

## **Large Scale Reporting Solution using SAS® and Excel**

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### **ABSTRACT**

Are you looking for large scale reporting from your data? Do you want to empower end-users with the information that data provides and help in the decision making? Do you want to serve all the reporting needs of the customers without the need for a BI or Reporting tool? Do you want the reports to be generated on a single click using a user-friendly UI? Do you have a large audience who are looking for the reporting services?

If your answer is affirmative, then this paper is for you. Here we discuss a use-case wherein every quarter the business wants to generate more than 1500 customized customer reports, so we have developed a tool which enables the business to generate the customer specific reports on single-click and share the report(s) with the customer(s) as an email attachment. To achieve this, we use SAS Programming, SAS Add-In for Microsoft Office (MS-Office), VB Script and Think-Cell plugin for MS-Office. The final output is MS-PowerPoint and PDF report which can be shared with the customer(s) via email and is accessible anywhere.

By the end of this paper, you will get an overview on using SAS Programming for large scale reporting purposes with the help of Output Delivery System (ODS) for Excel output and VB Script for converting excel data to MS-PowerPoint and PDF report.

### **INTRODUCTION**

Irrespective of the industry and size of the company, there will be steady-to-exponential growth in data collection and the number of users who use this data to make day-to-day business decisions. It is an expensive affair to provide an application which caters to all the reporting needs to the growing user base. To serve the reporting needs, irrespective of the user base, we can use the file-based reporting solution which is cost-effective, sharable and accessible (if stored in a central location). This paper describes an approach to generate thousands of customized reports in various formats. The solution discussed demonstrates the power of integration of SAS with VB Script and Think Cell for generating reports using predefined templates.

In this paper, we consider a use-case of YesMart, an anonymous large-scale franchise-based manufacturer and retailer with over 1500+ outlets. YesMart requires a solution which can report the performance of each outlet/customer on a quarterly basis.

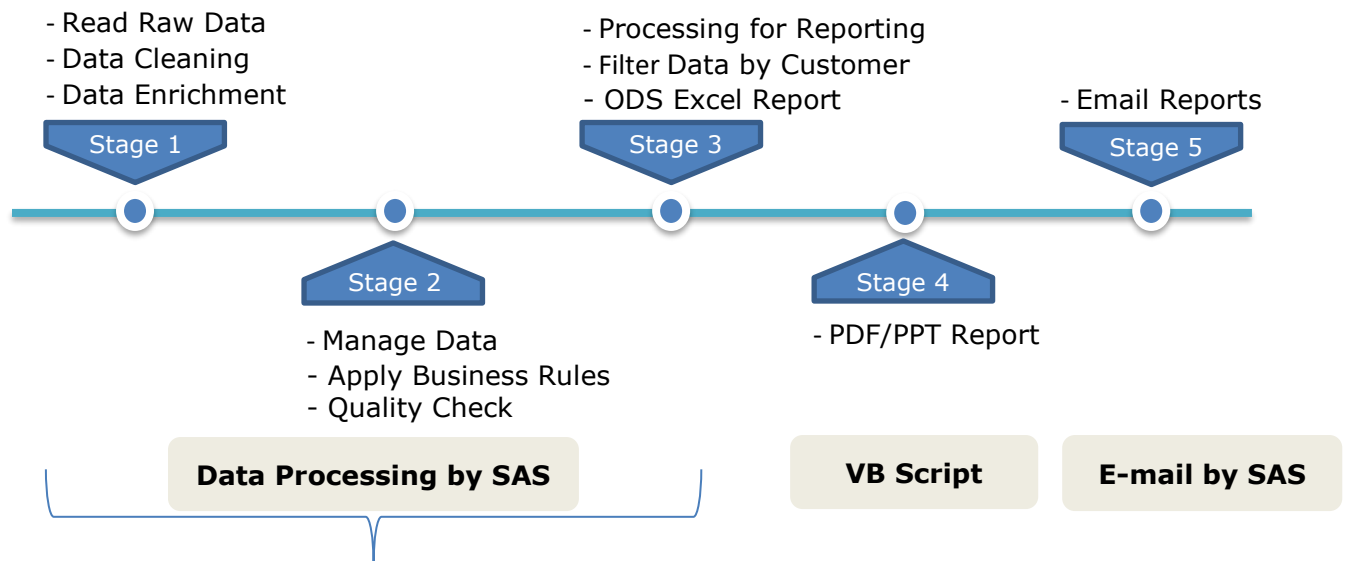
Reports are generated for each outlet/customer level which includes the following:

- Summary metrics with category combinations which include units sold, percentage contribution and quarterly sales value.
- Graphically represented yearly and quarterly performance till date.
- Tabular report which shows units and performance metrics by product hierarchy.
- Graphically represented year-on-year growth rate.

