

Understanding Software AG Products

Innovation Release

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About this Guide

This guide describes Software AG products and how to use them to accomplish your goals.

Document Conventions

Convention	Description
Bold	Identifies elements on a screen.
Narrowfont	Identifies storage locations for services on webMethods Integration Server, using the convention <i>folder.subfolder:service</i> .
UPPERCASE	Identifies keyboard keys. Keys you must press simultaneously are joined with a plus sign (+).
<i>Italic</i>	Identifies variables for which you must supply values specific to your own situation or environment. Identifies new terms the first time they occur in the text.
Monospace font	Identifies text you must type or messages displayed by the system.
{ }	Indicates a set of choices from which you must choose one. Type only the information inside the curly braces. Do not type the { } symbols.
	Separates two mutually exclusive choices in a syntax line. Type one of these choices. Do not type the symbol.
[]	Indicates one or more options. Type only the information inside the square brackets. Do not type the [] symbols.
...	Indicates that you can type multiple options of the same type. Type only the information. Do not type the ellipsis (...).

Online Information

Software AG Documentation Website

You can find documentation on the Software AG Documentation website at "<http://documentation.softwareag.com>". The site requires Empower credentials. If you do not have Empower credentials, you must use the TECHcommunity website.

Software AG Empower Product Support Website

You can find product information on the Software AG Empower Product Support website at "<https://empower.softwareag.com>".

To submit feature/enhancement requests, get information about product availability, and download products, go to "[Products](#)".

To get information about fixes and to read early warnings, technical papers, and knowledge base articles, go to the "[Knowledge Center](#)".

Software AG TECHcommunity

You can find documentation and other technical information on the Software AG TECHcommunity website at "<http://techcommunity.softwareag.com>". You can:

- Access product documentation, if you have TECHcommunity credentials. If you do not, you will need to register and specify "Documentation" as an area of interest.
- Access articles, code samples, demos, and tutorials.
- Use the online discussion forums, moderated by Software AG professionals, to ask questions, discuss best practices, and learn how other customers are using Software AG technology.
- Link to external websites that discuss open standards and web technology.

1 Quick Start

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Analytics & Decisions Quick Start

Product	Lets you...
Apama	Event processing platform that monitors rapidly moving event streams, detects and analyzes important events and patterns of events, and immediately acts on events of interest according to specifications.
ARIS Process Performance Manager	Draw business process data from data sources (for example, databases, trading partner data stores, third-party applications like SAP or Salesforce).
MashZone NextGen	Visualize data from Software AG data sources (for example, databases, XML files, Apama events, process instances) or from web feeds or web services.
Optimize for Process	Monitor business processes, activities, events, and other business-related data in real time. View and evaluate business data, define rules that trigger alerts when problems arise.
Optimize for Infrastructure	Monitor system resources using KPIs. Define KPI evaluation rules, discover trends in system behavior, and define actions to take in problem situations. Find rules that were violated, resources that are out of or will go out of compliance. Analyze historical KPI performance to find positive or negative trends.
Universal Messaging	Deliver events from producers to consumers.
Zementis Predictive Analytics	Execute predictive models built by machine learning and data mining tools to make real-time predictions.

API Management Quick Start

Product	Lets you...
API Gateway	Receive requests from consumer applications and forward them to API providers, then return responses from providers to consumer applications. Protect products and their applications,

Product	Lets you...
	services, and data from malicious attacks from external client applications.
API Portal	Expose and consume APIs. Web-based, self-service portal through which to securely expose APIs to external developers, partners, and other consumers for use in their own apps.
CentraSite	Provide design-time, governance, and run-time aspects of API management.
Insight Server	<ul style="list-style-type: none"> ■ Monitor and manage APIs. ■ Identify and isolate root cause of problems. ■ Predict and prepare for the impact of planned changes. ■ Create and apply policy to monitor performance and enforce SLAs. ■ Detect rogue, ungoverned APIs.
API Cloud	API Management-as-a-Service (MaaS) platform.

B2B Integration Quick Start

Product	Lets you...
Trading Networks	Build and manage network in which trading partners (retailers, manufacturers, suppliers, marketplaces) exchange electronic business documents using automated processes.
eStandards Modules	Define industry-standard transport protocol, provide business document types, specify document exchange rules. Modules support B2B standards for various industries (for example, manufacturing, financial, healthcare).
Optimize for B2B	Monitor Trading Networks transactions in real time.
B2B Analytics	Analyze Trading Networks partner transactions.
ActiveTransfer	Manage transfer of business documents in the trading network.

Product	Lets you...
Mobile	Interact with application integrations from mobile devices anywhere in the world.

Business and IT Transformation

Product	Lets you...
ARIS Connect, ARIS Designer, and ARIS Architect	Create business process models that are the designs for business processes.
ARIS business process governance	Control the lifecycle of business process models using standards, policies, and guidelines via out-of-the-box workflows.
Alfabet	Create a lean, modern, pliable enterprise architecture to develop and enable your digital business transformation strategy. Understand your IT assets and whether your investments align with your digital business vision.

Cross-Digital Business Platform (DBP) Tools

Product	Lets you...
Command Central	Install, patch, configure, manage, and upgrade Software AG products; create database components; and connect products to database components, remotely from one location.
Software AG Installer	Install Software AG products.
Software AG Update Manager	Install fixes and support patches on Software AG products and troubleshoot problems in Software AG product installations.

Product	Lets you...
Deployer and Asset Build Environment	Deploy user-created assets that reside on source Software AG runtimes or repositories to target Software AG runtimes (for example, from servers in a development environment to servers in a staging or production environment).
Digital Event Services and Universal Messaging	Foundation for the event-driven architecture (EDA) that enables Software AG products to communicate using events.

Cumulocity IoT

Product	Gives you...
Cumulocity	Visibility and control over your remote assets, such as houses, cars, and machines

Hybrid Integration Quick Start

Development

Product	Lets you...
Software AG Designer	Eclipse-based graphical development tool.
Service Development perspective	Design and test services that make up application integrations. Users can collaborate using CentraSite as a shared database.
CloudStreams Development perspective	Develop and govern integration flows between SaaS providers (for example, Salesforce.com) and on-premise applications (for example, CRM, ERP).
webMethods Adapters	Convey data from external resources (for example, SAP, Siebel, PeopleSoft) to Software AG products and vice versa.

Product	Lets you...
Integration Cloud	Cloud-hosted integration Platform-as-a-Service (iPaaS) that provides connectivity between cloud-based SaaS providers such as Salesforce.com and on-premises applications such as CRM and ERP.
EntireX	Easily connect services that run on Integration Server to mission-critical programs written in languages like COBOL or Natural.
ApplinX	Efficient, robust, and easy way for web applications to access and integrate data and transactions from core system applications without changing those applications.

Local Development and Testing

Product	Lets you...
Software AG Designer	Eclipse-based graphical development tool.
Application Platform perspective	Develop application logic in Java without having to use proprietary webMethods APIs.
Local Version Control Integration	Develop Integration Server packages locally as Eclipse projects; check package elements and their supporting files in to and out of a version control system (VCS) directly from Software AG Designer.
Unit Test Framework	Service unit testing and regression testing tool that enables service developers to quickly assemble unit tests to improve overall development quality without custom development.

