Big Blue Parking Genie

# Project Overview

This project aims to build a system for listing and renting parking spaces for collegiate sporting events at Utah State University.

The system will allow owners of parking lots/spaces to list their lots on Big Blue Parking Genie and enable attendees of the sporting event to park there once rented out. Event attendees will be able to use the app to find and purchase parking spaces for their event. Additionally, parking supervisors will be able to manage their parking, by viewing their total number of rentals and viewing total money made from rentals. This system aims to solve issues with collegiate event parking, by ensuring there is plenty of parking near the event, and that people willing to allow attendees to park in their available parking spaces can properly list and manage their available parking. The system will support the buying, listing, and managing of parking spaces and will be a web application, capable of running on PC, as well as iOS and Android devices.

# Team Organization

Our team is taking a hybrid approach to the Agile software development team structure. Andrew and Sarah will focus on backend development with work on the database and associated code. Spencer and Kevin will work on frontend development working on the user application itself and associated webpages. However, each team member is generally familiar with all the elements of the application, and can scale up their area of focus. Our project leader is Spencer, who oversees the burndown chart, as well as overseeing and assigning tasks to the other team members. We are implementing the egoless programming philosophy, as well as the DRY method. Additionally, we wish to develop with the open source philosophy in mind.

# Software Development Process

The development will be broken up into four phases. Each phase will be a little like a Sprint in an Agile method and a little like an iteration in a Spiral process. Specifically, each phase will be like a Sprint, in that work to be done will be organized into small tasks, placed into a “backlog”, and prioritized. Then, using on time-box scheduling, the team will decide which tasks the phase (Sprint) will address. The team will use a Scrum Board to keep track of tasks in the backlog, those that will be part of the current Sprint, those in progress, and those that are done.

Each phase will also be a little like an iteration in a Spiral process, in that each phase will include some risk analysis and that any development activity (requirements capture, analysis, design, implementation, etc.) can be done during any phase. Early phases will focus on understanding (requirements capture and analysis) and subsequent phases will focus on design and implementation. Each phase will include a retrospective.

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| **Phase** | **Iteration** |
| 1. | Phase 1 - Requirements Capture |
| 2. | Phase 2 - Analysis, Architectural, UI, and DB Design |
| 3 | Phase 3 - Implementation, and Unit Testing |
| 4 | Phase 4 - More Implementation and Testing |

We will use Unified Modeling Language (UML) to document user goals, structural concepts, component interactions, and behaviors.

# Communication policies, procedures, and tools

We are primarily using Discord to communicate. The team has a discord server with a general messaging channel, in which the team can communicate. It also contains an important documents channel where team and project documents are stored and shared. Team meetings are also being held over Discord or Zoom during class times. Important team and project documents are also stored and shared using both Google Drive and Github. Each team member can view and work on the items contained on those platforms. Currently, our procedure entails splitting up tasks among team members, meeting once a week to discuss those tasks, and maintaining contact through Discord in the event that a team member has questions or needs assistance.

Our communication tools include:

