Research Report

Juffali: The Mainframe vs. Distributed Decision

Executive Summary

When making a decision regarding which platform to use to process a given workload, all too often Information Technology (IT) executives default to x86-based servers. Their logic is that x86 servers are commodities and cost less than scale-up servers such as mainframes. In addition, they claim that skilled administrators are easier to find.

> *The right approach to server selection should be to closely evaluate the characteristics of a given <u>workload</u> – and the related <u>service level requirements</u> – and then make a decision based upon which type of system can execute a workload most efficiently while meeting enterprise Quality-of-Service requirements.*

Ebrahim A. Juffali and Brothers (Juffali), Saudi Arabia's largest commercial enterprise, recently evaluated its portfolio of enterprise resource planning (ERP) applications and found their custom programs lacking in functionality and reporting facilities. After exploring several ERP options, advocates for change lobbied executive management for a move to SAP's integrated ERP environment – an environment that contains resource planning software that can serve multiple industries. Given Juffali's multiple business interests in industries such as automotive, technology, chemical, construction, AC and refrigeration and Services – SAP was an ideal choice.

Next came platform selection. Key in the selection process were cost; service level requirements for high performance, large scale transaction processing, security, manageability – and last, but not least, high system availability. Proponents of x86 architecture argued that distributed x86 servers could handle Juffali's performance, reliability and security requirements – and at a lesser cost than a scale-up, centralized mainframe environment. Proponents of mainframes argued that mainframe architecture was cost competitive; mainframes would cost far less to manage; and mainframes were better suited to meet the company's service level requirements – especially the company's security and manageability requirements.

Each organization articulated its point-of-view – and an IBM EC12 mainframe was chosen to host the company's new SAP deployment. The mainframe was chosen because it offers:

1. The industry's strongest security environment with an *EAL level 5+* ranking (some x86 servers have only recently attained EAL 4+ certification – significantly lagging the mainframe in security). Additionally, mainframe Crypto Express 6S security cards have been engineered to meet *FIPS 140-2* cryptographic compliance requirements;

2. High performance thanks to a system design that off-loads communications and security processing to specialized processors; that offers very large memory; and that offers a processor designed to process variable workloads more efficiently than x86 architecture (see this [report](#) for a more technical comparison of x86 versus mainframe processors);

3. Unmatched system availability, reliability with greater management efficiency; and,

4. Extreme flexibility in resource allocation, and infrastructure scalability.

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In this *Research Report*, *Clabby Analytics* examines Juffali's application and system selection criteria – and the results achieved by choosing a mainframe to process the new workload. And we affirm Juffali's choice – the selection of a mainframe to process Juffali's new SAP workloads was the ideal choice when it came to addressing the company's performance, availability, security and system management requirements.

Juffali: Saudi Arabia's Largest Commercial Enterprise

Ebrahim A. Juffali and Brothers is Saudi Arabia's largest commercial enterprise, employing almost 50,000 people worldwide. This conglomerate serves six business sectors:

1. *Automotive* – where provides parts (including the Michelin and Bosch part brands, tractor assembly, vehicle assembly and distribution and vehicle superstructure fabrication;
2. *AC and Refrigeration* – including HVAC installation, distribution and support, the manufacture of refrigerators and appliance distribution;
3. *Technology* – where it sells and supports information technologies, power, telecommunications and medical equipment, telecommunications and printing;
4. *Construction* – providing light industrial product distribution, engineering project consulting, steel structure manufacturing and mobile crane and cement mixer equipment;
5. *Chemical* – where it manufactures and distributes extruded Polystyrene products, latex products, provides thermoforming and acrylic-based solid surface products; and,
6. *Services* – offering insurance services.

Juffali's Information Systems Centre

Juffali built its first data processing center in Riyadh in 1971; and subsequently moved it to Jeddah in 1978. Prior to the 1970s, Juffali's online system was based on IBM's CICS transaction processing environment running on IBM's mainframe S/360 architecture.

