TECHNOLOGY BRIEF: CA GEN OUTLOOK

CA Gen Strategy and Vision

CA GEN PRODUCT TEAM
MAINFRAME BUSINESS UNIT
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Executive Summary

Challenge

IT organizations are under constant pressure to improve efficiency and quickly react to change. IT investments must be linked with business strategies, stay apace of advancing technology and maintain existing systems. IT investments in application development and the systems they produce are often the more challenging and important aspects of balancing responsiveness and cost effectiveness.

Opportunity

CA Gen is a model-driven, application development suite that helps organizations quickly develop and maintain multi-platform applications via 100% code generation. CA Gen supports many deployment options for generated applications, including platforms, languages, middleware and databases. CA Gen can be used to construct reusable software components, integrate solutions, create Web applications and modernize existing applications. CA Gen can significantly reduce maintenance costs, because design changes are made to the model and reflected in generated code. CA Gen insulates application design from changes in implementation technology. This enables rapid adoption of new platforms like .NET, Java EE and Web services without growing, retraining or replacing your staff.

Benefits

CA is committed to enhancing CA Gen to help quickly deliver higher quality mission-critical applications and significant return on investment.

Enhancements under consideration for CA Gen will help facilitate business agility, increase developer productivity, improve application performance and increase platform flexibility.

This paper outlines the benefits of key features planned for the CA Gen r8.x series of releases.

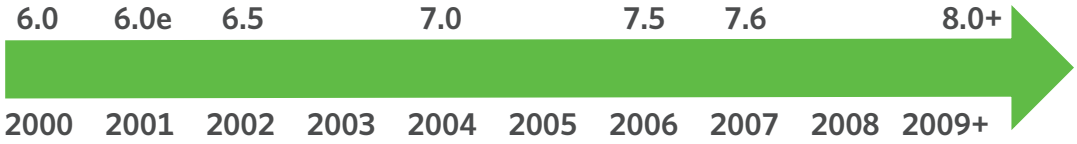
SECTION 1: OVERVIEW

CA Gen Vision and Strategy Overview

CA Gen provides a proven application development suite for designing, deploying and maintaining high-performance, scalable, enterprise applications. It allows you to quickly produce complex business applications in response to changing business requirements. CA Gen can be used to construct reusable software components, integrate solutions, create Web applications and modernize existing applications.

CA Gen helps hundreds of global businesses and governments create and maintain mission critical-applications. CA Gen is strategic to CA. CA is investing in new releases of CA Gen and integration of CA Gen with other CA products, and is always seeking opportunities to add value for you, our customers. Figure A, below, is a timeline of releases of CA Gen under CA's aegis. This time span covers approximately one third of CA Gen's service to the marketplace.

FIGURE A - CA GEN RELEASE SUMMARY UNDER CA



Three core CA Gen benefits are platform independence, technology independence and application portability – all of which preserve the intellectual property you have invested in your models. These benefits now extend to include the Java EE and .NET frameworks and to Web services. These were introduced in releases 6.5 and r7.0. Releases r7.5 and r7.6 introduced support for Linux® and HP Integrity (Itanium®) servers. These are examples of some of the ways CA Gen continues to deliver those key benefits (in addition to many other significant advancements in each release).

In addition to these core benefits, the current drivers of the vision for CA Gen include:

- On-going enhancements to existing functionality and re-implementation of design tools to current technology
- Easier CA Gen upgrades and application migrations
- Extending existing support of Web services and SOA
- Keeping pace with evolving technology and 3rd party products
- Integration with CA systems management, security and application life cycle solutions

Planned expansion of CA Gen core benefits to include:

- 100% code generation of complete applications
- Platform independence
- Application portability and integration
- Improved developer productivity
- Robust applications with proven performance

CA Gen Customers Report Significant ROI:

"All of these features translate into savings speed quality and control. It only cost us around fifty cents a line to develop code with CA Gen -- the industry standard is $8-$11 a line. CA Gen lets us build and deploy client/server transactions in hours that would take 2-3 days to develop test and install using other technologies. And the CA Gen distributed processing architecture ensures that those same applications can 'scale up': that they 'won't hit the wall' under industrial-class volumes."

Model-Driven Development Reduces TCO

A convergence of CA Gen capabilities and attributes combine to reduce the total cost of ownership of using CA Gen when compared to handwritten solutions. The root attributes driving the reduction are:

- Model-based development
- Platform span
- 100% Code Generation

CA Gen benefits business by helping to enable business application integration, reduce risks of platform transformation, and increase operational efficiencies (with reduced staff costs).