* Discord
* Zoom
* Google Drive
* Github

# Risk Analysis

1. Create User. (Create a new user account.)
   1. Likelihood - Low
      1. The team has experience creating user accounts, and has experience storing user input into a database. However, there is always a possibility for bugs or validation errors to arise in this process.
   2. Severity - High
      1. Users must be able to make an account to access and use the application--if there is an issue in the account creation process, they may not be able to properly use the app.
   3. Consequences - High
      1. Since using the app requires that the user has a working account, being unable to make a working account would mean the user loses access to the app.
   4. Work-arounds
      1. Work Around 1 - Allow users to browse parking spaces without an account, and then call the parking offices to place an order.
         1. Difficulty - Easy. It would only require removing login for the available spots browsing.
         2. Impact - This change would likely have a large impact, since all rental reservations would have to be taken and made by a supervisor.
         3. Pros - Simple, requires very little work from the user.
         4. Cons - Not automatic, requires a supervisor in the office.
      2. Work Around 2 - Allow users to browse and reserve parking spaces without an account.
         1. Difficulty - Medium. While this is a work around for creating an account, it would still require keeping track of buyers and which parking spot they have rented.
         2. Impact - Low. This change would require little extra work.
         3. Pros - Simple, requires little work from the user or the supervisors.
         4. Cons - Would require a reformat of the way keeping track of users works.
2. User Login. (Allow user to enter credentials and access account.)
   1. Likelihood - Low
      1. The team has experience in searching a database and matching entries, and feels confident in their ability to write code that will execute this task. However, issues with searching or validation could still arise.
   2. Severity - High
      1. If a user cannot log into their account, they cannot purchase or view parking spots.
   3. Consequences - High
      1. Since using the app requires that the user has a working account, being unable to log in would mean the user loses access to the app.
   4. Work-arounds
      1. Work Around 1 - Allow users to browse parking spaces without an account, and then call the parking offices to place an order.
         1. Difficulty - Easy. It would only require removing login for the available spots browsing.
         2. Impact - This change would likely have a large impact, since all rental reservations would have to be taken and made by a supervisor.
         3. Pros - Simple, requires very little work from the user.
         4. Cons - Not automatic, requires a supervisor in the office.
      2. Work Around 2 - Allow users to browse and reserve parking spaces without an account.
         1. Difficulty - Medium. While this is a work around for creating an account, it would still require keeping track of buyers and which parking spot they have rented.
         2. Impact - Low. This change would require little extra work.
         3. Pros - Simple, requires little work from the user or the supervisors.
         4. Cons - Would require a reformat of the way keeping track of users works.
3. Reserve Parking Spot. (Allow user to purchase a parking spot.)
   1. Likelihood - Medium
      1. The team has some experience managing listings, however there are many factors at play in reserving listings. Issues could arise in the process of accepting payment, or connecting a user to the spot they have reserved.
   2. Severity - High
      1. If a user cannot reserve a parking spot, there is no point to the application, as that is its primary function.
   3. Consequences - None
      1. There are no other portions of the app that rely on parking spots being able to be reserved, however the reservation of parking spots is the purpose of the app.
   4. Work-arounds
      1. Work Around 1 - Allow users to browse parking space, and then call the parking offices to place an order.
         1. Difficulty - Easy. It would only require removing login for the available spots browsing.
         2. Impact - This change would likely have a large impact, since all rental reservations would have to be taken and made by a supervisor.
         3. Pros - Simple, requires very little work from the user.
         4. Cons - Not automatic, requires a supervisor in the office.
4. Cancel Parking Reservation. (Allow user to cancel a parking reservation they have made.)
   1. Likelihood - Low
      1. The team is confident in their ability to remove connections between users and spaces within the database, and to mark them as available for relisting on the website.
   2. Severity - Low
      1. Canceling a parking spot is likely something a user may want to do, but if canceling does not work, the user will still be able to use the app as primarily intended.
   3. Consequences - None
      1. No other portions of the app rely on canceling parking reservations.
   4. Work-arounds
      1. Work Around 1 - Have users call the parking office to cancel their reservations.
         1. Difficulty - Easy.
