# Project for Hong Kong University

Objectives

This project is conducted by Hong Kong University for helping to develop sample materials for teachers who will teach CIT programme in coming year.

For my coursework, I need to write a computer program for playing Apple Chess game. The followings are the details of the coursework:

1. The program should played by 1 or 2 players
2. The maximum size of the chessboard is 10 X 10
3. The program should show the results (either Win, Lose, or Draw) at the end of the game
4. The program should follow the rules of Apple Chess, such as:
   - ☼ Choose one color, black or white, to use throughout the game.
   - ☼ The game always begins with the setup of two black discs and two white discs in the central square.
   - ☼ The players take turns to move in order to "outflanking" the opponent's disc(s) vertically, horizontally and diagonally - placement of a disc make the opponent's row / or rows of disc(s) is bordered at each end by a disc of his color and make opponent's disc(s) become the same color to his.
   - ☼ When it is no longer possible for both players to move, the game is over. Different colours of discs are counted and the player with the majority of his color discs on the board is the winner.
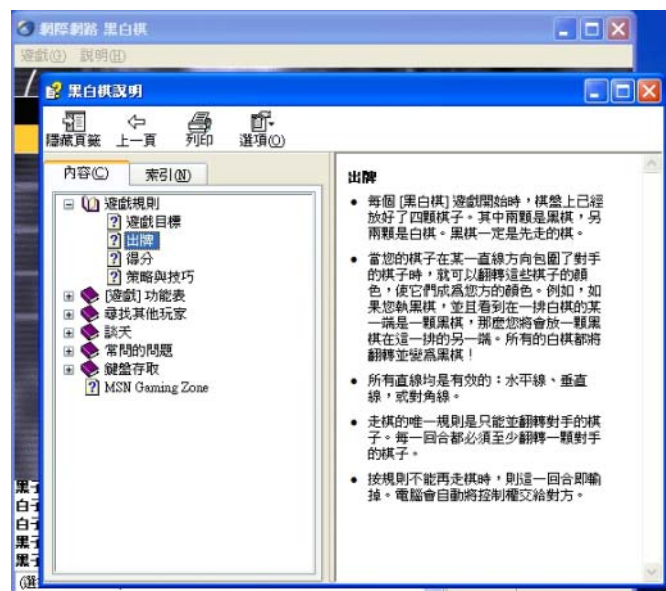
The detailed rules are come from the help of the apple chess game in Win XP, and help of the online games in Yahoo! Games, Games.sina.com.hk, and the reference site: http://www.netfun.com/cgi-bin/netfun/reversi.htm

Analysis

In this project, all I need are a computer, and a program developing toolkit. Here are some details of my working computer:

- ✓ AMD Athlon XP 1600+
- ✓ 2theMax 8K5A2 (VIA KT333)
- ✓ Samsung 256MB DDR-333 RAM
- ✓ Maxtor 80GB 7200 rpm HDD
- ✓ Grandmars ATI Radeon 8500 VIVO
- ✓ Creative Sound Blaster Live! DE 5.1
- ✓ Microsoft Windows XP Pro with SP1

Just after receiving the project, I have thought of using several different programming languages to finish my job, including C, Pascal, QBasic …… but I think the most suitable 2 languages for this program are Java and Visual Basic.

The advantage of using Java is program portable. The program/applet written by Java can be run in many different platforms. Windows, Linux, UNIX, OS/2, Mac OS, Free BSD…… all operating systems which have a Java Virtual Machine can run the program without re-compiling the source code. However, it has a huge disadvantage that it is rather difficult for me to write such a large amount of Window Objects by Java, since I have not learnt any of them.

Oppositely, the advantage of using Visual Basic is that it is quite easy and convenient for me to create lots of Window Objects in a relatively short period of time. Also, since I have learnt it in Form 3, it is easier for me to pick up this programming language and writing the program in a quicker and better way. However, the main disadvantage of Visual Basic is that the program written by Visual Basic usually can only run in Windows Platform. If you need to use the program in other operating systems, you must re-compile the source code with another compiler, or using some programs which simulates the Windows environment (e.g. Virtual PC, VM-Ware, or WINE for Linux).

