

Department of Information Technology

NBA Accredited

A.P. Shah Institute of Technology

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UNIVERSITY OF MUMBAI

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A Project Report on

Robotic Process Automation of Supply Chain Management for Healthcare

Submitted in partial fulfilment of the degree of
Bachelor of Engineering(Sem-8)

in

INFORMATION TECHNOLOGY

By

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Under the Guidance of
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1. Project Conception and Initiation

1.1 Abstract

- Need for systematic deliverance of the healthcare sector is in demand.
- Delay in restocking of medicines affects the healthcare profitability.
- RPA can create, deploy and manage bots to automate certain human actions.
- Paper describes how RPA can automate various processes of SCM Healthcare.

1.2 Objectives

- To automate inventory management System.
- To maintain the adequate stocks of medications.
- To minimize the occurrence of unexpected out-of-stock scenarios resulting from depletion or expiration of inventory.
- To automate vendor selection Process.
- To automate vendor On Boarding Process.

1.3. Literature Review

Sr.No.	Authors	Title	Methodologies	Findings
1	Allam Maalla	Development Prospect and Application Feasibility Analysis of Robotic Process Automation	Study the enterprise problems that RPA can solve, Feasibility analysis of RPA application.	With the development of artificial intelligence, the combination of artificial intelligence technology with automation technology will make RPA more competitive.
2	Yatskiv, S., Voytyuk, I., Yatskiv, N., Kushnir, O., Trufanova, Y., & Panasyuk, V.	Improved Method of Software Automation Testing Based on the Robotic Process Automation Technology	Compared two main approaches i.e. Selenium Web Driver & WorkFusion, to the test automation.	The most effective RPA automation is when user interacts with different applications and needs to have specific actions done before test execution.

1.4 Problem Definition

- Problem Identified
 - Existing SCM of Healthcare relies on a group of people.
 - No clear idea for the entire process journey.
 - Process of Vendor selection and Vendor onboarding are handled manually.
 - Order Processing and Inventory management are handled manually.
 - Time consuming and more prone to human errors.
- Proposed Solution
 - Software bots programmed to automate all the processes of SCM healthcare.

1.5 Scope

- Using autonomous bots we can finalize the vendor selection and vendor onboarding in accordance with predefined criteria.
- We can automate the order processing task to reduce the workload of manual process.
- We can automate the inventory management so that bot can notify when stock level are low, also reorder the products that go below a threshold level, etc.

1.6 Technology stack

Back End:-

- RPA Tool (Blue Prism)
- SQL Express
- C#

Front End:-

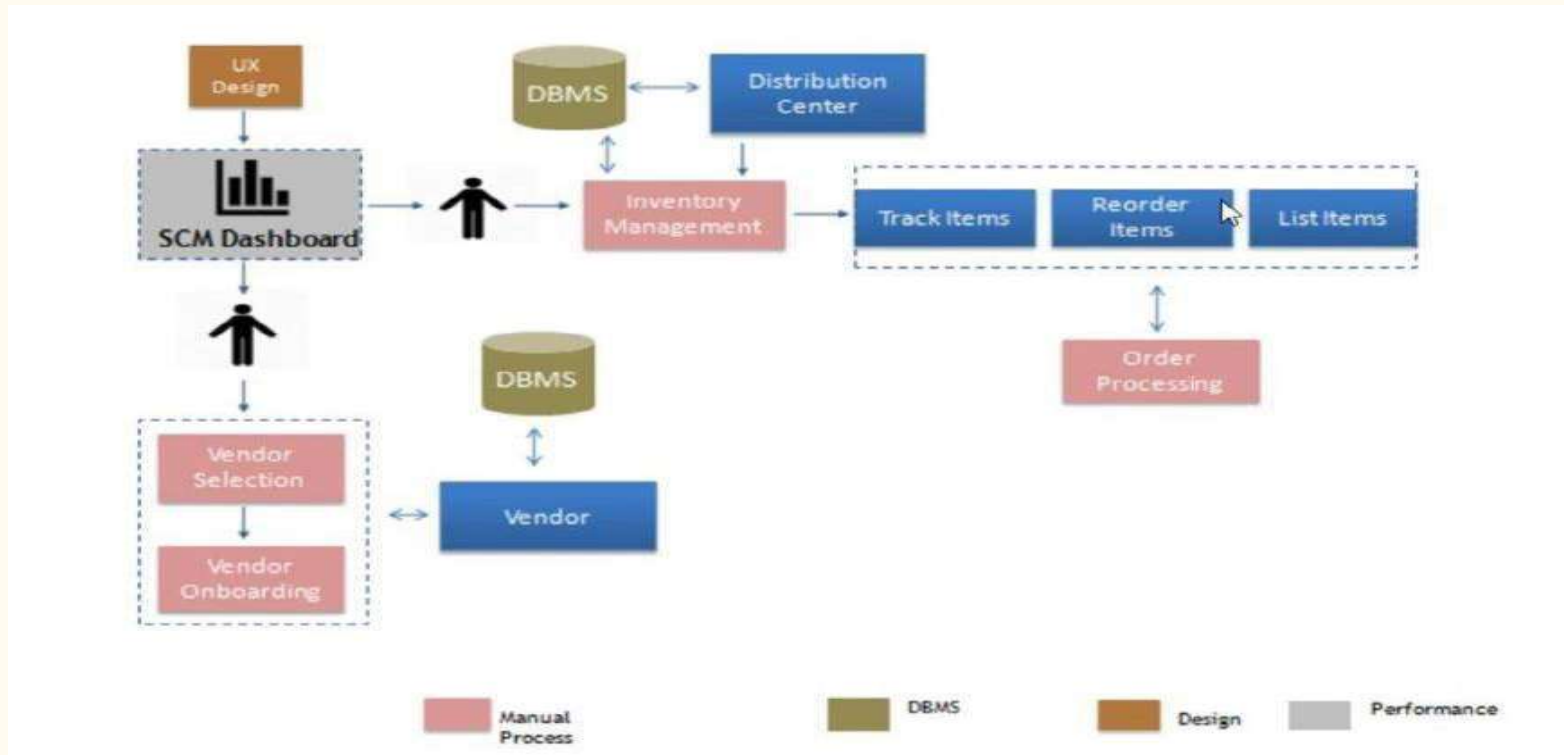
- Sigma

1.7 Benefits for environment & Society

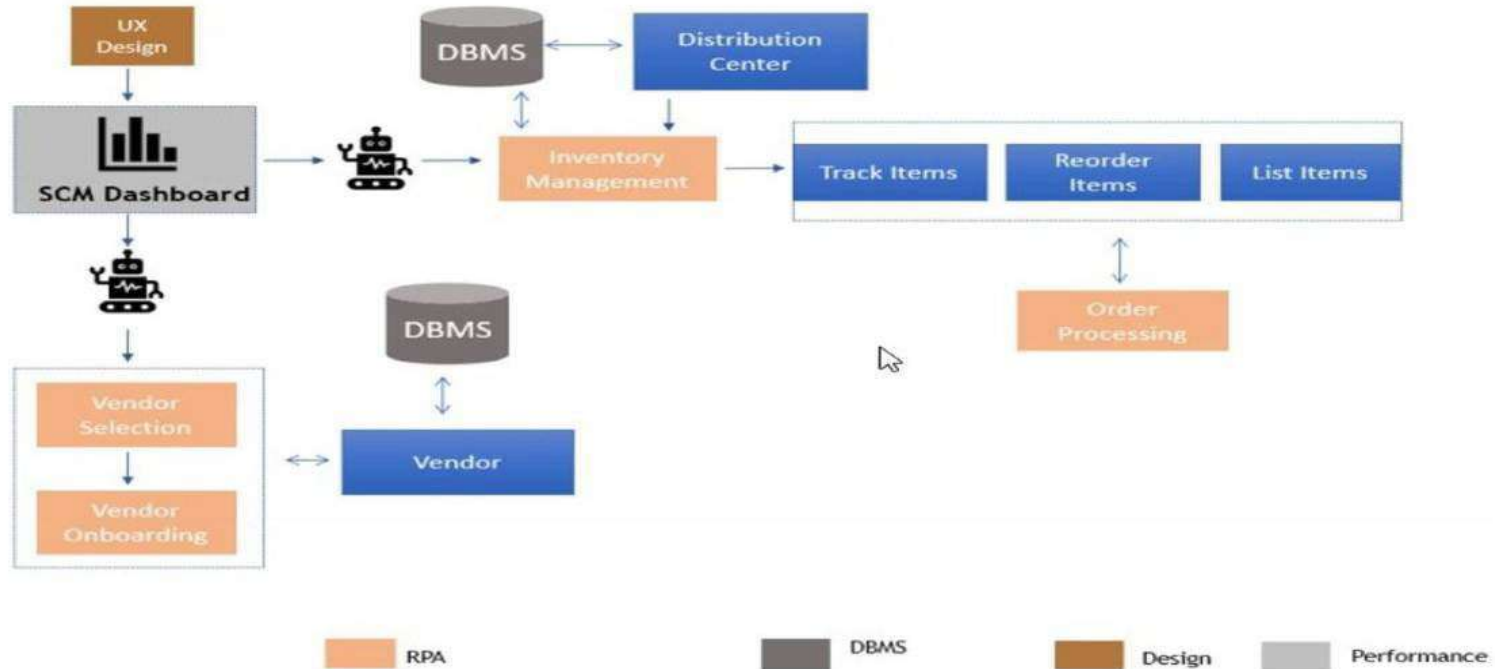
- The automation minimizes the time, effort, waste and labor cost and maximize s the productivity and financial improvements.
- It will help to ensure medications are available whenever the patients need them.
- It will help to finalize the vendor as soon as the tenure for current vendor terminates.

