

# Adding value to the mainframe with Web technologies



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### The main ideas

- ◆ The mainframe hosts two-thirds of French companies' critical applications and remains the core of many information systems for strategic applications.
- ◆ The mainframe and the Web are not two separate worlds: nowadays the integration of the mainframe with the Cloud is possible and is becoming a reality in a growing number of companies.
- ◆ Several scenarios are possible for the evolution of mainframe environments: upgrading, replacing applications by a software solution, modernizing by sustaining applications, opening the mainframe to establish a dialogue based on Web services.
- ◆ Opening the mainframe is the most relevant option as it adds value to legacy applications and to previous investments by improving users' satisfaction, including final customers, to whom companies can offer new services while optimizing "time to market".
- ◆ Opening the mainframe makes life easier for CIOs: short deployment time ensures a quick return on investment; centralizing the environments improves security and reduces maintenance costs; the scalability of a mainframe platform makes it easier to answer business departments' needs. ◆

# Adding value to the mainframe with Web technologies

## *Introduction*

Used as legacy systems in many organizations, mainframe environments are often perceived as a burden and not as a source of innovation. Suffering from an outdated image, they are considered too monolithic or immutable to meet new challenges and are, as a consequence, ignored in projects and investments.

## *The mainframe, strategic component of information systems*

In fact, used as legacy applications for core business, mainframe environments are still playing a strategic role. According to a study published by IDC France early 2014, 65% of critical applications are supported by a mainframe environment which accounts for 13% of France's GNP, or €240 billion. Gartner's analysts have also observed that mainframes are running in the world's top 25 banks and in nine of the 10 biggest insurance companies.

Apart from the field of financial institutions, the mainframe platform has also convinced other sectors to manage their critical applications. Accordingly, 40% of partners and integrators surveyed in the IDC France study consider that the mainframe meets the expectations of the industrial sector, 33% of services and 18% of administration.

According to IDC analysts and authors of the study Karim Bahloul and Stéphane Krawczyk, "In the industrial sector, the mainframe is the historical platform". The mainframe indeed hosts critical business applications such as orders and billing.

## *A real diversity of environments and applications*

A continuously growing potential has been propelled by the strategy of major manufacturers such as IBM. They have indeed recently demonstrated, in abandoning its x86 series, their will to focus on the z series which already addresses a wide

variety of environments and applications: System z, virtualized environments with ELS and z/VM, Linux environment, Java environment (zAAP), some DB2 processing or optimized memory processing (zIIP), etc. Thanks to this approach, the mainframe's potential has become today a lot more flexible and agile than one might believe.

## *The mainframe can be integrated to the Web and the Cloud*

As regards to its increased agility, the mainframe now appears as a key platform to meet current challenges linked to information systems overcrowded access heightened by Web Services, mobility and Cloud, high expectations for performance, virtualization, optimization of energy consumption, safety and reliability, etc.

Its high level of parallelism makes it well adapted to applications that require both efficient and scalable performance and need to provide the same service regardless of the load. This is the main difference between distributed servers and System z architectures. Indeed, due to their design, distributed servers quickly become saturated and must be dedicated by application (thus multiplying their number). On the other hand, the System z architecture is designed to absorb load peaks without overloading the infrastructure.

## *Enhanced competitive advantage*

This fundamental distinction naturally makes the mainframe particularly well suited to meet the evolution of mobile clients and the cloud. It is in fact the main reason why IBM abandoned its older x86 architectures to focus on the System Z, particularly on their ELS (Enterprise Linux System) product. IBM thus optimizes its R&D and production costs while offering a scalable solution to its customers.

In the end, the mainframe has in many cases demonstrated its competitiveness against distributed environments in terms of cost-to-power or performance-to-energy consumption ratios.

## *An opportunity to improve performance*

However, these new opportunities involve a number of changes that require rethinking the mainframe's place in the information system. Indeed, it is no longer a matter of supporting heavy business applications that users access via dedicated "pipes" such as 3270 terminals.

