

ASSIGNMENT COVER SHEET

Course: BSc Computing		Year: 3	Software Engineering 3
Assignment No: 1		Title: The Design and Development of Client-Driven Software Solution Using a Rapid Application Development/Agile Hybrid Development Methodology	
Date due out:	Date due in:	Extension date:	Extension agreed by:
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Student comments, specific request for feedback etc.		Marker's General View of the work	

ASSESSMENT FEEDBACK:

RATING SCALE	Excellent (A- - A+)	Good (B- - B+)	Satisfactory (C- - C+)	Needs some more work (D- - D+)	Needs much more work (F+ - G)
Problem Domain Elicitation (15%) (Including Problem Domain Workshop Plans, Findings and Facilitation)					
Requirement Specification Formulation (15%) (Including Requirements Elicitation Workshop Plans Findings, Facilitation and Final Specification Documentation)					
Facilitation Observation and Critical Review (10%)					
Prototype System Design (Including Design Documentation) (10%)					
Prototype (30%) (Including Prototype Functionality, Quality of Application Code and Implementation Development Plan)					
Testing/Evaluation Strategy (10%)					
Client Presentation (10%)					
Specific aspects of your assignment that the marker likes:	Specific aspects of your assignment that need more work:				
Tutor's Signature:	Date:	Grade:			

Demo Video Link: https://northampton.mediaspace.kaltura.com/media/t1_qrd6etsi (Kaltura) and
https://drive.google.com/file/d/1rOKmpN8RY7rGMeZGeB40by1_GoXjVIPb/view?usp=sharing (Drive)

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1. INTRODUCTION

This project intends to produce a computerized solution to Claybrook Zoo, where at the time of writing, a clerical system is being used to handle the zoo's information. The methodology will be client-driven and will focus on client satisfaction. A Hybrid-Agile or Rapid Application Development methodology will be utilized to come up with the solution. The initial steps will involve workshops to elicit problem domain information as well as the requirements. The project will be broken down to several steps including the final prototype development phase. The prototype development phase will include development of the system in steps or blocks according to the functionalities and their priority. This report is structured to contain the requirements engineering documentation, specification and design documentation.

1.1 Project Background

The key focus of this project will be the addressing the requirements elicited from the provided documents and workshops through a web application. It will consist of information about the animal database such as species, gender, description, etc. as well as their location such as The Aviary, The Hothouse, etc. and different characteristics relevant to specific types of animals such as mammals, birds, fish and reptiles. This information is to be made available for the zoo's visitors through the system. The basic background information is provided in the form of a client-supplied requirements document. Other ambiguities are to be addressed through the joint workshops involving the clients and the design team.

The must-have features made available through the client-supplied document include the ability to add, remove or search animal records in the zoo and the ability for the visitors to obtain relevant information. Other complex features are also provided which are to be added in corresponding time blocks as they have lower priority. These complex features include allowing search with multiple criteria, inclusion of animal sponsorship scheme, inclusion of location such as cages or tanks or compounds, Internet-ready animal catalogue pages for visitors, relevant security features, automated reports and technologies to incorporate touch-screen features. The final outcome will be an online web application that includes all of these features. The project will be completed in different phases, including additional features in terms of their priority and ease of implementation during each phase.

1.2 Project Aims and Objectives

The main aim of this project is to come up with an online web application for Claybrook Zoo that will address the features or requirements provided by the clients, discussed in workshops with the stakeholders and discovered through similar systems in order to transition the existing clerical system to a computerized system. In order to achieve this, the objectives could be set to:

- Study and understand the provided information including brief and the documents.
- Formulate plans and other requirements for conducting the workshops to address any ambiguities or missing information from the provided documents.
- Collect the necessary problem domain information and understand the requirements via the workshops.
- Document the elicitation plans and findings including relevant legislation, comparable systems, which is followed by requirements specification documentation.
- Conduct design workshops involving relevant stakeholders and proceed the prototype to implementation.
- Through a series of consulting and confirming with the client, implement all the basic as well as core functionalities to meet the requirements (in blocks).
- Test and evaluate the system also involving the clients where relevant.
- Confirm and present the final system to the client.

2. REQUIREMENTS ENGINEERING

Requirements Engineering is a very crucial step and will comprise of understanding the problem domain and requirements.

2.1 Elicitation Activities

Elicitation activities will involve group workshops for problem domain information and requirements gathering, JAD (Joint Application Design) workshops for client agreement, study of client-supplied documentation and review of relevant comparable systems.

2.1.1 Individual Workshop 1 Plans

This section contains the plans for conducting the first workshop. This workshop will be used to gather problem domain information as well as the requirements from the clients.

2.1.1.1 Rationale

The first workshop will focus on collecting the requirements as well as providing an understanding of the problem domain. Upon completion of the workshop, the design group should have a clear understanding of the problem domain and the area of expertise in order to solve the problems (requirements). This includes the size and scope of the problem domain, business processes, the input output processes and the stakeholders' involvement within the organization or outside the organization (Zoo staff, sponsors and visitors). The workshop will also aim to gather all the core as well as additional requirements to build the system. The key objectives for the workshop can be listed as:

- To understand how the current clerical system works including the sponsorship scheme and visitor experience.
- To learn about the different type of data, including input output formats which the current clerical system uses.
- To learn about the budget and time scales for the project.
- To learn about the key features required in the new system (requirements).
- To learn about the additional or optional features.

2.1.1.2 Agenda

Time: 7:30 AM

Date: 23rd Feb 2020

Venue: Workshop 103

Expected Workshop Duration: 1-2 hours

- Confirm the attendance of all necessary members
- Introduction of the guests including their role
- Discussion of the problem domain, about how the zoo functions in general.
- Discussion of current visitors' experience.
- Discussion of the sponsorship scheme.
- Discussion of final requirements.
- Budget and timeframe discussion.
- Workshop adjournment.

2.1.1.3 Rules

- The people with comprehensive knowledge about the problem domain must be present.
- The agenda for the workshop must be followed.
- Everyone's views and points are equally considered or prioritized.
- There should be no side talk.
- The topic should not deviate from the scope of aim and objectives.

2.1.1.4 Questions

Mark Jones (Zoo Manager)

- What is your motivation for shifting from a clerical system to a computerized system?
- Have you studied competitors' software to know what benefits they have over you and what exactly are you looking for from the planned system?
- What problems are you currently facing with the existing system?
- Could you tell us about the planned budget and timescales for this project?
- Did we miss any important discussion?

John Smith (Regular visitor)

- Have you visited other zoos with an existing computerized system? What are the benefits in such zoos?
- What is your take on the change about to be attempted by the Claybrook Zoo?
- What is the most interesting aspect of a zoo to attract visitors and how could a computerized system address it?

Georgia Rodgers (Sponsorship Administrator)

- From a zoo's perspective, what could be the most important aspect to run a successful sponsorship scheme and how could a computerized system aid?
- How does your current sponsorship scheme function?
- Do you want the system to handle payments from sponsors or will you be dealing with this separately?
- Did we miss any important discussion?

Laura Brown (Business owner)

- What are your current benefits from sponsoring animals in the Claybrook Zoo?
- From a sponsor and a business owner's perspective, what is key for running a successful sponsorship scheme?
- Have you come across any other zoos or a similar business with compelling sponsorship schemes and its integration in a computerized system?
- What are the main benefits you look forward to from the proposed system?

2.1.2 Group Workshop 1 Plans

This section contains the group finalized plans for conducting the first workshop. Some of the matching points from the individual plans are repeated in the group plans.

2.1.1.1 Rationale

The aim of conducting the workshop, is to gather requirement specification of all key stakeholders, by understanding their problem domain. All existing problem within the problem domain shall be discussed for meeting stakeholder's requirement. Discussion includes size and scope of problem domain, existing and proposed business process, input/output process.

In order to fulfill the aim, the objectives can be listed as:

- To gain an understanding of how the current clerical system works (problem domain and Business Logic).
- To understand expectations of key Stakeholders from the system solution.
- To have in depth understanding of all problem that exists within the problem domain and finalize on problem that can be solved through proposed solution system.
- To learn about the existing sponsorship scheme.
- To learn about the different type of data, including input output formats which the current clerical system uses.
- To learn about the current visitor experience in the zoo.
- To learn about the project time scales and budget.
- To have in depth knowledge about requirement of all key stakeholders.

2.1.1.2 Agenda

Time: 7:30 AM

Date: 23rd Feb 2020

Venue: Workshop 103

Expected Workshop Duration: 1 hour

Time	Activity
7:30 AM	Confirm all the necessary members are present
7:35 AM	All the guests from both parties will be introduced, commencing the workshop formally.
7:35 AM	Discussion of the problem domain, about how the zoo functions in general. Discussion of existing business processes. (Questions prepared for Mr. Mark Jones to be asked).
7:55 AM	Discussion of current visitors' experience. (Questions prepared for Mr. John Smith to be asked).
8:05 AM	Discussion of the sponsorship scheme. (Questions prepared for Ms. Georgia Rodger Ms. Laura Brown to be asked).
8:20 AM	Budget and timeframe discussion.
8:25 AM	Adjournment (Confirm that all gathered information is interpreted correctly, if any information is left out.)

2.1.1.3 Rules

- There should be no side talk.
- Both parties are expected not to eat during the interview.
- Any questions that needed to be addressed, shall be given time at the end of each session. So, no disturbance is expected during actual discussion process.
- The topic should not deviate from the scope of aim and objectives.
- Silence means agreement.
- All team members are required for the entire duration of the JRP.
- Smartphones and handheld devices should be kept in silent mode throughout the workshop.
- Express all questions clearly, using plain language (no jargon).
- New session can only be commenced after completion and agreement of all parties on recently conducted session.

2.1.1.4 Questions

Mark Jones (Zoo Manager)

- Can we have brief understanding of existing processes of the zoo? Are there any documents such as System Document, Employee manuals, Business related documents? If yes, can you provide us these documents?
- What is your motivation for shifting from clerical based system to computerized system?
- Have you studied other competitor's software for in depth knowledge of the system you desire to be implemented in your zoo?
- What do you think are the must have functionalities you want to integrate in this system?
- Taking about ticketing system, what is the business process you follow for ticketing of visitors?
- How do you want your ticketing system to be integrated in new system?
- What are the problems you are facing as a result of clerical system?
- What is the allocated budget of this project?
- What is the deadline of the project?
- Did we miss any aspect you want to have discussion on?

John Smith (Regular visitor)

- Can you give us insight about your current experience of zoo visit?
- What do you think are lacking to enhance your visiting experience in the zoo?
- Have you visited other zoos as well? What difference you found during your visit to other zoos compared to this one?
- From customer's perspective, how do system be designed, to gain full experience from their visit?
- What are the features, that should be integrated in this system to improve visitor's experience in this zoo?
- What effort has this zoo been doing to enhance your visiting experience? How do you want navigation system of zoo to be operated in new system? (navigation system include map of giving direction to all animal available in the zoo)

Georgia Rodgers (Sponsorship Administrator)

- Can you explain about current sponsorship scheme?
- What is most important aspect to run a successful sponsorship scheme?
- What are the benefits you provide to sponsors?
- What are the different levels of sponsorships you would like to provide for the sponsors? For example: \$100 sponsorship package with certain benefits included in that package.
- How long does a typical sponsorship scheme last? Should it be included according to the level or sponsorship?
- Do you need an integrated payment method for sponsorship, or will it be handled separately?
- Do you have any other important aspects about the sponsorship that you would like to tell us?

Laura Brown (Business owner)

- Do you feel being benefited from current sponsorship scheme?
- In your view, what needs to be included for a successful sponsorship scheme for a zoo like Claybrook?
- Do you know about any other compelling sponsorship schemes provided by other competitors that you would like to see in this system?
- What are the key benefits you look forward to in the new computerized system?

2.1.3 Workshop 1 Findings

Stakeholder	Question Number	Questions & Responses
Mark Jones (Zoo Manager)	001	<p>Question: Can we have brief understanding of existing processes of the zoo? Are there any documents such as System Document, Employee manuals, Business related documents? If yes, can you provide us these documents?</p> <p>Answer: As far as how the zoo operates, it has been provided in the brief so I would request you to go through the brief again. We have also provided you with a folder with sample documents and forms and other documents. There are some important documents that you might find helpful.</p>
	002	<p>Question: What is your motivation for shifting from clerical based system to computerized system?</p> <p>Answer:</p> <ul style="list-style-type: none"> • We are trying to move from the clerical system to a computerized system because our competitors have already adopted themselves to operate a computerized system. • Also, our visitor numbers are declining, and it is becoming a cause for concern as 80% of our revenue comes from visitors, 10% from food sold in the zoo and 10% from sponsorship. • It is also difficult to keep track of the animals in the current system. • Another thing is that most of our visitor's demographics is teenage population. The teenagers are more accustomed to using the latest technology whereas we only have static signages of animals besides their location. They probably have no

		<p>enthusiasm when they see the same repetitive things.</p> <ul style="list-style-type: none"> • We are also facing issues of keeping records of animals as well as staff. • Also, we have events at different times, and we give away fliers. We want as much people as possible to participate in the giveaway, however, the only ones present in the zoo or signed up for mails during the giveaway get a chance to participate. Sending letters to thousands of people also costs a lot of money also noting that the letters have a chance of getting lost in the way. If we could have it up on the website, it would be easy to advertise and notify people about these kinds of events. Ultimately this should rise our visitor numbers as well, as many people can get access to all the information.
	003	<p>Question: Have you studied other competitor's software for in depth knowledge of the system you desire to be implemented in your zoo?</p> <p>Answer: Basically, our staff have been with us for a long time and are older generation. They are not quite accustomed to newer technology. We have not quite looked at our competitor's systems in terms of gaining depth knowledge from them and in fact, we wish your team could look into those systems to come up with good and bad aspects.</p>
	004	<p>Question: What do you think are the must have functionalities you want to integrate in this system?</p> <p>Answer:</p>

		<ul style="list-style-type: none"> • The system that we are envisioning is a record management system. We should be able to keep animal and staff records. Another will be the website for the general public to view and search the information. • We want to have something like a watchlist for animals. It is for cases where the animals are sick, and we put them on the watchlist. The zookeepers can login to the system and they can look at the animals that are on the watchlist. • We would also want the signage of animals in an electronic form. Signages contain information about the animals and are put in front of their location. Electronic signage could allow us to change the information and prevent it from being static which the visitors are probably bored of. We also want the information of the signage in the website. We could also have QR code in the electronic signage where the visitors could scan and get the information about the animals through the website. The main goal is to make it interesting specially for the children.
	005	<p>Question: Talking about ticketing system, what is the business process you follow for ticketing of visitors?</p> <p>Answer:</p> <ul style="list-style-type: none"> • In the current system, we have few ticket counters and sometimes people have to stand on the line for more than half an hour. The new system should allow the visitors to book their tickets online and also, if possible, have an integrated online payment system.

		<ul style="list-style-type: none"> • In the website, we can also have deals and promotions for example: we can have for ten tickets, giving away one extra ticket for free. We can have other events such as animal of the week and other events.
	006	<p>Question: How do you want your ticketing system to be integrated in new system?</p> <p>Answer: <i>Answered in previous question, so did not ask.</i></p>
	007	<p>Question: What are the problems you are facing as a result of clerical system?</p> <p>Answer: Keeping the records, children aren't interested because we are lagging behind in terms of technology and we are losing visitors because of this. I think we talked about this earlier.</p>
	008	<p>Question: Shall we discuss about the budget and timescales of the project?</p> <p>Answer: We basically want to hold the discussion about budget after we look at the prototype. About the timescales, we want the prototype to be finished by the end of April. We also wish to be updated about the progress of the system from time to time. Perhaps this would allow us to provide you with helpful feedback.</p>
	009	<p>Question: This is the end of our questions. Did we miss any important topic?</p> <p>Answer:</p> <p>We are sending out all these letters through physical mail, it would be great to allow the customers to sign up for</p>

email and we could send the fliers and leaflets through email.

We want to keep our working procedures and not change the processes but have to automate as much aspects as possible through the electronic system.

The system should be usable and easy to navigate, intuitive as our staff are not too familiar with using the latest technology.

We also want to see the contact details and maps for the zoo, perhaps integration of google maps.

We also thought about a separate game section for kids where the kids can play a game about animals. For example, matching food with animals. This should encourage them to visit the zoo.

I think another aspect that needs to be taken care of is about the accessibility for disabled people and the legislation such as the data protection act and other relevant ones.

On top of games, it would be great if we could add some videos related to animals to the website.

It would be great if we could have a kind of content management which would allow for example to manipulate the forms or labels without your aid in such minor issues.

We could also integrate social media.

In the summer, we have more visitors and we need more staff, so a separate vacancy system could be very helpful where we hire a lot of students who are willing to work.

We wish to be able to update images for animals as they grow.

In the watchlist, some animals could require more care than others and we could add a field such as severity which would indicate which animal requires more care and let the zookeepers know.

		<p>Also, I think we did not talk about the level of access in the system. We will require three levels of access in the system. The highest level of users will be administrators. The administrators will basically be able to do everything in the system such as adding, managing and deleting records. The second level of users will be managers who should be able to add and update animal records. The other thing is sometimes deletion could be accidental or due to some malicious intent. We would like to prevent such accidents to cause us loss of data and thus would like them moved to somewhere like a trash or archived directory instead of direct deletion. The third level of access is for zookeepers. The zookeepers should only be able to look at the animal records, not operate with the data but only view the data.</p> <p>We need a good basic as well as advanced search with advanced search criteria.</p>
John Smith (Regular visitor)	001	<p>Question: Can you give us insight about your current experience of zoo visit??</p> <p>Answer: I am a regular visitor of this zoo who has been visiting since my childhood. This zoo is very dear to me as it is in my locality. I love animals and regularly visit this zoo. Lately though, I have started to feel that everything is always the same and sometimes I don't get the newsletters and there are a lot of problems. I really wish for some changes. Maybe we can have a calendar feature in the website as I miss a lot of events. Perhaps I could go to the website and find out about any upcoming events. Another problem is about ticketing, I have to stand in long queues. These are basically some of the problems I have been</p>

		facing. Also, on a different note, having a digital signage would also be very great.
	002	<p>Question: What do you think is lacking to enhance your visiting experience in the zoo?</p> <p>Answer: <i>Answered in previous question, so did not ask.</i></p>
	003	<p>Question: Have you visited other zoos as well? What difference did find during your visit?</p> <p>Answer: Yes, I have visited quite a lot of other zoos as well because I love animals and watching them keeps me very relaxed. The other zoos are very updated in terms of management and technology. I would love to see the same level of integration of modern technology in this zoo as well.</p>
	004	<p>Question: From customer's perspective, how should the system be designed, to gain full experience from their visit?</p> <p>Answer:</p> <ul style="list-style-type: none"> • From my perspective, of course I think there should be online ticketing system. • Getting information through the website and email. • Also, games would be a very good addition. • The website should be very appealing – simple yet elegant.
	005	<p>Question: What are the features, that should be integrated in this system to improve visitor's experience in this zoo?</p> <p>Answer: <i>Repetitive question.</i></p>

Georgia Rodgers (Sponsorship Administrator)	001	<p>Question: Can you explain about current sponsorship scheme?</p> <p>Answer: I think from the brief, you might have gathered that we have the sponsorship scheme for animals where local businesses pay certain amount of money for the upkeep of the animal throughout the year. Also, it comprises 10% of our revenue.</p> <ul style="list-style-type: none"> • Our sponsorship scheme runs from 1st of January through 31st December. Whoever sponsors the animals, they are responsible for the upkeep of the animals from the 1st of January to 31st of December. The actual process for signing up for sponsorship begins in September because we need to do all the paperwork. One of the things we want to reduce is the involvement of too much paperwork like the papers, contracts and sponsorship forms. • In September, the regular sponsors have to renew their sponsorship where we send them a newsletter regarding continuity of the sponsorship for the next year. If they want to discontinue, we have to find new sponsors. • We could have a separate area for sponsors where they login and get notifications about the continuity of sponsorship. Currently, we are facing a lot of problems where sometimes the physical letters don't reach the businesses in time, or they are lost, and the response is quite late. Also, sending physical email is costing us a lot of money

		<p>which could be prevented through this computerized system.</p> <ul style="list-style-type: none"> • Coming back to the sponsorship contracts, the latest we need to hear from the sponsors is 15th November, otherwise we assume that they are not interested in the scheme. This opens up talks with other sponsors. In the website, it could be helpful if there is a separate area to list the animals that are available for the sponsors. • The system can help us by allowing us to advertise about the sponsorship scheme. Things like testimonials from existing sponsors could encourage more businesses for participation. • About the advertisement, usually people do not like to see too much ads or ads in general. So, what we can do is, in the signage, we take a small area to provide the sponsor's advertisement and clicking the advertisement should take the user to the business' website. • Also, when businesses see the list of animals they can sponsor, they should be able to fill up the sponsorship form and submit it. They submit the form; we go through their submission and could contact them later regarding further proceedings. We can allow the sponsors to register in the system, provide them a separate space to interact with the sponsorship forms, the sponsorship renewal and payment. This would prevent a lot of paperwork, money and time.
	002	<p>Question: What is most important aspect to run a successful sponsorship scheme?</p> <p>Answer: <i>Answered in previous question, so did not ask.</i></p>

	003	<p>Question: What are the benefits you provide to sponsors?</p> <p>Answer: <i>Answered in previous question, so did not ask.</i></p>
	004	<p>Question: What are the different levels of sponsorships you would like to provide for the sponsors? For example: \$100 sponsorship package with certain benefits included in that package?</p> <p>Answer: The cost associated with different animals is different. We can display the list of animals that are available for sponsorship and right beside the animals, we could list the level of sponsorship required for the animal. For example, a tiger would require higher level of sponsorship than a rabbit.</p>
	005	<p>Question: How long does a typical sponsorship scheme last? Should it be included according to the level or sponsorship?</p> <p>Answer: <i>Answered in previous question, so did not ask</i></p>
	006	<p>Question: Do you need an integrated payment method for sponsorship, or will it be handled separately?</p> <p>Answer: <i>Answered in previous question, so did not ask.</i></p>
Laura Brown (Business owner)	001	<p>Question: Do you feel benefited from current sponsorship scheme?</p> <p>Answer: I am an existing sponsor and I have been sponsoring animals in this zoo since a long time. Personally, I am quite happy about the sponsorship scheme and recommend it to anyone. It has been a great experience. The only problem is there is so much</p>

		paperwork and so much hassle. It could be much easier with the aid of technology.
	002	<p>Question: In your view, what needs to be included for a successful sponsorship scheme for a zoo like Claybrook?</p> <p>Answer: In terms of success, we want to maximize what we get from sponsoring the animals in the zoo. So, talking about the signage, when you click on the link of our business, it should take you to our business webpage and our expectations are that it helps our business by bringing in more traffic and exposure. Another thing is about the banners, currently we have the same static banner that does not change throughout the year. Perhaps the computerized system would allow dynamic banners in the electronic signages. It would be great if we could contact the zoo for some minor changes through the system itself instead of calls or emails. The other features that should be included would be online forms, online payment, online renewal and discontinuity as well as sponsoring new animals.</p>
	003	<p>Question: Do you know about any other compelling sponsorship schemes provided by other competitors that you would like to see in this system?</p> <p>Answer: Yes, we do have some knowledge regarding sponsorships provided by other competitors. However, the thing is that we are a local business and want to target our advertisement to local people in this locality rather than distant people. This zoo is strategically very good for our business and the reason we are not going for other competitors.</p>

	004	<p>Question: What are the key benefits you look forward to in the new computerized system?</p> <p>Answer: <i>Answered in previous question, so did not ask.</i></p>
All the Stakeholders	001	<p>Question: We have reached the end of our questions. Do you have anything else that you would like to share?</p> <p>Answer: <i>(Answered by Georgia Rodgers)</i></p> <p>One thing we would like to see is automated report generation and automation of emails sent to all the sponsors. For example, currently we send out letters to all the sponsors about continuation of the sponsorship, this could be automated to be done on the 1st of September.</p> <p><i>(Answered by Mark Jones)</i></p> <p>One thing I think I missed on was about an audit trail. Sometimes some people could have some malicious intent or by accident, they manipulate the data or erase the data from the system. To keep track of who is doing what, we would love to have an audit trail. Having regular backup of data would also help us in keeping the information safe. Another thing is we could have a separate area for people to provide us some kind of feedback and suggestions.</p>

2.1.4 Individual Workshop 2 Plans

This section contains the plans for conducting the second workshop. This workshop will be used to consult the clients with premade mockups and prototype design with the aid of information gained from previous workshop as well as the brief and supplied documents.

2.1.4.1 Rationale

The second workshop will focus on producing system wireframes, mockups or clickable prototypes that the clients are satisfied with. The key objectives for the workshop can be listed as:

- Study the workshop 1 findings and all the provided information to come up with the key functionalities to be implemented.
- Select one or more functionalities for producing prototypes using CASE tools.
- Prepare the required number of prototypes including clickable navigation with the help of CASE tools.
- Meet the clients in the workshop to walk them through the prototype mockups and receive feedback.
- Note any agreement about the design from the clients' side.
- Note any important changes the clients want to see in the design and proceed the next parts of the project (construction phase).

2.1.4.2 Rules

- The relevant client representative who will participate in animal record management in the proposed system must be present.
- The client needs to actively participate in testing and observing the prototype.
- The prototypes should be open for moderation during the period of the workshop as per everyone's agreement.
- Other technical experts, with expertise in design should also be present and engage in pointing out faults in the design.
- The involved facilitator should be neutral.

2.1.4.3 Functionality and Mockups

Functionality chosen: Animal Record Management

Mockups:

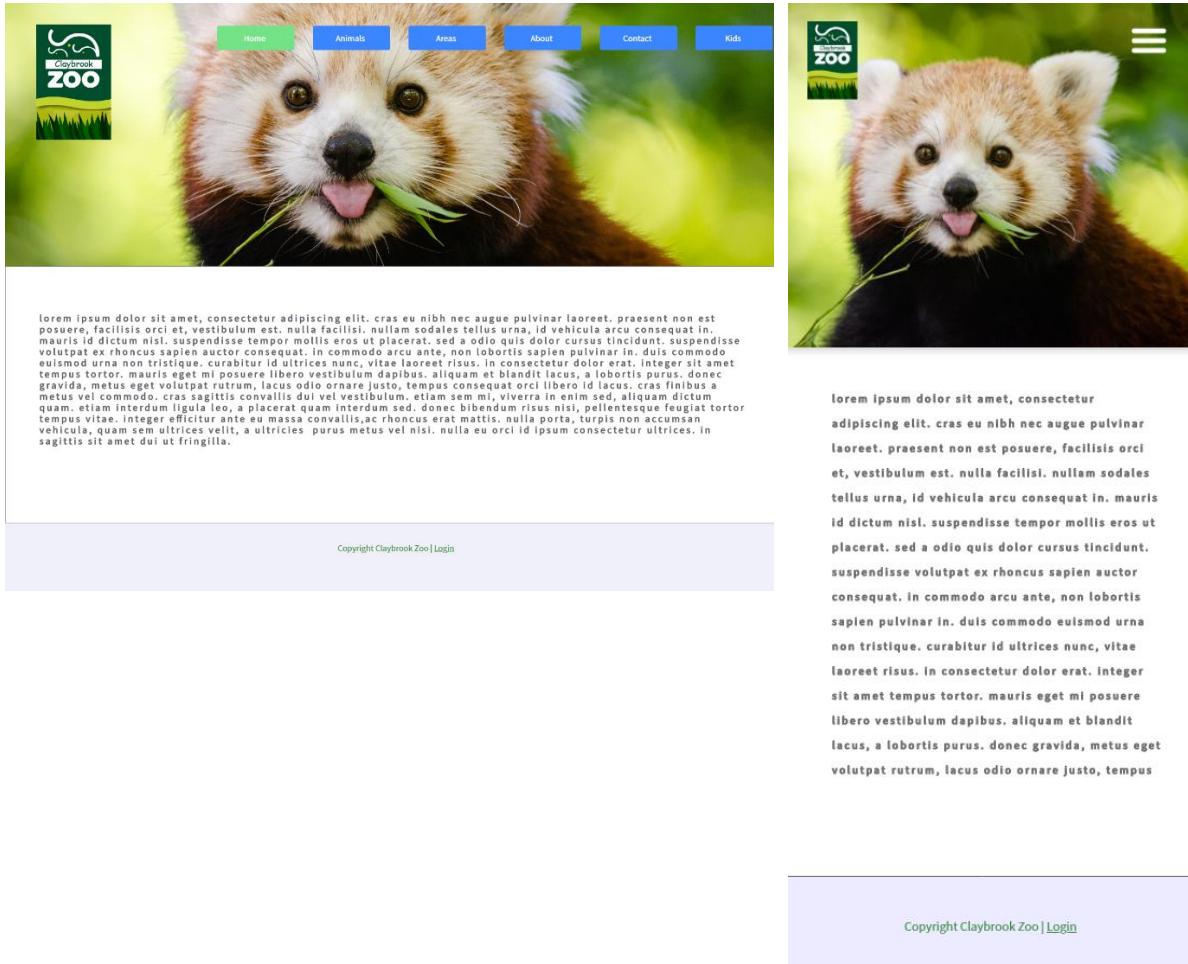


Figure 1 – JAD Mockup Sample (Homepage)

All mockups are included in the [Appendix](#). The mockups were presented as clickable and interactive prototypes during the workshop and were prepared with the use of Adobe XD as the CASE tool.

