Senior Software Engineering Project
CSSP Project
CEN 4935

April 5, 2006

Adam Cox
Tass Oscar

1. Introduction

One of the ways in which social worker professionals and students evaluate their clients is with questionnaires and surveys provided by the Walmyr Publishing Company[1]. The surveys, given weekly, are used to evaluate their clients in a variety of emotions including contentment[2], stress[3], and self-esteem[4]. Data acquired from these questionnaires must be translated into a visual chart to be placed in the client's file. This chart is used by medical personnel to evaluate the effectiveness of any treatment given to the client.

2. Problem Description

Note: the figures shown in the requirements below are examples. The actual implementation screens may differ slightly.

2.1 Functional Requirements

2.1.1 Upon starting, the program shall display a welcome screen summarizing its basic functionality and a prompt to either continue or exit.

2.1.2 If the operator chooses to exit, then the program shall close.

2.1.3 If the operator chooses to continue, then the program shall display the client profile load screen as presented in figure 2.1.3.

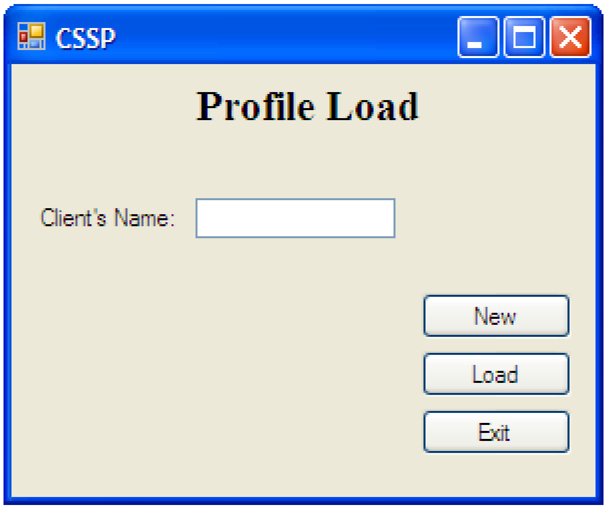


Figure 2.1.3

2.1.4 On the screen, the operator will create a new client profile, load an existing client profile, or exit the program.

2.1.5 If the operator chooses to create a new client profile from Req. 2.1.4, then the program shall display the profile creation screen as shown in figure 2.1.5.

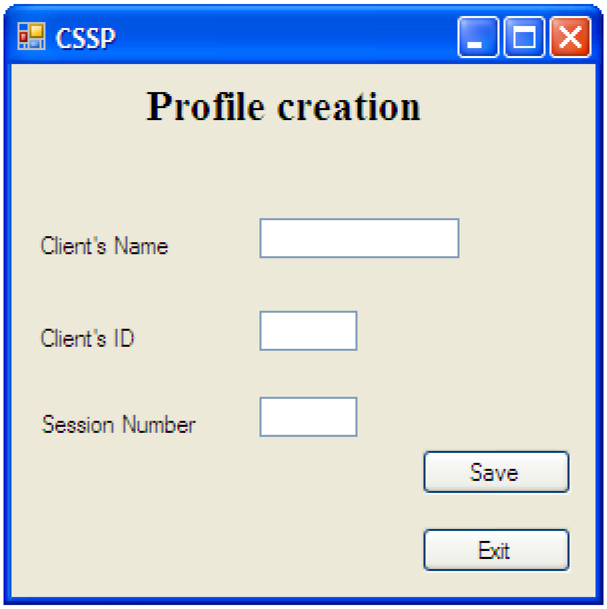
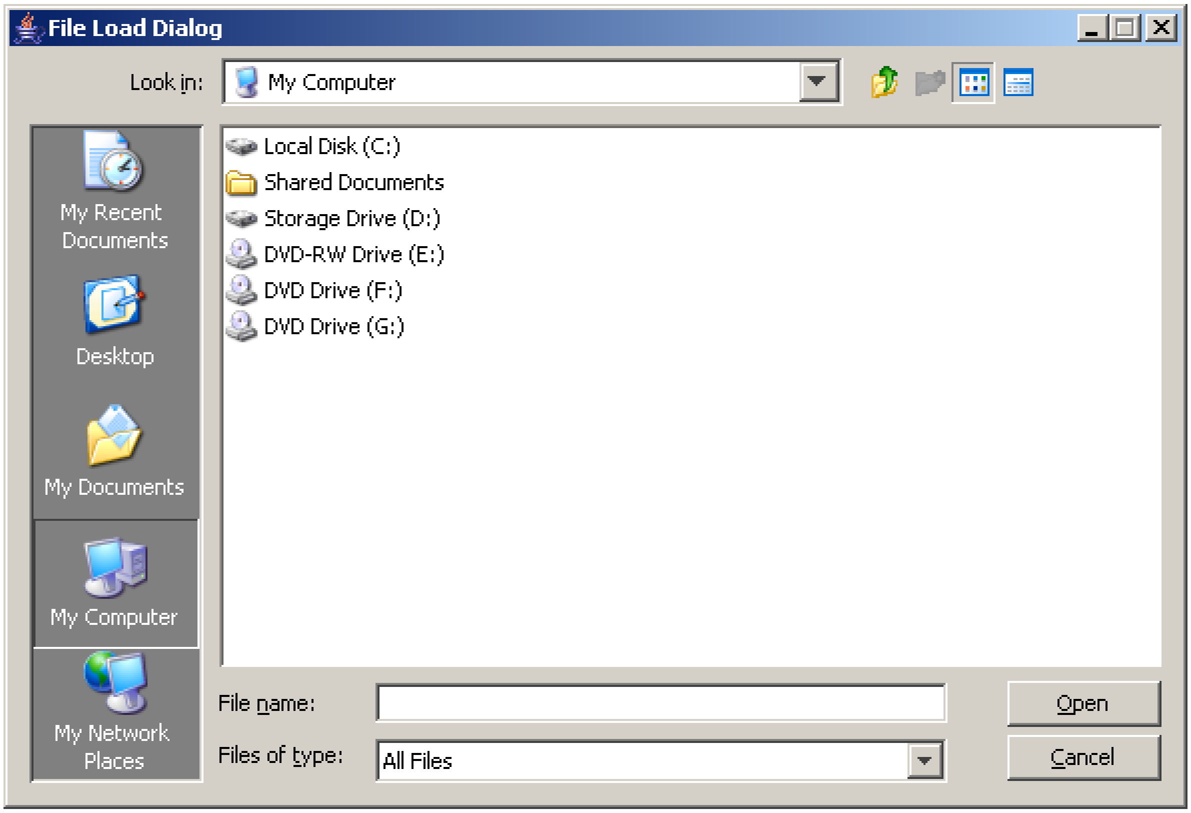


