CowChips4Charity

DESIGN DOCUMENT

Team Number 16
Client: Ken Johnson
Advisor: Lotfi ben Othmane
Members:
Justin Lee: Admin Panel Team Lead
Dustin Schultz: Test Engineer
Tyler Bartleson: Game Team Lead
Elizabeth Li: Game Developer
Meghna Vaidya: Co-Project Manager
Brandon Bui: Co-Project Manager
sdmay20-16@iastate.edu
https://sdmay20-16.sd.ece.iastate.edu/

Revised: 10/3/19/Version 1.0

Executive Summary

Development Standards & Practices Used

List all standard circuits, hardware, software practices used in this project. List all the Engineering standards that apply to this project that were considered.

- Version Control: 3 main branches: master, dev, QA

- Code Review: Pull Requests will be made before committing to main branches

- Standard Practices: conform to existing standards within partially-completed project we're receiving

- Specialization: members have focus areas to reduce redundancy

- Use Cases: Use Cases will be organized on Trello

Summary of Requirements

Functional Requirements

- The User shall be able to choose a square(s) depending on how many squares they bought
- The User shall be able to choose which game to watch
- The User shall be able to watch the game live
- The Game shall be able to choose an unbiased square for every game
- The Game shall inform which square won
- Multiple games should be able to be run at once
- Game time should last between 5-10 minutes
- Game should have a limit to how late a user can choose a square(s)
- The Admin shall be able to see various data in the data panel (donations per game, the number of people who donated, donations per team, etc.)

Nonfunctional Requirements

- The Website shall look aesthetically pleasing
- The Website should be able to work on any device
- The Website should be able to work using any browser

Applicable Courses from Iowa State University Curriculum

List all Iowa State University courses whose contents were applicable to your project.

- COM S 309
- SE 319
- COM S 228
- COM S 311
- COM S 363

New Skills/Knowledge acquired that was not taught in courses

List all new skills/knowledge that your team acquired which was not part of your Iowa State curriculum in order to complete this project.

- Vue.js
- Node.js
- Express
- Heroku
- mLab
- AWS
- Stripe

Table of Contents

List of figures/tables/symbols/definitions (This should be similar to the project plan)

1 Introduction

PROBLEM AND PROJECT STATEMENT

The Boo Radley Foundation funds the research of diseases that are common between humans and household pets. They believe research on these animals is a better way to find cures and treatments for animals and humans with the disease. To fundraise for their cause, the Boo Radley Foundation hosts an event called CowChips4Charity. This event is held at halftime of college football games between two participating schools. The event is a bigger scaled version of cow chip bingo. Participants will select a square on a 36x36 grid and if the cow defecates on your square, you win. Currently, the foundation does this in a real field with a real cow and presents the outcome via video feed on YouTube. The cost for the cow and time to make the grid are too high for the foundation. Our goal is to convert the cow chip bingo process to a digital version. We believe this will considerably decrease the costs for the cow chip bingo game and increase the participants and donations of the event.

Our team will develop a cross-platform web application for the CowChips4Charity event. The Boo Radley Foundation will use the web application to enable people to participate in the event. Participants will sign in to the application, select which football game they want to play at, and then select square(s) on the grid to buy. Once the user has at least one square selected they will then pay via credit card. This will occur all the way up to halftime during the football game. During halftime, participants will then go to our app to watch the outcome of the CowChips4Charity event. Our web app will then show an on-screen animation of a cow that the defecates on a certain square in the grid. People who picked the winning square will then be notified that they won and to claim their prize.

OPERATIONAL ENVIRONMENT

Due to the fact that our end project will only be software and not involve any hardware it will not be subjected to any form of physical hazard such as weather. However, the project is designed to be used during the half-time of college football games both by users watching from home and users in the stadium. This environmental factor does cause us to have to account for the spotty cellular and internet connection that is often found in college football stadiums when creating the project so that even the users in the stadiums can still use the product.

REQUIREMENTS

Functional Requirements

- The User shall be able to choose a square(s) depending on how many squares they bought
- The User shall be able to choose which game to watch
- The User shall be able to watch the game live
- The Game shall be able to choose an unbiased square for every game
- The Game shall inform which square won
- Multiple games should be able to be run at once
- Game time should last between 5-10 minutes
- Game should have a limit to how late a user can choose a square(s)
- The Admin shall be able to see various data in the data panel (donations per game, the number of people who donated, donations per team, etc.)

