# SSE 659 Project 2

## Refactoring the Deli App

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**ABSTRACT**

Demonstrate knowledge of topics covered in Chapters 3-12 of the text Refactoring – Improving the Design of Existing Code. Each team member will submit his or her own report.

Kei'Shawn Tention's Submission
March 23, 2015

# Table of Contents

# 1. Introduction

The purpose of Project 2 is to demonstrate one's knowledge of the topics covered in Chapters 3 – 12 of Refactoring: Improving the Design of Existing Code, written by Martin Fowler.

# 2. Development Tools

## 2.1 Eclipse

## 2.2 GitHub

# 3. What is Refactoring?

## 3.1 What are we Refactoring?

The Deli Training application is a rather complex application. The classes that make up the application are as followed:

- *main.java*
- *Products.java*
- *Results.java*
- *testing.java*
- *GameEngine.java*

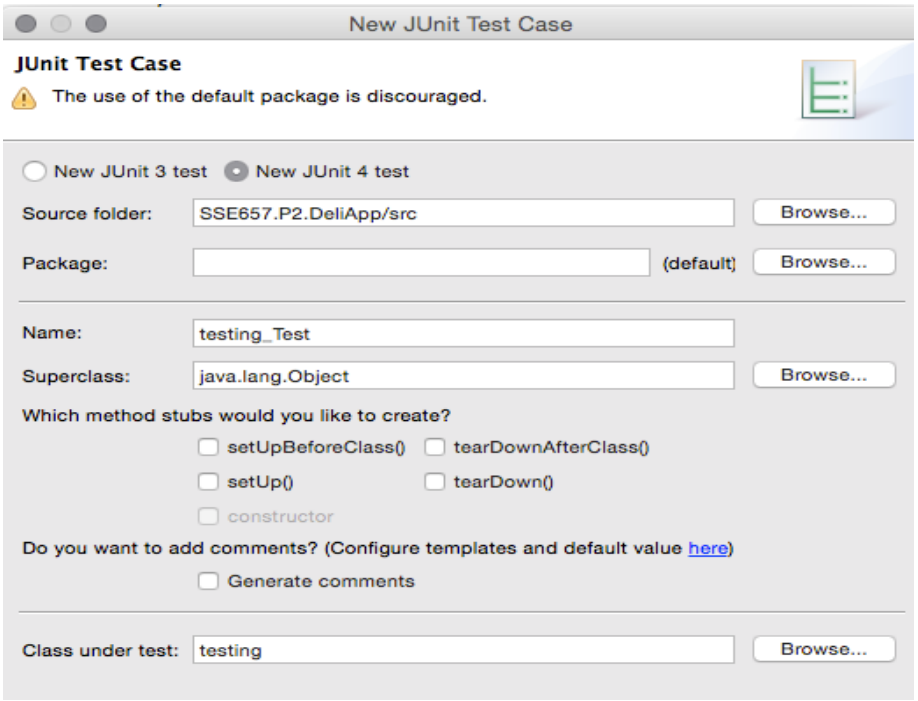
For the most part, the classes drive the GUI aspect of the Deli Application. The source code for each class be viewed in Appendix 8.2. The two main classes that control the functionality of the Deli Application are *testing.java* and *GameEngine.java*.