Figure 2.1.5

2.1.6 If the operator chooses to load an existing client profile from Req. 2.1.4, then the program shall display an open file dialog as shown in figure 2.1.6.



Look in: My Computer

File name:

Files of type: All Files

Figure 2.1.6

2.1.7 If the operator chooses exit from Req. 2.1.4, then the program shall close.

2.1.8 Once a profile is selected the program shall display the client information screen as shown in figure 2.1.8.

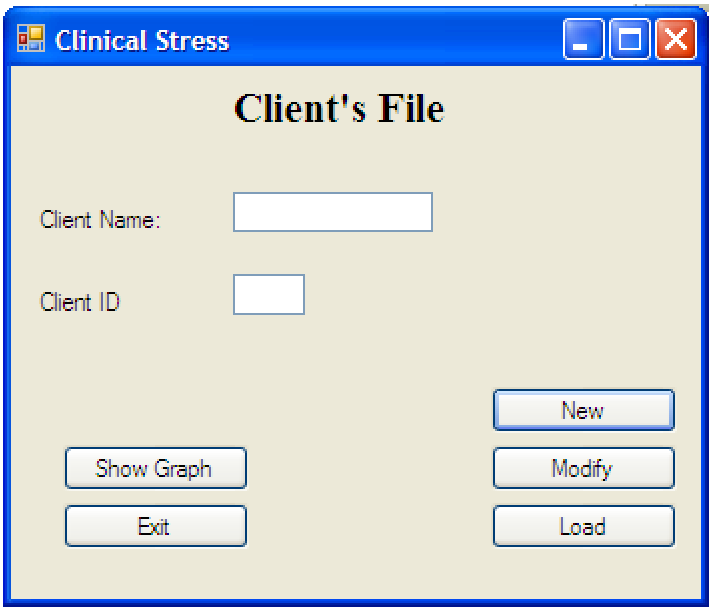
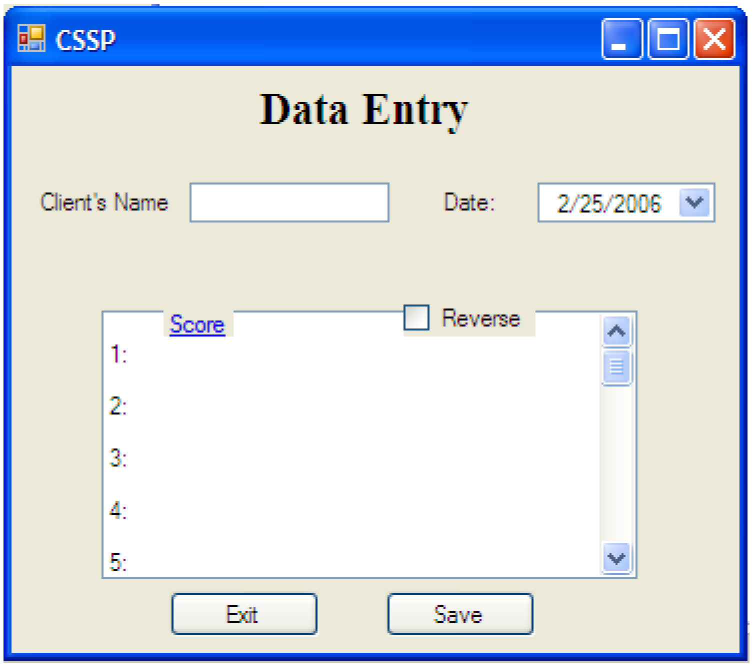


Figure 2.1.8

2.1.9 The client information screen presents the following options:

a) Enter new session data
b) Modify old session data
c) Display data graph.
d) Load another profile.
e) Exit

2.1.10 If the operator chooses option (a) from Req. 2.1.9, then the program shall display the data entry screen as shown in figure 2.1.10.



