Customer Relationship Management & Analysis Program

VBA Project; Winter 2010

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Executive Summary

Background

Before returning to MBA school, I worked for a credit card Bank in a variety of different roles. One of my roles was to manage the outbound telesales (a.k.a. telemarketing) campaigns where existing Bank customers were contacted and given the opportunity to enroll in another product. Each month, the Bank would generate a file of eligible customers and I would manage the calling of that file, trying to get the largest number of sales, for lowest possible cost.

Business Challenge

When the telesales campaigns first started, they were extremely successful. The results continued to improve for a time, but there came a point where the campaign performance began to decline. After weeks of analysis, I discovered that all of the eligible customers had already been called about the offer and some were being called for a second or third time. Furthermore, I discovered that for each additional time a customer is called, they become less likely to accept the offer. While this could be extremely valuable information for the Bank, they did not have a customer relationship management system to store, analyze and use past marketing information to the improve performance of future campaigns.

Solution

In response to this challenge, I have created a Customer Relationship Management / Analysis program (CRM program for short) in VBA that will store past marketing information, calculate and analyze past marketing results in various ways, and output the information so the Bank can use it to guide future marketing campaigns. Below is a brief description on what the program does and how it works.

1. **Stores campaign data** – The CRM program can store the data for up to 13 marketing campaigns.
2. **Analysis options** – The user can select which campaign they would like to analyze, how many previous campaigns to include in the analysis (i.e. past 6, 9 or 12 campaigns), what type of analysis to conduct, how to output the results and they can choose if they want an email or text message notification once the analysis and output is complete.
3. **Analysis** – The CRM program evaluates each customer in the selected campaign and determines if, and how many times they were previously marketed to and the result of each attempt. Four different counts are available to summarize the findings and each count can be used in a different way to target customers for future campaigns. The counts are focused on the quality of the customer's phone number on file as well as the "reach-ability" of the customer.
4. **Output options** – The CRM program can either append the selected counts on the selected campaign tab to use them in customer selection or it create an additional tab with all relevant data and counts which can be used to further analyze the historical results.
5. **Notification** – Finally, the user can request an email or text message notification once the CRM program has finished running.

Expected Results

By automating this analysis for the Bank, it will not only save an estimated 20 man hours per month (this is about how long it took me to complete the analysis), but it will also complete the analysis in a reasonable amount of time which will allow the Bank to use the information to better target customers for future campaigns. With just small improvements in the quality of the marketing lists (i.e. eliminating the confirmed bad phone numbers from past campaigns), the Bank should enjoy thousands of dollars of savings each month.

CRM Program Description & Explanation

This section will provide additional details on what the CRM program does, how it does it, and other steps that were taken to ensure it does it correctly. Each of the five areas identified in the executive summary will be covered. Specifically the areas will be stores campaign data, analysis options, analysis, output options and notification.

Stores campaign data

The CRM program can hold data for up to 13 marketing campaigns. The type of data, field order, and number of fields for each campaign may differ, but there are two fields that are crucial to the CRM program. Those include the "Cust_ID" (short for Customer ID) and the "Disposition" (result of the marketing effort) fields. An example of what the campaign data may look like is below in Exhibit A. The Cust_ID is a unique identifier for each customer. It is a number generated by the Bank that is linked to their credit card account. This field is used to track the marketing history of each customer, so it is vital that this field be present for each campaign. The Cust_ID field must be the first field in each campaign and the instructions in the CRM program remind the user of this requirement.

Exhibit A – Example of campaign data

	A	B	C	D	E	F	G	H	I	J	K
1	CUST_ID	Last Name	First Name	Suffix	Street Address	City	State	Zip Code	Phone	Credit Line	DISPOSITION
2	443291307619	Smith 01	John	Jr	123 Main St	Salt Lake City	UT	84678	801-459-1111	2000	81
3	444694021813	Smith 02	John	Jr	123 Main St	Salt Lake City	UT	84678	801-459-1111	2000	20
4	444786713657	Smith 03	John	Jr	123 Main St	Salt Lake City	UT	84678	801-459-1111	2000	81
5	442814361874	Smith 04	John	Jr	123 Main St	Salt Lake City	UT	84678	801-459-1111	2000	50
6	442863917599	Smith 05	John	Jr	123 Main St	Salt Lake City	UT	84678	801-459-1111	2000	92
7	442710382055	Smith 06	John	Jr	123 Main St	Salt Lake City	UT	84678	801-459-1111	2000	20
8	444580544987	Smith 07	John	Jr	123 Main St	Salt Lake City	UT	84678	801-459-1111	2000	50
9	443619920278	Smith 08	John	Jr	123 Main St	Salt Lake City	UT	84678	801-459-1111	2000	81
10	442761506680	Smith 09	John	Jr	123 Main St	Salt Lake City	UT	84678	801-459-1111	2000	20
11	443820439685	Smith 10	John	Jr	123 Main St	Salt Lake City	UT	84678	801-459-1111	2000	24