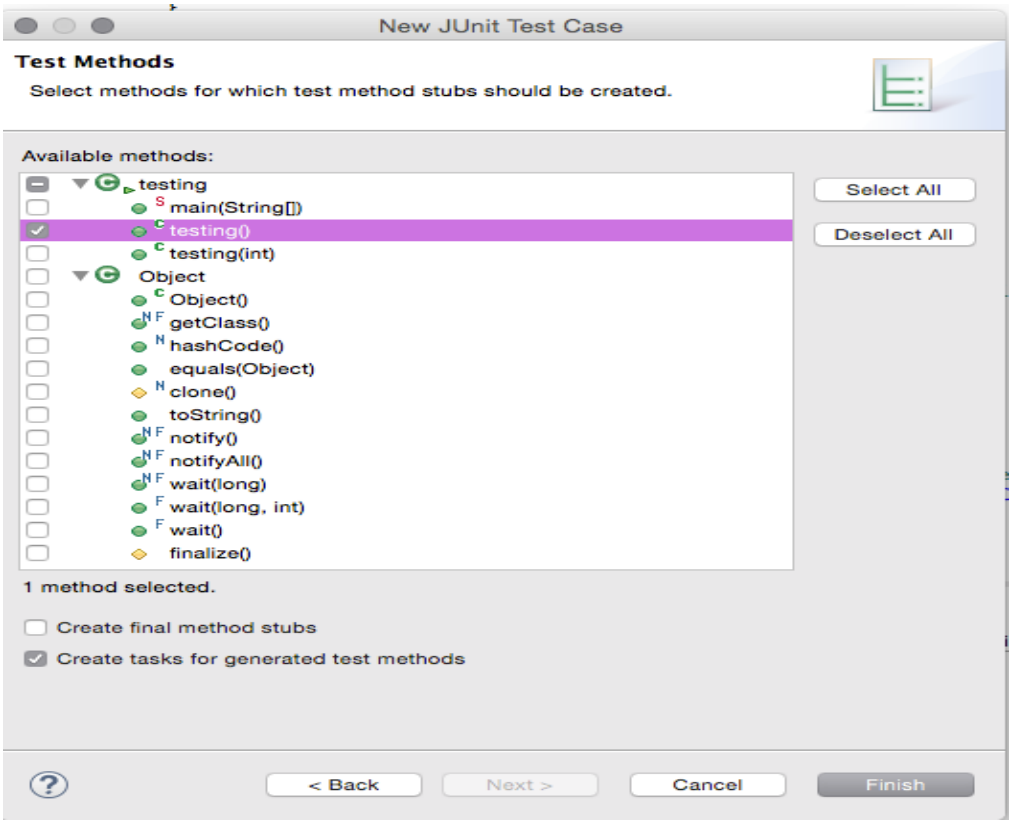
After thoroughly examining each class file, we noticed that the *testing.java* and *GameEngine.java* are the classes that refactoring could be applied to. In *testing.java*,

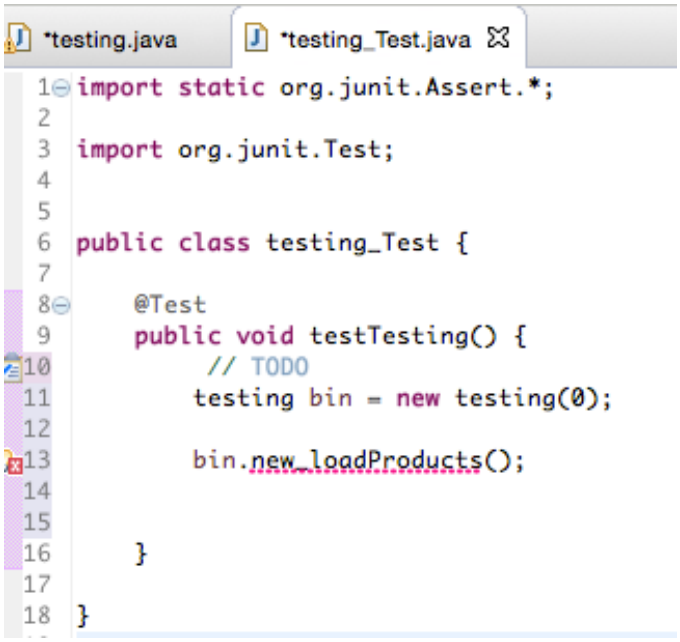
we noticed that the method *loadProducts()* was rather lengthy, which was an indication that refactoring was necessary. Also within that method, we recognized duplicate code. In *GameEngine.java*, we recognized the excessive use of conditional statements and concluded that refactoring can be performed to simplify the code. Each member of the team had their own particular area of concern to refactor, hence the separate reports. One are I want to address and refactor pertains to the Organizing Data, which is covered in Chapter 8 of Martin Fowler's text, Refactoring: Improving the Design of Existing Code. The second area of concern is Moving Features Between Objects, which is covered in Chapter 7 of the same text. Section 5 and Section 6 will discuss my knowledge and implementation of Chapters 7 and 8, respectively.

