INVOICE PROCESSING NON PO TAX CODING

*Dissertation/ Project report submitted in partial fulfillment of the requirement
for the degree of*

BACHELOR OF TECHNOLOGY

IN

ELECTRONICS AND COMMUNICATION ENGINEERING

By

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UNDER THE GUIDANCE OF
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JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT
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DECLARATION BY THE SCHOLAR

I hereby declare that the work reported in the B-Tech thesis entitled **"Invoice Processing Non PO Tax Coding"** submitted at **Jaypee University of Information Technology, Waknaghat, India,** is an authentic record of my work carried out under the supervision of **Mr. Ravi Shrivastava, Assistant Vice President;, Mr. Hari Om Sharma, Senior Manager and Mr. Riyaz Mohd, Manager.** I have not submitted this work elsewhere for any other degree or diploma.

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May 15, 2019

CERTIFICATE

This is to certify that the Project Report entitled **"Invoice Processing Non PO Tax Coding"** submitted by **Richa Bhardwaj (151021)** for the partial fulfillment of the requirements of Bachelor of Technology in Electronics and communication Engineering Degree of **Jaypee University of Information Technology, Waknaghat** embodies the bonafide work done by her under my supervision. The matter embodied in this project report is original and has not been submitted for the award of any other degree.

Mr. Ravi Shrivastava   Mr. Hari Om Sharma   Mr. Riyaz Mohd

(Assistant Vice President)   (Senior Manager)   (Manager)

ACKNOWLEDGEMENT

I am indebted to a number of individuals who have contributed in progress of this project. Their contribution has been important in so many different ways that I find it difficult to acknowledge them in any other way but alphabetically.

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I would express a deep sense of gratitude for the assistance I received from all of them. I will always be grateful to them for providing me this valuable opportunity to have me worked under them and for their constructive criticism.

Finally, I express my indebtedness to all those who have directly or indirectly contributed to the successful completion of my project.

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COMPANY PROFILE "GENPACT"

Genpact is a global professional services firm that makes business transformation real. It drives digital-led innovation and digitally-enabled intelligent operations for their clients, guided by their experience running thousands of processes for hundreds of Global Fortune 500 companies.

From New York to New Delhi and more than 20 countries in between, Genpact has the end-to-end expertise to connect every dot, re-imagine every process, and reinvent companies' ways of working.

Its focus is to make sure they have the right set of people delivering what they promise. People who think with design, dream in digital, and solve problems with data and analytics. People who obsess over operations, focus on the details, and lead change by being curious, incisive and courageous in everything they do—on a foundation of unyielding integrity.

Genpact is an Equal Opportunity Employer and considers applicants for all positions without regard to race, color, religion or belief, sex, age, national origin, citizenship status, marital status, military/veteran status, genetic information, sexual orientation, gender identity, physical or mental disability or any other characteristic protected by applicable laws. Genpact is committed to creating a dynamic work environment that values diversity and inclusion, respect and integrity, customer focus, and innovation.

"TRANSFORMATION HAPPENS HERE"

ABSTRACT

With the evolution of technology, there is a significant impact on the economy that brings us to the increasing demand of automation. Automation is being carried out in the organizations for quite some time now and has influenced our lives in most different ways. Large-scale organizations, MNCs, medium to small-scale organizations, all of these are adopting the new technology i.e. RPA. RPA acts as catalyst to achieve the goals faster and easier. It focuses on reducing the manual effort and increasing the accuracy. Certain change in any system or process brings more investment that requires more manual work but automation through RPA minimizes this change and gives importance to value and time. RPA brings more productivity and less hassle in the digital world.

CHAPTER 1

INTRODUCTION TO RPA

1.1 EVOLUTION OF AUTOMATION[1]

Automation and communication technology goes hand in hand with each other. They are both parallel of each other. The evolution of one certainly brings the evolution of the other.

1.1.1   ROBOTIC PROCESS AUTOMATION (RPA)

- Leveraged for rules-based methodical tasks
- Screen scraping data collection
- Tactical toolset to automate repetitive tasks
- Require lower investment, provide high quality and enable process efficiency

1.1.2   COGNITIVE AUTOMATION

- Improve non-routine tasks requiring judgment
- Data input and output in any format
- Pattern recognition within unstructured data
- Basic learning capabilities for continuous improvement to quality and speed

1.1.3   ARTIFICIAL INTELLIGENCE (AI)

- Natural language recognition and processing
- Dealing with unstructured super data sets
- Hypothesis based predictive analysis
- Self-learning rules continuously rewritten to improve performance
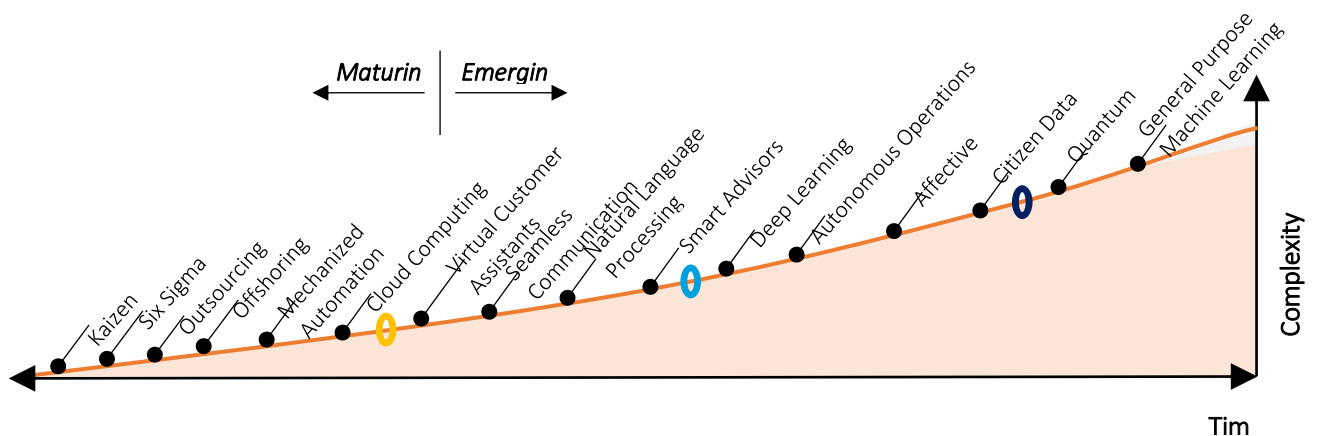
Figure 1.1 Hype cycle for emerging technology

1

1.2 WHAT IS RPA?

RPA is a process where business operations are automated with the help of robots to reduce human interference and effort. In a more brief sense, bots imitate human actions to perform a series of steps that products a significant result.

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          ┌──────────┐
          │   RPA    │
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│ ROBOTIC  │ │ PROCESS  │ │  AUTOMATION  │
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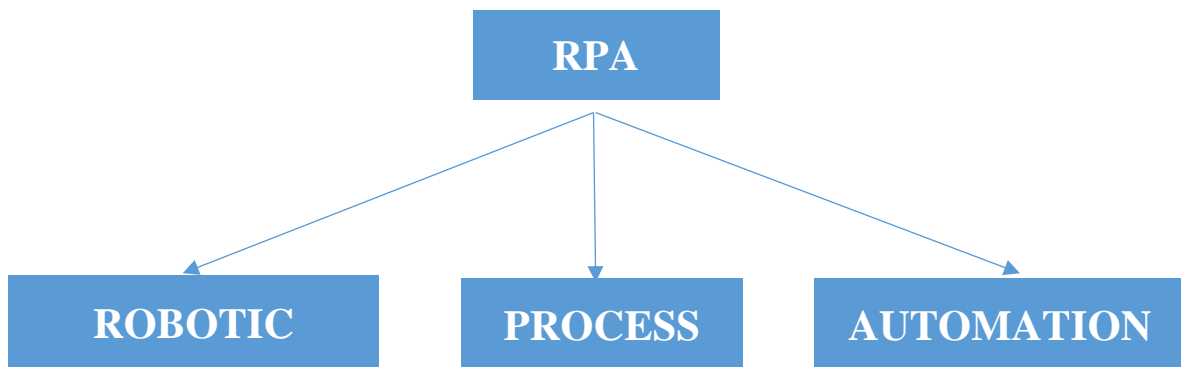
Figure 1.2 Schematic diagram of RPA

All these three terms hold different meanings but complete each other when put together.

- ROBOTIC- This is an entity that can be programmed to impersonate human actions.
- PROCESS- This refers to an order of steps that lead to a meaningful activity.
- AUTOMATION- The phenomenon of automating tasks and processes i.e. if somethings happens automatically (without human intervention).

1.3 WHY RPA?

RPA has been the hot topic in the technology world for quite some time now. This section outlines some of the benefits of this technology. Some of the major benefits are-

- SAVING- RPA allows to produce substantial savings in personnel costs. The average cost of a bot is one third of the cost of one FTE (Full Time Equivalent).Also, there is an increase in productivity due to uninterrupted 24x7x365 working days, and a significant increase in performance through continuous learning and optimization, which increase the total savings. RPA can save 50-80% current costs of a process.

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- ACCURACY- RPA allows eliminating the human margin of error, which in the case of repetitive tasks is between 5%-10%. Robots have the capability for unlimited attention, have no distractions, and do not make mistakes in their calculations.

- ANALYTICS- RPA is designed to return a huge amount of performance data analysis as KPI's key analysis. This information is used to continuously improve the system and to be able to have accurate information about the savings generated and productivity.

- SCALABILITY- RPA solution can be as large or as small as needed. If at any moment there is a requirement to increase the processing capacity then one can increase or decrease the robots accordingly.

- PRODUCTIVITY- A robot can be equivalent between 2 and 5 FTE. They work continuously without rest or absence. This improves the overall operational efficiency.

Some of the other pluses of RPA are-

- It is cost effective.
- It provides great accuracy in lesser time.
- It is easy to learn and implement.
- It crises large volumes of data rapidly and effortlessly.
- There is no employee exhaustion or mistakes.
- This reduces the processing costs to up to 80 percent.
- This reduces FTEs up to 43 percent.

1.4 HOW RPA WORKS?[2]

RPA is a technology that uses softwares that configure automation workflows to automate business operations. These softwares are not actual robots but RPA tools/vendors. RPA bots replicate employee actions but in an automated way. They interact with various altered systems via integrations and screen scraping, allowing RPA tools to perform actions.

Bot is a fundamental unit of automation and these bots can be run from desktops or from cloud. Some of the necessary key features are-

- INTEGRATION- It is necessary for the bot to work with the enterprise applications. App integration provides more reliability thus reducing the causes of errors. Most of the bots in the market work with legacy, web and

desktop applications. They also work with other major enterprise softwares such as Citrix, SAP, Java etc.

- PROGRAMMING INTERFACES- Bots are needed to be programmed so, programming interfaces are required. RPA programming is simpler and is not language specific.

1.5 RPA TOOLS

RPA tools are the software through which automation is carried to configure tasks. In today's market there are certain tools that are available for process automation. Some of them are- Blue Prism, Automation Anywhere, UiPath, WorkFusion, Pega Systems and many more. But the leaders in the market are – **UiPath, Blue Prism & Automation Anywhere**.