Finally, I decided using Visual Basic to write this program since it is most convenient to use. In this time, I am using the 'Microsoft Visual Basic 6' software development toolkit to finish this project.
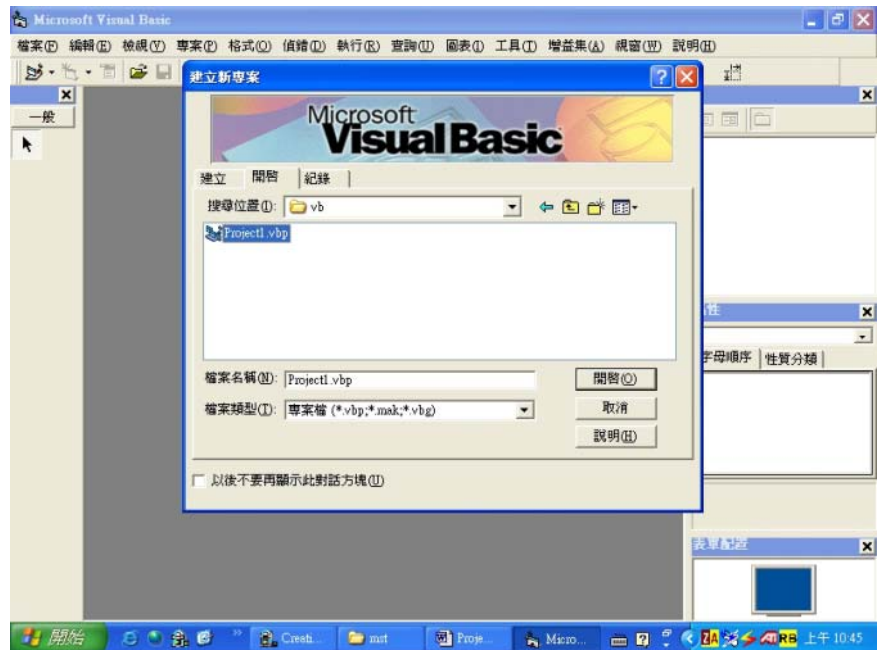
Design

