



Transform your VSE/ESA system into a scalable e-business transactional server today using VisualAge Generator

The e-business application architecture

e-business is a simple concept: an e-business is an organization that connects critical business systems directly to key constituencies (customers, employees, suppliers and distributors) via the Web (Internet, intranet and extranet). But this simple concept becomes powerful quickly. As customers, employees, suppliers and distributors are all connected to the business systems and information they need, e-business actually transforms key business processes.

Developing e-business applications requires bringing the enormous value of the existing IT assets into a web centric world, a world where your competitor is just one click away, a world where systems that fail to provide adequate response and availability can have devastating effects.

The e-business application architecture that maximizes ease and speed of development and deployment, accommodates any client device, ensures portability across a diverse server environment and leverages and extend existing assets, is a server-centric topology with thin-client, dynamically-built HTML content. In a Java context this architecture, shown in fig. 1, is implemented using Java servlets and JavaServer Pages (JSP), and it is often referred to as the *Model/View/Control* architecture.

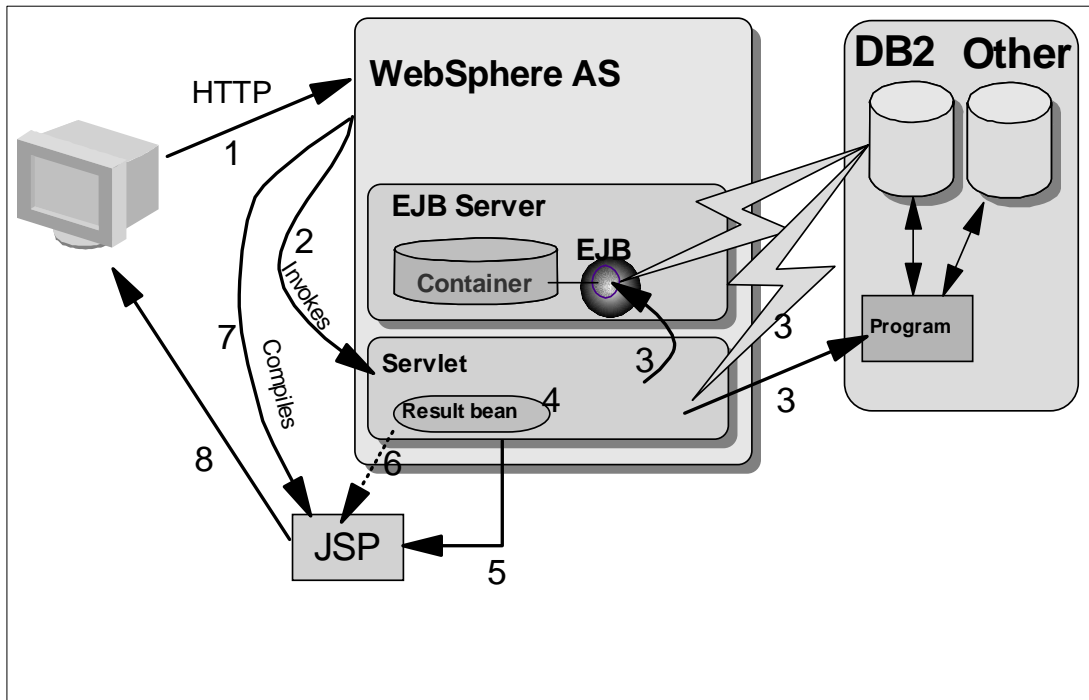
- *View* refers to the User interface (UI) and relative logic (validation and formatting). Implemented through JSP.
- *Control* refers to code running on web server that handles requests and dispatch services and in general manages the application flow. Implemented through Java servlets.
- *Model* refers to the data access and manipulation, transaction management and back-end business logic. This can be implemented in three different ways:

1. Java programs accessing relational database directly through JDBC, SQLJ. In this case, the business logic resides in the Java program executing in the middle-tier Web Application Server.

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2. Java programs gathering data via an Enterprise JavaBean (EJB). In this case, the business logic also resides on the Java program executing in the middle-tier Web Application Server

3. Java programs gathering data via some sort of connection to third-tier resources such as
- connectors that allow communication with Java stored procedures
 - connectors to non-Java programs that access legacy data



- connectors to data management software residing on third-tier platforms
- connectors to other types of information such as workgroup or ERP applications/data

Fig. 1 : e-business application architecture

Your S/390 running VSE/ESA can host the entire *Model* component of the e-business application architecture we just described, allowing you to exploit the processing power of your S/390 and to leverage your existing data assets. Using VisualAge Generator as your application development workbench, you can quickly develop, test , generate and deploy today, all the components of a scalable e-business solution, transforming your VSE/ESA system into a powerful e-business transaction server!