# 4. TDD in Conjunction with Refactoring

## 4.1 Deli App Tests






***CURRENT CODE AS OF 3/23/15 3:40PM.***

*testing_Test.java  testing.java

```
1  import static org.junit.Assert.*;
4
5
6  public class testing_Test {
7
8      @Test
9      public void testTesting() {
10         // TODO
11
12         Beef b_products = new Beef();
13         Ham h_products = new Ham();
14         Chicken c_products = new Chicken();
15
16         testing bin = new testing(0); //the number represents the difficult level
17                                       //not important for testing purposes
18
19         bin.new_loadProducts(b_products, h_products, c_products); //plan to implement this
20                                 //new method within testing.java
21                                 //to take in each type of product to load
22                                 //this will reduce the duplicate code currently in
23                                 //load products. test will see if products load
24                                 //successfully. Refactoring is the creation of each
25                                 //product class
26
27
28     }
29
30 }
```

# 5. Chapter 7 – Moving Features Between Objects

## 5.1 Overview

## 5.2 Implementation

# 6. Chapter 8 – Organizing Data

## 6.1 Overview

## 6.2 Code Clean Up

Before implementing the concepts behind data organization, I notice that the *testing.java* class contained unnecessary lines of code. It seems that the lines of code were initially used to do validation within the class file. The side-by-side view of the code refactoring is show below.

| Original *testing.java* | Modified *testing.java* |
|---|---|

```
…..
…..
…..
public class testing {

protected JFrame
frmDeliTrainingApplication;
Random generator = new
Random(System.currentTimeMillis(
));
int max = 0, rand_product = 0,
rand_product2 = 0, rand_option =
0, score = 0, questions = 0,
difficulty = 0;
String name = "", name2 = "",
type = "", type2 = "";
GameEngine Engine = new
GameEngine();
Results resultsWindow;


/**
* Launch the application.
*/
public static void
main(String[] args) {
EventQueue.invokeLater(new
Runnable() {
public void run() {
try {
testing window = new testing();
window.frmDeliTrainingApplicatio
n.setExtendedState(JFrame.MAXIM
IZED_BOTH);
window.frmDeliTrainingApplicatio
n.setVisible(true);
} catch (Exception e) {
e.printStackTrace();
}
}
});
}

/**
```

```
…..
…..
…..
public class testing {

protected JFrame
frmDeliTrainingApplication;
Random generator = new
Random(System.currentTimeMillis
());
int max = 0, rand_product = 0,
rand_product2 = 0, rand_option
= 0, score = 0, questions = 0,
difficulty = 0;
String name = "", name2 = "",
type = "", type2 = "";
GameEngine Engine = new
GameEngine();
Results resultsWindow;


public testing(int
difficulty){ //Constructor
passing in level of difficulty
this.difficulty = difficulty;
loadProducts();
pickProducts();
initializeTesting();
}

private void loadProducts() {

…..

…..
```

```
* Create the application.
*/
public testing() {
loadProducts();
pickProducts();
initializeTesting();

}

public testing(int difficulty){
//Constructor passing in level
of difficulty
this.difficulty = difficulty;
loadProducts();
pickProducts();
initializeTesting();
}

private void loadProducts() {
…..
…..
…..
```

## 6.3 Implementation

The goal of this project is refactor the *testing.java* and *GameEngine.java* classes. The Deli App is full functional as is, however we found many areas that could be improved. In order to limit the amount of duplicate code and organize data better, I decided to created individual product classes. This will allow the *loadProducts()* method in *testing.java* to be a more flexible and intuitive block of code. For the

purpose of this project and skill demonstration, I choose 3 products to refactor. They are the *beef product*, *ham product*, and the *chicken product.* The complete and original *loadProducts()* can be viewed in Appendix 8.2.5

Below are the class diagrams for each product, respectively.

