

Virtual Saxophone

Final Report

by

ABDULLAH HAZIQ BIN HUSSAIN

7060

Dissertation submitted in partial fulfillment of

the requirements for the

Bachelor of Technology (Hons)

(Business & Information System)

JULY 2008

Universiti Teknologi PETRONAS

Bandar Seri Iskandar

31750 Tronoh

Perak Darul Ridzuan

Virtual Saxophone

Progress Report 1

by

ABDULLAH HAZIQ BIN HUSSAIN

7060

Dissertation submitted in partial fulfillment of

the requirements for the

Bachelor of Technology (Hons)

(Business & Information System)

JULY 2008

Universiti Teknologi PETRONAS

Bandar Seri Iskandar

31750 Tronoh

Perak Darul Ridzuan

Virtual Saxophone

Final Report 2

by

ABDULLAH HAZIQ BIN HUSSAIN

7060

Dissertation submitted in partial fulfillment of

the requirements for the

Bachelor of Technology (Hons)

(Business & Information System)

July 2008

Universiti Teknologi PETRONAS

Bandar Seri Iskandar

31750 Tronoh

Perak Darul Ridzuan

CERTIFICATION OF ORIGINALITY

This is to certify that I am responsible for the work submitted in this project, that the original work is my own except as specified in the references and acknowledgements, and that the original work contained herein have not been undertaken or done by unspecified sources or persons.

ABDULLAH HAZIQ BIN HUSSAIN

ABSTRACT

This report basically discusses the preliminary research done and basic understanding of the chosen topic, which is “Virtual Saxophone”. The objective of the project is to create an application so that user can learn to play saxophone without need to attending musical class or with the aid of instructor. Since nowadays people are busy with their work or studies and have no time for musical class, with the completion of this project, people will be able to learn to play their favorite musical instrument whenever and where ever they want to when they have free time.

Table of Contents

CHAPTER 1	3
1.1 PROJECT DEFINITION	3
1.2 PROBLEM IDENTIFICATION	5
1.3 OBJECTIVES	6
1.4 SCOPE OF STUDY	6
1.5 FEASIBILITY OF THE PROJECT WITHIN THE SCOPE AND TIME FRAME.....	7
CHAPTER 2	7
LITERATURE REVIEW	8
2.1 ALTO SAXOPHONE.....	8
CHAPTER 3	12
3.1 METHODOLOGY	12
3.2 DETAILS OF EACH PROCEDURE	13
3.2.1 Planning	13
3.2.2 Requirement Analysis	13
3.2.3 Design Phase	13
3.2.4 System Prototype	13
3.2.5 Implementation Testing	14
3.2.6 System Release	14
3.3.1 Development Tools	14
3.4 Work Flow	15
3.5 System Architecture.....	16
CHAPTER 4	17

4.1 Graphical User Interface (GUI)	17
4.2 Sound	18
4.4 Testing Phase	21
.CHAPTER 5	22
CHAPTER 5	23
5.1 CONCLUSION.....	23
5.2 RECOMMENDATION ON NEXT COURSE OF ACTION	23
References	24

CHAPTER 1

INTRODUCTION

1.1 PROJECT DEFINITION

This project will cover the innovative part of Virtual Saxophone. This is conducted to learn how to play saxophone virtually without the need to attend musical classes or hiring musical instructors. Further applications may be possible, but the scopes for this project will confine to beginners level. The prototype would be developed to represent the actual saxophone.

BACKGROUND OF STUDY

Not many people can play saxophone, since most of the instrument is quite pricy and not everyone can afford to buy musical instrument. First thing before we can come up with the application we need to do some research on the instrument first.

The **alto saxophone** is one of the saxophone types. It is a family of woodwind instruments created by Adolphe Sax. The alto is the third smallest of the saxophone family and is the most common size of saxophone. The saxophone was not immediately recognized in the musical community. The saxophone had to wait many years before it was recognized. Starting to gain its reputation in American jazz movement, and ever since has been becoming more and more popular. The alto saxophone is the most common choice for beginners learning to play the saxophone. Teachers and expert often suggest an alto for a beginner depending on their physical size, as well as their preferences.

