Box 1
Folder 9

2 of 2

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PRODIGY

Technologies Corporation

Conor G. Shankey

(604) 687-4636

1100 - 1190 Hornby St. Vancouver, B.C. Canada V6Z 2H6

fax: (604) 687-1671 Internet: cshankey@prodigy.bc.ca

BRYAN R. GRUMMON

President

SERVIO CORPORATION

15400 N.W. Greenbrier Parkway

Suite 280

Beaverton, Oregon 97006

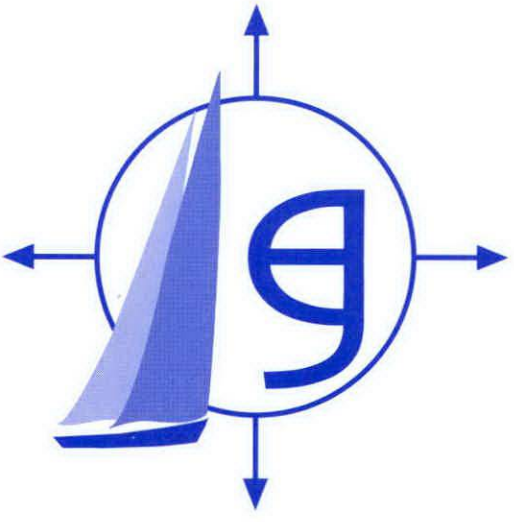
Phone: (503) 531-2574

Fax: (503) 629-8556

Internet:bryang@slc.com

SERVIO





genoa explorer

An easy-to-use application that puts you in touch with everyone in your organization and its affiliates.
Always current.
As close as your keyboard.

About Genoa Explorer

Genoa Explorer for the Macintosh provides you with fingertip access to every person in your organization and its affiliates. Without leaving your computer keyboard, you can use the *Genoa Explorer* to find individuals, locate people who perform certain functions in your organization, or find everyone within a given location or organizational unit. Once Genoa has located the people for whom you're searching, you can open any individual's *Directory Summary* window or *Organizational Chart* window.

The *Directory Summary* window lists the persons's vital contact information including numbers for phone, fax, e-mail, cellular, pager, and other devices. Since *Genoa Explorer* is dynamic, the information is as current as the most recent electronic update by your system administrator.

The *Organizational Chart* window graphically illustrates the individual's location within the organization. You can move anywhere within the *Organizational Chart* window to get more details about the people in other parts of the organization and its affiliates.

Starting *Genoa Explorer*

To start the application, double-click on *Genoa Explorer* icon, or select it and choose **Open** from the **File** menu.

The *Search Directory* dialog box appears.

If you have already started *Genoa Explorer*, you may choose **New Search** from the **File** menu; a new *Search Directory* dialog box will appear.

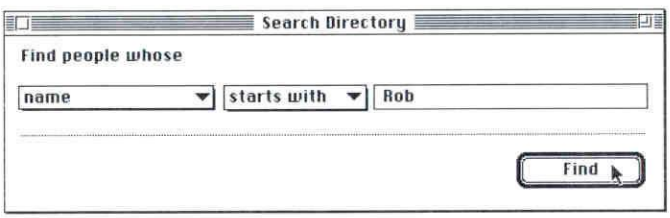
Setting your search criteria

The *Search Directory* dialog box contains two pop-up menus and a text box which allow you to set your search criteria.

1. Click on the first pop-up menu, and select the appropriate value.
2. Click on the second pop-up menu, and select the appropriate value.
3. Enter text in the text box at the right.

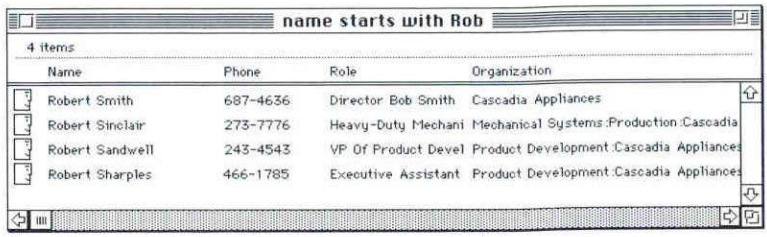
➢ **Important:** The text box is case-sensitive. Most names and words are capitalized

4. Click Find.



If *Genoa Explorer* finds people who fit the criteria of your search, the *Found* window appears with a list of people's names and their corresponding phone numbers, roles, and organization names. You

can click on the list headings to sort the lists in alphabetical or numerical order.



If no-one in *Genoa Explorer* fits your search criteria, an alert dialog box appears. To begin another search, you may enter new information in the *Search Directory* dialog box, or you may choose **New Search** from the **File** menu. Another *Search Directory* dialog box appears.

Resizing the *Found* window

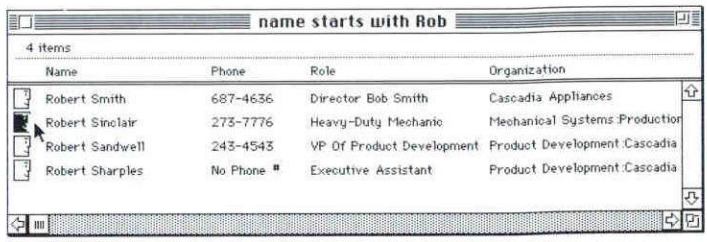
You can resize the columns in the *Found* window by placing your cursor in the list heading area just to the right of the column you want to resize. A double-sided arrow and a dotted line appear which can be dragged to the right or left. When you release your mouse, the area is resized.



Opening the *Directory Summary* window

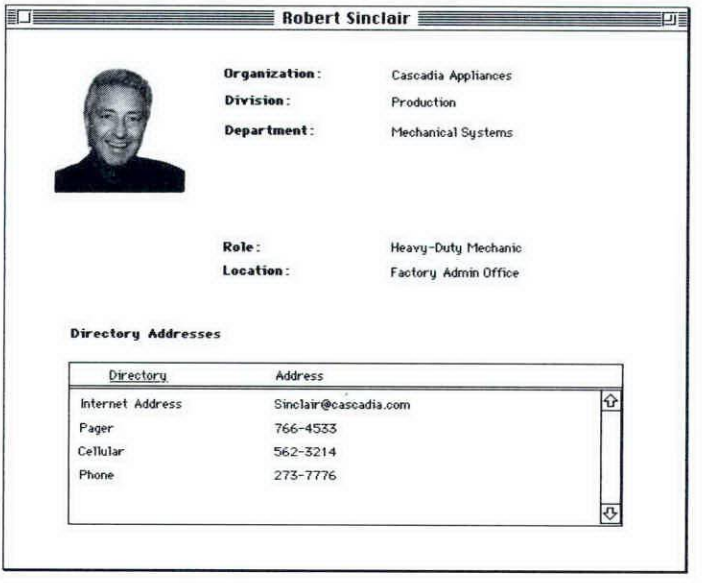
The *Directory Summary* window contains more detailed information about the person's physical location, organizational role(s), and various contact numbers.

To open the *Directory Summary* window, select the person's name or icon in the *Found* window, and choose **Open** from the **File** menu.



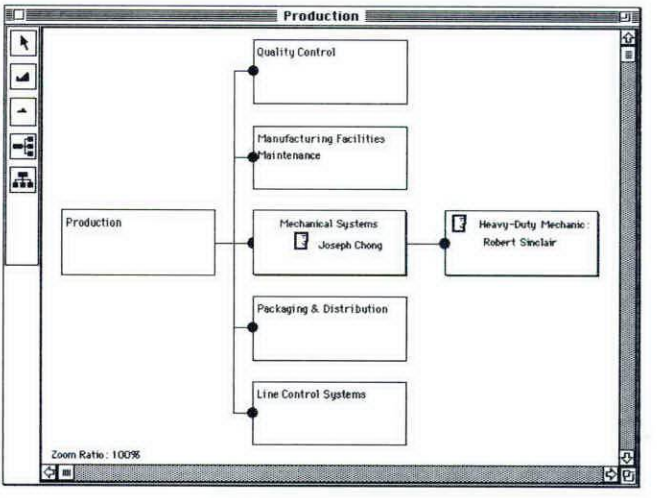
- *Another way to perform this step:* Double-click on the person's name or icon.

The *Directory Summary* window appears which contains the location and contact information for the person you selected. To view additional information in the Directory Addresses box, use the scroll bar. To sort the lists in alphabetical or numerical order, click on the list headings.



Using the *Organizational Chart* window

1. To open the *Organizational Chart* for an individual, select the person's name in the *Found* window, and choose **Show Org Chart** in the **Directory** menu. The *Organizational Chart* window for the selected person opens.

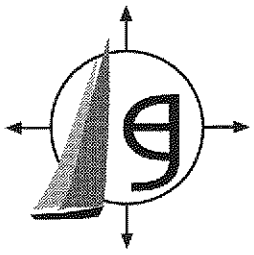


   You may open any of the organizational units in any *Organizational Chart* window to view the names of individuals who work within them.

2. To open another organizational unit, double-click on the appropriate box. A new *Organizational Unit* window opens.

   You may select any name in the *Organizational Unit* window, and view the person's *Directory Summary* window or open the person's *Organizational Chart* window by repeating the steps described above.

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genoa explorer

Large-scale, easy-to-use corporate directory management software

Know "Who's Where" in Your Organization

Locate individuals or groups of people in one easy step—based on who they are, what they do, where they work, or who they work with.

Chart the latest version of your entire organization

With *Explorer,* you have the power to automatically chart the latest version of your entire organization, yet *Explorer*'s power is extremely easy to use. Search for people, positions, or organizational units—*Explorer* quickly takes you directly to the selected point in the organizational chart—then move through the chart to locate associated individuals and organizational structures.

Uncompromised Capabilities

All Genoa products are mainframe-class applications—*Genoa Explorer* makes thousands of contacts available to hundreds of users.

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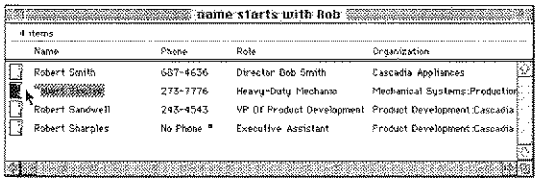
Product Overview

One-Step Searches

Genoa Explorer provides a one-step approach to finding people in your organization—who they are, what they do, and where they work.

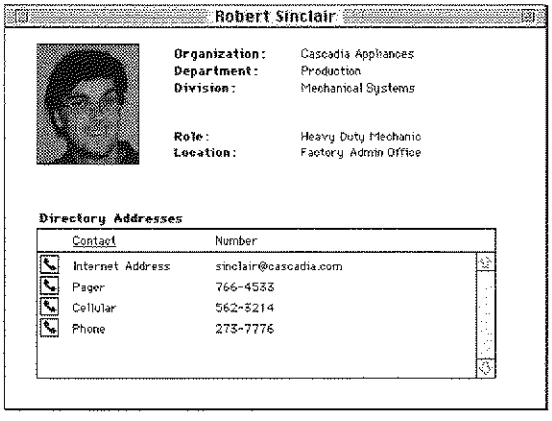


Even with just partial information, *Genoa Explorer* locates exactly the right person. One search can locate many people simultaneously and display the results in a scrolling list; you can sort the lists numerically or alphabetically to find the person for whom you're searching.



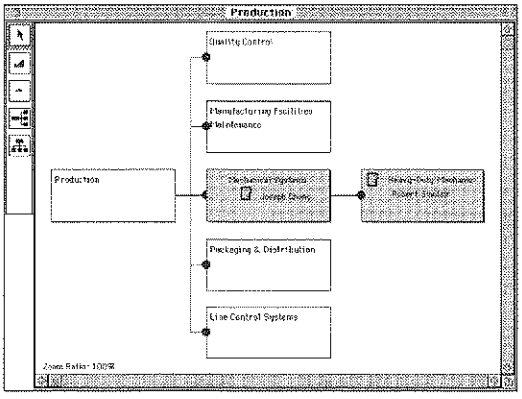
Unique Individual Directories

Double-clicking on a person's name in the *Search Results* window displays the individual's *Directory* window which contains the person's unique contact list: telephone numbers—including cellular phones, pagers and facsimile machines—e-mail addresses, and any other type of contact information appropriate to your organization.



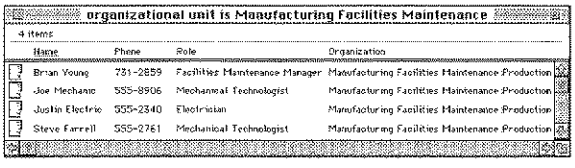
Automatic Organizational Charting

Opening the *Organizational Chart* window from the *Directory* window takes you directly to the individual's position within the organization—*Explorer* automatically displays the most recent organizational structure. Once in the *Organizational Chart* window, you can move anywhere within the entire company, examining the information of associated individuals, reporting structures, and organizational structures.



Move Anywhere in the Organizational Chart

Double-click on any unit in the chart; the *Organizational Unit* window appears with a list of all the positions and people fulfilling those positions within the selected business unit. *Genoa Explorer*'s structure is completely integrated so that you can select any individual in the window and open his or her organizational chart. And, you can move to a macro view which displays the organization in its entirety.



Application Architecture

All Genoa software uses the same highly efficient client/server architecture to ensure the best possible performance over even the slowest network links—dial-up lines and wireless links both provide acceptable performance. Combined with our highly-tuned object-oriented search engine, *Genoa Explorer* will provide outstanding performance in your office environment.

Implementation Requirements

Genoa Explorer's client software runs on Macintosh or Windows workstations with TCP/IP networking capability and 16 Mb or more of RAM. The *Explorer*'s server software uses Servio Logic Corporation's GemStone OODBMS.

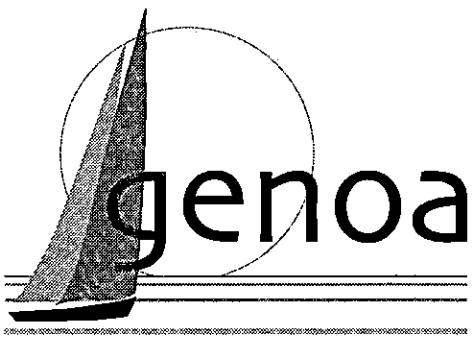
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Contact Prodigy Technologies Corporation to find out more about our extensive experience and practical toolset for converting corporate data to object-oriented client/server technology.

1190 Hornby Street, Suite 1100
Vancouver, British Columbia, Canada V6Z 2K5
Toll-Free: 1·800·694·4424 • Telephone: [604] 687·4636
Fax: [604] 687·1671 • Internet: genoa@prodigy.bc.ca

genoa explorer

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Large-scale, user-focused business modeling and resource management software

Uncompromised Usability

From executives to trades people, users see Genoa as a powerfully convenient way to coordinate work and allocate resources. Cost accounting and equipment status alike are conveniently available in a "drag-and-drop" report generation and delivery system.

Unparalleled Flexibility

Genoa lets you model your business the way you see it. The application places no arbitrary restrictions on the names of anything you create. Your model can be as broad or as deep as you need.

Exceptional Performance

All Genoa products are mainframe-class applications — hundreds of users immediately benefit from the shared work of a few highly-skilled experts. As your model changes, your Genoa business model is immediately available to end-user applications.

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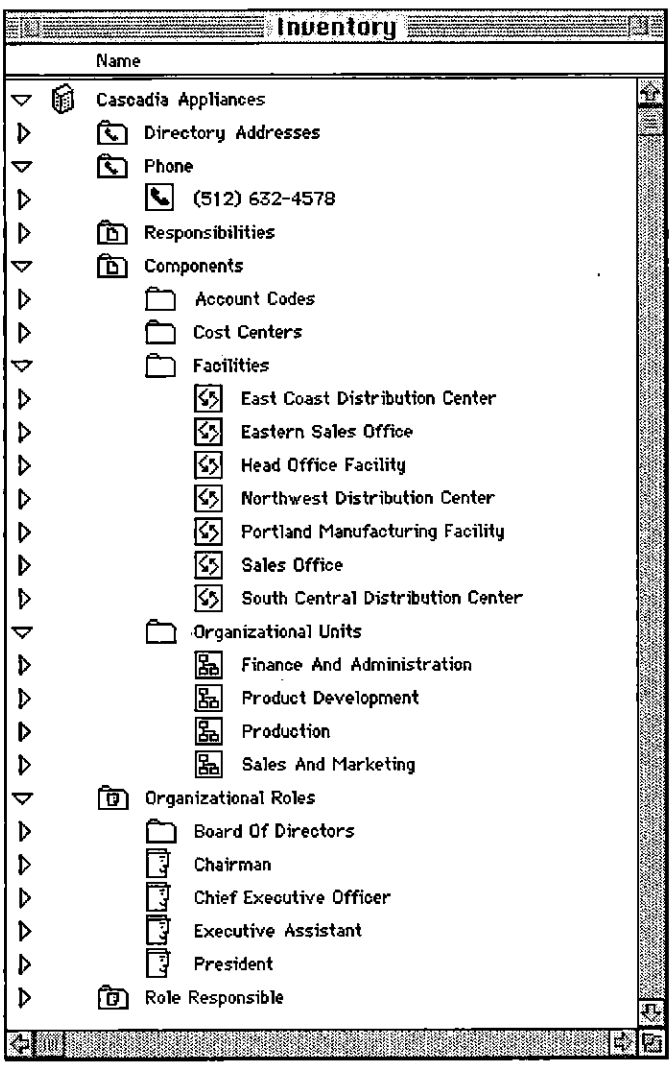
Business Modeling

Facilities Maintenance

Genoa is an innovative tool designed to support your organization's critical functions and the people who perform them. These people are the true business experts, and Genoa empowers them to create a current and accurate model of your organization's critical functions. Genoa makes this dynamic model immediately and simultaneously available throughout your organization, providing invaluable assistance in managing work and critical resources.

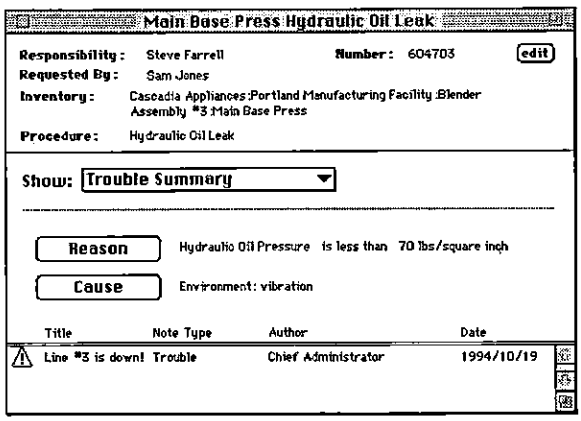
Genoa Business Model: People, Places and Things

In Genoa's universe, inventory consists of the people, facilities, business units, and equipment within your organization. Your experts, or administrators, use Genoa to define how things are related to one another, and how they perform the activities necessary to meet business objectives. These activities are captured in a highly-flexible work management system which provides you with vital information through Genoa's unique report generation and delivery facility.

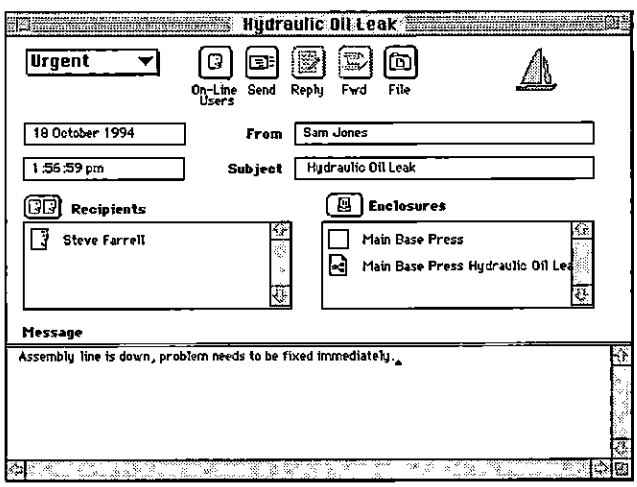


Corrective Maintenance and Trouble Reports

Genoa provides a powerful trouble notification system to enable the real-time identification of problems with your facilities or resources. To ensure that the appropriate person in your organization is notified immediately, Genoa offers full support for alphanumeric paging devices and internet mail.



Genoa automatically generates electronic mail messages for critical trouble reports based on its knowledge of the organizational and individual responsibilities for inventory. However, the e-mail system goes beyond a trouble reporting function; each person in the organization can communicate with anyone else using Genoa's e-mail. E-Mail's Enclosures feature ensures that any part of your organization (inventory, work, reports, resources, or any combination thereof) can be brought to a person's attention for his or her immediate review.



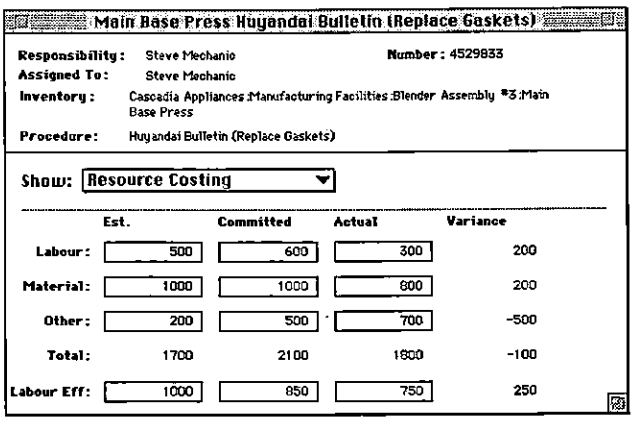
Preventive Maintenance: Rule-based Work Scheduling

Genoa's maintenance rules are customized by experts within your organization so that your resources, equipment, and facilities can self-predict when work is needed. Work scheduling is based on procedures performed in the past and on the current state of the inventory item.

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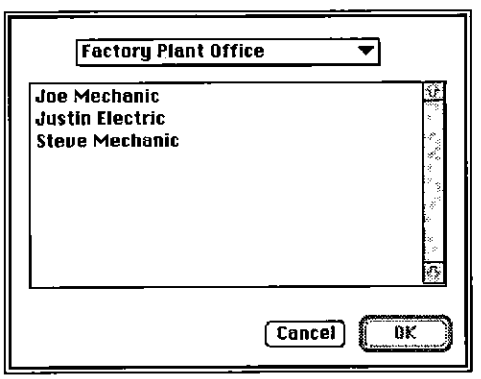
Resource Cost Accounting

Genoa puts your organization to work. Its resource management capabilities help you to identify required work and to determine its cost, both in terms of dollars and resource usage. These capabilities can be used at any management level, enabling the financial control of all types of work from a project or budgeting perspective.



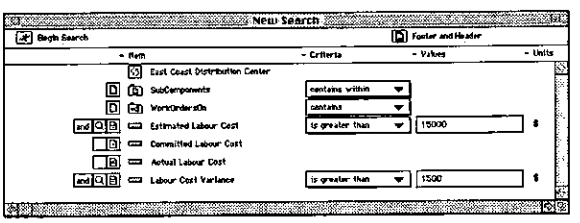
Work Delegation

Genoa allows managers to delegate work throughout the organization so that they can explicitly identify responsibility for both performing work and for cost allocation.



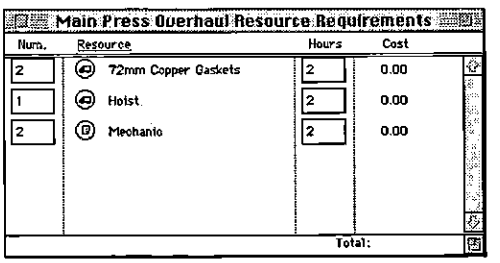
Report Definition and Delivery

Genoa offers a unique reporting system which allows you to define reports based on any inventory item or their classes. The intuitive "drag-and-drop" user interface complements a high-performance object-oriented search engine to create a business tool of unparalleled power and flexibility.



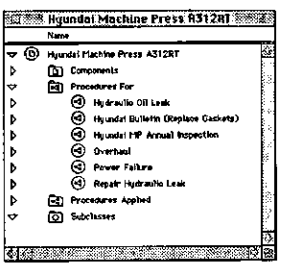
Customizability

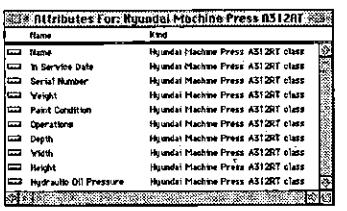
Genoa is customized to your individual business requirements (manufacturing, facilities management, software development, health care, fleet management, etc.) by your own end-users. As your organization grows, Genoa will evolve to meet your business needs. Programmers are not required. Expensive business analysts are not required. Your in-house experts continually tune the model of your business to meet new challenges as they arise.



Modeling Work

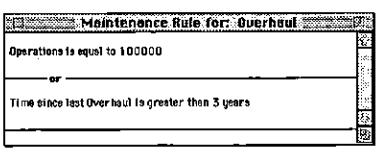
Administrative users customize Genoa by classifying inventory and the different types of work done on that inventory. Attributes can be defined for each inventory class; specific inventory items can then use those attributes for recording operational characteristics. Complex inventory items can contain other inventory items as components, and maintenance tasks can be broken down to sub-tasks on the component items. Specialized classes of inventory inherit attributes, components, and work procedures from more general classes of inventory.

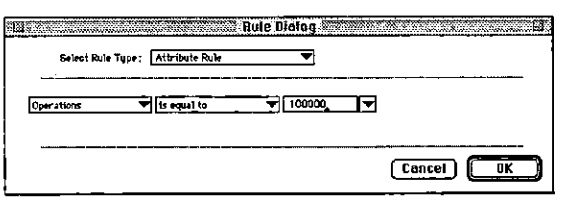




Customizing Maintenance

Genoa allows complex maintenance rules to be constructed for the types of work procedures in each inventory class. Rules can be based on a number of variables including changes in attribute values and either the time elapsed or attribute value changes since a procedure was performed. Genoa then automatically creates work orders based on changes in inventory item attributes.





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Additional Features

Learning and using Genoa is made easy through consistency, integration, and flexibility.

User-focused Design

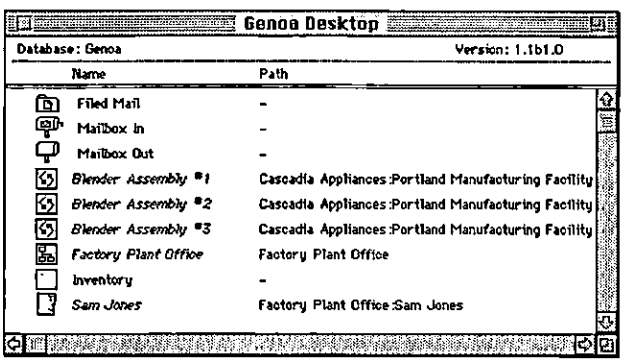
The consistent look and feel of the application requires little or no typing skills on the part of any user, from administrators to trades people to report writers. The menu commands and dragging operations work the same way at every point in the software, reducing confusion and keeping support costs at a minimum.

Amazing Flexibility

All information about inventory, work orders, reports, mail, and system administration is completely integrated. As your business environment changes, dramatic changes can be made to organizational information yet all references to that information are automatically kept up-to-date.

Easily Personalized Desktop

Each user can customize his or her own *Genoa Desktop* window by adding aliases of frequently-used inventory items, business units, or even people.



Portability

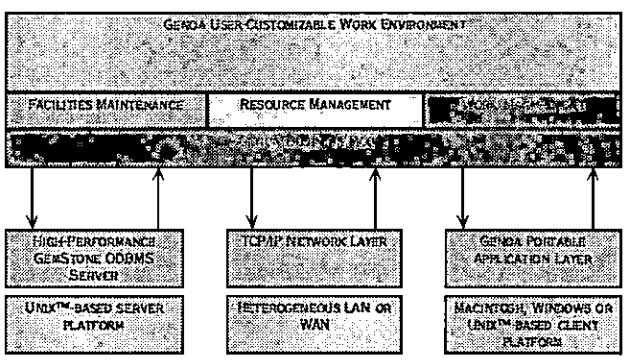
Genoa is available for both Macintosh and Windows-based workstations. People can work concurrently in Windows and Macintosh environments, sharing all of Genoa's information.

Implementation Requirements

Genoa is a client/server system designed to be used by many hundreds of users over wide geographic areas. This highly scalable architecture is achieved by conforming to modern network and operating system standards; each component is highly tolerant of a variety of underlying implementations, ensuring a smooth transition to installation in most organizations.

Overall Architecture

Genoa employs a modular, layered architectural philosophy at all levels of its conception, design, and implementation. Changing the basis of one part of the system has no impact on other parts. Thus, client machines and network software can be used in a heterogeneous manner.



Client System Requirements

Genoa runs on Windows or Macintosh workstations with 16 Mb or more RAM and support for TCP/IP networking.

Server System Requirements

Genoa uses GemStone (Servio Logic Corporation's high-performance ODBMS) as a critical component in achieving the required flexibility and performance. Contact Servio for an up-to-date list of supported hardware platforms.

Network Requirements

Genoa has been stress-tested over network links covering some of the most difficult terrain in North America. Users separated by thousands of miles successfully collaborate on a daily basis using Genoa technology. Genoa does not require laboratory conditions to operate effectively: if a TCP/IP connection can be established, your existing network will support Genoa.

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Technologies Corporation

Contact Prodigy Technologies Corporation to find out more about our extensive experience and practical toolset for converting corporate data to object-oriented client/server technology.