Here are the screenshot of my design.
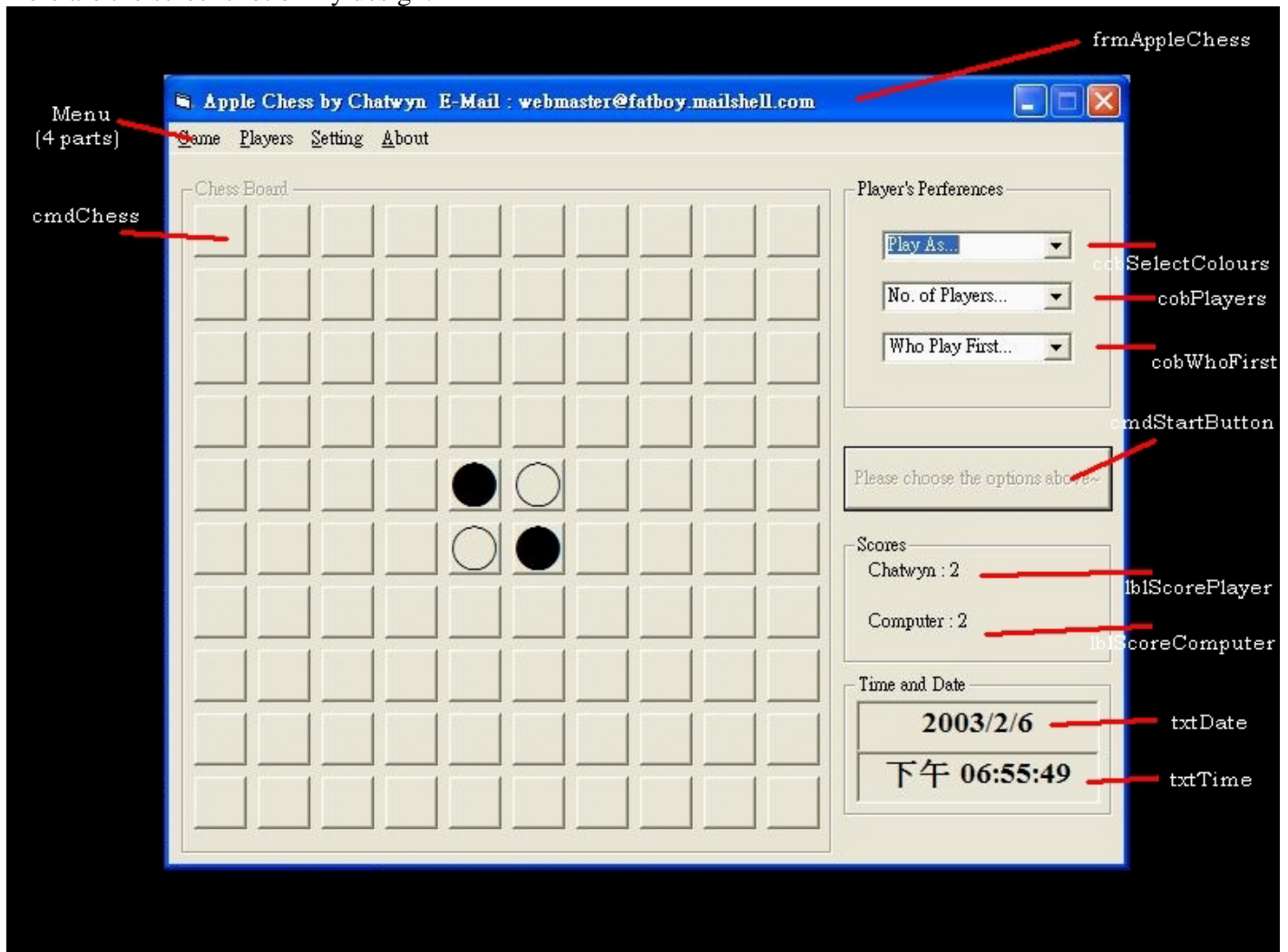
When the program is run, you can tell the program your name, or just leave anonymous. Then, you will have to choose three things.
1.   To be black or white.
2.   To play alone or with friends.
3.   To start with you for computer/friend.
Next, you can start playing by clicking the button (cmdStartGame).
After that, you can put the chess into the boxes by pressing the buttons (cmdChess).

The program will be compiled into *.exe form, which can be run in the 32-bit Windows Environment, such as Microsoft Windows 95, 98, Me, NT, XP etc. This program does not need to install but you can only run the program if that computer has Visual Basic's DLL.

