CS673F14 Software Engineering
Group Project - 2
Project Proposal and Planning

Your project Logo here if any

Team Member	Role(s)	Signature	Date
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Revision history

Version	Author	Date	Change
1.0	Nigel Stuart	9/11/2014	Initial team roles and responsibilities set up. Signed agreement.
1.1	Nigel Stuart	9/22/2014	Broke up document assignments across team
1.2	Ana Beglova	9/23/2014	Filled out sections assigned to me
1.3	Nigel Stuart	9/23/2014	Filled out sections assigned to me
1.4	Jon Kelley	10/9/2014	Filled out sections assigned to me
1.5	Chris Wright	10/9/2014	Filled out/updated sections assigned to me
1.6	Nigel Stuart	11/27/2014	Updated Schedule and Management Plan

1. Overview

This document contains the project proposal and planning for Project 2. For the semester long project the team will focus on developing an online Piano application, called Noteable. The goal of the application will be to help users learn how to read sheet music as well as associate sheet music to keys on the keyboard. The application will be broken up into eight levels. Each level will have a tutorial and a quiz. Each level will progress and introduce new notes to the user. At the end of each tutorial, the user will be able to take a quiz to test the items learned in the tutorial. Towards the later levels, users will be able to use the keys that they learned to play popular sounds like Happy Birthday and Row Row Row Your Boat, which will be provided via demos.

2. Related Work

Below are some related applications that were found.

Project	Description
Virtual Keyboard	A similar virtual keyboard view, the application only provides a free play keyboard. NoteAble shall be different because it will provide quizzes and tutorials to the user.
Virtual Piano	A similar virtual keyboard view, the application only provides a free play keyboard. NoteAble shall be different because it will provide quizzes and tutorials to the user.

3. Detailed Description

This section covers functional and nonfunctional requirements of the Virtual Music Application. The application will be broken up into two main components; a front-end and a back-end service.

Functional

The Noteable application shall provide the following functional requirements. Below are some of the behavioral requirements that the application must provide.

- The app allows users to take tutorials to learn musical notes.
- The app will track the score for each quiz completed by the user.
- The app allows user to take quizzes to see if they understood the tutorial.
- The app allows users to play songs such as “Happy Birthday”.
- The app shall play the key on the keyboard pressed by the user.
- The app can be accessed via browser by the user.

Non-Functional

The Noteable application shall provide the following non-functional requirements. These requirements shall be specific, quantifiable and testable.

- The application will be available 99.99% of the time.
- The user will get response from keyboard in real time.
- The app shall display the keyboard to the user in less than 2 seconds.
- The app shall display the next quiz question within 1 second upon request.

4. Management Plan

a. Process Model

The project will follow an Agile process model with three iterations over the the course of 13 weeks. The process model will not be as strict due to the fact that the group cannot meet everyday. There will be discussion of what the group has accomplished and what the group is looking to accomplish at each scrum meeting. At the end of the first iteration, planning will be done and the initial development of independent services and UI will have started. At the end of the second iteration, all backend and frontend components will be integrated together. The end of the third iteration will provide a product to meet the initial requirements set and if time permits, additional enhancement features will be added. At the end of each iteration, there will be a presentation of the work accomplished thus far. There should be evidence that some user stories have been completed to present to the customer. Also, demonstration of working software should be presented at the end of each iteration to keep the customer engaged. User stories and tasks will be assigned at the beginning of each iteration and reevaluated consistently based on various the risks assessed.

b. Objectives and Priorities

The objective of the project, within scope, is to create a virtual piano application. The application will allow users to play songs in real-time. In addition the application will provide the option to take tutorials and quizzes, which will help assist the user to learn how to read music and understand key placement on the keyboard. Below is a list of all the items listed by priority.