Execution

Product	Lets you...
Integration Server	Execute application integration services.

Product	Lets you...
Integration Agent	Light-weight Integration Server that provides a subset of Integration Server functionality.
Universal Messaging	Route application integration data from publishers to subscribers.

Microservices

Product	Lets you...
Microservices Runtime	Host or deliver microservices as a package that includes a set of related services, interfaces, document types, and triggers that subscribe to topics or queues, or as a set of related packages of this kind.

Events

Product	Lets you...
Digital Event Services	Foundation for the event-driven architecture (EDA) that enables Software AG products to communicate using events. Works with Software AG Designer (configuration of Integration Server document types for publishing as digital events), Integration Server and Apama (built-in services for sending and receiving events), and Universal Messaging (delivery of events from producers to consumers).
Universal Messaging	Route events from producers to consumers.

Administration and Monitoring

Product	Lets you...
Mobile	Interact with application integrations from mobile devices anywhere in the world.

In-Memory Data Management Quick Start

Product	Description
Terracotta BigMemory Max	Distributed, in-memory data storage solution that enables applications to create very large in-memory caches outside the Java heap and share cached data with other applications on the network.
Terracotta DB	Distributed, in-memory data management solution that handles caching and operational storage use cases and enables transactional and analytical processing.
webMethods Adapter for Terracotta DB	Enables Integration Server to integrate with Terracotta DB.

Master Data Management Quick Start

Product	Description
OneData	<ul style="list-style-type: none"> ■ Reconcile, cleanse, synchronize, store enterprise master data (for example, data about customers, trading partners, employees, suppliers, products, materials, assets). ■ Store enterprise data definitions, structures, workflow, processes, rules. ■ Integrate with any industry-standard ESB or SOA to share and reuse master data in operative, data warehousing, and reporting systems.
Locate	Verify international addresses for OneData.
Integration Server	Execute services to validate or enrich data.
Universal Messaging	Acquire data from and deploy data to back-end systems.

Mobile Integrations Quick Start

Product	Lets you...
Software AG Designer	Eclipse-based graphical development tool.
Mobile Development perspective	Design a user interface and then generate Java code that displays the user interface and responds to user-initiated events, such as clicking a button. Code business logic separately from the user interface, in Java classes created by Mobile Development.
Mobile Designer	Create mobile apps in Java and then automatically convert the apps for any mobile device.
Mobile Support	Create mobile data synchronization solutions that transfer data between mobile devices and backend enterprise applications and resolve conflicts that occur when backend data is updated by multiple sources at the same time.

Process & Applications Quick Start

Design

Product	Lets you...
ARIS Connect	Design and collaborate on design of business process models.
ARIS Designer	Design more complex business process models, and analyze problems, like bottlenecks.
ARIS Architect	ARIS Designer plus administrative features, such as database management.
ARIS products	Control lifecycle of business process models using standards, policies, and guidelines from ARIS workflows (governance).

Analysis

Product	Lets you...
Software AG Designer	Document requirements in business process models for developers.
AgileApps	Build and deploy process-driven application solutions. Application Platform-as-a-Service (aPaaS) product.

Governance

Product	Lets you...
ARIS products	Control lifecycle of business process models using standards, policies, and guidelines from ARIS workflows (governance).

Implementation

Product	Lets you...
Software AG Designer	Implement business process from model. Develop services, rules, tasks using Process, Service, and Business Rules perspectives.
AgileApps	Build and deploy process-driven application solutions. Application Platform-as-a-Service (aPaaS) product.
CentraSite	Collaborate using shared SOA registry/repository of metadata about business process assets.
Task Engine	Find and manipulate tasks from services or other applications through APIs.

Execution

Product	Lets you...
Integration Server	Execute business processes and services.
Dynamic Business Orchestrator	Control and direct execution of dynamic business processes.
Process Engine	Control and direct execution of classic business processes.
Rules Engine	Execute rules invoked by business processes or services.
Task Engine	Execute tasks.
Universal Messaging	Route business process data across Integration Servers when process steps are distributed.

Administration and Monitoring

Product	Lets you...
Monitor	Stop processes, resubmit process steps, define process step time-outs, set up audit logging.
Mobile Monitor	View process instances, view and work on tasks from mobile device or tablet.
Task Engine	Assign tasks, start and stop tasks.
Business Console	Quickly and easily improve business process performance. Collect data about process health (for example, process volume, cycle times, SLA or KPI rule violations). Administrators escalate observed problems.

Product	Lets you...
Mobile Business Console	Collaborate on tasks and workflows, get real-time insights, and make time critical decisions from mobile device or tablet.
Closed Loop Analytics	View data from Closed Loop Analytics, monitor business processes and tasks, work on tasks, view trending info for business processes on social media.
Mobile	Interact with business processes from mobile devices anywhere in the world.

Composite Applications

Product	Lets you...
Software AG Designer	Design composite applications. Webpages in CAF invoke services and access and display data stored in databases.
My webMethods Server	Host composite applications.
CentraSite	Collaborate using shared SOA registry/repository of metadata about CAF assets.

2 Analytics & Decisions

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Analytics & Decisions

Analytics & Decisions is a method for monitoring and analyzing key performance indicators (KPIs) and linking them to business processes and daily activities to make sure the entire enterprise is moving toward stated performance goals. Analytics & Decisions enables you to detect and collect events, visualize and analyze data, and define rules and alerts so you can improve your organization's operational or strategic decision-making.

Business Event Processing

Event processing is an emerging technology in business systems. It provides continuous, real-time insight into events that flow through business networks. Originally used in ultra high-volume stock trading scenarios, event processing has expanded into other aspects of business due to its ability to improve end-to-end visibility, situational awareness, and business agility.

Business event processing begins with the arrival of events containing business data such as a condition, a trend, or a change. Typically, the events are emitted in streams from live data sources, such as tweets from Twitter feeds. The streams are analyzed in real time to identify and extract events that are meaningful to your organization.

As business event processing technologies become more mainstream, they are being applied to more and more business cases. These include:

Business Case	Examples
Financial	Credit card and debit card fraud detection, trading optimization.
Logistics monitoring	Package tracking, fleet management, route optimization.
Manufacturing	Defect detection, machine monitoring, operations optimization.
Healthcare	Fraudulent claims detection, patient monitoring, safety operations.
Government	Homeland security, system security, suspicious activity monitoring.

Business Activity Monitoring

Business activity monitoring (BAM) enables an enterprise to monitor the performance of the business processes it uses to deliver goods and services. Business optimization enables an enterprise to use the monitoring information to proactively manage and optimize those business processes.

Business process data is monitored via key performance indicators (KPIs). KPIs are quantifiable measurements that reflect the critical success factors of an enterprise. For example, in a car loan application process, you might define a KPI to monitor process cycle time. KPIs monitor data for exceptions and trends and alert you to problems.

Business activity monitoring also monitors process health, such as transition times, step times, and number of tasks at each step.