In service now for over 45 years, Juffali's Information System Centre provides the following services:

- Centralized mainframe ERP;
- EDI services for itself and its suppliers;
- Physical and virtual server hosting and administrative services;
- Office productivity applications;
- Virtual Desktop deployment and management services;
- Data network connectivity and support services;
- Internet and e-mail hosting and services;
- Security services; and,
- HelpDesk support.

The Juffali Enterprise Transformation

Juffali needed to improve its custom enterprise resource planning environment: it needed to improve business process flow; it wanted better reporting facilities; it needed an environment that would allow greater innovation; it wanted an environment that would improve workforce effectiveness – and one that would simplify and improve auditing.

Four Basic Challenges

Juffali Information Service Centre executives faced four basic challenges as they considered their ERP migration. They wanted:

1. Seamless integration between their businesses and their technologies across the enterprise;
2. An environment that would allow the company to make greater use of analytics;
3. An environment that would allow the information technology organization to respond more quickly to business needs; and,
4. An environment that would ensure that they would have a new support staff in place to replace older workers who would ultimately retire.

The Application Selection Process
Over the past several years Juffali has seen strong and solid growth across the board in its many business ventures. The company's existing legacy ERP system consisted of an IBM z9 BC (a small mainframe) that ran a wide range of custom ERP programs written in PL/1, COBOL and other program environments.

The way the executive management team saw it, they had three options. They could:

1. Try to modernize their existing applications;
2. They could develop a new ERP environment by doing a code re-write; or,
3. They could buy a package solution that could address their four basic challenges (previous paragraph).

Application modernization was not considered tenable because it did not address requirements for better reporting and analytics facilities, nor did it address requirements for improved business process flow. A code re-write was turned down because of the complexity – and because it would present ongoing skills issues as well as code maintenance challenges. According, Juffali chose to buy a packaged solutions – and after examining several options, the company chose SAP.

The Platform Selection Process
Juffali's platform selection process was driven by three elements:

1. Service level requirements;
2. Technical criteria; and,
3. Previous experience with both mainframe and x86 architecture.

The primary service level requirements involved in Juffali's platform selection were security, availability, performance and system manageability.

In the Middle East security has become a top priority for businesses and governments over the past several years. Accordingly, the security characteristics of a given platform have taken on new meaning as of late. In the commodity x86 world, security can be "assembled" using third party cryptographic cards, by exploiting some on-chip security and by relying on the security features of a given operating environment (Windows, Linux, etc.) In the mainframe world, security is "engineered into" the mainframe system design, starting with crypto engines on the processor and extending out to CryptoExpress cards designed specifically to offload security processing overhead from the processor – enabling the processor to perform more work. These crypto cards are capable of offloading 19,000 SSL transactions per second, thus making more processing power available for applications and data processing.

As for security rankings, the IBM mainframe's superior EAL ranking enables applications running in one partition to run independently from those in another – meaning that one application running in one partition cannot access another application and its data in another partition. This, combined with support for Elliptic Curve Cryptography (ECC) and other features/functions geared to address a wide variety of regulatory requirements, helped edge the security selection criteria in favor of mainframe architecture.

IBM's security services also played a role in the platform selection criteria. IBM has become a major force in security over the past several years – and offers numerous security services that fall into seven categories:

1. Data and application security services;
2. Offensive security testing;
3. Incident response and intelligence services;
4. Identity and access management;
5. Infrastructure and endpoint security;
6. Security strategy, risk and compliance; and,
7. Security intelligence and optimization.

Juffali uses several IBM security products including IBM Connection Authorized User (controls use rights); IBM MaaS360 (mobile management and security); and the company takes advantage of IBM's security by design, exploiting many security features available on the mainframe.