These tools are widely used for enterprise applications. All three of them have their own advantages and drawbacks.
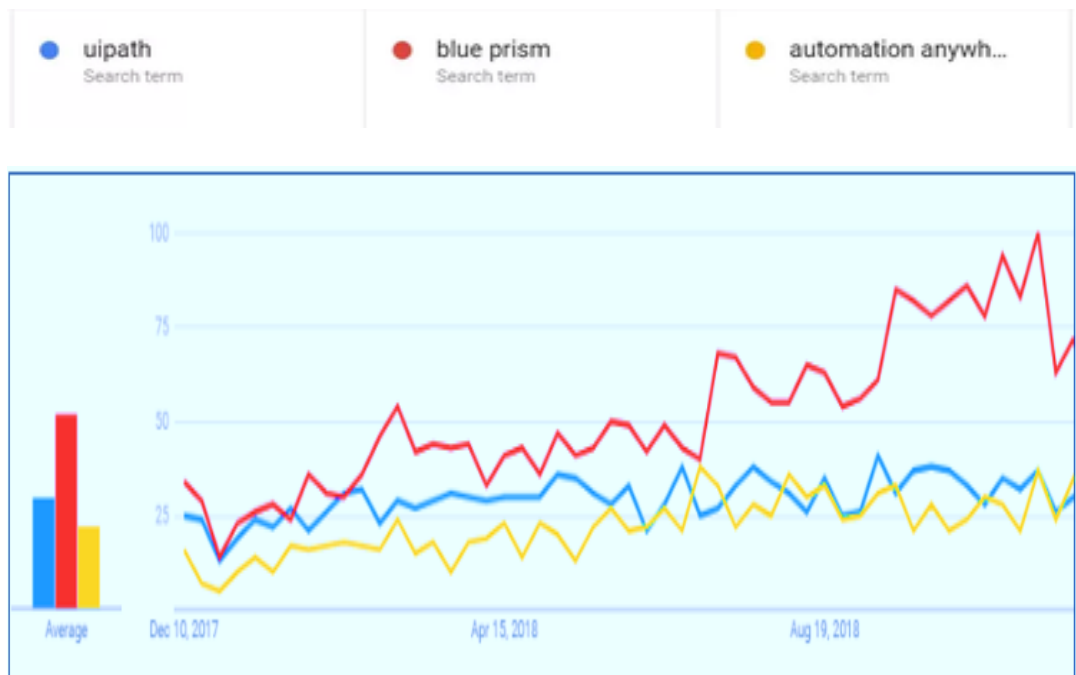
Figure 1.3 Market trend of RPA tools in 2018

Comparison of these three emerging tools can be done as-

SR.NO.	FEATURES	AUTOMATION ANYWHERE	UIPATH	BLUE PRISM
1	Learning	Basic developer	Visual design	Ability to develop and control
2	Accuracy	Reasonable	Excels in Citrix automation	Excels in desktop and web applications
3	Robots	Front and back end	Front and back end	Back end
4	Recorders	Yes	Yes	No
5	Reliability	High	Moderate	Very high
6	Pricing	Higher cost of deployment	Attractive entry level pricing	High cost of acquisition
7	Trial version	Available for 30 days	Community edition is available	Not available

Table 1.1 Comparison of RPA tools

1.6 APPLICATIONS OF RPA
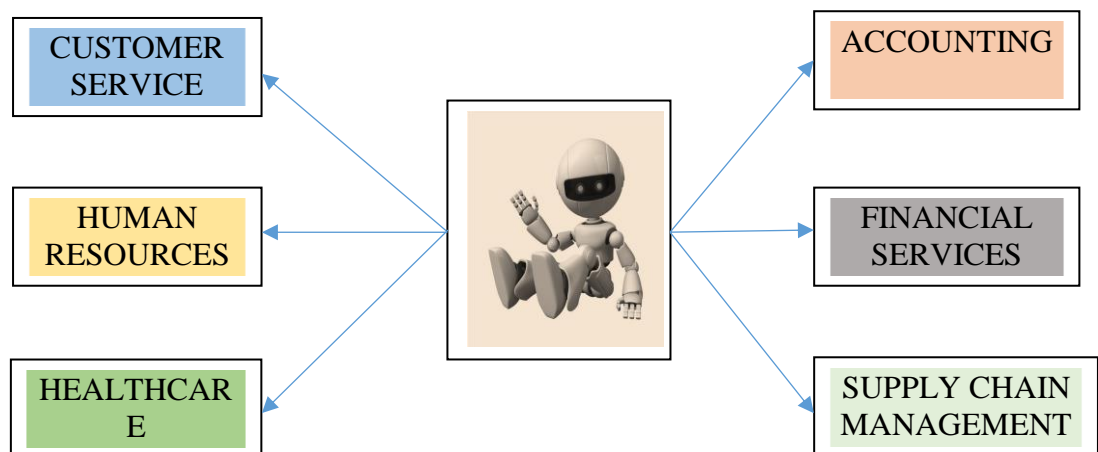
Figure 1.4 RPA Applications

RPA can be used in various other capacities. Some of the other application areas are-

- Operational Activities in Sales
  Sales is a critical aspect of all category of businesses. These businesses include processes such as- data replication, invoice preparation and invoice delivery. Software bots ease these operational processes as compare to manual performance.

- Data extraction
  RPA has the capacity for elementary pattern recognition. This reduces the trouble for manually entering data into the systems that produces less errors and faster results.

- Data management
  RPA manages the relevant data that comes from a variety of sources. It carefully processes the data with paying attention even to a minor detail.

- Reconciliation
  Software bots when successfully performing the data extraction process, can also reconcile purchase orders and also ensure compatibility of orders and deliveries.

CHAPTER 2

RPA TOOL: AUTOMATION ANYWHERE

Automation Anywhere (AA) is a RPA software that has made a mark in RPA industry by delivering intelligent automation technology that empowers people. With its enterprise great cognitive RPA platform, AA enables enterprises to create a digital workforce capable of automating complex business processes with complete ease and flexibility. This platform can be used to automate almost any application. For example, an application operating at User Interface (UI), Application Program Interface (API), Operating System (OS) and Database (DB) layers.

Figure 2.1 Four levels of integration

2.1 KEY FEATURES OF AA

Some of the key features of Automation Anywhere are-

- This platform is infrastructure-agnostic-
  AA platform facilitates centralized deployment and control from desktop to data center without any programming skills or IT involvement.

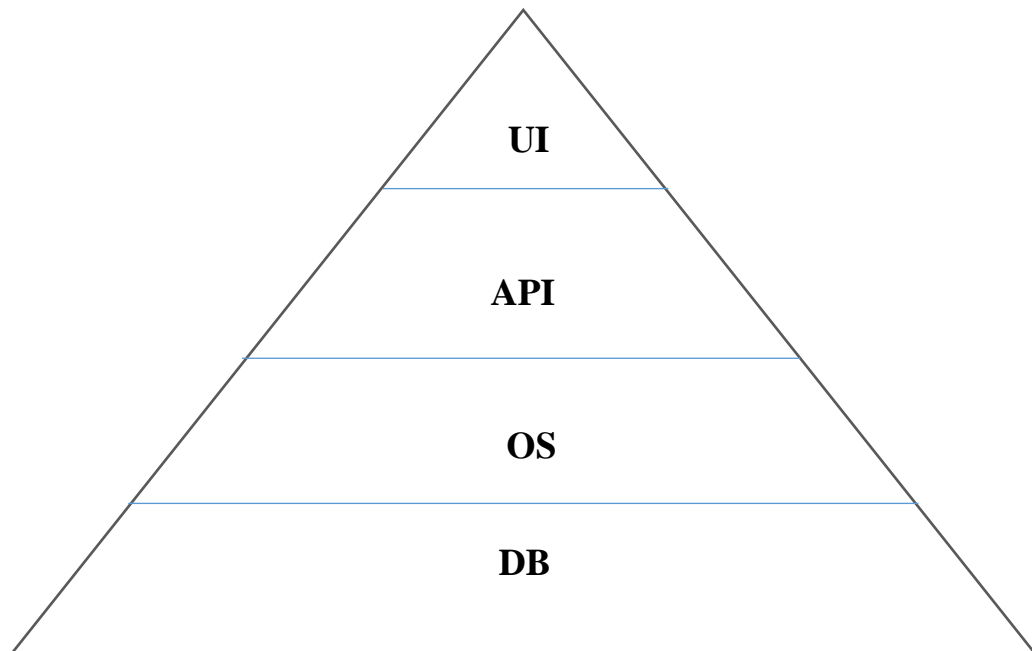- It automates complex and complicated processes easily and quickly.

- It is scriptless automation.

- Tasks can be scheduled anytime with the help of auto-login, even if the computer is locked.

- Automate, Manage and Define
  Automate- It enables the user to transform a complicated and complex process to a single mouse click and keystrokes. It also helps to automate FTP/SFTP processes in just a few minutes.
  Manage- This hosts centralized control, distribution and analysis. It enables the user to run scheduled bots anytime by using powerful bot scheduling even when computer is locked.
  Define- This feature allows the user to visually document any process with the click of a button. It also helps in scheduling and executing batch data processing.

2.2 AA TOOLS AND COMMANDS

2.2.1 RECORDERS- AA enterprise provides three types of recorders to automate-
- Object based smart recorder
- Screen recorder
- Web recorder

2.2.2 COMMANDS- It has 575+ drag and drop commands that can be used to automate business processes.

2.2.3 TOOLS- It has a centralized Control Room (CR) that allows to manage, monitor and scale automation bots across multiple business functions.

2.3 AA ARCHITECTURE

AA Architecture consists of three components-

- Control Room- It is a centralized managed and control layer.
- Bot Creator- It is a Bot Development Client System that is used to create, edit and execute bots.
- Bot Runner- It is a runtime client that is used to execute bots.
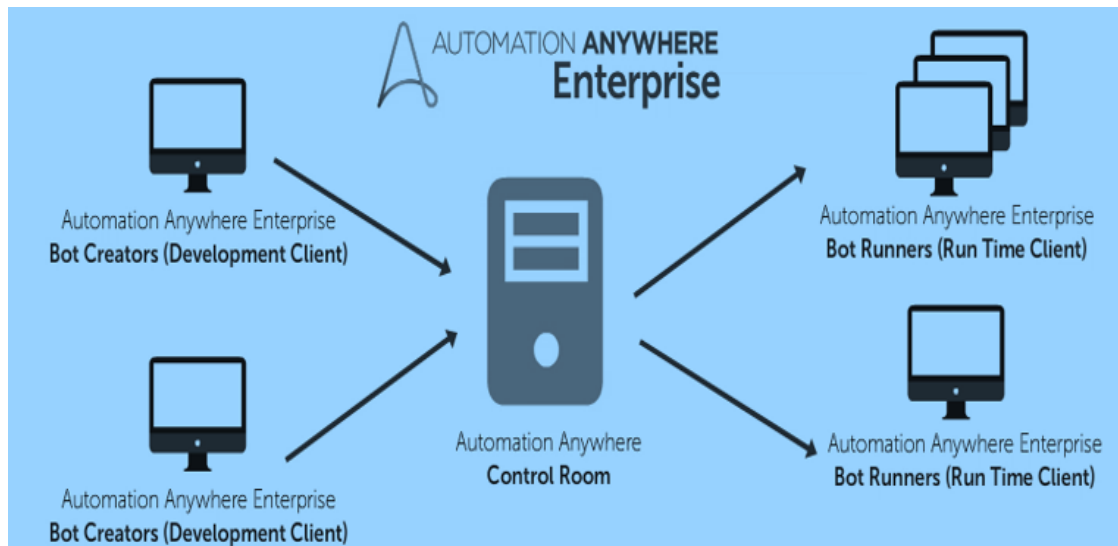
Figure 2.2 AA Architecture

Both bot creators and runners are authorized and controlled by the Control Room (CR)
a

2.3.1 CONTROL ROOM

- It provides easy access and management of automation bots.
- It is web based and allows enhanced monitoring and administration.
- It facilitates an environment for increased collaboration to optimize productivity.
- It is easily scalable to multiple client machines.