2. Project Design

2.1 Existing System



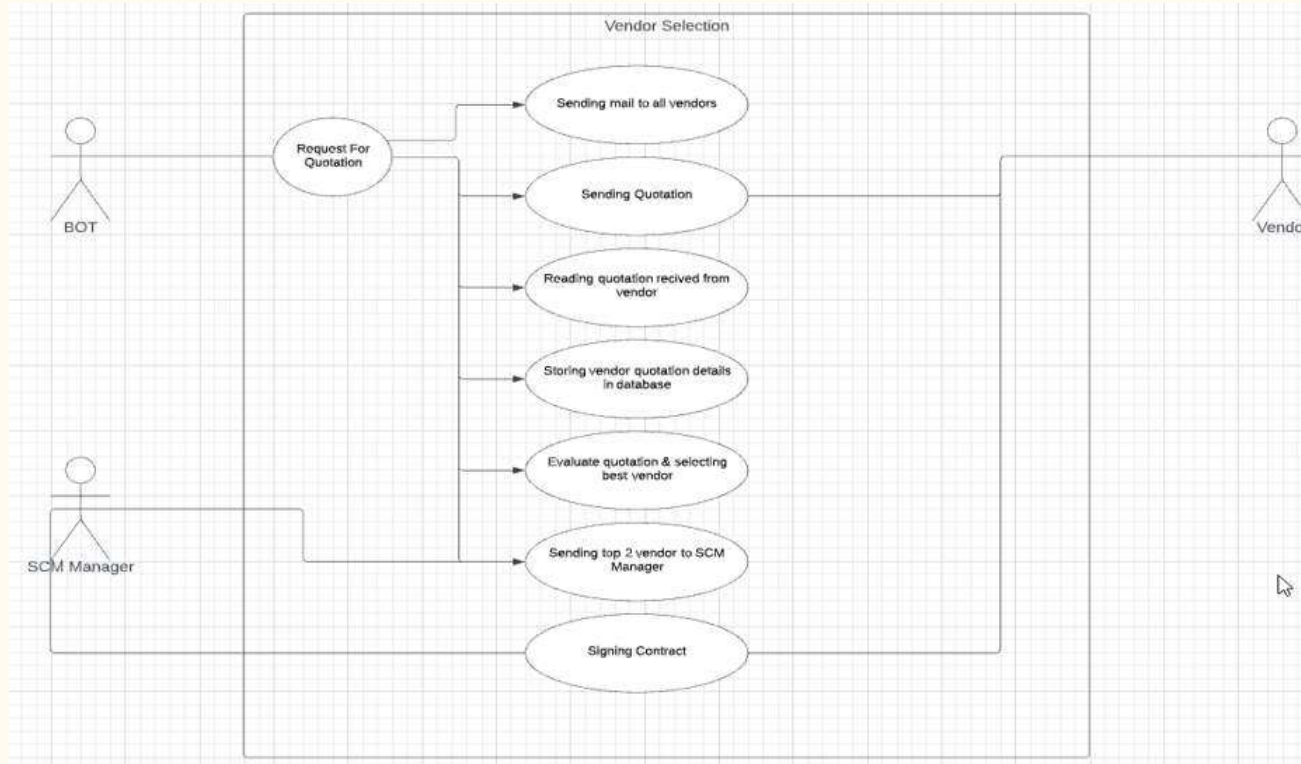
2.2 Proposed System



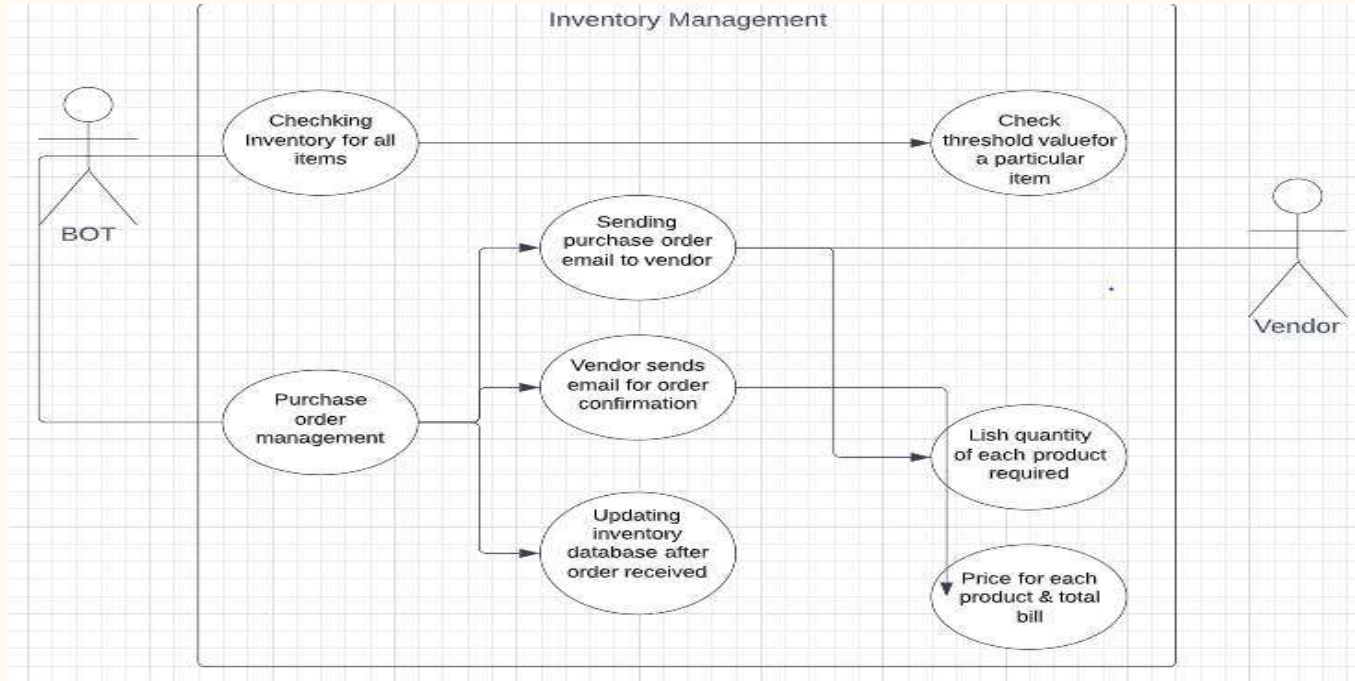
2.3 Design(Flow Of Modules)

https://lucid.app/lucidchart/invitations/accept/inv_7d8e1ff2-74bd-4f0b-a543-a59a81842f9f?viewport_loc=-1341%2C79%2C4377%2C1696%2C0_0

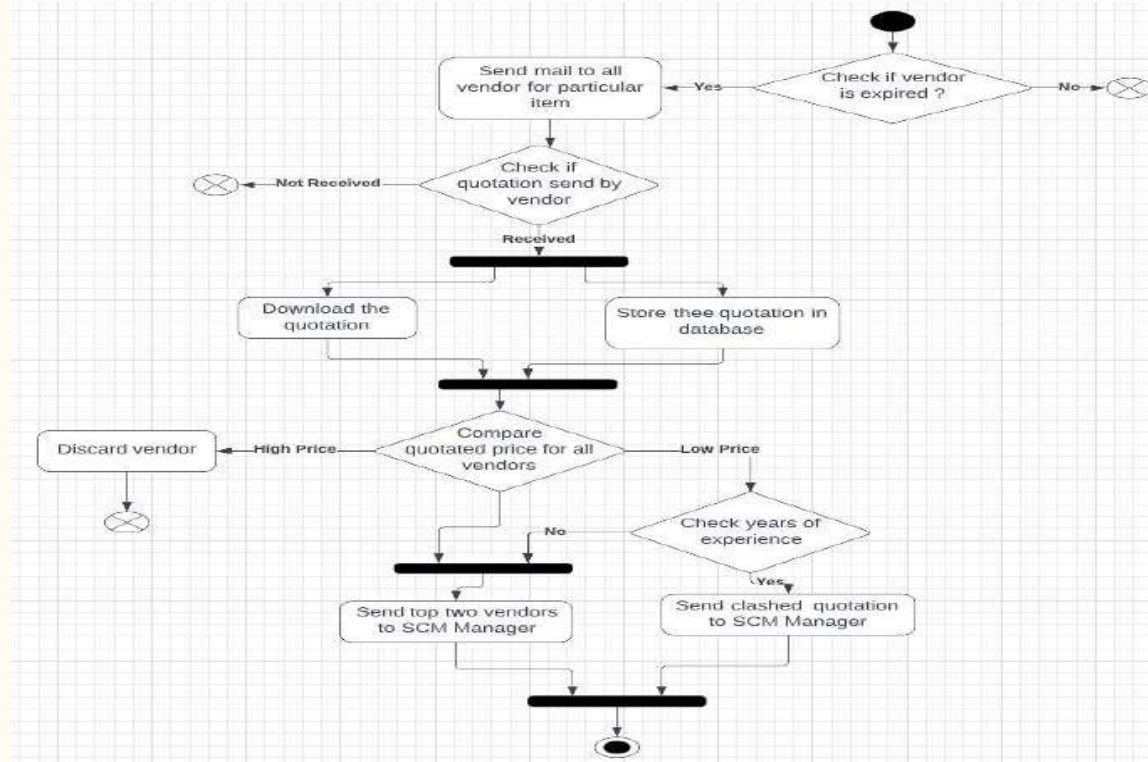
2.4 Description Of Use Case (Vendor Selection)