Data Entry

Client's Name

Date: 2/25/2006

□ Reverse

Figure 2.1.10

2.1.11 After entering the data into the form the program shall prompt the operator to verify the data integrity.

2.1.12 Upon verification by the operator, the program shall save the data into the client's profile.

2.1.13 If the operator chooses option (b) from Req. 2.1.9, then the program shall present a list of the sessions already entered in the client profile.

2.1.14 Once a specific previous session has been chosen by the operator, the program shall display the data entry screen for that session for possible modification.

2.1.15 Once modifications are complete, the program shall prompt the operator to verify the data.

2.1.16 Upon verification by the operator, the program shall now save the modified data.

2.1.17a If the operator chooses option (c) from Req. 2.1.9, then the program shall show a graph depicting the client's progress as presented in figure 2.1.17. The program shall also display an option to print the graph.

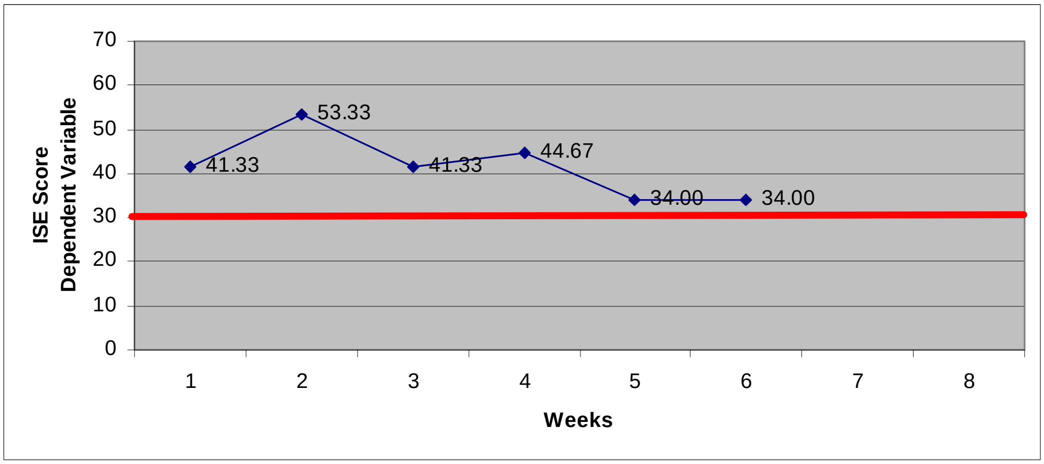


Figure 2.1.17

2.1.17b The formula used to calculate the total score of each session is as follows:

S = (100[Sum(y) – N]) / (N[k-1])

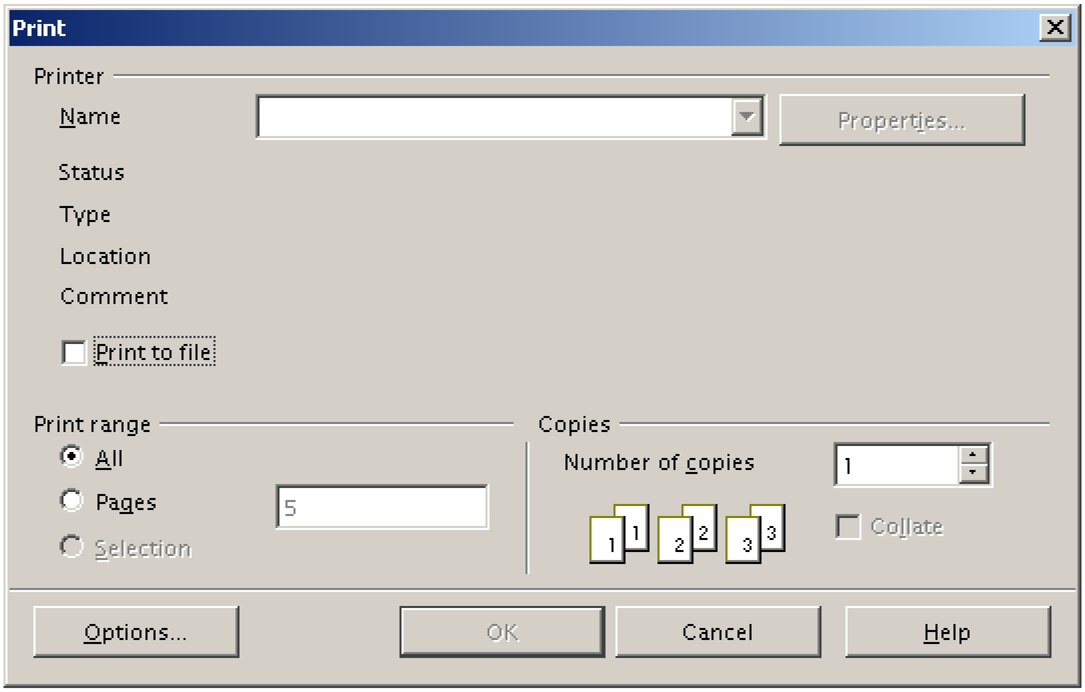
S: score
y: item responses
N: number of questions properly completed
k: highest possible response score