Evolution or revolution? The challenges of e-business application development

Clearly, your e-business transformation will not and cannot take place overnight. You will continue to develop and extend traditional systems, both 3270 terminal attached and GUI-based client/server, while gradually introducing innovative web-based ways to automate new business functions. It is important, therefore, that your new application development tools facilitate this evolution, instead of dictating a revolution.

One major challenges you will face in this transformation is that of adapting existing programming skills to the requirements of the e-business architecture, and specifically dealing with the complexities of tier-2: learning OO programming to design and develop Java servlets and JSP, mapping data between Java objects and flat data structures, understanding Java connectivity to the host, managing sessions, saving and restoring application state between web pages, etc.

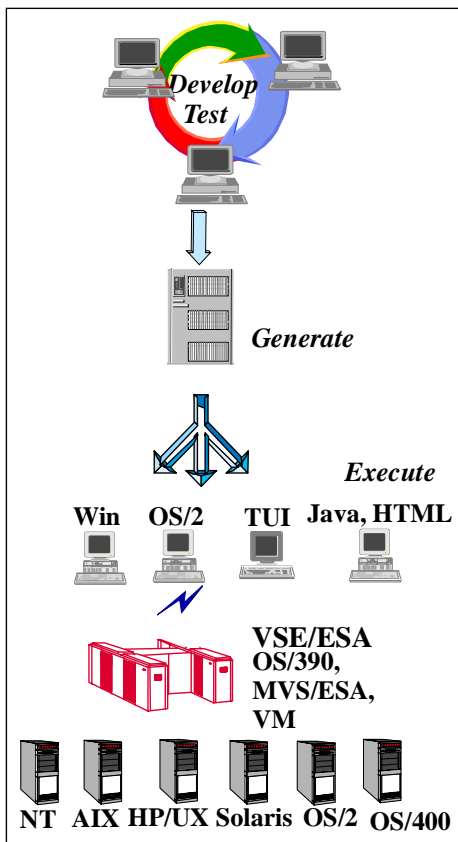
IBM's answer: VisualAge Generator

IBM is one of the recognized leaders in Application Development technology with its VisualAge family of products, which pioneered the now widely accepted concept of visual construction from components. VisualAge Generator is IBM's VisualAge offering focused on bringing productivity to organizations facing these challenges. It is a powerful, integrated development workbench used by programmers to fully define, test, build and deploy traditional as well as web-ready enterprise level systems in record time.

A powerful simulation and test environment enables the programmer to fully test the system without ever compiling or deploying to the final target system. This environment, built and integrated into the development workbench, allows rapid iteration between specification and verification.

Once the application is fully verified, a code generation facility transforms the high level specifications into native 3GL source code optimized for the selected execution systems for compilation and deployment in production.

This solution combines the best of both worlds...all the productivity of an iterative desktop development environment with the scalability and the performance of a compiled and optimized 3GL production application.



Programmer Productivity.

To boost programmer productivity, VisualAge Generator has been equipped with four core facilities:

- Data model driven automatic code generation

Industry research has shown that the bulk of the code (up to 80%) written to implement business applications has nothing to do with the business problem, but it is necessary to establish the "mechanical" infrastructure of the system providing functions such as handling error conditions, keeping track of positioning within an array of data, etc.

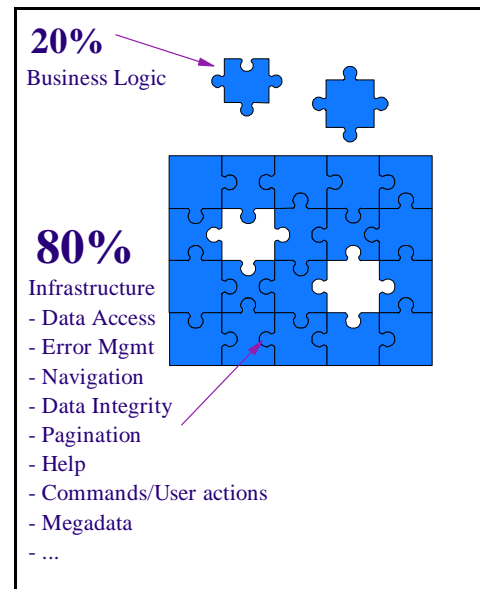
Using the VisualAge Generator Templates facility, developers can have the application infrastructure (framework) automatically generated by the system, reducing the coding requirements up to 80% and allowing the creation of a fully functional database manipulation application in a matter of minutes!

