

complementSoft's ASAP™

The innovative productivity tool for all SAS® users

White Paper

Abstract

With its innovative code visualization, complementSoft's ASAP™ is the productivity tool for SAS® users and programmers. Its new visual and modular approach allows a user to quickly and easily review, debug, build, expand or enhance their SAS® programs, ASAP™ can help companies significantly improve their SAS® experience without requiring a wholesale restructuring of their existing environments. The rich, pre-built functionality and modular architecture offers companies a number of benefits over traditional manual-build SAS® approaches: accelerated deployment time, reduced project risk, and lower total cost of ownership.

complementSoft's strategy of building a code Visualizer and plug-n-play template approach to SAS® is in line with the needs of senior IT and line-of-business executives operating in today's economy. This approach decreases costs, time and risk while increasing productivity versus having to build, review, and maintain an Enterprise's SAS® implementations and components either manually or from scratch.

Enterprises are choosing to roll out ASAP™ as their standard platform on top of SAS® because of its ease of deployment and use as well as lower cost of ownership over other approaches. The combination of SAS® with ASAP™ helps save time, cost, and risk, over building typical SAS programs, components, and implementations from scratch. ASAP's™ automatic visual code diagramming helps users to quickly grasp the structure of unknown code, recognize areas of over-complexity, and increase productivity by resolving problems more rapidly - adding significantly to the usability and manageability of a SAS installation while decreasing total costs.

This paper examines challenges facing the SAS® users community, evaluates other products in the markets and points out key reasons for ASAP™. It then examines complementSoft's ASAP™ solution, including its visualization and automated diagramming, and how it enables SAS® users and programmers to automate and expedite the delivery of SAS® programs and solutions – decreasing costs, time, and risk while increasing productivity.

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I. Introduction

Our mission is to bring low-cost, easy-to-use, productivity interfaces with new functionality to established software products. Our products are meant to complement and enhance, accelerate deployment time, reduce project risk, and lower total cost of ownership of existing products.
-- Ed Schroeder,
CEO, 2002

complementSoft's *ASAP*[™] is a software productivity tool for all SAS® users. With its automated visual diagramming it represents the next generation in programming as it literally allows you to visualize your SAS® program code. In addition to the code visualization with *ASAP*[™], you can easily build, edit, transfer, and debug SAS® programs with a modern graphical user interface (GUI). Built-in program flow, execution flow, and data flow visualization, automatic local or remote execution, and plug-n-play language and best practices templates support, all these are some of the features that make complementSoft's *ASAP*[™] an essential tool in any SAS® environment.

complementSoft's integrated approach brings application tools and usability into the new visual millennium. To the user, having *ASAP*[™] means having the tools or software utilities that the user needs to perform the following example tasks:

- ✓ Automatically creates visual diagrams of the program flow, i.e., how a program is coded. Any changes to the program code in the editor are reflected instantaneously in the program flow visual diagrams.
- ✓ Automatically creates visual diagrams of the data flow, i.e., where the data came from, how the program manipulates the data, the sequence of the manipulation, and where the program finally stores it. Any changes to the program code are reflected instantaneously in the data flow visual diagrams as well.
- ✓ Automatically creates visual program and data flow diagrams of the execution flow after program execution. Reads the log file with MPRINT and other execution options for visualizing Macro data flows in the execution flow diagrams.
- ✓ Access and transfer SAS® programs, documents, or data files transparently across different platforms.
- ✓ Build, edit, highlight and summarize SAS® programs and execution logs.
- ✓ View the program code, the execution log, and debugging hints interactively. Automatically matches execution errors to the corresponding code segment while providing interactive debugging hints.
- ✓ Run Programs, in normal or step-wise mode (one statement at a time with the option of skipping some statements) simply with a mouse.
- ✓ Profile data from SAS® datasets, RDBMS tables, with two mouse clicks.
- ✓ Find the "magic" syntax to do the job, i.e., plug-n-play language and best practices templates.