For reverse questions, the y score is calculated as follows:

y = (k + 1) – x

y: reversed score
k: highest possible response score
x: the original response

2.1.18 If the operator chooses to print the graph, then the program shall display a print dialog box as shown in figure 2.1.18.



Name

Status

Type

Location

Comment

□ Print to file

Print range

● All

○ Pages 5

○ Selection

Copies

Number of copies 1

□ Collate

Figure 2.1.18

2.1.19 If the operator chooses option (d) from Req. 2.1.9, then the program shall display the profile load screen as detailed in Req. 2.1.3.

2.1.20 If the operator chooses option (e) from Req. 2.1.9, then the program shall close.

2.2 Security Requirements

2.2.1 Since the program handles medical information, the data shall at least be password protected.

2.2.2 Additional security requirements to be determined by operator.

Currently, there is no standard method to handle the questionnaire data and create charts. Walmyr offers survey assessment software for sale online, but it costs $60 per copy and does not feature chart creation functionality. Another option is to use spreadsheet software like Microsoft

Excel to store the data and generate the charts, but not all users have the skills necessary to operate this type of software. Also, each user may input their data into the spreadsheet differently. Without a standard template, sharing data becomes confusing as one social worker must decipher another’s data.

3. Solution

Our solution is to create a simple, user-friendly, stand-alone application to standardize data input and chart creation between users. The program shall be GUI driven, with descriptive buttons and separate windows for each program task.

The overall design of the program is shown in the flowchart below:

