

What's New in CA Gen r7.x Series?

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Executive Summary

Challenge

IT organizations are under constant pressure to do more with less and quickly react to ongoing changes related to technology, legislation and ongoing business demands. It's not enough to deliver applications on-time and within budget, IT investments must be linked with business strategies, keeping pace with new business and technology opportunities, while at the same time maintaining the existing application infrastructure.

Opportunity

CA Gen is a world class model-driven development environment that enables organizations to speed the delivery and maintenance of multi-platform solutions using integrated models and 100% code generation. CA Gen provides flexible deployment options, including platforms, languages, middleware and databases. CA Gen enables developers to use flexible methods to construct reusable software components, integrate solutions, web-enabled applications as well as modernize legacy system to new technologies and platforms.

In addition to speeding application delivery, CA Gen also significantly reduces maintenance efforts since design changes occur in the model, not the code. CA Gen insulates organizations from technology change, enabling them to quickly deploy to new platforms, such as .NET, J2EE and Web services without being experts on the target environments and rewriting the code.

Benefits

CA is committed to providing ongoing enhancements to CA Gen which empower IT organizations to deliver the right mission- critical applications faster, with better quality and significant return on investment.

The CA Gen r7.x series of releases (r7, r7.5, r7.6) provide numerous enhancements that increase platform flexibility, speed time to market with increased developer productivity and improve performance of generated applications.

This paper outlines the key features included in the latest CA Gen r7.x series of releases and the benefits they deliver. The cumulative benefits of each of these releases can be obtained by upgrading straight to CA Gen r7.6.

The New CA Gen r7.6 Release

CA Gen r7.6 provides enhancements that improve application performance, increase platform and database flexibility, as well as further increase developer productivity. Some of these enhancements include:

- Support for CA Datacom as a target DBMS
- Diagram Trace Facility for increased developer productivity and improved application quality
- Increased z/OS compatibility features
- Web Generation performance improvements

CA Datacom® Support

CA Gen has been enhanced to support CA Datacom as a target DBMS for generated CICS COBOL applications. CA Datacom is a high-performance relational DBMS that runs on mainframe systems. CA Gen has been enhanced to provide a CA Datacom technical design. An application's DDL and code can be generated from the CA Gen Toolset, Client/Server Encyclopedia or Host Encyclopedia. The Host Encyclopedia and z/OS Implementation Toolset (IT) have been enhanced to install the DDL and code generated for CA Datacom.

Database Schema Import Facility

The Database Schema Import Facility is an optional CA Gen plug-in application that enables the creation of new applications using data stored in a CA Datacom database by performing the following steps:

- Use ODBC to read the schema of an existing CA Datacom database
- Import schema into a CA Gen data model
- Create a technical design using CA Gen transformation features
- Design new application using imported model information to access the existing CA Datacom database

Diagram Trace Utility

The new Diagram Trace Utility is an interactive debugging tool for CA Gen applications generated in C, Java and C# languages running on Microsoft Windows, UNIX, and Linux operating systems. CA Gen applications are modeled using easy-to-understand Procedure Action Diagram (PAD) language statements. During code generation, the PAD language statements are converted to appropriate programming language statements based on the selected target language (C, Java, or C#).

The new Diagram Trace Utility provides a user-friendly graphical user interface (GUI) that contains numerous options to customize the utility to suit your needs. It enables developers to trace the execution of PAD statements, examine the contents of views and system attributes to locate the problems in your application. Support has also been added to the CA Gen server runtime so that Tuxedo and WebSphere MQ server applications can now be traced using the Diagram Trace Utility.

The following features help you debug your applications:

- Display and modification of PAD view data and system variables
- Evaluation of defined expressions
- Breakpoints to control program execution
- Bookmarks in Action Diagrams enabling quick navigation to items of interest
- Region expansion and contraction
- National Language Support capability
- Syntax coloring
- Accessibility features

Server applications can be debugged using the Diagram Trace Utility, with one limitation. For remote server applications, one Diagram Trace Utility can communicate with one running server installation. If you need to have multiple users tracing the same server installation, you should run multiple server installations that in turn can communicate with unique Diagram Trace Utilities.

Changes in behavior have been made to make the new Diagram Trace Utility comply with Eclipse standards. For example, when a breakpoint is encountered, the application you are tracing will not automatically give focus to the Diagram Trace Utility. Instead, the Diagram Trace Utility icon in the Windows Taskbar flashes to signify that a breakpoint was encountered. Similarly, if you resume debugging when no breakpoints are set, you should switch focus to your running application. For detailed information on this new feature, see the CA Gen Diagram Trace Utility User Guide.