The project is about how to create an application that can teach user effectively on playing musical instrument. Alto Saxophone was chosen as the musical instrument for this project. Since there are many type of saxophone, alto saxophone has been chosen because it is popular among beginners because of its size is suitable for many users. The software will be created to work with this particular piece of instrument. Even though there are some software that teach on how to play saxophone, most of them are not cheap and doesn't allow user to try it first whether it is suitable with them or not. Some teaching method such as video and books are also produced but that one way communication is not effective enough.

1.2 PROBLEM IDENTIFICATION

The problems identified for this project are:

- a. Not all people can play Saxophone by themselves easily through books or videos. Learning music through book might be troublesome because it's just a one way communication learning process which user won't realize if they have made some mistakes and keep on repeating it.

- b. Not all people have enough free time to go to music classes. Since most people now are busy with works and studies, they are more willing to spend their time with friends or family rather than spending their free time going to musical classes.

- c. There are not many software that teach user on how to play saxophone. Even there are applications that teach user on how to play saxophone, most of the application need the user to buy first before using it. Most of the application cost a lot and also the user might be risking that the application might not be suitable for the user because user can't test it first before buying it.

1.3 OBJECTIVES

- To create an interactive application to allow musical enthusiast learning how to play alto saxophone virtually.
- Possible to extend the application into other types of musical instruments.

1.4 SCOPE OF STUDY

The scope of study of this project is divided into categories below:

- Alto saxophone studies
The study is about research on the instrument background and its mechanism.
- Musical background studies
To create a musical application, the developer must at least know some basic knowledge about the music himself. Thus it is important to do some research on musical education
- Programming languages
As for creating an application, the developer must know which programming language is suitable for the application and also the language that the developer likes to explore.
- Graphical User Interface (GUI)
For the interface, the developer can refer to any musical application that already available in market as reference.

1.5 FEASIBILITY OF THE PROJECT WITHIN THE SCOPE AND TIME FRAME

Activities/ Week	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1. System requirement	█														
2. User Interface Development	█														
3. Coding implementation	█														
4. Seminar Presentation												█			
5. Final Report Submission (First Draft)													█		
6. Pre-EDX													█		
7. Oral Presentation															█
8. Submission of Dissertation															