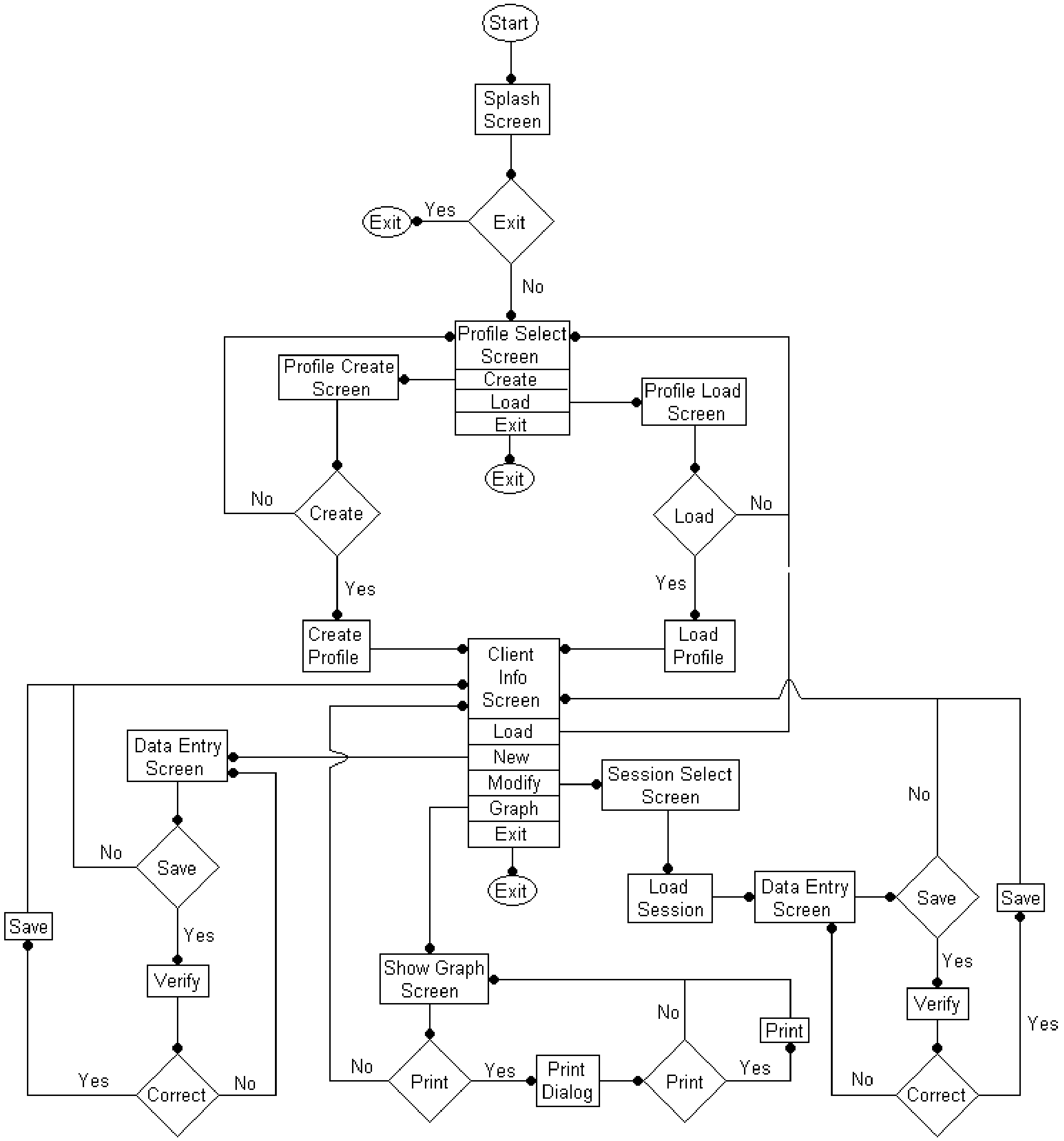


Figure 3.1 – Program Design Flowchart

The function blocks in figure 3.1 correspond to the software functional requirements in the following manner:

1.) The Splash Screen block corresponds to requirements 2.1.1 – 2.1.2.

2.) The Profile Select block corresponds to requirements 2.1.3 – 2.1.4 and requirement 2.1.19.

3.) The Profile Create Screen and the Create Profile blocks correspond to requirement 2.1.5.

4.) The Profile Load Screen and Load Profile blocks correspond to requirements 2.1.6 – 2.1.7.

5.) The Client Info Screen block corresponds to requirements 2.1.8 – 2.1.9 and requirement 2.1.20.

6.) The Data Entry Screen, Verify, and Save blocks joined to the “New” section of the Client Info Screen block correspond to requirements 2.1.10 – 2.1.12.

7.) The Session Select Screen, Load Session, Data Entry Screen, Verify, and Save blocks joined to the “Modify” section of the Client Info Screen block correspond to requirements 2.1.13 – 2.1.16.

8.) The Show Graph Screen, Print, and Print Dialog blocks joined to the “Graph” section of the Client Info Screen block correspond to requirements 2.1.17 and 2.1.18.

4. Implementation

There are two versions of our program in development. Each version is written using a different programming language. One version of the program is coded in Java using the Swing GUI interface, while the other version is created using Visual Basic. Given the time constraints we programmers have to create the application, it was important to choose programming languages which have easy GUI editing capabilities.

Considering our audience, it is important to emphasize that our application must be very user-friendly. Therefore, our program is GUI driven, with program operation flowing between several small windows. Each window shows a limited amount of information as to prevent overwhelming the user with too much data and too many options. Special care is taken to ensure that each program function is clearly labeled and represented in the program windows by buttons.

Menu bars are avoided as to keep all options represented by buttons. However, his deviation from standard office-type applications may upset some users. If our primary user requests that menu bars be implemented, they could be added into the program relatively easily.

The programs perform the same functionality, but they differ in two ways: look and feel, and profile format. The differences between each will be shown below.

4.1 Java Implementation

Development Tools:

The Java implementation of the software was developed on the Windows XP Pro operating system using Java version 1.5.0 update 6 and the Netbeans 4.1 IDE. Both Java and Netbeans can be downloaded as a single executable package at the following URL: http://java.sun.com/j2se/1.5.0/download-netbeans.html. Running the downloaded file will start a standard installation wizard which installs both Netbeans and the Java SDK.

The program executable was created using a free tool called JSmooth, version 0.9.7. The purpose of JSmooth is to convert a Java jar file into a Windows executable. To install JSmooth, simply download and run its wizard-based installation program at this URL: http://jsmooth.sourceforge.net/.

Running the Program:

To run the CSSP software, the user must have Java 1.5.0 update 6 runtime environment (JRE) installed on their computer. The proper JRE can be downloaded at the following URL: http://java.sun.com/j2se/1.5.0/download.jsp. This webpage offers several installation options, including online and offline installation methods.

To execute the program, the user simply has to double click on the “cssp.exe” program icon in Windows. For help operating the Java version of the software, refer to the user manual in Appendix A at the end of this document.

Source Code Package:

The final package (containing source code, build files, etc.) is kept in a single Netbeans project folder called “cssp.” The cssp folder hierarchy is detailed in table 4.1.1. Each module in the source directory of the cssp folder is detailed in table 4.1.2.