1190 Hornby Street, Suite 1100
Vancouver, British Columbia, Canada V6Z 2K5
Toll-Free: 1·800·694·4424 • Telephone: [604] 687·4636
Fax: [604] 687·1671 • Internet: genoa@prodigy.bc.ca

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PRESS RELEASE

CONTACT: Derri Day
Marketing Communications Manager
Telephone [604] 687·4636, ext. 39

OCTOBER 25, 1994
FOR IMMEDIATE RELEASE

Prodigy Technologies and Servio Announce Pact

OOPSLA CONFERENCE, SERVIO BOOTH #201, PORTLAND, OR., OCTOBER 25, 1994—Prodigy Technologies Corporation of Vancouver, British Columbia and Servio Corporation of Beaverton, Oregon announced today that they are joining forces to implement and market OO (object-oriented) technology applications to the North American end-user community. Servio is the leading developer and marketer of ODBMS (Object Data Base Management Systems) and related development tools. Over the past several years, Prodigy has delivered an array of complex client-server applications developed for the exceptional demands of the power utilities industry, all of which remain in use today.

Conor Shankey, Director of Development and Prodigy co-founder, states: "Since our inception in the late 80s, we have assembled a comprehensive team with proficiency in both established technology and with new and challenging ideas. Our people—consultants, analysts, UI designers, programmers, and quality assurance specialists—are thoroughly conversant in object-oriented analysis, database systems, programming languages, and the development of large client-server applications."

Prodigy Technologies has invested in excess of thirty person-years in applying Servio's leading-edge technology to the construction of highly functional multi-user information management systems. James Willette, Prodigy's Vice President of Sales and Marketing, says that "Prodigy's latest product—Genoa Business Modeling and Resource Management—is an excellent example of the successful utilization of Servio's technology in an application setting. To our knowledge, we are one of the few software developers which has successfully taken an enterprise-level object-oriented application to the point of delivery in a large corporation."

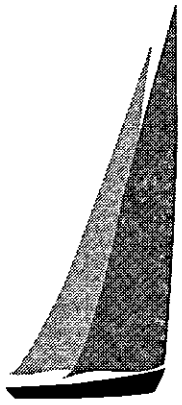
Servio President and CEO, Bryan Grummon, says, "Servio sees itself as a builder of the finest 'engine' available. Prodigy has proven itself proficient in building 'multi-purpose conveyances' to exacting specifications (i.e., cars, trucks airplanes). Together, we see our customers benefiting by getting a 'jump-start' into early realization of the power and efficiency inherent in the proficient deployment of OO technology at the enterprise level."

P R O D I G Y
Technologies Corporation

1190 Hornby Street, Suite 1100
Vancouver
British Columbia
Canada V6Z 2K5

Toll-Free 1·800·694·4424
Telephone [604] 687·4636
Fax [604] 687·1671
email: genoa@prodigy.bc.ca
Printed in Canada

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Technologies Corporation



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Vancouver
British Columbia
Canada V6Z 2K5
Toll-Free: 1·800·694·4424
Telephone: [604] 687·4636
Fax: [604] 687·1671
Internet: genoa@prodigy.bc.ca

In a maturing object-oriented industry, we have a history. We use object-oriented methods and technology to build and deliver large client/server applications.

Since the 1980s, the people at Prodigy have successfully brought their diverse technological backgrounds to the tasks of analysis and construction of client-server applications for large user populations. In less than five years, our group has delivered seven complex applications to one of Canada's largest corporations—all remain in use today.

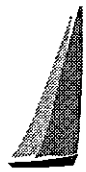
The abilities of Prodigy's team are collectively comprehensive and thorough; we are equally proficient with both established technology and with new and challenging ideas. Our people—consultants, analysts, UI designers, programmers, and quality assurance—are thoroughly conversant in object-oriented analysis, database systems, programming languages, and the development of large client-server applications. Together, our team has successfully applied object-oriented technology to the construction of a highly-functional multi-user information management system. In fact, Prodigy Technologies Corporation is one of the few which has taken an enterprise-level object-oriented application to the point of delivery in a large corporation.

In an industry where diversity often challenges those who work within it, Prodigy's applications operate seamlessly in a variety of environments—Macintosh, Windows, OS/2, Sun, HP, UNIX, VAX—and have been successfully interfaced to mainframe-based legacy systems. Our record underscores our system-integration abilities.

Finally, Prodigy never loses sight of the fact that the software we develop is for people, users who simply want their computers to easily perform a variety of sophisticated tasks.

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P R O D I G Y
Technologies Corporation



Offers a project organization that has built and delivered large-scale, multi-user, client/server applications

- Applies true object-oriented (OO) software engineering methodologies and processes through all stages of the project.
- Holds comprehensive project management and project administration expertise to carry large development projects; have consistently managed over 25 resources concurrently working with up to 18 sub-projects.
- Develops viable client/server applications through consultation with on-site information systems personnel and existing architecture.

Designs highly user-centered applications

- Works closely with field users and business managers to develop highly functional applications that meet the actual and prospective business needs of the client.
- Considers business analysis requirements as integral to the design process and ensures that analysis results are continually referenced throughout design, implementation, and usability/assurance processes.
- Develops high-quality usable user documentation.

Develops and manages the acceptance of complex interfaces to legacy applications developed in IMS and DB2 (CICS, PL/1 development)

- Develops real-time collaborative interfaces to mainframe legacy systems.
- Configures, operates, and maintains enterprise-level UNIX servers including Sequent, SMP Sun, and SMP HP.
- Configures computing architectures for optimal suitability in regard to systems, applications, and anticipated user loads.
- Configures systems to make optimum use of WAN/LAN band widths available.

Analysis and Design

- Information Needs analysis.
- Decision Support Systems (DSS) design.
- Problem-domain analysis using software engineering methods and tools based on Structured Analysis and Design, Information Engineering, and Use-Case Analysis.
- Analysis, design, development, and testing of various applications for large client/server systems developed in OO environments.
- Analysis, design, and operational procedures for cleanup and auditing of data converted from legacy (IMS-based) databases into highly-structured OO database system.
- Data modeling and "wrapping" legacy database systems within an OO framework.
- Requirements and design of client-server interfaces with interactive relational technology DB2-based systems.
- Consultation with researchers, business people, and trades people; management of projects from planning/business case phase through analysis, design, and implementation.

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PRODIGY
Technologies Corporation

Human Interface Design

- Interface design and multimedia production.
- Interaction design, software prototyping, human factors, usability, and user-testing.
- Human Factors design for client-server applications.
- Analysis of existing requirements documentation and production of user-centered revisions of interface design.
- Creation of behavior prototypes.
- Planning and execution of usability studies.

Server Management

- Planning, analysis, design, implementation, and management of systems.
- High-performance server evaluation and benchmarking.
- Design, implementation and maintenance of fault-resilient enterprise OO database servers and networks.
- Design and implementation of operational controls, procedures, and disaster recovery plans for enterprise servers.
- Design, implementation, and management of various computing platforms and networks including Macintosh, HP 700 and 800 business servers, SPARCservers, Sequent Symmetry servers, Sun SPARCstations and Appletalk, TCP/IP, PPP, Ethernet, and FDDI.
- Installation and configuration of GemStone OO databases as well as fault-resilient configuration, maintenance, and performance tuning.
- Design and implementation of fault-resilient GemStone OODMS servers and networks, and on-line backup schemes to synchronize data between servers.
- Configuration of HP 800 T500 symmetric multiprocessor servers.
- Benchmarking of symmetric multiprocessing servers from HP, Sequent, and Sun.
- Implementation of redundant network services and automatic failovers.
- Several years experience with managing Sybase SQL Server and Sybase Open-Server systems.

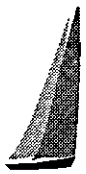
Programming and Software Engineering

- Network configuration of high performance UNIX servers for large multi-user network.
- OO system development including OO construction and testing.
- Comprehensive knowledge of Sybase products including database design, debugging, connectivity software (gateways), Open Client and Server for CICS, Net Gateway, and DB2 Gateway. Knowledge of issues and solutions involving connectivity to legacy systems using Open Server/Client for CICS.
- Implementation and support of low-level network code between application and database servers, porting of applications to other operating systems, and technical support for all programmers.
- Strong background in programming OO database systems (GemStone).
- Strong background in programming Sybase servers and programming Open Client and Open Server APIs.
- Strong background in C/C++ programming, UNIX (BSD and System 5r3) operating systems, and Mac OS.
- In-depth understanding of OO methodologies and systems; problem-analysis and creation of OO solutions.

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Programming and Software Engineering continued on next page

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Programming and Software Engineering, continued

- Coordination and facilitation of prototyping sessions and development of fully functional prototypes.
- Implementation of core classes with GemStone for large client-server applications; development of Smalltalk/80 class libraries; implementation of Macintosh UI elements in Smalltalk/80.
- Development of automated processes to convert extremely large database from legacy (IMS/DB2-based) systems to client/server OO system.
- Thorough familiarity with Geographical Information System (GIS) and Spatial Databases, UNIX systems and network administration, OO database application design and implementation, and multi-platform client/server information systems implementation.
- Database software design and construction, high-level software architecture, and client/server communications.

Project Administration

- Facilitation of objectives and accurate task definition from proposal level through to detailed planning.
- Strong understanding in managing project related issues for large OO based application development projects.
- Planning of change control, resource leveling, logic analysis and troubleshooting, costing, and project reporting.
- Refinement and maintenance of detailed project plans.
- Supervision of work delegation for Prodigy's technicians and programmers.
- Interface project planning with billing system.

Quality Assurance

- Full facilities for testing, quality assurance, and quality control.
- Extensive experience in performing quality testing of Smalltalk, GemStone and Sybase applications.
- Familiarity with wide variety of systems including VAX VMS, UNIX, Macintosh, MS-DOS, and SUN Solaris.
- Extensive hardware knowledge including OS/2, Macintosh, DEC VAX-11/70, PDP-AAMC6809, IBM XT/AT, and SUN Sparc.
- Customer Support, communication with non-technical people.

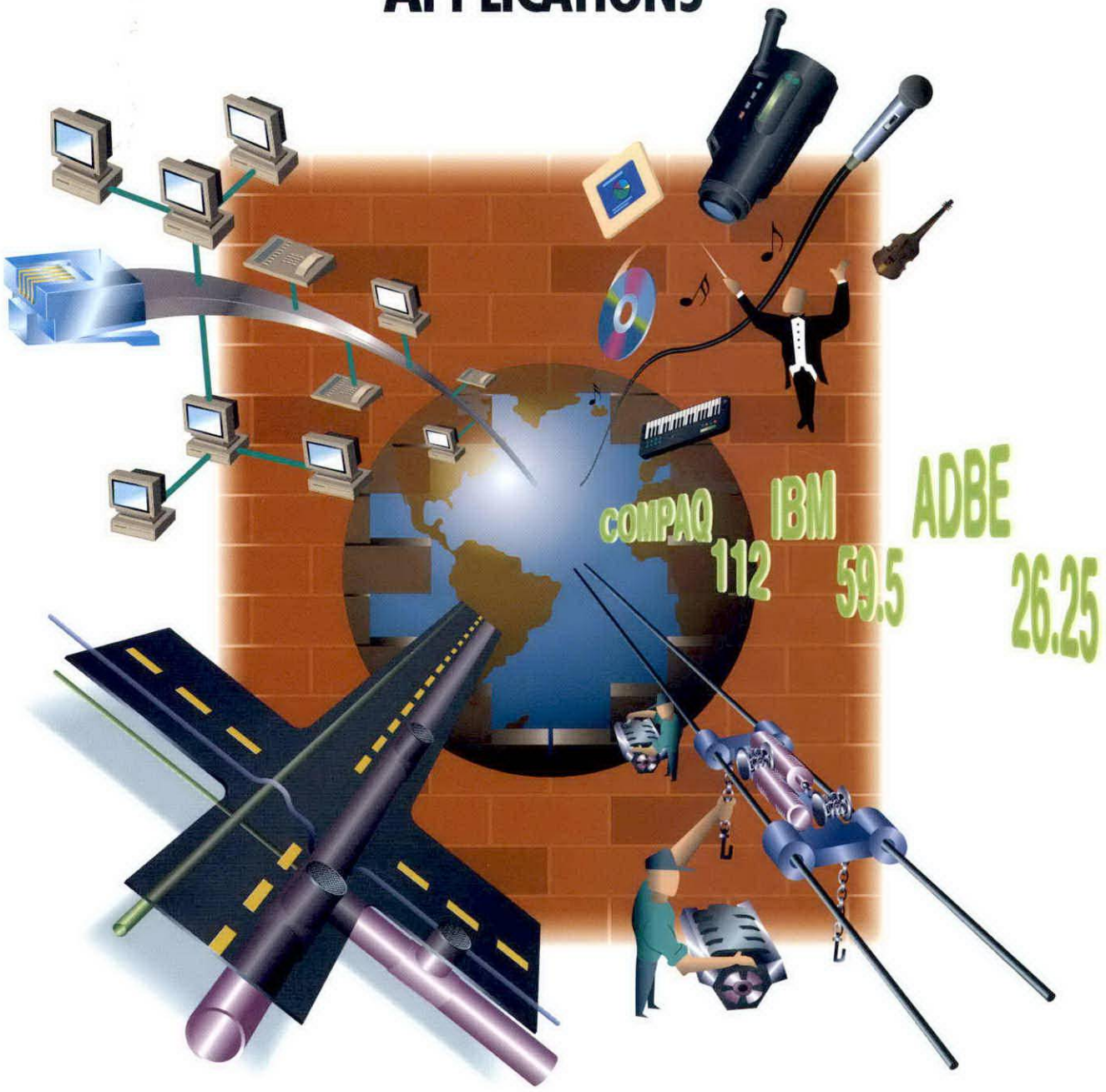
User Documentation

- Concept development, nomenclature studies, compilation of material, writing, graphic design.
- Familiarity with various standards in user documentation.
- Usability studies including development of user groups and technical editing.
- Familiarity with various processes involved in bringing documentation to press.

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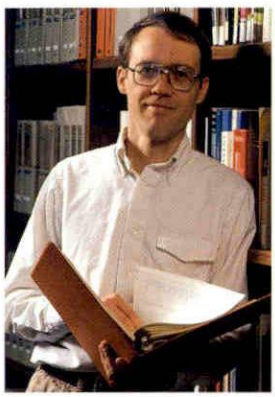
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BREAKING THROUGH TO A NEW WORLD OF COMMERCIAL OBJECT APPLICATIONS



ANNOUNCING GEMSTONE VERSION 4.0

A Vision Unfolds...



Beginning with the first release of GemStone® in 1987, Servio has pursued the goal of delivering object-oriented information management technology that meets the needs of commercial multi-user applications.

We envisioned an environment that allowed application developers to take advantage of the benefits of object-oriented programming, and also provided a reliable, high performance delivery vehicle for multi-user applications. With the release of GemStone, Version 4.0. we have substantially realized this vision,

GemStone 4.0 is the first object database management system that meets the rigorous requirements of mission-critical applications. It provides features such as high transaction rates, transaction logging for reliable database and disaster recovery, scalability to hundreds of users, and support for databases in the tens of gigabytes. GemStone 4.0 uses shared-memory caching techniques to run efficiently on multi-processor shared-memory machines. It also supports the workstation-oriented view of computation by allowing object server processes to execute on multiple non-shared memory processors.

The real breakthrough of GemStone 4.0 is that in addition to providing the database features and performance typically associated with large relational databases, GemStone provides efficient support for Smalltalk object storage and method execution. Smalltalk objects are directly represented in GemStone's active database. GemStone's Smalltalk DB DDL/DML provides complete representation of both structure and behavioral components of an object database schema. Efficient access to GemStone is available from the popular single-user Smalltalk programming environments using interfaces that Servio has tailored to run efficiently with GemStone. In addition, GemStone's unique active database gives application developers the flexibility of programming Smalltalk methods to execute in either client environments or in GemStone's Smalltalk DB server environment.

If you are developing commercial applications in Smalltalk, I invite you to try out GemStone 4.0–the realization of our vision.

ALLEN OTIS
Chief Database Architect,
GemStone Version 4.0

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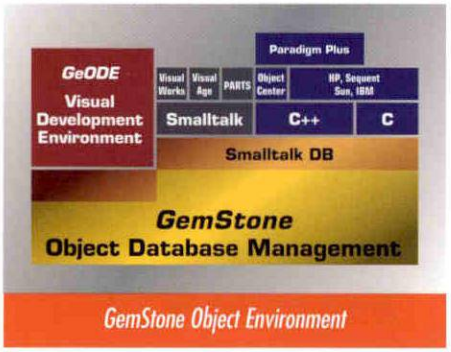
Servio Support 10

GemStone 4.0 Features Listing 11

GemStone 4.0 Breaks The Barriers

With Version 4.0 of the GemStone object database management system (ODBMS) developers now have the technology to put large-scale mission critical distributed object applications into full-scale production.

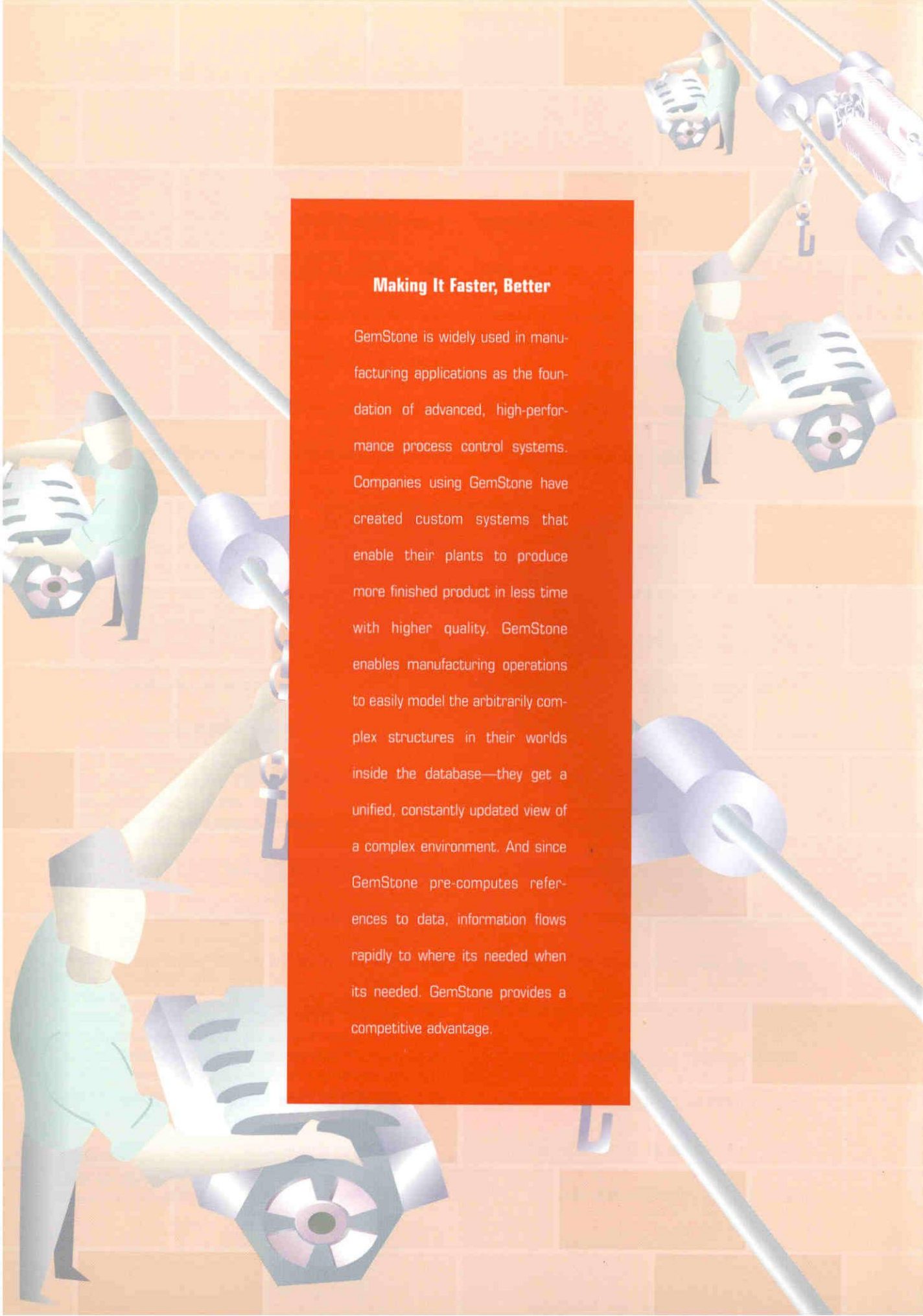
The key phrase is object applications. GemStone applications are object-oriented from top to bottom, from client to server. Up until now a pure object-oriented solution capable of supporting major enterprise-wide Smalltalk and C++ applications has simply not existed.



GemStone Version 4.0 changes the rules about what applications you can build using object technology. Companies can now use object technology to manage information across their enterprises. GemStone 4.0 opens the door to large-scale applications that require a serious mature database management system—and object technology's ability to deliver rapid application development and handle complex application environments.

In developing GemStone Version 4.0, we talked to very reliable sources: our customers. In particular, we talked to the ones preparing to deploy major GemStone applications about their requirements in a production quality DBMS. From there, we forged close working alliances with development groups within large corporations to gain real-world feedback and input. The result is a product that's more than just a guess about customer requirements—we know it meets customer needs.

Thus, while GemStone Version 4.0 may be considered a breakthrough, it is also very down to earth. At its core is an industrial strength, hard-working high performance DBMS. Our customers told us to add more transaction performance, increase simultaneous user support, make memory usage more efficient, optimize I/O and add support for 24-hour by 7-day-per-week operations. Consider it mission accomplished–now break through to a new world of object applications.



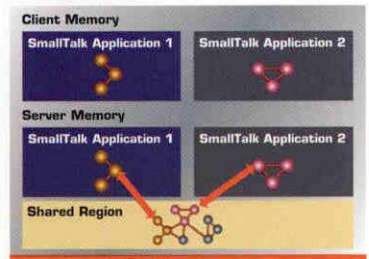
Making It Faster, Better

GemStone is widely used in manufacturing applications as the foundation of advanced, high-performance process control systems. Companies using GemStone have created custom systems that enable their plants to produce more finished product in less time with higher quality. GemStone enables manufacturing operations to easily model the arbitrarily complex structures in their worlds inside the database—they get a unified, constantly updated view of a complex environment. And since GemStone pre-computes references to data, information flows rapidly to where its needed when its needed. GemStone provides a competitive advantage.

Performance To Deploy Breakthrough Applications

Many GemStone developers are building never before implemented, enterprise-wide systems. A major component of business process redesign, for instance, is for information—often very complex information with variable-length unstructured data—to flow easily on a grand scale. Object technology with its logical modeling of the real world is perfectly suited for this mission. But there is a practical consideration: these new world applications must be fast and scalable. And that is where GemStone 4.0 comes in.

To raise ODBMS scalability to new levels, GemStone Version 4.0 introduces the industry's first shared object cache architecture. This allows objects that are common across user applications to be shared in memory. For large-scale applications, this reduces overall memory requirements by up to 70 percent and improves performance by increasing the probability that required objects will already be in memory.



Innovative Shared Object Cache Architecture

Dramatically improving performance in high-demand environments has been a primary focus in GemStone Version 4.0. Virtually every aspect of GemStone related to performance and scalability has been architected for speed and efficiency. For example, we've changed the way we write files to disk so that disk I/O operations are reduced. New techniques for managing concurrency reduce conflicts and lower overhead for improved multi-user performance.

The results? According to initial benchmarks GemStone Version 4.0 delivers 5-10 times greater transaction performance along with an equal increase in the number of users over previous versions. GemStone 4.0 is designed to handle mission-critical environments requiring support for millions of transactions per day, hundreds of concurrent users, and databases in 10s of gigabytes.

GemStone's performance story is stronger than ever with its new features. We began with a superior architecture. At GemStone's core is the industry's only active or intelligent database. In any client/server environment, processing burden should be optimally divided between the client and server. Only GemStone provides this flexibility.

Where performance and scalability were once obstacles to deploying many object applications, GemStone Version 4.0 breaks through to set a new standard—one you should be considering.



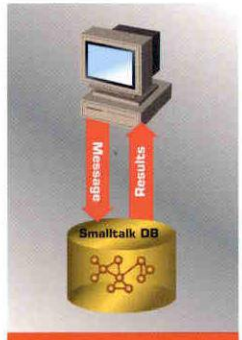
Enterprise Information Resource

Most companies have far more information online than can be readily accessed—much less across the enterprise. GemStone developers however, are creating new applications that instantly deliver information drawn from throughout their organizations. All the end-user sees is a simple, easy-to-use interface that masks all the underlying complexity. Yet users have access to multiple legacy databases, multi-media files, computer-based training and much more. And of course GemStone operates in the distributed, heterogeneous environment demanded by such enterprise-wide applications.

A Single Paradigm Supercharges Productivity

One of the best reasons for turning to object technology is its proven ability to improve programmer productivity and to let you develop flexible, easy to maintain data models. But barriers, such as those encountered when there is a technology mismatch, negate many of the benefits expected of object technology.

GemStone 4.0 when used with leading Smalltalk languages including VisualWorks from ParcPlace Systems and Smalltalk/V from Digitalk eliminates development barriers. You now realize single paradigm programming—and the dramatic productivity gains that result from this approach.

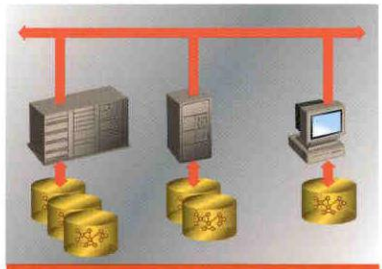


Intelligent Database Architecture

A core problem with traditional application development is the gulf between the client application and the database. The data exists in its own world with its own unique problems while the applications exist in their world with another set of problems. In the middle is a translation layer with yet another set of problems. The developer must overcome each problem area and be highly proficient in three or four different environments.

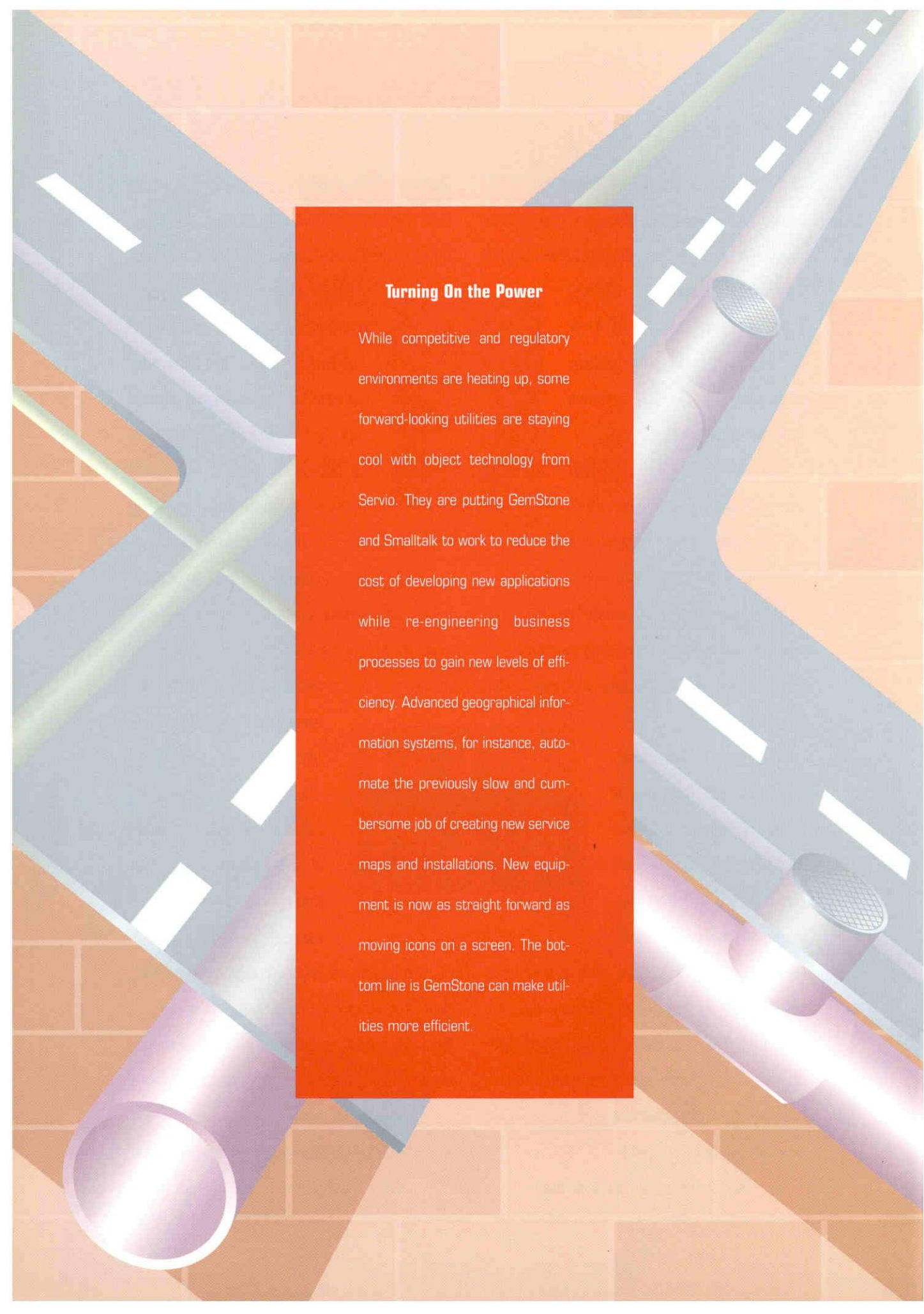
GemStone uses a vastly more efficient approach. The programming language used to build the client application and design the database are the same—standard Smalltalk. The data model needed to support the application is the same in both the client and the database. This eliminates the need for a cumbersome translation layer. So instead of developing an application multiple times, the Smalltalk developer using GemStone creates an application once.

