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REGIS UNIVERSITY

SCHOOL FOR PROFESSIONAL STUDIES

MASTER OF SCIENCE

IN

COMPUTER INFORMATION TECHNOLOGY

THE ALL SQUIRREL BAND

PROFESSIONAL PROJECT

Gennetta E. Lovelady

May 2006

Regis University

School for Professional Studies
MSCIT Program

Certification of Authorship of Professional Project Work

Submitted to: Cory Graham and Tim McKenzie

Student's Name: Gennetta E. Lovelady

Date of Submission: April 26th, 2006

Title of Submission: The All Squirrel Band

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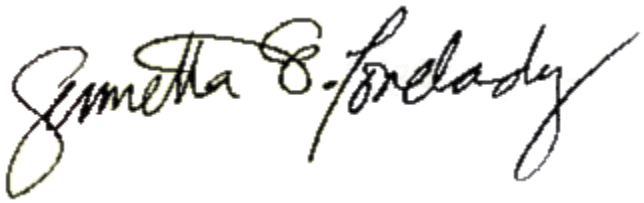

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Advisor/MSC 696 and 696B Faculty Approval Form

Student's Name: Gennetta E. Lovelady

Professional Project Title: "The All Squirrel Band"

Advisor's Declaration: I have advised this student through the Professional Project Process and approve of the final document as acceptable to be submitted as fulfillment of partial completion of requirements for the MSC 696 or MSC 696B course. The student has received project approval from the Advisory Board or the 696A faculty and has followed due process in the completion of the project and subsequent documentation.

ADVISOR

Tim McKenzie	Tim McKenzie	April 30, 2006
Name	Signature	Date

MSC 696 or MSC 696B Faculty Approval

Cory Graham	Cory Graham	April 27th, 2006
Name	Signature	Date

Project Paper Revision Log

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    a. Started with only Abstract and Chapter 1 complete
    b. Draft of Chapters 2 and 4
2. Revision 2: Draft 3-17-06
    a. Added to content of Chapter 4
    b. Draft of Chapters 3 and 5
3. Revision 3: Draft 3-24-06
    a. Added Front Matter
    b. Added to content of Chapters 2 and 3
    c. Updated Formatting and Outline
4. Revision 4: Draft 4-1-06
    a. Added content for Chapters 3 and 5
5. Revision 5: Draft 4-8-06
    a. Completed content for Chapters 2 and 3
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    c. this draft proofread and corrections made throughout
6. Revision 6: Final Draft 4-23-06
    a. Incorporated changes suggested by instructor

Abstract

Business Problem

Science is a crucial part of our educational curriculum. It has become vitally important for children to be introduced to science at an earlier age to insure their interest is cultivated throughout the rest of their education. The dilemma is finding interesting ways to engage grade school aged children in learning about science.

Technical Solution

'The All Squirrel Band' is a web based phrase completion game hosted by a rock band made up entirely of squirrels. The object of the game is to collect enough 'nuts' for the band to go on tour this winter. Each 'nut' represents a letter of the alphabet used to complete the phrase. A category is given for each phrase. Categories would include subjects pertaining to science. An example category would be the moons of our solar system, where each phrase contains the name of a moon and the planet it orbits. The phrase can then be used to search the web for additional information on the subject.

Business Case

The purpose of the project is to introduce science to grade school aged children through the use of art, music and games. The project also introduces the use of the internet as a learning tool and resource for information.

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Chapter 1: Introduction

1.1 Problem Statement

In today's technology driven work place the skills and experience acquired from an education rooted in the study of science has become a necessity. The American Psychological Association states that "it is generally the case that higher levels of education result in a higher likelihood of employability and higher wages once employed" in an article from University of Missouri-Columbia about the importance of mathematics and science in education. Getting youths interested in science at a younger age can make the difference between a good foundation in the sciences and an education that lacks a strong comprehension of highly valued concepts. This project will explore how technology can be used to introduce grade school children to science through the use of games, art and music.

1.2 Description of Existing Project Situation

The internet is a valuable resource and teaching tool for children. There is a large variety of information, project ideas and games available that can be used to add to a students understanding of the sciences. The problem addressed by this project is that of finding resources for science students on the internet. Although the information is out there, a student may not intuitively be able to find these resources without the guidance. The main function of this game is to provide search content that introduces the many available resources to the student.

