



# Choosing the Right Middleware

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TRANSFORM YOUR DATA INTO KNOWLEDGE WITH ACTIVEEDGE

*With the increasing demands for distributed real-time systems in today's businesses, the need for appropriate tools and platforms is more critical than ever before. Middleware is at the forefront of distributed computing. The choice you make determines the success and strength of your network applications. . Choosing a solution that can easily grow and change with your organization and allows your organization to be flexible, adaptable, and cost-efficient is key.*

*As business systems evolve, they will need to provide advanced features to support dynamic and flexible processes that adapt as business situations change. And they will need to provide complete control & visibility into your entire enterprise. These features will ultimately require a flexible, distributed architecture that enables secure collaboration, advanced data management, dynamic system updates, and custom, rule-based processes. Intelligent agents provide the means to achieve these requirements most effectively. Intelligent systems deal with massive amounts of information to levels of accuracy, timeliness and quality never before possible.*

## EXECUTIVE SUMMARY

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With the increasing demands for distributed real-time systems, the need for appropriate tools and platforms is more critical than ever before. Middleware is at the forefront of distributed computing, and the choice you make determines the success and strength of your network applications.

Middleware has a variety of qualities like cost, flexibility, and performance. For each application, different qualities are more important than others. Certainly, choosing the right middleware means determining the qualities that matter most for your application, and then evaluating the different types of middleware to see how well they meet your requirements. In the modern enterprise, business operations are in a constant state of flux evolving from one form to another in fluid and often unpredictable ways. The major problem for the modern enterprise is how to become more aware, agile and flexible. Choosing a solution that can easily grow and change with your organization and allows your organization to be flexible, adaptable, and cost-efficient is key.

More flexible and advanced than basic peer-to-peer or object-oriented computing, agent-based systems represent the next major advancement in network computing architectures. With intelligent agents, it is possible to build larger, more complex systems that are more dynamic, adaptable, and collaborative than conventional architectures. A middleware solution that takes advantage of this intelligent technology advancement will help you realize the full potential of your infrastructure, your data, and your processes. It will help you future-proof your development investments and optimize your business as a whole.

As business systems evolve, they will need to provide advanced features to support dynamic and flexible processes that adapt as business situations change. They also will need to produce accurate and relevant metrics about past, current, and future situations. And they will need to provide complete control & visibility into your entire enterprise. These features will ultimately require a flexible, distributed architecture that enables secure collaboration, advanced data management, dynamic system updates, and custom, rule-based processes. Intelligent agents provide the means to achieve these requirements most effectively. Intelligent systems deal with massive amounts of information to levels of accuracy, timeliness and quality never before possible.

## WHAT SHOULD YOU LOOK FOR?

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Choosing a solution that can easily grow and change with your organization and allows your organization to be flexible, adaptable, and cost-efficient is key for today's middleware and network applications.

### ARCHITECTURE IS ESSENTIAL

Make sure the architecture you choose scales to the size and complexity of your problems, intelligently transforms your data into usable knowledge, supports industry standards, maximizes your developer and employee productivity, and allows you to easily implement and extend business policies, rules and processes that make sense for your operations.

### CREATE KNOWLEDGE FROM DATA

Today's advanced network applications must support data and communication from a myriad of sources. And, most legacy systems cannot reason about the reliability of source data, which makes it impossible to unlock the meaning of data. Intelligent agent-based middleware, on the other hand, uses a variety of advanced reasoning techniques to transform raw data into information, information into situational understanding, and understanding into actionable, usable knowledge.

### FUTURE-PROOF YOUR INVESTMENT

Business moves fast—processing times are critical; enterprises must adapt and keep pace or they will fail. Choosing a middleware solution that supports quick development of process-based applications as well as immediate and dynamic adaptation of policies, rules, processes, analysis, and reporting is necessary.

Your architecture should support industry standards; it should be easily extensible with an open architecture. This ensures future hardware and software purchases can quickly integrate in the enterprise, leverages your existing investments, saves significant research time and development efforts, and takes advantage of proven capabilities. Such standardization and interoperability in your middleware make it easier to use, support, and evolve your advanced network applications.

### SEE YOUR ENTERPRISE OPERATIONS

Ensure that your solution provides an accurate, integrated picture that gives real time visibility into your enterprise operations to support effective decision-making and eliminates overload of irrelevant data. Your solution should use lightweight, easily accessible, web portal interfaces for selectively sharing key information with your employees, your customers, and your partners. .