Products Involved in Analytics & Decisions

The primary products you use in Analytics & Decisions are Apama, ARIS Process Performance Manager, MashZone NextGen, Optimize for Process, Optimize for Infrastructure, Zementis Predictive Analytics, and Universal Messaging.

Analytics & Decisions Example

Suppose your company is a bank that wants to improve its process for car loan applications. With Analytics & Decisions, you could do the following:

Category	Activity	Example
Detect patterns	Run continuous queries to detect and collect identified events.	Monitor Twitter feeds to detect and collect negative tweets that contain keywords like the name of your bank and “unhappy,” “slow,” or “bad.”
Visualize data	View the collected data in various formats.	Text of each complaint, a Google map of the complaint locations, and a graph of the process cycle times.
Mine data	Examine historical data to determine whether similar complaints occurred in the past.	Aggregate fast process cycle times, aggregate slow process cycle times, and compare the results. Filter data to find the age of applicants in the slow processes.

Category	Activity	Example
Analyze root causes	Drill into historical data to find the cause of the problem.	Applications from people under 18 in certain countries loop back through the process because of a form that requires a guardian's signature.
Improve process	Improve the business process model.	Add a line to the application for a guardian's signature.
Define real-time baselines, metrics, and alerts	Monitor key performance indicators (KPIs) and create rules that send alerts when data is out of compliance.	Set up a KPI for process cycle time and create a rule that alerts when cycle time is one standard deviation slower than normal.
Detect events	Detect and analyze complex patterns in real time.	Identify best action to take with unhappy customers based on recent customer support interactions.
Predict events	Classify data and make predictions.	Determine whether a credit card transaction is valid or fraudulent.

Visualizing Data

MashZone NextGen

MashZone NextGen is a data mashup and visualization tool used to deliver stored data to end users. MashZone NextGen provides customizable dashboards that come with out-of-the-box components such as line charts, grids, and bubble charts. A custom-widget framework enables the ability to create bespoke visualisations. You can create dashboards based on a flexible, responsive layout; MashZone NextGen is entirely web browser-based to facilitate configuration of widgets. MashZone NextGen provides direct connectivity to consume Software AG product data (for example, ARIS PPM graphs, Apama and Digital Event Services events, Optimize for Process process instance details) and data at rest (for example, JDBC, XML, CSV, JSON and Excel files and Terracotta BigMemory and Terracotta DB). You can refine and condense data from Terracotta BigMemory and Terracotta DB using Real-Time Analytics Query Language (RAQL) before visualizing it.

MashZone NextGen can generate Apama events and send them to an Apama correlator for further processing.

When used with business process management webMethods Business Process Management (BPM), MashZone NextGen is used to visualize process event data collected by Optimize for Process. MashZone NextGen offers these dashboards:

- Business Process Analytics dashboard that shows data on process volume and cycle times from Process Engine, and data on SLA or KPI rule violations from Optimize for Process, as part of Closed Loop Analytics solution. For more information, see [“Solving Problems with Closed Loop Analytics ” on page 112.](#)
- Business Process Dashboards that display summary metrics, instance detail, and other performance information about processes that has been collected by Optimize for Process. These dashboards are as follows:
 - Process Overview Dashboard. Provides high-level information about a selected process, including intrinsic metrics, historical views, and normality comparisons across a specified time range. This dashboard helps you quickly identify potential issues, obtain information about alarms and stage activity, and use email or escalation actions to share findings with others.
 - Stage Instances Dashboard. Shows stage activity and performance for a process across a specified time range. The top of the page shows metrics about each stage, including information about activity, cycle time, and alarms. Selecting table rows reveals information about individual stage instances and enables you to send email notifications or escalation actions for individual stage instances.
 - Process Instances Dashboard. Shows process activity and performance across a specified time range. A chart at the top of the page displays historical information about process volume activity and cycle time performance. A table at the bottom of the page shows individual process instances and enables you to send email notifications or escalation actions for individual process instances.

You can display these dashboards in My webMethods and Business Console. You can jump from a dashboard to ARIS PPM for further drill-down analysis.

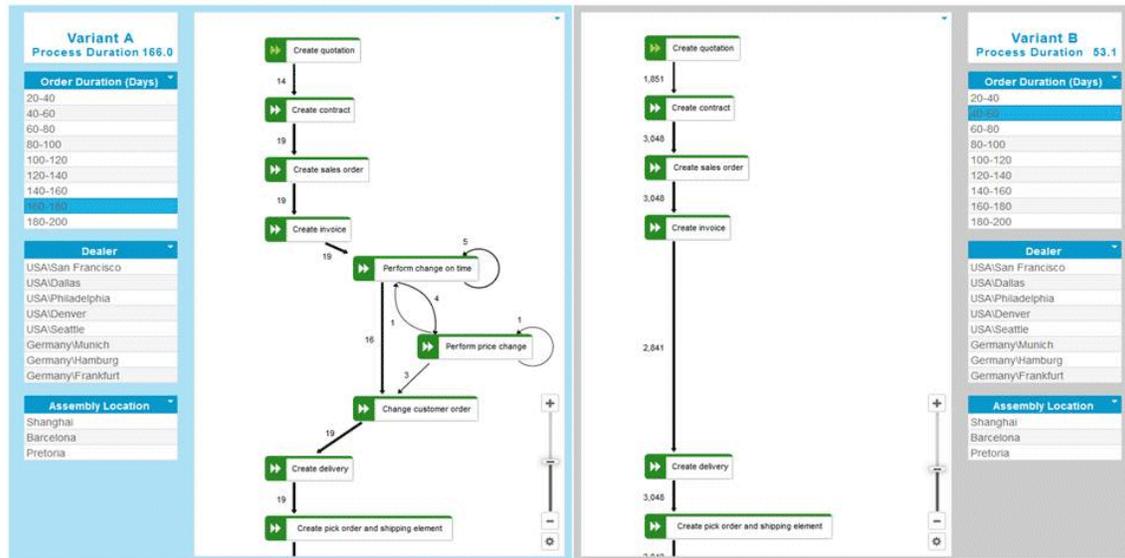
Mining Process Data and Analyzing Root Causes

ARIS Process Performance Manager

ARIS Process Performance Manager, also known as ARIS PPM, is a tool for process analytics that draws data from various data sources you identify, such as databases containing business process execution and audit data, or data stores of trading partners contacted by business process steps, or third-party applications such as Oracle Applications, SAP, or Salesforce. In addition to facilitating process, function, and organizational analyses, ARIS PPM enables you to evaluate process-independent data using data analytics.

You specify the KPIs to investigate (for example, cycle times, frequencies, costs, adherence to deadlines, and quality guidelines). ARIS PPM automatically reconstructs the entire business process via process mining and visualizes the results in various

process views. ARIS PPM provides a wide selection of chart types and tables in which to display the results of your analyses clearly and in detail. ARIS PPM data can be analyzed in different user interfaces, such as light-weight dashboards. The illustration below shows the comparison of the aggregated fast-running processes versus the aggregated slow-running processes described in “Analytics & Decisions Example” on page 23.