Model-Based Development

CA Gen allows teams of developers to quickly model the data, interfaces, logic, business rules, and interactions of application components at an abstract level. The resulting models are then easily checked for consistency and then transformed into executing business applications.

Developer Productivity

Developer productivity with CA Gen is increased through a variety of mechanisms. Working at the abstract level of a CA Gen model allows the developer to focus on solving the business problem rather than focusing on the technology or technologies the solution may be implemented in. CA Gen's code generation and debuggers combine to allow the developer to investigate algorithm issues from the perspective of the model. CA Gen generates 100% of the code for a solution, so that the developer is not required to implement the business logic inside a generated stub and contend with syntax issues. This increase in developer productivity can lead to faster time to market and more nimble applications which can both provide a competitive edge. The increased developer productivity may also lead to lower staff costs.

Maintenance Productivity

Maintenance efforts are also reduced with model-based development. A maintenance staff can more quickly discern what an application is supposed to do from a model than from source code. Changes applied to the model are reflected in generated code. Consistency checks of the model help verify that surprises will not occur in the changed application. As a result the maintenance staff can more quickly understand the problem, apply necessary changes and confirm that the needed changes have been made; thus, maintenance costs can be reduced and the application remains nimble.

Intellectual Property Protection

A considerable amount of intellectual property, experience, and expertise are embedded in the source code of applications. As a generation of COBOL programmers begin to retire it is apparent that the applications they created that are running businesses today are often not understood by the remaining staff. With a CA Gen model, that intellectual property is protected in two principal ways. First, the model is easier to understand than the equivalent source code. Second, the model can be used to generate the application in another programming language like Java while retaining the capabilities of an application originally generated in COBOL, or vice versa.

"CA Gen lets us quickly 'ramp up' staff for new projects. The knowledge engine development methods and consistency checks built into the CA Gen toolset lets us take entry-level developers who understand rudimentary programming and turn them into builders of high-performance multi-platform communicating transaction processing systems within 2-3 weeks."

Platform Span

CA Gen supports a broad range of target platforms, database, operating systems, middleware and Application Servers. The code generators also handle the creation of the application, the database, and test harnesses. CA Gen is capable of generating batch, block mode, remote data and distributed applications. Generated client-server applications support conventional GUI clients, Web browsers, or generated proxies supporting hand-crafted clients.

Generated applications may be targeted for a single platform or a variety of platforms. For example, a Java based client supported by a Java based mid-tier application server, which can in turn be supported by C based servers which may reside on Unix and also a COBOL based mainframe application. CA Gen isn't restricted to a single technology per platform, for example a mid-tier server may support its clients with a combination of C and Java applications.

Platform Independence

Because of the flexible nature of the CA Gen generators and the broad span of platforms and application styles, CA Gen generated applications are platform independent. We have customers who have moved some or all of their mainframe applications to distributed servers, consolidated hundreds of distributed servers on one mainframe, and switched from a Java based web environment to a .NET based environment (and back again due to a merger). Platform independence allows you to avoid locking to a vendor, technology or pricing strategy. As the technology pendulum swings you can track those changes to provide the most cost effective configuration for that moment in time.

Technology Independence

Technology independence is very similar to platform independence – CA Gen provides the flexibility to avoid lock-in. Technology independence allows a single programmer to generate and debug an application with a Java based client supported by a combination of C based servers which may reside on Microsoft Windows, Linux or UNIX® and a COBOL based mainframe — all without knowing anything about Java, C, or COBOL. This provides the potential to reduce staff size. Should a brand new programming language come into vogue there is no need to retrain or replace your staff, because CA Gen insulates the new technology from your developers.

Enable Business Application Integration

In the introduction to the 'Platform Span' section (above) a multi-tiered, multi-technology, multi-platform application is described. CA Gen also provides capability to integrate other applications in your environment. CA Gen can produce stubs to allow "calling out" to other applications or services in you environment. CA Gen Web Services and proxy interfaces allow other programs to "call in" to CA Gen generated servers.

Application Portability

Platform independence, technology independence and flexible integration combine to provide application portability. Some or all of an application may move without doing more than regeneration and redeployment. Application portability is also a contributor to intellectual property preservation.

