Phase III: System Modeling and Prototype

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## Abstract

The “Fraction Worksheet Creator” (FWC) is an off-line worksheet generation tool designed by Elementary Engineers to help elementary school teachers to create a lot of exercises for students to study and practice fractions. The fractions worksheets are randomly created and never repeated so the teachers have an endless supply of quality fractions worksheets to use in the classroom or at home.

The purpose of this document is to explain the designed system model using class diagram for the “Fraction Worksheet Creator” (FWC) software for the user. It will illustrate the partial prototype version and demonstrate the features of the software.

This document is primarily intended to be proposed to a customer and the board of directors for their approval and a reference for developing the first version of the system for the development team.

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## Overview

Basics

The Fraction Worksheet Creator should be installed by the person you will designate as your administrator. They will have the ability to add/remove teachers from the system and can assist in resetting teacher passwords.

Users will first be presented with a login screen.

From this screen they can also reset their password using the FORGOT PASSWORD button.

The **.random** package of the Fraction Worksheet Creator is heart of programs primary function of creating worksheets. There are multiple classes that build off one another to accomplish the task of generating the PDF files for the worksheets and answer sheets.

**Fraction**

The base class for describing a fraction. Includes the numerator and denominator and provides the ability to reduce fractions to their lowest terms.

**FractionGenerator (FNG)**

Generates a random set of fractions based on the parameters provided. This includes limits on the numerator, denominator, if whole numbers can be generated, and if matching denominators are required. Passes the fractions to calling classes as a List.

Equation

Forms equations based on the fractions generated by the FNG. Then based on the operator for this equation it calculates the answer which is stored in an additional Fraction class object.

**WS\_Master**

An abstract class used to store common data for all worksheets. This includes the list of fractions generated by the FNG, the seed value used to create the fractions and the base worksheet document. This includes common header and footer methods for all worksheets. Example and Problem methods must be implemented by all subclasses.

The following subclasses use **WS\_Master**

**WS\_Beginner\_LG** – Beginner Least to Greatest problems

**WS\_Beginner\_Pie** – Beginner pie diagram to fraction problems

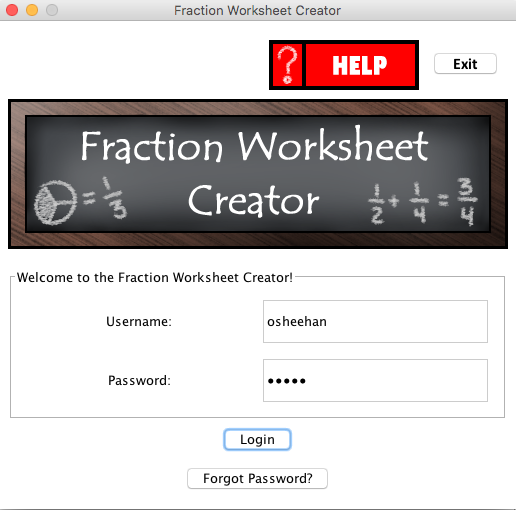
**WS\_Beginner\_PieAdd** – Beginner pie diagram addition problems

Beginner worksheets require separate subclasses since there is little commonality between the different worksheets at this level.

**WS\_Intermediate** – All three intermediate worksheets (Addition, Subtraction, Multiplication/Division) use this one subclass since the only differentiator is the operator. The equation class handles the answers being different based on the operator used for the sheet.

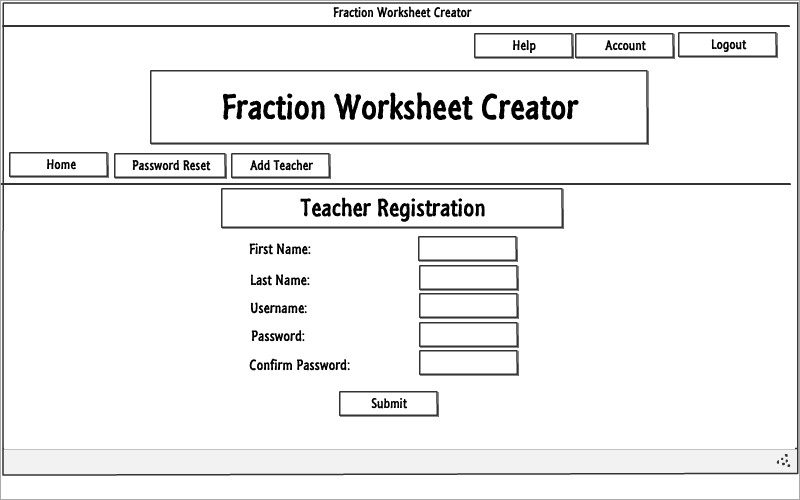
**WS\_Advanced** – All three advanced worksheets (Addition, Subtraction, Multiplication/Division) use this one subclass since the only differentiator is the operator. The equation class handles the answers being different based on the operator used for the sheet.

