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1. Introduction

This document provides an overview of both our preliminary plans and our project's systems-architecture & design, which will help simplify the complexity of the whole project. First, the *context diagram* will show the core transactions between the primary group of stakeholders and the main system (a.k.a., the Arts-Access-Pass System) based on the client's requirements.

Before delving deeper into the process flows, we'll define a list of our hardware-and-software requirements followed by our system's operation. After addressing our technology selections and briefly describing how they'll integrate, we'll show our architecture from two perspectives: physical (network), and application (full stack: back-end + front-end).

Once there's a general understanding of our system, we'll define our database structure (tied with business rules) and all of its attributes in a data dictionary; and security measures for each primary stakeholder. Importantly, the GUI model and use case diagrams will represent the front-end user experience.

2. Context Diagram
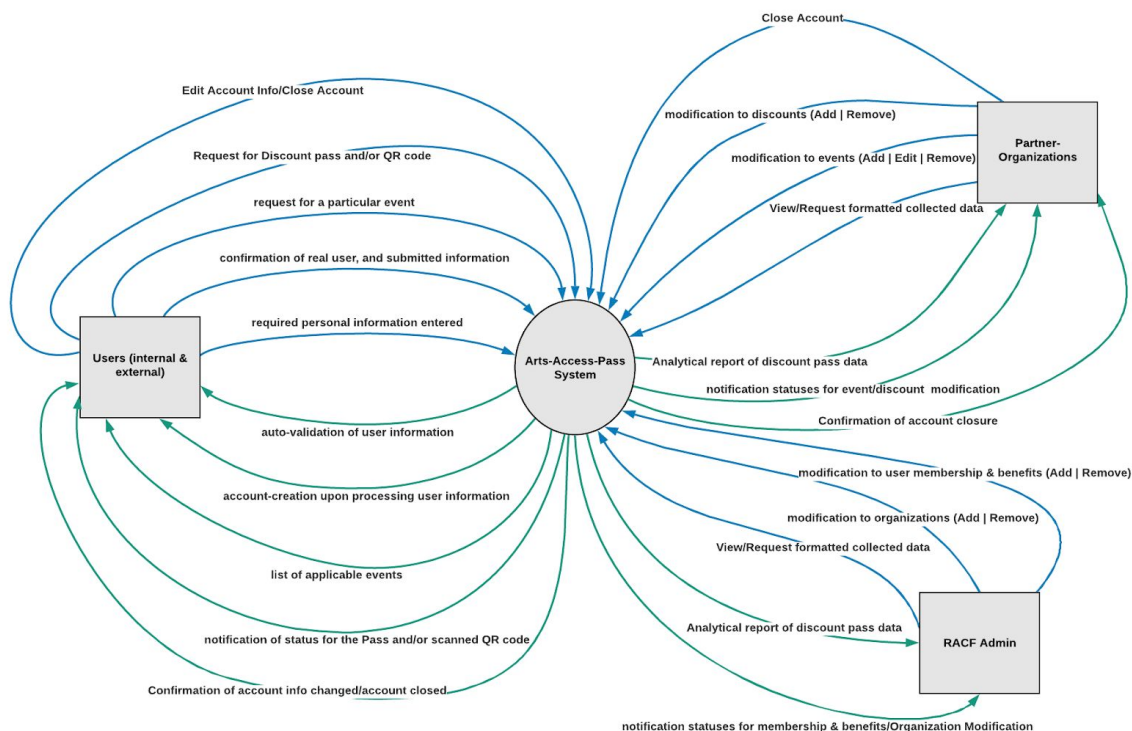
3. Hardware Requirements

3.1 The following hardware will be required to access the website:

   3.1.1 A device that's capable of using modern web browsers

   3.1.2 Connection to the internet:
   - Wired
   - Wireless
   - Cell

3.2 Other technical specifications:
- CPU (1 Shared Core)
- RAM (1 GB)
- Storage (25 GB SSD)
- Bandwidth (1 TB)

4. Software Requirements

4.1 The following software will be required to operate the website:

   4.1.1 Modern web browser:
   - Chrome
   - Firefox
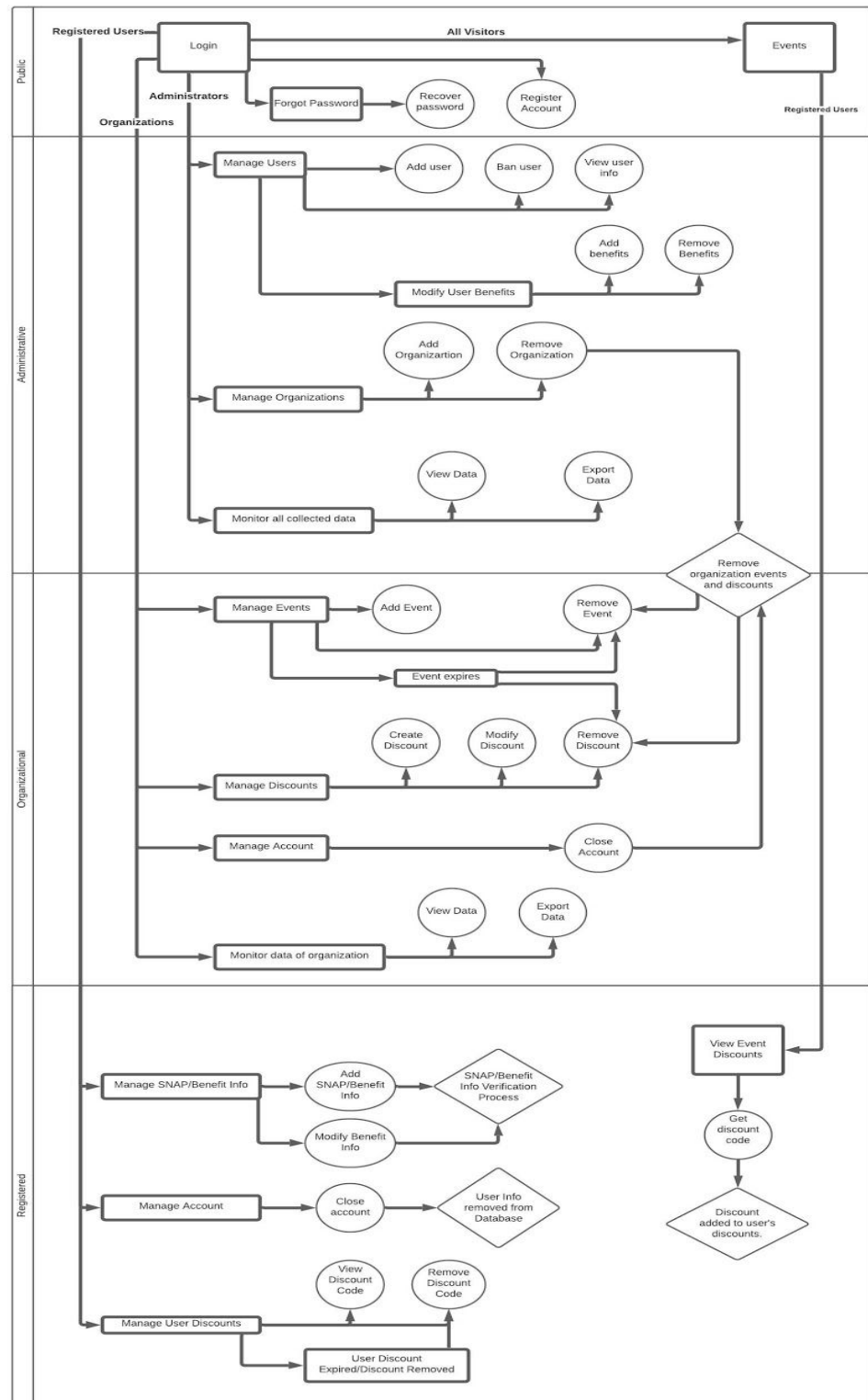   - IE or Edge
   - Safari

   4.1.2 Front-end software:
   - HTML5 (Latest standard: HTML5.2)
   - CSS3
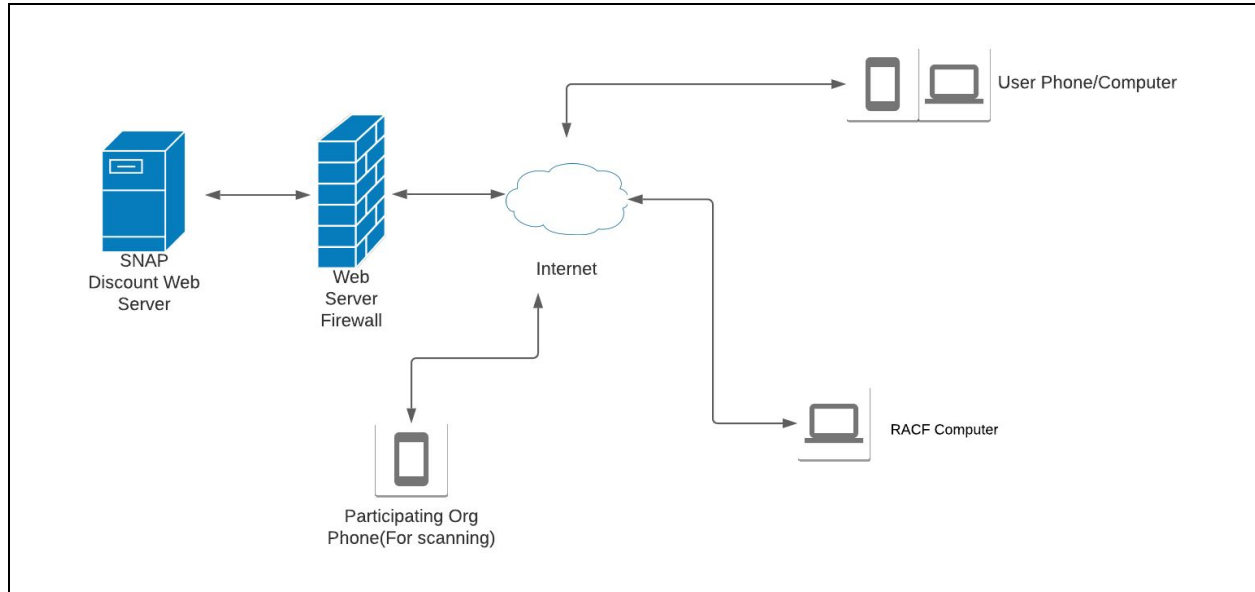   - Bootstrap (Latest release: Bootstrap 4)

