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Optimization of the calculation times of the business process of production lines through the use of information technology

Optimización de los tiempos de cálculo del proceso de negocio de líneas de producción a través del uso de Tecnologías de Información

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Abstract

Currently the Information Technology (IT) are fundamental for the development of an organization, so it must be well managed to provide VALUE to the internal or external customers thereof, IT support critical business processes and support process on an organization so, if there is not an IT strategic plan aligned to the strategic business plan it willbe impossible obtain the benefits of the area, and it will be impossible to be seen as a profit center or investment center and will remain regarded as a cost center. In this work proposes through consultancy to provide the synergy that must exist between the business and technology providing great VALUE in different corners of the organization through the appropriate use of IT.

Resumen

Actualmente las Tecnologías de la Información (TI) son fundamentales para el desarrollo de una organización, por lo que deben ser bien administradas para proporcionar VALOR a los clientes internos o externos de la misma, las TI soportan procesos críticos del negocio y dan soporte a los procesos de una organización por lo que, si no existe un plan estratégico de TI alineado al plan estratégico del negocio será imposible obtener los beneficios del área, y será imposible que sea vista como un centro de utilidades o de inversión y seguirá siendo considerada como un centro de costos. En este trabajo se propone a través de la consultoría aportar la sinergia que debe existir entre el negocio y la tecnología aportando gran VALOR en los diferentes rincones de la organización a través del uso adecuado de las TI.

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Introduction

About Flexi Group

Flexi Group was founded in 1935 by Don Roberto Plasencia Gutiérrez, who with little capital and the support of a small group of craftsmen, started a small workshop where he manufactured children's footwear under the brand name CÉSAR.

Mission: To offer through our products and services in the leather-shoe sector, the optimum satisfaction to the consumer and client, sustained by an economically prosperous company, committed to the development of its personnel and the society in which it is located.

Values: Ethics, solidarity, dignity, equity (justice), human development, participation, responsibility.

The social benefit generated by the company transcends to other companies that have been integrated into the Flexi Group's production chain, thus offering job opportunities to more than 4,000 people.

In this case study I describe the consultancy methodology that I carried out in order to add value to a solution within Grupo Flexi with the help of IT.

Problem Description

Flexi Group had a project in 2006 to implement i2 Supply Chain Planner (SCP), which manages the supply chain and incorporated production planning (PP), their process is fundamental and critical to the business and the objective was to:

- Optimise simultaneous production, inventory, distribution and transportation between multiple plants.
- Accelerate the supply chain.
- Collaborate to solve problems.
- Enable demand to be prioritised based on stock security and replenishment requirements.

The information generated is loaded into an ETL (extract, transform and load), a process that allows organisations to move data from multiple sources, reformat it, clean it, and load it into another operational system to support a business process. For Flexi Group, ETL is for production line calculations and warehouse planning.

The time to perform the process was 13 hours so they could not run it daily, they ran it weekly and could not stop production, the implication was basically that if a customer asked for changes in the maquila caused problems of supply to their customer, forcing them to have a higher Target Inventory Level (TIL), if they ask for change, shrinkage, outlets and rescheduling of production.

The technological platform on which this business process was supported was SUN infrastructure with Solaris operating system and EMC, this platform had been acquired in 2005, so it still had a life time of two or three more years.

After understanding and analysing the business process, it was concluded that the operations they executed were floating point; in computing, floating point operations per second are a measure of the performance of a computer, especially in scientific calculations that require a large use of floating point operations. For this type of operations, it was recommended to use scientific computing processing, which is optimised for the operation of large intensive workloads, parallel and algorithmic computations.

Methodology

The process I undertook was a consultative approach in order to get Flexi Group to really see the value within their process through the services and technology solutions that could be put forward.

The methodology I used has been developed during the experience of 10 years working with different clients, with this methodology we seek to achieve different objectives:

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- Align the solution with the needs of the business.
- To translate technical benefits into business benefits.
- To be optimal in the use of the resources required for a successful project: human, technological and financial.
- Avoid rework during execution based on a good technological design and devoting the maximum time to project planning.
- Take care of the triple constraint required by the PMI project methodology: time, cost and scope.
- Control the project.
- Reduce the risks that may arise during the execution of the project and that may impact the operation of the company.
- Achieve Quality Assurance throughout the entire process from the analysis and design phase of a project until its completion.

The following points explain the steps I followed in order to demonstrate VALUE through the right solution aligned to business requirements.

Evaluation and detection of Flexi Group's business need, with an understanding of the company's business processes.

Documentation of the business promises that the project can deliver, i.e. the indicators expected from the project.