Implementation

Here are the sources of the program:

```
Dim play_as_black, single_player, player_first, this_turn_has_eaten, check_next_dimension, AI_think,
AI_can_eat, chosen_colours, chosen_players, chosen_play_first As Boolean
Dim empty_box, black_num, white_num, eat_opponent, max_eat_opponent,
max_eat_opponent_index, play_again As Integer
Dim PlayerName, SecondPlayerName As String
Sub Reset()
Dim i As Integer
player_first = False
single_player = True
ready_to_play = 0
For i = 0 To 99
Select Case i
     Case 44, 55
         cmdChess(i).Caption = "●"
     Case 45, 54
         cmdChess(i).Caption = "    "
     Case Else
         cmdChess(i).Caption = ""
End Select
Next i
white_num = 2
black_num = 2
empty_box = 96
End Sub
Sub StartGame()
cmdStartgame.Enabled = True
cmdStartgame.Caption = "Click to play NOW !"
End Sub
Sub CheckChess(index As Integer)
Dim xy, Index_loop, Temp, i As Integer
this_turn_has_eaten = False
For i = 1 To 8
Select Case i
Case 1:        xy = -11
Case 2:        xy = -10
Case 3:        xy = -9
Case 4:        xy = -1
Case 5:        xy = 1
Case 6:        xy = 9
Case 7:        xy = 10
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Case 8:         xy = 11
End Select
Index_loop = index + xy
check_next_dimension = False
Do While Index_loop >= 0 And Index_loop <= 99 And (index Mod 10 = 0 Or Index_loop Mod 10 <> 0)
And (index Mod 10 = 9 Or Index_loop Mod 10 <> 9) And (index \ 10 = 0 Or Index_loop \ 10 <> 0) And
(index \ 10 = 9 Or Index_loop \ 10 <> 9) And (cmdChess(index).Caption = "" Or this_turn_has_eaten =
True)
If cmdChess(Index_loop).Caption = "" Then
      Exit Do
ElseIf (cmdChess(Index_loop).Caption = "    " And play_as_black) Or (cmdChess(Index_loop).Caption
= "●" And Not play_as_black) Then
      Temp = Index_loop + xy
      If (((cmdChess(Temp).Caption = "    " And Not play_as_black) Or (cmdChess(Temp).Caption = "●"
And play_as_black))) And (check_next_dimension = False) Then
            this_turn_has_eaten = True
            If Not (AI_think) Then
                  For k = Temp To index Step -(xy)
                  If play_as_black Then
                        cmdChess(k).Caption = "●"
                  Else
                        cmdChess(k).Caption = "    "
                  End If
                  Next k
            End If
            eat_opponent = eat_opponent + ((Temp - index) \ xy)
            Exit Do
      End If
   Else
            check_next_dimension = True
      Exit Do
End If
Index_loop = Index_loop + xy
Loop
Next i
End Sub
Sub Chess_AI(AI_can_eat As Boolean)
Dim i As Integer
        AI_think = True
        max_eat_opponent = 0
        For i = 0 To 99
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        eat_opponent = 0
        If AI_can_eat = True Then
            'Debug.Print "AI check"
            CheckChess (i)
        End If
        If eat_opponent > max_eat_opponent Then
            max_eat_opponent = eat_opponent
            max_eat_opponent_index = i
        End If
        Next i
        AI_think = False
        If max_eat_opponent = 0 Then
            'MsgBox "AI can't eat !"
            If this_turn_has_eaten = True Then
                play_as_black = Not (play_as_black)
            End If
        Else
                CheckChess (max_eat_opponent_index)
        End If
End Sub
Private Sub cmdChess_Click(index As Integer)
Dim i As Integer
this_turn_has_eaten = False
CheckChess (index)
If Not (single_player) Then
    If this_turn_has_eaten = True Then
        play_as_black = Not (play_as_black)
    End If
    Else
        AI_can_eat = this_turn_has_eaten
        If this_turn_has_eaten = True Then
            play_as_black = Not (play_as_black)
        End If
        Chess_AI (AI_can_eat)
        If this_turn_has_eaten = True Then
            play_as_black = Not (play_as_black)
        End If
End If
empty_box = 0
black_num = 0
white_num = 0
```

```
For i = 0 To 99
If cmdChess(i).Caption = "●" Then
     black_num = black_num + 1
ElseIf cmdChess(i).Caption = "   " Then
     white_num = white_num + 1
     Else
     empty_box = empty_box + 1
End If
Next i
If empty_box = 0 Or white_num = 0 Or black_num = 0 Then
     If black_num > white_num Then
          If play_as_black Then
               MsgBox PlayerName & ", you win !", vbInformation, "Congratulations !!!"
               Else
                    MsgBox PlayerName & ", you lose !", vbInformation, "Try again !"
          End If
     ElseIf white_num > black_num Then
          If Not play_as_black Then
               MsgBox PlayerName & ", you win !", vbInformation, "Congratulations !!!"
               Else
                    MsgBox PlayerName & ", you lose !", vbInformation, "Try again !"