   4.1.3 Back-end software:
   - PostgreSQL (Latest stable release: 13.0)
   - Node.js (Latest TLS version: 14.15.0)
   - Express.js (Latest stable release: 4.17.1)
   - Certbot (Latest release: 1.19.0)
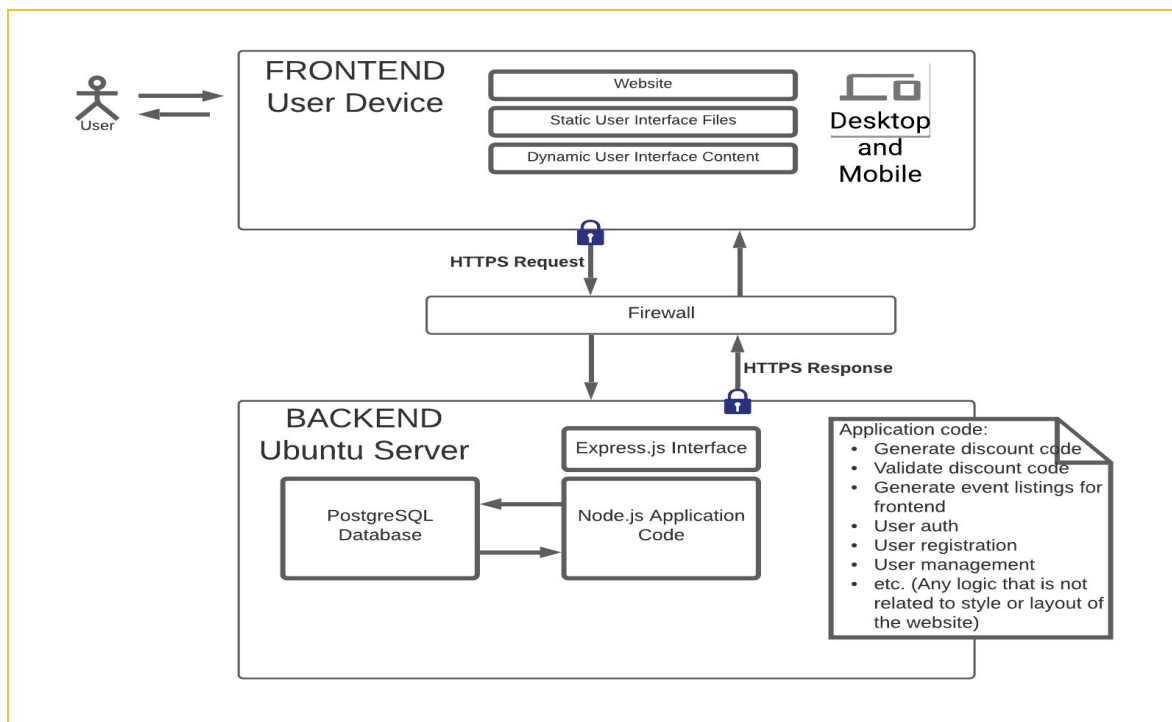   - Ubuntu Server (Latest TLS release: 20.04.1)
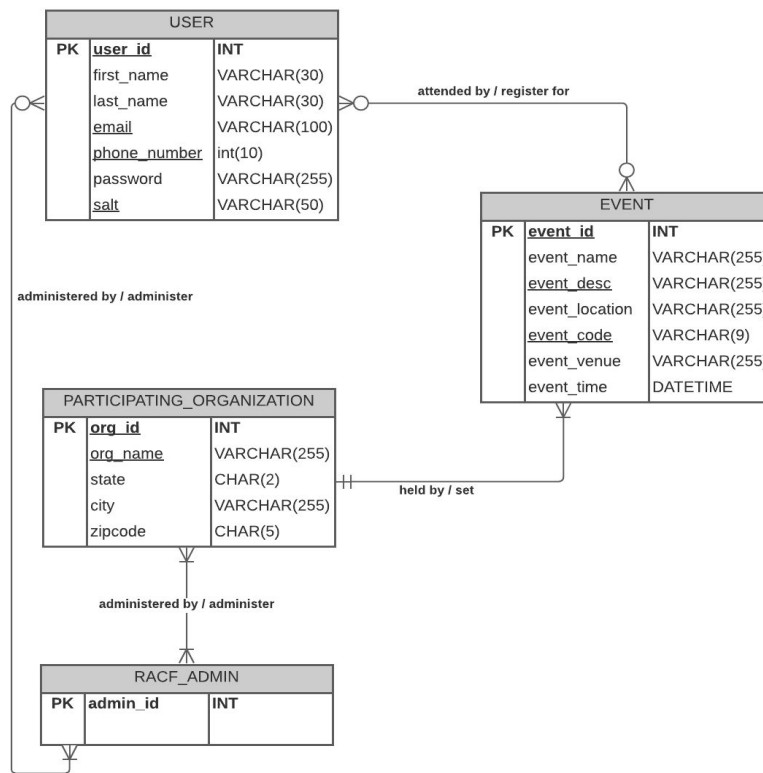
5. Operational Model

6. Physical Architecture Model

7. Application Architecture Model

8. Database Model

9. Business Rules

Business Rules for the Entity-Relationship Diagram

(1). Users can register for many events, but may not register at all.
(2). Events can, but don't have to be attended by many users.
(3). Organizations must set at least one event, and can set many events.
(4). Each event must be held by exactly one organization.
(5). Users can register for many discounts, but may not register at all.
(6). Organizations must set at least one discount, and can set many discounts.
(7). Organizations can, but don't have to scan many discounts.
(8). Each user will have exactly one account.

