iJRASET
International Journal For Research in Applied Science and Engineering Technology



INTERNATIONAL JOURNAL FOR RESEARCH

IN APPLIED SCIENCE & ENGINEERING TECHNOLOGY

Volume: 12 **Issue:** VI **Month of publication:** June 2024

DOI: https://doi.org/10.22214/ijraset.2024.63129

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International Journal for Research in Applied Science & Engineering Technology (IJRASET)
ISSN: 2321-9653; IC Value: 45.98; SJ Impact Factor: 7.538
Volume 12 Issue VI June 2024- Available at www.ijraset.com

Design of Part Request Form Application and Data Migration

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Abstract: ***The migration of the data form legacy systems to modern enterprise solutions is critical for optimizing business processes and enhancing performance. This paper focuses on comparison of the data migration techniques LSMW and S/4 HANA migration cockpit. The main objective is to optimize the business process through the creation of Part Request Form application in fiori launchpad and performing data migration using S/4 High performance analytic appliance(HANA) migration cock- pit. Traditional methods of data migration has several problems, including performance bottlenecks. Addressing this limitation is essential to ensure seamless data transfer and accurate system integration. This report explores these issues and presents a methodology to address them by using advanced capabilities of the S/4 HANA Migration Cockpit over the conventional Legacy system migration workbench(LSMW) tool. The primary objective of this work is to optimize business process using part request form application. The data comes from the application will be saved in the database table in the user system. That data is extracted into a file and send it to the IT firm where that data will be migrated to the HANA database. The tool used for the data migration is s/4 HANA migration cockpit. The software used for this project is SAP-ERP software. The Results from the simulation shows that migration cockpit process is 48% faster than LSMW technique. The part request form application uses 12 kilo bytes of memory which is very less and the processing time is 0.1 seconds which is very less. These results highlight advantages of using an application in data warehouse and the effectiveness of the S/4 HANA Migration Cockpit in optimizing business processes within warehouse environment.***

Keywords: Migration cockpit, Fiori application, SAP data migration , Legacy system migration workbench

I. INTRODUCTION

The technology in Enterprise resource planning(ERP) is ad- vancing day by day. It made essential for the business to move from the SAP ERP central component(ECC) to the s/4 High performance analytic appliance(HANA) environment. The part request application can be used in the business warehouse environments to get the data from the workers. Later they send that data to the IT firm where the engineers transfer the data to the centralized database using data migration. There are many data migration techniques available in SAP such as (LSMW), S/4 HANA migration cockpit, (BDC). The newer and efficient approach is to use S/4 HANA migration cockpit. The main fo- cus here is to improve warehouse operations through efficient data migration techniques and SAP-fiori applications. SAP fiori application is created using module pool programming.

First step is to create a screen in module pool and then next step is to create a tile in fiori launchpad. Data migration is performed using migrate your data application.

II. PROBLEM STATEMENT

The requests from the user in the warehouse management has to be processed in a faster rate. So there is a requirement to design an application and migrate the data stored from the application to the HANA database.

III. LITERATURE SURVEY

SAP is the most widely used ERP software in the organiza- tions. Enterprise Resource Planning systems are software plat- forms designed to manage and integrate the business processes of an organization across various departments. [1] ABAP is the programming language used in SAP software. RICE stands for reports, interfaces, conversions, enhancements. These are the development works that we can carry in SAP.[2] Explains the use of Intermediate Document technology based on XML techniques as a method for ensuring efficient data exchange between enterprise resource planning systems and other por- tal applications.[3] Intermediate Document technology is a method for ensuring efficient data exchange between enterprise resource planning systems and other portal applications.[4] Creating source and target structure is the important step while creating migration object.