Code Generation

Code generation is the mechanism which enables many of the capabilities and benefits just discussed. In addition to promoting platform and technology independence, programmer productivity, technology independence and other benefits, code generation helps create consistently reliable and robust applications which scale to meet demanding environments. Some customers have reported, without prompting, that their CA Gen generated applications have been running without fail for more than 15 years. The applications are only taken down when required by other maintenance being applied to the environment. With such a low profile, senior management is often unaware of what these applications do. CA Gen applications are used by national tax authorities, stock exchanges for transaction processing, global freight companies and a national telecom for billing tariff calls.

Proven Return On Investment

CA Gen also has a proven track record of providing bottom line results. The ROI that can be realized with CA Gen can be significant in both initial development of the application (cost per line of code, training costs, etc.), as well as in downstream maintenance.

SECTION 3: KEY CAPABILITIES

CA Gen Key Capabilities

CA Gen helps create superior solutions by addressing significant challenges and wide ranging technologies that exist in enterprise class application development. CA Gen provides key capabilities for both development and run-time environments.

Integrated Modeling Environment

CA Gen allows you to model an entire application – logical database models, server functions, client interfaces, and communication infrastructure. The completed model is used to generate the entire application for a specified, heterogeneous, n-tiered run-time environment. The selectable run-time environment options include operating system, language, middleware, TP-monitor and database. CA Gen utilities will also build the generated application in the target environment and deploy it for execution. Finally, CA Gen provides debugging tools that operate from the perspective of the model rather than the generated code to support correcting faulty algorithms.

Enterprise class applications are typically very large and initially require teams of developers to create the application. Models created in CA Gen can be stored in server-based encyclopedias. The encyclopedias support model subset definitions, subset check-in and checkout, reporting and consistency checks. Maintenance of model-based applications is less labor intensive and error prone than maintaining handwritten code; changes made to the model are reflected in all impacted code.

Component based application development methodologies allow common application components for multiple enterprise applications to be shared. Defining a reuse strategy can significantly increase developer productivity and provides a foundation for implementing a Service Oriented Architecture (SOA).

Code generation is supported at both the individual developer workstation as well as the server based encyclopedias. Workstation based code generation is typically used for unit testing changes to a model subset. Encyclopedia based code generation is typically used for regenerating entire applications, integration testing or the final application for production. CA Gen generates code for the complete solution. Application logic, communications infrastructures, web servers and browser interfaces are automatically generated, packaged and ready for immediate deployment.

Heterogeneous Run-Time Environment

CA Gen will generate applications that span both physical machines and software environments. Generated applications may exist on one or more Windows, Unix, Linux and IBM® z/OS® environments. CA Gen also handles the generation of necessary calls to the specific communications infrastructure and handles data marshalling for intra-platform communication. In addition to the traditional hardware/software platforms, CA Gen also supports .NET and Java on an equivalent basis.

Support For .Net

Starting with CA Gen r7, generated applications can target the Microsoft .NET environment. This includes the ability to generate CLS-compliant C# code, Web clients for the ASP.NET environment, server procedure step as .NET servers executing under Microsoft Component Services, communication between the ASP.NET client and the .NET server via .NET Remoting, and a .NET Proxy for user-written .NET applications to access CA Gen generated servers via TCP/IP or .NET. The .NET Proxies also have the necessary annotations to allow them to be Web Services.

Java EE Environment Support

Our Java EE support delivers comprehensive Java EE solutions, generating HTML for the browser, JSPs on the web server, and EJBs on the application server. Users get the best of both worlds - the flexibility of Java EE combined with proven performance of automated native code generation. Organizations can choose to implement pieces of the Java EE architecture as they are ready, reducing the risks of this technology transformation.

Application Integration

The CA Gen open, extensible application environment enables organizations to integrate existing non-Gen applications and multiple client technologies with CA Gen generated servers. The CA Gen Proxy options support the integration of systems built to multiple platform standards. Using proxies, components are exposed or viewed as COM+ objects, Java objects or .NET objects, enabling integration with multiple application sources. Applications built in either a Java or a Microsoft-centric environment can tap into the power of CA Gen servers. The XML features of the proxies extend this flexibility by simplifying integration with client technologies and making it easier to expose CA Gen servers as Web services and transition to a Service Oriented Architecture. The EJB Web Services feature and Web Services based on .NET Proxies will also enhance the integration of CA Gen generated applications into leading SOA's.

Integration With Other CA Solutions

CA ERWIN® DATA MODELER Three ca smart™ certified solutions exist today allowing data model exchange between CA ERwin Data Modeler and CA Gen. Leverage the power, skills and existing investments surrounding the CA ERwin Data Modeler in the generation of enterprise applications using CA Gen.