Other business rules:

(9). RACF will have administrator accounts with many elevated privileges.
(10). RACF branding should be used in only one style: the default style.
(11). All discounts must be visible/accessible.
(12). Users must be verified for SNAP/Discount qualifications.

10. Data Dictionary

User			
Data Item	**Data Type**	**Unique Identifier? (Y/N)**	**Description**
user_id	int	Y	*user_id* uniquely defines the user's identity.
first_name	string	N	*first_name* is the user's first name, or the first part of the user's full name.
last_name	string	N	*last_name* is the user's last name/surname: the other part of the user's full name.
email	string	Y	*email* indicates an individual user's email address.
phone_number	int	Y	*phone* indicates an individual user's mobile-phone number.
password	string	N	*password* is the combination of character texts the users will use to log into their account securely.
salt	string	Y	*salt* is a randomly generated data value that serves as an additional security method for protecting the user's password.

Participating Organization			
Data Item	**Data Type**	**Unique Identifier? (Y/N)**	**Description**
org_id	int	Y	*org_id* uniquely identifies a particular, participating organization.
org_name	string	Y	*org_name* is the name/title of the participating organization.

state	char	N	*state* indicates the abbreviated U.S. state where the organization is located.
city	string	N	*city* indicates the U.S. city where the organization is located.
zipcode	char	N	*zipcode* indicates the five-digit, U.S. postal code for the organization's location.

RACF Admin			
Data Item	**Data Type**	**Unique Identifier?** (Y/N)	**Description**
admin_id	int	Y	*admin_id* uniquely identifies the administrator at RACF who handles user accounts.

Event			
Data Item	**Data Type**	**Unique Identifier?** (Y/N)	**Description**
event_id	int	Y	*event_id* uniquely identifies a particular event.
event_name	string	N	*event_name* is the title of the event.
event_desc	string	Y	*event_desc* is a brief description of the event.
event_location	string	N	*event_location* is where the event takes place.
event_code	string	Y	*event_code* is a serialized QR code (expect nine digits) generated for a particular event that users will use to register for the associated event.

event_venue	string	N	*event_venue* is the main facility used for hosting the event.
event_time	datetime	N	*event_time* indicates both the date and time of the event.

11. Security Model

11.1 Authentication

    11.1.1 Every user will have their own login credentials.
- General users
- Admins
- Sponsors

11.2 Authorization

    11.2.1 Role type will determine content that is displayed.
- General users have basic rights.
- Admins have full control.
- Sponsors can edit their content.

    11.2.2 Passwords will be hashed + salted + peppered to prevent common password cracking methods.

11.3 General Web Security

    11.3.1 Site will resolve OWASP top 10.
- Injection Attacks
- XSS attacks
- Broken Authentication
- Insufficient monitoring

    11.3.2 Site will use SSL for secure web communication.

    11.3.3 Firewall will be used to filter malicious traffic and DDoS attempts.

    11.3.4 Rate limit login attempts

12. GUI Model

Welcome Page:
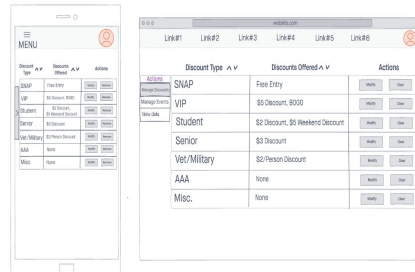

Create-Account Page:

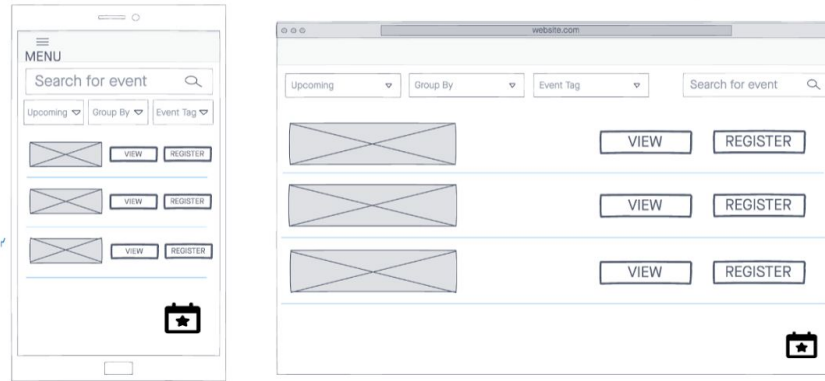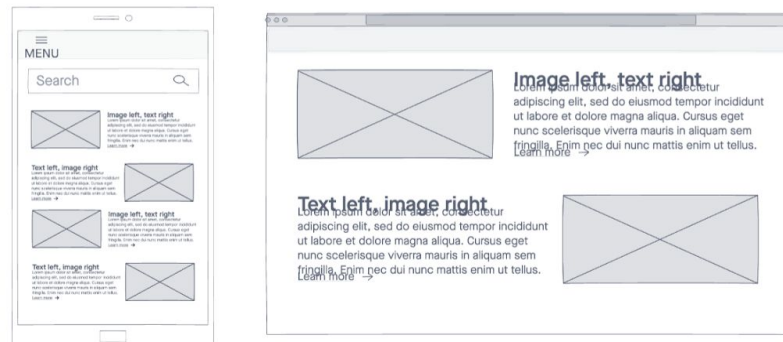User's Homepage (once logged in):
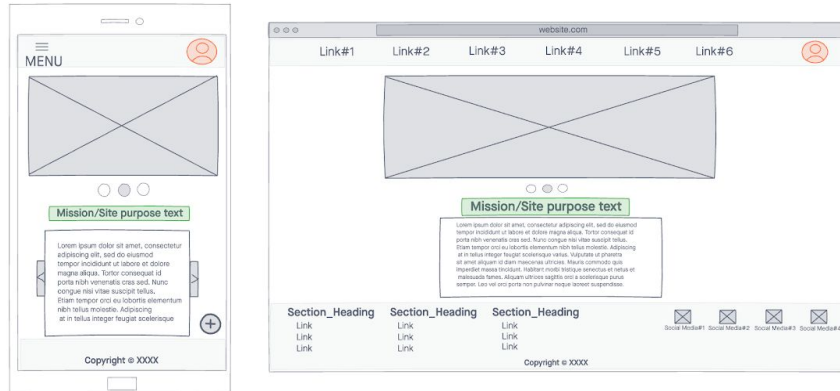
RACF Admin View
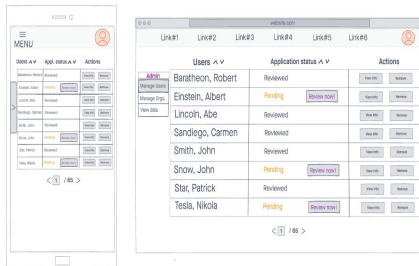
Partner Org. View
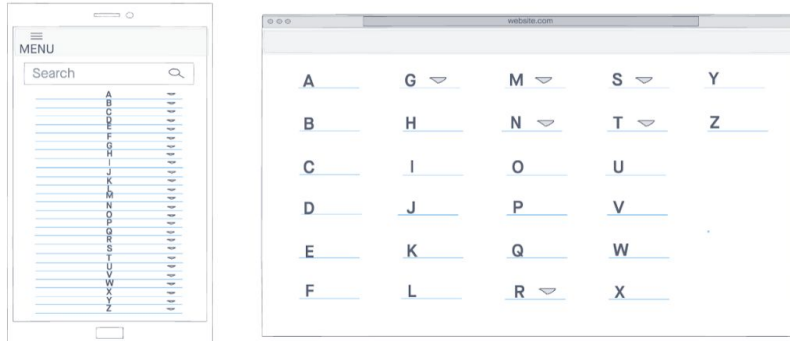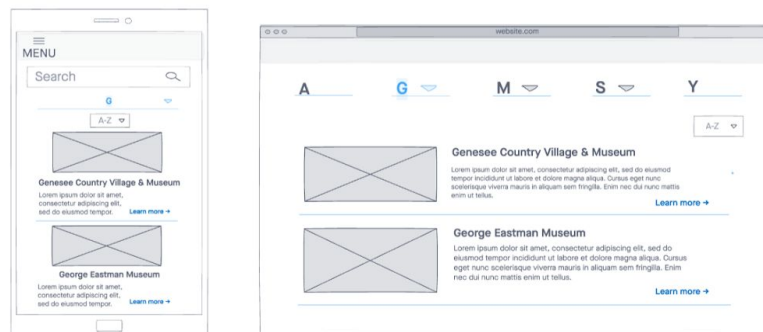
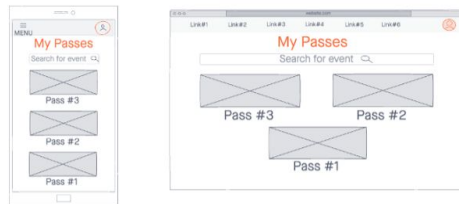## Event Page:

Discount Page w/ Pricing Options:

Contact Page (List of partner organizations & venues):