**Teacher/User Login Profile**



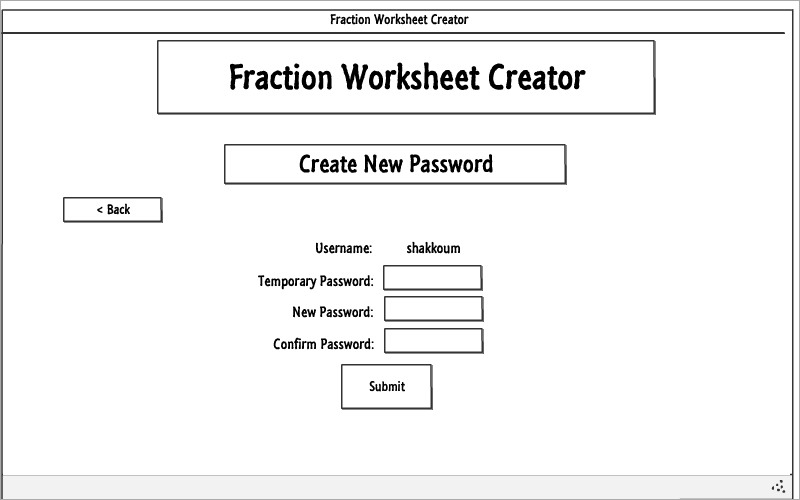
This is a teacher’s profile as viewed by the Admin, where the Admin can reset a teacher’s password on-demand or delete the teacher account, as well as makes changes to the teacher name and username.

## Teacher registration



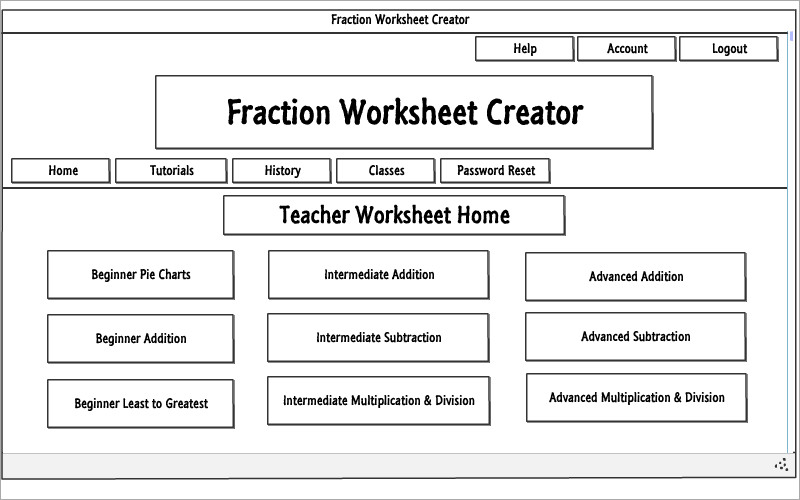
Teachers are registered by the Admin using this page, which is reached by clicking the Add Teacher button in the menu.

## Teacher – Forced password reset



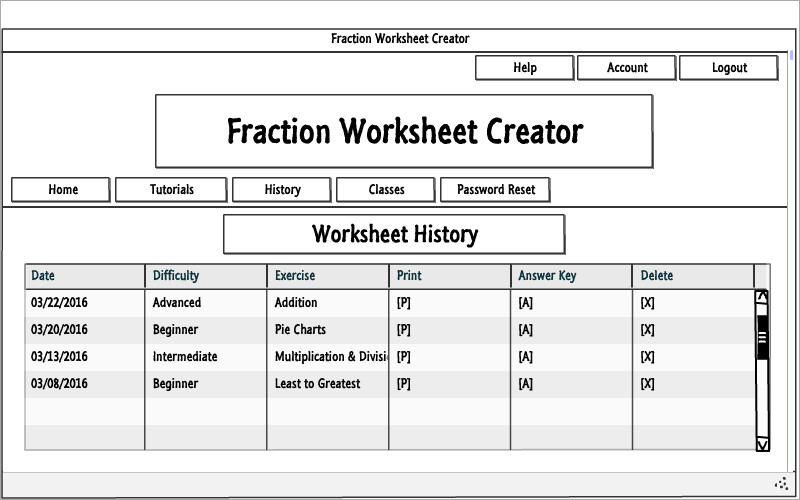
When the Admin resets a teacher’s password, this is the page the teacher sees the next time he/she logs in with the temporary password set by the Admin. The teacher must reset his/her password before logging in.