### **PROCESS FLOW DESIGN**

The process flow designed to create the solution is discussed in this section. Predefined PowerPoint templates have been created after discussing with the business. SAS is used to create the data lake and with the help of SAS Macros, data for the specific customer is

exported to MS-Excel file using SAS ODS Statement. VBScript is used to read customer specific data from Excel file to feed the data into the pre-defined PowerPoint template objects and produce updated customer report as MS-PowerPoint and PDF document. Generated MS-PowerPoint and PDF reports are distributed to end users using automated email solution.



**Figure 1: Stages Overview**

Following listed technology platform was used for developing reporting solution:

- SAS Programming – To create Data Lake, generate MS-Excel Reports and Email Reports.
- Microsoft Excel – User-friendly UI which invokes SAS Stored Process using SAS Microsoft Add-in to generate Excel Reports.
- VBA – To read data from Excel Reports and feed it to PowerPoint Objects such as Tables, Text box and Graphs (ThinkCell objects) and store as MS-PowerPoint and PDF reports.

## IMPLEMENTATION

### DATA LAKE

Raw data files are imported to SAS and transformed to create a final dataset and is a primary dataset to be used by the SAS Stored Process which is invoked from Excel using SAS Add-in for Microsoft Office. Data lake is used to store aggregated sales data, product master and customer related information.

### EXCEL REPORTS

A SAS Program which is converted to SAS Stored Process is used to generate customer-specific Excel Reports. Below are the steps:

- a) Dimension files shared for each customer every quarter is converted to SAS tables.
- b) Dimension tables are joined with the data available in the data lake.
- c) SAS Macros are used to subset the data from the consolidated dataset for each customer, implement the business logic and then generate a customer-specific Excel Report.

## REPORT GENERATION

An MS Excel interface is created, which enables users to run the Job and generate PPT/PDF reports with a single button click.

*VBScript* performs the followings tasks:

- a) Invoke SAS Add-in for Excel to call SAS Stored Process.
- b) Invoke ThinkCell plugin to inject data to ThinkCell Objects in PPT.
- c) Open the PPT Template (Standard Report Template).
- d) Read the data from the generated Excel Reports (specific to each customer).
- e) Feed the data from Excel to PPT Report objects which include Graphs, Text elements, KPI's, Tables and format text based on the type of metrics and data.
- f) Save report as PPT and PDF.
- g) Share reports via email.



**Figure 2: Step by Step Report Generation Flow**

## ADVANTAGES

Below are some of the advantages:

- Tight coupling between SAS, VB Script and PPT Template.
- SAS Microsoft Add-in allows us to invoke SAS Stored Process and generate Excel Reports.
- Low-cost solution for reporting needs.
- As it is a file-based solution, there is no need for subscribing/maintaining separate applications/servers.
- Serves a large user base.
- No need to login to any application as reports are shared via email and stored in a central location.

## EXCEL TOOL

Excel tool works as a front-end, which invokes SAS Stored Process with the help of SAS Add-in for Microsoft on a single button click.

D3					
"CustReport_BL_Main" executed at 5/3/2018 3:18:44 AM.					
	A	B	C	D	F
1					
2		Year	Quarter	Stored Procedure Execution Status	Executed By
3		2018	1	"CustReport_BL_Main" executed at 5/3/2018 3:18:44 AM.	balraj.pitlola
4				"CreatingFolders_Distribution" executed at 4/23/2018 9:06:01 AM	balraj.pitlola
5					Report Gen
6					Distribute Reports
7					
8					
9					
10					
11					
12					