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Developing detailed data mapping and transformation rules to ensure alignment between source and target data structures.[5] S/4 HANA is noted for its advanced capabilities in analytics, real time data processing and overall improved performance, which are essential for creating an intelligent enterprise.The paper identifies several challenges, such as data migration difficulties, issues inte- grating with existing systems, the necessity for extensive user training, and the potential for operational disruptions. To mitigate these risks, the paper recommends thorough planning and conducting extensive testing.[6] SAP fiori is recognized for its user centric design. The paper [7] suggests that SAP fiori acts as a catalyst for innovation by streamlining complex processes and making it easier for users to perform their tasks efficiently. Additionally, it examines how the adoption of SAP fiori influences socio technical dynamics by changing how users interact with technology in their work environments. The study in [8] highlights the benefits of using SAP fiori for its intuitive interface and how it simplifies user interactions with metrology applications. The integration of these technologies enhances data accessibility and accuracy, streamlines calibra- tion processes, and improves overall operational efficiency.The paper [9] underscores the importance of this transition in maintaining competitive advantage and achieving supply chain excellence in the digital era. This paper [10] explores how SAP technology revolutionizes business processes from a buyer's perspective. It discusses the various SAP solutions that enhance business operations, such as SAP S/4 HANA for real- time analytics, SAP fiori for improved user experience, and cloud-based solutions for scalability and flexibility.
The overall study tells that S/4 HANA migration cockpit is an efficient method in terms of time and memory consumed. It is a new approach and compatible for both SAP ECC and S/4 HANA. SAP applications can be used in the warehouse environments for optimizing business processes in terms of time.

IV. METHODOLOGY

A. Creating Part Request Form Application

Warehouse management involves maintaining activities that go in a business's warehouse, including order fulfillment and shipping. The main warehouse management processes are receiving, Picking, Packing, Shipping, Reporting. Whenever the worker in the warehouse require a particular material he has to request to the supervisor. Instead of this, part request from application can be used. Worker just enter the material data in the form and submit it. After submitting the form the data will be stored in their own databases. That data need to be passed to the IT service consultants process the data and transfer the data to HANA database. All the workers of the warehouse can access the data and process the request. Storing this data helps to calculate the expense and it can also be used for future prediction. This application can be created using module pool programming. First the screen has to created in the module pool and later fiori tile has to be created in the fiori launchpad using the transaction code created for the module pool screen.

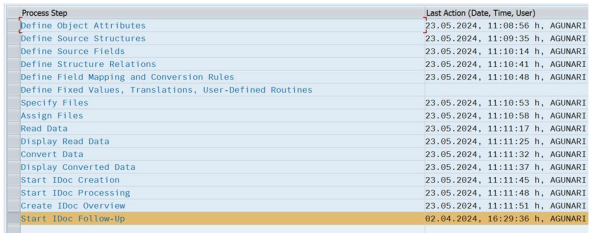
B. Data migration using migration cockpit

The data entered by the worker in the warehouse is stored in their own database. Later that data need to be transferred to the IT firm, where the engineers migrate that data to the centralized database of the company. The main techniques used for the data migration are LSMW and migration cockpit. LSMW is the older technique and it takes more time for the data migration. LSMW only supported by SAP ECC. S/4 HANA does not support LSMW approach. So it is better to use migration cockpit approach for data migration. Before performing the data migration the data needs to be validated. Once the data is validated then the data can be migrated. LTMOM is the transaction code used for creating migration object in the SAP software. The migration object contains source structure and target structure. Structure mapping and field mapping needs to be done while creating migration object.

V. IMPLEMENTATION

A. Comparison of LSMW and migration cockpit

In migration cockpit more than 200 migration objects can be created for ERP sources and excel template files delivered. In LSMW no need to create migration objects. We use IDOC for the delivery. For Direct Transfer in migration cockpit installation of DMIS add-on in the source system is necessary. In SAP standard delivery IDOC/ALE have to be configured. Migration cockpits are supported by SAP fiori and SAP gui. LSMW is supported only in SAP GUI. In migration cockpit data is created using SAP standard API's, Restfull Application programming and business objects. In LSMW we use BAPI, IDOC.
SAP S/4 HANA provides predefined objects. It Reduce ef- fort and save time. Structure mapping to SAP S/4 HANA data model is simple. 80% less custom developments compared to other techniques. It is simple to create migration object in the transaction LTMOM. Migration cockpit provides simulation procedure using we can reduce errors by 50%.