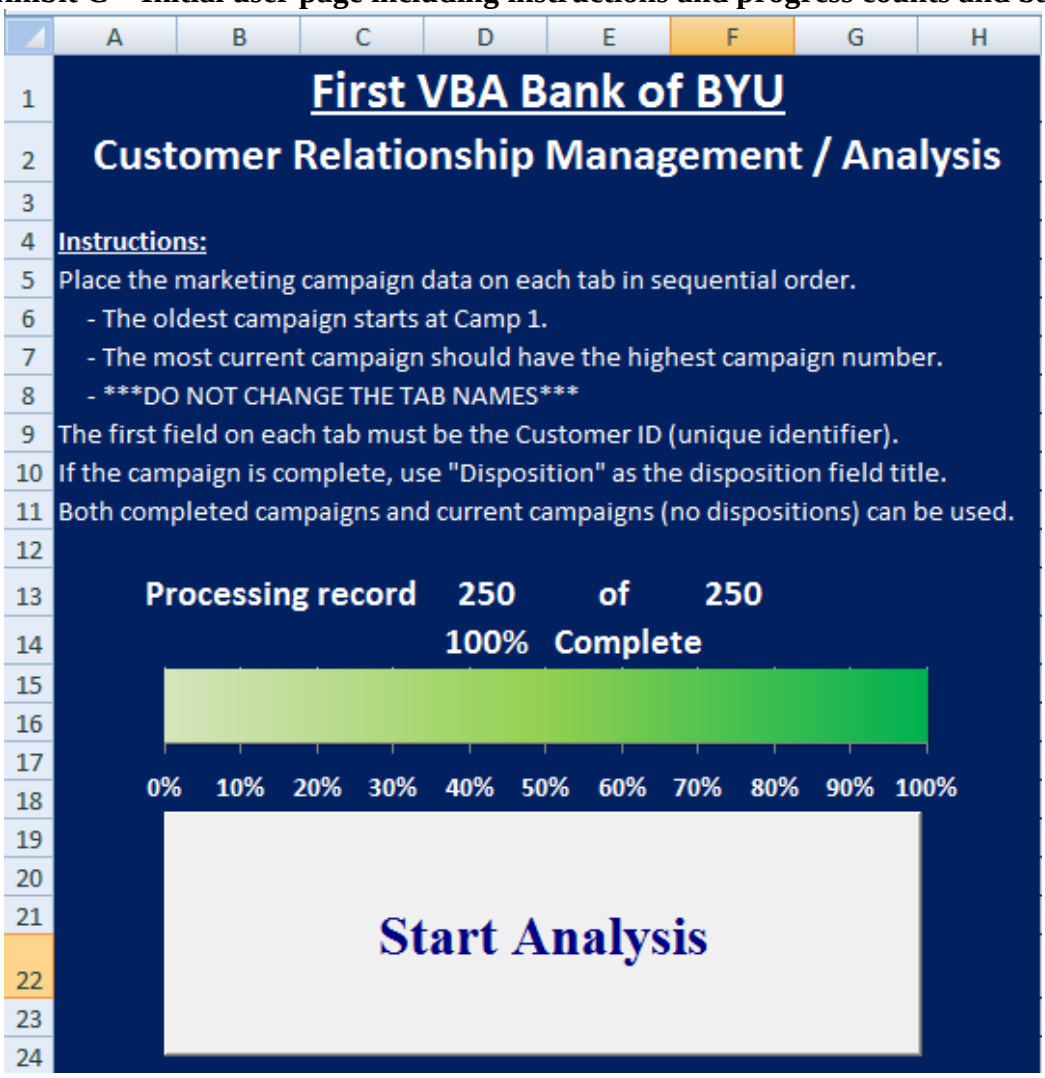
The Disposition field should also be present for each completed campaign, but the positioning of this field is not important. This field will contain a numerical code that indicates the result of the marketing effort for each customer. A list of the various codes and to which count options they are assigned is below in Exhibit B (the count options will be explained in the next section). Since campaigns can last for longer than a month, and a new campaign starts each month, some of the campaigns will not have the Disposition field yet. Those campaign as still included in the analysis because it is valuable to know if a customer is currently being called or has been called recently. The actual result of the marketing attempt will just be unknown until the campaigns are complete, thus a "TBD" (to be determined) disposition will be used in this case.

