The Enterprise Benefits of Choice:
Robust Mainframe Integration and TCO Reduction

GT Software

Ivory Service Architect

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Ivory Service Architect
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Introduction

Despite the increasing adoption of Service-Oriented Architectures (SOA) and other component-based development approaches, the mainframe remains a cornerstone of enterprise computing. Moreover, as IT organizations look to more modern development paradigms to support new business requirements, integration of proven mainframe functionality and data are persistent concerns.

Perception – Platform Disparity and Architectural Rigidity

Enterprise IT architects know that they cannot replace mainframe functionality and processing power. But at the same time, they view the mainframe as an old-world platform, a veritable 'old dog' incapable of learning new tricks. They perceive the mainframe as rigid, offering a rather low degree of architectural flexibility.

Assuming that there are no tools to effectively bridge the gap between the mainframe and the service-oriented demands of today's customer-centric enterprises, they often take a rudimentary integration approach. Typically, this consists of wrapping discrete chunks of mainframe functionality as Web services, and publishing them for non-mainframe service developers to do with what they can.

In essence, many IT architects settle for less when it comes to mainframe integration. They proceed with low expectations, and as a result, their efforts yield minimal gains – in both functional efficiency and financial return on investment.

> *With Ivory Service Architect, IT organizations enjoy the many benefits of architectural 'choice' and can set high expectations for fully leveraging mainframe assets in the modern development initiatives of today.*

Reality – Platform Synergy and Architectural Flexibility

No longer do enterprise IT organizations have to settle for less. With Ivory Service Architect, they enjoy the many benefits of architectural 'choice' and set high expectations for fully leveraging mainframe assets in the modern development initiatives of today. And most importantly, with Ivory Service Architect, they meet – even exceed – these high expectations.
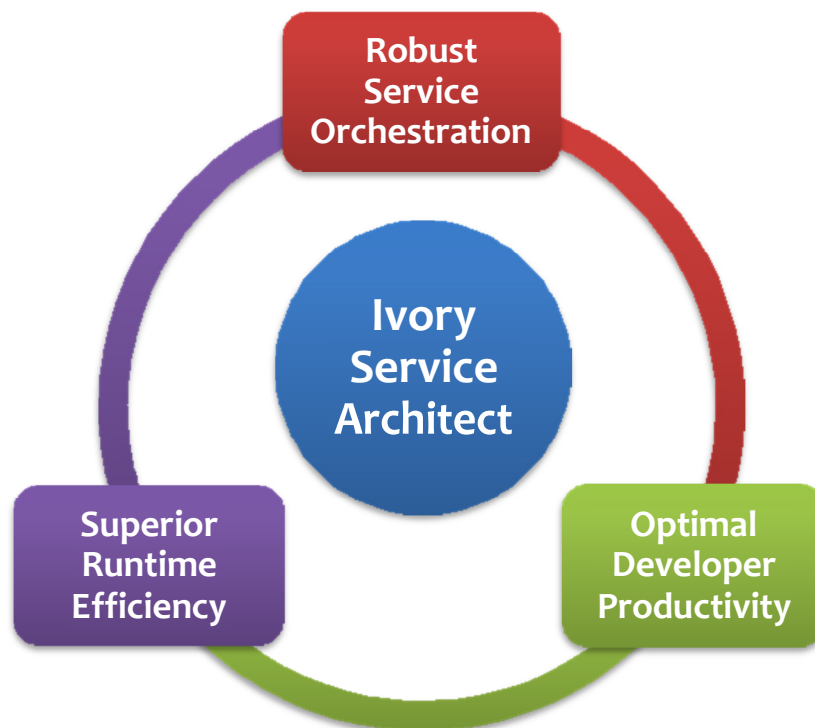
Optimized for platform synergy and architectural flexibility, Ivory Service Architect offers fully-automated service orchestration, enabling the right-sizing and high-performance deployment of multi-step, multi-operation business services from proven mainframe functionality. This orchestration can encompass mainframe business logic, mainframe data and non-mainframe resources.

Ivory Service Architect instantly transforms knowledgeable mainframe programmers into service developers, providing an intuitive and automated development environment designed specifically for their needs. These programmers rapidly assemble composite business services from existing mainframe assets – with little or no training, and no consulting required.