CA CHANGE MANAGEMENT SUITE A ca smart™ certified solution provides very specialized functionality to provide change and configuration management of objects in the CA Gen models in conjunction with CA Software Change Manager or CA Endevor® Software Change Manager. It also provides facilities for versioning CA Gen objects and for automating the key CA Gen processes of object migration, impact analysis and system implementation.

SECTION 4: **LATEST RELEASE**

Latest Release Enhancements – CA Gen r7.6

We are very excited about the product features of CA Gen r7.6 and the series of releases to follow CA Gen r7.6. We are using a multiyear, multi-release planning process to build our product vision and roadmaps.

Cross Context Flow Support

We now support Component Based Development in Java via separate models/contexts. This allows you to separately deploy an application and its constituent components. The capability to separately deploy components of an application can greatly reduce your deployment time for large applications undergoing localized changes.

CA Datacom®/DB Support

CA Gen been enhanced to support CA Datacom as a target DBMS for generated IBM 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 or Client/Server Encyclopedia. The Host Encyclopedia and z/OS Implementation Toolset (IT) have been enhanced to install the DDL and code generated for the 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 Server Enhancements

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 BEA® Tuxedo® and IBM 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

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 operating system 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.

Dynamic Program Call Compatibility Feature for z/OS

Releases of CA Gen before r7 compiled z/OS COBOL applications to perform dynamic program calls using the COBOL OS load and branch technique as its 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. An 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 5: **FUTURE PLANS**

Future Plans – CA Gen r8.0 and Beyond

Our future vision for CA Gen includes numerous strategic initiatives that can significantly enhance the way you use CA Gen and improve the applications it generates.

- CA Mainframe 2.0 Strategy
- CA Gen Studio – Modern Developer Tool Framework
- Web View – Web 2.0 Application Support
- Web Services Access – Web services consumption
- Expanded Web services and SOA Support
- Simplify Upgrades and Migrations

Each new feature or functionality included in future releases is subject to change based on a number of factors, including but not limited to internal and external beta testing, development plan changes, and feedback from customers and users. Accordingly, the product may likely have different features and/or functionality than stated herein.

CA Mainframe 2.0 Strategy

Mainframe 2.0 is a new CA strategy that will standardize how our customers acquire and manage their CA z/OS software. This strategy represents a significant investment by CA in the future of the mainframe and in our products that support it. At a high level, there are three components of the CA Mainframe 2.0 Strategy:

- Provide a familiar GUI for CA software management – for example, installation, deployment, configuration. A consistent, user-friendly interface similar to what non-mainframe products use will help new mainframe staff become proficient on this proven platform more quickly.
- Reduce the manual effort required to install, configure and deploy CA solutions. We intend to automate this process as much as possible, capitalizing on z/OS dynamic capabilities and introducing new configuration capabilities.
- Standardize how CA z/OS software is acquired and managed. Products will use SMP/E and follow z/OS packaging standards to provide consistency and standardization. We will simplify and automate the delivery of CA products and services as well as synchronize product releases and perform interoperability testing on a defined CA software stack.

CA Gen is playing a mission critical role in the development and execution of our Mainframe 2.0 strategy. CA Gen is being used internally by CA to develop software components that will enhance our mainframe products so that customers benefit from a simplified "Out of the Box" experience – as a result, the z/OS platform will be more user-friendly and easier to manage. CA Gen itself is scheduled to be installed, deployed and configured via Mainframe 2.0.

CA Gen Studio — Modern Developer Tool Framework.

CA Gen Studio is a new framework for a collection of designers and tools which is planned to eventually replace the current CA Gen Workstation Development Toolset. A prime motivation for implementing CA Gen Studio is to provide a modern user interface for the current toolset capabilities. CA Gen Studio is implemented on top of the Eclipse framework, and specifically as an Eclipse Rich Client Platform.

The Eclipse platform provides a rich set of capabilities that, by extension, would become part of CA Gen Studio. Those capabilities include a standard set of user interface controls and behaviors, extensive end-user customization of fonts, colors, window size, selection and position.

Within CA Gen Studio, multiple designers would provide functionality that is analogous to the diagrams of the current toolset. CA Gen Studio designers share a common default user interface with a common set of controls. Each designer provides the user with a tree control based navigator for traversing a model. A designer has one or more main views available in a tab control. Each designer also provides a property sheet window for the display and editing of attributes of a selected object. Property sheets are easier and more efficient to use than the dialog box equivalents in the existing toolset. Related to the main view window is an overview window to provide contextual information for the main view's displayed information.

