

September 2002



## Enterprise Data Integration for Collaborative Applications

**Rapid . Robust . Cost-Effective**

A White Paper on Capabilities and Architecture



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## Executive Summary

To keep pace in today's fast-moving business environment, line-of-business professionals, knowledge workers and executives need to collaborate effectively, with timely access to all pertinent information. With increased use of messaging systems, web services and mobile devices, enterprise collaborative applications are becoming business-critical. What is needed is an environment that enables individuals, groups, and organizations to share information among coexisting heterogeneous applications, with each group using its own preferred interface.

CASAHL ecKnowledge® addresses this critical need. It provides a powerful, yet easy-to-use software for enterprise data integration among coexisting heterogeneous collaborative applications. By capitalizing on existing systems and preferred user interfaces, ecKnowledge facilitates rapid implementation of collaborative solutions, encourages user participation by means of familiar interfaces, and maximizes an organization's return on all previous investments in applications and infrastructure.

Built on CASAHL's history of experience with over 1000 corporate customers, ecKnowledge is CASAHL's premier product for data integration among collaborative applications built on Microsoft and IBM messaging and collaboration platforms (Exchange, SPS, STS, CMS, Lotus Notes and Domino). ecKnowledge 7.5 has built-in connectivity to virtually all data sources, including ERPs, DBMSs, legacy applications, XML, EDI, web services, and all Microsoft Office products. ecKnowledge provides a wizard-based GUI development environment that requires no custom programming and a GUI Server Manager for remote server administration. ecKnowledge is fully scalable, with multi-processing, multi-threaded cluster server technology, automatic load-balancing, security, and fail-over protection.

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## Key Technical Requirements

An enterprise data integration product for collaborative applications must offer the following key technical features:

### **Collaborative Platform Support**

Line-of-business professionals and knowledge workers use a variety of collaborative systems on a daily basis. By supporting the use of each business's preferred Web, groupware, or messaging-based system, an enterprise data integration product such as ecKnowledge allows the coexistence of multiple heterogeneous collaborative systems and supports the development of mission-critical applications that will be more rapidly

adopted and endorsed by end users because they are already familiar with the collaborative front-end system interface.

## **Web Services Support**

Web services show great promise for reducing the complexity and cost of system and application communication within and across corporate boundaries. Application coexistence and data integration solutions must help realize this promise by providing an environment for rapid development of integration solutions that are compatible with existing systems and compliant with web services standards. This is especially critical for collaboration among partners and customers, since each partner in the exchange will have their own applications to maintain business data.

## **Rich enterprise data integration options**

Each organization has its own integration requirements. An integration product must be flexible enough to support a variety of architectural options to address specific customer needs. For example, one organization may need to maintain a tightly synchronized image between its collaborative application and the corporate ERP system, while another organization may need only a loosely coupled relationship with its partners through a “publish-and-subscribe” interchange over the Web. An enterprise data integration product for collaborative applications needs the flexibility to support these options.

## **Inter-enterprise and intra-enterprise communication**

In today’s business environment, data flows often cross enterprise boundaries. Companies must share information with partners, customers, and suppliers. An enterprise data integration product must support end-to-end communication within and across the enterprise.

## **Scalability**

An integration product must be able to scale as business needs grow. The product must support scaling up for better performance and scaling out for load balancing and fail-over.

## **Non-intrusive to existing infrastructure**

Integration software should require no changes to the existing infrastructure, and no additional software should be required on the systems to be connected.

## **Connectivity**

To function as a central hub for streamlining operations, integration software must be able to connect to diverse ERP, database, messaging, and other enterprise systems.

## Security and Internet Standards

For inter-enterprise communications, integration software must support Internet standards, XML, and security, with no compromises needed to firewall settings or authentication and authorization policies.

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## ecKnowledge: Meeting the Challenge

Addressing the key technical requirements discussed above, CASAHL ecKnowledge® provides a rapidly deployable, cost-effective solution for enterprise data integration among coexisting collaborative applications. ecKnowledge provides a comprehensive platform for integrating systems within the enterprise and for linking customers, partners, and suppliers between enterprises. CASAHL's proven technology is built on experience with over 1000 customer implementations.

ecKnowledge provides the following key benefits:

- Collaborative environment support

ecKnowledge has built-in support for Web applications and groupware/messaging environments such as Lotus Notes and Microsoft Exchange/Outlook. Rich collaborative experience can be built in these systems, with ecKnowledge providing connectivity to back-end corporate operations and transaction systems.