Defining Baselines, Metrics, and Alerts

Optimize for Process

Optimize for Process is a Java application that enables you to monitor business processes, activities, events, and other business-related data in real time. The collected monitoring data is displayed in the web browser-based Optimize for Process user interface. In this interface you can view and evaluate business data, and define rules that will trigger alerts when problems arise.

Optimize for Process uses data collectors to gather data from business sources and other Software AG products. Optimize for Process comes with key performance indicators (KPIs) that help you measure business activities, and business process developers can develop custom KPIs that reflect critical success factors for your organization’s business processes. For example, developers might define KPIs to monitor margin, revenue, customer satisfaction, and inventory levels. At run time, Universal Messaging routes the KPI readings from the Process Engines that execute the business process steps to Optimize for Process.

You can define rules in Optimize for Process that define problem conditions in your business processes. For example, you might define a rule that specifies acceptable inventory levels. Optimize for Process compares KPI readings against the rules and alerts you when a monitored business process is out of compliance.

Optimize for Process offers APIs and other services that enable you to extract monitoring data from its database for use in other systems, such as MashZone NextGen. Events generated by Optimize for Process include custom data associated with business processes.

Monitoring System Resources

Optimize for Infrastructure

Optimize for Infrastructure lets you monitor system resources. You identify Software AG products for which to collect data and configure KPIs to monitor the collected data, then define rules that evaluate collected KPI readings and notify you when a problem resource requires your attention. You can also have Optimize for Infrastructure notify you of potential problems based on automatically detected trends and define actions for Optimize for Infrastructure to take automatically when a problem occurs.

You can view and analyze the collected monitoring data to find rules that were violated, resources that are out of compliance, and resources that Optimize for Infrastructure predicts will go out of compliance in the future. You can view a high-level summary of all resources and the performance of the entire enterprise, compare the performance of different KPIs, and analyze historical KPI performance to find positive or negative trends.

Optimize for Infrastructure also offer a Java Management Extensions (JMX) capability that lets you do the following:

- Monitor applications, system objects, and devices.
- Create KPIs, rules, and alerts to understand behavior and trends in system-level metrics for Java applications that implement JMX.
- Analyze key information related to the performance of Integration Server and Infrastructure Data Collector, such as CPU usage, JVM statistics, and garbage collection activity.

Detecting and Analyzing Complex Patterns in Real Time

Apama

Apama is an event processing platform that monitors rapidly moving event streams, detects and analyzes important events and patterns of events, and immediately acts on events of interest according to your specifications.

You develop Apama applications that contain custom monitors that specify the events or patterns of events that interest you. These specifications are the logical equivalent of database queries. After you load your monitors into the Apama correlator, incoming

events flow over the monitors and they monitor incoming event streams for the events and patterns you specified. When a monitor finds a matching event or pattern, it processes the event or pattern according to the rules you specified in the monitor. Apama can support huge numbers of individual monitors operating simultaneously.

Developing Apama Applications

Apama offers multiple approaches to developing Apama applications.

- Developers can make use of the full set of APIs and technologies within the Apama architecture to create sophisticated, customized CEP solutions. Developers can create applications directly in Apama native event processing language (EPL) and use Apama's Java and C++ plug-in interfaces to use logic written in these languages..
- Developers and business analysts can create scalable applications that process events originating from very large populations of real-world entities. Scaling, both vertically (same machine) and horizontally (across multiple machines), is inherent in Apama query applications. Scaled deployments on multiple machines use Terracotta's distributed cache technology to maintain and share application state. This makes it easy to deploy across multiple servers, and keep the application running even when some servers are taken down for maintenance or fail. Apama queries can be used alongside EPL monitors in the same correlator process, interacting by sending events between them.

Apama's Data Player accelerates the development/deployment cycle of EPL applications by letting users pre-test applications using event streams captured in Apama. Users can investigate the likely behavior of Apama applications prior to deployment via simulation, or analyze the actual performance of those applications already in production. Users can select event streams to test, and specify segments of time from the past to use (for example, an entire day or a specific 30-minute period). Users can accelerate replay speeds to many times the actual live speeds, or slow them down or pause for more careful exploration of event processing operations.

Integrating Apama with External Data Sources

You can connect Apama to any event data source, database, messaging infrastructure, or application. There are several ways to do this:

- Implement connectivity plug-ins. These are adapters that run inside the Apama correlator using a mixture of built-in and user-defined "transports" for message sending and receiving, and "codecs" for message transformation. Apama includes a built-in connectivity plug-in transports for use with protocols and systems such as MQTT, HTTP/S, Kafka, and Universal Messaging.
- Create applications that use Java Message Service (JMS) integrated into the Apama correlator.
- Develop client applications with Apama Java, .NET, or C++ APIs.
- Implement Integration Application Framework (IAF) adapters. The IAF is a server component that adapters plug into for run-time invocation. IAF adapters provide

bi-directional connectivity between an external event source and Apama, and XML-based mapping between the event source's data format and Apama's internal format. Apama offers a range of standard adapters for capital markets, infrastructure, and connectivity to data and messaging sources, and provides APIs for building custom adapters.

Building Dashboards

Apama provides a visual design and deployment environment called Dashboard Builder that non-technical users can use to create sophisticated dashboards. From these dashboards, users can start, stop, parameterize, and monitor Apama data views. Dashboard Builder offers a wide range of visual objects and drag-and-drop technology. For applications written in EPL, users can create data views and use Dashboard Builder to create a dashboard from the data views.

You can use MashZone NextGen to create dashboards for Apama data views.

Making Predictions

Zementis Predictive Analytics

Zementis Predictive Analytics allows you to execute predictive models built by machine learning and data mining tools to make real-time predictions. The predictive algorithm classifies data into categories (for example, low water level or high water level) and performs regressions to predict the value that will come next. These classifications and predictions can be processed and sent as events to other Software AG products for the purpose of raising alerts, kicking off automated processes, and so on.

The open, standards-based approach of Zementis Predictive Analytics leverages Predictive Modeling Markup Language (PMML) to execute models created in all leading third-party or open source modeling platforms. The execution engine is highly performant, allowing new predictions to be made at the speed with which new data arrives.

3 API Management

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API Management

API management is a system in which an enterprise creates, manages, and publishes application programming interfaces (APIs) in a secure environment. API management typically does the following:

- Maintains the APIs in a registry.
- Manages the lifecycle of APIs.
- Securely exposes APIs over a network to consumers inside and outside the enterprise.
- Exposes API documentation to developers through a developer portal.
- Collects usage data for analytic purposes.

API providers typically make APIs available through a mediation layer. The mediation layer provides a layer of abstraction that prevents client applications from having to know details about the APIs, or which languages, technologies, or platforms were used in their development. API consumers, such as developers or trading partners, can use the APIs to quickly and easily create business and mobile applications.

Exposing and Consuming APIs

The product you use to expose APIs for end-use consumption is API Portal.

API Portal

Developers create APIs using design tools like Software AG Designer, register them in CentraSite registry (see below), and expose them in the API Portal API Gallery. API Portal is a web browser-based, self-service portal that supports both SOAP- and REST-based APIs.