Figure 2.3 Control Room Login
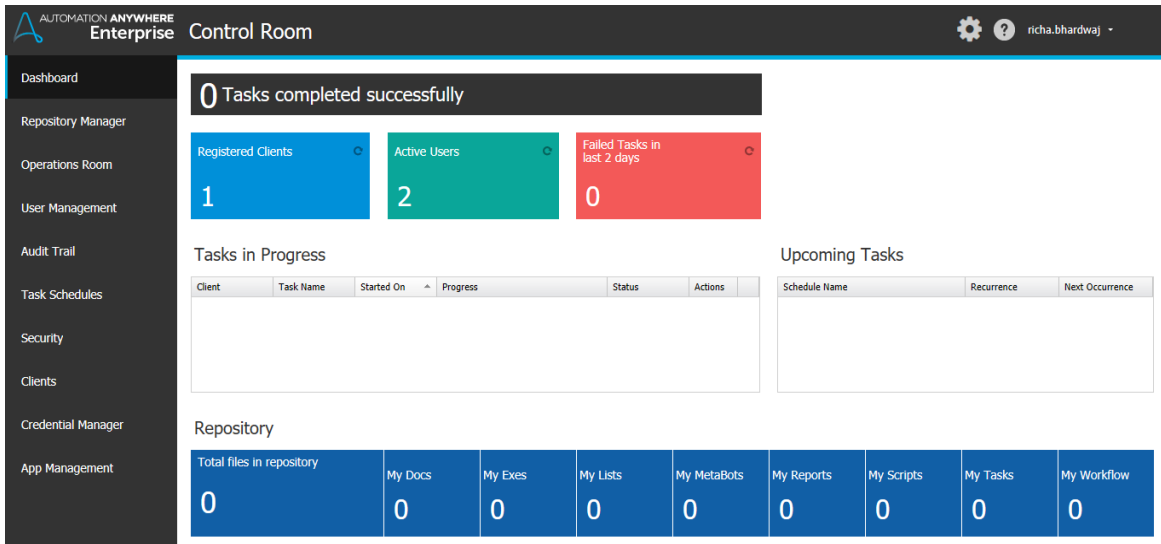
Figure 2.4 Control Room Dashboard of v10
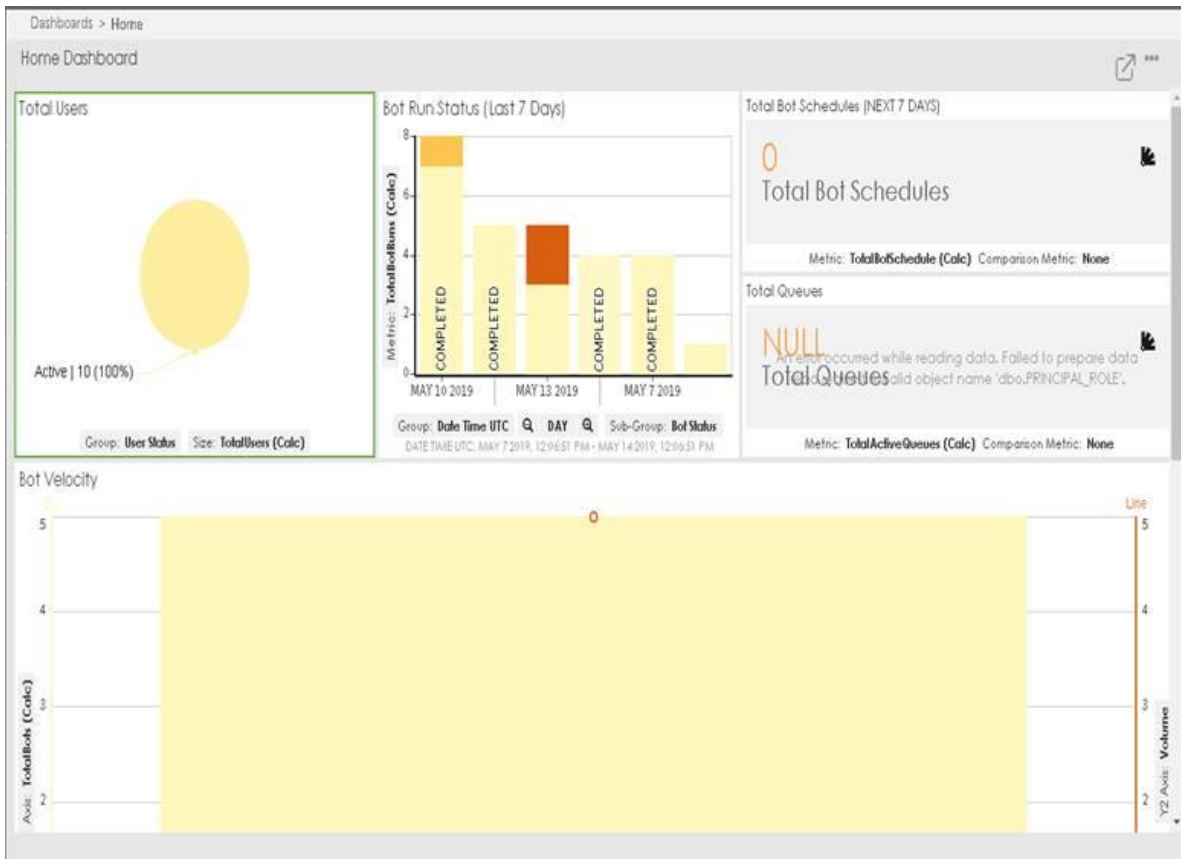
Figure 2.5 Control Room Dashboard of v11

Figure 2.6 Bot Dashboard

2.3.2 BOT CREATOR

- It is licensed for each type of bots i.e. task bots, meta bots and IQ bots and comprises of a runtime system for testing and execution.
- It runs on windows.
- It must be connected to an active control room in order to function.
- It creates and edits bots such as editing the properties of the bots i.e. scheduling and event trigger.

2.3.3 BOT RUNNER

- Control Room schedules and assigns bots to runtime client.
- These must be registered, identified and authenticated by the control room, only then they can be executed.
- They are easily scalable.
- They can be easily grouped and dynamically allocated.

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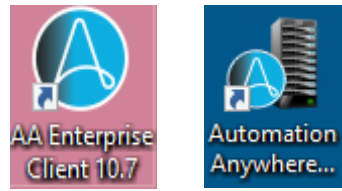
Figure 2.7 AA Clients and CR Icons
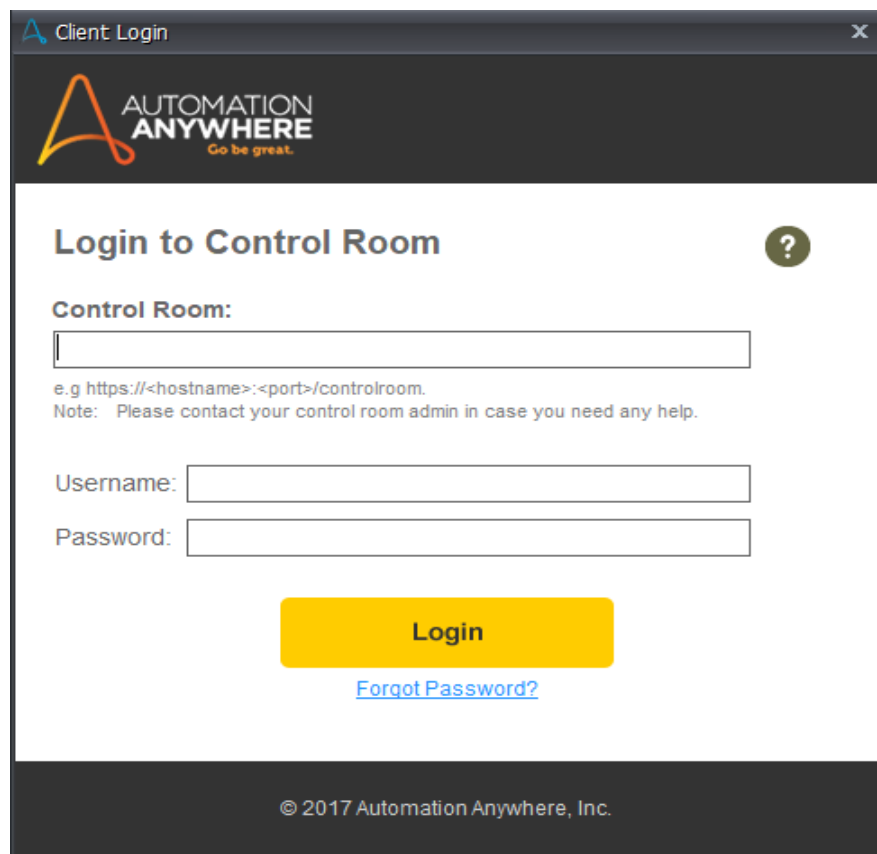
Figure 2.8 AA Client Login
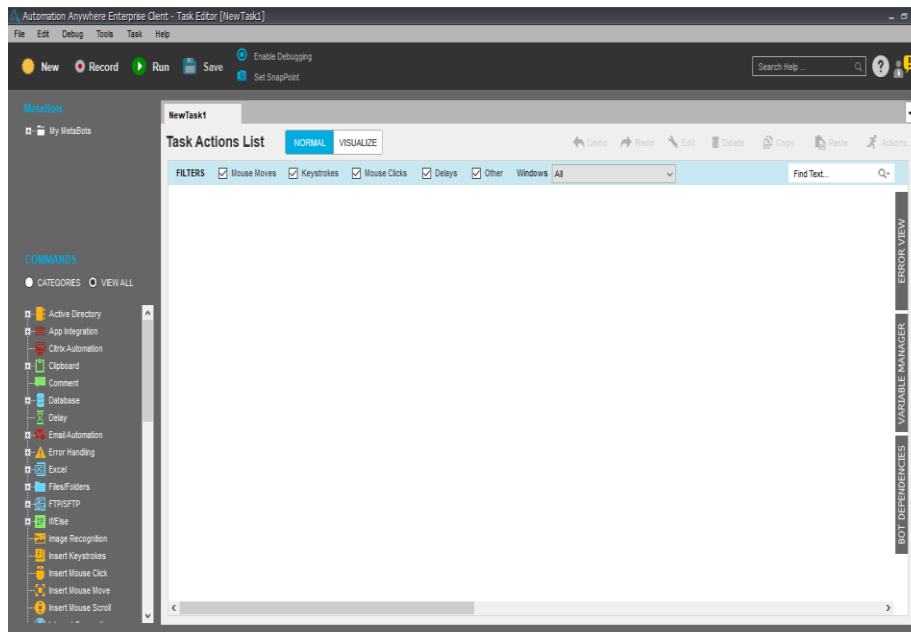
Figure 2.9 AA Client Interface

2.4 UNIQUE FEATURES OF AA

Some of the unique features of Automation Anywhere that differentiate it from the other tools are:

- Auto-Calibration Technology-
  It enables bots to sense and adjust automatically to application changes.
- Cognitive ability-
  Enables it to study and enhance processes to maintain accuracy and reliability
- Sense AI technology-
  It gives an adaptive automation experience employing smart pauses and environment related adjustments to perform tasks
- It is the only enterprise grade RPA platform with cognitive capabilities and analytics.
- This platform has incorporated machine-learning techniques such as feature extraction and classification algorithm for data extraction.
- Embedded analytics-
  It captures business data to gain real time business insights.
- It has system logs and auto-compliance features.
- Licensing and execution is centrally controlled and orchestrated.
- It features private/public key infrastructure combined with AES encryption.
- It has multiple layers of security with stealth mode and keyboard disable features.
- It has credential integration feature using SAML (Security Assertion Markup Language) 2.0 and standard directory service protocol.

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2.5 AA VERSIONS

AA works on two different versions i.e. v10 and v11. Both of these versions have their own features and capabilities. However, v11 is the newest version of AA that has some additional and enhanced features as compared to v10.

CONTROL ROOM	VERSION 10	VERSION 11
User Interface	Standard Web UI	Responsive UI controls
Centralized Scheduling	Basic	Advanced with repeat option
Credential Vault	Standard	Advanced with RBAC, lockers
Operations Room	Standard	Detailed
Audit	Basic	Detailed with changes
Data Migration	Desktop Utility	Web-based tool
Dashboard	Basic	Graphical, drill down UI
Hosting Technology	IIS	Java
Workload Management	Not Available	Available
Bot Lifecycle Management	Not Available	Available
Bot Runner health check	Not Available	Available
Create/Rename Folders in Control Room	Not Available	Available
Credential Vault API's	Not Available	Available
Data Migration API's	Not Available	Available
Bot Login Credentials API	Not Available	Available

Table 2.1 v10 vs v11 Control Room

BOT INSIGHT	VERSION 10	VERSION 11
Installer	Separate Installer	Integrated Installer
Fluid Visualization Engine	Not Available	Available
Denser Dashboards	Not Available	Available
Better data caching	Not Available	Available

Table 2.2 v10 vs v11 Bot Insight

AAE CLIENT (BOT CREATOR/BOT RUNNER)	VERSION 10	VERSION 11
Bot Obfuscation	Basic 3DES	AES-256 algorithm
AI Sense	Not Available	Available
Integrated Workbench	Not Available	Available
Quick command replication	Not Available	Available
Support for Windows 10	Not Available	Available
Support for Edge browse	Not Available	Available
Command-line Login to Client	Not Available	Available
Disaster Recovery of Bot Runners	Not Available	Available
Support for Windows Server 2016	Not Available	Available
Auto mode in OCR	Not Available	Available
Resolution independent IR	Not Available	Available
Folder support for Meta Bots	Not Available	Available
Microsoft logo certification	Not Available	Available
Support for Japanese language	Not Available	Available

Table 2.3 v10 vs v11 Automation Anywhere Enterprise (AAE)

2.6 HIGHLIGHTS ON SIMILARITIES IN V10 AND V11

2.6.1 CONTROL ROOM- Data Storage, Centralized Bot Deployment, Roles and Permissions, Role based access control, Centralized licensing, API based deployment, Load Balancing, High Availability mode, Version Control Integration, Multi Domain Support, Email notifications, Customizable help links, Bot Runner Session on Control room, and Bot Deployment API.

2.6.2 BOT INSIGHT- High Availability, Multi-Domain Support and Double byte data visualizations.

2.6.3 AAE CLIENT- Number of Commands, Recorders, Meta Bot, Packaging bot dependencies, Multi User support (Citrix/Terminal server), Secure Recording, Integrated OCR engine and, Dynamic Java Automation.

CHAPTER 3

AA CONTROL ROOM DASHBOARDS

3.1 DASHBOARDS OVERVIEW

Control Room Dashboard provides exclusive graphical insight so that informed decisions can be made for Bots. It represents RPA infrastructure in the form of meaningful visuals and charts so that one can analyze it, interpret it, and take action on important updates. It dynamically updates information related to active users, registered clients, failed tasks, apps, bots, bot schedules, workflows, queues, and the overall status of devices - their memory, CPU, and HDD utilization.