All the above features work together to streamline the workflow and are available with a mouse click.

II. Current Challenges and the *ASAP*[™] Solution

The SAS® Environment

The SAS® System, a suite of software for enterprise wide information delivery, runs on all major operating systems (Mainframe, UNIX, as well as Windows, Linux and VAX). Since its inception, the SAS Institute has been committed to make SAS® products available for all major computer operating systems. To facilitate this SAS® software is designed using a Multi-Platform Architecture, meaning the software is written in as portable a way as possible. This "least common denominator" portability approach has come at the expense of usability.

Challenges for SAS® Users and Programmers

SAS® users and programmers must constantly deal with the following tasks:

- ✓ Visualizing and documenting program functions, program flow and data flow.
- ✓ Interpreting what your SAS® program is doing.
- ✓ Accessing/transferring programs transparently across different platforms.
- ✓ Building and Editing programs.
- ✓ Running programs.
- ✓ Viewing errors and debugging programs.
- ✓ Reviewing and maintaining heavily patched and undocumented legacy programs.
- ✓ Finding the "magic" syntax to do the job.
- ✓ Finding the best way to share and reuse codes.
- ✓ Performing effective data profiles to get a quick overview of the data regardless of where it is stored, whether it's in SAS datasets or RDBMS tables.

SAS users and programmers often must juggle between different programs on different platforms to accomplish their tasks. To assist with these chores there are a number of useful tools. Data flow charts are manually put together with Microsoft's VISIO. Transferring files between environments or locations (FTP) can be accomplished with commercial products such as EXceed from Hummingbird or shareware programs such as CuteFTP and WS-FTP. Similar Telnet products exist for remotely accessing other computers. But there are no visualization tools designed to automate and assist with the visualization of SAS® data and program flows.

The *ASAP*[™] Solution

In the quest for an integrated solution that streamlines the workflow for SAS® users and programmers, *ASAP*[™] was born. It is a productivity tool that brings application tools and usability into the new millennium, decreasing total cost of ownership while increasing productivity.

The following table shows how quickly payback can be achieved with *ASAP*[™]:

Feature	SAS® Users Without <i>ASAP</i>[™]	SAS® Users With <i>ASAP</i>[™]
Diagramming and Documentation	Manual effort to diagram, document, and maintain SAS programs.	Automatically generates program and data flow diagrams.
Error Checking	Manually scan the execution log and match it with the corresponding code segment to correct error.	<p><i>ASAP</i>[™] automatically scans the execution log and highlights errors. The user clicks on a highlighted icon and a pop up window shows the log's error message and the corresponding program code segment.</p> <p>Clicking on the error message will show the appropriate debugging hints if the user is unsure of how to correct the error.</p> <p>The user can consequently make the correction interactively.</p>
Analyzing Legacy Code and Archived Programs	<p>Labor-intensive effort required to understand previously developed SAS programs.</p> <p>Manually or mentally diagrams the program and data flow.</p>	<p>Program flow and data flow are automatic.</p> <p><i>ASAP</i>[™] also provides a tree view to help summarize the program and provide a quick understanding of the program flow. It allows the user to quickly view, hide, expand and navigate to the interested code segment.</p>
Locating and Sharing SAS® Templates	Time consuming searches to locate existing programs.	Streamlines process to locate, use, and insert code from Templates.
ANSI SQL Database Support	Must use a separate software tool (e.g., SAS Access, MS Access, RapidSQL) to query and drill down into ANSI SQL data sets.	<p>Automatic display of ODBC supported RDBMS databases provides quick connection to these databases.</p> <p>Automatic display of table structure/column structure for ANSI SQL data sets. Includes DB2®, Oracle® & MS SQL®</p> <p>Effective data profiling functions such as table or column samples, min/max, distinct, and average values, are just a mouse click.</p>
Support for Popular SAS	No integration between popular editors and Base SAS.	Automatically visualizes your programs even when you use an

Editors		alternative SAS editor, such as UltraEdit or K-Edit.
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Comparing *ASAP*[™] with Alternative Products