As for system availability, availability was a key factor in the choice of mainframe architecture. Juffali believes that mainframes, with their industry leading meantime between failure (measured in decades) offered the best choice when it came to systems reliability and availability.

From a performance perspective, the mainframe under consideration, the EC12, offered 25 percent more performance per core than their existing system – meaning that applications could run a lot faster. And with Juffali's need to accommodate current and future growth, the new mainframe performance characteristics were very attractive.

As for manageability, Juffali operates both mainframe and distributed environments, and with the knowledge gained from operating both environments, the company was able to "size" the number of resources it would take to manage each environment. Taking into consideration the task of managing multiple distributed servers, corresponding application and database environments and a large number of peripherals (NICs, routers, etc.) – Juffali forecast that a distributed computing environment would require four-times as many administrators as a mainframe environment.

> *Juffali's experience with mainframes was hugely influential in the company's EC12 decision. The company knew what it takes to secure an x86 environment as compared with a mainframe – and chose the mainframe because of the level of security integration and its superior security ranking. The company needed more performance to keep up with growth – and the new EC12 could provide that performance by virtue of a faster processor, a large communications subsystem – and substantial off-load facilities for security processing. As for manageability, the company now manages its mainframe environment with three administrators – as compared with a projected twelve to manage a distributed environment. All three of the company's primary service level requirements were better addressed using a mainframe solution as compared with an x86 distributed solution.*

The Transformation Process

According to the company's general manager, Juffali Information Systems Center and CoE, Mr. Oussama Zein, the reason that SAP was chosen was it "improves the performance of our core business and business support process – inside and outside our organization. SAP supports end-to-end business process flow for all of our companies that deal with heterogeneous types of businesses.

The migration process involved moving the existing instance of the Customer Information Control System (CICS) environment (a transaction server environment) to a new instance on a new mainframe. It also involved creating a disaster recovery instance that would ensure business continuity – as well as make it easier to introduce new patches, protect data and maintain current functions. This project became known as the "infrastructure modernization project", and its deliverables were to complete DC civil work, provision the new mainframe, migrate CICS, create a new DB2 database partition, and virtualize the hardware.

In parallel to modernizing the system architecture, Juffali also concentrated on a major business transformation effort that included headquarters financial consolidation; implementation of and training on SAP materials management, financial accounting , human capital management, supply chain and other modules at the business unit level; implementation of and training on vertical industry software (automotive, trading, manufacturing); and implementation and training on a new customer resource management environment. Data conversion and migration also needed to take place during while implementing the new software environments.

The first year of system migration focused on building a new system environment, migrating data to that environment and implementing SAP development modules. With the basic system in place, Juffali was able to focus on headquarters financial consolidation as well as the deployment of SAP vertical modules to serve the company's automotive segment. In year two, the company has focused on deploying SAP trading modules. And next year the company will shift its efforts to support manufacturing organizations (see Chart 1).

