

*Tools for Application
Reface & Redesign*

by

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Tools for Application Reface & Redesign

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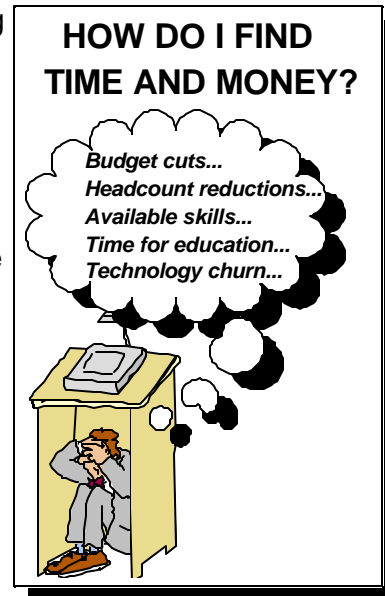
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Executive overview

So, your IS strategy is directed toward a new e-business initiative. If all goes well, the new application development process should be complete in, say, about six months. And then, if you're really lucky, it will be available for market about two months later. In the meantime, your competition may take every advantage of this time frame getting their products to market sooner, and building a brand-loyal following from your customer base!

But why wait, especially when you've got time-proven business applications doing much of the work already? It may be possible to have your applications modernized and get your Web initiative up and running very quickly! Application refacing and redesigning can accomplish the job faster, easier and cheaper than starting from scratch. By capitalizing on existing business logic, you can accelerate new Web and graphical user interface (GUI) development efforts. Sooner than you had ever dreamed, your company can be positioned to incorporate and exploit the advantages of e-business?



Modernizing applications doesn't always mean rewriting them. Most development teams have neither the time nor the money to take the "rewrite from scratch" approach. What's more, they generally have a unique enough environment that a simple "just buy a new application" solution is not a viable option either.

The most cost-effective and time-saving answer in such situations is application reface and redesign. By using reface and redesign techniques and tools, you can manipulate long-standing 5250 applications in various ways from simply "screen scraping" an application for a more user-friendly graphical interface, to integrating technologies, such as audio, video and telephony, into existing 5250 displays in a graphical environment.

This paper focuses on the various tools available to IBM iSeries and AS/400 customers that put a new, graphical face on 5250 applications. This paper also focuses on the tools that help redesign existing applications to take advantage of OS/400 features, such as ILE and DB2 UDB for iSeries, to form a powerful single support system for an e-business initiative. This is one topic of a six-part series of white papers designed to ease the transformation process for iSeries and AS/400 organizations from a green-screen, 5250-proprietary, back-office supported system to a fully integrated, Web-enabled, functioning e-business. (Some of the papers in this series are available in Appendix D, others will be available later in the year.) This white paper series is centered on the "pillars of strength" application development strategy model for e-business, with each paper emphasizing a specific category of tools to aid in the e-business transition.

Tools for Application Reface & Redesign

Tools for Application Reface and Redesign will give the reader an appreciation for the efficiencies of utilizing existing RPG and COBOL code and applying an application reface for a "quick-to-market" deployment of e-business initiatives. This paper will also provide an understanding of longer-term modernization approaches that involve the redesign of user interfaces that offer even more flexibility and functionality to tried-and-true back-office applications. The reader will also attain a stronger recognition of the value of the [IBM Application Development Tools Network for iSeries Web site](#) as a primary vehicle for identifying applicable tools that maximize application refacing efforts. Finally, the reader will benefit from a clearer picture of the required steps for driving the design and implementation of an efficient e-business environment.

IBM philosophy

Let's look at the big picture of e-business and how IBM is positioned to support its customers for this generation of computing. This philosophy is mentioned in the other white papers in this series, if you have seen it earlier, please pardon the repetition. We feel it is so beneficial to the understanding of IBM's complete modernization strategy that it bears reviewing. IBM's e-business initiative advocates server-centric, thin-client, network computing based on IBM servers and open, standards-based interfaces. This company-wide philosophy is based on a strong belief that e-business is the "sink or swim" strategy for successfully operating organizations in the 21st century.

IBM believes that business transformation and integration are key elements to unlocking the door to e-business success. Further, IBM holds that the extent to which an organization will profit in this challenging arena may not only be determined by the way it uses software to extend and enhance its business processes, but more importantly, how the business model evolves into an e-business. This is very important because if an e-business initiative is to be successful, it is crucial to understand that a company cannot merely incorporate e-business technologies into an existing IS system, rather, it must become an e-business from end to end.

iSeries modernization strategy

Application extension and Web-enabling projects are often accompanied by hefty expenses. Moreover, the time, technical resources, and financial drains of application modernization can seem exaggerated when the current systems still have proven effectiveness worthy of continued use — except for the fact that they still sport the now very dated “green screen” interface and that they are not accessible via the Web. A few years ago, IBM recognized the potential challenges that would be inherent in e-business transformation and established a modernization strategy to assist iSeries and AS/400 users with the e-business shift. As part of this strategy, the AS/400 brand and now its successor iSeries is supported by six pillars of strength application development strategy model for e-business. (See Figure 1.)



(Figure 1)

The theory behind these six modernization strategies is to provide the strength and functionality necessary to catapult iSeries and AS/400 customers into complete e-business enterprises. In fact, the new iSeries models deliver one of the strongest end-to-end, e-business platforms on the market today. This particular paper focuses on the first category, application reface and redesign.

- ✍ **Application Reface and Redesign** — Tools that provide a Graphical User Interface (GUI) for existing 5250 applications, and help redesign existing applications to take advantage of OS/400 features such as Integrated Language Environments (ILE) and DB2 UDB for iSeries.
- ✍ **Lotus Domino and Lotus Notes Integration** — Tools that allow you to build new collaborative Lotus Notes applications and/or to seamlessly integrate Lotus Notes clients with existing iSeries and AS/400e applications.
- ✍ **Business Intelligence** — These tools transform an organization's data into meaningful business information to be used to make strategic decisions.
- ✍ **Application and Systems Management** — Tools that make it easier, and less costly, both to manage the system and to create applications that run on the system. These tools can also extend the capabilities of OS/400 security, automate the operations of your iSeries or AS/400e, streamline backup and recovery, control object distribution, and much more.
- ✍ **Cross-Platform Integration** — Tools that help build and manage applications that interoperate across disparate server platforms, databases and clients.
- ✍ **e-business and e-Commerce** — These tools extend core applications to the Web. This can involve the creation of an electronic shopping cart, or can be more complex, involving a complete end-to-end integrated application from supply chain management to customer relationship management.

IBM supplies various assistance mechanisms to aid iSeries and AS/400 users in the e-business evolutionary process. For example, IBM has created the Application Development Tools Network for iSeries 400 program. This program's Web sites (see Appendix D) supply a comprehensive listing of application tools available for iSeries and AS/400 application design and enhancement. In addition, IBM supplies "road maps" to successful migration within this series of white papers. These resources serve as a guide in determining the tasks that have to be accomplished, what tools are available, and what strategies to follow to move in an evolutionary manner toward the deployment of e-business applications — while continuing to capitalize on current line-of-business applications.