#### *Beef.java Class Diagram*

See Appendix 8.2.1 for complete source code.

#### *Ham.java Class Diagram*

See Appendix 8.2.2 for complete source code.

#### *Chicken.java Class Diagram*

See Appendix 8.2.3 for complete source code.

## 7. Conclusion

## 8. Appendix

### 8.1 Test Results

### 8.2 Source Code

#### *8.2.1 Beef.java Class file*

#### *8.2.2 Ham.java Class file*

#### *8.2.3 Chicken.java Class file*

*8.2.4 Complete and Original testing.java Class file*

```
import java.awt.EventQueue;

import javax.print.DocFlavor.URL;
import javax.swing.JFrame;
import javax.swing.JTabbedPane;
import javax.swing.JScrollPane;
import javax.swing.JDesktopPane;
import javax.swing.JLabel;
import javax.swing.ImageIcon;
import javax.swing.JFormattedTextField;
import javax.swing.JButton;

import java.awt.event.ActionListener;
import java.awt.event.ActionEvent;
import java.io.File;
import java.security.CodeSource;
import java.util.ArrayList;
import java.util.HashMap;
import java.util.List;
import java.util.Map;
import java.util.Random;
import java.util.zip.ZipInputStream;
import java.awt.event.ComponentAdapter;
import java.awt.event.ComponentEvent;
import java.awt.event.MouseAdapter;
import java.awt.event.MouseEvent;
import java.awt.Color;
import javax.swing.UIManager;
import java.awt.SystemColor;
import java.awt.Font;
public class testing {

protected JFrame frmDeliTrainingApplication;
Random generator = new Random(System.currentTimeMillis());
int max = 0, rand_product = 0, rand_product2 = 0, rand_option =
0, score = 0, questions = 0, difficulty = 0;
String name = "", name2 = "", type = "", type2 = "";
GameEngine Engine = new GameEngine();
Results resultsWindow;


/**
* Launch the application.
```

```
*/
public static void main(String[] args) {
EventQueue.invokeLater(new Runnable() {
public void run() {
try {
testing window = new testing();
window.frmDeliTrainingApplication.setExtendedState(JFrame.MAXIMI
ZED_BOTH);
window.frmDeliTrainingApplication.setVisible(true);
} catch (Exception e) {
e.printStackTrace();
}
}
});
}

/**
* Create the application.
*/
public testing() {
loadProducts();
pickProducts();
initializeTesting();

}

public testing(int difficulty){ //Constructor passing in level
of difficulty
this.difficulty = difficulty;
loadProducts();
pickProducts();
initializeTesting();
}

private void loadProducts() { //Convert All Censored Beef
Pictures into Beef Product Objects Objects
File Folder = new File(
testing.class.getResource("/ProductImages/CensoredImages/Meats/B
eef/").getPath() );
File [] beefs = Folder.listFiles();


for(int index = 0; index < beefs.length; index++) {
Map<String, String> properties = new HashMap<String, String>();
```

```
name = beefs[index].getName();
properties.put("name", name);
properties.put("type", "Beef");
Engine.getProducts().add(new Product(properties));
}

//Convert All Censored Bologna Pictures
Folder = new File(
testing.class.getResource("/ProductImages/CensoredImages/Meats/B
ologna/").getPath() );
File [] bolognas = Folder.listFiles();
for(int index = 0; index < bolognas.length; index++) {
Map<String, String> properties = new HashMap<String, String>();
name = bolognas[index].getName();
properties.put("name", name);
properties.put("type", "Bologna");
Engine.getProducts().add(new Product(properties));
}

//Convert All Censored Chicken Pictures
Folder = new File(
testing.class.getResource("/ProductImages/CensoredImages/Meats/C
hicken/").getPath() );
File [] chickens = Folder.listFiles();
for(int index = 0; index < chickens.length; index++) {
Map<String, String> properties = new HashMap<String, String>();
name = chickens[index].getName();
properties.put("name", name);
properties.put("type", "Chicken");
Engine.getProducts().add(new Product(properties));
}

//Convert All Censored Ham Pictures
Folder = new File(