Nonfunctional Requirements

- The Website shall look aesthetically pleasing
- The Website should be able to work on any device
- The Website should be able to work using any browser

INTENDED USERS AND USES

This product is intended for two colleges to go against each other to raise money for the Boo Radley Foundation. The end product should allow for users to donate through the website to support their college and the Boo Radley Foundation. The end product should also allow for the user to see the game on their device.

ASSUMPTIONS AND LIMITATIONS

– Assumptions
- Users will have a device from which they can access can access the internet
  - In order to be able to get to the website to play the game, users will need an internet connection
- Users will have a credit or debit card
  - In order to bet on a square or squares in the game
- The product shall comply with all laws and regulations
  - States have different privacy laws
- Admin panel users will not have an in-depth software development knowledge
- Limitations
- Internet connection in the college football stadiums tends to be spotty.

EXPECTED END PRODUCT AND DELIVERABLES

The deliverables we will produce will be amendments to existing documentation, and an expanded final project cross platform web application. A large portion of the documentation for the project

already exists, but the additional changes we're making will need to be reflected in updated documents. The new/adjusted deliverables will be: a new use case diagram for the analytics portion, an updated communications diagram, and a scope and requirements document for the amendments we will be making.

Analytics Use Case Diagram (Delivery TBD)
One of our major changes is a large expansion of the analytics portion of the admin dashboard. This will describe the interactions that an admin will have available to them, and the flow of events of those actions. This document solidifies the client and team's understanding of the expansion's expected flow.

Updated Communications Diagram (Delivery TBD)
The existing project already contains a well-documented communications diagram. Our expansion to the project will entail new communications between components of the application. To ensure understanding of these additions, the existing communication diagram will be updated to reflect our new features.

Scope and Requirements Document (Delivery TBD)
This document will serve as a high-level guide for the desired output of our work on the application. It will be frequently evolving as time allows additional expansions. Despite this, an initial version will be approved by the client to ensure a full understanding of the expected work.

Final Version Web Application (Delivery TBD)
A fully functional version of the expanded web application will be the ultimate deliverable. It will include all our new features, including game generation, data visualization, and analytics

2. Specifications and Analysis

2.1 PROPOSED DESIGN

Our main components that we'll implement are the game animation, and admin panel analytics.

For the game animation, we've begun discussion on potential tools and libraries that fit into our existing framework that adhere to the requirements of being lightweight for spotty mobile connections. A conclusion hasn't been reached on which tool to use, the decision is awaiting confirmation with client of an idealized style for the animation.

For the admin panel analytics, we're currently investigation data visualization libraries that fit into our framework. Also under our consideration, analytical tools that will provide output to for use in our selected data visualization techniques. While specific analytical desires are still being refined, we've halted selection of pre-built analytics, or even if we'll use them at all, depending on what level of analysis is desired be available.

We will strive to follow the IEEE Standard Std 829-1998 within our test planning.

2.2 DESIGN ANALYSIS

Our components fit into the existing application, with somewhat defined "openings" in the code ready for development. We've examined these openings, and while nothing has been committed and tested, discussion with our technical contact leads us to believe this is the correct approach.

We believe that implementing new libraries for data visualization, analytics, and animation will be beneficial to both development time, and maintainability of the product. This will conform to the standards already existing in the project, which already uses libraries where possible to avoid redundant development.

Selecting the correct tools mentioned above will be a time consuming activity, but the benefits gained by faster development and maintainability gains will outweigh this upfront cost.

2.3 DEVELOPMENT PROCESS

For this project we are following the Agile development process. We settled on using the Agile development process because we thought that it would be the easiest and most efficient way to have meetings, work together, and organize the tasks required to complete our project. More efficient meetings means that we will be able to make the most of whatever time we are able to have all of our team members together; allowing us to come together and discuss what we have all gotten done, what we all still have to do, and what problems any of us are having. Agile will help work together easier because we will know the current progress of our project. Finally, the Agile process will help us organize the tasks required because it allows us to know who has been assigned which task and the approximate time of when each task should be complete.