Figure 3: Excel UI Tool

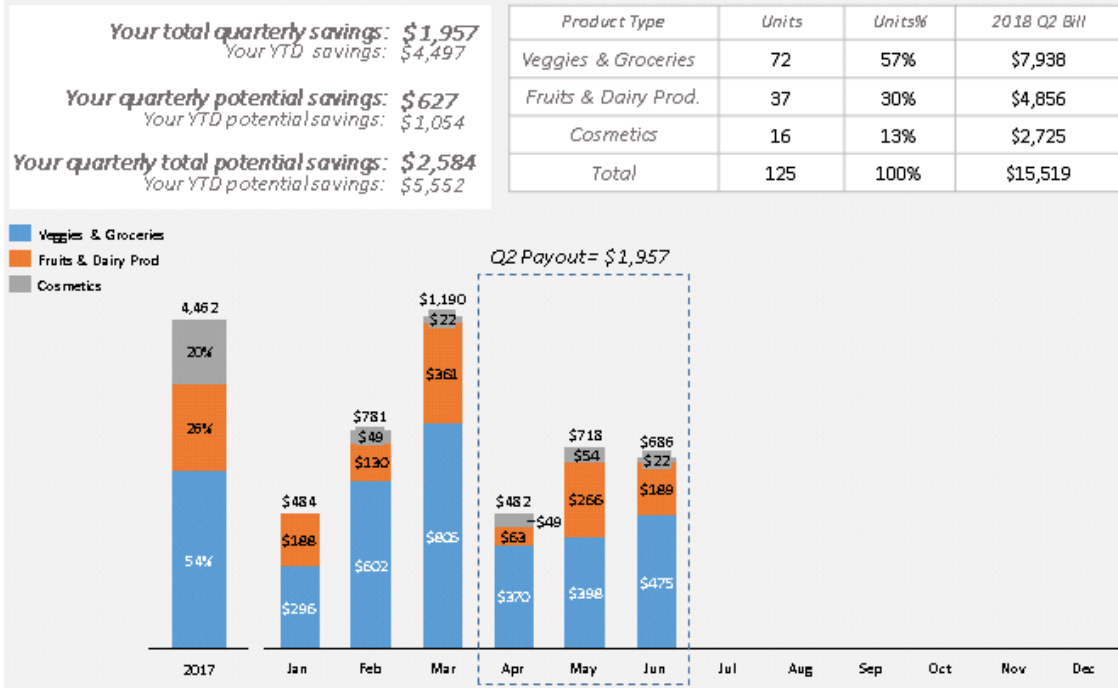
### SAMPLE REPORT

Sample reports have been used to illustrate the power of integration of SAS, VB Script and Think Cell to generate the customized reports in PowerPoint format as well as PDF format.



Page 1: Customer Report of an account

## Customer Savings Summary



Page 2: Customer Savings Summary

## Customer Rebate/Savings Details

**Your total quarterly savings: \$1,957**

### 2018 Q2 Veggies & Groceries Savings

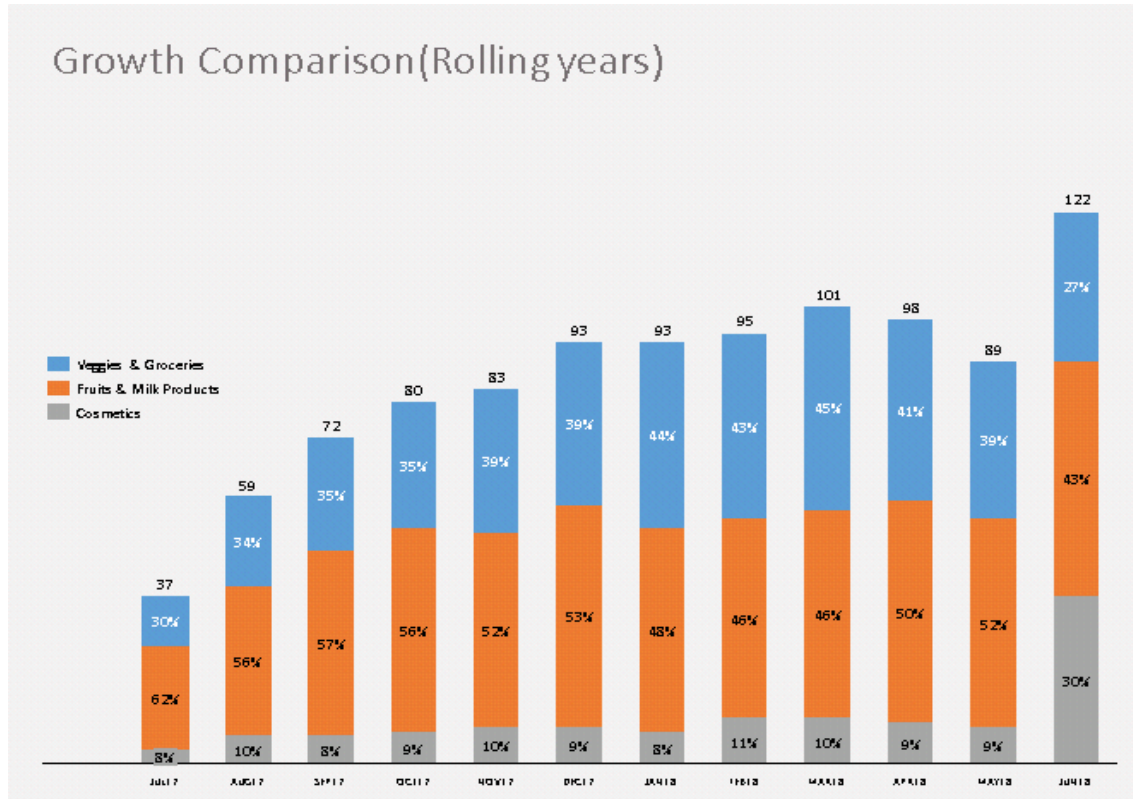
Combinations	Units	\$Savings
Coffee & Tea Powder with Sugar	26	\$827
Noodles with Ketchup or Cheese	0	\$0
Dal & Pulses with Refined Oil	0	\$0
Leafy Veggies with Masalas & Spices	0	\$0
Dry Fruits with Honey & Nuts	0	\$0
Bread & Biscuits with Jam or Spreads	5	\$84
Utensil Cleaner with Floor cleaner	3	\$74
Mosquito Repellent with Fragrance	0	\$0
Veggies with Rice or Flour	10	\$222
Health Drinks with Soft Drinks	2	\$36
<b>Total</b>	<b>46</b>	<b>\$1,243</b>