Code-free orchestration not only means enhanced developer productivity, but also translates into faster time to deployment, reduced maintenance costs, improved governance, and system portability.

Moreover, comprehensive platform support fully leverages all mainframe assets within composite systems, incorporating all types of mainframe data and applications - even batch - while respecting security requirements and performance levels in a distributed environment.

Ivory Service Architect enables choice – choice about how to build services; choice regarding what functionality to include within services; choice as to where to deploy services, and more. And even better, when business requirements evolve again, it's no problem to choose a different path, to switch course rather abruptly, and re-architect the mainframe integration infrastructure.

Robust Service Orchestration

Ivory Service Architect

Superior Runtime Efficiency

Optimal Developer Productivity

Ivory Service Architect

Optimized for dynamic mainframe integration, Ivory Service Architect is a robust, yet flexible solution that allows enterprise IT organizations to choose the architectural approach that best suits current requirements. However, with Ivory Service Architect, architects and developers rest assured that if business requirements change in the future, they can quickly and easily re-architect their integration schema with no performance or ROI loss.

Ivory Studio – Comprehensive Mainframe Support

Built for rapid development of production-ready services, Ivory Studio is an intuitive tool that enables mainframe developers to leverage any mainframe transaction, application or data in creating single- or multifunction composite services.
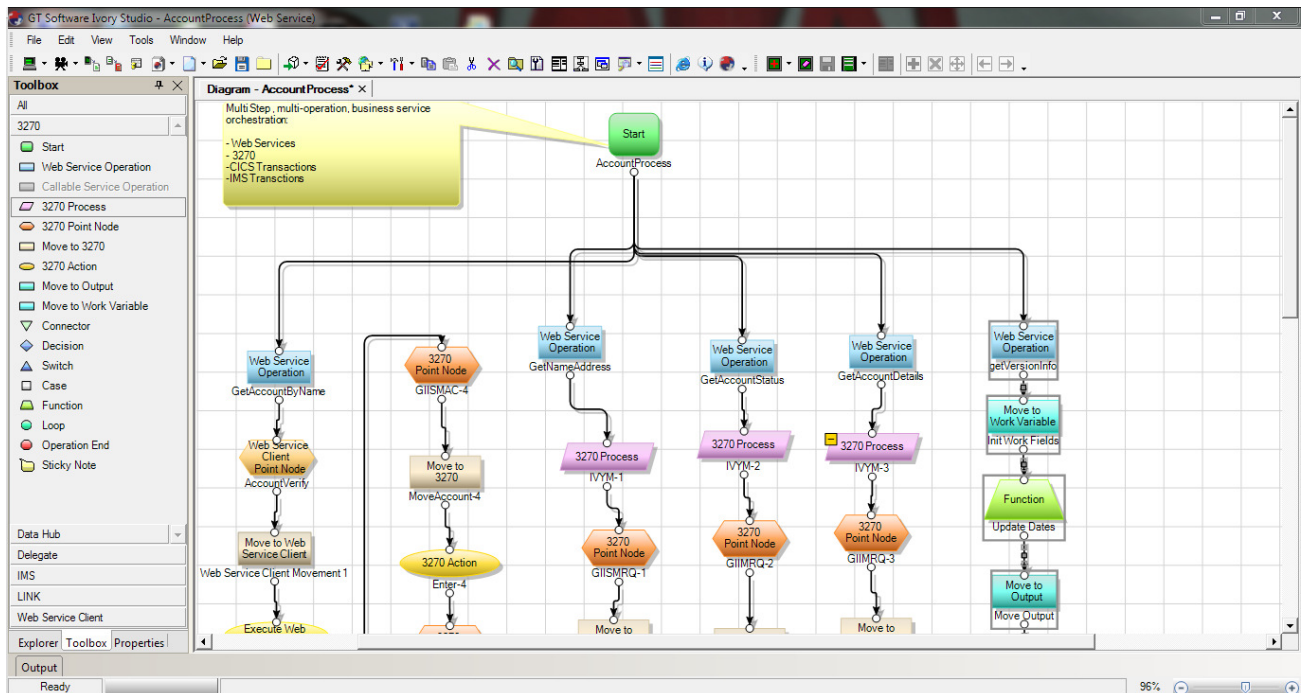
Simple to learn and operate, Ivory Studio's graphical environment empowers developers, allowing them to easily orchestrate function-specific building-blocks into ready-to-deploy business services.
Using the drag-and-drop environment, developers define Web service inputs and outputs, and then graphically model the multi-step process to implement the service.