2.1.5 Workshop 2 Findings

In the workshop, the clients actively engaged in testing the prototype. The clients gave positive as well as negative feedbacks and the changes they wanted to see. The key takes from the workshop can be listed as:

- Everyone somewhat agreed with the prototype design.
- Some clients did not want the calendar as date of birth selector and wanted it to be changed to a date selector text field.
- The clients also mentioned about how they also wanted a separate design for kiosk management for the zoo as well.
- Overall, the clients were satisfied with the core design and were okay with rest of the application being built on top of the presented design.
- The workshop ended with an agreement about the design among both the design and client groups. The final talk was to proceed the construction of the application and present it to the client after completion of certain levels of functionalities.

2.1.6 Workshop Observation Critical Review

As part of the project, two workshops were conducted which include the Joint Requirements Planning (JRP) and the Joint Application Design (JAD) Workshop. For both the workshops, a different group's workshop was observed and analyzed. Some of the notable points are recorded in this section.

a) The suitability/appropriate nature of the agenda and processes (tools) used during the workshop.

The group successfully conducted the workshop gathering most crucial requirements. The agenda and tools were selected appropriately such that most ambiguities present in the provided documents and the brief were addressed (for example: about negotiation of unique identifier for animals). The flow of questions and topics used were appropriately sorted in order of priority and allowed discussions in such a way that the most important requirements were very clear at the end of the workshop.

However, there were some flaws in the agenda and processes utilized as the workshop did not accurately follow the agenda. Addressing some portions required way too much time than planned whereas some did not need as much. Also, arguably, the major flaw of the process used could be considered as not putting much focus on the problem domain. The group did not focus on current working procedures of the Zoo at all, but instead fixated on learning about the requirements. Adequate participation from the user group was there for coming up with the requirements, but the experts in the field were somewhat silent due to very little talk about how the zoo operates in general.

b) The strengths and weaknesses of the facilitators during the workshops.

Strengths	Weaknesses
The neutrality of the facilitator was clear, and they showed no inclination towards any specific group.	The facilitator felt somewhat nervous during the workshop and sometimes lost their words while sometimes talked too fast.
Despite the nervousness, the facilitator's language skills were clearly very good, and they were respectful in their words.	The facilitator did not show proper enthusiasm and attentiveness during the later stages of the workshop.
Good language skills also means the facilitator clearly understood what both parties were trying to say.	The facilitator was rather passive during the JAD workshop.
The facilitator was good at proceeding when a discussion was not nearing a conclusion.	The facilitator did not plan to ensure that early queries were suitably dealt with later.

c) The strengths and weaknesses of the workshop processes utilized.

Strengths	Weaknesses
The workshop allowed fairly good level of participation from the user group.	Not all members from the design group were actively participating.
Some key decisions such as interface design, ticketing and kiosk were made then and there	As mentioned earlier, there was less focus on the problem domain.
It allowed to clear doubts and misinterpreted information.	The workshop could not follow the agenda accurately.
The workshop processes allowed to clearly sort out the priority of requirements for upcoming development blocks.	The lack of expertise was very clear during the workshop as sometimes the topics deviated and led to irrelevant discussions.
Some problems or design flaws were immediately addressed and resolved.	In some topics, lack of collaboration among the stakeholders was seen.

d) A record of specific examples of good and bad practice during the workshop.

Good Practices:

- In the JAD workshop, the design group was actively displaying relevant competitor product examples to give the user group a clear picture as to what exactly they wanted.

- Some members from the design group were actively participating in understanding the clients and making themselves clear about what information they need while the others remained passive.

Bad Practices:

- Although it was listed in the rules that side talk is not allowed, there was side talk among group members.
- Some members were late for the workshop and it caused some disturbance.
- Not everyone from the design group was participating.
- The workshop deviated from the agenda.

e) Suggested improvements that could be used to enhance the workshop and/or facilitation approaches used.

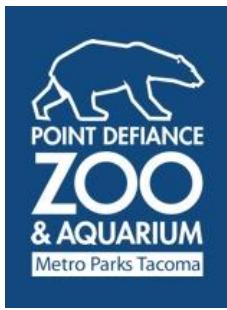
- There should be more focus on understanding the problem domain rather than simply focusing on the requirements.
- Proper planning prior to workshop date should allow to address all the necessary and relevant information during the workshop and not miss out on important points.
- The agenda could be improvised to allocate time appropriately and not miss out on anything as a workshop is a costly process and cannot be reconducted for small omissions.
- A higher participation from both groups should improve the workshops.
- As very few were fully attentive at the end of the workshop, there could be some shorter breaks available for refreshments.
- After the workshop, it was felt that skilled facilitators are very important as they are the “enablers” leading the team to a successful workshop. The facilitators should set the scene and actively look for engaging everyone present in the workshop.

2.1.7 Other Problem Domain Research

This section includes research on other sources such as existing comparable systems and relevant legislation which will provide further understanding of the problem domain.

2.1.7.1 Comparable Software System Review

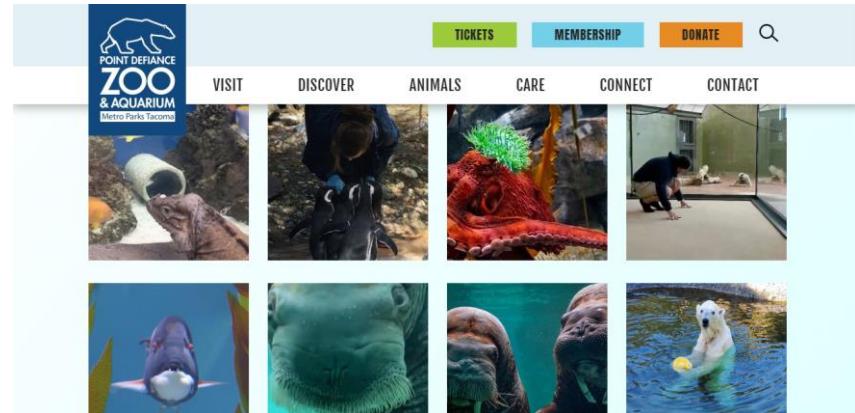
System	Description										
 Apenheul Zoo https://apenheul.com/ (Web Application)	<p>Apenheul is a zoo in Netherlands which holds 35 species of primates. In the website, they mention that half of the animals among the 300 inhabitants in the zoo roam freely among the visitors. All in all, the website for Apenheul looks very clean, informative and appealing. (Apenheul, 2020)</p>										
											
	<table border="1"> <thead> <tr> <th>Advantages:</th><th>Disadvantages:</th></tr> </thead> <tbody> <tr> <td>Clean and appealing design perfect for attracting a lot of attention.</td><td>Albeit containing a lot of information, there is not a clear way to know what animals are housed in the zoo.</td></tr> <tr> <td>Contains a lot of navigational information such as parking, location and inner zoo maps.</td><td>Because of high quality images used in the background, the load times are sometimes high.</td></tr> <tr> <td>In terms of usability in handheld devices such as tablets or phones, the system is very responsive and works very well.</td><td>The design in navigation menu (desktop) seems to have a flaw where the text and buttons are overlapped.</td></tr> <tr> <td>The system contains a lot of extra information such as fun facts, quiz, etc.</td><td></td></tr> </tbody> </table>	Advantages:	Disadvantages:	Clean and appealing design perfect for attracting a lot of attention.	Albeit containing a lot of information, there is not a clear way to know what animals are housed in the zoo.	Contains a lot of navigational information such as parking, location and inner zoo maps.	Because of high quality images used in the background, the load times are sometimes high.	In terms of usability in handheld devices such as tablets or phones, the system is very responsive and works very well.	The design in navigation menu (desktop) seems to have a flaw where the text and buttons are overlapped.	The system contains a lot of extra information such as fun facts, quiz, etc.	
Advantages:	Disadvantages:										
Clean and appealing design perfect for attracting a lot of attention.	Albeit containing a lot of information, there is not a clear way to know what animals are housed in the zoo.										
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The system contains a lot of extra information such as fun facts, quiz, etc.											



Point Defiance Zoo

<https://www.pdza.org/>

(Web Application)



Advantages:

The website is clean and informative with a lot of detail.

Disadvantages:

The large navigation bar blocks a lot of content while trying to browse the webpage.

Individual detail of animals (for example: the page for Sumatran tiger contains details about the tiger named Kali).

The design seems to be inconsistent across pages.

Separate downloadable map for each location within the zoo, including a single large downloadable map.

There exists navigation bar bug in mobile view where contents are overlapped.

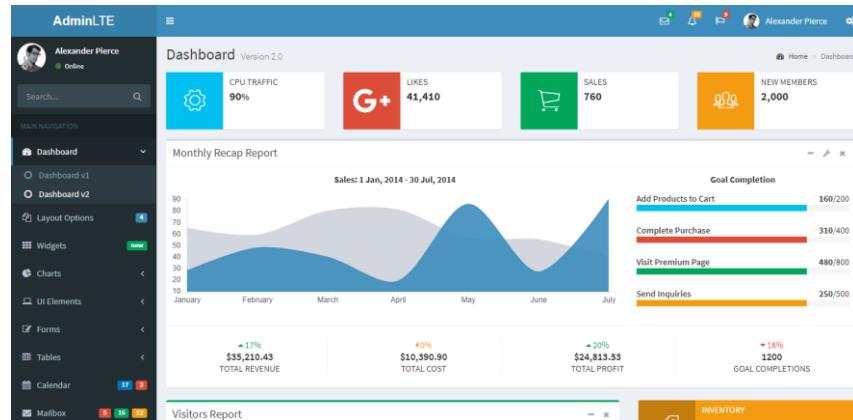
The information about tickets and zoo membership is very clearly presented.

Detail about some inhabitants is missing.

AdminLTE

Admin LTE Template
<https://adminlte.io/>
(Bootstrap Template)

AdminLTE is an open source bootstrap desktop control panel by Colorlib. It is a very popular free template that a lot of systems are built on top of. Comprising of a lot of charts, buttons, form elements, and a range of UI as well as other elements, this can be a suitable inclusion for handling the backend (AdminLTE, 2020).



Advantages:

The dashboard template is open source and free to use.

Disadvantages:

Need to search for individual elements within the HTML.

The template contains a lot of ready-to-use elements such as charts, buttons, modals, pages, cards, etc. These can be directly implemented to a system.

The template references a lot of libraries that need to be referenced within the template files. It is not clear which element uses which library.

The template uses Bootstrap. It is easy to use Bootstrap knowledge to any elements within the template.

Referencing lot of libraries will take up a lot of space from the server and increase load times (more if they are referenced online)

The information about tickets and zoo membership is very clearly presented.

2.1.7.2 Development Relevant Legislation

The proposed Claybrook Zoo computerized system will hold information about staff, sponsors and potentially members of the zoo. The information should be used appropriately and held only when necessary. There are rules provided by UK's implementation of the General Data Protection Regulation (GDPR) as the **Data Protection Act 2018**. The rule states the following about usage of private data held within the system (GOV.UK, 2018).

- used fairly, lawfully and transparently
- used for specified, explicit purposes
- used in a way that is adequate, relevant and limited to only what is necessary
- accurate and, where necessary, kept up to date
- kept for no longer than is necessary
- handled in a way that ensures appropriate security, including protection against unlawful or unauthorised processing, access, loss, destruction or damage

The pages should also comply with W3C's accessibility evaluation standards and should be accessible, navigable and comprehensible despite any limitations. Individual pages can and must be tested for evaluation using web accessibility evaluation tools.

2.2 Requirements Specification

Requirements Specification includes the description of the solution system in terms of functional and non-functional aspects.

2.2.1 Problem Domain Description

The existing working processes in the form of flowcharts as well as limitations in current clerical system are listed in this section.

2.2.1.1 Overview of Existing Business Operation

Saving Animal Records

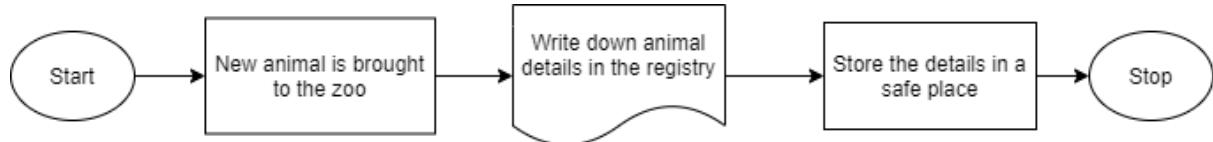


Figure 2 – Animal Record Clerical

In the current clerical system, animal records are stored manually and written down. This kind of information is fairly hard to manage (accessing them requires a lot of manual search, updating them could require writing down the details completely from the scratch, which is very repetitive).

Updating Animal Signage

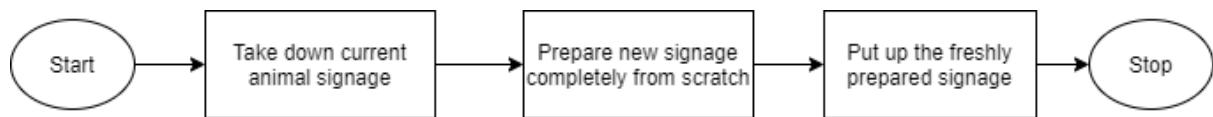


Figure 3 – Animal Signage Clerical

As animal signage is currently maintained as static hoarding boards, updating information in these require completely replacing them. Preparing new signage each time an update is required costs a lot of money.

Purchasing Tickets

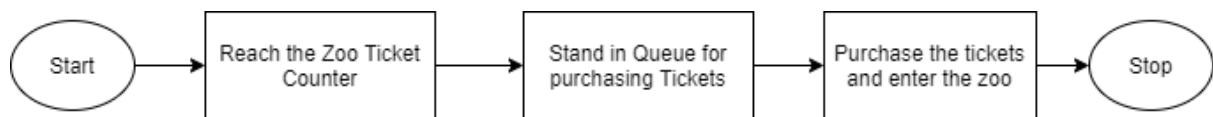


Figure 4 – Tickets Clerical

As mentioned by the visitor representative, purchasing tickets is a lot of hassle in the current clerical system. People have to tolerate long queue times (sometimes reaching up to half an hour) just to enter the zoo.

Sponsorship Application

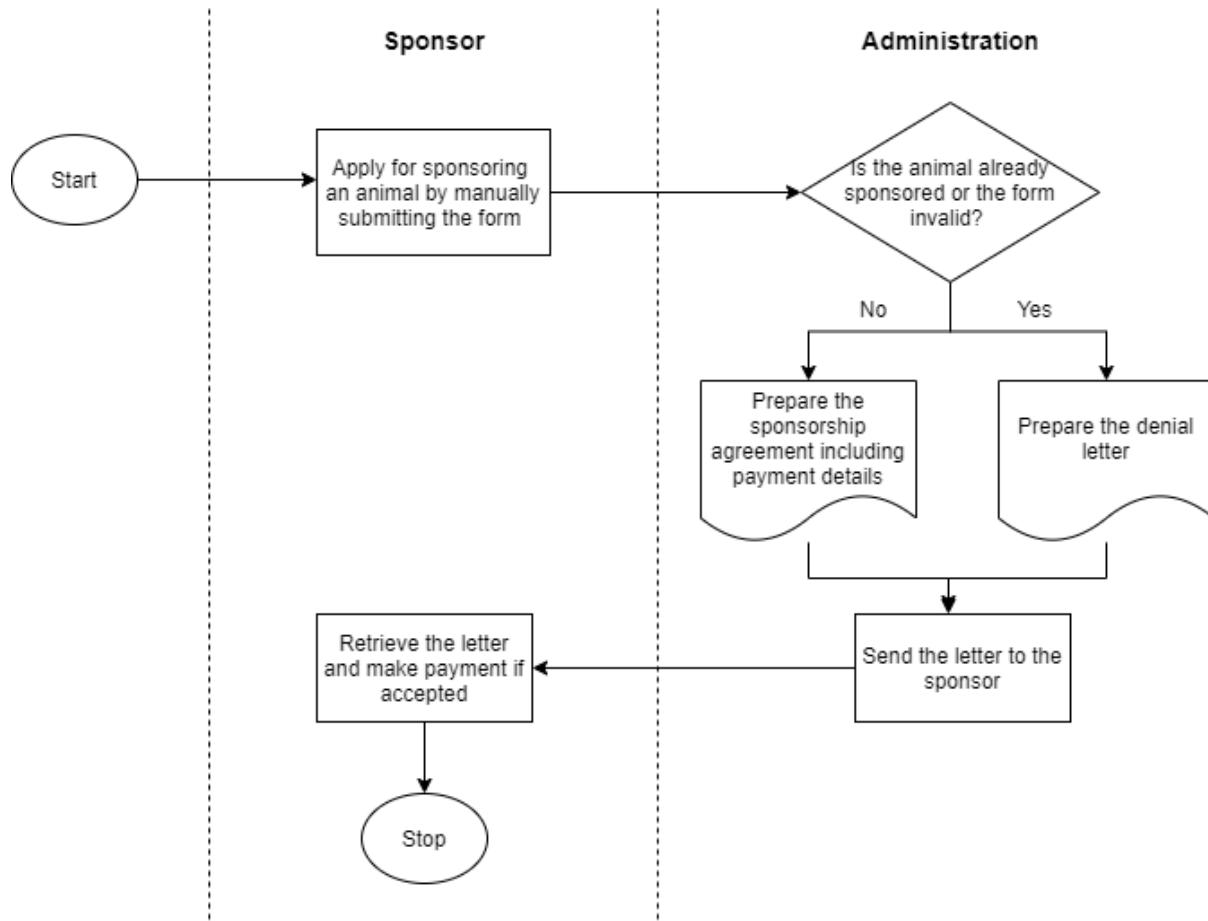


Figure 5 – Sponsorship Application Clerical

The sponsor applies for sponsoring an animal through the sponsorship form where all the details about sponsorship and the sponsors are written. The administration then accepts or rejects the application and sends a follow-up message. Most paperwork involved is communicated through physical letters. It was mentioned about how current sponsorship scheme is run clerically and requires a lot of manual work.

Other Notable Operations:

- Events are conducted by sending out flyers manually to zoo members through physical letters.
- Sponsorship follow-ups such as renewal, cancellation and expiry is also done manually through letters.
- The animal watchlist is manually written and placed in relevant areas of the zoo where the zookeepers can view them.

2.2.1.2 Summary of Existing Business Limitations

Through the workshops, a lot of limitations were discovered in existing operations that need to be addressed. The key limitations include:

- Storing and managing animal as well as staff records is a manual clerical process and tedious.
- Sending out flyers to zoo members during events costs a lot of money and there is a chance the letters get lost in the way.
- Most of the competitors have already shifted to an electronic system and attract more visitors.
- The ticketing system is manual, and visitors have to go through long queue times in order to purchase tickets.
- Animal signage and mostly everything in the zoo is static and this is causing many visitors to turn away towards competitors who already implement a computerized system.
- Too much paperwork involved with sponsorship and there is a chance the physical letters are lost in the way. It is very costly to interact using physical letters every time.

2.2.2 Functional Requirements

Functional requirements include different functional aspects of the proposed system including features, access rights and data attributes.

2.2.2.1 Features Required

By background reading of the brief, provided documents and through the workshops, the necessary features have been collected. These features will be implemented in blocks and according to priority.

Animal Record Management:

- The system should allow management of all the animal records. This includes operations such as adding, updating and deleting.
- The animal information needs to be visible to the visitors.
- The system should allow searching animals.
- Animals should not directly be deleted from the system and instead archived.

Staff Management:

- The system should allow management of staff that will be involved in the computerized system.
- It should allow three levels of access – Administrator, Manager and the Zookeeper. Administrator should have all the privilege; Manager should not be able to delete animal records and manage staff records; and Zookeeper should only be able to view animals in watchlist.

Sponsorship Management:

- Sponsors should be able to fill a form or have a separate area allocated for them to submit the sponsorship form and apply for sponsorship.
- The zoo administration should be allowed to manage the sponsorships from the backend where they should be able to communicate with existing as well as potential sponsors (applicants) about approval, rejection, renewal or expiry of sponsorships.
- There should be an option to allow electronic payment for sponsorships.
- If possible, a separate login area should be provided to the sponsors where they should be able to access their private emails or notifications regarding sponsorships.

Other Features:

- The system should allow storage of information such as area and location of the zoo where the animals are housed at and allow stock management.
- It should allow the visitors to apply complex search combinations to search animals in the zoo.
- A clean and intuitive GUI, with clear navigation and accessibility should be present in the system for staff as well as visitors.
- There should be examples to show how the system can be implemented for kiosk management.
- The system should be secure and people with malicious intent should not be allowed to access the administrative part of things.
- The system should allow purchase and booking of tickets online.
- The events should be listed on the system so that the visitors can directly access the website and learn about them.
- There should be a kids section with games about animals.

2.2.2.3 Access Rights and Data Attributes

Staff Record Management

The staff records will hold information about staff that can log into the system. There are three types of users – Administrator, Manager and Zookeeper.

Access Rights:

Operation	Administrator	Manager	Zookeeper
Create Staff	Has Access	No Access	No Access
View Staff	Has Access	View Personal Info	View Personal Info
Edit Staff	Has Access	No Access	No Access
Delete Staff	Cannot Delete Self.	No Access	No Access

Attributes:

Attribute Name	Format or Datatype	Other Notes
ID	INTEGER (11), Auto incremented	Primary key for staff record, also used for login
Fullscreen	VARCHAR	Full name of the staff
Type	ENUM (“Administrator”, “Manager”, “Zookeeper”)	Type of the staff
Password	VARCHAR	Password for login
Status	ENUM (“Active”, “Dormant”)	Only active can login
Email	VARCHAR	Email of the staff.

Animal Record Management

The animal records will hold information about the animals housed in the zoo.

Access Rights:

Operation	Administrator	Manager	Zookeeper
Create Animal	Has Access	Has Access	No Access
View Animal	Has Access	Has Access	Through Frontend
Edit Animal	Has Access	Has Access	No Access
Archive Animal	Has Access	Has Access	No Access
Delete Animal	Has Access	No Access	No Access

Attributes:

Attribute Name	Format or Datatype	Other Notes
ID	VARCHAR (11)	Unique Identifier for the animal.
LID	INTEGER (11)	Reference to Location ID.
Species	VARCHAR	Name of Species
Name	VARCHAR	Animal's Name
DOB	DATE	Date of Birth
Gender	ENUM ("Male", "Female")	Gender of Animal
Lifespan	VARCHAR	Average Lifespan
Level	ENUM ("A", "B", "C", "D", "E")	Level of animal (used for sponsorship)
Category	ENUM ("Bird", "Reptile or Amphibian", "Fish", "Mammal")	Class of Animal
Diet	TEXT	What the animal eats
Natural_habitat	TEXT	Natural habitat description of the animal
Global_population	TEXT	Details about global population for the animal
Date_of_join	DATE	Date the animal joined the zoo.
Size	VARCHAR	Average size numbers for the animal (Height, Weight)
Featured	ENUM ("Yes", "No")	Is the animal set as featured or not?
Status	ENUM ("Active", "Archived")	Is the animal active or archived?

Animal attributes are further extended depending on their type.

Bird

Attribute Name	Format or Datatype	Other Notes
BID	VARCHAR (11)	Reference to animal ID
Nest_method	TEXT	Nest construction method of bird
Wingspan	VARCHAR	Average wingspan of species
Fly	ENUM (“Yes”, “No”)	Can fly
Colours	TEXT	Color variants

Reptile

Attribute Name	Format or Datatype	Other Notes
RID	VARCHAR (11)	Reference to animal ID
Reproduction	VARCHAR	Type of reproduction
Clutch_size	VARCHAR	Average size of clutch
Offspring	INTEGER (7)	Average number of offspring

Fish

Attribute Name	Format or Datatype	Other Notes
FID	VARCHAR (11)	Reference to animal ID
Average_temperature	VARCHAR	Average body temperature
Water_type	VARCHAR	Type of water (salt, fresh, etc.)
Colour	VARCHAR	Color variants

Mammal

Attribute Name	Format or Datatype	Other Notes
MID	VARCHAR (11)	Reference to animal ID
Gestation_period	VARCHAR	Period of gestation
Category	VARCHAR	Category of mammal, ex. Eutheria.
Average_temperature	VARCHAR	Average body temperature

Another type of record Animal_Image should exist to store detail about images for an animal.

Animal_image

Attribute Name	Format or Datatype	Other Notes
AIID	VARCHAR (11)	Reference to animal ID
Filename	VARCHAR	File path (relative to server)
Type	ENUM (“Cover”, “Gallery”, “Global”)	Type of image for the animal.

Area Record Management

The area records will hold information about different areas in the zoo such as Cages, Aviary, Hothouse and Aquarium and their details.

Access Rights:

Operation	Administrator	Manager	Zookeeper
Create Area	Has Access	Has Access	No Access
View Area	Has Access	Has Access	Through Frontend
Edit Area	Has Access	Has Access	No Access
Delete Area	Has Access	Has Access	No Access

Attributes:

Attribute Name	Format or Datatype	Other Notes
ID	INTEGER (11), Auto incremented	Primary key for area record
Title	VARCHAR	Title of area (example: Aquarium)
Description	TEXT	Description of the area
Code	VARCHAR (11)	Code for area (if already exists for current reference)

Location Record Management

The area records will hold information about different areas in the zoo. A location belongs to an area and contains details like feeding time, area, food that animals are fed, etc.

Access Rights:

Operation	Administrator	Manager	Zookeeper
Create Location	Has Access	Has Access	No Access
View Location	Has Access	Has Access	Through Frontend
Edit Location	Has Access	Has Access	No Access
Delete Location	Has Access	Has Access	No Access

Attributes:

Attribute Name	Format or Datatype	Other Notes
ID	INTEGER (11), Auto incremented	Primary key for location record
AID	INTEGER (11)	Reference to area
Code	VARCHAR (11)	Code for location (if already exists for current reference)
Dimensions	VARCHAR	Dimensions of the location
Feeding_time	VARCHAR	Time to feed the animals
Food	VARCHAR	Food to feed the animals
Size	VARCHAR	Size in square feet

Watchlist Record Management

The watchlist records will hold information about animal sickness records. An animal should be added to watchlist from the animal's edit page. It holds details such as the sickness, severity and date of discovery/recovery.