          End If
          Else
          MsgBox PlayerName & " and computer draw...", vbInformation, "Draw !!"
     End If
     play_again = MsgBox("Play again ?", vbQuestion + vbYesNo, "Play again ?")
     If play_again = vbNo Then
          MsgBox "bye!", vbInformation, "See You~"
          Unload Me
          End
          Else
               Call Reset
     End If
End If
End Sub

Private Sub cmdStartgame_Click()
fraChess.Enabled = True
cmdStartgame.Enabled = False
If player_first = False Then
     play_as_black = Not (play_as_black)
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```
        Chess_AI (True)
        play_as_black = Not (play_as_black)
End If
cmdStartgame.Caption = "    " & PlayerName & ", play NOW !"
End Sub
Private Sub cobPlayers_Click()
If cobPlayers.ListIndex = 0 Then
    single_player = True
    mnuSinglePlayer.Checked = True
    mnuTwoPlayers.Checked = False
    Else
        single_player = False
        cobwhoFirst.RemoveItem 1
        SecondPlayerName = InputBox("Please enter the second player's name (Leave blank to
change back to Single if you choose it wrongly)", "Senond Player's name please~~")
        If SecondPlayerName = "" Then
            SecondPlayerName = "Computer"
            cobPlayers.ListIndex = 0
            Else
                mnuSinglePlayer.Checked = False
                mnuTwoPlayers.Checked = True
        End If
        cobwhoFirst.AddItem SecondPlayerName, 1
End If
chosen_players = True
If chosen_colours = True And chosen_players = True And chosen_play_first = True Then
    Call StartGame
End If
End Sub

Private Sub cobSelectColours_Click()
If cobSelectColours.ListIndex = 0 Then
    play_as_black = True
    Else
        play_as_black = False
End If
chosen_colours = True
If chosen_colours = True And chosen_players = True And chosen_play_first = True Then
    Call StartGame
End If
End Sub
```

```
Private Sub cobwhoFirst_Click()
If cobwhoFirst.ListIndex = 0 Then
     player_first = True
     Else
          player_first = False
End If
chosen_play_first = True
If chosen_colours = True And chosen_players = True And chosen_play_first = True Then
     Call StartGame
End If
End Sub


Private Sub Form_Initialize()
cobSelectColours.AddItem "Black", 0
cobSelectColours.AddItem "White", 1
cobPlayers.AddItem "Single", 0
cobPlayers.AddItem "Two", 1
cobwhoFirst.AddItem PlayerName, 0
cobwhoFirst.AddItem "Computer", 1
mnuTwoPlayers.Checked = False
mnuSinglePlayer.Checked = False
tmrTime.Interval = 1000
Call Reset
End Sub


Private Sub Form_Load()
Dim Play_Anonymous As Integer
Do
PlayerName = InputBox("Please enter your name :", "Your name please~~")
If PlayerName = "" Then
     Play_Anonymous = MsgBox("You really have no name ? May you please tell me your name ?",
vbQuestion + vbYesNo, "No name ?")
End If
Loop While PlayerName = "" And Play_Anonymous = vbYes
If PlayerName = "" Then
     MsgBox "Okay... you are Anonymous now.", , "That's all right~"
     PlayerName = "Anonymous"
End If
End Sub


Private Sub mnuAbout_About_Click()
```

```
MsgBox "Apple Chess by FatBoy" & vbCr & "E-Mail : webmaster@fatboy.mailshell.com" & vbCr &
"This is the program written for doing the HKU project", vbInformation + vbOKOnly, "About ..."
End Sub


Private Sub mnuGame_Exit_Click()
Dim Leave As Integer
Leave = MsgBox("Are you sure ?", vbExclamation + vbYesNo, "Really Exit ?")
If Leave = vbYes Then
     Unload Me
End If
End Sub


Private Sub mnuGame_New_Click()
Call Reset
End Sub


Private Sub mnuSinglePlayer_Click()
mnuTwoPlayers.Checked = mnuSinglePlayer.Checked
mnuSinglePlayer.Checked = Not (mnuSinglePlayer.Checked)
cobPlayers.ListIndex = 0
End Sub


Private Sub mnuTimeAndDate_Click()
If mnuTimeAndDate.Checked = False Then
     fraTimeAndDate.Visible = True
     mnuTimeAndDate.Checked = True
     Else
         fraTimeAndDate.Visible = False
         mnuTimeAndDate.Checked = False
End If
End Sub


Private Sub mnuTwoPlayers_Click()
mnuSinglePlayer.Checked = mnuTwoPlayers.Checked
mnuTwoPlayers.Checked = Not (mnuTwoPlayers.Checked)
cobPlayers.ListIndex = 1
End Sub


Private Sub tmrTime_Timer()
txtDate.Text = Date
txtTime.Text = Time
```

```
If play_as_black Then
    lblScorePlayer.Caption = PlayerName & " : " & black_num
    If single_player Then
        lblScoreComputer.Caption = "Computer : " & white_num
        Else
            lblScoreComputer.Caption = SecondPlayerName & " : " & white_num
    End If
    Else
        lblScorePlayer.Caption = PlayerName & " : " & white_num
        If single_player Then
            lblScoreComputer.Caption = "Computer : " & black_num
            Else
                lblScoreComputer.Caption = SecondPlayerName & " : " & black_num
        End If
End If
End Sub
```