Ivory Service Architect facilitates the integration of all mainframe assets within a single service, regardless of underlying platforms, languages and data formats, from 3270 "green screen" applications to mission-critical online transactions.

For example, needed functionality might be found in a 3270 screen, another piece in a COMMAREA program, more in an IMS database, as well as some function housed in an external Web service. Ivory Service Architect enables developers to quickly and easily assemble these functional building blocks into a complex, ready-to-deploy business service.

> *Ivory Service Architect facilitates the integration of all mainframe assets within a single service, regardless of underlying platforms, languages and data formats:*
>
> | | | |
> |---|---|---|
> | **Adabas** | **Batch** | **CICS** |
> | **COBOL** | **DATACOM** | **DB2** |
> | **DL/1** | **IDMS** | **IMS** |
> | **IDEAL** | **MVS** | **Natural** |
> | **PL/I** | | **VSAM** |

Ivory Server – Scalable and Reliable Runtime Performance

Optimized, for scalable, reliable runtime deployment, Ivory Server consists of a high-performance Web service processor, a business service flow processor, and a central repository for WSDL discovery.

Ivory Server exploits CICS, IMS, and native data access capabilities, eliminating the need for middle-tier servers, and providing the flexibility to fully leverage mainframe processing power as appropriate within composite applications. The server receives SOAP/ REST (XML and JSON) request, invokes the business service flow previously defined in Ivory Studio to satisfy the request, and formats the SOAP/REST (XML and JSON) response. Ivory Server provides SOAP/REST (XML and JSON) support via HTTP and HTTPS protocols.

In providing the highest level of Web service integration, Ivory Service Architect offers comprehensive support of XML, enabling the incorporation of WSDL definitions created in almost any tool, application, or environment, further enhancing support for proven top-down service design.

Ivory Server optimizes the storage of data dynamically by only saving data as needed to serve the application or to send output for the SOAP response.

There are several Ivory Server products, including:

- o Ivory Server for CICS/TS

- o Ivory Server for z/OS

- o Ivory Server for z/VSE

- o Ivory Server for Windows (Java)

- o Ivory Server (Java) for Linux

- o Ivory Server (Java) for Linux on System Z

The ability to import and leverage XSD schemas enables developers to leverage centrally-defined XML schemas that comply with corporate and industry standards such as ACORD, IFX, and HR-XML or company specified standards.

Additionally, Ivory Service Architect enables the development of outbound callable Web services, providing a mainframe-based interface for any service you can build. It is this powerful outbound service support that provides the foundation for Ivory Service Architect's robust batch integration capabilities.

GT Ivory deployed on mainframe   GT Ivory deployed off mainframe
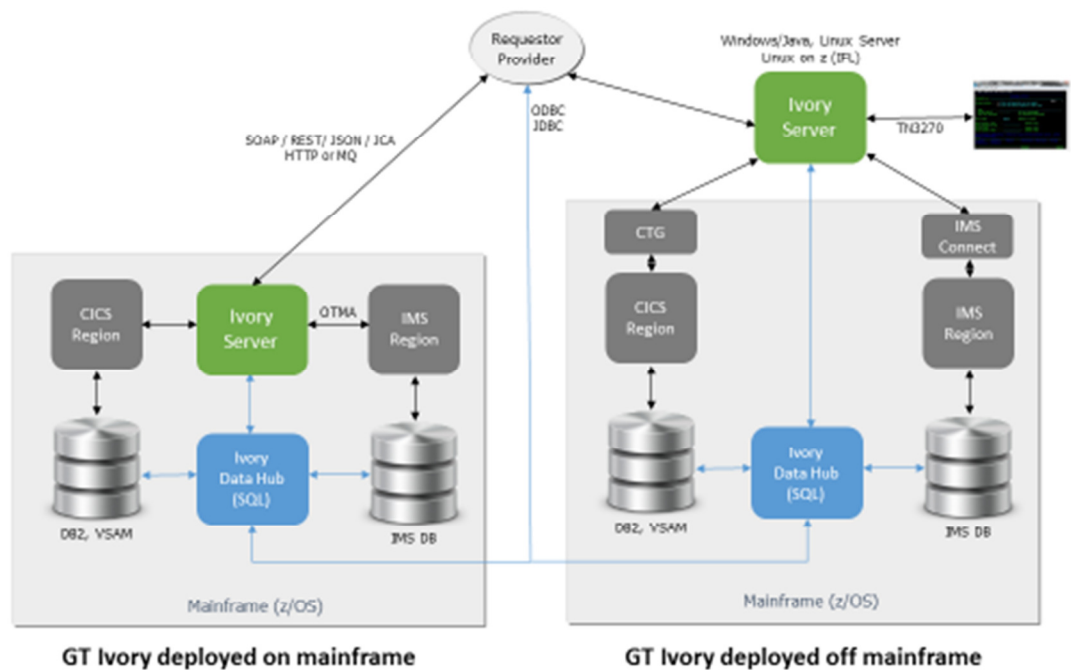
When it comes to integrating batch applications with Web services or other modern enterprise computing components, Ivory Server handles the high transactional volume with very low overhead and incredible throughput.