And not only are GemStone-based applications created in a fraction the time, they require a fraction of the resources to maintain. For instance, when an RDBMS's structure changes every separate SQL application must also be modified by hand. Conversely, a change in a GemStone or application's data model is automatically updated online.


GemStone 4.0 Enables Data Distribution

The benefits of single paradigm programming don't stop at boosting productivity. Runtime performance is much as better as well since you're no longer wasting processor cycles to compose and decompose objects.

Single paradigm programming is here and now in the real-world with GemStone 4.0.



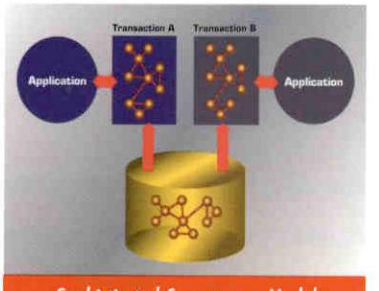
Turning On the Power

While competitive and regulatory environments are heating up, some forward-looking utilities are staying cool with object technology from Servio. They are putting GemStone and Smalltalk to work to reduce the cost of developing new applications while re-engineering business processes to gain new levels of efficiency. Advanced geographical information systems, for instance, automate the previously slow and cumbersome job of creating new service maps and installations. New equipment is now as straight forward as moving icons on a screen. The bottom line is GemStone can make utilities more efficient.

Mission Critical? We're Ready

While the glitz and glamour of being able to easily manage sound and video with object technology is exciting, there's a serious side to any critical application. That is the data processing environment needs to be secure, support multi-user access, and ensure data integrity.

With its latest release, GemStone has evolved into a DBMS that meets rigorous corporate standards. It has advanced mechanisms for ensuring the security and integrity of every object stored in the database and provides rapid recovery from system failures. It supports around-the-clock operation environments with such features as on-line backup and online system tuning and maintenance capabilities.



Sophisticated Concurrency Model

Unlike other object technology products which also claim to have similar production features, GemStone provides these functions in a far more demanding environment. Most other ODBMSs play in CAD/CAM environments with just a few users. In this situation, when an object is use it is simply unavailable until returned. This simplistic model works relatively well in a low transaction rate environment.

The commercial environment is much different. Here hundreds of users may be accessing and updating information in the database concurrently. This environment places far more stringent demands on the DBMS. And GemStone 4.0 delivers some of the most sophisticated concurrency control mechanisms in the industry today.

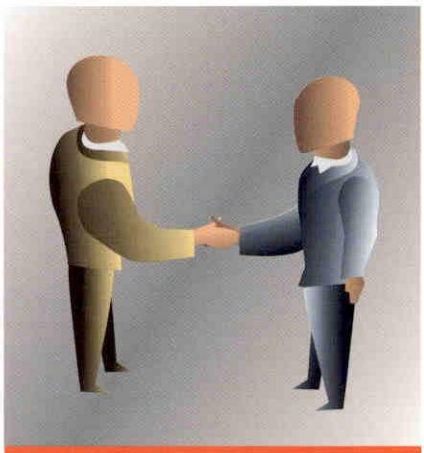
We've added innovative reduced conflict classes to ensure that the minimum number of objects are locked at any given time. This is on top of GemStone's sophisticated mechanisms that provide a flexible combination of pessimistic and optimistic locking schemes.

GemStone 4.0 now provides both roll back and roll forward recovery. Database files can be replicated on either the same or different server to provide fault tolerance in the event of a system or disk failure. GemStone provides incremental and full online database backups. And graphical administration tools support many frequently performed administrative operations.

The fact that GemStone 4.0 is ready to tackle mission-critical applications didn't happen by chance. It happened by design.

Your Success Is Our Top Priority

Moving to object technology enables companies to rapidly develop new computer applications that make their organizations more efficient and that provide an edge over the competition. Yet, while the payoff is evident, many organizations face real concerns with the transition to a new technology.



Servio's Mission Is to Help Maximize Your Technology Investments

In order to enable companies to make the transition to object technology, Servio provides a full range of customer support, training and consulting programs. We recognize that it is only through forging partnerships with our customers that we will be successful. For instance, in its 1994 Software Market Survey, Sentry Market Research found that 72% of all sites rank vendor support, service and training as their most important consideration in purchasing software.

Servio's mission is to help companies better manage their information. When you purchase a product from Servio you can be assured that you are working with a company dedicated to understanding your requirements and to providing the best information management solution possible.

Avoid Obstacles-Move to GemStone 4.0

More and more developers are discovering the inadequacies of the relational database model for many applications. As Craig S. Mullin notes in the April 1994 Byte Magazine, "Object-oriented DBMS products are gaining wide acceptance for their ability to handle complex data in ways that relational products simply can't."

In the past, you may have been tempted to select RDBMS products for their production-oriented features. But GemStone 4.0 renders such notions invalid today. There's no need to be constrained by the limitations of the relational model. GemStone 4.0 can handle the complex applications where relational fails–and it has all the production features you expect in a prime-time database.

With GemStone 4.0 you'll encounter opportunities, not obstacles. Learn for yourself by calling us today for an on-site consultation, or send for more information using the attached reply card. After all, the best way to deal with an obstacle is to avoid it in the first place.

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GemStone 4.0 Partial Features Summary

- Complete Client/Server Architecture
  - Active database model
  - Heterogeneous hardware support
  - Multi-client/multi-server support
  - 500 classes included with GemStone
  - Flexible data, processing distribution
- Flexible Data Modeling
  - Pure object database
  - Unstructured data type support
  - Object identity architecture for fast, efficient storage, transactions
  - Encapsulation in the database
- Extensibility
  - Create specialized servers for unique applications
  - GemStone methods callable from other applications
- Performance and Scalability
  - Data clustering for optimized disk I/O
  - Shared object cache technology
  - SMP, CPU cluster support
- Integrity Control
  - Automatic referential integrity
  - Automatic garbage collection
  - Enforcement of complex business rules in server
- Concurrency Control
  - Optimistic/automatic and pessimistic/explicit
  - Optimized queue and collection classes
  - Reduced conflict classes, bags, counters and hashed-access dictionaries
- High Availability, Production Support
  - On-line incremental and full backups
  - Data replication
  - Transaction log mechanism
  - Event notifiers, signals
- Security
  - User and group level
  - Object level
  - Kerberos authentication
- Schema Modification
  - Dynamic schema modification, migration
  - Version histories
  - Extensible user-defined versioning
- Concurrent Language Interoperability
  - C++
  - Smalltalk
  - C or any language capable of making C calls
  - Concurrent GemStone access and object modification

GeODE (GemStone Object Development Environment)

- Visual development of object/database applications
- Define classes and database schema
- Database administration tools
- Browsers, inspectors, debuggers

GemStone Smalltalk Interface (GSI)

- Transparent Access to GemStone
  - Maintains interface across GemStone and Smalltalk applications
  - Automatic updates across interface
- Automatic Class Generation
- GemStone Browser
- GemStone Workspace
- GemStone Inspectors
- GemStone Breakpoint Browser, Debugger
- GSI Runtime Models
  - Linked into Smalltalk space
  - RPC communication
- Smalltalk DB
  - Syntactically compatible with VisualWorks, Smalltalk/V
  - Smalltalk method execution in the server

GemStone C++ Interface (GC++I)

- Class Library Support
  - Predefined classes for persistence, access to database capabilities
  - Custom class derivation
- Collections
  - GS_Collection classes for large, complex applications
  - Active database support
  - Optimized searches
- Rapid Application Integration
  - GC++I registrar utility
  - Establishes application link to GemStone
  - Class library for multiple application support
- Automatic Object Buffering
  - Query support
    - Single parameter function in C++
    - Registered query function
  - Unique, user-defined query names
  - Exception handling mechanisms

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1-800-243-9369

☐ Have a Servio representative call me.

What is your time frame for evaluating object technology?

☐ Immediate ☐ 3 months ☐ 6 months ☐ 1 year or more

What development languages do you use?

☐ Smalltalk ☐ C++ ☐ COBOL ☐ C

☐ 4GL(specify) _____ ☐ Other _____

What platforms are you developing on? _____

Name _____ Title _____

Company _____

Address _____ Suite _____

City _____ State _____ Zip _____

Phone _____ Fax _____

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SERVIO CORPORATION
15400 NW GREENBRIER PKWY STE 280
BEAVERTON OR 97006-9813

SERVIO
1-800-243-9369

SERVIO

Headquarters

SERVIO CORPORATION
15400 NW Greenbrier Parkway
Suite 280
Beaverton, OR 97006
Toll Free: 1-800-243-9369
Phone: (503) 629-8383
Fax: (503) 629-8556

International Distributors

UNITED KINGDOM:
2 Fieldside Cottages
Barnet Lane Totteridge
London N20 8AT England
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FRANCE
Eurogiciel
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92240 Malakoff
Paris
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GERMANY
Objektorientiente
Systemtechnologien
Baroper Str. 337
4600 Dortmund 50
Phone: 49-231-975990
Fax: 49-231-9759920

ITALY
Etnoteam S.P.A.
Via Adelaide Bono Cairoli, 34
20127 Milano, Italy
Phone: 39-2-26162-1
Fax: 39-2-26110755

JAPAN
Japan Information Processing
Service Co., Ltd (JIP)
2-4-24 Toyo Koto-ku
Tokyo 135, Japan
Phone: 81-3-5690-3268
Fax: 81-3-5690-3390

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81-1,1-Chome, Higashiazabu,
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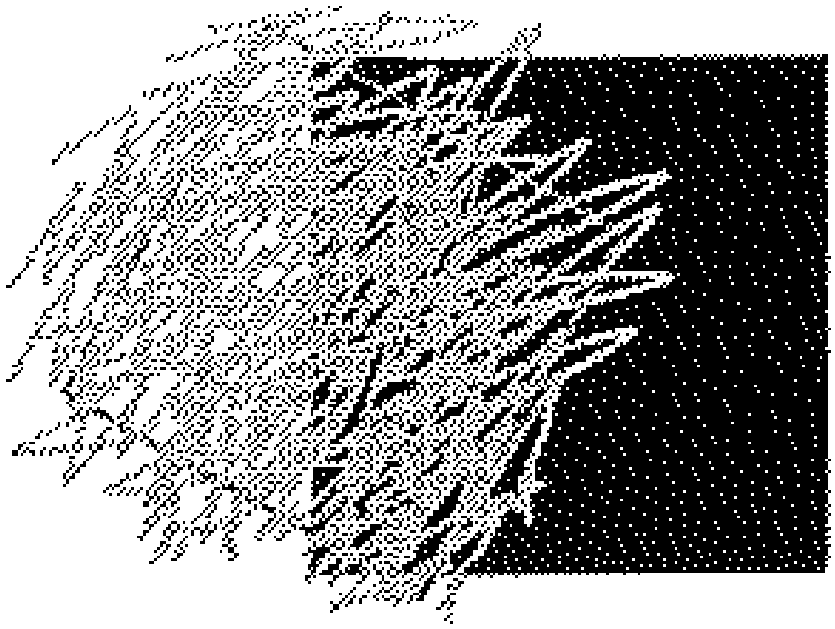
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TEIX, Sistemas de Informacion
Estrategica S.A. de C.V.
Antonio M. Anza No. 43
Col Roma, Mexico D.F. 06700
Phone: 52-5-564-7146, 264-6375
Fax: 52-5-264-6559

TAIWAN
Anco Technologies, Inc
11-1F, 76, Tun Hwa S. Road, Sec 2
Taipei, Taiwan, R.O.C.
Phone: 886-2-7053779
Fax: 886-2-7053896

SCANDINAVIA
WM-Data
Sandhamnsgatan 65
Box 27030
102 51 Stockholm
Sweden
Phone: 46-8-6702000
Fax: 46-8-6702060

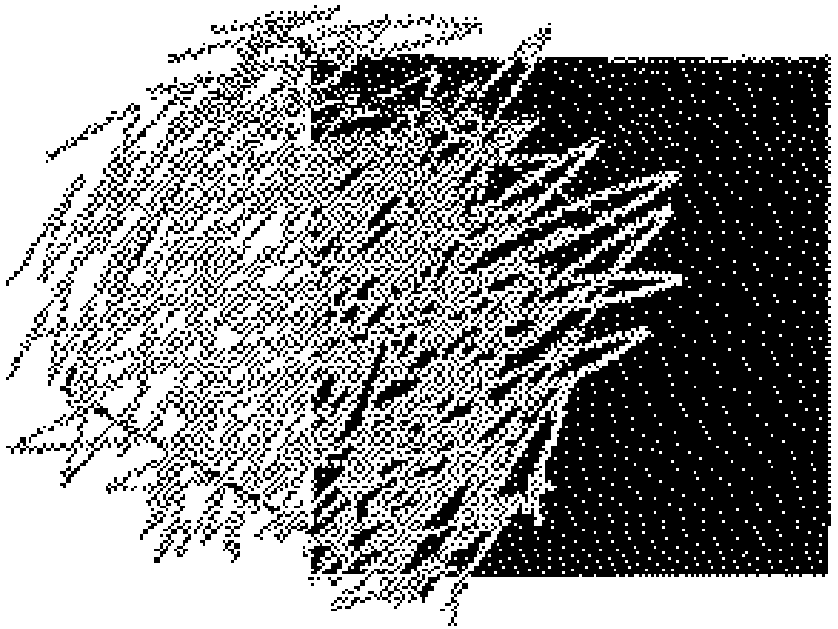
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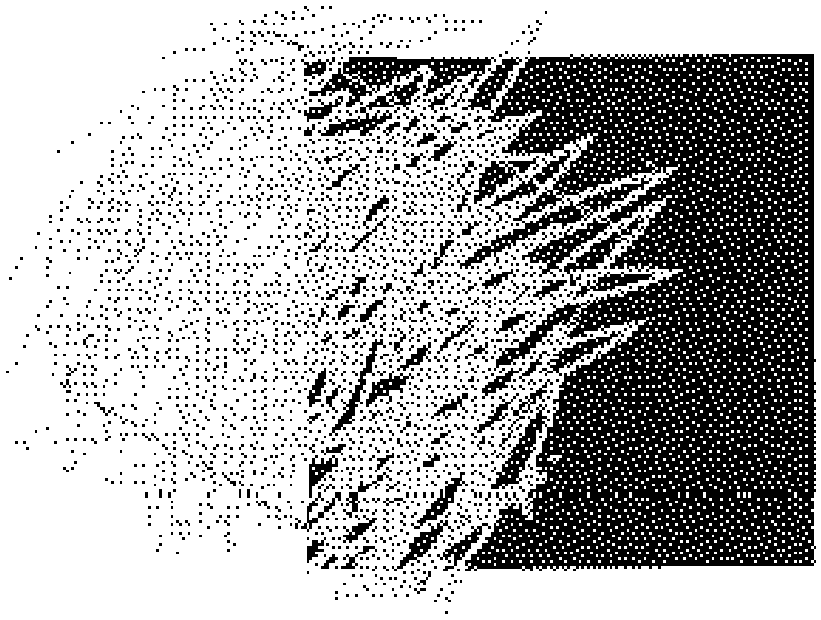
DEX Information Systems, Inc.
117 E. Colorado Blvd., Suite 200
Pasadena, CA 91105
818.792.6009~direct
818.577.0044~main
818.577.0593~fax
73173,31~compuserve

Louise J. Wannier
President & CEO



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818.577.0044~voice
818.577.0593~fax
74762,2503~compuserve

Quentin M. Compton-Bishop
Vice President,
Business Development

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For Immediate Release

For further information:
Marcia Goodstein
DEX Information Systems, Inc.
(818) 577-0044

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Pasadena, Calif., March 30, 1995 -- Louise J. Wannier, co-founder of Gemstar Development Corp., developer of the VCR Plus+ Instant Programmer, is launching DEX Information Systems, a new computer software company that has developed a proprietary technology that will significantly improve the way people create, access and use information on their computers. The new company will launch the first of a family of products built on a new architecture in the third quarter of 1995. Wannier, who is president and chief executive officer, is responsible for the strategic direction and overall operations of the company.

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# # #

For Immediate Release

For further information:
Monica Berndt
DEX Information Systems, Inc.
(818) 577-0044

DEX Information Systems, Inc. Previews Breakthrough Content Management Application at Demo '95

Palm Springs, Calif., February 5, 1995 -- DEX Information Systems, Inc. today previewed the first of a family of products built on a new breakthrough software architecture that will significantly simplify the problem of managing information on the desktop. Code-named "Eden," the new product is the first to offer a truly effective way of managing the avalanche of information that can overwhelm even the most sophisticated power users.

Eden, which will be available initially for Windows 3.1™, Windows NT and OS/2, sets new standards in ease of use and flexibility, significantly simplifying the process of entering, finding and sharing information. Eden is particularly attractive to people who regularly receive hundreds of daily E-mail messages and need to integrate and use the information coming to them on-line with the information that they create on their desktops, e.g., memos, letters, spreadsheets, etc.

"For heavy users of information, such as on-line subscribers and users of corporate E-mail programs, absorbing and filtering the sheer tonnage of information that is now a part of everyday life is a big challenge," said Louise Wannier, President and Chief Executive Officer of DEX Information Systems, Inc. "Current solutions are simply too limited and cumbersome to be effective, which is why we developed content management software that is the fastest, easiest way to manage and integrate the information on your desktop."

- more-

Managing information in a complex environment created by the explosion of E-mail, CD-ROM and electronic downloads creates demands that current technologies cannot meet. For example, conventional applications such as relational databases, PIMs, and others require the user to create structure for and anticipate all future uses of the information in order to use it. In addition, it is nearly impossible to intelligently link these downloads with personal information already residing on the desktop, often in several different applications. Because of rigid structures and incompatible formats, sharing information with others can be extremely difficult.

Eden replaces these complex processes with an interface that is as easy to use as a word-processor. With a unique floating toolbar and a new concept called "DEXing," users will be able to integrate the information on their desktops whether it comes from external sources like E-mail, CD-ROMs or on-line downloads, or from their own desktop applications like word processors or spreadsheets.

To enter new information, users begin with a "blank sheet of paper," then add as much or as little structure as they wish, without programming. Users do not have to save, name or file the records -- with Eden, the information can always be found. Eden's floating toolbar enables users "to DEX" information, regardless of the application they are working in. Eden provides automatic analysis, linking and cross-referencing of the information. Users can now navigate easily through all the information on their desktops via hypertext links, regardless of where the information is located.

Once information is DEXed, Eden captures associations, knowledge and meta-information, integrating the content users create with the content they receive. The associations form a web of knowledge that allows Eden to think like the user when it comes to finding information.

- more -

Eden's proprietary PowerSearch™ function uses the knowledge and associations to enhance searches so that users can find things without having to remember much about them or where they are located. If users don't find what they are looking for the first time, they simply "Turn up the Power℠." Eden will automatically expand the scope of the search to find additional related or relevant information. With Eden, users can also add knowledge and synonyms to find specific or related items, sort and filter information, and search more than one database transparently (e.g., on a PC, CD-ROM or network server) without having to merge them.

Eden simplifies the process of sharing information with a one-step send function and an integrated address book for mail merge, E-mail and fax.

DEX Information Systems is dedicated to making information easier to use. They are headquartered at 117 E. Colorado Blvd., Suite 200, Pasadena, CA 91105; (818) 577-0044.

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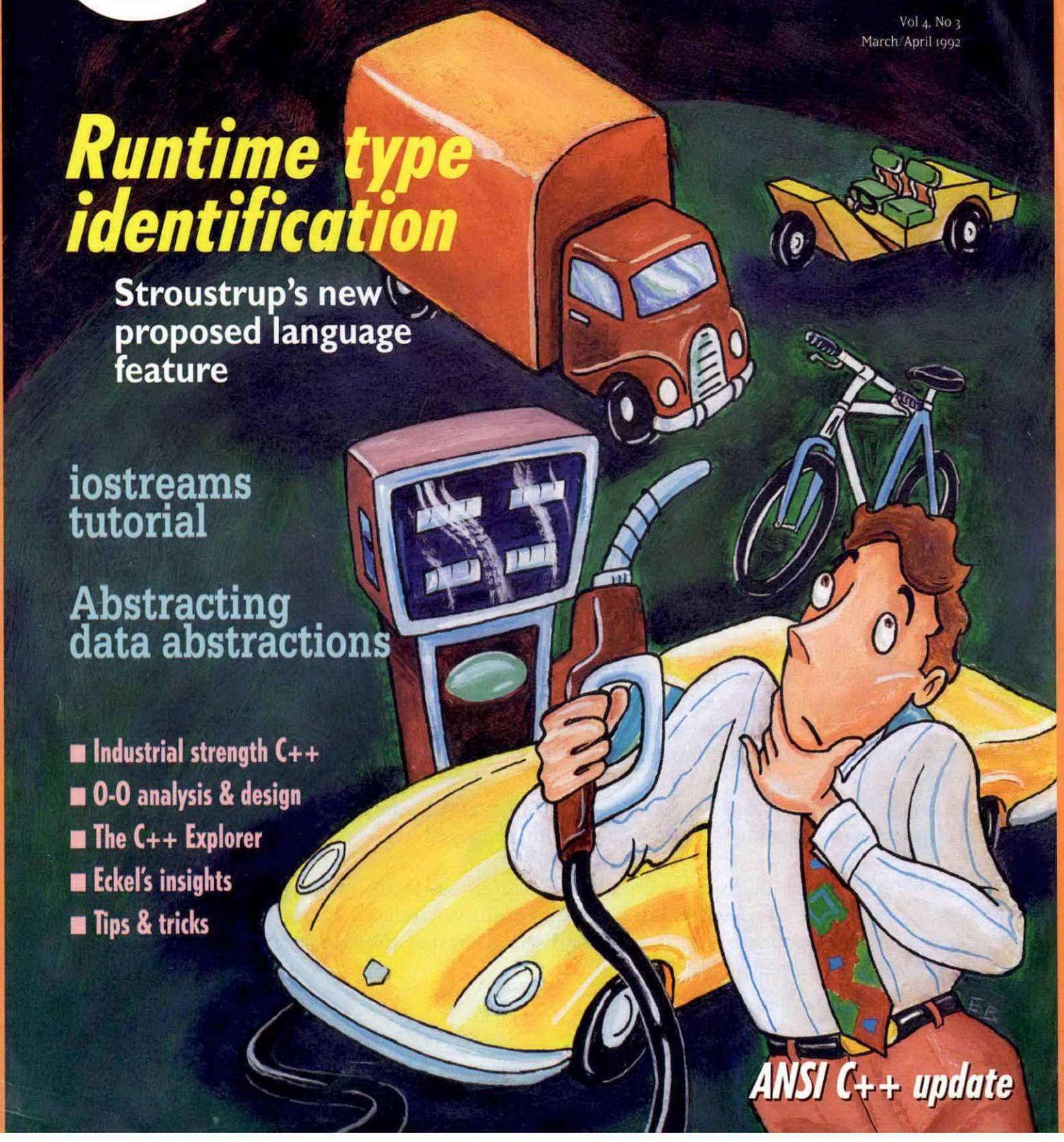
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PREMIERE MAGAZINE ISSUE

C++ REPORT

THE INTERNATIONAL AUTHORITY ON C++ DEVELOPMENT

Vol 4, No 3
March/April 1992



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Stroustrup's new proposed language feature

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- Industrial strength C++
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BRUCE ECKEL BECOMES FEATURES EDITOR

In a never-ending quest to publish the most incisive and fresh ideas available, **The C++ Report** has added a top-notch Features Editor to its staff. Well-known C++ book author and popular lecturer Bruce Eckel will help recruit articles, authors, story ideas, as well as contribute a regular column entitled, "Eckel's Insights." His partnership with longtime Editor Rob Murray gives **The C++ Report** one of the strongest editorial teams in software publishing.

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- C++ Traps And Pitfalls
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Regular Columns & Columnists:

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- Industrial Strength C++; *Jeri Soukup*
- European Scene; *From members of the European C++ Users Group*
- Eckel's Insights; *Bruce Eckel*
- C++ Advisor; *Rob Murray*
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Closing Dates & Material Deadlines:

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March/April	February 4	February 6
May	April 3	April 6
June	May 4	May 6
July/August	June 3	June 5
September	August 4	August 6
October	September 3	September 7
November/December	October 2	October 5

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Maker of VCR Plus+ now organizing PCs

By Josh Green
STAFF WRITER

PASADENA — A new Pasadena software company announced that it was armed and ready to do battle against information overload.

DEX Information Systems is headed by La Canada resident Louise J. Wannier, one of the founders of Pasadena-based Gemstar Development Corp.

As a budding company born last year, DEX plans to hit the ground running late this year when it releases an information organizer for personal computers.

Though details of the new product are still under wraps, Wannier said the "binder" program will be a blessing for computer users who deal with masses of information.

"Information out there is locked up in a lot of different formats and interfaces," Wannier said. "

Wannier's Gemstar was a hit with VCR owners when it marketed the VCR Plus+ programming system in 1990, allowing viewers to punch in codes to tape certain shows. Wannier, who headed Gemstar's European operations for two years, said she got tired of the commute to London, and thought it was time to venture into the information frontier with her own company.

Wannier said the product, codenamed "Eden," would be targeted at the "information intensive" crowd.

Eden will allow users to access and cross-reference information across various applications.

Francis Gaskins, chief executive officer of Marlar, a Westwood technology executive search firm, got a sneak preview of Eden at the Demo '95 software expo. He said his company would snap up a copy of the program as soon as it was released.

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Friday 4/7/95

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Vol. 2, #68

ON RAMP RECEIVES LICENSE TO CARRY BMI MUSIC OVER NET, LAUNCHING NEW SERVICES

BMI, the music performing rights licensing organization, and **On Ramp, Inc.**, an Internet marketing and content provider, have reached an agreement for a music performance license covering the transmission of BMI music contained in On Ramp's programming over the Internet. The BMI agreement grants On Ramp a blanket license which covers unlimited access to the more than 3 mill. compositions in BMI's repertoire, encompassing the work of more than 160,000 songwriters, composers and music publishers.

The relationship is far from exclusive, say BMI officials, who suggest that their charter requires them grant licenses to all interested parties. "We believe this agreement is the first to cover musical performing rights on the Internet and recognizes that the online transmission of musical compositions constitutes a public performance under the U.S. Copyright Law," says BMI CEO Frances W. Preston.

On Ramp also announced two new services using real-time audio. The first is On Ramp's *Real Time Audio Services*, in which users can listen to audio programs directly over the Internet without downloading large data files. Even modem users will be able to hear the programming in real time the minute the user selects their choice, say officials. One of the programs that On Ramp will make available is *Up Close*, a music/interview program. The Internet selection of *Up Close* will feature BMI songwriters and composers. The second service is On Ramp's *Browse, Listen and Buy*, which will permit users to browse and listen to 30 second music clips. If they wish to purchase a copy of the song, they can download a CD-quality sound file onto their computer hard drive. BMA, John Shaker, sen. v.p. licensing, 212/830-3850; On Ramp, Adam Curry, chairman, 212/764-4747) http://bmi.com http://metaverse.com

INTERPLAY, MCA IN MULTIPLE TITLE DEAL, *CASPER* FIRST OF MANY

Interplay Productions and **MCA/Universal Merchandising Inc.** have established a multiple title deal where Interplay will develop 32-bit game titles based on MCA/Universal properties. MCA maintains a significant minority investment in Interplay. The first property under the arrangement gives the company rights to develop and produce 32-bit game titles based on the forthcoming big budget *Casper* film. Other projects are expected to be announced later this year involving other high budget films. MCA has been the subject of takeover talks in recent days with reports of **Seagram Company's** intentions to buy MCA from **Matsushita Electrical Industrial**.