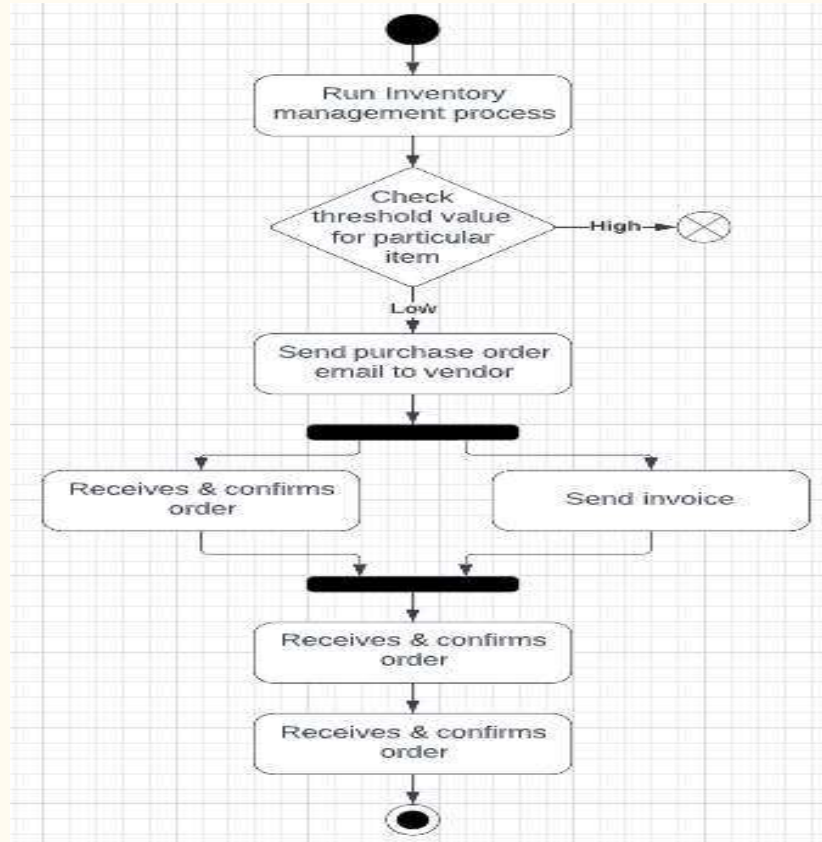
2.4 Description Of Use Case (Inventory Management)