CA Gen Studio itself would provide each of the designers' common functionality: file/model operations, printing commands and help facility.

Designers could be added to CA Gen Studio using a plug-in; additional functionality may be added to CA Gen Studio outside of release cycles.

We plan to replicate the functionality of the current Toolset into CA Gen Studio over time to allow for a smooth transition. The current Toolset will retain its existing functionality until it is retired.

Three new designers are planned to be introduced with CA Gen r8:

- Web View UI-Generation
- PStep Interface Designer
- Web Services Access Designer

Web View UI Generation

Web View is a new type of generated Web application that uses new technologies, e.g., Ajax, REST Web Services, etc. It is analogous to, but more capable than, the existing CA Gen Web Generation product.

Web View would enable you to create a Web 2.0 application using:

- A design component from the toolset to create your brand new web UI and Logic
- Customized Web UI pages external to CA Gen

PStep Interface Designer

The PStep Interface designer would allow you to create an alternate interface in the model for an existing CA Gen PSTEP by selection of the desired data views and customizing the names. The alternate interfaces can be selected to create a WSDL. The selection of the desired data views helps enable efficient Web Service exposure by avoiding unneeded data transfers. The customized naming permits exposing the view data names in user-friendly form, free of the context of the originating procedure.

Web Service Access Designer

With the introduction of the Web Service Access Designer, CA Gen would allow you to create and customize the Web Interface of your Web applications using an industry standard Web authoring tool such as Adobe™ Dreamweaver™. The Web interface would utilize Web Services technologies to retrieve data asynchronously and seamlessly from CA Gen-generated or third-party Web Services.

Expanded Web Services and SOA support

The trend in application development is toward service-oriented architectures. One key point is that SOA is an architecture and Web Services is one implementation of that architecture. Often the terms are used interchangeably. The idea is that servers publish one or more services that are exposed in a platform independent format. Consumers can combine services from any number of different sources to create an application.

CA Gen supports SOA today via Web Services. The CA Gen proxies can be wrapped to provide services for any new or existing transaction. The CA Gen Web Services Wizard can speed the wrapping using the Java Proxy. In CA Gen r8, the intent is that ASP.NET proxies based Web Services will be certified. CA Gen r8 will also enable EJBs to be exposed as Web Services. In addition, CA Gen business partners provide additional capability to help with using Web Services and CA Gen today.

Today web services can be consumed by a CA Gen application via OLE, EABs, HTML controls. In CA Gen r8, the Web Service Access Designer would also allow you to consume both CA Gen and third party Web Services. And again our business partners have created additional capability to assist with the consumption of Web Services.

64K Object Count Expansion

The workstation developer toolset object count would change 64K of all objects to ~1 million objects of any given type, thus greatly increasing the size of subsets/models. The change would also be reflected in the Encyclopedias.

Additional Planned r8 Enhancements

Z/OS DYNAMIC LINK OF RI TRIGGERS: CA Gen's dynamic linking would enable CA Gen developers to package their z/OS applications such that its RI Triggers components are dynamically linked at runtime.

TCP/IP SOCKET LISTENER: CA Gen TCP/IP Direct Connect for CICS implements the Connection Manager as event driven, replacing the previous polling implementation. This change addresses the high CPU utilization sometimes attributed to the Connection Manager. This capability was introduced in CA gen 7.6 and will replace the TICON manager which will not be present in CA Gen r8.

IDENTITY COLUMNS: Provides support for identity columns in DBMS's that provide the capability. In this enhancement CA Gen would provide support for the identity column feature of IBM's DB2™ Universal Database™ and Microsoft SQL Server™. Identity columns automatically generate a unique, identifying numeric value for each row in a table.

MULTI-ROW FETCH/BLOCK FETCH: Support for DB2 Multi-Row Fetch/Block Fetch features as well as similar capabilities on supporting DBMS's.

CUSTOM CASCADING STYLE SHEETS FOR WEB GENERATION: Java Web Generation would use custom written CSS defined on the level of the Business System. Custom CSS could be associated to controls statically at design time or dynamically using application logic.

ASP.NET WEB CLIENT ENHANCEMENTS: ASP.NET web client applications would be enhanced to improve their performance and user interface. Ajax is used to asynchronously update controls such as list boxes. Customized themes can be used to change the user interface characteristics of applications on the fly.

WEB TABS FEATURE: With this planned capability Web Generation and ASP.NET web client applications could operate independently in different tabs from within a single browser instance.