Providers can brand API Portal using logos, skins, corporate colors and fonts, and more; change layouts for the portal landing page, API Gallery, and API details pages; and customize the portal's privacy and usage terms. API Portal displays statistics that help providers understand where visitors are coming from, which pages attract the most interest, and which APIs are the most popular so they can improve the portal experience and increase API adoption.

API Portal also provides public APIs for providers to use as extension points with external solutions. The APIs enable providers to do the following:

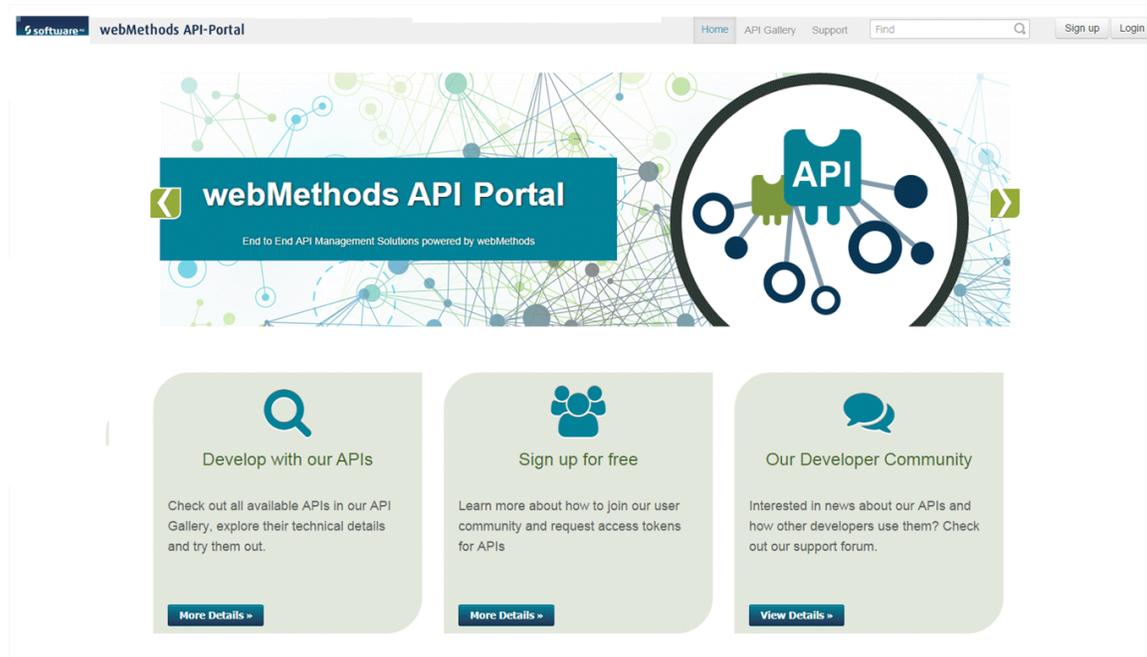
- Publish APIs to API Portal. This feature supports both REST and SOAP APIs, and enables you to leverage your current investments in SOAP-based APIs while you adopt REST for new APIs.

- Register as providers of specific APIs, and register a URL for API Portal to call if someone requests access to those APIs.
- Query API Portal for pending API access requests.
- Send API Portal information about access tokens that should be approved, denied, renewed, or revoked.

API consumers can quickly find the APIs they need in the API Gallery or by running a simple keyword search. API Portal provides code samples with expected error/return codes and descriptions so consumers can easily try out APIs, and dashboards that display runtime data and graphs for APIs.

A collaborative community environment in API Portal allows providers to supply information about APIs, and consumers to rate APIs, follow and un-follow updates to APIs, and participate in discussions with other developers. Users can also upload, describe, and promote applications build using APIs published in API Portal.

API Portal is available as an on-premises product, as well as in the cloud as a hosted solution called API Cloud.



Governing and Securing Your API Management System

The primary products you use to govern and secure your API management system are API Gateway and CentraSite.

API Gateway

API Gateway enables providers to securely expose APIs to consumers. Providers can do the following:

- Create APIs and publish them to API Portal.
- Expose a mocked API implementation to consumers before the actual API exists or is complete.
- Define API policies. Policies can include data masking, request and response transformation, and cross-origin resource sharing (CORS).
- Monetize a set of APIs by bundling them into a package, providing one or more plans that define pricing and quality of service terms for the package, and publishing the package and plans in API Portal. Consumers can subscribe to API packages, and then use access tokens issued by API Portal upon subscription to access the APIs within the package. When defining service plans for use with monetization, providers can separately define rate and quota limits. For quota limits, providers can warn consumers that approach a specified limit, and to block consumers that actually reach that limit.

Note: API Portal also provides public APIs that providers can use to publish API packages and plans from other sources.

- Configure an approval workflow for creating or updating applications, registering applications to APIs, and managing subscriptions to API packages.
- Gather information about gateway events and API events, as well as details about the popularity of individual APIs. API Portal displays this information in the form of dashboards.
- Version SOAP and REST APIs. CentraSite allows versioning of virtual services and publishing of distinct versions to API Portal. API Gateway can host multiple versions of the same virtual service during run-time, and automatically routes requests to the appropriate version.
- Define stages (for example, DEV, TEST, PROD) by supplying connection information to other API Gateways. Providers can define promotion sets and execute promotions across stages. If necessary, providers can roll back previously executed promotions.

API Gateway does the following:

- Makes sure requests from and responses to consumer applications conform to policies you define.
- Transforms requests from and responses to consumer applications as instructed by transformation steps you define.
- Mediates between consumer applications and API providers. API Gateway receives requests from consumer applications and forwards them to back-end services, which

could be on an Integration Server or any other system where services are executed, then returns responses from providers to consumer applications.

- Uses request context or content to route requests from consumers to different service endpoints, or to load balance requests.
- Provides an audit logging facility for functional modules such as API, approval, application, alias, access profile, analytics, group, policy, package, plan, promotion, and user management.

In an API management system, one API Gateway sits behind an internal firewall and is not allowed to directly interact with external clients through the DMZ. Instead, another API Gateway acts as intermediary between external clients and the internal API Gateway. API Gateway protects these products and their applications, services, and data from malicious attacks from external client applications. Administrators can secure traffic between API consumer requests and the execution of services on API Gateway by:

- Filtering requests from and blacklisting specified IP addresses.
- Detecting and filtering requests from mobile devices.
- Avoiding additional inbound firewall holes.
- Defining custom rules that call a Flow service to perform custom processing within the API Gateway (for example, authentication and authorization).
- Defining trusted external JWT issuers, including their truststore, certificate and JWKS URI information.

CentraSite

CentraSite is a standards-based registry and repository that provides the infrastructure that supports API design and life-cycle governance using API Gateway. API providers can publish APIs, applications, and aliases from CentraSite and manage runtime policy enforcement in API Gateway. CentraSite provides a graphical tool you can use to create and modify life-cycle models.