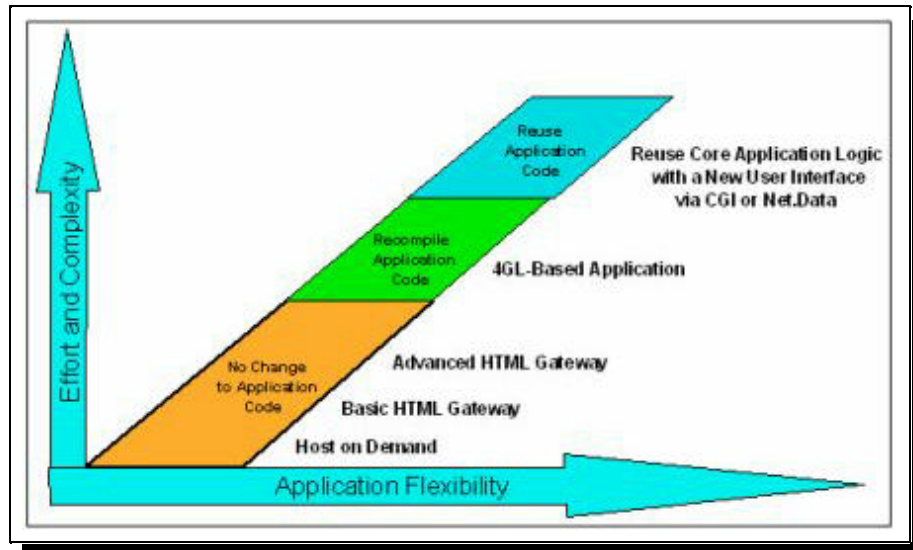
Techniques for refacing and redesigning applications

With that background of understanding, let's begin our discussion with a brief explanation of how application reface and redesign tools can be used to modernize existing applications. We will then move on to a more detailed discussion of two specific strategies that are available for this modernization approach. The paper will then look specifically at a "road map" or course of action for implementing application reface and redesign techniques.

Application reface/redesign tools help you modernize existing applications by:

- ✍ Migrating RPG III code to ILE and RPG IV — This is important because the ILE program model addresses key requirements for modularization and reuse of code. It also establishes the initial foundation for all future enhancements to the AS/400 or iSeries servers and its compilers.
- ✍ Modularizing and partitioning applications to better prepare for future programming models — Modularization and reuse are not only the two key elements for improving development productivity, they are the fundamental requirements for object-oriented programming. This is important because Java, the language of e-business, is object-oriented.
- ✍ Integrating the use of stored procedures, triggers and other new DB2 UDB for iSeries features — Stored procedures are a powerful tool for quickly obtaining data results. Triggers are stored procedure programs that are automatically called each time a database action occurs. These and other new DB2 UDB for iSeries functions are specifically designed to make the sharing, distribution, replication and failsafe accuracy of enterprise data an easy thing for developers to ensure as they e-enable the back-office systems.
- ✍ Transforming the 5250 datastream from existing applications into a browser or PC-based GUI — Extending an existing application to the Web can be accomplished easily and incrementally with the continual stream of new and enhanced tools that are available to facilitate this process. Some of these tools work by mapping 5250 interfaces into HTML (Hypertext Markup Language) equivalents. More advanced tools will accomplish transition to the Web by generating Web pages from application source code, such as DDS (Data Definition Specifications).
- ✍ Providing graphical tools for the developer to use in creating host-based RPG/COBOL applications — There are several means for moving

host-based applications to the Web. Your decision regarding what tool(s) to use will be the result of analyzing your needs related to implementation flexibility and application complexity. (See Figure 2.)



(Figure 2)

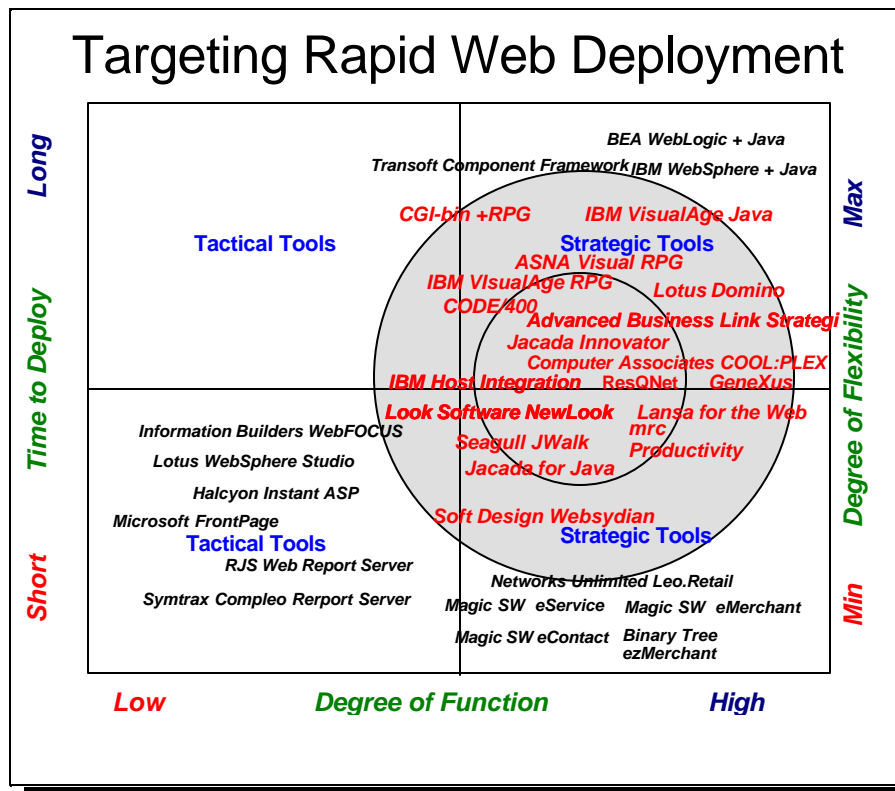
- ✍ Building GUI front ends for user query and report writing — A GUI front end and the use of Java-based Web technologies provides for iSeries and AS/400 application information delivery, so that a broader range of users, throughout a company, can more rapidly and cost-effectively access standard reports and queries. A GUI front end eases access to information, lessening end-user reliance on IT, or "power users" to produce much-needed reports. A company can also extend the benefit of this information universally via a Web browser — sharing to its customers, partners and suppliers. The information provider can schedule queries and reports to execute at pre-determined times, and then post results automatically to departmental, work group, or individual folders within a Web directory.
- ✍ Adding workflow to existing applications — Process integration and workflow technologies are emerging as mission-critical components of managing end-to-end e-business processes. Tools are available in this space that encapsulate business processes separately from run-time components to facilitate rapid process enhancement and code (object) reuse across the enterprise, delivering dramatic return on investment for enterprise workflow initiatives.
- ✍ Integrating existing applications with advanced iSeries technologies such as image and fax — The world of the Web is full of pictures, graphics and other images. iSeries and AS/400 are well equipped to store, transfer and display these types of images. iSeries and AS/400 can also support full fax functionality from any client.

Strategic targeting for refacing versus redesigning

Most IT operations are faced with mounting challenges, if not from budget cuts and head-count reductions, then from programming skill shortages and turnover. With technology changes coming faster than ever, obstacles within the IT framework are growing daily and are uncovering issues, such as where to find the skills, time and money to accomplish modernization projects. To have the most effective approach for a well structured migration, the first step is to project where the enterprise needs to be in the future. Only after you know where you are going can you begin the process of developing a target to keep the effort on track.

