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Submitted by

RAVI KUMAR – (1900290149080)

Under the Supervision of

Prof. ANKIT VERMA

(Assistant Professor)

Department of Computer Applications,

KIET Group of Institutions,

Delhi-NCR, Ghaziabad

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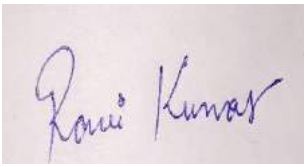
DR. A.P. J. ABDUL KALAM TECHNICAL UNIVERSITY, LUCKNOW (AUGUST ,2021)

DECLARATION

I hereby declare that the work presented in this report entitled "**Automatically End-to-End Monitoring Report and Dispatcher Status Report**", was carried out by me. I have not submitted the matter embodied in this report for the award of any other degree or diploma of any other University or Institute. I have given due credit to the original authors/sources for all the words, ideas, diagrams, graphics, computer programs, experiments, results, that are not my original contribution. I have used quotation marks to identify verbatim sentences and given credit to the original authors/sources. I affirm that no portion of my work is plagiarized, and the experiments and results reported in the report are not manipulated. In the event of a complaint of plagiarism and the manipulation of the experiments and results, I shall be fully responsible and answerable.

Name: **RAVI KUMAR**
Roll. No.: 1900290149080
Branch: MCA



(Candidate Signature)

ACKNOWLEDGEMENT

Guidance is the key factor for achieving the goals. No project can be completed without correct help from expert in any field. At this point, I wish to express my gratitude towards those, who have made this work possible.

I am indebted to my guide and Head of Computer Application Department **DR. AJAY SHRIVASTAVA** and co-guide **Prof. ANKIT SHARMA** for his invaluable suggestions, scholarly guidance, constructive criticism and encouragement at every step in the dissertation study.

I am highly indebted to **ANKUR TYAGI** (**PLM Project Manager Motherson Sumi Infotech and Design Ltd., Noida**) for the guidance and constant supervision as well as for providing necessary information regarding the project and for the support in completing the project.

I also wish to acknowledge with great appreciation my parents, all my classmates and all my friends at KIET, who encouraged me throughout the year and for their timely help and kind co-operation.

With Sincere Regards,
RAVI KUMAR

CERTIFICATE

This is to certify that dissertation entitled **"Automation of End to End Monitoring Report and Dispatcher Status Report"** submitted by **Ravi Kumar, Roll No 1900290149080** is record of bonafide work carried out by him, under my guidance, in fulfilment of the requirement for the award of the Degree of Master of Computer Application with specialization in Product Lifecycle Management (PLM) from Department of Computer Application, Krishna Institute of Engineering and Technology, Muradnagar, Affiliated DR. A. P. J. ABDUL KALAM TECHNICAL UNIVERSITY ,LUCKNOW

Date:

Place: Muradnagar

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LIST OF ABBREVIATION

BMIDE	Business Modeler Integrated Development Environment
CPG	Consumer Packaging Goods
FMCG	Fast Moving Consumer Goods
ITK	Integrated Tool Kit
PLM	Product Lifecycle Management
IS	Interspec
TC	Teamcenter
RMI	Remote Method Invocation

ABSTRACT

Fast-moving consumer goods (FMCG) or consumer-packaged goods (CPG) are products that are sold quickly and at relatively low cost. Examples include non-durable goods such as packaged foods, Beverages, toiletries, over-the-counter drugs and many other consumables. In contrast, durable goods or major appliances such as kitchen appliances generally replaced over a period of several years.

Many fast moving consumer goods have a short shelf life, either as a result of high consumer demand or because the product deteriorates rapidly. Some FMCGs, such as meat, fruits and vegetables, dairy products, and baked goods, are highly perishable. Other goods, such as pre- packaged foods, soft drinks, chocolate, candies, toiletries, and cleaning products, have high turnover rates.

The project solution provides the way to automate generation of End to End Monitoring Report and Dispatcher status Report.

CHAPTER-1

INTRODUCTION

FMCG (Fast-Moving Consumer Goods) are products that are replaced/used up within a relatively short period, which depending on the product ranges from days to a year. They quickly substituted not available, and they are generally produced in bulk quantity. Because of these bulk quantities, they are profitable despite typically low profit margins.
The FMCG industry covers the household materials that you buy when shopping in the supermarket or a pharmacy. Fast-moving connect that the items. They are quick to leave the locker band also tend to be high in volume but low in cost items. [1]
They are following the Features of FMCG-

- Frequently purchased materials.
- Replaced throughout the year.
- Suddenly turnover.

PLM (Product life management) refers to the management of data and processes used in the design, engineering, manufacturing, sales, and service of a product across the entire lifecycle.
PLM (product life management) software allows to manage this information throughout the entire product lifecycle efficiently and cost-effectively: from ideation, design, and manufacture to service and disposal. Teamcenter is the PLM solution which is provided by the Siemens.

PLM has recently attracted a lot of attention both the place at companies and research area because of its potential advantages to cope with current manufacturing challenges, the promise of PLM has yet to be realized in most organizations. The narrow results of current PLM implementations lie fundamentally in three main causes. PLM (product life management) is a difficult concept and there is still a lack of understanding of what it really means in practice

1.1 Need

Today's business environments Projects are more complex; products are becoming more advanced. So, it's not a miracle that business, engineering, software development, design, aand other responsibilities that are part of an enterprise's development need a better model to support products development.

Product development is the key to future innovation. Here is the challenge new products take more time to develop and reach to the market.
While most enterprise agree that intellectual property and assets are some if not the most important of assets in the organization, it does not mean they have a comprehensive strategy for managing information and intellectual property. that information is no useful for future at that time is hard to access, search, retrieve and index when dealing with bulk data volumes. Having to regenerate design and documents that cannot be found is expensive.

The industrial Needs for PLM are:

- Improving development of new product.
- Reduce costs.
- Increase productivity.
- Improved quality of products.
- To support traceability.
- Manage engineering change

1.2 Reports Overview

This chapter contains explanation about both "End to End Monitoring Report" and "Dispatcher Status Report" on below points-

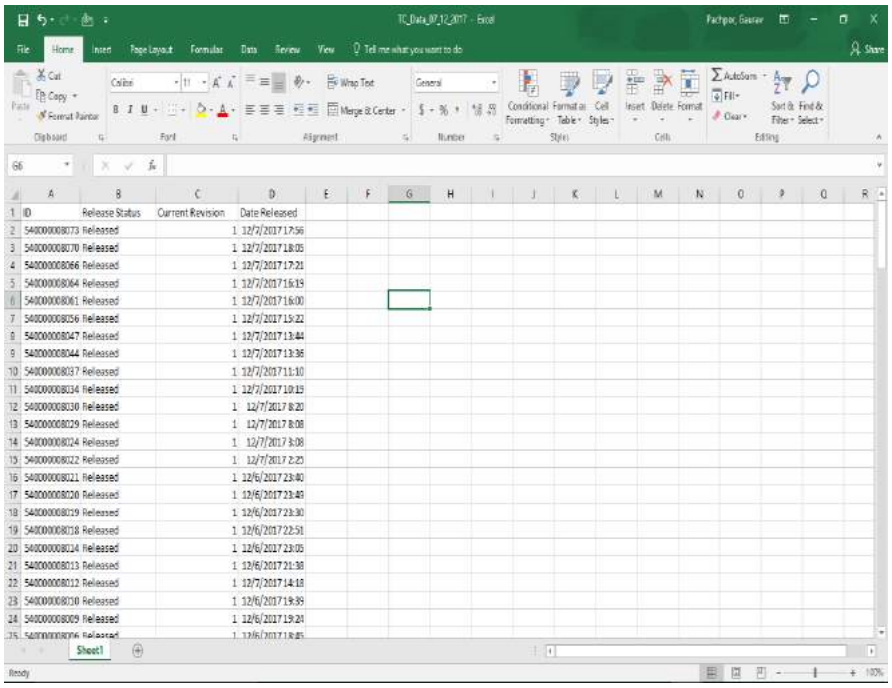
- What exactly are both the reports?
- what is the content and importance of these reports?
- Meaning of terms used in reports.

End to End Monitoring Report

The data flow in Hindustan Unilever is from Teamcenter to IS. When any PAM or PNP is released from Teamcenter it will flow to SAP PLM in maximum 15 minutes as job runs after every 15 minutes of time interval. And the Data will flow from SAP PLM to Interspec (IS) every day as job runs at 12 midnight every day.

The purpose of this End-to-End Monitoring Report is to cross verify and ensure that all PAMs and PNPs that are released from Teamcenter whether have reached to SAP PLM and IS.

This report contain details about PAMs and PNPs released in Teamcenter in definite Period of Time(24 hrs.). The Excel file of this report have 4 columns "ID", "Released Status", "Current Revision", "Date Released".



ID	Release Status	Current Revision	Date Released
540000008073	Released	1	12/7/2017 17:56
540000008070	Released	1	12/7/2017 18:05
540000008066	Released	1	12/7/2017 17:21
540000008064	Released	1	12/7/2017 16:19
540000008061	Released	1	12/7/2017 16:00
540000008056	Released	1	12/7/2017 15:22
540000008047	Released	1	12/7/2017 13:44
540000008044	Released	1	12/7/2017 13:36
540000008037	Released	1	12/7/2017 11:10
540000008034	Released	1	12/7/2017 10:13
540000008030	Released	1	12/7/2017 8:20
540000008029	Released	1	12/7/2017 8:08
540000008024	Released	1	12/7/2017 3:08
540000008022	Released	1	12/7/2017 2:23
540000008021	Released	1	12/6/2017 23:40
540000008020	Released	1	12/6/2017 23:49
540000008019	Released	1	12/6/2017 23:30
540000008018	Released	1	12/6/2017 22:51
540000008014	Released	1	12/6/2017 23:05
540000008013	Released	1	12/6/2017 21:38
540000008012	Released	1	12/7/2017 14:18
540000008010	Released	1	12/6/2017 19:39
540000008009	Released	1	12/6/2017 19:24

Figure 1-1 Format of Excel File

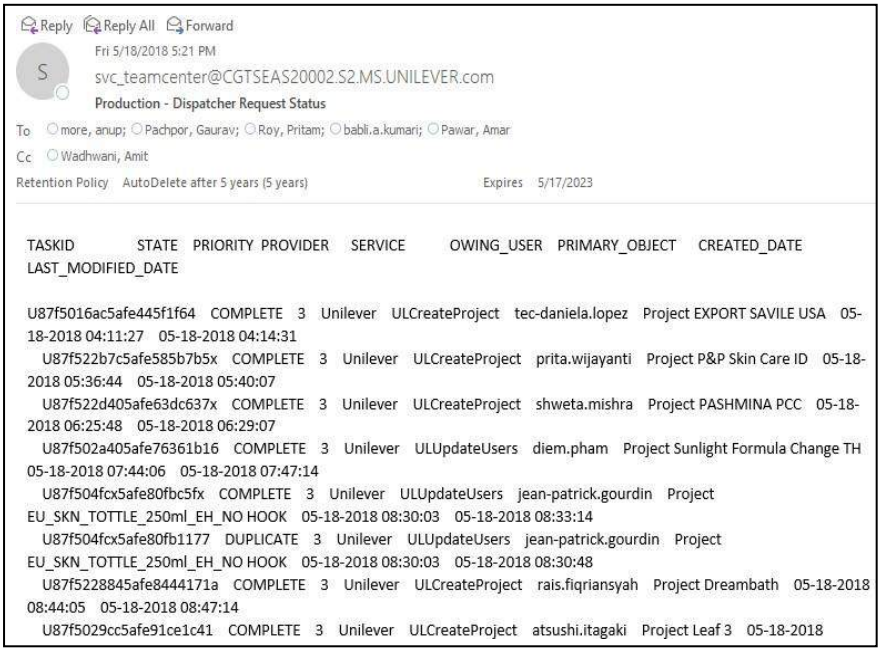
Dispatcher Status Report

Dispatcher is used for various purposes in Hindustan Unilever. There are as mentioned below-

1. Assigning Project Id to newly created Projects.
2. Update the users of Project.

As these tasks are really important and can impact the business enormously if the dispatcher is down for even some time. Hence, it is really important to know if the dispatcher is up and running continuously without fail. This can be achieved if we get to know statuses of the tasks that are performed in the Dispatcher. It is cognizable through "Automation of Dispatcher Status Report".