2.4 DESIGN PLAN

This project is a charitable bingo game with an admin panel feature. Therefore, we will have the standard client, server, and database setup. We do not know exactly which tools would be used for the server and database, but since this is a web-based project, it is assumed that a fair amount of HTML, JS, and CSS will be used. As we get more information, we will be able to create more specific diagrams that go along with the principles of UML.
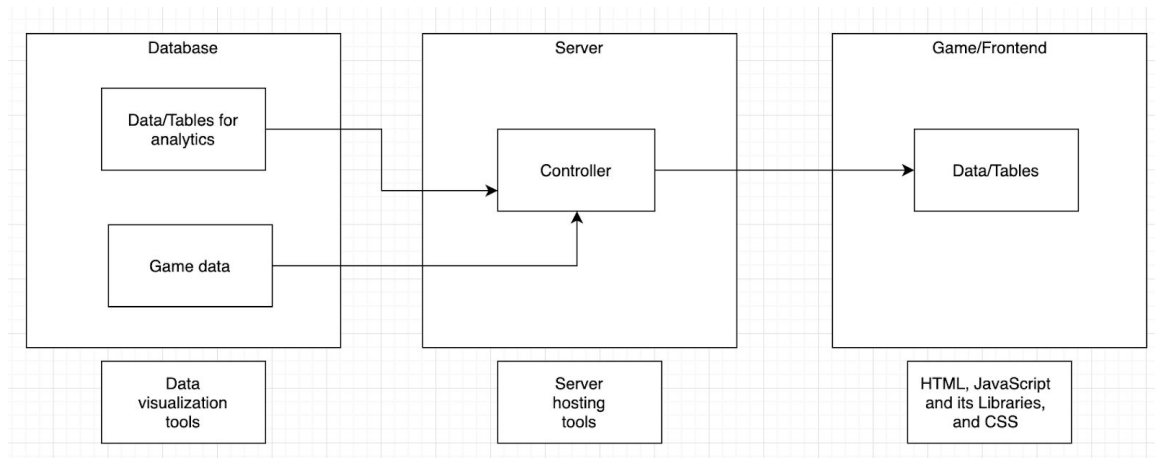
3. Statement of Work

3.1 PREVIOUS WORK AND LITERATURE

- This project is basically a bingo game that involves betting on some squares, which are two basic ideas that have probably been done many a time.
- We have access to the previous teams work on this project, and it can be used as a basis for our work this time around.
    - Advantages
        - The access to the previous teams work, gives us more of an insight as to what our client's requirements actually means.
        - It gives us a visual on what our end product should look like and on what parts we can build upon and make better
    - Shortcomings
        - We are limited to the technologies we are using, we have to use what the previous team used as to keep everything on the same page.

3.2 TECHNOLOGY CONSIDERATIONS

We will be using the previous group's technology stack (Vue.js, Node.js, etc.). This will make it easier to transition to without any problems.

3.3 TASK DECOMPOSITION

There are two main aspects to this project: the game itself and an admin panel with analytic data from the games that have been played. In order to complete both of these aspects of the project it will help to break them down into multiple tasks as follows:

- Game front-end such as the graphics and animations of the game
    - Create pleasing graphics
    - Create pleasant animations
    - Enable sprite movement to parameterized destinations
- Game back-end such as the mechanics of choosing the winning square and knowing which squares have been bet on by who
- Admin panel front-end such as all of the graphs and diagrams necessary to display all of the analytic data
    - Integrate data visualization tool
    - Integrate analytics tool
    - Create various analytics
- Admin panel back-end such as the data recording, calculation, and management of the data retrieved from the game
    - Enable exportation of parsed data from analytics module

3.4 POSSIBLE RISKS AND RISK MANAGEMENT

A part of this project that slow us down would our collective teams knowledge of the technologies we are using. We are going to be using technologies that most of us on the team are not

knowledgeable about, including Vue.js, Node.js Express, Heroku, mLab, AWS, and Stripe. While some of us may have had some exposure to these, nobody is proficient in them, and it will require all of taking the time to really learn what each one of these do, and how they play in to our overall project.