CHAPTER 2

CHAPTER 2

LITERATURE REVIEW

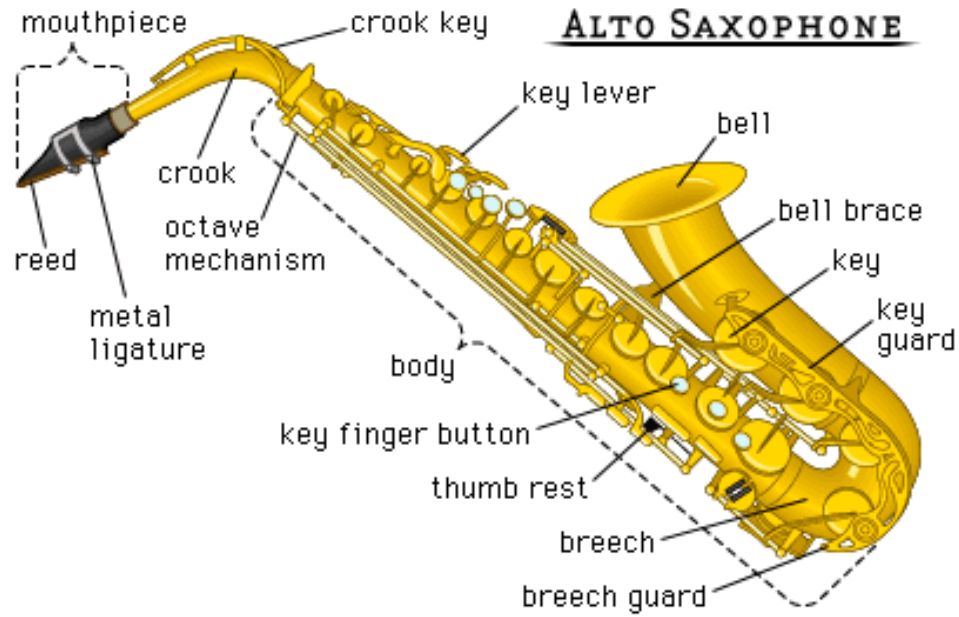
2.1 ALTO SAXOPHONE

The **alto saxophone** is a variety of the saxophone, a family of woodwind instruments invented by Adolphe Sax. The alto is the third smallest of the saxophone family, which consists of ten sizes of saxophone. The alto is the most common size of saxophone, and is also the size most commonly included in classical compositions.

The saxophone was not immediately recognized or utilized in the musical community. The saxophone had to wait many years before its potential was recognized. It gained its reputation in American jazz movement, and ever since has been becoming more and more popular.

The alto saxophone is the most common choice for beginners learning to play the saxophone. The second most common saxophone used by beginners is the tenor; the teachers and the pros often suggest either an alto or a tenor for a beginner depending on their physical size, as well as their preferences. [1]

The literature above explains about the background history of alto saxophone, further detail of the literature is the explanation of the alto saxophone mechanism and also history of the popular saxophone players.



The image above briefly explain parts of the alto saxophone, as we can see here, most of the instrument part are made of brass. Different type of saxophone has different number of key that can be pressed by the saxophone player.

2.2 *GUITAR PRO*

Guitar Pro is software meant to help musicians and aspiring musicians to compose, transcribe, edit and study music. It also helps the sharing of compositions among groups of people and other musicians.

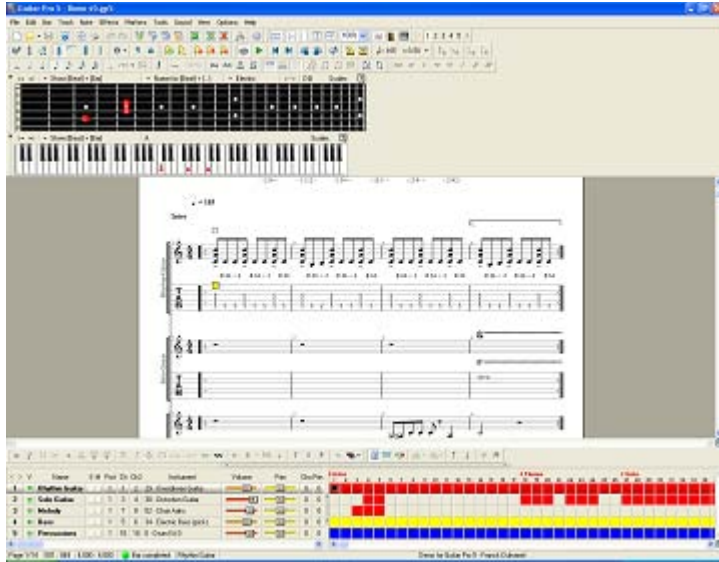
Guitar Pro 5 is also well suited for classical music study and composing. Prior to version 4, it wasn't possible to remove the tablature from the screen or printout, making it a little confusing for classically-trained musicians to edit standard notation scores; and impossible to achieve print-outs without the tablature notation. This limitation has been lifted as of version 5 and many improvements to standard notation and printout quality introduced.

Guitar Pro is also a useful tool for guitarists when learning to play songs.

The software makes use of multiple instrument tracks which follow standard staff notation, but also shows the notes on tablature notation. It gives the musician visual access to keys (for keyboard instruments) and strings (for guitars, basses, banjos, etc.) for the song to be composed, and allows live previews of the notes to be played at a specified tempo. It allows for certain tracks to be muted and provides dynamic control over the volume, phasing and other aspects of each track. Included in version 4 onwards is a keyboard that allows pianists to add their part to a composition.