Web and mobile technologies have opened the mainframe outside the organization. A situation which has increased the volume of transactions and complicated even more the application system, creating new maintenance, performance, development or accessibility challenges.

In order to benefit from the agility of the mainframe and to make the most of its capacities, it is thus necessary not only to remove it from its traditionally confined space, but also to be able to meet new challenges resulting from this opening in allowing dialogue with the outside in a simple, efficient and optimized manner.

## *I - New perspectives to open the mainframe*

Some organizations have tried to get rid of their mainframe, as a result of various factors such as skills' shortage or a scalability that seemed insufficient. In order to meet these challenges, several paths have been explored to solve them or, at least, work with the existing platform.

Experience shows that migration or redevelopment solutions entail risks. And, since IBM has developed for the past few years more interactivity, scalability and competitiveness, the mainframe arouses today a renewed interest. Nowadays, abandoning the mainframe is no longer a requirement for organizations which are trying to include it again as an integral part of their application infrastructures.

Thus, rather than considering a substantial and costly restructuring which brings no obvious added value, why not optimize past investments by modernizing and enhancing those systems?

The objectives would then be to lean on the existing applications and to have them truly communicate with other technologies

in order to facilitate the reactivity and agility required to best meet new business challenges.

## *Facilitating a true dialog between the mainframe and the Web*

These past few years, modernizing the mainframe often meant to access applications through client/server emulation solutions. But this type of solution, requiring a simple call from external applications to the applications located on the mainframe via incoming Web services, remains a one-way process. However the current trend to relocate applications on the mainframe increases the need to manage outgoing Web services. Now, this new need can be solved by choosing existing solutions.

The arrival of these versatile modernizing solutions makes it not only possible to keep using the old applications while taking advantage of the mainframe's new potential, but also to re-host some applications on the mainframe.

This adds another option to the important alternatives that have so far been proposed to organizations. Besides rewriting, replacing with software, or modernizing by sustaining the applications, organizations can now also chose a modernization approach that revitalizes mainframe applications, allows them to communicate and expands their features.

## *Which modernization strategy for which objectives?*

This new possibility should encourage the CIO to reconsider their mainframe strategy and to review the criteria that led them to choose a specific strategy:

**Standardization:** is standardization meant to simplify the information system and to ensure the sustainability of applications?

**HR risk:** does the organization wish to reduce the human resources risk related to the retirement of mainframe experts?

**TCO:** does the organization look for optimizing its platforms' total cost of ownership by facilitating their deployment and maintenance?

**Ergonomics /performance:** is it a priority to meet users' needs by

improving the applications' ergonomics and/or performance?

**Scalability:** is the organization considering, in the short to middle term, implementing new services or supporting new uses such as mobility?

**Project risk:** depending on the chosen solution, what are the risks in terms of, deadline, costs and ability to take-over the inherited platform?

To meet these challenges, the possible answers prove to be uneven. Furthermore, they are not equal in terms of feasibility, cost and deadlines.

### Scenario 1: rewrite applications

**Main benefits:** rewriting on an evolved platform enables to overcome mainframe resources, provided it is anticipated early enough as the age pyramid is not favorable. Rewriting the applications may also be a way to reduce complexity by simplifying application features and interfaces, provided that the impact is carefully appraised and measured on architectures, on third-party applications and on users. Also, such an approach promotes a higher satisfaction of the latter, since working on ergonomic features are close to what they are used to, either inside or outside the organizations.

**Drawbacks:** time and resources are required when rewriting is done manually. However, if it is totally or partially automated, what are the guarantees that the organization will regain its ISO certification perimeter?

In both cases, the choice of the target platform is not obvious and, if wrong, the problem with skills may reappear sooner than forecast.

Finally, the cost of this type of solution is directly proportional to the size of the applications involved (number of code lines).

**Feasibility:** the benefits largely depend on the choice of the target platform, as much for sustainability as for the ability to find skills. This choice also affects the TCO that may be expected at the end of the project.