This Report contains details about "TASKID" performed in the Dispatcher in definite Period of Time (9 Hours). The mail of this report contains "TASKID", "STATE", "PRIORITY", "PROVIDER", "SERVICE", "OWNING_USER" "PRIMARY_OBJECT", "CREATED_DATE", "LAST_MODIFIED_DATE" as shown below-



Reply Reply All Forward

Fri 5/18/2018 5:21 PM

svc_teamcenter@CGTSEAS20002.S2.MS.UNILEVER.com

Production - Dispatcher Request Status

To more, anup; Pachpor, Gaurav; Roy, Pritam; babli.a.kumari; Pawar, Amar

Cc Wadhwani, Amit

Retention Policy AutoDelete after 5 years (5 years) Expires 5/17/2023

TASKID STATE PRIORITY PROVIDER SERVICE OWING_USER PRIMARY_OBJECT CREATED_DATE LAST_MODIFIED_DATE

U87f5016ac5afe445f1f64 COMPLETE 3 Unilever ULCreateProject tec-daniela.lopez Project EXPORT SAVILE USA 05-18-2018 04:11:27 05-18-2018 04:14:31

U87f522b7c5afe585b7b5x COMPLETE 3 Unilever ULCreateProject prita.wijayanti Project P&P Skin Care ID 05-18-2018 05:36:44 05-18-2018 05:40:07

U87f522d405afe63dc637x COMPLETE 3 Unilever ULCreateProject shweta.mishra Project PASHMINA PCC 05-18-2018 06:25:48 05-18-2018 06:29:07

U87f502a405afe76361b16 COMPLETE 3 Unilever ULUpdateUsers diem.pham Project Sunlight Formula Change TH 05-18-2018 07:44:06 05-18-2018 07:47:14

U87f504fcx5afe80fbc5fx COMPLETE 3 Unilever ULUpdateUsers jean-patrick.gourdin Project EU_SKN_TOTTLE_250ml_EH_NO HOOK 05-18-2018 08:30:03 05-18-2018 08:33:14

U87f504fcx5afe80fb1177 DUPLICATE 3 Unilever ULUpdateUsers jean-patrick.gourdin Project EU_SKN_TOTTLE_250ml_EH_NO HOOK 05-18-2018 08:30:03 05-18-2018 08:30:48

U87f5228845afe8444171a COMPLETE 3 Unilever ULCreateProject rais.fiqriansyah Project Dreambath 05-18-2018 08:44:05 05-18-2018 08:47:14

U87f5029cc5afe91ce1c41 COMPLETE 3 Unilever ULCreateProject atsushi.itagaki Project Leaf 3 05-18-2018

Figure 1-2Format of Dispatcher Report

As we can observe in the above Figure 1-2, "STATE" of the tasks are "COMPLETE" and its meaning is Dispatcher Request Successfully completed.

Following Table shows all statuses of dispatcher request at different point of time-

State	Description
INITIAL	Request just get created
PREPARING	Data being extracted from teamcenter
SCHEDULING	Task is being added to the Dispatcher Server scheduling queue.
TRANSLATING	Request is in translation stage
LOADING	Results are uploading inside teamcenter
COMPLETE	Dispatcher request successfully completed
TERMINAL	Dispatcher task has failed
DELETE	Request is marked for deletion
CANCELLED	Request has been canceled
NO_TRANS	Request did not requires translation

Table 1-1 Dispatcher Statuses

LITERATURE REVIEW

- Sandro Moose et.al [1] has studied Development of a Supporting Tool for Sustainable FMCG Packaging Designs**.** They found that (FMCG) industry, packaging as a design medium has a vast global reach that touches billions of customers every day throughout the world. The packaging industry has evolved from only containing products which have a powerful communication brand image. With the increment of competition in the industry, there is high motivation among engineers to create innovative packaging designs to differentiate products to establish the brand name. At several instances, new packaging designs have also created entirely new product lines.

  The proposed methodology in this paper offers great potential for food & beverage product developers who want to develop innovative packaging at a relatively cost. This can be achieved by reusing the historical knowledge of the enterprise, which is recorded and shared through the PLM database without heavy investments. Its implementation creates wide possibilities for the reuse of old Designs and solutions adopted in other similar fields or products without wasting time in searching for historical knowledge. It reduce design costs, plant setup costs, and reduce the needed time to reach the market.

  There has been more interest on the subject of Sustainable packaging ever since global climatic changes sent out alert symbol to manufacturing industries. HDPE is a highly cost-effective material as it has wide ranging design potential and processing flexibility. These make the proper choice for (FMCG) like shampoo bottles, soap wrappers etc. There are six plastic resins that account for nearly all FMCG packaging: High Density Poly Ethylene (HDPE), Low Density Poly Ethylene (LDPE), Polyethylene, Polystyrene, Polypropylene, and PVC. these six plastic resins, HDPE and PET account for nearly 90% of entire plastics used in terms of Metric Tons.
- Srinath Srinivasan, Wen F. Lu [2] (Development of a Supporting Tool for Sustainable FMCG Packaging Designs). These are focus on the development of a supporting tool for engineer to evaluate the design with the balance of environmental impact, material cost and value creation of the FMCG packaging as Plastics are an essential part of most Fast-Moving Consumer Goods (FMCG) packaging; however,

plastics could pose a significant threat to environment. As (FMCG) **Fast-moving consumer goods** packages are characterized by short life spans and high turnover rates, FMCG packaging is contributing to enormous amount of plastic pollution.

- San yuan Zhou, Xinxiang Wang [3] "Study on **Fast-moving consumer goods** Inventory Control Optimization" with the improvement of consumption, the FMCG market competition of China is becoming more intense. For our **Fast-moving consumer goods** (FMCG) companies, how to gain a foothold in the fierce competition has been a problem. This paper studied on the **Fast-moving consumer goods** (FMCG) inventory control. To solve the problem of **Fast-moving consumer goods** companies' large backlog of list and other issues, this paper studied the time-based vendor managed the inventory replenishment policy which is based on the traditional inventory control, and take affectation analysis of inventory level under different transport delays and different inventory replenishment cycle. This paper give the reference solution for the FMCG (**Fast-moving consumer goods**) business enterprises.
- A dispatcher server functions use as an independent compute server which help translates files from one format to other.
  It consists of three main components-
  1. dispatcher scheduler
  2. dispatcher modules
  3. Dispatcher Client

  For better equibillum, every dispatcher module resides on a separate machine and is connected to the dispatcher scheduler. The scheduler invokes one or more translator translators to perform the translations. when translation send tasks to the modules.

  The names of Dispatcher and its components have changed from previous versions of the application-

New name	Old name
Dispatcher Server	Translation Solution Toolkit (TSTK)
Dispatcher Client	Translation service
Dispatcher	Translation Management

Figure 2-1 Translation Manager as Dispatcher

The Dispatcher Server allows you to perform translations either

using a Web server (Web mode) or through remote method invocation mode.

The following figure shown a typical translation flow using RMI mode.

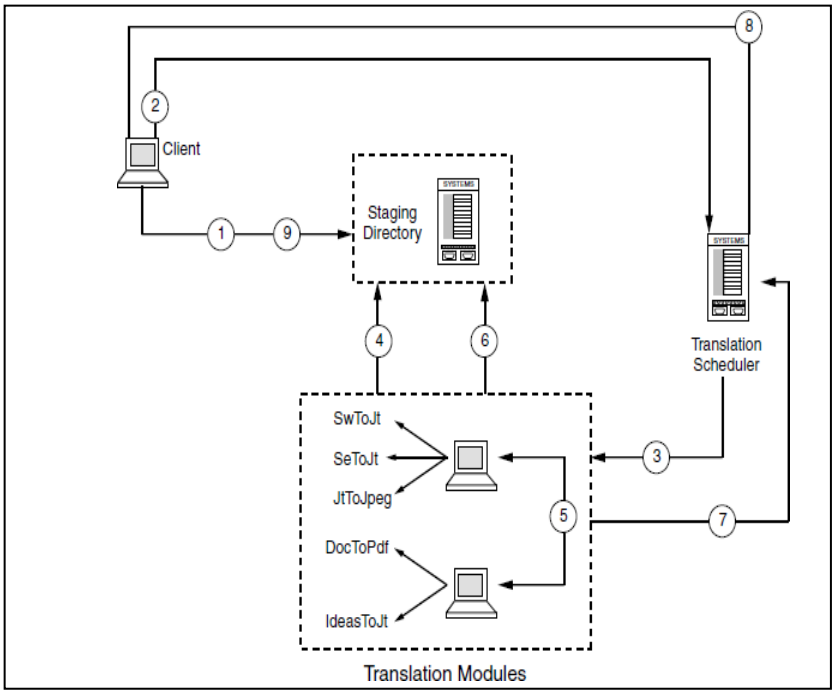


Figure 2-2 A typical translation process using RMI mode

Some of the General benefits of Dispatcher are as follows-

1. It reduces server Load.
2. Asynchronously distributes job to machines with the resource capacity to execute the Job.
3. It allows the long processes to be carried out in background and allows user to use TC meanwhile.

2 Problem Statement

Based on the literature study and study of the business requirements of the industry, the problem statement is identified as given below,
Automation of End-to-End Monitoring Report to save one hour of non-Value-added time and Automation of dispatcher status report to avoid dispatcher downtime enormously.

3.1 Requirements

For preparing End to End Monitoring Report at least one hour is required daily. So, it can be said that daily one hour of time can be saved if the automation of this report is made.

Also, it is critical priority issue if the dispatcher stops working, so immediate action needs to be taken whenever dispatcher gets down. So, the need is to AM and AD Team should get to know the status of dispatcher tasks automatically without logging into remote servers. So that respective person will take immediate action on the issue and solve it.
Above two statements can briefly be listed down as below-

1. Automate the process of validation of data flow.
2. To reduce the downtime of Dispatcher and hence minimize the business loss.

3.2 Objectives

1. To automate report generation and hence save the time required for daily generation of End-to-End Monitoring Report.
2. To validate automatically generated file with Manually generated file for End-to-End Monitoring Report.
3. To reduce the Incident count due to dispatcher Issues.
4. To avoid manual checking of dispatcher status by logging into remote servers.

3 Methodology

Flowchart for overall execution of Project is shown in below flowchart-

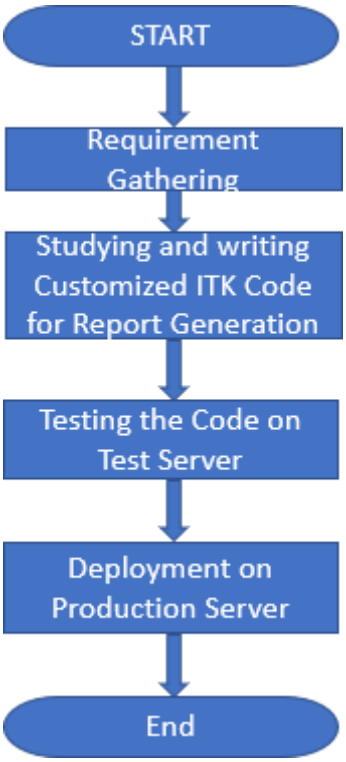


Figure 4-1 Overall Flowchart of Project

4.1 End to End Monitoring Report

4.1.1 Execution Sequence

Overall Execution sequence is as follows-

1. Login to Teamcenter.
2. Write CPP Program for fetching Yesterday's date.
3. Create and Open filename with "TC_Data_DD_MM_YYYY" where date is Yesterday's date.
4. Create 4 Columns in the excel sheet.
5. After columns are created, POMenquiryPAMrevision function will be executed.
6. After all the PAMs are done. POMenquiryPNPrevision function will be executed.

