AS400 system modernization – Wipro's point of view

Abstract

Today, many enterprises are looking to modernize their IT landscape – including their AS400 systems (that run mission-critical legacy applications that are difficult to maintain and expensive to operate) – to gain higher scalability, agility and cost benefit.

This white paper analyzes the challenges of modernizing AS400 systems along with various modernization approaches and useful architecture patterns that maximize the benefit of AS400 modernization. This will be useful to an IT decision-maker in any organization looking to modernize their existing AS400 system.

Introduction

IBM AS400 (also known as 'IBMi' or 'IBM iSeries') is an application server with proven robustness, scalability, reliability, security and low cost of ownership compared to MIPS in IBM Mainframe (also known as 'IBM z'). The advent of newer technologies forces an increased need to modernize AS400 systems to harness greater value.

Every company that uses AS400 systems wants to leverage and reap the benefit of the large volume of valuable information stored in it. However, limitations such as the monolithic nature of the code base, 5250-based 'Green Screens', tightly coupled Business Logic along with high cost of Server/OS upgrades, create greater challenges to the modernization of AS400 systems.

In the case of the AS400 system, unlike IBM Mainframe systems, IBM does not charge customers based on the number of transactions (MIPS – Million Instructions per Second), but it's a sunk cost instead. In other words, the AS400 system is not an expensive server to maintain and hence the modernization should deliver benefits beyond reducing cost. AS400 systems need a customized approach that reduce Total Cost of Ownership (TCO), unlock insights from hidden data and increase system agility while delivering consistent business value.

Given the large AS400 footprint on the IT landscape and the variety of technologies, databases and supporting software involved, a one-size-fits-all solution for AS400 modernization is unlikely to succeed.

Modernization challenges

AS400 system modernization is complex and requires different approaches depending on the requirements, work load and risk profiles.

Common causes for delay in AS400 Modernization Projects are:

- Limited view of the existing AS400 application landscape

- Lack of clear business plan to address the future business needs

- Understate/Unaware of the potential risks involved

- Lack of proper funding for long-term modernization projects

- Various type of Modernization patterns such as: Re-Hosting, Re-Engineering, Re-Architecting and Re-New are available to consider

In order for an organization to execute their AS400 system modernization successfully, they must have a clear strategy along with a dedicated plan, modernization methodology and future-proof architecture.

Re-Host, Re-Engineer, Re-Architect and Re-New your AS400 applications on cloud for higher application scalability, agility and performance

#	Modernization challenge	Recommendation
1	Lack of AS400 application knowledge	Tool-based knowledge engineering approach for knowledge discovery and to minimize dependencies on SMEs
2	Lack of clear modernization Plan	Develop a set of business and technology patterns that create a roadmap for delivering continuous business value
3	Mitigation of data migration risk	Usage of data migration tools and proven testing frameworks that minimizes migration risk
4	Slippage of Modernization Schedule	Proposes a people, process and technology-based approach, where fewer SMEs leverage the modernization tools and thereby accelerate the journey to the target state
5	Lack of budget for modernization journey	Help customers develop business cases by providing multiple options with a phased approach to plan for budget
6	Fear of change management	To promote customer comfort during the transformation, a short assessment of the AS400 system is done during the planning stage to understand the change management requirements

Modernization approaches

1. **Re-Hosting:** Re-host low touch AS400 portfolio 'as is' on the cloud – to reduce cost & increase scale.

    Re-hosting does not require any change to the existing interfaces or functionality and can run the existing AS400 applications on an x86-64 cloud-based instance using an AS400 emulator such as Infinite i – a suite of compilers, utilities and operating system services that allow applications programs (developed under RPG or COBOL for the AS/400 environment and database) to be migrated at the source code level, recompiled and executed on AWS including the complete replication of database DB2/400. Application components that use third-party tools such as Message Queues, Schedulers, Printing, Reporting, Backup and Tape Management are also migrated to the cloud environment. This allows the applications to execute as they did on their original platform without having to rewrite large portions of the code. Wipro works with multiple re-hosting and enterprise software partners to deploy and manage their software on the cloud environment.

2. **Re-Engineer:** Migrate Batch Jobs to the cloud – to reduce complex code, make batch 'near real time' or 'event driven' and leverage open-source tools.