Both Internet Explorer® 7.x and Mozilla® Firefox® 2.x feature Tabbed Browsing as one of their prominent features. CA Gen would take advantage of the tabbed browsing feature so that a CA Gen Web application in a browser tab is not affected by the presence of another CA Gen application in another tab.

Extended Platform Support

The last few releases of CA Gen have focused on providing support for three major platforms – Java EE, .NET and Linux. We plan to continue to enhance our support for these three platforms and track their evolution (in addition to optimizing our mainframe support). Web services support was also introduced in CA Gen 6.5 with full awareness that the Web services standards and SOA methods would continue to evolve. We are planning additional enhancements in this area as standards evolve and solidify.

CA Gen is supported on the following hardware platforms .

- Intel x86 Hardware running Windows Operating Systems
- Intel x86 hardware running 32 bit SUSE®/Red Hat® Enterprise Linux®
- HP PA-RISC hardware running HP-UX operating systems
- HP Integrity hardware running HP-UX Operating Systems
- HP PA-RISC hardware running NonStop® operating systems
- Sun Microsystems SPARC® hardware running Solaris® operating systems
- IBM System p5®/ IBM System p6®, architecture hardware running AIX®
- IBM z/Architecture® hardware running z/OS

Simplify Upgrades and Migrations

When we talk to customers about their upgrade process we typically see two steps that have the greatest potential to reduce time and cost of upgrades: identification of impacted applications and choice of testing methods for impacted applications. Without careful consideration, the default choice is to regression test everything, a costly and time consuming task. It would be more efficient to focus only on applications that are impacted by a release. If an application is batch or 3270 and the CA Gen release focuses on, say, Java or .NET capabilities, there really isn't a reason to regression test that application. Implementing a focused test plan will prompt CA to provide additional information regarding what changed in a release. The second area involves testing of impacted applications. In this area the best practice is to create a special test application that collects all the unique behavior that exists within your inventory of applications. That way you can test one server-to-server flow, or one web page or one GUI window that contains all of the controls (list box, dropdowns, etc.) that your applications use, and avoid testing every instance of a CA Gen operation used by your application.

Also, starting in CA Gen r8, we plan to provide side-by-side support of the Toolset. You will no longer need to uninstall your existing release of CA Gen on your workstation before installing the new release. You will be able to compare and maintain different models in two releases with them open at the same time. We hope this will help simplify your transition to new releases.

Our customer support/sustaining engineering organization has a free upgrade assistance program for customers under active maintenance and support agreements to help move you to CA Gen r7.6. They will provide phone support to assist with verifying your technical environment is suitable, answer questions in detail about fitting CA Gen r7.6 into your environment, and review or help create your upgrade plan.

Additional Enhancements Under Consideration

Although not an exhaustive list, some specific projects planned for one or more future releases are:

Consuming Web Services Phase 1 (as a communication type)

CA Gen has had the ability to publish Web Services based on CA Gen server load modules for several releases. In CA Gen r8, we plan to introduce for the first time the capability to consume Web Services via Web Service Access. This feature would allow you to invoke CA Gen created or third party Web Services from HTML designed/updated in Adobe Dreamweaver. The Web Service Access feature maps input and output parameters of Web Service operations to user interface components. CA Gen post r8 will explore additional mechanisms for consuming Web Services in other environments besides HTML. One of the options being explored is to enable CA Gen clients to consume CA Gen generated Web Services as an alternate option to the traditional communications mechanism between clients and servers.

Customizing CA Gen Proxy Interfaces

CA Gen Studio, which is scheduled for introduction in CA Gen r8, includes a designer to allow users to provide alternate interfaces for PSteps: PStep Interface Designer (described above). The alternate interfaces are customized versions of the original PStep interface. This includes hard coding, renaming, or changing the order of selected attributes. The customized interfaces are saved in the model. The CA Gen Proxies in the future can take advantage of the customized interfaces to provide a user-friendly alternate.

MFC Evolution (E.G. WPF)

One of the primary strengths of CA Gen is to shield customers from changes in technology. Microsoft is evolving beyond MFC. CA Gen is exploring a transition path for customers using GUI applications. CA Gen is currently reviewing WPF as a transition path with a primary goal of minimal to no impact on customer applications.

