Lab 1 – Power Play Product Description

Nicholas Benfield
Old Dominion University

CS 411W
Janet Brunelle
January 16, 2017
Version 1
Contents
INTRODUCTION ........................................................................................................................................... 3
POWER PLAY PRODUCT DESCRIPTION ................................................................................................. 3
   Key Product Features and Capabilities ................................................................................................. 4
   Major Components (Hardware/Software) ................................................................................................ 4
IDENTIFICATION OF CASE STUDY ......................................................................................................... 5
POWER PLAY PRODUCT PROTOTYPE DESCRIPTION .............................................................................. 5
   Prototype Architecture (Hardware/Software) .......................................................................................... 5
   Prototype Features and Capabilities ...................................................................................................... 6
   Prototype Development Challenges ....................................................................................................... 6
Glossary .................................................................................................................................................... 7
References ................................................................................................................................................ 7
List of Figures
Figure 1.1 .................................................................................................................................................. 4
List of Tables
Table 2 .................................................................................................................................................... 6
INTRODUCTION

When a natural disaster happens, electricity is a very common utility to go out. Utility companies must send personnel out to resolve the issue and restore service. In 2003, Hurricane Isabel took out more than 700,000 residents within North Carolina lost power to their homes (Ambrose, K). This massive incident caused utility companies to send out workers to restore service. When utility companies send out workers they are reacting to situations they are force into. These decisions can lead to cost time and money resolving the issue.

American society currently enjoys the benefits of having electricity flowing through the country. Companies like Dominion Power supply electricity to parts of the country. Dominion specifically distributes power to Virginia and North Carolina (Dominion). Dominion has a lot responsibility when it comes to delivering power to their customers. The managers from the dispatchers all the way up to the CEO must make decisions that are reactive and could cost them a lot of money. Any decision that has information that could potentially be disastrous for the company. The research analysts of Dominion look at all the data they’ve gathered throughout the year and present this data at the decision that is made once a year.

If researchers could gather data on scenarios that could potentially happen throughout the life of a plant, they would be able to examine data more efficiently. A cross platform game that would have scenarios that feed information to a player would allow many different solutions in the data. This would allow researchers to sort through the solutions and provide the most efficient way to handle similar situations. The platform would have to be user friendly would provide a way to bring users back to the platform and continue creating solutions.

Power Play would be a scenario driven cross platform game that would gather data and allow for real time impact on decisions. Many different scenarios will be generated for users to select from and provide different solutions to each scenario. As the player plays through a scenario, they solve the scenario and the solutions that are provided will be able to be used for analyzing possible decisions.

POWER PLAY PRODUCT DESCRIPTION

Power Play will be a free to play game that is accessible through the web. The game will be available to any device that can connect to the internet. Google Maps will be used to provide real world locations that will provide the mapping of the area. The Spark Simulation engine will be receiving data from the game that will be used to generate real numbers for the player’s actions. As the player plays through the game, their decisions will be reported and recorded to be analyzed by research analysts.

Ultimately, the game will provide data to improve future decision making that Dominion Power will utilize for future incidents. This will allow for an informed decision from the analyzed data. Each scenario that the player is given, will have different outcomes based on how the player tackles the task. With each different outcome, each scenario will have multiple outcomes produced. As the player replays the same scenario over, they can optimize their approach towards the given scenario.
This tool that will be provided to Dominion will allow them to use various data points to train personnel on approaches to various scenarios. Each scenario will be unique and this uniqueness allows the personnel to have more than one approach to solving the issue.

Key Product Features and Capabilities

Players will be able to create an account for the game by using a web browser to sign up. When they sign up they will be given a profile that will keep track off the outcomes of the scenarios that they have completed. Achievements will be given to players who complete various tasks within scenarios. At the end of every scenario, an analysis of the decisions they made throughout the game will be shown to them. The more scenarios a player completes the higher the ranking they are and will be competing with other players for higher ranks. The loading of the simulation will be handled by another server that will balance the load of information sent from the scenario to the player. Players will be engaged in a turn based environment where they will make decisions and end their turn.

Major Components (Hardware/Software)

In Figure 1.1 the major components that are required for this product to function are shown. There are two databases that are in contact with each other through accessing databases. The web server will handle players access the website along with providing the player with information from the scenarios. Spark Simulation engine will handle the simulation of the scenarios and processing the user’s data when they finish a turn. The three databases will contain player information, gameplay information and results from the scenarios they have completed. Each of these databases act as intermediators between the two servers. Players and research analysts can access the website and see reports from completed scenarios.

**Figure 1.1** The diagram shows the various hardware and software components for this product.

This server will be running Ubuntu as the operating systems to run the webserver and databases on. Python will be used to make connections to the Spark Simulation. These databases are using Flask as
the central way of connecting to the databases. The databases will be using MongoDB to store the information from the web server. The front end of the game will be using PHP and AJAX to generate the various scenarios players will scene through the web browser.