Exhibit B – Disposition codes, descriptions and assigned counts

	A	B	C	D	E	F
1			Included in which count?			
2	Code	Description	Called	Household Contacted	Customer Contacted	Bad Phone
3	01	Sales	X	X	X	
4	20	Not Interested	X	X	X	
5	22	Has no balance / does not use card	X	X	X	
6	23	Cancelled Credit Card / No Account	X	X	X	
7	24	Hang Up	X	X	X	
8	25	Problem with Bank	X	X	X	
9	26	Too Expensive	X	X	X	
10	27	Already responded to offer	X	X	X	
11	28	Refused Taping	X	X	X	
12	29	Information Only Request	X	X	X	
13	30	Planning to Cancel Card	X	X	X	
14	50	Wrong Number	X	X		X
15	52	Language Barrier (other than Spanish)	X	X		
16	53	Spanish Speaking	X	X		
17	54	Ineligible Address Mismatch	X	X		
18	55	Away for Extended Period	X	X		
19	56	Deceased	X	X		
20	57	Do Not Solicit	X	X		
21	58	DNC Request	X	X		
22	59	Cell Phone	X	X		X
23	61	Cancelled Sale before it was complete	X	X		
24	63	Modem	X			X
25	72	Ineligible Name Mismatch	X	X		
26	81	Max Attempts Total Calls	X			
27	92	Tri-Tone	X			X
28	99	Unfinalized	X			
29	CS	Weekly DNC	X			
30	DA	Scrub	X			
31	DP	Scrub	X			
32	RE	External Scrub Status	X			
33	S3	Scrub	X			
34	S4	Scrub	X			
35	S5	Scrub	X			
36	S7	Scrub	X			

The data for each campaign will be stored on separate tabs within the CRM program. The oldest campaign that will be included in the analysis should be stored on the tab called "Camp 1". Each subsequent campaign should be included in sequential order on the tabs called "Camp 2", "Camp 3", etc. The tab names are pre-populated and the user is informed not to change the names. The user instructions in the CRM program can be found in Exhibit C below.

Exhibit C – Initial user page including instructions and progress counts and bar



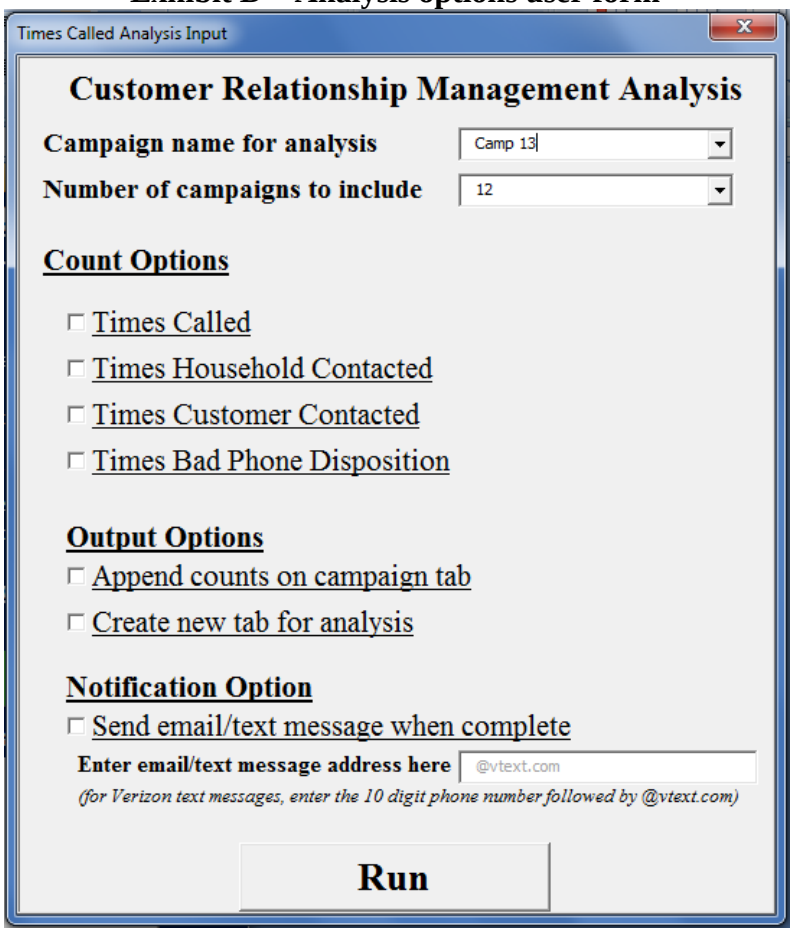
Once all the campaign data is placed in the CRM program, the user is ready to start the analysis. To do so, they simply click on the "Start Analysis" button on the CRM analysis tab (as show above in Exhibit C). The program first checks to see if the Cust_ID and Disposition fields are properly included on each tab. First, if the Cust_ID field is not in the first column on a tab, a message box will appear asking the user if they would like to hide that campaign tab and continue with the analysis. Hiding the campaign tab removes it from the analysis and allows the program to continue running properly. If the user clicks "No", the program ends and the user can investigate why that field is missing. If they click "Yes", the sheet is hidden and the program continues to check the rest of the tabs until they are all correct, or hidden.