Process Step	Last Action (Date, Time, User)
Define Object Attributes	23.05.2024, 11:08:56 h, AGUNARI
Define Source Structures	23.05.2024, 11:09:35 h, AGUNARI
Define Source Fields	23.05.2024, 11:10:14 h, AGUNARI
Define Structure Relations	23.05.2024, 11:10:41 h, AGUNARI
Define Field Mapping and Conversion Rules	23.05.2024, 11:10:48 h, AGUNARI
Define Fixed Values, Translations, User-Defined Routines	
Specify Files	23.05.2024, 11:10:53 h, AGUNARI
Assign Files	23.05.2024, 11:10:58 h, AGUNARI
Read Data	23.05.2024, 11:11:17 h, AGUNARI
Display Read Data	23.05.2024, 11:11:25 h, AGUNARI
Convert Data	23.05.2024, 11:11:32 h, AGUNARI
Display Converted Data	23.05.2024, 11:11:37 h, AGUNARI
Start IDoc Creation	23.05.2024, 11:11:45 h, AGUNARI
Start IDoc Processing	23.05.2024, 11:11:48 h, AGUNARI
Create IDoc Overview	23.05.2024, 11:11:51 h, AGUNARI
Start IDoc Follow-Up	02.04.2024, 16:29:36 h, AGUNARI

Fig. 1. Steps involved in LSMW method

Figure 1 shows the user interface of the LSMW method. It contains 16 steps. IDOC data interface is used for transferring the data from the legacy system to the SAP system.

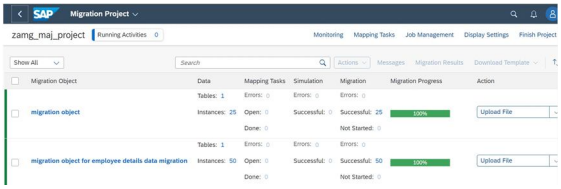


Fig. 2. Migration objects

Figure 2 shows the migration objects created. The main steps in migration cockpit approach are to create migration object, downloading the template and filling the data, finally uploading the file and transferring the data to the staging tables.

B. Creating A Fiori Application

Part request form is a fiori application created using module pool programming. First step is to create a module pool programming screen and the transaction code is created for that screen. The same transaction code need to be used while creating fiori tile. The follwing are the steps to create a fiori tile.

1) After creating module pool programming screen and transaction code next step is to create a transport request. After creating transport request catalog group needs to be created in the fiori launchpad.

2) Target mapping has to be done after creating a catalog group. The tile has to be assigned to the catalog group created. Semantic object needs to be created in this step.

3) Tile is created using the tile create button. The transaction code needs to be mentioned in the tcode input.The semantic object name has to be same as that of one we created in the previous step.

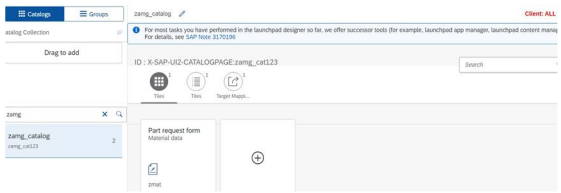


Fig. 3. Creation of tile

Figure 3 shows the user interface for creating catalog group, target mapping and tile.

4) Final step is to assign the tile to the catalog group. The tile we created will comes under the same catalog group in the fiori launchpad.

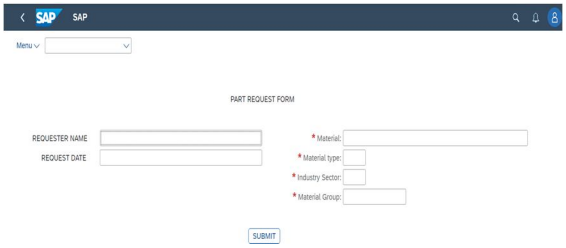


Fig. 4. Part request form application

Figure 4 shows the part request form application created. This application can mainly be used in the material manage- ment. Since the inputs are corresponding to the material data. The person who is requesting the material has to enter the material name, material type, industrial sector and material group.After clicking on submit button the data will be trans- ferred to the database table. The code for this is written in the module pool programming.

