

VBA Final Project

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Introduction

My VBA final project is to assist the Orem Public Library of Utah to improve their processes and better serve the general public through a series of streamlining and automation procedures. The Orem Public Library of Utah was established in 1919 with a mission to enhance the education of the public. It is also one of the busiest single-branch libraries in the state of Utah with more than 310,000 collection stored, including books and non-print titles, and about 1.1 million items checked out annually.

Executive summary of the project

In March 2015, one of the library's staff members had requested that I initiate a VBA project with the intent of streamlining and automating a process via VBA that will ultimately help visitors locate and check-out their desired book or collection from the library's vast book shelves. The project also would assist library administrators to more efficiently scheduling work shifts for library staff, a task currently taking 20 minutes per schedule. Below is a list of the project's objectives:

- a. A drop-box list with the names of all of books.** When people click the title of books, all information related to the said books, including its complete title, author's name (s),

call#, annotation, and page will pop up immediately in different cells with the proper formatting.

- b. A shift schedule.** A sheet will be created and named “Worker_schedule”. On this sheet, there are 3 tables. The table is located in the top left side which details the five workdays for the library. The second row of the table provide the number of workers and staff person’s name are displayed. The second table is on the bottom left side. Names of available workers are marked in red. The third table is on right side, it will show the most efficient shift schedule directly when cells in the first table are changed. Based on the city’s needs, I applied the VBA knowledge that I have learned from school to solve their problems. I will introduce the data I got from the Orem city as following.

The city of Orem has a datasheet like the first figure below (until now, they have about 200 rows and 10 columns, but this database is constantly getting bigger). Based on the client's requirements, I will first use VBA macro to reformat the information to another sheet. They require that once the book name or other items are inputted in the datasheet, the macro will automatically update the information accordingly and into another sheet with specific formatting for each row. When users select any book from the database, they will immediately see a table like the second figure below.

	A	B	C	D	E	F	G	H	I
1	Title				Call #		Annotation		pgs
2	Sword of the Samurai: Adventure Stories from Japan	/	Kimmel, Eric		J 398.2663 A1		Vivid stories packed with action and humor, Eric A. Kimmel brings to life the fiercely honorable "knights of old Japan."		114 pgs.
3	Young Zorro: The Iron Brand	/	Adkins, Jan		J Adkins		Where death can cross your path at any turn, from rattlesnakes and thieves, to bears and blackbirds Diego and his mute milk-brother Bernardo encounter injustice so wicked that they must take action.		233 pgs.
							Wicked wolves and a grim governess threaten Botnie and her cousin Sylvia when Botnie's		

	A	B	C
1	Tango: The Tale of an Island I		
2	Tango: The Tale of an Island Dog	/	Beha, Eileen
3	J Beha		244 pgs.
4	Far, far away, in a Midwestern town in late winter, a wonderful event was happening in a small factory. As the cold wind blew across the flat, open land, a brand-new airplane named Tango was being fitted with its identification number plate. This was a big event for the little airplane because it was the final step before it was allowed to fly. This particular plane's identification number, or ID for short, was 1228, its date of manufacture. The little plane was checked, inspected, and labeled as Airworthy. He was ready to take to the skies.		

Implementation documentation

Once the VBA procedure is fully functional, it will take less than a second for users to enjoy the benefits. Considering the client's requirement, I used the following tools in VBE.

1. Adding a Combo Box under Active X controls and add a list of books when the workbook is open.

Reason for using it: even though a combo box does similar work like a list box, a combo box combines a drop-down-list and a single-line text box. When the data is

getting larger, it will be a little bit harder for users to go through every book title on the list. The book list will actually skip a lot when the user only scrolls down a little. Hence, users can type the book's name that he or she wants to read and get the same information faster.

2. Using Ubound, Left, and Len functions to avoid using a long code statement

Reason for using it: Because I used arrays in my code, Ubound is a terrific statement to find out the upper and lower limits of an array.

3. Applying multiple "Do...Loop" and "If...Then" statements and "Resize" property, and declaring arrays for more complex database

Reason for using them: Arrays are great to restore a list of data and very convenient to avoid defining or redefining length of the list. "Do...Loop" statement helped me to let the code run automatically and provide the values I need. In addition, this statement also saved my time to use less syntax to meet the same requirements. "If...Then" is very valuable to judge a statement and narrow down your searching scope to get a right answer. Resize property enables me to change the size of a range based off the location of the active cell. I found that it's useful than the Offset property.

4. Add a command button and assign macro to it

Reason for using it: this button is extremely convenient for users, especially those who are totally new to Excel or VBE. Users don't need open the code to run. Everything can be done by only click of this button.