List of Contacts (filtered by starting letter):
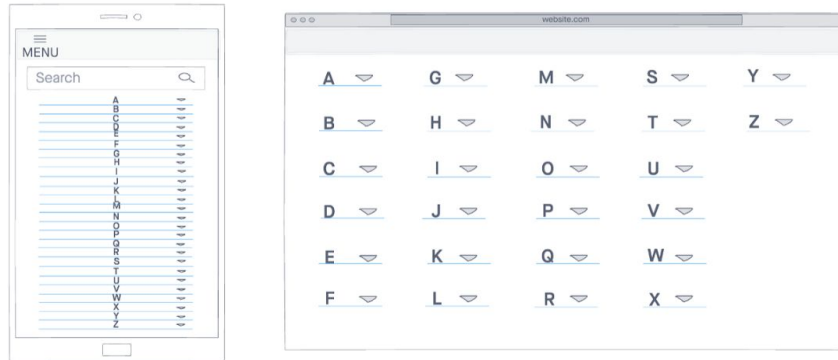
History-Page-List of Passes
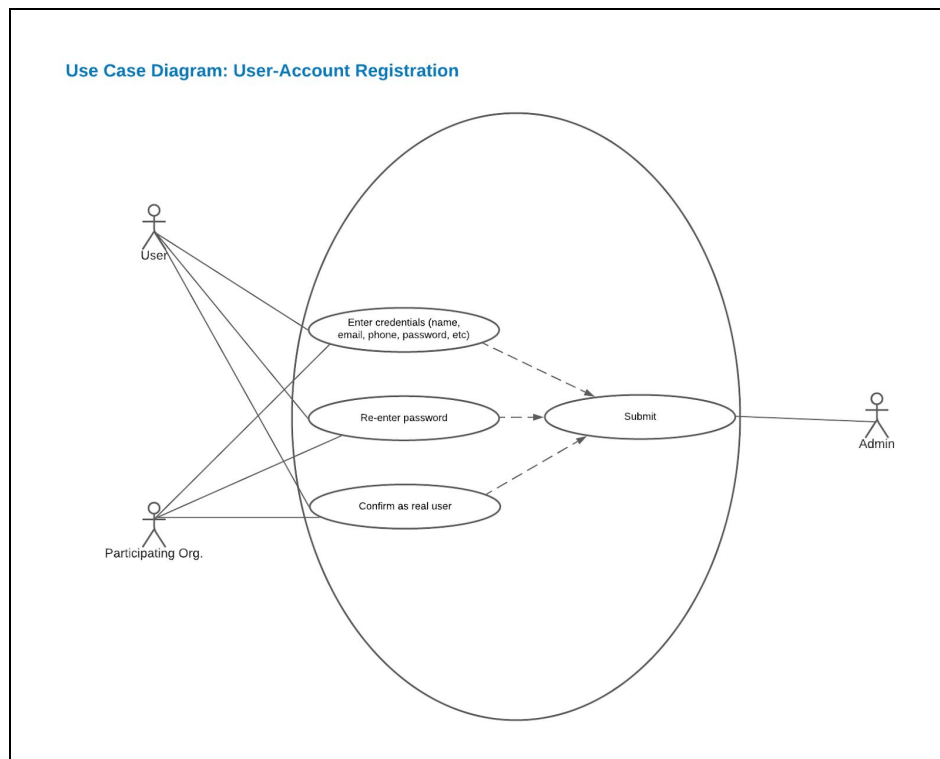
My Passes

Pass-Status Page (per Pass)
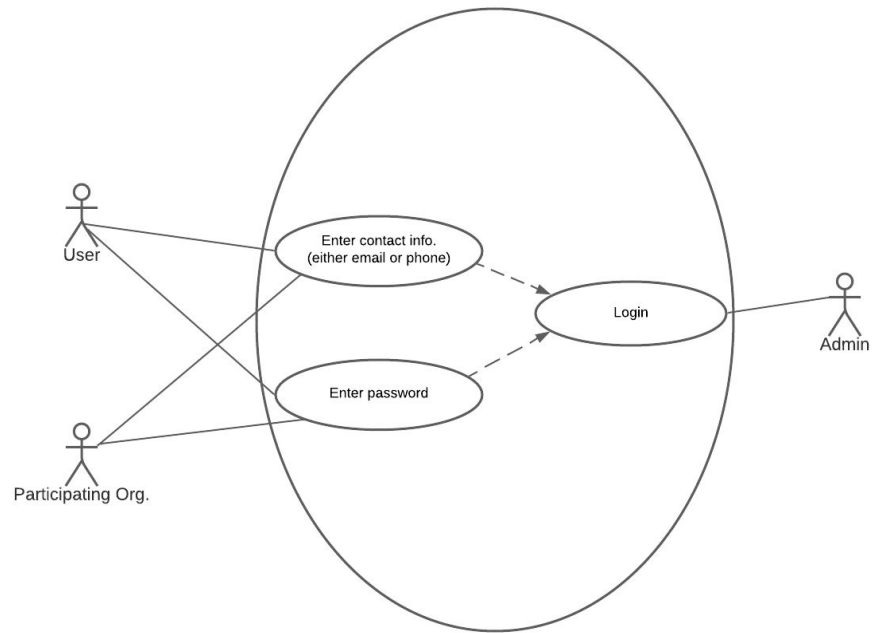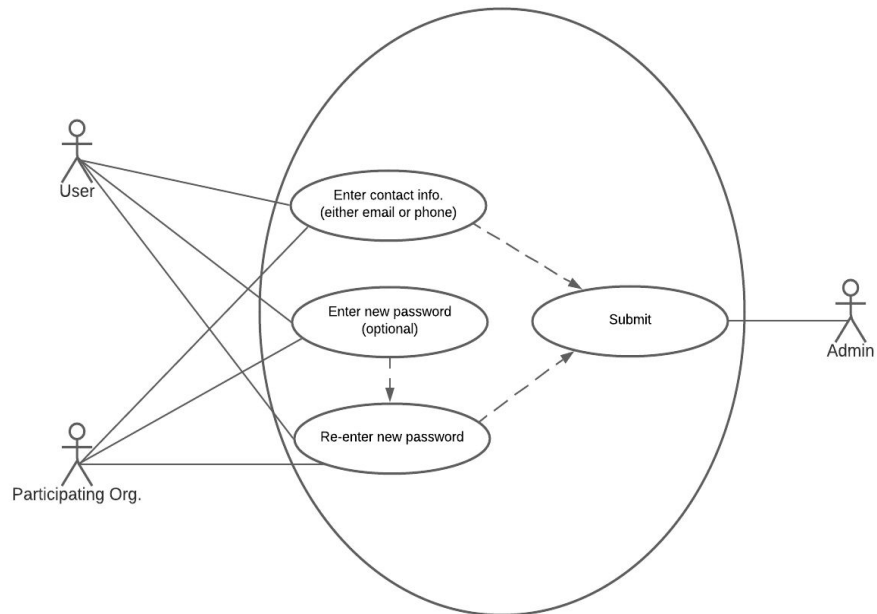