    Batch Jobs such as ETL data processing, EDI file processing and Ad-hoc report generation form a significant portion of AS400 applications that are business critical, however, mostly have low business value, resulting in lower agility and high cost and becomes a good candidate for migration to the following two distributed solutions on the cloud:

1) File based processing:

Physical Files once created in the system are sent to cloud storage for long-term persistence and quick access for additional processing and analytics. Various Big Data components such as Hadoop, Spark, and Hive etc., are leveraged to perform analytics on the stored data. Analytics output created can be in the form of reports or normalized data to be stored in cloud-based NoSQL database.

2) Near real-time processing:

From AS400 system, real-time data streams such as MQ, web services, logs etc., are sent to the cloud data stream platform, processed and analyzed using Apache Spark Steaming and loaded into cloud-based NoSQL database for future reporting and analytics. Moreover, data is directly loaded into the data warehouse for future historical reporting with dashboard visualization tools.

3. **Re-Architect:** Re-Architect AS400 applications and process as cloud native workload and enable it for future-proof architecture.

If the current AS400 application is no longer able to meet future-state business requirements (or) an agile, target architecture (or) does not qualify for a re-hosting solution, then the Re-Architecture approach is considered for similar or enhanced functionality and performance.

Re-Architected AS400 Application
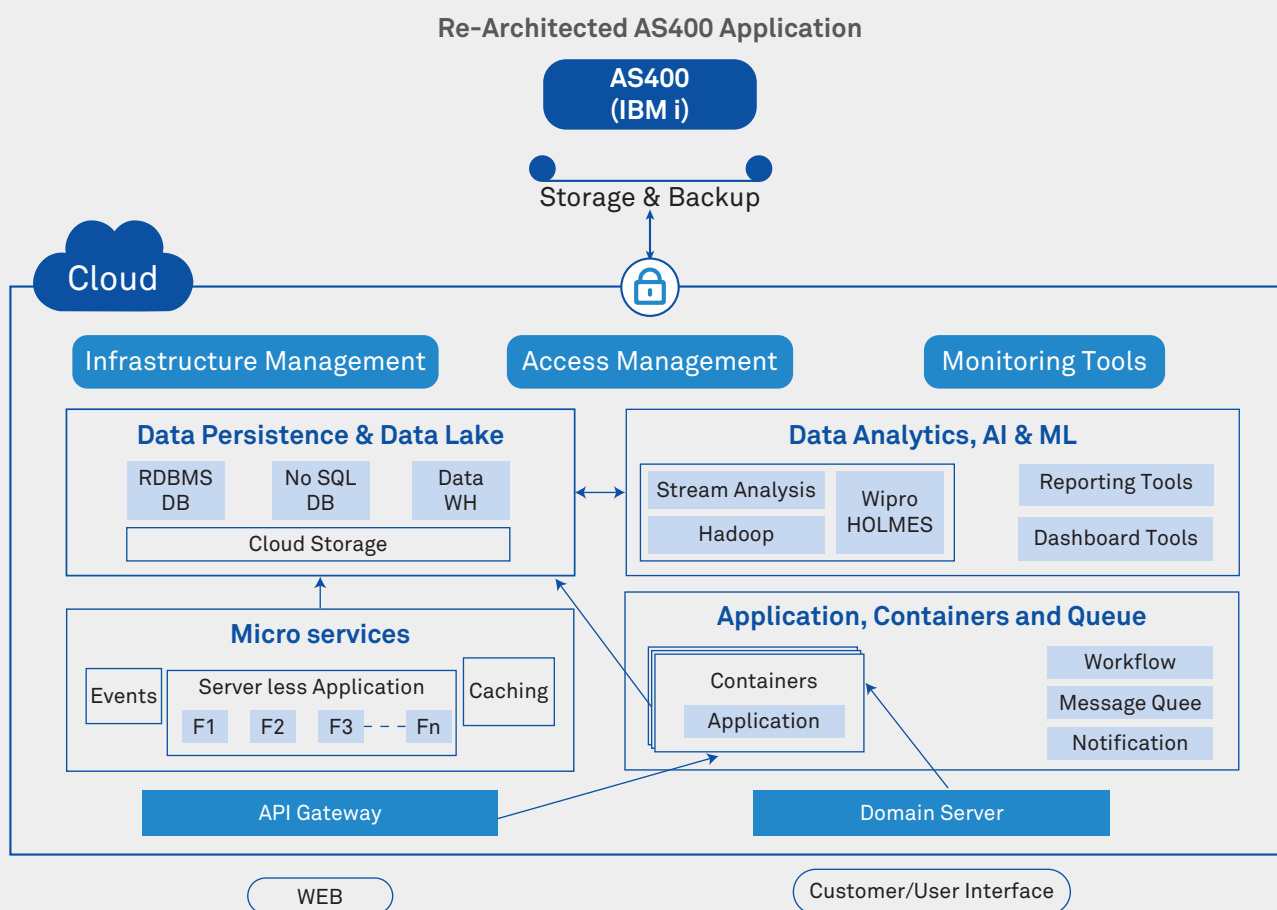
The above picture depicts Re-Architecting approach to cloud-native applications that involves four key elements:

1) Microservices:

Applications can run code without provisioning or managing the server while paying for the computing time only. This can be achieved by using a cloud-based API Gateway and server-less applications like AWS Lambda/Azure Functions. These discrete functions form the core of the

Re-Architected application and allow wrappers to connect to the on-premises AS400 when needed. An application built using the server-less architecture follows an event-driven approach. An in-memory cashing layer ensures faster response time for both read and write access to data, thereby solving data challenges that emerge within the microservices architecture.

2) Application, containers & queues:

Docker containers (the cloud container service) and message queues enable the workflows and other application-related services to decouple complex business functionalities and then can be deployed and managed at scale using open source and cloud native services.

3) Data persistence & data lake:

Persisting data in the cloud to services such as managed relational databased, NoSQL database, data warehouses and cloud storages enable customers to effectively store and analyze data in ways that were previously not possible.

4) Data analytics, artificial intelligence & machine language:

Once data is persisted in the cloud, customers can leverage cloud-based Hadoop and **Wipro HOLMES** to get different insights from data. Wipro HOLMES is a machine learning and artificial intelligence powered platform that offers cognitive services that accelerate business processes through automation.

4. Re-New: Upgrade the existing version of the Programing Language, Database, and User Interface & adopt DevOps.

1) Upgrade RPG: Upgrade old RPG into new, free form, optimized and modular RPG ILE. Modular and Decoupled applications are easier to maintain and accelerate modernization initiative.

2) Upgrade DB2: By converting Data Definition Syntax to Data Definition Language, a significant and measureable performance boost can be given to programs using buffered read. While a Physical File processes 8,000 page sizes, SQL tables process 64,000 page sizes, giving programs 8 times more data to access with faster memory. This process creates the database and copies the data into the modernized database without the need to recompile existing programs and this can be achieved using tools such as Fresche Legacy X-Analysis.

3) UI Modernization: Two approaches that can be considered are: (1) Vanilla Conversion – Plain vanilla conversion of 5250 screen to enable a web interface without changes to DSPF & RPG and (2) Modern UI – Convert green screens DDS files to High Rich Display files with web interface and improvisation on User Interface. Wipro has a strategic partnership with ARCAD for AS400 UI Modernization.

4) DevOps on IBMi: DevOps improves collaboration between development and operations teams and streamlines the application delivery process. By collaborating with IBM & ARCAD, we offer a complete set of tools for DevOps.

Conclusion

Our solution approaches for enterprises looking for a seamless AS400 modernization journey enable them to Re-Host, Re-Engineer and Re-Architect their AS400 applications on cloud for higher application scalability, agility and performance. Re-New approach helps enterprises modernize their existing applications through UI Modernization, DB2 upgrade, RPG upgrade, API-fication, and DevOps. These approaches also help enterprises enhance their business agility, reduce manual dependencies, improve performance, lower cost and enable their IT to drive business growth.

About the author

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He brings in 25 years of IT experience with core strength in analytical skills, extensive business knowledge of enterprise wide applications and experience in designing applications. He has led successful IT Delivery organizations serving global leaders in Banking & Retail industries.

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