Information gathering through monitors to document, determine and understand the service levels as well as the current quality of service. Monitoring with IBM-SAP competence centre tools (insight), operating system and disk commands to determine the IOPS (inputs/outputs per second) demanded by the application.

Analysis of the information obtained to generate an adequate design aligned with the business needs. This design contemplates all the technological components in order to provide an integral _turnkey' solution. These components have to do with processing, disk and tape storage, disk storage network (SAN), high availability clustering scheme, components necessary to be able to back up and restore critical business information in the times required by the business.

Elaboration of an interoperability matrix of hardware and software components.

Elaboration of the Technological Architecture, i.e. dimensioning the size of the components and choosing the types and model of the infrastructure and licensing that covers the requirements of the business.

Elaboration of the economic proposal together with the financial justifications to document the benefits according to the purchasing strategy of the organisation (capex, opex) and knowing if the IT area within the organisation is measured as a profit centre, cost centre or investment centre.

Formalising the scope in technical detail through a SOW, with a clear definition of the deliverables of each stage and their completion criteria in order to move forward in a coordinated way and to rule out different perceptions or understandings that different project stakeholders may have. Identify project assumptions, constraints and risks.

Formalisation of the project management team based on the PMI methodology, identifying sponsors, project managers, technical leaders with the capacity to integrate the different technical specialities required by a technological project and avoid silo work.

Project execution planning and documentation of the WBS, with the communication plan and escalation matrix.

Determining the implementation strategy and the application migration process based on certified SAP migration processes, in order to obtain a painless change for the Flexi Group operation.

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Preparation of an Installation Specification Document (ISD), which aims to document the technical parameters and prerequisites comprehensively required by all technological components of the solution.

Elaboration of the Work Plan according to the PMI methodology, i.e. with baseline, critical path, dependencies, resource time, milestones, etc.

Execution of the activities to achieve the implementation of the solution previously planned in the previous steps.

Execution of technical and functional test matrices for the release of the documented deliverables according to the completion criteria.

Closing of the project with a session to corroborate to the Flexi Group project sponsors that the objectives committed to in the project were achieved.

Results and Discussion

Solution Overview

In order to respond to the business need detected and presented to Flexi Group, I considered several technological components that could guarantee the reduction of time in the critical process already described above. The following points briefly detail each of the major components of the implemented solution. For the processing units, we took into account an international SAP benchmark, called SAPS, to measure the performance units of the current machines and to be able to offer only what the operation needs, taking into account the future growth that Flexi Group indicated, the definitions of each one are explained below:

The SAPS (SAP Application Performance Standard) is a hardware-independent unit that indicates the performance of a server with a preset configuration which is within an SAP environment. This unit is derived from the Sales and Distribution (SD) benchmark where 100 SAPS is defined as 2,000 fully processed business order items per hour. In technical terms this performance is achieved by processing 6,000 dialogue steps (better known as screen changes), 2,000 publications per hour in the sales and distribution benchmark or 2,400 SAP transactions.

In the sales and distribution benchmark, "fully processed business orders" means the complete business process of a line item: creating the line item, creating the delivery schedule for a line item, displaying the line item, changing the delivery, publishing a goods issue, listing orders, and creating an invoice.32

Quality of Service: This is the experience, given in time/period (seconds) that the user perceives when interacting with the application, based on the SAPS defined in the previous paragraph.

Since the SAPS are equivalent to dialogue steps (screen changes in the application), the quality of service in its minimum transactional unit is given in dialogue steps per millisecond.

Storage Units: For the disk storage of the proposed infrastructure, the measurement parameter was GB (gigabyte), MB/sec and pure IOPS (cache free).

IOPS (Input/Output Operations Per Second, pronounced i-ops) is a common benchmark performance measure for computer storage devices such as hard disk drives (HDDs), solid state drives (SSDs), and storage area networks (SANs).

The specific number of IOPS possible in any given system configuration will vary greatly depending on the variables that the tester enters into the program, including the balance of read and write operations, the combination of sequential and random access patterns, the number of working threads and queue depth, as well as data block sizes. There are other factors that can also affect IOPS results including system configuration, system configuration, storage controllers, background operations of the O.S., etc.33

SAP/IOPS relationship: To technically explain the relationship between SAP and IOPS it must be understood that master and transactional data needs to be loaded into the processing system. The desired ratio for IOPS versus SAP is 0.2 - 0.5 IOPS per 1 SAPS34.

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Processing

The technological solution consisted of two scientific 575 computers with power 5+ processor, UNIX AIX 5.3 operating system with the capacity of 12,800 SAPS each to support the SAP guaranteed response time of less than 1sec. per dialogue step. The planning and distribution of the 8 environments in different partitions was carried out with the optimisation of the use of resources (processor, memory, cards, disk) using the characteristics provided by IBM's own technology with which the processor can be assigned in each partition in such a way that if it is required to steal processor it can do so from the other partitions in case it is not occupied, this helps to micro-partition the processors and use much better the performance it can give without the need to buy additional processors that will be used only in its high seasons.