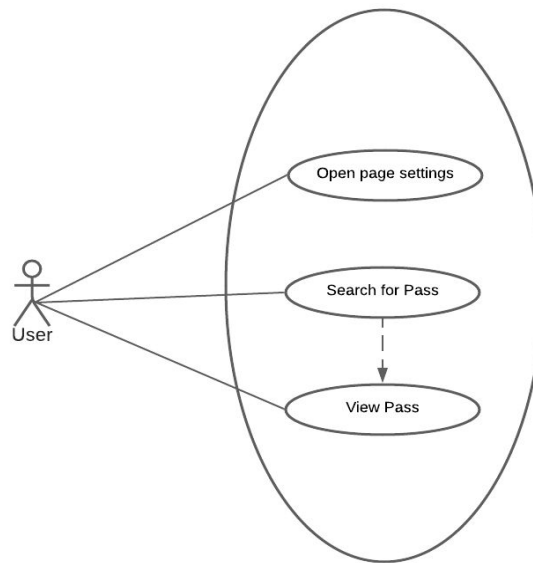Analytics Page (per individual usage):
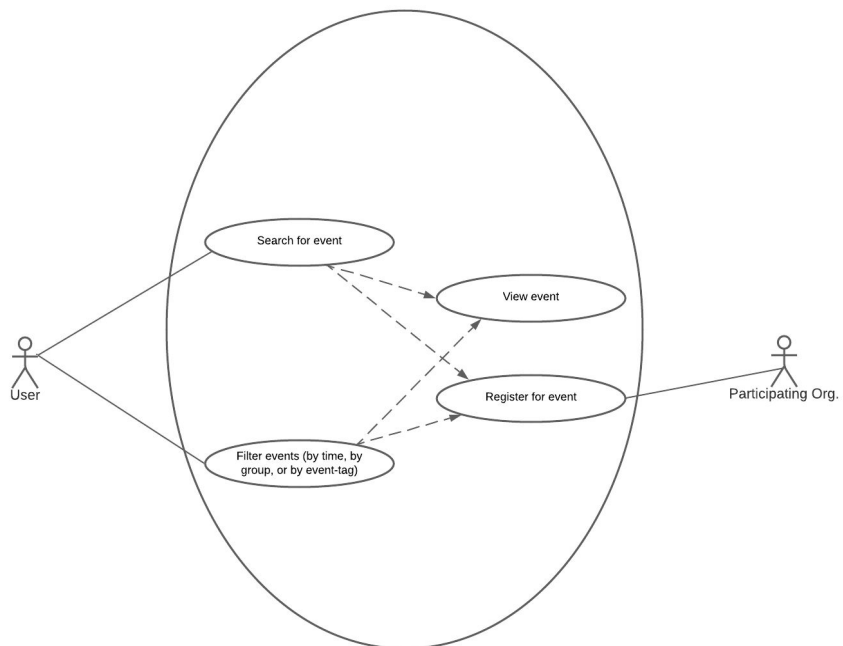
Sitemap Page:

13. Use Case Diagrams

Use Case Diagram: User-Account Registration

Use Case Diagram: User Login

Use Case Diagram: Password Reset

Use Case Diagram: View Saved Passes

Open page settings

Search for Pass

View Pass

User

Use Case Diagram: User Registration for Event

Search for event

View event

Register for event

Filter events (by time, by group, or by event-tag)
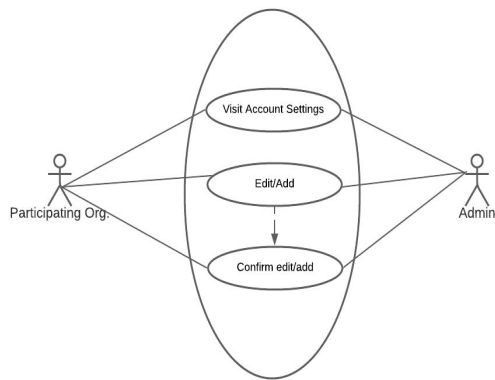
User

Participating Org.