Strategy for rapid Web deployment

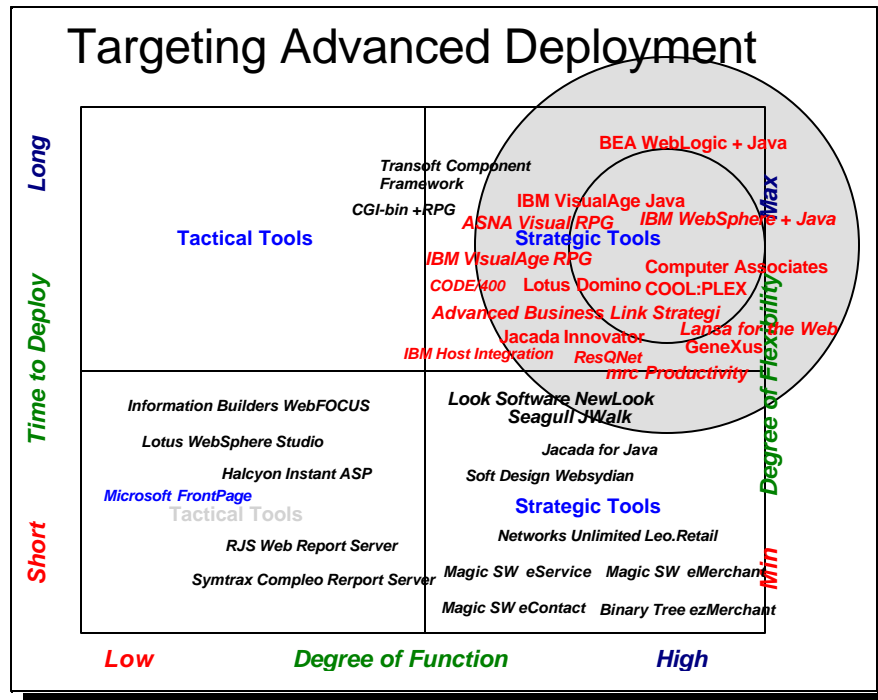
There are two available paths for strategically targeting your organization's destination. The first looks at rapid Web deployment, where the goal is to get to market as quickly as possible. This does not shadow the grand IBM strategy, but one that is simply geared to a faster market entry. It utilizes refacing tools that add GUI interfaces and Web-enabling (i.e., browser) capabilities to existing applications. The following graphic (Figure 3, circled area) shows a set of tools for this GUI and browser strategy. The tools in the targeted zone are most likely to be used by organizations' whose strategy involves very rapid deployment.



(Figure 3)

Strategy for advanced functionality deployment

The second path for strategically targeting your organization's modernization destination follows the IBM long-term strategic model more closely. (See Figure 4, circled area.) It emphasizes advanced deployment while focusing on tools that provide more functionality and flexibility than is provided by simple reface tools. Subsequently, these tools will require a longer implementation time. Many of the tools listed in the top right quadrant will be discussed later in this paper.



(Figure 4)

Road map to application reface and redesign

Follow these directions along the way...

Here are a few tips to keep in mind while applying an application reface and/or redesign.

Invest in visual tools

If you do not understand how visual tools work, it will be difficult to deliver visual applications. The design paradigm for visual tools is different from traditional DDS concepts and will require thinking along different terms. This gives you better programmer productivity and can potentially spawn ideas for additional features to incorporate back into your long-standing programs. After an interim "break-in" period, visual tools can reduce the skills necessary to interface with relational data and external services.

Migrate to ILE

ILE (Integrated Language Environment) is a programming model that supports the separation of business code from the data access code. It also requires additional design disciplines, as already mentioned, that provide for easier modification and enhancement in the future. The ILE environment includes a family of compilers and substantial system enhancements should be taking advantage of.

Partition the applications

"Distributed application partitioning" tools help programmers decide where to place each object or component of a distributed application within a client/server or n-tier network topology in order to achieve the best overall performance. Partitioning applications allows for device-independence at the desktop. This makes for a compatible application no matter what your customer happens to use for a front end, whether it be a Windows PC, an Apple Macintosh or other client device.

You might ask, "How hard could it be to manually partition my applications?" Well, it's not at all uncommon for a manually-partitioned application to initially run an order of magnitude (or even two!) slower than it did before being partitioned. This is because some objects can end up on the wrong machine. With the advent of large-scale frameworks and code-generating wizards, the poor programmers in the trenches have almost no hope of guessing correctly where the objects they have written (and which are heavily based on inherited or generated code) should be placed.

In order to address this problem, there are tools to assist programmers in partitioning distributed objects and component-based applications in an optimized manner. These tools automatically determine the best possible partitioning of the application, based on observation of the behavior of the application during actual runs on a representative mix of transactions. The results of the tool's partitioning scheme are presented visually to the programmer for the purpose of "fine tuning." The tool will even provide visual feedback concerning problematic components which the programmer might want to consider redesigning.

Use advanced database functions

Triggers control the starting and stopping of particular application segments. Each DB2 UDB for iSeries table may have from zero to six triggers. Stored procedures exist as compiled programs (objects) on an iSeries or AS/400 server. ILE allows programs written in any native iSeries or AS/400 language (RPG, COBOL, C, C++ and CL) to call programs written in other native iSeries or AS/400 languages, and permits mixing of commands from various languages in one program. PC database programmers will probably feel most comfortable writing SQL statements within simple C programs. The C program will handle parameters in and out, program logic, and arrays for holding temporary results, while the standard SQL statements handle data. iSeries and iSeries ILE C/SQL programs (stored procedures) may be called repeatedly, may call other

programs, and may be saved on tape to be restored on other iSeries or AS/400 systems. PC programs can call iSeries programs and wait for results, or, the PC program can continue after the call and the iSeries or AS/400 server program can place the results in a data queue for later access by the PC program. Use all the database functions that you have available. Make sure you are exploiting all the functionality and getting the most out of your current technology investment as you are preparing to move on to new technologies.

Integrate advanced function within applications

The purpose of application modernization is to integrate new and advanced technologies. Be sure to take advantage of imaging, messaging and wireless technologies as well as systems management.

Create a strategy for new technology integration

Develop a "plan of attack" for moving to e-business, e-commerce, and for incorporating business intelligence. For instance, if you want a solution that offers the best opportunity to easily incorporate future technologies and delivers the most technical features available today, you may choose the advanced functionality deployment strategy (i.e., the second path demonstrated in Figure 5 previously). On the other hand, your organization may not need all of this functionality. In which case, you may opt to use the rapid deployment strategy (Figure 4, shown earlier) and focus on the tools within this space. However you decide, make sure there is a strategy and a viable plan for meeting the requirements that have been established. Stay on track with the original plan and keep the plan focused by frequently reassessing its implementation for opportunities to benefit from features that might be newly available from upgrades to the toolset that has been selected for the rapid deployment.

Consider using high level tools

Many RPG programmers are convinced that writing their own RPG code yields the most efficient solution. This strategy worked well a few years ago when there were more people resources to code and more time to produce a new or enhanced application, and less pressure for rapid production output. However, the most efficient way to move forward with reface and redesign efforts now may be to utilize tools to leapfrog through the application production process, rather than laboriously writing all the code by hand. Even though moving to 4GL tools to generate applications separates you from the lowest levels of technology, the realized gain in productivity makes up for any sacrificed customization.

Higher level tools allow for:

- ✍ **A single point of business/application rules definition.** The developer becomes a master to the design paradigm, while no longer being required to master the technology underlying the design.
- ✍ **An easier way to achieve GUI and event-driven database tasks.** Even if the developer does not have a great deal of event-driven skills, 4GL tools provide a lot of benefits in these areas — and of course, 4GLs deliver faster trigger implementations than when writing from scratch. In regard to triggers and stored procedures, it is helpful to understand that 4GL languages are

more organized than just grabbing a standard interface and inserting it into a piece of code. They focus on the tasks, not the controls.