CICS Web Services

Additions to the Web Services capability could allow you to generate server procedure steps as Web services for selected target platforms. CA Gen introduced Web Services support via the Web Service Wizard, as an additional interface for the .NET Proxy and through EJB Web Services. Post CA Gen r8, the initial platform planned is CICS. As this implementation would be designed to conform to Web services standards, there would be no limit to the size of the communication buffer. This capability is intended to provide an alternative/replacement to the existing 32K limited CFB based server managers. The generated Web service would conform to the WS-I basic profile. See also "Evolve Away from 32K CFB Limit" later in this document.

BLOB Support

Allow CA Gen applications to use BLOBs natively. For deployment environments without a view size limit, we plan to support binary large database objects (BLOBs). This enhanced functionality would support applications, which need to present images (BMP, JPG, GIF, etc) to the client or store large text encoded strings (XML).

New Entity Relationship Designer

Address the most often requested enhancements and improve usability and readability. This completely new implementation would use the same metamodel as the ERD in the toolset. Diagrams can be alternatively edited in the Gen CA Studio ERD and the ERD in the toolset. This implementation would feature a model navigator, one or more view windows, an overview window and property sheets – all configurable to the preferred way of working. Printing, display and zoom services would be provided by the underlying Eclipse foundation, resulting in a contemporary user interface experience. Also provided by the Eclipse foundation are list and table sorting facilities. Font and color selection are provided by the operating system for customization to end-user preference. Additionally, this implementation would store the endpoints and turn points of relationship lines – providing full and persistent control over the aesthetics of the diagram.

New Action Language Designer

A new action language designer is planned which is modeled after contemporary context sensitive text oriented language editors. The editor would supply support for syntax checking and suggestions, formatting, keyword coloring and drag and drop.

Additional CA Gen Studio Capabilities, Search Sort, Generation Control, Undo

Under consideration for CA Gen Studio are uniform capabilities for sorting tabular information, search capability and, where appropriate, undo capability.

New UI Designers

CA's strategy for providing UI designers in CA Gen Studio is to call best-in-class UI designers from third party tools.

z/OS Build Tool

A new Build Tool for z/OS would provide improved usability and provide an implementation that could be more easily maintained for future releases of CA Gen. The new Build Tool for z/OS would be independent of the TSOAE execution environment.

Linux on System z and EJBs

Support for generating code for Java applications running on mainframe Linux™.

Unicode

Support for Unicode in generated application as well as converting CA Gen itself to Unicode support.

In-line SQL

To provide additional flexibility we are considering adding support for SQL statements within action diagrams. The programmer can then supply SQL to enhance database performance within their unique processing environment, the SQL would be stored in the model and no post processing of generated code would be required. This capability would augment the existing SQL generation.

Communication Bridge Remote Administration Interface

CA's plan is to provide a remote administration interface for the Communication Bridge Server which would provide a single point from which all Communication Bridge instances could be managed. This management function would allow both local and remote Communication Bridge instances to be administered from the same management application.

Evolve Away From 32K CFB Limit

Our plan is to introduce, over time, new elements of CA Gen (server managers, supporting runtimes, etc.) that would have no view size limits. These elements of CA Gen would need to co-exist with existing, view size-limited elements of CA Gen to allow for a graceful transition of production environments to take place. Applications using these new elements will need to be regenerated.

The Java elements introduced in CA Gen 6.5 are the first instantiation of this strategy. Applications generated entirely for Java have no view size limit. In a similar manner, applications generated entirely for the .NET environment have no view size limit. As this strategy is refined, similar capability may become available for other portions of the CA Gen infrastructure.

3RD PARTY PRODUCT FEATURE ADOPTION REQUIREMENTS

- Support 64-bit servers on UNIX, Linux, and Windows.
- Support for large database objects (i.e. BLOBs and similar long fields).
- Support stored procedures to tap into potential performance improvements.
- Improve the efficiency of the generated SQL via exploitation of new DBMS statements/ features or the improved structure of the generated statements.

Conditional Action Diagrams

This feature would provide a new option to the action diagram facility to add conditional targeted environment action statements, allowing the customer to tailor Action Diagram statements for selected technologies such as Java and .NET client logic.

Store Files In Models

This would allow external files associated with a model (such as EABs, OCX and other objects) to be stored in the model.

User Added Functions

Our plan would be to create a tool that accesses a toolset or encyclopedia model and provides for the creation, removal, or change of user-added functions. The tool would include the following functionality:

- Ability to create a user-added function and generate a code stub and make file targeting a selected language or operating system.
- Allow libraries of user-added functions to be included in the build of generated applications.
- Allow user-added function definitions to be added to models in a batch fashion.