testing.class.getResource("/ProductImages/CensoredImages/Meats/H
am/").getPath() );
File [] hams = Folder.listFiles();
for(int index = 0; index < hams.length; index++) {
Map<String, String> properties = new HashMap<String, String>();
name = hams[index].getName();
properties.put("name", name);
properties.put("type", "Ham");
Engine.getProducts().add(new Product(properties));
}
```

```
//Convert All Censored Italian Pictures
Folder = new File(
testing.class.getResource("/ProductImages/CensoredImages/Meats/I
talian/").getPath() );
File [] italians = Folder.listFiles();
for(int index = 0; index < italians.length; index++) {
Map<String, String> properties = new HashMap<String, String>();
name = italians[index].getName();
properties.put("name", name);
properties.put("type", "Italian");
Engine.getProducts().add(new Product(properties));
}

//Convert All Censored Turkey Pictures
Folder = new File(
testing.class.getResource("/ProductImages/CensoredImages/Meats/T
urkey/").getPath() );
File [] turkeys = Folder.listFiles();
for(int index = 0; index < turkeys.length; index++) {
Map<String, String> properties = new HashMap<String, String>();
name = turkeys[index].getName();
properties.put("name", name);
properties.put("type", "Turkey");
Engine.getProducts().add(new Product(properties));
}

//Convert All Censored Wurst Pictures
Folder = new File(
testing.class.getResource("/ProductImages/CensoredImages/Meats/W
urst/").getPath() );
File [] wursts = Folder.listFiles();
for(int index = 0; index < wursts.length; index++) {
Map<String, String> properties = new HashMap<String, String>();
name = wursts[index].getName();
properties.put("name", name);
properties.put("type", "Wurst");
Engine.getProducts().add(new Product(properties));
}



//Convert All Censored Cheese Pictures into Cheese Product
Objects
```

```
File cheeseFolder = new File(
testing.class.getResource("/ProductImages/CensoredImages/Cheeses
/").getPath() );
File [] cheeses = cheeseFolder.listFiles();

for(int index = 0; index < cheeses.length; index++) {
Map<String, String> properties = new HashMap<String, String>();
name = cheeses[index].getName();
properties.put("name", name);
properties.put("type", "Cheese");
Engine.getProducts().add(new Product(properties));
}


}



private void initializeTesting() {
/**
* Initialize the contents of the frame.
*/

frmDeliTrainingApplication = new JFrame();
frmDeliTrainingApplication.getContentPane().setForeground(Color.W
HITE);
frmDeliTrainingApplication.getContentPane().setBackground(Color.W
HITE);
frmDeliTrainingApplication.setTitle("Deli Training Application -
Testing Mode");
frmDeliTrainingApplication.setBounds(100, 100, 1274, 688);
frmDeliTrainingApplication.setDefaultCloseOperation(JFrame.EXIT_
ON_CLOSE);
frmDeliTrainingApplication.getContentPane().setLayout(null);

final JLabel Option1 = new JLabel("");
final JLabel Option2 = new JLabel("");
final JFormattedTextField QuestionText = new
JFormattedTextField();
final JFormattedTextField ScoreCounter = new
JFormattedTextField();

Option1.setBackground(Color.WHITE);
Option1.setForeground(Color.WHITE);
```

```
Option1.setFont(UIManager.getFont("Menu.font"));
Option1.addMouseListener(new MouseAdapter() {
@Override
public void mouseClicked(MouseEvent arg0) {
updateScore(0);
pickProducts();
updatePage(Option1,Option2,QuestionText,ScoreCounter);
}
});
Option1.setIcon(new
ImageIcon(testing.class.getResource("/ProductImages/CensoredImag
es/Meats/Beef/BLondonBroilTopRound.jpg")));
Option1.setBounds(0, 50, 600, 600);
frmDeliTrainingApplication.getContentPane().add(Option1);


QuestionText.setFont(new Font("Tahoma", Font.PLAIN, 19));
QuestionText.setBorder(null);
QuestionText.setSelectedTextColor(new Color(255, 255, 255));
QuestionText.setSelectionColor(Color.WHITE);
QuestionText.setForeground(Color.BLACK);