- ✍ **A faster development cycle.** After the break-in period, during which time the developer has learned the toolset, 4GLs speed up the entire reface and redesign process.
- ✍ **Easier technology jumps.** This is because the developer does not have to go from language to language. Rather, the tool vendor does that for you by providing support for multiple presentation back-end targets. Tool providers who are included in the Tools Network program also work with the labs in Rochester to assure that new functionality is embraced and that tried-and-true functionality remains in place.
- ✍ **Smooth programmer transitions.** Tool providers routinely provide service offerings, mentoring and technical education to get new users quickly up to speed.

Application reface and redesign tools

There are several possible solutions for putting a new face on existing applications. You can utilize products that simply intercept the existing 5250 datastream and reformat it so that it can be presented to the user as a graphical interface. Beyond that, you can do additional cosmetic work, such as consolidating multiple 5250 screens into one form, or inversely, splitting one 5250 display into multiple forms. Additionally, you can integrate other technologies, such as audio and video, with existing 5250 displays in a graphical environment. To take the modernization process a step farther, you could rewrite just the front-end application using a graphical development environment. This involves more work than refacing the datastream, but offers more flexibility in terms of what you can accomplish. Or, perhaps you might choose to let existing RPG or COBOL applications communicate with a graphical client via a messaging architecture of some sort. The tools referenced below can help you accomplish the tasks described above.

- ✍ [Application Redesign Existing](#) — These tools are used to move applications to ILE, provide new interfaces, or incorporate new technologies.
- ✍ [Application Reface Existing](#) — These tools are used to put a graphical front-end on existing 5250 applications. The tools are either form based PC interfaces or web GUI interfaces with little or no programmer intervention.
- ✍ [Database Utilities](#) — Miscellaneous 5250 tools for viewing and accessing DB2/400 data. They include explorers, query utilities, and report writers.
- ✍ [Fax Enablement](#) — Tools that automate the integration of the print output of existing applications with iSeries facsimile software.
- ✍ [Graphical Query and Report Writing](#) — Tools that provide graphical front ends for user queries and ad hoc reporting.
- ✍ [GUI Application Generators](#) — Model based tools for creating new applications. The tool may generate code for server, client or both.
- ✍ [GUI Builders/ IDEs](#) — Graphical development environment including tool palettes, iSeries integration features and properties for creating graphical applications.
- ✍ [GUI Print Viewers](#) — Tools for viewing iSeries print files in a form based PC GUI.
- ✍ [Image Integration](#) — Tools that allow existing or new applications to integrate with document imaging systems for document capture and management.
- ✍ [Language Translation](#) — Tools that provide translation from one language to others.
- ✍ [New 5250 Green Screen Applications](#) — Tools that can be used to create new "green screen" applications or provide "green screen" interfaces to existing resources.

- ✍ **Print Utility Software** — Tools are available to enhance printing functions. These tools can extend the value of existing applications and can create new strategic print solutions.
- ✍ **Programmer Productivity Tools** — These are miscellaneous programmer tools. This category also contains single products with multiple tools that span multiple categories
- ✍ **Telephony Enablement** — Tools that allow existing or new applications to integrate with telephone switches for inbound and outbound calls.
- ✍ **Workflow Enablement** — Tools that provide the enablers to force an application to run in a specific sequence and may force specific users to complete process steps.

Now, let's take a closer look at the available tools...

Here are some of the tools that are available to help with your application reface/redesign.

Application Redesign Existing Tools

These tools are used to update existing applications. This category of tools provide features such as ILE migration, interface enhancements, and the incorporation of new technologies.

Business Link's Strategi™ has a high-speed messenger that sits between an RPG back end and a dissimilar front end. It allows you to read/write to the data queues while it handles the presentation. So, you can utilize current RPG skills on the back end but deploy to a device such as a cell phone, pager, or Palm Pilot. **BCD's Progen Plus ILE/RPG** tool provides developers with a robust RPG IV development product. **Linoma Software's CVTILERPG** allows developers to convert RPG III and RPG/400 to ILE RPG. **Lotus® Domino™** is a good tool to enhance existing applications by providing a modern GUI user interface. And **ProData's CVTRPGIV** is a conversion tool that provides additional features than the OS/400 supplied command.

Figure 5 shows the Tools Network vendors that provide tools that can be used in your application redesign efforts:

Advanced Business Link Strategi	www.businesslink.com
BCD ProGen Plus ILE/RPG	www.bcdsoftware.com
Linoma Software CVTILERPG	www.linomasoftware.com
Lotus Domino	www.lotus.com
ProData CVTRPGIV	www.prodatacomputer.com

(Figure 5)

Application Reface Existing Tools

These tools are used if you simply want to reface existing 5250 applications or put a graphical front end on applications that will be implemented in RPG or COBOL fields, rather than requiring the developer to learn VisualBasic or Java, etc.

Refactoring involves three phases:

- ✍ *Phase one* involves enabling dynamic transformation of 5250 datastreams to a GUI front end at the client. In this phase, nothing happens to the program, it all happens automatically at the client.
- ✍ *Phase two* requires the building of rules-based definitions regarding the presentation of the GUI. Phase two also adds customized controls that are not in the RPG program.
- ✍ *Phase three* allows you to break a single 5250 screen into multiple panels to present on the GUI interface. Or, in this stage you might consolidate several systems into one interface.

These are the tools that accomplish these. Products, such as **IBM Host Publisher**, allow a series of 5250 screens to be encapsulated as a reusable JavaBean component. **Look Software's NewLook** interface instantly looks and behaves like Windows by dynamically generating a Windows user interface directly from your existing "green screen" application. NewLook is marketed by both LANSA and Look Software. **Jacada**® has several products for this space, including **Innovator**, which is currently a "one of kind" product that allows back-end RPG programs to write to a special device file, such as a workstation file, which handles all the writing to the Web GUI. This lets the RPG programmer write the GUI without having to learn any of the Java tools that you would otherwise have to use. **Jacada for Java** is a thin-client, Web-to-host computing solution that automates the generation and maintenance of 100% Java clients for mainframe and iSeries and AS/400 applications.

Jacada Innovator extends legacy applications as business-to-business and business-to-consumer solutions to the Web. **Jacada for Visual Basic** generates a graphical user interface for mainframe and iSeries or AS/400 applications in fully functional Visual Basic code. Jacada for Java generates java based applications that can interface both mainframe and iSeries or AS/400 applications. **ResQNet.com's ResQNet™** suite provides refactoring features to existing applications. It has a drop-and-drag development tool that generates additional graphics to applications accessed through a browser. **I/NET's Webulator/400** provides 5250 emulation through any Web browser, and is natively on iSeries and AS/400. Just install and configure Webulator/400 and every green screen application on your iSeries or AS/400 is converted into HTML, whether it's written in COBOL, ILE C, RPG or any other iSeries or AS/400 language. Source code is generated by allowing developers to add additional graphics. **SEAGULL's GUI/400™** product is a reface tool that allows developers to build Windows GUI clients for iSeries and AS/400 applications. **SEAGULL JWalk™** is a complete Web/Windows-to-host development and deployment solution for 3270 and 5250 business applications.