### Scenario 2: replace with a software solution

**Main benefits:** The choice of a software solution allows to benefit from the experience of the market and to standardize processes. This makes the organization less dependent on internal mainframe resources to the extent that the "ecosystem" of the software is relatively rich. Moreover, users benefit from the improved ergonomics requested for user-friendly, provided of course, that the chosen solution fits in the context.

**Drawbacks:** whereas it is easy to find a solution for basic functions such as reporting, this is not the case when it comes to look for software dedicated to core business applications. Implementing software takes time and can lead to problems inherent to the management of strategic projects. This choice may be costly, particularly if the business activity involved is important or strategic. Finally, it fosters dependency of the organization towards the software editor, which may slow down potential developments.

	<b>Main advantages</b>
	<ul style="list-style-type: none"> <li>◆ RH Risk ++</li> <li>◆ Ergonomics ++</li> <li>◆ Scalability --</li> </ul>
	<b>Main drawbacks</b>
	<ul style="list-style-type: none"> <li>◆ Project costs --</li> <li>◆ Time management --</li> <li>◆ Capacity to use the existing --</li> </ul>

	<b>Main advantages</b>
	<ul style="list-style-type: none"> <li>◆ Standardization ++</li> <li>◆ Ergonomics +</li> <li>◆ RH Risk +</li> </ul>
	<b>Main drawbacks</b>
	<ul style="list-style-type: none"> <li>◆ Scalability -</li> <li>◆ Project costs --</li> <li>◆ Time --</li> </ul>

**Feasibility:** this option can only be considered for relatively standard applications. The more the applications tend towards business, the more specific developments may be required, increasing complexity and TCO.

**Scenario 3: modernize by freezing the applications**

**Main benefits:** emulators allow to rapidly extend access to mainframe transactions. Other solutions, called “webization solutions”, also allow enhancement of the ergonomics of the interfaces by converting protocols between mainframe and Web applications. This approach gives also the possibility to minimize project risks and to act quickly.

**Drawbacks:** these solutions, and in particular emulators, only help to sustain the applications hosted by the mainframe without added value. Limiting exchanges to incoming Web services goes against new uses, which require agility, openness and interactivity. Furthermore, the growth of the mobility and of the cloud results in increasing the number of mainframe application users, creating performance requirements that basic emulators are often unable to provide.

Feasibility these choices quickly improve the access or the ergonomics of the applications, but they preclude subsequent evolution and do not allow to take advantage of the mainframe’s new potential

	<b>Main advantages</b>
	<ul style="list-style-type: none"> <li>◆ Project costs +</li> <li>◆ Time ++</li> </ul>
	<b>Main drawbacks</b>
	<ul style="list-style-type: none"> <li>◆ Scalability -</li> <li>◆ Standardization --</li> <li>◆ Performances --</li> </ul>

**Scenario 4: Make the mainframe dialog**

**Main benefits:** opening the mainframe with incoming and outgoing Web services allows capitalization of solid and proven legacy applications by putting the mainframe within reach of users as well as developers. The new generation of developers, familiar with Web technologies, can use these technologies to extend the applications’ potential without needing mainframe expertise, thus limiting the risk associated with skills availability. For their part, users benefit from new services, modernized interfaces, and easier access to applications they are used to working with. The applications perform better, with controlled project costs and deadlines.

**Feasibility:** this solution is quickly implemented, scalable and based on standard technologies.

Strategy	Standardization	RH Risk	Project management	TCO	Ergonomics	Performances	Scalability	Project cost	Time management
Rewrite the applications	++	++	--	-	++	-	+	--	--
Replace by a software	++	+	++	-	+	-	-	-	-
Modernize by sustaining the applications	--	-	+	-	+	--	-	+	++
Make the mainframe dialog	++	+	++	++	++	++	+	+	++

	Main advantages
	<ul style="list-style-type: none"> <li>◆ Standardization ++</li> <li>◆ Scalability +</li> <li>◆ TCO ++</li> <li>◆ RH Risk +</li> <li>◆ Ergonomics ++</li> <li>◆ Performances ++</li> <li>◆ Project cost +</li> <li>◆ Time ++</li> </ul>
	Main drawbacks
	<ul style="list-style-type: none"> <li>◆ NONE</li> </ul>

## Revitalize the mainframe with Web technologies

Contrary to preconceived ideas, the mainframe is able to communicate with open environments in a more flexible and modern way than when some of these environments communicate with each other. Indeed, Web technologies such as HTML, Javascript, http or XML, provide a set of open languages and protocols which can be used to initiate two-way communication with mainframe applications.