Category	Definition	Alternative Products
Document Manager	Capability to interact with multiple platforms and computers via a File Manager that sees local and network drives.	Hummingbird EXceed
Full Feature Code Editor /Multi-Editor Support	Code editing with color-coding, line numbering; capable of using other editors Provides tree view summary and navigation.	Numerous document management software apps exist, but none are designed to enhance SAS software.
Template Manager	Libraries of templates that the user can select from as well as to add into; capable of connecting to a local network and Web files.	SAS On-line help
Database Manager	Capable of viewing/accessing database's elements - table structure, column structure, data profiling functions, etc.	RapidSQL MS Access
Graphical Code Visualizer	Read the program code and convert the code into a visual diagram showing program flow and data flow. Debugging – find errors visually. Optimizing the performance – visually identify redundant code.	None
Intelligent Code Executor	Allows local and remote execution.	
Site Manager	Dialog with the remote server via FTP or Telnet, allowing performance of administration of the remote server.	Hummingbird EXceed
Server-Emulation	Server (Telnet-Emulation)	Hummingbird EXceed

Without *ASAP*[™], SAS users and developers must use 3 to 5 different applications to perform the same tasks that are accomplished with *ASAP*[™].

ASAP[™] offers several clear advantages:

- Conservative payback ROI periods of 2 weeks to 3 months depending upon how an enterprise presently handles SAS program documentation.
- Productivity gains across an enterprise from cleaner, more efficient, and quickly developed SAS programs.
- The ability to easily share SAS code and SAS error corrections techniques across an enterprise.
- The ability to leverage your total SAS resources with greater efficiency.

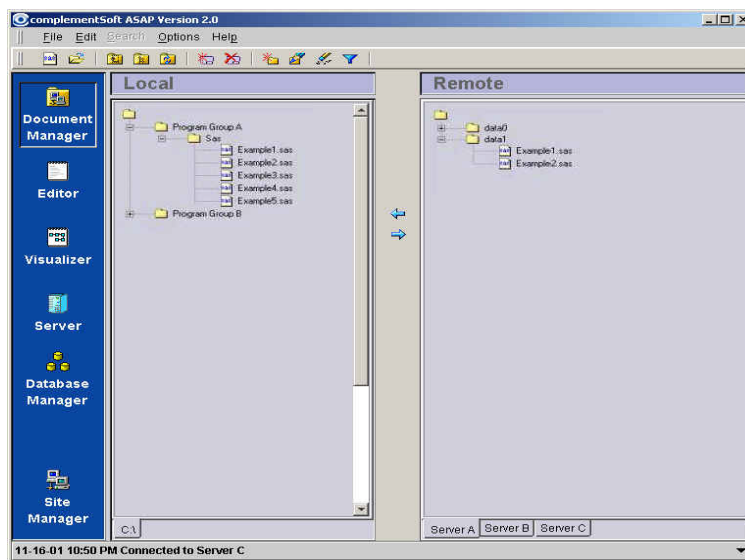
III. complementSoft *ASAP*[™] Features

ASAP[™] is made up of several major modules that are designed to support user workflow for every function such that a user's needs are just a mouse click away AND these functions work in concert with each other to streamline the entire workflow.

The major modules of *ASAP*[™] are the Document Manager, Editor, Visualizer, Server, Database Manager, and Site Manager.

Document Manager – *ASAP*[™] incorporates a Windows Explorer style File Manager interface that interacts with multiple platforms (Mainframe, UNIX and Windows). With this document management facility, the user can easily locate and transfer documents (SAS® program

files, log file, output files) across multiple computers. All documents are moved with just a mouse click, regardless of where they physically reside.