Once this application framework is generated, developers simply add the business logic using the standard VisualAge Generator specification facilities to complete the creation of the system.

- Visual construction from components

VisualAge Generator includes IBM's award winning visual, component-based construction architecture. This facility is much more than a User Interface (UI) layout builder: programmers can build their own components and make them available for reuse, or they can take advantage of pre-built, pre-tested components sold by IBM or third parties, visually assembling them to meet their system specifications.

Hundreds of reusable components are already available and with the growth in popularity of JavaBean and Enterprise Java Bean component models, thousands more will become available, allowing IT shops to implement a "Buy and Integrate" application development strategy instead of the traditional "develop from scratch" approach.



- High level 4GL specification facility.

VisualAge Generator provides a simple and yet powerful specification language. This language includes a set of high-level and polymorphic constructs, such as I/O verbs, Unit Of Work (UOW) management verbs, and Remote Procedure Call (RPC), and hides the complexity of underlying target execution environment. The programmer, therefore, can focus on the business problem rather than on writing to complex API's.

Beyond the abstraction provided in the language, VisualAge Generator includes many aides to make 4GL programming even more productive. These include powerful utilities such as language sensitive editors, wizards, and graphical assistants. Each is fully integrated and designed to speed the programming effort and help to prevent or eliminate errors.

- Interactive test facility integrated with the development facilities

The most powerful feature of the development workbench is the Interactive Test Facility (ITF). This facility is tightly integrated with the specification environment, allowing programmers to easily specify, animate and verify the application without leaving the development environment. This rapid iteration between specification and verification, frees

the developers from costly generation/compilation and deployment steps, and facilitates an evolutionary prototyping development approach.

Fulfilling the enterprise requirements.

An “enterprise class” application development solution must be capable of fulfilling the following key requirements:

- Provide a robust development workbench that can scale up to large development teams.

VisualAge Generator is equipped with integrated repository services that facilitate Software configuration management and version control. In addition, it is possible to transfer VisualAge Generator source specifications between the integrated repository and external SCM tools.

- Deliver systems that can scale up to the highest transactional throughputs.

VisualAge Generator generates COBOL and C++ source that can be compiled and run under the control of TX Series, CICS/ESA, and IMS/TM transaction managers. This native support of the most proven TP monitors in the industry assures the transactional scalability required by the most demanding business critical systems.

- Produce systems that can run on a wide variety of platforms

The code generated by VisualAge Generator can run not only as VSE/ESA CICS transactions, but on a variety of client and other server platforms, including Windows 95/98, Windows NT, Sun Solaris, OS/2, AIX, HP/UX, OS/390, OS/400. This ensures investment protection as companies evolve their IT infrastructure or add new runtime environments.

- Ease the integration with existing legacy systems, allow access to legacy data

VisualAge Generator systems can easily reuse existing legacy programs through a simple CALL API, and can also be invoked by hand-crafted existing COBOL or other 3GL programs. In addition, VisualAge Generator programs can access not only the most popular Relational databases such as the DB2/UDB family, Oracle and others, but can easily manipulate legacy file systems, such as VSAM, and non relational IBM databases, such DL/I. This allows to easily integrate new applications into existing IT infrastructures maximizing the protection of the previous investments.

- Deliver enterprise IT assets to the web

VisualAge Generator allows to develop end-to-end multi-tier systems with Java servlet/JSP dynamic HTML front-ends, transparently connected to transactional servers running on VSE/ESA or on any of the supported server platforms and transactional systems mentioned earlier in this article.

- Be useable by traditionally skilled programmers

Although VisualAge Generator is tightly integrated with a pure Object Oriented programming environment (Smalltalk or Java) the programmer can exploit these technologies without the need to learn OO programming, and simply use the procedural 4GL specifications. The power of the underlying OO technology, however, can be gradually unleashed as the developer becomes more familiar with the component architecture and begins to explore and exploit the additional facilities.

Delivering e-business solutions.