3.2 DASHBOARDS- HOME

As a Control Room user with View dashboards privileges, you can view data to which you have access permission presented in the form of widgets. It provides information about the following

It provides information about the following:

• Number of active users
• Bot Run Status (Last 7 Days)
• Total Bot Schedules
• Bot Velocity
• Capacity Utilization (Bot Vs Bot Runners)

Figure 3.1 AA CR v11

3.2.1 NUMBER OF ACTIVE USERS

Total no of active users in control room
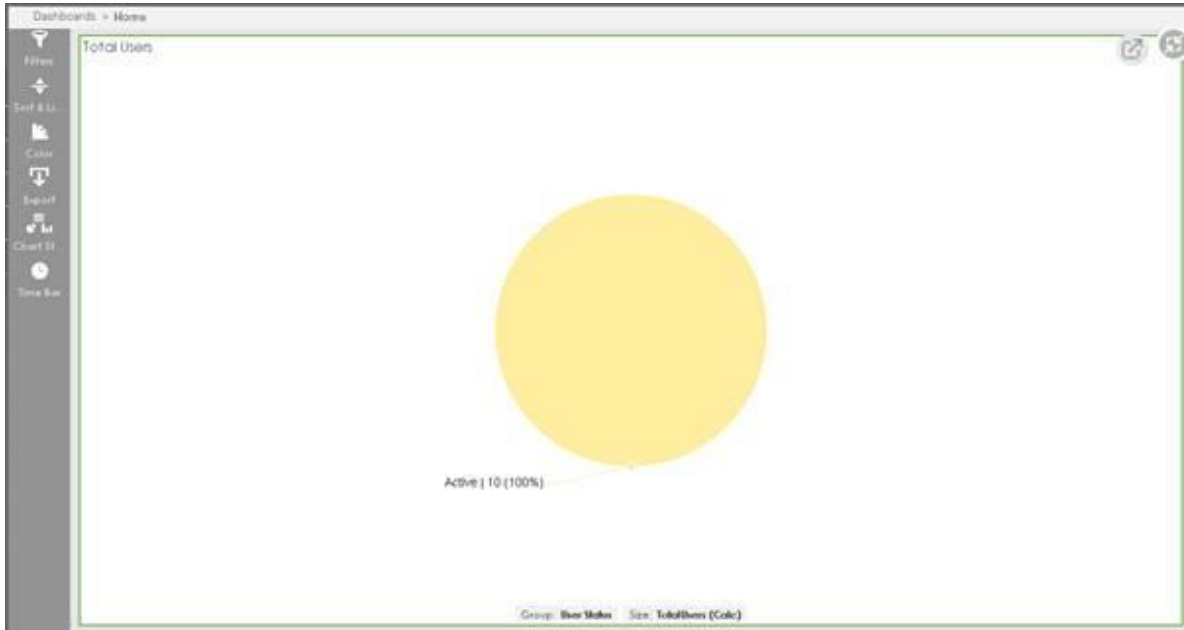
Figure 3.2 Demonstration of number of active users

3.2.2 BOT RUN STATUS

Display the status of bot execution in graphical manner representing completed, failed, and stopped.

Figure 3.3 Demonstration of Bot Run Status

3.2.3 TOTAL BOT SCHEDULES

This widget displays the total number of task scheduled.

Figure 3.4 Demonstration of Total bot Schedules

3.2.4 BOT VELOCITY

It represents the bot first uploaded and its modified time.

Figure 3.5 Demonstration of Bot Velocity

3.2.5 CAPACITY UTILIZATION (BOT VS BOT RUNNER)

This widgets displays the capacity utilized by bots while running through production VDI.

Figure 3.6 Demonstration of Capacity Utilization

3.3 DASHBOARDS- BOTS

The Bots dashboard provides answers to following questions

• Which of my bots use the most system resources?

• Which bots are scheduled to run? Which of these bots failed to run?

• What percentage of bots are in progress, paused, unknown, failed, and completed?
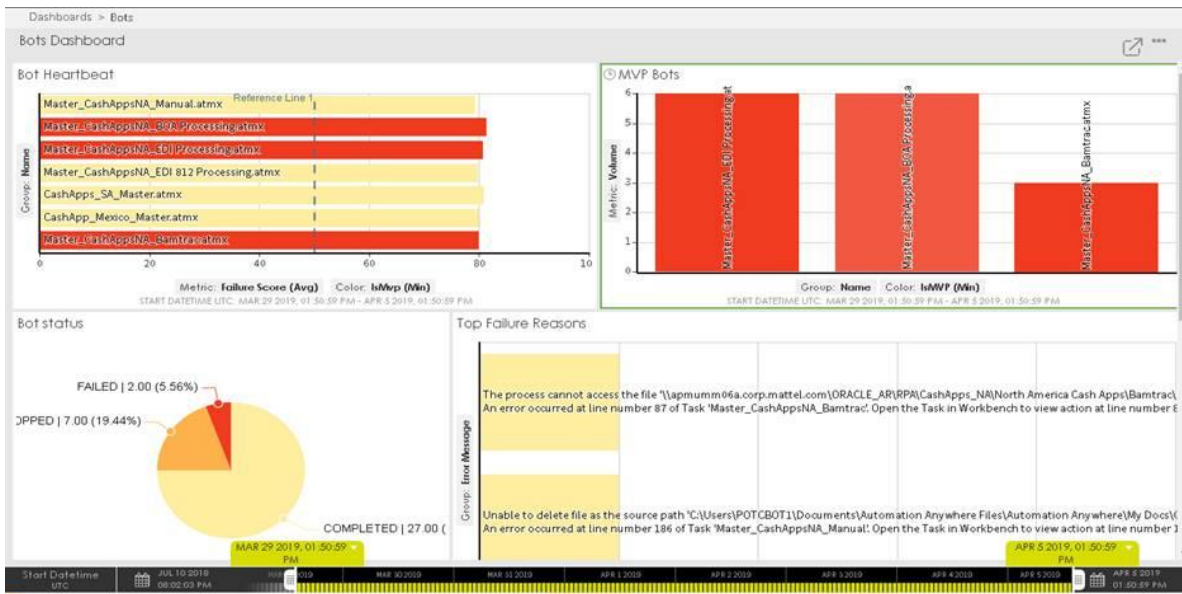
Figure 3.7 Bot Dashboard

3.3.1 BOT HEARTBEAT WIDGET

The Heartbeat widget provides a statistical representation of the relationship between the failure score of a bot and the respective bot. A failure score is a calculation of the resources utilized by the CPU, memory, and hard disk (HDD) when you run a bot. By default, the formula for calculating the failure score is:

Failure Score = $0.5*M + 0.3*C + 0.2*H$ where,

M = Memory usage

C = CPU usage

H = HDD usage
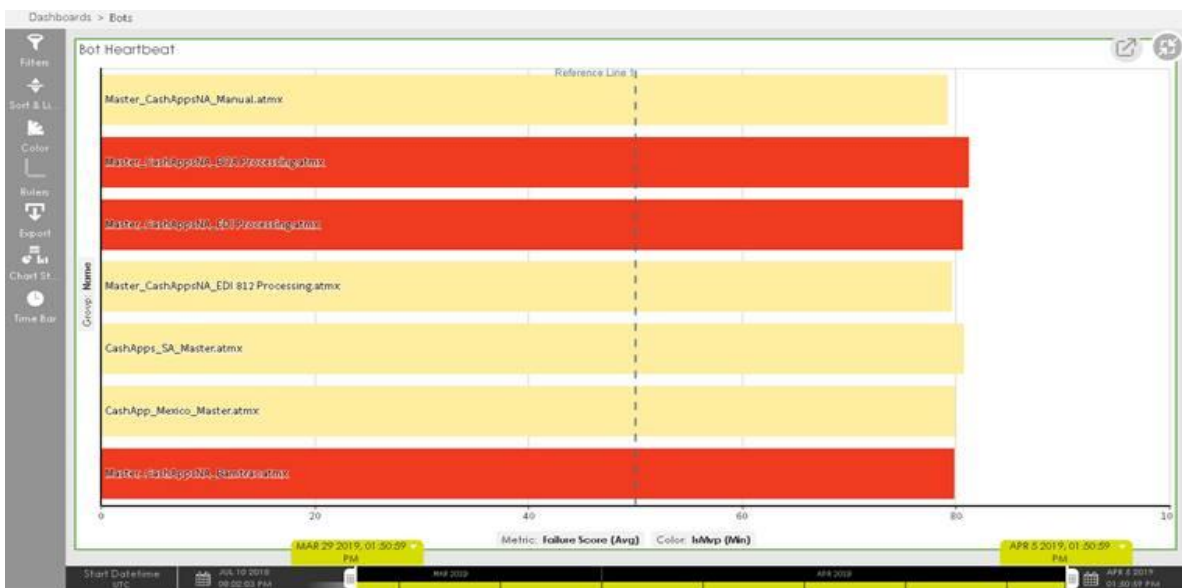
Figure 3.8 Bot Heartbeat

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3.3.2 MVP BOTS WIDGET

This widget displays bots based on their maximum processing time and the number of times they are run.
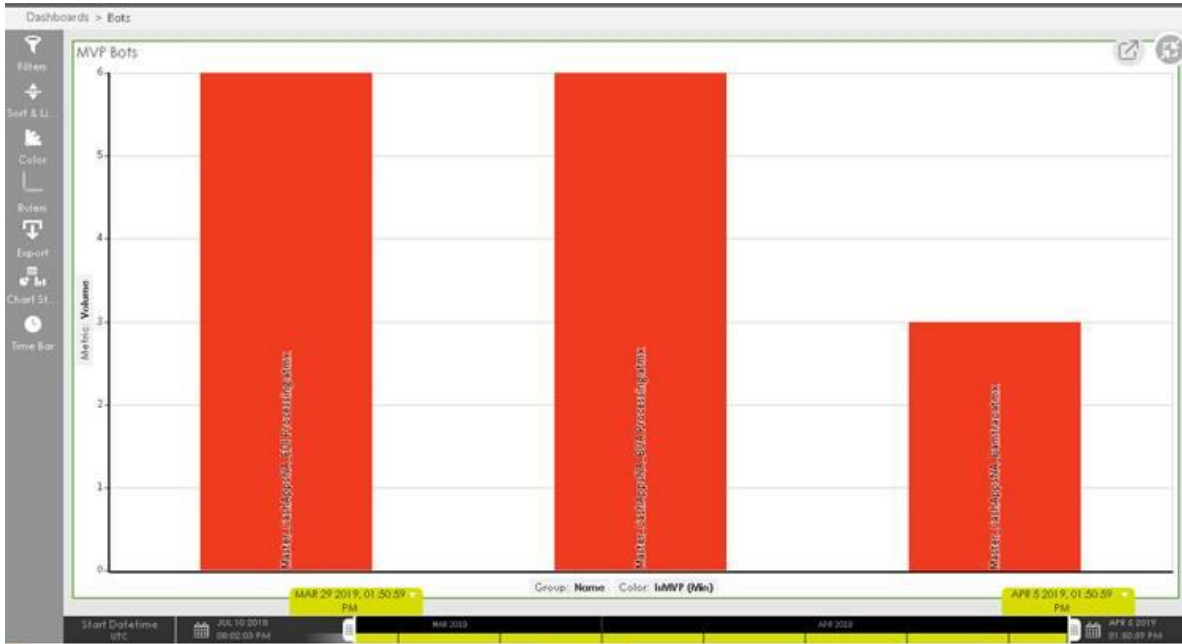
Figure 3.9 MVP Bots

3.3.3 BOT STATUS WIDGET

It displays the status of bot executed as either completed, failed, started, stopped, deploy failed etc.
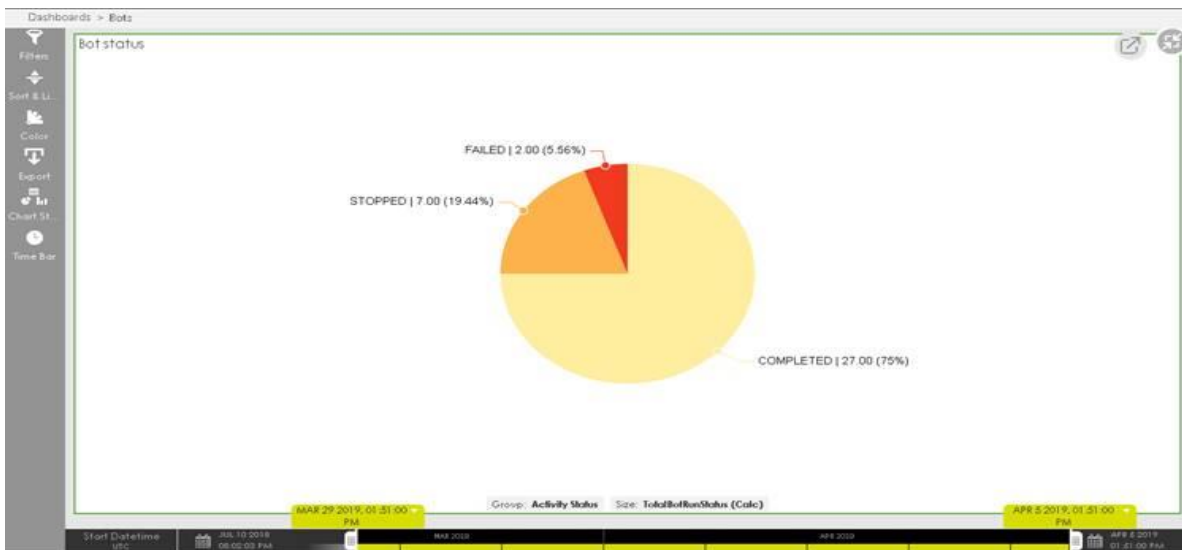
Figure 3.10 Bot status