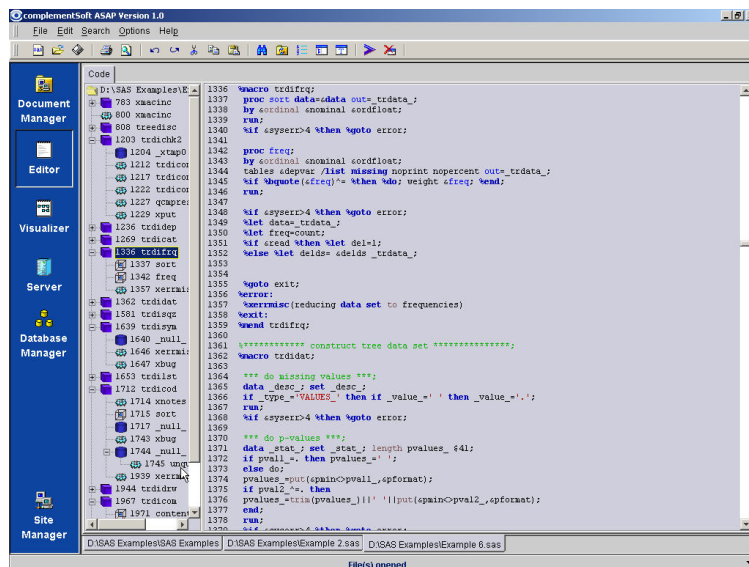
For example, as illustrated in the above screen shot, locating and moving a document is easy. The left panel displays the local workstation's file systems, i.e., the files and folders that were stored on the local workstation. Once *ASAP*[™] has connected to a remote server, the right panel shows the user what is available on the remote server. To migrate a

document, a user points their mouse at the document, clicks to select, and clicks the transfer button - or drags the selected document from one panel to the other.

Multiple tabs can be opened on both the left panel and the right panel. Consequently, the Document Manager allows the user to seamlessly retrieve and work with documents that were stored at multiple remote computers as if these documents are located locally on the user's workstation. In addition, the Document Manager has the built-in intelligence to recognize related documents (e.g., execution logs, output files etc.) and manages them as a unit (package) regardless of locations.

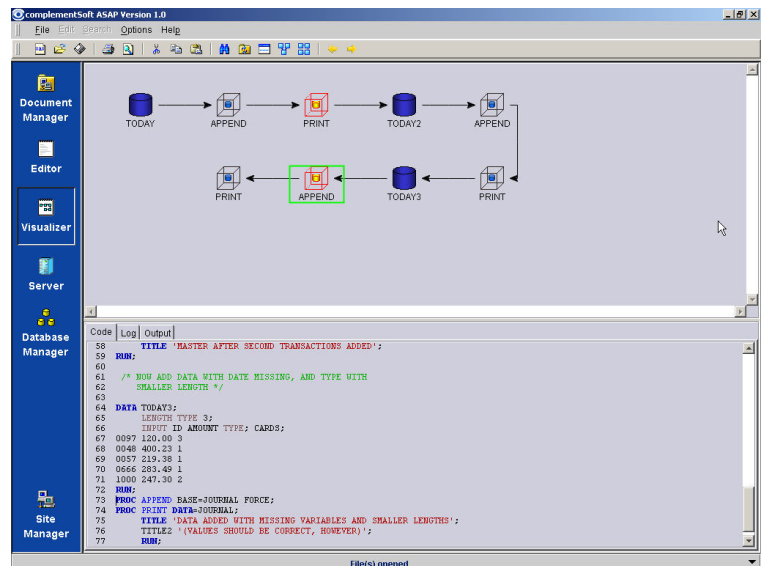
Code Editor – The Editor is a full-featured code editor that offers a variety of advanced code-handling capabilities. The Editor provides language-aware syntax highlighting—a

feature that makes source code and log files easy to read and understand. Moreover, when using the auto-execute feature, warnings and errors come back highlighted within the log files. Other features include line numbering, tree views of program blocks, code templates, breakpoint execution, and more.