1.3 Goals of the Project

One goal of this project is to develop a concept that will capture and hold a students attention while introducing them to informative content. This project will develop a sample curriculum that illustrates an ability to guide students to appropriate and useful content on the internet.

1.4 Barriers and/or Issues

The internet is notorious for containing content that is not suitable for children. There is a growing concern that children may be exposed to such content while using the internet for other purposes. This project will take this issue into consideration. The very nature of this project is to influence the content our children are able to access.

1.5 Scope of Project

The development of “The All Squirrel Band” prototype will be accomplished in several phases. The prototype will design and build an application using HTML, Java Server Pages, Enterprise Java Beans and an Oracle Database. Deliverables will include project management documents, a story board of the game interface, analysis and design documentation, and a working prototype using an example science curriculum.

Chapter 2: Review of Literature & Research

2.1 Review of existing solutions available

There are three types of applications and services available that relate to the purpose of “The All Squirrel Band” game.

- applications and services that block inappropriate content
- search engines for finding content
- web sites that provide educational content

Content blockers have become common on the internet. They work by filtering out inappropriate content. “The All Squirrel Band” game works on the opposing premise by suggesting appropriate content. The two technologies are a perfect complement to each other. The use of both a content blocker and technologies like “The All Squirrel Band” is an extremely effective way to influence the content user’s access via the internet.

Search engines are a highly effective tool for finding internet content. They match a users search criteria to words and phrases contained in the web site. Since the user is responsible for determining the search criteria, search engines do not influence the user’s choice of content. The purpose of “The All Squirrel Band” game is to provide search criteria that will lead to valuable internet content. The use of search engines as part of “The All Squirrel Band” application allows for rapidly changing internet content. The content suggested by this technology changes as new web sites are developed and old web sites are deprecated.

There is an unending supply of web sites that supply educational content to children. The focus of this project is to find a way to lead users to that content. One portion of this project was the development of a sample set of phrases to be used in the game. These phrases are closely tied to the internet content. There is a need for the development of a support application that would control the content of these phrases. Among the options for adding phrases is the possibility of automated compilation of web sites metadata. This concept would use the types of web sites were this application is meant to lead to create phrases that would produce the desired search results. Another option would be to allow the user to add phrases to the game. This would give users the ability to customize the application to their specific needs. The user would be able to input spelling lists or any list to be memorized. This functionality greatly expands the usefulness of this application and is considered very desirable. Controlling the curriculum that influences these phrases is a subject for the future development of this project.

2.2 Research methods used

The internet has been a valuable tool in the researching for this project. Research concentrated on web sites that offer educational material, organizations that offer suggestions about appropriate curriculums and technical references related to the technology intended for this project.

The original prototype for this project was inspired by the word games available at Yahoo! games. Online word games are a popular source of entertainment that attract and hold a child's interest. These games can be considered an educational tool because of the spelling and problem solving

challenges they present. The main objective of the first prototype was to find a way to use this technology to create an interactive learning tool.

Feedback from end users contributed significantly to the design of this application. Requirements gathering began with interviewing classmates for their thoughts and ideas concerning the first prototype. Several conversations with family members, including both parents and children, have provided inspiration for functionality and constructive criticism in response to the prototypes. Parents have a vested interest in their children's education and expressed concern about their children gaining access to inappropriate internet content. The parents and educators responsible for influencing the education of children are the stakeholders for this project. The grade school aged children that will benefit from this applications functionality are the end users.

2.3 What is known & unknown about this topic?

Web based games and search engines are common internet applications. It is unknown how the web game, search engine and educational content will combine to create this application. Although the technology is proven, this combination will be new concept to stakeholders and end users. There is a factor of unpredictability in how users will react to a new type of application. They could find the tool cumbersome or even dislike some functionality.

2.4 Contribution the project will make to the field

This application works with search engine technology to suggest content that is appropriate and educational for children. It provides a new tool in the quest to protect young children from internet content that is unsuitable and

undesirable. The project will expand on the concept of search engines by providing an alternative means to access information on the internet. Search engines are only as effective as the search criteria given them. This application will increase this effectiveness by providing quality search criteria. The project goal is to create a more entertaining and interactive experience for end users when searching the internet.