C. Data migration using migration cockpit

Once the data is transferred to the database in the warehouse environment, the data is extracted to an excel file and send it the IT firm. IT firm will maintain the data of the company in a centralized database. S/4 HANA migration cockpit method is used for transferring the data from the excel file to the centralized database. Previouslt LTMC transaction code was used for creating migration object. But later SAP removed the create option in the LTMC transaction code and migrate your data application can be used for creating the migration objects.

The following steps has to be followed for transferring data using migration cockpit.

1) Migration project is created using migrate your data app in the fiori launchpad. Then migration object is created using the transaction code LTMOM.

2) Migration object involves creation of source structure and target structure. And source structure mapped to the target structure and fields are also required to be mapped.

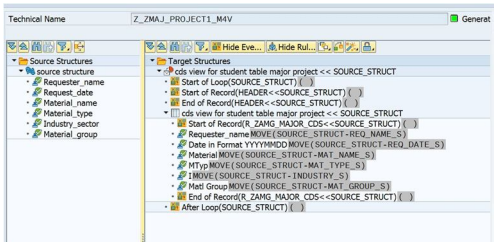


Fig. 5. Field mapping in migration object

3) Figure 5 shows the field mapping in migration object. After creating migration object it has to be generated.

4) The template is downloaded from the migrate your data app. The template will be an excel file which contains the fields that are in source structure. The template need to be populated with the data.



Fig. 6. Migration cockpit steps

5) The excel template after filling the data needs to be uploaded back and validate the data. If there are any validation errors the data needs to changed. Figure 6 shows the steps involved in the migration cockpit process.

6) If there are no validation errors the data needs to be passed to staging tables. The simulation is started. If there are no errors in the simulation the migration can be started.

After migration step the data will be stored in the database table. If there are any errors after the simulation, the errors can be traced using monitoring option in the application. If there is any data type mismatch between source structure and data in the excel file the data can not be migrated. Then the data in the file needs to be changed and uploaded again.

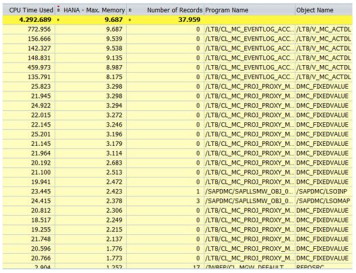
Migration cockpit process involves less creation of custom code and objects. SAP provides predefined migration objects which can be used for most of the business applications. It reduces human effort and helps to automate the process.

VI. RESULTS AND CONCLUSION

A. Comparison of LSMW and migration cockpit

The migration cockpit provides predefined functionalities that streamline the migra- tion process, requiring 80% less custom development compared to the LSMW. Addition- ally, the material part request form, used in data warehouses, automates processes and reduces human effort, further enhanc- ing efficiency. The migration cockpit offers a more efficient, reliable and automated solution for data migration compared to LSMW.

International Journal for Research in Applied Science & Engineering Technology (IJRASET)
ISSN: 2321-9653; IC Value: 45.98; SJ Impact Factor: 7.538
Volume 12 Issue VI June 2024- Available at www.ijraset.com