- Web services support

ecKnowledge simplifies use of Web services to integrate information among various systems within an enterprise or with external business partners. ecKnowledge provides a RAD environment for Web services-based data integration, which allows the publication or retrieval of information from web services without any programming. Users need only model the invocation by means of a graphical wizard interface.

- Rich enterprise data integration options

Each organization has its unique requirements for information sharing. With its flexible architecture and rich information sharing options, ecKnowledge is well equipped to deliver a wide variety of enterprise data integration solutions.

- Inter-enterprise and intra-enterprise communication

A complete, end-to-end enterprise data integration product must be able to handle communication both within an enterprise and between enterprises over the Internet. ecKnowledge supports building connective relationships between business partners, customers, and suppliers – across enterprise boundaries –

by facilitating a range of interactions from tightly-integrated (with mutually dependent data flows) to loosely-coupled by means of XML.

- Quick ROI and low cost of ownership

With its rapid deployment, ease of use, intuitive graphical interface, and enterprise-strength, scalable server architecture, companies can benefit from quick ROI and low cost of ownership with ecKnowledge.

- Non-intrusive to existing infrastructure

There is no need to install additional software on the network or on any ERP or database system to work with ecKnowledge. Moreover, no changes are required to existing applications.

- Vast connectivity

ecKnowledge can connect to virtually any ERP, database, middleware, directory, or messaging system. With this vast connectivity and support for XML, ecKnowledge can be used to streamline data flows throughout the enterprise.

- Security and Internet standards

ecKnowledge supports HTTPS and SSL for secure transport over the Internet to facilitate inter-enterprise communications. ecKnowledge does not require any changes to a company's existing security infrastructure or firewalls. With support for various Internet protocols and XML, ecKnowledge can fit well into any eBusiness infrastructure. In addition, ecKnowledge fully enforces existing authentication and authorization mechanisms when working with enterprise systems and applications.

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## Application Scenarios

CASAHL products are in use by over 1000 customers, delivering the entire spectrum of enterprise data integration solutions, from CRM to supply-chain, from intranets to extranets, from migration and application coexistence to decision support, running virtually any type of enterprise- or user-level application.

### Corporate portals and self-service web applications

Intranet corporate portals are the most effective way to aggregate the valuable information distributed across various enterprise systems into a self-service interface for employees. With wide connectivity and integration options, CASAHL products can help build corporate portals to provide a self-service interface for internal tasks such as HR benefit enrollment, purchase requisition tracking, and other important functions.

## **Extranets for customers and partners**

CASAHL products can help enterprises build extranets to externalize ERP and other operational data for use by customers, suppliers, and distributors, without affecting the performance of internal systems. Up-to-date operational data can be delivered to a web site for access by external users, allowing hundreds and thousands of eBusiness partners to query critical data, with no impact on the performance, response time, or security of internal ERP systems.

## **Unified view of customer**

One of the biggest challenges facing organizations today is the ability to create a unified view of a customer across business units and disparate CRM, ERP, and customer support systems. CASAHL enterprise data integration products can synchronize information across all these systems to enhance customer satisfaction, achieve better responsiveness to customers, and facilitate cross-selling products and services.

## **Decision support and reporting**

An organization's ability to make faster, more insightful decisions depends on its ability to access all pertinent information. CASAHL products can help aggregate information from all data sources in an enterprise in a timely fashion, allowing companies to create reports, analyze operations, and make insightful decisions.

## **Marketplaces**

Private and public marketplaces need the ability to provide multi-vendor catalogs to buyers, with accurate and timely updates from suppliers' catalogs. They must also integrate marketplace interactions with buyers' and suppliers' existing systems. CASAHL products use XML and other industry standards to provide a rich framework for end-to-end integration of marketplaces with buyers and suppliers.

## **Field sales applications**

CASAHL products can enhance SFA or CRM applications by enabling a remote sales force to stay current with corporate information such as customer contact information, product and inventory information, and order fulfillment status. In addition, CASAHL products can facilitate consolidation of information from multiple customer-related applications to provide a single view of customer information.

## **Multi-location consolidation and distribution of enterprise content**

With support for secure transport over the Internet, CASAHL's technology can be used to collect, consolidate, and distribute information that originates from multiple branches, franchises, business units, or point of sale locations.