Visual Studio 2005

CA Gen software has been upgraded to be compatible with Microsoft Visual Studio 2005, and allows use of its new manifest files feature.

Cross Context Flows

Cross Context Flows is a feature that facilitates Component Based Development (CBD) for Java Web Generation applications. It allows you to develop and deploy components of your applications independently in separate web applications. A Cross Context Flow occurs when the procedure steps participating in either a flow or a Procedure Step USE are deployed in separate EAR files. You can configure security at the level of each component and flow between secure and non-secure contexts using the Cross Context Flows feature. For detailed information on this new feature, see the CA Gen Web Generation Guide.

z/OS Dynamic Program Call Compatibility Feature

Releases of CA Gen prior to r7 compiled z/OS COBOL applications to perform dynamic program calls using the COBOL OS load and branch technique as a means of supporting dynamic calls from one program to another.

A new Compatibility feature has been added to CA Gen r7.6 that allows older, COBOL OS style dynamic program calls to be made from a CA Gen r7.6 generated DLL application to pre-existing application modules. This feature is only available in models converted to the 9.1.A5 schema and only when using CA Gen r7.6 tools and runtime.

The Toolset, CSE, and Host Encyclopedia now allow the Dynamically Link Packaging property that is associated with an individual procedure step, screen, or action block to be set to Compatibility. This new property setting indicates that the item already exists and prevents the item from being generated, compiled, or linked. If the generator encounters a Compatibility item, a warning indicating that Compatibility modules will not be generated is output. The warning is informational and does not interrupt the selected generation or install processing.

When the Dynamically Link Packaging property of an item is set to Compatibility, Intelligent Regeneration on the Host Encyclopedia generates any calling module in the model. An item that has its associated Dynamically Link Packaging property set to Compatibility may show up in regeneration lists due to the property change, but because it is designated as Compatibility, the item will not be generated.

When an application generated with the CA Gen r7.6 software executes a dynamic program call to a COBOL module that is marked for Compatibility, any module it dynamically calls must also be a non-DLL z/OS load module. To help identify interaction with modules designated for Compatibility, the CA Gen r7.6 software provides the following assistance:

- Two new reports can be produced for models contained in either a Host Encyclopedia or a CSE:
 - MODEL ACTION BLOCK USE REPORT** Displays all procedure steps and all the modules it calls for a specified model by Business System.
 - MODEL COMPATIBILITY USE REPORT** Displays only modules marked for Compatibility and all the modules it calls.
- Four new Consistency Check rules have been added. Three of these rules warn users about the possible implications of nested calls that use CA Gen USE statements, SET USING statements, and derivation algorithms. When those statements target a module marked for Compatibility, the target action block is examined to determine if it contains program calls to any other module. A inconsistency is reported as a severe warning if the target of any dynamic program call subordinate to this module is not also marked for Compatibility. The fourth rule informs the user that a screen contained within the model is marked for Compatibility and only standard map block mode screens can be the target of a dynamic program call issued from CA Gen r7.6 DLL modules.

Java-Generated Applications

The Java package name in generated applications has been updated in the CA Gen r7.6 software to enable applications generated with CA Gen r7.6 to run concurrently with applications generated with prior versions of the software. Therefore, you must regenerate your Java applications to work in a CA Gen r7.6 environment.

Performance Enhancements for Web Generation

Web Generation applications have been streamlined to use less memory, providing improved throughput of your application server.

The WAR tab of the Build Tool Assemble dialog now has the following two additional options that you can select for compression:

- **COMPRESS STATIC CONTENT** Compresses static content, such as generated HTML and JavaScript files, using the GZIP compression algorithm. When the static content is requested by the browser, the runtime requests the compressed version of the file from the application server. This content is then streamed to the browser, which automatically decompresses the content.
- **COMPRESS DYNAMIC CONTENT** Compresses all content generated at runtime using the GZIP compression algorithm. This content is streamed to the browser, which automatically decompresses the content.

Compression will reduce the amount of data being sent between the browser and the application server and consequently improve performance.

SECTION 2: **BENEFITS OF CA GEN r7.5**

What's New in CA Gen r7.5?

CA Gen r7.5 provides numerous enhancements that improve application performance and flexibility, as well as further increase developer productivity. Some of these enhancements include:

- Increased platform flexibility with Linux support, including native code generation on Linux
- Enhanced Precision Math Library technology provides application performance improvements
- New accessibility features for Java Web applications increase usability of generated applications
- Dynamic Cascading Style Sheets simplifies and speeds development of web applications
- ASP.NET enhancements increase performance and support for .NET applications
- z/OS Runtime enhancements increase reliability and performance of generated mainframe applications
- Build Tool enhancements increase developer productivity

Precision Math Libraries

Starting with CA Gen r7.5, the underlying technology used for providing decimal precision math has changed. Applications generated with CA Gen r7.5 will use less CPU resources compared to prior releases. The amount of improvement is application dependant. Applications with long complex expressions or extensive database access using Oracle, Microsoft SQL Server, or ODBC should show the most improvement.