Next, the program checks for the Disposition field on each tab. If it is missing from a tab, a message box informs the user that this field is not present and asks if they would like to continue. Since it is probable that at least one campaign will not have the Disposition field, the message just informs the user and continues if they click "Yes". If there is something wrong with the data (i.e. maybe the disposition field heading is misspelled), the user can click "No" and end the program to correct it.

Analysis options

Once the data is validated, the user is asked to make selections for the campaign to analyze, how many previous campaigns to include in the analysis, the type of analysis (counts), the type of output, and whether or not they want notification once the program has finished running. These selections are made on the user form shown in Exhibit D below. The types of selections the user can make are each described in more detail below.

Exhibit D – Analysis options user form



- **Campaign name for analysis** – First, the user selects the campaign tab name to use in the analysis. A pre-populated drop down list is provided with the eligible campaign tab names. The list is populated with all the tabs that are visible, so if a campaign tab was hidden because the Cust_ID field was missing, it would not be an option for the user to select. "Camp 13", if available, is the default value. Also, there are error messages if the user does not select a campaign name, or if they type a campaign name that is incorrect.
- **Number of campaigns to include** – Next, the user must select the number of campaigns to use in the analysis, or in other words, how far back they would like to go in their analysis. This combo box is pre-populated with values from 1 to 12 in descending order. 12 is the default value. This option also contains error messages if left blank or if an incorrect value is entered. Finally, there is an error message is the user tries to include more campaigns then there are available after the campaign selected for analysis. For

example, if "Camp 10" is selected as the campaign to analyze, the number of campaigns must be 9 or less since there are only 9 previous campaigns stored in the CRM program.

- **Count Options** – The user then selects the type of counts to include in the analysis. Each count tracks a different group of dispositions as was shown in Exhibit B. An error message is presented if the user does not select any counts, as at least one count must be selected. The meaning of each of the counts are explained below:
    - Times Called – This simply counts the number of times a customer was called (showed up in a campaign).
    - Times Household Contacted – This counts the number of times someone in the customer's household (either the customer or someone else) was contacted.
    - Times Customer Contacted – This counts the number of times the customer was contacted.
    - Times Bad Phone – This counts the number of times the phone number was confirmed as a bad phone number.
- **Output Options** – The user then selects the type of output for the analysis. Again, if no selection is made, an error message is presented directing the user to make a selection. The types of output are described below.
    - Append counts on campaign tab – This option will append the selected counts on the campaign tab selected for analysis. The counts will simply be placed to the right of the last field on the campaign tab, each count after the previous one.
    - Create new tab for analysis – This option will create a brand new tab that the user can use for further analysis. All the Cust_IDs from the selected campaign will be placed on the first column, followed by all the customer's disposition codes for each previous campaign and finally the selected counts will be placed as the final columns on the tab. The name for this new tab is dynamic, so the user can create as many analysis tabs as needed without causing any errors or over-writing previous analysis tabs.
- **Notification Option** – Finally, since the analysis may take some time to run, the user can request an email or text message once the program has completed. After selecting this option, the input box is enabled where an email address or Verizon 10-digit cell phone number can be entered. The Verizon email extension was pre-populated because that is the Bank's cell phone provider. There are error messages if the user selects the option without providing an email address or cell phone number.

