ISTANBUL TECHNICAL UNIVERSITY
Faculty of Computer Science and Informatics

SOFTWARE INTERNSHIP
ROBOTIC PROCESS AUTOMATION DEVELOPMENT

INTERNSHIP PROGRAM REPORT

ÖMER MALİK KALEMBAŞI
150180112

SUMMER / 2022

Istanbul Technical University

Faculty of Computer Science and Informatics

INTERNSHIP REPORT

Academic Year: 2021/2022
Internship Term: ☒ Summer ☐ Spring ☐ Fall

Student Information

Name Surname: ÖMER MALİK KALEMBAŞI
Student ID: 150180112
Department: Computer Engineering
Program: 100% English
E-Mail: kalembasi18@itu.edu.tr
Mobile Phone: +90 (507) 008 4458

Pursuing a Double Major? ☐ Yes (Faculty/Department of DM: _____)
☒ No

In the Graduation Term? ☐ Yes
☒ No

Taking a class at Summer School? ☐ Yes (Number of Courses:_____)
☒ No

Institution Information

Company Name: BORUSAN MAKİNA VE GÜÇ SİS. A.Ş.
Department: ROBOTIC AND ARTIFICIAL INTELLIGENCE DEPARTMENT
Web Address: https://www.borusancat.com/tr
PostalAddress: Kuriş Kule, Cevizli Mahallesi, Cevizli D-100 Güney Yanyolu No:2 Kat:10, 34865 Kartal/İstanbul

Authorized Person Information

Department:	ROBOTIC AND ARTIFICIAL INTELLIGENCE DEPARTMENT
Title:	ROBOTIC PROCESS AUTOMATION LEADER
Name Surname:	CÜNEYT UĞUR
Corporate E-Mail:	cugur@borusan.com
Corporate Phone:	+905497472635

Internship Work Information

Internship Location:	☒ Turkey ☐ Abroad
Internship Start Date:	19.08.2022
Internship End Date:	16.09.2022
Number of Days Worked:	20
During your internship, did you have insurance?	☒ Yes, I was insured by İTÜ. ☐ Yes, I was insured by institution. ☐ No, I did my internship abroad. ☐ No.

Table of Contents

1 INFORMATION ABOUT THE INSTITUTION

BorusanCat [1] is a subsidiary of Borusan Holding and is the distributor of Caterpillar for Middle and Far Asian geographies such as Russia, Azerbaijan, Kazakhstan. The company markets and provides technical service for CAT products. In the department where I did my internship, in the Robotics and Artificial Intelligence team, I worked as an RPA developer intern in the robotics team.

The robotics team is responsible for automating processes and making improvements that will save manpower and time in line with the demands of business units and process mining. Their projects include robots that need to be controlled by daily and weekly schedules such as PDF extractions, SAP processes, data storage and control operations, automatic tender controls. They use the Kofax RPA tool [2] as an auxiliary tool. System dashboard and assign projects control is carried out over Jira platform.

During my internship, I was responsible for adapting the KOFAX RPA tool and developing a project here. My project was to create an automation robot that would extract similar data from 5 different types of PDF invoices and then process and control these data in SAP, upon the request of the company's Kazakhstan branch. At the end of the internship process, the robot I developed was put live and is actively working on the calendar.

2 INTRODUCTION

During this internship period, my goal and task was to adapt to the KOFAX RPA tool, to develop a project here, to test myself in practice on algorithms and database management, and to see the systematic functioning in corporate company planning.

3 DESCRIPTION AND ANALYSIS OF THE INTERNSHIP PROJECT

The internship process can be broadly classified under four headings: Adapting to KOFAX, Project development, Functional tests and putting the project live, presentation to colleagues.

3.1 Adapting to KOFAX

First, I finished the 10 video certified training of the Kofax Kapow Training series to get used to the KOFAX tool and RPA [3]. Then I practiced using the RPA tool on the website "https://www.rpachallenge.com" [4]. Each time this site is refreshed, tags such as 'First Name', 'Phone Number', 'Address' are replaced and the robot you are using is expected to write and save the correct data taken from the Excel file (Figure 3) against these tags. With this exercise, I understood the importance of the 'name tag' and its usage areas in sustainable algorithm development.

Figure 1: Kofax Kapow Certified Training [3]

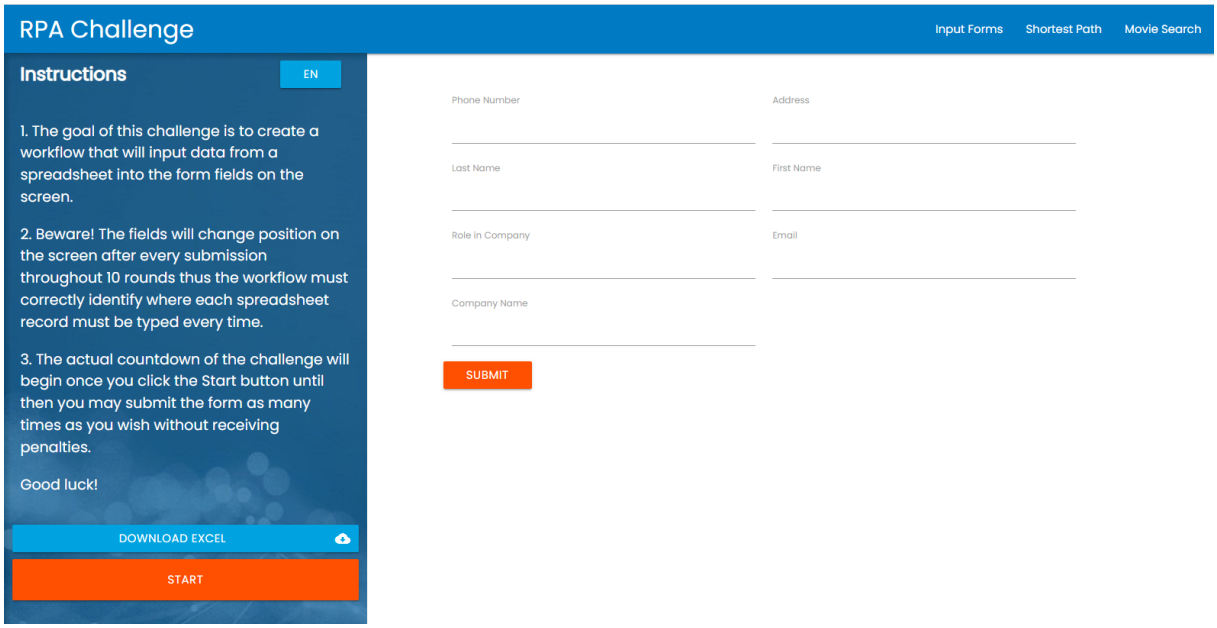

Figure 2: ”https://www.rpachallenge.com” web site [4]

	A	B	C	D	E	F	G
1	First Name	Last Name	Company Name	Role in Company	Address	Email	Phone Number
2	John	Smith	IT Solutions	Analyst	98 North Road	jsmith@itsolutions.co.u	40716543298
3	Jane	Dorsey	MediCare	Medical Engineer	11 Crown Street	jdorsey@mc.com	40791345621
4	Albert	Kipling	Waterfront	Accountant	22 Guild Street	kipling@waterfront.con	40735416854
5	Michael	Robertson	MediCare	IT Specialist	17 Farburn Terrace	mrobertson@mc.com	40733652145
6	Doug	Derrick	Timepath Inc.	Analyst	99 Shire Oak Road	dderrick@timepath.co.u	40799885412
7	Jessie	Marlowe	Aperture Inc.	Scientist	27 Cheshire Street	jmarlowe@aperture.us	40733154268
8	Stan	Hamm	Sugarwell	Advisor	10 Dam Road	shamm@sugarwell.org	40712462257
9	Michelle	Norton	Aperture Inc.	Scientist	13 White Rabbit Stree	mnorton@aperture.us	40731254562
10	Stacy	Shelby	TechDev	HR Manager	19 Pineapple Bouleva	sshelby@techdev.com	40741785214
11	Lara	Palmer	Timepath Inc.	Programmer	87 Orange Street	lpalmer@timepath.co.u	40731653845
12							
13							
14							
15							
16							

Figure 3: challenge.xlsx file

3.2 Project Development

There are two robots developed, one of them is PDF Extraction Robot, another is SAP Process Robot. While starting the project, I reviewed the PDD document prepared by the business analyst at the request of the company's Kazakhstan branch. The requested process was for BorusanCat to collect certain data from invoices in PDF format issued from 5 different companies, and to control and save each invoice in the SAP system. Workflow shown below as Figure 4.