2.5 Discussion of other available tools

There are several graphics and animation tools that could be used including Macromedia Flash and Java Applets. The most useful strength of Macromedia Flash is its ability to produce high quality graphics and animation. Flash includes a scripting style language, known as Lingo. Lingo could be used to link to a more powerful technology to implement the complex functionality of the game. Unfortunately, Lingo does not support the low level computation the game requires. Macromedia Flash requires the user to download and install a player in which to run applications, which may prove difficult for end users. Macromedia Flash also requires that more memory and processing time on the end users hardware be allocated to run the application. The time needed to download the application may become frustrating for the end user. Applications produced using a less client heavy technology, such as Java, tend to start sooner and run smoother. It is hoped that later prototypes will develop the user interface and graphics for “The All Squirrel Band” into a more polished look.

2.6 Why Java as opposed to the other tools

The emphasis of this prototype was to develop a robust model for the background functionality of the application. Although other technologies may have been a better choice for developing the graphics and animation, Java and EJB provided a good fit for developing the background functionality of the application. They allow the application to be web accessible and are compatible with several database technologies. Java and EJB have the advantage of being more easily integrated with database technology and internet markup languages such as HTML. The background functionality of the game requires a robust versatility to the language that is lacking in Macromedia's Lingo script. The use of Java Applets will provide the needed interface elements and is easily integrated with other Java technologies being used for development.

2.7 Summary

This application combines several existing technologies to create a solution the problem of providing suitable internet content to children. The combination of development tools were chosen based on the functionality provided by each tool. The development tools were evaluated on their ability to meet the application requirements and integrate with other technologies being used.

The importance of tools that protect against inappropriate internet content is emphasized as a key project goal. Interviews with stakeholders demonstrated that the influence of internet content could be both beneficial and harmful to the end users.

Alternative development tools were explored including Macromedia Flash and Java Applets. It was found that the Java development tools best suited the needs of this project.

Chapter 3: Project Methodology

3.1 Software Development Life-Cycle Model Followed

The life-cycle of this project was very free flowing. The best match for modeling the process was the Extreme Programming Model. The prototypes were quick and cheap to produce, allowing change to occur without difficulty. It is this ability that makes Extreme Programming ideal for rapid prototyping. The project used this approach to allow for changes that are inevitable to the process of exploring a concept in detail. Short iterations through the different stages of the lifecycle allowed ideas discovered during a later stage of the process to reverberate back through earlier stages. Discoveries and decisions made in one prototype could be incorporated into the implementation of earlier prototypes because change was not costly.

3.1.1 Research & Analysis Phase

3.1.1.1 Information Gathering

The opinions and reactions of users including children, parents and educators have been instrumental in the development of this project. The prototypes were designed specifically to communicate ideas and obtain responses from the users and stakeholders.

The project included extensive online research exploring the availability of educational materials and web based games. Preliminary research was conducted to find suitable curriculums that may be offered by the games content.

3.1.1.2 Requirements Analysis

3.1.1.2.1 Graphical User Interface GUI Requirements

These requirements encompass the interactive elements of the graphical user interface GUI that must be present to implement the basic functionality of the game. The user needed to be able to start a new game by either selecting a category or using a random category for the phrase. This allowed the user to explore new subjects or concentrate on a specific subject matter. The user could use the game to memorize list of related phrases by playing within one category. This functionality is useful for memorizing subjects such as state capitals, US presidents or spelling list.

The GUI displays the current phrase category as a clue to the user that will make it easier to complete the phrase. The phrase was represented by a series of blanks, with one blank per letter in the phrase and spaces between words, i.e. _ _ _ _ _ _ _ _ _ . A representation of the alphabet allows the user to select each letter. Previously chosen letters become unavailable to be chosen again. If the chosen letter is part of the phrase it is filled into the appropriate spaces on the series of blanks representing the phrase, i.e. _ _ E _ _ _ _ _ E. The GUI also includes a timer to motivate the user to finish the phrase in a timely manner. The user is given six possible incorrect letter choices. The GUI includes a indicator of how many incorrect choices are left. The timer and limited incorrect letter choices add a sense of challenge to the game.

The phrase will automatically complete if the user chooses more than six incorrect letters or if the timer runs out. This allows the user to benefit from the subject matter even if they are unable to complete the phrase. Once the phrase is completed the user can use the phrase to perform an internet search. Several

search engines were made available so that the user can use their favorite search engine or gain access to more content by switching search engines. The purpose of the internet search is to allow the user access to content were they can learn more about the phrases subject.