Access Rights:

Operation	Administrator	Manager	Zookeeper
Create Watchlist	Has Access	Has Access	No Access
View Watchlist	Has Access	Has Access	Has Access
Edit Watchlist	Has Access	Has Access	No Access
Delete Watchlist	Has Access	Has Access	No Access

Attributes:

Attribute Name	Format or Datatype	Other Notes
ID	INTEGER (11), Auto incremented	Primary key for watchlist record
AID	VARCHAR (11)	Reference to animal
Condition	VARCHAR	Sickness/Condition name
Level	ENUM (“Low”, “Moderate”, “Substantial”, “Severe”, “Critical”)	Level of threat of sickness.
Record_date	DATE	Date sickness was recorded
End_date	DATE, DEFAULT NULL	Recovery date
Details	TEXT	Details about the Sickness/Condition

Sponsor Record Management

The sponsor records hold information about the sponsor including their banner image for display as advertisement. A sponsor's detail is added to the system after they fill and submit form for animal sponsorship.

Access Rights:

Operation	Administrator	Manager	Zookeeper
Create Sponsor	No Access	No Access	No Access
View Sponsor	Has Access	Has Access	No Access
Edit Sponsor	Has Access	Has Access	No Access
Delete Sponsor	Has Access	Has Access	No Access

Attributes:

Attribute Name	Format or Datatype	Other Notes
ID	INTEGER (11), Auto incremented	Primary key for sponsor record
Company_name	VARCHAR	Name of company
Primary_telephone	VARCHAR	Primary telephone number
Secondary_telephone	VARCHAR	Secondary telephone number
Email	VARCHAR	Email address of company
Address	TEXT	Physical address of company
Website	VARCHAR	Web address of company

Banner	VARCHAR	Banner image path (relative to server)
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Sponsorship Record Management

The sponsorship records hold information about sponsorships. A record is created when a sponsor applies for sponsorship. These sponsorships can be Active, Expired or Pending. Other information such as payment, signage area and price are included in a sponsorship record.

Access Rights:

Operation	Administrator	Manager	Zookeeper
Create Sponsor	No Access	No Access	No Access
View Sponsor	Has Access	Has Access	No Access
Edit Sponsor	Has Access	Has Access	No Access
Delete Sponsor	Has Access	Has Access	No Access

Attributes:

Attribute Name	Format or Datatype	Other Notes
ID	INTEGER (11), Auto incremented	Primary key for sponsorship record
AID	VARCHAR (11)	Reference to animal
SID	INTEGER (11)	Reference to sponsor
Price	DOUBLE (15, 2)	The price needed for sponsorship
Start_date	DATE	Date to start the sponsorship
End_date	DATE	Date to end the sponsorship
Area	VARCHAR	Percentage area covered in signage
Notes	TEXT	Additional notes from sponsor
Payment_details	TEXT	Details about payment methods
Paid	ENUM ("Yes", "No")	Whether payment complete or not
Review_date	DATE	Last review date
Sign_date	DATE	Sponsor sign date
Status	ENUM ("Pending", "Active", "Expired")	Status of the sponsorship

Event Record Management

Events can be added to the system through the backend by Administrators and Managers. These event records will hold information about the event going to be held in the zoo.

Access Rights:

Operation	Administrator	Manager	Zookeeper
Create Event	Has Access	Has Access	No Access
View Event	Has Access	Has Access	No Access
Edit Event	Has Access	Has Access	No Access
Delete Event	Has Access	Has Access	No Access

Attributes:

Attribute Name	Format or Datatype	Other Notes
ID	INTEGER (11), Auto incremented	Primary key for event record
Title	VARCHAR	Title of event
Description	TEXT	Description about the event
Ticket	TEXT	Ticketing information for event
Start_date	DATE	Date event starts
End_date	DATE	Date event ends
Banner	VARCHAR	Banner image path (relative to server)

2.2.2.3 Output Format

The output formats are ready-made formats for auto-generated emails to be sent to different parties.

Expiring Sponsorship (To Relevant Sponsor):

Today's Date

Sponsor Company Name,

Sponsor Address

Greetings,

This is Claybrook Zoo. The **Animal Name** you sponsor is under good care.

We write this as a reminder that the sponsorship package you bought for the animal is about to expire. The sponsorship lasts until **Sponsorship Expiry Date**, and we wanted to know whether you are willing to continue sponsoring the animal. Please reply to this email to let us know about your sponsorship plans to extend the sponsorship.

Please note that if we do not hear from you by November-15, we will have to assume that you are no more interested in continuing the sponsorship. If that happens, we will have to search for a new sponsor for the animal and will list it as available for sponsorship.

Yours Sincerely,

Sender Full Name.

Claybrook Zoo

2.2.2.4 New Process Models

This section contains some relevant flowchart models for the computerized system for core functionalities.

Add Animal Record

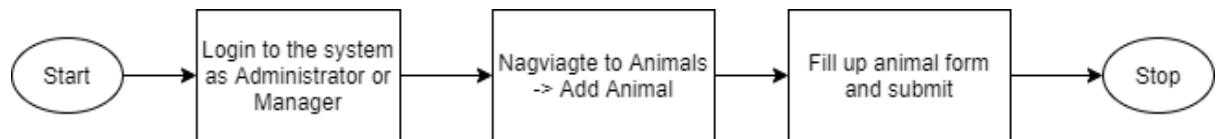


Figure 6 – Add Animal Computerized

The records such as staff records, area records, location records and event records are added in the same manner.

Edit Animal Record

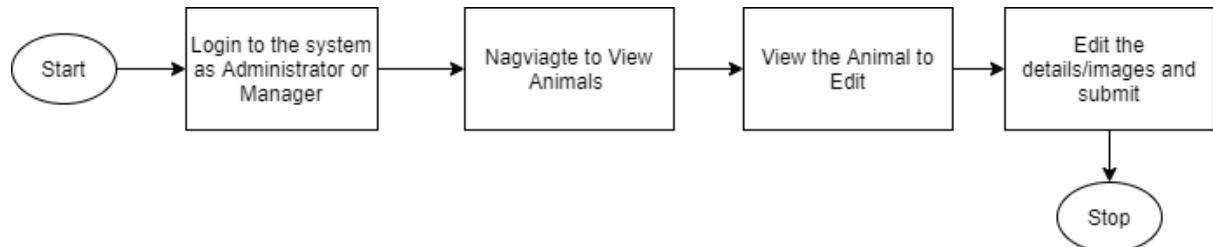


Figure 7 – Edit Animal Computerized

The records such as staff records, area records, location records, event records, sponsor/sponsorship records and watchlist records are edited in the same manner.

Archive Animal Record

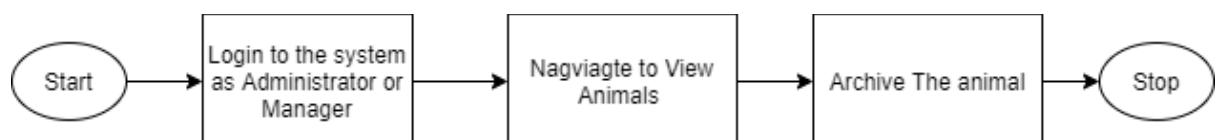


Figure 8 – Archive Animal Computerized

Adding Sponsorship/Sponsor Record

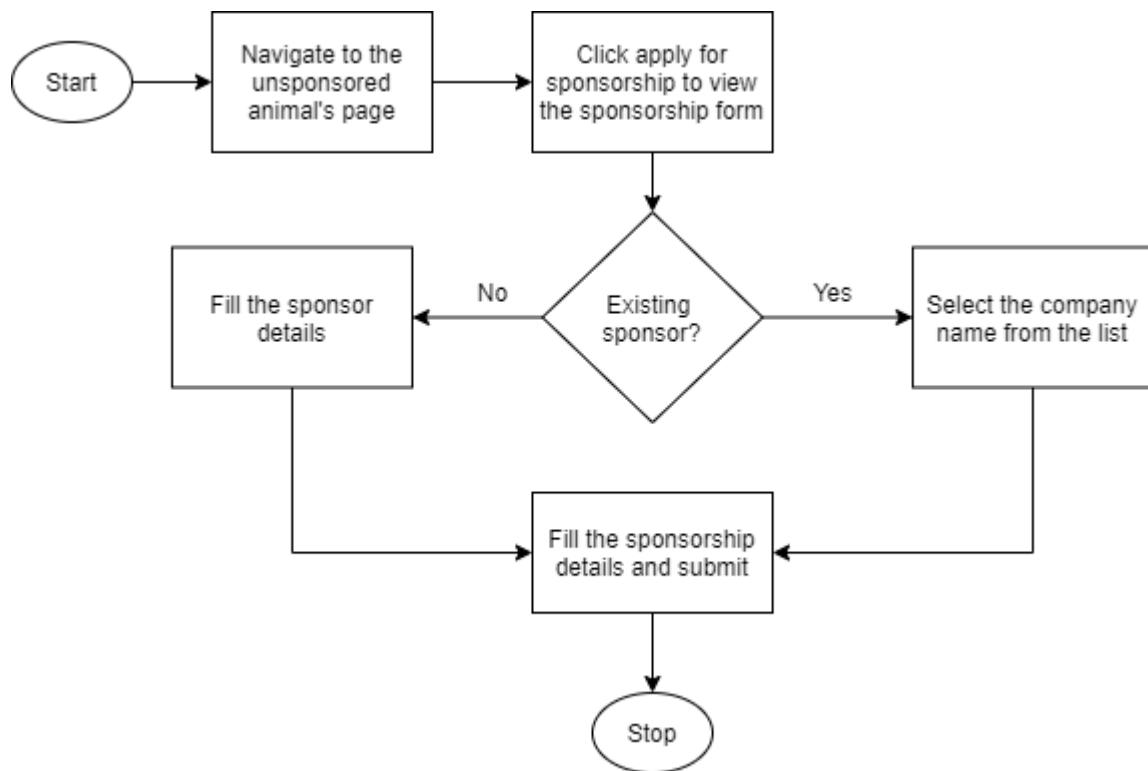


Figure 9 – Add Sponsor/Sponsorship Record

Sponsorship and sponsor records cannot be directly added by the Manager or Administrator and a form should be submitted by a sponsor through the animal's page.

Adding Animal to Watchlist

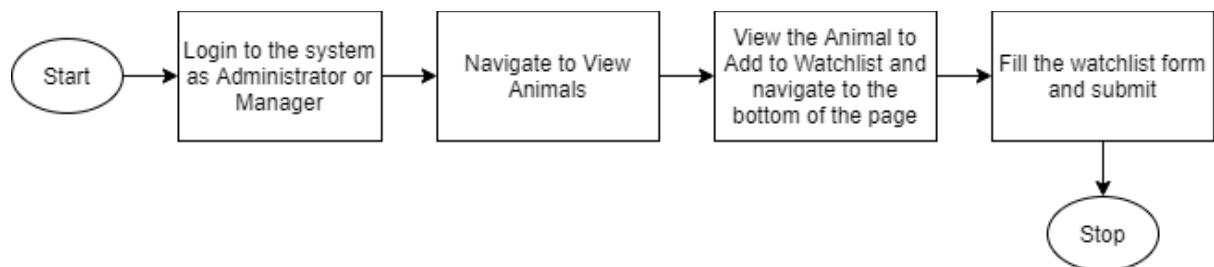


Figure 10 – Add Animal to Watchlist

2.2.3 Proposed Prototype Development Blocks/Priority of Development

The system is being built following a hybrid agile (RAD) methodology. At this point it has reached towards the beginning of the construction phase. The construction phase will comprise of different blocks where the clients will test the prototypes up to that point. The functionalities will be separated according to priority to around four blocks. The first block will be the largest one with maximum core functionalities implemented. This section includes the target functionalities for each block and their timeline of development.

2.2.3.1 Block I

Functionalities: (60-65%)

- Design of database
- Basic design of backend dashboard
- Management of staff records
- Management of animal records
- Allow different types of images for animals (global distribution, gallery, cover).
- Management of area/location records
- Basic design of frontend to display animal records
- Allow sponsorship application
- Add contact page with map and contents to homepage to provide basic overview of the frontend.

Time period: 4 weeks

2.2.3.2 Block II

Functionalities: (15-20%)

- Management of watchlist
- Implement access control features
- Allow management of sponsorship through the backend
- Implement sponsor banner to relevant frontend areas
- Management of events
- Include separate Kids page in the frontend which contains animal-related games

Time period: 2 weeks

2.2.3.3 Block III

Functionalities: (10%)

- Improvise access control features by allowing selected user types to access relevant pages.
- Improvise dashboard as well as front-end design
- The frontend design should at this point include complex search, featured animals and events.

Time period: 1 week

2.2.3.4 Block IV

Functionalities: (10%)

- Design example kiosk template
- Implement remaining smaller features such as not allowing area with existing location to be deleted, or the system requiring at least one administrator.
- Finalize the system is fully functional and working as intended (fixing any bugs discovered and addressing any change requests)

Time period: 1 week

The iterative processes will be conducted at least four times, addressing any changes the clients want to see. The documentation for the first block will be included in the upcoming sections.

3. SYSTEM ANALYSIS & DESIGN – BLOCK 1

This section includes the system analysis and design documentation. The system will follow PHP MVC architecture with separation of Database access, user views and logical aspects of the web application. MySQL database will be used for storing all the data.

3.1 Textual Analysis

The textual analysis will highlight expected classes and their behaviors. This is formulated according to the provided brief, documents and workshops.

Candidate Class	Candidate Behaviors
Staff	Add_staff, Edit_staff, Delete_staff, Change_status, Login, Logout, Change_password, Archive, Make_active
Animals	Add_animal, Edit_animal, Archive_animal, Delete_animal, View_animal, Set_featured, Add_gallery, Add_global_image, Add_cover_image, Add_to_watchlist
Areas	Add_area, View_area, Edit_area, Delete_area
Locations	Add_location, View_location, Edit_location, Delete_location
Sponsors	Add_sponsor, View_sponsor, Send_expiry_email, Add_banner, Edit_sponsor, Delete_sponsor
Sponsorships	Add_sponsorship, Edit_sponsorship, View_sponsorship, Change_status, Delete_sponsorship,
Watchlist	View_watchlist, Create_watchlist, Edit_watchlist, Delete_watchlist, Change_severity
Events	Add_event, View_event, Edit_event, Delete_event, Add_event_banner

Note: Although all the potential classes and their behaviors have been included here, the system will be implemented fully up to locations and partially up to sponsorships as part of block I.

3.2 Significant Event Analysis

This section lists some potential events that different types of users will perform while using the system.

EVENT	PERFORMER	FIELDS INVOLVED
Login	Administrator, Manager, Zookeeper	ID, password
Logout	Administrator, Manager, Zookeeper	-
View Staff	Administrator, Manager, Zookeeper	ID, fullname, role
Add Staff	Administrator	Fullname, email, password, role
Edit Staff	Administrator	Fullname, email, password, role
Delete Staff	Administrator	ID
View Area (Backend)	Administrator, Manager	ID, title, key, description
Add Area	Administrator, Manager	Title, key, description
Edit Area	Administrator, Manager	ID, title, key, description
Delete Area	Administrator, Manager	ID
View Location (Backend)	Administrator, Manager	ID, code, size, food, timetofeed, capacity, area(AID)
Add Location	Administrator, Manager	code, size, food, timetofeed, capacity, area(AID)
Edit Location	Administrator, Manager	ID, code, size, food, timetofeed, capacity, area(AID)
Delete Location	Administrator, Manager	ID
View Animal (Backend)	Administrator, Manager	ID, location(LID), species, name, dob, gender, lifespan, level, category, diet, naturalhabitat, globalpopulation, dateofjoin, size, featured, status, nestmethod, wingspan, fly, colours, averagetemperature, watertype, gestationalperiod, reproductiontype, clutchsize, offspring, filename, filetype
Add Animal	Administrator, Manager	location(LID), species, name, dob, gender, lifespan, level,

		category, diet, naturalhabitat, globalpopulation, dateofjoin, size, featured, status, nestmethod, wingspan, fly, colours, averagetemperature, watertype, gestationalperiod, reproductiontype, clutchsize, offspring, filename, filetype
Edit Animal	Administrator, Manager	ID, location(LID), species, name, dob, gender, lifespan, level, diet, naturalhabitat, globalpopulation, dateofjoin, size, featured, status, nestmethod, wingspan, fly, colours, averagetemperature, watertype, gestationalperiod, reproductiontype, clutchsize, offspring, filename, filetype
Archive Animal	Administrator, Manager	ID
Delete Animal	Administrator	ID
View Sponsor	Administrator, Manager	ID, Company, primary_telephone, secondary_telephone, email, website, address, banner
Add Sponsor	Sponsor	Company, primary_telephone, secondary_telephone, email, website, address, banner
Edit Sponsor	Administrator, Manager	ID, Company, primary_telephone, secondary_telephone, email, website, address, banner
Delete Sponsor	Administrator, Manager	ID
View Sponsorship	Administrator, Manager	ID, animal(AID), sponsor(SID), price, startdate, enddate, area,

		notes, paymentdetails, paid, reviewdate, signdate, status
Add Sponsorship	Sponsor	animal(AID), sponsor(SID), price, startdate, enddate, area, notes, paymentdetails, paid, reviewdate, signdate, status
Edit Sponsorship	Administrator, Manager	ID, price, startdate, enddate, area, notes, paymentdetails, paid, reviewdate, signdate, status
Delete Sponsorship	Administrator, Manager	ID

3.3 Commands, Queries and Constraints (CQC) Charts

Staff

CLASS	STAFF	Part: 1/1
TYPE OF OBJECT		Author: Diwas Created: 04/03/2020
A Zoo Staff Object.		
Queries	ID, Password, Full name, Email, Type, Status	
Commands	Login, Logout, Add, Edit, Change Password, Archive, Delete	
Constraints	<ul style="list-style-type: none"> • There needs to be at least one Active Administrator • Password cannot be less than 8 characters • Administrator can do everything • Manager cannot access staff and trash directory • Zookeeper can only view watchlist 	

Animals

CLASS	ANIMALS	Part: 1/1
TYPE OF OBJECT	Author: Diwas Created: 04/03/2020	
An Animal Object.		
Queries	ID, Location ID, Species Name, Animal Name, Date of Birth, Gender, Lifespan, Level, Category, Diet, Natural Habitat, Global Population, Date Joined, Size, Featured, Status, Image Path, Average Temperature, Color, Water Type, Nest Construction Method, Wingspan, Fly, Reproduction Type, Classification, Gestational Period, Clutch Size, Average Offspring	
Commands	Add, Edit, View Details, Change Image, Set Featured, Archive, Delete	
Constraints	<ul style="list-style-type: none"> • Animal must be at least of one category • Category cannot be changed once animal is added • Animal must have cover image • Animal cannot have more than one sponsorship 	

Areas

CLASS	AREAS	Part: 1/1
TYPE OF OBJECT	Author: Diwas Created: 04/03/2020	
An Area Object.		
Queries	ID, Title, Description, Code	
Commands	Add, Edit, View Details, Delete	
Constraints	<ul style="list-style-type: none"> • Area with location cannot be deleted 	

Locations

CLASS	<i>LOCATIONS</i>	Part: 1/1
TYPE OF OBJECT		Author: Diwas
A Location Object.		Created: 04/03/2020
Queries	ID, Code, Area, Dimensions, Feeding Time, Food, Size	
Commands	Add, Edit, Assign Area, View Details, Delete	
Constraints	<ul style="list-style-type: none"> • Location with animal cannot be deleted 	

Sponsors

CLASS	<i>SPONSORS</i>	Part: 1/1
TYPE OF OBJECT		Author: Diwas
A Sponsor Object.		Created: 04/03/2020
Queries	ID, Company Name, Primary Telephone, Secondary Telephone, Email, Address, Website, Banner Image	
Commands	Add, Edit, Change Banner, Delete	
Constraints	<ul style="list-style-type: none"> • Sponsors with active sponsorships cannot be deleted. 	

Sponsorships

CLASS	<i>SPONSORSHIPS</i>	Part: 1/1
TYPE OF OBJECT	A Sponsorship Object.	Author: Diwas Created: 04/03/2020
Queries	ID, Sponsor, Animal, Price, Start Date, End Date, Review Date, Sign Date, Status, Paid, Payment Details, Notes, Area	
Commands	Add, Edit, View, Send Email, Print Email, Change Status, Delete	
Constraints	<ul style="list-style-type: none"> • Sponsorship should expire automatically after end date exceeds • More than one sponsorship cannot be active for one animal. 	

3.5 UML Use Case Diagram

3.5.1 Administrator and Manager Use Case Diagram

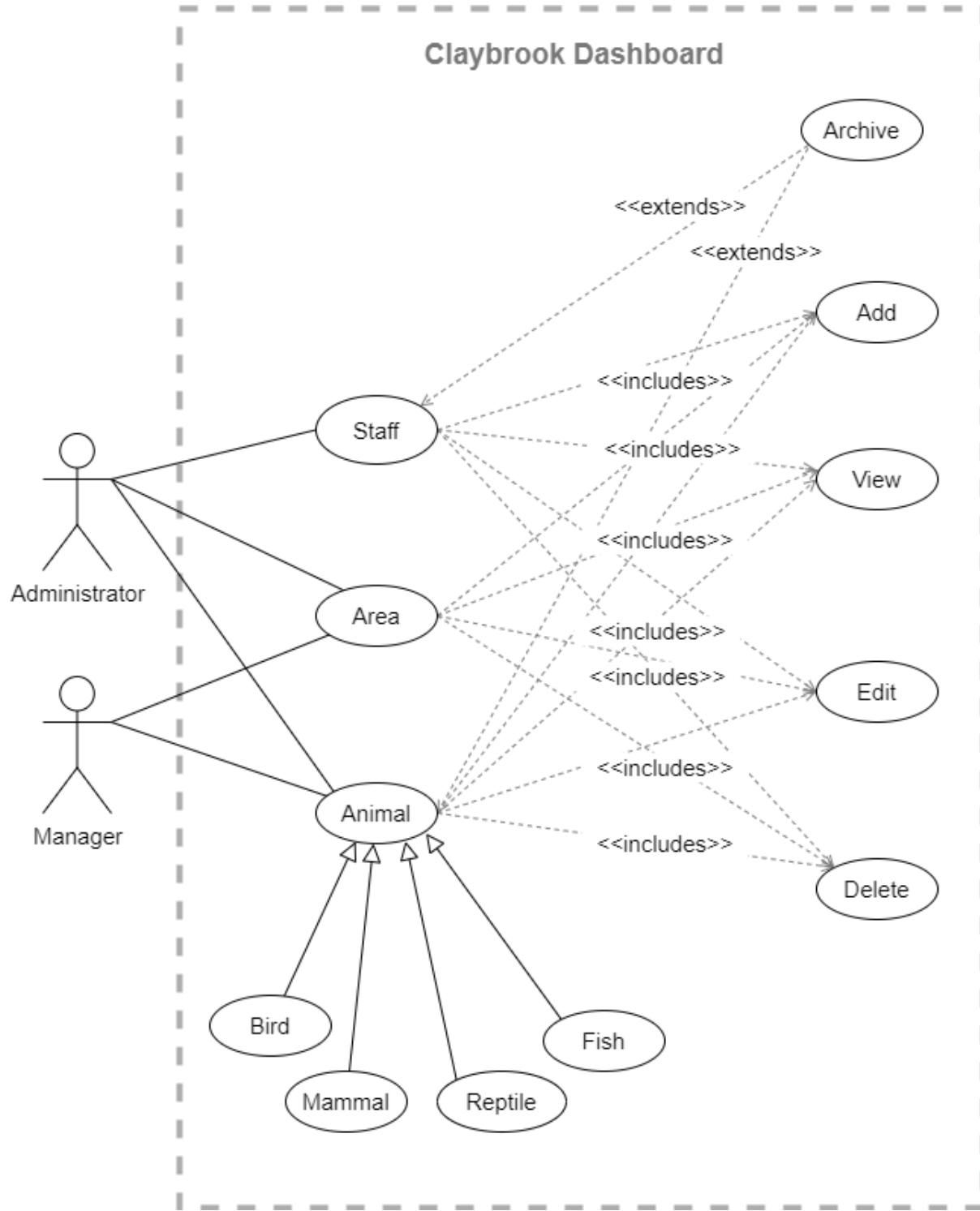


Figure 11 – Administrator and Manager Use Cases with Staff, Area, Animal

Documentation of Use Cases

i. UC1 Staff

Name: UC1 Staff

Initiator: Administrator

Goal: Administrator performs desired action with staff records (add, view, edit, delete or archive)

Pre-condition: User is logged in and is an administrator

Post-condition: The desired action is performed on staff records

Assumptions: The staff details entered are valid.

Main Success Scenario:

1. Administrator navigates to staff area.
2. Administrator performs desired action

Includes: Add, View, Edit, Delete

Extends: Archive

ii. UC2 Area

Name: UC2 Area

Initiator: Administrator, Manager

Goal: Initiator performs desired action to area records (add, view, edit or delete)

Pre-condition: User is logged in and is an administrator or manager

Post-condition: The desired action is performed on area records

Assumptions: The area details entered are valid.

Main Success Scenario:

1. Initiator navigates to area section.
2. Initiator performs desired action

Includes: Add, View, Edit, Delete

Note: Other use cases for locations, sponsors and sponsorships is the same for Administrators and Managers as **UC2 Area** with the only difference being the entity.

iii. UC3 Animal

Name: UC3 Animal

Initiator: Administrator, Manager

Goal: Initiator performs desired action to animal records (add, view, edit, delete or archive)

Pre-condition: User is logged in and is an administrator or manager

Post-condition: The desired action is performed on animal records

Assumptions: The animal detail entered is valid.

Main Success Scenario:

1. Initiator navigates to animals section.
2. Initiator performs desired action

Includes: Add, View, Edit, Delete

Extends: Archive

3.5.2 Sponsor Use Case Diagram

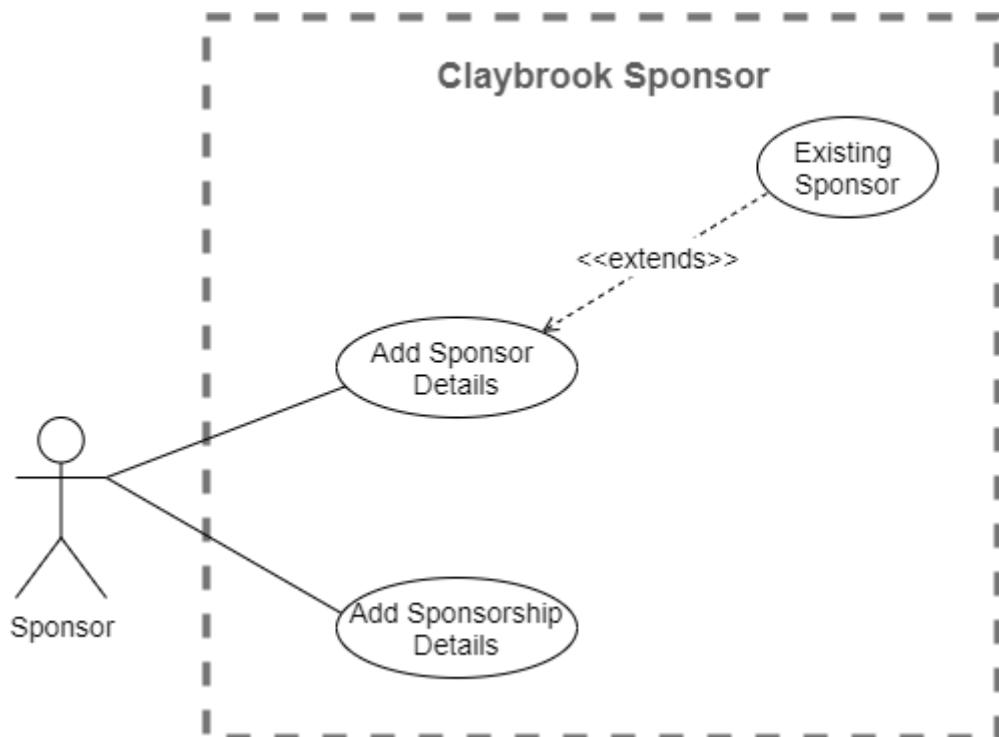


Figure 12 – Sponsor use cases

Documentation of Use Cases

i. UC1 Add Sponsor Details

Name: UC1 Add Sponsor Details

Initiator: Sponsor

Goal: Sponsor adds details about their company to the system

Pre-condition: The animal selected is not already sponsored

Post-condition: The sponsor is added to the system

Assumptions: The sponsor details entered are valid.