Storage Area Network

A Storage Area Network (SAN) was designed and implemented at the time with a speed of 4Gbps through brocade switches with redundancy in its components and connections made up of an inter switch link (ISL) that allows a single SAN fabric between both sites, and that the servers of Site A can access the storage of Site B and vice versa.

High availability

Three high availability clusters were set up for the production environments with IBM's HACMP (High Availability Cluster Multiprocessing) software running on the UNIX AIX and Linux platform. This guaranteed an availability of 99.98% per year.

External disk storage

The sizing and implementation of an IBM Model DS4800 disk subsystem was carried out, with the redundant characteristics provided by the technology plus the configuration of the protection that can be obtained with the RAID arrangements and the disks that can be placed as spares, it was possible to offer adequate protection to take care of the single points of failure that reduce the level of availability of the applications that support the business processes of Flexi.

The issue of performance, which has implications for the quality of service in the response times of the applications, was taken into account, with the sizing that involves the amount of IOPS demanded by the application and the GB capacity required for storage, taking into account issues of whether the application takes advantage of the cache of the subsystem or goes directly to disk.

Backup Solution

A backup solution was developed and implemented with the IBM Tivoli Storage Manager (TSM) tool, which is a storage administrator that not only helps to back up and restore information but also allows ILM (information life management), it has a DB that automatically controls the recording of tapes and the information that is being backed up in order to avoid operator intervention in the event of needing to restore information at a certain point in time. The design was made depending on the type of data to be backed up. Files smaller than 256K are sent through the LAN as this avoids degrading the performance of the SAN and files larger than 256K must be sent through the SAN, The amount of tapes required for the backup policies that Flexi Group required was taken care of in order not to oversize or avoid having to make purchases in a short period of time after the solution was implemented.

|Restoration times are the key when a design is made and, depending on this time, the right amount of drivers were placed in the libraries to ensure that the target time of 4 hours was achieved, as well as taking care of the backups in groups of consistencies demanded by the applications due to the communication that exists between the different environments. We took advantage of the Disaster Recovery Manager that TSM has to protect Grupo Flexi in case of a disaster that could be recovered through the backups in an orderly and automated way.

Heterogeneous Migration Process

It was considered a Heterogeneous migration since the base environment was SUN, which implied a change from Solaris to AIX OS and platform. SAP's own migration methodology was used as a basis to migrate SAP environments and Oracle's migration methodology to migrate the client's I2 environments.

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It consists of generating pivot environments to perform the necessary tests and time adjustments for the production transition process in the shortest possible time, which was achieved in less than 24 hours, so the window required for these activities was very well planned and controlled so that Flexi Group did not have interruptions greater than those allowed in its operation.

Solution Diagram

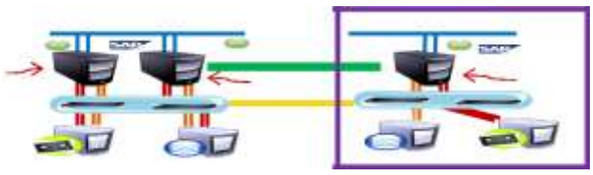

Figure 1

Benefits for Flexi Group

99.98% availability in its applications, which it did not have before.

An improvement in the quality of service (response times) of SAP environments to less than 1 sec. per dialogue step.

Reduced time in its business-critical supply chain and planning process, which triggers associated benefits such as cost reductions due to shrinkage.

Justification of the 3-year TCO and ROI for the investment made by replacing the existing technology, this benefit was compared to the exercise of not changing the infrastructure and continuing with the process time of 13 hours.

We had very specific objectives to improve response time. The main contribution of the consultancy is the knowledge that we were able to obtain from the organisation, through which we obtained a solution that reached the target times that had been established and at a very adequate price. We have an empathetic relationship, they understand our concerns and try to resolve them, anticipating that the solutions contain elements that tend to resolve that concern; there is a proactivity to resolve them.

The previous response time compared to the current one represents an improvement of 340%, which gives Grupo Flexi greater control over its inventories, reducing costs and shrinkage‖.

Conclusions

With this success case I can conclude that it is viable to deliver value to the business using Information Technologies and the way in which they enhance the capacity of business processes to give the results that the organisation is expecting, and not only the expected ones but also the unexpected benefits that contribute to a better integration of business areas with IT areas. It can also be observed that if information technologies are properly used within the IT areas of an organisation, they can gradually become a profit centre for the organisation.

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