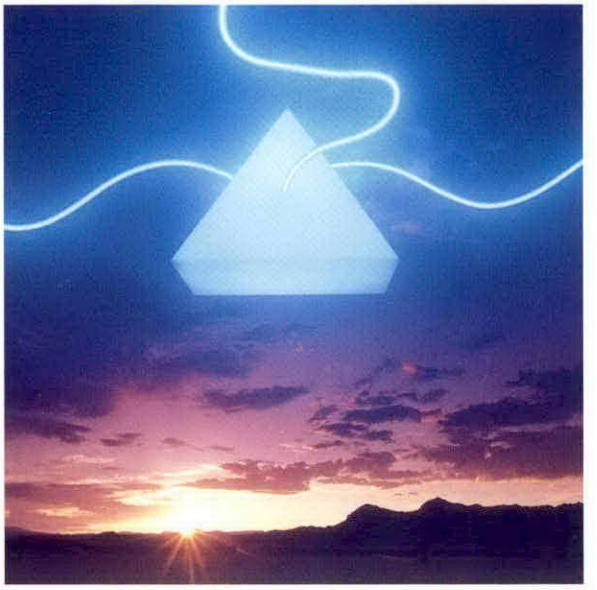
While the details of the video game are under tight wraps, Interplay is expected to use images from the movie to generate the artwork. The *Casper* game will be developed for *3DO*, *Sega Saturn* and *Sega 32X* and possibly other platforms. *Casper* is scheduled for release Memorial Day weekend by Steven Spielberg's **Amblin Entertainment**, **Universal Pictures** and **The Harvey Entertainment Co.** The title is expected to be released sometime after the film hits theaters and before it arrives to video stores. (Interplay, Brian Fargo, president, 714/553-6655; MCA/Universal Merchandising, Nancy Cushing-Jones, exec. v.p., 818/777-1000)

DEX AIMS TO CHANGE HOW PCs RECEIVE INFORMATION

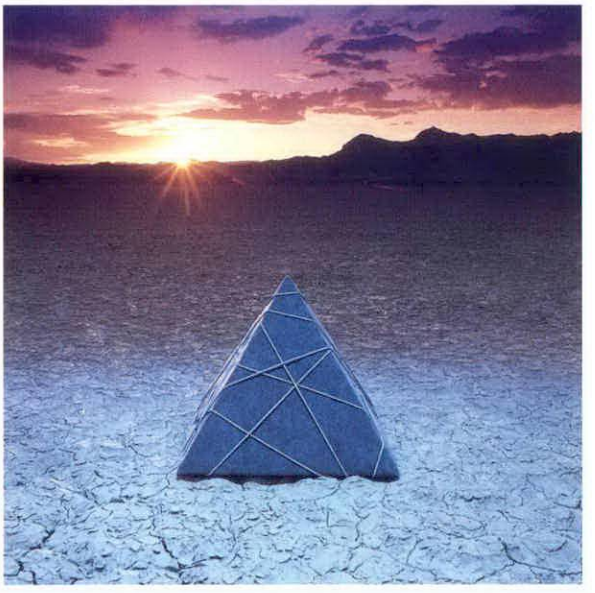
DEX Information Systems, a startup computer-software company, is developing a proprietary technology that officials say will significantly improve the way people create, access and use information on their computers. The software is designed to be packaged by publishers with their digital products. The unnamed software product "is for information gatherers and users, integrating all sources of information," says Louise J. Wannier, DEX founder. The new company will launch the first of a family of products built on a new architecture in the third quarter of 1995. DEX is currently seeking potential alliances with major information publishers, says Wannier. (DEX, Louise J. Wannier, CEO, 818/577-0044)

INTERACTIVE NETWORK LOSES THREE DIRECTORS

Interactive Network, which is struggling for cash and may have to close its doors later this year if it



THE PANGAEA MODEL



A BUSINESS SOLUTION
FROM TELOS CORPORATION

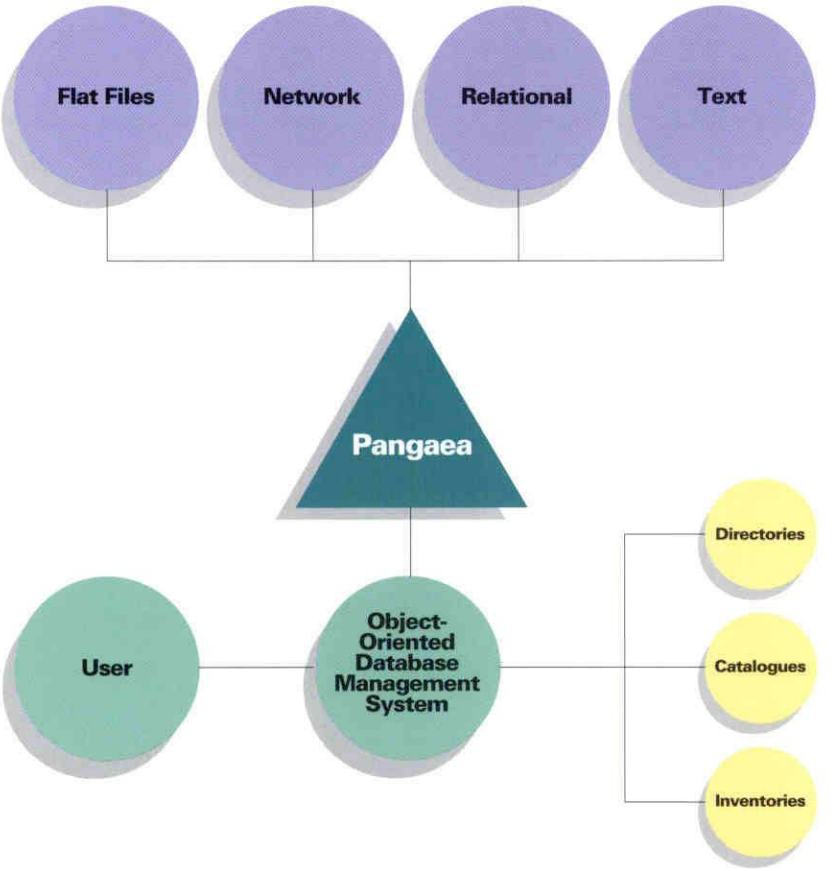
The Pangaea Model

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Faced with the dilemma of consolidating disparate systems, databases and business processes, many organizations recognize the need to bundle solutions through re-engineering and redesign.

Responding to the complexity of integrating such systems, Telos Corporation developed the Pangaea Model. This system bridges past, present and future data requirements using a Virtual Database integration strategy. Telos combines object-oriented technologies, commercial products and system engineering skills that allow a corporation to migrate and integrate its legacy field-delimited and textual data into Open Systems.

The Pangaea Model employs the flexibility and power of object-oriented technology to allow users to access data transparently, regardless of its form or location, and in a wide range of legacy data structures. Using this approach, businesses can improve the information system bottom line, make the systems more cost-effective and extract as much information and value as possible. This translates into a higher quality of service without increased cost or risk.



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The Challenge

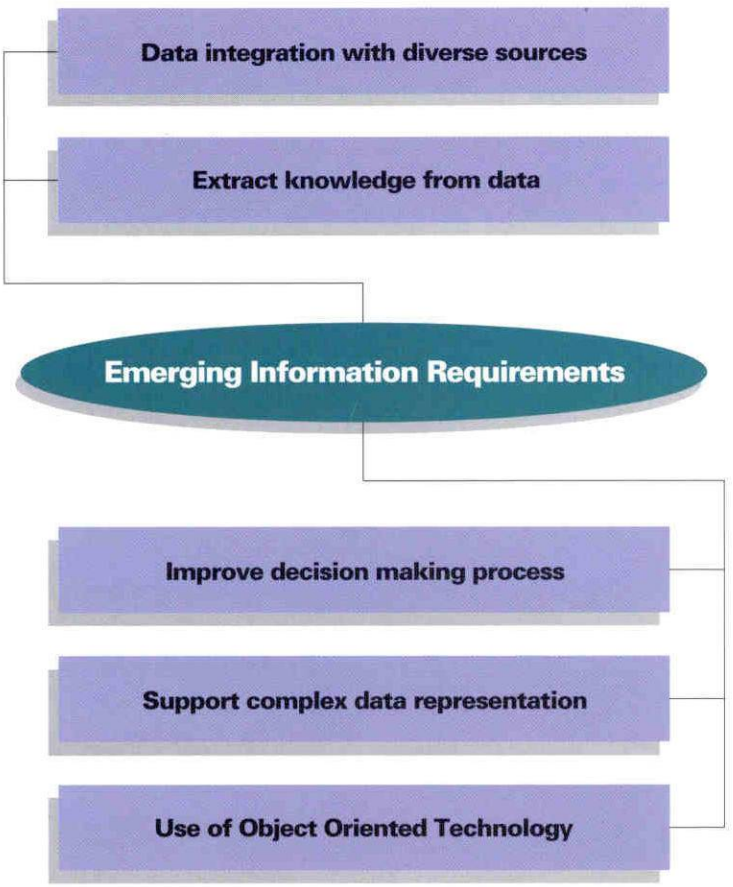
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Several different approaches can be used to integrate a highly heterogeneous environment, however, three provide the greatest potential for success: Reverse Engineering, Divide-and-Conquer, and the Virtual Database.

Reverse Engineering

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The End-To-End Solution

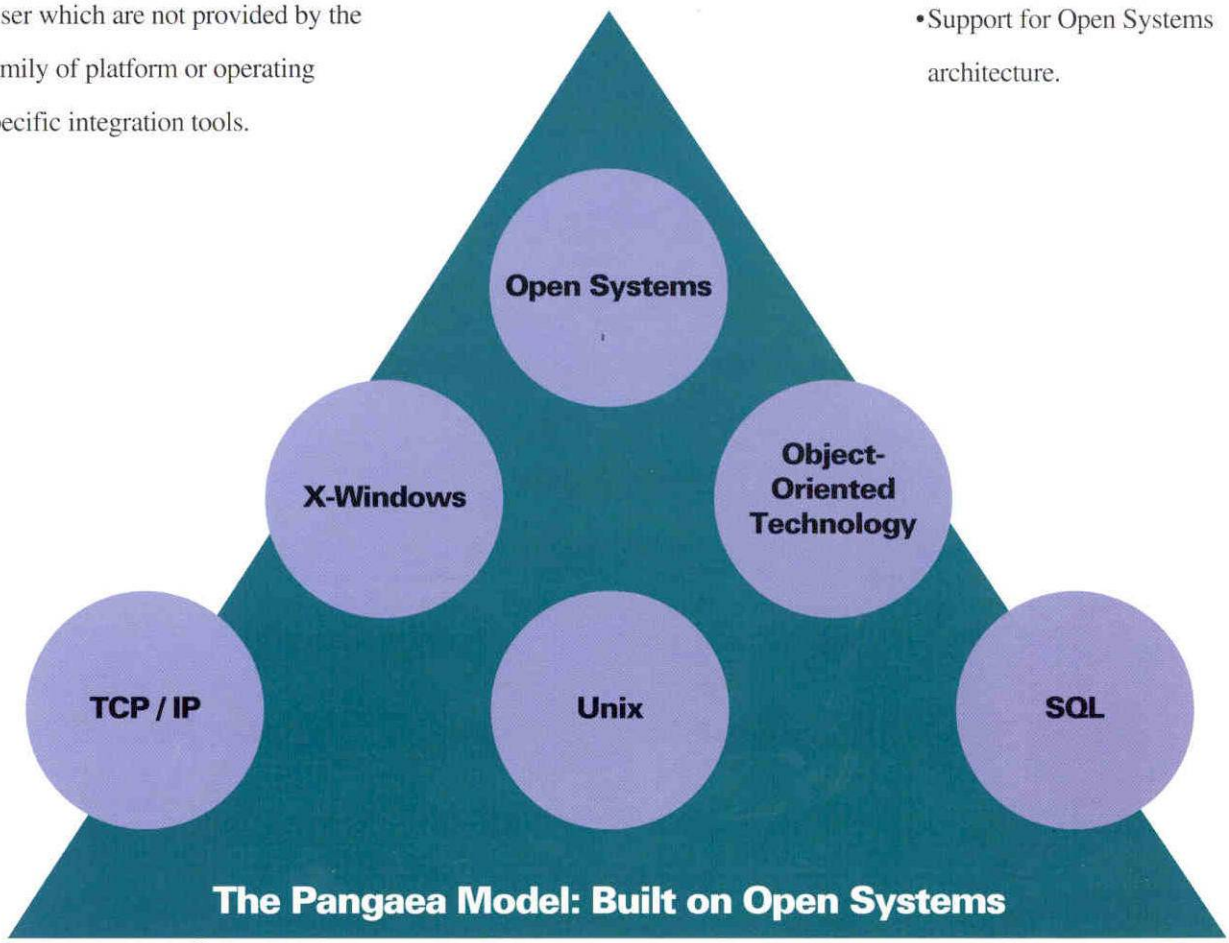
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The Pangaea Model: Built on Open Systems

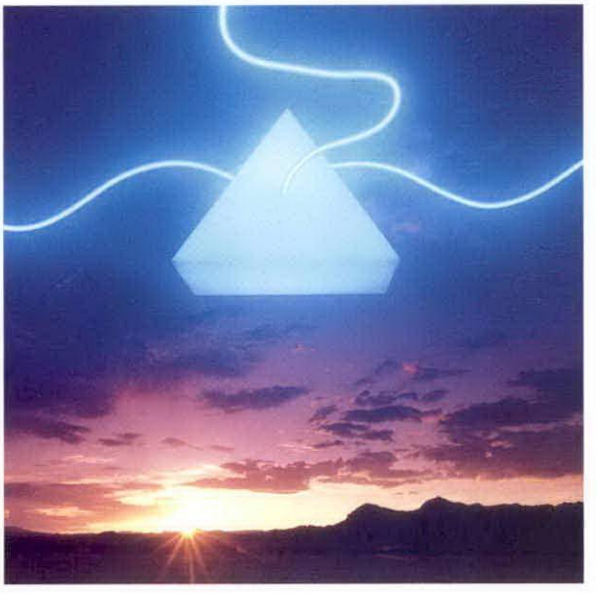
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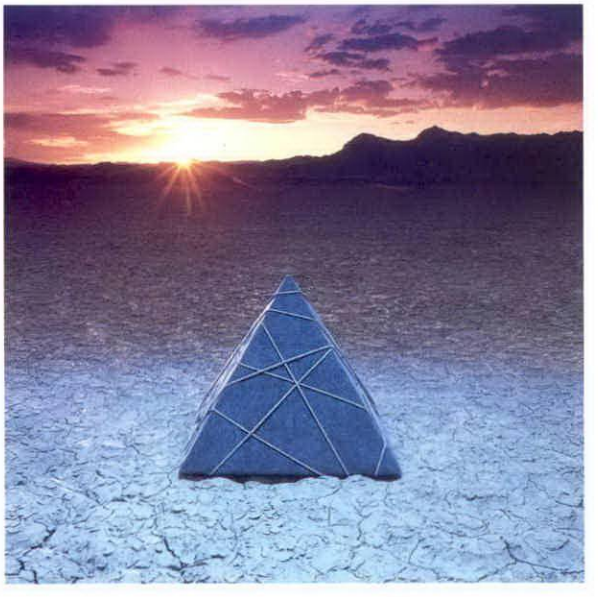
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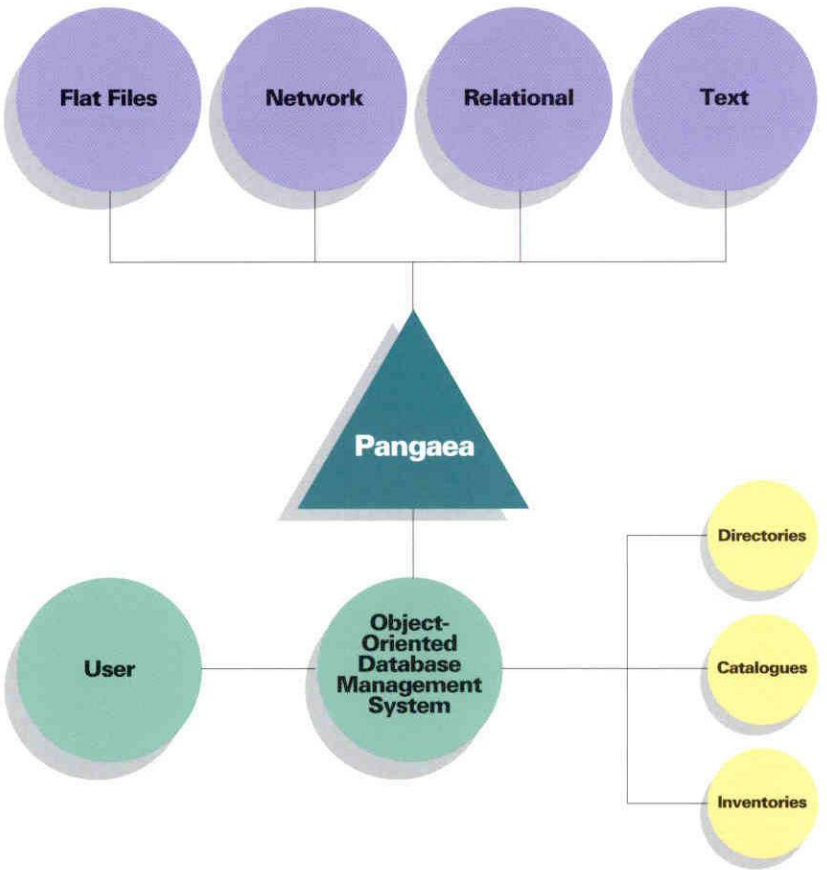
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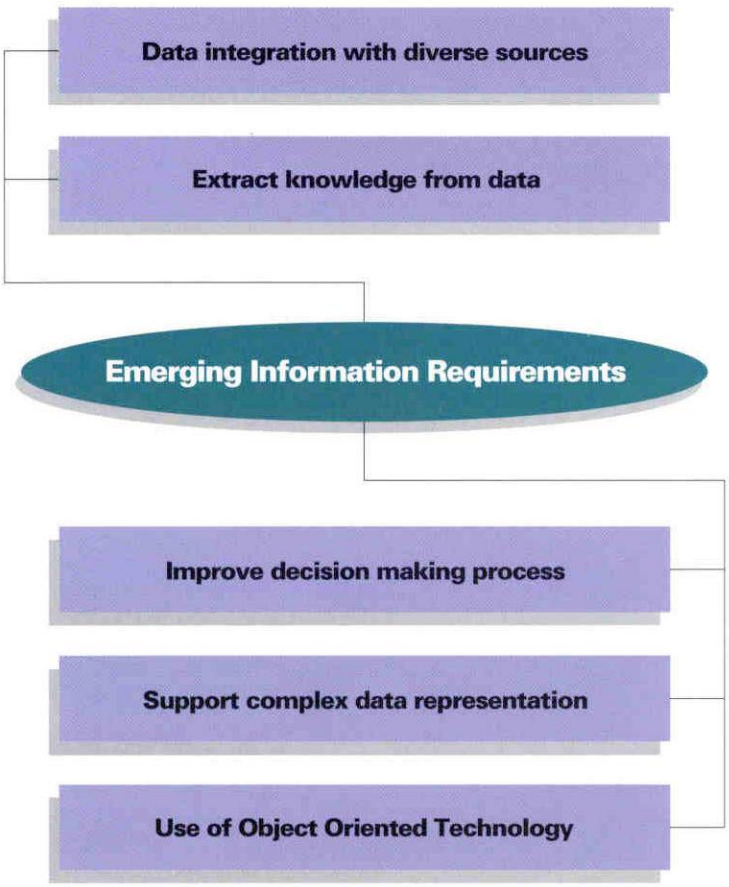
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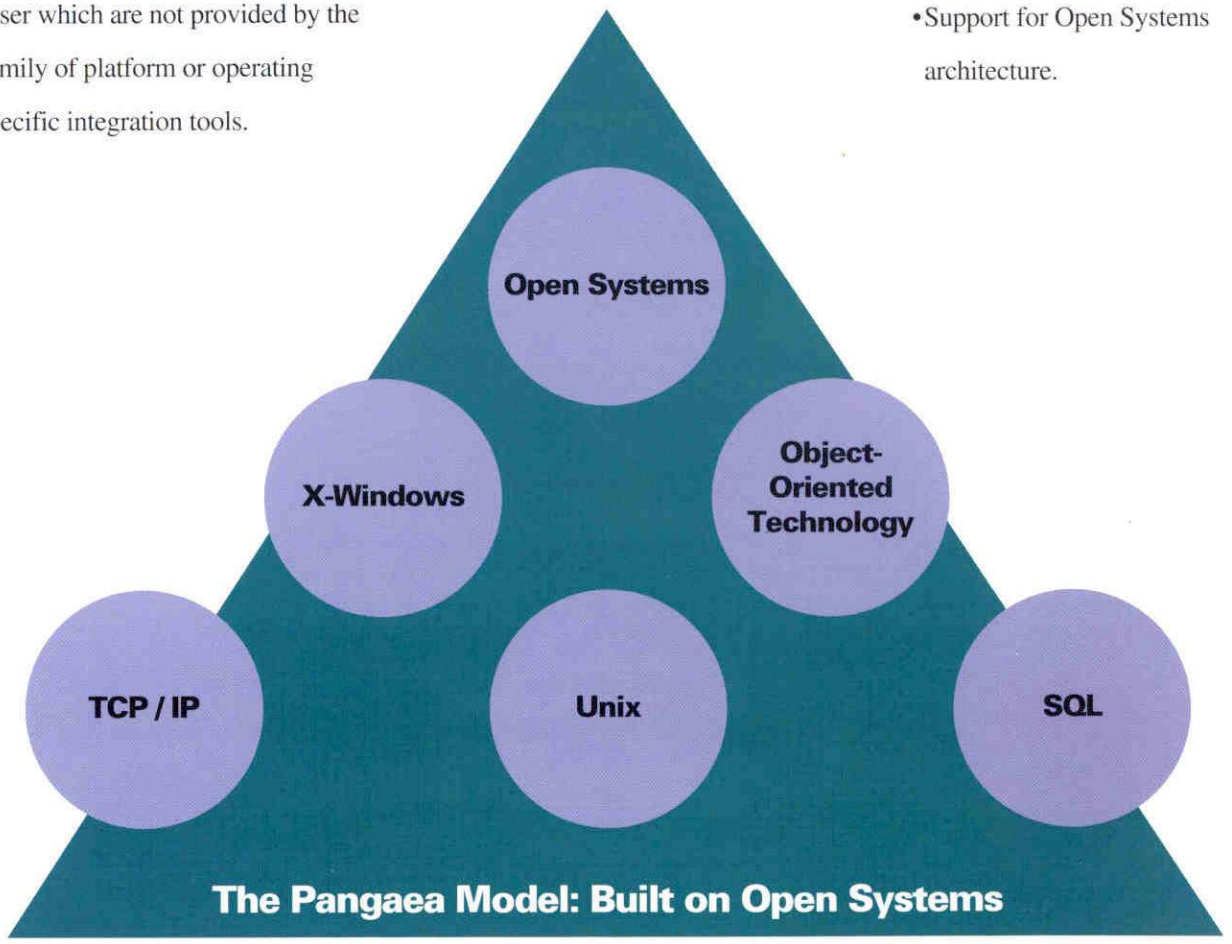
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HEWLETT® PACKARD

Odapter

Object/Relational Adapter

Technical Data

A Productivity Tool for Scalable Object-Oriented Applications

Odapter is a tool for developers writing scalable object-oriented applications requiring the integration of new objects and legacy information. Odapter is valuable because it:

- accelerates application development
- reduces the cost of keeping applications current
- enables applications to scale

Odapter delivers the productivity of object technology while adhering to your data management standards.

Consider Odapter if you need to be able to do one or more of the following:

- develop object-oriented applications and store objects in a relational database
- easily access legacy data and existing applications from your new system
- support a large number of end-users who will be simultaneously accessing information
- store large amounts of complex information

The following are examples of applications well-suited for Odapter:

- a customer billing application written in Smalltalk combining data stored in DB2 with new objects. (Telecommunications)
- a network management application written in C using Odapter as the object manager, able to scale to millions of objects (Manufacturing)
- a complex Oil and Gas industry standard model automatically generated from an Express analysis and design tool. (Oil & Gas)
- a medical application using Odapter to combine heterogeneous components of patient records. (Healthcare)

Odapter provides authorized access to sharable objects, including existing data and business processes. By bringing object-oriented capabilities to heterogeneous systems environments, Odapter delivers increased functionality while leveraging the stability of existing RDBMSs and legacy information.

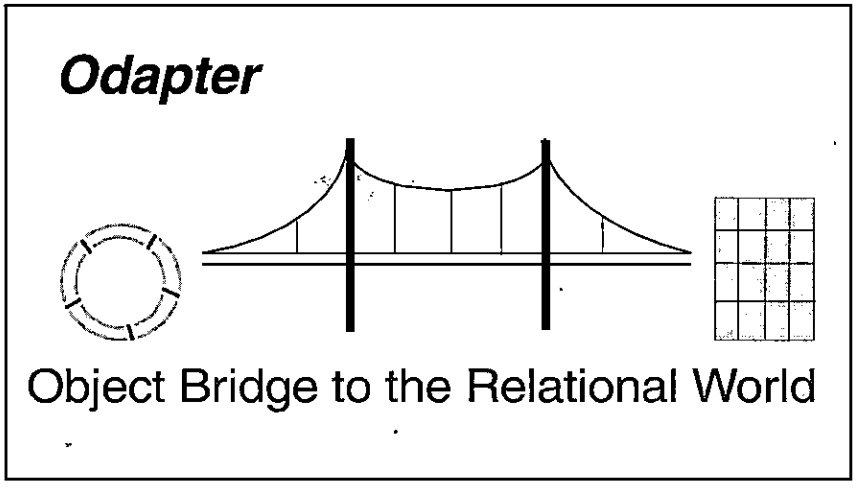


Figure 1

Odapter Object Model

The Odapter object model is based on three key concepts - objects, types and functions.

- *Objects* are a combination of data and behavior (functions). Figure 2 is an example of an object.
- *Types* are dynamic templates allowing you to group together similar components or objects.
- *Functions* define the attributes, relationships and behavior of objects. Odapter supports four types of user-defined functions:

Stored functions define attributes and relationships that are stored in the database. In Figure 2, *flightno* is a stored function. The functions *aircraft* and *crew* are also stored functions with user-defined results.

SQL-based functions allow you to access existing relational tables with Odapter's object-oriented model. In Figure 2, *citypair* is an SQL-based function accessing values from an existing relational table.

OSQL-based functions define attributes and relationships that are derived or calculated with OSQL statements. In Figure 2, *delay* and *depart* are OSQL-based functions. *Delay* calculates changes in arrival and departure times based upon events that disrupt the schedule; *depart* handles the update of functions related to departure and transitions the flight from OnGround to InAir.

External functions are a reference to code or data stored outside of Odapter. In Figure 2, *cancel* is an external function that executes code outside of Odapter to free up resources no longer assigned to the flight.

Odapter Language

The Odapter language can be combined with functions implemented in C++, Smalltalk or C. You create and manipulate objects, types and functions using Odapter's object-oriented structured query language (OSQL). OSQL is a functional language that is a semantic superset of SQL, the structured query language for relational databases. OSQL is a computationally complete language with statements allowing you to define and manipulate information in your Odapter enhanced relational database, specify authorization for individuals or groups, define transactions, embed program logic within functions, and administer the database.

OSQL includes programming flow statements, such as IF/THEN/ELSE, FOR and WHILE. This procedural language allows Odapter functions to model complex behavior, simplifying your application code. By decoupling behavior from the applications, multiple applications can share information with benefits such as consistency, security and integrity. See Table 5 for a list of all OSQL statements.

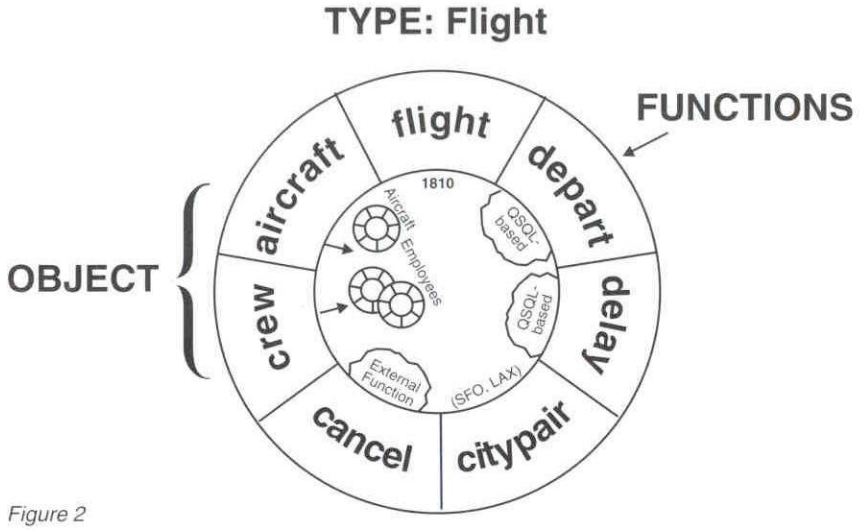


Figure 2

Odapter Object Storage

Odapter objects are stored in the developer's choice of relational databases. Odapter interfaces to the underlying RDBMS through an SQL command interface. Currently, developers can choose to store their objects in ORACLE7 or HP ALLBASE/SQL.

The choice of RDBMS is made when a particular database is created. The users are only limited by the number of Odapter concurrent user licenses purchased. This flexibility allows database administrators to continue using their existing administration procedures and keeps the group from having to choose yet another database management system.

During the initial development of an application, developers can make rapid progress without knowledge of the underlying relational database. Optimization of the objects and how they are stored in the underlying relalational database is best done during the deployment phase.

Odapter Development Environments

Odapter developers have a choice of development environments. Whether Smalltalk, C++ or more traditional C and C-linkable languages are used, Odapter enables object storage in a scalable and robust relational database. In fact, objects can be shared between different applications, allowing different projects to employ the best tools for the job!

Odapter and Smalltalk

Odapter provides Smalltalk developers with transparent access to information stored in the underlying relational database.

Odapter's *Smalltalk Class Builder* utility automatically generates ParcPlace Smalltalk compatible classes and methods based upon an Odapter object model. The developer can select specific Odapter types and functions, resulting in a corresponding set of Smalltalk classes and methods. Once the Smalltalk schema is generated, the Smalltalk developer can transparently access the underlying relational database, as shown in Figure 3.

Figure 3 shows how to access the flight objects shown in Figure 2 through Smalltalk. This example retrieves all flight object identifiers and prints the flight# for each one of the flight objects.

All Smalltalk classes and methods which result in the access of Odapter structures are italicized. Flight is a Smalltalk class that corresponds to the Odapter type Flight. The Smalltalk methods *allObjects* and *flightno* map to Odapter calls that access data from the relational database storage manager.

Odapter and C++

For C++ developers, once the corresponding C++ model is created, Odapter provides the abilility to manage C++ objects stored in the underlying relational database, as shown in Figure 4.

Figure 4 shows a C++ version of the Smalltalk example in Figure 3. That is, Figure 4 shows how to access all the flight objects shown in Figure 2 and prints the flight number associated with each flight object.

The Odapter C++ library includes a set of classes (e.g. ODBType, ODBClass, ODBFunc, ODBBag) and corresponding member functions (e.g. *allObjects*). User-defined classes (Flight) and member functions (*flightno*) are also shown. In Figure 4, all Odapter calls are in italics.