IBM's WebSphere Host Integration provides secure access to your host applications and data, using a simple, Java-enabled Web browser. It provides a fast and easy way to implement e-business goals by extending existing host applications to Web-users and new e-business applications. **IBM's Screen Customizer** automatically converts host screens into graphical presentations which are customizable without programming. The **IBM WebFacing Tool** converts DDS used to define 5250 interfaces to a Web GUI interface with minimal changes to the host application. This new WebFacing Tool intercepts application data prior to 5250 data stream generation, avoiding the overhead of GUI solutions that first require the creation of the 5250 interface and then the execution of a corresponding screen scraping effort. It converts, at development time, the display file source into Java Server Pages (JSPs) and Java data beans. JSPs and Java data beans are deployed to the WebSphere Application Server (WAS) for execution of the Web application. There are no separate tool costs or runtime charges. A WebFaced application supports both the 5250 and Web interface so there is no dual maintenance.

BOS Jadvantage is a Java-based application that provides iSeries users with TN5250 GUI emulation on PCs or network computers via an Internet browser. **Cabel's AStoWeb®** tool converts existing programs and screens at runtime in a web browser, allowing users the capability of accessing applications on the Internet or intranet. **JET Labs e-terminal™** provides a screen designer utility that works with API's that are inserted in screen execution in existing programs. This allows the programs to be executed in a web browser.

Figure 6 shows the Tools Network vendors that provide tools that can be used in your application refacing efforts:

BOS Jadvantage	www.bosweb.com
Cabel AStoWeb	www.astoweb.com
IBM Web Facing Tool	ibm.com/software/ad/wdt400/
IBM WebSphere Host Integration	ibm.com/software/webservers/hostintegration/
IBM WebSphere Host Publisher	ibm.com/software/webservers/hostpublisher/
IBM Screen Customizer	ibm.com/software/network/screencustomizer/
I/NET Webulator	www.inetmi.com
Jacada for Java	www.jacada.com
Jacada Innovator	www.jacada.com
Jacada for Visual Basic	www.jacada.com
JET labs e-terminal	www.jetlab.com
Look Software NewLook	www.looksoftware.com
ResQNet.com ResQNet	www.resqnet.com
Seagull GUI/400	www.seagullsw.com
Seagull JWalk	www.seagullsw.com

(Figure 6)

Database Utilities

These are the tools a programmer can use to access, view, or manage databases. **Linoma Surveyor/400** includes a 5250 emulator that currently allows

access only to OS/400, but soon will also permit users to run certain Surveyor/400 components (for example, the database editor and properties displays) from an OS/400 command line. **GEN/400 ENQUIRY** is a screen inquiry program generator, which quickly builds drill-down suites of information access programs on top of existing DB2 UDB for iSeries data. **GEN/400 REPORT** is a report program generator, not a one-off report writer. GEN/400 REPORT automates the production of iSeries and AS/400 reporting programs. **GEN/400 UPDATE** facilitates the rapid development of high quality file maintenance programs and works well for single and multiple, large scale, record changes. **GEN/400's Reorganise** is a set of programs that allows reorganizaion and monitoring of files to be done on either an ad-hoc basis, by choosing the relevant files at that time, or by scheduled regular jobs for lists of selected files. **Help Systems' Easy View** increases programmer productivity by reducing the need to use DFU's and queries to view or change contents of database files. **NSC's eSuite eSQL400** allows users with limited SQL skills to build queries in a browser and save output to PC applications. **ProData's DBU** and **SQL/PRO** are products that allow users to access data and build queries. These products display field level attributes that assist in database updates or query creation. **Touchtone's QuestView** saves queries as programs, which provide performance enhancements when generating reports.

Figure 7 shows the Tools Network vendors that provide database utility tools.

GEN/400 ENQUIRY	www.gen400.com
GEN/400 Reorganise	www.gen400.com
GEN/400 REPORT	www.gen400.com
GEN/400 UPDATE	www.gen400.com
Help/Systems Easy View	www.helpsystems.com
Linoma Software Surveyor/400	www.linomasoftware.com
NSC eSuite eSQL400	www.nsc-inc.com
ProData DBU Database Utility	www.prodatabcomputer.com
ProData SQL/PRO	www.prodatabcomputer.com
Touchtone QuestView	www.touchtonecorp.com

(Figure 7)

FAX Enablement

These tools facilitate the sending of output such as invoices generated by iSeries applications. These tools provide basic fax capabilities and advanced features such as overlay design. **BOS PrintBoss** is PC software that can fax iSeries output such as spool files and email. **Cornerstone's Fax Server/401** is a product that can send and receive faxes to the iSeries. It also provides API's that can be placed in existing applications. **IBM's Facsimile Support/400** allows users to monitor the progress of submitted faxes. And it includes a set of commands that can be placed in applications that generate iSeries print output.

Figure 8 shows the Tools Network vendors that provide FAX enablement tools.

BOS PrintBoss	www.bosweb.com
Cornerstone Fax Server/401	www.cstoneindy.com
IBM Facsimile Support	ibm.com/eserver/series/fax400/

(Figure 8)

Graphical Query and Report Writing Tools

These are tools that provide a graphical user interface that allows users to create queries and reports. **mrc-Productivity** is a 4GL iSeries tool suite for Web site creation, rapid application development and report writing. **ComMit DataGlider** gives you a graphical front end that makes it easy to use an RPG program in a cross-platform environment that demands access to several data sources. **Brio Technology's Brio.Enterprise 6.0™** integrates query, analysis and reporting capabilities for Web and client/server environments. **BCD's DbGen** manages and describes database files, imports from existing files, cross-references files and fields within itself, automates the creation (or recreation) of files, and provides advanced application development database description functions. And **BCD's ProGen WebSmart** can be used to create dynamic HTML reports that can be accessed in a web browser. **LANSA/Client** gives end users GUI access to iSeries and AS/400 data for charting and query purposes — all from a single tool. LANSA/Client will also copy data to popular spreadsheets or other PC tools for analysis. **New Generation's NGS-IQ™** is a single vendor suite of business intelligence solutions that can be used enterprise-wide for data warehouse/datamart development, on-line analytical processing, advanced query, and reporting. **Jinfont's Jreport Enterprise Server** is a Java based product that is both a report development tool and a report distribution tool.

Figure 9 shows the Tools Network vendors that provide graphical query and report writing tools that can be used in your reface and redesign efforts:

BCD DbGen	www.bcsoftware.com
BCD ProGen WebSmart	www.bcsoftware.com
Brio.Enterprise 6.0	www.brio.com
ComMit DataGlider	www.dataglider.com
Jinfont Jreport Enterprise Server	www.jinfont.com
LANSA/Client	www.lansa.com
mrc-Productivity	www.mrc-productivity.com
New Generation NGS-IQ	www.ngsi.com

(Figure 9)

GUI Application Generator Tools

Comparing the 3GL products that were available 10 years ago to the 4GL products available today is like comparing night and day. First, you are not limited to writing everything within the 4GL environment. Additionally, the standard expectation today is that a 4GL *WILL* integrate with other applications and *WILL*

provide ways to import database definitions, application rules and pieces of code. This is important to note because it destroys the old reputation of using a 3GL or 4GL that says you have to throw out all your existing code!