2.5 Activity diagram (Vendor Selection)

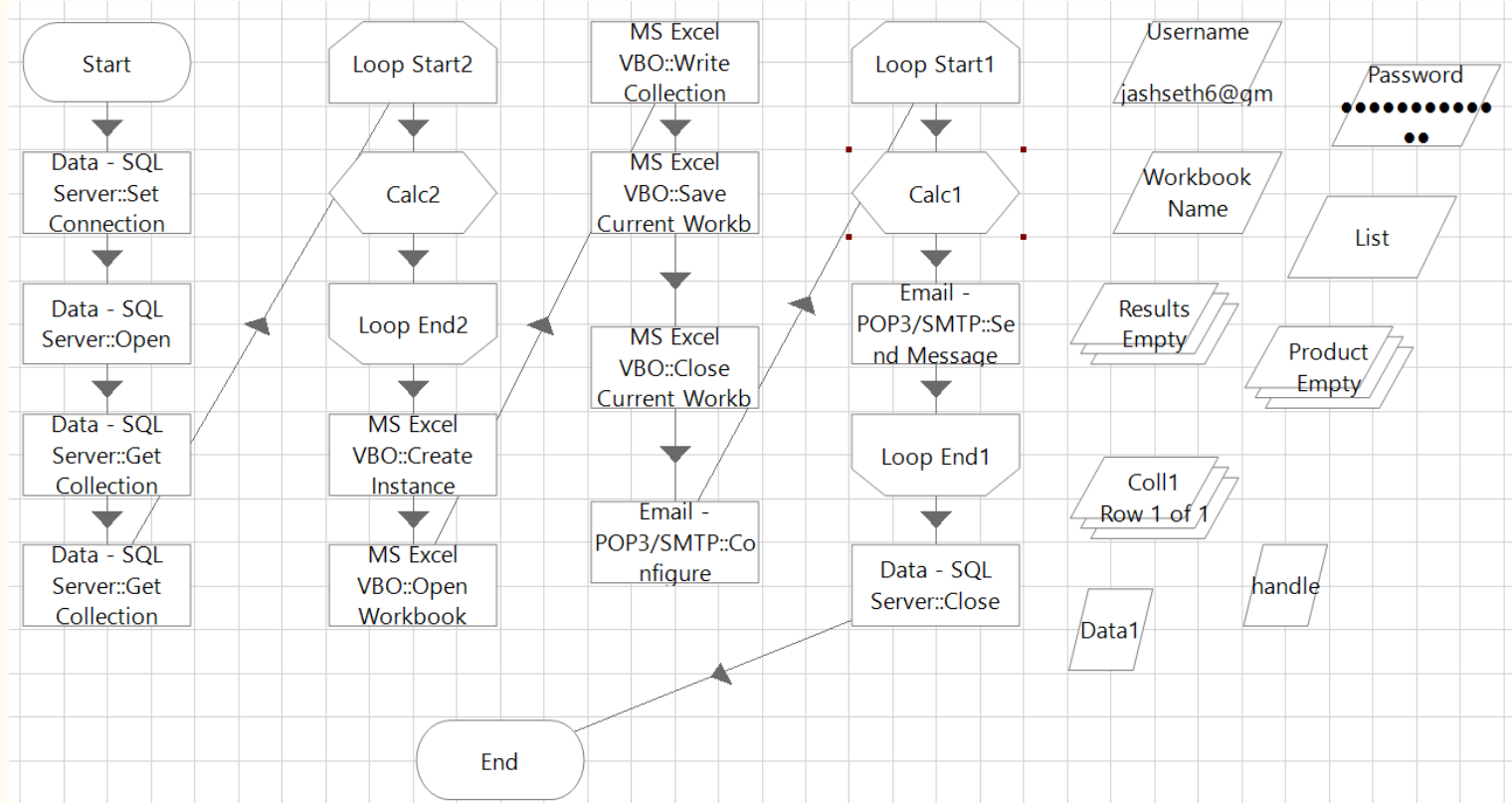


2.5 Activity Diagram (Inventory Management)

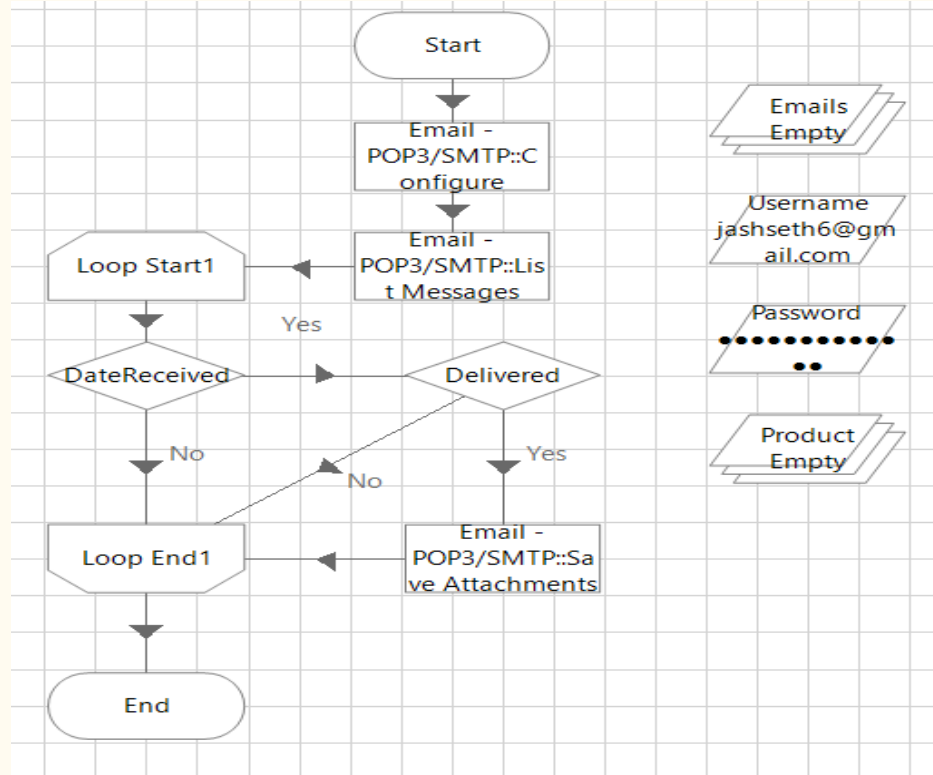


3. Implementation

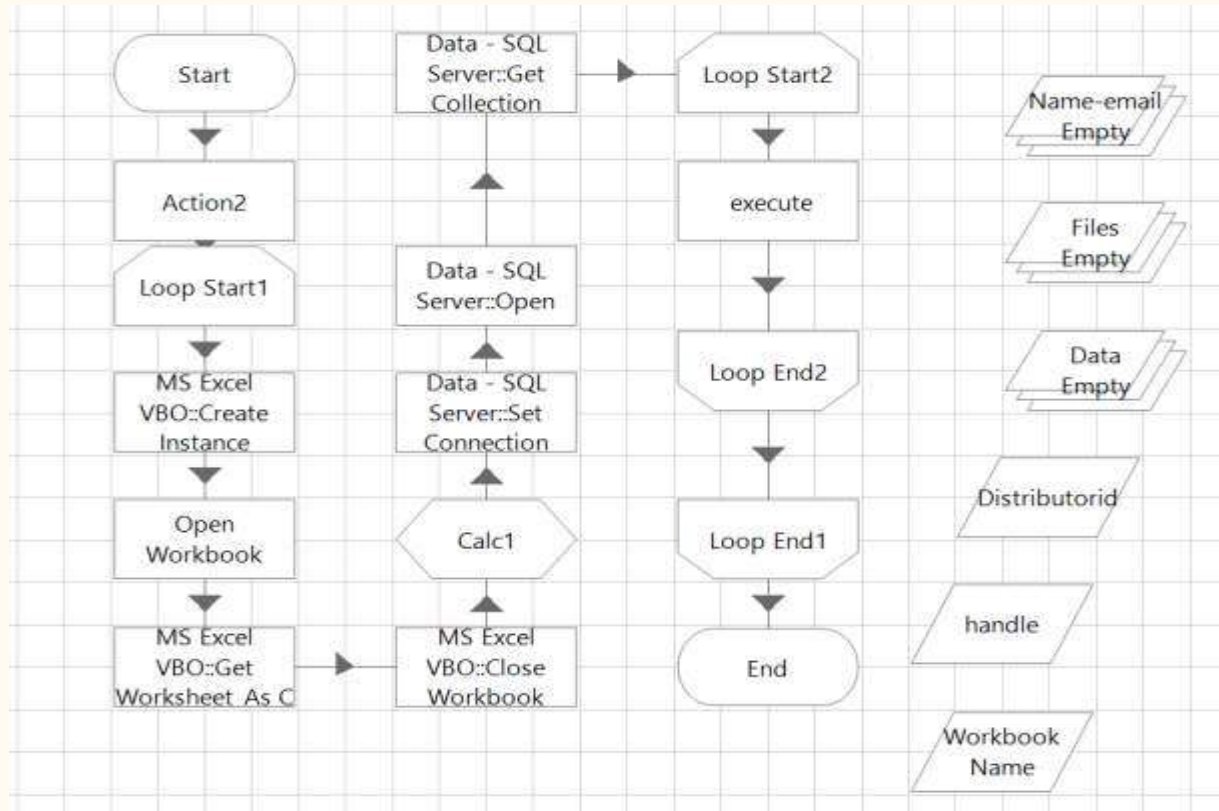
3.1 Sending quotation format to all vendors (Vendor Onboarding)



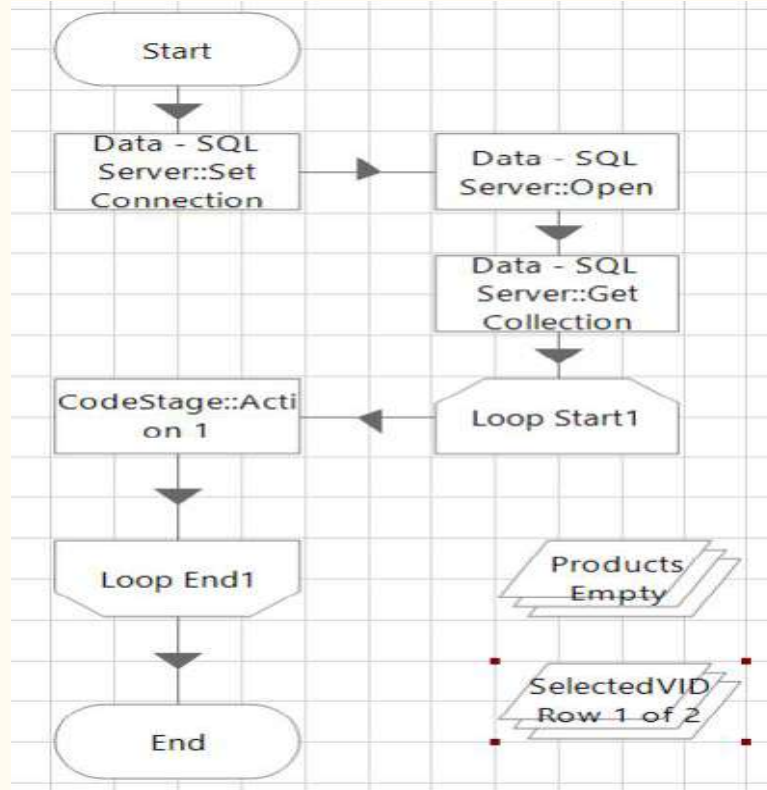
3.2 Reading all 30 days emails with subject “Sending Quotation”