3.5 Project Proposed Milestones and Evaluation Criteria

The milestones of our project will largely revolve around the two different aspects of our project. Some milestones of the Game aspect of our project will be: creating working visuals for the game, creating backend so that the game can be run from start to finish, one game is able to be played at a time, multiple games are able to be played at a time, the game can scale to multiple sized devices, the game can be run on multiple browsers, and the game can run with little internet connection. Some milestones for the Admin Panel aspect of our project will be: able to collect data from the game, able to store data from the game, able to analyze / calculate additional data from the data collected from the game, and being able to show that data as graphs and diagrams.

3.6 Project Tracking Procedures

Our team will github to track our progress. We will be using a storyboard with use case cards to keep track of what needs to be done, who is working on which card, which card needs to be tested, and which card is done.

3.7 Expected Results and Validation

The desired outcome is to have a working simulation game of Cow Patty Bingo along with an admin panel that will display various data of the games. The website should also be able to host multiple games at the same time.

4. Project Timeline, Estimated Resources, and Challenges

4.1 PROJECT TIMELINE

| | Week 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 |
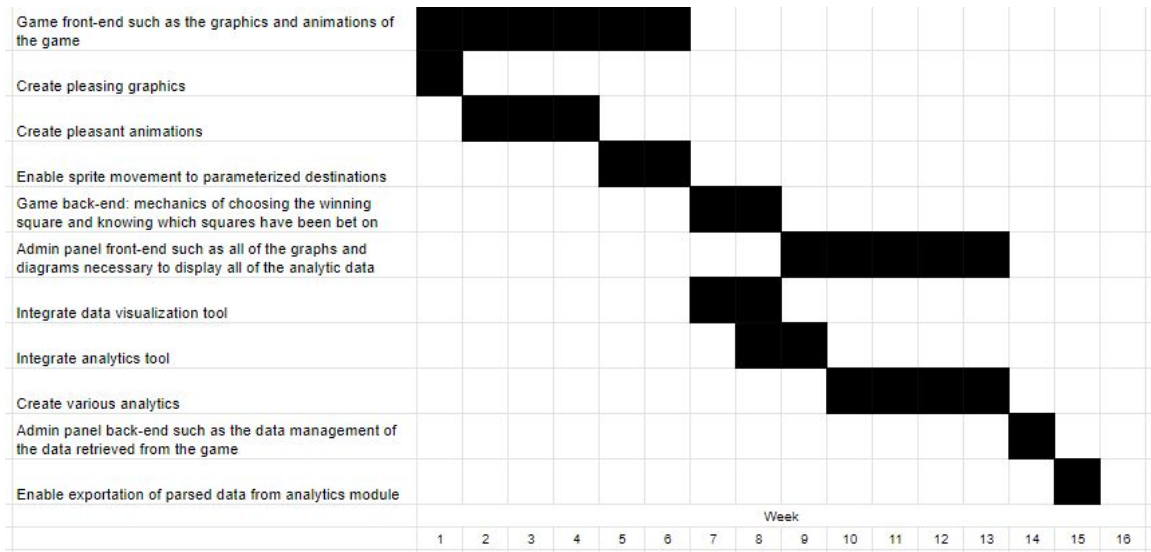
We're proposing to split the development up into two main stages: game animation, and admin panel tasks. We'll begin with game-related tasks, and move to admin panel analytics after.

We believe that a larger portion of time will need to be dedicated to the admin panel activities, since it'll be using existing libraries, and those still need investigated as to which we want to use (if any).

4.2 FEASIBILITY ASSESSMENT

The realistic projection of our project will be that the website will be able to run multiple games at the same time while the admin panel will be able to see various data on the games live. Some challenges we thought of was adapting and understanding the previous group's project.

4.3 PERSONNEL EFFORT REQUIREMENTS

Game	Admin Panel
Elizabeth 33%	Justin 33%
Meghna 33%	Dustin 33%
Tyler 33%	Brandon 33%

Each member will work around 10-15 hours on average per week on the project.

4.4 OTHER RESOURCE REQUIREMENTS

Due to the fact that this project will be entirely software the only resources we may need are different softwares and frameworks.

4.5 FINANCIAL REQUIREMENTS

As of now it does not seem like our project will have any financial requirements unless we need to purchase professional versions of software.