Analysis

Once all the analysis options have been correctly entered, the user clicks "Run" to start the analysis. This is where all the behind the scenes "magic" happens. There were many ways to go about automating this program and many of which were attempted (these will be described in the Learnings and Challenges section), but the final program is the one that was the quickest and most efficient. Given the large size of the Bank's campaign files (tens or hundreds of thousands of customers each), speed was the most critical factor for this program.

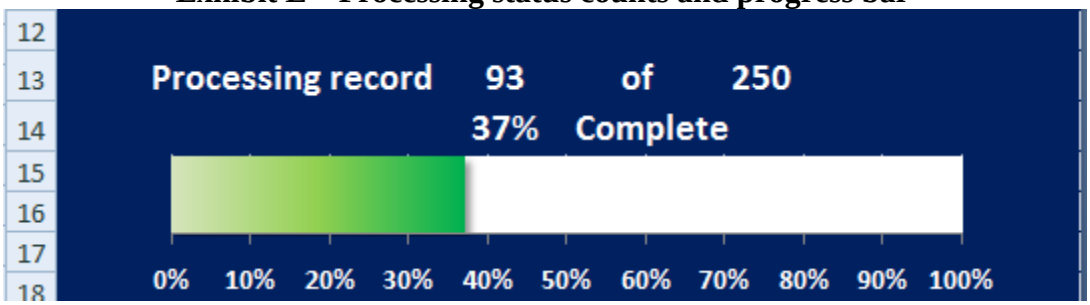
For each Cust_ID in the campaign to analyze, the CRM program does the following:

- Uses the built-in Find procedure to search for the Cust_ID on previous campaign tabs.
- If a Cust_ID match is found, the program searches for the Disposition field on that tab.
    - If there is no Disposition field, a "TBD" (to be determined) disposition is used.

    - If the Disposition field is found, the disposition value is located for that Cust_ID for that campaign.
- Using the disposition value, or "TBD", the program begins counting the dispositions (or adds to the previous count) for each of the selected count options (see exhibit B for the disposition values and their assigned counts).
    - The initial analysis that I completed while working at the Bank only included the Times Called count, or the number of times a customer showed up in a marketing campaign file. The CRM program takes this analysis one step further by incorporating the previous marketing results and creating different counts based on those results. These additional counts can be used to further optimize the calling file by eliminating customers who are not likely to be reached and/or those not likely to accept the offer. One obvious example is customers where a bad phone number was identified in a previous campaign. As it stands today, the Bank may call those customers in subsequent campaigns. The CRM program can identify those customers and allow the Bank to remove them from future marketing files.
- The program continues to run and add to the selected counts until each Cust_ID on the campaign to analyze has been searched for on each of the previous campaigns as selected by the user.

Since the program can take some time to run, I wanted the user to be aware of how many records there are to search and how far along the program is in the analysis. This was to avoid the thought that the program is frozen. Once the program starts the analysis, the user will see the CRM Analysis tab (as seen in Exhibit B). This tab will display the record which is currently being processed, the total number of records to process, and the percentage complete of the program. Additionally, there is a progress bar that continues to move as the program progresses. A screen shot of these elements in progress is below is Exhibit E.

Exhibit E – Processing status counts and progress bar



Output options

The user has two output options available. The first is to append the counts on the campaign tab being analyzed. With this option, the counts that were selected are placed on the campaign tab, starting with the first available field to the right of the campaign data. The count titles are dynamically placed at the top of each column indicating which type of count it is, and the timeframe for which the count is based (i.e. Called 12 months). As the program runs, the counts are placed on the campaign tab as they are encountered. For example, after the first instance a Cust_ID is found on a previous campaign, a "1" is placed in the Called column for that Cust_ID.

The next time that Cust_ID is found, the Called count will increment by 1, and so forth. An example of this output option is below in Exhibit F.

With this output option, the user can utilize the counts to select customers that will be more likely to accept the offer (lower Called and Contact counts) as well as eliminate customers who are not likely to be reached (higher Bad Phone counts). These selections more easily made with the counts on the same tab as the campaign data. The data can be placed in a pivot table where selection criteria can be applied and the qualifying records can be output with all the data needed to make the telesales calls.