Guitar Pro outputs sound by means of a MIDI library and/or, as of version 5, the "Realistic Sound Engine" (RSE), which uses high quality recorded samples for a more realistic playback. By using its live preview feature musicians may play along with the song, following the tablature played in real time.

Files composed using Guitar Pro are recorded in the GP5, GP4 and GP3 format. Such files are available for free on several websites, including songs of both underground and popular bands. However, copyright issues raised by the Music Publishers' Association (MPA) pressured some of these sites to close.[2]



Screen shot of guitar pro 5 application

This literature above described about guitar pro, an application that teach user on how to play guitar and also songs that are available are always updated from time to time. Users also can create their own song by using the application. Thus the concept can be use as reference for the project like part where user can play latest song from variable artist and learning through the musical notes. Since the project also need user to play some music through musical notes, this means that there are some kind of file format for the musical note to work with the application.

CHAPTER 3

METHODOLOGY

3.1 METHODOLOGY

The methodology used for this development prototyping methodology. Considering the size of this project and the advantages provided by this method which enables flexibility in algorithm development, it is believe that this approach could assist in the shorter period of project's development.

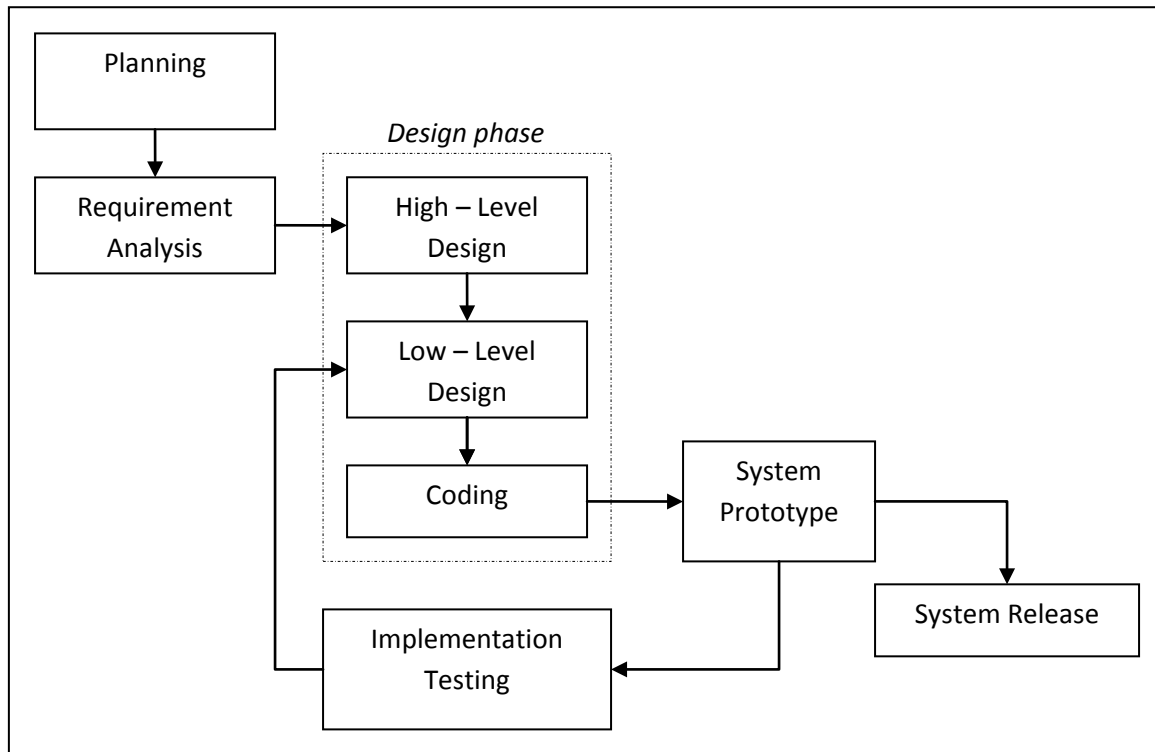


Figure 1.1: Prototype Model

3.2 DETAILS OF EACH PROCEDURE

3.2.1 Planning

The planning phase is where the task schedule for the whole system development. Where schedule for the time constraint for creating the interface, coding method and all process needed in order to complete the project.