This unique ability to meet the rigorous performance requirements of batch applications within more modern enterprise systems empowers organizations to realize the business value of distributed computing without disrupting critical operational processing.

GT Software Ivory Service Architect Mainframe Integration Requirements Checklist	
Mainframe Integration Requirements	**Ivory Service Architect Capabilities**
Robust Service Orchestration	Ivory Service Architect, developers deliver composite business services at the optimal level of granularity to facilitate reuse, insulate from costly downstream maintenance, and avoid the risks associated with hard-coded rigidity.
Optimal Developer Productivity	Essentially, Ivory Service Architect takes mainframe programmers off the sidelines, and puts them into the service development game – in critical roles. For enterprise organizations, this re- empowerment of seasoned mainframe developers translates into an array of organizational benefits.
Superior Runtime Efficiency	Ivory Service Architect brings to the mainframe integration table an unrivaled level of technical innovation – innovation that translates into dramatically improved runtime performance, as well as substantial reductions in runtime processing costs.

Working in concert, Ivory Studio and Ivory Server provide a comprehensive mainframe integration development and deployment environment that ensures robust service orchestration, optimizes the productivity of mainframe developers, and delivers superior runtime efficiency for the high-volume transactional processing.

Robust Service Orchestration

Ivory Service Architect's automated orchestration is the cornerstone of success for mainframe-based service development. Ivory Studio provides the orchestration tool to compose complex business services, while Ivory Server provides the runtime to execute the orchestration.

Complex composite business services do far more than simply invoke functions in a standard way. In addition to being readily recognizable and understandable by the business user, they typically contain orchestrated multi-step, multi-operation functionality, with transparent communications and data transformation.

With Ivory Service Architect, developers deliver composite business services at the optimal level of granularity to facilitate reuse, insulate from costly downstream maintenance, and avoid the risks associated with hard-coded rigidity.

> **Refined service optimization quickly leads to strong ROI – tangible cost savings, streamlined operational efficiencies, reduced IT overhead and viable strategic advantage.**

Tactical Service Design – 'Whatever-Size' and 'Bottom-Up'

Often times, service developers take a tactical 'bottom-up' approach, wrapping discrete pieces of mainframe functionality as isolated services to be accessed by various end-user applications and systems. Such an approach has usefulness as a mainframe integration "jumpstart" tactic.

These elementary composite building blocks usually answer immediate business needs, but as requirements evolve downstream, developers typically must disassemble and reassemble these functional blocks into a new structure elsewhere, with all the attendant development, testing and maintenance ramifications that implies.

Strategic Service Design – 'Right-Size' and 'Top-Down'

However, Ivory Service Architect allows developers to work in collaboration with everyday business users and quickly 'right-size' composite services from the start. In other words, with Ivory Studio's graphical drag-and-drop interface lets developers choose the appropriate pieces of mainframe application functionality and then connect them in an easily-maintained, highly-transparent architecture.

In essence, Ivory Service Architect offers 'top-down' service design capabilities – best practices for mainframe integration. With Ivory Service Architect, mainframe developers abbreviate the IT project scoping process, working in advance with service consumers to identify functional and data requirements, and then map mainframe components to the service requirements.