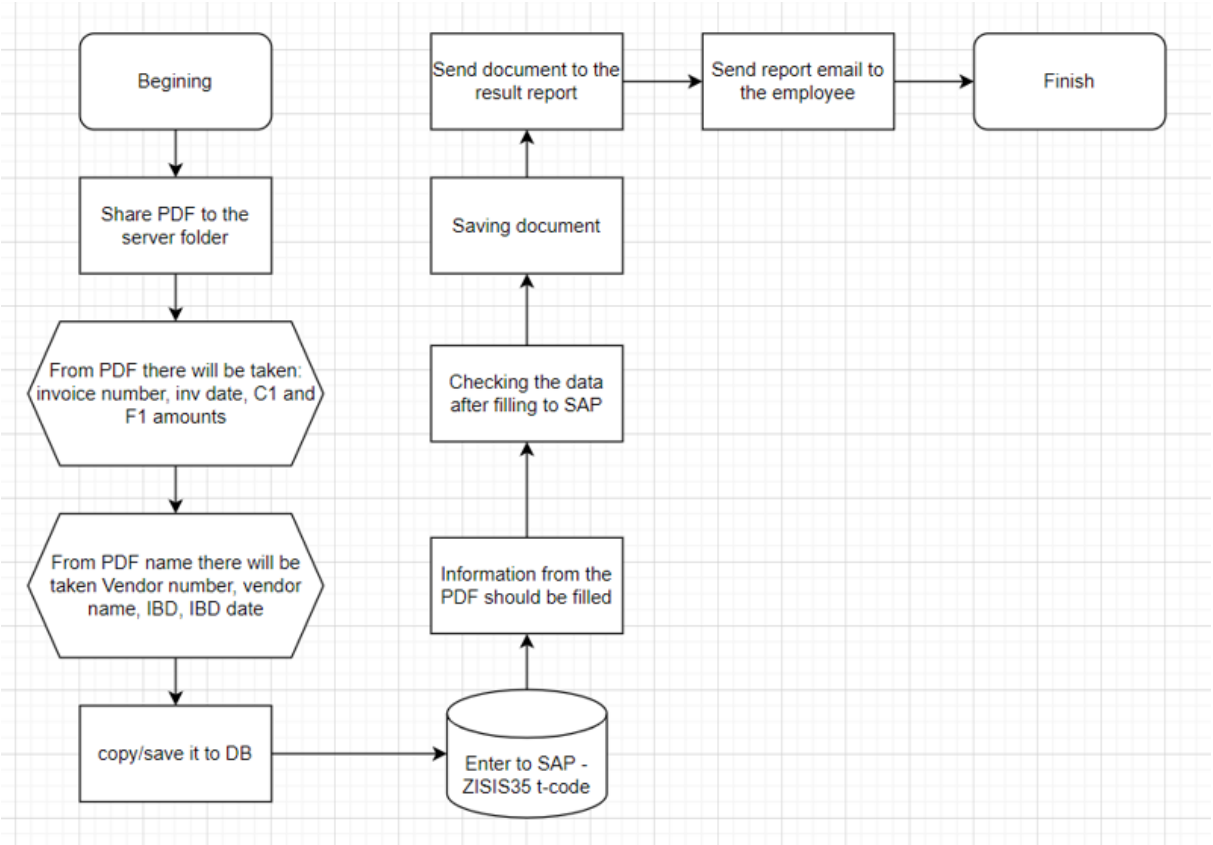

Figure 4: Workflow

3.2.1 PDF Extraction

The data that needed to be extracted automatically from invoices (Figure 14) were posting date, reference, vendor account, document date, currency, sales document, expense values, freight costs and total invoice. A sample invoice from the analysis document is shown in appendix as a figure (Figure 15). Invoicing companies and exact values will be included in the report in a censored manner as per company policy.

If we look inside the extraction robot (Figure 5), first of all, a general type (Figure 16) is created to store the variables and a table is created in the database with this type. The data extracted from each PDF is typed and stored in the database.

The robot pulls the pdfs in turn from the common folder (Figure 17) and extracts the posting date, vendor account and sales document data from the pdf names (Figure 18) and fills in the type. Then, it goes to the appropriate branch (Figure 6) according to the invoice type in the pdf name, extracts the reference, document date, currency, expense values, freight cost and total invoice data from the invoice content and fills in the type (Figure 7). Finally, he writes the data he filled in the type (Figure 20) to the database and saves it here (Figure 21). Type includes columns such as robot execution date, file name, status, process message to keep control of the process, apart from data.