         2. Impact - This change would likely have a large impact, since all rental cancellations would have to be taken and made by a supervisor.
         3. Pros - Simple, requires very little work from the user.
         4. Cons - Not automatic, requires a supervisor in the office.
      2. Work Around 2 - Maintain a no cancellation policy at the moment, and roll out cancellation at a later date.
         1. Difficulty - Easy.
         2. Impact - Low. This change would require little extra work.
         3. Pros - Simple, requires no work from the user or the supervisors.
         4. Cons - May bother users, since they will lose money if they no longer need a parking spot.
5. Browse Available Spots. (Allow user to view all available parking spots for an event.)
   1. Likelihood - Medium
      1. While the team does believe they can maintain and display listings, there are many components to displaying listings, including sorting them, not displaying rented listings, and displaying the correct information for each lot. This can mean that bugs are likely to arise within the task of displaying and browsing available parking spots.
   2. Severity - High
      1. If a user cannot see available spots, they will be unable to make a choice on which spots to reserve, or be able to reserve those spots at all.
   3. Consequences - Medium
      1. Reserving a parking space requires the ability to browse available spaces.
   4. Work-arounds
      1. Work Around 1 - Assign parking spots to users if they indicate they want parking for an event.
         1. Difficulty - Easy.
         2. Impact - This change would have little impact, since it would remain automatic.
         3. Pros - Simple, requires very little work from the user, automatic, requires no supervision.
         4. Cons - Users cannot choose the type of parking they would like or the conditions the parking space should have.
6. Parking Owner Registration. (Allow a parking spot owner to create an account.)
   1. Likelihood - Low
      1. The team has experience creating accounts, managing permissions, and storing user input into a database. However, there is always a possibility for bugs or validation errors to arise in this process.
   2. Severity - High
      1. If a parking owner cannot register, they will not be able to list parking spots, so there will be no available spots for users to rent, and the primary function of the app will no longer work.
   3. Consequences - High
      1. All functions of the app available to parking owners rely on parking owners being able to register and create an account. Furthermore, parking owners must be able to list their spots in order for users to reserve those spots.
   4. Work-arounds
      1. Work Around 1 - Allow parking owners to call the parking office to list parking spaces.
         1. Difficulty - Easy.
         2. Impact - This change would likely have a large impact, since all parking spot registrations would have to be taken and made by a supervisor.
         3. Pros - Simple, requires very little work from the user.
         4. Cons - Not automatic, requires a supervisor in the office.
      2. Work Around 2 - Allow users to list parking spaces without an account.
         1. Difficulty - Medium. While this is a work around for creating an account, it would still require keeping track of owners and which parking spot they own, as well as where their payment should be sent.
         2. Impact - Low. This change would require little extra work.
         3. Pros - Simple, requires little work from the user or the supervisors.
         4. Cons - Would require a reformat of the way keeping track of parking owners and their spaces works.
7. Parking Owner Login. (Allow a parking spot owner to enter credentials and access account.)
   1. Likelihood - Low
      1. The team has experience in searching a database and matching entries, and feels confident in their ability to write code that will execute this task. However, issues with searching or validation could still arise.
   2. Severity - High
      1. If a parking owner cannot log in to their account, they’ll be unable to manage their parking spaces, including listing their spaces for events, meaning users will have no parking spots to reserve.
   3. Consequences - High
      1. Listing and managing parking spaces all rely on parking owners being able to access their account. Furthermore, parking owners must be able to list their spots in order for users to reserve those spots.
   4. Work-arounds
      1. Work Around 1 - Allow parking owners to call the parking office to list parking spaces.
         1. Difficulty - Easy.
         2. Impact - This change would likely have a large impact, since all parking spot registrations would have to be taken and made by a supervisor.
         3. Pros - Simple, requires very little work from the user.
         4. Cons - Not automatic, requires a supervisor in the office.
      2. Work Around 2 - Allow users to list parking spaces without an account.
         1. Difficulty - Medium. While this is a work around for creating an account, it would still require keeping track of owners and which parking spot they own, as well as where their payment should be sent.
         2. Impact - Low. This change would require little extra work.
         3. Pros - Simple, requires little work from the user or the supervisors.