It should support quick development of process-based applications using visual tools that accurately represent your organization to maximize developer productivity. Administrators also need a centralized 'command center' where they can quickly and easily set up, monitor, and configure the system including logging, security, and selective access and authorization.

## NEVER MISS AN OPPORTUNITY

Choose a middleware solution that enables secure and selective data sharing with customers, partners, and other sites, which allow you to find new opportunities for improvement and expansion. It should enable easy collaboration, optimized operations, and development of more accurate plans and projections. You and your partners can collaborate and share capabilities to reduce mutual cost, time, and manpower.

## MANAGE PROACTIVELY

Many big problems start out as small issues. Use a middleware solution that allows you to deal with events immediately, before they affect operations. Real-time monitors and triggers can catch emerging problems at the first signs. Execution monitoring can alert operators about unstable or undesirable conditions, which enables rapid resolution long before the event data makes it into legacy systems. Intelligent systems can also take advantage of advanced reasoning features to predict and take preventive actions *before* problems occur.

## EMPOWER YOUR PEOPLE

Nobody knows your enterprise operations better than the people who do them everyday. Choose a middleware solution that empowers each user to take advantage of their knowledge and tailor processes, manage their environment, and get the job done more effectively and efficiently. With a comprehensive and easy-to-use tool suite your developers should be able to easily develop and configure new and existing components and your end users should be able to define their own business rules, workflow, alerts & triggers, and desktop views as needed. This will enhance the focus and clarity per user and eliminate the costs of high-priced consultants or customizations.

## ENTER ACTIVEEDGE

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*ActiveEdge creates an understandable, real-time picture of enterprise operations.*

Cougaar Software's ActiveEdge® Middleware is an intelligent agent-based middleware platform for building complex, distributed, intelligent applications. ActiveEdge is designed to transform data into usable knowledge, create an understandable real-time picture of enterprise operations, and provide execution monitoring and collaborative decision support. User-configurable triggers, analysis, and reporting allow users to perform with advanced focus and clarity. Ultimately, ActiveEdge empowers organizations to be agile, adaptive, and flexible.

ActiveEdge offers a full framework for building intelligent applications and provides a comprehensive tool suite for developing such applications. Based on existing standards and open technologies like Java, SOAP, OWL, XML, the Cognitive Agent Architecture (Cougaar), etc., ActiveEdge saves significant research time and development effort as well as takes advantage of proven capabilities. ActiveEdge provides a user friendly visualization tool that lets users quickly and easily create task-specific, collaborative applications and to modify process flows graphically without changing any code. Users can easily 'drag-and-drop' components from one application to another.

Unlike any other middleware platform that is available today, ActiveEdge allows you to build intelligent solutions and applications that automate the complex processes humans do everyday most effectively.

## ACTIVEEDGE APPLICATIONS

The benefits of ActiveEdge are directly applicable to such sectors as logistics, the modern supply chain, and any other areas with complex business applications that must handle massive amounts of data.

- **Logistics/Planning** - The technology on which ActiveEdge is based was initially created to solve massive logistics problems in the military. It is naturally well-suited for both commercial and military logistics applications.
- **Data Mediation** - The agent technology combined with semantics provides the perfect platform for advanced data mediation systems.
- **Dynamic Availability Systems** - Dynamic availability problems can be solved by using ActiveEdge with role-based and goal-oriented agents.

ActiveEdge is a dynamic and adaptive sensor-enabled, middleware software platform. It collects data from a wide variety of distributed data sources and models including many types of systems, software, and sensor hardware such as RFID and bar codes, physical sensors, cyber intrusion detection systems, temperature control sensors, etc. It then turns this data into intelligent and actionable business information; and integrates effortlessly back into an enterprise's applications such as ERP, Supply Chain Management, Transportation Management, Warehouse Management, Building Automation, Facilities Management, to name a few.

The overall purpose of ActiveEdge is to allow enterprises to create an operational understanding of events as applied to their business context, detect emerging trends and then react to these trends in an accurate and time-critical manner.

## DISTRIBUTED, AGENT-BASED ARCHITECTURE

ActiveEdge provides capabilities that let you efficiently and reliably gather, integrate, distribute, and manage volumes of data from various sources. The ActiveEdge architecture allows selective input, retrieval, sharing and analysis of data to help organizations closely monitor and control resources, plans, and operations as well as facilitate appropriate decision-making. ActiveEdge provides all the power of Cougar—the Cognitive Agent Architecture, an open source, distributed agent architecture—and includes key extensions to simplify application development, increase agent functionality, and provide enhanced system capabilities.