Main Success Scenario:

1. Sponsor navigates to a specific animal in the frontend.
2. Sponsor clicks sponsor this animal and reaches the sponsorship form
3. Sponsor fills up the sponsor details and clicks submit

Extends: Existing Sponsor

Documentation of Use Cases

i. UC2 Add Sponsorship Details

Name: UC2 Add Sponsorship Details

Initiator: Sponsor

Goal: Sponsor adds details about sponsorship to the system

Pre-condition: The animal selected is not already sponsored

Post-condition: The sponsorship details are added to the system

Assumptions: The sponsorship details entered are valid.

Main Success Scenario:

1. Sponsor navigates to a specific animal in the frontend.
2. Sponsor clicks sponsor this animal and reaches the sponsorship form
3. Sponsor fills up the sponsorship details and clicks submit

3.6 UML Class Diagram

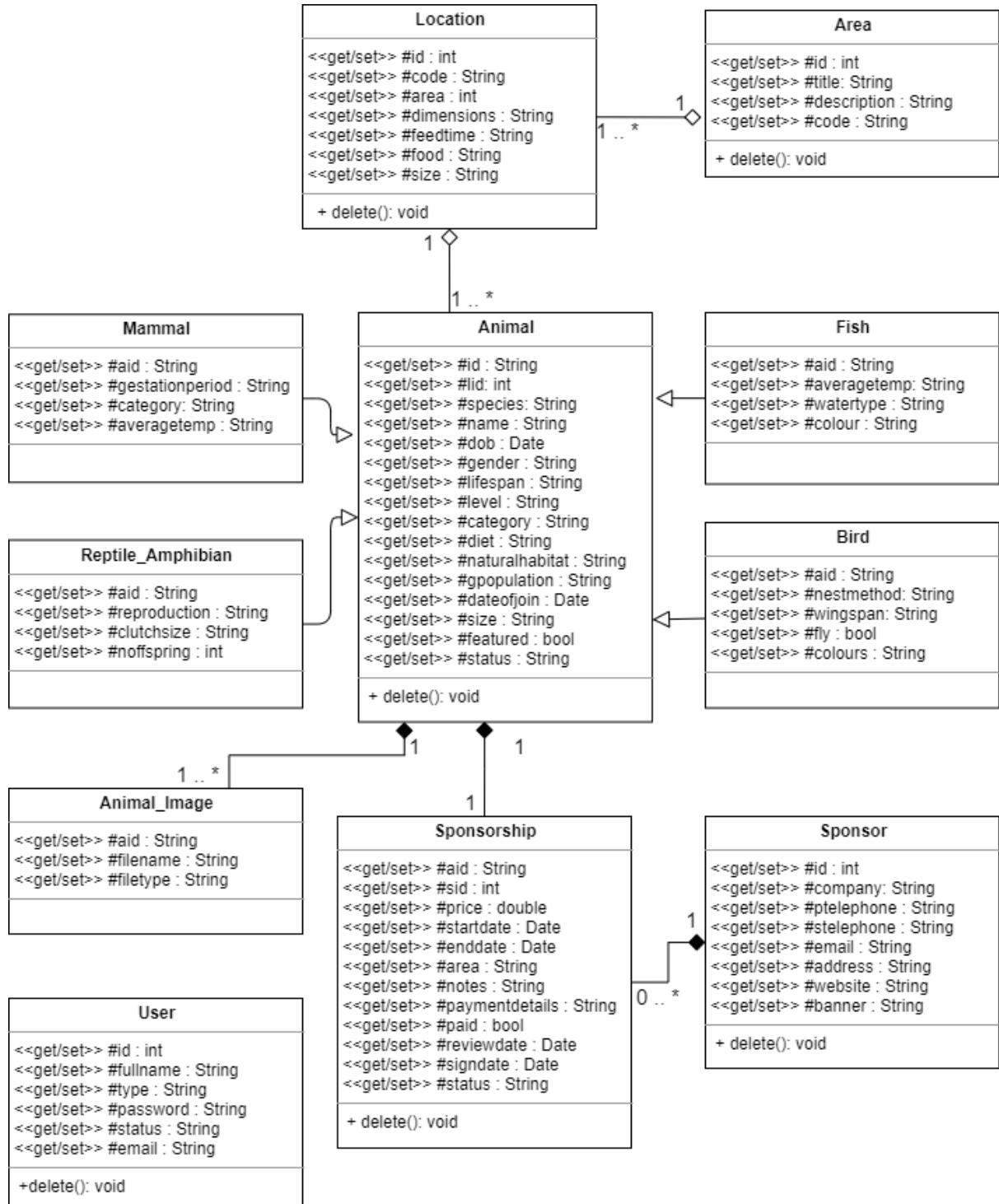


Figure 13 – Class Diagram

3.7 Entity Relationship Diagram

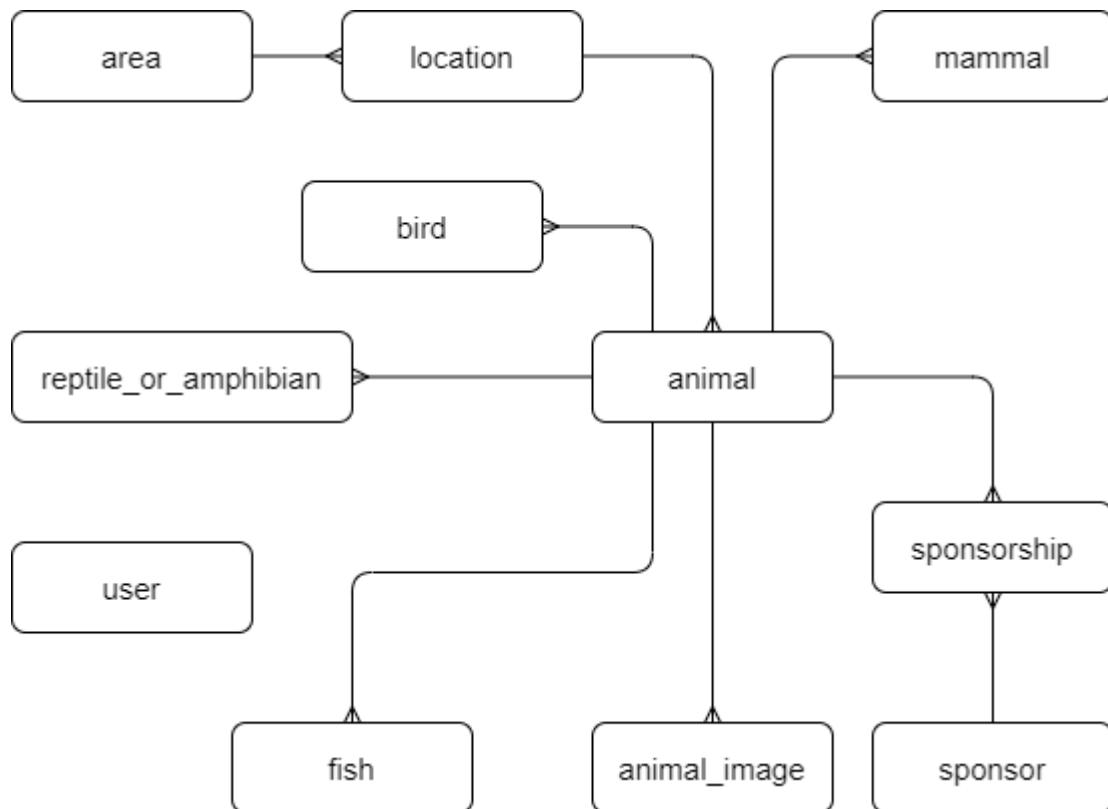


Figure 14 – ER Diagram

3.8 System Interface Design

3.8.1 System Wireframes/Mockups

Mockups from the JAD workshop are included in the [Appendix](#). This section includes wireframes/mockups prepared after the JAD workshop as part of designing the system UI. This leads to construction of actual GUI and implementation. Some repetitive aspects of the wireframes have not been included for all the pages but are expected to be consistent in the implementation. For example: pages for adding new records should be consistently similar for all the entities.

Dashboard:

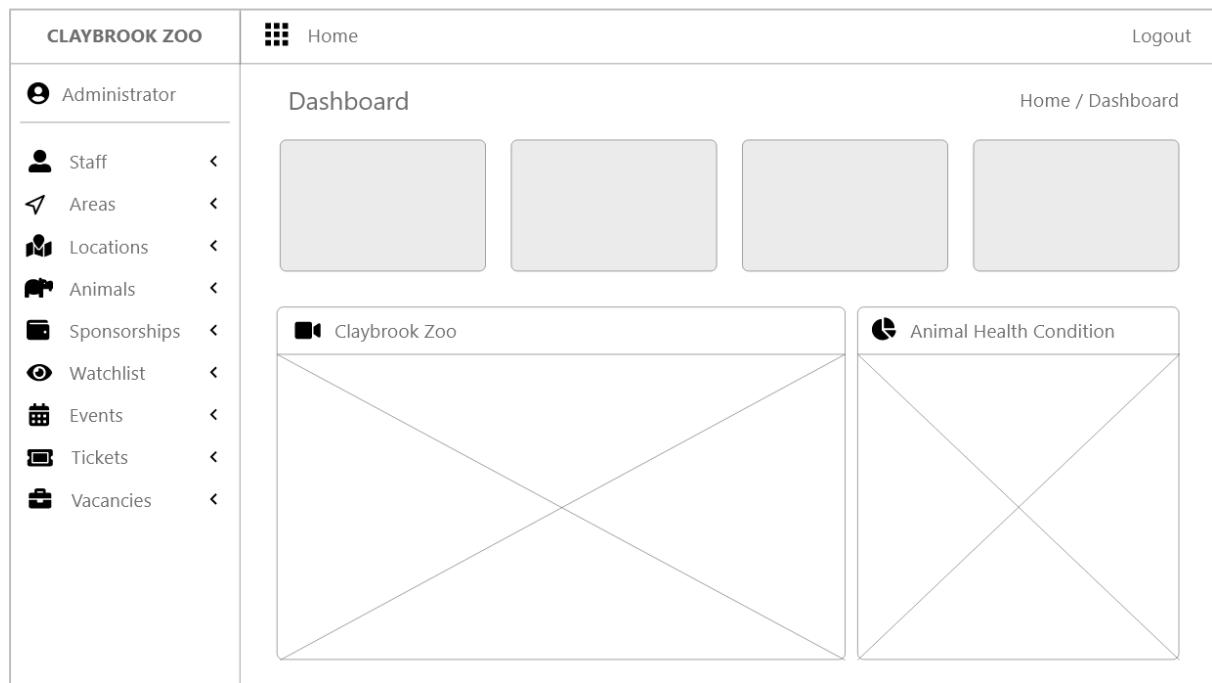


Figure 15 – Dashboard Wireframe

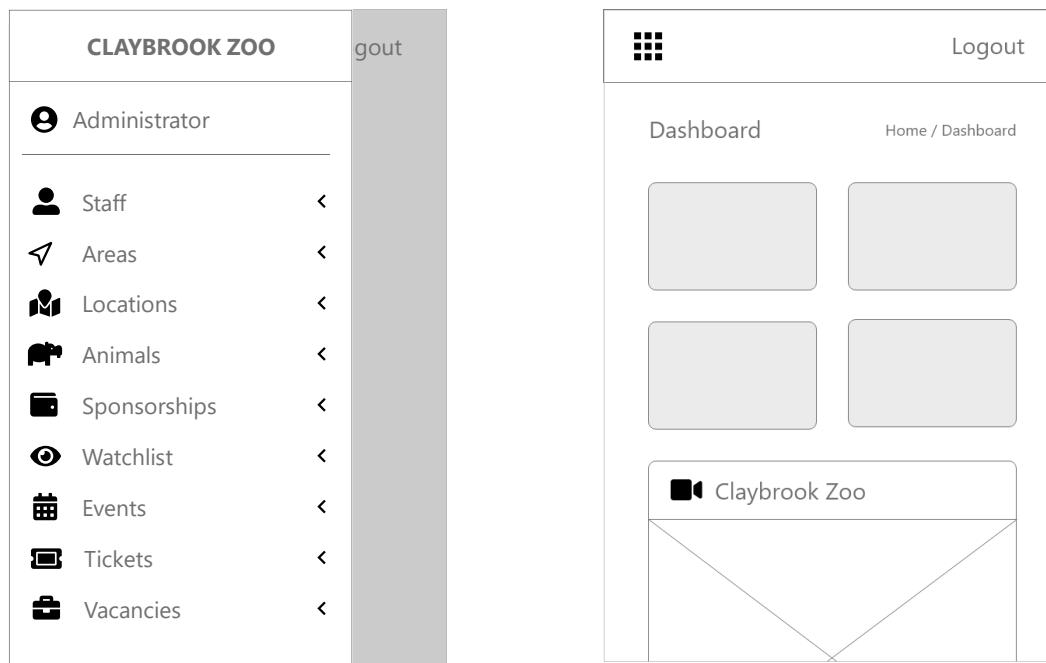


Figure 16 – Navigation on and off, Dashboard Mobile View Wireframe

Login:

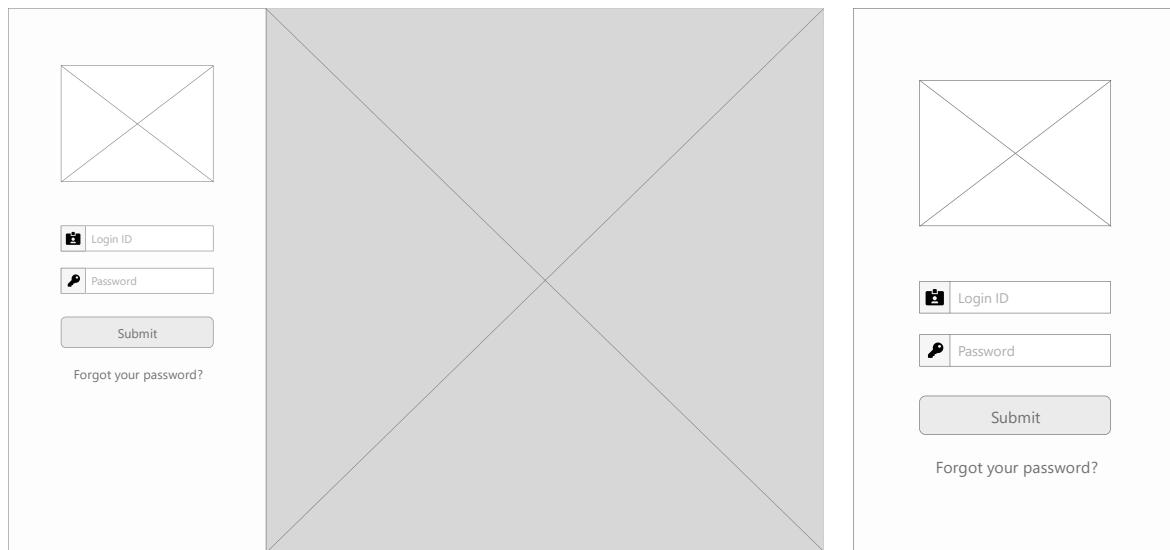


Figure 17 – Login Web and Mobile View Wireframe

CLAYBROOK ZOO		Home							Logout	
Administrator										
Staff	▼									
View Staff									Home / Staff	
Add Staff									Search <input type="text"/>	
Areas <										
Locations <										
Animals <										
Sponsorships <										
Watchlist <										
Events <										
Tickets <										
Vacancies <										
									Previous <input type="button" value="1"/> Next <input type="button"/>	

Figure 18 – View all Staff Wireframe

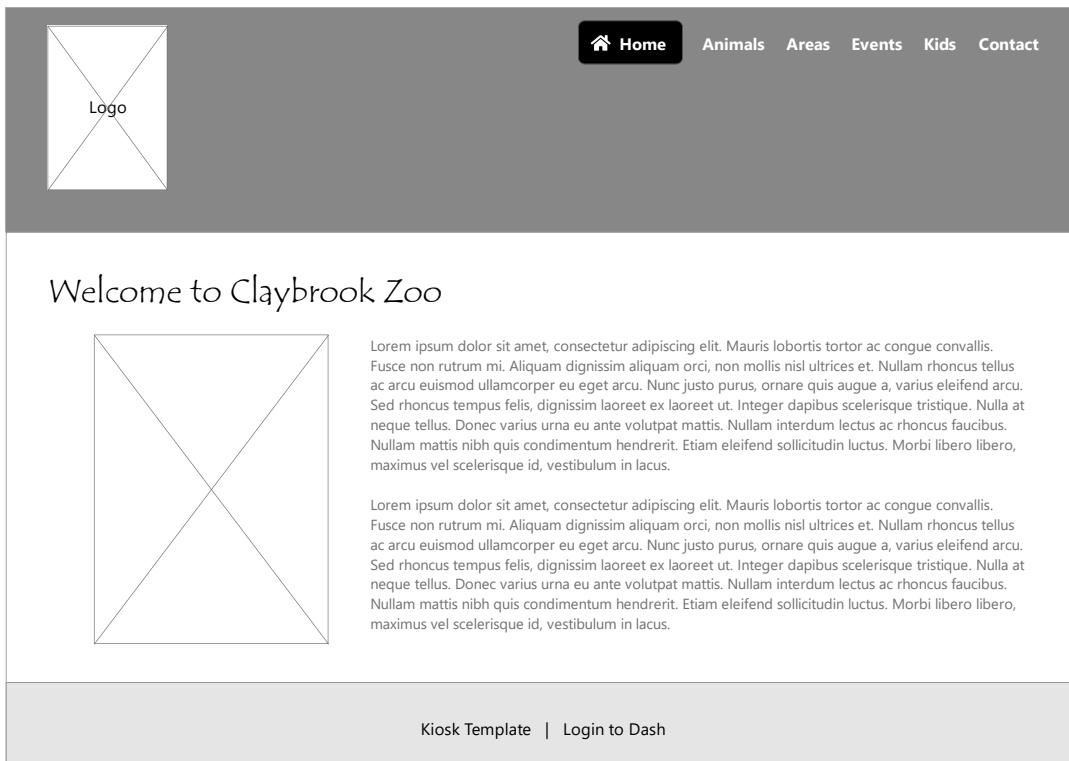
CLAYBROOK ZOO <hr/> <div style="background-color: #f0f0f0; padding: 5px;"> Administrator <hr/> Staff ▼ View Staff Add Staff <hr/> Areas ◀ Locations ◀ Animals ◀ Sponsorships ◀ Watchlist ◀ Events ◀ Tickets ◀ Vacancies ◀ </div>	<div style="display: flex; justify-content: space-between;"> Home Logout </div> <div style="margin-top: 10px;"> <h3>Add Staff</h3> </div> <div style="text-align: right; margin-bottom: 10px;"> Home / Staff / Add Staff </div> <div style="border: 1px solid #ccc; padding: 10px; border-radius: 5px;"> <p style="font-weight: bold; margin-bottom: 5px;">User Form</p> <div style="display: flex; justify-content: space-around; margin-bottom: 10px;"> <div style="width: 45%;"> <input style="width: 100%; height: 30px; border: 1px solid #ccc; border-radius: 5px; padding: 5px; margin-bottom: 5px;" type="text"/> Full Name </div> <div style="width: 45%;"> <input style="width: 100%; height: 30px; border: 1px solid #ccc; border-radius: 5px; padding: 5px; margin-bottom: 5px;" type="text"/> Email </div> </div> <div style="display: flex; justify-content: space-around; margin-bottom: 10px;"> <div style="width: 45%;"> <input style="width: 100%; height: 30px; border: 1px solid #ccc; border-radius: 5px; padding: 5px; margin-bottom: 5px;" type="text"/> Password </div> <div style="width: 45%;"> <p style="color: red; margin-bottom: 5px;">Password must contain more than 8 characters</p> <input style="width: 100%; height: 30px; border: 1px solid #ccc; border-radius: 5px; padding: 5px; margin-bottom: 5px;" type="text"/> Confirm Password </div> </div> <div style="display: flex; justify-content: space-around; margin-bottom: 10px;"> <div style="width: 45%;"> <p style="color: red; margin-bottom: 5px;">Passwords must match</p> <input style="width: 100%; height: 30px; border: 1px solid #ccc; border-radius: 5px; padding: 5px; margin-bottom: 5px;" type="text"/> Administrator </div> </div> <div style="text-align: center; margin-bottom: 10px;"> <input style="width: 150px; height: 30px; border: 1px solid #ccc; border-radius: 5px; background-color: #f0f0f0; color: black; font-weight: bold; padding: 5px;" type="button" value="Submit"/> </div> </div>
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Figure 19 – Add Staff Wireframe

CLAYBROOK ZOO <hr/> <div style="background-color: #f0f0f0; padding: 5px;"> Administrator <hr/> Staff ▼ View Staff Add Staff <hr/> Areas ◀ Locations ◀ Animals ◀ Sponsorships ◀ Watchlist ◀ Events ◀ Tickets ◀ Vacancies ◀ </div>	<div style="display: flex; justify-content: space-between;"> Home Logout </div> <div style="margin-top: 10px;"> <h3>Edit Staff</h3> </div> <div style="text-align: right; margin-bottom: 10px;"> Home / Staff / Edit Staff </div> <div style="border: 1px solid #ccc; padding: 10px; border-radius: 5px;"> <div style="display: flex; align-items: center; margin-bottom: 10px;"> Example Full Name </div> <div style="display: flex; justify-content: space-between; flex-wrap: wrap;"> <div style="width: 45%; border-bottom: 1px solid #ccc; padding-bottom: 5px;"> User ID 1532 </div> <div style="width: 45%; border-bottom: 1px solid #ccc; padding-bottom: 5px;"> Email example@test.com </div> <div style="width: 45%; border-bottom: 1px solid #ccc; padding-bottom: 5px;"> Type Zookeeper </div> <div style="width: 45%; border-bottom: 1px solid #ccc; padding-bottom: 5px;"> Status Active </div> <div style="width: 45%; border-bottom: 1px solid #ccc; padding-bottom: 5px;"> Delete </div> </div> <div style="border: 1px solid #ccc; padding: 10px; margin-top: 10px;"> <p style="font-weight: bold; margin-bottom: 5px;">User Form</p> <div style="display: flex; justify-content: space-around; margin-bottom: 10px;"> <div style="width: 45%;"> <input style="width: 100%; height: 30px; border: 1px solid #ccc; border-radius: 5px; padding: 5px; margin-bottom: 5px;" type="text"/> Example Full Name </div> <div style="width: 45%;"> <input style="width: 100%; height: 30px; border: 1px solid #ccc; border-radius: 5px; padding: 5px; margin-bottom: 5px;" type="text"/> example@test.com </div> </div> <div style="display: flex; justify-content: space-around; margin-bottom: 10px;"> <div style="width: 45%;"> <input style="width: 100%; height: 30px; border: 1px solid #ccc; border-radius: 5px; padding: 5px; margin-bottom: 5px;" type="text"/> Zookeeper </div> </div> <div style="text-align: center; margin-bottom: 10px;"> <input style="width: 150px; height: 30px; border: 1px solid #ccc; border-radius: 5px; background-color: #f0f0f0; color: black; font-weight: bold; padding: 5px;" type="button" value="Update"/> </div> </div> <div style="border: 1px solid #ccc; padding: 10px; margin-top: 10px;"> <p style="font-weight: bold; margin-bottom: 5px;">Update Password</p> <div style="display: flex; justify-content: space-around; margin-bottom: 10px;"> <div style="width: 45%;"> <input style="width: 100%; height: 30px; border: 1px solid #ccc; border-radius: 5px; padding: 5px; margin-bottom: 5px;" type="text"/> Password </div> </div> <div style="color: red; margin-bottom: 10px;">Password must contain more than 8 characters</div> </div> </div>
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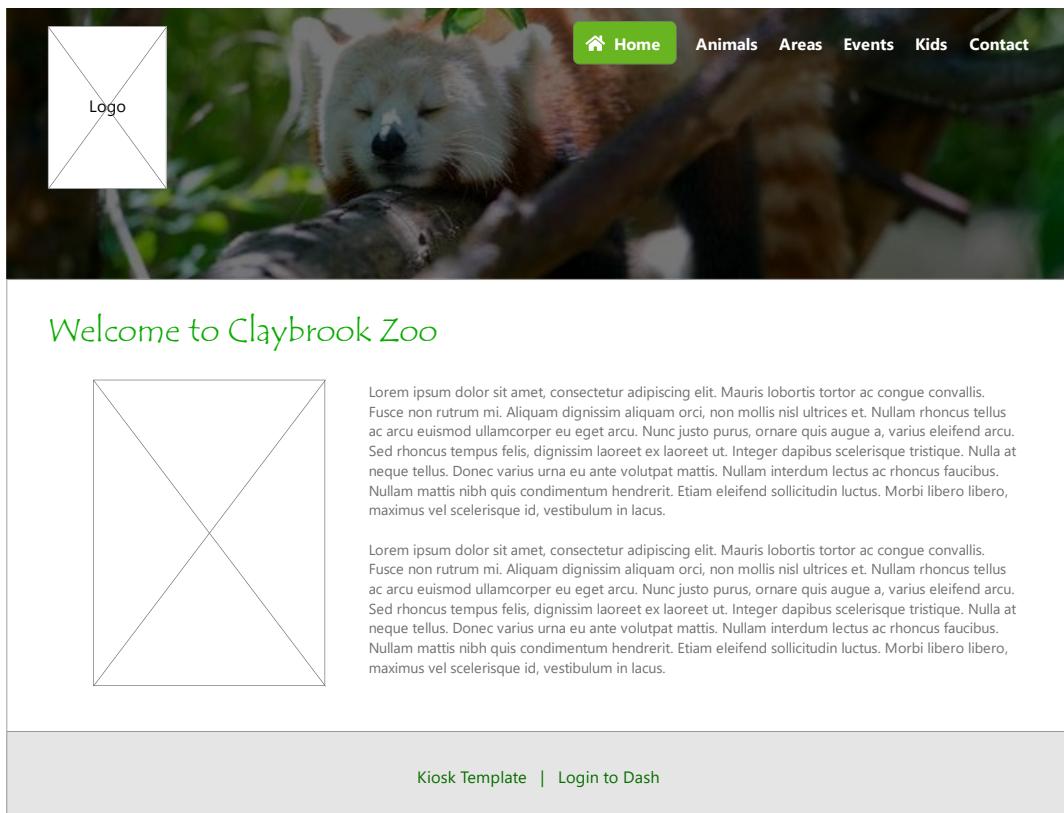
Figure 20 – Edit Staff Wireframe

Frontend:



The wireframe shows the layout of the homepage. At the top is a dark header bar with a logo placeholder containing a 'Logo' text and navigation links for Home, Animals, Areas, Events, Kids, and Contact. Below the header is a large white content area. On the left side of this area is a placeholder for the main image, which contains a large 'X' mark. In the center of the content area is a text block with two identical paragraphs of placeholder text (Lorem ipsum). At the bottom of the content area is a grey footer bar with links for Kiosk Template and Login to Dash.

Figure 21 – Homepage Wireframe



The mockup shows the final design of the homepage. The header features a logo placeholder with a 'Logo' text and a navigation bar with Home, Animals, Areas, Events, Kids, and Contact links. The main content area has a large image of a koala sleeping on a branch. To the left of the image is a placeholder for the main image, which contains a large 'X' mark. The central text block contains two identical paragraphs of placeholder text. The footer bar at the bottom includes links for Kiosk Template and Login to Dash.