3.2.2 Requirement Analysis

This phase is where the system requirement is identified, what tools are needed to be used in order to create the application and research need to be done on the musical instrument which is the alto saxophone.

3.2.3 Design Phase

The phase can be divided into three smaller sub-phase; High Level Design, Low Level Design and Coding phase. All the phases will be done concurrently after one another for each functional and non-functional requirement.

3.2.4 System Prototype

In this stage, prototype of the software has been completed, even though there will be many bugs and correction need to done since it is not an end product yet. More required function will be added if necessary so that the software will function according to plan. It will be tested for the next implementation phase.

3.2.5 Implementation Testing

In this phase, the prototype that is produced will be tested to check for the requirement desired. In this project the requirement is to allow the software to produce sound according to interface and button that are pressed according to the timing. If the requirements are not met, therefore we will need to start again from design phase to check or to add some more functions.

3.2.6 System Release

The phase is where the final software is expected to be completed. If there are any error and bug in this phase, patch or update will be implemented. In this stage it mean that the project already succeed to let user use the software for learning purpose or the software manage to interact with user as it supposed to be.

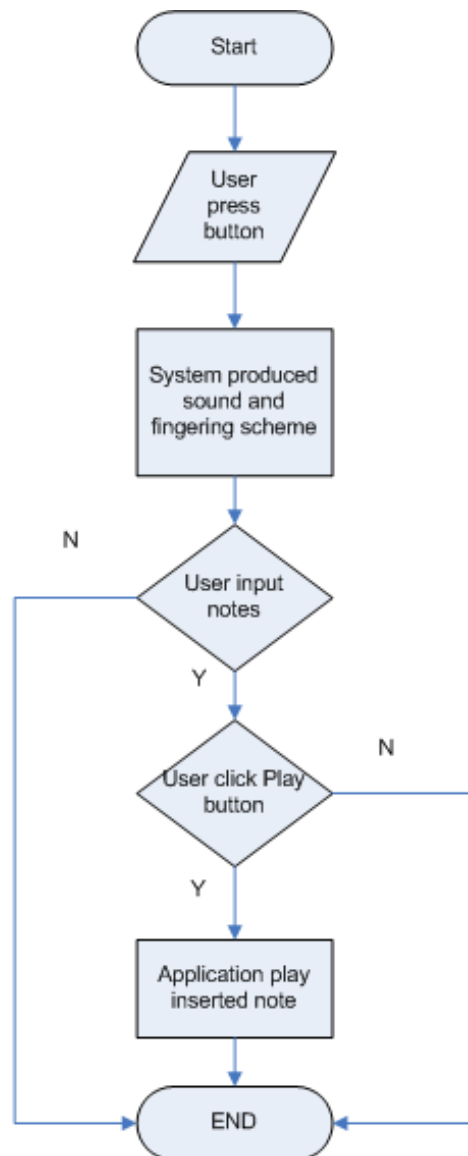
3.3.1 Development Tools

Virtual Basic .Net (VB.Net)

Since developer has some basic knowledge on the language, these tools were chosen for the ease of the developer to develop the application.

3.4 Work Flow

The diagram below shows the work flow of the application. When user starts the application, a window will appear showing the Saxophone diagram user to understand it mechanism first before using the application. User may click on the button of the application that represents every musical notes of the saxophone. The application will react by producing the sound according to the real saxophone sound produce and also show the fingering diagram of the saxophone.