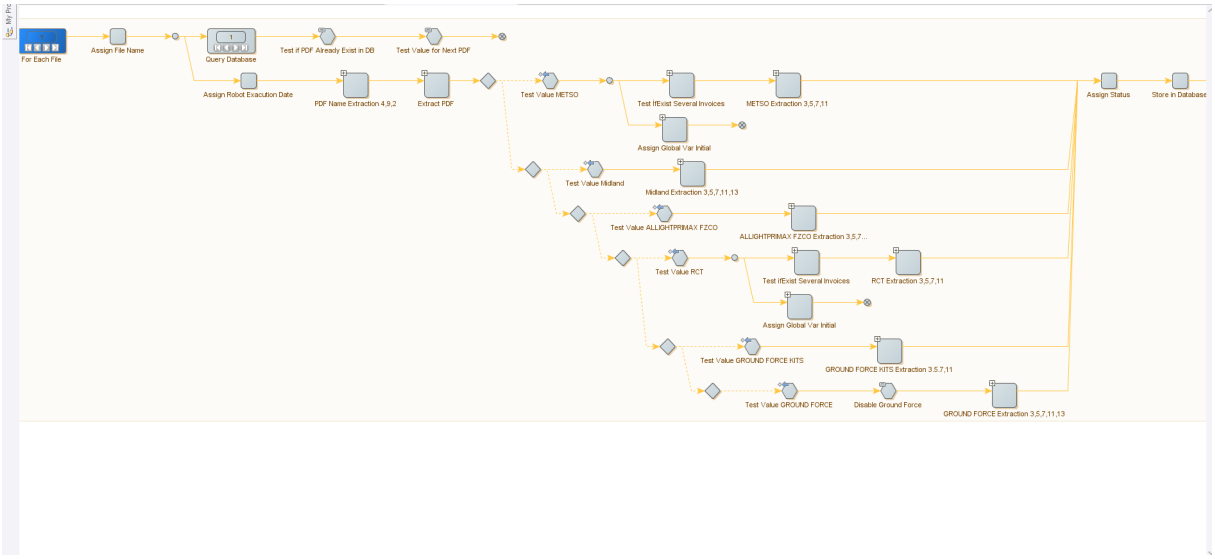

Figure 5: General look to PDF Extraction Robot

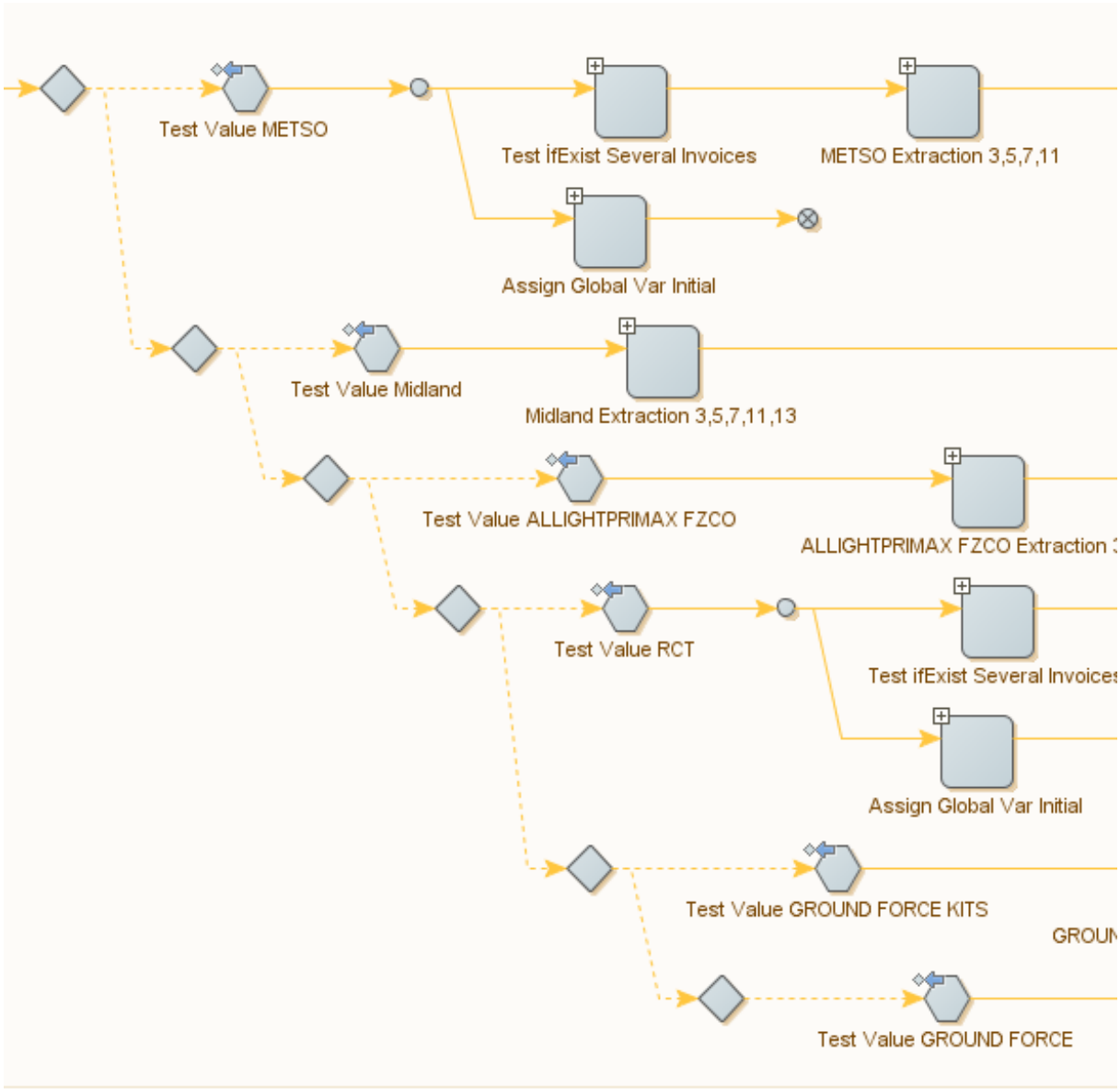

Figure 6: Try steps that decide which branch going to select in order to PDF type

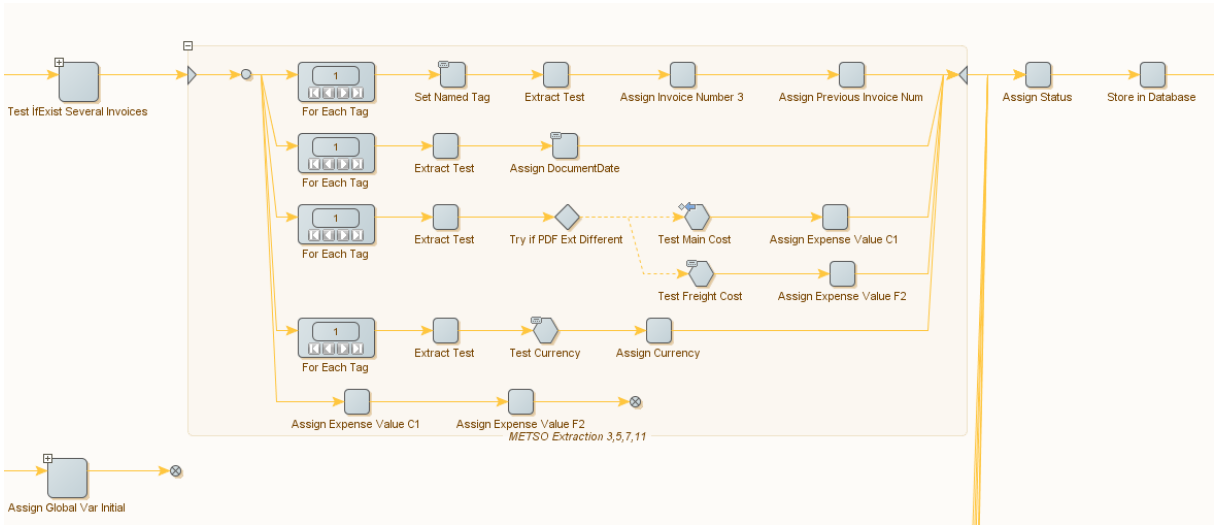

Figure 7: Inside an extraction branch, in order to selected PDF type, there are 4 branches more, similarly

3.2.2 SAP Process

Let's look inside the SAP Process Robot (Figure 8). The purpose of this robot, as seen in the workflow, is to log in to SAP and then go to the 'ZISIS35' transaction code, query the data obtained by the PDF Extraction robot from the database, and save it by filling in the transaction screen (Figure 9). After successfully completing all these processes, the robot writes the numbers of the recorded invoices into an excel file (Figure 10) and sends a result mail to the relevant business units (Figure 25).

While the robot is logging into SAP, it encrypts the password so that it is not seen by third parties and automates the process. In this way, the password cannot be shared with the developer and third parties who come later or access the robot development.

To summarize the operation of the process robot simply, it finds the data and the relevant tags, writes the data it receives from the database, ticks the appropriate boxes, simulates the screen, and then saves it. As a result of the transaction, it receives the process message on the SAP screen and writes it to the database.