CentraSite enables you to control design-time events such as the acceptance of new assets into the registry and the modification of existing assets in the registry through policies. For example, you could define a policy that new APIs submitted to the catalog must be approved by specific people. You can also use policies to define review and approval processes, perform quality assurance tests, and issue notifications when new APIs are added or when existing APIs are about to be modified. CentraSite provides full support for versioning of SOAP and REST APIs and all other assets in the repository.

CentraSite enables you to define security, audit logging, service level agreement (SLA) monitoring, and routing policies that control the use of APIs in the registry. Policies specify actions the mediation layer is to perform when a client application requests an API. For example, actions can prevent unauthorized access to an API, route a request to the appropriate API, record events to a logging system, or monitor performance attributes and send alerts when specified thresholds are exceeded.

Monitoring and Managing Your API Management System

The product you use to monitor and manage your API management system is Insight Server.

Insight Server

Insight Server is a monitoring and management tool for API management that lets you:

- Understand the interdependencies of complex networks that change frequently.
- Identify and isolate the root cause of problems quickly, preventing them from spreading and rippling through the network.
- Predict and prepare for the impact of planned changes, enabling publishing without interruption.
- Create and apply policy to monitor performance and enforce SLAs without requiring custom programming.
- Detect rogue, ungoverned APIs when they are consumed and register them automatically in CentraSite to put them under governance control.

An Insight Agent runs continuously on application servers on your network that host web services, such as Integration Servers. The agent collects data about service traffic from the application servers. The agent detects incoming and outgoing web service calls, records them, and reports them to Insight Server. The agent also collects run-time statistics, evaluates them, and stores them for reporting and dashboarding purposes. You can also have the agent publish the run-time statistics to CentraSite. Insight Agents do not affect the runtime flow; clients and servers are unaware that they exist.

Insight Server is a central engine that receives data from the Insight Agents, correlates the data, and analyzes it to determine the information below.

- The logical thread. Because the agents examine each call, Insight Server identifies logical threads accurately and unambiguously. Across application platforms, Insight Server tracks service calls and correlates them into a complete transaction view.
- The root cause of service failures. A failure at one node usually depends on the upstream path of service calls.
- The amount of time a message spends, the amount of data transmitted, and what errors, if any, are returned from each node. This information is used to detect throughput bottlenecks.

Insight Server makes this information available to the network administrator.

API Management in the Cloud

API Cloud is an API Management-as-a-Service (MaaS) platform that makes it easy to securely manage and expose APIs to your developer and partner community. With API Cloud, you get the following:

- **Development collaboration.** With API Cloud, developers have a place to discover, test, and sign up for your APIs, and to publish REST and SOAP APIs. API providers and product managers can collaborate with consumers. The developer portal is the public face of your API offerings and enables you to create and grow your network of developers and partners.
- **Security.** API Cloud's gateway protects your APIs from unauthorized and malicious users, while also giving you full control and visibility over who is accessing your APIs. The built-in approval process workflow lets you manage third-party access requests, ensuring secure and reliable access management.
- **Life-cycle models and versioning.** Ensure standards and practices are followed as every API moves through its lifecycle. With built-in versioning capabilities, you can define and track API versions. Multiple versions can co-exist, and older versions can be retired over time.
- **Policy management.** Design and configure policies to be applied to your APIs at runtime. Policies can be applied to multiple APIs at the same time, and can be dynamically scoped by naming patterns, categorization, or organization, which saves time when making changes.
- **Monetization.** API Cloud provides the tools to allow you to create API plans and packaged offerings.
- **Analytics and reporting.** API Cloud tracks usage to give you stats and dashboards to make sure you meet your API service agreements and understand how your APIs are being accessed and used.

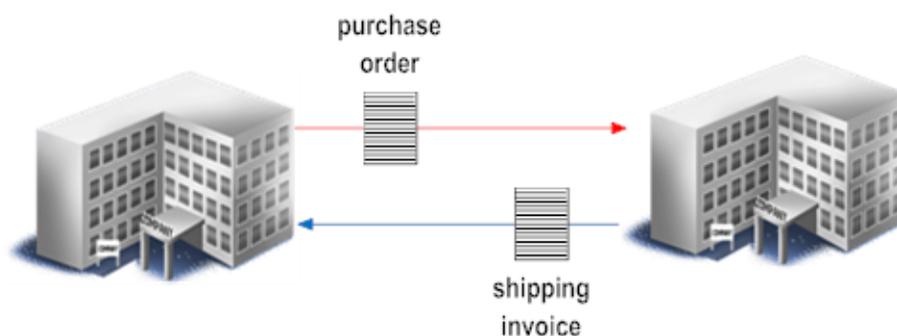
4 B2B Integration

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B2B Integration

Business to business (B2B) describes electronic transactions between businesses (as opposed to between businesses and consumers). Businesses that engage in electronic transactions are called *trading partners*, and can include retailers, manufacturers, suppliers, and marketplaces.

Transactions between trading partners usually involve the exchange of business documents using automated processes. A B2B integration network, or *trading network*, consists of a set of trading partners that conduct business by exchanging mutually agreed-upon business document types electronically. For example, a trading network might include computer retailers, a computer manufacturer, and computer parts suppliers. The retailers might send purchase order documents to the manufacturer, which returns purchase order acknowledgment, shipping notice, and invoice documents. Similarly, the manufacturer might send purchase order documents to the parts suppliers, and so on.



Some industries have developed B2B standards for exchanging business documents. For example, many manufacturing companies use the EDI messaging standard to conduct business electronically. A B2B standard typically defines the business document types and transport protocols that trading partners need to use in exchanges, and specifies document exchange rules.

B2B can include managed file transfer (MFT), a process that ensures protected internal and external data transfers in a centralized system. MFT provides reliable, secure data transfer you can automate based on policies, partners, and permissions. MFT also provides insight and control at every stage of the transfer process, including real-time monitoring, error and receipt logging, auditing, and data tracking. Most MFT solutions include these key components:

- MFT servers that perform MFT exchange behind a firewall and support all communications and security protocols.
- Proxies/reverse proxies that operate in the demilitarized zone and protect the IP addresses and ports of file senders and receivers.
- Clients that enable both human users and applications to administer, report, schedule, and script file transfers.

- APIs that third-party applications use to interact and communicate with MFT servers.

Building, Managing, and Monitoring a Trading Network

The primary products you use to build, manage, and monitor a trading network are Trading Networks, eStandards Modules, and Optimize for B2B.

Trading Networks

Trading Networks enables you to build and manage a peer-to-peer or hub-and-spoke network of trading partners. Trading Networks enables trading partners to exchange business documents in XML and structured flat-file formats.

Trading Networks offers a web browser-based user interface in which you build the elements you need to define and link trading partners. The illustration below shows a partner profile definition in this user interface.