Program Flowchart for sequence of execution is on next page-

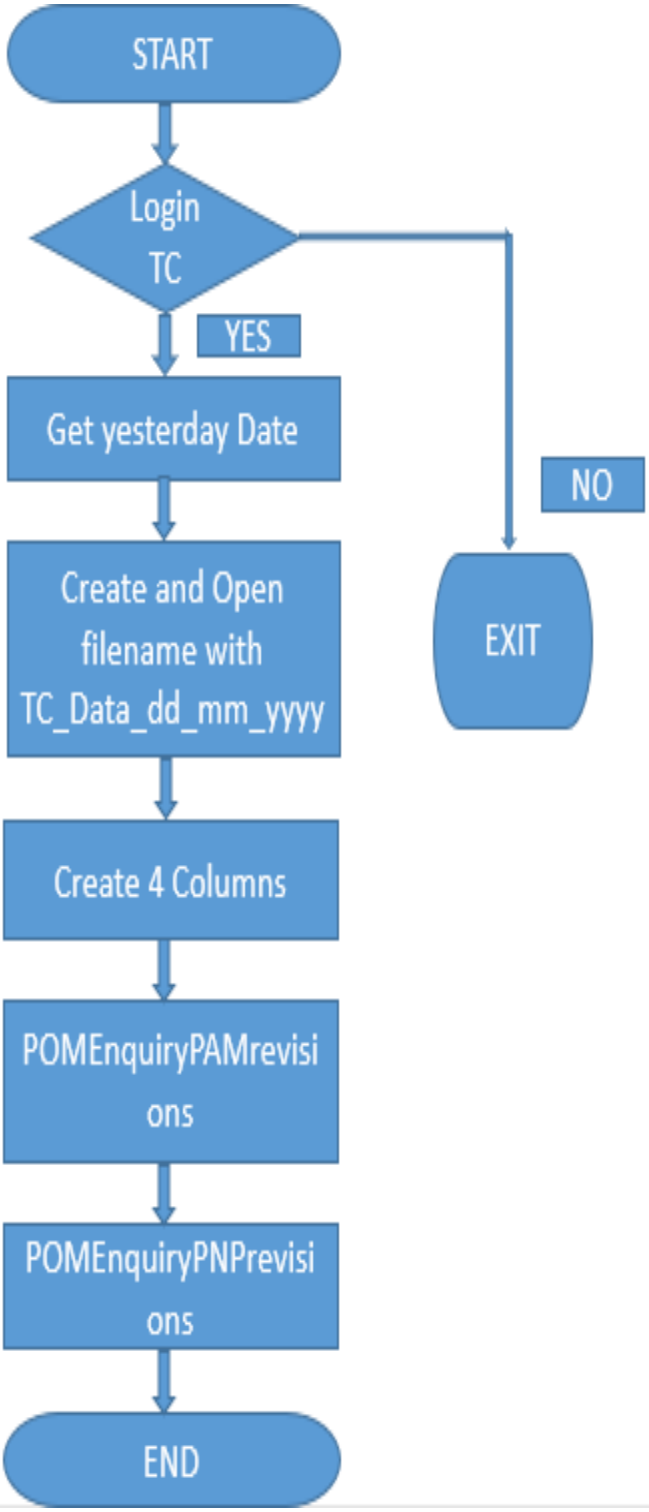


Figure 4-2 Program Flowchart for Sequence of Execution

4.1.2 API Functions Used in Program

An application programming interface is a particular set of rules which is used to connect software program user interface to the server to communicate with each other.

Below are APIs used in Program [4].

1. POM_enquiry_create

Use - This function creates a new enquiry.

Parameters: The id to be given to the new query (enq_id)

2. POM_enquiry_add_select_attrs

Use- Adds a list of attributes to the select clause of the query. Parameters:
enq_id (I) The query whose clause is to be modified.

a class (I) The POM class, class or pseudo-class alias or TC type that the user wants to query

n_attr The Number of attributes to be added to query's select clause

Attrs (I) The List of attributes to be added

3.POM_enquiry_set_date_value

Use- Creates a date value on a query. Parameters:

en_id (I) The query that is to own the new value

val_id (I) The id to be given to the new value

n_vals (I) The number of values in the list

Vals (I) The list of n_vals values

propriety (I) Specifies whether the value is a constant or a bind value

4.POM_enquiry_set_attr_expr

Use- Creates an attribute-expression from

1. An attribute
2. An Operator

This method allows the caller to generate the fresh expression from an optional expression, an operator, and an value or query.

Parameters:

enq_id (I) The (enq_id) query that is to own the new expression.
expr_id (I) The id to be given to the new expression
a class (I) The class, alias or type that owns attr
attr (I) The attribute or supported compound property that is to form the left-hand operand
op (I) The attribute-expression operator
rhs_id (I) The identifier of the right-hand operand

5.POM_enquiry_set_where_expr

Use- Sets the where clause of the query to the specified expression. Parameters:
enq_id (I) The query whose where clause is to be set
expr_id (I) The expr_id of an existing expression defined on the query

6. POM_enquiry_execute

Use- Executes the query and fetches the data.
Parameters:
enq_id (I) The query that is to be executed
rows (O) Number of rows returned by the query
cols (O) Number of columns returned by the query *report* (OF) Result of the query.

4.1.3 Logic for PAM Revision

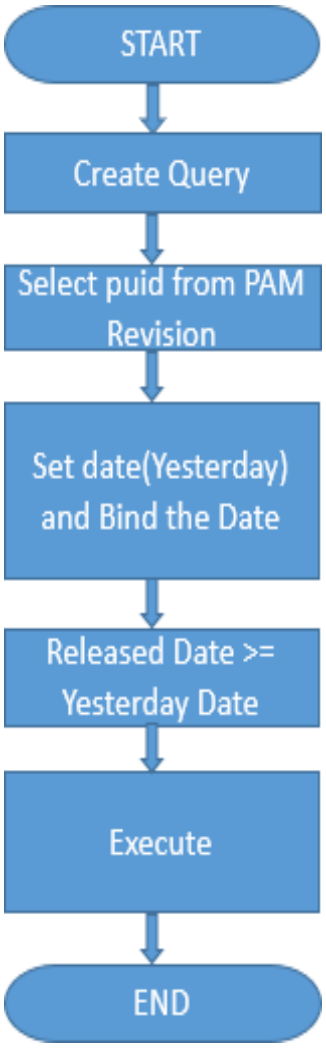


Figure 4-3 Flowchart for PAM

All the items in Teamcenter have some Unique id. So, with the help of the "puid" data is fetched for PAMs with required details. (ID, Released Status, Current Revision, Date Released).
Below are the step-by-step details of the logic-

1. New query will be created with the help of function "POM_enquiry_create"
2. Once query is created, with help of function "POM_enquiry_add_select_attrs" we give input for the POM class. In this case as we need to fetch data for PAM so input for POM class will be "PAMrevision".

3. Now with help of function “POM_enquiry_set_date_value” , the value for the date is fixed as Yesterday’s date.
4. “POM_enquiry_set_attr_expr” helps to set expression so that date released of PAM is greater than or equal to Yesterday’s date.
5. “POM_enquiry_set_where_expr” is used to connect statement 2 with statement 3 and 4.
6. “POM_enquiry_execute” will execute the query.

4.1.4 Logic for PNP Revision

Details for PNP revision will be extracted with the same logic as for PAM revision. Flowchart for PNP revision is as below –

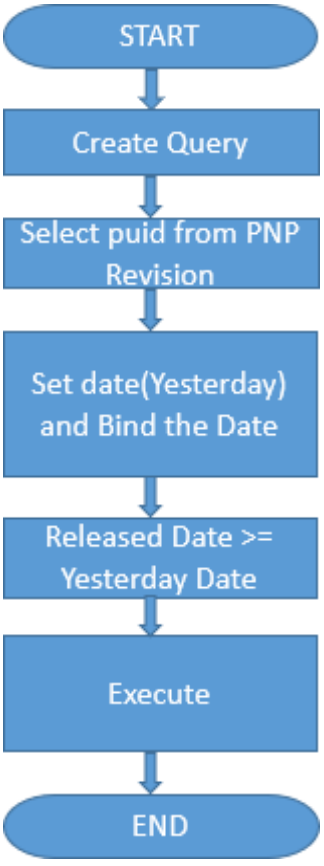


Figure 4-4 Flowchart for PNP

Below are the step-by-step details of the logic-

1. New query will be created with the help of function “POM_enquiry_create”
2. Once query is created, with help of function “POM_enquiry_add_select_attrs” we give input for the POM class. In this case as we need to fetch data for PAM so input for POM class will be “PNPrevision”.
3. Now with help of function “POM_enquiry_set_date_value” , the value for the date is fixed as Yesterday’s date.
4. “POM_enquiry_set_attr_expr” helps to set expression so that date released of PAM is greater than or equal to Yesterday’s date.
5. “POM_enquiry_set_where_expr” is used to connect statement 2 with statement 3 and 4.
6. “POM_enquiry_execute” will execute the query.

4.1.5 Solution Implementation Approach

For creating End to End Monitoring Report, we need to run “PAM_and_PNP_Report.exe” and before that we need set up the environment variables.
So we have created one batch file for that which first calls the batch file for setting up the environment variable and then it calls the “PAM_and_PNP_Report.exe” for generating Report.
Below is the screenshot of the Batch file for the same-

Figure 4-5 Report.bat File

Below is the batch file which is called in the Report.bat file for setting up the environment variables-

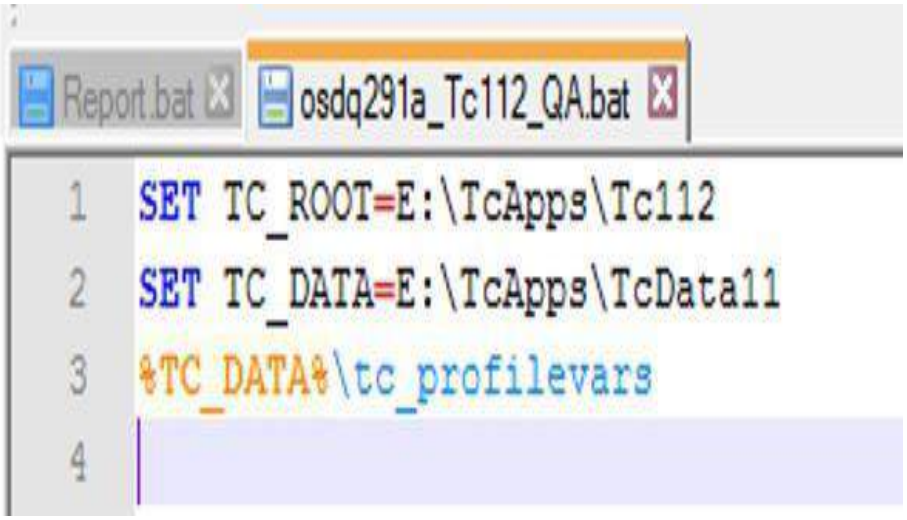


Figure 4-6 Batch file for Setting up Environment Variable

Now when we click the Report.bat file we can see that Environment variables are getting set as shown in below screenshot-