3.1.1.2.2 Graphics and Animation Requirements

These requirements tie the elements of the GUI into the visual theme of "The All Squirrel Band". The theme includes a band of squirrel musicians that perform an introductory concert which is used to explain the function of the game. The band is trying to collect enough nuts to be able to go on tour next winter. This gives the user a motivation for completing the game in a timely manner. The nuts are used to represent the alphabet from which the user selects letters to complete the phrase. The main game board contains a depiction of a tree containing the alphabet nuts. The squirrel band members revisit the user during the course of the game providing the user with praise for choosing correct letters. The band plays as a reward for completing the phrase. If the user completes the phrase on time the squirrel are able to go on tour. The tour bus goes off rolling by when the game is completed successfully.

3.1.1.2.3 Technical Requirements

The application retrieves a phrase and category from a server side database, based on a user selected category or a random category choice. The database can be located on a server because the game was developed to be a web application. The server side database allows the data to be updated and

edited without supplementary modifications to an installed stand alone application.

The application then creates a blank phrase from the phrase. For example T H E P H R A S E converts to the blank phrase of _ _ _ _ _ _ _ _ _. The application then keeps track of which letters have been selected by the user and makes that letter unavailable to be chosen again. The game replaces each blank letter "_" in the blank phrase with the letter chosen by the user if it matches the letter in that position of the phrase. If the user chooses the letter E the phrase blank is filled in to produce _ _ E _ _ _ _ _ E. In this way the phrase is eventually completed by the end user.

The number of incorrect letters chosen by the user is tracked and limited to six incorrect choices. The limited number of incorrect choices prevents the user from randomly selecting all the letters to complete the phrase. The application ends the game when the user chooses the sixth incorrect letter. The phrase is completed when the user chooses the sixth incorrect letter. This allows the user to benefit from the content even when they are not able to complete the phrase.

A two minute timer starts at the beginning of each game. The timer adds an element of urgency to playing the game. The timer stops when the user chooses the sixth incorrect letter, completes the phrase correctly or when the two minutes are up. Any of these conditions will complete the phrase and end the game.

3.1.1.2.4 Software Requirements

It was decided that the game should be a web accessible application instead of a stand alone application. This was done partially because the game is intimately link with the internet and search engines. A stand alone application also requires that the user buy, install and commit hard drive space to the application. Web applications are easier to distribute and require no installation or memory storage on the users' hard drive. As an online application the user has access to a continuously changing database containing phrases and their category.

The application will require multi-threading will be used to run a timer. The timer must run independent of other actions taken by the application. This allows the user to play the game in one thread, while the timer runs in a second thread. Threading essentially allows the application to multi-task.

A user selected search engine will return search results using the phrase in a new window. A verity of search engines were made available so that the user would be able to use the search engine they are most familiar with and compare the result of several search engines to find more content.

3.1.2 Design Phase

The design phase for this project covers much of the decision making process. This includes the development of a concept that would make the game entertaining and fun. The focus was on finding a way to engage the user and motivate them to use and therefore learn from the application.

The first prototype used a set of images depicting a man being drawn into a gallows as motivation for completing the phrase. Although this is a traditional

"Hang Man" theme, the instructor pointed out that this image was a bit morbid. Even though the stick figure drawings were pretty far from being a graphic depiction of violent death, the statement that the concept could be seen as inappropriate was still a valid point. This started the process of discovering how the game could be designed using a healthier theme.

Phrases containing movie titles, American presidents, famous artist, cartoon characters and capital cities were chosen for use in the first prototype. These categories were really arbitrary and came mostly from an attempt to be interesting. It was discovered through user interaction that this game would be a great way to memorize things like capital cities and American presidents. The wealth of information available on the internet about these subjects is impressive. Using the phrases as criteria for internet searching would be a great way to introduce that content to kids. At least it would be one step above just sitting a kid at a computer and leaving them to their own devices.

The issue of finding a less morbid theme for the game still remained. Inspiration was found while searching through online image archives. Someone had edited photos of squirrels to have Mohawk hair, punk garb and musical instruments. A squirrel band would be an interesting theme for the game, minus the piercing and fish net stockings. The punk theme would just need to be mellowed down a little to make it more appropriate for children.