         4. Cons - Would require a reformat of the way keeping track of parking owners and their spaces works.
8. Register Parking Spot. (Allow a parking spot owner to list their parking spot.)
   1. Likelihood - Low
      1. The team knows how to add and maintain listings, and is confident in their ability to do so. However, this is some possibility for bugs and errors in this process.
   2. Severity - High
      1. If a parking owner cannot register their parking spots there will be no available spots for the user to rent.
   3. Consequences - Medium
      1. The only other functions of the app that rely on parking registration are deleting parking spots, and allowing users to reserve parking spots.
   4. Work-arounds
      1. Work Around 1 - Allow parking owners to call the parking office to list parking spaces.
         1. Difficulty - Easy.
         2. Impact - This change would likely have a large impact, since all parking spot registrations would have to be taken and made by a supervisor.
         3. Pros - Simple, requires very little work from the user.
         4. Cons - Not automatic, requires a supervisor in the office.
9. Delete Parking Spot. (Allow a parking spot owner to delist their parking spot.)
   1. Likelihood - Low
      1. The team is confident in their ability to remove connections between users and their parking spaces within the database, and to remove those spaces from the database altogether.
   2. Severity - Low
      1. Deleting a parking spot is likely something an owner may want to do, but if deleting does not work, the owner will still be able to use the app as primarily intended.
   3. Consequences - None
      1. No other portions of the app rely on deleting parking spaces.
   4. Work Around 1 - Have users call the parking office to remove their spot registrations.
      * 1. Difficulty - Easy.
        2. Impact - This change would likely have a large impact, since all deletions would have to be taken and made by a supervisor.
        3. Pros - Simple, requires very little work from the user.
        4. Cons - Not automatic, requires a supervisor in the office.
      1. Work Around 2 - Maintain a no deletion policy at the moment, and roll out parking spot removal at a later date.
         1. Difficulty - Easy.
         2. Impact - Low. This change would require little extra work.
         3. Pros - Simple, requires no work from the user or the supervisors.
         4. Cons - May bother users, since they will not be able to delete parking spaces they no longer own or want to list.
10. Register spots for events. (Allow a parking spot owner to mark their spot available for an event.)
    1. Likelihood - Medium
       1. The team feels confident in their ability to mark spots as available for events, however, the process of notifying owners about events to register their spaces for, as well as allowing them to opt in to being available for all events may be somewhat difficult to implement and could lead to issues in the process.
    2. Severity - High
       1. If a parking owner cannot mark their spots as available for events, the users will be unable to see parking spots available for the event they wish to rent for.
    3. Consequences - High
       1. Displaying spaces for users to browse relies on spots being able to be registered for events, and users being able to register spots relies on users being able to browse and view available spots.
    4. Work-arounds
       1. Work Around 1 - Allow parking owners to call the parking office to list parking spaces as available for events.
          1. Difficulty - Easy.
          2. Impact - This change would likely have a large impact, since all parking spot availability changes would have to be taken and made by a supervisor.
          3. Pros - Simple, requires very little work from the user.
          4. Cons - Not automatic, requires a supervisor in the office.
11. Supervisor Registration. (Allow a supervisor to create an account.)
    1. Likelihood - Low
       1. The team has experience creating accounts, managing permissions, and storing user input into a database. However, there is always a possibility for bugs or validation errors to arise in this process.
    2. Severity - High
       1. If a supervisor is unable to register, they will be unable to create events or approve user registration, meaning users and parking owners will be unable to view events, and parking owners will be unable to create listings.
    3. Consequences - High
       1. All supervisor app functions rely on the supervisor having an account, and an account can only be created through supervisor registration.
    4. Work-arounds
       1. Work Around 1 - Automate the supervisor role, and require no supervisor accounts.
          1. Difficulty - Difficult. This would require a fundamental restructure of the way the supervisor works.
          2. Impact - None. Supervisors would not have to do any extra work.
          3. Pros - Simple for the user, automatic.
          4. Cons - Supervisors would not be able to manage users or their parking spaces, implementing this work around would take a lot of work
12. Supervisor Login. (Allow a supervisor to enter their credentials and access their account.)
    1. Likelihood - Low