Linux

The CA Gen Implementation Toolset, Transaction Enabler, and User Funnel have been ported to Linux running on Intel x86 (or compatible) 32-bit hardware. Online block mode and distributed process server applications can be generated to target Linux using the C language. The generated applications use embedded SQL to access Oracle or IBM DB2 UDB databases.

Accessibility Feature for Java Web Applications

Many countries have regulations that require electronic and information technology be accessible to people with disabilities. The Java Web Generation option has been enhanced in CA Gen r7.5 to enable generated web applications to be accessible entirely via the keyboard, without the need for a mouse. Java web applications generated with CA Gen r7.5 can be read by specialized accessibility software. All controls generated by the CA Gen Java Web Generation feature comply with accessibility requirements including being keyboard-enabled.

Dynamic Cascading Style Sheets in Java Web Generation

Dynamic Cascading Style Sheets allows web authors to attach styles (e.g. fonts, colors, spacing) to web documents. In CA Gen r7.5, Java Web Generation now supports the generation of display properties as cascading style sheets instead of inline style attributes. This feature lets users modify a common business system cascade style sheet and influence the appearance of all windows and controls in a business system. In addition an overriding CSS file may be used to supersede the style statements in a generated common business system cascade style sheet.

z/OS Runtime Enhancements

In CA Gen r7, the z/OS Runtimes were enhanced to keep pace with IBM mainframe platform improvements and the C components of the z/OS runtime were converted from SAS/C to IBM C. This conversion enables CA Gen to support dynamic linking of runtimes and the use of DLLs. The CA Gen r7.5 z/OS runtime is now a multi-language execution environment made up of C, COBOL, and Assembler code. The fact that these runtimes now use DLLs instead of static linking provides these benefits:

- Eliminates need to re-link generated applications for maintenance and new releases post r7.5
- Provides industry standard approach to dynamic program management
- Increases capability and flexibility for the future
- Reduces module sizes
- Reduces redundant copies of code in storage

These runtimes have also been updated to full IBM Language Environment (LE) conformance. They have been updated to use the standard LE call interface, which reduces the complexity of the runtime code and improves storage management performance. The runtimes have been made fully re-entrant and threadsafe, which enhances the reliability and performance of the runtime and generated applications they support.

We recognize these enhancements will require reinstallation and regeneration of your mainframe applications, a rarely required activity for your development organization when upgrading CA Gen. But we clearly had reached a critical stage in the evolution of CA Gen, and our goal was to provide a basic structure to support future development, improve basic performance and serviceability, as well as remove the roadblocks that prohibited full participation in modern applications.

ASP.NET Enhancements

CA Gen r7.5 enhances ASP.NET support. Changes range from performance to new features mainly to match Java Web Generation in CA Gen r7. In addition, the following features were added:

- Customizable Close and Help Buttons
- Support SetBitmapName
- CBD Techniques in ASP.NET
- Dynamic Images and Multi-State Bitmaps
- Varying and Fixed Size Tables
- Hypertext Links
- Extended Selection for Listboxes
- Listboxes in ASP.NET Web Clients

Build Tool Enhancements

A number of enhancements have been made to the Build Tool related to the Profile Manager User Interface, addition buttons to support adding and removing modules in viewing modes, support for right mouse button activated pop-up menus and the ability to specify session timeout for assembly operations.

Component Manager

The CA Gen Component Manager facilitates Component Based Development (CBD) in the CA Gen product family. With this release the Component Manager supports models in 9.0.A2 and 9.1.A5 schema on the Client Server and Host Encyclopedias and 9.1.A5 on the Local Encyclopedia.

What's New in CA Gen r7?

CA Gen r7 provides increased platform flexibility with .NET Framework support and C# code generation. CA Gen r7 also enables developers to speed time to market with increased team productivity and improved performance of generated Web applications.