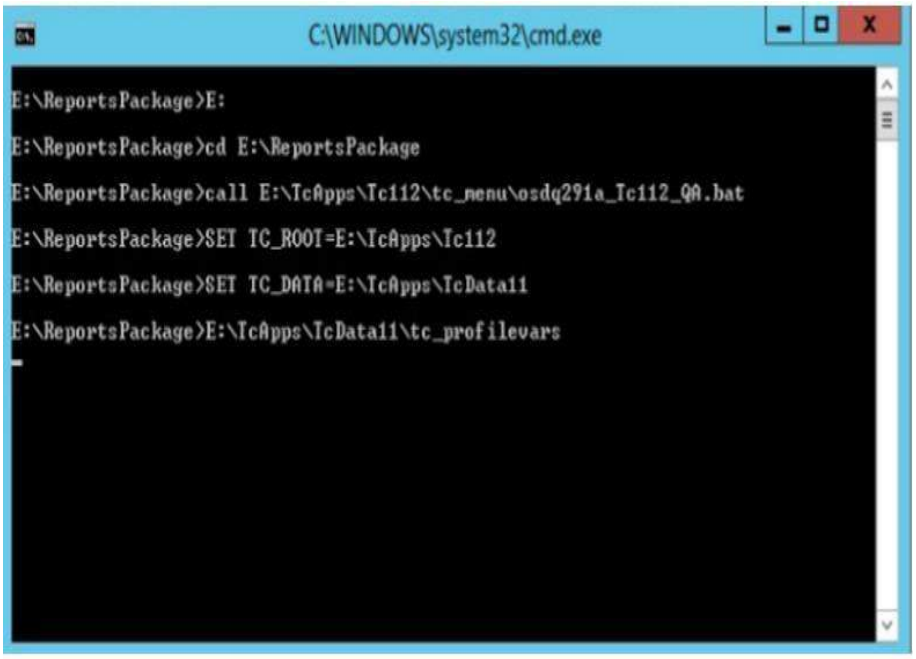


Figure 4-7 Execution of Report.bat setting Environment variables

After setting up the environment variables, Report.bat file calls the "PAM_and_PNPReport" which first fetches the last date as shown in below screenshot-

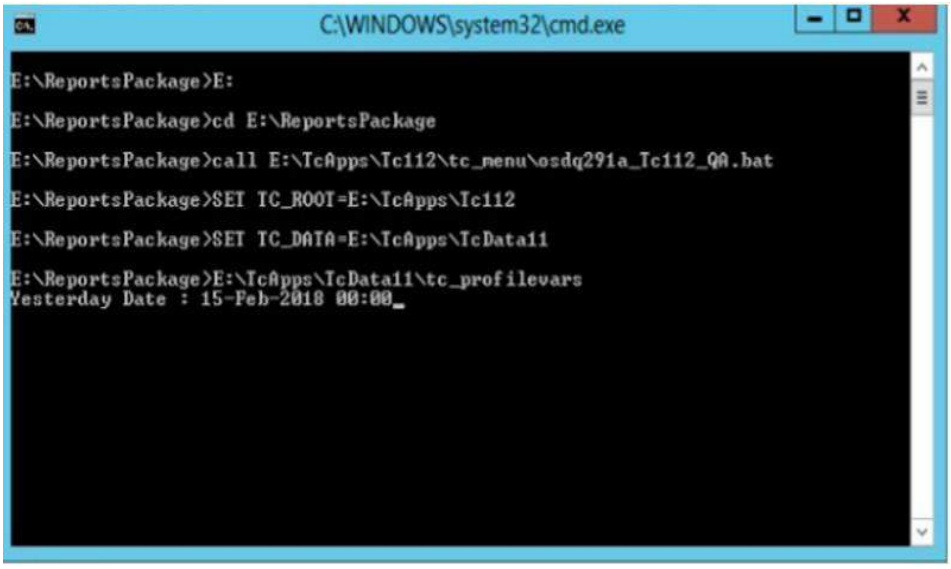


Figure 4-8 Fetching Yesterday's Date

As shown in above screenshot after the last date is fetched with exe, now program fetches All the PAMs and PNPs from the database with "Released Date" greater than or equal to Yesterday's date. Once the execution is

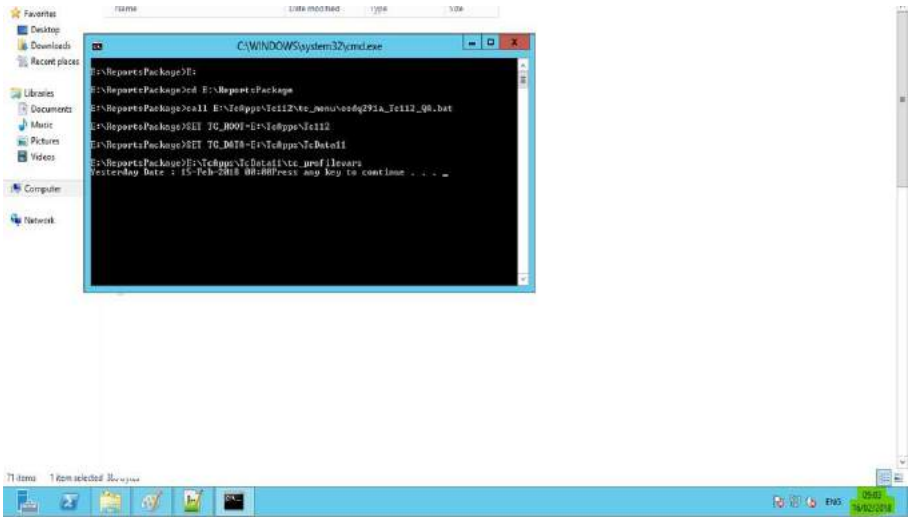


Figure 4-9 Execution of Exe Complete

When this window appears, execution of program is completed, and we can see that (.csv) file is created with containing all the details of the PAM and PNP. We can notice in the Reports package folder .csv file is created with Yesterday's date as shown below-

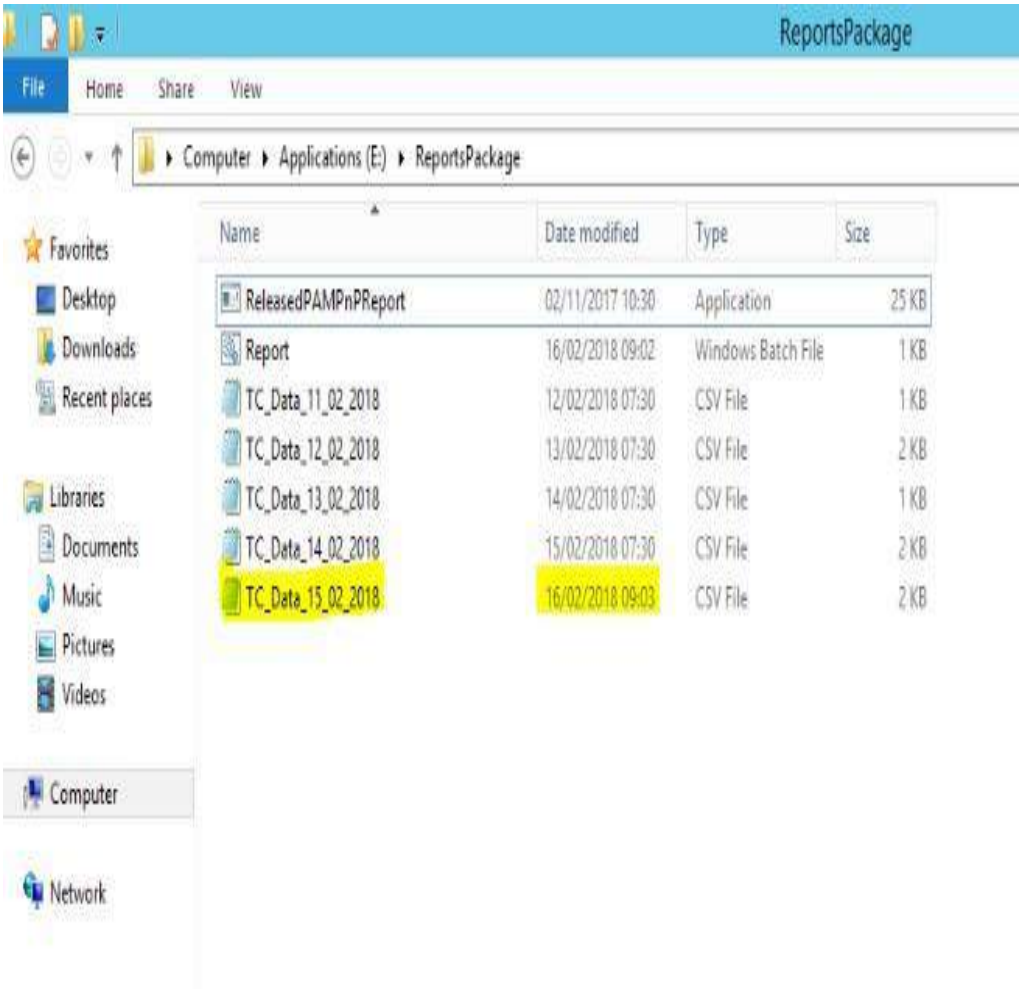


Figure 4-10 CSV file with Yesterday's date

Now, as this report needs to be generated daily, we need to run this batch file daily morning. So, we have planned to run this batch file every morning 7.30 with the help of scheduler. I have created one Basic task on the Application Server as shown below-

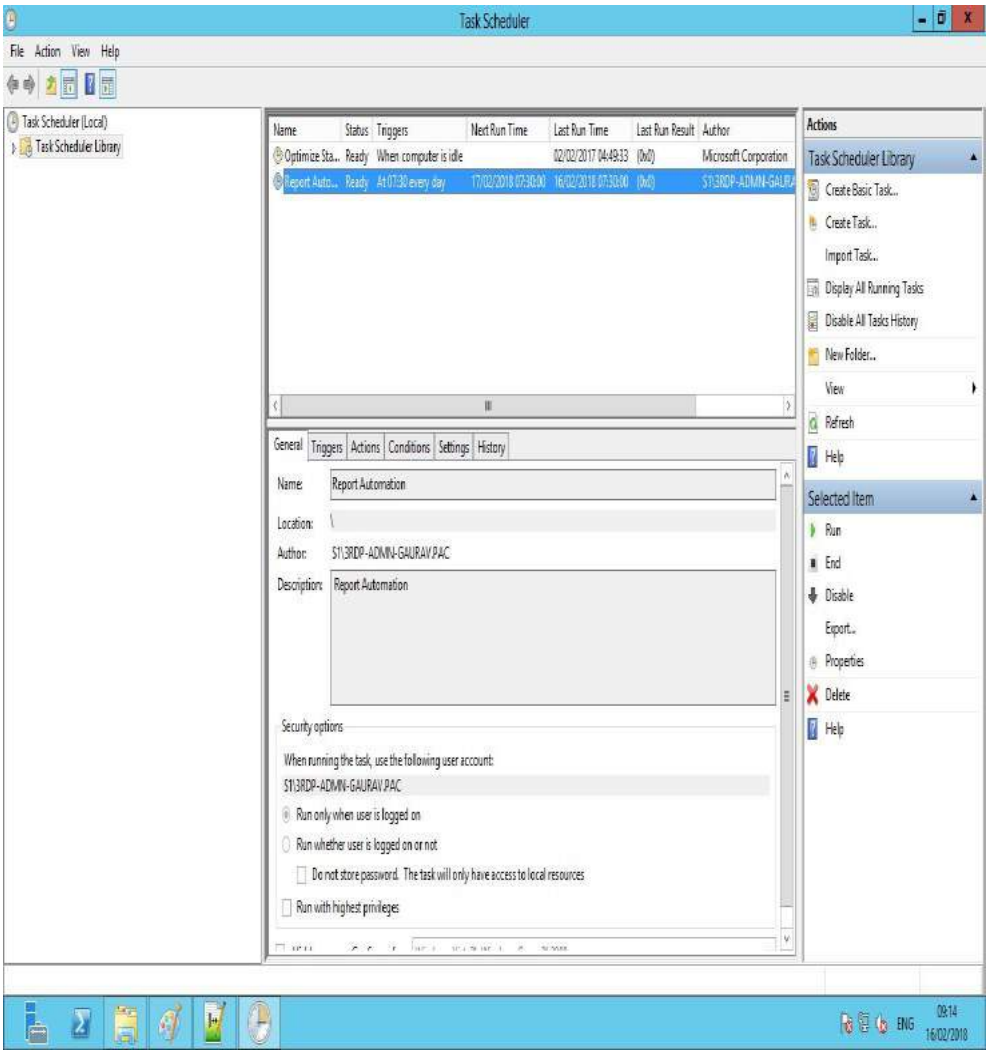


Figure 4-11 Basic Task in Scheduler

While creating the Basic Task I have given name to the Task as “Report Automation” and selected other properties as shown below-