3.3.4 TOP FAILURE REASONS WIDGET

This widget categorizes the errors that bots may encounter into various groups and shows the count of each group.
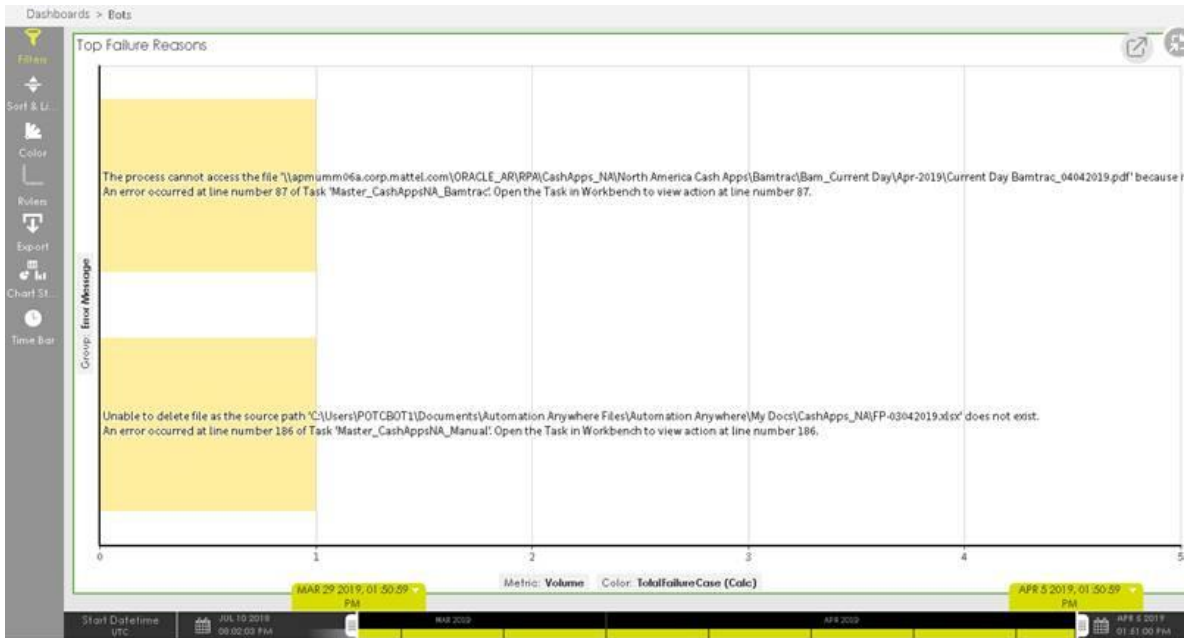
Figure 3.11 Top Failure Reasons

3.3.5 UPCOMING SCHEDULES WIDGET

This widget shows all bots that are scheduled to run, which are sorted by the number with which they are run.
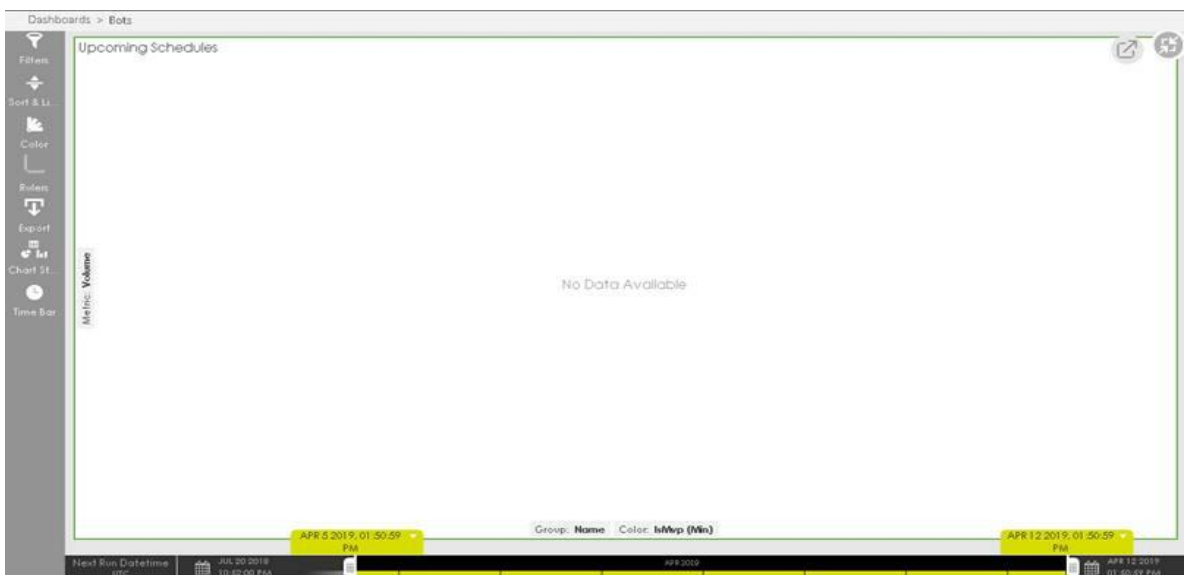
Figure 3.12 Upcoming Schedules

3.4 DASHBOARDS- DEVICES

As a Control Room user with Dashboard view privileges, you can view and analyze Devices (Bot Runner machine) relevant data when Bots are deployed on those Devices. This data is presented in the form of widgets which provide information about:

1. The number of bots that failed to execute on devices for a given time.
2. The number of devices that either crossed, did not achieve or are equal to the threshold for CPU, Memory, and HDD utilization for a given time frame.
3. The overall device status for given time frame.
4. The number of devices on which automations are scheduled for given time frame.
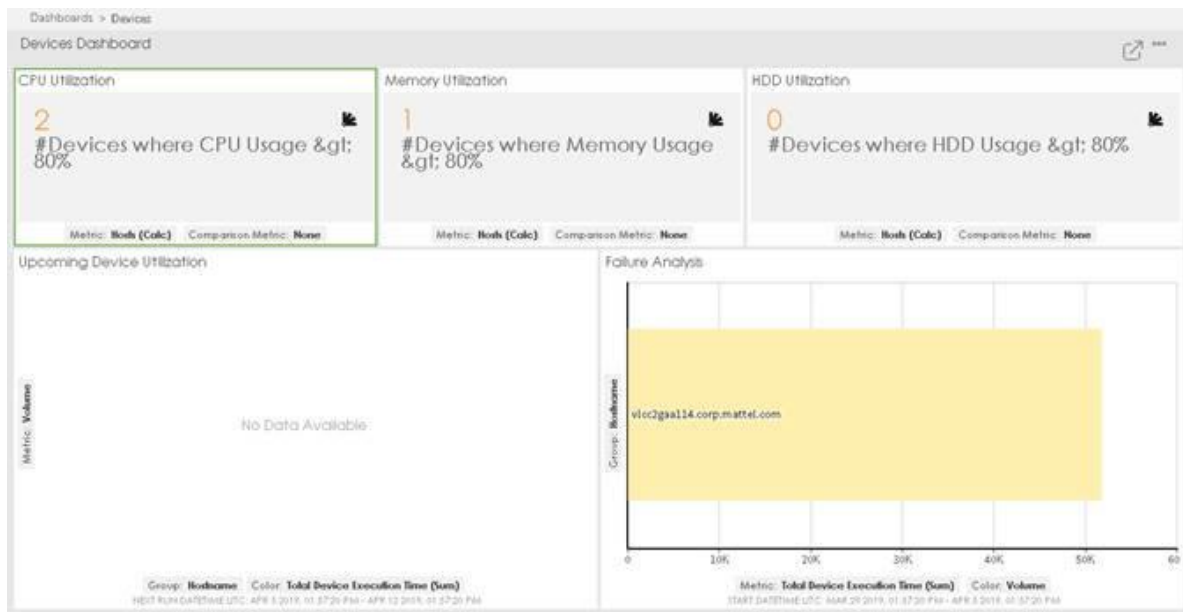
Figure 3.13 Devices Dashboard

3.4.1 FAILURE ANALYSIS WIDGET

This widget displays the top n number of devices with most failures for a given time period.

Figure 3.14 Failure Analysis

3.4.2 CPU UTILIZATION WIDGET

This widget displays the number of devices that crossed the threshold for CPU usage (> 80%) for a given time period.

Figure 3.15 CPU Utilization

3.4.3 MEMORY UTILIZATION WIDGET

This widget displays the number of devices that crossed the threshold for Memory usage for a given time range.
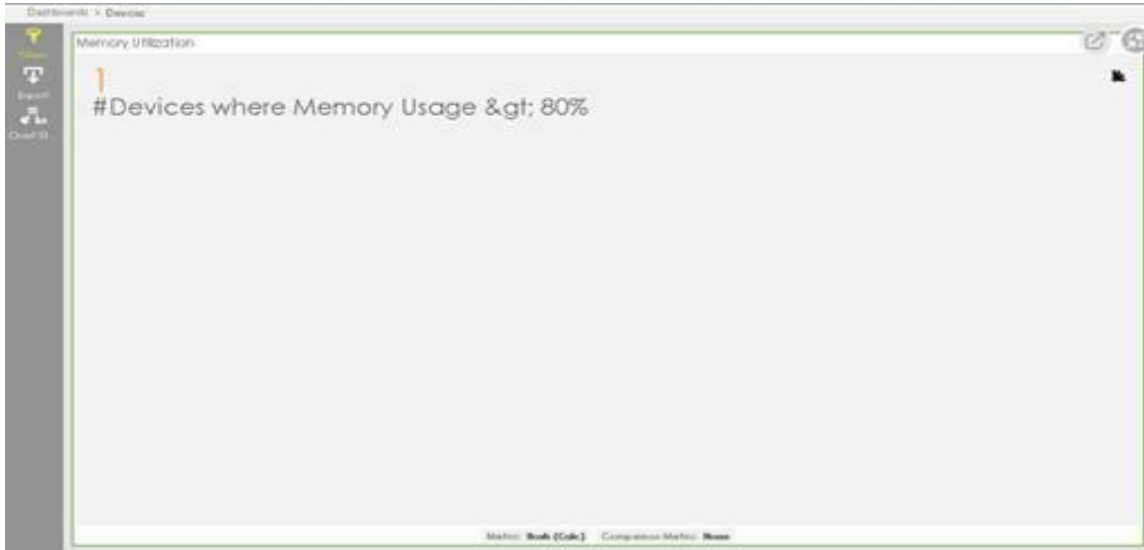
Figure 3.16 Memory Utilization

3.4.4 HDD UTILIZATION

This widget displays the number of devices that crossed the threshold for HDD   usage for a given time range.
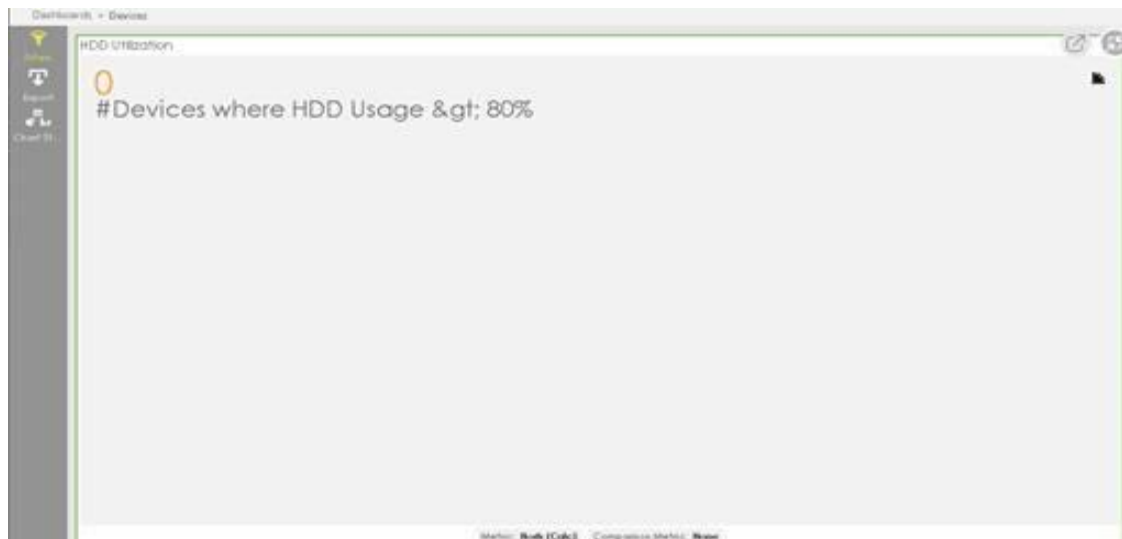
Figure 3.17 HDD Utilization

3.4.5 OVERALL DEVICE STATUS WIDGET

This widget displays the number of Devices that are Connected or Disconnected for a given time range.