From these design maps, developers use Ivory Service Architect's robust service orchestration capabilities build code-free integrated business services, optimizing and right-sizing the architectural components to promote maximum reuse and efficiency.

Ivory Service Architect Robust Service Orchestration Wish List	
Wish List	*Ivory Service Architect Capabilities*
Cross-Platform Support	Supports all mainframe data sources (Adabas, DB2, etc.) and application sub-systems (Natural, IMS, CICS, etc.)
Intelligent Service Design	Supports strategic 'top-down', tactical 'bottom-up', removing layers of required software and complexity
'Right-Size' Granularity	Enables true collaboration with business owners, ensuring that new services answer operational needs
Component Reuse	Delivers code-free, transparent business services that promote efficient reuse and reduced maintenance
Architectural Flexibility	Allows IT organizations to quickly adapt to evolving business requirements

Refined service optimization quickly leads to strong ROI – tangible cost savings, streamlined operational efficiencies, reduced IT overhead and viable strategic advantage. And just as important, transparent, easily-maintained service orchestration translates into a strong degree of architectural flexibility and risk aversion, meaning even more efficiencies and savings in years to come as business requirements inevitably evolve.

In either case, whether enterprise organizations need the strategic top-down approach or a tactical bottom-up method – or a combination of the two – Ivory Service Architect provides the service orchestration tools that ensure dramatic operational efficiencies and substantial cost savings.

Optimal Developer Productivity

Well-orchestrated mainframe integration is a critical piece to success in the service-centric enterprise. Moreover, in addition to integrating functionality, data and performance assets of the mainframe, it is equally important to leverage mainframe developers themselves and all the institutional knowledge they hold.

When this does not happen and IT organizations marginalize mainframe developers in composite development initiatives, they in effect, leave much of the mainframe's value on the sidelines.

Some fear that the skills required for modern service-oriented development and the in-depth institutional knowledge of mainframe programmers are human-capital islands separated by an ocean of generational disparity. To some degree, this is true.

Professional Reinvention – Overcoming Platform Disparity

For example, it is unrealistic to expect distributed platform developers to quickly come up to speed on highly-customized mainframe applications and data. However, with the right tools, a reverse of the process is actually quite practical.

Using graphical flow modeling diagrams that allow dragging, dropping and wiring together various building blocks of functionality, Ivory Service Architect enables mainframe developers to quickly and easily assemble multi-step, multi-operation composite business services from existing mainframe assets – with little or no training, and little consulting required.

> *Ivory Service Architect enables mainframe developers to quickly and easily assemble multi-step, multi-operation composite business services from existing mainframe assets – with little or no training, and little consulting required.*

With Ivory Service Architect's powerful visualization and orchestration features, mainframe developers build highly-functional business services with the right level of granularity, removing technical limitations as they package services for maximum reuse and minimal downstream maintenance.

Essentially, Ivory Service Architect takes mainframe programmers off the sidelines, and puts them into the service development game – in critical roles. For enterprise organizations, this re-empowerment of seasoned mainframe developers translates into an array of organizational benefits.

Ivory Service Architect Optimal Developer Productivity Wish List	
Wish List	**Ivory Service Architect Capabilities**
Efficient Scoping	Reduces complex project scoping by encouraging collaboration between IT architects and business owners
Developer Reuse	Maximizes reuse of mainframe developer knowledge, enabling them to actively participate in service design
Consulting Reductions	Reduces expensive consulting engagements as mainframe developers are empowered to build modern services
Training Savings	Slashes software training and support costs with powerful visualization and orchestration features
Rapid Deployment	Deploys production-ready business services from the mainframe in a matter of days

Professional Empowerment – Bridging Between Platforms

Primarily, the reinvention of mainframe programmers into modern service developers means immediate IT cost savings in the form of a reduced need for 'next-generation' developers or consultants. Secondly, with unrivaled institutional knowledge of business-critical functionality, mainframe developers are ideally suited for the right-size, top-down service design that ensures strong service orchestration.

Also, because Ivory Service Architect was built with mainframe developers in mind, the productivity gains it engenders lead to even cost savings. With no special skills and no understanding of SOAP, REST, JSON, XML, WSDL, or HTTP protocols, mainframe developers typically learn how to use Ivory in less than half a day. The reduction in training costs alone makes Ivory Service Architect an attractive mainframe integration tool.