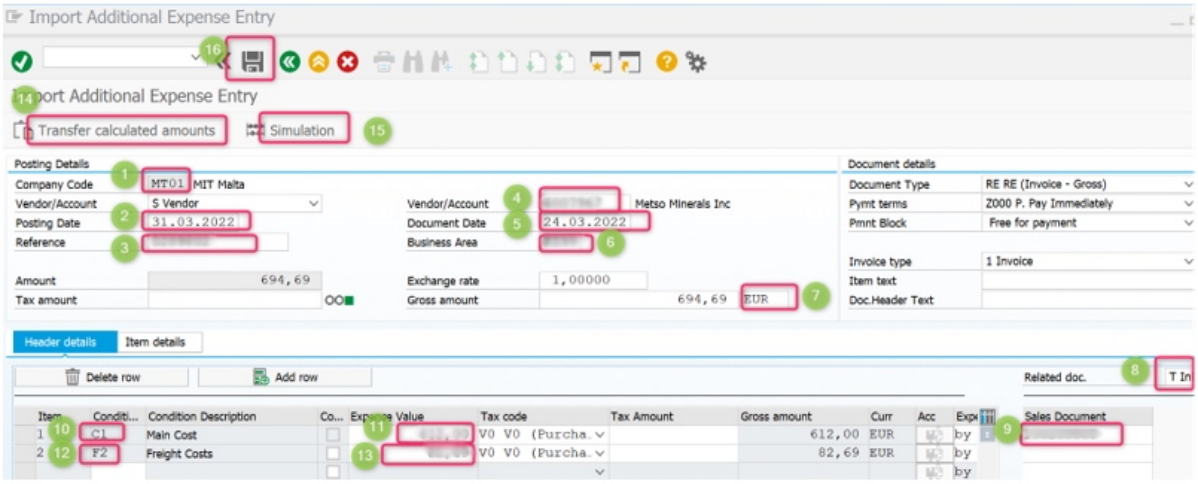

Figure 8: SAP Process which taken from analyst document

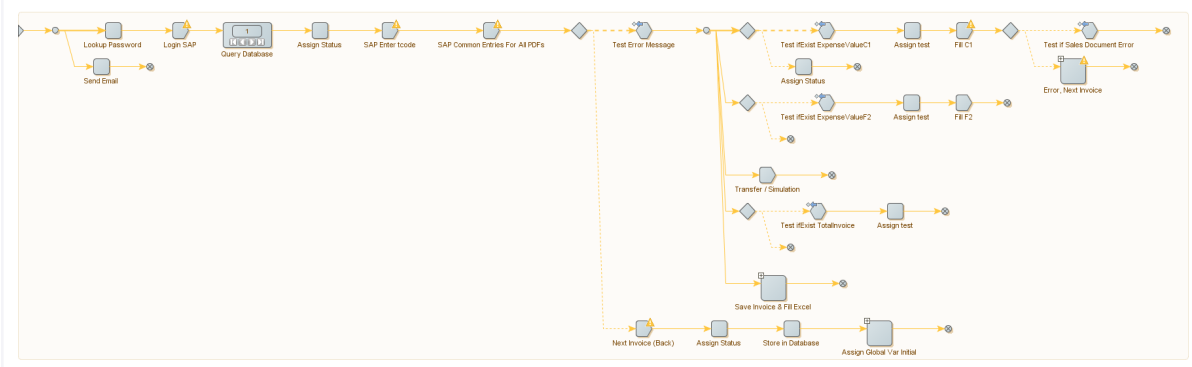

Figure 9: General look to SAP Process Robot

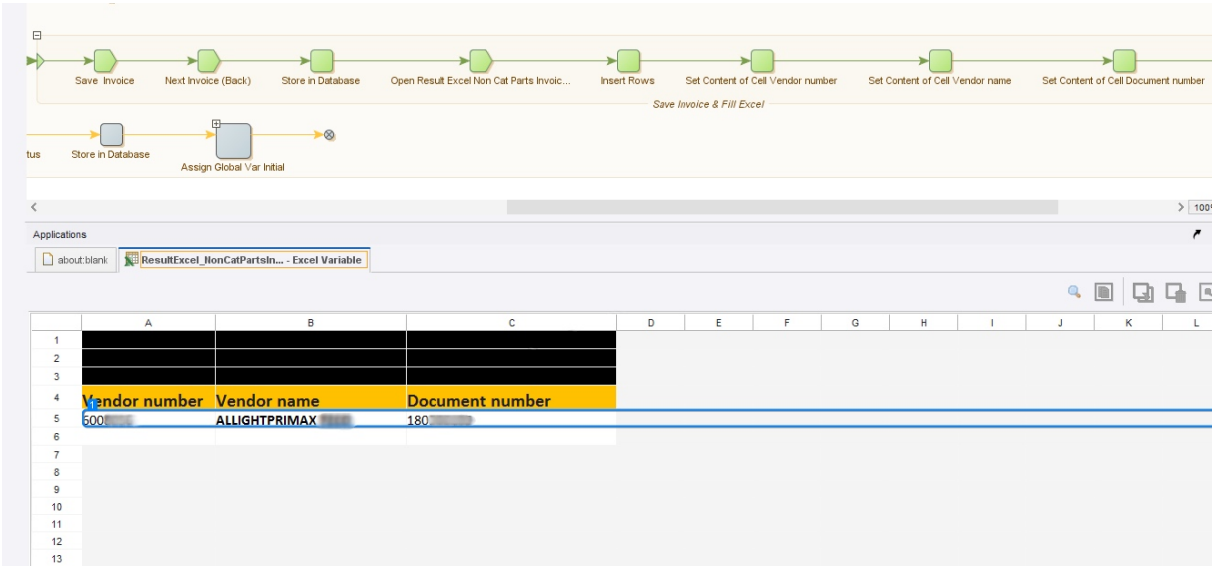

Figure 10: Excel file prepared by robot after steps completed successfully

3.3 Functional Tests and Putting the Project Live

After the development was completed, functional tests were started. Invoices coming to the business unit were entered into the system by the robot. Five different types of invoices were tested and it was seen that the automation performed the process successfully. After the tests, the robot was taken live and a shortcut 'Kapplet' was created via KOFAX Environment for easy access of the bussines unit.

Kapplets (Figure 11) are the robot operation screen developed by KOFAX tool, running on Kofax Management Console, and accessible with user name and password. The business unit that sent the robot request can operate the robot manually or on a scheduled basis by logging into this screen with the user name and password assigned to it after the robot is developed. In this project, the business unit that requested the robot wanted to run the robot manually instead of schedule. User and password were assigned to them. Its user has been granted access only for the robots he has requested.