I debug the program by using two statements:
☺   Debug.print(var)
☺   MsgBox var

The program and the source can be downloaded in my school web space.
Testing & Evaluation
I have test the program by playing it for a long period. I play by myself, play with my relatives, and also sending the program to other people to let them play. All the comments and suggestions are collected and well-used to fixing the bugs and improving my program. Most of the bugs have been fixed after the beta versions.
The followings are the details that I have to check:
  ☺   At first, are there are 2 black and 2 white discs of chess in the middle square of the chess board?
  ☺   Can I put the Chess correctly into the chess board?
  ☺   Are the chess put into the board is the colours of the correct user?
  ☺   Can I block putting the chess into the boxes that already have chess disc?
  ☺   Can I eat the opponent's chess discs?
  ☺   Can I eat the opponent's chess discs in their dimensions (vertical, horizontal, and diagonal) at the same time?
  ☺   Can the computer eat my chess back normally, following the rules of the game?
  ☺   Can I play with my friend, without the disturbance of the computer?
  ☺   Can the score be counted as soon as all buttons are pressed?
  ☺   When all of the buttons have put discs, can the program know that the user wins or loses?

Conclusion & Discussion

The program I have written can be played normally. However, the AI of the computer is very cheap. The computer cannot think of how the human players respond the computer's moves. It only thinks of how many opponent's chesses the computer can eat, and choose the maximum one.
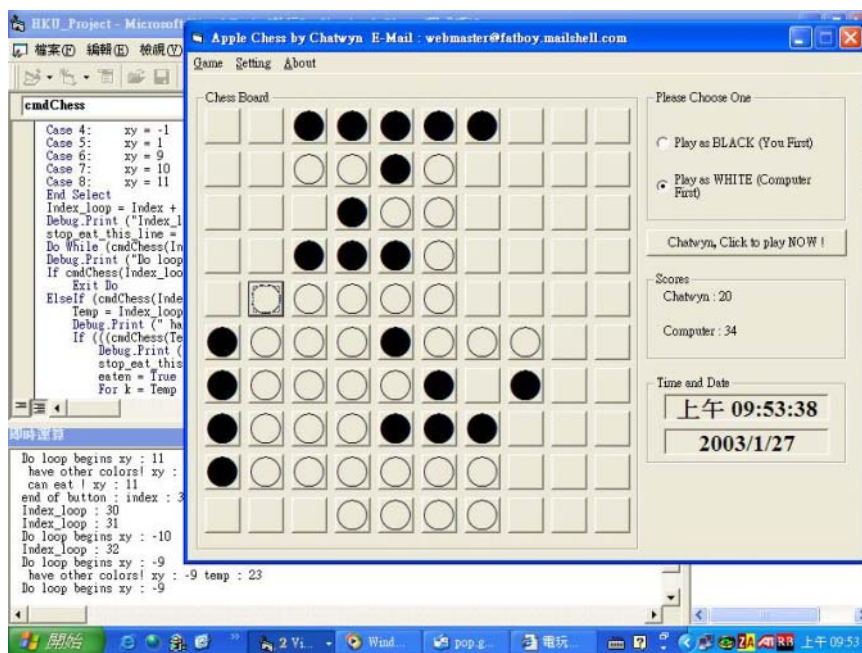
Documentation

*Produce a summary report of the coursework.

