# Task 1 – Proposal

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## Activity A (ii)

### The Solution

Our solution for Riget Zoo Adventures involves the development of a web application that is accessible at any time, providing a seamless and user-friendly experience for both customers and administrators. This application will serve as a central hub for managing bookings, accessing loyalty and reward schemes, and ensuring inclusivity through a range of accessibility features. The application will feature an intuitive dashboard that allows customers to manage their bookings and access loyalty and reward scheme features with ease. Administrators will have access to a separate dashboard with additional functionalities.

Customers can book tickets without logging in, receiving a booking reference number via email. Logged-in users, however, will earn loyalty points for their bookings. Administrators will have access to administrative features, enabling them to oversee the application's functionality and content, while customers will enjoy a personalised experience focused on their health and well-being. An intermediate of the two would be an employee who does not have access to customer information but will have additional features in comparison to a standard customer user.

The application will include adjustable font sizes, high contrast modes, and other features to cater to a wide range of user needs, promoting equal access to information and the zoo.

The application will be designed with a clean and simple interface, making the booking process straightforward for all users. Seamless integrations with payment gateways, distribution channels, and CRM software will be included to enhance functionality. The application will be customizable to align with Riget Zoo Adventures' specific business needs and brand identity, with scalability to accommodate business growth. The application will be accessible and manageable on smartphones and tablets, ensuring smooth operations from any location.

Automation of booking confirmations, follow-up requests for reviews, and integrations with other tools and software providers will streamline operations and improve customer service.

### Software Requirements

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| --- | --- | --- |
| **Name** | **Type** | **Reasoning** |
| HTML | Markup Language | HTML is required to generate text and other content for the web application. All devices that will be able to access the site will have this by default as it is what displays content on a browser |
| CSS | Stylesheet Language | CSS is required to stylise/format the content displayed for the web application; it is used in conjunction with HTML. All devices that will be able to access the site will have this by default as it is what displays content on a browser |

### Programming Languages

|  |  |  |
| --- | --- | --- |
| **Name** | **Type** | **Reasoning** |
| Python | Programming Language | It will be used to process requests made to the web app e.g. logging in. This will also serve the web app and will process the routing in the site. A user goes to the login page, it will show the correct page when going to webapp.com/login for example.  I chose Python as the main backend language over other web frameworks as it is simple enough for future management and scalability but powerful enough to process all requests that come to and from that site. This part of the web application will process all requests including database management and sending confirmation emails etc. |
| SQL/SQLite | Programming Language | It will be the location of data storage, e.g. user login details. Python will integrate with the SQL database and manage data to and from it. |

### Permissions and Risks

#### Permissions

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| --- | --- | --- |
| **Feature Permission Distribution** | | |
| **Customers** | **Employees** | **Administrators** |
| Managing their account details | All features that are available to customers will also be available to employees | Features that are available to customers and employees would not necessarily be available to administrators as the account with this level of access would be only for administrating, an employee with an admin account would also have a separate employee account |
| Managing their settings e.g. accessibility features | Booking tickets for the safari could be at a discount for employees and family members (when booking through the employee account) | Managing the account information of customers and employees |
| Checking availability and booking tickets for the safari, on-site hotel booking etc. | Loyalty point rewards could be at a discount for employees | Managing the loyalty points and reward scheme |
|  |  | Managing the reward scheme e.g. managing which rewards are available, adding or removing rewards |
|  |  | Viewing site analytics |

#### Risks

Risks can stem from both internal and external sources, including unauthorised access by employees or cyberattacks from outside Riget Zoo Adventures. To mitigate these risks, it is essential to determine the level of risk, identify the data protected information, and understand the impact of a potential breach. We must regularly perform risk assessments to identify vulnerabilities and implement appropriate security measures.

Customers should use personal devices when possible and apply security updates regularly. Strong passwords, encryption tools, and avoiding public Wi-Fi are also important for maintaining the security of their information and the site.

The web app should explain the privacy and security risks when using it in plain language and provide tips on how to reduce these risks. Awareness of the proper handling of devices can significantly lower the risk of data breaches.

Human risks include lack of awareness and the potential for intentional or unintentional data breaches by authorised users. To address these risks, we should implement methods to protect against both internal and external threats, including training employees to prevent policy violations.

To integrate with third-party apps and algorithms, it is important that we ensure that the privacy and security measures align with their regulations and standards. This includes conducting risk assessments and adhering to the privacy and security rules.

Failure to adhere to accessibility guidelines can exclude users with disabilities from accessing and using the application effectively and can also lead to legal issues.