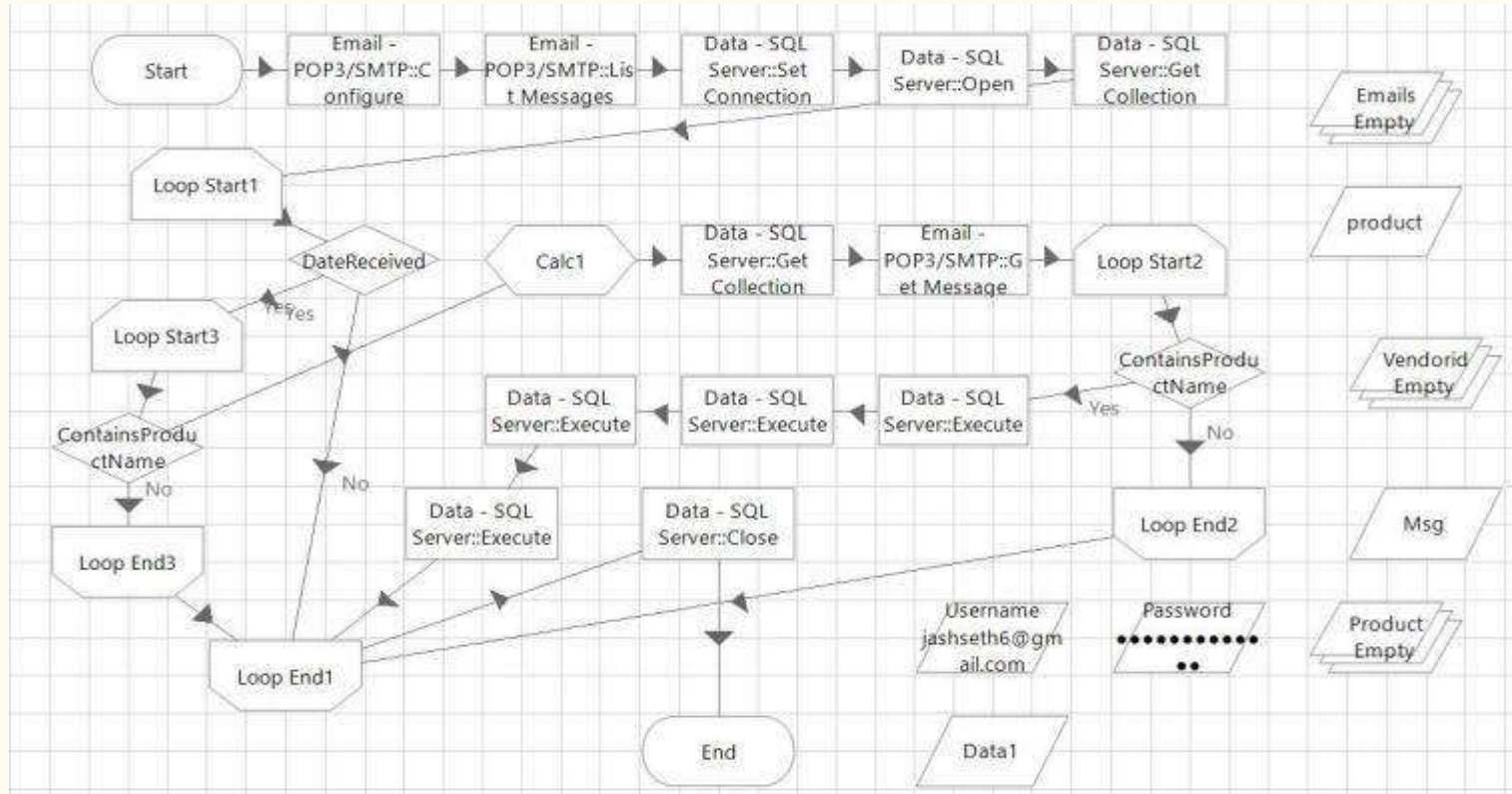
3.3 Reading and storing quotations



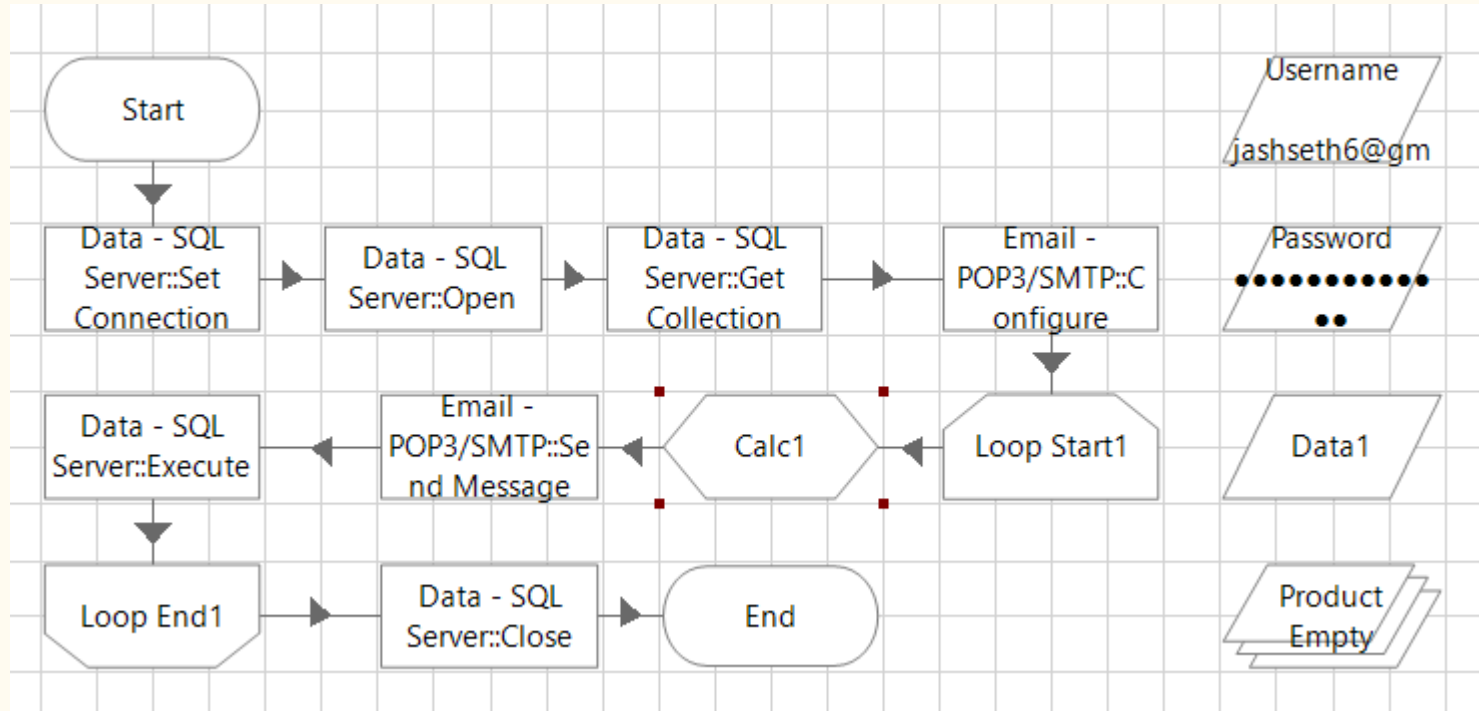
3.4 Vendor Selection



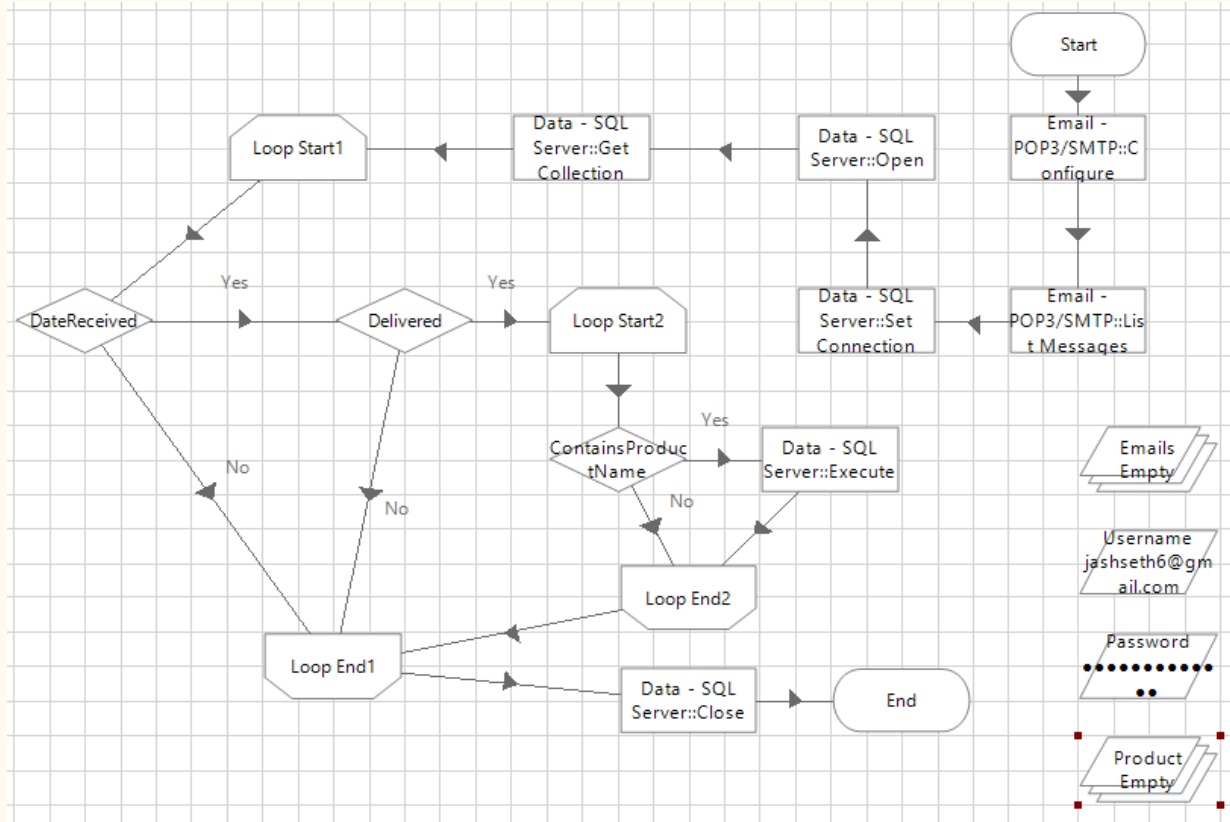
3.5 Updating Database when Vendor Selected



3.6 Check inventory and send mail to vendor to order required medicine.



3.7 Updating Inventory when Product Delivered



3.8 Table of vendors

LAPTOP-Q0D1CUKJ\S...- dbo.distributor						
	distributor_id	distributor_name	distributor_contact	distributor_addr	distributor_email	contracr
▶	110	PEDICON PHARMACEUTICALS	8647591398	VILE PARLE	Pedicopharma1@gmail.com	2022-10-09
	101	EUPHORIA HEALTHCARE PVT. LTD.	9764312864	MALAD	euphoriahealthcare3@gmail.com	2022-05-31
	102	VIVI LIFECARE	9173648297	KANDIVALI	vivilifecare102@gmail.com	2023-07-06
	103	J&J MEDICAL	9685743212	BORIVALI	jashseth6@gmail.com	2022-04-04
	104	SATYAM REMEDIES	9382711728	MALAD	satyamremedy1@gmail.com	2022-08-09
	105	MARC LABS	9476829716	BANDRA	marclabss12@gmail.com	2023-06-05
	106	OLCARE LABS	9764318291	BANDRA	olcare.labs@gmail.com	2022-04-04
	107	SUNRISE REMEDIES	9754261498	JOGESHWARI	sunriseremediess@gmail.com	2022-11-07
	108	SANIFY HEALTHCARE	9472921649	GOREGAON	sanifyhealth@gmail.com	2022-12-03
	109	MORVEL LABORATORIES	8192461639	DADAR	morvel.labs@gmail.com	2023-05-05