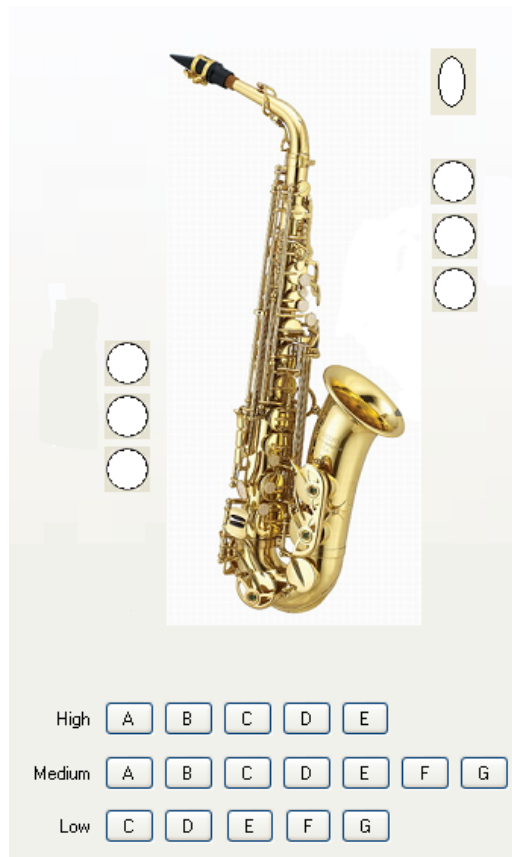
3.5 System Architecture

CHAPTER 4

RESULT AND DISCUSSION

4.1 Graphical User Interface (GUI)

This is the first draft of the application's interface design, where user can interact with the application by clicking on the assigned button so that the application will produce the sound according to what real saxophone sound produce and also the fingering scheme for the note. The link will bring the user to other GUI which still under planning phase. The second GUI is planned to let user to play some basic song of saxophone through musical notes in order to let user be familiar with saxophone music.



4.2 Sound

Currently the GUI already implemented with the sound function, user now can click on the note button and the application will produce the sound that the real saxophone will produced.

```
Public Declare Function PlaySound Lib "winmm.dll" (ByVal pszSound As String, ByVal hmod As IntPtr, ByVal fdwSound As  
'Public Declare Function PlaySound Lib "winmm.dll" (ByVal pszSound As Byte(), ByVal hmod As IntPtr, ByVal fdwSound As  
  
Public Enum SoundFlags As Integer  
    SND_SYNC = &H0 'standard'  
    SND_ASYNC = &H1  
    SND_NODEFAULT = &H2  
    SND_MEMORY = &H4  
    SND_LOOP = &H8  
    SND_NOSTOP = &H10  
    SND_PURGE = &H40  
    SND_NOWAIT = &H2000  
    SND_ALIAS = &H10000  
    SND_FILENAME = &H20000  
    SND_RESOURCE = &H40004  
  
End Enum  
  
Private Sub TabPage1_Click(ByVal sender As System.Object, ByVal e As System.EventArgs) Handles TabPage1.Click  
  
End Sub  
  
Public Sub Play(ByVal strFileName As String)  
  
    PlaySound(strFileName, IntPtr.Zero, SoundFlags.SND_ASYNC)  
  
End Sub
```

The coding above shows that declaration that are needed in order to allow sound file to be played by the application, some of the declaration have different purpose function on how the application react on user input while the sound were played. Some allowed multiple inputs while some only allowed input to be inserted once the output finished the process. At the moment, all type of declaration was keep in view for future reference.