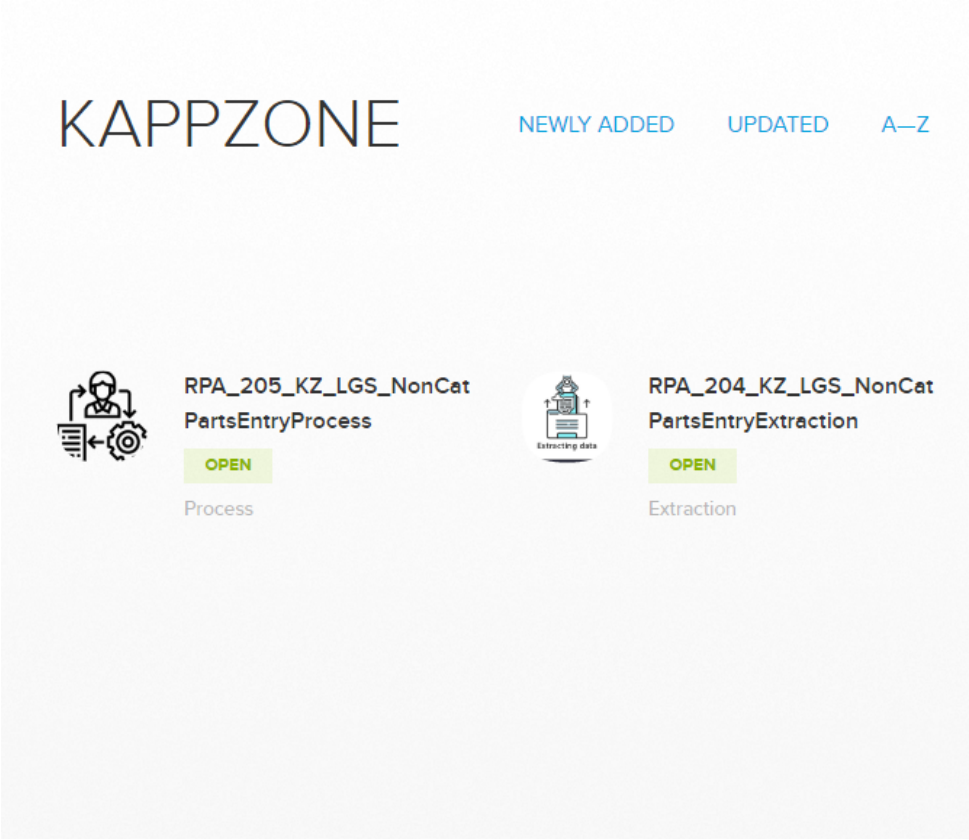

Figure 11: PDF Extraction Robot and SAP Process Robot's Kapplets

3.4 Presentation to Colleagues

In the final, I prepared and presented a presentation in which I explained the robot flow process, development and results to my colleagues, manager and business analysts in the department.

Figure 12: Presentation file preview

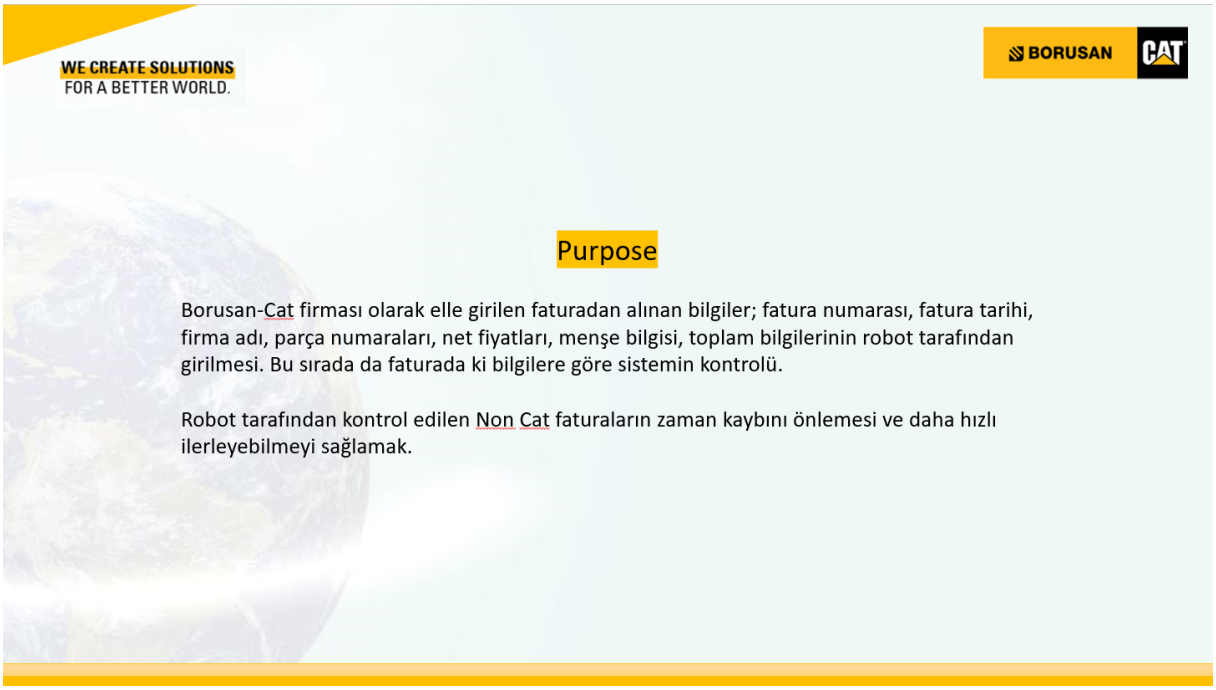

Figure 13: Presentation file preview

4 CONCLUSIONS

This internship program has been very beneficial for me. I witnessed the operation of the corporate company, the division of labor, the flow chart and how the works were controlled and followed. I improved my algorithm and database skills. I started learning and used Robotic Process Automation, which I had not had the chance to practice before. I was in constant contact with business analysts and colleagues. They supported me by discovering and applying things myself rather than asking. They did not set a deadline for the project, they said that the important thing is not to finish it in a short time, but to have a project that works flawlessly at the end of the job. KOFAX is a useful tool that facilitates the process, once you become familiar with this tool, the process becomes easier. I am very happy with what I learned and I think that my internship process was both visionary, instructive, productive and fun.

