

Teaching Case

A First Case Project in Visual Basic.Net: Preparing an Income Tax Return

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ABSTRACT

Most commercial programming applications are considerably more complex than the end-of-chapter exercises found in programming textbooks. This case addresses this problem by requiring the students in an entry-level Visual Basic programming class to create an application that helps users prepare their U.S. income tax returns. For convenience, the forms in this project are simplified versions of some of the tax forms that a U.S. taxpayer would use to complete a real income tax return—i.e., Schedules A, B, and C, as well as a Child Care worksheet and a Schedule 1040. Although integrative in nature, the case does not require advanced programming skills, is useful as an interim class assignment, and can be completed using either VB.6 or VB.Net.

Keywords: Visual Basic, VB.Net, Computer Programming, Project Development, Income Taxes, Data Validation, Multiple forms

1. INTRODUCTION

The purpose of this case is to require students to use elementary programming tools within the context of a comprehensive project—a tax-preparation case. The key screens required of the developer are a Main form that acts as a switchboard for the project, tax forms that represent simplified versions of Schedules A, B, and C of a U.S. tax return, a child care worksheet, a Schedule 1040, and an About window. The project also requires students to validate selected data values, use global, form-level, and procedure-level variables to compute required tax values, and carefully document their work. An additional feature (that instructors can omit if desired) is the requirement that students create one or more enhancements. This project is more complex than the chapter assignments found in most programming textbooks, and instructors should encourage their students to plan on spending considerably more time on this case than on simple programming assignments. The author has used this case for five years in a Visual Basic programming course with great success and usually allows students to work in groups.

2. AN INCOME TAX CASE

Many taxpayers now use computer tools to help them

prepare their income taxes. This case requires its developers to create a simplified application for preparing a U.S. income tax return. Although a number of programming languages could be used for this task, the windows orientation of the user interfaces particularly lend themselves to the use of a Visual Basic as the primary development tool. The descriptions below outline the system's basic requirements. Figures 1-7 may be found in Appendices A-G, respectively.

2.1 Main Screen

The starting user interface is the Main Screen (Figure 1), which consists of several Labels, Text boxes, and Radio Buttons, as well as five Command Buttons. Its purpose is to acquire general information, and to allow the user to navigate among the several other supporting forms for the different tax schedules. The individual Buttons found at the bottom of this form are explained below.

2.2 Form 1040

When the user clicks on the "Form 1040" Button, the program displays that form (Figure 2). Note that some of the Labels in this screen appear in bold italics while others do not. As stated in the upper-right corner of this form, the *program* should compute values for the Text boxes with bold italics Labels, while the *user* should input information

for the Text boxes without such Labels. Thus, for example, the user should input a value for "Wages, Salaries, Tips, etc." in line 2 of this form. However, the program (and not the user) should compute values for line 6 of this form—the amount for "adjusted gross income." This general rule applies to all the other forms as well. (You do *not* have to recreate the labels that remind you about this.) Finally, in Figure 2: (1) the term "These are Your Total Payments" on line 11 is the total amount the user paid in withholding and similar taxes, and (2) line 12 is the difference between line 10 and line 11.

2.3 Schedule A

When the user clicks on the "Schedule A" Button from the Main Screen, the screen for Schedule A appears (Figure 3). Here, the user enters dollar values for medical and dental expenses, taxes paid, interest paid, and so forth. When the user clicks on the "Calculate Deductions" Button in this form, the *program* adds the amounts in the Text boxes, displays this sum in the TextBox at the bottom of the form, and transfers the value from line 8 of this form to line 7 in Form 1040. When the user clicks on the "Main Screen" Button, the system hides the current form and displays the Main Screen form. When the user clicks on the "Print Form" Button, the program prints this form on paper. Finally, if the user clicks on the "Exit" Button, the program ends execution.

2.4 Child Care Worksheet

If the user wishes to enter a value for the child-care entry in line 7 of Schedule A, he or she must complete the worksheet shown in Figure 4. Note carefully: all the text entries in lines 1, 2, and 3 in this form are *Labels*—not Text boxes. When the user clicks on the label with caption "1" or "2" on the first or second line of this worksheet, the system displays sequential InputBoxes that prompt the user for his or her name (i.e., the "Name of Payee") and for his or her Social Security Number. The system also displays a MessageBox that reminds this person to use the ScrollBar to the right in order to enter the amount paid for child care. The user must also enter the first name, last name, and qualified expenses paid for each child or dependent in lines 4 and 5 of this form. When the user clicks on one of the entries in the Applicable Percentage frame and then clicks on the Button with caption "Calculate Allowable Expenses," the system computes the totals shown on lines 3 and 6, determines the smaller of these two values in line 7, displays the appropriate percentage value in line 8, computes the "Allowable Child Care Expenses" in line 10, transfers the value from line 10 to line 7 in Schedule A, and formats the output. The remaining Buttons are self-explanatory, and work similarly to those in Schedule A.