       1. The team has experience in searching a database and matching entries, and feels confident in their ability to write code that will execute this task. However, issues with searching or validation could still arise.
    2. Severity - High
       1. If a supervisor is unable to log in, they will be unable to create events or approve user registration, meaning users and parking owners will be unable to view events, and parking owners will be unable to create listings.
    3. Consequences - High
       1. All supervisor app functions rely on the supervisor being logged in to access their account.
    4. Work-arounds
       1. Work Around 1 - Automate the supervisor role, and require no supervisor accounts.
          1. Difficulty - Difficult. This would require a fundamental restructure of the way the supervisor works.
          2. Impact - None. Supervisors would not have to do any extra work.
          3. Pros - Simple for the user, automatic.
          4. Cons - Supervisors would not be able to manage users or their parking spaces, implementing this work around would take a lot of work
13. Supervisor approves parking owner registration. (Allow supervisors to view and approve pending parking spot owner accounts.)
    1. Likelihood - Medium
       1. The team is confident with both allowing parking owners to request registration, however, the process of sending registration requests to supervisors and allowing the supervisors to approve registration requests could be a more difficult task.
    2. Severity - High
       1. If a supervisor is unable to approve parking owner registration, parking owners will be unable to list their spaces, and users will be unable to rent those spaces.
    3. Consequences - High
       1. All parking owner functions are dependent on parking owner accounts being verified.
    4. Work-arounds
       1. Work Around 1 - Remove the requirement of supervisor approval for parking owners.
          1. Difficulty - Medium. This would require a restructure of the parking owner registration process.
          2. Impact - None. Supervisors would not have to do any extra work.
          3. Pros - Simple for the user, automatic.
          4. Cons - Parking owners will go unverified.
14. Supervisor creates events. (Allow supervisors to list events parking is needed for.)
    1. Likelihood - Low
       1. The team has experience with creating event entries and maintaining them in the database, and is confident in their ability to implement this task.
    2. Severity - High
       1. If a supervisor is unable to create an event, users will not be able to rent spots for that event.
    3. Consequences - High
       1. Browsing available parking requires parking to be listed for an event, which requires that events are able to be made.
    4. Work-arounds
       1. Work Around 1 - Remove events, allow parking spots to be listed for any time.
          1. Difficulty - Easy.
          2. Impact - None. Supervisors would not have to do any extra work.
          3. Pros - Simple for the user, automatic.
          4. Cons - Parking spots could be rented out for things besides events.
15. Manage Inventory. (Allow supervisors and parking owners to view available spots.)
    1. Likelihood - Low
       1. The team has had experience with pulling and displaying items belonging to a user within a database, and is confident in their ability to allow users to view and manage their listed parking spaces.
    2. Severity - Medium
       1. While viewing the inventory of available parking spaces is something that is very helpful to both supervisors and parking owners, being unable to see and manage their available parking spaces will not impede the primary function of the app.
    3. Consequences - None
       1. No other app functions rely on inventory management
    4. Work-arounds
       1. Work Around 1 - Remove managing inventory for now, and roll it out at a later date.
          1. Difficulty - Easy.
          2. Impact - Low. Supervisors and owners would be unable to see or manage available spots, but this would not prevent them from using other portions of the app.
          3. Pros - Simple for the user, automatic.
          4. Cons - Supervisors and owners would not be able to manage or view available spaces.
16. Manage Funds. (Allow supervisors and parking spot owners to view money made.)
    1. Likelihood - Low
       1. The team has had experience with pulling and displaying items belonging to a user within a database, and is confident in their ability to allow users to view and manage their listed earnings.
    2. Severity - Medium
       1. While viewing the funds made off of available parking spaces is something that is very helpful to both supervisors and parking owners, being unable to see these funds will not impede the primary function of the app.
    3. Consequences - None
       1. No other app functions rely on fund management.
    4. Work-arounds
       1. Work Around 1 - Remove managing funds for now, and roll it out at a later date.
          1. Difficulty - Easy.
          2. Impact - Low. Supervisors and owners would be unable to see or manage the amount they’ve made, but it would not affect any other portions of the app.
          3. Pros - Simple for the user, automatic.
          4. Cons - Supervisors and owners would not be able to manage or view the funds they’ve made.

# Configuration Management

See the README.md in the Git repository.