Odapter and C-linkable Languages

For traditional developers using C, or any languages linkable with C, the object-oriented features are provided by Odapter. Odapter objects are manipulated by embedding OSQL statements in the C program, similar to the db.execosql call shown in Figure 4. In addition, the C interface requires the conversion of data types from Odapter to C.

By embedding Odapter calls in a C program, the C language becomes object-oriented.

```
printFlight
    |allFlightObjects|
    allFlightObjects:=Flight allObjects.
    allFlightObjects do:[:aFlight|
        Transcript show:aFlight flightno value;cr].
```

Figure 3

```
void printFlight()
{
    int i;
    ODBType Flight("Flight");
    ODBBag allFlights=Flight.allObjects();
    ODBFunc flightno("flightno");

    for(i = 0; i < allFlights.size() ; i++) {
        cout<<flightno(allFlights[i]);
    }
}
```

Figure 4

Features and Benefits

Accelerates Application Development

Odapter accelerates application development by integrating with familiar development environments and by providing a robust object-oriented model.

Odapter's choice of development environments includes those which support the Smalltalk, C++ and C languages.

Odapter's robust object model enables the integration of legacy data and business processes in the context of one sharable business object model, shielding the developer from the data storage complexity.

The following Odapter features accelerate application development:

Automatic mapping of objects to relational databases
The application developer is shielded from the task of converting complex object models to two dimensional relational tables.

Smalltalk Class Builder
Once an OSQL schema is created, whether using available analysis and design tools or manually, Odapter's Smalltalk Class Builder can generate corresponding Smalltalk classes and methods. The developer can select the relevent part of the Odapter schema to generate. As the Odapter object model changes, developers can also incrementally update the Smalltalk classes.

Object Identity
Each object manipulated by Odapter has a unique, system-provided handle called an object identifier (OID). OIDs eliminate the need for creating unique keys to identify stored information. Additionally, OIDs reduce duplication of information when several attributes would be needed to uniquely identify information in the database. OIDs are also a powerful way to tune data access and performance.

Inheritance
Odapter objects can use functions defined on parent types in the type hierarchy. For example, as shown in Figure 5, a subtype of Employee called Pilot could inherit functions from Employee like *hire* and *name*, while defining unique functions like *hoursflown* and *status*.

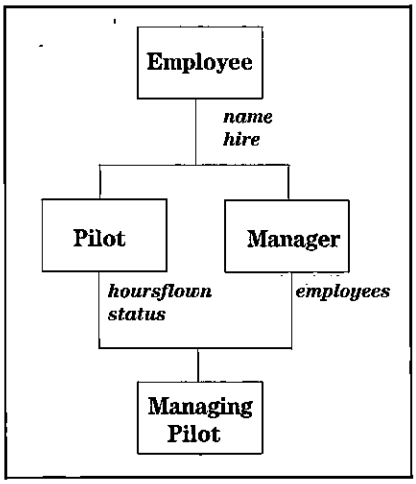


Figure 5

Multiple Inheritance
Functions defined on a type can be inherited by one or more subtypes. In Figure 5, functions accessible by the type ManagingPilot are inherited from its parents, namely all functions defined on Employee, Pilot and Manager. By inheriting rather than redefining functions, you can easily add functionality to your application.

OSQL
If you already know SQL, you can quickly be productive using Odapter's OSQL. Both query languages are set-based, that is they retrieve sets of information based upon queries. Thus, OSQL does not require users to navigate through the database chasing pointers or object references.

Encapsulation
Odapter protects end-user applications from changes to the internal definition of objects. Since Odapter only allows access to data through functions with well defined arguments and results, your applications are protected from changes to the function body and you have control over how information is used.

Aggregate Types
Aggregates are used to represent collections, such as crew members (maybe several pilots, flight attendants and a mechanic) for a particular flight, or the employees reporting to a particular manager. Aggregates are not required to have a predetermined size. Odapter manages the memory associated with aggregates, relieving your application of this work.

User-defined Data Types
You can construct user-defined data types in Odapter, such as a type called Flight, Employee or Aircraft, as shown in Figure 6. Functions defined on these types can manipulate data stored within the current object, within other related objects or outside of Odapter. User-defined types maximize flexibility and lead to more manageable, clearer code.

Complex Objects
With Odapter you can construct complex objects from simpler objects. For example, Figure 6 shows the relationships between the types Flight, Aircraft and Employee. Complex objects relieve applications from managing such relationships.

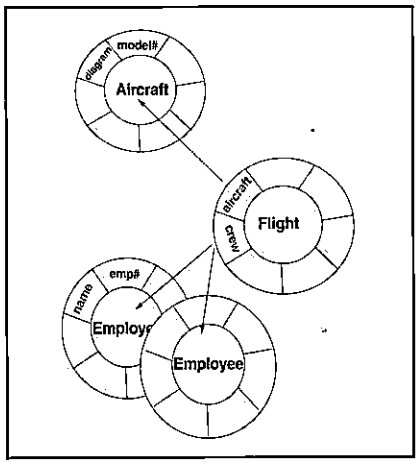


Figure 6

Reduces the Cost of Keeping Applications Current

Odapter supports a server-centric business model which means the business logic and associated data is sharable by multiple applications. By separating out business objects (data and processes), from the application development environment, your company's business can be modified without impacting the applications. These changes can be immediately leveraged by the calling applications without recompilation

The following features make applications easier to keep current:

External Functions
Using external functions, you can access distributed data and code stored outside of the relational database used by Odapter for storage, regardless of location or data format. Examples of external data sources include IMS, DB2 as well as custom databases and flat files. Odapter acts as an integrator so your application can manipulate information as recognizable business objects. This not only allows transparent migration of data over time, it accelerates developer productivity by hiding the complexity of a diverse data storage environment.

Overloaded Functions
Multiple functions can have the same name with different implementations. An application calls a function (e.g. *salary*) and Odapter determines at run-time which code (*salary* for Manager or *salary* for Pilot) to execute, based upon the type of the object against which the function is invoked. The application is simplified since the conditional logic for determining which function to execute is now in Odapter.

Dynamic Schema Modification
Odapter object models can be modified while the database is running. Developers can add new functions and types, as well as change the implementation of functions. This capability is particularly valuable to applications with high availability requirements.

Dynamic Typing
You can change the type of an object without destroying and recreating the object. An object can also belong to more than one type. As shown in Figure 7, once a Flight leaves the ground, it would change state from being an OnGround to an InAir Flight. OnGround functions such as *maintenancecrew* and *availableseats* would no longer be needed. An InAir object would need certain functions like *bestroute* and *delay* to calculate the most time efficient route and to calculate a projected delay based current weather conditions. Dynamic Typing allows you to represent an object in Odapter which transforms itself over time and, therefore, changes capabilities and attributes.

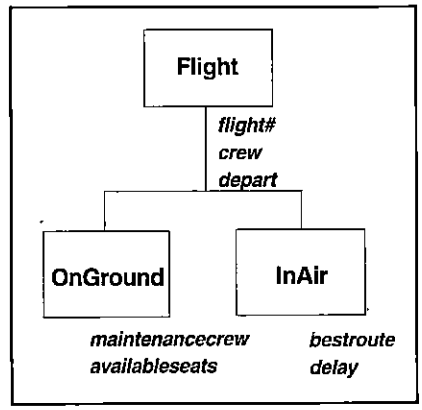


Figure 7

Late Binding
Odapter supports functions that are resolved at runtime. Late binding allows you more flexibility in application development and gives you the full power of overloaded functions as described earlier. On the other hand, Odapter will precompile or do early binding to improve performance. However, when types and functions changes at runtime, impacting a particular function, late binding occurs and the application automatically takes advantage of the new implementation of the function when it is called.

Referential Integrity
Since Odapter manages the relationships between objects, it can manage referential integrity on your behalf. That is, if an object referenced by other objects is deleted, the system removes all

dependencies. Your application code is simplified since Odapter is able to keep the logical business model intact automatically.

Multimedia
Odapter allows you to manage large, unformatted data in binary format and treat that data as an attribute of an object. For example, you may want to create a function called *diagram* to show the sections and seating for an Aircraft object. Multimedia information can include graphics, images and voice. You can also define functions in Odapter to manipulate this multimedia information. For example, you can create a function called *showexits* that adds information to the *diagram*. Thus, various applications can share these complex functions.

Import Facility
The Odapter Import facility allows developers to update existing Odapter functions with data from external files such as spreadsheets or other databases. This is an object-oriented version of the relational "bulk load" functionality.

Enables Applications to Scale

Odapter makes applications more scalable by storing objects in a choice of RDBMSs, like ORACLE7. As a result, applications can access large volumes of data, be used by a large numbers of users, and perform on-line backup. In addition, Odapter protects against unauthorized access from users in a distributed environment.

Odapter, with the help of the underlying relational storage manager, ensures the integrity and security of your data while maximizing the availability of that data for end users.

The following features enable applications to scale:

Indexing
Indexes are automatically generated when you create types and functions in Odapter. You can also define your own indexes using B-tree and hashing algorithms. Indexes make end user access to information faster.

Clustering
Related functions and objects which have the same value for a function can be stored close to each other. This ability to influence how objects are stored allows you to tune the performance of the database based on how the information will be accessed by applications.

Transaction Management
Odapter ensures the logical and physical integrity of your database by giving you complete control over the unit of work to be performed within a single transaction. With this control, you can save or rollback a transaction (throw away temporary work) at your discretion. Savepoints are also supported so that you can rollback parts of a transaction.

Multi-user Concurrency Control
Odapter is designed to support hundreds of users accessing the same information while guaranteeing the integrity of that information.

Authorization
You can control access to an Odapter enhanced database at the database and function levels based on individuals or groups of users. For example, authorization statements can provide read access to a large group of users while limiting write or delete access.

High Availability
Because Odapter actually stores objects in an RDBMS, Odapter can leverage RDBMS features to maximize the availability of your information by providing:

- on-line backup of the database, to backup the database while it is being accessed
- dual logging, to ensure the integrity of your log file
- switch log, to automatically switch to a second log file if the original log file becomes full
- dynamic file expansion, to expand the size of your database as it becomes full

Odapter will also take advantage of other available features of the underlying relational database management system such as replication or "warm standby".

Recovery
Odapter uses the robust logging and recovery facilities of the RDBMS. In case of a failure, you can rollback work or perform rollforward recovery to a particular time, using the log file to recreate saved work.

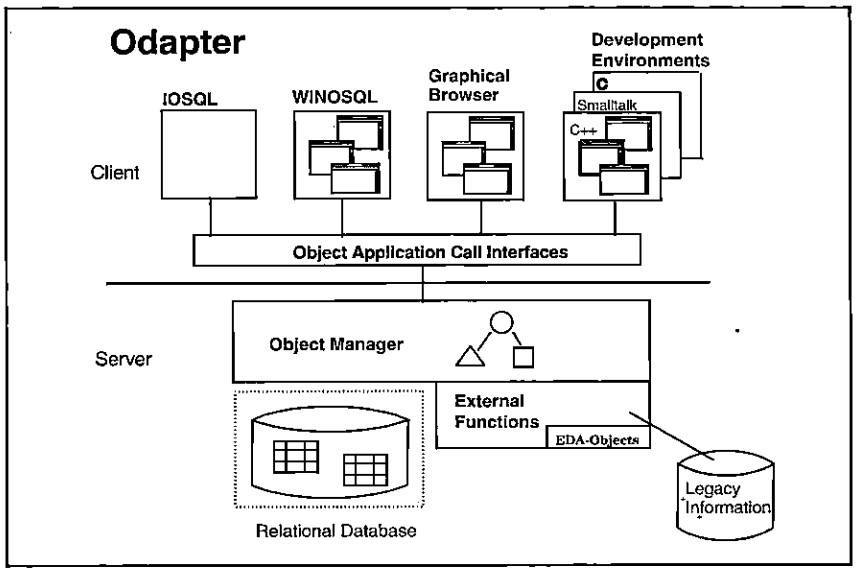


Figure 8

Odapter Software Components

Odapter uses a client/server architecture, enabling you to efficiently utilize your computing power. Clients use the object application call interface (OACI) to communicate with the server over the network. The clients and server components can also reside on the same machine.

Odapter is bundled with the following client and server components, as shown in Figure 8:

Client Components

- *Interactive Object-Oriented SQL (IOSQL)*

  This interface allows you to interactively enter all Object-oriented SQL (OSQL) statements, facilitating rapid prototyping and testing. IOSQL provides query, administration and editing capabilities.

- *Graphical Browser (GOSQL)*

  The Graphical Browser is a tool that allows you to graphically explore your database schema and contents, and execute any OSQL statement. This tool is designed to assist application developers by making it easier to view and manipulate your object model stored in Odapter.

- *Windows OSQL (WINOSQL)*

  This PC-based interactive interface to OSQL allows you to interactively enter all OSQL statements.

- *Object Application Call Interfaces (OACI)*

  Odapter provides client interface libraries for the Smalltalk and C++ object-oriented programming languages, allowing these languages to be tightly coupled with Odapter.

  You can also write Odapter applications using any programming language that can be linked with C (such as Ada, COBOL, FORTRAN and Pascal). The programmatic interface is similar to a "Dynamic SQL" interface, and passes strings representing OSQL statements to the Odapter server. No preprocessors are required.

Server Components

- *Odapter Object Manager*

  The Object Manager executes OSQL calls made by the Odapter clients. The Object Manager processes requests, and accesses data and code stored in the Odapter enhanced relational data storage manager or passes the request to a subsystem outside of Odapter using Odapter External Functions.

- *External Functions*

  External functions allow you to access data and code stored outside of Odapter, regardless of data format or location. External functions can automatically link to specific data sources using the Odapter EDA-Objects class library and the EDA/SQL product from Information Builder's, Inc. (IBI). External functions can also be implemented by you as subroutines written in general-purpose programming languages and compiled outside of Odapter. External functions can be called by any OSQL statement, allowing you to manipulate this remote data and application code like any other Odapter object. For example, Figure 9 shows how Odapter integrates diverse heterogeneous information in an Oil and Gas environment.

- *EDA-Objects*

  HP and IBI have jointly developed an external function library called EDA-Objects. Coupled with IBI's EDA/SQL product, EDA-Objects provides connections to over 50 commonly used databases on 35 different platforms. The external function library to connect to EDA/SQL is shipped with Odapter; however, you must purchase other EDA/SQL components from IBI directly to use the product. EDA-Objects is one way to integrate external data from multiple servers into a single business model managed by Odapter. This is done without physically moving the data or changing the applications which are dependent on the data in its current form.

Additional Products

- *Development Environments and Tools*

  Odapter allows you to use your favorite development environments for application development. Some tools are more tightly coupled with Odapter than others. HP has recruited tools partners to address all aspects of application development including application design and analysis, data model manipulation, fourth generation language application development, report writing and legacy data access.

- *Relational Database*

  Odapter uses a relational database as its storage manager for the storage of Odapter objects. The relational database performs physical file management and database functions such as multi-user concurrency, transaction management, and recovery. The relational database allows you to perform on-line backup and recovery, manage physical distribution of files, maximize availability and change database parameters.

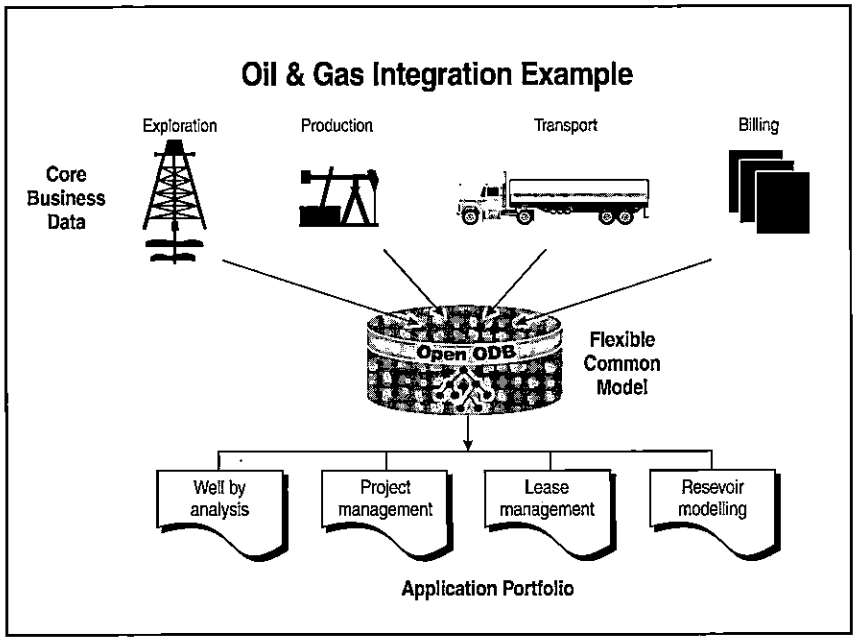
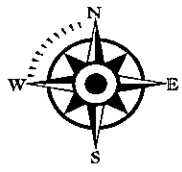


Figure 9

- *COMPASS*



COMPASS is a consulting product which includes the Hewlett-Packard implementation of the Petrotechnical Open Software Corporation (POSC) Software Integration Platform (SIP) specification. The SIP specification defines a data model and an interface which allow users and applications to access exploration and production data, independent of the database engine technology.

The COMPASS package is an add-on to Odapter and includes:

- COMPASS specific consulting/ training (1 day)
- POSC-based DAE interface library and documentation
- Interactive user interface called ixpres
- Archived copy of a pre-loaded Odapter enhanced database with sample reference data
- Scripts for building a POSC-based Odapter enhanced database
- Contributed software library (data loaders, demonstration programs)

COMPASS gives developers a 'jump start' on building applications focused on petroleum exploration and production. Other industries will find COMPASS an inexpensive and useful approach for building geographic information systems (GIS) and other applications which can re-use of the cartography (mapmaking) and geometric objects defined in the model.

POSC is a not-for profit organization created to lower the costs associated with accessing and integrating exploration and production data for the oil and gas industry.

System Environment

Hardware platform	Operating System Version	Memory (minimum)	Disk Space (minimum)*
HP 9000 S700 and S800	HP-UX 8.07 of later	32MB	10MB + necessary swap space
Sun	Solaris 1.0 (SunOS 4.3); Solaris 2.0 (SunOS 5.2)	32MB	10MB + necessary swap space
IBM RS/6000	AIX 3.2.5	32MB	10MB + necessary swap space
X Terminal		6MB	none
IBM PC compatible	DOS 5.0, MS-Windows 3.1 or later	4MB	1MB

Table 1: Odapter Client Environments

**Swap space needed will depend on the complexity of the application and the number of concurrent users. Swap space will significantly increase the necessary disc space.*

Hardware platform	Operating System Version	Memory (minimum)	Disk Space (minimum)*
HP 9000 S700 and S800	HP-UX 9.0 or later	64MB	15MB + necessary swap space

Table 2: Odapter Server Environment

**Additional memory may be required. Swap space will significantly increase the necessary disc space. The amount of memory and swap space depends on the complexity of the application and the number of concurrent users.*

Odapter Software Requirements

To use Odapter, you will need one of the RDBMSs listed below, TCP/IP transport and ARPA Berkeley Services (for Unix systems), HP LAN Manager or Microsoft LAN Manager (for the PC client) software. To use the Odapter Graphical Browser, you will need X11 X-Window support.

Table 3: Relational Databases

	Version	Memory (minimum)	Disk Space (minimum)
ORACLE7	7.0.13 or later with "procedural option" (PL/SQL), Pro*C, SQL*Plus & Oracle common libraries and utilities	refer to Oracle manuals	refer to Oracle manuals
ALLBASE/SQL*	shipped with OpenODB	64MB (ALLBASE/SQL and Odapter)	10MB

**ALLBASE/SQL is included with the Odapter software. The combination of Odapter and ALLBASE/SQL is known as OpenODB.*

Ordering Information

Software, training, consulting and support can be purchased separately, as well as in bundles. Pricing for the stand-alone software is based on the number of user processes accessing a single database server at the same time. Any number of user licenses can be ordered. You must also order the Odapter Media & Manuals product when ordering the Developer's Bundle or the Concurrent User License. HP standard support options are available for all Odapter license and media products.

The OpenODB and Odapter products are sold together. OpenODB is the combination of Odapter and ALLBASE/SQL. You are only limited by the number of concurrent licenses purchased for Odapter.

Product Number	Product Description
B3767BB	Odapter/OpenODB Concurrent User License Software license only. Must order B3768BA to receive software and manuals. Must specify number of users.
B3768BA	Odapter/OpenODB Media and Manuals Must choose media option. Includes software and one set of manuals. Requires prior or concurrent purchase of software license.
B2470BA	Odapter/OpenODB Developer's Bundle Includes 8 user software license, 5 days of on-your-site consulting, one year of on-line support and 2 passes to the Odapter/OpenODB Training Class. Must order B3768BA to receive software and manuals.
B3179A	Odapter/OpenODB Evaluator's Bundle Includes a 40 user software license for 3 months, media, documentation, 3 months of on-line support, and 1 pass to the Odapter/OpenODB Training Class.
B3184S	Odapter/OpenODB Training Class (5 days)
B3185A	Odapter/OpenODB Reference Manuals Includes the Odapter/OpenODB Reference Manual and the Odapter/OpenODB System Functions Manual.
B3186A	Odapter/OpenODB Consulting Customized consulting in any of the following areas: COMPASS, object-oriented analysis and design, schema design and review, authorization/security design and review, performance tuning, advanced usage, Odapter/OpenODB application development planning and review and implementation of access to legacy data sources.

Table 4

To order these products, please contact your local HP sales representative or one of the offices on the back page of this document.

Table 5. Odapter Features

OBJECT-ORIENTED FEATURES
Aggregates (BAG, LIST, SET, TUPLE)
Complex Objects
Dynamic Schema Modification
Dynamic Typing
Encapsulation
External Functions
Functions (Stored Code or Methods)
Late Binding
Multiple Inheritance
Object Identity (OID)
Overloaded Functions
Type (Class) Hierarchy
User-defined Data Types
Versioning Primitives

CLASS LIBRARIES
C++
EDA-Objects
Smalltalk
Softbench

CLIENT INTERFACES
Graphical Browser (GOSQL)
Import
Interactive OSQL
Object Application Call Interfaces (OACI):
- C++
- SmallTalk
- C-linkable languages (Ada, COBOL, FORTRAN, Pascal)

Smalltalk Class Builder
Windows OSQL

OSQL STATEMENTS
Add/Remove Type To/From Object
Add/Remove User
Begin/Commit/Rollback Work
Call Function
Change Owner
Change Password
Connect/Disconnect
Create/Delete Function
Create/Delete Index
Create/Delete Object
Create/Delete Type
Create/Delete User/Group
Declare/Delete variables
Grant/Revoke
If/Then/Else, While, For
Implement/Modify Function
Open/Fetch/Close Cursor
Raise Error
Security On/Off
Savepoint
Select
Store
Update

PRIMITIVE DATA TYPES
Binary
Boolean
Character
Date
Datetime
Decimal
Floating Point
Integer
Interval
Small Integer
Time

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HEWLETT® PACKARD

Customers Speak Out About Odapter!

Customer Testimonial

When is Odapter the Solution of Choice?

Dataquest user survey rates OpenODB #1 in its September 27, 1993 report – "Hewlett-Packard's OpenODB is the #1 object database in the user ratings" *with 31% of the survey responses saying that OpenODB is* "ideal for their long-term client/server system" *needs!!!*

OpenODB is a combination of Odapter and HP's ALLBASE/SQL relational database management system (RDBMS).

In the following excerpts, two customers explain in their own words why they chose Odapter as their Object-to-Relational solution of choice.[1]

The Challenge

What kind of problems were you trying to solve?

Defense Contractor:



"We had several challenges to address: requirements for a very sophisticated graphical user interface; and, business objects with a range of complex geographical, temporal, hierarchical, and abstract relationships."

"Our target system architecture was PC clients connected to HP-UX servers via a combination of LAN and dialup modems over a variety of carriers. There are a large number of servers geographically distributed across the US with a wide range of workloads (4 - 15 users, 80,000 - 800,000 MBytes of raw data, 120,000 - 12,000,000 update events over 2 week periods). The servers are primarily connected through a WAN. Each server has an autonomous database and a geographically separated backup. A pair of maintenance nodes manage this system and provide some centralized capabilities."

"The system is required to provide interactive update and query capabilities with a real-time view of the database. Thirty-five screens are required, including several screens that allow graphical representations of the database AND graphical manipulation of database objects with update capabilities."

Electronics Manufacturer:



We required "a system that included database capability for storing measurements and relating them to the complex configuration of network elements and software agents involved in measurement capture. It also had to support dynamic control of the collection process and the implementation of data refinement algorithms to correlate and extract information from the volume of individual measurement data points."

[1]Some of the names and details have been edited to protect the proprietary nature of the customers' applications.

The Decision: Why Odapter?

Productivity of Development Team

How is developing with Odapter different than developing with a traditional RDBMS?

Defense Contractor: 

"[The alternate choice] is a 3rd or 4th generation RDBMS. As such, it has attempted to address a number of the technical challenges one confronts in trying to implement a distributed client-server system with a wide-range of uses. ... The bottom line is that ... it doesn't supply the infrastructure to implement an object model and this is the price one pays for using [it]. ...With Odapter you trade a number of bells and whistles for an infrastructure in which to implement a persistent object model. This makes implementations simpler, much like the difference between doing things in Assembler (the relational database) vs. FORTRAN (Odapter)."

"Odapter acts as a configuration management tool and provides integrity to the entire knowledge model (not just the data and a few of the relationships). If one were to implement most of the business model rules in a 3GL, one would have to provide the infrastructure to manage those rules as 3GL code."

Electronics Manufacturer: 

Completion of "these milestones show a realized benefit in reducing the cycle time for developing an application with Odapter's object-oriented features. The same level of functionality could not have been prototyped in 6 weeks and delivered in 4 months using more traditional RDBMS technology. The Object-Oriented Analysis object model requires very little transformation into a design that can be directly implemented with Odapter."

"Odapter applications have a range of options for heterogeneous client access. Client applications have choices of platform, with distributed clients supported. The client application may be written in any of several languages, including C, C++ or Smalltalk. The choices available provide developers with an effective array of options for implementing Odapter based applications."

Extensibility and Maintainability of the System

How do you manage changes and extensions that occur in the environment?

What features help you maintain your applications?

Electronics Manufacturer: 

"The ability to dynamically define new subtypes of existing object types enables well tested common behaviors to be used while still allowing changes through modified or extended operations that apply only to the subtype. Changes that occur in the [Odapter] environment do not require any compilation, linking or software distribution for the client applications. These extensions can be developed, independently tested, and then installed on a running system without any need for down time or major release overhead."

"A key maintainability benefit of Odapter is the limited need for redistribution of software components when a function implementation changes. When functions are linked to the Odapter server, the implementation of those functions may be changed without requiring any recompilation or relinking on the part of the using client applications."

"The Odapter benefit of flexibility is one that has been realized and exploited by us. Implementation changes were made after the pilot implementation to improve functionality and performance, with no impact on the client applications or interruption of service."

Maturity

Do you find Odapter to be a stable product?

Electronics Manufacturer: 

"Maturity is often measured by the stability of the product and the availability of a rich set of support tools. Odapter is designed to leverage the toolset of the RDBMS, that provides the storage for many of the maintenance aspects of support. This approach has been an effective means of accomplishing com-

mon support tasks such as backups, unloads and session manipulation. Backup and recovery options support either static or dynamic backup. The dynamic option enables 24x7 database availability. When archive logging is enabled, the database offers a roll-forward feature that would return the database to the last consistent state prior to service interruption. In addition to backup and recovery, Odapter offers other features that are provided through the underlying RDBMS engine. These include isolation levels to support concurrent access, cost-based query optimization, deadlock detection and DBA [database administration] control over user processes."

"Odapter uses the RDBMS maturity to provide capabilities that take significant resources to develop. It has proven to be a practical way to provide a mature environment for a relatively new object database."

"Odapter leverages the capabilities of the underlying RDBMS to provide facilities for routine maintenance, without interrupting service to users of the Odapter applications. These capabilities include such maintenance tasks as on-line backup, updating database statistics and changes to the Odapter schema."

Complex Object Representation

Were you able to represent complex objects and relationships?

Defense Contractor: 

"We used collections and aggregates extensively in Odapter to handle relationships, aggregated objects, etc. ... I have used the automatic iteration over bags of function arguments [an Odapter Feature] to eliminate the need for writing loop code..."

"We have lots of complex objects, and have found it very expensive to use SELECTs to manipulate them. [Instead] Odapter OIDs enable the implementation of complex objects. ... [and] manipulating OIDs is a lot easier than user-implemented primary and foreign keys."

Electronics Manufacturer: 

"One of the major reasons for using an object-oriented model is the ability to directly represent complex objects. These objects may contain aggregate structures of literal data types or other objects. Directly modeling and referencing these complex object instances, without the need for reconstructing them through database joins, is a benefit of an Odapter approach. Odapter proved capable of representing complex objects. The functional object model is an effective means of building objects that are composed of a wide range of other embedded objects, stored aggregates and complex operations. From the interface to an object, the user need not be concerned with the storage details or the means of accessing the object's components. The choices available to the developer offer flexibility in implementing the object for most effective access."

Performance

How does your Odapter application's performance compare to RDBMS application's performance?

Electronics Manufacturer: 

"It is possible to optimize the frequently executed operations against large collections of objects to reach near-RDBMS levels of performance on SELECT, LOAD and DELETE operations. Performance can be obtained that is close to relational databases on comparable tasks."