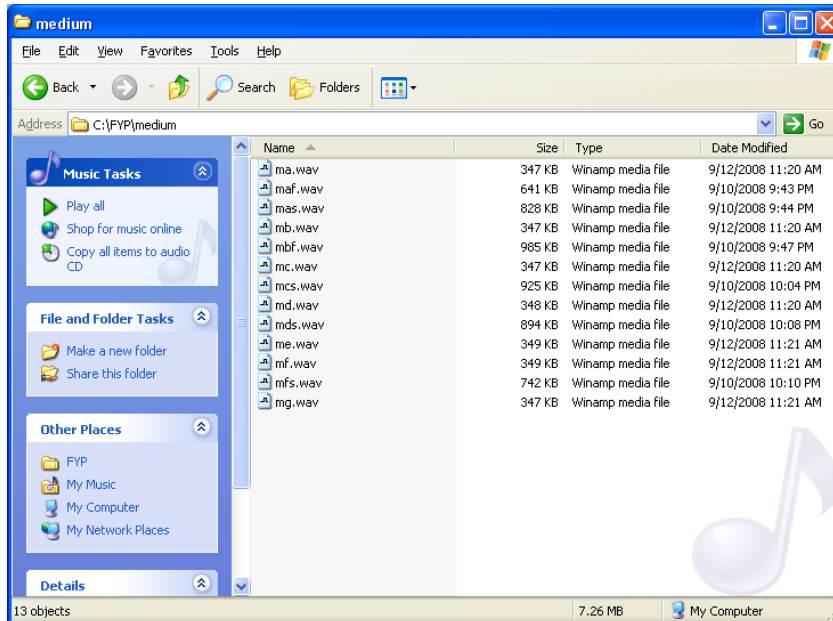
After declaration, the application now can play audio files, the coding below are applied to every button. Each button is bind to different sound file according to every musical notes that are playable for Alto saxophone. All sound files of the saxophone are stored in a folder for the ease of changes in the future. Most sound length is more than four seconds so that it can be easier edited by the developer in the future.

```
Private Sub BtnHa_Click_2(ByVal sender As System.Object, ByVal e As System.EventArgs) Handles BtnHa.Click

    PicBtn1.Image = System.Drawing.Image.FromFile("C:\FYP\Button\btntop1.png")
    PicBtn2.Image = System.Drawing.Image.FromFile("C:\FYP\Button\btnip.png")
    PicBtn3.Image = System.Drawing.Image.FromFile("C:\FYP\Button\btnip.png")
    PicBtn4.Image = System.Drawing.Image.FromFile("C:\FYP\Button\btn1.png")
    PicBtn5.Image = System.Drawing.Image.FromFile("C:\FYP\Button\3bup000.png")
    PicBtn6.Image = System.Drawing.Image.FromFile("C:\FYP\Button\btn1.png")
    PicBtn7.Image = System.Drawing.Image.FromFile("C:\FYP\Button\btn1.png")
    PicBtn8.Image = System.Drawing.Image.FromFile("C:\FYP\Button\btn1.png")
    PicBtn9.Image = System.Drawing.Image.FromFile("C:\FYP\Button\btn900.png")
    PicBtn10.Image = System.Drawing.Image.FromFile("C:\FYP\Button\3bdwn000.png")
    Play("C:\FYP\high\ha.wav")

End Sub
```

Coding for playing the sound file



Audio files kept in a folder for references.

4.3 Fingering Diagram

After meeting with the saxophone player and record the sound, more understanding on the fingering scheme of the saxophone were acquired. Some changes of the GUI were also applied to the application.

```
Private Sub BtnHa_Click_2(ByVal sender As System.Object, ByVal e As System.EventArgs) Handles BtnHa.Click
```

```
PicBtn1.Image = System.Drawing.Image.FromFile("C:\FYP\Button\btntop1.png")  
PicBtn2.Image = System.Drawing.Image.FromFile("C:\FYP\Button\btnip.png")  
PicBtn3.Image = System.Drawing.Image.FromFile("C:\FYP\Button\btnip.png")  
PicBtn4.Image = System.Drawing.Image.FromFile("C:\FYP\Button\btn1.png")  
PicBtn5.Image = System.Drawing.Image.FromFile("C:\FYP\Button\3bup000.png")  
PicBtn6.Image = System.Drawing.Image.FromFile("C:\FYP\Button\btn1.png")  
PicBtn7.Image = System.Drawing.Image.FromFile("C:\FYP\Button\btn1.png")  
PicBtn8.Image = System.Drawing.Image.FromFile("C:\FYP\Button\btn1.png")  
PicBtn9.Image = System.Drawing.Image.FromFile("C:\FYP\Button\btn900.png")  
PicBtn10.Image = System.Drawing.Image.FromFile("C:\FYP\Button\3bdwn000.png")  
Play("C:\FYP\high\ha.wav")
```

```
End Sub
```

The coding above is applied for every button so that when the button is pressed, the fingering diagram of the application will change according to the real saxophone fingering.