QuestionText.setDisabledTextColor(Color.WHITE);
QuestionText.setCaretColor(Color.WHITE);
QuestionText.setBackground(new Color(255, 255, 255));
QuestionText.setEditable(false);


QuestionText.setBounds(10, 0, 600, 46);
frmDeliTrainingApplication.getContentPane().add(QuestionText);


Option2.addMouseListener(new MouseAdapter() {
@Override
public void mouseClicked(MouseEvent e) {
updateScore(1);
pickProducts();
updatePage(Option1,Option2,QuestionText,ScoreCounter);
}
});
Option2.setIcon(new
ImageIcon(testing.class.getResource("/ProductImages/CensoredImag
es/Cheeses/BWhiteAmericanCheese.jpg")));
Option2.setBounds(648, 50, 600, 600);
frmDeliTrainingApplication.getContentPane().add(Option2);
```

```
QuestionText.setText("Select the: "+ name.subSequence(0,
name.indexOf('.')));

updatePage(Option1,Option2,QuestionText,ScoreCounter);


ScoreCounter.setText("Score: 0/0");
ScoreCounter.setSelectionColor(Color.WHITE);
ScoreCounter.setSelectedTextColor(Color.WHITE);
ScoreCounter.setForeground(Color.BLACK);
ScoreCounter.setFont(new Font("Tahoma", Font.PLAIN, 19));
ScoreCounter.setEditable(false);
ScoreCounter.setDisabledTextColor(Color.WHITE);
ScoreCounter.setCaretColor(Color.WHITE);
ScoreCounter.setBorder(null);
ScoreCounter.setBackground(Color.WHITE);
ScoreCounter.setBounds(1140, 0, 108, 46);
frmDeliTrainingApplication.getContentPane().add(ScoreCounter);
}

private void updatePage(JLabel Option1, JLabel Option2,
JFormattedTextField QuestionText, JFormattedTextField
ScoreCounter)
{
rand_option = generator.nextInt((1+1));
QuestionText.setText("Select the: "+ name.subSequence(0,
name.indexOf('.')));
ScoreCounter.setText("Score: "+score+"/"+questions);
questions++;


//Determine Where to display correct picture
if(rand_option < 1) //then display correct picture in Option1 box
{
if(type.compareTo("Cheese")!=0)//Determine which folder correct
picture is in
Option1.setIcon(new
ImageIcon(testing.class.getResource("/ProductImages/CensoredImag
es/Meats/"+type+"/"+name)));
else
Option1.setIcon(new
ImageIcon(testing.class.getResource("/ProductImages/CensoredImag
es/Cheeses/"+name)));
```

```
if(type2.compareTo("Cheese")!=0)//Determine which folder
incorrect picture is in
Option2.setIcon(new
ImageIcon(testing.class.getResource("/ProductImages/CensoredImag
es/Meats/"+type2+"/"+name2)));
else
Option2.setIcon(new
ImageIcon(testing.class.getResource("/ProductImages/CensoredImag
es/Cheeses/"+name2)));
}
else
{
if(type.compareTo("Cheese")!=0)//Determine which folder correct
picture is in
Option2.setIcon(new
ImageIcon(testing.class.getResource("/ProductImages/CensoredImag
es/Meats/"+type+"/"+name)));
else
Option2.setIcon(new
ImageIcon(testing.class.getResource("/ProductImages/CensoredImag
es/Cheeses/"+name)));

if(type2.compareTo("Cheese")!=0)//Determine which folder
incorrect picture is in
Option1.setIcon(new
ImageIcon(testing.class.getResource("/ProductImages/CensoredImag
es/Meats/"+type2+"/"+name2)));
else
Option1.setIcon(new
ImageIcon(testing.class.getResource("/ProductImages/CensoredImag
es/Cheeses/"+name2)));

}
}

private void updateScore(int selection) {
if(selection == rand_option)
score++;
}

private void showResults(){
resultsWindow = new Results(score,questions);
resultsWindow.setVisible(true);
```

```
this.frmDeliTrainingApplication.dispose();
}

private void pickProducts(){
Product product1 = Engine.getUnpicked();
Product product2;

if(product1 == null)
//No more unpicked products
showResults();
else
{
name = product1.properties.get("name");
type = product1.properties.get("type");

if(difficulty == 0) //if easy
{
product2 =
Engine.getProduct(Engine.getProducts().indexOf(product1));
type2 = product2.properties.get("type");
}
else
{
product2 = Engine.getProduct ( type,
Engine.getProducts().indexOf(product1) );
type2 = type;
}

name2 = product2.properties.get("name");
}
}
}
```