Feature	Priority
Allow user to free play the keyboard	P1
Provide tutorials to the user	P2
Provide quizzes to the user	P2
Provides demos to the user	P3
User authentication and score tracking	P4

c. Risk Management

See separate Team 2 Risk Management Plan document.

d. Monitoring and Controlling Mechanism

We will be checking in as a team twice a week to review what we did earlier in the week as well plan for what we will do in the up and coming week. Our meetings take place after class as well as on google hangout on sunday nights. We will also be using tools such as Github and Pivotaltracker to share our code with one another.

e. Schedule and deadlines

Below are all the milestones for the project. The milestone and features are arranged in a top down fashion and are broken up into two week cycles. Each milestones contains prerequisite features which must be completed before the next milestone can be successfully started. At the end of each milestone a retrospective will be held to demonstrate each feature. This allow the team to determine if they are on track and ready for the next sprint. Milestone 5 will provide the team time to solidify any unpredicted issues. It also considers that team members may be out of town enjoying their Thanksgiving break and/or prepare for final(s).

Delivery Schedule

Phase	Start	Finish	Status
Iteration 1			• Design Phase
Iteration 2			• Develop base framework for front & backend • Develop independent components for front and backend • Start Integrating frontend and backend connectivity
Iteration 3			• Solidify required functionality for project • Perform system testing • Make bug fixes • Final testing • Release

Feature	Iteration	Status
Design Database Schema	1	COMPLETE

Design RESTful API Document	1	COMPLETE
Design Sound API	1	COMPLETE
Design Data Models	1	COMPLETE
Training: Learn Git and promoting	1	COMPLETE
Design GUI Front-end Views	1	COMPLETE
Solidify Personal Development ENV	1	COMPLETE
Training: Coding Standards and Database versioning standards	1	COMPLETE
Design Java Interfaces	1	COMPLETE
Solidify Personal development ENV	2	COMPLETE
Develop base REST and Database functionality	2	COMPLETE
Give tutorial of Spring and Hibernate to team	2	COMPLETE
Investigate how to perform secure login	2	COMPLETE
Investigate Angular and how we can use it in the project	2	COMPLETE
Start collecting images and musical notes	2	COMPLETE
Prepare tutorial questions	2	COMPLETE
Prepare quiz questions and answers	2	COMPLETE
Prepare Happy Birthday demo notes	2	COMPLETE
Insert tutorial data into database	2	COMPLETE
Insert quiz data into database	2	COMPLETE
Insert demo data into database	2	COMPLETE
Develop Maven tests for backend code	2	COMPLETE
Develop /quiz REST call	2	COMPLETE
Develop /question REST call	2	COMPLETE
Develop /demo REST call	2	COMPLETE
Develop /note REST call	2	COMPLETE
Develop /level REST call	2	COMPLETE
Develop /tutorial REST call	2	COMPLETE
Solidify details in the quiz questions within the database	2	COMPLETE

Add CORS support	2	COMPLETE
Develop base REST calls within Angular JS	2	COMPLETE
Modularize UI keyboard methods to accept a descriptor note	2	COMPLETE
Develop REST call to get tutorial data via Angular JS	2	COMPLETE
Develop REST call to get demo data via Angular JS	2	COMPLETE
Develop REST call to get note data via Angular JS	2	COMPLETE
Deploy production environment via Azure	2	COMPLETE
Perform significance testing on production	2	
Bug Fixes	2	
Perform final testing to ensure requirements are met	2	
If time permits, introduce additional instrument(s)	2	

5. Quality Assurance Plan

   (For more detail, please refer to SQAP document for encounter example)

   a. Metrics

   Software Quality Metrics

   Goal: A software metric is a measure of some property of a piece of software or its specifications. Since quantitative measurements are essential in all sciences, there is a continuous effort to bring similar approaches to software development. Our goal is obtaining objective, reproducible and quantifiable measurements, which may have numerous valuable applications in schedule and budget planning, cost estimation, quality assurance testing, software debugging, software performance optimization, and optimal personnel task assignments.

   Implementation: Our team will be using Eclipse Metrics to capture the desired quantifiable measurements. This Eclipse plugin calculates various metrics during build cycles and warns the developer, via the Problems view, of 'range violations' for each metric. This allows you to stay continuously aware of the health of your code base. You may also export the metrics to HTML for public display or to CSV format for further analysis. The Eclipse metric plugin supports the following metrics:

   McCabe's Cyclomatic Complexity

Efferent Couplings
Feature Envy
Lack of Cohesion in Methods
Lines Of Code in Method
Number Of Fields
Number Of Levels
Number Of Parameters
Number Of Statements
Weighted Methods Per Class

Our team will be focusing on the following metrics:

Defects – This metric will be used to determine current quality of the software by dividing resolved known defects by known defects as well as the defect density by dividing known defects by the number of lines of code

McCabe's Cyclomatic Complexity - This metric is an indication of the number of 'linear' segments in a method (i.e. sections of code with no branches) and therefore can be used to determine the number of tests required to obtain complete coverage. It can also be used to indicate the psychological complexity of a method. This is very useful for estimating integration and test efforts as well as estimating productivity for similar modules in the future.