### 2018 Q2 Fruits & Dairy Products

Combinations	Units	\$Savings
Milk with Banana & Mango	14	\$455
Curd or Yogurt with Eggs or Banana	2	\$63
Cheese with Grapes or Apples	0	\$0
Soya Milk with Orange	0	\$0
<b>Total</b>	<b>16</b>	<b>\$518</b>

Cosmetics	Units	\$Savings
Eyeliner/ Lip gloss	0	\$0
Body Lotion	4	\$103
Fragrance	1	\$22
<b>Total</b>	<b>5</b>	<b>\$125</b>

Page 3: Customer Savings Details



Page 4: Growth Comparison

## APPENDIX

### SAS PROGRAM

Given below is a generalized program that gives a high-level overview of how SAS Macros is used to filter the data at Customer and OfficeId to generate respective excel outputs.

```

/* This DATA Step is for Filtering Data */
DATA << FILTERED-DATA >>;
  SET << FINAL-DATASET >>;
  << FILTER DATA FOR QUARTER AND YEAR >>
RUN;

/* Fetching unique CUSTOMER NAME and OFFICE ID */
PROC SQL;
create table << TABLE >> as
select distinct monotonic() as row,customer, office_id from << TABLE >>;
QUIT;

/*
creating macro variable nrows with count value w.r.t Customer & Office id
*/
PROC SQL noprint;
select COUNT(*) as cnt into :nrows from << TABLE >>;
QUIT;

```

```

%macro final_report();
%macro d;%mend d;
/*Running loop for each Customer and their OfficeId*/
%do i=1 %to &nrows;

    /* Assigning CustomerName to a Macro-variable */
    PROC SQL;
    select distinct strip(customer) into :Office_owner
    from << TABLE >>
    where strip(put(row,8.))="&i";

    /* Assigning OfficeId to a Macro-variable */
    select distinct strip(office_id) into :Office_id
    from << TABLE >>
    where strip(put(row,8.))="&i";

    QUIT;

    /**** Filtering Data for each Customer and OfficeId ****/
    %macro data_filter;

        DATA << CUSTOMER-DATA >>;
        SET << TABLE >>;
        WHERE STRIP(customer)=STRIP("&Office_Owner");
        %if %length(&Office_id)>0 %then %do;
        WHERE also STRIP(OfficeId)=STRIP("&Office_Id");
        %end;
        RUN;
    %mend data_filter;

    %data_filter;

    /**** REPORTING BUSINESS LOGIC HERE ****/

    /**** Macro for generating Excel Report ****/
    %macro report_gen();

    %if %length(&office_id)>0 %then %do;
    ods excel file="&output_des./&office_owner. &office_id..xlsx";
    %end;

    %else %do;
    ods excel file="&output_des./&office_owner..xlsx";
    %end;

    ods excel options (embedded_titles='yes' sheet_interval="none"
    sheet_name="Summary");

    << PROC PRINT Statements-1 >>
    << PROC PRINT Statements-2 >>
    << PROC PRINT Statements-3 >>
    << ...>>
    ods _all_ close;
    %mend report_gen;

    % report_gen;

```

```
%end;  
%mend final_report;
```

```
% final_report;
```

## CONCLUSION

By leveraging SAS Programming, SAS Macros, VB script and Think Cell; we can develop a reporting solution which enables business users to generate thousands of customized reports with one button click and distribute using email without any manual intervention. The reporting solution orchestrated in the paper can be deployed to generate thousands of reports on a periodic basis.

## ACKNOWLEDGMENTS

I would like to thank Vasanth Gummadala (Data Scientist, Alfuttaim,) and Sai Buddhavarapu (Executive Consultant, Core Compete) for their guidance in creating a blueprint during the development phase.

## CONTACT INFORMATION

Your comments and questions are valued and encouraged. Contact the author at:

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