5 REFERENCES

[1] https://www.borusancat.com/tr

[2] https://www.kofax.com/

[3] http://docshield.kofax.com/RPA/

[4] https://www.rpachallenge.com/

[5] https://www.w3schools.com/sql/

6 APPENDIX

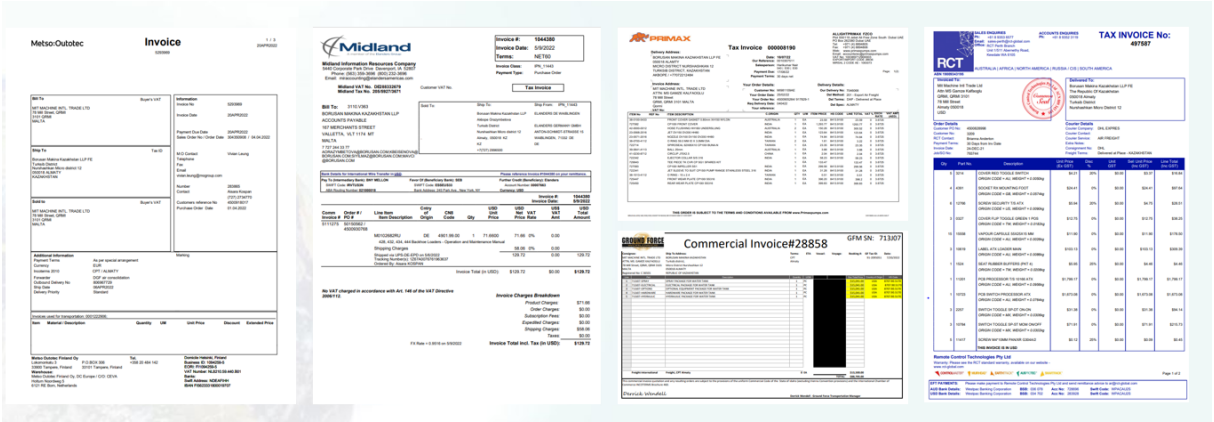

Figure 14: Invoice types

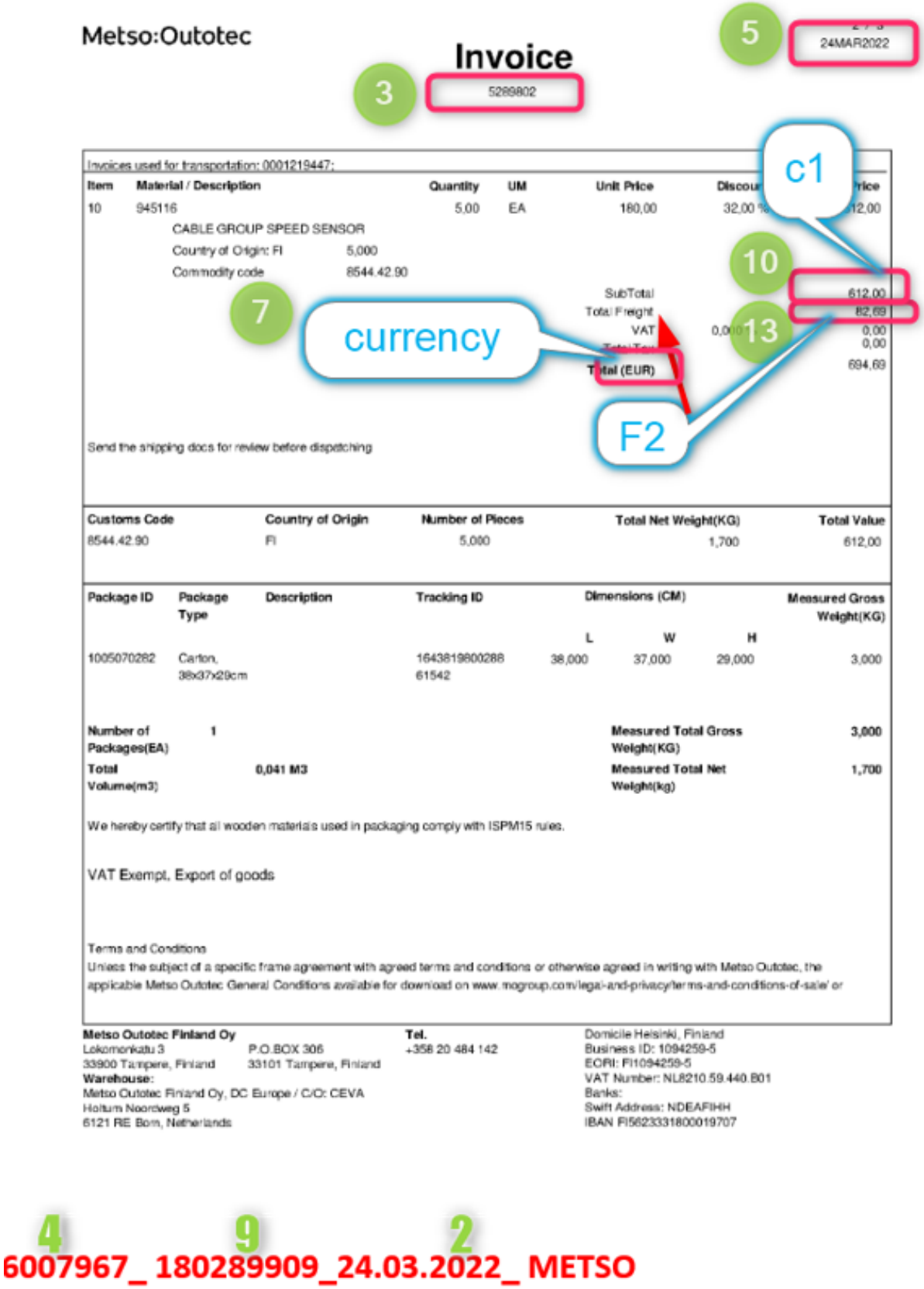

Figure 15: PDF sample to extract

Name	Storage Name	Attribute Type	Default Value	Storable	Required	Part of Database Key
RobotExacutionDate		Date		✔		
FileName		Short Text		✔		
CompanyCode		Short Text	MT01	✔		
PostingDate		Short Text		✔		
Reference		Short Text		✔		✔
VendorAccount		Short Text		✔		
DocumentDate		Short Text		✔		
BusinessArea		Short Text	KZ99	✔		
Currency		Short Text		✔		
RelatedDoc		Short Text	T Inbound Delivery	✔		
SalesDocument		Short Text		✔		
ExpenseValueC1		Number		✔		
ExpenseValueF2		Number		✔		
TotalInvoice		Number		✔		
Status		Short Text		✔		
ProcessMessage		Short Text		✔		

Figure 16: Empty type ready to fill, database key selected as 'reference', because of Invoice number for each invoice is unique.

600[redacted]_18[redacted]_09.02.2022_METSO.PDF	2/9/2022 8:21 AM	Chrome HTML Document	60 KB
600[redacted]_18[redacted]_02.03.2022_METSO.pdf	3/2/2022 6:21 PM	Chrome HTML Document	642 KB
600[redacted]_18[redacted]_25.02.2022_METSO.pdf	2/25/2022 7:15 PM	Chrome HTML Document	38 KB
600[redacted]_18[redacted]_05.05.2022_METSO.pdf	5/5/2022 2:08 PM	Chrome HTML Document	41 KB
600[redacted]_180[redacted]_16.08.2022_METSO.pdf	8/18/2022 10:13 AM	Chrome HTML Document	69 KB
600[redacted]_1802[redacted]_03.02.2022_MIDLAND.pdf	2/3/2022 1:04 PM	Chrome HTML Document	432 KB
600[redacted]_1802[redacted]_09.02.2022_MIDLAND.pdf	2/9/2022 12:08 PM	Chrome HTML Document	432 KB
600[redacted]_1802[redacted]_11.02.2022_MIDLAND.pdf	2/11/2022 7:59 PM	Chrome HTML Document	434 KB
600[redacted]_1802[redacted]_28.04.2022_MIDLAND.pdf	4/29/2022 5:59 AM	Chrome HTML Document	435 KB
600[redacted]_1802[redacted]_05.03.2022_MIDLAND.pdf	3/9/2022 7:08 AM	Chrome HTML Document	434 KB