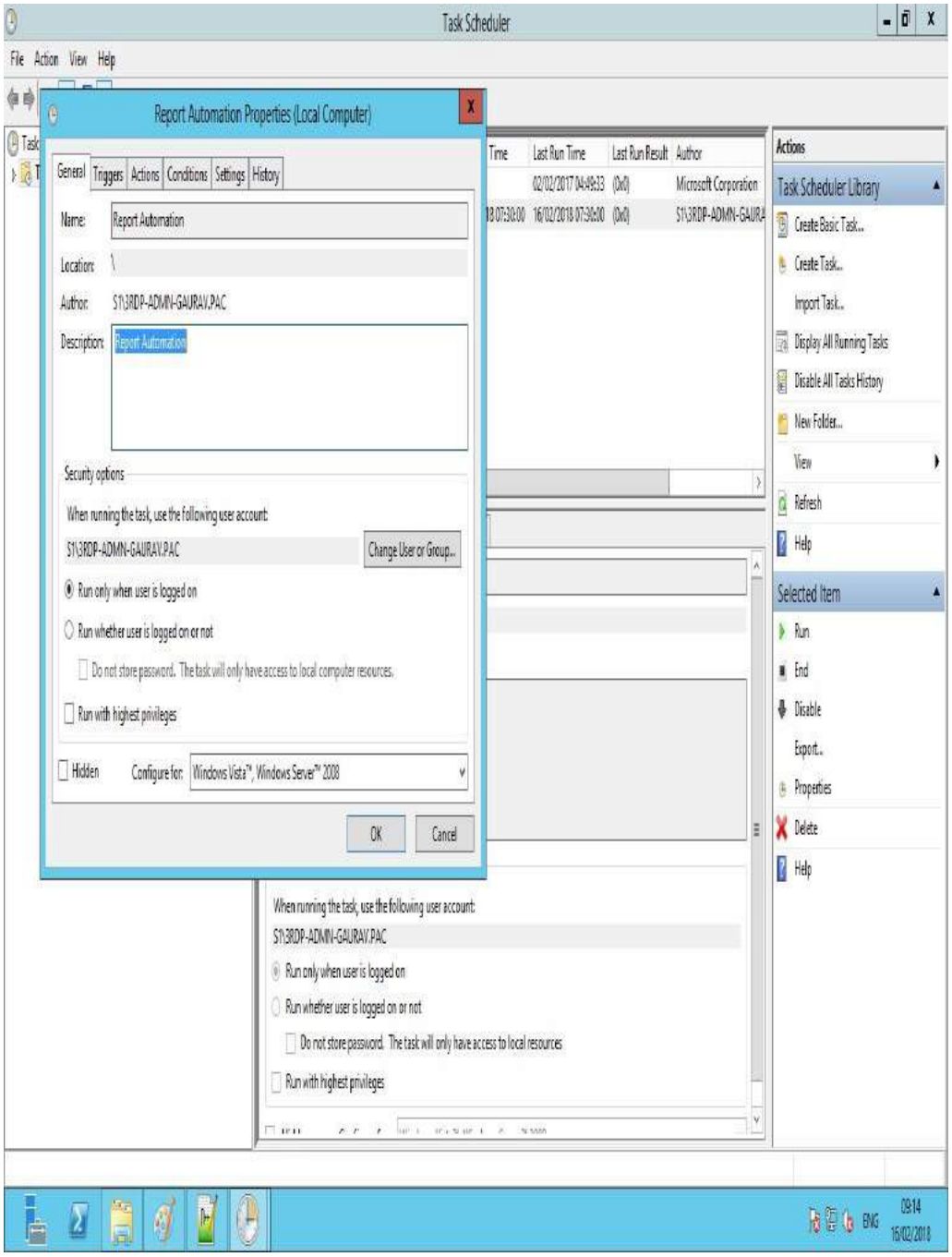


Figure 4-12 Name and Description of the Task

In the Triggers tab click on “New” to add the conditions under which the task will run. As we have to run the task every day morning at 7.30, so accordingly we have selected details as shown in below screenshot.

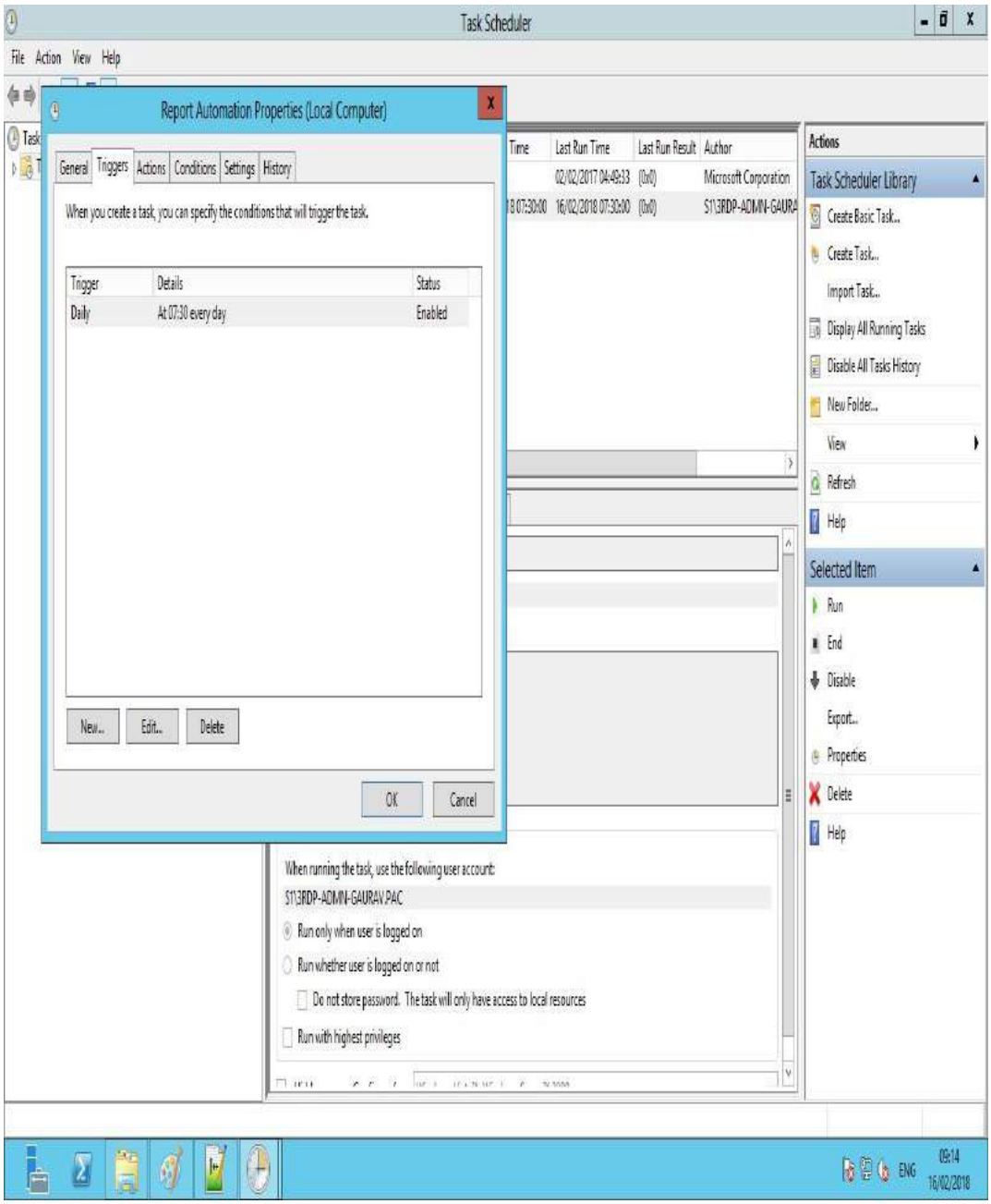


Figure 4-13 Details of Schedule for Batch File

After giving the Triggers details, now we will have to give the action to be performed at the occurrence of the event, i.e. when the clock hits the 7.30 every day.

To give the details, add new Action and give the Action i.e. Start a Program and Details i.e. path of the Batch file needs to be run for generating Report.

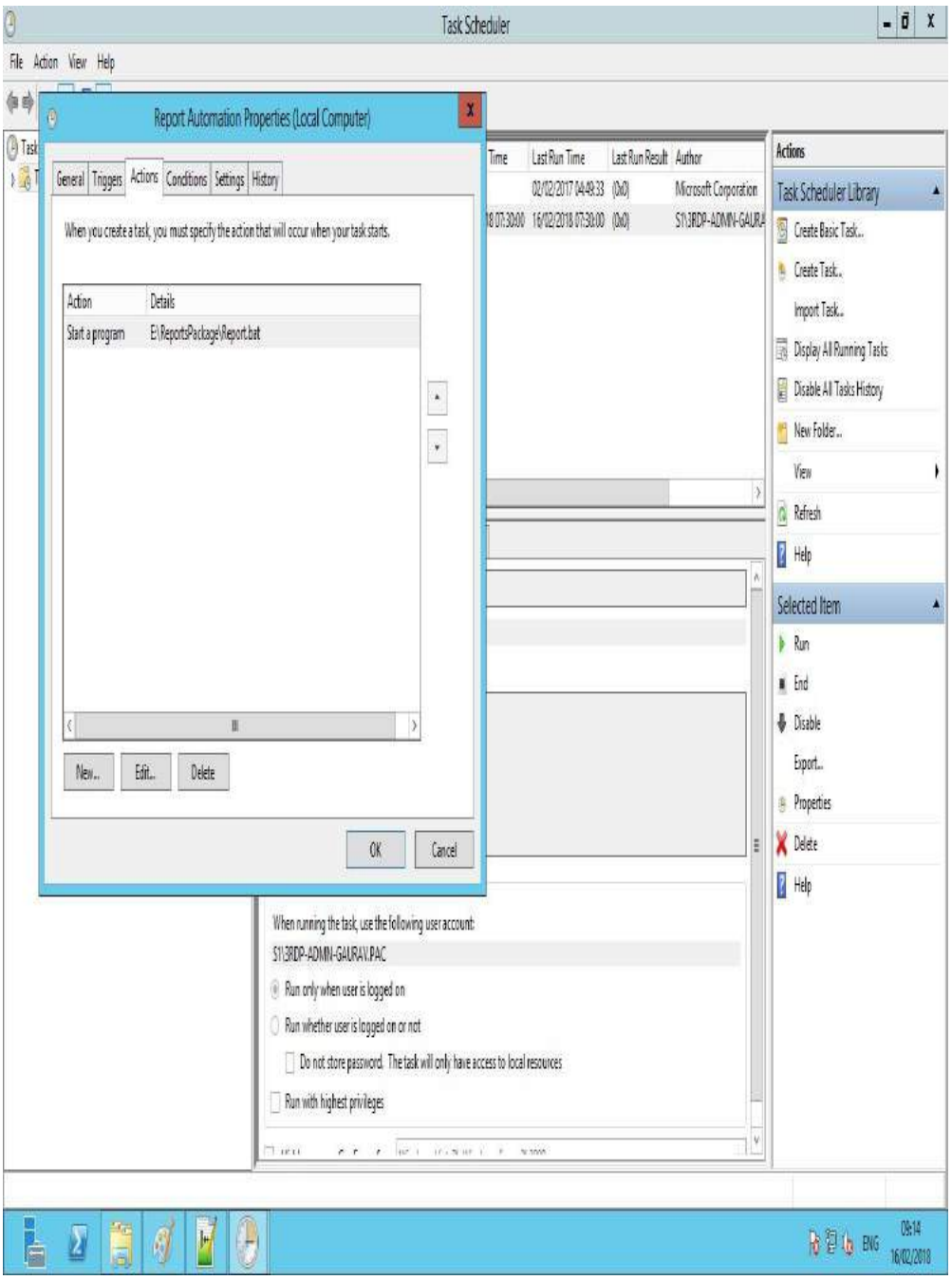


Figure 4-14 Batch File Path

4.2 Dispatcher Status Report

4.2.1 Execution Sequence

Overall Execution sequence is as explained below-

1. Run Dispatcher_Util Exe. This utility is provided by siemens and It is used for creating a report which contains Tasks existing in dispatcher.
2. Login in TC. If login is unsuccessful then it will give error as Invalid Credentials and it will ask you the credentials again.
3. Once the Login is successful utility will generate dispatcher report.
4. If there is any already existing consolidated report, then we need to Unlink the old file. So that fresh file will be created with new tasks.
5. Now Program will try to open the Dispatcher Report generated by Dispatcher_Util. If there is any error while opening the report, then it will exit.
6. Once the Dispatcher report is opened, logic for generating consolidated report will be executed, which is shown in separate Flow chart.
7. After the Consolidated report is generated, program will validate if the report is empty?
8. If report is empty, then mail will be sent without body.
9. And if the report is not empty the mail will be sent with Body i.e. Consolidated Report.