Figure 22 – Home Page Mockup (new)

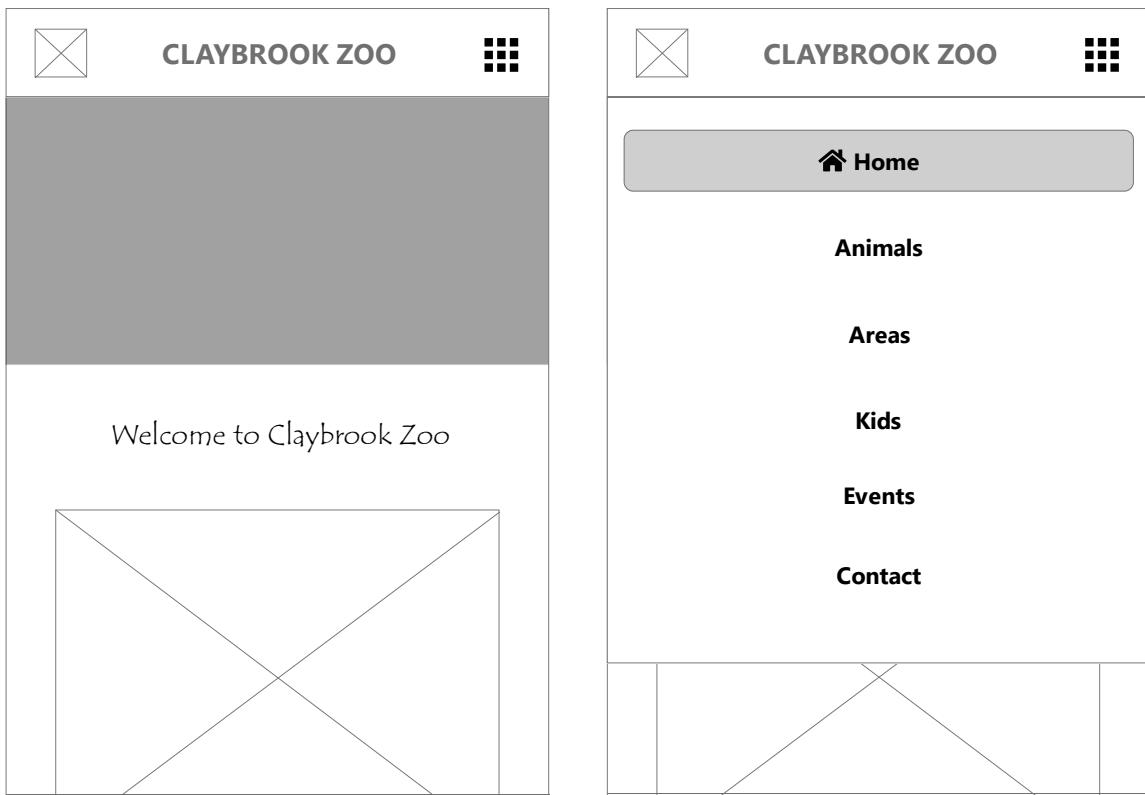


Figure 23 – Frontend Mobile View Wireframe

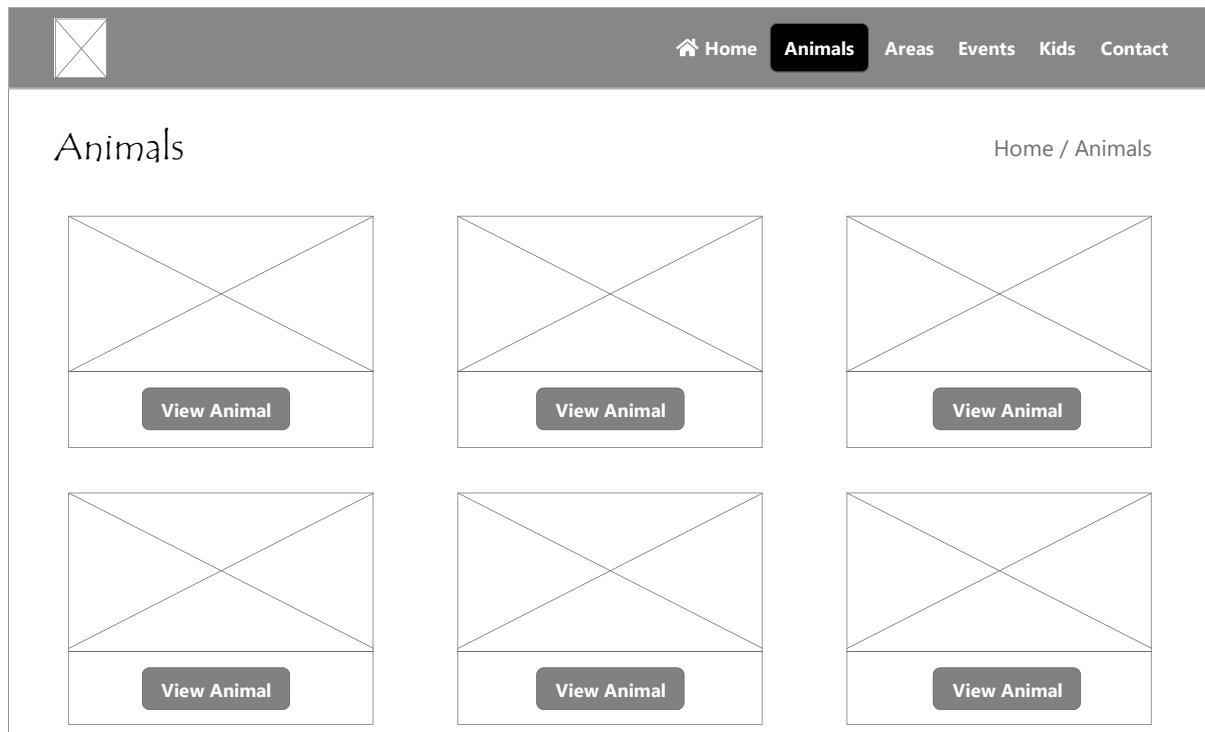


Figure 24 – Animals Wireframe

The wireframe shows a dark header with a logo and navigation links for Home, Animals (which is highlighted), Areas, Events, Kids, and Contact. The main content area has a title "Animal Details" and a large empty rectangular placeholder for an image. To the right is a sidebar with a grey header "REPLE20217C". It contains six data items with icons: NAME (Bengal Tiger), SPECIES (Tiger), BORN (01-02-2012), JOINED (01-02-2012), GENDER (Male), and CATEGORY (Mammal). Below these is a lifespan entry with a bar chart icon and the text "LIFESPAN 10 years". At the bottom of the sidebar is a dark button labeled "SIGNAGE".

Figure 25 – Animal Details Wireframe

The mockup shows the same layout as Figure 25, but the large empty image placeholder now contains a vibrant photograph of a blue and yellow fish, likely an angelfish. The sidebar data remains identical to Figure 25.

Figure 26 – Animal Details Mockup

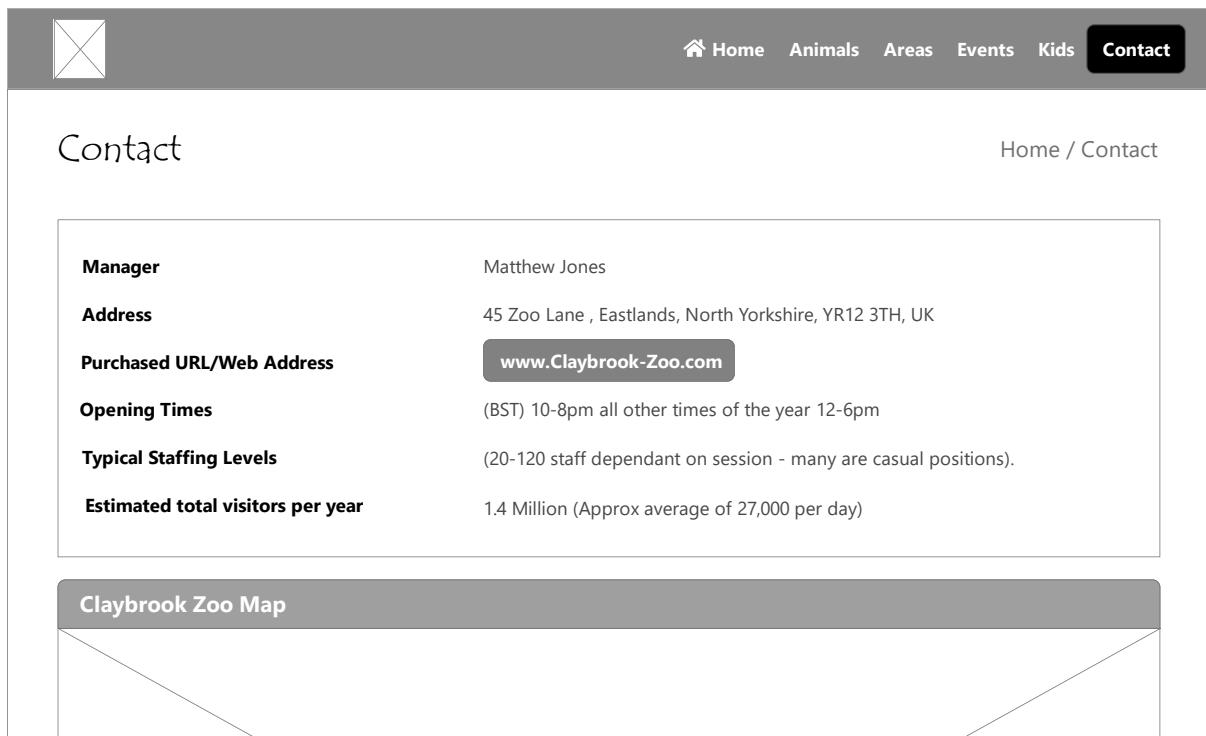


Figure 27 – Contact Page Wireframe

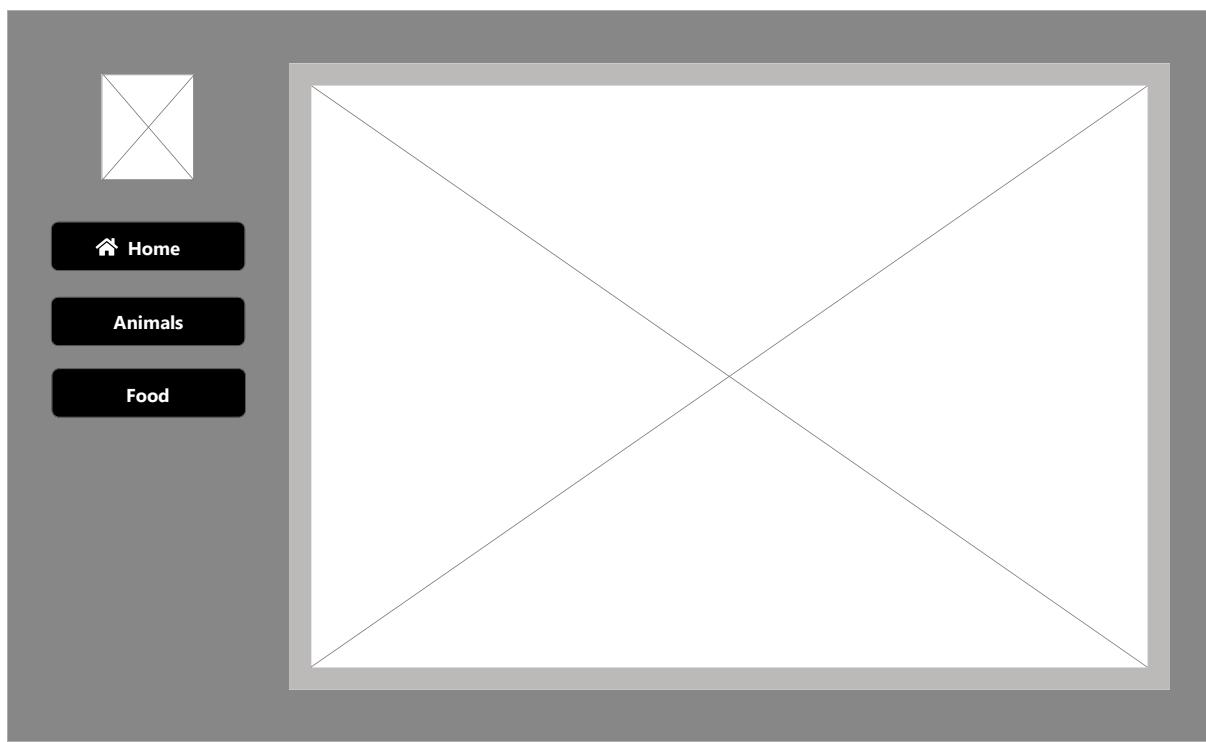


Figure 28 – Kiosk Template Wireframe

3.8.2 System Navigation Diagram

Dashboard

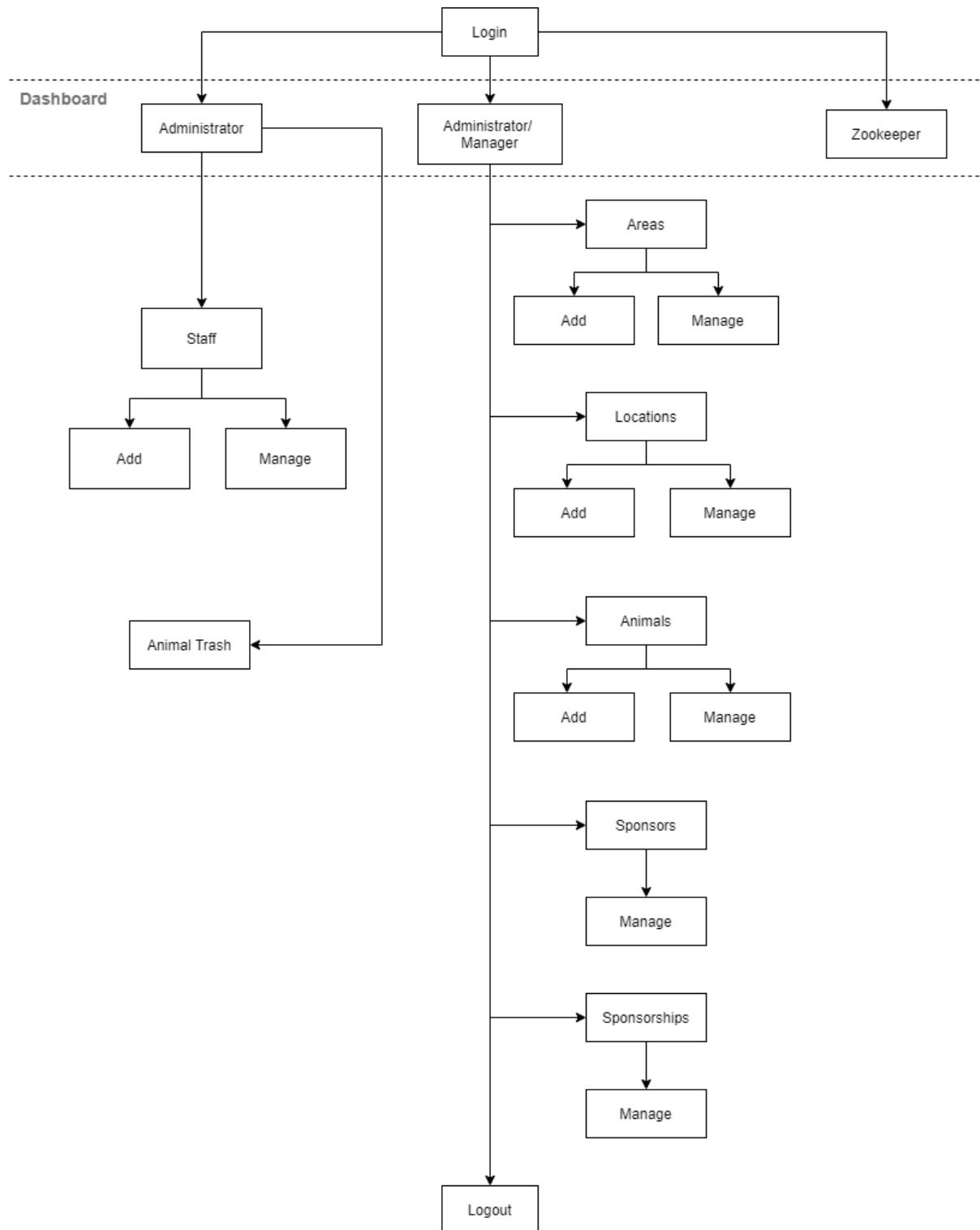


Figure 29 – Dashboard Navigation Diagram

Frontend

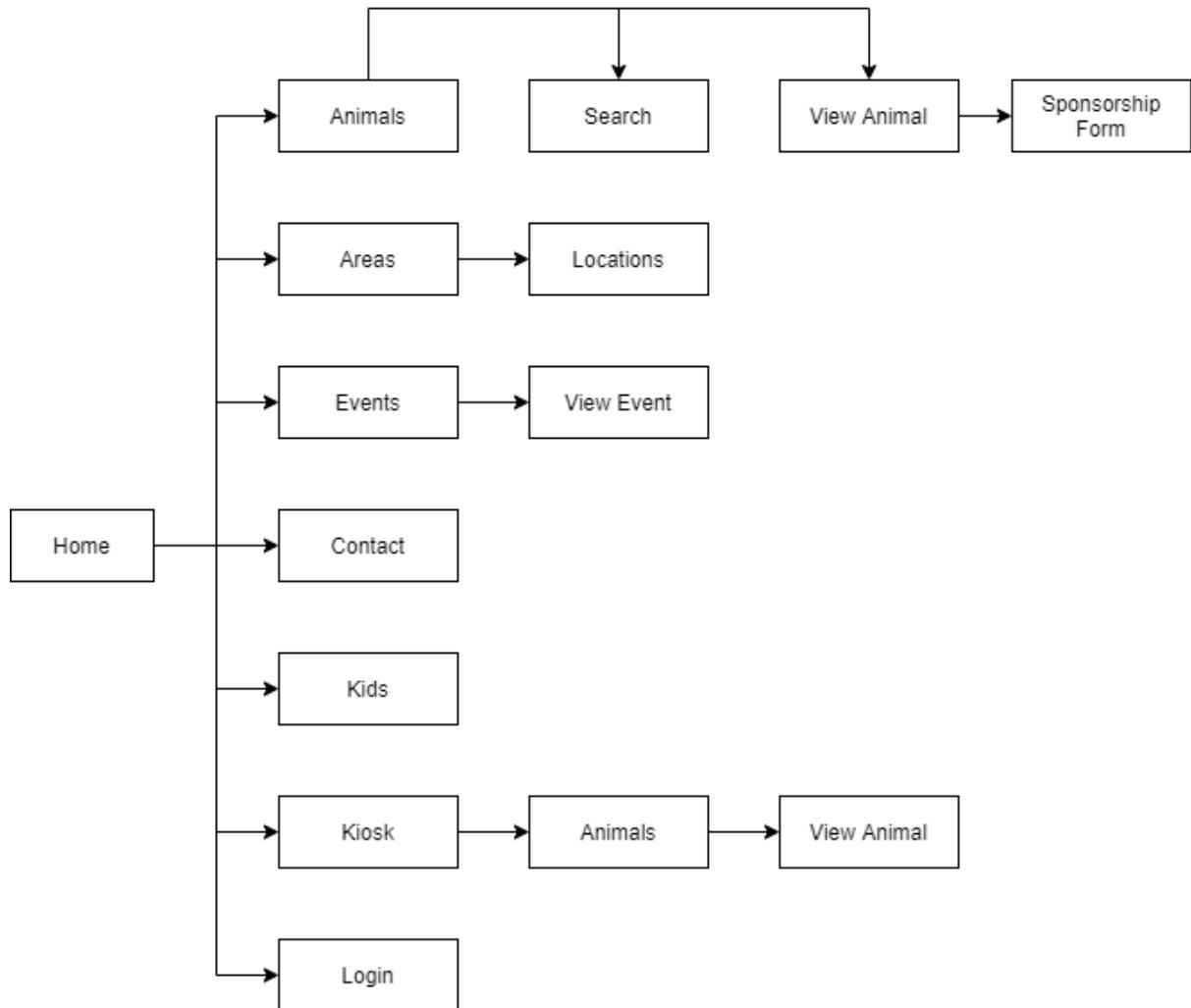


Figure 30 – Frontend Navigation Diagram

3.8.3 System Activity Event Diagrams

This section will include some activity charts for key business events in the system. Similar or repetitive types of events will not be shown more than once.

Add new Staff

Other records such as Areas, Locations and Animals can be added in a similar manner.

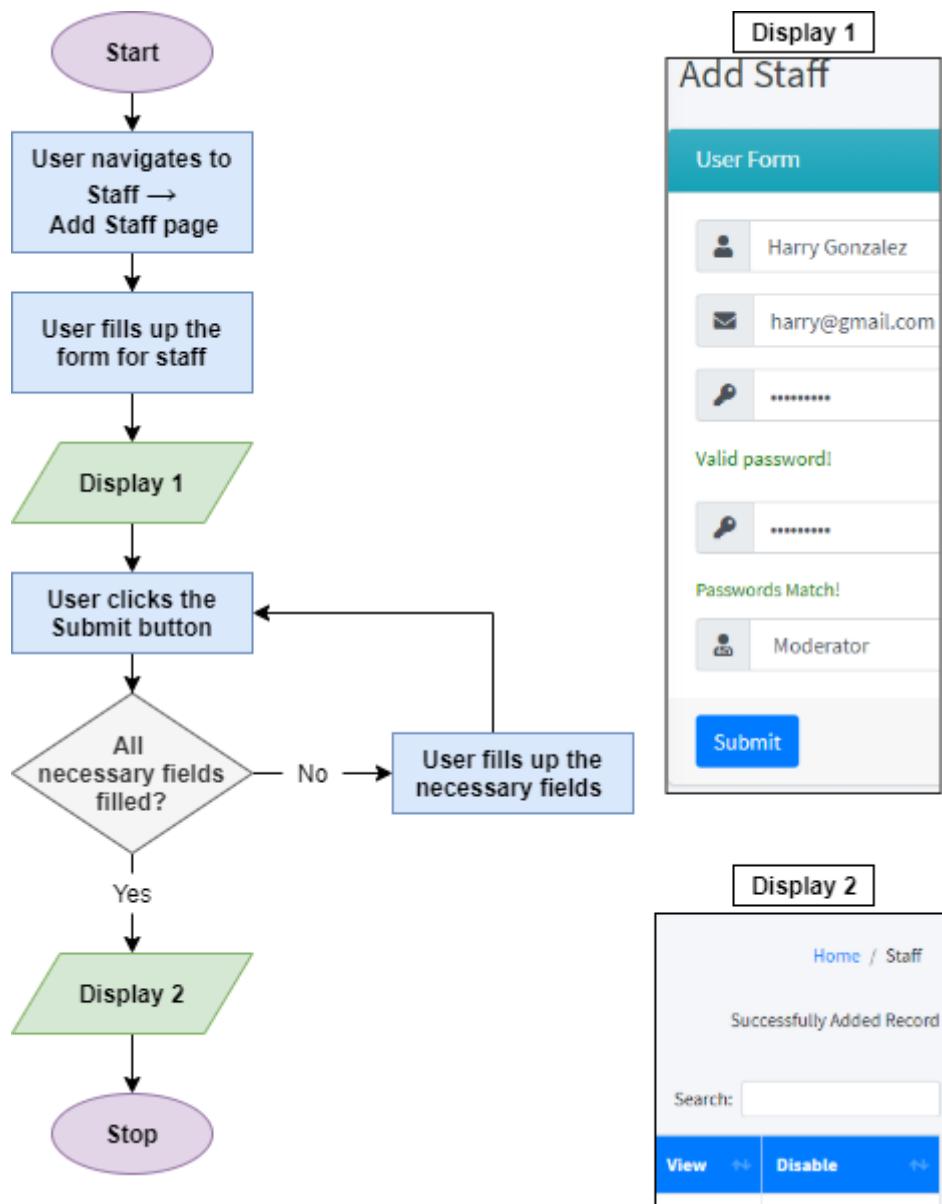


Figure 31 – Adding new Staff Event Diagram

Edit / Delete Staff

Other records such as Areas, Locations, Animals, Sponsors and Sponsorships can be edited or deleted in a similar manner. The only difference will be about limiting constraints that prevent deletion. For example: an administrator cannot delete their own account, a location with other locations cannot be deleted, etc.

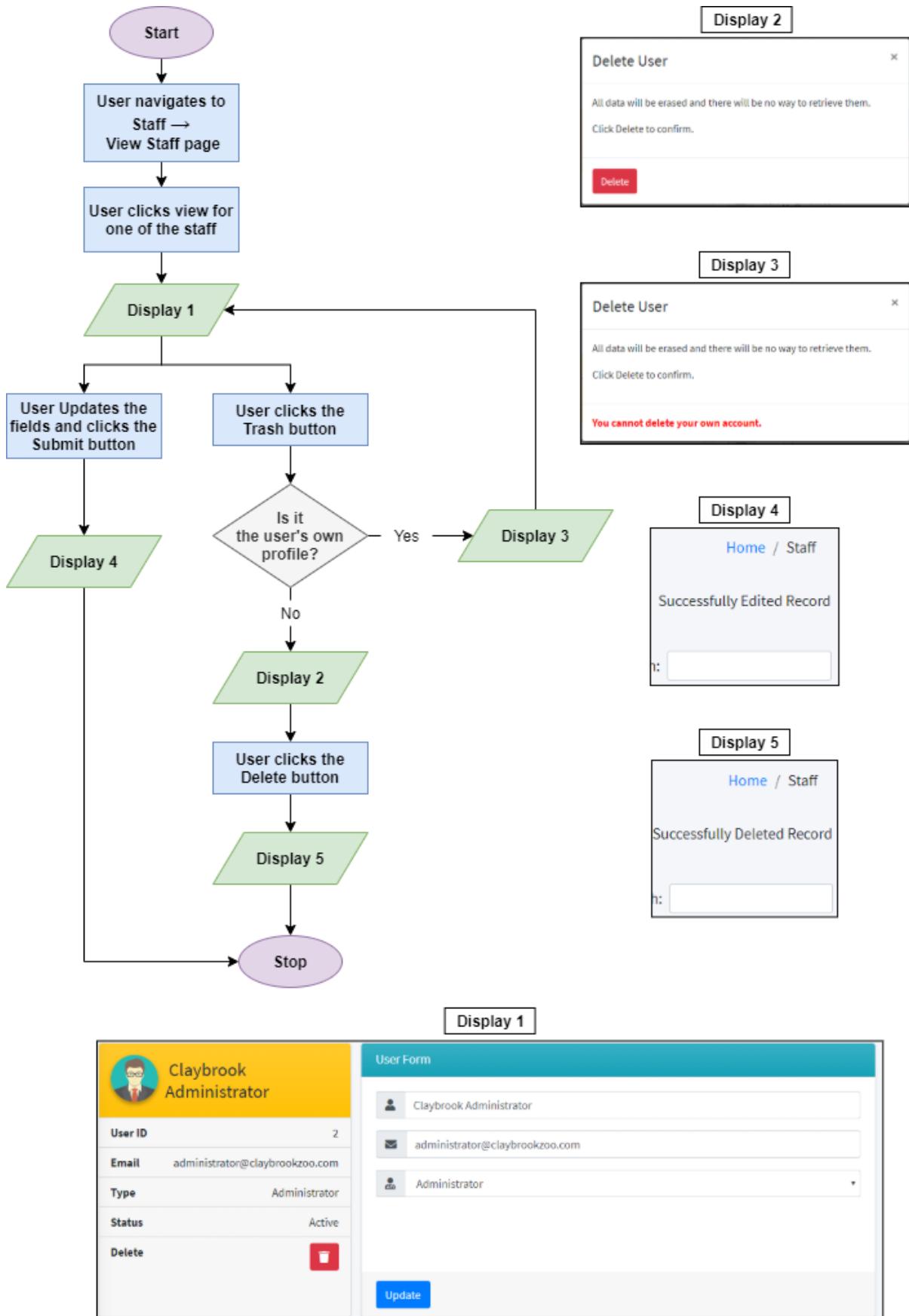


Figure 32 – Editing/Deleting Staff Event Diagram

Mail Sponsor about Expiry

The Administrator/Manager can print or send an automated email to the sponsor for a running/expiring sponsorship.