CPU Time Used	HANA - Max. Memory	Number of Records	Program Name	Object Name
4.292.689	9.687	37.959		
772.956	9.687	0	/LTB/CL_MC_EVENTLOG_ACC...	/LTB/V_MC_ACTDL
156.666	9.539	0	/LTB/CL_MC_EVENTLOG_ACC...	/LTB/V_MC_ACTDL
142.327	9.538	0	/LTB/CL_MC_EVENTLOG_ACC...	/LTB/V_MC_ACTDL
148.831	9.135	0	/LTB/CL_MC_EVENTLOG_ACC...	/LTB/V_MC_ACTDL
459.973	8.987	0	/LTB/CL_MC_EVENTLOG_ACC...	/LTB/V_MC_ACTDL
135.791	8.175	0	/LTB/CL_MC_EVENTLOG_ACC...	/LTB/V_MC_ACTDL
25.823	3.298	0	/LTB/CL_MC_PROJ_PROXY_M...	DMC_FDXEDVALUE
21.945	3.298	0	/LTB/CL_MC_PROJ_PROXY_M...	DMC_FDXEDVALUE
24.922	3.294	0	/LTB/CL_MC_PROJ_PROXY_M...	DMC_FDXEDVALUE
22.015	3.272	0	/LTB/CL_MC_PROJ_PROXY_M...	DMC_FDXEDVALUE
22.145	3.246	0	/LTB/CL_MC_PROJ_PROXY_M...	DMC_FDXEDVALUE
25.201	3.196	0	/LTB/CL_MC_PROJ_PROXY_M...	DMC_FDXEDVALUE
21.145	3.179	0	/LTB/CL_MC_PROJ_PROXY_M...	DMC_FDXEDVALUE
21.964	3.114	0	/LTB/CL_MC_PROJ_PROXY_M...	DMC_FDXEDVALUE
20.192	2.683	0	/LTB/CL_MC_PROJ_PROXY_M...	DMC_FDXEDVALUE
21.100	2.513	0	/LTB/CL_MC_PROJ_PROXY_M...	DMC_FDXEDVALUE
19.941	2.472	0	/LTB/CL_MC_PROJ_PROXY_M...	DMC_FDXEDVALUE
23.445	2.423	1	/SAPDMC/SAPLLSMW_OBJ_0...	/SAPDMC/LSOINP
24.415	2.378	3	/SAPDMC/SAPLLSMW_OBJ_0...	/SAPDMC/LSOMAP
20.812	2.306	0	/LTB/CL_MC_PROJ_PROXY_M...	DMC_FDXEDVALUE
18.517	2.249	0	/LTB/CL_MC_PROJ_PROXY_M...	DMC_FDXEDVALUE
19.255	2.215	0	/LTB/CL_MC_PROJ_PROXY_M...	DMC_FDXEDVALUE
21.748	2.137	0	/LTB/CL_MC_PROJ_PROXY_M...	DMC_FDXEDVALUE
20.596	1.776	0	/LTB/CL_MC_PROJ_PROXY_M...	DMC_FDXEDVALUE
20.766	1.773	0	/LTB/CL_MC_PROJ_PROXY_M...	DMC_FDXEDVALUE

Fig. 7. Timing analysis of data migration using LSMW technique

25 records are passed from the excel file to the database ob- ject. Figure 7 shows the timing analysis of the data migration using LSMW. The total time taken for processing 25 records and for the migration is 4.293 seconds.

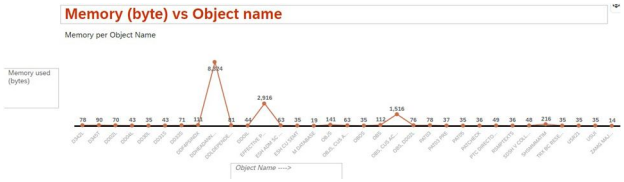


Fig. 9. Memory used vs Object name

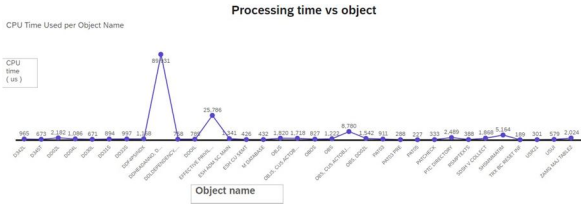
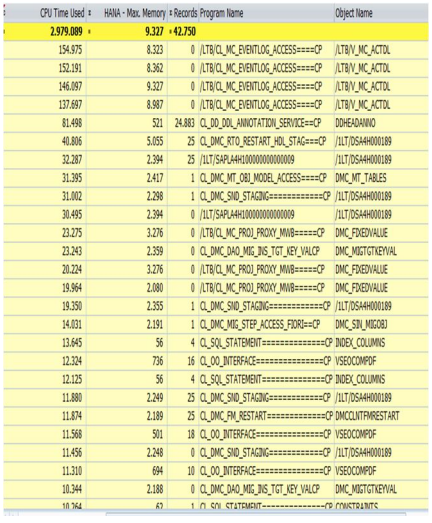


Fig. 10. Processing time vs Object name

Figure 10 shows the graph plot between processing time versus Object name. The graph shows that the total time taken for processing the data is 0.11 seconds. The processing time starts when the worker clicks on the submit button after entering all the inputs in the application.