*Agents are autonomous, continuous, collaborative, adaptive, reactive, and mobile.*

ActiveEdge uses a distributed intelligent agent architecture that is based on the human cognitive model of reasoning and planning. This advanced software model captures the way humans observe, reason, plan, act and monitor. It allows you to automate the complex processes humans do everyday more realistically and robustly than any other system available.

Intelligent agents are software entities that function continuously and autonomously in a particular environment. These entities carry out activities in a flexible and intelligent manner that is responsive to changes in the environment. Agent-based systems represent the next major advancement in network computing and leverage the strengths of object-oriented, peer-to-peer and service-oriented architectures while providing a process-centric design. The real value is that intelligent reasoning occurs at each level of the system to reduce overall system load and increase quality, control, and responsiveness.

*Intelligent reasoning occurs at each level of the system to reduce overall system load, & increase quality, control, and responsiveness.*

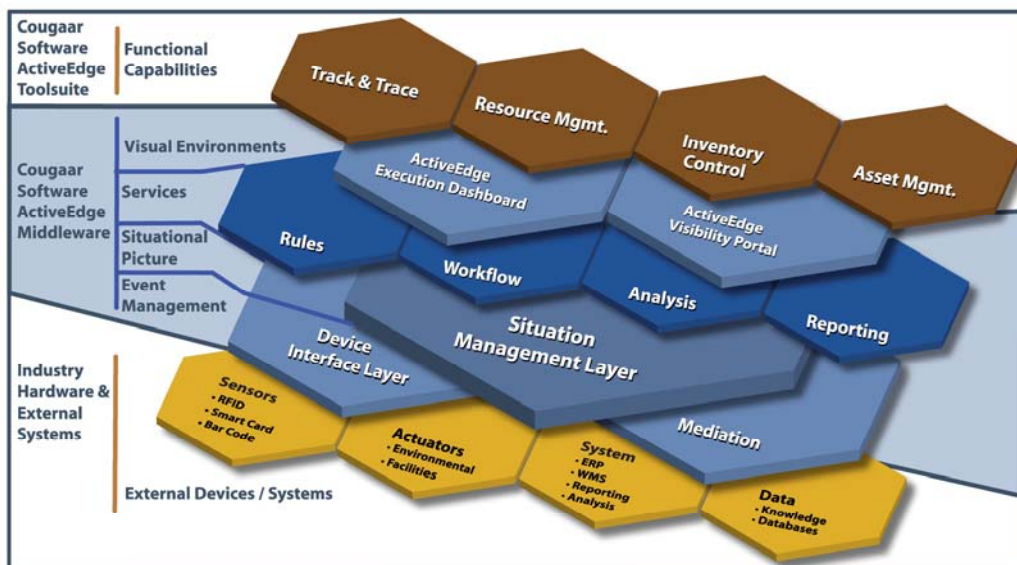


Figure 1 ActiveEdge Architecture

The ActiveEdge architecture, as shown in the previous figure, is composed of a series of layers that each provide specific services and capabilities. Individual agents are configured with special behaviors to perform designated functions in the system. The logical architecture identifies these key middleware layers of ActiveEdge:

Layer	Description
Visual Environments	Provides dashboard and portal end-user interfaces, which can be standard ActiveEdge versions or based on your other existing commercial products.
Services	Provide the Rules, Workflow, Analysis and Reporting Engines for a complete, customizable business solution
Situational Picture	Maintains a real-time picture on which the services all operate
Event Management	Includes the Device Interface and Mediation components, which provide the external interfaces

*ActiveEdge supports a diverse set of data sources, and, due to the open system architecture, the middleware can easily scale to adopt new data sources as needed.*

ActiveEdge also provides a set of software tools that allow the enterprise to view and understand their situational picture and manage their domain specific business rules and processes. Applications like Track & Trace and Asset Management leverage the middleware services in a rich easy-to-use dashboard or portal environment.

The hardware and external systems layers show the types of systems that can interface with ActiveEdge. ActiveEdge supports a diverse set of sensor types and data sources, and, due to the open system architecture, the middleware can easily scale to adopt new types of sensor hardware and data sources as needed.

## HOW DOES IT WORK?

ActiveEdge provides real-time intelligence and event management through agents. The middleware manages the real-time processing of high volume sensor signals and turns these signals into intelligent and actionable business information. The actionable information is then delivered in end-user power dashboards to individual users or is pushed to systems within or outside the enterprise. Based on an open system architecture, it is able to support various heterogeneous types of hardware and software and provides an API for interfacing with external systems. This highly scalable, distributed architecture embeds intelligence throughout the network to transform raw data systematically into actionable and relevant knowledge and provides the tools for your organization to view and manage operations and build advanced network applications most effectively.