Chart 1 – Juffali's Transformation Roadmap
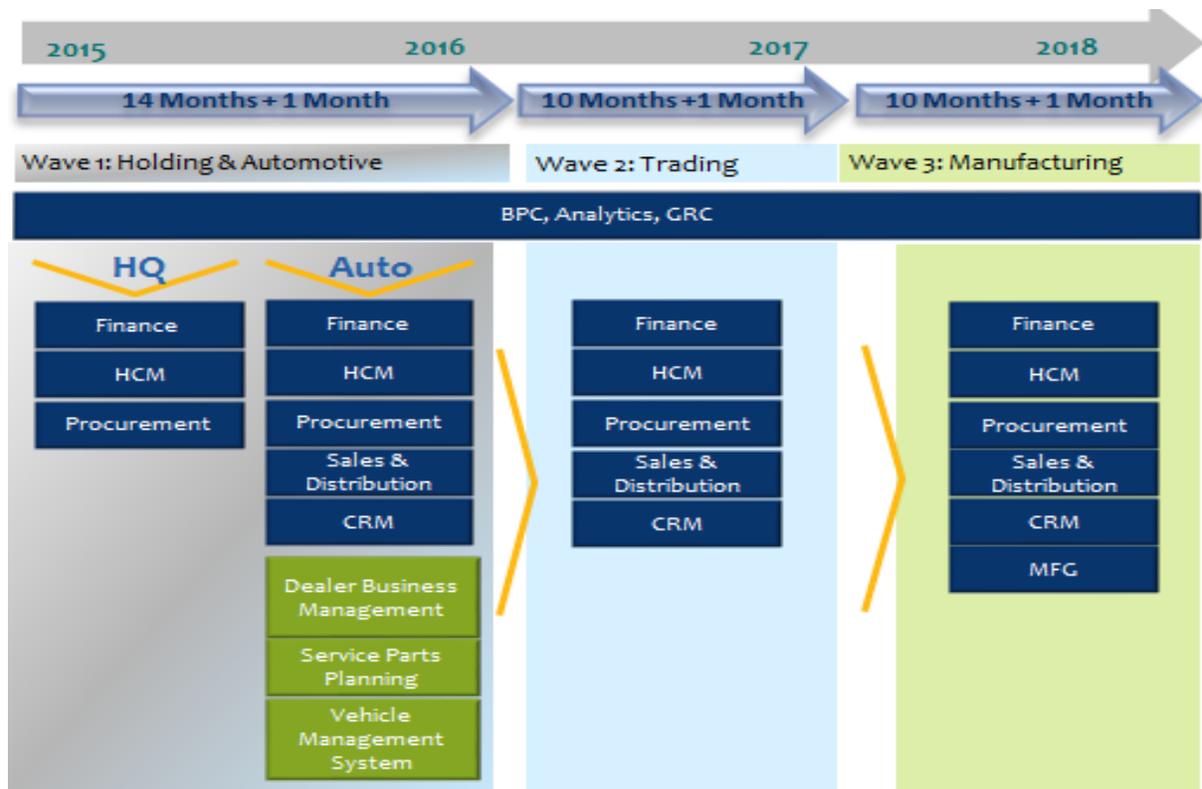
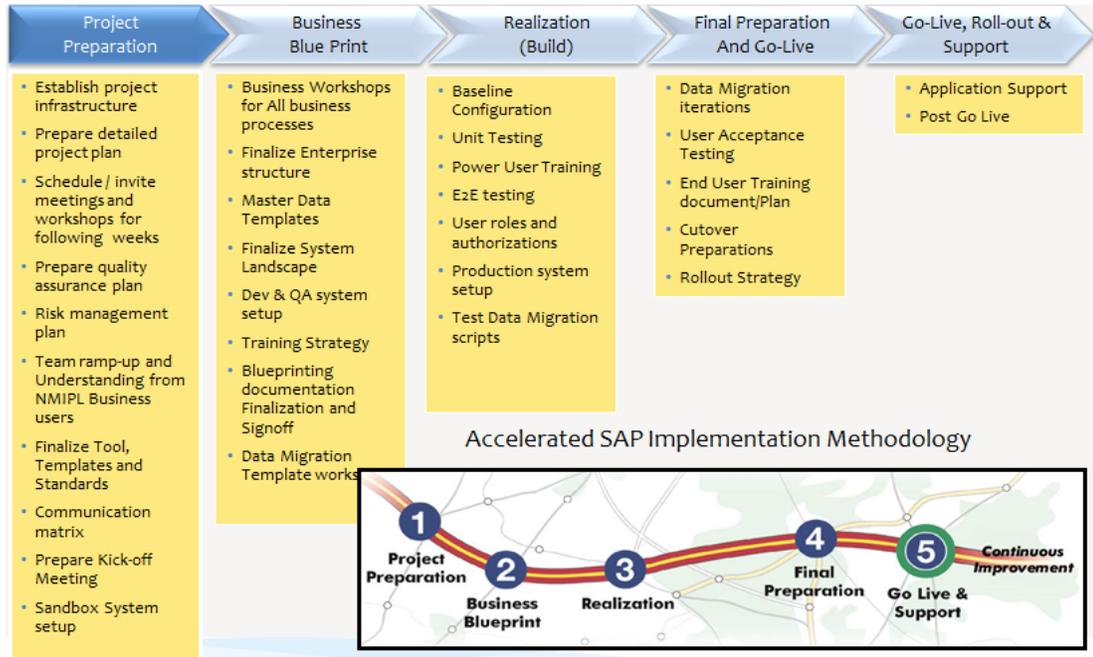_Source: Juffali Enterprise Transformation Program Team – September, 2017_