File/Directory	Purpose:
Build	Contains Java *.class files
Dist	Contains distribution files (*.jar)
Nbproject	Contains files for compiling/building the program through Netbeans
Src	Contains *.java source code files and *.form Netbeans GUI editor files
Test	Empty
Build.xml	File for compiling/building application
Manifest.mf	File for compiling/building application

Table 4.1.1 – CSSP folder hierarchy

Name:	Purpose:	Requirement(s):
Org	Package containing Netbeans awtextra files	-
csspProfile.java	File containing profile handling methods	-
PrintUtilities.java	File containing printing methods	2.1.18
frmClientInformation.form	File containing Netbeans GUI data for Client Information screen	2.1.8 – 2.1.9 & 2.1.20
frmClientInformation.java	File containing Client Information screen methods	2.1.8 – 2.1.9 & 2.1.20
frmDataEntry.form	File containing Netbeans GUI data for Data Entry screen	2.1.10 – 2.1.12 & 2.1.14 – 2.1.16
frmDataEntry.java	File containing Data Entry screen methods	2.1.10 – 2.1.12 & 2.1.14. – 2.1.16
frmGraph.form	File containing Netbeans GUI data for Graph screen	2.1.17
frmGraph.java	File containing Graph screen methods	2.1.17
frmProfileCreate.form	File containing Netbeans GUI data for Profile Create screen	2.1.5
frmProfileCreate.java	File containing Profile Create screen methods	2.1.5
frmProfileSelect.form	File containing Netbeans GUI data for Profile Select screen	2.1.3 – 2.1.4 & 2.1.6 – 2.1.7 & 2.1.19
frmProfileSelect.java	File containing Profile Select screen methods	2.1.3 – 2.1.4 &

		2.1.6 – 2.1.7 & 2.1.19
frmSessionSelect.form	File containing Netbeans GUI data for Session Select screen	2.1.13
frmSessionSelect.java	File containing Session Select screen methods	2.1.13
frmSplash.form	File containing Netbeans GUI data for Splash screen	2.1.1 – 2.1.2
frmSplash.java	File containing Splash screen methods and program entry point	2.1.1 – 2.1.2

Table 4.1.2 – Source Module Details

Profile Data Format:

The client profiles are saved in a binary file using Java’s default byte size and byte order.

The data types are described in table 4.1.3 and the file format is described in table 4.1.4.

Name:	**INT**	**BOOL**	**CHAR**	**QUESTION**
Type:	Integer	Boolean	Character	Structure (INT, BOOL)
Size:	4-bytes	1-byte	2-bytes	5-bytes (4, 1)

Table 4.1.3 – Data types and byte sizes

Type:	**Name:**	**Number to Read:**	**Notes:**
INT	MagicNumber	1	Must equal 1668510576
INT	LengthFirstName	1	Number of chars in first name string
INT	LengthLastName	1	Number of chars in last name string
INT	LengthId	1	Number of chars in id number string
INT	NumSessions	1	Number of completed sessions in the file
INT	NumQuestions	1	Number of questions per session
INT	MaxScore	1	Highest allowed answer for each question
CHAR	FirstName	LengthFirstName	Series of chars in first name string
CHAR	LastName	LengthLastName	Series of chars in last name string
CHAR	Id	LengthId	Series of chars in id string
CHAR	Survey	3	Three character string indicating survey type
QUESTION	Questions	(NumSessions*NumQuestions)	Series of question structs containing answer data.

			The first NumQuestions structs represent the first session, the following NumQuestions structs represent the second session, etc.

Table 4.1.4 – Profile file format

4.2 Visual Basic Implementation

In the VB implementation, we were able the use the screen below to enter the data and save them into a file.

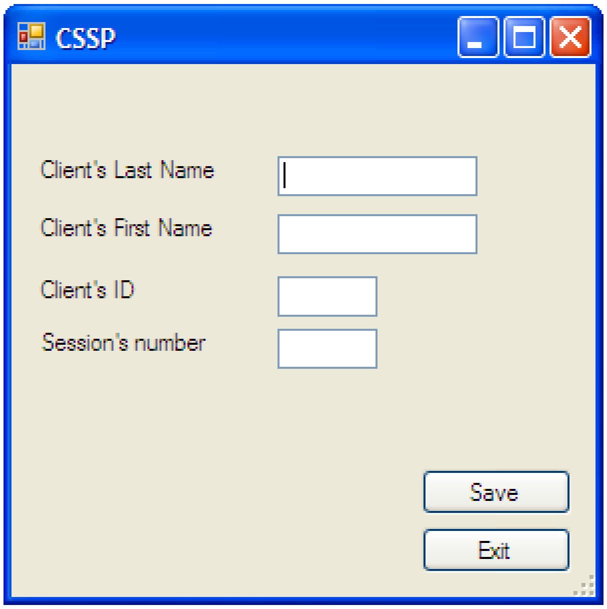


Fig 4.2

After some difficulties we were able to come up with the codes allowing the user to save these data as a “css” type files. The user can chose the directory in which he or she wants to save, but My Documents is the directory being offered to the user as the default directory. After selecting the directory the user can then give a name to the file save it for later use. Below are some codes examples to save the data entered in the TextFields into the file.

```
'Button1 is the save Button.
```

```
    Private Sub Button1_Click(ByVal sender As System.Object, ByVal e As
System.EventArgs) Handles Button1.Click
        Dim SaveFileDialog As New SaveFileDialog
        SaveFileDialog.InitialDirectory =
My.Computer.FileSystem.SpecialDirectories.MyDocuments
        SaveFileDialog.Filter = "CSSP Files (*.css)|*.css|All Files
(*.*)|*.*"

        If (SaveFileDialog.ShowDialog(Me) =
System.Windows.Forms.DialogResult.OK) Then

            Dim FileName As String = SaveFileDialog.FileName
            Dim tw As System.IO.TextWriter
            tw = System.IO.File.CreateText(SaveFileDialog.FileName)
            tw.WriteLine(TextBox1.Text)
            tw.WriteLine(TextBox2.Text)
            tw.WriteLine(TextBox3.Text)
            tw.WriteLine(TextBox4.Text)
            tw.Flush()
            tw.Close()
        End If
          End Sub
```

5. Testing

Java Version

The program has seven modules which need to be tested: the splash screen, the profile select screen, the profile create screen, the client information screen, the data entry screen, the session select screen, and the graph screen. The testing procedures and results for each module are detailed in tables 5.1 – 5.7.