There are a wide variety of application generators. Some of them take a different approach. Visual LANSA is for the Windows desktop, while Lansa also has LANSA for the Web. IBM VisualAge is also a 4GL product. **BCD's ProGen Plus** received the *Showcase Magazine* "Product Excellence 2000" award for the best AS/400 and iSeries program generator and report writer in the industry. Their product, **ProGen Plus for Java**, is an add-on that allows you to take existing green-screen ProGen Plus applications and regenerate them to run in Web browsers or standalone with a Java Virtual Machine (JVM), without any required recoding. And their WebSmart product generates dynamic HTML reports that can be displayed in a web browser. **Visual LANSA** allows you to deploy applications to many platforms including Windows, iSeries and AS/400, UNIX and wireless devices. Visual LANSA uses LANSA's Object Repository and 4GL to develop both client and server programs. **Computer Associates™, COOL:Plex** product is an object-oriented approach to a 4GL product. **Compuware's UNIFACE** is designed to deliver business-critical applications for B2B e-commerce, legacy renewal, and Web-based enterprise solutions. UNIFACE can also build zSeries and System/390 and iSeries and AS/400 applications with the same interface. **GeneXus™** is an intelligent database application development tool that helps construct small to large corporate database applications. **IBM VisualAge™ Generator** is a high-end, rapid application development environment for building and deploying e-business applications with little or no Java expertise. It allows OO and Java developers to implement systems running on traditional transactional platforms, such as CICS or IMS, and accessing legacy data, such as DL/I or VSAM. **Magic/400** offers a uniform paradigm and integrated development environment for client/server and Internet/intranet computing. **michaels, ross & cole's mrc-Productivity Series** was voted best product in the AS/400-based application development category in the *2000 AS/400 Technology SHOWCASE Product Excellence Awards* recognition program. **Progress/400 DataServer** provides application developers a transparent interface to a wide range of non-Progress database management systems. **Sapien's eMerge Application Server** uses rules-based methodologies and technologies to deliver a safe, incremental transition for business-as-usual performance. **Score's CIM/400** is a tool that generates applications and source code.

Figure 10 shows the Tools Network vendors that provide GUI application generator tools that can be used in your reface and redesign efforts:

BCD ProGen Plus for Java	www.bcdsoftware.com
Computer Associates COOL:Plex	www.sterling.com
Compuware UNIFACE	www.compuware.com
GeneXus	www.genexus.com
IBM VisualAge Generator	ibm.com/software/ad/visgen/
Visual LANSA	www.lansa.com
Magic/400	www.magic-sw.com
mrc-Productivity	www.mrc-productivity.com
Progress/400 Data Server	www.progress.com
Sapiens eMerge	www.sapiens.com
Score CIM/400	www.cim400.com

(Figure 10)

GUI Builder Tools

ASNA Visual RPG is a complete Web and Windows development environment. **Aura's Advanced Client Easycom/400 for Delphi** is built from an IDAPI (integrated database API) driver for the Borland Database Engine (BDE). It contains a set of components and tools that provide access to DB2 UDB for iSeries databases and other iSeries or AS/400 resources from Delphi or C++ Builder applications. **Aura's Advanced Client Easycom/400 for VisualBasic** is a complete set of tools, controls and functions organized to access iSeries and AS/400 databases and resources from Visual Basic or Visual C++ applications. **Aura's Easycom for WinDev and Java** allows developers to access iSeries databases. **Sapien's eMerge Application Server** uses rules-based methodologies and technologies to deliver a safe, incremental transition for business-as-usual performance. Use **System Object's Active Objects/400** for Visual Basic with any tool that is compliant with ADO (ActiveX Data Objects) components, OLE DB, or ODBC. **System Object's C++Builder/400™** is a development solution to create Web-based and distributed applications for iSeries and AS/400. **System Object's Delphi/400** is a cross-platform development tool. Keep in mind though that these are not tools that will let you attach a graphical front end to your existing RPG syntax, that would be refacing. These are GUI builders that let you create graphical applications using a particular tool, so they clearly fall within the redesign category. **BCD's ProGen WebSmart** generates dynamic HTML pages that can be displayed in a web browser.

IBM VisualAge C++ provides a rich environment and toolset for multiplatform, object-oriented application development. It is especially valuable for high-performance and highly computational applications. **IBM's VisualAge for Java** is a native compiler and Java Developer Kit for iSeries that is provided with OS/400. It allows you to compile Java bytecode into runnable classes that are optimized for iSeries and AS/400. **IBM VisualAge RPG** helps you develop new client/server applications or convert old applications to client/server for iSeries and AS/400.

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Figure 11 shows the Tools Network vendors that provide GUI builder tools that can be used in your application redesign efforts:

ASNA Visual RPG	www.asna.com
Aura EASYCOM/400 for C++	www.easycom-aura.com
Aura EASYCOM/400 for Delphi	www.easycom-aura.com
Aura EASYCOM/400 for Visual Basic	www.easycom-aura.com
Aura EASYCOM/400 for Java	www.easycom-aura.com
Aura EASYCOM/400 for WinDev	www.easycom-aura.com
BCD ProGen WebSmart	www.bcdsoftware.com
IBM VisualAge C++	ibm.com/software/ad/visualage_c++/
IBM VisualAge Java	ibm.com/software/ad/as400/vajava/
IBM VisualAge RPG	ibm.com/software/ad/varpg/
Sapiens eMerge Application Server	www.sapiens.com
System Objects Active Objects/400	www.systemobjects.com
SystemObjects C++ Builder/400	www.systemobjects.com
SystemObjects Delphi/400	www.systemobjects.com

(Figure 11)

GUI Print Viewer Tools

Some companies only want to add simple graphical functionality such as marking text with a yellow highlighter or zooming in and out to make text more readable. This category of tools helps with this. **Symtrax** has developed a suite of products for use in the Windows environment to help the end user interface easily with iSeries and AS/400. Symtrax products use industry standard routers, such as Client Access, NetSoft, etc., in order to link to iSeries and AS/400. All Symtrax products function in native TCP/IP mode, so there is no need to re-key reports into PC applications. With **Compleo Supervisor**, spool file reports may be routed automatically from iSeries or AS/400 to the correct person, in the correct format. It works hand-in-hand with Symtrax's report download and distribution product, **Compleo Explorer**. And the **RJS Web Report Server** has a suite of features that support the conversion and viewing of spool file output.

Figure 12 shows the Tools Network vendors that provide graphical query and report writing tools that can be used in your reface and redesign efforts:

RJS Web Report Server	www.rjssoft.com
Symtrax Compleo3 Explorer	www.symtrax.com
Symtrax Compleo3 Supervisor	www.symtrax.com

(Figure 12)

Image Integration Tools

Image integration tools are used for scanning documents and images, or for capturing images from the Web which will then be treated as iSeries or AS/400 objects. **DalTech DTI/400 Suite** creates a seamless integration of your line-of-business applications with software that retrieves images from the imaging server, typically a Microsoft Windows NT server. Both **Real Vision Basic** and **Real Vision Complete** products offer "image enabler" interfaces into iSeries and AS/400 applications with the addition of as few as four lines of native code, or through the use of "screen scraping" if another source of image displaying is not available. Real Vision Complete also supports color picture capturing and color scanning and offers image management, which permits users to establish specific routing procedures for scanned images (commonly referred to as workflow).

Figure 13 shows the Tools Network vendors that provide image integration tools that can be used in your application redesign efforts:

DalTech DTI/400 Suite	www.daltech.com
Real Vision Basic	www.realvisionsoftware.com
Real Vision Complete	www.realvisionsoftware.com

(Figure 13)

Language Translation

Tools are available to assist developers in a multi-lingual environment. **Navan LTF** converts the languages of display files and reports. **Seagull's TTT™** translates Languages iSeries applications as well as its own WinJa and J Walk products.