3.9 Table of potential vendors

LAPTOP-Q0D1CUKJ\S...ntial_distributors						
	pvid	pvname	pvcontact	pvaddr	pvcemail	pvexp
▶	111	Chemo Pharma	9619493023	Thane	chemopharma1@gmail.com	3
	110	PEDICON PHARMACEUTICALS	8647591398	VILE PARLE	Pedicopharma1@gmail.com	2
	101	EUPHORIA HEALTHCARE PVT. LTD.	9764312864	MALAD	euphoriahealthcare3@gmail.com	6
	102	VIVI LIFECARE	9173648297	KANDIVALI	vivilifecare102@gmail.com	8
	103	J&J MEDICAL	9685743212	BORIVALI	jashseth6@gmail.com	2
	104	SATYAM REMEDIES	9382711728	MALAD	satyamremedy1@gmail.com	4
	105	MARC LABS	9476829716	BANDRA	marclabss12@gmail.com	5
	106	OLCARE LABS	9764318291	BANDRA	olcare.labs@gmail.com	20
	107	SUNRISE REMEDIES	9754261498	JOGESHWARI	sunriseremediess@gmail.com	11
	108	SANIFY HEALTHCARE	9472921649	GOREGAON	sanifyhealth@gmail.com	7
	109	MORVEL LABORATORIES	8192461639	DADAR	morvel.labs@gmail.com	3
	112	Vardhman Lab	9619493023	Pune	vardhamanlab1@gmail.com	12
	113	Relish Pharma	9920600170	Dadar	relishpharma2@gmail.com	1
	114	Parnax Lab	9920600170	Vile Parle	parnaxlab1@gmail.com	0
	115	Zenith Health	9757099850	Panvel	zenithhealth2@gmail.com	4
	116	Source Natural	9821163550	Navi Mumbai	sourcenatural2@gmail.com	4
	117	Zenotech Labs	7977551882	Nasik	zenotechlabs1@gmail.com	9
	118	Parabolic Drugs	7977551882	Mulund	parabolicdrugs1@gmail.com	2
	119	Piramal Phytoca	9769825813	Matunga	piramalphytoca@gmail.com	2

3.10 Table of products

LAPTOP-Q0D1CUKJ\...ism - dbo.product									
	product_id	product_name	price	availability	manufacturer	distributor_id	reorder_qnt	flag	trigger_qnt
▶	1	ALERGIN	16.76	254	CIPLA	101	350	FALSE	50
	2	DERICIP	7.85	350	CIPLA	101	300	FALSE	35
	3	AZICIP	71.09	450	CIPLA	101	400	FALSE	40
	4	OMNICLAV 375	101	521	CIPLA	101	450	FALSE	60
	5	ACARCIP	85	455	CIPLA	101	400	FALSE	65
	6	ABZORB ANTI FUNGAL	115	20	SUNPHARMA	109	450	1	80
	7	CAVERTA	154	482	SUNPHARMA	109	350	FALSE	75
	8	CARTISHINE	120	514	SUNPHARMA	109	350	FALSE	90
	9	DAZTOR	154	345	SUNPHARMA	109	450	FALSE	100
	10	ELKAR	100	433	SUNPHARMA	109	400	FALSE	50
	11	FELCAM	14.9	265	SUNPHARMA	109	300	FALSE	30
	12	CROCIN	30	379	GSKPHARMA	110	300	FALSE	40
	13	IODEX	40	498	GSKPHARMA	110	350	FALSE	40
	14	OSTOCALCIUM	156	375	GSKPHARMA	110	350	FALSE	50
	15	OTIRIVN	39	655	GSKPHARMA	110	400	FALSE	80
	16	ALKOF SYRUP	56	364	ALKEMLAB	106	300	FALSE	70
	17	ENZOFAM-CT TABLET	132	259	ALKEMLAB	106	350	FALSE	65
	18	MAYLOX	37	487	NICHOLASPIRAMAL	103	400	FALSE	80
	19	MULTIZYME DROP	17.5	165	ALKEMLAB	106	450	FALSE	75
	20	SEPHALEXIN	63	659	RANBAXYLAB	107	450	FALSE	35

3.11 Table of quotations

LAPTOP-Q0D1CUKJ\...- dbo.Quotation						
	Vendor_id	Vendor_name	Vendor_email	Product_name	QuotedPrice	experience
▶	101	EUPHORIA HEALTHCARE PVT. LTD.	euphoriahealthcare3@gmail.com	ENZOFLAM-CT TABLET	110	6
	101	EUPHORIA HEALTHCARE PVT. LTD.	euphoriahealthcare3@gmail.com	MAYLOX	90	6
	101	EUPHORIA HEALTHCARE PVT. LTD.	euphoriahealthcare3@gmail.com	MULTIZYME DROP	32	6
	103	J&J MEDICAL	jashseth6@gmail.com	ENZOFLAM-CT TABLET	44	2
	103	J&J MEDICAL	jashseth6@gmail.com	MAYLOX	66	2
	103	J&J MEDICAL	jashseth6@gmail.com	MULTIZYME DROP	78	2
	107	SUNRISE REMEDIES	sunriseremediess@gmail.com	ENZOFLAM-CT TABLET	100	11
	107	SUNRISE REMEDIES	sunriseremediess@gmail.com	MAYLOX	100	11
	107	SUNRISE REMEDIES	sunriseremediess@gmail.com	MULTIZYME DROP	33	11

4. Testing

4.1 Functional Testing

A. Unit Testing

- Unit testing is the testing of an individual unit of a software at the code level are functional and work as they were designed.
- Testing of each process separately, like the vendor selection, vendor onboarding, order processing and inventory management.
- All these processes are tested and debugged before going for further integration.
- And check whether we are getting the desired output from each process as for the objectives.

4.1 Functional Testing

B. Integration Testing

- After each unit is thoroughly tested, it is integrated with other processes to create modules or components that are designed to perform specific tasks or activities.
- These are then tested as group through integration testing to ensure whole segments of an application behave as expected.

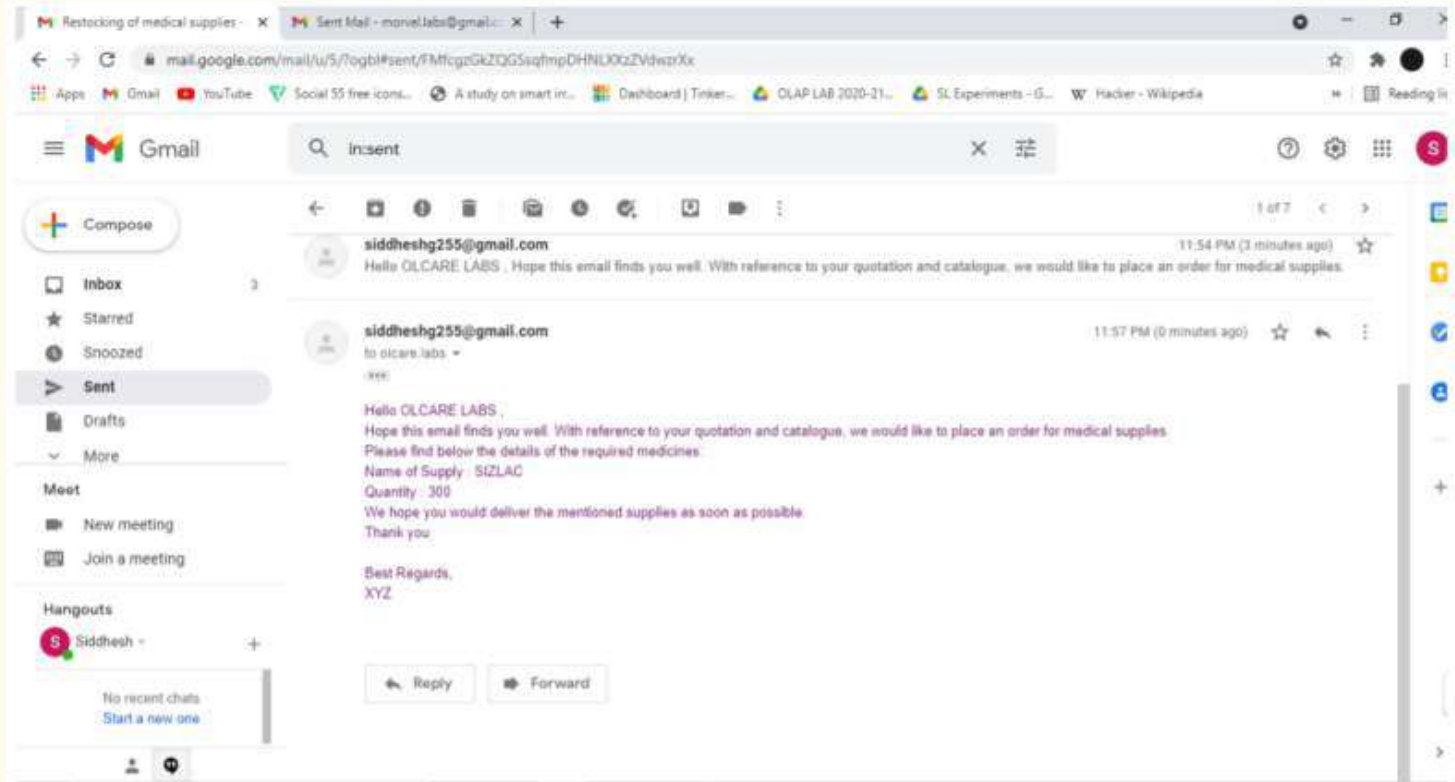
4.2 Non-Functional Testing

A. Usability Testing

- Usability testing is a testing method that measures an application's ease of use from the end-user perspective and is often performed during the system or acceptance testing stages.
- Usability testing is a great way for teams to review separate functions, or the system as a whole is intuitive to use.