Some software leans on this Web «Esperanto» to modernize and open legacy applications (CICS, IMS, TSO, Natural...). These middleware are based on http servers and are installed directly on the mainframe. They offer several advantages:

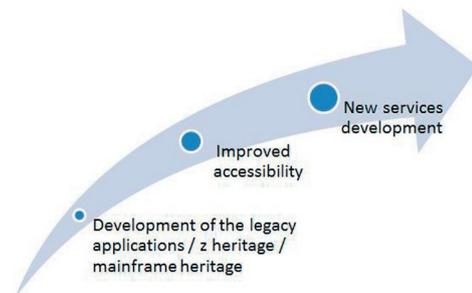
- ◆ They are based on universal formats and protocols, which can be interpreted by any Web client, regardless of the browser, the operating system and the terminal (Smartphone, tablet...).
- ◆ They allow the use of today's preferred development technologies to create new services: Ajax, JavaScript, REST architectures, HTML, Web services, etc.
- ◆ They provide a high-performance gateway - simple and not verbose - between the mainframe environment designed to operate naturally in synchronous mode, and the Web environment which favors the asynchronous mode
- ◆ They support two-way communication (incoming and outgoing Web services) between the mainframe and distributed environments.

- ◆ They implement an architecture including several levels of protocol assurance. This environment provides a higher security level than environments delivering TCP-IP end to end. Moreover, the sending of data is no longer controlled after transmission over the network but at the source.

- ◆ They do not require any installation on the Client station, increasing speed of deployment and simplifying maintenance.

## II Value for companies

When they switch from a modernization solution which sustains applications, to this type of solution implementing real dialogue between the Web and the mainframe and thus allowing the mainframe's integration into distributed environments, organizations can expect several levels of benefits, for the users as well as for the IT department.



### Business benefits

#### 1. Develop legacy applications

For business units, the first benefit of an open modernization solution is the increased value of the legacy applications. The organization can therefore keep its strategic applications on a reliable and safe platform and maintain their performance, while improving their ergonomics and adapting them to new uses. Investments made in the past for mainframe environments have usually been written off and have proven their adaptability. In fact, organizations continue to invest and according to the IDC study, 30% of French companies' external IT budgets are allocated to mainframes.

### Case study

#### *Simplify and modernize interfaces*

A provider specialized in payroll outsourcing was hosting its applications on a mainframe, with users accessing them via a modernized Web interface using a Java component. This provider was not satisfied with its solution which carried technical drawbacks associated with the use of Java and which no longer met the needs nor evolutions requested by customers.

They then looked for a solution to modernize their application, taking into account two criteria that would later allow them to add value to their services.

On one hand, the objective was to modernize the user's interface to make it more user-friendly and ergonomic, and to give access to the application from mobile terminals, particularly tablets.

On the other hand, it was necessary to find a solution that would not use Java and that would keep the core of the application on the mainframe to lean on previous developments, maintain the technological expertise and keep the advantages of that platform in terms of capacity and safety.

Thus, the outsourcer implemented a modernization solution based on the mainframe which does not require any installation on the Client and gives access to the application from a simple and secured URL. This solution uses Web technologies to provide the application with a new graphic Web interface which is simpler and user-friendly. It does not require modifying the source code and allows adapting the screens display to any mobile. Unlike 3270 screens, users benefit from an application interface that is really modern and adapted to their uses, while the outsourcer is able to improve service quality. ♦

### Case study

#### *Making a CICS application dialog*

A major European financial institution wanted to share the data -issued from a consumer credit CICS application and used by the back office - with the information processed by its call center via a CRM application hosted on a distributed server.