2.5 Schedule B

When the user clicks on "Schedule B" from the Main Screen, the screen for Schedule B appears (Figure 5). This is where the user reports the sources and amounts of interest income and dividend income. When the user clicks on the "Calculate Income" Button, the program adds the amounts listed in Parts I and II of this form, and displays these sums

in lines 2 and 4. When the user clicks on the "Main Screen" Button, the program automatically transfers the value from lines 2 and 4 of this form to lines 3 and 4 of Form 1040, and then displays the Main Screen form. When the user clicks on the "Print Form" Button, the program prints this form on paper. Finally, if the user clicks on the "Exit" Button, the program ends execution.

2.6 Schedule C

When the user clicks on "Schedule C" from the Main Screen, the screen for Schedule C appears (Figure 6). This is where the user reports income from a business. This is a multi-part form. The user must enter a business name, business type, and gross receipts (at the top of the form), total expenses (in the middle of the form), and inventory information for lines 6 and 7 (at the bottom of the form). When the user clicks on the "Calculate Profit" Button, the program automatically computes values for the remaining Text boxes in this form. When the user clicks on the "Main Screen" Button, the program displays the Main Screen form. When the user clicks on the "Print Form" Button, the program prints this form on paper. Finally, if the user clicks on the "Exit" Button, the program ends execution.

2.7 General Requirements and Tips

This is a large project, but the quality of your work will not be appreciated if you do not document it carefully. Thus, you should be very meticulous: You will *not* get credit for missing or poorly-documented work. To start, your project should use the object-naming conventions discussed in class and you should format the numbers appearing in text boxes as currency figures with dollar signs and two decimal places to the right of the decimal point. Your project should also contain data validation tests that disallow faulty data. A complete list of data-validation requirements may be found in Figure 7 (Appendix G).

Use Text-Leave procedures or the click procedure for the "Calculate" Buttons in your forms to perform your data validation tests, as appropriate. If an entry in a form violates one or more of the requirements listed above, the program should (1) display a MessageBox indicating the type of error (e.g., "Wages must be more than \$1" in Form 1040), (2) *not* perform any calculations or data transfers, and (3) return the focus to the appropriate TextBox for user correction. Finally, note that all Buttons in this project have access keys.

3. PROJECT DELIVERABLES

3.1 Test Data

Test your program with the data provided by your instructor. For each set of data, you should print a complete set of screen captures that show the resultant tax values. Collect these materials together, organized by test set, as "Part A." (A points)

3.2 Technical Documentation

Documentation is critical. Create both internal and external documentation that describe your program in sufficient

detail to allow someone else to understand it and maintain your code. To do this, print exemplary copies of all form images (at run time) as well as the code for all forms in this assignment, including an About form (not shown). You may print more than one form image on a page, but all code should be clearly identified so that the reader knows what code corresponds to what form. Please omit any system-generated code. Collect this set of pages together and label it "Part B." (B points)

3.3 User Manual

The programmers who create a project are rarely the end users. Thus, you must also create a manual that helps non-technical individuals use your application. This (small) manual should include a general introduction and a description of what each and every Button in each form does (see pages 1-3 above). Collect this external documentation for your project together and label it "Part C." (C points).

3.4 Enhancements

This is your chance to be creative. Develop two enhancements for this project, each of which uses an additional form. Examples might be additional income tax schedules. *Documentation for each enhancement is critical.* For each enhancement, provide a screen capture of your form *at run time*, a listing of your code, and in addition, *a description of your enhancement on one or more separate pages.* Collect these pages together and label them "Part D." (D points).

3.5 Publication.

Use tabbed pages to separate each section of the project listed above, and combine the complete set of items in a 3-ring binder. The title page should contain the title of this project and the name(s) of the developers. Each subsequent page should be numbered, and the first page following your title page should be a table of contents that indicates the starting page of each major section. (E points)

4. CONCLUSION

This case requires students to create an integrated Visual Basic application that replicates simplified versions of selected U.S. income tax forms. The skills required of the developer(s) are those typically learned in the first few weeks of a VB programming class, thereby permitting instructors to assign the case as an interim project. The students who finish this case uniformly say two things: (1) it required a lot of work, and (2) it taught them how to use a number of formerly-isolated programming skills in a comprehensive application. The students who survive also say that their experiences with the project were positive, and often suggest that the instructor use more such cases when teaching the class in the future.

AUTHOR'S BIOGRAPHY

Mark G. Simkin is a professor of Information Systems at the University of Nevada. He earned his BA degree in mathematics from Brandeis University and his MBA and Ph.D. degrees from the University of California, Berkeley. He is the author or coauthor of 15 textbooks, including 3 on Visual Basic and 8 in Accounting Information Systems. He is also the author or coauthor of over 100



research articles, some of which have been published in *Decision Sciences*, *JASA*, *the Communications of the ACM*, *the International Journal of Information Management*, *the Journal of Accountancy*, *the Journal of Computer Information Systems*, *Interfaces*, and *the Journal of Systems Management*.