Efferent Couplings - This metric is a measure of the number of types the class being measured 'knows' about. This includes: inheritance, interface implementation, parameter types, variable types, thrown and caught exceptions. In short, all types referred to anywhere within the source of the measured class. A large efferent coupling can indicate that a class is unfocused and also may indicate brittleness, since it depends on the stability of all the types to which it is coupled. When used to measure couplings between packages (coming in a later release) this measure can be used together with others to calculate 'abstractness', 'stability' and 'distance from the main line'.

Lack of Cohesion in Methods - Cohesion is an important concept in OO programming. It indicates whether a class represents a single abstraction or multiple abstractions. The idea is that if a class represents more than one abstraction, it should be refactored into more than one class, each of which represents a single abstraction.

Despite its importance, it is difficult to establish a clear mechanism for measuring it. This is probably due to the fact that good abstractions have deep semantics and a class that is clearly cohesive when viewed from a semantic point of view may not be so when viewed from a purely symbolic point of view.

Lines Of Code in Method - This measure indicates the number of lines a method occupies - a line is determined by the presence of a newline character. It is a very basic measure of size and is susceptible to variation purely on the basis of different formatting styles.

Setting aside the obvious difficulties with variations produced by different formatting styles, Lines of Code counts also suffer from problems in definition due to lines of whitespace, comment lines, etc (i.e. should these be counted or not). This implementation includes all of these things in the measure. For an alternative approach that does not suffer from these problems, we will use the Number of Statements metric as well for productivity and density calculations.

Number Of Statements - This metric represents the number of statements in a method. It is a more robust measure than Lines of Code since the latter is fragile with respect to different formatting conventions. However, as in the case of Lines of Code, a large number of statements is not in itself a bad thing, it does suggest the possibility of extracting methods which gives related groups of statements a name and therefore increases the level of abstraction and deepens semantics.

All of the above mentioned metrics will continuously captured and monitored.

b. Standards

See separate Team 2 Coding Standards document.

c. Inspection/Review Process

All code should be subject to review before new code is merged into the master branch. Code review will be conducted when someone thinks they have a working branch that is ready to be merged into master. In all cases, a team member other than the person who wrote the code should do a code review, sign off on new additions to the code base and merge the branch with the new addition to the master branch.