3.1.2.1 Game Concept

The concept started with the idea of a phrase completion game and a cute idea about a band of musicians who just happen to be squirrels. The challenge was finding a way to make the theme match the needs of the game. The focus was on finding a way to engage the user and motivate them to use and therefore

learn from the application. The game requires that there is a way to choose letters to complete the phrase, and there must be some motivation for completing the phrase in a timely manner. A solution was found through exploring what goals a musical band would have and what would they need to accomplish those goals. Most bands are looking for a way to promote their music, such as recording and touring. These types of promotion require a financial investment, so bands just starting out spend a lot of time trying to raise funds. Squirrels wouldn't have any concept of money, but they do gather nuts to make it through the winter. Thus the concept for the game was conceived. The object of the game would be to collect enough nuts for the band to go on tour this winter. Each nut would be a letter for completing the phrase. The phrase would have to be completed before winter set in.

3.1.2.2 Character Development

Some thought has been put into what the animated characters of the game should be like. It is important that the characters be fun and entertaining while also being good role models for young children. Parents work very hard to protect their children from the "sex, drugs and rock'n'roll" culture commonly found in many forms of entertainment. Although the characters in this game are musicians, it may not be appropriate to model the characters after the common persona of a rock or pop star. The characters should represent good role models for the application end users.

3.1.2.3 Technology

The original prototype was built using a Swing interface and Java to implement the background functionality of the game. A new set of technology was required since this prototype was required to be internet accessible. This

phase of the project explored which technologies would be required to implement each requirement of the project.

3.1.3 Construction Phase

3.1.3.1 Develop the prototypes

3.1.3.1.1 Character Sketches

There were several visual resources that went into designing the characters of “The All Squirrel Band”. The characters are squirrels, so it was necessary that images of squirrels be used for visual reference. It was decided that the band should have four members; a singer, drummer, bassist and guitar player. Visual references for rock bands were also used in the development of the characters. This is where concerns about what is and isn’t appropriate for the age group of our main users had to be addressed. The input from parents for this project was extremely valuable. Many parents would agree that it is a troublesome problem to protect their young children from the sexual nature of images used in the entertainment industry. While the content of most music videos may seem harmless to an adult audience, many parents worry that the emphasis on sexuality may be harmful to the development of their children’s ability to form healthy relationships later in life. For this reason, the choice was made to model the characters more after the children themselves and less after the popular image of a rock’n’roll band. The manner of dress for the characters would need to be appropriate dress for the children that would be using the game.

3.1.3.1.2 Interface Layouts

Creating story boards is a technique for developing the sequence of events as a user moves through the application. Story boarding is most often used in film making to plan out what scenes need to be shot, but the technique is equally useful when designing user interfaces. The main story board for the game is the game board itself. The game board has many technical requirements including the alphabet from which to choose letters, the blank representation of the phrase, the timer and category. The story board for the game board showed how these elements would be laid out and how the theme would be incorporated into the functional interface.

The main story board included the depiction of a tree full of nuts each with a letter of the alphabet on it. The interface for the first prototype represented the alphabet as a series of buttons in order from a-z. The first prototype allowed the user to either press the button with the mouse or use keyboard input to select a letter. User feed back indicated that it was cumbersome finding the letter they wanted to select with the mouse because the letters were not in the same order on the interface as they were on the keyboard. This story board incorporated this user input by arranging the nuts in the more familiar order of the keyboard.

Other storyboards included an introduction to the rules and objectives of the game, along with a short intro by the band. After creating these story boards it was apparent that there was a need to incorporate the band characters into the main story boards of the game. The characters would need to appear during the course of game play. A drum role or guitar riff would be a great reward for choosing a correct letter. When the user completes a phrase the band will play a song.

3.1.3.1.3 Use Cases

The use cases for this project were integral to the process of storyboarding. Breaking the game down into independent steps showed at what points the characters would be able to make an appearance without interrupting the flow of the game.

The use cases also showed the different ways the game could be used as a learning tool. During the development of the first prototype, users were struck by how the game could be used to memorize data sets such as the state capitals. At the time the user completes the phrase they have the choice either to use the phrase to perform an internet search or start a new game. This emphasized the need to allow the user to choose a category and only be given related phrases to complete.

3.1.3.1.4 Class Diagram

The class diagram from the first prototype used technology that did not meet the needs of this project. One of the goals of object oriented design is the reuse of code. Although the technology changed, the object structure was reusable. The objects from the first prototypes class diagram, such as the phrase and timer, were still needed in the new prototype. The challenge was to convert the design into a technology that was web compatible.