Heterogeneous Data Integration

How do you deal with problems of heterogeneous data access?

Electronics Manufacturer: 

"Odapter provides an ability to access heterogeneous data (both databases and flat files) with external functions and to present information from those data stores through the Odapter object model. This ability allows Odapter to operate as a 'multi-database' that integrates data from many sources into a single

model and provides the ability to transparently operate on remote data. Odapter queries can combine information from internal and external data stores and present it as a unified result."

Large Volume Capability

Are you able to store large quantities of objects?

Electronics Manufacturer: 

"Because of its reliance on a mature RDBMS storage engine, Odapter offers the RDBMS capability for storing and managing large numbers of objects. Our experience showed that this capability can be exploited."

Making the Decision



After a careful evaluation of alternatives, these customers chose Odapter from Hewlett-Packard.

Odapter provides the object-oriented capabilities for complex object implementation and manipulation, yet it relies on a mature RDBMS storage engine for object persistence.

The other 'hybrid' approaches introduce an additional storage database lacking the robustness of relational databases and requiring additional database administration training and expertise. In addition, these products do not have the heterogeneous integration capabilities of Odapter.

"Pure" object-oriented databases have difficulty scaling to support more than 10 to 20 concurrent users. Also, due to their relative immaturity, they also lack full database capabilities commonly found in commercial-grade relational databases.

Relational databases are unable to effectively integrate with object-oriented development environments. This results in developers reinventing the object to relational mapping and spending quite a bit of time and money in the process. In addition, RDBMSs cannot provide a common integration mechanism for legacy data sources and applications.

Odapter provides the productivity for development, as well as the extensibility and flexibility required by dynamic applications in a constantly changing environment.

"We needed something that aggressively used object technology. We originally considered other OODB's, but retracted when we got a good look at the state of the "pure" OODB market. Odapter from HP was a logical choice." (Defense Contractor)



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Hewlett-Packard Ltd.
5150 Spectrum Way
Mississauga, Ontario L4W 5G1
(416) 206-4725

Japan:
Yokogawa-Hewlett-Packard Ltd.
3-29-21, Takaido-Higashi
Suginami-ku
Tokyo 168, Japan
(813) 3331-6111

Latin America:
Hewlett-Packard
Latin American Region Headquarters
Monte Pelvoux No. 111
Col. Lomas de Virreyes
11000 Mexico, D.F.
Mexico
(52 5) 326 4000

Australia New Zealand:
Hewlett-Packard Australia Ltd.
31-41 Joseph Street
Blackburn, Victoria 3130
Australia (A.C.N. 004 394 763)
(613) 272-2895

Asia Pacific:
Hewlett-Packard Asia Ltd.
22-30/F., Peregrine Tower
Lippo Centre
89 Queensway, Central
Hong Kong
(852) 848-7777

Europe/Africa/Middle East:
Hewlett-Packard S.A.
150, route du Nant-d'Avril
CH-1217 Meyrin 2/Geneva
Switzerland
(41 22) 780 8111

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HEWLETT® PACKARD

Odapter

The Solution to Scalable Object-Oriented Applications!

Executive Summary

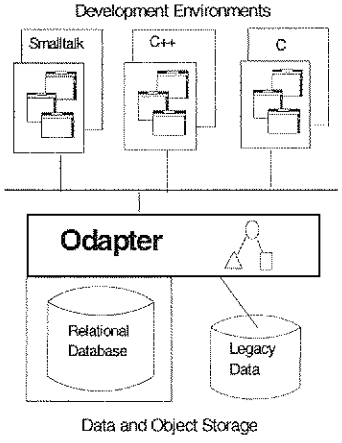
Odapter bridges the object/ relational gap.

Odapter is a tool for developers writing scalable applications requiring the integration of new objects and legacy information. Odapter is supported on a choice of hardware and relational database management system (RDBMS) platforms.

Odapter uses relational databases to store objects created by object-oriented applications, making RDBMSs object-friendly. Odapter delivers the productivity of object technology while adhering to your corporate data management standards.

Odapter accelerates application development.

Developers can use various environments, including Smalltalk, C++ and C with Odapter. Odapter can also integrate legacy data and business processes in the context of one shared object model, shielding developers from the complexity of their data storage.



Odapter reduces the cost of keeping applications current.

Odapter's object model resides on a server so that business processes and data can be shared between applications. Odapter's server-centric object model also shields applications so that changes can be made to business processes, relationships and logic without recompilation.

CAUTION

Attempting to write your own layer between object languages and relational databases is costly. One company spent 2.5 engineering years using a Smalltalk development environment and hand-mapping information into an RDBMS. The result was complex application code which was difficult and costly to maintain.

Odapter enables applications to scale.

By using the ORACLE7 or ALLBASE/SQL relational databases for storage, Odapter supports large numbers of users, large volumes of data, as well as on-line changes in a distributed environment. New administration training is not needed.

CAUTION

Another company spent several years developing a "pure ODBMS solution", only to discover more than $5 million later that it lacked the robustness and scalability of an RDBMS.

Odapter has been used with various development environments across multiple applications and industries.

If you have chosen an object approach and want an integrated, scalable client/server system, Odapter is the solution for you.

Tools/Languages Used
- Ada
- EDA/SQL & FOCUS
- ObjectIQ
- Paradigm Plus/FUSION
- SoftBench C/C++
- STEP Tool Kit
- VisualWorks Smalltalk

Sample Customer Applications
- Airspace Management
- Customer Service
- Electronic Patient Records
- Geographic Information System
- Library Research System
- Network Management
- Well Log Analysis

Sample Industries
- Financial Services
- Healthcare
- Manufacturing
- Oil & Gas
- Telecommunications
- Utilities

Hewlett-Packard (HP) has over 10 years of object experience to help you take your first step with Odapter.

Odapter and related services are available today. Contact your local HP office to get started with an Odapter evaluation package right away! In the U.S., you can also contact HP Direct Marketing at (800) 637-7740, ext. 8521.

HEWLETT® PACKARD

Sales Offices
For more information, call you local sales office listed in your telephone directory or an HP regional office listed below for the location of your nearest sales office.

United States:
1-800-637-7740

Canada:
Hewlett-Packard Ltd.
5150 Spectrum Way
Mississauga, Ontario L4W 5G1
(416) 206-4725

Japan:
Yokogawa-Hewlett-Packard Ltd.
3-29-21, Takaido-Higashi
Suginami-ku
Tokyo 168, Japan
(81 3) 3331-6111

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Advanced Concepts Center

OMTool™

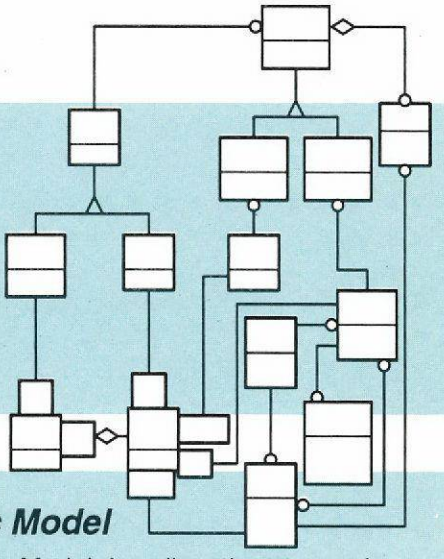
Version 2.0 for the PC

OMTool™ for the PC version 2.0 supports the graphical representation and editing of object models for systems, programs, and databases. OMTool's concept is based on GE's Object Modeling Technique (OMT), which is defined in the text, *Object–Oriented Modeling and Design,* written by GE Corporate Research and Development Center scientists Rumbaugh, Blaha, Premerlani, Eddy, and Lorensen.

OMTool automates the process of preparing models, updating them, adding implementation details and generating data structures and class descriptions in object–oriented languages. C++ is OMTool's language of choice.

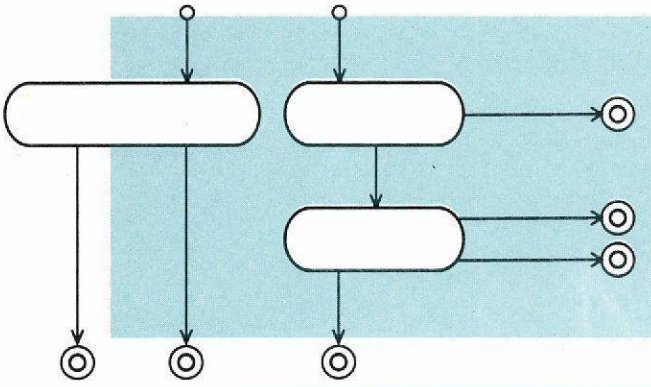
OMTool version 2.0 provides full Object, Dynamic, and Functional Model support.

The latest release of OMTool fully supports OMT notation with Object, Dynamic, and Functional models that enable the OMTool user to describe complex systems from three different viewpoints, each represented by its own kind of model.



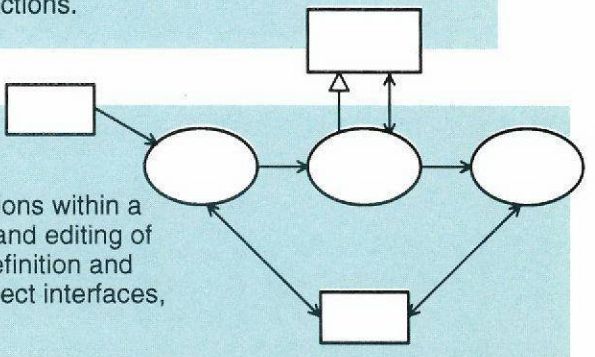
Object Model

The Object Model describes the static structural relationships of objects. OMTool provides for: the creation and editing of object diagrams; the definition and manipulation of class hierarchies, attributes, operations; and associations, and reporting capabilities.



Dynamic Model

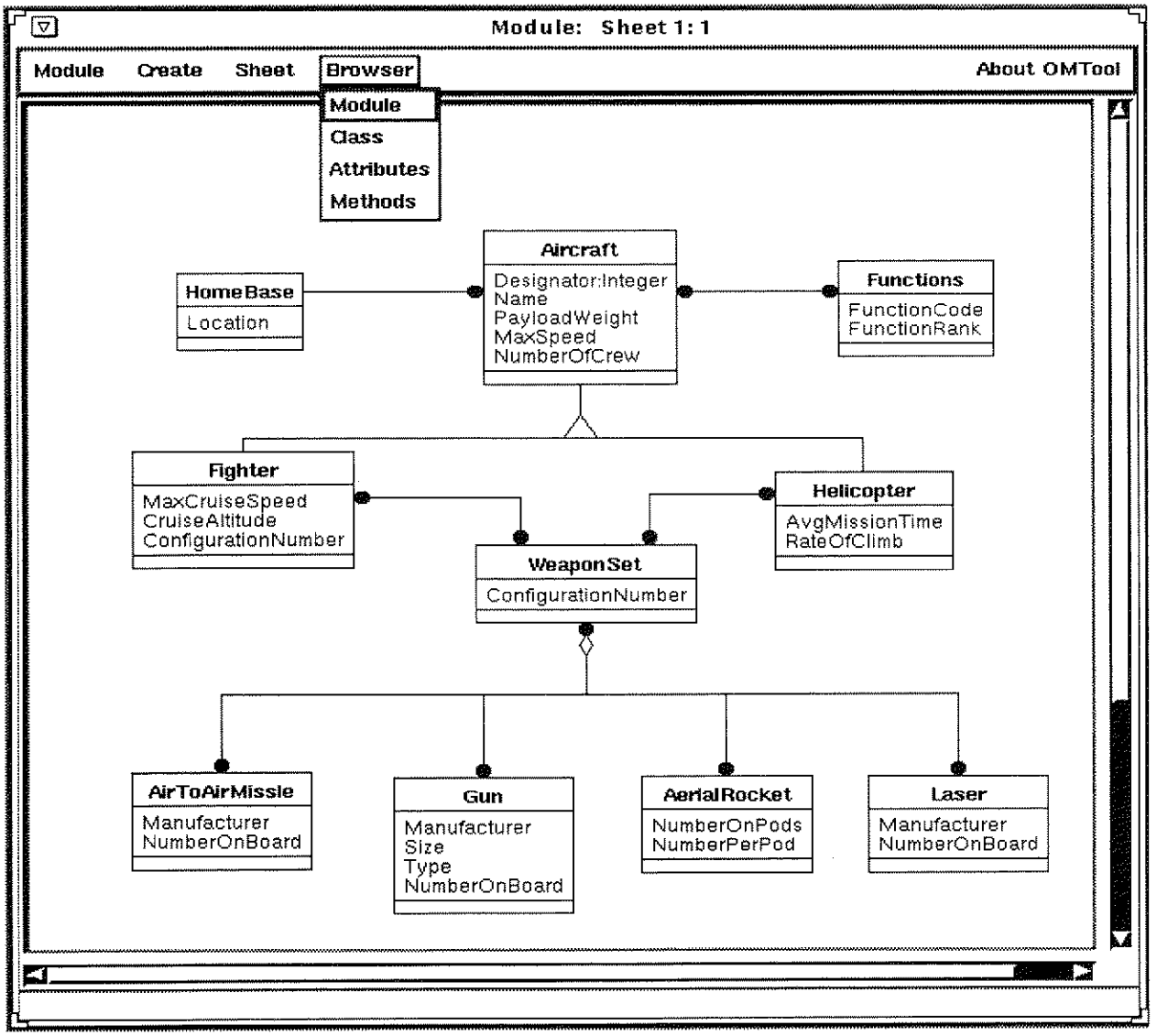
The Dynamic Model describes the temporal interactions of objects. OMTool provides for the creation and editing of state and substate diagrams, state generalizations, and state aggregations, and provides for transitions between states and their associated events/actions.



Functional Model

The Functional Model describes computations within a system. OMTool provides for the creation and editing of dataflow diagrams, and provides for the definition and manipulation of processes, datastores, object interfaces, dataflows, object flows, and control flows.

Mastering a World of Technology



OMTool provides annotation capabilities for modeling entities and print/export capabilities to PostScript, Interleaf, and Framemaker.

To find out more about OMTool, call the Advanced Concepts Center at

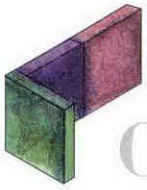
1-800-438-7246

Advanced Concepts Center

MARTIN MARIETTA

640 Freedom Business Center
King of Prussia, PA 19406
Telephone (215) 992–6200
Fax (215) 992–6299

Trinzic

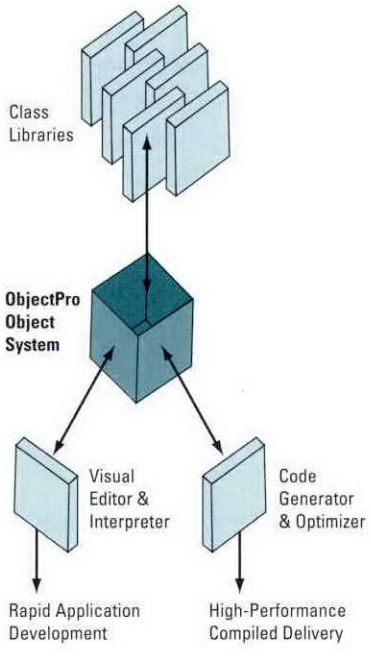


ObjectPro™— An Object-Oriented Application Development Tool for Professionals

Unparalleled Productivity + Performance

to Address the Requirements

of Today's Client/Server Applications



Product Overview

As client/server business applications evolve beyond simple data access and display, a void is growing between the requirements of these applications and the ability of existing tools to build them. ObjectPro provides the performance, power and productivity to fill this void.

ObjectPro is fast—generates C-code for high-performance application delivery

ObjectPro is powerful—full object-oriented system offers improved flexibility and quality for all parts of an application

ObjectPro is productive—enables rapid application development through on-line syntax checking and complete development environment

---

ObjectPro from Trinzic is an object-oriented application development tool for professional programmers. The ObjectPro architecture has four integrated components:

A visual development environment includes high-productivity editors, debuggers and developer tools for easy application development, maintenance, and navigation.

A full-scale object-oriented system supports inheritance, specialization and encapsulation. The ObjectPro Object System is leveraged throughout the development environment to enable the productive development of simple and complex client/server applications—even by developers inexperienced in object-oriented techniques—with all of the associated power and productivity benefits of objects.

Class libraries support rapid development by enabling the reuse of application components among applications. Class libraries can contain screens, simple functions and entire business models.

A code generator translates each completed application into C code, optimizing the data structures and code to enable delivery of exceptionally high-performance finished applications.

A Full-Scale Object-Oriented System

ObjectPro is built around a highly optimized object-oriented system that provides the productivity and flexibility developers need for building today's increasingly complex client/server applications. Because all application components are stored as objects, developers realize the benefits of inheritance and specialization throughout their entire application. These benefits apply to the whole business model—not just screens and database interaction, but logic as well.

The ObjectPro Object System is fully integrated with ObjectPro libraries, making it especially easy to share and reuse all application components—even complex business models—built in ObjectPro. And, because the Object System is fully integrated into the editing environment, developers don't need to be experts in objects to be productive building applications—they can concentrate instead on the creative aspects of an application's screens, data and logic; the ObjectPro editing system takes care of the programming details.

The ObjectPro Language contains built-in constructs for iteration, assignment, evaluation and basic operations; this increases ease of use and decreases the developer's learning curve. The ObjectPro language is also easily extensible with libraries, providing more power than Basic-like scripting languages.

Typical ObjectPro Applications:

Sales order entry suggesting cross-selling opportunities

Pricing and discount strategies evaluation

Benefits entry and approval

Problem tracking and analysis

ObjectPro enforces database integrity during concurrent use by multiple users with automatic optimistic locking, automatic pessimistic locking, and manual options for controlling access.

Strong Database Integration

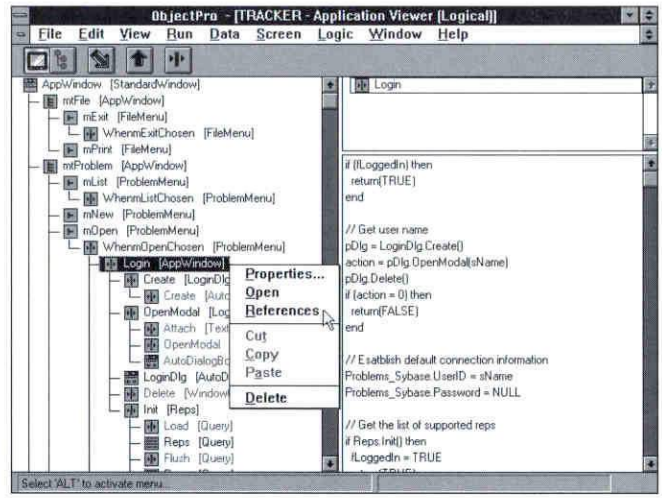
ObjectPro provides a high-productivity interface for accessing and updating a wide variety of databases. Database operations are implemented through ObjectPro classes and methods. Developers specify data access and display by using the graphical tools in the ObjectPro editing environment.

Three basic building blocks provide the structure for building the data access component of an application:

Query builder—The ObjectPro query builder contains graphical tools for building the SQL retrieval and update statements and for easily finding and specifying stored procedures. An SQL Paster helps the developer specify accurate SQL syntax for each query.

System-supplied methods—ObjectPro includes a library containing methods for managing data access and update, providing developers with full control over all database interactions. As part of the Object System, methods can be added, modified, and even overridden.

Report control—The ObjectPro report control makes it easy to display, update and print application data. Developers can easily build the report by visually specifying headers, footers, graphics, bitmaps, radio buttons, check boxes and more.



ObjectPro's Logical View details *how* an application works—enabling productive individual and team development.

Productive User Interface Development

ObjectPro provides a fully graphical environment for building the application user interface. Completed applications can use all the standard controls (such as check boxes, bitmaps and radio buttons) as well as drawn graphics, drag-and-drop and 256-color bitmaps. By representing applications using object-oriented structures, ObjectPro enables the inheritance, specialization and reuse of all elements of a screen—including how the screen looks, where the controls are placed, and how the screen and controls respond to user interaction. Completed screens can be integrated into libraries and reused—for example, a main window can be shared among multiple applications to provide a common look.

Developer Tools for Increased Productivity

ObjectPro supplies a wide array of tools to support application development:

Libraries—ObjectPro groups application components into libraries to facilitate sharing code among applications and team development on applications. There is no limit to the number of class libraries that can be created and shared; developers can even specialize the code in each library for an application without disturbing other applications that use the same library.

ObjectPro supplies seven different class libraries for common operations, including window and database operations, interaction with DDE and common system dialogs, advanced math and time functions, and system control functions.

Source control—ObjectPro allows organizations to utilize existing procedures for source control. By putting libraries under the control of systems like PVCS, multiple developers are able to work together, track changes, and reuse existing code. Since ObjectPro uses tools already in place, there is no need to learn new, proprietary methods for managing development.

Logic editor—ObjectPro eases the actual writing of code and makes the software easy to learn through tools that include an editor customized for creating methods, automatic syntax generators, navigation tools for locating relevant parts of the application, and on-line syntax checking.

Viewers—ObjectPro offers developers two ways to look at an application. The structural view shows all the components of an application (such as the libraries, classes and methods) and how they fit together. The logical view shows how they interact at runtime. Together, these viewers act as an application self-documenter that is always up to date and makes it easy to understand how the application works.

Debugger—An integrated source level debugger allows the developer to step through execution, set breakpoints, examine memory, and change values. The system also automatically writes trace and log information.

Other ObjectPro developer tools include search and replace facilities, on-line help, customizable editors and an application print facility.

Support for Rapid Application Development and High-Performance Delivery

ObjectPro supports the need for rapid application development and high-performance, cost-effective delivery by providing two modes of operation. During application development and testing, ObjectPro functions in an interpreted mode so programmers can build prototypes and initial versions quickly and verify that they meet the changing demands of their users. When the application is ready for delivery, ObjectPro translates the application into ANSI standard C code, compiles it and then links it. The resulting series of Dynamic Link Libraries (DLL's) can be distributed even to small client workstations. This combination of high-productivity development and high-performance delivery enables developers to successfully implement a wide range of applications in their client/server environment.

ObjectPro translates your finished application into C code and compiles it so your application logic executes up to 10-20 times faster

There is no charge for runtime licenses, easing potential budget constraints for delivering ObjectPro applications.

fast...
powerful...
productive

Trinzic Corporation
Corporate Headquarters
101 University Avenue
Palo Alto, CA 94301
415 328-9595

Trinzic Corporation
404 Wyman Street
Suite 320
Waltham, MA 02254
617 891-6500

Trinzic International Limited
Royalty House
10 King Street
Watford
Hertfordshire
WD1 8BP
+44-923-202-050

Specifications

- Microsoft Windows Version 3.1 required
- Development environment requires 4MB RAM; completed applications require minimum 2MB RAM
- 11 MB disk space required for complete installation
- 486-class processor recommended for development, 386-class or higher processor recommended for delivery
- ANSI compatible C compiler for application deployment

Database Support

- Sybase SQL Server and Oracle through native interfaces
- Informix, Ingres, DB2/2, SQLBase, Allbase, Access, dBase, FoxPro, Btrieve, Sybase SQL Server and Oracle through an ODBC interface. ODBC drivers for development environment included.*
- MVS databases (DB2, VSAM, IMS (DL/I), ADABAS, CA-IDMS) through InfoHub.

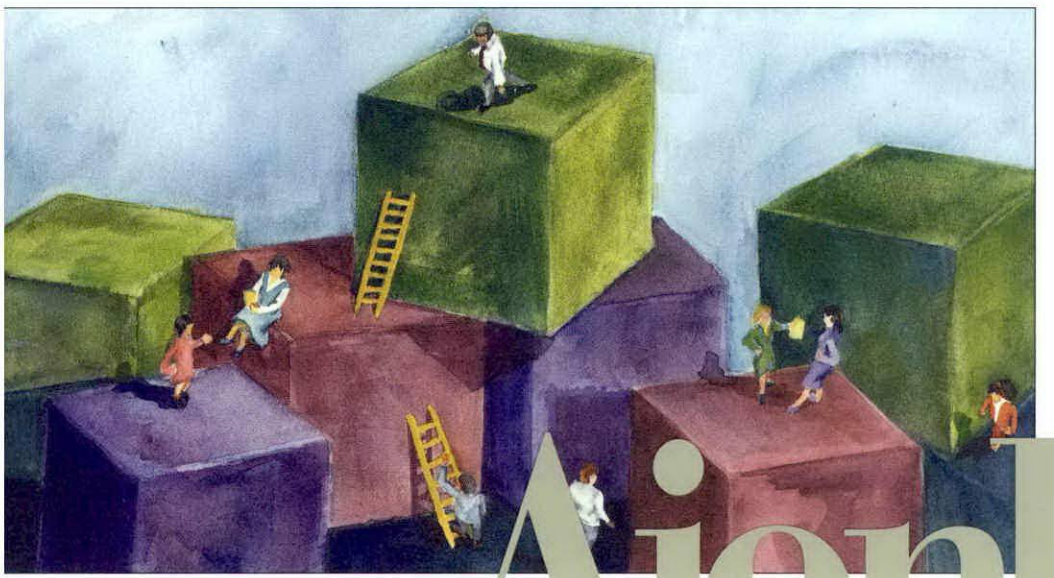
*Applications delivered using ODBC require the correct ODBC driver on each client.

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OP-DS-v.1-10K-4/94

Trinzic

Enhancing software quality and developer productivity with objects



AionDS

Aion® Development System

A Powerful Application Development Environment

for Automating Business Processes

* "Business Process Automation," from *Highlights and Q&A Sessions of the Fifth Annual ADM Conference,* September 30, 1992.

BPA

Your key to gaining strategic and competitive advantage today is to automate the complex processes that run your business.

To gain strategic and competitive advantage, many businesses today are focusing on such critical goals as delivering premier customer service, increasing quality in all aspects of products and services, and reducing time-to-market cycles. Successfully achieving these goals depends on the company's ability to enable managers and employees to make more efficient, effective decisions in their daily activities. The question is—how?

More and more organizations are turning to information technologies to empower their employees and improve their business operations. They are using advanced software development tools and technologies to automate their increasingly complex business policies and procedures—applications which have been difficult and expensive to develop using traditional tools. This function is known as Business Process Automation, or BPA.

BPA applications play an important role in the day-to-day running of a business. They must be dynamic, flexible and easily adapted to new and constantly changing conditions and regulations. It is no longer enough for systems to just *support* business; today, they must be an integral part of running it.

"Business Process Automation (BPA) is the automation of complex business functions, beyond traditional data manipulation and record-keeping activities, through the application of advanced technologies."

—Gartner Group*

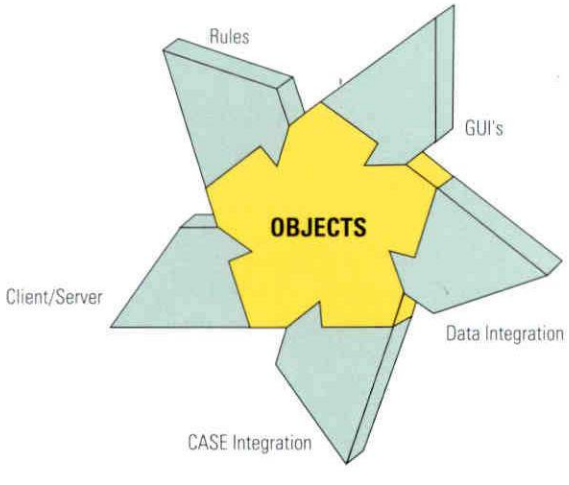
You can meet this challenge with the Aion® Development System (AionDS).

Critical Business Applications Require Highly Productive Solutions...

The critical business applications in your backlog today are difficult to write with traditional application tools. These BPA applications may require sophisticated business models and processing methods, multiple data sources and formats, cross-department cooperation in development and maintenance, and rapid, ongoing maintenance cycles. They may also need to be delivered in a graphical, client/server environment that users readily accept. As a result, the development and delivery methods for these applications are often more complex than those required for traditional software applications.

You simply may not be able to productively address these advanced requirements using existing techniques.

integrated objects



...and AionDS Integrated Objects Enable

Their Rapid Development and High-Quality Delivery

"Thanks to AionDS, we quickly developed a complex underwriting application, delivered it on both mainframes and PC's, and now maintain it with ease. We not only have a valuable application now that we could never have attempted with 3GL's or 4GL's—but AionDS increased our productivity in certain areas by a factor of 10-25 times over what it would have been using other tools."

—Aegon, Benelux

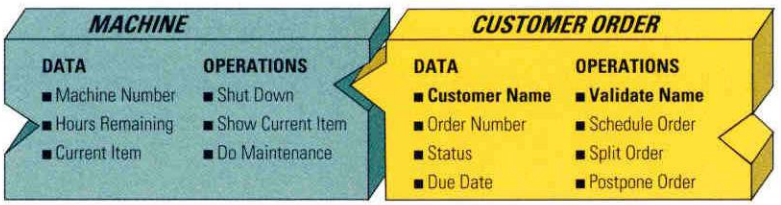
AionDS is an object-oriented, graphical, client/server application development environment that integrates all the enabling technologies required to build your BPA applications faster and deliver them with high quality and reliability in one or more production environments.