Exhibit F – Output option #1 - Append counts on campaign tab

	A	I	J	K	L	M	N
1	CUST_ID	Phone	Credit Line	Called 12 months	Household Contacted 12 months	Customer Contacted 12 months	Bad Phone 12 months
2	443640245060	801-123-4567	2500	1	1		1
3	444667322430	801-123-4568	2501	1	1	1	
4	445288096999	801-123-4569	2502	1	1		1
5	444242577706	801-123-4570	2503	1	1		
6	443646822458	801-123-4571	2504	1	1	1	
7	443574774801	801-123-4572	2505	1	1	1	
8	443811422163	801-123-4573	2506	1	1	1	
9	444709195178	801-123-4574	2507	1			1
10	443187838743	801-123-4575	2508	1			1
11	444964522764	801-123-4576	2509	1			1
12	443155783013	801-123-4577	2510	2	1	1	

The second output option is to create a new tab for analysis. With this option, a brand new tab is created with a dynamically generated tab name. The tab name begins with "Analysis" and is followed by the number of analysis tabs for this campaign, and finally the campaign name being analyzed. For example, if you are analyzing Camp 13 for the first time and you selected the previous 12 campaigns, the tab name would be, "Analysis 1 – Camp 13". The reason the name had to be dynamic is to allow for multiple analysis tabs for a single campaign name. On the new tab, the Cust_IDs are placed on the first column followed by the dispositions from all the previous campaigns for each Cust_ID. Finally, the selected counts are placed at the far right. An example of the new tab for analysis is below is Exhibit G.

With this output option, the user can analyze the results of the previous marketing efforts to determine an appropriate selection criteria for future campaigns. They can also continue to refine that criteria as more campaigns are completed and new data becomes available.

Exhibit G – Output option #2 – New tab for analysis (part A: columns A - M)

	A	B	C	D	E	F	G	H	I	J	K	L	M
1	CUST_ID	Camp 12	Camp 11	Camp 10	Camp 9	Camp 8	Camp 7	Camp 6	Camp 5	Camp 4	Camp 3	Camp 2	Camp 1
2	443640245060									50			
3	444667322430							1					
4	445288096999					50							
5	444242577706										53		
6	443646822458							1					
7	443574774801						20						
8	443811422163									20			
9	444709195178								63				
10	443187838743									92			
11	444964522764				92								
12	443155783013	TBD		20									

Exhibit G cont. – Output option #2 – New tab for analysis (part B: columns A, N-Q)

	A	N	O	P	Q
1	CUST_ID	Called 12 months	Household Contacted 12 months	Customer Contacted 12 months	Bad Phone 12 months
2	443640245060	1	1		1
3	444667322430	1	1	1	
4	445288096999	1	1		1
5	444242577706	1	1		
6	443646822458	1	1	1	
7	443574774801	1	1	1	
8	443811422163	1	1	1	
9	444709195178	1			1
10	443187838743	1			1
11	444964522764	1			1
12	443155783013	2	1	1	

For both output options, the new columns of data are auto-fit and formatted so the data appears in a presentable and readable format for the user.

Notification

Finally, the user can select the option to be notified via email or text message once the program has finished running. Since the Bank's cell phone provider is Verizon, the text message email extension for Verizon is pre-populated in the input box. The email is sent from a Gmail account set-up just for the CRM program, so no user name or password information is required from the user. The email or text message simply reads, "The CRM analysis has finished running." If the email is unable to be sent for whatever reason, a message box notifies the user of such.

Learnings and Challenges

The CRM program has gone through a lengthy evolution to arrive at where it stands today. The largest driver behind all the changes was speed. It is critical that the code run as quickly and efficiently as possible in order to handle the Bank's large marketing files. With each version of the program, the speed and efficiency improved. I will provide a brief history of the CRM program evolution as well as some my key learnings and "cool" aspects of the program.

Need for Speed

The CRM program started out as an array based, iterative solution. Two dynamic arrays were used to store and track all the data. The first array stored all the Cust_IDs and their corresponding dispositions for each previous campaign. The second array stored all the values for each of the counts that the user selected. The code would run "For" loops to iterate through each Cust_ID on each campaign, one-by-one, to check if they matched the Cust_ID on the selected campaign to analyze. At first, it appeared that this was the best solution and that it would work in the desired amount of time, but then I discovered a crucial flaw in my code. The flaw was unnoticeable when using my staged data, but when live data was used, it became quite apparent that something was wrong. The code was only trying to match the first Cust_ID on the selected campaign with the first Cust_ID on each previous campaign, the second with the second, and so forth. This is opposed to checking for the first Cust_ID on the selected campaign with *every* Cust_ID on previous campaigns. After I corrected the code, the processing time for

became absurd, and would not work for the Bank. According to my estimates, the code would run for about 38 days before completing (and this may have been conservative).