Integrated tools make Ivory even more productive. For example, Ivory Service Architect includes an integrated FTP client for importing copybooks and BMS macros from mainframe file systems.

Ivory Service Architect also provides a fully integrated test and trace harness to exercise and inspect the newly created service. Additionally, the tool is integrated with Ivory BMS/TS, guaranteeing that the Ivory-based business service won't break when changes to the BMS map occur.

Professional Success – Enjoying Platform Synergy

In spite of its power and flexibility, Ivory Service Architect incorporates ease-of-use features that set the standard for mainframe service development and establish the industry benchmark for the fastest time-to-value. Once installed, the tool lets the mainframe developer build complex business services, with no learning curve.

Ivory Service Architect's graphical visualization interface allows for code-free service construction – development that engenders robust composite services that leverage proven mainframe functionality within distributed computing environments.

And, with the highly-transparent, easy-to-maintain granular design, developers can easily re-architect production services if business requirements change abruptly.

Other vendors' tools are complicated and difficult to master, requiring extensive knowledge typically outside of the traditional mainframe developer's experience, such as Java or XML. Ivory Service Architect extends the many benefits of flexibility to the IT enterprise.

> *"When looking to extend mainframe investment into SOA, one thing is for sure — you simply cannot code your way into the future. Look for tools that enable mainframe developers to quickly and easily become service developers in an automated, code-free environment."*
>
> *Dale Vecchio*
> *Research Vice President*
> *Gartner*

With the opportunity to select right-size service orchestration over tactical implementation and then have the ability to change directions when needed with minimal operational or financial loss, IT organizations can truly leverage the mainframe, as well as mainframe developers, within modern service architectures.

Superior Runtime Efficiency

In addition to superior service orchestration capabilities and optimized developer productivity, Ivory Service Architect brings to the mainframe integration table an unrivaled level of technical innovation – innovation that translates into dramatically improved runtime performance, as well as substantial reductions in runtime processing costs.

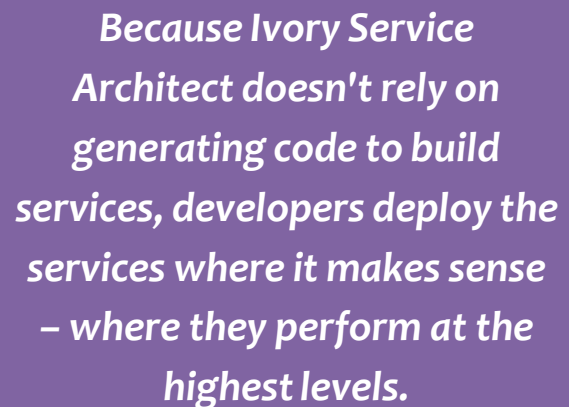## Real-Value Performance Gains

The new release of Ivory delivers significant performance gains across all versions of the Ivory Studio and Ivory Server as a result of an intensive code optimization effort.

Ivory Service Architect offers full support for efficient 'binary' XML, providing runtime performance gains across all versions of the Ivory Server. Additional performance improvements center on the processing of large XML schemas and orchestration of large Ivory Service Architect projects.

Ivory Service Architect supports deployment of mainframe-based Web services across the widest range of platforms, giving organizations broad flexibility in where they choose to house service-related workload. No other solution on the market today offers such a variety of options for mainframe integration.

> *Because Ivory Service Architect doesn't rely on generating code to build services, developers deploy the services where it makes sense – where they perform at the highest levels.*

Without requiring any changes to the service definition, Ivory Service Architect supports the deployment of mainframe-based Web services across z/VSE, z/OS, CICS/TS, CICS, IMS, Windows, Wintel, UNIX, and Linux.

The ability to automatically orchestrate Ivory-developed business services within the CICS environment is an especially enticing design for mainframe organizations. This architectural schema provides for "built-in" commit and rollback functionality across transactions. Alternative approaches force developers to build compensating transactions to achieve this level of functionality - an inelegant approach that delays deployment and creates significant maintenance issues.

The flexible architecture of Ivory Service Architect provides for dynamic cross-platform deployment, a key performance factor. Because Ivory Service Architect doesn't rely on generating code to build services, developers deploy the services where it makes sense – where they perform at the highest levels.