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## ecKnowledge Capabilities

ecKnowledge is a mature, sophisticated product with extensive capabilities that are vital to the development and deployment of industrial-strength data integration solutions. Using ecKnowledge, enterprises can build solutions that are scalable, reliable, and secure enough for enterprise-level collaboration, yet flexible enough to change easily, as required by changing market conditions.

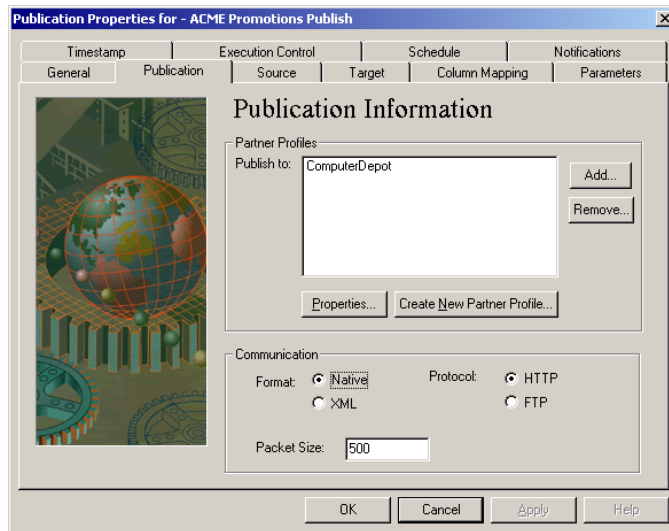
### Key Technical Advantages

#### Web Services Support

ecKnowledge provides a non-programming interface that allows integration application developers to publish to or consume information from web services simply by modeling the invocation using wizards. With this high-level object-based GUI system, integration application developers can focus on high-level business application logic, data mapping, and data transformation, without needing to struggle with the details of web services technology programming and implementation. The ecKnowledge Web Services Connector is built on industry standard technologies such as UDDI, SOAP, WSDL, XML Schema, and .NET framework.

#### Wizard-Based Development Environment

ecKnowledge is easy to set up – and easy to change when integration requirements change. It employs wizards and property sheets to simplify the process of developing and editing all the types of ecKnowledge objects.



## **Rich enterprise data integration options**

With its flexible architecture and rich information-sharing options, ecKnowledge can easily deliver a wide variety of enterprise data integration solutions, tailor-made for the needs of each user organization. Interactions can range from tightly integrated to loosely coupled, from synchronization to publish/subscribe, from scheduled to real-time, and more.

## **Publish, Subscribe, and Broadcast Information over the Internet**

ecKnowledge's unique Publish/Subscribe capability allows businesses to send and receive information securely over the Internet. ecKnowledge also includes a Broadcast feature to distribute information to multiple partner nodes. Businesses can use ecKnowledge to build dynamic networks, based on an open standards design, to collaborate and exchange information with eBusiness partners over the Internet. ecKnowledge provides facilities to easily manage profiles of partner nodes, and it guarantees reliable delivery of information (such as XML files) over the Internet by using XMLRPC/SOAP for handshaking and delivery confirmation between peer nodes.

## **Consolidate Information from Multiple Sources over the Internet**

ecKnowledge's Consolidation feature allows companies to gather information from multiple locations, business units, or partner sites and consolidate this information in one central location for reference by subsequent processing. The information to be consolidated is retrieved over the Internet using a variety of file formats (including XML) and communication protocols (such as HTTP and FTP).

## **Java Message Service Support**

Messaging systems provide a highly efficient platform for reliable, event-driven communication between enterprise applications. ecKnowledge supports the Java Message Service (JMS) standard, which enables integration with messaging systems such as IBM MQSeries, TIBCO, Sybase SEEB, and other JMS-compliant messaging systems. ecKnowledge can listen and respond to enterprise events on a real-time basis. It can also write information in the form of messages to the queue for other enterprise applications to consume.

## **Protocols and Listeners**

ecKnowledge supports standard Internet protocols such as HTTP/HTTPS, FTP, SMTP, and SSL. It also provides listeners for HTTP, JMS, and SMTP/POP3/IMAP protocols. The listeners wait to receive new information from partner nodes and then process the information accordingly.

## **Security**

ecKnowledge supports standards such as HTTPS, SSL and certificates for secure communication over the Internet, without requiring changes to firewalls. In addition,

ecKnowledge fully enforces the authentication and authorization mechanisms in any enterprise system or application it encounters.