Results shows that migration cockpit has more advantages compared to LSMW. Migration cockpit process reduces the engineers work by providing predefined objects for creating migration objects. And the part request application reduces the human effort and helps to automate the business processes in the data warehouses.



CPU Time Used	HANA - Max. Memory	Records	Program Name	Object Name
2.979.089	9.327	42.750		
154.975	8.323	0	/LTB/CL_MC_EVENTLOG_ACCESS====CP	/LTB/V_MC_ACTDL
152.191	8.362	0	/LTB/CL_MC_EVENTLOG_ACCESS====CP	/LTB/V_MC_ACTDL
146.097	9.327	0	/LTB/CL_MC_EVENTLOG_ACCESS====CP	/LTB/V_MC_ACTDL
137.697	8.987	0	/LTB/CL_MC_EVENTLOG_ACCESS====CP	/LTB/V_MC_ACTDL
81.498	521	24.883	CL_DD_DDL_ANNOTATION_SERVICE==CP	DDHEADANNO
40.806	5.055	25	CL_DMC_RTO_RESTART_HDL_STAG===CP	/1LT/DS4HI000189
32.287	2.394	25	/1LT/SAPL4HI100000000000009	/1LT/DS4HI000189
31.395	2.417	1	CL_DMC_MT_OBJ_MODEL_ACCESS====CP	DMC_MT_TABLES
31.002	2.298	1	CL_DMC_SND_STAGING============CP	/1LT/DS4HI000189
30.495	2.394	0	/1LT/SAPL4HI100000000000009	/1LT/DS4HI000189
23.275	3.276	0	/LTB/CL_MC_PROJ_PROXY_MWB=====CP	DMC_FDXEDVALUE
23.243	2.359	0	CL_DMC_DAO_MIG_INS_TGT_KEY_VALCP	DMC_MIGTGTKEYVAL
20.224	3.276	0	/LTB/CL_MC_PROJ_PROXY_MWB=====CP	DMC_FDXEDVALUE
19.964	2.080	0	/LTB/CL_MC_PROJ_PROXY_MWB=====CP	DMC_FDXEDVALUE
19.350	2.355	1	CL_DMC_SND_STAGING============CP	/1LT/DS4HI000189
14.031	2.191	1	CL_DMC_MIG_STEP_ACCESS_FIORI==CP	DMC_SBL_MIGOBJ
13.645	56	4	CL_SQL_STATEMENT==============CP	INDEX_COLUMNS
12.324	736	16	CL_OO_INTERFACE===============CP	VSEOCOMPDF
12.125	56	4	CL_SQL_STATEMENT==============CP	INDEX_COLUMNS
11.880	2.249	25	CL_DMC_SND_STAGING============CP	/1LT/DS4HI000189
11.874	2.189	25	CL_DMC_FM_RESTART=============CP	DMCCLNTFMRESTART
11.568	501	18	CL_OO_INTERFACE===============CP	VSEOCOMPDF
11.456	2.248	0	CL_DMC_SND_STAGING============CP	/1LT/DS4HI000189
11.310	694	10	CL_OO_INTERFACE===============CP	VSEOCOMPDF
10.344	2.188	0	CL_DMC_DAO_MIG_INS_TGT_KEY_VALCP	DMC_MIGTGTKEYVAL

Fig. 8. Timing analysis of data migration using migration cockpit

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Figure 8 shows the timing analysis of the data migration using migration cockpit approach. The processing time taken in this process is 2.979 seconds, which is less compared to LSMW technique. With this result, migration cockpit is 48% faster and 1.48 times effective than LSMW technique. Figure
5.1 and 5.2 shows that the memory consumed by the migration cockpit process is 9.32 MB is less than the memory consumed by LSMW approach which is 9.68 MB.