### *8.2.5 Original loadProducts() method*

```
private void loadProducts() { //Convert All Censored Beef
Pictures into Beef Product Objects Objects
File Folder = new File(
testing.class.getResource("/ProductImages/CensoredImages/Meats/B
eef/").getPath() );
File [] beefs = Folder.listFiles();
```

```
for(int index = 0; index < beefs.length; index++) {
Map<String, String> properties = new HashMap<String, String>();
name = beefs[index].getName();
properties.put("name", name);
properties.put("type", "Beef");
Engine.getProducts().add(new Product(properties));
}

//Convert All Censored Bologna Pictures
Folder = new File(
testing.class.getResource("/ProductImages/CensoredImages/Meats/B
ologna/").getPath() );
File [] bolognas = Folder.listFiles();
for(int index = 0; index < bolognas.length; index++) {
Map<String, String> properties = new HashMap<String, String>();
name = bolognas[index].getName();
properties.put("name", name);
properties.put("type", "Bologna");
Engine.getProducts().add(new Product(properties));
}

//Convert All Censored Chicken Pictures
Folder = new File(
testing.class.getResource("/ProductImages/CensoredImages/Meats/C
hicken/").getPath() );
File [] chickens = Folder.listFiles();
for(int index = 0; index < chickens.length; index++) {
Map<String, String> properties = new HashMap<String, String>();
name = chickens[index].getName();
properties.put("name", name);
properties.put("type", "Chicken");
Engine.getProducts().add(new Product(properties));
}

//Convert All Censored Ham Pictures
Folder = new File(
testing.class.getResource("/ProductImages/CensoredImages/Meats/H
am/").getPath() );
File [] hams = Folder.listFiles();
for(int index = 0; index < hams.length; index++) {
Map<String, String> properties = new HashMap<String, String>();
name = hams[index].getName();
properties.put("name", name);
```

```
properties.put("type", "Ham");
Engine.getProducts().add(new Product(properties));
}

//Convert All Censored Italian Pictures
Folder = new File(
testing.class.getResource("/ProductImages/CensoredImages/Meats/I
talian/").getPath() );
File [] italians = Folder.listFiles();
for(int index = 0; index < italians.length; index++) {
Map<String, String> properties = new HashMap<String, String>();
name = italians[index].getName();
properties.put("name", name);
properties.put("type", "Italian");
Engine.getProducts().add(new Product(properties));
}

//Convert All Censored Turkey Pictures
Folder = new File(
testing.class.getResource("/ProductImages/CensoredImages/Meats/T
urkey/").getPath() );
File [] turkeys = Folder.listFiles();
for(int index = 0; index < turkeys.length; index++) {
Map<String, String> properties = new HashMap<String, String>();
name = turkeys[index].getName();
properties.put("name", name);
properties.put("type", "Turkey");
Engine.getProducts().add(new Product(properties));
}

//Convert All Censored Wurst Pictures
Folder = new File(
testing.class.getResource("/ProductImages/CensoredImages/Meats/W
urst/").getPath() );
File [] wursts = Folder.listFiles();
for(int index = 0; index < wursts.length; index++) {
Map<String, String> properties = new HashMap<String, String>();
name = wursts[index].getName();
properties.put("name", name);
properties.put("type", "Wurst");
Engine.getProducts().add(new Product(properties));
}
```

```
//Convert All Censored Cheese Pictures into Cheese Product
Objects
File cheeseFolder = new File(
testing.class.getResource("/ProductImages/CensoredImages/Cheeses
/").getPath() );
File [] cheeses = cheeseFolder.listFiles();

for(int index = 0; index < cheeses.length; index++) {
Map<String, String> properties = new HashMap<String, String>();
name = cheeses[index].getName();
properties.put("name", name);
properties.put("type", "Cheese");
Engine.getProducts().add(new Product(properties));
}


}
```