Task 1: Selecting a book and getting all information about that book

I inserted a Combo Box under Active X controls of the item Developer. The first thought to fill the combo box with a list of book names I had is to change the Combo Box's properties. I chose the function "Design Mode" and selected the item "Properties". The properties window will pop up, then input the cell address that I want to receive the value when selecting a book from the list. Next, I input the range with book names under "ListFillRange" item. Even though this method works, the Combo Box shows a terrible list of books. Then I had to collect values by adding codes. But how can one still get the list as long as I open the workbook? I used Workbook Open to record my code for the list of the book. But before writing my code, I used Clear method to clear any existed values in the list. The core code to add code is "OLEObjects("ComboBox1").Object.AddItem". Then the code will run fantastic.

a. Conceptual difficulties I had

- i. When I insert the range address to the property "ListFillRange", I found that this property doesn't allow programmers to insert an active range. In other words, it only allows me to input a specific range.
- ii. Another difficulty I met was how to keep the list of books without repetitive values. This mistake was so hard to figure out since the book list is so long. I

even didn't realize that the list was getting longer when I run my code more than one time. Later, I found that the list repeated the whole range of book names once I run the code. Therefore, I have to clear values before run it.

- iii. I couldn't get the list of books when I open my sheet, because I inserted a module and edited my code in it. Then I had to open the VBE to click "run" button or press "F5" to get the list. It's impossible to let a person without any VBA knowledge to open VBE and use my "xlsm" sheet. The city asked me to simplify the whole process.
- iv. Another problem I had for this task was that all of cells couldn't change automatically based the event that happened in my worksheet.
- v. The annotation for each book is pretty long and can't fit the cell automatically. It's very inconvenient for users to adjust the row height and width by hands every time. The thing the city requested is only to choose the book name from the list and get all of information without any other steps.

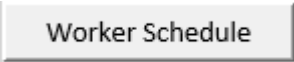
b. Things I learned

- i. Forms controls are very easy to use. I never use a Combo Box under Active-X control and don't pay much attention on the difference between a Forms control and an Active-X control. But by doing this assignment, I know what the difference between them. Form controls are built in to Excel but Active-X controls are loaded separately. Under Active-X controls, I can use objects in my code whereas I can't do this with Forms controls. In addition, Active-X

allows us to design more and can also do the tasks that a basic Forms control cannot do.

- i. Every time when you have to add values to a list, it's better to clear the values that have existed there. Otherwise you will mess up your code.
- ii. If you want the cells change automatically based on the changes of other cells' values, it's better to use Change declaration under that active sheet.
- iii. To let the long description of books fit the cell automatically, I applied "WrapText" and "Rows.AutoFit" methods. Although my code was perfect, it didn't work at the first time because where to place this code is critical too. I have to imbed this code after "Application.EnableEvents = True". The reason is that I need to wait all values are fitted into cells then I can format it. Otherwise, the code will not work the way you expect.

Task 2: Assigning work schedule for all available employees

The task that the Orem city asked is to assign people to a five-day work shift. They had a list of available employees (see figure1 below). They also had a changeable table (see figure2 below). They want to click a button  and get a comprehensive work schedule for all staff (see figure3 below).

# order	Available workers				Data	Morning shift	Afternoon Shift	Number of workers	Start
1	Dave				1/1/2015	Dave	Jeff	3	Katie
2	Jason				1/2/2015	Jason	Tony		
3	Katie				1/3/2015	Katie	Peter		
4	Merrisa				1/4/2015	Merrisa	Flint		
5	Kyle				1/5/2015	Kyle	David		
6	Jeff								
7	Tony								

Figure 1

Figure 2

Data	Morning shift	Afternoon Shift	Number of workers	Start
1/1/2015	Katie,Merrisa,Kyle	Jeff,Tony,Peter	3	Katie
1/2/2015	Flint,David,Ikaika	Carolyn,Nicole,Lila		
1/3/2015	Ashley,Danielle,Dustin	Todd,Jenie,Caitlin		
1/4/2015	Beatriz,Gabriella,Dave	Jason,Katie,Merrisa		
1/5/2015	Kyle,Jeff,Tony	Peter,Flint,David		

Figure 3

For this task, only the red parts in above tables are changeable! Dave, Jason etc. are staff's names. Number of workers means that one person will works in the morning and another one works in the afternoon. If the number is 2, it means that 2 people will work in the morning and another 2 people will work in the afternoon. Figure3 is scheduled from the "start" person. If all of people are assigned, then the shift will start from the first person again. The assumptions are that today's date is Jan 1, 2015 and people working in Orem public library only have a five-day work schedule.

a. Conceptual difficulties I had

- Array is easy to understand but hard to apply it in my own code. For the second task, I couldn't get the right range on my first try.
- How to use Ubound correctly was a challenge to me.

- iii. How to write the code with “If...Then” in one line without making mistakes was hard. This assignment reminds me to use colon sign to combine different parts of a statement together.
- iv. How to nest several “Do...Loop” statements in one sub took me a while to figure out the right logic.

b. Things I learned

- i. Using excel function “Left, Len, Resize” helped me to simplify the code.
- ii. For this assignment, I suggest to declare an array of variables if you have a list of items which are of similar type to deal with. Using “Array” saved me so much time rather than declaring items one by one.

Assistance

For this assignment, I finished it by myself. But the professor also mentioned one thing and I reedited my code a little bit to make it more perfect.