This kind of operational flexibility and service portability is not possible with service development approaches that rely on fixed code generation. In addition to making the services easier to build and deploy, Ivory Service Architect's no-code-generation approach streamlines maintenance, avoiding the hefty cycles required by most companies to rebuild and redeploy source-code-based applications.

Ivory Service Architect Superior Runtime Efficiency Wish List	
Integration Wish List	Ivory Service Architect Capabilities
Deployment Portability	Deploys natively on the mainframe or on middle-tier distributed platforms
Specialty Engine Exploitation	Supports offloading of service-centric workloads to all three IBM specialty engines – IFL, zIIP, and zAAP
Workload Allocation	Enables intelligent routing of specific workloads to the GPP or to the specialty engine of choice
Performance Gains	Delivers dramatic performance gains for mainframe integration architectures
Transactional Cost Savings	Enables substantial reduction in mainframe MIPS usage and the resulting transactional processing costs

Ivory Service Architect also enables effective service governance, providing the ability to interrogate the registry to identify available services and easily register newly created services.

Ivory Service Architect also automates the process of providing the information necessary for the service management component to understand new services and their orchestration, a key feature of Ivory Service Architect's integration into the broader composite 'ecosystem'.

Minimized Processing Costs

Complementing the tool's high-impact performance gains, Ivory Service Architect offers an unprecedented array of mainframe cost-saving options that provide true application agility for mainframe integration.

True runtime flexibility engenders cost reductions and dramatically reduces the Total Cost of Ownership (TCO) of the mainframe. In fact, Ivory Service Architect is now the only mainframe integration solution that fully exploits all three IBM System Z mainframe specialty engines.

> *Early indications from the Ivory Service Architect customer base suggest up to 80% savings when leveraging IBM specialty engine support over running the same workload on the mainframe GPP.*

Specifically, by directly supporting the Integrated Facility for Linux (IFL), System Z Integrated Information Processor (zIIP), and the System z Application Assist Processor (zAAP), Ivory Service Architect delivers immediate efficiency gains and dramatic reductions in mainframe million instructions per second (MIPS) usage.

Ivory Service Architect	
IBM Specialty Engine Exploitation	
IFL	Certified by IBM as 'Ready for zLinux'. Offloading of processing workload to the IFL avoids additional MIPs on the z/OS general processor. The IFL offers the largest reduction in MIPS, as the entire workload is shifted to the IFL engine.
zIIP	Leverages the zIIP specialty engine, or more specifically, the inbound SOAP packet XML parsing, the Ivory runtime XML parsing, the outbound SOAP XML packet processing, and movement nodes, effectively decreasing MIP usage on the z/OS GPP and enabling processing cost reductions
zAAP	Supports the IBM XML Parser, which runs on the zAAP. Some workloads can run on the zAAP, while using the XML Parser for smaller payloads where moving to the zAAP would not provide a benefit. Offloading of XML parsing to the IBM XML Parser on the zAAP reduces total GPP usage, and costs.

Mainframe specialty engines are not governed in speed, delivering much stronger performance than workloads running on the General Purpose Processor (GPP). Integration and transactional workloads running on or exploiting one or more of these specialty engines does not incur charges against the mainframe's processing capacity, resulting in significant reductions in integration-related MIPS usage.

Early indications from the Ivory Service Architect customer base suggest a savings of up to 80% when leveraging the IBM specialty engine support over running the same workload on a mainframe's general purpose processor (GPP).
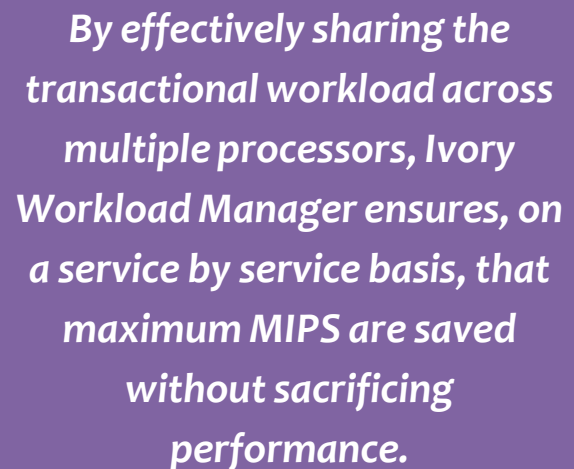
Intelligent Workload Allocation

In addition to supporting transactional-offloading to these three IBM specialty engines, Ivory Service Architect goes even further in enabling enterprises to get the most out of their specialty engine investment. As part of Ivory Service Architect, Ivory Workload Manager provides intelligent routing to determine when and how service-centric transactional workload is allocated to the GPP or specialty engines.