CA Gen would be modified to support in/out and out-only parameters which allow a function to return multiple values as well as supporting more than five parameters and allowing views and repeating group views to be used as parameters.

Encyclopedia Renovation

The current strategy of merging the functionality of the two encyclopedias needs to address the outstanding enhancement requests so that, as much as practicable, the host encyclopedia and the client server encyclopedia become functionally identical.

Support For Stored Procedures

We are researching the possibility of generating portions of server logic in the form of stored procedures. This would permit you to call the CA Gen generated stored procedures from handcrafted code. An emerging industry trend is for all database references to be implemented as stored procedures, allowing the database administrator to manage the stored procedures and ensure they contain efficient, well-structured queries.

UML Metamodel Objects

This feature would add objects to the metamodel to support UML objects.

UML and MDA

Research is underway to understand the implications of merging the existing CA Gen diagramming standards with UML.

Common Edit Modifications

The facility provided by the Common Edit Modification option of the toolset aims to facilitate customizing and sharing user interface components between GUI, Web Generation and ASP.NET applications. The architecture of such a feature would be enhanced to take advantage of new metamodel changes and provide more consistency across the three design environments.

Integration with other CA Solutions

This initiative involves providing an interface to CA Service Desk for generated applications such that call requests could be opened for events that take place in the z/OS environment. CA Service Desk is able to monitor the z/OS system for selected events, both solicited and unsolicited, which are generated by CA Gen generated applications. Events, such as a program ABEND, would be captured and used to automatically open a call request on a named CA Service Desk server.

In addition to the generic security exit provided by CA Gen, our proposed plan is to provide a documented, pre-built, customized user exit targeting CA Siteminder® to simply and effectively integrate the generated application with CA Siteminder®.

We are also investigating integration with CA AutoSys for running batch on non-MVS™ platforms.

SECTION 6: **CONCLUSIONS**

Conclusions

CA Commitment

CA is committed to the continued development and support of this vital product line. CA understands that you have made significant investments in CA Gen, and we know that you depend on your mission-critical applications, generated with CA Gen, to run your businesses. We constantly strive to meet your needs and in particular, seek to strike a balance between advancing the CA Gen feature set and spacing releases far enough apart to mitigate the impact of changes to your production environment. That balance means that major releases of CA Gen occur approximately every 18 to 24 months with intermediate service packs as required. Architectural enhancements being made to CA Gen are planned to simplify rollout of new functionality even further.

CA Gen Partner Community

We reiterate our commitment to our customers and our business partners and express our appreciation for your continued commitments to us. CA's partner strategy is to enhance and extend our partner relationships by protecting their investments and providing new opportunities. Business partners continue to be a critical component of our growth strategy for CA Gen. There is an active and growing community of business partners who provide CA Gen services, education and CA smart™ solutions that enhance the value of CA Gen.

Customer Support and Services

CA continues to maintain skilled services staff, providing a variety of consulting and support services to help maximize your CA Gen investments. CA Gen Technical Support/Sustaining Engineering can assist with your CA Gen r7.6 upgrade to make it as simple and straightforward as possible.

CA provides consultation to:

- Review your application environment to verify it meets the CA Gen r7.6 technical requirements
- Answer your questions on fitting new release into your environment
- Review and/or help create your CA Gen r7.6 Upgrade Plan

We currently plan to support CA Gen r7.6 on the current compatible platforms through March 31, 2012.

Get Involved!

BETA PROGRAM The CA Gen development teams are hard at work on product enhancements for CA Gen r8 and beyond. Your input is welcomed and encouraged. The future of CA Gen depends on CA's ability to build solutions that fulfill our customers' requirements. We rely on your active participation in the Development Buddy™ Program and Beta Programs to help identify future enhancements to CA products that would provide value to your business.

EDGE User Group CA is a proud sponsor of EDGE, the independent users group for application development professionals worldwide. EDGE holds two technical conferences a year, one in North America and another in Europe. CA encourages you to join and participate in EDGE. It's a chance to network with other CA Gen users, discuss the challenges and solutions inherent in IT and meet third party vendors offering products and services in support of CA Gen. To learn more about EDGE, to join or register for an upcoming conference, please visit the EDGE website at http://www.edgeusergroup.org/

To learn more about the CA Gen architecture and technical approach, visit **ca.com/gen** and **support.ca.com.**

CA, one of the world's largest information technology (IT) management software companies, unifies and simplifies the management of enterprise-wide IT for greater business results. Our vision, tools and expertise help customers manage risk, improve service, manage costs and align their IT investments with their business needs.

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