## Teacher Home



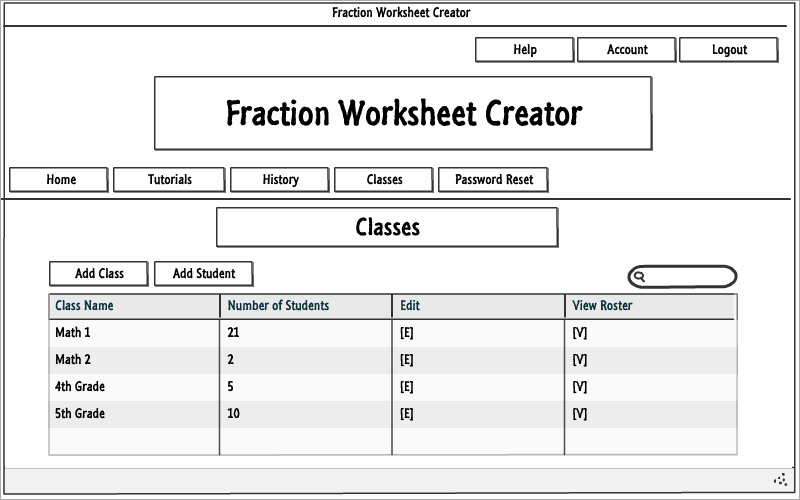
The teacher homepage is where the teacher can generate random fractions worksheets of different difficulties and exercise types.

## Teacher – Worksheet History



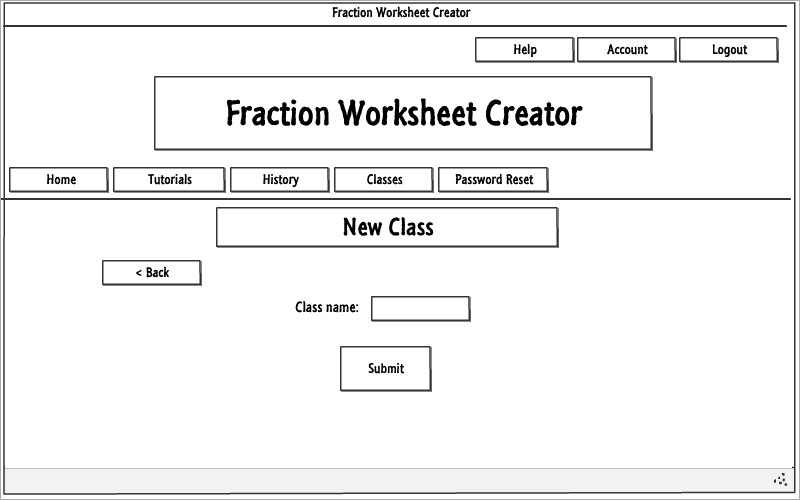
The History button takes the Teacher to this page which displays his/her worksheet history, allowing the Teacher to print old worksheets, view their answer sheets, and delete them from the history.

## Teacher – Classes



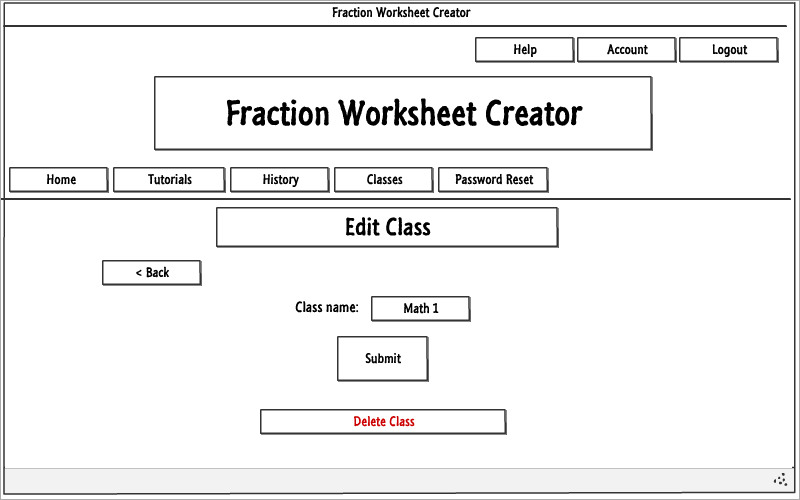
The Classes button displays this page which allows teachers to add a class, add a student to an existing class, search classes, modify classes, and view a class’ roster.