Figure 17: Shared folder which robots pulls the PDFs

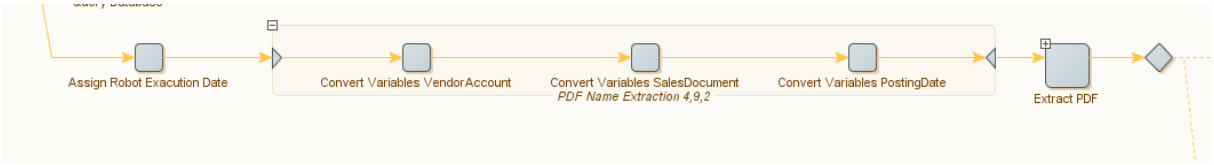

Figure 18: PDF name extraction steps

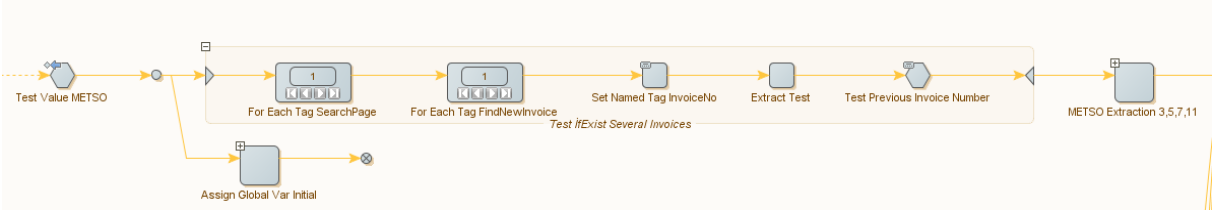

Figure 19: Flow example represents if one PDF involves several invoices

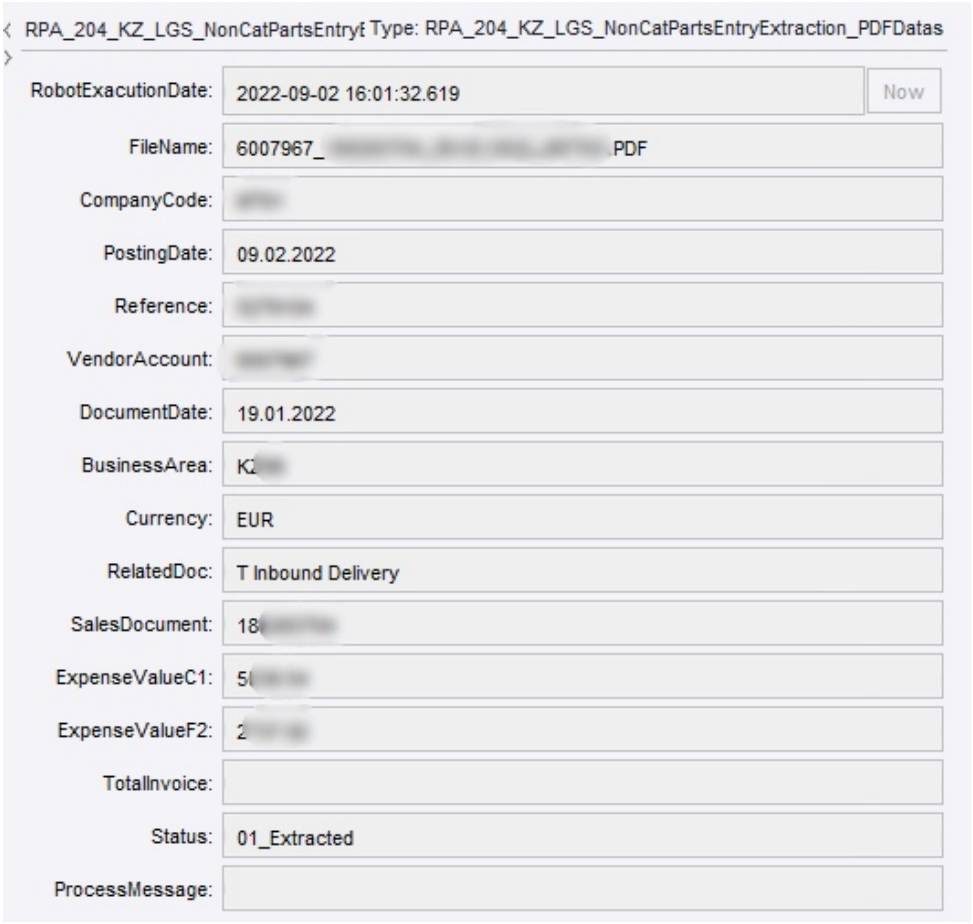

Figure 20: After data extractions done, general look into type

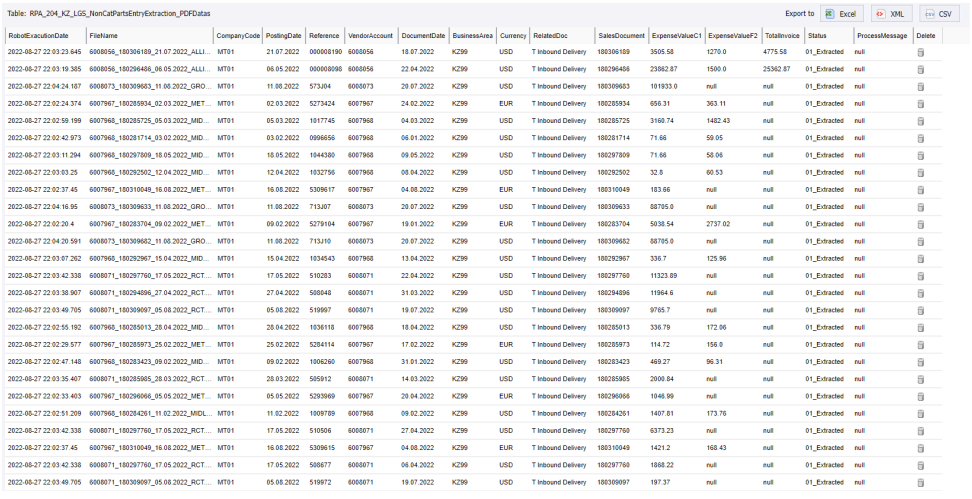