## 8.3 Non-Direct Log

| Time/Task Log | Activity Type: Non Direct | | |
|---|---|---|---|
| Date | Duration (in minutes) | Specific Activity/Task | |
| Feb-23 | 60 | Read some of Chapter 3 Refactoring - Improving the Design. Most of it I seen before | |
| Feb-25 | 60 | Read some of Chapter 4 Refactoring - Improving the Design | |
| Feb-27 | 60 | Read Chapter 5 Refactoring - Improving the Design | |
| Feb-28 | 60 | Read Chapter 5 Refactoring - Improving the Design | |
| Mar-1 | 60 | Read Chapter 6 Refactoring - Improving the Design | |
| Mar-2 | 60 | Read Chapter 6 Refactoring - Improving the Design | |
| Mar-3 | 60 | Read Chapter 7 Refactoring - Improving the Design | |
| Mar-4 | 60 | Read Chapter 7 Refactoring - Improving the Design | |
| Mar-5 | 60 | Updating my log and reading the repo Mike Dumas created for project 2 | |
| Mar-10 | 60 | Read part of Chapter 8 to see how it can be applied to the Deli Training App | |
| Mar-11 | 60 | Read the first half of Mike Dumas's report for Project 2 | *These reports* |

| | | | |
|---|---|---|---|
| | | of SSE 657 | *are Deli App specific* |
| Mar-12 | 90 | Read the 2nd half of Mike Dumas's report for Project 2 of SSE 657 | |
| Mar-16 | 120 | Read the first half of Mike Dumas's report for Project 3 of SSE 657 | |
| Mar-17 | 120 | Read the 2nd half of Mike Dumas's report for Project 3 of SSE 657 | |
| Mar-19 | 60 | Explored the code of the Deli App | |
| Mar-20 | 120 | Read Chapter 8 of Refactoring - Improving the Design and figured out what areas of code could be refactored | |
| Mar-21 | 120 | Further analyzed the driving system behind the Deli App (GameEngine.java) and reasearched how the Map interface works Refactored code in the Testing.java class | |
| Mar-22 | 240 | Visting Refactoring.com to obtain an overview of Chapter 8. Structured classes for the different types of products the Deli App consisted of. Created a JUnit test for testing.java | |
| Mar-23 | 120 | Modified JUnit test for testing.java and structured report | |
| **TOTAL** | **1650** | | |
| **REQUIRED** | **4500** | | |
| **REMAINING** | **1390** | | |