The objective was to consolidate the data, either when creating a new customer's file in order to enrich the CRM tool with new data, or when changing or adding information to a contract in order to directly retrieve various information and to avoid, duplicate entries and errors.

For these reasons, the financial institution chose a solution which would generate outgoing Web services from its CICS application. This solution, installed on the mainframe, provides conversion between Cobol and SOAP and allows to send a SOAP request toward the CRM application, which is a Java application hosted on a WebLogic server. In return, the solution processes the responses transmitted as a Web service from the CRM application. The responses are then sent to the CICS application after having been converted by the solution from SOAP to EBCDIC.

A true dialog has been established between the mainframe and the Web applications after a quick implementation and the solution was created in less than three weeks. ♦

These legacy applications that have been accumulated over the years must evolve with business needs: what was complicated in the past and raised doubts about mainframe environments has become nowadays technically possible without calling into question previous investments. This added value offers several benefits: it minimizes the risks of a major technological migration and the risks associated with project management, it reduces time to market, particularly for strategic applications, and it optimizes costs and operating performance.

## 2. *Improve accessibility*

Thanks to the use of standard and open Web technologies, organizations have not only the opportunity to modernize their applications, but also to extend and facilitate their access, without having to substantially change them. Any terminal equipped with a browser is thus able to connect to the mainframe's applications locally, remotely, or even as a cloud service. Changing pages' layouts does not require special skills combining Web and mainframe, since only the HTML code is affected.

The interface adapts automatically to the different screen sizes thanks to the support of RWD (Responsive Web Design) technologies, allowing mobile users to access the applications from their Smartphone, tablet or laptop.

Such interface's accessibility and simplicity are increasingly required by users who have been influenced by the e-commerce and by the use of the cloud. The BYOD (Bring Your Own Device) type of policy reinforces such requirements, even for users that are sedentary.

## 3. *Deploy new services*

The third level of benefits, and not the least as far as value is concerned, is the possibility to develop new services and to expand the functionalities of mainframe's applications, especially through the outgoing calls

Many organizations have their customers' accounts managed by their mainframe applications. It may be advantageous for them

### Case study

#### *P&V (Insurance) gives free access to its business applications*

P&V Insurance is a Belgian insurance group whose network of 300 resellers is composed of exclusive independent agents. For their business, these agents must access all of P&V's business applications including customers, contracts, marketing campaigns management, etc. However, these are CICS applications running on an IBM System z environment.

To meet their needs, P&V provided them so far with the necessary hardware (station + emulator) for which the agents paid a rental fee. However, the agents considered the rental cost too high compared to the acquisition cost of a basic workstation, and the conditions of use imposed by P&V too stringent.

The organization therefore looked for a solution that would give its agents access to its CICS applications, through a Se-

cure Web access allowing them to choose their workstation. This solution gives an access from a simple, secure URL and avoids having to install anything on the stations, making it completely independent of the terminal and browser used.

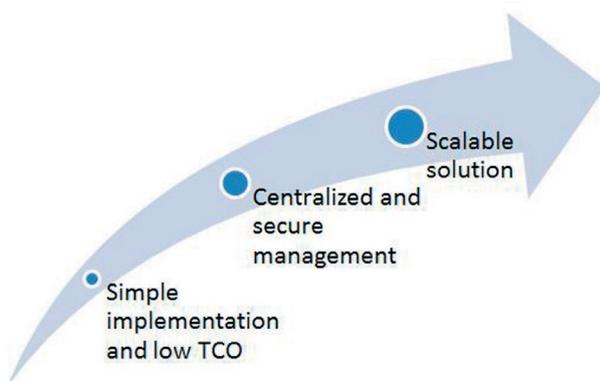
During a phase of tests, P&V checked that the performances were in compliance with its needs; "the solution is more efficient than an emulator" says Mark Sheers, Account Manager at P&V Insurances.