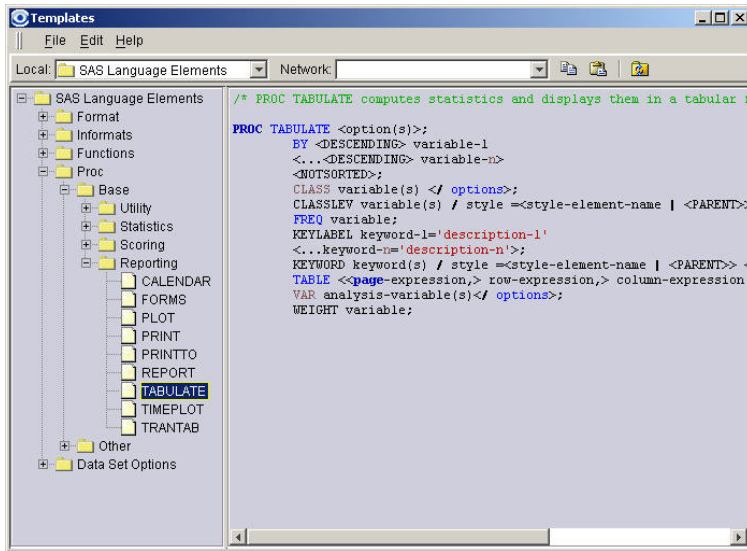


Another major feature of this Editor is its full integration with the Code Visualizer, thereby offering additional important functionality such as changes made in the Code Editor being instantly reflected in the Code Visualizer.

Debugging Manager – This facility enables the user to debug a program visually. The system automatically visually identifies common syntax mistakes and highlights them in the program flow. Clicking on the highlighted icon gives the user a popup window that shows the error message in the log file; clicking on the error message in the popup window gives a popup window with a user defined debugging hints window. This debugging help window can be shared across the Enterprise.



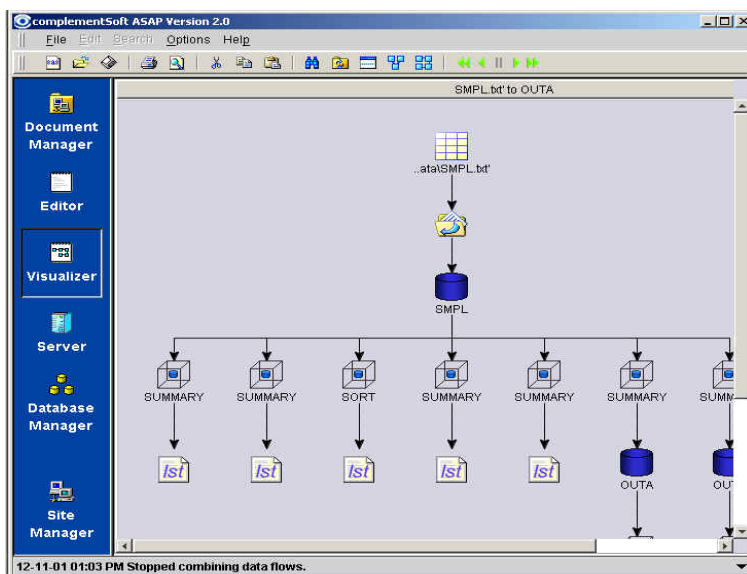
With these integrated features and functionalities users will now be able to analyze quickly and effortlessly both existing and new codes. Many corporations have large programs that have been running unaltered for years. The program coding itself takes up hundreds of pages. To analyze and alter these programs is a Herculean effort that few can do. With *ASAP™*, users will now be able to breakup and visually analyze in hours what would have taken days or weeks. Once analyzed, cutting out useless code and optimizing the process for performance can be accomplished in hours instead of even more days and weeks of analysis. Once updated, these programs will be able to run faster and more efficiently saving individual corporations significant cost in mainframe cycle-time and open systems CPU utilizations. Moreover, as business environments and business requirements change, these companies will be able to react quickly to changes in reporting and analysis needs. Their investment in the programs will be leveraged - a key objective for many information technology organizations today.