For better understanding of this logic, below is the algorithm/ flowchart for same-

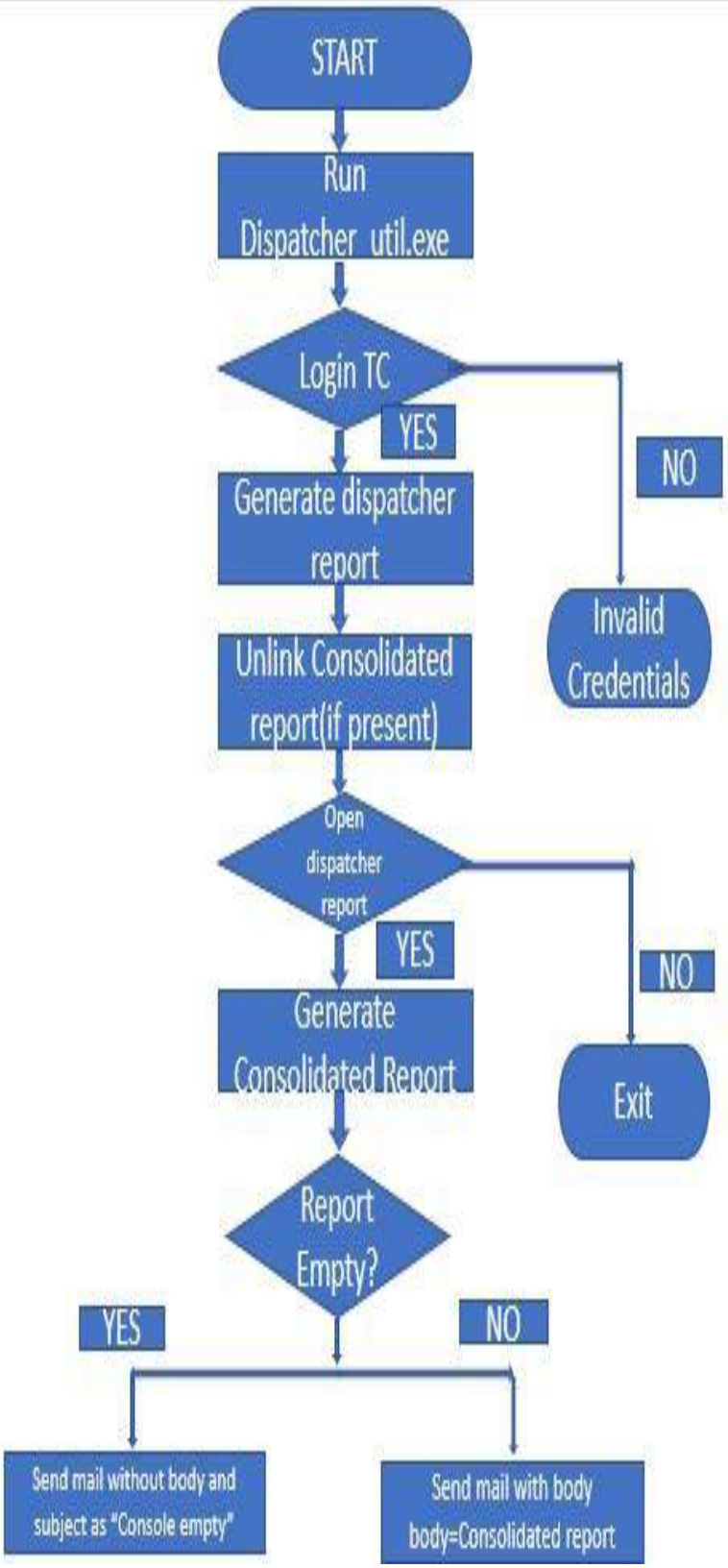


Figure 4-15 Flowchart for Overall Execution of Dispatcher Report

For generating consolidated report, the execution sequence is as given below-

1. Program will read lines one by one with feature of Perl language.
2. As the Dispatcher Report contains some special characters which will make reading the report difficult. So, in this step, Commas will be deleted and rest of the elements will be stored in an array with the help of SPLIT function.
3. After that program will separate Attributes with its values i.e. "Equal-to" will be deleted and rest of the elements will be stored in one array.
4. Now we don't want that Attributes such as "TASKID" ,"STATE", "PRIORITY", etc. to be printed for every single task. So, program will ignore attributes with IF loop.
5. Each Attribute in the dispatcher report is stored in curly braces. So now program will delete braces and rest will be stored in an array.
6. Program will now create and open the consolidated report in write mode if there is any error while opening, program will end with some error message.
7. Now as we want Attributes to be printed only once at the starting of the report, hence with the help of IF loop for the first time Attributed will be printed and from next time onwards only values will be printed.

For better understanding of this logic, below is the algorithm/ flowchart for same-

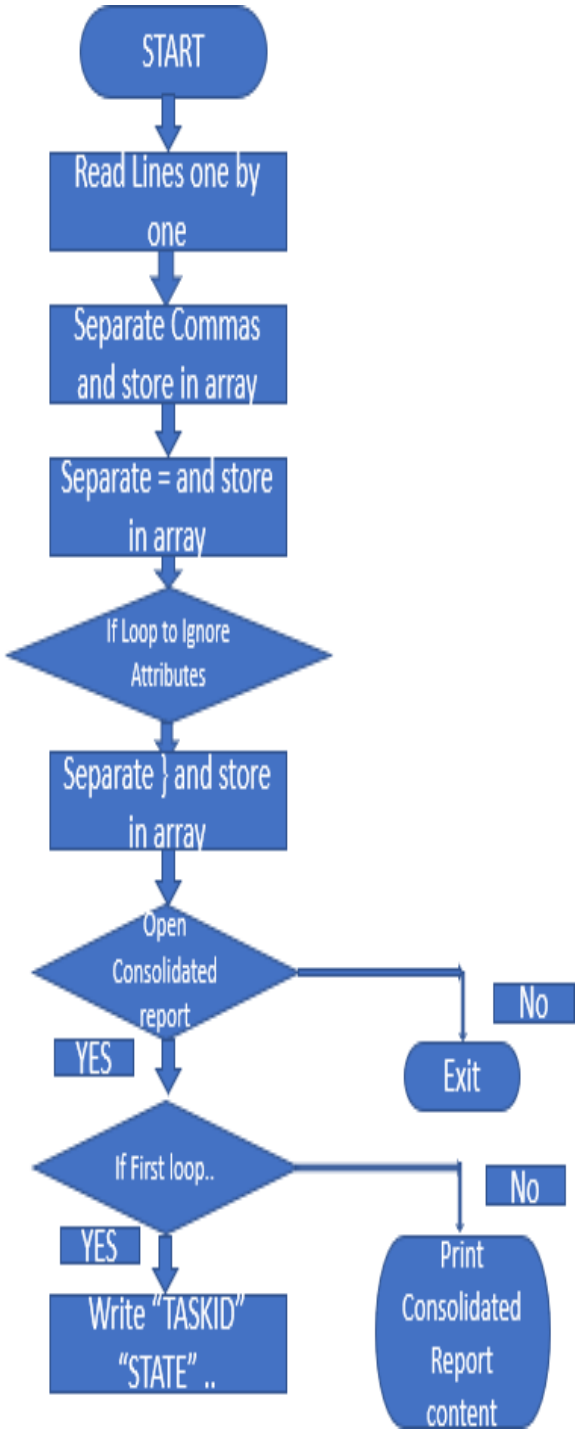


Figure 4-16 Flowchart for Generation of Consolidated Report

4.2.2 Sub-routines and Utilities used-

Program for generating report and sending the mails to user includes one Utility and few sub- routines. In Perl language functions are also known as "Subroutines".

Dispatcher_Util

This utility allows to list the details of dispatcher requests, it can also be used for deleting requests and resubmitting requests to dispatcher.[5]
SYNTAX

dispatcher_util
[-u=user-id {-p=password | -pf=password-file} -g=group]
-
a=lis
t |
delet
e |
resu
bmit
[-
force
]
[-export=file: file path]
[-tasked=dispatcher
task ID | file: file path]
[-provider=provider
name]
[-service=service name]
[-
priority
=priorit
y
number
] [-
state=d
ispatch
er
state]
[-h]

Where Arguments are-

-u

Specifies the user ID.
This is generally information database or other user with administration privileges.

-p
Specifies the password. This argument is reciprocally exclusive with the -pf argument.

-pf
Specifies the password file.

-g
Specifies the group associated with the user. While Without used a value, the user's default group is assumed.
-a
Performs the list, delete or resubmit actions. Choose from the following action values:
list: List's dispatcher requests.
delete: Deletes dispatcher requests.
resubmit: Resubmits dispatcher requests

-force
Forces an action without any prompts.
-export
Exports the information in a file.
-taskid
Specifies the task ID of the dispatcher request.
-provider
Specifies the name of the dispatcher provider, for example, Siemens.
-service
Specifies the service name, for example, tozipfile.
-priority
Specifies the dispatcher priority. Accepted values are 1, 2, or 3 corresponding to low, medium and high priority.
-state
Specifies the dispatcher state.
-h
Displays help for this utility.

Subroutines

Subroutines refers to function in Perl language. Various subroutines of Perl

are used in the program, some of the important subroutines and their working are as explained below [8].

- **Foreach Loop**

The **foreach** loop iterates over a list value and sets the control variable (var) to be each element of the list in turn. This is most used loop in the program, its feature of assigning values to variable for each of the values in array or list helps us to generate the report.

Syntax

The syntax of a **foreach** loop in Perl programming language like this given below−

```
foreach var (list) {
...
}
```

Flow Diagram-

From the below flow diagram, it can be easily understood that the Foreach loop will keep iterating till all the elements in the array or list are not finished.

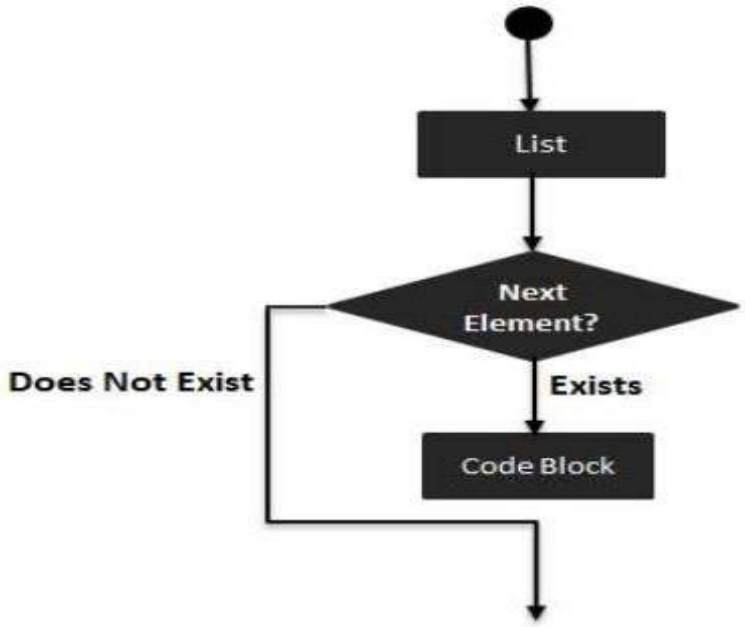


Figure 4-17 Flow Diagram for Foreach loop

.