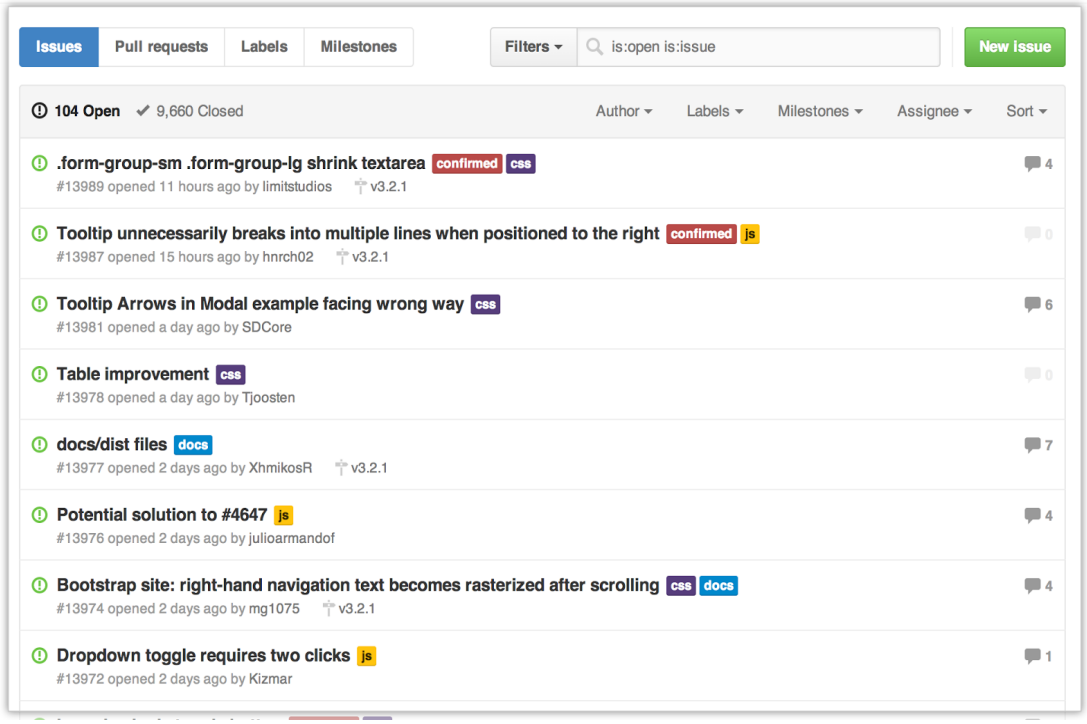
Git automatically sends out notifications when a pull request (request to merge a branch into master) is opened. If a new addition is not time sensitive (such as a bug in master or something that is blocking other members of the team) we should keep new pull requests open for at least 3 days or so so that everyone on the team has the chance to take a look at the code if they have time and make comments and suggestions for improving it. Code should not be merged into master until all comments are addressed.

d. Testing

Each member of the team will be responsible for both automated tests and and manual integration tests for the part of the code affected by their additions before merging the code to master. The code reviewer for each feature should also ensure that there is sufficient test coverage and the tests pass as well as do a quick manual test of the new functionality. Before the end of each phase (except maybe the first few phases), everyone on the team will also black box test the code.

e. Defect Management

Our team will be using gitHub's Issue Tracking feature to track defects. A typical view of the list of current defects would look like:



A simple title and description describe what the issue is all about. The olor-coded labels help you categorize and filter your issues (just like labels in email). A milestone acts like a container for issues. This is useful for associating issues with specific features or project phases (e.g. Weekly Sprint 9/5-9/16 or Shipping 1.0). One assignee is responsible for working on the issue at any given time. Comments allow anyone with access to the repository to provide feedback.

GitHub's Issue Tracking was the best choice because of the simplicity of the tool, the focus on collaboration, references, and excellent text formatting.

6. Configuration Management Plan

(For more detail, please refer to SCMP document for encounter example)

a. Configuration items and tools

The tools related to the programming environment are:

- HTML, CSS, Javascript, jQuery, Angular js, Maven, JBoss, MySql, Java JDK, Apache, and Git

The development environment will have different requirements for the front and backend. Backend developers will be working with the Eclipse IDE and applications such as Maven to perform testing on backend services. Backend developers will also work with the Java SDK to perform RESTful services for communication with the GUI on the frontend.

The application will be hosted as a static page on Microsoft Azure. This will simplify the integration of the front and backend environments. The group will also begin utilizing the same development environment as a virtual machine to ensure that the development stack is appropriate for all users. This stack will include the ability to access all of the related tools listed above for ease of integration between the front and backend. With the current configuration, the group simply needs to commit their code to a master branch on github and the Azure instance will reflect those changes, almost instantly displaying updates.

b. Change management and branch management

All new code should be written in a separate feature branch. Once the code for a new feature is completed, any upstream changes from the master branch should be merged into the feature branch and the code in the feature branch should be tested and code reviewed. The code in the master branch should always be working code that can be compiled and run without crashing.

c. Code commit guidelines

As long as the head of the master branch always has working code, we won't worry about having a clean commit history. Team members should commit as often as they would like to save their work in a feature branch and we will merge branches into the master branch using merge rather than rebase.

7. References

(For more detail, please refer to encounter example in the book or the software version of the documents posted on blackboard.)

8. Glossary

Below are terms used throughout the document.

Term	Definition
REST	Representational state transfer
ORM	Object relational Mapping - Term used to database interaction via objects.