Developers can define and configure new and existing components easily. Drag-and-drop features allow them to drag UI components from application to application to build custom applications and interfaces through dynamic reconfiguration of the agents and agent application communities.

## FEATURES AND BENEFITS

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ActiveEdge transforms raw data to usable knowledge and provides an understandable, up-to-the-minute picture of operations. It provides capabilities to define and execute custom business rules as well as monitor the execution of business processes. ActiveEdge also provides reporting capabilities and secure, collaborative decision support throughout the enterprise.

The combined capabilities of ActiveEdge provide robust, complex, distributed intelligent applications. Because the architecture is open and component-based, you can build systems that are modular, reconfigurable, and easily extensible. Systems and applications built on ActiveEdge are highly user-customizable so that each user or organization can have specialized processes, rules, policies and configurations. Integrated layered security allows fine-grained access control to information, services, and functional components, which allows only authorized personnel to access, update, or modify the system or data.

ActiveEdge offers the following powerful features that will transform your entire enterprise to be more efficient, more flexible, more agile, and more aware:

Feature Category	ActiveEdge Features	ActiveEdge Benefits
Data Considerations and Integration	<p>Open architecture supports conversion and formatting of data for legacy and modern systems and databases.</p> <p>Data components provide look-up capabilities from an embedded ONS server if needed.</p> <p>ActiveEdge also supports communications through the major Web Service interfaces when data is pulled from other business applications.</p>	<p>Actionable information from raw data</p> <p>Support for data and communication from various sources</p> <p>Easy integration with existing business systems and databases</p> <p>Security, Robustness, Scalability</p>
Execution Management	<p>Easy-to-use desktop provides real time monitoring capabilities for custom rules and workflow, automation and management of processes, and detection of conditions and events.</p>	<p>Up-to-the-minute visibility into operations</p> <p>Ability to deal with events before they impact operations</p> <p>More accurate, effective management of enterprise operations and status</p> <p>Reduced manpower requirements</p>

Feature Category	ActiveEdge Features	ActiveEdge Benefits
Analysis and Reporting	Situational desktop and portal environments provide real time analysis and data mining capabilities for accurate trend analysis and projection	Better planning and increased revenue
Configuration Management	ActiveEdge provides a network command center that allows administrators to monitor and configure the system including security, access control, logging and persistence within the system.	Centralized, cost-effective setup, operation and management
Collaborative, Extended Enterprise	ActiveEdge supports secure, selective and seamless collaboration among sites in the same organization as well as with employees, partners, and customers.	Secure, selective information sharing Streamlined processes across the enterprise
Distributed Computing	Architecture is composed of a series of layers that provide specific services and capabilities. Individual agents are selectively configured with specific behaviors to perform designated functions in the system.	Reduced system load More efficient processing Increased quality, control, and responsiveness
Customization and Extensibility	<p>Open architecture supports a wide range of systems, applications, and sensors and other data devices.</p> <p>A comprehensive set of tools and easy-to-use desktop environment enable custom business processes, rules, and workflow at the enterprise or user level.</p> <p>End-users define their own business rules, workflow, alerts and triggers, analysis processes, and desktop views.</p> <p>Developers define and configure new and existing components easily. Drag-and-drop features allow them to drag UI components from application to application to build custom applications and interfaces through dynamic configuration of agents and application communities.</p>	<p>Hardware and application independence/flexibility</p> <p>Expansion of existing systems through rich set of external interfaces</p> <p>Empowered end users</p> <p>Dynamic, custom business processes</p> <p>No high priced consultants / customizations or extensive system re-engineering required</p> <p>Dynamic adaptation of policies, rules, processes, analysis, and reporting</p> <p>Increased developer and employee productivity and quick roll-out of process-based applications</p>

## ABOUT COUGAAR SOFTWARE, INC.

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Cougaar Software, Inc. (CSI) is a leading provider of intelligent middleware systems for the commercial and military sectors. CSI was formed in 2001 to transition a suite of advanced technologies from military research to the commercial market. These technologies represent some of the most advanced reasoning and intelligent automation capabilities in existence, integrated to form a complete system architecture for global military logistics. Scalability, adaptability, flexibility, and security have been the cornerstone concepts of our approach, bringing our military knowledge and experience to applications that empower enterprises.

### FOR MORE INFORMATION

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