The screenshot displays the 'MY WEBMETHODS' web interface for defining a partner profile. At the top, the navigation bar includes 'My webMethods Administrator', 'My Profile', 'Help', 'About', and 'Logout'. The main content area shows a breadcrumb trail 'Partner Profiles > Partner Profile' and a 'Partner Details' window. The 'Partner Details' window contains the following fields:

- Corporation Name: Receiver
- Organization Unit: ABC
- Status: Active
- Preferred Language: Root Locale

Below the form are several tabs: External IDs, Addresses, Contacts, Partner Group Membership, Delivery Settings, and Extended Fields. The 'External IDs' tab is active, showing a table with the following data:

Id Type	Value
DUNS	3333

The table indicates '0 selected' items and '1 of 1' rows. The interface also includes buttons for 'Add ID...', 'Delete', and 'Add ID Type...' above the table, and 'Save', 'Save & Close', and 'Cancel' buttons at the bottom of the window.

All times IST (UTC+5:30)

software

Elements you need to define and link trading partners are as follows:

Element	Purpose
Trading partner definitions	Define and administer your trading partners.
Business document types	Define the business documents that trading partners want to exchange. A business document type can define an industry-standard document, such as an EDI, RosettaNet, cXML, CBL, or OAG document, or a custom business document.
Processing rules	Define how to process business documents. For example, the processing rule for a purchase order you receive from a trading partner might verify the sender's signature and then submit it to your order management system.
	<p>Note: If you need more complicated processing than is possible in the Trading Networks user interface, you can design a business process in Designer to use in addition to or instead of a processing rule.</p>
Trading Partner Agreements (TPAs)	Customize the way in which documents are exchanged between trading partners. For example, you and a trading partner might use a TPA to specify a custom ID field to include in all business documents.

Trading Networks provides templates that enable you to easily create onboarding questionnaires. Partners can respond to onboarding campaigns by replying to email invitations or by accessing self-service portals. Trading Networks administrators can easily generate reminder emails to partners that have not responded.

Trading Networks also includes a component that runs on Integration Server and manages the exchange of business documents among trading partners. When Trading Networks receives a document, it processes the document according to the processing rule for that document type.

Trading Networks provides a flexible schedule-based ability to suspend document deliveries to partners. Administrators can proactively schedule document delivery suspensions as necessary to accommodate planned partner outages.

Trading Networks is tightly integrated with API Gateway to selectively expose the APIs available in API Gateway and manage access for each partner.

eStandards Modules

Software AG supports B2B standards for various industries. This support comes in the form of eStandards Modules that run on Integration Server and usually require Trading

Networks. Each eStandards Module defines the industry-standard or proprietary transport protocol, provides the B2B standard's business document types, and specifies the standard's document exchange rules. When Integration Server receives a document that matches a business document type in an eStandards Module, it processes the document according to the document exchanges rules specified in the module.

Software AG provides eStandards Modules for the industries below.

Industry	eStandards Modules
Manufacturing	RosettaNet, Chem, PIDX, papiNet
Financial services	SWIFT, ACH, FIX
Consumer packaged goods and retail	1SYNC, ebXML
Healthcare	HIPAA, HL7
E-commerce	EDI, EDIINT, AS4

Optimize for B2B

Optimize for B2B enables business administrators to monitor Trading Networks transactions in real-time. You use Optimize for B2B to:

- Identify business document types and attributes to monitor.
- Define KPIs to monitor for transactions.
- Monitor transactions and other data related to exchanging data with trading partners.
- Compare the performance of different KPIs and analyze historical KPI performance to find positive or negative trends.

B2B Analytics

Trading Networks provides a variety of charts and dashboards for performing deep targeted analysis on Trading Networks partner transactions.

Some charts and dashboards provide a snapshot of current transaction volume trends that indicate top-tier and bottom-tier partners based on business activity. You can drill down into the charts to gain additional insight into the underlying data. You can export the data in any of these charts and dashboards to CSV files.

Other dashboards and charts to monitor a variety of metrics either across all partners or by partner. The metrics include transaction volume trends; total value trends based on purchase order amount, invoice amount, and so on; late functional acknowledgment

(FA) violations; and the split between successful and failed transactions. You can filter the information shown in the charts to focus on a subset of partners (top-tier, bottom-tier, and so on).

Managing File Transfers

The products you use to manage the transfer of business documents in your trading network are ActiveTransfer and ActiveTransfer Agent.

ActiveTransfer

ActiveTransfer offers a web browser-based user interface that enables administrators to manage file transfers, servers, and users; browse and search audit logs of file transfers; and examine analytics that show metrics, comparisons, and file upload and download activity. The interface also enables you to configure actions that are triggered based on criteria you specify. For example, you could set up an action to execute a specific Trading Networks service if a file transfer is successful. ActiveTransfer also offers a web client for end users who need to upload and download files to and from ActiveTransfer Server.

ActiveTransfer Server resides behind a firewall and performs file transfers. ActiveTransfer Gateway is a reverse proxy server that acts as an intermediary between the Internet and the internal ActiveTransfer Server for secure file transfer and supports virus scanning for file uploads. ActiveTransfer Server supports encryption and decryption of files and downloads. For example, files can be decrypted as they get uploaded, and then can be stored in a file system encrypted using a different set of keys. You can share files with external users through ActiveTransfer Gateway without compromising security. In addition, you can configure more granular access levels for an external user in order to limit the range of actions possible on the files shared, such as upload, upload, download, rename, delete, folder creation, and folder deletion.

ActiveTransfer is tightly integrated with Trading Networks so you can easily manage and monitor files that traverse the two products. You can use ActiveTransfer as the delivery method for Trading Networks and specify the remote end point to which ActiveTransfer should transfer the file. You can monitor documents delivered by ActiveTransfer in the Trading Networks user interface.

ActiveTransfer Support package runs on Integration Server and provides functionality for monitoring file transactions and managing ActiveTransfer Server, ActiveTransfer Gateway, users, post-processing events, scheduled actions, and data files and folders. You invoke this functionality through the ActiveTransfer user interface.

ActiveTransfer uses virtual folders for file transfers. You can organize these virtual folders by partner name, and you can associate ActiveTransfer users with partners. If you are using ActiveTransfer with Trading Networks, ActiveTransfer Server retrieves the list of partners from Trading Networks. If you are not using ActiveTransfer with Trading Networks, you can define your own partners.

You can use virtual folder definitions in scheduled and post-processing events instead of using the direct IP address for remote endpoints involved with file transfers. In this way, you can manage all endpoints centrally through virtual folders. If you change an endpoint address, you need only edit it once in the virtual folder definition and the change will be automatically reflected in all events that access that endpoint.

ActiveTransfer supports Common Internet File System (CIFS), HTTP, HTTPS, FTP, FTPS (SSL), Server Message Block (SMB), SFTP (SSH), SCP, WebDAV, and WebDAVs protocols, and offers complete data security and support for the most stringent encryption standards, including SSL and integrated PGP. ActiveTransfer enables accelerated file transfers that use a server's bandwidth to the maximum capacity regardless of network latency or distance.

ActiveTransfer Agent

ActiveTransfer Agents is a component you install on remote systems so you can transfer files between the remote systems and the central hub that hosts ActiveTransfer Server. For file uploads, ActiveTransfer Agent can access files from the file system and connect to a remote server to fetch files. You can install ActiveTransfer Agent on remote systems within or outside your organization's firewall.