The technology chosen for the project was taught in the courses on EJB here at Regis. Course projects used HTML, JSP, EJB, JDBC and a MySQL database. This combination of technology provides a good match for the needs of this project. During the creation of the class diagram for this project, it became apparent that HTML would not be sufficient for implementing the graphics and animation necessary for supporting the theme of the game. Several alternative

technologies were explored including Macromedia Flash and Java Applets. It was decided that the use of Applets would be the better choice because the Applet technology was more compatible with other technologies being used for the project. Applets are commonly used in online games to support complex graphics and interface components.

3.1.3.2 Create Documentation for Project

Documentation for "The All Squirrel Band" project consisted of requirements documents, sketches and diagrams. The documentation for this project also includes this thesis paper and a presentation. This paper has become a chronicle of the reasoning behind many of the decisions made during the course of this project. The significance lies in the explanations of why specific functionality was incorporated into this prototype.

3.1.4 Implementation Phase

The inexpensive prototypes produced by this project have been valuable for gathering the reactions and feedback from users. The process for this project has been iterative. Starting with the first prototype, many versions of each artifact have been presented to users and stakeholders. Their reactions were then incorporated into the prototypes. The prototypes produced in this phase of the project will be the basis for later prototypes to be developed as the project continues.

3.1.5 Maintenance Phase

3.1.5.1 Creation of Prototype Archives

All soft copies of documentation and prototypes will be archived on CD. Hard copies of drawings and diagrams will be scanned into softcopy and the originals will be saved in a physical archive.

3.1.5.2 Wrap up the project

Every project should end with a look back at what was learned, what worked well and what could be improved upon during the next project. There is a need for a cathartic cleansing to allow for a sense of completion. The completion of this project was celebrated.

3.2 Short Review of the Deliverables from each phase

Research and Analysis Phase	resources including: content blocker providers educational web sites curriculum guides requirements documents including: user interface requirements graphics and animation requirements technical requirements software requirements
Design Phase	game concept character development technology exploration
Construction Phase	character sketches interface layouts use cases class diagram
Implementation Phase	records of the reactions of users and stakeholders to the prototypes
Maintenance Phase	prototype archives documentation archives

3.3 Short Review of the Milestones between each phase

Since the process for this project was iterative, the milestones occurred upon the completion of each draft of the documents created. Each draft incorporated the reaction of end users and stakeholder to the previous draft. At each milestone the documents were presented to end users. A short break in work allowed the users to explore the new prototypes and form their response.

3.4 Outcomes

This project produced an entertaining and engaging theme for an online game. The educational value of the game was established through online research and interaction with end users and stakeholders. Characters were modeled after end users with a strong emphasis on presenting appropriate role models for children. The technology needed to implement the game was explored and the application was modeled using class diagrams. Documentation was produced chronicling the conceptual models and the creative process. The documentation was archived for use during later phases of the project.

3.5 Project Methodology Summary

The project used Extreme Programming and Rapid Prototyping to accomplish its goals of forming a conceptual prototype for “The All Squirrel Band” game. Cheap and simple prototypes were created and presented to end users and stakeholders. The short iterations and rapid prototypes allowed for the extensive changes required to incorporate new user reactions into the design and construction of the next prototypes. Discoveries in later phases of the process were easily incorporated into the projects design and concept. The

prototypes produced will be archived for reference during later stages of the project.

Chapter 4: Project History

4.1 How the project began?

The foundation of the “All Squirrel Band” project is based on a learning exercise from a course on Java. After reading through the technical requirements, it was found that the project originally proposed for the assignment was not a good technical fit. It is an odd phenomenon of academic exercises that often what you build is secondary to how it is build. The original proposal was to build a web application for an exotic pet store, a theme that was also considered for this thesis project. The scope of a fully functioning web sales application was considerably larger than what the constraints on time and resources would be for the assignment. After reviewing the requirements of the assignment it was decided that building a phrase completion game would be a better fit for the assignment.

This first prototype was built using a Swing interface, which is not web compatible. It used the simplest of graphic representations, the classic ‘Hang Man’ depicting a man being sent to the gallows. The object of the game was to complete the phrase and save the man’s life. The first prototype was presented to several users including family members, instructor and classmates. Their responses inspired the second prototype and influenced many of the design decisions made in this project.