Satisfied with the results, the organization switched its 300 agents onto the solution. P&V also plans to use it for the stand-by team responsible for IT support in order to allow them to access the CICS applications from any remote workstation. Finally, the insurance company is considering making its platforms accessible via mobile terminals (Smartphone, tablet, etc.) by using the Web Responsive Design features to adapt the user interface to the specific characteristics of such devices (screen size, browsing, etc.). ♦

to communicate with the CRM tools, generally SaaS applications or solutions, in order to update and share their data.

Another common case occurs when organizations provide access via portals and mobile applications to clients and partners to their applications and services heretofore reserved for internal use. It may concern, for instance, order taking, file monitoring, accounts or stocks enquiries, data updates (by the user or the client), as well as traceability or alert services applications.

## *IT department benefits*



### *1. Simplified implementation allowing a lower TCO*

For the IT department, the main benefit resulting from these solutions is the time savings right from the start. This gain can even be substantial compared to other types of projects. No need for rewriting, lengthy developments or for several configuration phases before getting started.

Moreover, these modernization solutions once installed on the mainframe don't require any deployment on the workstation which is a tremendous gain of time reducing implementation costs.

In the same way, these solutions are not affected by the operating systems' and browsers' up-dates, which avoid them from being tested and certified at each workstation's evolution.

This simplification contributes in reducing the TCO of the application system for both the mainframe and the customer.

### *2. Centralized and secure management*

By avoiding any other implementation than on the mainframe, whether on workstations or on intermediate servers, this type of solution considerably reduces costs for implementation and maintenance which count for a relatively high percentage of IT budgets - often higher than 25% -. This centralization on the mainframe also provides the benefits of a secure environment and avoids scattering data on remote servers or work stations.

Thanks to the stability and maturity of mainframe platforms, IT teams or hosting partners are able to focus on tasks with a higher added value for their customers. This simplification also helps lower the total cost of ownership (TCO) for the application system as a whole, both on the mainframe side and on the client side.

### *3. Scalable platform*

To promote scalability, it is necessary that the application components may be reused and integrated into new services. An open and simple architecture facilitates such reuse. If it is based on universal formats and protocols, such an approach also helps to make the information system less complex and to homogenize flows and processes, two factors that promote agility. Finally, in respecting the principles of the overall architecture, this process isolates the various technical layers allowing future modification and/or reuse. ♦

## Case study

### *Outsourcer in the Public sector: emulate Cyrillic characters*

The outsourcing agency in charge of information systems for the government and for a large city of a Balkan country wanted to replace its 3270 emulators which it considered too costly. The objective was thus to lower costs, but also to acquire a thin client access solution and to integrate additional features, knowing that such solution also had to be able to support the country's language and, consequently, Cyrillic characters.

Accordingly, the agency looked for a less expensive Web access solution that would support all character sets to account for the specific characteristics of the various languages and that would allow the display of its 3270 application on the user workstations via a simple Web browser, without requiring any deployment.

That solution also offered an extended functionality to the users by allowing transformation of the PCL (Printer Control Language) print flows directly into PDF files also supporting Cyrillic character and reducing printing costs. ♦

## Case study

### *Facilitating migration to Windows 8*

A dedicated entity manages the information systems of a German financial institution. As part of a migration of its workstations to Windows 8, the company had to re-validate the compatibility of its 3270 emulation solution with the new operating system. It was an opportunity to consider replacing this solution for accessing the mainframe from a thick client station, a solution deemed costly and complex, with a solution offering access from a thin client station and providing similar features so as not to disturb the users.

That solution provides access to legacy applications from any

terminal via an Internet browser and a secured IP connection, while maintaining the 3270 interface, in a transparent manner for thousands of users of the IT system.

The new solution facilitates the centralization of macro users on the mainframe while strengthening data access safety, without affecting the final user.