Each AionDS technology simplifies a specific application development function to make you more productive:

- *Objects* efficiently model and process even the most complex business data and relationships
- *Rules* represent and process business policies
- *Graphical user interface (GUI) class libraries* enable fast, integrated GUI development
- *Automatic Database Interfaces* minimize database coding
- *Integration with CASE tools* jumpstarts application development and guarantees consistency
- *Robust Application Programming Interface (API) protocols* blend new systems with legacy programs and data
- *Client/server and network support* offer distributed, cost-efficient delivery to end-users
- *Professional developer aids* ensure rapid application development and high-quality results

The unique AionDS object architecture tightly coordinates each development approach within a powerful object system, affording a technical synergy and flexibility simply not available with stand-alone object languages or other application development tools.

You can't help but be more productive when all the techniques you require for application development are coordinated within a powerful object system.



Each of the above objects contains its own data and operations to operate on that data. In this manufacturing model, customer orders are scheduled for production on machines.

Improve Business Modeling

and Eliminate Redundant Coding with Objects

Software applications that run a business must accurately model the business, but using 3GL's or older 4GL tools to model business processes can be time-consuming and inaccurate. Because you have to define each data element separately, much of your effort is redundant. Also, since the procedures to manage the data are scattered in subroutines and branches throughout the code, it's difficult to conceptualize and maintain your business model.

AionDS uses objects to facilitate business modeling and significantly enhance your productivity. Objects enable more accurate, modular and flexible design that promotes code reuse. You directly map business data to programming objects that each carry all the data and the operations to maintain themselves (for example, the procedures to validate a customer name can be stored with the customer name). In design, you can reuse a self-contained object anywhere you want to describe how it looks and acts in your business, and also define relationships between groups of similar objects to extend and share code. In development and testing, you can independently create, test and maintain object modules for rapid prototyping and early design verification.

accurate modeling

" Our procurement system requires complex, interrelated data models to represent hundreds of supplier relationships covering millions of dollars in purchases. AionDS objects give us the full power to represent this business. "

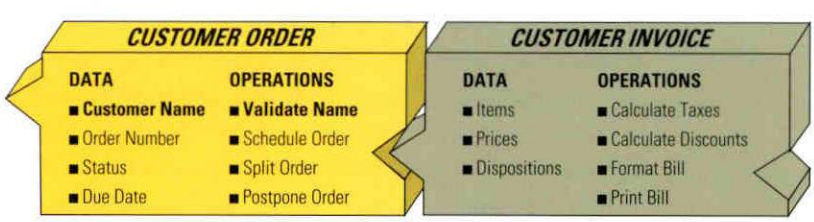
—A major telecommunications company

code reuse

AionDS enables you to rapidly build a library of tested object definitions and relationships and generate common, reusable subsystems. You can then quickly program new applications simply by reusing or adapting these existing subsystems—not by rewriting or writing new code. This code reuse eliminates a major portion of new application development time and improves program quality.

The modular, structured approach of AionDS objects offers the scalability and maintainability required for BPA applications. That's why objects are the coordinating technology within the AionDS environment.

Once tested, the MACHINE and CUSTOMER ORDER objects can be reused without modification for fast, quality code in other applications such as this one, which generates customer invoices based on orders processed.



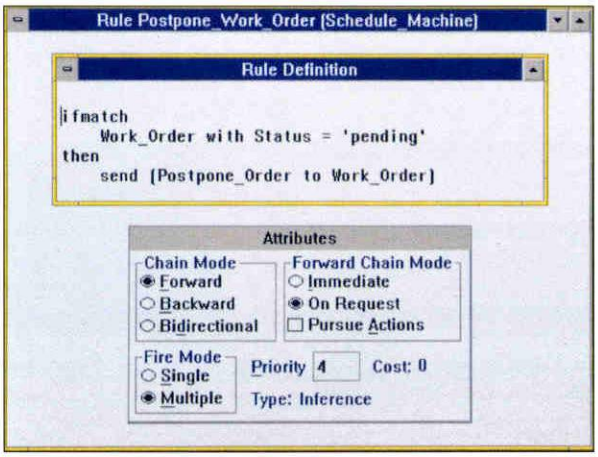
Objects break the productivity barriers in all areas of development and maintenance

There's No Minimum—Or Maximum—

Number of Rules To Succeed

A county government's application to support its Health and Human Services administration required over 6000 rules, derived directly from state and federal public assistance policy.

In contrast, a major proprietary credit card organization developed a delinquent collection application that uses just 3 main rules. Both production applications are saving their organizations millions of dollars and significantly improving quality of service and productivity of staff.



Rules separate business policy (in Rule Definition window) from the control instructions (in Attributes window).

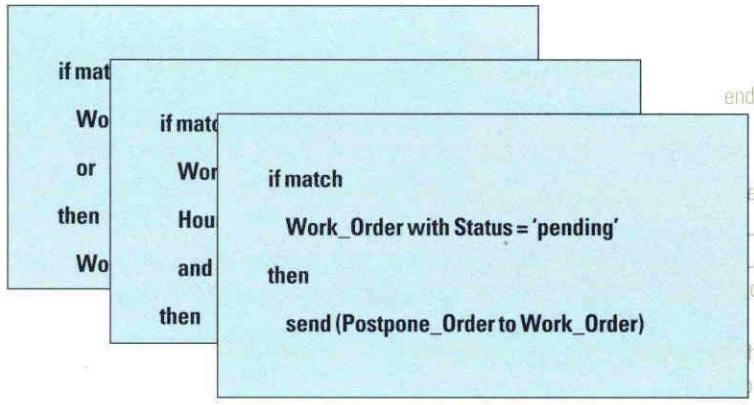
Dramatically Reduce Control Code and Maintenance by Expressing Logic with Rules

Expressing and processing business logic is especially important when writing BPA applications. With 3GL's or older 4GL's, you translate the business policies into a procedural programming language and write large amounts of control code to test and apply the policies—a tedious effort that significantly decreases your development and maintenance productivity. AionDS dramatically simplifies this effort by expressing the problem-solving logic in the language of business—rules—and then processing the rules automatically.

Rules enable you to express logic more productively than with other application development technologies. With rules, you express the business policies in simple "if-then" modular statements. There's no other code to add.

rule-based processing

rules vs. code



Because you write modular rules (above) with AionDS, you never write—or later maintain—the type of control code you see to the right.

```
//build list of pending customer orders
Number_of_customer_orders = sizeof(Customer_order_list)
Customer_order_index = 0

//for each customer order
for i = 1 to Number_of_customer_orders
    if Customer_order_list(i).status = 'pending'
    then
        Customer_order_index = Customer_order_index + 1
        Pending_order_list(Customer_order_index) =
            Customer_order_list(i)
    end


    each pending order to a machine
    _of_pending_orders = sizeof(Pending_order_list)
    _of_machines= sizeof(Machine_list)
    order_scheduled = false

    h pending order
    Number_of_pending_orders

    //for each machine
    for k = 1 to Number_of_machines
        //if time available and same stock
        if Machine_list(k).hours_available >=
            Pending_order_list(j).manufacturing_time
            and Machine_list (k).current_stock =
                Pending_order_list(j).stock
        then
            Schedule (Pending_order_list(j), Machine_list(k
            Current_order_scheduled = true
            break
        end
    end

    if Current_order_scheduled <> true
    then
    //since nothing of same stock matched,
    //check whether any machine has time available,
    //regardless of current stock

        //for each machine
        for m = 1 to Number_of_machines
            //if time available
            if Machine_list(m).hours_available >=
                Pending_order_list(j).manufacturing_time
            then
                Schedule (Pending_order_list(j),
                    Machine_list(m))
                Current_order_scheduled = true
                break
            end
        end
    end

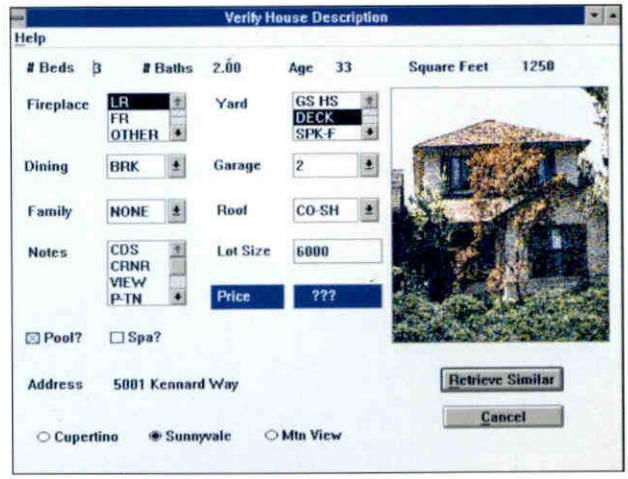
    if Current_order_scheduled <> true
    //since no machine had time, postpone the order
    then
        Postpone_order(Pending_order_list(j))
    end
end
```

Processing rules is also easier with AionDS because you don't have to program when and how the rule logic is applied. You simply specify the policy and AionDS automatically determines if, when and in what order to execute the rules. Because you don't manually code and maintain time-consuming nested loops, counters, branches and subroutines to control when and how rules execute, AionDS eliminates up to 80 percent of your application's control code—allowing you to concentrate on the far more important task—solving the business problem.

AionDS rules automatically map onto your business objects, leveraging the objects' methods and data. As objects are added, modified or deleted, the rule processor re-executes only the appropriate rules—without any manual programming on your part. As a result, both development *and maintenance* productivity are dramatically improved and you can solve far tougher problems than previously possible.

"To deliver our cross-platform mortgage application to 2000 offices, we need a GUI that is more than just a pretty face; we require serious logic processing tied right into the GUI. In AionDS, the GUI capability and the knowledge structure are superbly integrated."

—Banco Bilbao Vizcaya, Spain



Pressing the Retrieve Similar pushbutton in this real estate application invokes a method that retrieves house data from a server and then executes a set of rules.

GUI's

Use GUI Objects to Support Your Event-Driven Applications

To effectively automate business processes, your applications must deliver more than traditional query/update transactions; they must support event-driven processing with control flow determined dynamically by the user. To do this, the user interface must be tightly bound to the application logic and data.

With AionDS GUI objects, you can productively deliver GUI's to support the intelligent event-driven interface requirements of even your most complex applications —without manually writing low-level C or Windows calls or purchasing a separate GUI generator and manually integrating the GUI code with your program data and logic. AionDS saves time and expense, improves development productivity, and increases program quality by integrating a "point-and-click" GUI generator right into its object-rule development environment.

Simply use the graphical layout editor to visually design and evaluate your GUI screen and logic in minutes instead of days—with no programming. As you design, AionDS transparently creates the appropriate GUI objects for you in the underlying GUI class libraries. Since the GUI components are objects, they interact fully with your business model to invoke methods, execute business rules, or access server and host applications and data.

Your entire GUI application is portable to all AionDS-supported GUI platforms; you can develop in one GUI environment and deliver in another. Even if you are not delivering GUI applications, you can enjoy the productivity of a graphical development environment and then deliver your application on a host or other character-based platform—without rewriting a single line of code.

Eliminate Your Manual Database Coding;

AionDS Does It For You

In mainline BPA business applications, data is often scattered across departments, databases, machines and platforms. Because AionDS treats external data as objects, you can generate, access and update most forms of commercial data, both locally and on a server, *without manual database coding*. AionDS automatically associates objects with existing data tables and more—so you don't have to program.

Defining data to AionDS is easy: just use the pulldowns and menus to specify data locations on the client or server. AionDS then *automates data definition* by importing database data definitions to create class objects, and vice versa; *generates data retrieval code* so you don't have to write it manually; and *updates data automatically*, optionally performing data integrity checks so you don't have to program them. Of course, AionDS routes data security, synchronization and backout control to the relevant database or transaction manager, preserving the integrity of your applications and data.

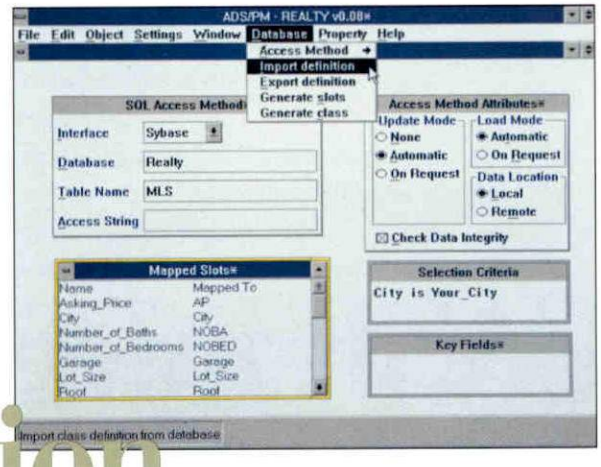
Combining these techniques, your AionDS application could, for example, automatically retrieve DB2 and Sybase data, intelligently join the data, apply rule logic to the joined data, and update the respective databases—all without your writing a single line of database code. And, since the automatic database code is not handwritten or embedded, it's easy to port your application to different platforms and databases. AionDS supports numerous commercial databases throughout the PC, workstation and IBM mainframe environments.

AionDS provides automatic interfaces to a full range of databases, including:

dBASE	ORACLE	SQL Server (MS and SYBASE)
DB2/2	IBM Database Manager	
DB2	SQL/DS	Teradata
QSAM*	VSAM*	DL/I*

*data definition only

You can access other databases with the Programmable Database Interface or with exits to your standard drivers.



Just declare data location and operations; the AionDS Automatic Data Interface generates the appropriate objects and calls for you.

data integration

Apply Your CASE Data in Applications—Automatically

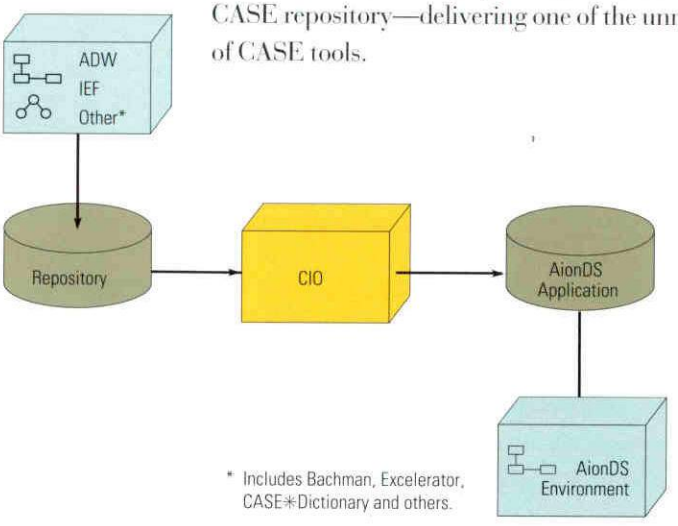
BPA applications often suggest new types of inter-departmental cooperation, such as between corporate systems analysts who use CASE tools to model enterprise systems, and application programmers who must accurately and consistently incorporate the enterprise model. Unfortunately, current CASE tools and methods typically do not help automate the enterprise model in a way that can be directly used by application programmers.

If you currently use CASE tools for business analysis and design but lose too much time and energy trying to code logic to test the design and add business rules and policies, Trinzic™ Corporation has the solution. The *CASE Integration Option (CIO)* enhances productivity across departments and enables you to leverage your CASE investment by automatically incorporating the key data elements from your CASE repository into your BPA applications.

Instead of manually redefining in AionDS the data and relationships already defined and stored in your CASE repository, use CIO to consistently generate accurate, executable AionDS objects and relationships from your CASE model, automatically and quickly. The CIO output supports CASE concepts such as cardinality and relationships, and common logic operations such as deleting and creating instances and relationships so you don't manually program them. For further productivity, extend the CIO output within AionDS by rapidly adding business rules, policies, commercial screens and data to build a robust business process application in a short period of time.

As your CASE definitions evolve, CIO helps you automatically update your AionDS applications accordingly. Together, AionDS and CIO ensure the ongoing consistency of data definitions and relationships across applications by directly updating information from your CASE repository—delivering one of the unmet promises of CASE tools.

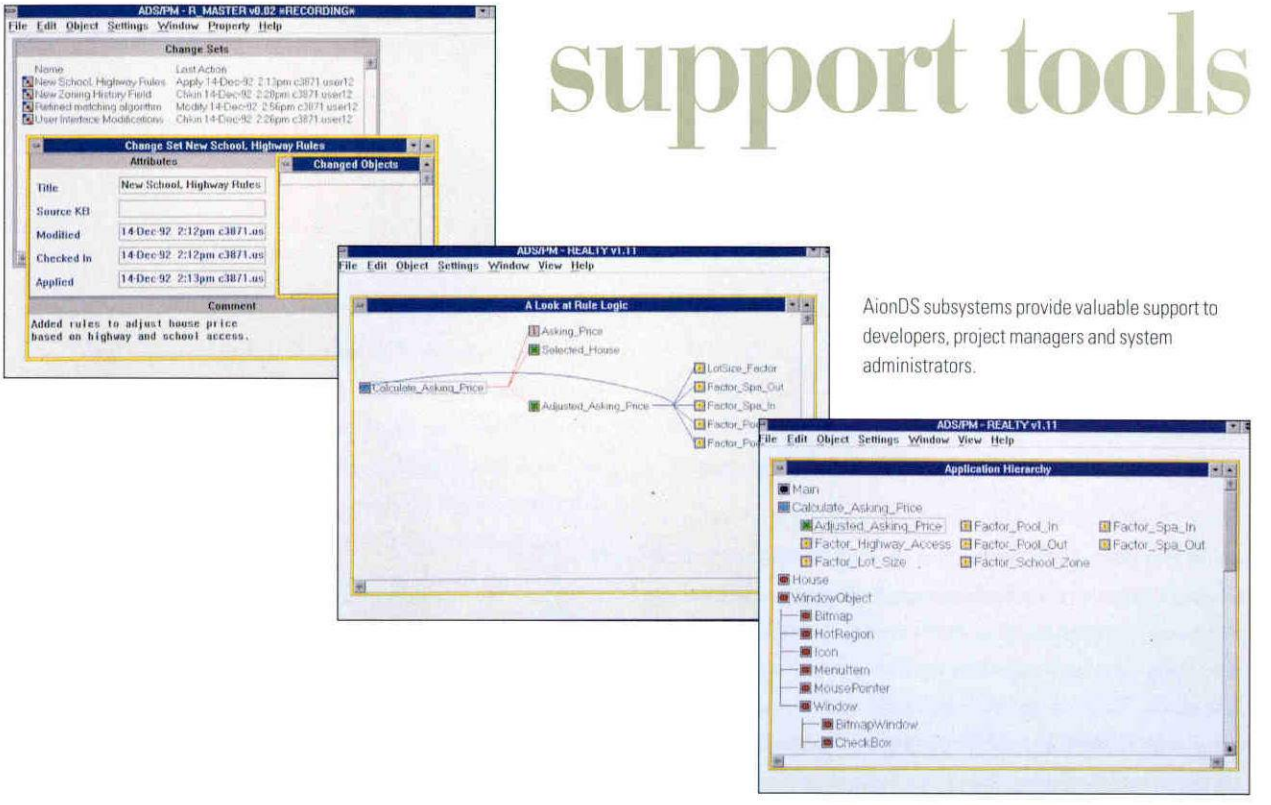
From your existing CASE enterprise model, CIO directly generates executable objects that you can quickly test and extend in AionDS.



* Includes Bachman, Excelerator, CASE*Dictionary and others.

CASE integration

support tools



AionDS subsystems provide valuable support to developers, project managers and system administrators.

I.S.-Friendly Tools and Courses Support Practical Software Management

" The AionDS methodology course really helped us understand how to correctly apply objects and rules as we design. The prototype we developed during class got us started quickly on our production application, and still functions as its core. "

—Limited Credit Services

As you use AionDS object, rule and GUI programming techniques, you still require traditional software engineering support to deliver quality and consistency in applications that will help run your business. The AionDS environment incorporates a variety of I.S.-friendly tools and courses to ensure technical synergy between new and traditional techniques.

To help the individual developer productively design and maintain large-scale code, AionDS offers *interpreted development* for a fast edit/test/edit cycle; *on-line cross-references* and *graphical development aids* showing object and rule relationships and dependencies; a *source-level debugger* for detailed help at runtime; a *source optimizer* before compiling; and a *methodology class* for designing integrated objects and rules.

For project managers and systems administrators who need to manage code growth and maintain quality, AionDS offers *change management facilities* to audit and manage individual change sets; an *application testing facility* to help automate regression testing; and *real-time monitoring facilities* to monitor system resources and bottlenecks.

Extend Your Existing Programs

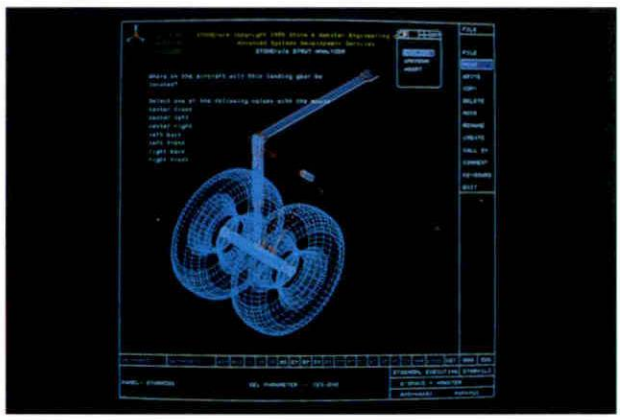
and Data on Your Preferred Platforms

AionDS integration facilities ensure that the BPA solutions you develop with AionDS interoperate within your commercial delivery environments, leveraging your investment in legacy programs, platforms and data.

Program Integration: The AionDS *Application Programming Interface (API)* helps you extend the life and value of existing programs by adding intelligent back-end decision-making components or by consolidating multiple existing programs within a single usable interface. Embed AionDS in COBOL, C, or any tool or language with standard OS linkage conventions to transparently add intelligence to your current programs without rewriting code—or embed COBOL, 4GL and other programs within an AionDS front end to provide a single login and look-and-feel. The API is portable and requires no data conversion or preprocessing, so you can develop and deliver for multiple platforms and languages without rewriting API code.

Reuse your 3GL data definitions productively by generating object definitions from your Microfocus or other COBOL or PL/I applications, accurately and without hand coding. If you modify your 3GL source, simply reimport the definitions so the 3GL and AionDS portions of the application are always in synch.

BPA applications require high performance on all platforms to enable large-scale production usage. Deliver optimized, compiled, re-entrant and preloaded applications with the AionDS *High Performance Option (HPO)*. The output code reduces requirements for both memory and disk storage, and can be dynamically or statically linked to your legacy programs.



Stone & Webster developed and resells this STONE*rule*® product to support concurrent engineering. As engineers design within the full CADAM® or CATIA® computer-aided engineering environments, embedded AionDS rules operate directly on the CAD/CAM model to make the CAD system more intelligent and the user more productive.

AionDS API's are so robust that customers have developed and then resold products that embed AionDS applications

" Our OS/2 data-driven financial analysis application uses AionDS to communicate risk information from LAN's at our branches to PC's in our home office. By enabling us to manage branch accounts from our home office while keeping branch files local, AionDS client/server capabilities have significantly increased the efficiency and cost-effectiveness of our operations. "

—A major insurance company

connectivity

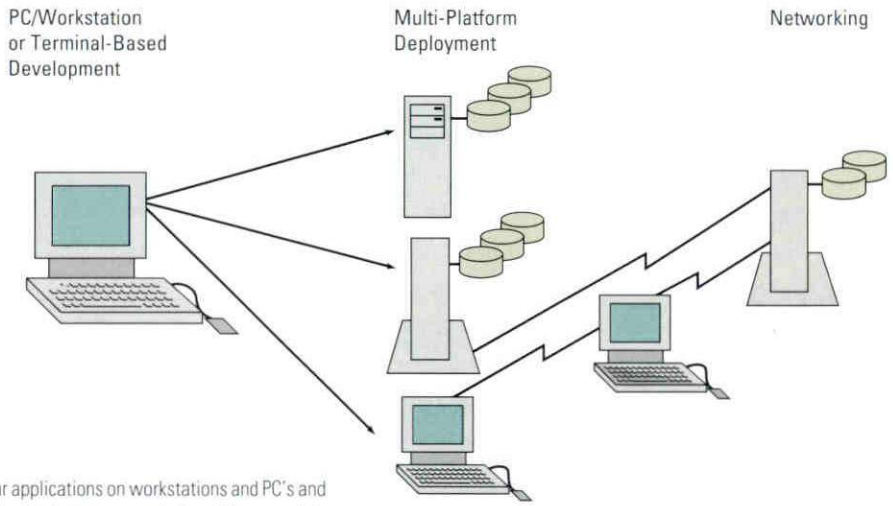
Client/Server and Cooperative Computing: The AionDS *client/server architecture* enables you to break a single application into different components and distribute each component to the platform that's best suited to the job. By using desktop processors for application logic and user interface services and automatically generating client access to server DBMS's, you bring data closer to your users and deploy applications cost-effectively.

Applications built with AionDS can run within any single platform or in client/server mode on a LAN. Using the AionDS *Cooperative Processing Option (CPO)*, AionDS applications can also execute cooperatively across platforms, with application logic and data on both the PC and the host. You can transparently deliver any data or logic on the LAN or mainframe to workstation users, and deliver any data and logic in your mainframe network to mainframe users.

AionDS Client/Server Support Includes:

Client	Server
MS Windows	ORACLE, SQL Server (MS & SYBASE)
OS/2 PM	ORACLE, SQL Server (MS & SYBASE)
	DB2/2, IBM Database Manager
SunOS	ORACLE, SYBASE SQL Server

portability



AionDS makes it easy to develop your applications on workstations and PC's and deploy them across a wide range of target platforms—including PC's, workstations and IBM mainframes. Your applications leverage the native user interface for each environment, and access data and applications that reside on other platforms.

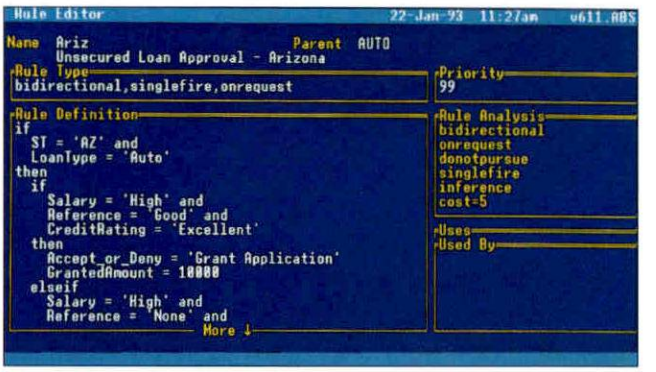
" Our production IMS batch/online AionDS application accesses DL/I, VSAM and QSAM data from various distribution applications, enabling us to integrate information from multiple applications into one. "

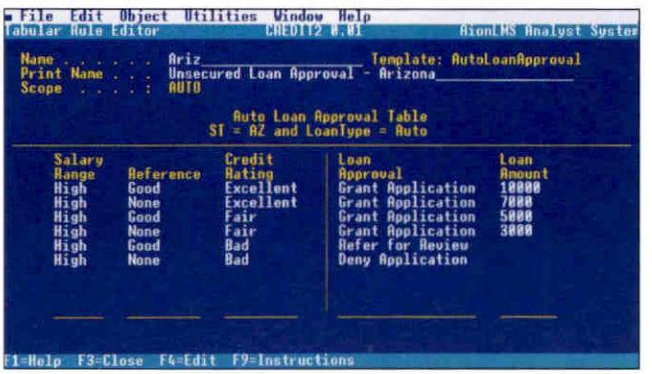
—Federal Mogul Corporation

Data Integration: For data integration in production environments, you select the data access method that matches your I.S. culture. You can use the automatic database interfaces or write data access and update code from within AionDS for explicit developer control. Or, if internal standards require it, you can call out to your standard data drivers.

AionDS Is Interoperable and Portable, Too

Achieve maximum productivity by developing with the fastest, least expensive and most friendly hardware, data, user interface and network and then transporting the results to one or more delivery platforms including Windows, OS/2, AIX, SunOS, MVS and VM. With AionDS, you can develop on any supported platform and deliver on any other supported platform—without changing the application.





Above: A sample business rule as seen by an AionDS developer. Multiple flags, attributes and options give the developer fine-tuned control of rule processing.

Left: The same rule as viewed by a non-programming professional. LMS masks the processing details and presents only the business logic. Analysts use this simplified LMS interface to introduce and test their own changes.

Control End-User Maintenance to Improve Quality and Turnaround

BPA applications require frequent maintenance to reflect evolving corporate policies, products and services. Already, nearly 80 percent of an I.S. budget—and a great percentage of time—is dedicated to system maintenance. As applications require faster, more accurate, and more frequent maintenance, new approaches must be adopted.

The AionDS *Logic Management System (LMS)* improves maintenance productivity and enhances end-user satisfaction by transferring the costly and time-consuming effort of maintaining applications to your end-users—while allowing you to retain full control over production integrity.

LMS enables you to present business rules to analysts and end-users in a variety of easily understandable formats. You can control what portions of rules users view or modify, effectively hiding the technical aspects of objects, GUI's, and CASE and enabling them to view or modify only certain business rules. Then, as business conditions change, analysts and users directly modify and test business rules in a simplified environment without learning the professional AionDS environment. This active user role reduces maintenance turnaround and improves quality. At the same time, however, I.S. fully controls production integrity; before the analysts' changes are applied to the production environment, you can regression test and validate all changes using the change management and regression testing facilities available in AionDS. The result—faster, higher-quality maintenance as end-users directly contribute to the success of the application.

maintenance

We'd Like to Show You

How AionDS Can Support *Your* Organization

You can evaluate the benefits of AionDS for yourself *at your own site* simply by calling Trinzic Corporation* and scheduling a presentation. We'll help you assess the productivity gains and investment payback you can expect, and give you a first-hand look at how other organizations in your industry use AionDS to achieve a competitive advantage through BPA.

Trinzic also offers free BPA seminars, personal product demonstrations, an AionDS Starter Kit, and AionDS consulting services and training classes. Just call and ask us for more information, or fax your request to 617-893-5681.