Support for Microsoft .NET

CA Gen r7 now generates applications that target the Microsoft .NET environment, further extending the platform flexibility of CA Gen. Some highlights of this new support include:

- Ability to generate CLS-compliant C# code
- Generate Web Clients for the ASP.NET environment
- Server Procedure Steps can be generated as .NET Servers executing under Microsoft Component Services
- Communications between the ASP.NET Web Client and CA Gen .NET Server is through .NET Remoting
- The .NET Proxy allows user-written .NET applications to access most CA Gen servers via the TCP/IP or .NET Remoting cooperative runtimes

- Hand developed .NET clients may call generated .NET servers without using a generated proxy
- Expands the number of cooperative flow runtimes between CA Gen clients and servers

Microsoft .NET Framework and ASP.NET

The Microsoft .NET Framework is a Microsoft Windows component for building and running the next generation of applications and XML Web services. The Microsoft .NET Framework consists of two main parts: the common language runtime (CLR) and the Framework libraries (FCL).

The FCL includes Microsoft ASP.NET for Web applications and XML Web services, Microsoft Windows Forms for smart client applications, and Microsoft ADO.NET for loosely coupled data access. This version of CA Gen targets only the Microsoft .NET Framework. CA Gen generates C# applications with C# runtimes to provide thin client ASP.NET Web applications.

To provide client/server capabilities, CA Gen ASP.NET Web clients can access CA Gen CICS, IMS, TE (Windows and UNIX), Tuxedo (using TCP/IP) and Microsoft .NET servers.

ASP.NET IMPLEMENTATION includes the following features:

- Generated C# code
- Internet Information Server (IIS), the application server used with ASP.NET applications
- Internet Explorer, the only Web browser used with ASP.NET applications
- The GUI user interface design is the basis for the ASP.NET user interface
- User interface modifications can be designated as common across the Windows for GUI, ASP.NET, or HTML for Java, or they can be made specific to each individual target environment
- Third-party Web controls can be hosted in the toolset and supported by generated applications
- Action block logic is common across target platforms
- Generation takes place on the Windows workstation or CSE (the Host is specifically excluded)
- Database access is through ADO.NET
- CA Gen Referential Integrity (RI) and DBMS RI are supported
- There is no 32K Common Format Buffer limit on the ASP.NET Web client to CA Gen server for .NET server flows
- ASP.NET Web client-to-C and COBOL server flows to CA Gen generated servers in the following TP environments; CICS, IMS, Tuxedo, and TE through TCP/IP

CREATENETOBJECT is an extremely powerful function included in the ASP.NET environment. CreateNetObject allows users to load any .NET assembly and instantiate one of its public classes during the execution of an ASP.NET application. CreateNetObject returns a reference to this object that can be used to access its methods, properties and fields. CreateNetObject allows the user to expand the capabilities of their application from within the model in an ASP.NET environment.

CA Gen .NET Servers

This feature allows customers to generate their server procedure steps as COM+ serviced components. Combined with the ASP.NET feature described earlier, this allows customers to generate a complete .NET application from a CA Gen client/server model.

The server load modules are generated for execution under COM+ - the next evolution of Microsoft Component Object Model (COM) and Microsoft Transaction Server (MTS). CA Gen .NET servers include the following features:

- Generation of the Server Manager in C# as a COM+ application. A server load module is generated as a set of DLLs and executes under COM+
- Interoperation with CA Gen generated ASP.NET Web clients using .NET Remoting
- No 32K Common Format Buffer limit on the ASP.NET Web client to CA Gen Server for COM+
- Hand developed .NET clients may invoke CA Gen .NET servers without the need of a generated proxy
- A C to C# cooperative flow which allows MFC GUI clients and C and COM proxies to interoperate with CA Gen .NET Servers is provided

New Proxy Interface

CA Gen r7 provides a new Proxy API that presents a more object-oriented paradigm. The new proxy API is implemented in the Java Proxy and the new .NET Proxy.

Group Views, Rows, Entity Views, and Work Views are all created as classes that are referenced by their parents as designed in the CA Gen Workstation Toolset. This allows for a more intuitive method of addressing an attribute view within an import or export view. For example:

```
double amount = Export.Employee.Salary();
```

All import and export views can be easily serialized, cloned, reset and validated.

Repeating Group Views can now be accessed with a looping construct within the user code allowing more natural usage from the user code.

Other features include changing the interface to have purely independent implementation and allowing the code to be more efficiently used in multithreaded applications. Error notification is accomplished through the use of the native facilities of the implementation language by throwing exceptions.

Java Proxy Interface Changes

The Java Proxy has been modified to provide the new proxy API as the default interface. It should be noted that the new Java Proxy API is not backward compatible with the classic Java Proxy API. For this reason, the classic Java proxy API can be selected by checking "Use Classic Style API..." in the generation dialog.

.NET Proxy

The .NET Proxy is new for CA Gen r7 and implements the new proxy API described above. It exposes a C# interface to allow hand-coded .NET clients to interoperate with CA Gen servers running on specific platforms.