This solution allowed to homogenize access to the 3270 application and to facilitate the Windows 8 migration process by removing the need to implement a certification procedure on workstations since nothing is installed on the workstations, eliminating any deployment. The result: shorter times and lower costs. ♦

### Case study

#### *Guaranty the safety of sensitive information*

A major German insurance company is organized with a network of agencies and brokers under a franchising system. Each one of these entities manages its own data and client information and also receives data from the insurer. For the latter, the problem was to control the use of the data sent to its network of franchisees in order to ensure their confidentiality. When using a thick client station, this process is relatively difficult to manage because it is necessary to retrieve the data and to manage confidentiality agreements covering the exchanged data for all the users. It is also a risky

approach since the volume of confidential data is very high for an insurance company and it is thus necessary to limit as much as possible their transfer outside of the information system.

The solution chosen by the insurance group to simplify this process and ensure the safety of data was to keep the data on its mainframe while allowing users to access it directly via a secure Web interface, with no data being stored on the user stations. ♦

### Case study

#### *MFP Services offers a new Web portal including DB2 data*

MFP Services is a group serving thirty mutual insurance companies from three public services (national government, regional authorities, and healthcare). The group wanted to improve the quality of the services offered to its members, partners and employees, as well as to elected officials.

To that end, MFP Services and Chorégie (MFP's Economic Interest Group for IT) have decided to offer a new, secure and ergonomic Web portal called "Santé Pratique".

For this project, MFP services chose a solution that allows the mainframe to communicate with the new portal, based on Websphere Portal for iSeries, via Web Services. The solution runs under System z and communicates with the WebSphere portal via a secure configured URL, using open standard languages such as XML and HTML. It calls the existing CICS

transactions to access data stored on the mainframe and makes that data available to the Web portal in real time via standard Web services. This solution prevents any dependence between the Web portal and the mainframe application, leaving complete freedom to evolve over time towards the implementation of a new technical architecture considered by MFP Services.

The objective of this portal is to facilitate access to a high volume of information and to integrate new services. From a technical perspective, it was necessary to be able to query the DB2 database associated with the central CICS management application from the new Web platform. Implementation of this interactive portal now offers better services and faster reactivity to members reimbursement needs. The technological choices, using standard and scalable technologies, also allow to take into account very rapidly any new evolutions of Web services for business applications (regulatory, institutional, etc..). ♦

# ADDING VALUE TO THE MAINFRAME WITH WEB TECHNOLOGIES

## Syspertec and Virtel in short

For the past twenty years, SysperTec has been supporting organizations operating in an IBM mainframe environment and bringing them solutions which promote interoperability and automation of communications within the heterogeneous computer environments.

Such solutions, based on the Virtel software series and used by hundreds of customers, promote scalability and access to the central site's applications and data in order to establish a true dialog with other technologies. Acting both as a communication monitor and an http server directly installed on the mainframe, Virtel establishes a secure dialog and automates transmissions between applications and data of IBM mainframes (z/OS, z/VSE, CICS, IMS, TSO, X25...) and terminals (PC, Smartphones, tablets, etc.) or heterogeneous servers (Web, IP, HTML, XML, PHP...). The technical architecture chosen allows to benefit from the best of mainframes and the best of the Web while keeping the advantages of the mainframe in terms of safety, ability to support increased loads and performance (volumes, response time, etc.) and taking advantage of technological evolutions (Web 2.0, XML, Ajax...).

This software series is composed of three main solutions:

- ◆ **Virtel Web Access** allows thin clients to quickly access mainframe applications from any type of Web browser (PC, Mac, tablet, Smartphone, etc.).
- ◆ **Virtel Web Modernization** transforms 3270 screens into interactive Web pages, making data entry easier and allowing to add new services such as PDF generation or sending e-mails.
- ◆ **Virtel Web Integration** allows to access 3270 transactions through incoming and outgoing Web services. This makes possible the implementation of bidirectional communications between the mainframe and the distributed environments, with the choice to keep or not the native screens.

No matter which solution is implemented, Virtel does not require any change in the source code. Recognized in France and the world over, Virtel helps companies to modernize their application assets and make them evolve by allowing them to take advantage of new technologies. ◆



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