4.2 How the project was managed?

Project management for “The All Squirrel Band” has been very informal, but the basic tasks of project management were still performed. A project

notebook was kept containing list of tasks. These tasks were organized and prioritized according to the interdependencies that existed between the tasks. The progress of the development process was monitored on a weekly basis. Since the development team consisted of only one person, there was no need for management tools to coordinate team efforts.

The scope of the project was set very early on in the process. Determining the scope of this phase of the project was more ambiguous. The scope changed with the form of prototype. It was determined that the project could be separated into three portions: the animation, the phrase completion game and the data set. As the project plan development progressed the scheduling of task became more finite. Management of the project had to be flexible to coincide with the free flow of the project methodology.

4.3 Was the project considered a success?

The primary goal of the project was to provide access to educational content found on the internet. The technology explored in this project accomplishes this goal by providing search criteria for use in internet search engines that leads the user to appropriate content. The application is complimentary to other existing technologies such as search engines, educational web sites and content blockers.

It is important that the game be interesting and entertaining, so that users will feel excited about the service the game provides. The theme developed by this prototype is appropriate for the end user. The game uses art and music to stimulate the user's interest and keep them entertained. The characters were developed to be someone that children can identify with and view as role models.

The game provides search criteria by interacting with the user to complete a phrase. This interaction makes the experience of internet searching more fun for the user.

The reactions of users to the new prototype have been very positive. Parents worry a great deal about the content their children access on the web. The game provides a unique way of suggesting content which gives parent a way to control what their children access on the internet. There have also been enthusiastic responses to the theme of the game. The theme is a good match for the functionality of the game.

4.4 What changes occurred to the plan?

It is often a difficult decision when creating a prototype as to what constitutes a prototype. The definitions of a prototype can be extremely varied. The American Heritage Dictionary defines a prototype as “an original, full-scale, and usually working model of a new product or new version of an existing product”. In software engineering a prototype can be as simple as a single diagram or a full scale implementation of an application.

This project was focused on furthering the development of a previous prototype. The original prototype was a fully functioning application. With the usual sense of ambition, it was intended that this next prototype also be a fully functioning application. The largest change in the project was the change in form of prototype. The end product of this prototype is a fully explored concept for “The All Squirrel Band” game.

A major reason for this change was time. The original prototype only took about two weeks to complete. At that point the concept for the game was

extremely simplistic. The first prototypes technical requirements were less challenging to implement, since the application was not web accessible. It would have been imprudent to start building an application when the requirements and concept were still not fully developed. A different form of prototype was needed that would facilitate communication with end users and stakeholders while not consuming large quantities of time to construct.

4.5 How did the project end?

This phase of the project was completed with the final acceptance of prototypes by the stakeholders. This acceptance was considered tentative. The prototypes and documentation were archived and will be re-evaluated during future phases of the project. The work done during this phase has now been set aside, so that the next phase can begin. The technology necessary for the creation and maintenance of the phrase curriculum will be addressed during the next phase. No timeline has been set for moving forward at this point. Completion of the project is seen as a worth while venture, so it is hoped the process will continue. The game has the potential to be a stimulating learning tool and a significant contributor to the education of end users.

4.6 What went right and what went wrong?

As the concept for the game developed it became apparent that the technology chosen to implement the interface was not sufficient. The basic needs of the game could be implement using only HTML or DHTML. However, the animation of characters, incorporation of sounds and music required more complex technology. The impact of developing the theme and characters

required that the class diagram be reworked to incorporate Java Applets as a new technology to support these features.

When asked to propose a project for this thesis, a major goal was to find a project that could be worked by one person. The scope of the project was set as to be an achievable task in the course of sixteen weeks while attending other courses and working part time. The original time estimates where far too enthusiastic. As the details of the project developed it became apparent that the scope of this phase of the project would have to change if the phase was to be completed in the time available. For this reason the portion of the project concerning creation and editing of the database was deferred to a later phase. As part of the proof of concept the initial research concerning database content was still included in the scope of this phase.