Figure 14 shows the Tools Network vendors that provide language translation tools:

Navan LTF	www.navan.co.uk
Seagull TTT	www.seagull.com

(Figure 14)

New 5250 application tools

These are the tools a programmer can use to build applications. **BCD's ProGen Plus** generates RPG applications and can ease the development of subfile screens and programs. Development is much faster than with RPG in LANSA's 4GL product, **LANSA/400**. It offers centralized definitions of common logic in the LANSA Object Repository for easy maintenance. **Computer Associates' COOL:2E** is a complete integrated development environment that enables developers to control all aspects of implementation — from design to production. **Score's CIM/400** product will generate screens, reports, programs as well as their source code. **mrc-Productivity Series'** 4GL interface combines menus and windowed prompts to provide an intuitive, user-friendly interface. Developers generate ILE/RPGIV "green-screen" applications for a 5250 environment.

Figure 15 shows the Tools Network vendors that provide 5250 application tools that can be used in your application reface and redesign efforts:

BCD ProGen Plus	www.bcdsoftware.com
Computer Associates COOL:2E	www.sterling.com
LANSA for the AS/400	www.lansa.com
mrc-Productivity Series	www.mrc-productivity.com
Score CIM/400	www.cim400.com

(Figure 15)

Print Utility Software

Tools are available to enhance printing functions. These tools can extend the value of existing applications and can create new strategic solutions. **InPro Utility Zone®** has tools that manage iSeries output. They include spool archiving, spool converting, and spool transmission. RJS has a variety of print tools that can be used to modernize your existing applications. Their converter products can convert iSeries spool files to multiple PC formats. Their AS/400 Report Splitter can be used to send selective parts of a report via email to end users. And their server tools can be used to manage application output that is routed to output queues. **Symtrax's Compleo** allows spool file maintenance functions that include

distribution, download, reformat, print, archive, and automation. Another function provided is spool file mapping to PC applications such as Microsoft Word and Excel.

Figure 16 shows the Tools Network vendors that provide print utility software:

InPro Utility Zone	www.inprointernational.com
RJS DataImport Report Converter	www.rjssoft.com
RJS Native AS/400 Report Converters	www.rjssoft.com
RJS Native PCL to PDF Converter	www.rjssoft.com
RJS AS/400 Report Splitter	www.rjssoft.com
RJS Email Report Server/400	www.rjssoft.com
RJS Web Report Server	www.rjssoft.com
Symtrax Compeo Explorer	www.symtrax.com
Symtrax Compleo Supervisor	www.symtrax.com

(Figure 16)

Programmer Productivity Tools

These are miscellaneous tools to enhance application development on the iSeries. For building graphical applications that bring in ILE components, use **BCD ProGen Plus ILE**. An add-on module to ProGen Plus, the ILE/RPG module includes an ILE/RPG generator and new ILE/RPG templates. (Existing ProGen Plus definitions can also be automatically regenerated as native ILE/RPG programs.) Their **DbGen** product provides cross-referencing of databases, automates recompiling of files, and minimizes the DDS skills required for developers. **Docu-Mint** is used to inventory iSeries objects and identify object/source code discrepancies. **File-Flash** supports DDS file updates and provides a file preview feature. And **NetBridge/400** is a client server tool that integrates native iSeries applications with client developed solutions.

InPro Utility Zone has tools that aid developers with performance, spool file conversions, and sockets support. Navan CDmaker allows you to package your software packages on CD. Navan's LTF product is also a language translation facility. Navan's NUTIL is a set of utilities designed to assist programmer development with intelligent compiler facilities.

Among other things, **GEN/400 SPOOL** is a sophisticated utility that enables you to carry out detailed selection and mass manipulation of spooled files, interactively or in automatically submitted jobs. **Original Software's TestBench400** can be used to create test data, capture screen testing, and archive audit testing. And their **Extractor400** has a referential integrity feature to support file maintenance activities.

ProData has three tools in this category. **ProData DSM** embeds compile listings as comments in source code. **NESTRPG** creates a nesting report that details operation codes and called programs. And **RDR** retrieves deleted records from ISeries physical files. **Navan Utilities** is a set of utilities designed to assist programmer development with intelligent compiler facilities.

Figure 17 shows the Tools Network vendors that provide programmer productivity tools that can be used in your application reface and redesign efforts:

BCD DbGen	www.bcdsoftware.com
BCD Docu-Mint	www.bcdsoftware.com
BCD File-Flash Plus	www.bcdsoftware.com
BCD ProGen Plus ILE	www.bcdsoftware.com
BCD NetBridge/400	www.bcdsoftware.com
GEN/400 Spool	www.gen400.com
InPro Utility Zone	www.inprointernational.com
Navan Utilities	www.navan.co.uk
Orig Software Extractor400	www.origsoft.com
Orig Software TestBench400	www.origsoft.com
ProData DSM	www.prodatacomputer.com
ProData NESTRPG	www.prodatacomputer.com
ProData RDR	www.prodatacomputer.com

(Figure 17)

Telephony Enablement Tools

These tools provide an interface between iSeries or AS/400 and your telephony system. How might this be helpful? For those enterprises that would benefit from an automated call program, these tools are your answered prayer. With **Cothorn's CallPro**, you can integrate existing applications or use CallPro as the basis for new application development. CallPro provides individual users with computer telephony features for both inbound and outbound calls. **DalTech CallProcess/400**, another telephony product, can dynamically route calls to the last point of contact, the account receivable department, security, or wherever your application needs the call to be routed. Therefore, it eliminates the need to enter the information into the switch because the database can automatically and instantly look up the information and route the call. The fact that this is database-driven means that alterations to the telephony flow is easily and quickly accommodated without the need for IS intervention.

Figure 18 shows the Tools Network vendors that provide telephony enablement tools that can be used in your application redesign efforts:

Cothorn CallPro	www.ccslink.com
DalTech CallProcess/400	www.daltech.com

(Figure 18)

Workflow Enablement Tools

One view of workflow, from a Web perspective, is the consolidation and preparation of graphical panels. A different view of workflow relates to workflow automation. It handles sequences or steps along a process. For instance, it would be used within a bank for loan approvals where the application may need to be approved by a sequence of people. **Lotus Domino** is a particularly strong tool

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for automating this type of activity. **Real Vision Complete** offers image management, which permits users to establish specific routing procedures for scanned images. BEA WebLogic Process Integrator is a workflow engine for BEA WebLogic application servers that automates workflow, business-to-business processes, and application assembly. This product was previously **jFlow/400** from **Workflow Automation**, which has been acquired by BEA.

Figure 19 shows the Tools Network vendors that provide 5250 application tools that can be used in your application reface and redesign efforts:

Lotus Domino	www.lotus.com
Lotus Domino Workflow	www.lotus.com
Real Vision Complete	www.realvisionsoftware.com
Workflow Automation jFlow/400	www.workflow.ca

(Figure 19)

Conclusion

Most of the world absolutely cannot afford NOT to modernize their green-screen applications with a graphical front end. Yet at the same time, these iSeries and AS/400 users may also find increased strains from budget cuts and a shortage of IT skills. Therefore, it becomes critical to maximize current investments in "tried and true" solutions.

If your organization is in this situation, it is important for your IT staff not to become overwhelmed with the project at hand. Indecisiveness can prevent them from trying the very tool that could eliminate the challenge that keeps them overwhelmed. What's more, the cost of doing nothing is simply too high of a price to pay.

That's why IBM provides the Application Development Tools Network for iSeries 400 — to present pre-researched advice and tools knowledge, assimilated and available to all iSeries and AS/400 shops that are interested in driving forward into the e-business challenge.