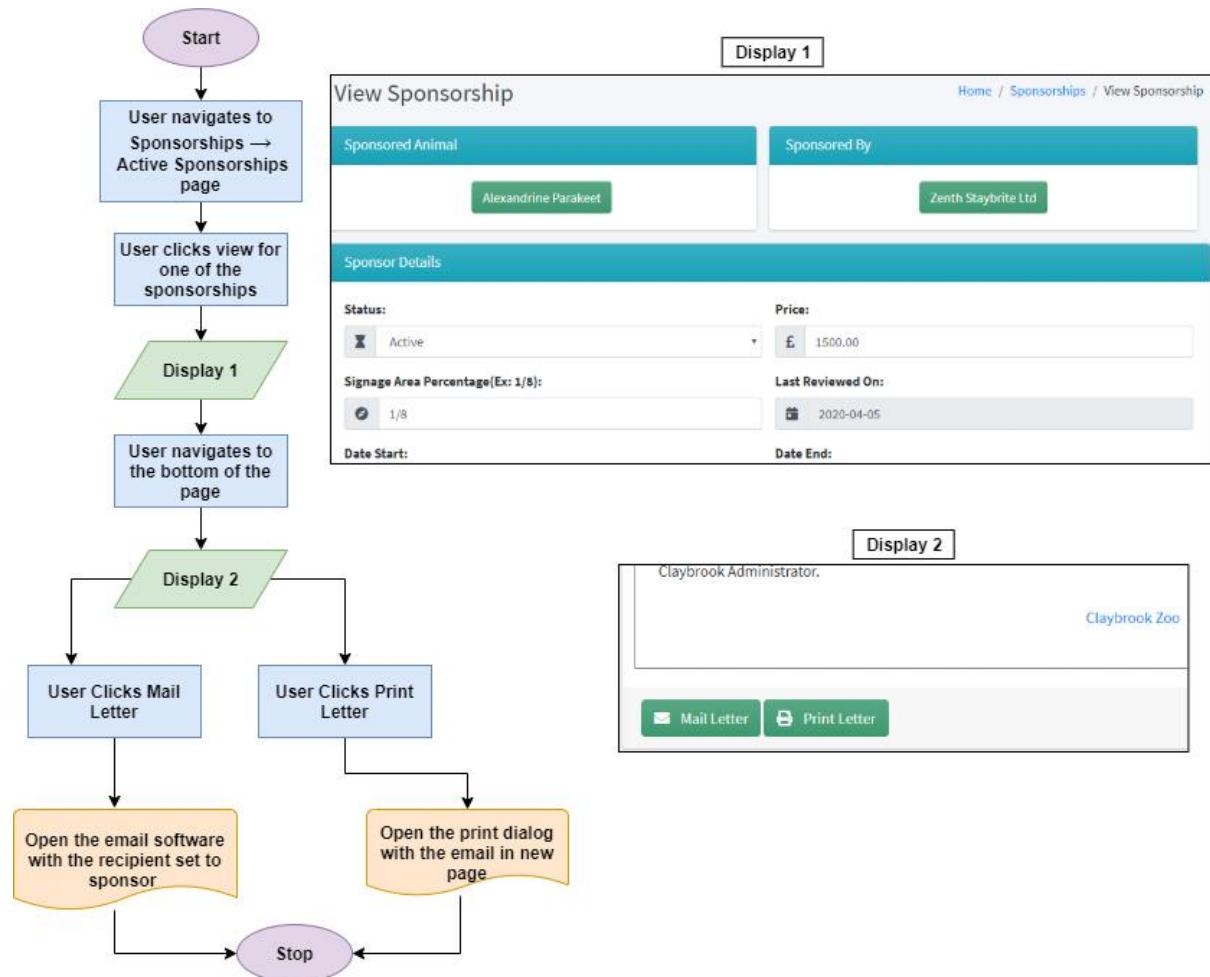


Figure 33 – Mailing Sponsor Event Diagram

Sponsorship Application

Sponsors can apply for sponsorship if an animal does not already contain an existing sponsor.

It is assumed that the user is currently browsing an animal's details in the frontend.

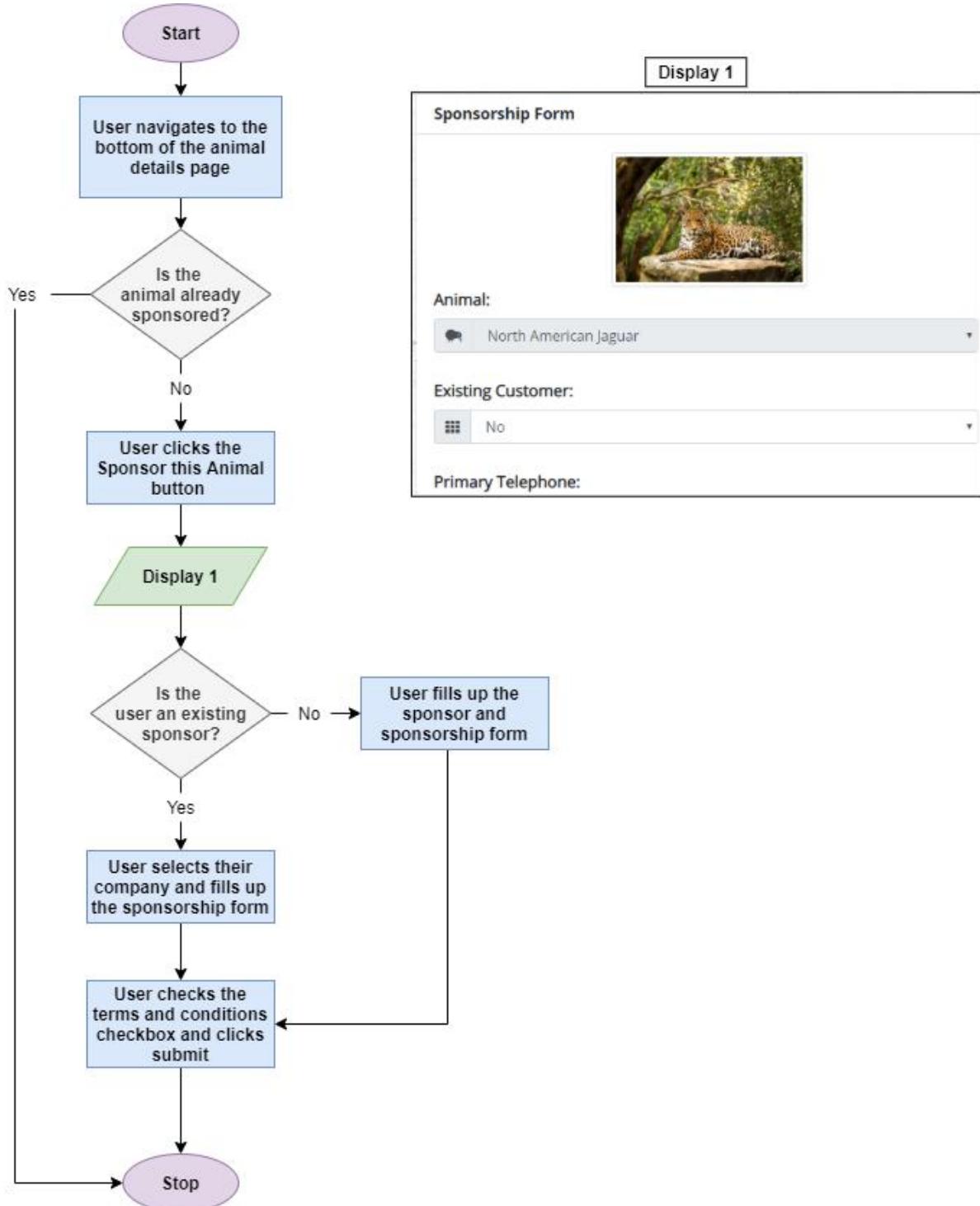


Figure 34 – Applying for Sponsorship Event Diagram

Approving Sponsorship

The application needs to be set to active by the Manager/Administrator in order to complete the sponsorship application process.

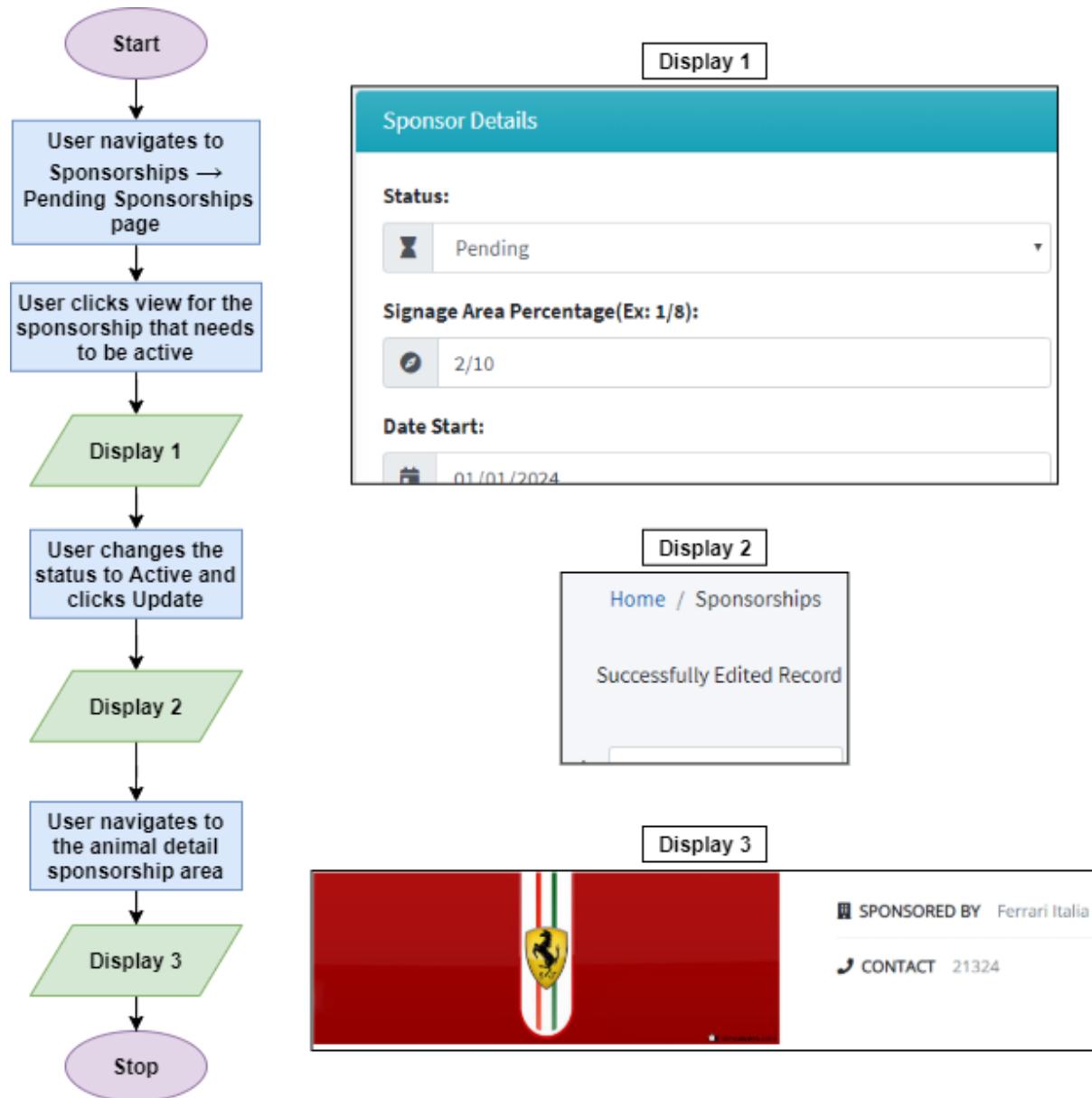
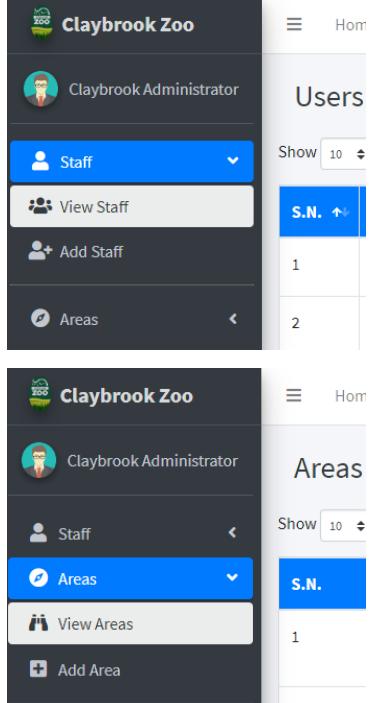


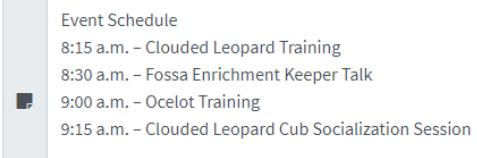
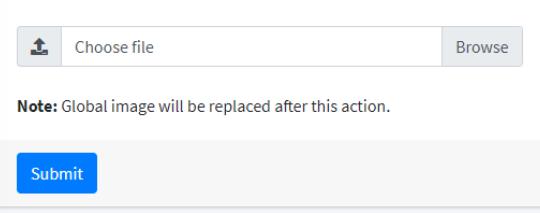
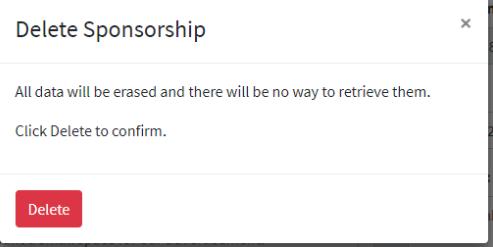
Figure 35 – Activate Sponsorship Event Diagram

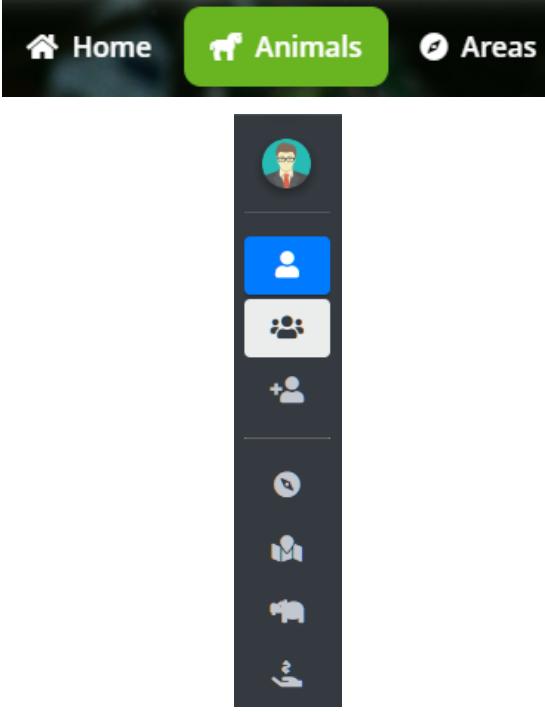
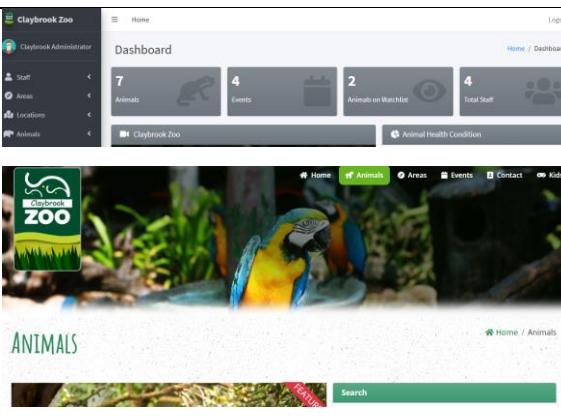
3.8.4 Heuristic Evaluation

Evaluation Conformity Key

- 1 → Fully conforms.
- 2 → Conforms in most areas.
- 3 → Conforms in few areas.
- 4 → Does not conform at all.

Usability Criteria (Heuristics) Appropriate Use of:	Level	Evidences	Comments
Metaphors	1		<p>Metaphors have been used to give the picture of different buttons or defining entities.</p>
Consistency/ Perceived Stability	2		<p>Consistency is achieved by using same template across all the relevant pages (example: for visitors, for kiosk, and for staff)</p>

WYSIWYG	3	<p>Ticket and Cost Information:</p>  <p>Event Schedule 8:15 a.m. - Clouded Leopard Training 8:30 a.m. - Fossa Enrichment Keeper Talk 9:00 a.m. - Ocelot Training 9:15 a.m. - Clouded Leopard Cub Socialization Session</p> <p>Other Information</p>  <p>Event Schedule 8:15 a.m. - Clouded Leopard Training 8:30 a.m. - Fossa Enrichment Keeper Talk 9:00 a.m. - Ocelot Training 9:15 a.m. - Clouded Leopard Cub Socialization Session</p>	The edited text/content shows exactly the same style of display as during the edit in some areas.
User Centered Control	2	<p>Change/Upload Global Distribution Map Image</p>  <p>Choose file <input type="file"/> Browse</p> <p>Note: Global image will be replaced after this action.</p> <p>Submit</p>	The controls are highly user-centered, and do not necessitate technical knowledge. Design is verified with key users from JAD.
Feedback and Dialog	1	<p>Home / Animals</p> <p>Successfully Edited Image</p> <p>Search... <input type="text"/></p>	Feedbacks and dialogues are provided with the use of messages after performing certain actions.
Forgiveness	2	<p>Delete Sponsorship</p>  <p>All data will be erased and there will be no way to retrieve them. Click Delete to confirm.</p> <p>Delete</p>	Forgiveness is provided through modals specially for deletion attempt.

Interface Text		<p>Size: They weigh anywhere from 65 to 165 pounds (0.9 to 2.1 m), not including their tails which can be up to 0.9 m long. The average adult black leopard weighs about 100 pounds.</p> <p>Diet: Panthers are carnivorous animals that eat meat like deer, wild hogs, and wild boar. They also eat smaller animals like rabbits, dogs, birds, and fish. They eat what they can find and are not picky about their diet.</p>	The interface text is a sans-serif font – “Open Sans” and is very readable.
Buttons	1		Buttons are consistently used across the system with similar design features.
Icons	1		A lot of icons have been used for navigation menu as well as buttons. This helps people with language difficulty to navigate through icons.
Color	2		Similar and consistent color combination is used throughout the template for both frontend and backend.

Modelessness	1	-	There is no use of special keys or buttons to change any mode. No Extra modes present.
---------------------	---	---	--

4. SYSTEM BUILD & TECHNICAL NOTES – BLOCK 1

The system uses PHP as the primary server-side programming language with a mix of HTML, CSS and JavaScript for the frontend. Bootstrap has been used for template elements which is also supported by AdminLTE template for the dashboard design, also reviewed in the Comparable Systems section. MySQL handles the database and is the DBMS utilized. An MVC template quite similar to how Laravel works has been used which was also used for many projects in the past. The model handles all the database queries and commands, the controller handles all the logical components and displays relevant views.

4.1 Difficult Code Sections

The MVC pattern followed allows adding new features for newer versions relatively easy, hence making the system highly scalable. Most of the difficult logical code sections have been implemented as functions and used across different parts of the system. An example of technically difficult code section is generation of animal unique identifier. The task was done by designing a function where entered animal details from the animal form are provided and the function returns the generated unique ID for the animal. Other difficult sections and notable features integrated in this build will be discussed in the Notable Features section.

```
function generateAnimalCode($animal){
    // CAT = Category, SP = Species, YY = Year Added, RND = Random Number,
    // L = Level    CATSPYYRNDL  MAMG020253C
    $yy = date("y");
    // https://stackoverflow.com/questions/8215979/php-random-x-digit-number - Marcus
    $digits = 3;

    // Do not let duplicated code
    $animalClass = new DatabaseTable('animals');
    do{
        $rand = str_pad(rand(0, pow(10, $digits)-1), $digits, '0', STR_PAD_LEFT);
        $code = strtoupper(substr($animal['acategory'],0,3).substr($animal['aspecies'], 0, 2)
            ).$yy.$rand.$animal['alevel'];
    }while(($animalClass->find('aid', $code)->fetch())!=false);
    return $code;
}
```

Figure 36 – Generation of Animal Identifier

4.2 Build Notes

Version: Block 1 Prototype

Product: Claybrook Zoo Software Solution (Web)

Date of Release: 15th March 2020

Overview: This build is the result of completion of first development block for Claybrook Zoo prototype. The system is at least 65% complete and the implemented functionalities are usable.

Core Functionalities:

- Addition and removal of animal records from the zoo
- Ability to search the records
- Provide animal information (frontend)

Additional Functionalities:

- Auto generation of unique identifier for every animal (negotiated with client)
- Complex search combining category, name, location, etc.
- Fully functional animal sponsorship scheme (except online payment).
- System expanded to include locations and areas and allocating animals to them for simple animal stock management.
- Internet ready pages for visitors to view animals, areas and locations in the zoo.
- Access control features provided to allow relevant staff to access relevant pages.

Issues: None found at the time of writing.

Installation Notes for Testing (For Technical Users Only):

- Move the “Claybrook_Zoo” folder to the server root directory.
- Import the “Claybrook.sql” to the MySQL database.
- Test the system from http://localhost/Claybrook_Zoo/

4.3 Notable Hidden Features

- For each animal, a separate folder is created for storing all the different types of images. This was done to simplify the process of removing an animal from the system, as well as removing any chance of accidental deletion of files for a different animal.



Figure 37 – Separate folder for animal images

- The function getAgeFromDate() can be used to provide a specific date and get the age of the animal in the format X years, Y months. This can be used to directly display the age of animal in the frontend instead of date of birth.

```
function getAgeFromDate($dob){  
    $dob = strtotime($dob);  
    $dob=date('Y-m-d', $dob);  
    $dob = new DateTime($dob);  
    $diff = $dob->diff(new DateTime());  
    $years = $diff->format('%y');  
    $months = $diff->format('%m');  
    if($years==0) return $months.' months';  
    return $years.' years, '.$months.' months.';  
}
```

Figure 38 – Retrieving age from provided Date

- This special function checks the system for available list of administrators. There should be certain restrictions in the system for deletion or archiving of administrators. This is because if there is no active administrator in the system, nobody would be able to login and manage staff records.

```
function checkLastAdministrator(){
    global $pdo;
    $ob = $pdo->prepare('SELECT * FROM users
                            WHERE ustatus = "Active" AND utype = "Administrator"');
    $ob->execute();
    return ($ob->rowCount()>1?false:true);
}
```

Figure 39 – Checking whether only one administrator is available

- Some functions are used to check whether an existing record is being used by something else. For example: An animal can be allocated a location. If such a location exists, the location should not be allowed to get deleted from the system as the animal record still requires the location information.

```
function checkAreaContainsLocations($aid){
    $locationClass = new DatabaseTable('locations');
    $location = $locationClass->find('larea', $aid);
    if($location->rowCount()>0)
        return true;
    return false;
}
```

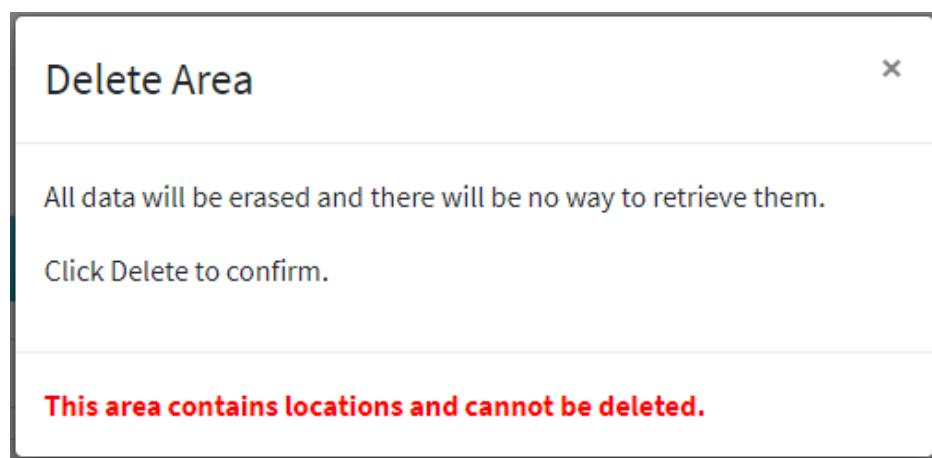


Figure 40 – Check whether Area Contains Locations

- The function below is used to check whether global distribution image is uploaded for an animal or not. This is useful for displaying the animal record as the layout would change if there is no global distribution image uploaded and it needs to be addressed in the interface.

```
function checkGlobalImageExists($aid){
    global $pdo;
    $stmt = $pdo->prepare('SELECT * FROM animal_images ai
                           WHERE ai.aianimal = "'.$aid.'" AND ai.aifiletype = "Global"');
    $stmt->execute();
    if($stmt->rowCount()>0)
        return true;
    return false;
}
```

Figure 41 – Check whether animal contains global distribution image

- The function below is used to remove all the images for an animal before removing the animal itself. This is very crucial as there could be lots of unwanted data in the system (sometimes uploaded maliciously) and these need to be deleted if the animal record itself is to be removed. Similar functions have been used to remove banners for sponsors as well as particular types of animal images when necessary.

```
function deleteAllImages($aid){
    $objClass = new DatabaseTable('animal_images');
    $obj = $objClass->delete('aianimal', $aid);
    $path="/ZooAssignment/public/";
    $pathSecond="resources/images/animals/".$aid;
    deleteDir($path.$pathSecond);
    deleteDir($pathSecond);
}
```

Figure 42 – Remove all animal images

```

// https://dcblog.dev/delete-folders-from-server-using-php
function deleteDir($dirname) {
    $dir_handle=false;
    if (is_dir($dirname)){
        $dir_handle = opendir($dirname);
    }
    if (!$dir_handle){
        return false;
    }
    while($file = readdir($dir_handle)) {
        if ($file != "." && $file != "..") {
            if (!is_dir($dirname."/".$file))
                unlink($dirname."/".$file);
            else
                delete_directory($dirname.'/'.$file);
        }
    }
    closedir($dir_handle);
    rmdir($dirname);
    return true;
}

```

Figure 43 – Removing a directory

- While removing an animal, it is also necessary to clean up any remaining information from the system about the animal such as sponsorship, watchlist and category information.

```

function deleteCategoryData($val){
    $catClass = new DatabaseTable(getAnimalCategoryTable($val));
    $catClass->delete(getAnimalCategoryCode($val), $val);
}

function deleteSponsorData($val){
    $sponsorClass=new DatabaseTable('sponsorships');
    return $sponsorClass->delete('said',$val);
}

function deleteWatchListData($val){
    $watchlistClass = new DatabaseTable('watchlists');
    $watchlistClass->delete('waid',$val);
}

```

Figure 44 – Clean up unwanted information

- A single function performs the complex search query. The search query is sent to the function in the form of an array and the results are filtered according to what data is sent.

```
// https://stackoverflow.com/questions/26270237/php-mysql-search-with-multiple-criteria - gahse
function findSearchAnimals($criteria){
    global $pdo;
    extract($criteria);
    $q = "SELECT * FROM animals a INNER JOIN locations l ON a.alid = l.lid WHERE astatus='Active' ";
    if(isset($location) && !empty($location))$q .= " AND (a.alid = '$location')";
    if(isset($area) && !empty($area))$q .= " AND l.larea = '$area'";
    if(isset($category) && !empty($category)){
        $category=str_replace("_", " ", $category);
        $q .= " AND a.acategory='$category'";
    }
    if(isset($name) && !empty($name))$q .= " AND a.aname LIKE '%$name%'";
    if(isset($sort) && !empty($sort))$q .= " ORDER BY $sort DESC";
    // $q .= " ORDER BY a.adateofjoin DESC LIMIT $per_page , $start;";
    $stmt = $pdo->prepare($q);
    $stmt->execute();
    return $stmt;
}
```

Figure 45 – Complex Search Function

- It is necessary to update all the sponsorship status to expired automatically once these are expired. Each time sponsorships details are queried; this function runs to make sure the expired sponsorships are moved to Expired.

```
function updateExpiredSponsorships(){
    global $pdo;
    $q = "UPDATE sponsorships SET sstatus = 'Expired' WHERE sstatus = 'Active' AND CURRENT_DATE>senddate";
    $stmt = $pdo->prepare($q);
    $stmt->execute();
}
```

Figure 46 – Updating expired sponsorships

5. SYSTEM TESTING & EVALUATION STRATEGY – BLOCK 1

5.1 Testing

Tests were performed both in desktop browser and handheld devices to ensure everything was working as intended. This section includes tests carried out before handing the prototype to the clients in the first block. Tests were manual and black box in nature where all the working functionalities were tested. The result screenshots are listed in order after the tests.