It is necessary that we follow accessibility guidelines such as the Web Content Accessibility Guidelines (WCAG). Use accessible fonts, appropriate colour contrast, and provide alt text for media content. Avoid excessive animation that may cause distractions or difficulties for users with cognitive disabilities.

We should also establish design guidelines and principles to maintain consistency throughout the application, use a consistent layout, typography, and colour scheme, ensure that interactions and navigation patterns are intuitive and predictable to maximise user experience.

### Legislation and Prevention

#### Data Protection and Privacy Compliance

It's essential to ensure compliance with data protection regulations such as the General Data Protection Regulation (GDPR). This includes clear privacy policies, obtaining user consent for data collection, and ensuring secure data storage and processing practices.

#### Loyalty and Reward Scheme Compliance

In relation to the loyalty and reward scheme, it is important to understand the roles and responsibilities of third parties involved in executing the loyalty program, ensuring clear terms and conditions, and implementing robust security measures to prevent fraud. It's also crucial to consider the legal implications of forcing participation in the loyalty program and to provide clear incentives for participation.

#### Fraud Prevention and Security Measures

Implementing industry-standard cybersecurity protocols and intrusion detection systems is crucial to protect against fraud and data breaches. This includes educating program members on the importance of using strong passwords and monitoring account activity.

#### Consumer Protection and Fair Practices

Ensure that your application adheres to consumer protection laws and fair practices. This includes providing clear and transparent terms and conditions, avoiding deceptive advertising, and ensuring that the loyalty program does not unfairly disadvantage consumers.

### Functional and Non-functional Requirements

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| --- | --- | --- |
| **Functional Requirements** | | |
| **Requirement** | **Priority** | **Description/Justification** |
| Ability to sign up for an account | High | A user can sign up to access most of the web application |
| Ability to login to an account | High | Why have an account if you cannot sign in |
| Ability to reset password | Medium | Not high priority as an administrator can do this for a user. It is a useful feature for a user to be able to access |
| Ability for an employee to create their own account | Low | Low priority as it is likely that an administrator will create employee accounts. A way that employee account creation could be accessed by the public is by integrating the use of access keys |
| Verify that a user is not a bot | Medium | Unlikely that a web app like this will be targeted for bot access but if it becomes an issue, a solution can be developed quickly |
| User redirected to appropriate dashboard for their role | High | This is a main feature of the web application, so it is essential the user is redirected to it upon login |
| Navigation throughout the site is accurate | High | The navigation of the site should be as expected, the most important part of user experience is the expected outcome of each button/tool that you come across e.g. if you press the login button, it should take you to the login page, this must stay consistent throughout the application |
| UI is displayed properly | High | Important that there are no UI issues as it would ruin the ease of use and could cause other problems |
| User can use all the features that they are permitted to use | High | There is no point implementing a feature for a user if they cannot use it |
| All the features work as they are intended to | High | The web app should work as expected, this would be the first thing that a user runs into problems with after UI issues |

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| **Non-functional Requirements** | | |
| **Requirement** | **Priority** | **Description/Justification** |
| Website is responsive and able to adapt to different screen sizes | High | It is important that any user on any device can use the web app as it is intended |
| Data is protected | High | This is one of the most important requirements as it can cause many legal issues and monetary loss |
| System is available at any time | High | There is no point developing a system that cannot be used whether that be for five minutes or five days |
| Scalable codebase to accommodate for features that may arise in the future | High | More users will use the web app over time ideally and the web app must be scalable to accommodate them |
| Scalable infrastructure to accommodate for more users | High | More users will use the web app over time ideally and it is important that the infrastructure can accommodate them to retain quick response time and feature functionality |
| Design guidelines are followed | High | The biggest effect of a modern web application is the modern, consistent design. It is essential the design guidelines we set are followed |
| Site has accessibility features | High | It is important that everyone is accommodated on the site |

### Key Performance Indicators (KPIs)

When we are working on a digital solution, it is important to figure out what signs show that it is doing well. We call these signs "key performance indicators" or KPIs. There are different ones we can use to see how things are going.

|  |  |
| --- | --- |
| **KPI (Key Performance Indicators)** | **Description** |
| Number of visits | The number of times pages are viewed. |
| Traffic source | Identify where your users are coming from (organic search, social media, referrals, etc.). |
| Bounce rate | The percentage of visitors who navigate away from a website or web app after viewing only one page |
| Page load speed | The time it takes for a web page to fully load and become visible to a user |
| Which pages are used most | The popularity and engagement level of specific pages |
| Conversion rate | Percentage of visitors who sign up for the app. |