## **XML Support**

ecKnowledge supports various XML formats and vocabularies, including xCBL, cXML, RosettaNet, XML schema, XML-Data, and others. ecKnowledge can also facilitate conversion and transformation between different dialects of XML.

## **Connectors**

ecKnowledge provides connectors to access information stored in virtually any database, ERP, groupware, XML file, or legacy system. These connectors allow ecKnowledge developers to quickly build applications without programming. A representative list of data sources accessible via the connectors can be found at the end of this document.

## **Real-Time or Scheduled Processing Capabilities**

ecKnowledge provides options to process transactions in real-time, at scheduled intervals or times, on an ad hoc basis, or based on a company's own applications (using the COM/XML interface).

## **Generalized Synchronization Service**

ecKnowledge includes a sophisticated synchronization facility, supporting bi-directional, selective, incremental synchronization of disparate systems, with conflict detection and automatic conflict resolution. This facility can be used in a wide variety of application scenarios – from corporate portals, marketplaces, and extranets to consolidation of information, field sales applications, decision support, creation of a unified customer view, or migrating data between two coexisting systems.

## **Job Sequencing**

When one ecKnowledge job completes, it will trigger another. Similarly, if a job fails, it can trigger a different job. Sequencing makes it possible to construct a complex series of interdependent jobs.

## **Workflow Triggers**

When a piece of data meets a specified condition, ecKnowledge can trigger a workflow action. The action may be as simple as an email notification (for instance, notifying a manager that inventory has fallen too low), or it may be more complex, involving the execution of a custom script and invoking external COM objects.

## **Data Transformation Facility**

Data transformations facilitate the seamless integration of data between systems. For example, you can use a data transformation to convert currency amounts according to current exchange rates. You can also use a data transformation to deal with similar

data that is specified differently in different systems. So, if one type of data (for example, “size”) is stored in one application as numbers (“1”, “2”, “3”) and in another application as words (“small”, “medium”, “large”), ecKnowledge can convert the data back and forth, ensuring that each data source obtains the data in a form it can use. Data transformations can be specified in either direction – that is, when reading data *from* an application or when writing data *to* an application.

## **Versatile Error Handling**

Error and exception handling is a critical part of integration between heterogeneous systems. For instance, a piece of your partner’s data, written into your system, may not conform to your business rules. ecKnowledge provides both simple and complex error handling facilities to handle such conditions.

## **Rules, to Enhance Data Integrity**

ecKnowledge provides a rules object that makes it possible to enforce business rules during the integration process. Rules perform integrity checking, permitting only those records that satisfy the specified rule to be included in the information exchange.

## **Robust System Facilities**

ecKnowledge is based on industrial-strength, cluster-server technology. The ecKnowledge Server is a multi-process, multi-threaded, scalable application that provides load balancing, fail-over, security, and other robust system facilities.

## **Scalability**

The ecKnowledge Server is a multi-tasking system that utilizes system resources efficiently. Multiple ecKnowledge servers can be deployed incrementally as the workload increases. ecKnowledge Servers can reside on the same or different machines from other servers.

## **Asynchronous Processing**

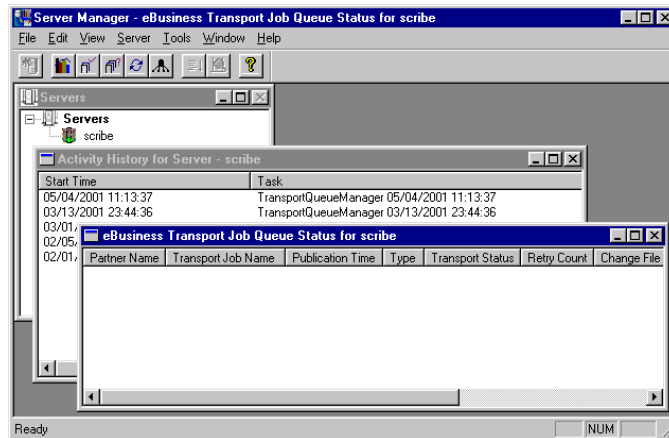
To achieve parallel operation whenever possible, ecKnowledge takes advantage of all database systems that support asynchronous data processing. During data transfer, ecKnowledge does not wait for the completion of an operation involving a database system before it starts the next data transfer. This parallelism has significant performance implications, especially when dealing with large databases.