5. Testing and Implementation

We would need to integrity test our data, playtest our game, and conduct user-studies to see how the UI reacts to each scenario. It would be essential to test the entire bingo game with every rule, the ability to choose squares, watching the game live, determining the winning square, the ability to run multiple games at once, the game time, user limits, and the admin privileges that include donations per game, those who donated, donations per team, and other data.

Our test cases should be based off of the game rules- the standard rule of Bingo, the ability to choose a square by the player based off the squares purchased, user being able to choose which game to spectate, watching the game live, unbiased square, determine winning square, having multiple games run at once, the limited time frame for each game, limits to how late a user can select a square, and having Admin be able to accurately see the data such as donations per game, the number of those who donated, and donations per team.

The anticipated test results for the actual game should be based off of the rules of how Bingo works and having the constraints properly set for one winning square per round, having more than one game run at once, having the game only lasts between 5 and 10 minutes, limiting how late to how a user can select a square, and accurate data should be exact to the predicted data that is calculated by the tester.

Once these features are implemented, we can perform the actual tests and evaluate the results to improve our product and retest, after documenting our entire process and results. We can run those tests and a lot of our results are based off of what is simulated in the game. We believe that the biggest challenge would be integrating the frontend and backend and allowing the user to watch the games live and having multiple games go off at once.

5.1 INTERFACE SPECIFICATIONS

The previous group has a CI/CD pipeline set up, so we will keep implementing tests as we move further into the project.

5.2 Hardware and software

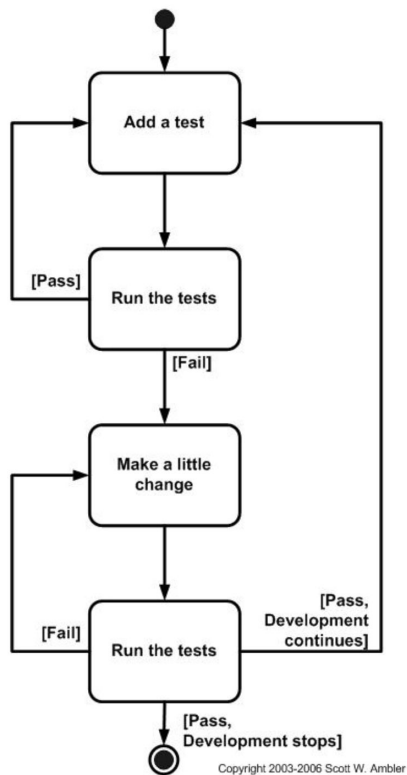We will be testing the admin panel and the game simulation on the website.

5.3 Functional Testing

We will be using unit testing and acceptance testing.

5.4 Non-Functional Testing

Performance and automated testing

5.5 Process

Our process should start as soon as the feature we want to test is implemented. We will go through the process of creating the test cases, run the tests, and if tests fail we can go ahead and implement the necessary changes to get them to pass and rerun the tests. The cycle shall repeat until there are no more features to test.

5.6 Results

As of now, there has not been any implementation for the project that can be tested. Therefore, there are no failures or successes during a nonexistent testing phase. Currently we will have to anticipate how testing will go and learn how to test and improve based off of the results. It is assumed that all team members should know how to run unit tests, playtests for the game, and

debug accordingly. Any form of errors are possible when testing, so it is best to get our project up to speed as best as possible and resolve any errors as soon as possible.

Since our project involves a majority of UI, a lot of the testing is visual and is dependent on the results of the game actions. A large amount of the testing would be a result of playing the game and seeing the UI interact with it and based off of the tester's analysis of the visuals.

This project will truly test the knowledge and capabilities of every team member. The biggest challenges would consist of getting the frontend and backend working together and implementing the analytics.

6. Closing Material

6.1 CONCLUSION

Our goal for this project is to be able to provide the technological solutions our client needs for the CowChips4Charity initiative to raise money for the Boo Radley Foundation. In order to do this we will be creating interactive web application where users can bet on square to play the CowChips4Charity game. We will also create an easy and organized admin panel for the admin user to be able to see analytical data about any of the games that are played. The intention of the project to be able to raise awareness and money for the Boo Radley Foundation.

6.2 REFERENCES

We have no references at this time

6.3 APPENDICES

We have no additional information at this time.