Template Manager – Code editing, no matter how powerful and user friendly the Editor is, cannot speed the development cycle by itself. The *ASAP*TM Editor takes the user beyond text editing with the integration of a Template Manager. The Template Manager provides the user with pre-built templates such as Language Elements Templates (syntax templates) and a facility for the user to browse and/or create their own. In general, templates are categorized into three types:

- ✓ Task oriented templates. Each task template is presented with a working example. The modular and concise format makes this an ideal tutorial and a great quick reference. Example tasks include inputting data, modifying and combining data sets, summarizing and presenting data, etc.
- ✓ Language oriented templates. These templates are based on the programming language syntax and would contain usage examples. We have included SAS® and SQL templates.
- ✓ "Best Practices" templates. These templates are industry or practice specific templates. ComplementSoft partners have available Clinical Trial Reporting Templates and ModelPro™ Data Mining Templates.

With a click of a button, the user can select a template and “snap-it-in” to the document being edited. This helps to encourage code reuse as well as code standardization, which enhances productivity both in code development and code maintenance. This also means that a user does not have to manually research documentation every time to ascertain how to code a certain function or procedure. To take this a step further, we have also added a web component to the Template Manager. Through this functionality a user can connect to Web sites that offer downloadable code. We have also built the URLs of several of these sites into the Template Manager. An Enterprise can also build into the Template Manager the address for an Enterprise intranet sites for sharing common Enterprise code.



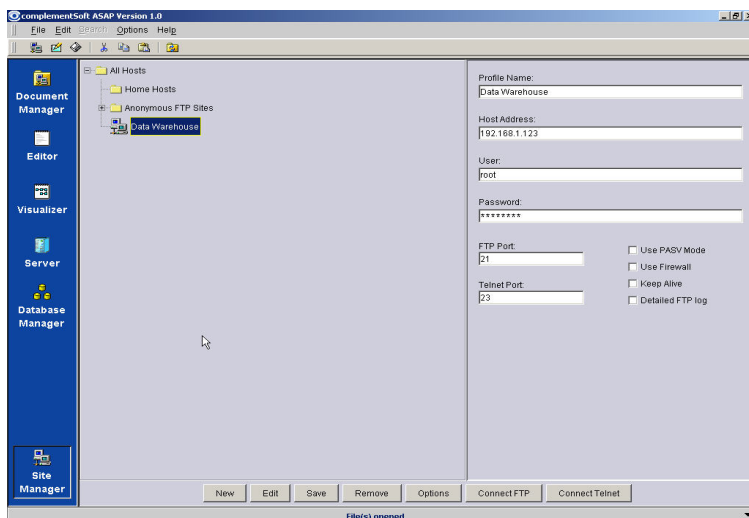
Code Visualizer – The Visualizer is a graphical, language-aware, program flow and data flow analysis tool. The Visualizer reads, parses, and displays your source code files representing each program and data block with an icon. Arrows connect these icons to show program and data flows, making them simple to read and understand. Tightly integrated with the Editor, the Visualizer lets you examine your source files interactively. For example, while in the split-screen view

mode, a user is able to click on an icon to jump to the actual program code in the editor. Similarly, changes made in the Editor (either in the split view mode or in the Editor mode) are instantly reflected in the Visualizer as well.

By showing the entire flow of the program visually, a user will be able to get a far better understanding of how the program functions. This will enable an understanding of the intent of the program and the dependencies between each module within the program without having to read through the code line by line. The drill down capabilities (right-click on a dataset either from the Program Flow or Data Flow to retrieve information about the dataset) through the right click menu show commonly used data profiling routines such as Sample, Freq Counts, Distinct Values, Tabulate, etc. In addition, the right click menu also provides the capability to use Proc SQL to query the dataset. The integration with the Editor allows the programmer to quickly examine any part of the code.

Site Manager - Both the Document Manager and the Code Executor use the Site Manager to

dialog with the user to capture all necessary information needed to make a connection to a remote server via ftp or telnet. Firewall configuration options, user logins, passwords, etc. are all configured through the Site Manager.