- Split

- This function splits a string express into fields based on bank line

specified by (PATTERN). If no pattern is specified whitespace, is the default. An optional range banned the number of Essence returned.
Syntax

```
split /PATTERN/, EXPR, LIMIT

split /PATTERN/, EXPR

split /PATTERN/

split
```

- Unlink

This function deletes the files specified by LIST, or the file specified by $_ otherwise. Be careful while using this function because there is no recovering once a file gets deleted.

Syntax-

```
unlink LIST

unlink
```

4.2.2.**Solution Implementation Approach**

For generating Dispatcher Status Report, we need to run "TestPerl.pl" and before that we need to set up the environment variables.

So we have created one batch file which will first setup the environment variables and then it will call the Perl script. Below is the screenshot of the batch file-

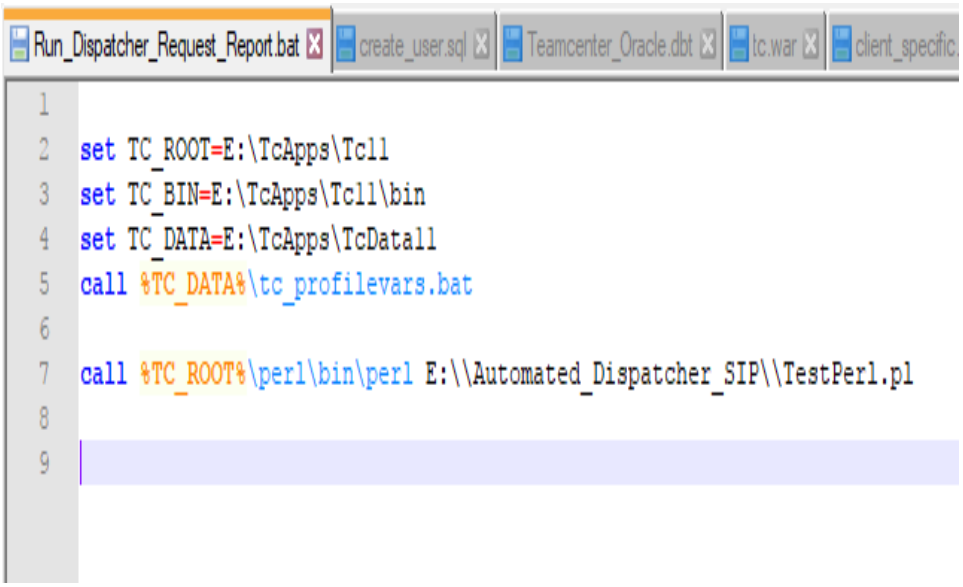


Figure 4-18 Run_Dispacther_Request_Report.bat

Now when we run this batch file, program execution will start as explained earlier in Methodology with the help of Flow diagram. Now we can see or verify this execution with the help of below screenshot.

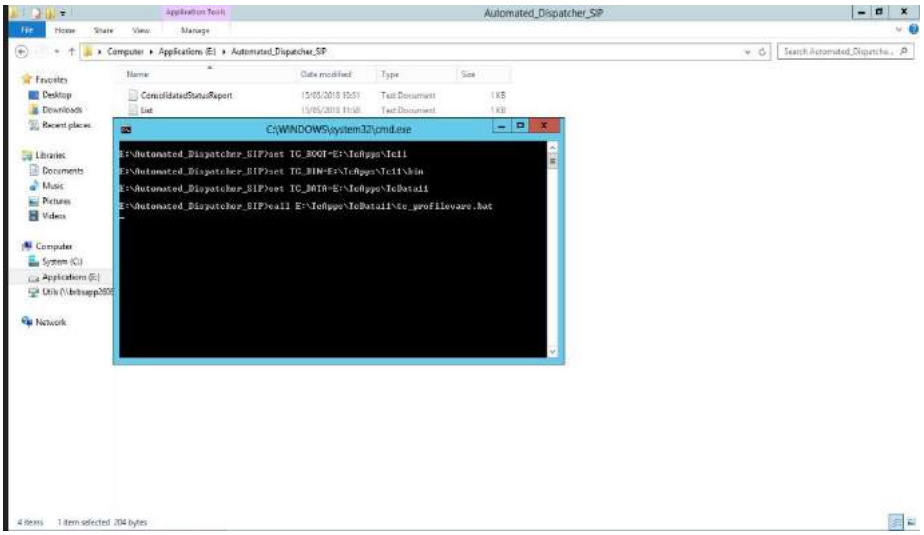


Figure 4-19 Execution of Run_Dispacther_Request_Report.bat

After setting the environment variables now program will try to login to Teamcenter, as we can see in the below screenshot-

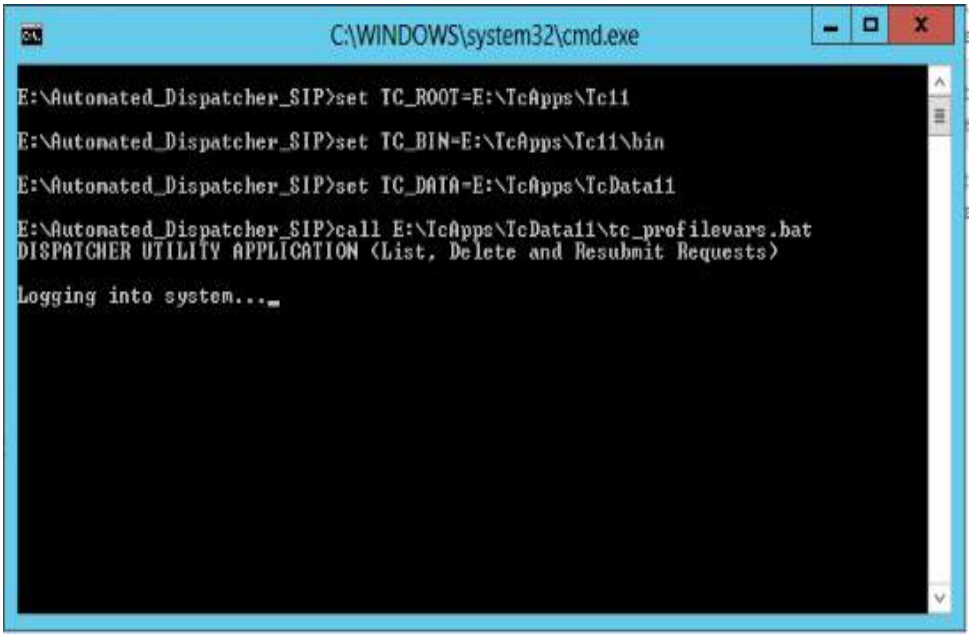


Figure 4-20 Login to Teamcenter

Once the login is successful, program now calls the Dispatcher_Util and this utility now fetches the data or tasks that are present in the Dispatcher. Data is fetched on the basis of some information like TASKID, PROVIDER, SERVICE etc. as shown below-

Figure 4-21 Fetching data from Dispatcher

Once fetching data from Teamcenter is complete then command prompt shows the following-

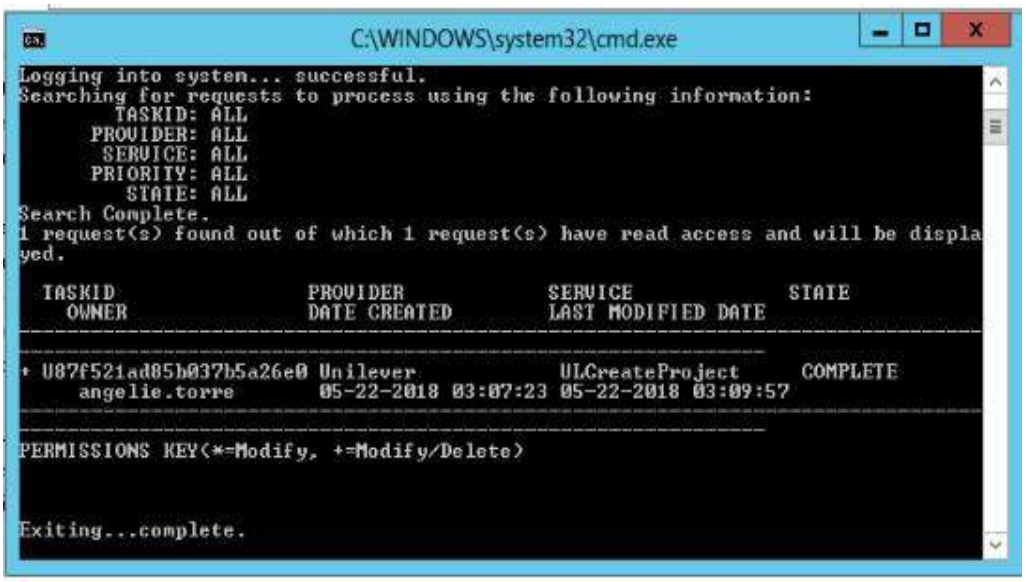


Figure 4-22 Fetching data complete exiting Program

So this is how report is generated. Our aim is to ensure that Dispatcher is always running and to reduce the downtime, to achieve this goal we need to get this report in short interval of time.
This can be achieved through “Task Scheduler”. So, we have created one Basic task as shown in below screenshot-

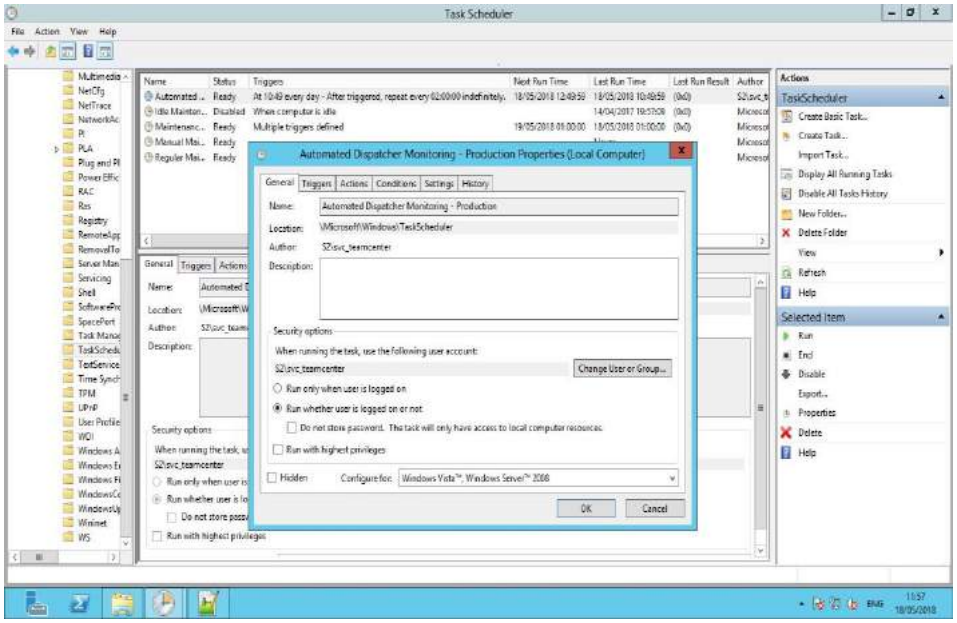


Figure 4-23 Create Basic Task

In Triggers option, enter the trigger action as Daily. Then we have entered the details with Start date and as we want to run the program for every 2 hours, selected from the dropdown accordingly.