5.1.1 Test Results

	Test	Test Steps	Expected Result	Result (Desktop)	Result (Mobile)
1	Login to dashboard (Administrator, Manager or Zookeeper)	<ul style="list-style-type: none">• Navigate to login page• Enter correct credentials and submit	The staff gets redirected to the dashboard	Same as expected	Same as expected
2	Incorrect login	<ul style="list-style-type: none">• Navigate to login page• Enter incorrect credentials	Wrong username or password message should be displayed	Same as expected	Same as expected
For administrator only (It is assumed that an administrator is logged in after this point)					
3	Add new staff (invalid password)	<ul style="list-style-type: none">• Navigate to Staff → Add Staff• Fill up details using invalid password (less than 8 characters and different from confirm password)	Passwords must contain more than 8 characters or passwords do not match message must be displayed.	Same as expected	Same as expected

4	Add new staff (valid password)	<ul style="list-style-type: none"> • Navigate to Staff → Add Staff • Fill up all the details correctly 	A new staff is added to the system	Same as expected	Same as expected
5	View all staff	<ul style="list-style-type: none"> • Navigate to Staff → View Staff 	All staff records displayed	Same as expected	Same as expected
6	Change staff status	<ul style="list-style-type: none"> • Navigate to Staff → View Staff • Click Change Status button on any staff 	The staff's status is changed and should not be able to login if Dormant.	Same as expected	Same as expected
7	Edit staff details	<ul style="list-style-type: none"> • Navigate to Staff → View Staff • View any staff by clicking the view button • Change staff details or password and click submit 	The staff's details or password used for login should be changed	Same as expected	Same as expected
8	Delete staff record	<ul style="list-style-type: none"> • Navigate to Staff → View Staff • View any staff by clicking the view button • Delete staff record by clicking delete button 	The staff record should be deleted if it is not own account.	Same as expected	Same as expected
From this point it is assumed either Manager or Administrator is logged in					
9	Add new Area Record	<ul style="list-style-type: none"> • Navigate to Areas → Add Area 	New area record is added to the system	Same as expected	Same as expected

		<ul style="list-style-type: none"> Fill the details and submit 			
10	View all area records	<ul style="list-style-type: none"> Navigate to Area → View Areas 	All area records displayed	Same as expected	Same as expected
11	Edit area details	<ul style="list-style-type: none"> Navigate to Area → View Areas View any area by clicking the view button Change the intended details and submit 	The area details are changed.	Same as expected	Same as expected
12	Delete area record	<ul style="list-style-type: none"> Navigate to Area → View Areas View any area by clicking the view button Delete area by clicking the delete button 	If the area contains no location, it should be deleted. If it contains locations, cannot be deleted should be displayed.	Same as expected	Same as expected.
13	Add new Location	<ul style="list-style-type: none"> Navigate to Locations → Add Location Fill the details and submit 	New location is added to the system	Same as expected	Same as expected
14	View all locations	<ul style="list-style-type: none"> Navigate to Locations → View Locations 	All locations displayed	Same as expected	Same as expected
15	Edit location details	<ul style="list-style-type: none"> Navigate to Locations → View Locations 	The location details are changed.	Same as expected	Same as expected

		<ul style="list-style-type: none"> • View any location by clicking the view button • Change the intended details and submit 			
16	Delete location record	<ul style="list-style-type: none"> • Navigate to Locations → View Locations • View any location by clicking the view button • Delete location by clicking the delete button 	If the location contains no animal, it should be deleted. If it contains animal, cannot be deleted message should be displayed.	Same as expected	Same as expected.
17	Add new Animal	<ul style="list-style-type: none"> • Navigate to Animals → Add Animal • Fill the details including category details and submit 	New animal is added to the system	Same as expected	Same as expected
18	View all animals	<ul style="list-style-type: none"> • Navigate to Animals → View Animals 	All animals displayed	Same as expected	Same as expected
19	Edit animal details	<ul style="list-style-type: none"> • Navigate to Animals → View Animals • View any animal by clicking the view button 	The animal details are changed.	Same as expected	Same as expected

		<ul style="list-style-type: none"> Change the intended details (cover image, global image, gallery, or other details) and submit 			
20	Archive animal record	<ul style="list-style-type: none"> Navigate to Animals → View Animals Archive animal by clicking the Trash button 	The animal is moved to trash and successfully archived message is displayed.	Same as expected	Same as expected.
21	View animals in trash (Admin only)	<ul style="list-style-type: none"> Navigate to Animals → View Trash 	Animals in trash are displayed	Same as expected	Same as expected
22	Delete animal record (Admin only)	<ul style="list-style-type: none"> Navigate to Animals → View Trash Click delete button next to animal to delete 	The animal is deleted from the records and successfully deleted message is displayed	Same as expected	Same as expected.
23	Make animal active (Admin only)	<ul style="list-style-type: none"> Navigate to Animals → View Trash Click change status button next to animal 	The animal is moved to active and can be viewed by the Manager	Same as expected	Same as expected
24	View All Sponsors	<ul style="list-style-type: none"> Navigate to Sponsorships → Sponsors 	All sponsors displayed	Same as expected	Same as expected.

25	Edit sponsor details	<ul style="list-style-type: none"> • Navigate to Sponsorships → Sponsors • View any sponsor by clicking the view button • Change the intended details (details, banner) and submit 	The sponsor details are changed.	Same as expected	Same as expected
26	Delete sponsor	<ul style="list-style-type: none"> • Navigate to Sponsorships → Sponsors • View any sponsor by clicking the view button • Click the delete button 	If the sponsor contains no sponsorship, it should be deleted.	Same as expected	Same as expected
27	View Sponsorships	<ul style="list-style-type: none"> • Navigate to Sponsorships → (Type of ex: Active, Pending, Expired) Sponsorships 	The sponsorships of selected status are displayed	Same as expected	Same as expected
28	Edit sponsorship details	<ul style="list-style-type: none"> • Navigate to Sponsorships → Sponsorships • View any sponsorship by clicking the view button 	The sponsorship details are changed.	Same as expected	Same as expected

		<ul style="list-style-type: none"> Change the intended details and submit 			
29	Delete sponsorship	<ul style="list-style-type: none"> Navigate to Sponsorships → Sponsorships View any sponsorship by clicking the view button Click the delete button 	Sponsorship record is deleted	Same as expected	Same as expected
30	Change sponsorship status	<ul style="list-style-type: none"> Navigate to Sponsorships → Sponsorships View any sponsorship by clicking the view button Change the status of sponsorship and submit 	The sponsorship status is changed, and the sponsorship record is moved to relevant page	Same as expected	Same as expected
The tests below will be related to front end					
1	View the homepage	<ul style="list-style-type: none"> Navigate to the frontend homepage 	The details in homepage displayed	Same as Expected	Same as Expected
2	Animals Page	<ul style="list-style-type: none"> Navigate to the animals page 	Some top animals including one featured animal and search box is displayed	Same as Expected	Same as Expected

3	Search animals	<ul style="list-style-type: none"> • Navigate to the animals page • Search for animals using any criteria 	Animals within the provided criteria are displayed	Same as Expected	Same as Expected
4	View any animal	<ul style="list-style-type: none"> • Navigate to the animals page or search animals • Click view animal button below any animal 	The animal details including images, descriptions and sponsor (if available) are displayed	Same as Expected	Same as Expected
5	Animal Sponsorship	<ul style="list-style-type: none"> • View any animal • Navigate to the bottom of the page • If there is no existing sponsor, click apply for sponsorship 	Animal sponsorship form is displayed. This can be used to apply for sponsorship.	Same as Expected	Same as Expected
6	View Areas	<ul style="list-style-type: none"> • Navigate to Areas 	All the areas displayed	Same as Expected	Same as Expected
7	View any area	<ul style="list-style-type: none"> • Navigate to Areas • Click view area button under any area 	Area details displayed and all locations under that area displayed	Same as Expected	Same as Expected
8	View any location	<ul style="list-style-type: none"> • View any area • Click view location under the area details among available 	Location details displayed	Same as Expected	Same as Expected

		locations in that area			
9	Contact page	<ul style="list-style-type: none"> • Navigate to Contact page 	Information about the zoo and map is displayed	Same as Expected	Same as Expected
10	Kids page	<ul style="list-style-type: none"> • Navigate to Kids page 	Two animal-related games are available which can be played.	Same as Expected	Same as Expected
11	Kiosk template	<ul style="list-style-type: none"> • Scroll to the bottom of any frontend page • Click Kiosk Template 	Kiosk template is displayed where the homepage shows zoo map	Same as Expected	Same as Expected
12	Kiosk view animals	<ul style="list-style-type: none"> • Go to Kiosk Template • Click View Animals 	All the animals in the zoo displayed in Kiosk template	Same as Expected	Same as Expected
13	Kiosk view any animal	<ul style="list-style-type: none"> • Go to kiosk view animals • Click view animal under any animal 	Animal details displayed in Kiosk template	Same as Expected	Same as Expected

Screenshots:

Dashboard

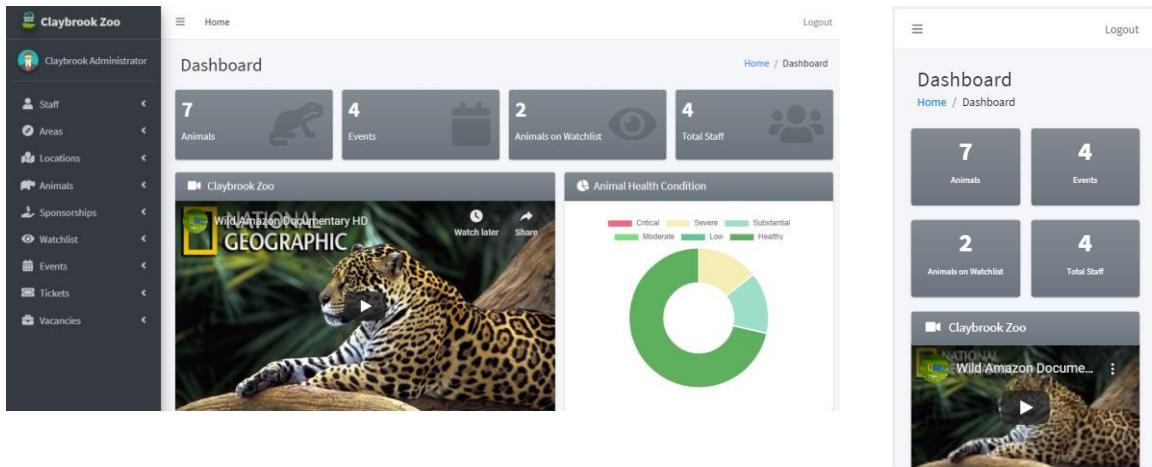


Figure 47 – Dashboard after Logged in (Administrator)



Figure 48 – Invalid login

Figure 49 – Add Staff (Invalid Password)

Home / Staff

Successfully Added Record

Add Staff

User Form

Profile icon	Ramnaresh Adhikari
Email icon	ramnaresh12@gmail.com
Password icon
Valid password!	
Password icon
Passwords Match!	
Profile icon	Administrator
Submit	

Figure 50 – Add new Staff (Valid Details)

Users

Show 10 entries Search:

S.N.	Full Name	User ID	Role	Email	Status	View	Disable
1	Claybrook Administrator	2	Administrator	administrator@claybrookzoo.com	Active	View	Change Status
2	Ramesha	5	Administrator	ramesha@ramesha.com	Active	View	Change Status
3	Diwas Lamsal	7	Zookeeper	diwas@diwas.com	Active	View	Change Status
4	Suresha Adhikari	8	Moderator	suresha@adhikari.com	Active	View	Change Status
5	Ramnaresh Adhikari	9	Administrator	ramnaresh12@gmail.com	Active	View	Change Status

Showing 1 to 5 of 5 entries Previous **1** Next

Figure 51 – View all Staff

5	Ramnaresh Adhikari	9	Administrator	ramnaresh12@gmail.com	Dormant	View	Change Status
---	--------------------	---	---------------	-----------------------	---------	-------------	----------------------

Successfully Archived Record

Figure 52 – Change Staff Status

The screenshot shows a user form for editing staff details. The fields are:

- User ID: Ramnaresha Adhikary
- Email: ramnareshasdasd12@gmail.com
- Type: Moderator

A blue 'Update' button is visible. A success message 'Successfully Edited Record' is displayed below the form.

User Form

User ID	Ramnaresha Adhikary
Email	ramnareshasdasd12@gmail.com
Type	Moderator

Update

Successfully Edited Record

User Profile

User ID	9
Email	ramnareshasdasd12@gmail.com
Type	Moderator
Status	Active
Delete	

Figure 53 – Edit staff Details

The screenshot shows a delete confirmation dialog. It displays the user's profile picture and name, and lists the user's details: User ID, Email, Type, Status, and a Delete button.

Delete User

All data will be erased and there will be no way to retrieve them.

Click Delete to confirm.

Delete

Successfully Deleted Record

Figure 54 – Delete Staff

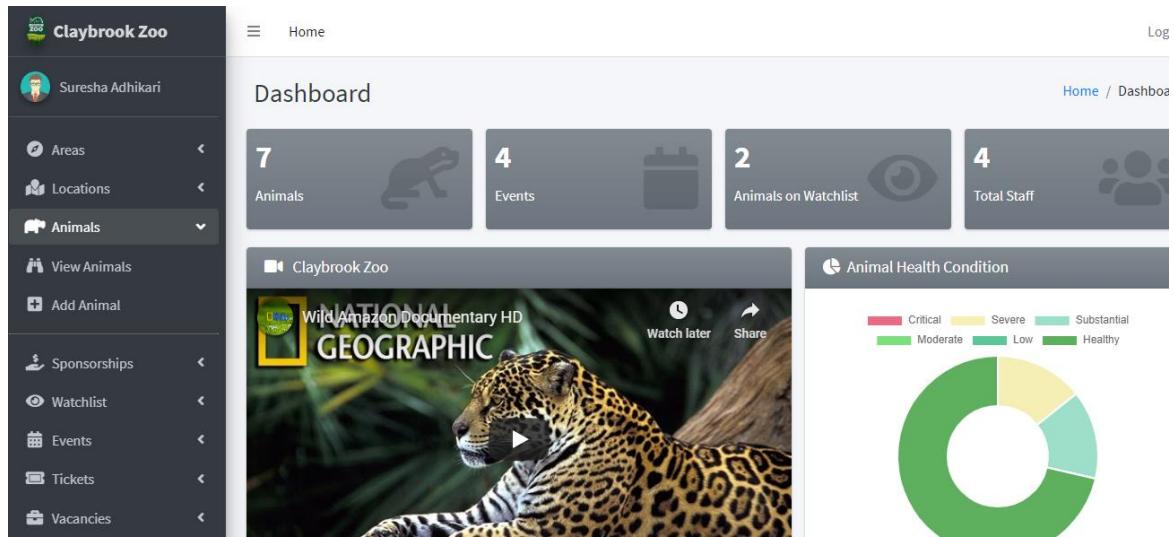


Figure 55 – Manager Dashboard

Add Area

Home / areas / Add Area

Area Form

 My New Area

 AREA-1534

 The description of my new area is that this is a The description of my new area is that this is a The description of my new area is that this is a The description of my new area is that this is a The description of my new area is that this is a The description of my new area is that this is a The description of my new area is that this is a The description of my new area is that this is a



Submit

Figure 56 – Add Area

Areas					Home / Areas
Show 10 entries				Search: <input type="text"/>	
S.N.	Area Name	Area Key	Area Description	View	
1	The Aviary	A1	Where all the birds in the zoo are housed the aviary.	<button>View</button>	
2	The Hothouse	B12	Where all reptiles and amphibians reside	<button>View</button>	
3	The Aquarium	AQ12	For all fish within the zoo	<button>View</button>	
4	The Cages/Compounds	CC9	Housing all mammals	<button>View</button>	
5	My New Area	AREA-1534	The description of my new area is that this is a nice area	<button>View</button>	

Showing 1 to 5 of 5 entries

Previous 1 Next

Figure 57 – View all areas

Area Form

My New Area Edited
 AREA-1534 Edit
 The description of my new area is that this is a nice area edit

Figure 58 – Edit Area

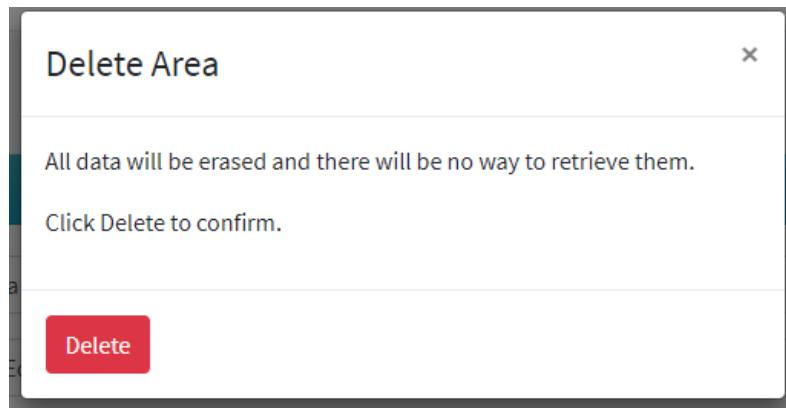


Figure 59 – Delete Area (Valid)

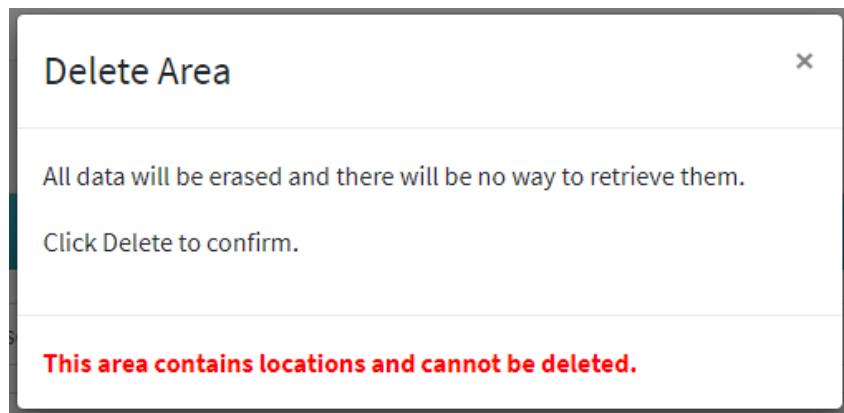


Figure 60 – Delete Area (Invalid)

The operations for location involved doing the same things as for area and the screenshots are not included here.

The screenshot shows the "Add Animal" form. At the top, it says "Add Animal" and "Home / Animals / Add Animal". The form has a teal header bar labeled "Animal Form". It contains several input fields: "Name:" with a paw icon and "My New Animal"; "Species:" with a elephant icon and "New Animal Species"; "Lifespan:" with a clock icon and "New Lifespan"; "Date of Birth:" with a calendar icon and "12/31/2014"; "Date Animal Joined the Zoo:" with a clock icon and "12/31/2017"; "Gender:" with a male/female icon and "Female"; and "Sponsorship Level:" with a document icon and "C - 1500".

Figure 61 – Add new Animal

The screenshot shows the "Edit Animal" page. At the top, it says "Edit Animal" and "Home / Animals / View Animal". The main content area features a large image of a chimpanzee's face with its tongue out. To the right of the image, the text "My New Animal - New Animal Species" is displayed. Below this, a table lists various animal details with their corresponding values:

Animal Code:	- FISNE20630C
Species:	- New Animal Species
Name:	- My New Animal
Date of Birth:	- 2014-11-29
Date Joined:	- 2017-10-30
Gender:	- Female
Average Lifespan:	- New Lifespan
Level (For Sponsorship):	- C
Category:	- Fish
Status:	- Active
Featured:	- No

At the bottom right of the table is a blue button labeled "Set Featured".

Figure 62 – Edit Animal Page, Animal Details

Animal Form

Name:	My New Animal Edited		
Species:	New Animal Species Edited	Lifespan:	New Lifespan Edited
Date of Birth:	09/27/2011	Date Animal Joined the Zoo:	08/27/2015
Gender:	Male	Sponsorship Level:	A - 2500
Category:	Fish	Location:	MC1-A2

Figure 63 – Edit animal form

3	FISNE20630C	MC1-A2	My New Animal	New Animal Species	Fish		Active	View	Trash
---	-------------	--------	---------------	--------------------	------	--	--------	------	-------

Successfully Archived Record

Figure 64 – Archive Animal

S.N. ↴	Code ↴	Location ↴	Name ↴	Species ↴	Category ↴	Image ↴	Status ↴	View ↴	Archive ↴	Delete ↴
1	FISNE20630C	MC1-A2	My New Animal	New Animal Species	Fish		Dormant	View	Make Active	Delete

Figure 65 – View Archived Animals

The animal can be made active (Make Active button) or deleted (Delete button).

Sponsors

Home / Sponsors

Show 10 entries Search:

S.N. ↴	Company ↴	Primary Telephone ↴	Address ↴	Website ↴	Banner ↴	View ↴
1	Zenth Staybrite Ltd	01966 7855122	Mrs Jane Woods (Senior Accountant) 45 Blackwood Road Westhills Longbottom North Yorkshire NY12 D454	Not Available		View
2	The Coca-Cola Company	(1.800.438.2653)	Atlanta, Georgia, United States	https://www.coca-colacompany.com/		View

Showing 1 to 2 of 2 entries Previous 1 Next

Figure 66 – View All Sponsors

The screenshot shows a list of sponsorships. The first row has an animal named "Alexandrine Parakeet" and a company "Zenith Staybrite Ltd". The second row has an animal named "Royal Bengal Tiger" and a company "The Coca-Cola Company". Both entries show a start date of January 1, 2021, and an end date of December 31, 2022. The payment method for the first is "Electronic Transfer of Funds to Zoo Sponsorship Account", while the second is described as "We will make a payment to your bank account through cash". Both are marked as "Active".

S.N.	Animal	Company	Start Date	End Date	Payment	Status	View
1	Alexandrine Parakeet	Zenith Staybrite Ltd	2021-01-01	2021-12-31	Electronic Transfer of Funds to Zoo Sponsorship Account	Active	View
2	Royal Bengal Tiger	The Coca-Cola Company	2022-01-01	2022-12-31	We will make a payment to your bank account through cash.	Active	View

Figure 67 – View Sponsorships (Active)

The screenshot shows the details for a sponsor named "Zenith Staybrite Ltd". It includes fields for primary and secondary telephone numbers, email address, and website link. Below this is a banner section where a file can be uploaded. A message at the bottom states that the sponsor contains sponsorships and cannot be deleted.

Company Name:	Zenith Staybrite Ltd		
Primary Telephone:	01966 7855122	Secondary Telephone:	0800 3289392
Email Address:	zenth@gmail.com	Website Link:	Not Available

Banner

Choose File No file chosen

Animal Sponsorship By
Zenith Staybrite Call for a FREE QUOTE 0800 328 9395

Update Banner

All data will be erased and there will be no way to retrieve them.
Click Delete to confirm.

This sponsor contains sponsorships and cannot be deleted.

Figure 68 – View/Edit Sponsor Details

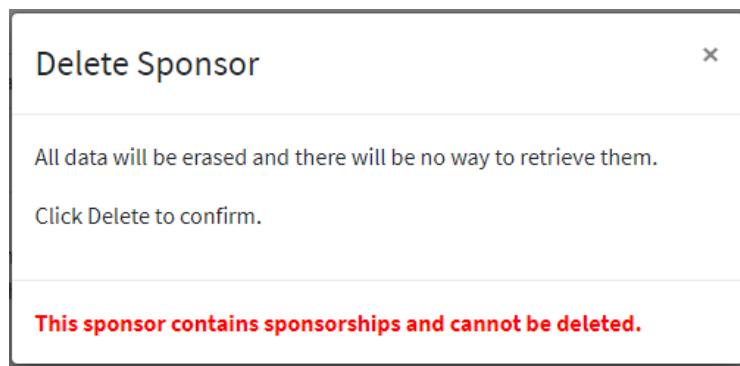


Figure 69 – Delete Sponsor (Invalid)

View Sponsorship

Home / Sponsorships / View Sponsorship

Sponsored Animal	Sponsored By
Alexandrine Parakeet	Zenth Staybrite Ltd

Sponsor Details

Status: Active	Price: £ 1500.00
Signage Area Percentage(Ex: 1/8): 1/8	Last Reviewed On: 2020-03-28
Date Start: 01/01/2021	Date End: 12/31/2021
Extra Notes: Sponsorship details to be displayed in the bottom right-hand corner.	Payment Details: Electronic Transfer of Funds to Zoo Sponsorship Account

Figure 70 – View/Edit Sponsorship

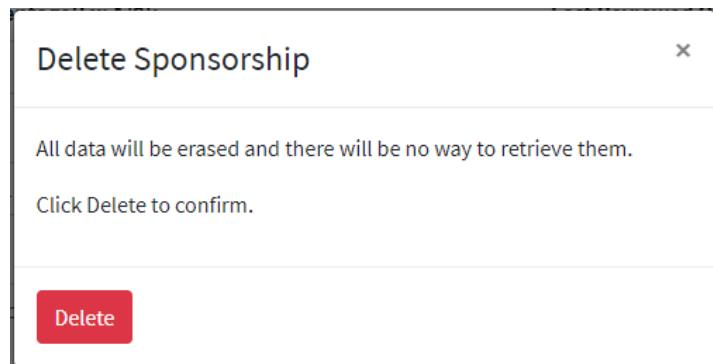


Figure 71 – Delete Sponsorship

Sponsorships

Successfully Edited Record

Show 10 entries Search:

S.N.	Animal	Company	Start Date	End Date	Payment	Status	View
1	Alexandrine Parakeet	Zenth Staybrite Ltd	2021-01-01	2021-12-31	Electronic Transfer of Funds to Zoo Sponsorship Account	Pending	View

Showing 1 to 1 of 1 entries Previous 1 Next

Figure 72 – Change Sponsorship Status

Frontend



Figure 73 - Homepage

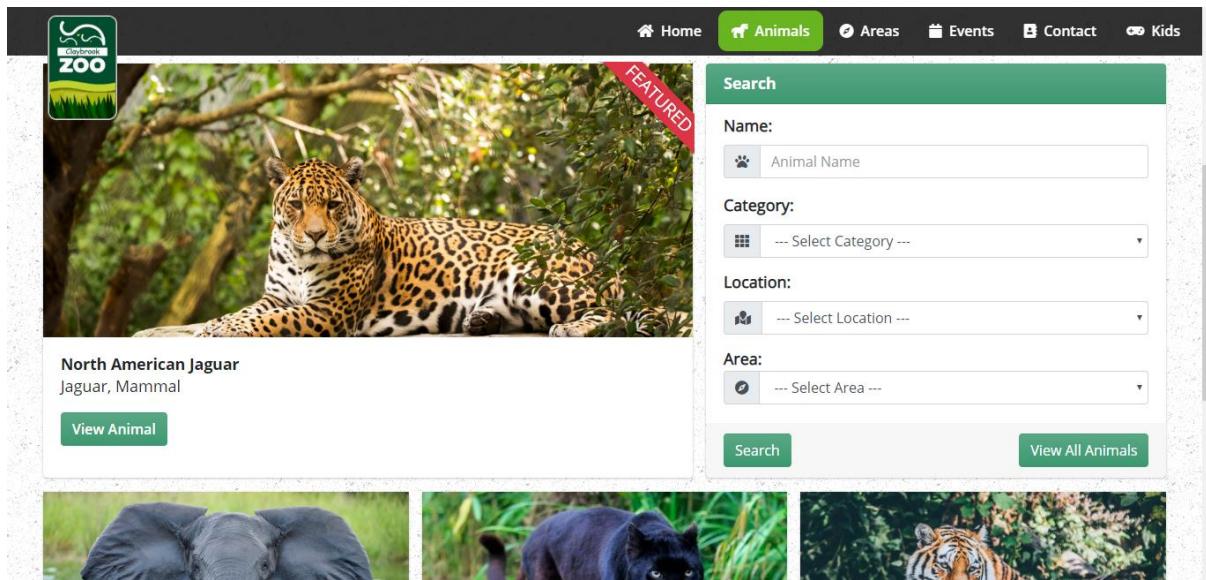


Figure 74 – Animals Page

Area and location details screenshots are not included here because these were similar to viewing animal records.