## **Logging**

All events and statistics for ecKnowledge jobs are logged in the ecKnowledge log database. In case of errors, the records and fields that caused the errors are also written to the log for later troubleshooting. Key values of changed records can also be reported. ecKnowledge includes several different views into the log to assist users in reviewing information such as errors, detailed statistics, and update conflicts.

## Remote Server Management

ecKnowledge provides a graphical user interface for administering all ecKnowledge Servers on a network. The ecKnowledge Server Manager allows administrators to remotely execute jobs on an ad hoc basis, manage multiple Servers and job queues, and view Server activity and history.



## Load Balancing

ecKnowledge incorporates load-balancing technology to spread the workload across a group of ecKnowledge Servers in order to achieve optimal overall performance for a set of ecKnowledge jobs. Where desired, particular ecKnowledge jobs can be assigned to specific dedicated Servers.

## Fault Tolerance

When there are multiple ecKnowledge Servers and one of them goes down, the others will automatically pick up unassigned jobs from the disabled server's job queue. When the disabled server starts up again, it will immediately start executing unassigned jobs without intervention from the server administrator.

## Error Recovery

If an ecKnowledge Server goes down while executing a job, when it starts up again, it will automatically restart and continue the job from where it left off.

## Performance Monitoring

The ecKnowledge Server includes performance monitoring capabilities to monitor all transactions in real-time.

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## ecKnowledge Connectivity

Using its built-in connectors or a partner's technology, ecKnowledge can be configured to integrate virtually any enterprise application.

### Enterprise Applications and Databases

- Web Services
- Corporate portals/websites
- Messaging systems (TIBCO, IBM MQSeries, JMS)
- FoxPro
- Centura SQLBase
- Hewlett Packard IMAGE/SQL
- IBM AS/400
- IBM CICS
- IBM DB2 via CAE
- IBM DB2 via MVS
- IBM DB2 via OS/400
- Computer Associates Ingres
- Computer Associates Open Ingres
- Informix
- XML data and applications
- EDI (EDIFACT and X12)
- Oracle
- Microsoft SQL Server
- Sybase System 10/11
- Sybase Adaptive Server
- Progress
- Novell Scalable SQL
- Teradata
- XDB
- IBM VSAM
- Text databases
- Inprise Interbase
- Hewlett Packard Allbase

### Enterprise Resource Planning Applications and CRM's

- SAP R/3
- Baan
- PeopleSoft
- Vantive
- J.D. Edwards Open World
- Oracle Financials
- Siebel
- Any system with an XML interface

### Desktop and Workgroup Applications

- Microsoft Internet Explorer
- Netscape Navigator
- Microsoft Outlook
- FoxPro

- Microsoft Exchange
- Lotus Notes
- MS SQL Server
- Visual Basic
- Clipper
- Novell Btrieve
- Oracle Workgroup DBMS
- Microsoft Access
- Microsoft Excel
- Inprise dBASE
- Corel Paradox
- Sybase SQL Anywhere
- Informix Workgroup DBMS
- FileMaker

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## About CAS AHL Technology, Inc.

CAS AHL Technology, Inc. is a leading provider of powerful, yet easy-to-use software for enterprise data integration, with emphasis on integrating data among coexisting heterogeneous collaborative applications. CAS AHL solutions enable knowledge workers, executives, and line-of-business professionals to better leverage information resources and thereby improve responsiveness, decision-making and operational efficiency.

Founded in 1993, CAS AHL Technology, Inc. began by developing, then licensing, significant database technology (NotesSQL, an ODBC driver to Notes databases) to Lotus/IBM. In 1995, CAS AHL introduced its flagship product, Replic-Action, which quickly became the leading integration software for workgroup applications. With the release of ecKnowledge in 1997, CAS AHL has maintained its leadership position in the enterprise data integration market by supporting the coexistence of multiple heterogeneous systems and consistently expanding product functionality to meet customer needs. Media and industry analysts have recognized CAS AHL with annual awards and honors for superior technology and professional services. CAS AHL has over 1000 customers worldwide, including Sony, Toyota, Bank of America, Jack-in-the-Box, and the United States Environmental Protection Agency (EPA). CAS AHL also has alliances with industry leaders such as IBM, Microsoft, SAP, Sybase and Oracle.

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