- Web Transaction Rapid Application Development

The Web Transaction RAD facility is an innovative and simple methodology that allows traditionally skilled programmers to develop, test and deploy multi-tiered web systems without having to deal with the complexities of tier-2, such as designing and developing servlets and JSP that manage and contain data provided by tier-3 servers (mapping data between java objects and flat data structures, understanding API for host connectivity, and so forth), manage sessions and state, etc. Using this approach, developers can specify their system at a logical level, and let VisualAge generate both tier-2 (Java and JSP) and tier-3 (C++ or Cobol) code that implements those specifications.

- Integration with VisualAge for Java

The VisualAge Generator Developer workbench is seamlessly integrated with the award winning VisualAge for Java workbench to provide the most powerful e-business Integrated Development Environment (IDE) in the industry. Programmers can develop and test Java clients (applications, applets or servlets) using either Java or 4GL specifications, or a mix of both, easily exchange data content between Java variables and VAGen data items, cross invoke business logic implemented in the two languages, and animate both source definitions in a seamless interactive debugging environment, facilitating traditional skills transition while delivering Java solution.

Tier-3 server logic, specified in 4GL, can be defined and tested together and seamlessly with the client prior to the generation of C++ or COBOL for the target runtime.

- Generation of Java Beans and Enterprise Java Beans.

Programmers can automatically generate, from VisualAge Generator server programs specifications, Java Beans and Enterprise JavaBeans that can be used within any Java

program (applet, application or servlet) to connect to and exchange data with a VisualAge Generator server program.

A Customer Success

CRPNPAC is a financial company that manages Pension Funds for Airline Industry employees with headquarters in Neuilly Sur Seine, Cedex, France. The advent of client/server provided the impetus to provide a more efficient and productive way for the agents to manage and update the clients pension contracts stored in their database running on a VSE system. The aging existing application that provided this service was cumbersome and difficult to use as the 3270 technology did not allow easy navigation in complex contracts with multiple sub-clauses. A small pilot project helped determine that client/server was the right approach to simplify and streamline the system thus making the end users far more productive.

The application development tool to be used for the full scale project had to guarantee portability across VSE, OS/2, Windows NT and AIX, had to allow the development of the complete solution, both client graphical interface as well as server transactional programs that would run on the VSE/CICS machine where the DB2 database resided, and had to guarantee an easy integration with the existing COBOL/CICS legacy applications.

IBM VisualAge Generator met all the requirements. The new system was designed and developed using an iterative prototyping approach; the existing development team without the need to add additional and specialized skills, was able to deliver in record time a sophisticated system where options can be selected from combination boxes on different tabs or notebook pages, and relevant data is separated onto different tabs to help the user navigate between different contract and subcontract possibilities. With the redesigned application, users can answer client questions faster and more accurately, and propose relevant new services to the client.

CRPNPAC has already migrated the VisualAge system to the latest version 4 and is beginning to extend the use of the application to the web for a self-serve Internet based solution, providing their Customers even better service. Thanks to the new e-business functionality offered by the latest version of the product, all the existing code can be used, with minimum investment, retraining and disruption for a smooth transition into e-business!

Product Evolution

As the topology of e-business solutions continues to evolve towards thin clients and component-based servers, the Enterprise JavaBeans (EJB) open industry standard will establish itself as the key technology for deploying scalable and flexible solutions.

VisualAge Generator, is designed to enable enterprise developers to create application systems through very productive high level abstractions that simplify the programming complexity of a wide range of runtime platforms and transactional environments. As the EJB platforms become

available, the need for high productivity tooling will extend to such new environments, and VisualAge Generator intends to continue supporting the emerging Enterprise JavaBean Servers (EIS) as new runtime environments within the context of web application development. VisualAge Generator will therefore be enhanced with the ability to logically define business objects which will be automatically generated into EJB Entity Beans.

More and more enterprises are improving and streamlining business processes through the connectivity and flexibility offered by Messaging and Queuing middleware. To facilitate the exploitation of IBM MQ Series, VisualAge Generator is being extended to significantly reduce the coding required to develop MQ systems.

IBM also intends to enhance VisualAge Generator code generation capabilities with server side Java source generation, in addition to the current COBOL and C++ , and expand to additional runtime server platforms (such as Linux, SCO Unix , and others) according to market requirements. This will enable Customers to continue to rapidly build and deploy e-business systems that meet the most stringent availability, scalability and performance requirements of today's and tomorrow's networked business world.