Figure 3.18 Overall Device status

CHAPTER 4

RPA LIFECYCLE & BOT LIFECYCLE MANAGEMENT

4.1 LIFECYCLE OF RPA[3]

RPA lifecycle usually defines how bot functions through various stages of development. It has four phases: Analysis, Bot Development, Testing, and Support & Maintenance.

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│          ANALYSIS           │
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┌─────────────────────────────┐
│       BOT DEVELOPMENT       │
└─────────────────────────────┘
              │
              ▼
┌─────────────────────────────┐
│          TESTING            │
└─────────────────────────────┘
              │
              ▼
┌─────────────────────────────┐
│          SUPPORT            │
│             &               │
│        MAINTENANCE          │
└─────────────────────────────┘
```

Figure 4.1 RPA Lifecycle

- Analysis –
In this, the opportunity of developing a bot is examined. There occurs a feasibility test that ensures that the provided task/process can be automated or not. Moreover, if it can be automated, what are the parts of it that can be completely automated. Input, system and, output are considered in this phase of RPA lifecycle. In addition, keystrokes and disaggregation screens information is provided by the client. Business teams & RPA Architects work together to analyze a business process for RPA bot development.

- Bot development –
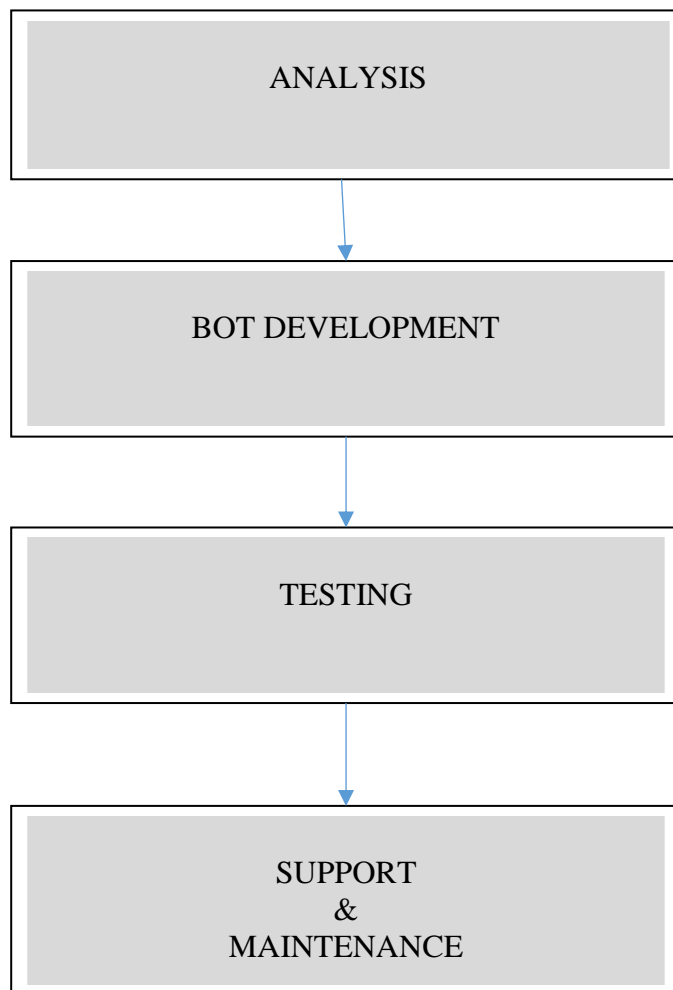This is the development phase of RPA lifecycle. In this phase, development team of RPA starts to develop the automation workflows as per the requirements stated by the client.

- Testing –
This includes the monitoring of bot in test environment. There are certain test environments that are available for examining the proper functioning of bot. These test cycles analyze the quality and correct defects. Some of the tests are- System Integration Test (SIT) and User Acceptance Test (UAT).

- Support & Maintenance –
After the development and testing phases, bot goes to the support & maintenance phase. After the UAT, bot enters to the production where it is observed for around 2-3 weeks. If any defect occurs during this phase, it is immediately resolved.

4.2 BOT LIFECYCLE MANAGEMENT (BLM)

This is a module in the Control Room that helps to Export and/or Import bots from one environment to another. The bots that are verified as "production ready" can be moved from staging to production.

BLM has two stages:

1	EXPORT

2	IMPORT

Figure 4.2 Stages of BLM

 STAGE 1- EXPORT

In this stage, bots and files can be exported from one control room to another. A package is formed that contains the bots and files. This package is then converted into a .blm file. Once the package is saved with .blm, it is ready to export. All the dependencies can be exported

as well. In case, if any user wants to encrypt the package before exporting it, he/she can set a password (optional) that will be required at the time of importing.

 STAGE 2- IMPORT

In this stage, the package that has been exported previously from one CR can be imported into another CR. If the package is encrypted with a password at the time of export, then it is required to decrypt that package with the same password.

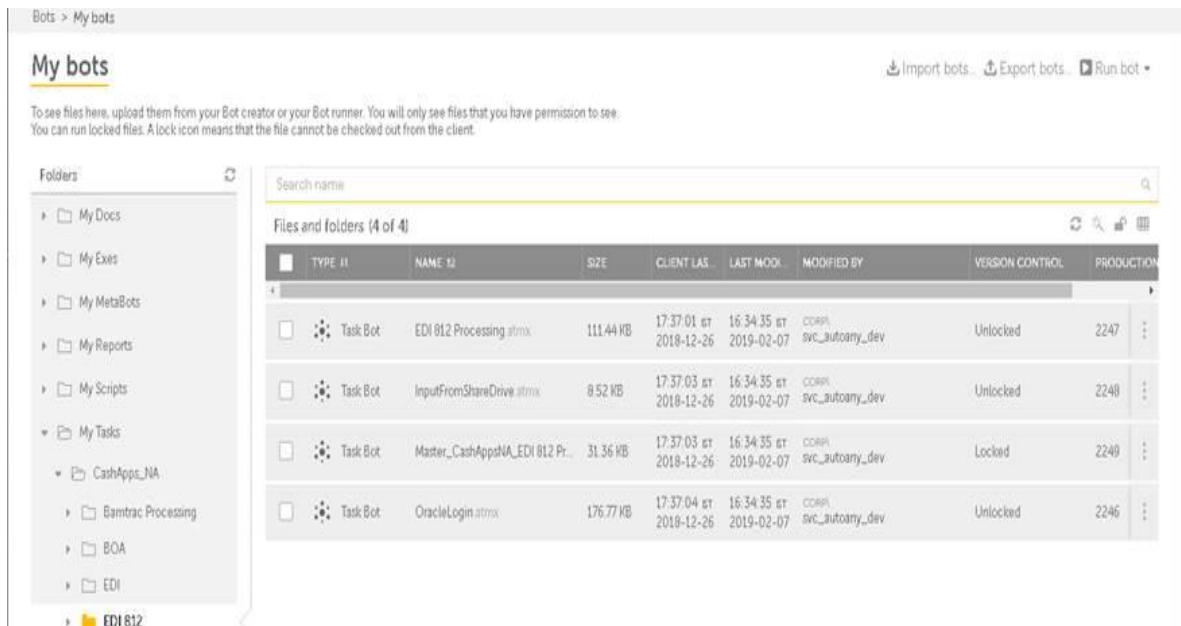 NOTE: This BLM module is available in the version 11 of AA.

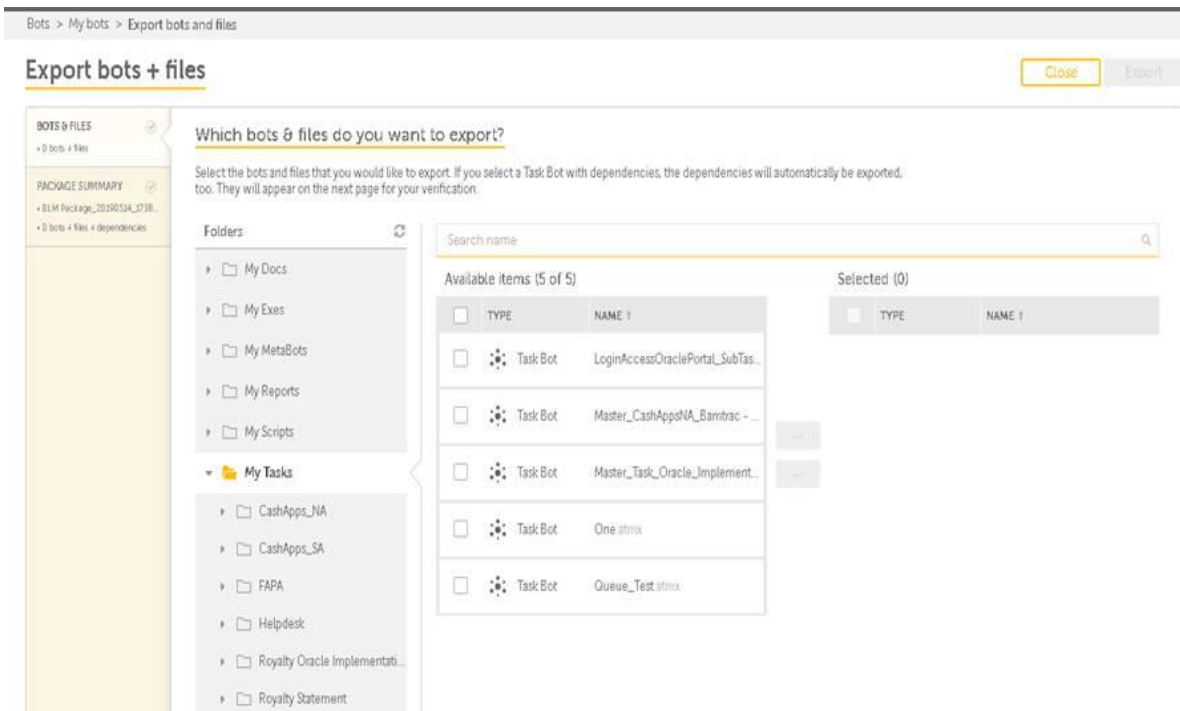Figure 4.3 Demonstration of dashboard with export/import options
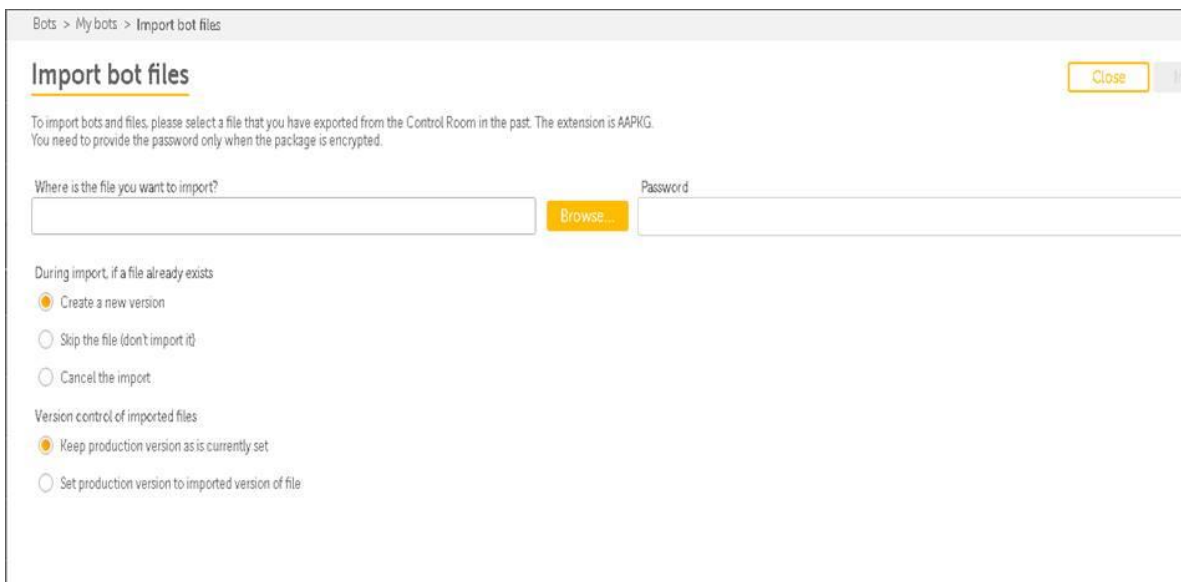
Figure 4.4 Export Bots

Figure 4.5 Import Bots

CHAPTER 5

INVOICE PROCESSING NON PO TAX CODING

5.1 PROCESS OVERVIEW

Project: Invoice Processing Non-PO (Purchase Order)
Client: Carlsberg

5.2 BENEFITS OF RAPID AUTOMATION SOLUTION

- Non-intrusive layer to implement application integration capabilities. No changes required to any of the application components. Hence, no further projects and change requests into any existing applications are needed in order to implement Rapid Automation based integration.

- Almost negligible risk and downtime as there is no direct server side interaction by Rapid automation tool.

5.3 IN SCOPE

There are 25 countries whose invoice processing is possible through RA solution. The entities of those countries are:

A001,A002,B001,B002,C001,C002,D001,D002,E001,E002,E003,F001, F002,G001,G002,L001,L002,L003,L004,X001,X002,X011,Z001

5.4 OUT OF SCOPE

Baltics

5.5 FUTURE ARCHITECTURE

- Install Rapid Automation (RA) Software i.e. AA on Carlsberg Desktop.
- RA to login to Carlsberg applications using user interface level automation and access the respective applications.
- RA needs to access all the applications; which FTE needs to access to do processing.
- RA to run the automation on customer applications from within Carlsberg network without requiring any access outside customer network.
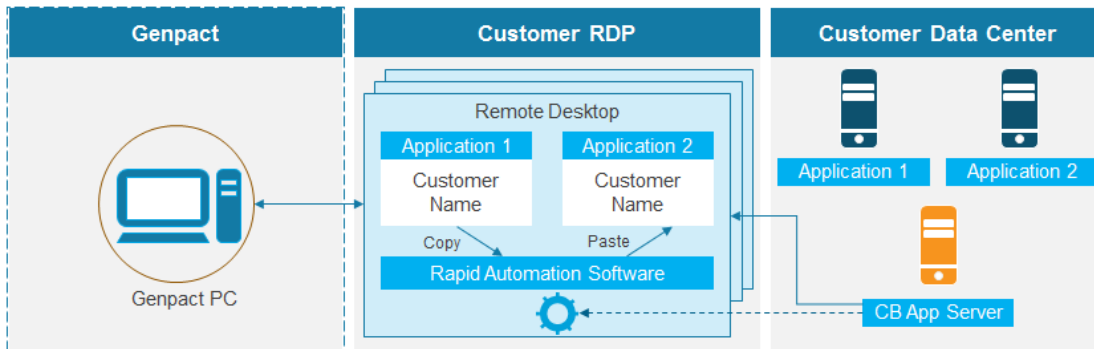
Figure 5.1 Diagram of RA fitted into existing infrastructure

5.6 APPLICATIONS USED

The applications that are being used in the Policy Migration process are:
- MS Office (excel)
- SAP

5.7 CONFIGURATION

5.7.1 REQUIREMENTS

- 2 machines (1 for Development, 1 for Testing)
- Number of dedicated Virtual Desktops for Production varies based on Number of Production licenses required.

5.8 USER DESKTOP REQUIREMENTS

- Intel Pentium i3 or higher having 2.13 GHz or higher.