A Closer Look at the Transformation Process

The complete revamp of an information system largely running custom code, combined with the rebuilding of the company's business process flow was detailed, time consuming work – work that is now providing the company with the ability to better manage its financials, to create new efficiencies in process flow – and to innovate.

Getting to this point involved significant project preparation; the creation of a business blueprint for all processes; an implementation phase (realization); final preparation and go-live; and go-live implementation, roll-out training and support. (See Chart 2).

Chart 2 – Juffali's Implementation Methodology Based on ASAP Project Management

Source: Juffali Enterprise Transformation Program Team – September, 2017

Critical Success Factors

As Juffali management looks back at its transformation effort, it has identified several critical success factors. The project started with an advocate for change (Mr. Oussama Zein, recently promoted to general manager). Mr. Zein enlisted top-level commitment from executive management, project sponsors and key stakeholders. All groups worked together to build a comprehensive business process flow blue print with clear objectives tempered with a clear understanding of gaps and shortcomings in existing operations. An effort was made to avoid customization when possible – meaning that skilled developers would not need to maintain custom code in the long run. The organization work as a single team: one team/one goal. Users of the software were given the opportunity to strongly participate in the project. Business and technical teams were recruited and hired to help with the transformation. Communication was constant – and team members were encouraged to take proactive actions to identify and resolve issues should they arise. And a disciplined approach to project planning and implantation was followed in order to meet commitments and deadlines. With open communications and clear goals and objectives, the project was well received and Juffali was able to conduct a major business transformation in a timely fashion.

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Summary Observations

What this Juffali case study shows is that a disciplined, well thought-out approach to migration can deliver important business results. The company has been able to change its information systems, implement new software and radically improve its business processes thanks to the efforts of talented, highly committed individuals who envisioned the project and enthusiastically worked to implement the company's modernization transition.

One of the most important lessons in this transition was that Juffali followed an important "rule" when selecting its system environment: "platform selection should be made on the basis of system characteristics and their ability to execute a given workload most efficiently and effectively." Juffali could have chosen to build a distributed environment – and the company would have faced numerous challenges in security, disaster recovery and management by doing so. Instead, Juffali chose a mainframe environment with highly integrated security and an extremely strong communications subsystem that offloads the processor from having to do systems related work and instead enables it to focus on processing transactions and other workloads. Platform selection should also be made on the basis of whether a given platform meets a company's service level requirements. In this case, the IBM EC12 met the company's need for extra-strong security; met the company's need to address current and future performance requirements; and met the company's need to reduce management costs – and addressed the company's stringent availability service level requirements.

The transformation of Juffali's business processes, and the modernization of its applications environment was no small task – but it was implemented (and is being implemented) in a highly organized fashion with clear communications taking place between all stakeholders. At this juncture, the company has migrated several of its business units to the modernized hardware/software environment – and several more will follow over the next few years.

With new reporting in place; with modern processes in place; with the ability to innovate across divisions – Juffali is now far better positioned to compete efficiently and effectively with its competitors in the regions – and around the world. And all of this began with the vision of a single advocate who had the vision to see that change was needed, and the drive to make it happen.