## Teacher – Adding a New Class



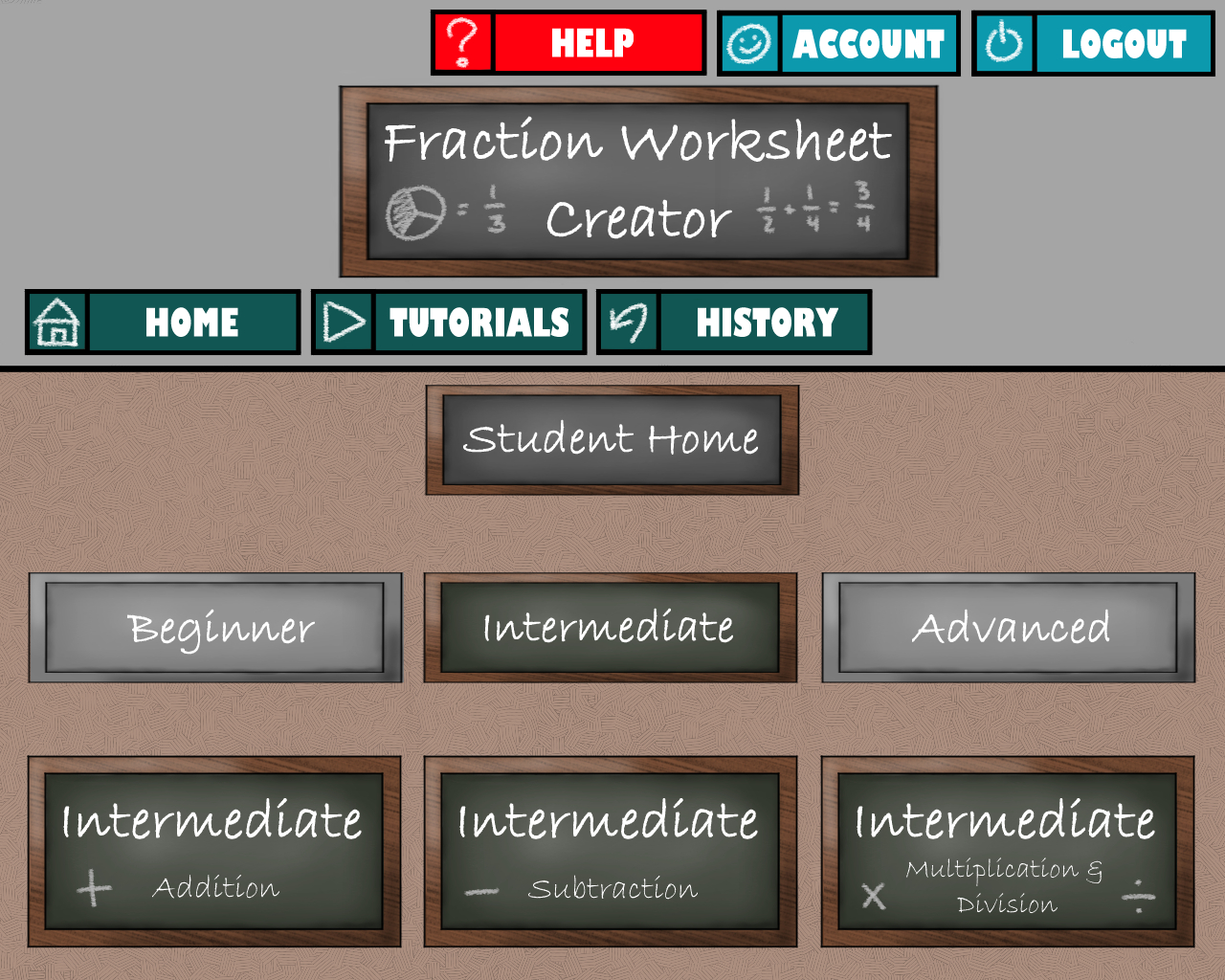
The Add Class button on the previous page takes the Teacher to this page that allows him/her to easily create a new class to add students to.

## Teacher – Edit Class



Clicking the Edit button next to a class on the Classes page displays this page which allows teachers to rename a class or delete the class, which also deletes all the students in that class. A warning message will be displayed.

## Graphical Mockup



This is a sample of what the finished user interface may look like after including

graphical components.