- High-level capabilities of this new feature include:
- The proxy code is generated in C# and provides synchronous, asynchronous, and XML interfaces
- The proxy generates sample code
- The proxy is supported by a new runtime written entirely in C#
- Generation can take place on the Windows Workstation Toolset or the Windows Client Server Encyclopedia
- Windows Build Tool is used to build the .NET proxy code and samples

To interact with the generated servers, the .NET proxy can use any of the following cooperative flow runtimes:

- TCP/IP cooperative flow to communicate with C or COBOL generated servers executing on CICS, IMS, Asynchronous Daemon or other platforms reachable through TCP/IP
- The new .NET Remoting cooperative flow to communicate with the new CA Gen .NET Servers

These capabilities allow the customer to integrate CA Gen into their existing .NET environment. Existing .NET applications can access generated servers, either on .NET or on other enterprise class platforms. In addition, CA Gen generated servers may be used by hand-crafted .NET client applications without the use of the .NET proxy.

User-Written Clients

The generated CA Gen EJB servers and the new CA Gen .NET servers have been enhanced to allow user-written clients to invoke them directly rather than having to utilize a generated proxy. The server's new interfaces are very similar to the new Java proxy and .NET proxy interfaces. This further extends the openness of CA Gen and increases your application integration options.

Build Tool

CA Gen r7 includes a new Build Tool with improved functionality and an updated user interface, making it easier to use. This new Build Tool replaces the existing Build Tool in Release 6.5 and prior releases, and is common across Windows and UNIX systems.

The new Build Tool provides the following enhancements:

- Java-based code provides a common version with similar features and capabilities across Windows and UNIX platforms
- Provides a GUI interface for both UNIX and Windows systems
- Retains the command line interface available on UNIX systems to facilitate batch processing. Adds a command line interface for Windows

- Provides multithreading capabilities to allow parallel builds to occur
- Provides a tool for assembling GUI, ASP.NET and Java applications
- Allows remotely administered builds so users can initiate, monitor and control builds on remote systems. Remote systems are supported on different platforms
- Provides distinct profiles on the same machine to enable specifying different setup options and simple switching between them
- Supports long directory names including spaces and NLS (National Language Support) characters
- Supports Application Versioning — users may set version properties for generated application DLLs and executables. This is valid for GUI and block mode applications and UNIX servers

Web Services Plug-in

The CA Gen r7 Web Service Wizard has a new interface. The Wizard fully automates the process of exposing new and existing CA Gen Java proxies as web services, further extending their ability to integrate with other external applications with no manual coding.

The wizard wraps the XML interface of the Java proxy so it can be installed on an Apache Axis SOAP server and receives and returns data formatted using SOAP. The wizard also generates a WSDL file that details the web service interface and a sample Java client source file that can be used as an example of how the web service is called. Also, the wizard generates the files needed to deploy the service to the Axis SOAP server and optionally allows the generated web service to be compiled and deployed to a local target environment.

The wizard is developed and deployed as a CA Gen plug-in. After this plug-in is installed, a menu item for it appears in the toolset Plug-in menu. Selecting this menu item runs the Web Service Wizard.

The wizard allows you to select the operations, or server procedures, to include in the Web service. It then generates the Java wrapper code for the proxy, the WSDL for the web service, a sample Java client to be used to test the Web service and the supporting deploy and un-deploy files used to indicate to Apache Axis that a new web service is available. If the web service is to be deployed locally, the wizard can optionally copy the necessary files from the generation directory to the correct locations under the Apache Axis directory structure.

You must download the free Apache Axis SOAP server and the Apache Tomcat application server, or get an application server that includes Axis. Some application servers that include Axis are highlighted on Apache Axis web site.

Web Generation Enhancements

The CA Gen Java Web Client has been extended to provide a set of new features to enhance the user interface and performance, as well as provide a more dynamic look and feel. These features include:

- Performance improvements specifically in the areas of View Matching and Set Cursor
- Support for dynamically changing multi-state bit maps and the 'SetBitmapName' function
- Three types of hypertext links

- Customizable help and close boxes
- Fixed size and varying size HTML tables
- Extended selection for list boxes
- Importing and mapping OCX controls using HTML editing

The supporting JavaScript in critical portions of web generated applications has been improved resulting in significantly improved performance.

SECTION 4: **CONCLUSION**

The cumulative benefits of each of the CA Gen r7.x releases can be gained by upgrading to the latest CA Gen r7.6 release. Additional information on the features discussed in this document can be found in the corresponding CA Gen user guides available on SupportConnect.

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