5. Results

5.1 Placing Order to Vendor

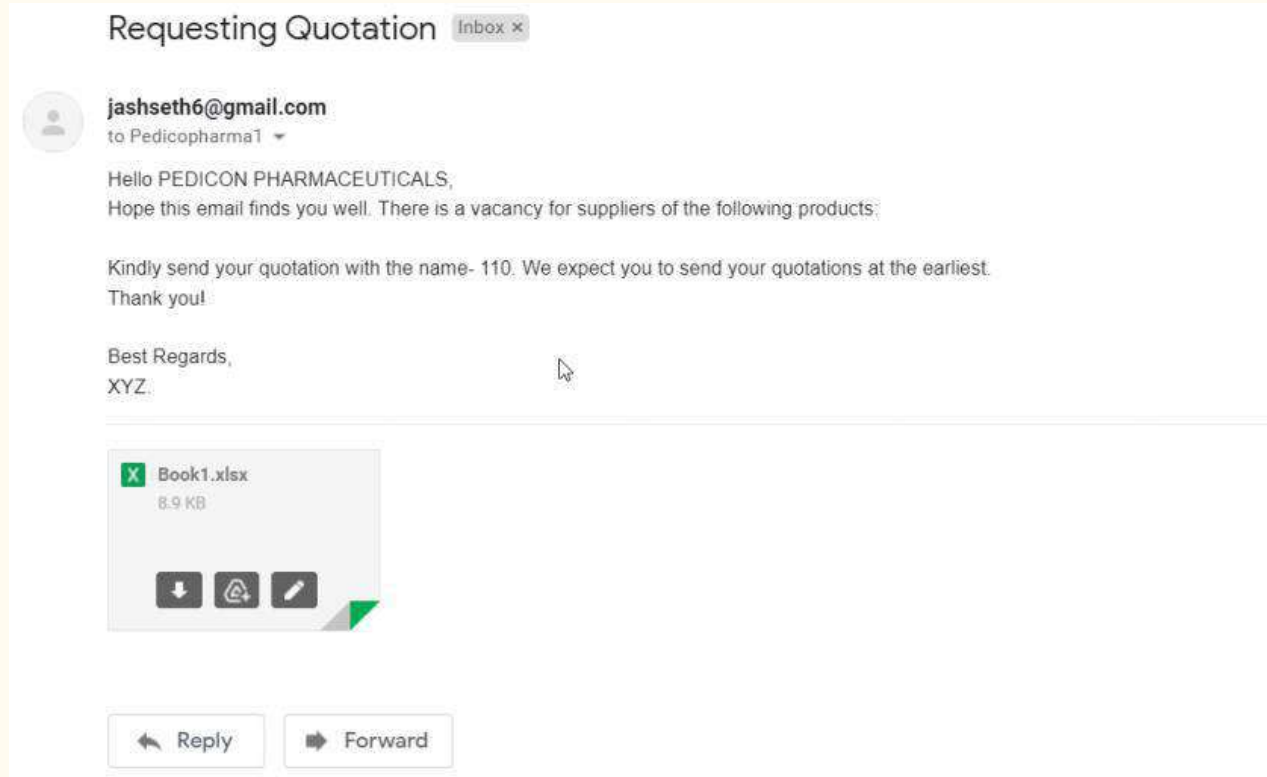


5.2 Updating the quantity in database

The screenshot displays the Microsoft SQL Server Management Studio interface. The title bar indicates the connection is to 'DESKTOP-TOKNEAQ\SQLEXPRESS: testDB - dbo.product'. The menu bar includes File, Edit, View, Project, Query Designer, Tools, Window, and Help. The toolbar contains icons for New Query, Execute, and other database operations. The Object Explorer on the left shows the database structure, with 'testDB' expanded to show 'dbo.product'. The main query window shows a SQL query: 'UPDATE dbo.product SET recorder_quantity = recorder_quantity + 10 WHERE product_id = 10'. The results pane on the right shows a table with columns: product_id, product_name, price, availability, manufactur..., distributor_id, recorder_quantity, and flag. The table contains 20 rows of data, with the first row highlighted in blue.


product_id	product_name	price	availability	manufactur...	distributor_id	recorder_quantity	flag
1	ALERGIN	16.75	254	...	101	350	false
2	DERICIP	7.85	350	...	101	300	false
3	AZICIP	71.09	450	...	101	400	false
4	OMNICALV 375...	101	521	...	101	450	false
5	ACARCIP	85	470	...	101	400	true
6	ABZORB ANTI F...	115	25	...	109	450	false
7	CAVERTA	154	482	...	109	350	false
8	CARTISHINE	120	514	...	109	350	false
9	DAZTOR	154	345	...	109	450	false
10	ELKAR	100	336	...	109	400	false
11	FELCAM	14.9	265	...	109	300	false
12	CROCI	30	379	...	110	300	false
13	IODIX	40	498	...	110	350	false
14	OSTOCALCIUM...	156	375	...	110	350	false
15	OTIRIVN	39	655	...	110	400	false
16	ALKIDF SYRUP	56	364	...	106	300	true
17	ENZOFLAM-CT...	132	259	...	106	350	false
18	MAYLOX	37	487	...	103	400	false
19	MULTIZYME DR...	17.5	165	...	106	450	false
20	SEPHALEXIN	63	659	...	107	450	false
21	SIZLAC	62	25	...	106	300	false
22	CITELEC 500 M...	520	237	...	107	350	false
23	ZURICAB	121	222	...	106	300	false
24	CONEVIRON-T...	58	198	...	107	450	false

5.3 Requesting Vendors to send quotation



5.4 Send best 2 quotation to SCM Manager

Supplier Selection for ALKOF SYRUP Inbox x



 **jashseth6@gmail.com**
to me ▾

Greetings Manager,

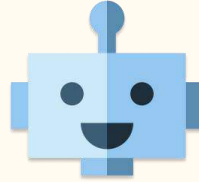
Following are the Shortlisted Quotations for ALKOF SYRUP:

ID	Name	Quoted Price	Experience(years)
103	J&J MEDICAL	25	2
107	SUNRISE REMEDIES 90		11

Kindly respond with the ID of the Vendor whose Quotation you wish to select, followed by the Name of the Product.

 Reply  Forward

5.5 SCM Manager Login



WELCOME SCM MANAGER!

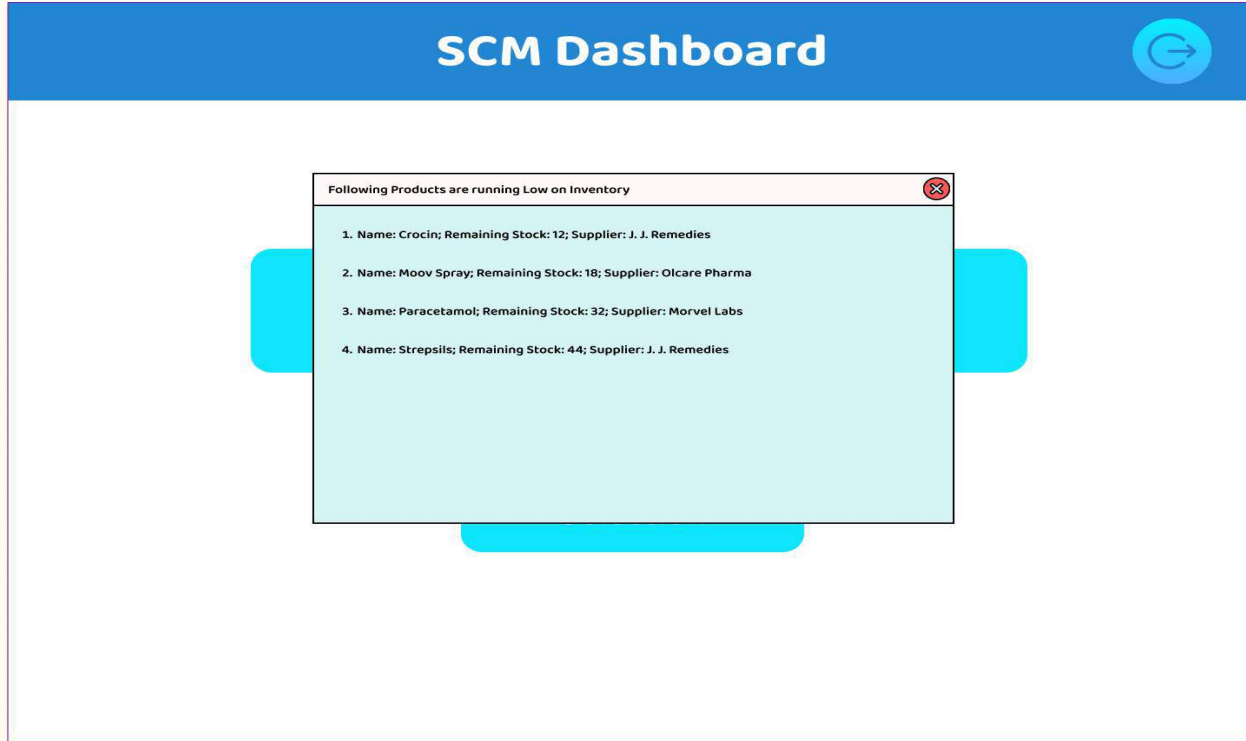
[Forgot Password?](#)