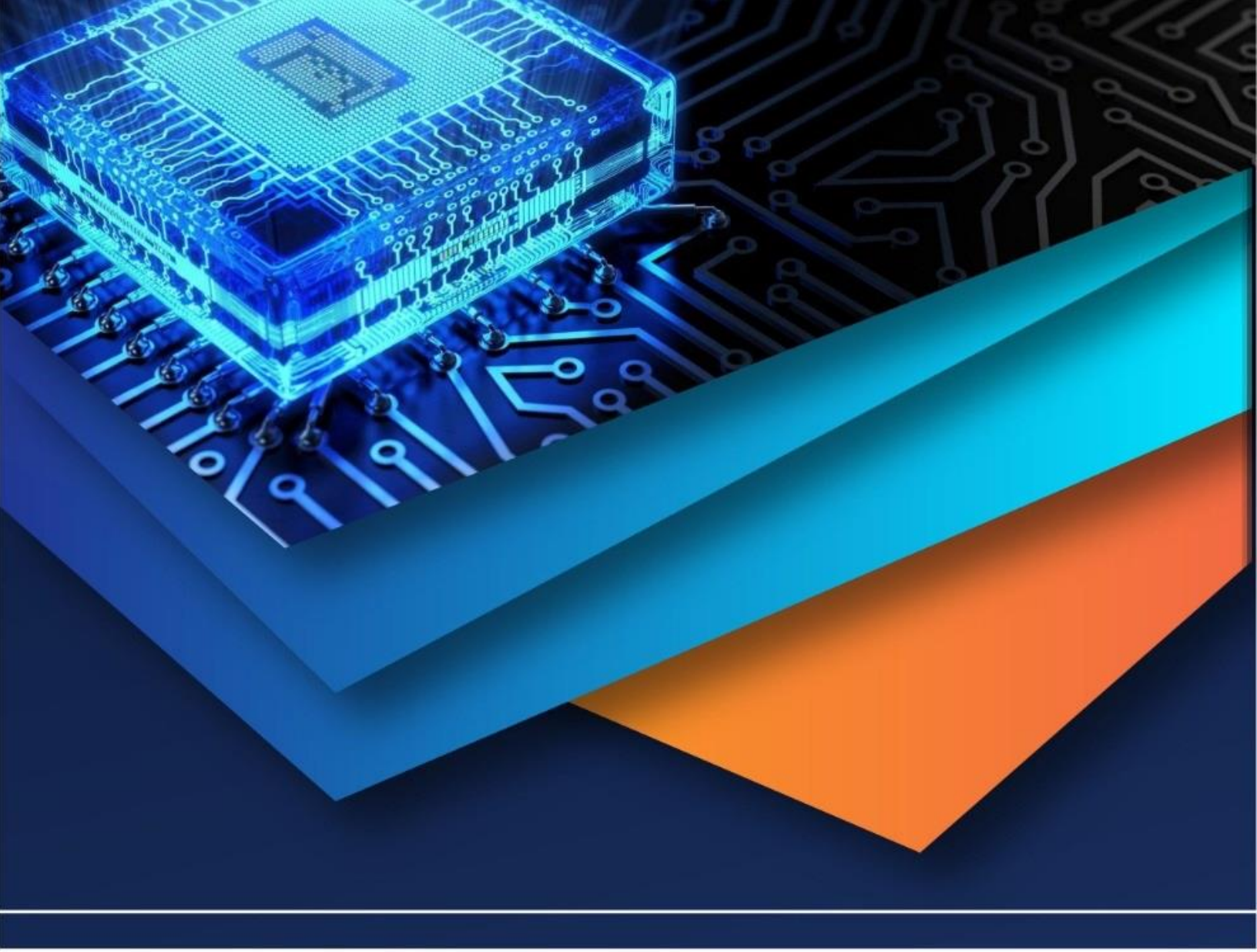
B. Performance analysis of Part request form

The part request form application is created using in fiori launchpad. The performance of the part request form is ana- lyzed using the ST05 transaction code and the data is obtained. The graphs plotted using SAP analytics cloud. SAP analytics cloud is a tools for visualizing the data.

Figure 9 is the plot of memory used versus object name. When the worker in the warehouse enter the data in the appli- cation and clicks on the submit button the processing will start. The total memory consumed is around 13 kilo bytes. When the application starts executing SAP automatically creates objects for the internal operations.

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