- Minimum 2 GB RAM, 4 GB Preferred.
- 100 MB free space on hard drive for installation.
- 1024 x 768 or higher resolution monitor.
- Mouse or other pointing device.
- Microsoft Internet Explorer 6.0 or later.
- Microsoft Windows 7 (32 bit and 64 bit editions) / Microsoft Windows Vista (32 bit and 64 bit editions) / Microsoft Windows XP (32 bit and 64 bit editions) with Service Pack 2.
- .NET Framework 4.0 is required.
- Access required for C:\D: drive for software installation and log file creation.
- Microsoft Office

5.9 RA DEVELOPER REQUIREMENTS

- Intel Pentium i3 or higher having 2.13 GHz or higher.
- Min 2 GB RAM, 4 GB Preferred.
- 100 MB free space on hard drive for installation.
- 1024 x 768 or higher resolution monitor.
- Mouse or other pointing device.
- Microsoft Internet Explorer 6.0 or later.
- Microsoft Windows 7 (32 bit and 64 bit editions) / Microsoft Windows Vista (32 bit and 64 bit editions) / Microsoft Windows XP (32 bit and 64 bit editions) with Service Pack 2.
- .NET Framework 4.0 is required.
- Access required for C:\D: drive for software installation and log file creation.
- Microsoft Office

5.10 RA SETUP REQUIREMENTS

5.10.1 AT GENPACT END

- Grant access to Developer's ID to login onto Genpact Desktop from where they should be able to login to Citrix/VDI desktop.

5.10.2 CUSTOMER END

- Dedicated generic IDs (Non-Person) for Citrix/VDI and Application login for each RA client for both Test and Production setups.
- Test Environment that is a replica of Production needs to be available for all the applications to build and test the automation.
- Dedicated Email IDs in case of any Email Requirements. Email ID and passwords in case any Email need to be processed.
- Active Directory details in case of AD integration
- Admin access on Remote desktops to install RA software.
- Access required on remote desktops for log file creation.
- Copy Paste functionality should be enabled inside Citrix/VDI
- Access to shared folder to process files.

5.11 INFRASTRUCTURE REQUIREMENTS

5.11.1 AT GENPACT END
Dedicated Development, UAT and Production Desktops for RA.

5.11.2 AT CUSTOMER END
Dedicated Development, UAT and Production Virtual Desktops.

5.12 ASSUMPTIONS/DEPENDENCIES

- The input fields provided in the excel/XML sheet will be considered as the true inputs and RA will process the inputs as per defined rules.
- Any additional inputs required by the RA will be shared in the defined location by the operation owner.
- Consecutive inputs received by RA during working hours will be processed in a sequential manner.
- Any diversion defined processing rules will be considered as exception and RA solution will throw them out as human intervention.
- There won't be any changes in the process steps in application.
- Any system level changes need to be informed, developed prior & tested in test environment with adequate test data with RA team.
- The machine will be dedicatedly being used for RA to work, while RA is executing the tasks; the machine will not be utilized for other activities i.e. any other manual processes.
- Dedicated Desktops would be used for RA Task development, UAT and Production and will not be utilized for any other process.
- All machines provided for Development, UAT and Production will have hardware and basic software specifications.
- Admin Rights would be provided for scheduling the RA Tasks and other AA Task development and Execution related processes.
- There would not be any latency in accessing the development server/related applications of customer – during process execution.

5.13 PROPOSED SOLUTION

- RA solution checks for input file in the input folder generated by the input template. This input template matches for two parameters i.e. Entity and Tax Code from the mapping sheet to process a Document ID. If the parameters match then the Document ID is sent to the input folder in form of an excel sheet. This can be done for multiple Document IDs.

Entity	Document ID	Tax Coding		Submit to Robo			
D001	3271100	dd	Not Matched				
D001	1234567	sa	Matched				
D001	1234567	sd	Matched				
D001	1234567	sd	Matched				
D001	1234567	sd	Matched				
D001	9876543	SA	Matched				
D002	3286965	aa	Not Matched				
D002	3286965	SD	Matched				

Figure 5.2 Input Template

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- When all the parameters must be matched, then only the Document IDs will be submitted to the Bot i.e. RA.

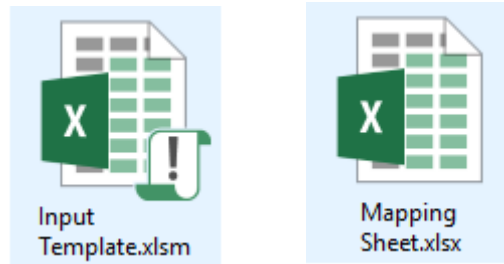| Entity	Tax Code	Concatenate
A001	12	A00112
A001	DC	A001DC
A001	DD	A001DD
A001	DF	A001DF
A001	DH	A001DH
A001	DJ	A001DJ
A001	DO	A001DO
A001	DQ	A001DQ
A001	DT	A001DT
A001	GA	A001GA
A001	92	A00192
A002	12	A00212
A002	DC	A002DC

Figure 5.3 Mapping Sheet

Figure 5.4 Input Template & Mapping Sheet Icons

- The status of the invoice in file will always be BLANK when it comes first time for processing to the "Tax code updates". Once, invoice get processed through "Tax code update" process, then one of the following status should be updated-

  - ➢ Completed - When role is available as "AP Processor" and tax code has been successfully updated.
  - ➢ Fail- When role is available as "AP Processor" but RA could not process the request due to SAP validation failure. "Status reason" field in output file should also be updated with SAP error message due to which it failed.
