of Apple Pay, Google Pay, or entering credit card and debit card information. Customers should also be able to cancel or change any reservations. All of this will be taking place within Back Yard’s Adventures new Shopify Website. The Shopify Website will allow customers to create their own user account and have control over their bookings and orders.

Now for the staff side of this new system. The specifications that the Back Yard Adventures Staff will need is the ability to view customer bookings, past, present, and future. However instead of a physical report, these bookings should be viewed on a mobile device such as a tablet, cell phone, laptop, or desktop computer via the Shopify Website. These bookings should be dynamic if customer’s cancels or change booking times. The staff should also have admin permission to the Shopify Website, to manually edit or add customer bookings. In addition to having the ability to add new services or products easily. As a whole the Shopify Website will have a prebuilt template installed for use. This template will provide high customization, with the ability to add different locations and duration time. You can also set dates of availability as well as auto assign appoints to certain individuals within the staff. Or let the customer choose. These reservations can also synch with google calendar if need be.

With each sale or new customer, the data will be synched via the service Zapier to the companies MySQL database. The current database that is being utilized is Microsoft Access. However, for ease of use, scalability, and availability, the current Microsoft Access Database will be migrated to MySQL within AWS. This expands the area of opportunity from a scalability and data perspective with utilizing MySQL that Microsoft Access unfortunately cannot handle. The data that will be synched to MySQL will be customer information, transaction records, and reservation records. Tables will be created in 3NF to accurately record such information. Future tables will be created and implemented as the company grows. However, for now, this is a starting point. From a hardware perspective, Shopify POS devices will be installed at Back Yard Location’s main office, and for their mobile devices.

Zapier will be utilized once again to connect MySQL to Quick Books. This will eliminate manual entry and provide a centralized location for Back Yard Adventures accounting needs. Since this data will be synched via API calls utilizing Zapier, Back Yard Adventure will be able to scale without depending on manual process that may require more staff. Another important factor of this system is the use of a data visualization tool to view sales and reservations. With all of the company’s data being synched to MySQL, connecting Power BI to the database to create custom reports and visualizations will bring much needed sales and customer insight to Harry and Shawn. This may shed light on new business opportunities that can be provided to Backyard Adventures customer base. In addition, a CRM application may be synched with MySQL as well to view customer profiles and spending habits.

The main benefit of this system is that it is automated and dynamic. Eliminating the chance of user error as well as manually updating and entering reports. This free’s up everyone’s time to operate the business effectively. Another benefit is that the system is effectively off premise. With the utilization of Shopify, Zapier, MySQL, AWS and Power BI, these services can be used not just at Back Yard Adventures home location, but in another location, if need be, or mobile. This eliminates overhead and security concerns as the company’s data is off premise and secured via AWS, and accessible virtually anywhere. Also, this brings agility to the company as new products and services can be quickly offered to customers without a lot of back-end work on the system side.

Software outsourcing will not be utilized but resources within the organization will be utilized. In particular, Insourcing will be utilized. This is defined as “using resources within an organization” (Zandergen, n.d). Currently Back Yard Adventures does not have a staff member to assist with the development and deployment of the system. However, one will be onboarded. This presents the opportunity of the developer seeing the system from start to finish. Having the opportunity to knowing the minute details of the system and its inner workings. All of this ultimately goes back to the cost of this new system, taking account of human resources and the software that will be used.

Pricing in regard to Shopify will be $105 per month. This pricing model was mainly selected for its inclusion of the Shopify Payments merchant process system, which will be heavily utilized within the new system. The use of Power BI will be $9.99 per month for one user. Opting for the Power BI pro version will give Back Yard Adventures the ability to fully create dashboards and reports with unlimited viewing and the ability to share reports as well. Four licenses will be needed in total, totaling $39.96. Zapier provides several options for their automation services. The starter service plan which costs $49.99 a month if billed annually is an excellent starting point. If additional capability is still needed, the account can be upgraded to accommodate any future needs.