Figure 21: After all data extractions done, general look to database

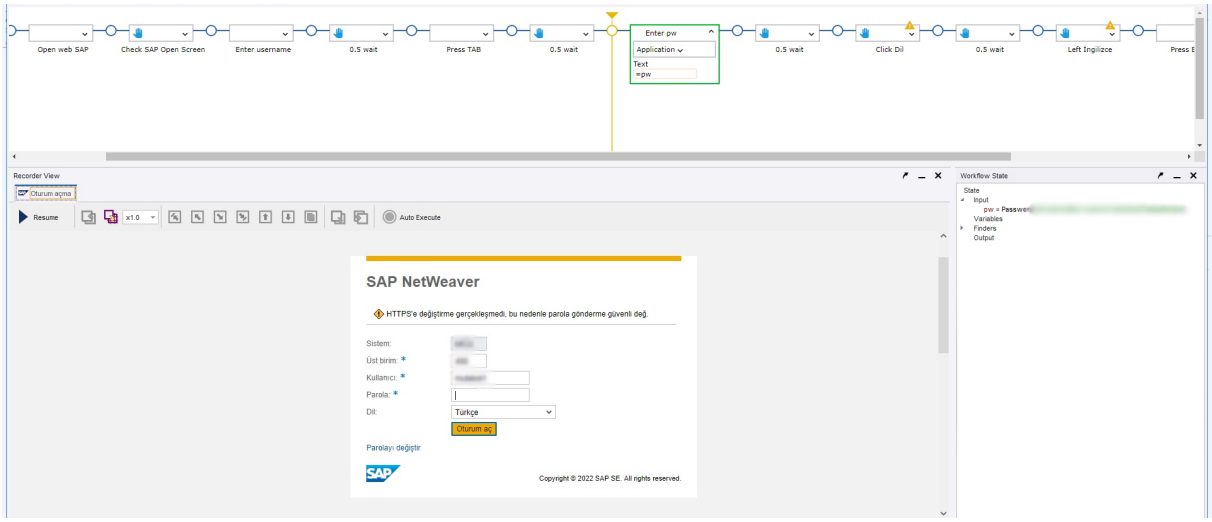

Figure 22: Login SAP steps

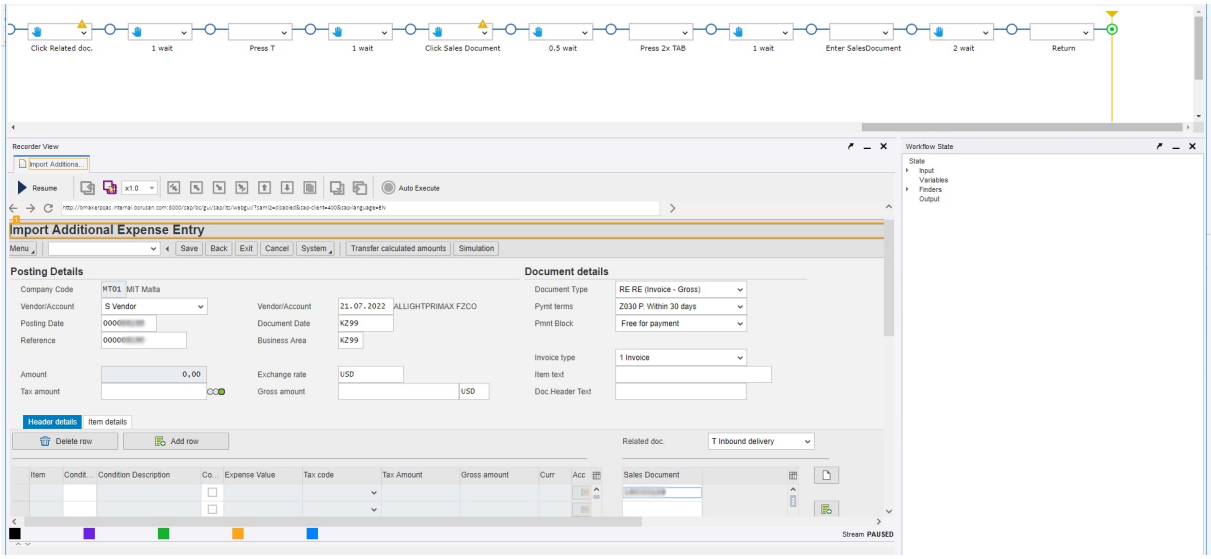

Figure 23: SAP look while robot running

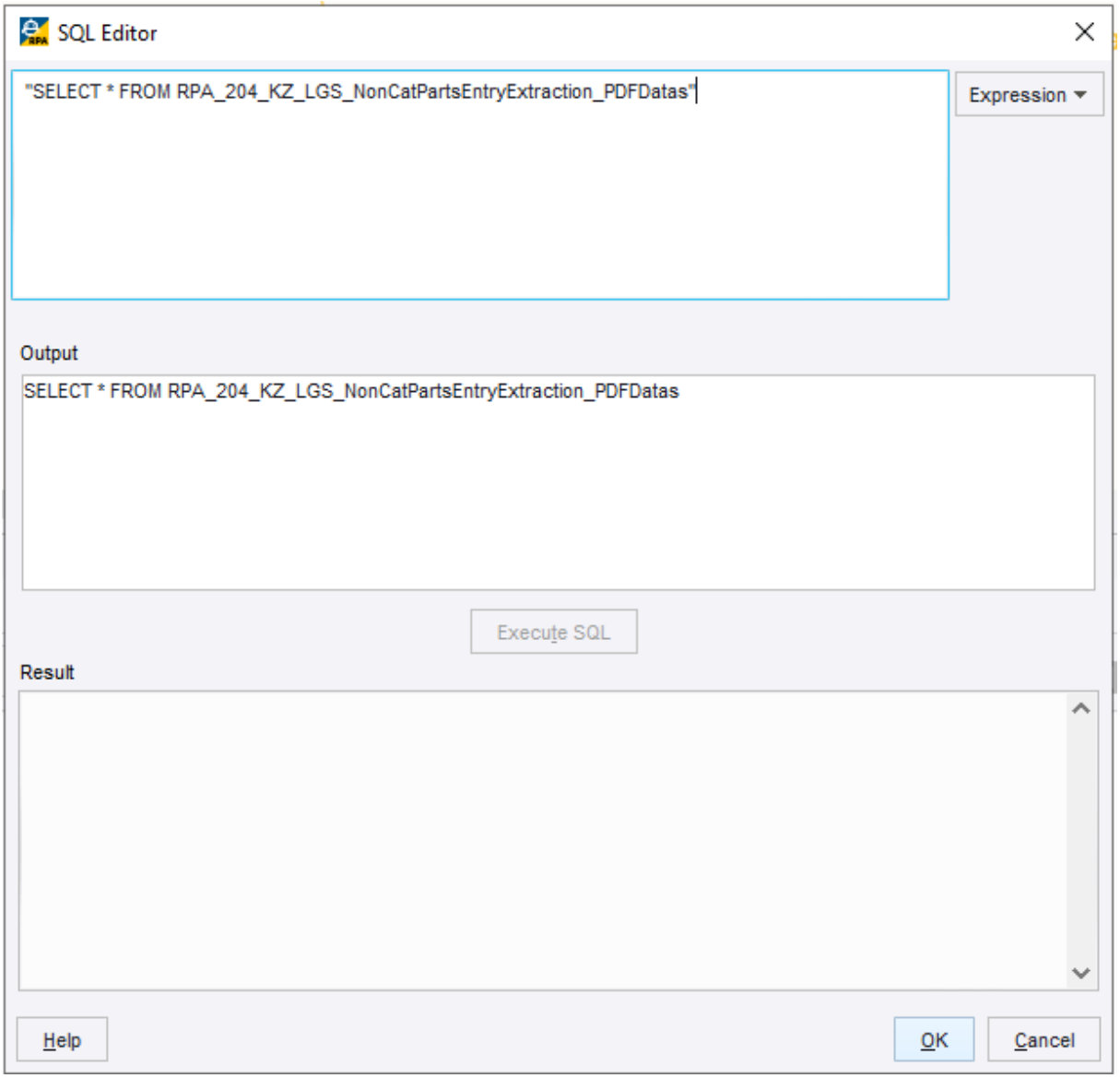

Figure 24: Query Database step and SQL Query example

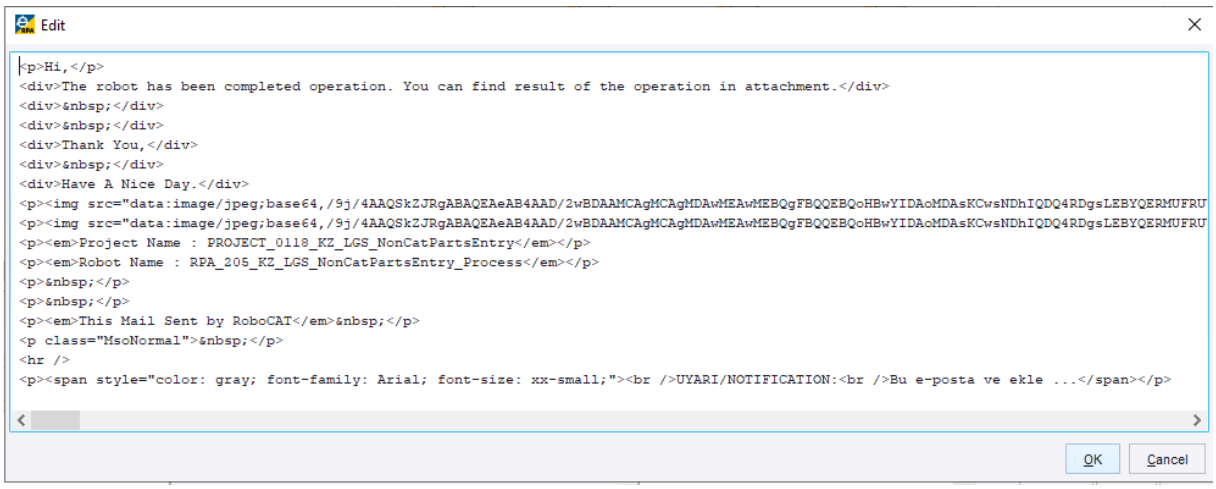

Figure 25: HTML source that written for sending result mail