The next version of the program was an array based, "Find" solution. Instead of using "For" loops to run through each Cust_ID in every previous campaign, I replaced that with the "Find" procedure. All the values were still stored in an array until the program was completed, and then they were output in the selected format. This approach reduced the estimated full file processing time from about 38 days to about 4 days. While this was a great improvement, it was still not short enough to be viable for the Bank to use.

The third version was a long shot attempt to use "VLOOKUP" formulas to allow Excel to find the desired information through processing power. This was a feeble attempt to solve the problem and I was not even able to time how long this would take because my computer would freeze as soon as the code began. The dual processors were maxed out and I thought my computer was going to begin to lift off the desk because the fan was working so hard. After a couple of attempts and subsequent reboots, I abandoned this approach.

The fourth and final version of the program kept the "Find" procedure and got rid of the arrays. Since the data was simply being stored in the array before being output, I decided that I could eliminate the array and go right to output whatever data is found as the code runs. This was successful and further reduced the processing time by 64%. This version of the program could successfully process a full size file over a weekend and maybe even overnight, depending on the size of the campaigns. This timeframe could work for the Bank. It was the fasters and most efficient solution that I came up with after many hours of trial and error.

Key Learnings

In re-engineering the code almost four complete times during this process, I learned a great deal. I figured out how to incorporate time stamps to estimate how long a full file would take to run. More importantly, I learned several ways to search for and gather information from various tabs and how to do so in the quickest and most efficient manner.

Another area in which I learned a great deal was in error checking and error handling. It is crucial for the CRM program to have valid data in order for it to work properly. And since it could take a long time to run, I didn't want to waste valuable time running the program with bad data. I figured out ways to have the program look for signs of bad data and inform the user or get input from them to correct the problem. For example, I made the mistake of running the program where my selected campaign was completely blank (no Cust_ID). I left it running all night only to find that it was still only 1% complete in the morning. After making this mistake, I put in the check for the Cust_ID in the first column of each tab and to hide any tabs that do not have this field.

Finally, the more time I spent working on the CRM program, the more "bells and whistles" I would think of. Really going into depth with this idea brought many additional ideas to light that could be useful to the Bank. For example, since the program may take a while to run, I thought about creating "Pause" and "Continue" options where the user could halt the program when they needed the resources on their computer, and simply continue where they left off when they have the time and available resources to do so. Also, I thought about allowing the user to dynamically

create counts and assign disposition codes to those counts. Both of these would provide greater flexibility and customization for the user. While these are enhancements that I could add to the CRM program, I have already spent more time than I should on the project (over 60 hours). Maybe I will hold out to see if those features provide any monetary benefits from end users.

Cool Factors

Overall, being able to create a program like this is pretty cool for several reasons. First, I was able to create something that a Bank with a lot more resources has been trying to do for some time. Secondly, the financial benefits of such a program can be very significant for the Bank or any other company with similar continuous marketing programs. Finally, I have come to understand the marketability of VBA skills and how they can become very applicable in a business setting.

Now from a program aspect, there are many things which I think are cool. First, being able to drastically shorten the amount of time it takes the program to run was a huge success. When I discovered how long the first, correct version took to run, I thought my idea was dead in the water, but I was able to try multiple solutions and find one that works. Next, I think the progress bar is pretty cool. I kept getting frustrated not knowing if the program was running and I didn't have a good way to track the progress. I first created the counts and the percent complete, but the progress bar that grows while the program is running was very exciting to me. I did test the processing time of the program with and without the progress bar and it does add to the processing time, but in the test mode it is well worth it. When full size files are used, it should be turned off to save time.

Summary

The CRM program is my attempt to solve the Bank's challenge of not being able to use historical marketing campaign results to make their future marketing efforts more productive. I was able to get the program to run in a reasonable amount of time so that the Bank can run full size marketing files either overnight or in a worst case scenario, over a weekend. This program can save numerous man hours each month in conducting this analysis, but more significantly, the Bank should be able to save thousands of dollars each month by using the analysis to target those customers that are more likely to accept their offer.