Hardware purchases include three ninth generation Apple iPads for $459 per unit. These iPads will be utilized to view reservations, communications and process any payments. Four iPads will need to be purchased totaling $1,836. These iPads will all have cellular capability to increase mobility. In addition, four Shopify Tap & Chip Card Readers will be purchased as well to compliment the use of the iPads. These devices cost about $49.99 for a total of $199.96 excluding taxes. Lastly, the purchase and utilization of AWS RDS for MySQL. An outright price is not provided by Amazon. Instead, their pricing model is based off of use, power, size of the database, the database engine type, whether the database is reserved or on demand, and whether or not payment will be provided up front, partial or no payment for services. For our system we will be utilizing a reserved instance of a Medium MySQL size.

The rate for that is $0.065 per hour. There is roughly 730 hours in a month, so by multiplying 730 by $0.065, you will come to a price of $47.45 roughly. Storage will also need to be calculated as well; general purpose SSD storage goes for a rate of $0.115/GB per month. By a rough estimate, assuming the data that will be consumed is around 50GB. You would then multiple 50 by $0.115 to equal $5.75. Lastly input/output operations will also need to be calculated. Since we will be utilizing Zapier automation, data will be traveling quite frequently, as such this cost should be factored in as well. This calculation is a bit more arduous as we do not have a baseline of the input and output size that will be regularly traversing through our database. However, once we have data traversing to and from our database, we will be able to calculate monthly estimate.

In total, technology related costs will amount to $2,254.12. Personnel cost will amount to $4,400. Totaling $6,654.12. This is under budget with a saving’s amount of $345.88. The remaining $345.88 can be used as discretionary spending for any additional taxes related to purchases or personnel on boarding cost. However, any amount after that may be fully saved.

**Testing, Implementation & Maintenance**

With any new system, testing is paramount before the official rollout. With this new system, we will be implementing a hybrid testing model. A cross between system integration and user acceptance testing. We want to fully test the system from top to bottom on the system side. Making sure each link is firmly connected to the next. With system integration testing, this method “checks how well the software interacts with other software application”(Ransom, n.d). User acceptance testing deals with “whether the software or system works for the end user” (Ransom, n.d). Utilizing both of these methods will ensure that the system is not only functional, but useful on the operating end by the staff.

Implementation is also paramount for adopting a new system. There are many methods to consider, however we will be utilizing the direct cutover method. The direct cutover method involves “the organization selecting a particular date that the old system will not be used anymore”(Pham et al., 2021). This will be for both the staff and Backyard Adventures staff. This method is indeed risky. If the new system has any issues, this can drastically slow down the daily operation. Barring any technical or service-related outages, our hybrid testing approach will attempt to identify and mitigate any possible future issues that may occur. Of course, anything can indeed happen, but effective and tedious testing regarding different scenarios that may occur will dampen the likely hood of any major issues when the direct cutover date is finalized. Training of the system will commence before the direct cutover date in conjunction with user acceptance testing. This accelerates the timeline as two action items are completed at the same time.

Finally, maintenance. Maintenance as a whole also important. If a system is too cumbersome and needs to be maintained heavily, this can take a way precious time from other pertinent business operations. Heavy maintenance also costs more as more time and resources are allocated to the upkeep of the system with diminishing returns. Maintenance for this system is light in regard to improving performance, and operation efficiently. Shopify, Power BI, Zapier and AWS RDS SQL for the most part are self-sufficient. Occasionally you may have to update the Power BI desktop or app client, as well as make cosmetic website changes to the Shopify site. Occasionally you may have to update the MySQL desktop program as well. You may also have to update the iPad OS to the latest Apple release as well.

But as a whole maintenance will mainly come from the programming side. Making sure the data that is being funneled into the MYSQL database and from the database is accurate. Maintenance regarding API call’s within Zapier may have to be configured depending on the current need. But these efforts will not require a lot of time and resources. Which again, allows resources for other operational ventures.

## Conclusion

Conceiving, developing, testing, and implementing a new system requires multiple pieces. All of these pieces must fit each other to create the end product. Replacing Back Yard Adventure’s current system with the new system will enable Back Yard Adventure to fully go digital in regard to their process. Remain light and mobile with operations. And open the door for future expansion. With the integration of Shopify, AWS and Zapier, this will be made possible.

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