### User Acceptance Criteria (UACs)

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| --- | --- | --- | --- |
| **SCENARIO** | **GIVEN** | **WHEN** | **THEN** |
| User registers with valid credentials | The user navigates to the registration page | The user inputs valid credentials and presses register | The system validates the criteria, hashes the password, and inserts it into the database |
| User logs in with correct password | The user navigates to the login page | The user inputs valid credentials (un-hashed password) | The system validates the credentials, validates the password matches the hashed password in the database and logs the user in, then redirecting them to their dashboard |
| User forgets their password | The user navigates to the login page | The user presses “Forgot password” option and enters a valid email in the database | The system sends a recovery link for the user for them to change their password |
| Employee or admin logs in with correct credentials | The user navigates to the login page | The user inputs valid credentials (un-hashed password) | The system will recognise their role using the database and display their additional features in the correct locations e.g. admin features |
| User books a ticket for the safari without logging in (continuing as a guest) | The user navigates to the booking page and selects the safari | The user chooses the available date and time they wish to book and the amount of people they are booking for and pays for the booking while continuing as a guest and giving their name and email | The system will add the booking to the database and email the user their booking confirmation |
| User books a ticket for the safari whilst giving their login (not continuing as a guest) | The user navigates to the booking page and selects safari | The user chooses the available date and time they wish to book and the amount of people they are booking for and pays for the booking while continuing as a guest and giving their name and email | The system will add the booking to the database and email the user their booking confirmation and give the user a loyalty points if they are registered for the loyalty reward scheme |
| User books a room at the on-site hotel as a guest | The user navigates to the booking page and selects hotel | The user chooses the available date and time range they wish to book and the size of the room (2 bed etc.) and pay for the booking while continuing as a guest and giving their name and email | The system will add the booking to the database and email the user their booking confirmation |
| User redeems a reward with their loyalty points | The user navigates to the dashboard and navigates to the rewards page | The user chooses to redeem a family safari with 5 reward points (subject to change) | The system will add the booking to the database and email the user their booking confirmation and thanks them for being a loyal customer |

### Agile Methodology

During the project requirements may shift midstream, Agile offers a responsive framework. It allows us to adjust our course iteratively, ensuring that the product anticipates the dynamic needs of Riget Zoo Adventures.

Regular engagement with stakeholders, including employees and customers, becomes an integral part of our plan. This ongoing collaboration ensures that the insights and expectations of those who will use our application are embedded into the development process.

Agile promotes the incremental delivery of value. This is particularly advantageous for Riget Zoo Adventures, as we can provide meaningful health information and services early in the development journey. Each iteration builds upon the last, steadily enhancing the functionality of the application.

It allows us to identify and address potential risks early in the process. Through regular review meetings, known as sprints, we can assess our progress, identify challenges, and make informed adjustments.

After each sprint, our team engages in reflective discussions, exploring what worked well and what could be refined. Ongoing learning ensures that our development process becomes increasingly efficient and effective over time.

## Activity A (i) - Research

### Use of Hardware and Software in Zoology

#### Animal Tracking and Monitoring Devices

Hardware such as GPS collars, radio telemetry equipment, and camera traps can be used to gather crucial data on animal movements, behaviour, and population dynamics. This data would help with informing conservation strategies and understanding the ecology of the wildlife.

#### Features for visitors

Safari vehicles can be equipped with comfortable seating, open-air viewing platforms, and knowledgeable guides facilitate up-close encounters with wildlife. The design and functionality of these vehicles would be carefully considered to ensure the safety and enjoyment of visitors during their wildlife excursions.

#### Animal Enclosures and Infrastructure

The design and construction of animal enclosures should involve the use of durable fencing, secure gates, and strategically placed feeding and watering stations to create naturalistic habitats for the animals. Additionally, the infrastructure must adhere to the highest standards of animal welfare and safety.

#### Veterinary Equipment

A zoo’s veterinary team should use a range of hardware, including animal scales for monitoring weight, anaesthesia machines for medical procedures, surgical instruments, and diagnostic devices such as ultrasound machines and X-ray equipment to ensure the health and well-being of the animals.

#### Mapping Tools

Geographic Information System (GIS) software allows wildlife conservationists and zoo management to create detailed maps of the zoo's grounds, including the natural habitats of the animals. This enables better understanding of the spatial relationships between different species and their environments, aiding in habitat management and conservation planning.