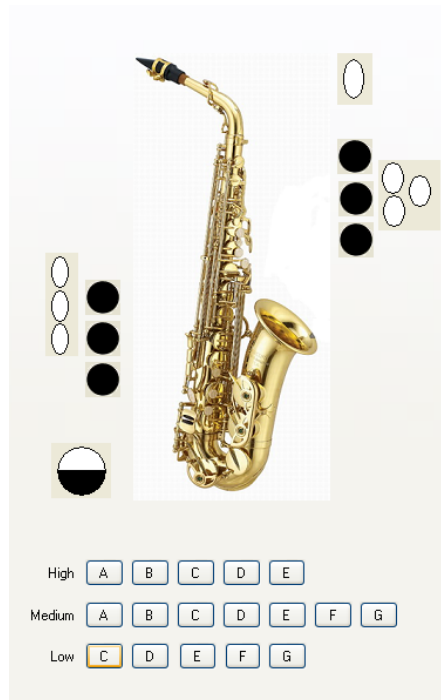


Image show changes that occur to fingering diagram when a button is pressed

4.4 Testing Phase

The author then has done some testing to the system to identify the errors and constraints.

Table 1.0 below shows a table that concludes the testing that had been done:

Test Type/Process	Pass	Fail	Comments
1) User Interface/ Medium Development			Interface is created and working as required
3.1 Page link testing			Pass
3.2 Button test			Pass
3.4 Whole Interface test			Pass
2) Sound implimentation			Implementation of saxophone sound to the application.
2.1 Sound test			Pass
2.2 Applying sound to button			Pass
3) Fingering Scheme			Interface is tested and working as required. It is tested by linking with dummy database.
3.1 Applying fingering diagram to			Pass

application			
4) Play Back Functionality			Further Function that will be applied to the application, where user can enter strings of musical notes and the application play it.
4.1 Drop down list of musical notes			Pass
4.2 Image of notes on musical sheet.			Incomplete, work in progress
4.3 Playback function			Completed, but require changes on coding.
4.4 Full System Test			Not done because the application is not complete yet

CHAPTER 5

5.1 CONCLUSION

In conclusion, the project is expected to come out with a prototype of Virtual Saxophone lessons. The software will help user in learning how to play musical instrument without the aid of an instructor or attending musical class. In hope by the completion of the application, it will able to help user to learn playing saxophone without constraint of time and money since they can just play it anywhere as long they have PC or laptops.

5.2 RECOMMENDATION ON NEXT COURSE OF ACTION

- Implementation of the application to other musical instruments.
- Improvement on the application for higher level use.

References

1. Wikipedia, Alto Saxophone, http://en.wikipedia.org/wiki/Alto_saxophone
2. Britanica Alto saxophone, <http://www.britannica.com/ebc/art/print?id=18339&articleTypeId=0>
3. Basic Saxophone Skills by Paul Berler
4. Javaworld, musical application, <http://www.javaworld.com/javaworld/jw-10-2005/jw-1024-funandgames.html>
5. Saxophone Journal, <http://www.dornpub.com/saxophonejournal.html>
6. Effective Use of Multimedia for Computer-Assisted Musical Instrument Tutoring by Graham Percival, Ye Wang and George Tzanetakis.
7. Computer-Music Interfaces: A Survey by BRUCE W. PENNYCOOK
8. Wikipedia, Guitar Pro http://en.wikipedia.org/wiki/Guitar_Pro
9. A saxophone player from UTP orchestra unit.