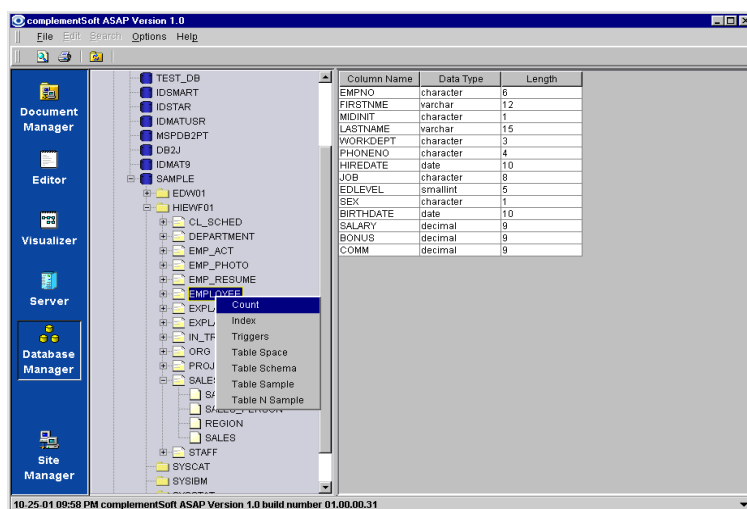


These configurations can be set and saved so that after initial logon, making new access transparent to the user. Additionally, these configurations as well as the configurations for the Message Manager and the Template Manager can be configured

once by a systems administrator for all the users in an Enterprise through this screen.

Code Executor (Server) - Is an enhanced telnet based remote execution program that enables the user to execute the denoted program on a remote server. Upon completion of the execution, the Code Executor will invoke the Document Manager to retrieve the resultant execution log and execution output for display using the Editor.

Program Optimizer - The Graphical Program Visualizer makes it easy to identify orphan and redundant code such as duplicate sorts of the same dataset. By allowing the user to easily visualize the program data flow *ASAP™* enables the user to optimize performance of their programs. Coupling this with other debugging and testing facilities can optimize the user's efforts.



Database Manager - By default, the Database Manager reads the ODBC Registry on the user's workstation. Left clicking on the + sign of the Database Type icon (e.g., SQL Server, Oracle, DB2, etc.) will display all databases of the selected database type in the window. From here a user can do

visual drilldown into that database to profile the data. A sample screenshot is shown on the prior page above.

IV. Software Compatibility

ASAP[™] runs on all 32-bit Microsoft Windows 95/98, 2000, NT, ME and XP operating systems. The latest version of *ASAP*[™] supports Base SAS® versions 6.x and 8.x, Proc SQL, SAS Stat, SAS ETS, and SAS Graph. The Automatic Execution feature connects with SAS® on UNIX, OS/390, OpenVMS, and Windows NT/2000. *ASAP*[™] supports most MVS, UNIX, and Hummingbird ftp protocols.

V. complementSoft *ASAP*[™] Licensing Information

Free trial versions are available and can be downloaded from the website. In order to continue to use the software after the 15-day evaluation period, you will need to contact complementSoft sales. Annual licenses of the product are available as *ASAP*[™] Standard Edition (full product with all functionality in this White Paper) or *ASAP*[™] Visualizer (Visualizer functionality only). Licensing includes upgrades and support for the year. Group and Enterprise Licenses are available.

European, Australian, and Asian customers may purchase from a local reseller. Contact our European Distributor Ratcliffe Technical Services Limited for the name of a local reseller. Website: <http://www.ratcliffe.co.uk/>

VI. For More Information

Please visit www.complementSoft.com, email sales@complementsoft.com, or call 773-755-7681.

About complementSoft, LLC

complementSoft[™] designs, manufactures, and markets software products that are designed to decrease a company's total cost of ownership and raise user productivity by bringing to market inexpensive new productivity tools with new functionality to established software applications. complementSoft's patented architecture is built entirely upon Java and XML.

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