> *By effectively sharing the transactional workload across multiple processors, Ivory Workload Manager ensures, on a service by service basis, that maximum MIPS are saved without sacrificing performance.*

It is important to remember that not all workloads are created equal, and where developers decide to route specific service workloads has a large impact on performance and costs savings. Some of these workloads should remain in the GPP, whereas others can easily be off-loaded to the appropriate specialty engine.

Since most organizations are generally undecided on which engines are strategic, Ivory Workload Manager allows developers to choose an option today, zAAP for example, and change direction tomorrow to IFL without redevelopment.

By effectively sharing the transactional workload across multiple processors, Ivory Workload Manager ensures, on a service by service basis, that maximum MIPS are saved without sacrificing performance. This new level of risk avoidance and flexibility makes Ivory Service Architect the most cost effective mainframe integration tool on the market today.

Ivory Service Architect Customer Success

A subsidiary of Barclays Bank PLC, ABSA Group Limited is one of South Africa's largest financial services organizations, employing over 40,000 associates who serve personal, commercial, and corporate customers.

ABSA's IT infrastructure was in desperate need of a robust mainframe integration solution. They wanted to expose a great deal of business-critical IMS and MQ Series functionality that was residing within an MVS environment. They were struggling with delivering a single solution across all their business channels.

Objectives – Architectural Flexibility

Their inability to reuse existing mainframe functionality was drastically slowing development efforts and hurting everyday business. They decided to take a strategic mainframe integration approach and turned to Ivory Service Architect.

They wanted to reuse IMS logic across more than 30 business channels, hoping to expose and consume a variety of business services across all channels with a significant need to increase developer productivity during this initiative.

Results – Amazing Success

After 18 months, ABSA has deployed over 110 distinct composite services serving a variety of core business functions. They have over 10 million mainframe web service requests per day! These IMS applications are now essentially 'presentation-agnostic' and are offered via any business channel.

> *Using Ivory Service Architect, after 18 months, ABSA had deployed over 110 distinct composite services that serve a variety of core business functions. They are seeing over 10 million mainframe service requests per day.*

This dramatic increase in development productivity and rapid time-to-deployment has emboldened ABSA's IT leadership. After witnessing such a large-scale reuse of proven mainframe functionality, they added over 300 services in the following 6 months.

Summary

Ivory Service Architect is a 'next-generation' mainframe integration solution that offers tremendous benefits to enterprise IT organizations. Delivering robust service orchestration, optimal developer productivity, and superior runtime efficiency, Ivory Service Architect delivers true architectural flexibility to the enterprise and dramatically lowers TCO of the mainframe.

Ivory Service Architect: True Architectural Flexibility	
Robust Service Orchestration	Cross-Platform Mainframe Support 'Bottom-Up' and 'Top-Down' Design Right-Size Service Granularity Maximized Potential for Reuse Minimized Downstream Maintenance
Optimal Developer Productivity	Decreased Project Scoping Costs Reuse of Mainframe Knowledge Set Decreased Consulting Costs Reduced Training and Support Costs Quick Time to Deployment
Superior Runtime Efficiency	Cross-Platform Deployment Portability Full IBM Specialty Engine Exploitation intelligent Workload Allocation Substantial Performance Gains Dramatic MIPs Cost Reductions

As enterprise architects and developers move forward in constructing a flexible, dynamic service-centric infrastructure of tomorrow, they will need to leverage and reuse the proven mainframe processing power of today. Ivory Service Architect is the bridge that spans the chasm of platform disparity, and enables forward-thinking enterprises to effortlessly exploit existing mainframe assets in the modern distributed computing world of tomorrow.

About GT Software

For over 30 years, GT Software has helped enterprise organizations unify business information across platforms, data formats and programming languages – including the "hard to access" mainframe. More than 2,500 organizations across the globe trust GT Software to help them improve business intelligence, workforce productivity and customer experience.

For more information, please visit GTSoftware.com.