Start by visiting the Application Development Tools Network Web site (see Appendix D). Get familiar with its organization, related hotlinks and tools search facilities. After you've viewed the Web site, take a look at the Web sites of the various Tools partners. Look at the features and functions that indicate the quality of tool products and read the success stories.

As another resource, read the other white papers in this series regarding the additional five application modernization strategies. When you are ready to take on the challenge of beginning a search for tools, review Appendix A of this paper for a "pros and cons" discussion of tools use. This will help you to decide if your modernization strategy will simply involve refacing tools or will require some rewriting of existing code. Further information is also found in Appendix B (a guide to the Tools Network). Appendix C gives you an actual framework for your tools selection. With all of these resources, along with the road map to application reface and redesign, you should be safely on your journey to application modernization. Finally, Appendix D lists various Web sites that may assist your application modernization efforts.

Appendix A: Application Development Tools Network for iSeries

Sorting out the available application development tools can be a daunting task for even the best of developers. Recognizing this, iSeries brand marketing and PartnerWorld for Developers have combined efforts to create the Application Development Tools Network for iSeries 400. For more information, visit the Tools Network Web site at: ibm.com/eserver/iseries/developer/tools/. The Tools Network identifies and promotes tools to facilitate application development on iSeries and AS/400e. The objective is to keep the application portfolio attractive and current with the latest technology. The Application Development Tools Network for iSeries 400 was created to not only help developers identify application modernization options, but to recruit and encourage business partners to create advanced development tools for iSeries.

Application development is key to the future of any computing platform. iSeries and AS/400 customers and solution providers must be able to create new applications, and extend existing applications in ways that take advantage of the latest technologies, such as:

- ✍ Graphical User Interfaces (GUIs) via a PC forms-based GUI or browser
- ✍ The World Wide Web
- ✍ Integration with Lotus Domino/Notes running natively on iSeries and AS/400
- ✍ Transition to Java and the world of object oriented programming
- ✍ Business intelligence

The mechanics of the Tools Network

There are more than 140 partners and 390 tools represented in the Tools Network, including both IBM and non-IBM tools. Understanding that a long list of tools can be overwhelming to sort through, the Tools Network Web site serves as a filter to quickly narrow the selection to those that perform a particular task. The site is available to iSeries (and AS/400) customers and business partners.

A tool search can be performed two ways. A tool can be selected by choosing a specific manufacturer or tool for immediate "quick navigator" drill down. Or, the user can choose a modernization strategy then drill down to the work task level and finally see a list of partners and tools available to accomplish that task. . For example, when the user drills down into the e-business/e-commerce strategy, tools are further categorized by functional area such as "browser front end for an existing application".

Within each sub category or work task, tools are displayed in tables. By clicking on a partner name, the user is directed to that partner's home page. Or, by selecting a particular tool, the user is transferred to a page dedicated to that particular tool or, if unavailable, a products page. The idea is to help iSeries and AS/400 shops and solution providers quickly identify an application development

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strategy and then filter the available tools to reduce the number of tools options that must be examined.

Appendix B: Development tools pros and cons

While some development teams like to work with low-level tools to provide these new interfaces, others prefer higher level development environments to accomplish the desired result. Additionally, customers and solution providers all differ in how aggressively they adopt new technologies and how important platform independence is to them. So, let's hit the pros and cons of using development tools "straight on." Below are some questions that will help you in the process of deciding if a vendor or a tool is right for your application development needs. Consider your answers carefully, and use them as the filters through which you view the promises and features of vendors and their tools:

- ✍ How much control do you require?
 - ✍ Are you willing to change the way you do business to accommodate a tool?
 - ✍ Does every application need to be built from scratch?
 - ✍ How does your corporate culture feel using about tools and partners? Can you ensure that your people mesh with outside resources?
 - ✍ How deep is your backlog? Do your people have time to learn new technologies and then build new applications from scratch?
 - ✍ How long is your development timeline? Can you afford to wait through the learning curve required to master a new tool or technology, or must your new applications be online sooner?

- ✍ Are you willing to rely on a partner?
 - ✍ What if that partner disappears (either through failure or merger)?
 - ✍ Will the partner's tools interoperate with those of other partners in which you've already invested?
 - ✍ How flexible is the partner on pricing?
 - ✍ How willing is that partner to support your training needs?
 - ✍ Does the partner know your business or at least your industry?
 - ✍ Does the partner have broad experience?
 - ✍ Can the partner provide contractors (to relieve your head count issues)?

- ✍ How complex and far reaching is the overall application you are trying to create?
 - ✍ How much integration work is required with existing applications?
 - ✍ Is this a new or extended (must be integrated) application?
 - ✍ Do you need heterogeneous deployment?

- ✍ How much are you willing to invest in training?
 - ✍ How much breadth should the training provide?
 - ✍ Where can the training be delivered?
 - ✍ Can you find qualified technicians?

Appendix C: Framework for tool selection

As we've worked with iSeries and AS/400 customers and solution providers to help them determine the best tools for their particular development needs, the following set of questions has evolved as a framework for considering the type of tools that might be appropriate for your needs. Look through this list and see if it might work for your selection process:

1. What does your business environment or application portfolio of the future need to do or look like?
2. How does e-business factor into that future business?
3. Do you want to build or generate (use an application generator) your new applications?
4. Do you need to deploy applications via an intranet for internal use, or will they need to extend to the Internet to external users?
5. Do you want to move to a component architecture or can your needs be met with traditional skills (RPG/other skills) and tools?
6. Is there a need to reface existing applications so that they are graphical, would you rather write brand new applications from scratch, or would you prefer to simply purchase a new set of applications with new interfaces? How many additional applications and interfaces will be needed later?
7. Will you need to deploy your applications to a browser or other GUI capable device or do you need to deploy it to a non-programmable terminal?
8. Will client device independence be important?
9. Do you have a predisposed preference for an IBM tool, or are you open to partner products?
10. Are you open to platform-specific tools, or will platform-neutral tools better suit your development and deployment needs?
11. Do you care about having to introduce intermediate nodes to your infrastructure in order to use specific tools?
12. What does your local skills-pool look like?
13. Can you impact that skills-pool?
14. Will you be building applications for internal use or for resale?

Appendix D: Additional Web sites

If you are a solutions provider, you should consider taking advantage of the opportunities and benefits offered by being a member of PartnerWorld for Developers, iSeries. Visit our Web site to find out more about the wealth of resources and assistance available: ibm.com/eserver/iseries/developer/

To get more details on becoming a member of PartnerWorld for Developers, iSeries, visit: ibm.com/eserver/iseries/developer/membership/reg_info.html

Check out the various PartnerWorld for Developers, iSeries service offerings at: ibm.com/eserver/iseries/developer/

For additional tool information, the Application Development Tools Network for iSeries is found at: ibm.com/eserver/iseries/developer/tools/

White papers related to this paper can be found at:

ibm.com/eserver/iseries/developer/tools/documents/index.html

Please continue to check this site for the remaining papers in this series.

Redbooks:

Who Knew You Could Do That with RPG IV? A Sorcerer's Guide to System Access and More, SG24-5402-00

ibm.com/redbooks/abstracts/sq245402.html

Additional papers available regarding Application Development tools strategies:

iSeries Application Development Directions Update, available at ibm.com/eserver/iseries/developer/tools/documents/addir/index.html

Creating Web Applications, available at:

ibm.com/eserver/iseries/beyondtech/creating_web_apps.htm

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