4.7 Project variables & their impact

A development team of one has both advantages and disadvantages. The more members there are in a development group the greater the need for efficient use of communication tools. Coordinating efforts between team members can be challenging. One advantage to working alone is that the confusion surrounding interpersonal relationships is avoided. With small projects this can be done with little disadvantage. However, if a project grows during the planning stage may become necessary to bring in others to share the workload. This project has experienced this type of growth. As the project continues it will be necessary to bring others into the development process. The documentation produced during these early phases will be invaluable when communicating the project goals to new members of the development team.

When working with any users group, it is important to learn as much about their needs as possible. This projects main end users where grade school aged children. There are many others who take a vested interest in the education of children including parents, grandparents and educators. The project quickly switched from being about designing a game into focusing on the needs and opinions of these users groups. Every design decision had to be evaluated under the basis of rather it resulted in appropriate content for the main end user group. Determining what content would be appropriate or inappropriate was a very subjective process. It is a well know idiom that the creative process is often controlled by the need to find an audience. This factor had a huge impact on the final products produced by the project.

4.8 Project Summary

The main goal of this project phase was to create a conceptual prototype including a theme and interface that would be engaging for the user. It was important that the theme be appropriate and entertaining for children. The challenge was to integrate the theme with the game in a way that would motivate the user to complete the phrase in a timely manner.

This phase of the project evaluated available development technologies. The goal was to find a set of technologies that integrated well and supported the functionality needed to develop the game as an online application.

5.0 Chapter Five: Lessons Learned

5.1 What was learned from the project experience?

The process of discovery is often difficult. Rapid prototyping is about finding quick ways to communicate and develop ideas. A fully functioning application may seem like a more impressive goal, but the end product may not be as useful. Simple tools such as drawings and diagrams get the information out there quickly and easily. The more adaptable the prototype is to change the more useful it is as a tool to allow for the evolution of ideas. Being patient with the creative process allows for good design which leads to successful and cost effective application development.

5.2 What could have been done differently?

It is considered an advantage that the form of prototype changed as the project progressed. If the development team had rushed into code development, the real work of making good design decision would have suffered. The concept and design of the application has taken huge leaps. Fast and cheap low-tech prototypes produced more information in a shorter period of time than a fully functional application build on preliminary designs would have produced.

The phrases are very important data set for this application. There are several ideas for how the data should be created. However, the support application that would be needed to create and edit the data set was not included in the scope of this phase of the project. The advantage of excluding this functionality was that it allowed the application to be developed in isolation from the data set.

5.3 Did the project meet initial expectations?

Initial expectations were met in that the intended goal was to create a prototype for an educational tool that made use of preexisting technologies. The theme for the game will encourage children to develop enthusiasm for learning. This was accomplished by applying a process model that allowed for flexibility, creativity and the incorporation of feedback from end users and stakeholders.

In many ways the project has been a vast success. However, the initial expectation that this phase would produce a working application was not met. The type of prototypes produced were extremely effective for development of the design and concept for the “All Squirrel Band” application. It was determined that quicker, cheaper and less costly prototypes, such as drawings and diagrams, would serve better to develop the concept of the game. The form of prototypes chosen allowed for a greater ease of change as the discovery process evolved.

5.4 What would be the next stage of evolution for the project if continued?

A great addition to this project would be a way for users to influence the content of the phrases used in the game. The game could be developed from the current designs and prototypes with a sample data base. However, the games effectiveness as a teaching tool requires that the database of phrases and categories fit a suitable curriculum. Input from end users could be obtained in several ways. Content could be obtained from curriculum standard set by each state educational department. A survey of web sites that provide educational content would be a valuable source of database content. The input

from teachers and parents would allow the game to be customized to specific student needs.

5.5 Conclusions/recommendations

"The All Squirrel Band" is an excellent candidate for continued development. The process of conceptualization, requirements gathering, research, analysis, design and review with end users and stakeholders will produced a valuable learning tool that presents suitable content for end users. "The All Squirrel Band" would be appropriate as a learning tool for both classroom and home use. It would also be a valuable tool for children who are home schooled.

5.6 Summary

A great deal was gained toward the main goals of "The All Squirrel Band" project during this phase. Quickly and cheaply constructed prototypes facilitated a high level of communication between the development team and end users/stakeholders. A model was constructed for the technology needed to implement the interface and main logical components of the game. The theme and characters used to motivate the educational exploration of end users were explored in detail. Research and stakeholder participation contributed to the development teams understanding of user needs. The next phase of the project will develop the data set along with an application that will allow the user to edit and add to the curriculum of internet content.

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