I have read some books, references when I am doing this project. Also, I have asked my friend, Jason Chan, who helps me a lot when writing the program.

Booklist:

✦ Microsoft Visual Basic 6.0   (   )
✦   Visual Basic 6   (   )
✦ Hundreds issues of PC Weekly's Visual Basic Programming Section (from No. 111 to No. 236)
✦ Some other magazines such as Hi-Tech Weekly, PC Buyer, PC Market, PC Home etc… Most of them have Visual Basic programming sections which are really useful.

Also, I have visited many other web sites, forums and newsgroups in the Web, such as:

➢ http://msdn.microsoft.com/vbasic/downloads/samples/visualbasic6.asp
➢ http://msdn.microsoft.com/library/default.asp?URL=/library/devprods/vs6/vbasic/vbcon98/vbstartpage.htm
➢ news://news.3home.net/3comp.programming
➢ news://newsgroup.com.hk/newsgroup.computer.programming
➢ news://newsgroup.com.hk/newsgroup.computer.VisualBasic
➢ http://www.planet-source-code.com/vb/default.asp?lngWId=1
➢ http://beta.miniforum.f4w.net/forum.fcgi?FID=2&page=1&tempid=2
➢ http://hk.geocities.com/shwskm/vb_menu.htm
➢ http://www.101-visual-basic-tutorials.com/
➢ http://www.freevbcode.com/
➢ http://run-fast.to/
➢ http://www.visualbasicforum.com/
➢ http://home.pchome.com.tw/computer/sskyworld/teach.htm
➢ http://www.google.com.hk/search?hl=zh-TW&ie=UTF-8&oe=UTF-8&q=Visual+Basic+6+Tutorial&btnG=Google%E6%90%9C%E5%B0%8B&lr=lang_zh-TW
➢ http://search.yahoo.com/bin/search?p=Visual+Basic+Tutorial
➢ http://ask.com/main/askjeeves.asp?ask=Visual+Basic+Tutorial&o=0&x=17&y=3
➢ http://www.altavista.com/web/results?q=Visual+Basic+6+Tutorial&kgs=0&kls=1&avkw=x

> ytx
> http://msxml.excite.com/_1_24OPTRB04RUBLVF__info.xcite/dog/results?otmpl=dog/webresults.htm&qkw=Visual%20Basic%206.0%20Tutorial&qcat=web&meta=rs&top=1&start=&ver=26935
> http://www.yayawoo.com/hk/Computer/Programming/VBVisualBasic/
> http://search.openfind.com.tw/cgi-bin/Timway/webgais2.exe?lang_type=0&query=Visual+Basic+Tutorial&group_by=site

Moreover, my project maker and supervisor, Mr X, tells me to download a already-made program as a reference of the project. The source URL: http://ckso.uhome.net/cgi-bin/link.pl?apple

Finally, the most important one I would like to thank you is that my Form 3 Computer Literacy teacher, Mr X, who teaches me most of the fundamental concepts and skills for Visual Basic programming. I am still using most of skills he taught in this project.

Creativity

I can only write the most basic things of the Apple Chess since the time given is not enough for me (only 20 hours). In this program, I have only added checking the Time and Date, asking the player's name, and counting the score while playing…… etc. these simple, but useful functions.

I try to make the whole program become more tiny and smaller in size, I ignored using the picture, just like the reference product in http://ckso.uhome.net/cgi-bin/link.pl?apple. Therefore, the end-product of the program is only about 40KB. It is convenient for users to pass the program even they are not using broadband.