#### Visitor Engagement

Customised mobile apps can be used for visitors to provide interactive maps, real-time animal sighting alerts, educational content, and conservation information. These apps would enhance the visitor experience by offering insights into the wildlife, conservation efforts, and the zoo's role in preserving biodiversity. Additionally, feedback and data collected through these apps can be used to tailor future experiences and improve visitor engagement.

#### Animal Management

Specialised software systems are used to track and manage the health, behaviour, and breeding of a zoo's animal population. These systems maintain comprehensive individual animal records, monitor breeding recommendations, and contribute to the overall welfare and sustainability of the zoo's animal collection.

#### Environment Monitoring

Weather stations, water quality meters, and soil analysis tools can be used to monitor environmental conditions within a zoo. This hardware helps in assessing the health of the ecosystem, understanding seasonal changes, and identifying any potential environmental stressors that may impact the wildlife and their habitats.

#### Photography

High-quality cameras, telephoto lenses, and video recording equipment can be used for capturing stunning images and footage of the wildlife within the zoo. These visuals not only serve as educational resources but also contribute to raising awareness about conservation efforts and the beauty of the natural world. They can also be used as a powerful marketing tool to show the great habitat and wildlife within the safari.

#### Communication

Two-way radios, public address speakers, and emergency communication devices play a crucial role in ensuring effective communication among zoo staff, especially during wildlife management activities, visitor guidance, and emergency situations.

#### Ticketing Systems

Software solutions enable efficient management of visitor bookings, ticket sales, and crowd control. Integrated with online platforms and mobile apps, these systems streamline the visitor experience and help in optimising the flow of guests through the zoo.

### Emerging Technologies in Zoology

#### Educational Interactive Displays

Software applications power interactive displays and virtual reality experiences that educate visitors about wildlife conservation, biodiversity, and the importance of protecting natural habitats. These exhibits offer engaging ways to learn about conservation challenges and solutions.

#### Training and Wildlife Management

VR is being used for training zoo staff in wildlife management, animal care, and emergency response scenarios. This technology allows employees to practice handling wildlife situations in a realistic and safe virtual environment, enhancing their skills.

#### Wildlife Monitoring and Behavioural Analysis

Camera systems and image recognition algorithms are used for wildlife monitoring and behavioural analysis. These technologies enable automated identification of individual animals, tracking population dynamics, and studying behavioural patterns without human intervention.

#### Predictive Analytics for Habitat Management

AI algorithms process environmental data to predict changes in wildlife habitats, water sources, and vegetation. This predictive capability aids in proactive habitat management, ensuring the well-being of wildlife and supporting conservation strategies.

#### Interactive Exhibits

Zoos are integrating AR (Augmented Reality) technology to offer interactive exhibits and guided tours. Visitors can use AR-enabled devices to view digital overlays of information, animations, and interactive elements superimposed on the real-world environment, enhancing their understanding and engagement.

#### Anti-Poaching and Security Measures

Drones are being used for anti-poaching patrols and security measures within wildlife reserves. Their ability to cover large areas and capture real-time footage aids in deterring illegal activities, protecting endangered species, and ensuring the safety of wildlife within the zoo.

### Industry-Specific Guidelines and Regulations

#### Wildlife Monitoring and Conservation Software Regulations

##### Wildlife Tracking and Monitoring Systems

The industry adheres to guidelines such as the "Ethical Guidelines for the Use of GPS and Radio Telemetry in Wildlife Research" to ensure the ethical and non-intrusive observation of wildlife. These guidelines emphasise the responsible use of software solutions for wildlife tracking and monitoring, focusing on data accuracy, animal welfare, and environmental impact.

##### Conservation Database Management

The industry follows regulations such as the "Wildlife Conservation and Management Act" that govern the development and maintenance of conservation database management software. These regulations emphasise data security, integrity, and accessibility to authorised personnel for conservation planning and decision-making.

#### Hardware Requirements for Wildlife Enclosures and Exhibits

##### Interactive Display and Information Kiosks

The industry complies with hardware requirements outlined in the "Zoo and Aquarium Safety Standards" to ensure the durability, weather resistance, and user interface accessibility of interactive display and information kiosks within wildlife enclosures and exhibits.

##### Environmental Monitoring Sensors and Devices

Regulations such as the "Wildlife Habitat Protection Act" govern the selection and installation of sensors and devices for environmental monitoring within wildlife enclosures. These guidelines emphasise compliance with industry standards for data accuracy, reliability, and environmental impact assessment.