Tested Module Name:	frmSplash
Inputs:	User clicks Continue button
	User clicks Exit button
Expected Outputs/Responses:	Profile Select screen is displayed
	Program exits
Actual Outputs/Responses:	Profile Select screen is displayed
	Program exits
Discrepancy Statement:	Works as expected
	Works as expected

Table 5.1 – Splash screen testing results

Tested Module Name:	frmProfileSelect

Inputs:	Profile pathname from textbox
	User clicks Browse button
	User clicks Load button
	User clicks Create Profile button
	User clicks Cancel button
Expected Outputs/Responses:	None
	File open dialog is displayed
	If the pathname is a valid cssp profile, the file loads; otherwise, a warning is displayed.
	Profile Create screen is displayed
	If a profile hasn’t already been loaded, then the program will close; otherwise, the program will return to the Client Information screen
Actual Outputs/Responses:	None
	File dialog displays
	If the pathname is valid, the profile loads; otherwise, the error displays
	Profile create screen displays
	If a profile isn’t loaded, then the program exits; otherwise, the Client Information screen displays
Discrepancy Statement:	Works as expected
	Works as expected
	Works as expected
	Works as expected
	Works as expected

Table 5.2 – Profile select screen testing results

Tested Module Name:	frmProfileCreate
Inputs:	User-completed strings in textboxes
	User clicks Save button
	User clicks Cancel button
Expected Outputs/Responses:	None
	First, a confirmation dialog will pop up warning the user about unchangeable data. Then, the save dialog will appear. If the user strings are formatted properly, the file will save; otherwise, an error message will appear.
	Profile Select screen is displayed
Actual Outputs/Responses:	None
	Confirmation dialog is displayed, then save dialog. Malformed strings are properly flagged and the error message displays
	Profile Select screen is displayed
Discrepancy Statement:	Works as expected

	Works as expected
	Works as expected

Table 5.3 – Profile create screen testing results

Tested Module Name:	frmClientInformation
Inputs:	Client information from profile
	User clicks New button
	User clicks Modify button
	User clicks Graph button
	User clicks Switch Profile button
	User clicks Quit Program button
Expected Outputs/Responses:	Text fields are populated with client information
	Blank Data Entry screen is displayed
	Session Select screen is displayed
	Graph screen is displayed
	Profile Select screen is displayed
	Program exits
Actual Outputs/Responses:	Text fields are populated with correct client information
	Blank Data Entry screen is displayed
	Session Select screen is displayed
	Graph screen is displayed
	Profile Select screen is displayed
	Program exits
Discrepancy Statement:	Works as expected
	Works as expected
	Works as expected
	Works as expected
	Works as expected
	Works as expected

Table 5.4 – Client information screen testing results

Tested Module Name:	frmDataEntry
Inputs:	Client information from profile
	Current session number
	Current session data
	User clicks Save button
	User clicks Cancel button
Expected Outputs/Responses:	Information labels populate with the proper information
	Session label displays the current session number
	Data entry form is populated with current session data

	Display confirmation dialog to verify saving profile
	Abandon changes and display Client Information screen
Actual Outputs/Responses:	Information labels properly populated
	Session label displays current session
	Data entry form populates with current session data
	Confirmation dialog displays. Once verified, data is saved in profile.
	Changes to session data is abandoned and Client Information screen displays
Discrepancy Statement:	Works as expected
	Works as expected
	Works as expected
	Works as expected
	Works as expected

Table 5.5 – Data entry screen testing results

Tested Module Name:	frmSessionSelect
Inputs:	Number of sessions from profile
	User clicks Continue button
	User clicks Back button
Expected Outputs/Responses:	Session combo box populates with number of completed sessions
	Data Entry screen is displayed with answers from selected session
	Client Information screen is displayed
Actual Outputs/Responses:	Session combo box properly populates with completed sessions
	Data Entry screen is displayed with correct answers from selected session
	Client Information screen is displayed
Discrepancy Statement:	Works as expected
	Works as expected
	Works as expected

Table 5.6 – Session select screen testing results

Tested Module Name:	frmGraph
Inputs:	Session data from client profile
	User clicking Print button
	User clicking Back button
Expected Outputs/Responses:	Graph with correctly mapped scoring dots
	Print dialog and successful print
	Return to Client Info Screen