  - ➢ "Not Processed": When role is not available as "AP Processor"

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- For tax code update process, RA will extract the fields- Document ID and Tax Code from the "Tax code database" file where the status of the invoices is available as "Not Processed" or BLANK.

- Once the invoice details are extracted from the database, RA will login to SAP application. SAP login credentials are taken from the AA Control Room (CR).

Figure 5.5 SAP Icon

- If SAP is logged in successfully, then RA will start processing the Document IDs else RA will send a mail to notify SAP issue to a specific E-mail ID.
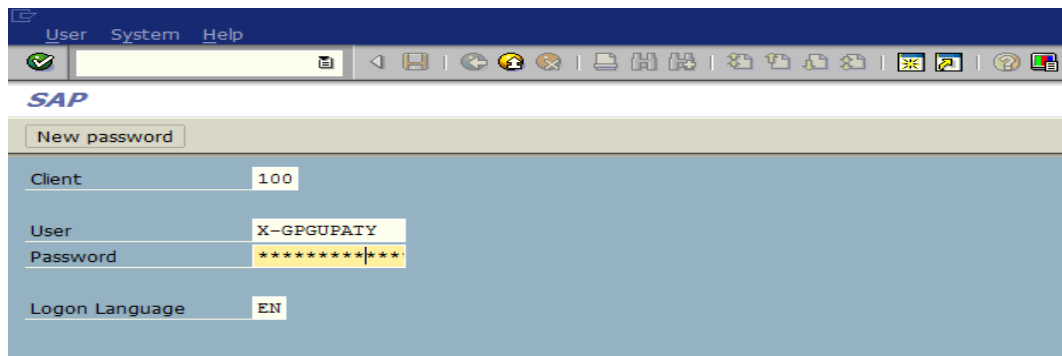

Figure 5.6 SAP login page

- RA will input the SAP T code -/OPT/VIM_ANALYTICS in the field box and use keystroke for Enter key to select the VIM analytics.
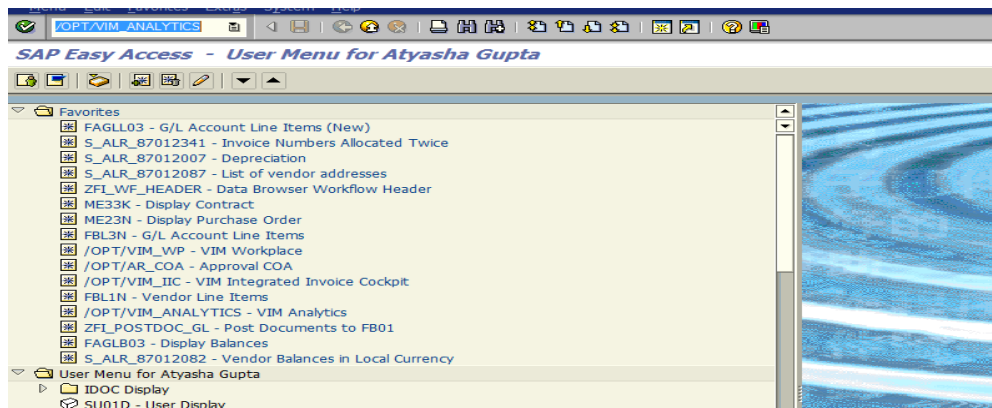

Figure 5.7 SAP VIM Analytics window

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- From the input file RA will pick the value of Document ID (DP ID) column, one by one and put in Document Processing number.
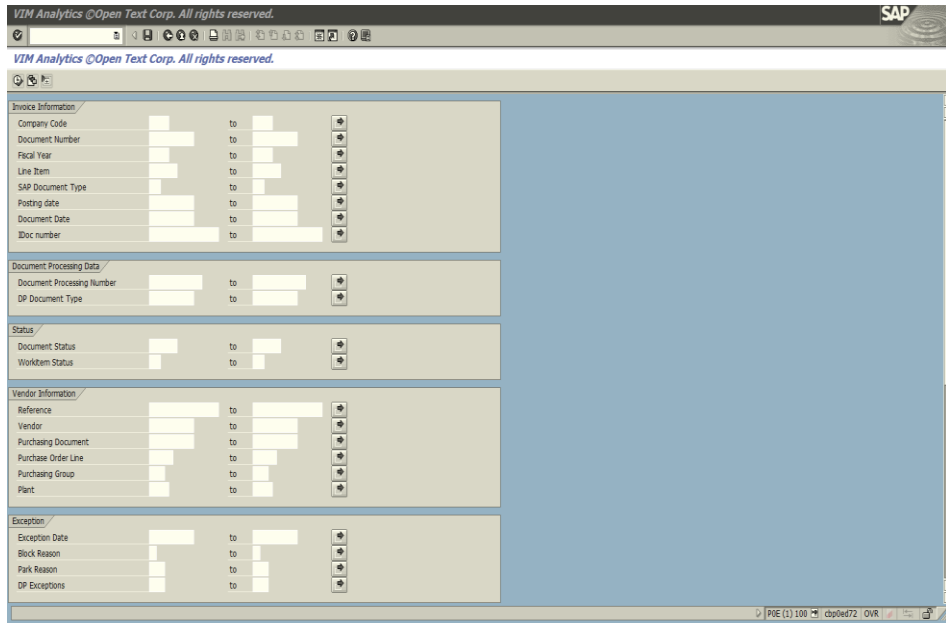

Figure 5.8 VIM Analytics Data window

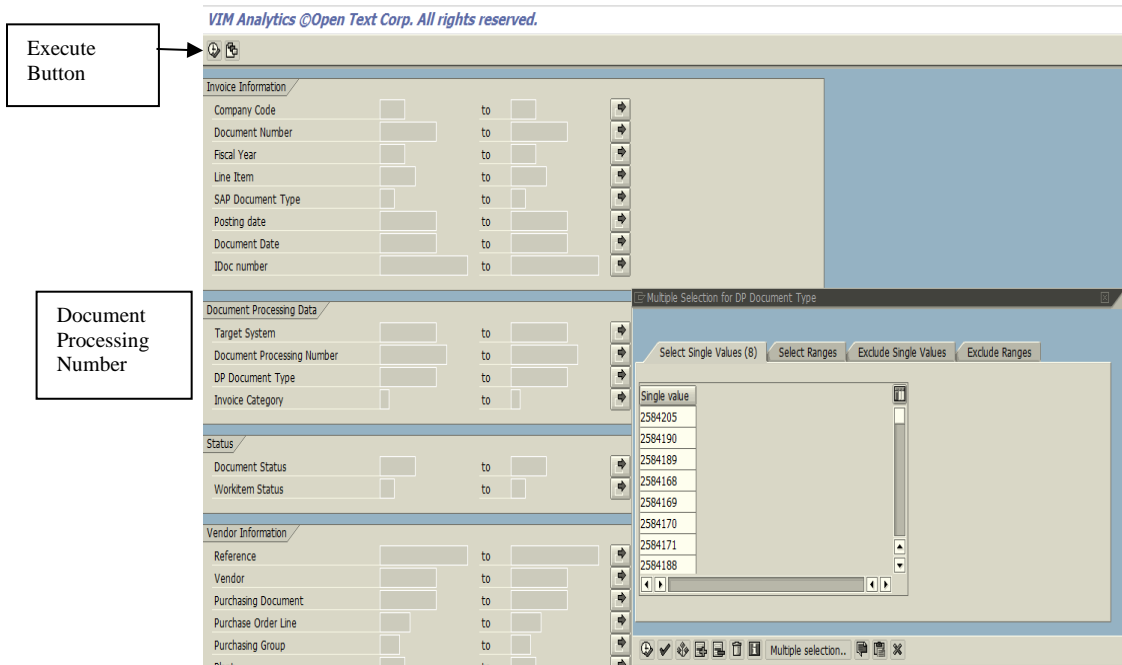- To execute the DP IDs in the above figure, RA uses a keystroke i.e. F8 for execution.

Figure 5.9 Demonstration of execution of DP IDs

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- RA will then click to Workflow View tab, and search and select the DP ID which was earlier selected, with status BLANK/ Role not available, from the excel template. RA will select the same DP ID and click on Workflow Log and will match DPID in excel with that in Workflow, one by one.
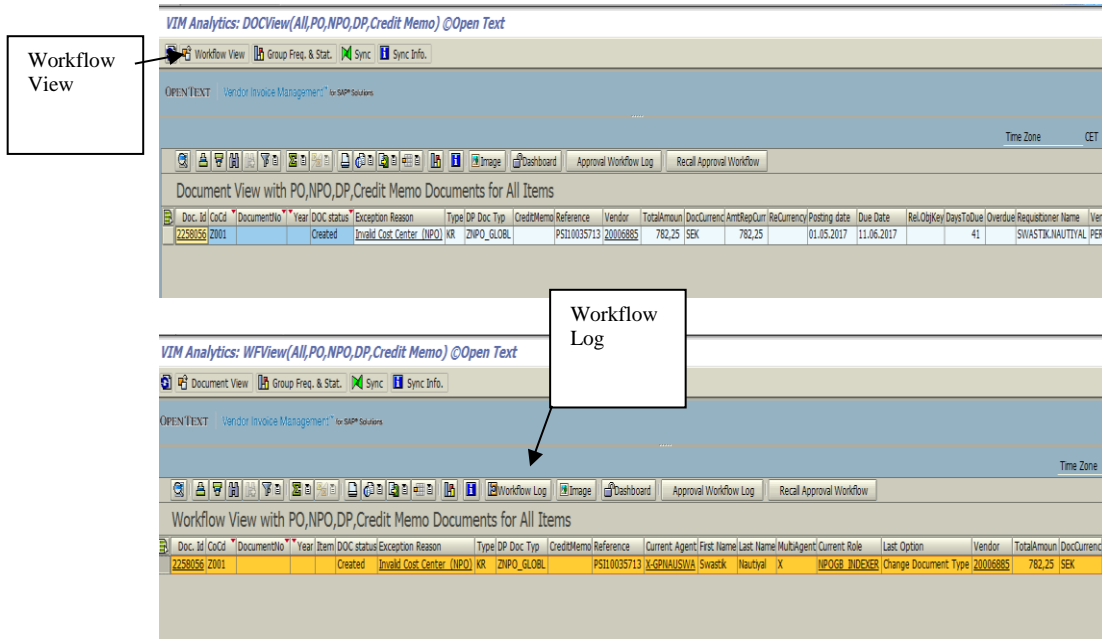

Figure 5.10 Workflow view and Log demonstration

- RA will now single click on the last Process Option bearing status as "In Process/Ready" and will then use the keystroke F8 to execute. Invoice Image Opens on one screen & Basic Indexing Pane opens on another screen. If the status is not "process or ready", RA will update the status as pending and will move to next DPID.
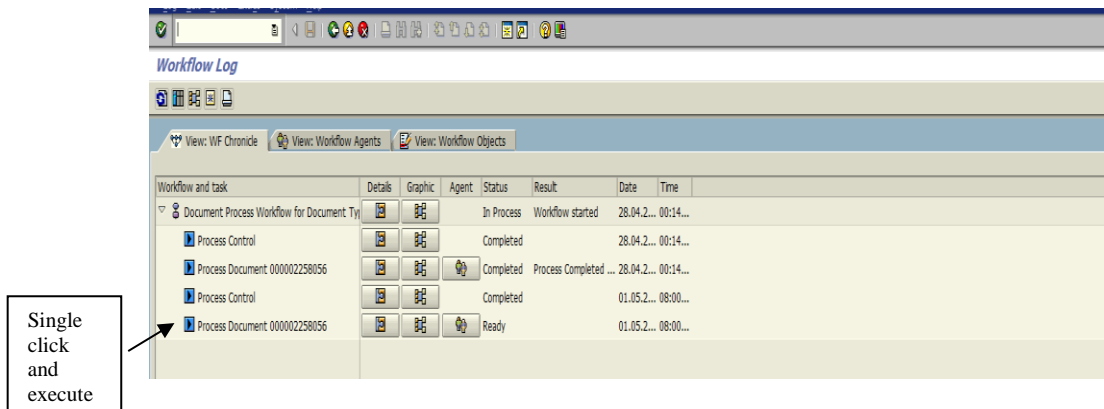

Figure 5.11 After workflow Log

- After clicking on execute or F8, RA will wait for next window.

  ➢ If the pop up has an image that cannot be opened, then it will close that pop-up. But in case bot finds an issue with opening the invoice, then output file is updated with status "Pending' and next record in the input file is processed further
  ➢ If New window opens with title "Approve invoice", then RA will match and update the tax field.

- RA will Update the TAX code on the below screen. It will handle only one line item at a time based on the DPIDs in the input file. In case invoice is coded with more than one tax code, then RA will throw the exception "Invoice with multiple tax codes" and process next record for DP ID from input file. In case of invoices with multiple line items, then RA will throw an exception " More than one row" and update the status as 'Fail'.
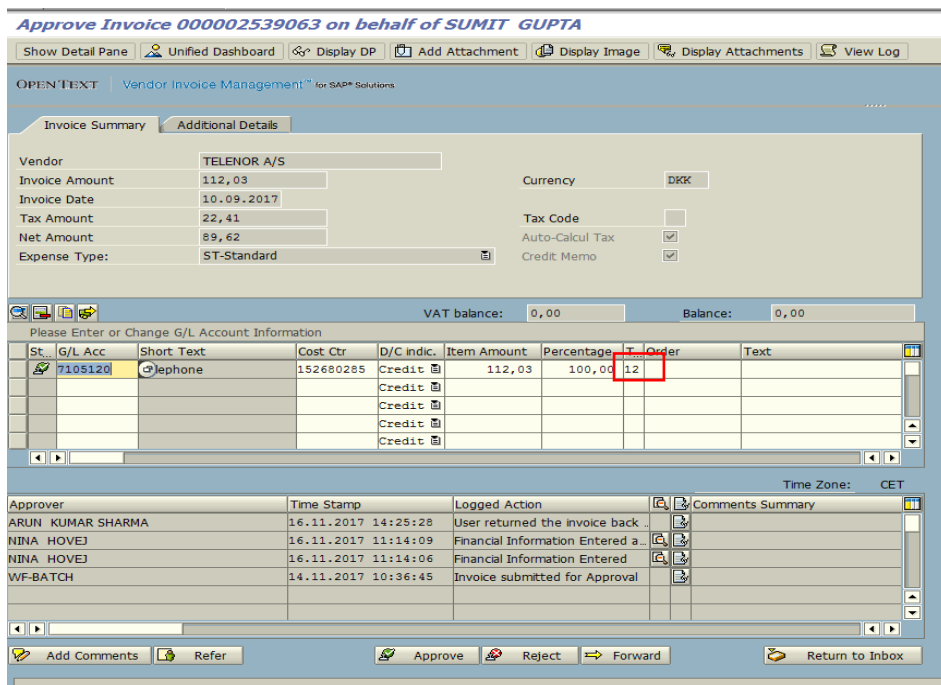

Figure 5.12 Approve Invoice Window Demonstration

- RA will then submit the invoice for final approval by clicking on the approve button. The following screen will appear after approving the invoice that confirms the approval and sends it to the final approval.
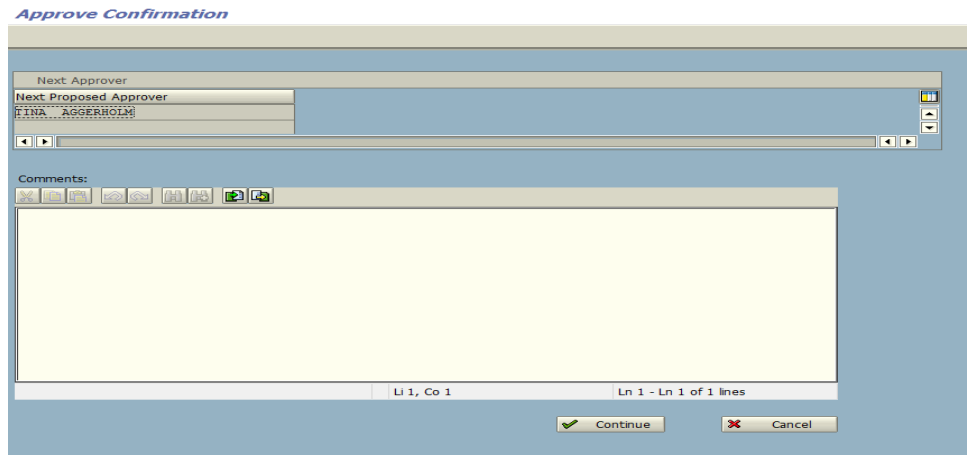
Figure 5.13 Approval Confirmation

- RA will then return to the workflow window by pressing F3.

- RA will update the status of each line item that was either completely processed or not. RA will be maintaining an output file that is nothing but the input file with added headers of Status, Status Reason and Time. Note that for both output and input, only a single file is maintained. The daily dashboard will be shared with AP leads. This would be based on a configurable excel template, which will list out the final status/actions which RA will update against each document ID.

- This process is repeated for all the Document IDs in the input file. Once the process gets completed, bot releases those IDs and updates the relevant fields.

CHAPTER 6

CONCLUSION

6.1 CONCLUSION

The bot developed for NON PO Tax Coding was up to the satisfaction for the client/mentors. All the user requirements are fulfilled and the bot works well in the production environment. The bot is well tested in different erroneous conditions and the errors are handled properly in the debugging phase. The bot can be further tested for different test scenarios and conditions.

6.2 FUTURE SCOPE

Robotic Process Automation (RPA) is itself a technology that will act as a base for the upcoming technologies in the future such as Artificial Intelligence (AI), Machine Learning (ML) and cloud services.

RPA's contribution-

- CLOUD SERVICES- RPA provides an increase in the digital services that further generates more computational power. This will impact the existing cloud services to improve and enhance its value for allocation and analysis.

- ARTIFICIAL INTELLIGENCE- RPA can be optimized for AI solutions. It can provide software specifications to action on different modules of AI. RPA acts as a vertical to AI's horizontals.

- MACHINE LEARNING- RPA workflows can be inserted into ML modules and steps. ML acts as a brain to the bot designed using RPA.

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