Search

Name:
 north

Category:
 Mammal

Location:
 MC1-A2

Area:
 The Cages/Compounds

Search
View All Animals

SEARCH RESULTS

North American Jaguar
Jaguar, Mammal

View Animal

Figure 75 – Search Animal

- Home
- Animals
- Areas 201
- Events
- Contact
- Kids

JOINED 2013-05-14

GENDER Male

CATEGORY Mammal

LIFESPAN 12 – 15 years

SIGNAGE

Global Distribution Map

- Habitat & Population
- Size & Diet
- Other Information

Natural Habitat: Jaguars prefer wet lowland habitats, swampy savannas or tropical rain forests. Their favorite habitat is in the tropical and subtropical forests. Jaguars also live in forests and grasslands, living near rivers and lakes, in small caves, marshland, and under rock ledges; they live in shrubby areas as well.

Global Population: Only 15,000 jaguars left: conservation experts call for greater collaboration.

Figure 76 – Animal Details

Animal: North American Jaguar

Sponsorship Level: B - £2000 Per Year

Existing Customer: Yes

Company Name: Zenth Staybrite Ltd

Figure 77 – Sponsorship form



Figure 78 – Kiosk Home

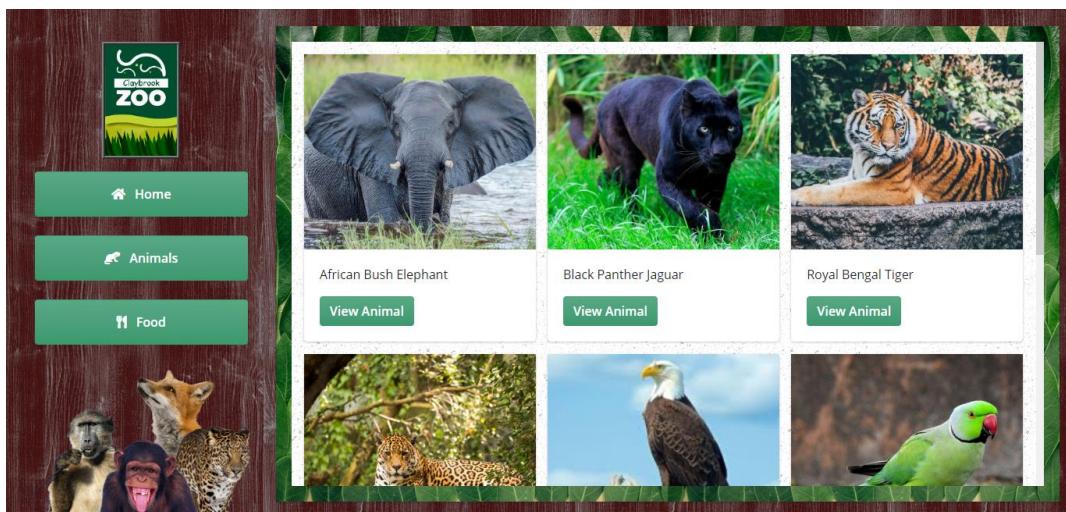


Figure 79 – Kiosk Animals

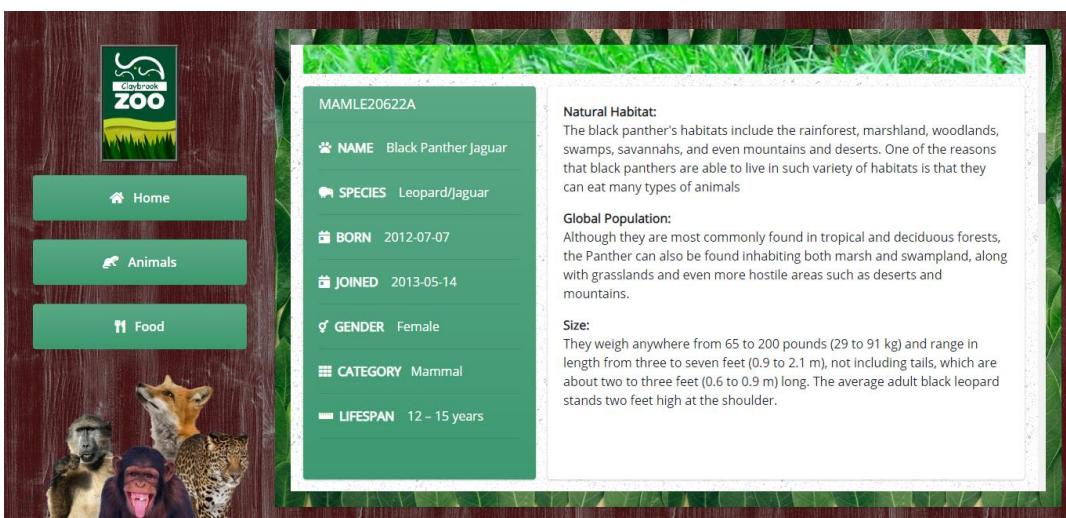


Figure 80 – Kiosk Animal Details

5.1.2 Acceptance Testing

The second phase of testing should be in the form of acceptance testing by the users also known as UAT(User Acceptance Testing) or beta testing. The target clients including zoo staff, visitor representatives and client representatives should be using the system in this testing stage and shall report any bugs or mistake in functionalities.

5.2 Evaluation

The evaluation of the system after completion of Block 1 will involve clients and their feedback. A very small-scale pilot trial can be conducted to test the feasibility of the system. At the end of the final block, a large-scale trial can be conducted before moving on to the cutover phase. This section will include the guidelines for effectively conducting the first trial.

Goal:

- To test the feasibility of the system
- To receive feedback about the look and feel of the system
- To receive feedback about any errors or misinterpreted functionalities
- To note and make any changes the clients want after the end of trial
- To receive go ahead to proceed the next development block

Length of Time: 1 day

Required Group of People:

- One Administrator representative
- Two Manager representatives
- One Zookeeper representative
- One or two Visitor representative(s)
- One or two sponsor representative(s)
- Two design group members to observe

Onboarding:

The user group shall not be trained and only be provided with relevant username and password for the Administrator. This is done because the system should be easily comprehensible and usable to anybody who has basic computer knowledge. Any necessary information (for

example: uploading animal gallery images, accessing animals in trash, etc.) will be provided at the very beginning to relevant users.

Feedback:

At the end of the trial, the clients should be individually assessed about their thoughts on the system at its current stage and the future. Some questionnaires can be prepared for each client to ensure important points are not missed and all the goals are addressed.

- Your thoughts on the overall looks and feel of the system interface?
- How difficult it was for you to use the system and get going?
- Did you find yourself enjoying the system?
- How efficient you were after you used the system for a while?
- Did you find any notable bugs or mistakes at the current stage?
- Do you think something about the system needs to be changed?

A separate qualitative as well as quantitative analysis could be done by asking the same questions to a larger user group. The questions could be amended to include answers within a range (ex: scale of 1-10). The answers could be used to statistically gain insights about the usability of the system. However, due to this system following the RAD methodology, only key users are involved for any feedback to proceed the next block as soon as possible.

Answers:

Answers from one of the key user group representatives.

- **Your thoughts on the overall looks and feel of the system interface?**
 - The system, at its current stage looks and feels quite good, smooth and clean. The frontend looks appealing and seems to match the current trends with our competitors. It is easy to navigate across different pages and the mobile view is working equally well. It feels like the design part of the system is proceeding quite well.
- **How difficult it was for you to use the system and get going?**
 - As mentioned, the system was easy to navigate, and you could find things exactly where you look for. Overall, it was very easy to get going after using the system for a while.

- **Did you find yourself enjoying the system?**
 - Yes, overall, the system was quite enjoyable to use. We look forward to using the system after more functionalities are implemented.
- **How efficient you were after you used the system for a while?**
 - After some use of the system, it felt quite like we were habituated to use it. Also, knowing where everything is made it easier to navigate and use the system.
- **Did you find any notable bugs or mistakes at the current stage?**
 - No, we did not find any errors from the trial.
- **Do you think something about the system needs to be changed?**
 - I think what we have progressed so far is going on quite well. I do not see anything that needs changes but wanted to talk about some few points that we would like to see in the next version. It would be very helpful to provide an Animal Watchlist in the next iteration. Also, it would be good if we could manage the events which would also appear in the front end. Another point I forgot about earlier is about feedback after submission of sponsorship. We have noticed that in the backend, after we perform some actions, we receive a feedback message for example: Successfully Added Animal Record. We would love to see a similar kind of feedback after submission of sponsorship form.
 - Basically, most of the important features such as adding animal records, areas, locations, managing and dealing with sponsors and sponsorships are already implemented including a clean and very usable interface in the front end.

6. COMPLETE LIST OF FEATURES (FINAL PRODUCT)

This section lists all the features integrated into the final end product after completion of all the development blocks. The system at this point should be ready for moving to the cutover stage. The points are client requests(requirements) either provided in the brief (copied directly from the brief) or the ones provided through the workshop.

Core Functionalities:

- Addition and removal of animal records from the zoo
- Ability to search the records
- Provide animal information (frontend)

Additional Functionalities:

- Auto generation of unique identifier for every animal (negotiated with client)
- Complex search combining category, name, location, etc.
- Fully functional animal sponsorship scheme (except online payment).
- System expanded to include locations and areas and allocating animals to them for simple animal stock management.
- Internet ready pages for visitors to view animals, areas and locations in the zoo.
- Example kiosk template provided to integrate the system for kiosk
- Access control features provided to allow relevant staff to access relevant pages.
- Clean and intuitive GUI prepared by following latest zoo and dashboard trends.
- Allow animals to be added to watchlist and Zookeepers to learn about the animal health condition through their login.
- Management of Events
- Restricted access to trash folder so that staff cannot maliciously delete records.
(Administrators have access)
- Games section for kids
- Contact section for contact information and Zoo map
- Ad space for sponsors in animal details page
- Can set featured animal (also seen in frontend)
- Different types of images for animals (global distribution, cover and gallery)
- Can send auto generated emails directly to sponsors about nearing expiry date.

7. CONCLUSIONS

To summarize, the Client-Driven solution for Claybrook Zoo is now complete and is ready for cutover. The project comprised of 12 weeks. The first two weeks comprised of JRP and JAD workshops which allowed the further proceedings. It was followed by documentation of the requirements specification and system design. Plans were made beforehand about how much functionalities to target in each block. This report contains all the documentation that was done for the first block. The build notes, tests and evaluation procedures followed after the implementation. Once all of these were completed for the first block, the same process was iterated for block II and so on.

Individually assessing the new software development methodology, it was quite different from the traditional waterfall model followed in the past. Although some parts of the documentation did seem familiar, the client interactions were very different. In the past, the client was consulted with once everything was completed, whereas, this approach required keeping clients up to date as much as possible and to address any changes they want at any point of the project. The clients were provided the software to use and to test once each block was completed. Some other agile approaches use testing methodologies that are client-driven in the sense that clients are actively participating in testing the system from the start and there is not a separate phase for testing (Tutorialspoint, 2020).

To sum up, the CSY3013 module attempts to teach most of the necessary knowledge required by a software engineer. From the different methods to gather requirements and problem domain information to document them, about how system analysis developed with time, about different software development methodologies, about different laws related to software development and about Object Oriented Databases and how databases evolved. This is arguably the knowledge that separates a “Software Developer” with a “Software Engineer” and is one of the most valuable takes of this course. The knowledge gained through this module could be very useful in developing large-scale business software and would provide a huge head start to one’s career if utilized correctly in the practical life.

APPENDIX I – REFERENCES

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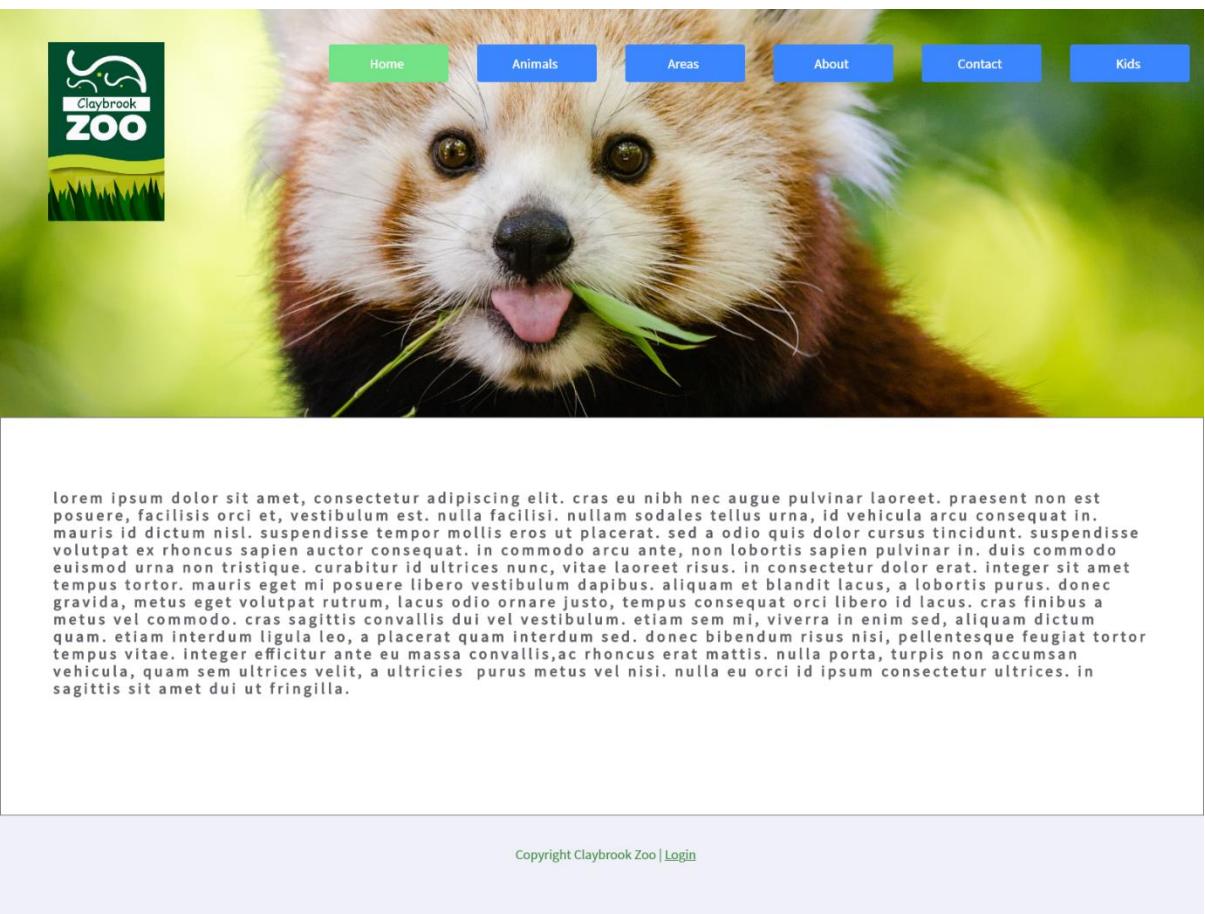
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APPENDIX II – MOCKUPS FROM JAD WORKSHOP



The mockup shows a website layout for 'Claybrook ZOO'. At the top left is the logo, which includes a stylized animal icon above the word 'Claybrook' and 'ZOO' below it. To the right of the logo is a navigation bar with six items: 'Home' (highlighted in green), 'Animals', 'Areas', 'About', 'Contact', and 'Kids'. The main content area features a large, close-up photograph of a red panda's face, looking slightly to the right with its tongue out. Below the photo is a block of placeholder text (Lorem ipsum) in a black font. At the bottom of the page is a light gray footer bar containing the text 'Copyright Claybrook Zoo | [Login](#)'.

lorem ipsum dolor sit amet, consectetur adipiscing elit. cras eu nibh nec augue pulvinar laoreet. praesent non est posuere, facilisis orci et, vestibulum est. nulla facilisi. nullam sodales tellus urna, id vehicula arcu consequat in. mauris id dictum nisl. suspendisse tempor mollis eros ut placerat. sed a odio quis dolor cursus tincidunt. suspendisse volutpat ex rhoncus sapien auctor consequat. in commodo arcu ante, non lobortis sapien pulvinar in. quis commodo euismod urna non tristique. curabitur id ultrices nunc, vitae laoreet risus. in consectetur dolor erat. integer sit amet tempus tortor. mauris eget mi posuere libero vestibulum dapibus. aliquam et blandit lacus, a lobortis purus. donec gravida, metus eget volutpat rutrum, lacinia odio ornare justo, tempus consequat orci libero id lacus. cras finibus a metus vel commodo. cras sagittis convallis dui vel vestibulum. etiam sem mi, viverra in enim sed, aliquam dictum quam. etiam interdum ligula leo, a placerat quam interdum sed. donec bibendum risus nisi, pellentesque feugiat tortor tempus vitae. integer efficitur ante eu massa convallis, ac rhoncus erat mattis. nulla porta, turpis non accumsan vehicula, quam sem ultrices velit, a ultricies purus metus vel nisi. nulla eu orci id ipsum consectetur ultrices. in sagittis sit amet dui ut fringilla.

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Claybrook Zoo

Username

Password

Remember me

[Forgot Password](#)

Login



Claybrook Zoo

Username

Password

Remember me

[Forgot Password](#)

Login

claybrook Zoo

Enter your email and we send
you a password reset link.

Email

Send Request



Claybrook Zoo

Enter your email and we send you a password reset link.

Email

Send request

Term of use. Privacy policy

CLAYBROOK ZOO

Ramesh Thapa

Home Profile Logout

Dashboard

Messages

Animals

Sponsors

Users

Calendar

Overview

Total Views: 246K ↓ 13.8%

Total Animals: 2453 ↑ 13.8%

Total Earnings from Tickets: \$39K ↓ 13.8%

Statistics (Last 6 months)

Referrer

LOCATION	VIEWS	SALES	CONVERSION	TOTAL
google.com	3746	752	43%	\$19,291

Details on Map

Show All List

The dashboard features a sidebar with navigation links like Home, Profile, and Logout. The main area has three cards: 'Total Views' (246K, -13.8%), 'Total Animals' (2453, +13.8%), and 'Total Earnings from Tickets' (\$39K, -13.8%). Below is a line chart for 'Statistics' from January to June, showing 'Total Tickets' (purple) and 'Total Earnings' (cyan). The chart shows a dip in January and February followed by a steady increase through June. A table for 'Referrer' shows data for google.com. On the right, there's a world map with location markers and a 'Details on Map' section.

CLAYBROOK ZOO

- Home
- Profile
- Logout

Animals

Add new Animal

Search animals

ANIMAL	NAME	DATE OF BIRTH	CATEGORY	AREA	SPONSOR	MEDICAL CONDITION	EDIT	ARCHIVE	
	Bengal Tiger	Sher Khan	02/07/2000	Mammal	ARCCAGE-01	Pepsi	Critical		
	Bengal Tiger Cub	Sher Khan	02/07/2000	Mammal	ARCCAGE-01	NIKE	Critical		
	Himalayan Hare	Sher Khan	02/07/2000	Mammal	ARCCAGE-01	ADIDAS	Critical		
	Black mamba	Sher Khan	02/07/2000	Mammal	ARCCAGE-01	RAZER	Critical		
	Black Panther Jaguar	Sher Khan	02/07/2000	Mammal	ARCCAGE-01	CocaCola	Critical		

Show More

Stats

Total Animals **53**

Net Money on Animal Food

Avg. \$5,309

Monthly Last Year

CLAYBROOK ZOO

- Home
- Profile
- Logout

Edit Animal

New Animal Form

Name	Royal Bengal Tiger
Helper Text	
Habitat	Mangrove Forests
Helper Text	
Press	Label Placeholder
Helper Text	
Focus	Label Input
Helper Text	
Idle & filled	Label Input
Helper Text	
Error	Label
Error Text	

Date of Birth

< January 2018 >

Su	Mo	Tu	We	Th	Fr	Sa
1	2	3	4	5	6	
7	8	9	10	11	12	13
14	15	16	17	18	19	20
21	22	23	24	25	26	27
28	29	30	31	-	-	-

Upload New Images

CLAYBROOK ZOO

- Home
- Profile
- Logout

Animals

Add new Animal

Search animals

Are you sure you want to archive animal?

Archive Animal

Stats

Total Animals 53

48%

Net Money on Animal Food

Avg. \$5,309

Monthly Last Year

CLAYBROOK ZOO

- Home
- Profile
- Logout

Add new Animal

New Animal Form

Name	Label Helper Text
Habitat	Label Helper Text
Press	Label Placeholder Helper Text
Focus	Label Input Helper Text
Idle & filled	Label Input Helper Text
Error	Label

Date of Birth

< January 2018 >

Su	Mo	Tu	We	Th	Fr	Sa
1	2	3	4	5	6	
7	8	9	10	11	12	13
14	15	16	17	18	19	20
21	22	23	24	25	26	27
28	29	30	31	-	-	-

Upload Images



CLAYBROOK ZOO



Home

Animals

Areas

About

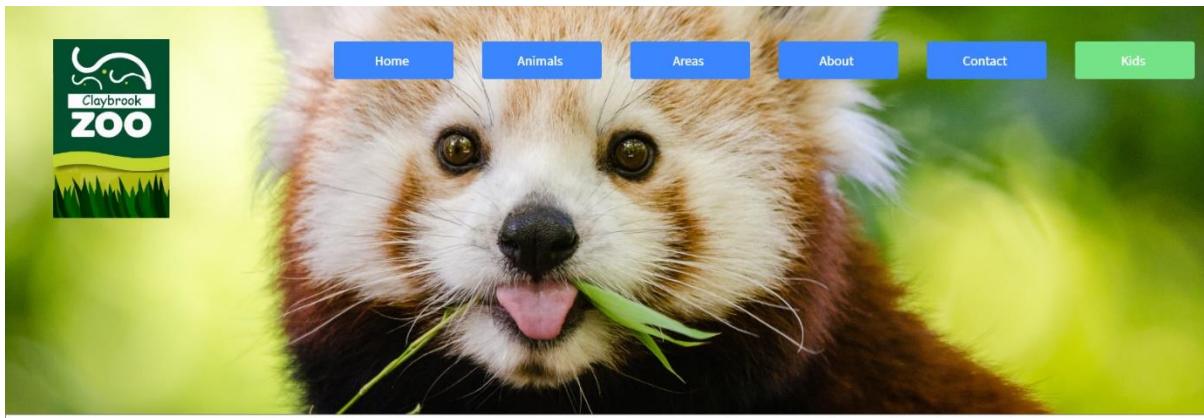
Contact

Vacancy

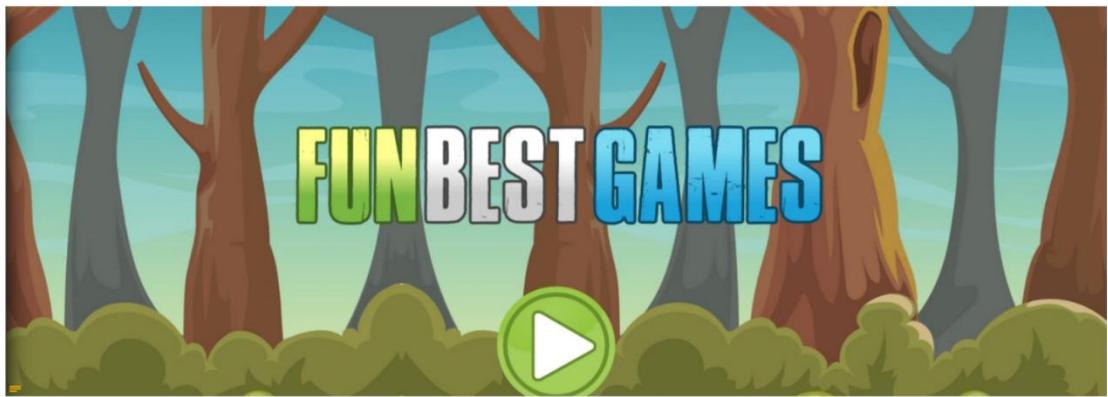
Kids

laoreet risus. in consectetur dolor erat. integer
sit amet tempus tortor. mauris eget mi posuere
libero vestibulum dapibus. aliquam et blandit
lacus, a lobortis purus. donec gravida, metus eget
volutpat rutrum, lacus odio ornare justo, tempus

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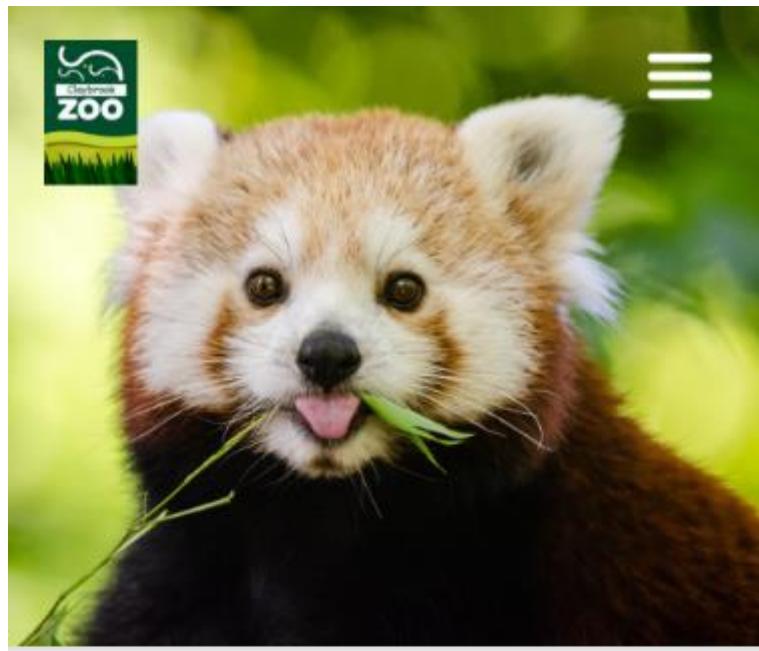


Play Tiger Jigsaw



Play Jungle Matching





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adipiscing elit. cras eu nibh nec augue pulvinar
laoreet. praesent non est posuere, facilisis orci
et, vestibulum est. nulla facilisi. nullam sodales
tellus urna, id vehicula arcu consequat in. mauris
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suspendisse volutpat ex rhoncus sapien auctor
consequat. in commodo arcu ante, non lobortis
sapien pulvinar in. duis commodo euismod urna
non tristique. curabitur id ultrices nunc, vitae
laoreet risus. in consectetur dolor erat. integer
sit amet tempus tortor. mauris eget mi posuere
libero vestibulum dapibus. aliquam et blandit
lacus, a lobortis purus. donec gravida, metus eget
volutpat rutrum, lacus odio ornare justo, tempus