Actual Outputs/Responses:	Correctly drawn graph
	Print dialog is displayed, printing is correct
	Graph screen closes and Client Info screen opens
Discrepancy Statement:	Works as expected
	Works as expected
	Works as expected

Table 5.7 – Graph screen testing results

Visual Basic Version

Let's first talk about the VB example of the program. When launching the program the user gets at first to the screen where he's being asked if he wants to continue or cancel, when testing this part we were successful in getting both buttons to work properly. Getting to the new screen now the user can either create a new profile or load a new profile unless he wants to exit of course, each button works perfectly and we get the results expected. After getting to these screens that's when our testing comes across some difficulties, after creating a new profile, we were able to save the data but not as expected, the data entered in the text field to save but just as a simple text file. The other problem that we encounter is with the loading and it is linked directly to the previous problem (the saving one). Since we were not able to save the file properly being able to load it was a major problem, so unfortunately we didn't have any success in loading the files saved. Not being able to get data in yet that we tried to save made it even harder to interpret them which later lead to us not being able to produce graphs, print.

6. Conclusion

Social workers evaluate their client's mental health with data collected from questionnaires and surveys. This data must be compiled and shared with other medical professionals in the form of a chart. However, there is currently no standard method for storing this data and creating the necessary chart is available right now. That made the job of the social worker a very difficult one when it comes to interpret the data that have been gathered. So as an attempt to alleviate the current situation, we've decided to come up with our own program. Our software has been created to address this problem in a user-friendly fashion. The CSSP program provides a standard data storage and chart creation method for all users.

References

1. Walmyr Publishing Company

   http://www.walmyr.com/

2. Generalized Contentment Scale (GCS)

   http://www.walmyr.com/GCSSAMPL.pdf

3. Index of Clinical Stress (ICS)

   http://www.walmyr.com/ICSSAMPL.pdf

4. Index of Self-Esteem (ISE)

   http://www.walmyr.com/ISESAMPL.pdf

Appendix A – Java User Manual

How to Start the Program:

To start the program in Windows, simply double click on the "evaluator.exe" icon. This will launch the CSSP software.

Screens:

There are seven main screens used in the CSSP software. Their functionality is defined in table A.1.

Name:	Purpose:	Buttons:	Function:
Splash Screen	Welcomes the user to the CSSP software	Continue	Loads the Profile Load Screen
		Exit	Quits the program
Profile Load	Provides options for	Browse	Opens a file open dialog to

Screen	either loading an existing client profile or creating a new client profile.		search for an existing client profile file
		Load	Loads the profile name in the pathname text field
		Create New Profile	Opens the Profile Create Screen
		Cancel	If no session has been loaded into the program, clicking this button will cause the program to exit. Otherwise, this button will return the user to the Client Information Screen with the previously opened session's data loaded into it.
Profile Create Screen	Data entry screen for new client information, including name, id, survey type, etc.	Create	Opens a save file dialog to save the profile file to disc. Automatically appends the ".cssp" extension to the created profile file
		Cancel	Returns to the Profile Select Screen
Client Information Screen	Shows general client information and provides options to create and modify survey sessions.	New	Opens a blank Data Entry Screen to
		Modify	Opens the Session Select screen to modify previous session data
		Graph	Opens the Graph Screen to view session scores
		Switch Profile	Opens the Profile Load Screen
		Quit Program	Quits the program
Data Entry Screen	Displays an array of answer fields to be completed. Answering a question as 0 causes it to be ignored in the score calculation.	Save	Saves the session data to the profile file
		Back	Returns to the Client Information Screen without saving the session data
Session Select Screen	Provides a list of previously completed sessions for modification.	Continue	Loads the selected session for modification in the Data Entry Screen
		Back	Returns to the Client Information Screen
Graph Screen	Draws a graph depicting the client's survey scores and	Print	Opens a print dialog to print the graph
		Back	Returns to the Client

	provides an option to print the graph.		Information Screen

Table A.1 – program screens functionality

Program Output:

The CSSP software outputs only two different forms of data: the binary client profiles and printed graphs showing the client’s progress. The client profiles are saved to disc at three points in the program: upon profile creation, upon the saving of new session data, and upon saving modified session data. Each of these disc writes is preceded by a confirmation dialog instructing the operator to verify writing of the profiles to disc. Creating a profile writes a profile with only the basic header information in the file (name, id, survey, etc.). Adding new sessions modifies the number of question structures within the profile, while modifying sessions rewrites the file with the changed session answers.

How to Exit the Program:

Like most other Windows applications, clicking the X button in the corner of any CSSP screen will quit the program. However, aside from this, the CSSP software contains three other methods to exit the program which are detailed in table A.2.

Window:	**Button:**	**Notes:**
Splash Screen	Exit	Exits immediately
Profile Select Screen	Cancel	Only exits as long as a client profiles hasn’t already been loaded into the software. If a profile has already been loaded into the software, clicking this button will take the user back to the Client Information Screen.
Client Information Screen	Quit Program	Exits immediately

Table A.2 – exit procedures

Appendix B: Visual Basic User Manual