Use Case Diagram: Pass Validation
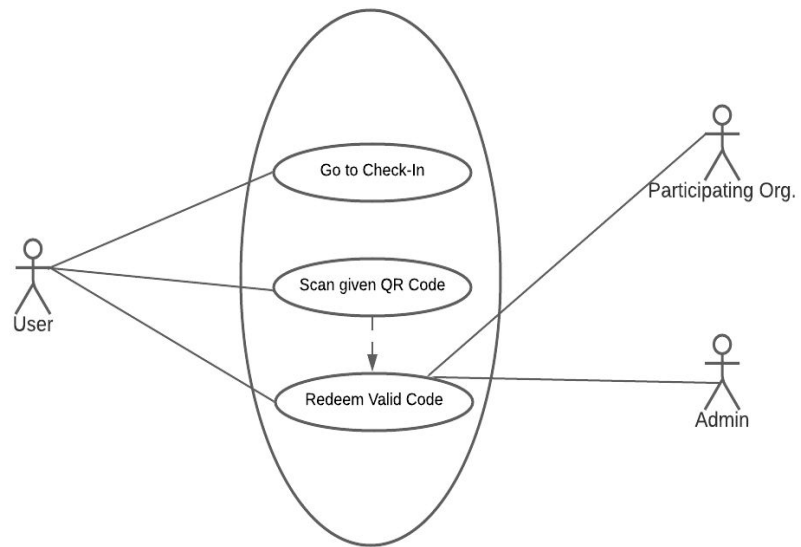
Use Case Diagram: Access User Analytics

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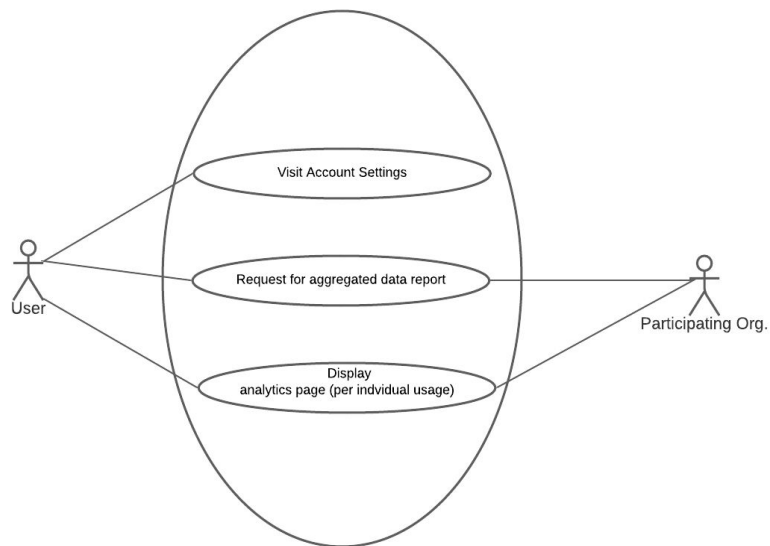
Use Case Diagram: Add Participating Organization/User

Participating Org.

Visit Account Settings

Edit/Add

Confirm edit/add

Admin

Use Case Diagram: Remove Participating Organization/User

Participating Org.

Visit Account Settings

Edit/Remove

Confirm edit/removal

Admin
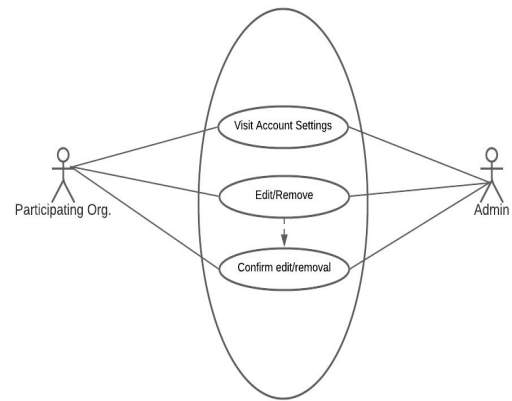
Use Case Diagram: Add Discount Pass

Participating Org.

Visit Account Settings

Edit/Add Discount

Confirm
Added Discount
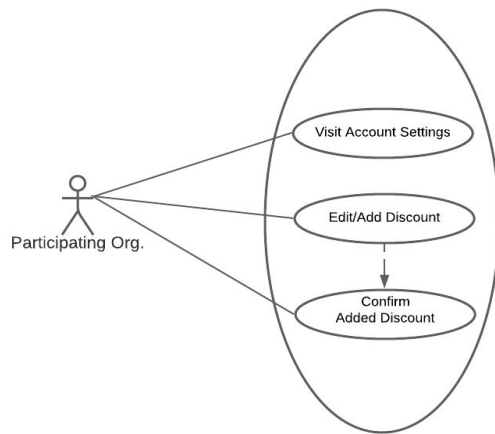
Use Case Diagram: Remove Discount Pass

Participating Org.

Visit Account Settings

Edit/Remove Discount

Confirm
Discount Removal