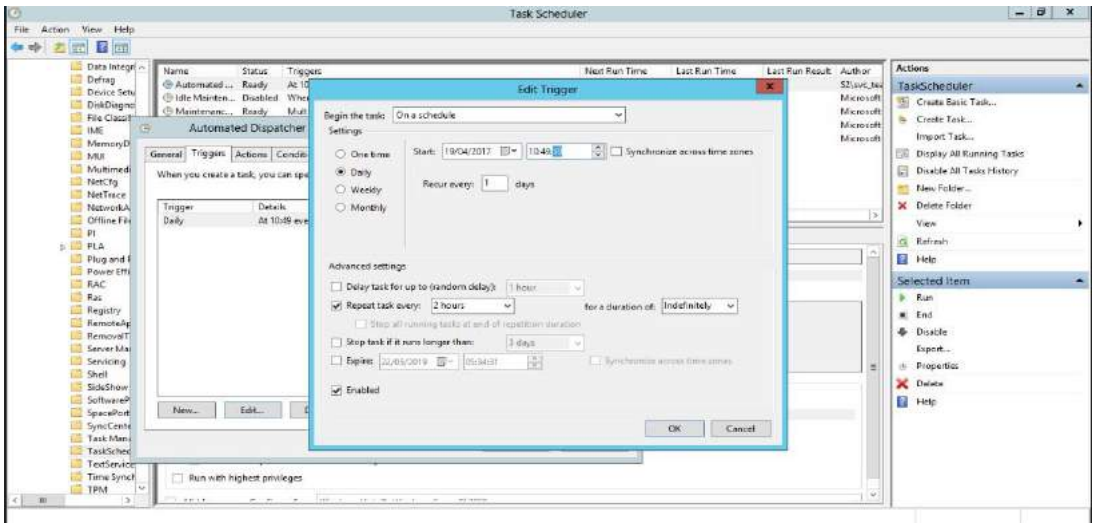


Figure 4-24 Triggers Details in Scheduler

Then we have given the path of the batch file to be run at the occurrence of the schedule, as shown in the below screenshot-

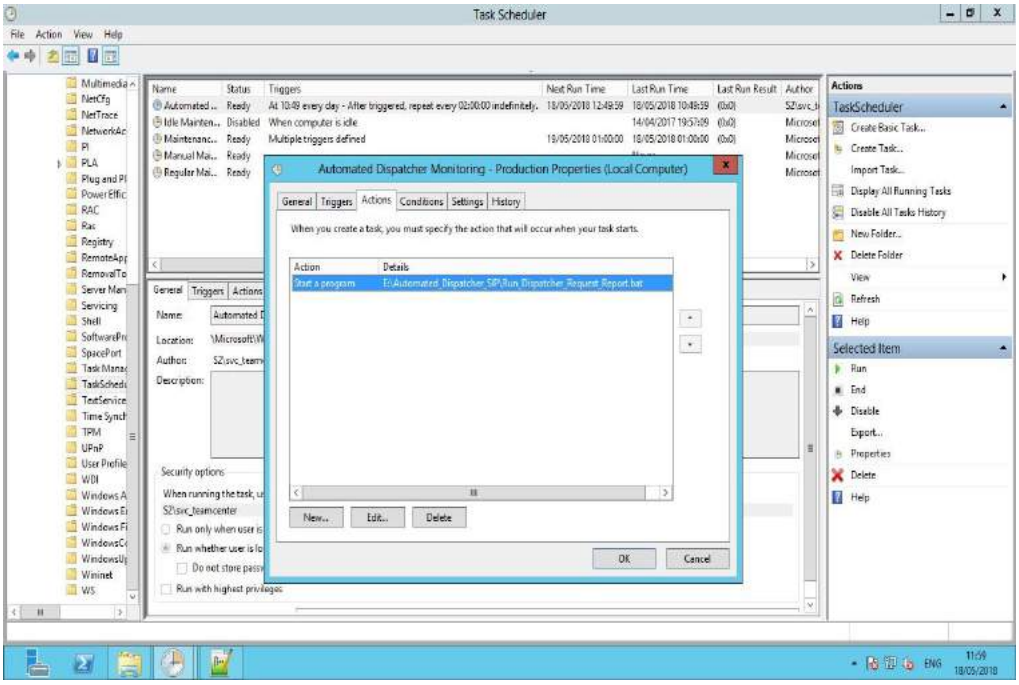


Figure 4-25 Batch File Path for execution

Above procedure shows how to create a basic task so that the batch file will be executed every 2 hours.

When there is no task in dispatcher, for this condition we have already written code to send the mail with no body and definite subject. This situation occurs every Saturday and Sunday as these are non-working days and no work is done by end users. And as a result, there will be no task in dispatcher to send the report.

Example for such scenario is shown in below screenshot-

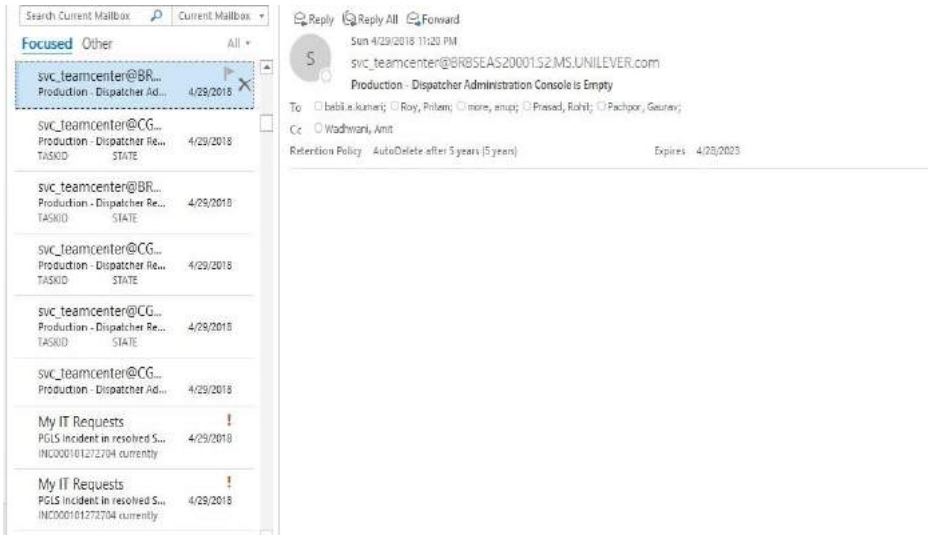


Figure 4-26 Empty Report without Body

Also, main aim of program is to minimize the downtime of the dispatcher enormously as we will be notified of the dispatcher status every 2 hours. And whenever we will get the STATE as TERMINAL frequently, then we will get to know that dispatcher is down and needs immediate action to be taken for it.

Below is the example when the dispatcher is down, STATE of all the Task were Terminal as shown below-

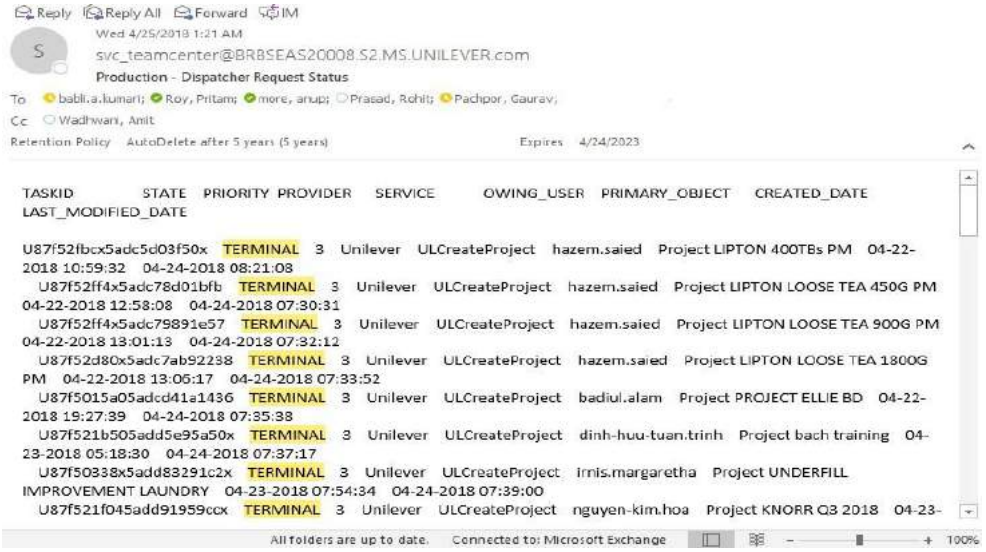


Figure 4-27 Example of Dispatcher down mail

4 Results and Conclusion

End to End Monitoring report takes around one-hour time to be prepared manually and it is necessary to be prepared daily. So, automating this report will save one hour daily.

If this one hour of report saved daily, then-

Assuming average employee salary to be **50,000** per month. Per day payment= 50,000/22= 2272 Rs.
Per hour payment of an employee= 2272/8= 285 Rs.

- *Hence it can be concluded that with Automation of End to End Monitoring Report yearly saves 264 hours and hence resulting into 75,240 Rs. Cost saving per year.*

Total time saving and Cost saving is as stated in below table-

	Time Saving (in Hours)	Cost Savings(In Rupees)
Daily	1	285
Monthly	22	6,270
Yearly	264	75,240

Table 5-1 Estimated Output for End to End Monitoring Report

The table below shows the cost saved if dispatcher downtime is avoided once-

	Time Saving Per incident (In Minutes)	Total Time Savings in Hrs. (For 40 Incidents)	Cost Saving (In Rupees)
User	20	13.5(Approx.)	3375
AM Team	30	20	5000
Business Loss(For one day)			11,25,000

Table 5-2 Estimated Output for Dispatcher Status Report

Now if we consider cost saving per year, approximately 56 Lakh rupees will be saved. The explanation of the same is as below-

Whenever the dispatcher is down, AM Team will get around 40 incidents. So, assuming 40 incidents will be received whenever dispatcher is down. Time saving due to automation of Dispatcher Status report can be divided into 3 categories as below-

1. User time saving

For end user to raise incident it takes at least 20 minutes. So, this time will be saved if user need not to raise incident and can use this same time for any other productive work.
So total time saving = 40*20=800 Minutes
example:-13.5 hours approx. Cost saving= 13.5* 250= 3375 Rs.

2. AM team time saving

For solving one incident it takes around 30 minutes. So, if we reduce one incident there will be saving around 125 Rs.
Cost saving= 125*40=5000 Rs.

3. Business Loss

Business loss is the major one contributor to the loss due to Dispatcher problem.

Suppose the dispatcher is down, so AM team will get to know when the user raises incident and it comes to queue. Normally, it takes around 1 day for this process. So, if there is any urgent work needs to be done then that will be delayed. And as consequence, production will be kept on hold.
For better understanding let's consider one example of Unilever Product as "Lever Ravi Toothpaste".
Suppose the production is on hold due to delay in business process. So other competitive products will be sold instead. Across India at least 25,000 products will be sold everyday. If we consider cost of one product to be 45 Rs.
So Total Loss= 25,000 * 45= 11,25,000 Rs.

Now adding the above three factors will give total saving in Rupees if we avoid dispatcher down time.
Total Saving = 5000+3375+ 11,25,000=11,33,375 Rs.

The above figure indicates total savings when we avoid dispatcher downtime once. With the help of Dispatcher status report, downtime will be saved. And per year dispatcher issue happens at least 4 to 5 times.
Total saving per year= 11,33,375*5=56,66,875 Rs.

- *Hence it can be concluded that, as dispatcher downtime is avoided hence our objective to reduce incidents logged to AM queue has been achieved.*
- *As dispatcher status is now sent periodically through mails, hence manual effort to check dispatcher status regularly is also saved.*

References

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