Appendix A

Figure 1. Main Screen

Appendix B

Exemptions	
<input checked="" type="checkbox"/> Yourself	<input type="checkbox"/> Spouse
Enter number of dependents <input type="text"/>	
1. Total Number of Exemptions Claimed <input type="text" value="1"/>	
Income	
2. Wages, Salaries, tips, etc. From from W2	\$35,000.00
3. Taxable Interest Income -- Schedule B	\$123.50
4. Dividend Income -- Schedule B	\$65.95
5. Business Income or [loss] -- Schedule C	\$42,374.55
6. This is Your Adjusted Gross Income	\$77,564.00
Tax Computations	
7. Itemized Deductions -- Sched A	\$13,181.70
8. Exemptions = \$2,450 * Line 1	\$2,450.00
9. Taxable Income = 6 - 7 - 8	\$61,932.30
10. Total Tax = 22.5% of Line 9	\$13,934.77
11. These are Your Total Payments	\$10,000.00
Amount You Owe	12. This is the Amount You Owe
	\$3,934.77

Figure 2. Form 1040

Appendix C

Medical and Dental Expense	1. Medical and Dental Expenses	\$1,000.00
Taxes You Paid	2. State/Local Income, Real Estate, and Personal Property Taxes	\$2,000.00
Interest You Paid	3. Home Mortgage and Investment Interest	\$5,750.00
Gifts to Charity	4. Gifts by Cash or Check	\$1,000.00
Casualty or Theft Losses	5. Casualty or Theft Losses	
Misc. Expenses	6. Unreimbursed Employee Expenses, Tax Prep. Fees, and Misc. Expenses	\$2,500.00
Child/Dependent Care Expenses	7. Total of Child/Dependent Care Expenses from Worksheet	\$931.70
Total Deductions	8. Add the Amounts from Lines 1-7 for Total Itemized Deductions	\$13,181.70

SCHEDULE A

Figure 3 Schedule A

Appendix D

Part I: Payee Information

	Name of the Payee	Social Security Number	Amount Paid by this Payee
1	Michael Adams	123-45-6789	\$4,165.00
2	Barbara Johnson	065-34-5432	\$1,760.00
3. Total Paid.....			\$5,925.00

Part II: Child/Dependent Information

	First Name	Last Name	Qualified Expenses
4.	Bonnie	Adams	\$4,235.00
5.			
6. Sum of Qualified Expenses:			\$4,235.00
7. Enter the Smaller of Total Paid Expenses (line 3) or Qualified Expenses:			\$4,235.00
8. Select an option from the choices to the right to enter the appropriate percentages:			22.00%
9. Allowable Child Care Expenses: Multiply the appropriate percentage times the amount in Line 8 and enter this amount on Line 8 in Schedule A:			\$931.70

Applicable Percentage:

- \$0 - \$2000: 30%
- \$20,001 - \$39,999: 27%
- \$40,000 - \$54,999: 22%
- \$55,000 - \$75,000: 20%
- Over \$75,000: 18%

Child Care Worksheet

Figure 4. Child Care Worksheet

Appendix E

Schedule B: Interest and Dividend Income

Part I Interest Income	1. List name of payer:	Amount
	Bank of America	\$123.00
	2. Add amounts from Line 1 for Interest Income	\$123.00

Part II Dividend Income	3. List name of payer:	Amount
	IBM	\$65.95
	4. Add Amounts from Line 3 for Dividend Income	\$65.95

SCHEDULE B

Buttons: Calculate Income, Main Screen, Exit

Figure 5. Schedule B

Appendix F

Schedule C -- Profit or Loss from Business

Business Name: Adams Accounting
 Business Address: 123 Main St., Anytown USA 12345

Part I Income	1. Gross Receipts or Sales:	\$65,875.00
	2. Cost of Goods Sold from Line 8:	\$50.00
	3. Gross Income: Line 1 - Line 2	\$65,825.00

Part II Expenses	4. Total Expenses Advertising, Bad Debts, Mortgage, and Taxes, etc.	\$23,450.45
	5. Net Profit or [loss] = Line 3 - Line 4	\$42,374.55

Part III Cost of Goods Sold	6. Inventory at Beginning of Year + Purchases + Cost of Labor, Materials	\$3,700.00
	7. Inventory at End of Year:	\$3,650.00
	8. Cost of Goods Sold = Line 6 - Line 7	\$50.00

SCHEDULE C

Buttons: Calculate Profit, Main Screen, Exit

Figure 6. Schedule C

Appendix G

<u>Form</u>	<u>Line(s)</u>	<u>Requirement</u>
Main Screen	1, 2	Each Social Security number should contain exactly 9 numeric digits in the form xxx-xx- xxxx where x is a number.
	1,3,4	The text boxes for the tax preparer's name, social security number, home address, city, state, and zip code cannot be blank.
	4	The zip code must contain exactly 5 numeric digits.
1040	2	Wages must be more than \$1.00 and no more than \$500,000.
	11	Tax payments must be positive or zero.
Schedule A	1,2,3,4,5,6,7	All entries, where given, must be non-negative numbers.
	4	Gifts must be less than the Wages reported in Form 1040
Schedule B	(all)	All entries, where given, must be non-negative numbers.
Schedule C	(all)	All entries, where given, must be <u>non-negative numbers.</u>

Figure 7. Data Validation Tests