*In the U.S. and Canada, call 617-891-6500. In Europe, call +44-462-442466.

Trinzic Is Dedicated to Supporting Your BPA Efforts

Trinzic Corporation offers the leading BPA tools and services to help organizations automate their business processes. Formed by the merger of industry leaders AICorp and Aion Corporation, Trinzic is a publicly held company with headquarters in Palo Alto, California and worldwide sales and support locations throughout North America, Europe, the Pacific Rim and South America. Our customer base includes over 1,200 companies with applications in every major industry.

Trinzic offers comprehensive customer support services, product documentation and reference materials. Our dedicated worldwide service organization provides a wide variety of consulting services and comprehensive training courses, on- or off-site. For resellers, a value-added partnership program is also available .

Trinzic is an IBM Business Partner and a member of the Sybase Synergy Program, ORACLE ISV, Sun Catalyst, and the Digital Equipment Corporation Cooperative Marketing Program (CMP).

training and consulting

In addition to AionDS, Trinzic's comprehensive family of BPA application development tools includes KBMS®, a BPA tool designed for developers who prefer the ease and speed of a higher-level language, and Intellect™, a natural language query system.

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Trinzic Corporation
Corporate Headquarters
101 University Avenue
Palo Alto, CA 94301
415 328-9595

Trinzic Corporation
P.O. Box 9156
Waltham, MA 02254
617 891-6500

Trinzic International Limited
3/4 Portmill Lane
Hitchin
Hertfordshire
SG5 1DJ
United Kingdom
+44 462 442 466

Object/FX Corporation
2515 Wabash Avenue
St. Paul, MN 55114
612. 644. 6064 Fax: 612. 644. 0366
Internet: ofx@maroon.tc.umn.edu

OBJECT|FX

October 7, 1994

Ms. Adele Goldberg
ParcPlace Systems
999 E. Arques Avenue
Sunnyvale, CA 94086

Dear Adele:

We have recently completed the production of new data sheets for both Visual Companion and SpatialWorks. I thought you would be interested in seeing them. If you need additional copies or further information please feel free to give me a call. Thank you for your continued support.

Sincerely,

Bruce Gilmore
President

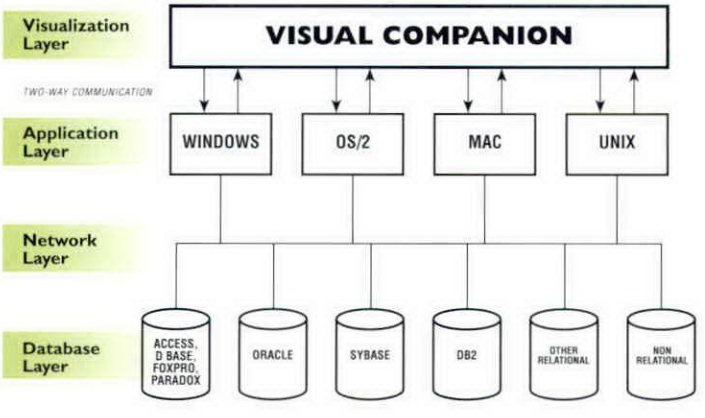
Enclosures

OBJECT|FX

Visual Companion™



Visual Companion makes it easy to access information by simply drawing search areas on the map.



Visual Companion offers a totally visual, two-way interface with any application and can take full advantage of any database connectivity provided by its host.

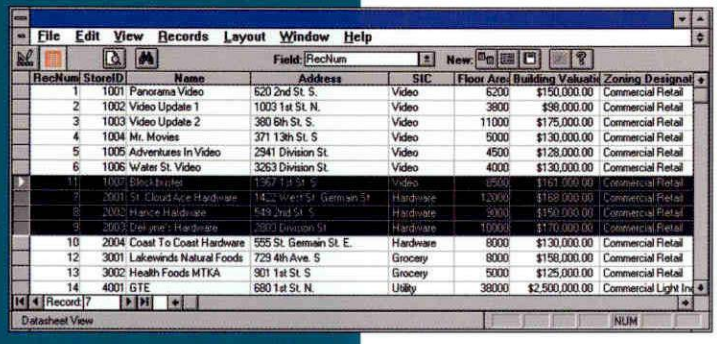
Add Geographic Visualization To Your Software With Visual Companion!

Provide added value to your users
Gain competitive advantage

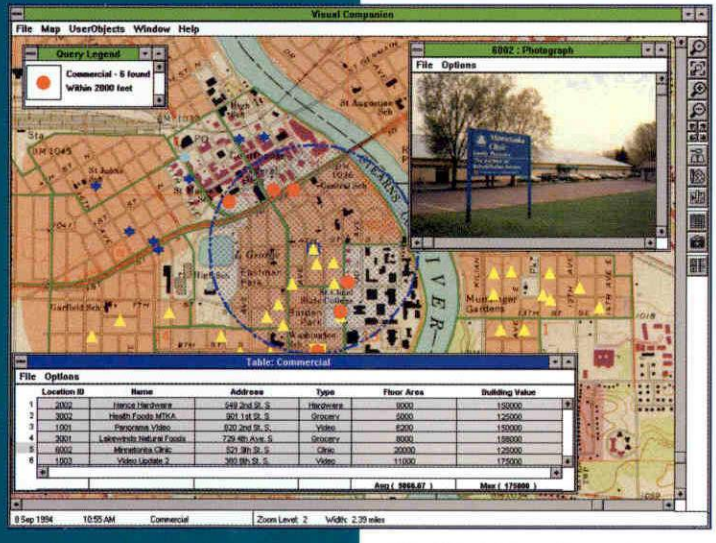
- *Adds interactive map, image, and table views of your data*
- *Supports sophisticated spatial analysis, including proximity searches, color-coded mapping, searches by attribute, and more*
- *Works with any information management application*
- *Instant upgrade to your software — minimal programming needed*
- *Supports two-way interaction between the map and your application*
- *Easy, yet powerful graphical user interface*
- *Multi-platform capability, including PCs, Macintoshes, UNIX workstations, and client/server environments*

Visual Companion provides you with a better way to view and analyze seemingly unrelated pieces of data. Its most important feature is its ability is to be embedded in, and controlled by your software.

This is one way to interact with information.



Here's a better way!



Visual Companion enhances the understanding of information by presenting data as interactive map objects. Maps, tables, and pictures all work together with text-based applications to provide users with multi-dimensional views of information. These new perspectives lead to easier analysis, quicker problem solving, and more effective communication of information.

Introduction

Your organization creates software that manages information about objects or events in the physical world. It might be customer tracking, utility billing, vehicle dispatching, prospect analysis, or any one of hundreds of business or government applications that include geographic or locational references.

At one time or another, your users have probably talked about viewing data on maps. What they're after is a better way to view and analyze seemingly unrelated pieces of data. In other words, they want answers to questions such as:

- Where do my customers live, what's going on around them, what's the closest highway?
- Is this store in the right zone, surrounded by the right potential customers, away from competitors?
- What happens if we realign our sales areas?
- Can I print this map and use it in my management presentation?

Your users may have even asked you to add such capabilities. Or they may have tried to link your software to a Geographic Information System (GIS) or a Desktop Mapping system, or asked you to do it for them.

However, linking your software to any of the current GIS products involves a huge programming effort in a non-standard macro language. And typically, any code you write for one application won't be usable for any others. Besides, linking to a GIS means your users will have to leave your application in order to view their data in the GIS.

We believe there's a better way — embedding the GIS within your application!

Now There's a Better Way

Embedding geographic visualization and analysis right within your application offers benefits such as:

- GIS functionality that's immediately available to all of your users, not just specialists.
- No requirements for specialized GIS training.
- Easy access to data by simply touching objects on the map.
- Spatially enhanced analysis — such as finding all customers over 40, within 5 miles of my store.

Component Software

Visual Companion is a new and better type of software — an object-oriented component — that works cooperatively within your software. It stores and presents information in the form of maps, tables, and images. In addition, it offers sophisticated capabilities for spatial analysis such as proximity searches, color-coded thematic maps, and more.

And that's not all. Visual Companion's most important feature is its ability to be embedded in, and controlled by your software!

Each time users view information through your application, the Companion can automatically show the locations on a windowed map. Each time information is found as the result of a query, the Companion can highlight all of the locations.

Unlike all other Desktop Mapping or GIS products, the Companion is built with a state-of-the-art design that's 100% object-oriented, and it presents you with a more accurate, intuitive presentation of your data. That means your users will interact with the easiest, most powerful interface possible.

Simple Yet Powerful

Simple enough to master in about an hour, Companion allows your users to query by touching, to search around, within, or along features on the map, to create complex queries combining spatial proximity and attribute values, to print their own map and tabular displays, and more. And the best part is, when they're through with the map, they're still inside your application.

Who Is It For?

The Companion is designed to work with products based on all of the commercial 4GLs, as well as languages like COBOL, BASIC, C, or PICK. The minimal changes to your software need only be done once and can then be offered as enhancements to all of your existing users. Visual Companion operates in client/server environments on PCs, Macintoshes, and UNIX workstations.

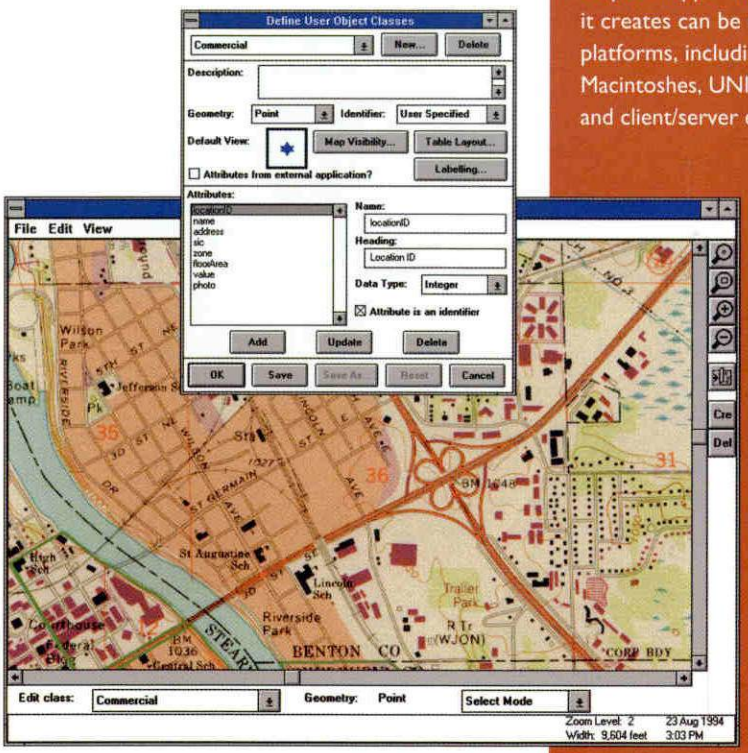
The programming required to integrate the Companion is minimal, in some cases, less than a week!

We Can Help You Now!

The Companion is available now and can be added to your current applications with minimal cost and effort. Object/FX Corporation offers consulting services to answer your questions and help you provide the solutions your users want. We also offer complete solutions for the acquisition, construction, and maintenance of geographic databases, or you can build them yourself with Object Mapper.

If you would like more details about Visual Companion, please contact us at

612. 644. 6064 extension 17 or
Internet: ofx@maroon.tc.umn.edu.



With Object Mapper, text-based data can quickly be turned into "visual objects", able to display themselves in the form of interactive maps, tables, and pictures.

Create And Maintain Geographic Databases With Object Mapper

The Perfect Tool for Building and Managing Geographic Databases for Visual Companion™ Applications

- Create and edit multiple types of map objects
- Use geocoding to automatically turn lists of addresses into map locations
- Associate map objects with existing information applications
- Customize map object behaviors, including symbology, visibility rules, highlighting/labeling defaults, and more
- Assemble continuous basemaps from scanned (raster) images or line (vector) maps
- Import pictures tied to map objects
- Easy, yet powerful graphical user interface
- Written completely in Smalltalk
- Object Mapper and the databases it creates can be used on multiple platforms, including PCs, Macintoshes, UNIX workstations, and client/server environments

Object/FX Corporation
2515 Wabash Avenue
St. Paul MN 55114
612. 644. 6064 Fax 612. 644. 0366
Internet: ofx@maroon.tc.umn.edu



OBJECT|FX

Object/FX develops, markets and supports object-oriented Geographic Information System software products and reusable software components.

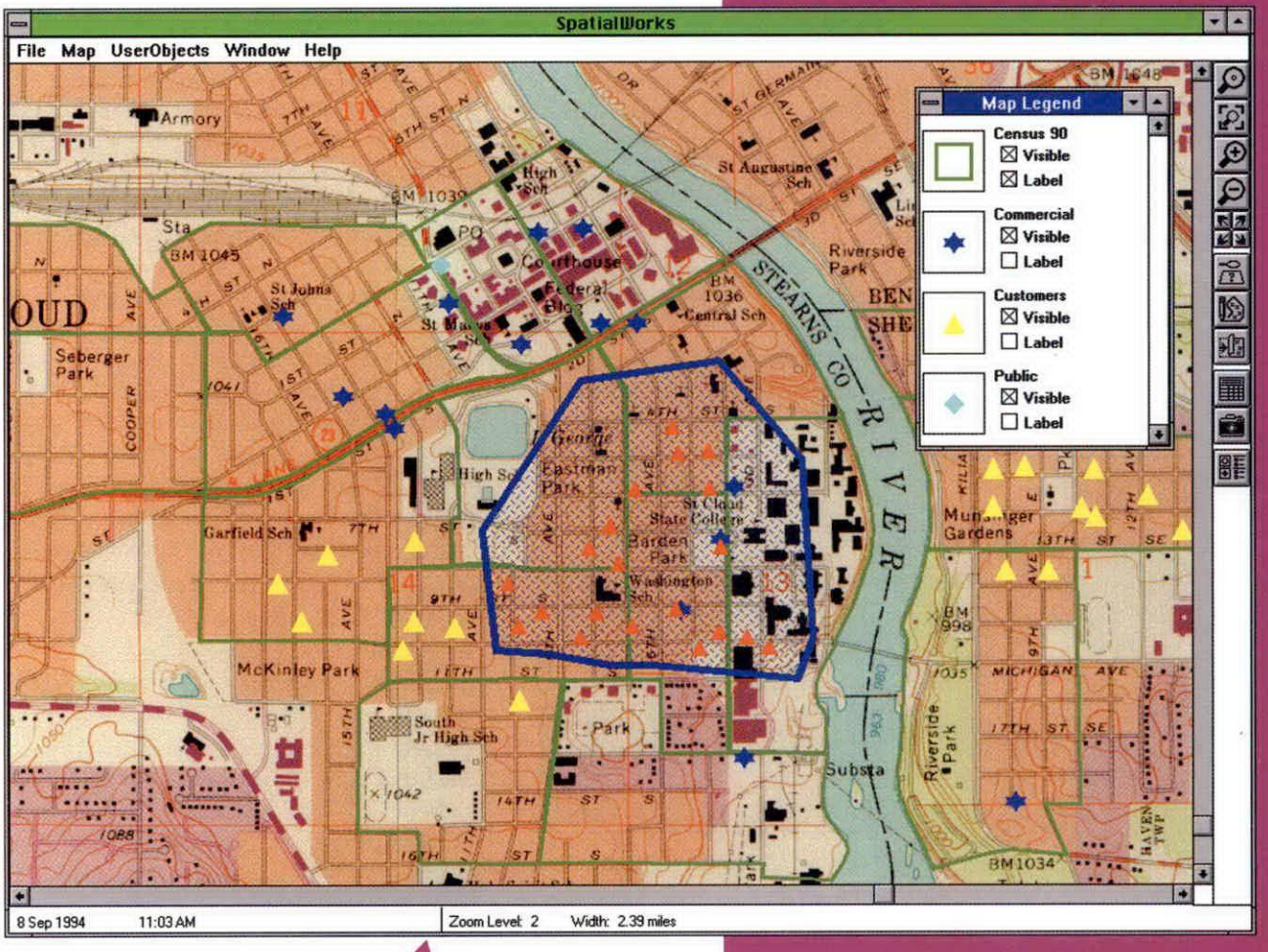
Technical Specifications

PLATFORM	HARDWARE	OPERATING SYSTEM	WINDOW SYSTEM REQUIREMENTS	MINIMUM MEMORY
MS-Windows	Intel 386, 486, Pentium	MS-DOS 5.0, 6.0	MS-Windows 3.1	8MB
Windows NT	Intel 386, 486, Pentium	Windows NT	Built-in	16MB
OS/2	Intel 386, 486, Pentium	OS/2 2.1	Built-in	16MB
Macintosh	68030, 68040	System 7.0.1	Built-in	12MB
SunOS 4	Sun SPARC	SunOS 4.1.3	OpenWindows 3.0	16MB
Solaris 2	Sun SPARC	SunOS 5.3	OpenWindows 3.1, 3.2	12MB
IBM RS/6000	IBM RS/6000	AIX 3.2	AIX Motif	16MB
HP	HP PA-RISC	HP-UX 9.0	HP-UX Motif	16MB
Sequent	Sequent	Dynix 2.1.3	Not applicable	16MB

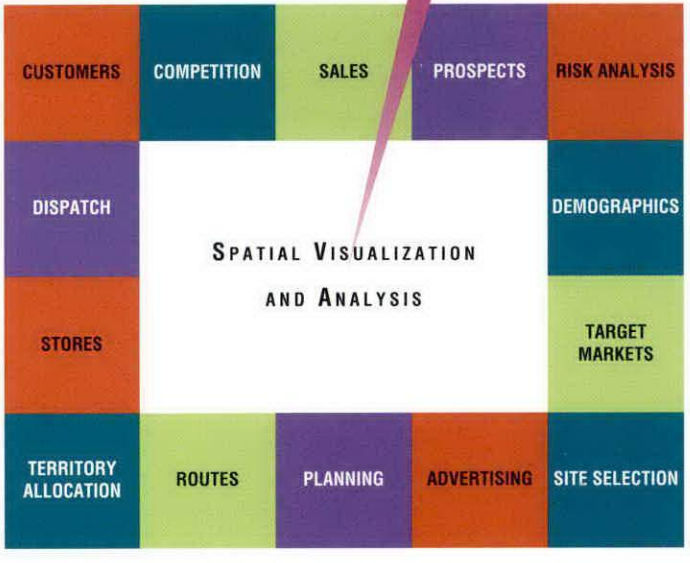
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OBJECT|FX

SpatialWorks™



SpatialWorks makes it easy to access information by simply drawing search areas on the map.



Integrate complex data applications with simple illuminating visualization.

Reusable Object-Oriented Components for Smalltalk Developers! Easy Implementation of Advanced Data Visualization and Analysis!

- *Flexible Smalltalk components which you can adapt to your development requirements*
- *Creation and management of general or highly detailed map contexts, including interactive objects, scanned backgrounds, and imported data*
- *Interactive map, image and tabular views of data*
- *Sophisticated spatial analysis capabilities such as proximity searches, color-coded mapping, searches by attribute values, address location, and more*
- *ODBMS independent storage of persistent objects*
- *Available for all major platforms (i.e. PCs, Macintoshes, and UNIX workstations) and client/server environments*

Add Geographic Visualization To Your Software With Ready To Use Components

Visual Companion: A Complete Visualization and Analysis Component

- Works with any information management application
- Adds interactive map, image, and table views of data
- Supports sophisticated spatial analysis, including proximity searches, thematic mapping, searches by attribute, and more
- Offered as a large Business Object
- Higher quality and reliability through reuse of well tested components
- Drastically reduce coding requirements
- Create highly visual applications in a fraction of the time
- Easy, yet powerful object-oriented interfaces — minimal training required
- Multi-platform capability, including PCs, UNIX workstations, and client/server environments

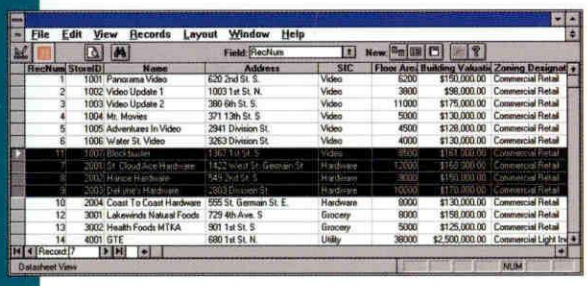
SpatialWorks is an extensive set of reusable, adaptable, object-oriented components that can be used in your development project to add state-of-the-art capabilities for managing, analyzing, and viewing information in geographic and other spatial contexts.

Add The Power Of Visualization To Your Software

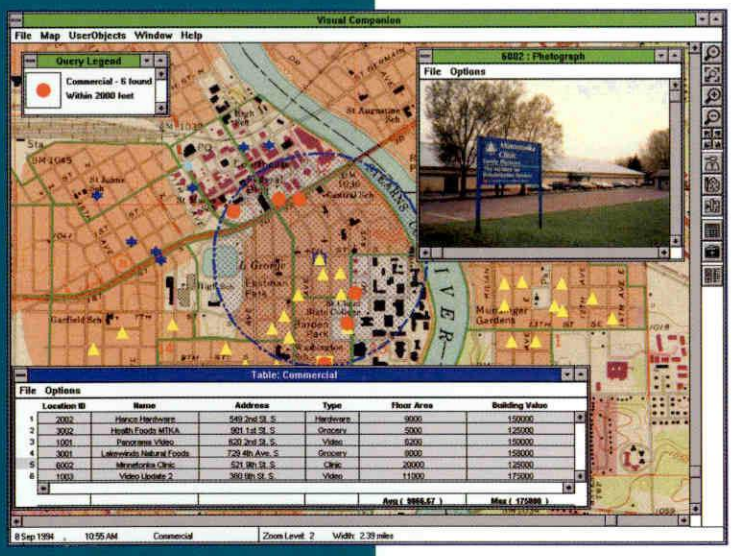
You probably realize that today's managers and professionals don't simply want more data — they want more effective ways to understand and manage it all. Since over 80% of the data that businesses and governments use has geographic references, it is likely that users would benefit from a technology which provides powerful tools for the assembly, analysis, and display of spatial information. Object/FX Corporation offers you this technology.

The value of being able to integrate and visualize highly complex data within new contexts is something that application users will understand and appreciate immediately. Visual representations of data give people the power and flexibility needed to interpret data more easily and gain new insights which would otherwise be obscured. Your software will have all this — and more — with SpatialWorks.

This is one way to interact with information.



Here's a better way!



Make use of reusable Smalltalk components to add multidimensional views of information to your applications. Increase the satisfaction and productivity of your end users through highly visual and intuitive interfaces.

What Exactly Is SpatialWorks?

SpatialWorks is an extensive set of reusable, adaptable, object-oriented components that can be used in development projects to add state-of-the-art functions for managing, analyzing, and viewing information in geographic and other spatial contexts. Written exclusively in Smalltalk — the highly acclaimed object-oriented programming language — SpatialWorks is simply the easiest way to quickly implement reliable, comprehensive capabilities like map viewing, interactive spatial analysis, image viewing, and much more. SpatialWorks components can be used to build applications for any of the major operating systems.

Reusable Components

Specifically, SpatialWorks components include:

- ***Visual Companion*** – Offers a complete environment for geographic visualization and analysis. Its easy-to-use interface allows end users to view and analyze data at national, regional, or street level detail. Its simple Smalltalk interface allows developers to quickly incorporate comprehensive spatial functionality within new or existing applications.

- ***Object Mapper*** – Offers a complete environment for the creation and maintenance of spatial databases and user objects. It provides on-screen digitizing, data importing, raster map registration, geocoding, and more.
- ***Map Viewer*** – Offers interactive access, display, and manipulation of geographically indexed data objects. Map displays can be composed of vector-drawn objects as well as raster backgrounds like satellite images, aerial photographs, scanned paper maps, etc. Simple map selection and drill down capabilities, as well as printing facilities are included.
- ***Spatial Analysis*** – Offers the creation, execution, and display of complex queries based on both geographic characteristics and attribute values. This includes thematic mapping, proximity searches, selective "overlay" viewing, hard copy output, and more.
- ***Image Viewer*** – Offers the storage and retrieval of scanned photos, documents, drawings, floorplans, etc.
- ***Table Viewer*** – Offers the viewing and manipulating of numeric and text attributes in a tabular format.
- ***Map Editor*** – Offers the interactive addition, deletion, and editing of geographic objects through simple drawing and editing tools.
- ***Data Import/Export*** – Supports the population of classes of objects through import translators. Map objects can be created through geographic keys such as latitude/longitude, or geocoding of common addresses. Also supports the export of selected objects for use in other applications.
- ***Symbol Editor*** – Supports the creation and refinement of specialized map symbology.

All of the different components can work independently or interactively. Interactions in one view can automatically cause appropriate changes in all the others. Application users get to work within the views or contexts they find most useful, and the result is better management, maintenance, and understanding of highly complex data. This synergy is one of the true values of this new, ready-to-use technology — and it is only available with SpatialWorks.

With Object Mapper, text-based data can quickly be turned into "visual objects", able to display themselves in the form of interactive maps, tables, and pictures.

The Benefits

- Powerful tools for the management, analysis, and visualization of data
- Increased user productivity
- Accelerated development
- Reduced development costs
- High quality reliable components that are already tested and proven
- Software that's easier to support, thanks to state-of-the-art object technology

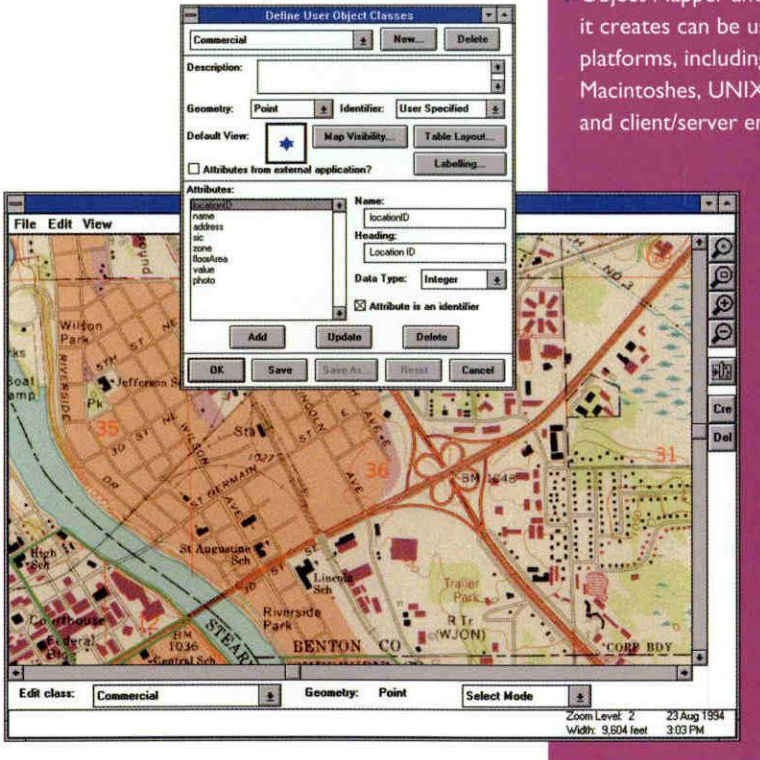
SpatialWorks is the right choice to help meet your development goals in less time than you would have thought possible.

We Stand Behind Our Software

Object/FX Corporation offers consulting and support services to answer questions and help you incorporate SpatialWorks components within your own information management software. We also offer complete solutions for the acquisition, construction, and maintenance of geographic databases.

If you would like more details about SpatialWorks, please contact us at

612. 644. 6064 extension 17 or
Internet: ofx@maroon.tc.umn.edu.



Create And Maintain Geographic Databases With Object Mapper

The Perfect Tool for Building and Managing Geographic Databases for SpatialWorks™ Applications

- Create and edit multiple types of map objects
- Use geocoding to automatically turn lists of addresses into map locations
- Associate map objects with existing information applications
- Customize map object behaviors, including symbology, visibility rules, highlighting/labeling defaults, and more
- Assemble continuous basemaps from scanned (raster) images or line (vector) maps
- Import pictures tied to map objects
- Easy, yet powerful graphical user interface
- Written completely in Smalltalk
- Object Mapper and the databases it creates can be used on multiple platforms, including PCs, Macintoshes, UNIX workstations, and client/server environments

Object/FX Corporation
2515 Wabash Avenue
St. Paul MN 55114
612. 644. 6064 Fax 612. 644. 0366
Internet: ofx@maroon.tc.umn.edu

OBJECT|FX

Object/FX develops, markets and supports object-oriented Geographic Information System software products and reusable software components.

TECHNICAL SPECIFICATIONS

PLATFORM	HARDWARE	OPERATING SYSTEM	WINDOW SYSTEM REQUIREMENTS	MINIMUM MEMORY
MS-Windows	Intel 386, 486, Pentium	MS-DOS 5.0, 6.0	MS-Windows 3.1	8MB
Windows NT	Intel 386, 486, Pentium	Windows NT	Built-in	16MB
OS/2	Intel 386, 486, Pentium	OS/2 2.1	Built-in	16MB
Macintosh	68030, 68040	System 7.0.1	Built-in	12MB
SunOS 4	Sun SPARC	SunOS 4.1.3	OpenWindows 3.0	16MB
Solaris 2	Sun SPARC	SunOS 5.3	OpenWindows 3.1, 3.2	12MB
IBM RS/6000	IBM RS/6000	AIX 3.2	AIX Motif	16MB
HP	HP PA-RISC	HP-UX 9.0	HP-UX Motif	16MB
Sequent	Sequent	Dynix 2.1.3	Not applicable	16MB

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