Login

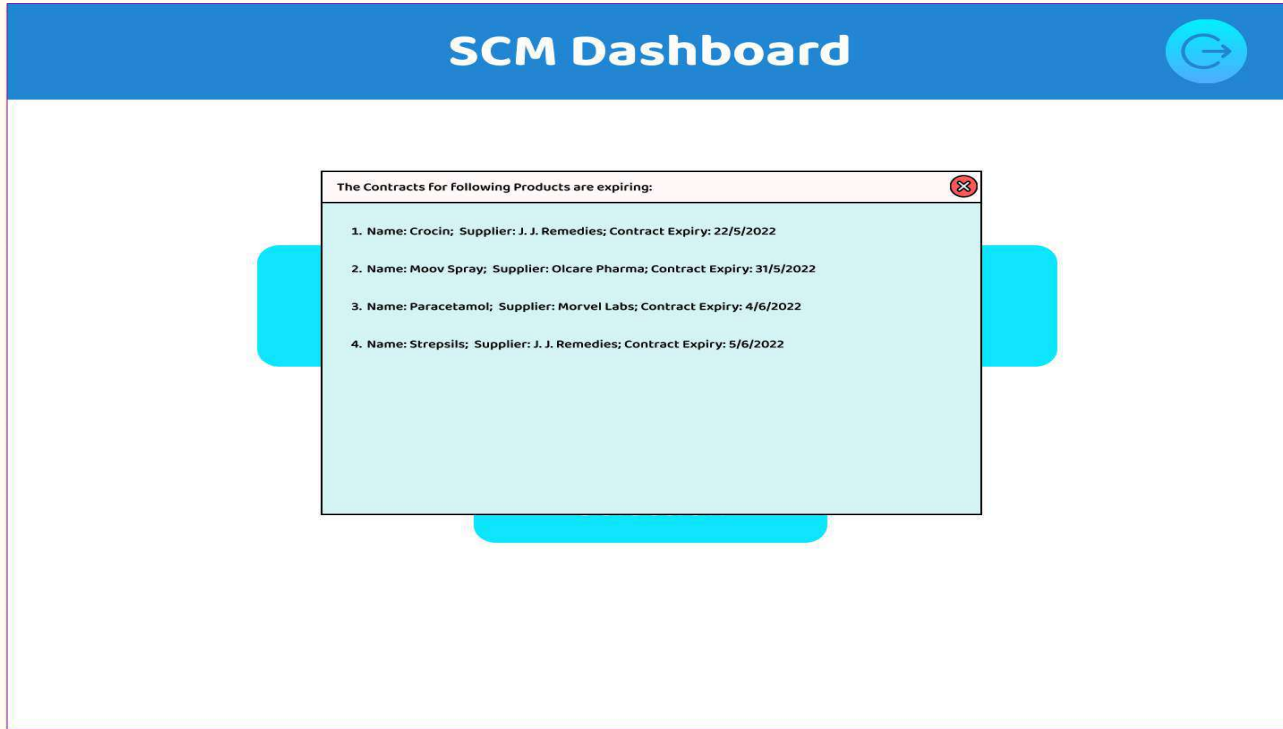
5.6 SCM Manager Dashboard



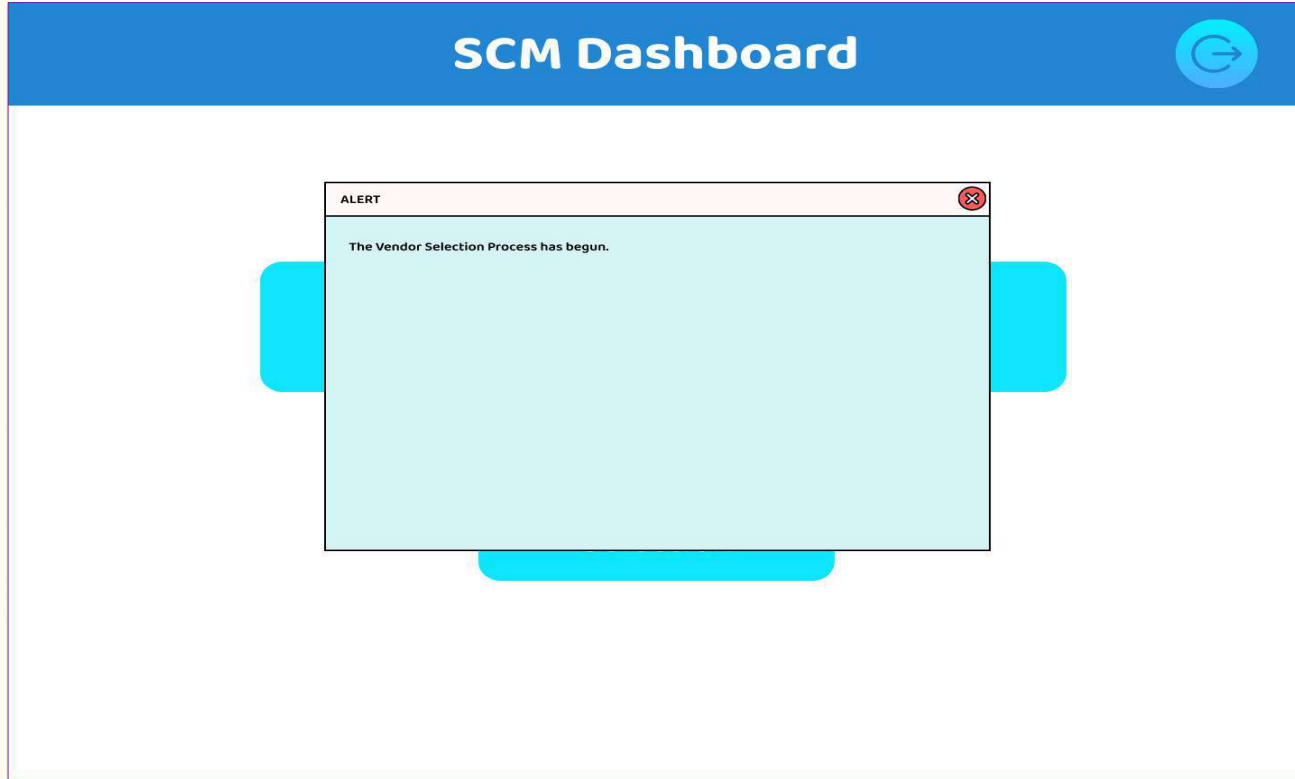
5.7 Check Inventory



5.8 Vendor Contracts



5.9 Begin Vendor Selection



6. Conclusion and Future Scope

6.1 Conclusion

- Existing SCM of healthcare has disadvantages because of human management of processes.
- The proposed system overcome the several shortcomings in SCM such as:
 - Frequent human errors
 - Excess delay
 - Inaccuracies, etc.
- Automated the key processes such as:
 - Vendor Selection
 - Vendor Onboarding
 - Order Processing
 - Inventory Management

6.2 Future Scope

- To integrate SCM Manager dashboard to BluePrism software.
- To use data analysis and set the threshold value of a product based on its demand.

References

- A. Maalla, "Development Prospect and Application Feasibility Analysis of Robotic Process Automation," *2019 IEEE 4th Advanced Information Technology, Electronic and Automation Control Conference (IAEAC)*, 2019.
- S. Yatskiv, I. Voytyuk, N. Yatskiv, O. Kushnir, Y. Trufanova and V. Panasyuk, "Improved Method of Software Automation Testing Based on the Robotic Process Automation Technology," *2019 9th International Conference on Advanced Computer Information Technologies (ACIT)*, 2019.
- S. Voeng and D. Kritchanchai, "Factors Influencing Supplier Selection for Vendor Managed Inventory Adoption in Hospitals," *2019 4th Technology Innovation Management and Engineering Science International Conference (TIMES-iCON)*, 2019.

Paper Publication

ICDLAIR 2021

3rd International Conference on Deep Learning, Artificial Intelligence and Robotics

CERTIFICATE OF PRESENTATION

This is to certify that the contribution titled

Automation of Supply Chain Management for Healthcare

Authors:

Hitarth Saiya, Samyak Doshi, Jash Seth, Vishal Badgular, Geetanjali Kalme

has been presented at ICDLAIR 2021, held online on December 13-17.

DATE 22.12.2021



Prof. Luigi Troiano
ICDLAIR 2021 Chair

Thank You