IDENTIFICATION OF CASE STUDY

The focus of this product is for companies such as Dominion to utilize the data that is gathered from players to make smarter decisions towards issues they may face. With the use of this game players will learn the struggles that utilities companies face during certain scenarios. Utility companies will benefit from players learning because they will be able to take that information and use it for when they face scenarios. This game is designed with power companies in mind, but it is designed to be able to expand to other types of utility companies.

With the information that is gathered utility companies can compare how they previously handled specific scenarios in regions to the way other players have handled the situation. This reduces the turnaround time that they face when they must make decisions on building or maintaining facilities. The game allows for players and personnel to be trained on how to handle situations.

POWER PLAY PRODUCT PROTOTYPE DESCRIPTION

Power Play is a simulation based game that will be accessed through a web browser. Players will be shown a user interface where they will be acting as CEO over a utility company. Scenarios will be given to the player and they must solve the scenarios. After each scenario is over the players will be given feedback on how well they handled the scenario. The feedback will also be stored and be accessible by research analysts.

Prototype Architecture (Hardware/Software)

The server that the prototype will be housed on a Virtual Machine provided by the Old Dominion University Computer Science Department. Our prototype will be using Ubuntu as it has a lower overhead on the hardware. The databases will be using MongoDB to store data from the Spark Simulation Engine. We will have one database that will be connecting to the Spark Simulation Engine and provide our prototype with scenarios. The other two databases will be populated with information generated by users signing up and the decisions they make within scenarios. The main programming language that will be used will be HTML. This will be how we develop the front page that users will see. PHP and AJAX will be how the users can connect to the server without having to constantly refresh the page after each turn.

(This space is intentionally left blank)
Prototype Features and Capabilities

In Table 1, the features are being compared to the real-world product and the prototype. The base functionality of the real-world product can be accomplished in the prototype. The Player Features and the Administrative Features are the focus that our prototype will can achieve.

<table>
<thead>
<tr>
<th>Features</th>
<th>RWP</th>
<th>Prototype</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Player Features</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Plant retirement</td>
<td>✔</td>
<td>✔</td>
</tr>
<tr>
<td>Plant refurbishment</td>
<td>✔</td>
<td>✔</td>
</tr>
<tr>
<td>Plant construction</td>
<td>✔</td>
<td>✔</td>
</tr>
<tr>
<td>Viewable resources</td>
<td>✔</td>
<td>✔</td>
</tr>
<tr>
<td>Viewable Environmental Impact</td>
<td>✔</td>
<td>✔</td>
</tr>
<tr>
<td>Viewable Earnings</td>
<td>✔</td>
<td>✔</td>
</tr>
<tr>
<td><strong>Administrative Features</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Create game scenarios</td>
<td>✔</td>
<td>✔ partially implemented</td>
</tr>
<tr>
<td>Create and remove player accounts</td>
<td>✔</td>
<td>✔</td>
</tr>
<tr>
<td>Reset collected data</td>
<td>✔</td>
<td>✔</td>
</tr>
<tr>
<td>Access player game results</td>
<td>✔</td>
<td>✔ partially implemented</td>
</tr>
<tr>
<td>Player update notification</td>
<td>✔</td>
<td>✔</td>
</tr>
<tr>
<td><strong>Analysis Features</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Viewable decision data</td>
<td>✔</td>
<td>✗ eliminated</td>
</tr>
<tr>
<td>Viewable event collection data</td>
<td>✔</td>
<td>✗ eliminated</td>
</tr>
<tr>
<td>Viewable data collection by type</td>
<td>✔</td>
<td>✗ eliminated</td>
</tr>
<tr>
<td>Downloadable data by region</td>
<td>✔</td>
<td>✗ eliminated</td>
</tr>
<tr>
<td>Downloadable data by date</td>
<td>✔</td>
<td>✗ eliminated</td>
</tr>
</tbody>
</table>

*Table 2. Comparison between the real-world product and the prototype*

Prototype Development Challenges

A challenge that the prototype will face, will be connecting to the Simulation Spark Engine and transfer information between them. The simulation engine is being developed by another group of software developers. The design of the prototype must be adjustable to accommodate the engine and updates the engine may have. The integration of the Google Maps API will be a challenge as we will be
creating elements on top of the maps as they are generated. Most of the development team has some experience with web development and the ability implement features fully will be a heavy challenge on the prototype.

Glossary

**Flask**: A pithing microframework for Python.

**PHP**: Hypertext Preprocess (PHP) is a server side scripting language that generates webpages dynamically.

**Python**: A high-level programming language.

**MongoDB**: A document oriented database. A NoSQL database that uses JSON-like documents to create the schema.

**AJAX**: A client side application that allows for asynchronous connection to a webserver without having to reload the page.

**Spark Simulation Engine**: A simulation that generates real world calculations for scenarios.

**Google Maps API**: An API that allows programmers to access data from Google Maps.

References