The central ActiveTransfer Server manages and monitors ActiveTransfer Agents. ActiveTransfer Server also manages all configurations related to file transfers through events that you push directly to one or more agents. Event definitions include a variety of options, such as the ability to rename files at source or destination, delete original files, compress files, and verify checksum to maintain file integrity during transfers. You can further simplify your setup by grouping agents that have the same file transfer characteristics for an event and applying the event across those agents. ActiveTransfer Server also tracks all activities related to file transfers involving an agent, including authentication, file transfer operations, and the status of each action.

5 Business and IT Transformations

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Business Transformation

Designing Business Processes

Experts in company procedures create *business process models* that are the designs for business processes. These business process designers define the steps in business processes and dictate the order of the steps and the conditions under which each step should run.

The products that business process designers use to create business process models are ARIS Connect and ARIS Designer or ARIS Architect. The ARIS products offer a wide range of graphical representation tools that enable the designer to focus on the high-level design of a business process without having to get involved in developing the underlying technology.

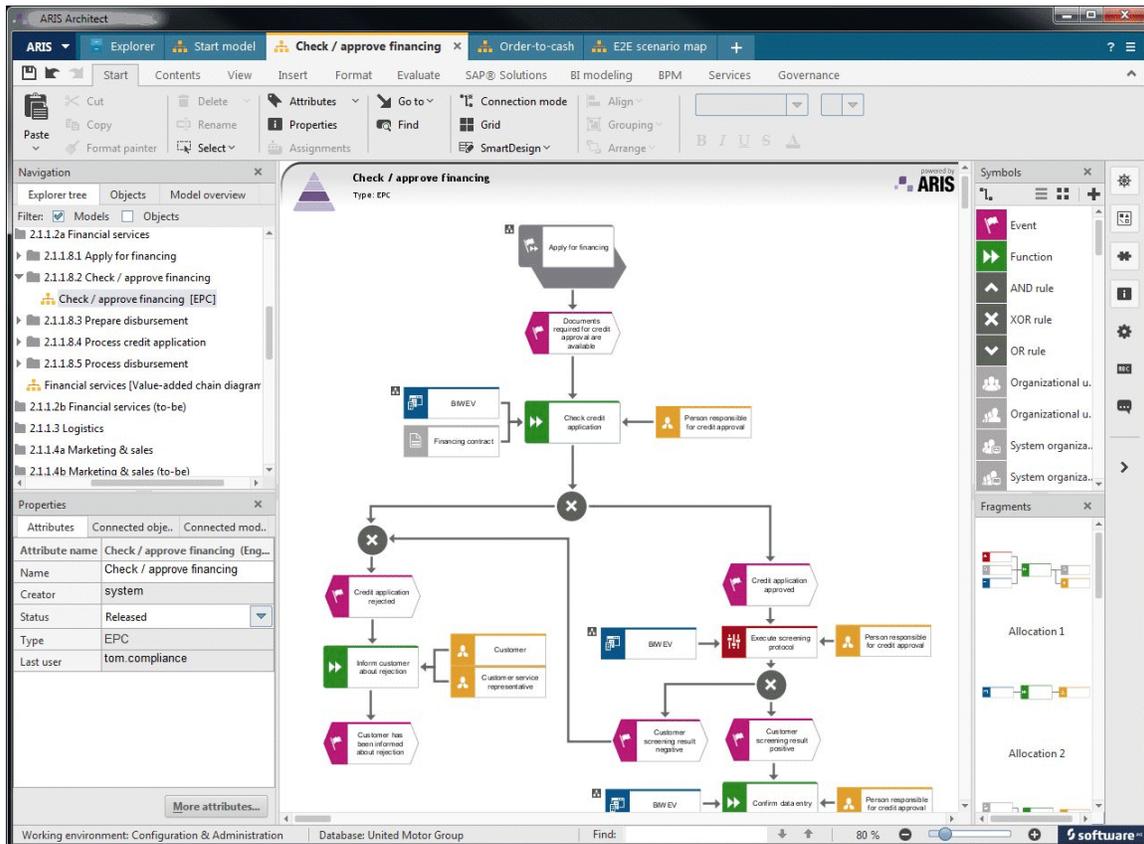
ARIS Connect, ARIS Designer, and ARIS Architect

ARIS Connect is a design tool based on HTML5 technology that allows business process designers to design, and optionally collaborate on the design of, business process models.

ARIS Designer is a Java client that enables business analysts and process owners to design and analyze more complex business process models. ARIS Designer offers greater functionality than ARIS Connect, such as the ability to run analyses that identify bottlenecks in business process.

ARIS Architect is ARIS Designer with administrative features, such as database and functional ARIS application management.

The illustration below shows a business process model in ARIS Designer.



Business process models are stored on a central server, and all ARIS Connect, ARIS Designer, and ARIS Architect users connect to this central server. Configuration settings supplied by ARIS Architect users are also stored on the central server, and are propagated to all ARIS Connect, ARIS Designer, and ARIS Architect clients.

After a business process model has been designed, ARIS users can do the following:

- ARIS Connect users can publish the model to the rest of the company. ARIS Publisher, a set of JavaServer Pages that display in a web browser, can also be used to publish models. Anyone in your company who has viewed a published business process model can ask a business process designer to add, modify, or delete a process step to the model.
- ARIS Architect users can convert the business process into Business Process Modeling Notation (BPMN), a graphical representation for specifying business process models and the functionality and behavior of process steps, and then share the model with Software AG Designer business process developers.
- ARIS Architect users can share data models, user interface designs, and service information with Software AG Designer business process developers.

Governing Business Process Models

ARIS business process governance lets you control the lifecycle of business process models using standards, policies, and guidelines via out-of-the-box workflows. You can define approval and release workflows that govern aspects of BPM such as business process model change requests, approvals, and release. Workflows can include tasks that send notifications to users who need to perform the actions in each step of the approval and release workflow, user interfaces for tasks, and task-to-task data maps.

Automated tasks can call services provided with your ARIS products. The services include ARIS business services for operations on the ARIS server and ARIS document storage services for document operations and user management services for operation on UMC.

IT Transformation

IT transformation is the process used to redesign your IT organization and infrastructure. IT transformation typically includes baselining, benchmarking, planning, strategy, implementation, and change management. IT Transformation uses governance to monitor and control its transformation processes.

The product you use for IT transformation is Alfabet.

Alfabet

Alfabet is an enterprise architecture and IT planning and portfolio management system.

As an enterprise architecture system, Alfabet helps you create a lean, modern, pliable enterprise architecture to develop and enable your digital business transformation strategy. Alfabet helps you understand exactly what IT assets you have, how they interrelate, where redundancies exist, and whether those investments align with your digital business vision. With Alfabet, you can:

- Improve business and IT collaboration by creating a common understanding of business strategy.
- Articulate how IT can drive business strategy and actively support business success.
- Make sure your technology portfolio achieves the best business results and is up to date.
- Reduce costs for licenses, operations, support, and application integration.

As an IT planning and portfolio management system, Alfabet enables you to:

- Align your IT portfolios (application, project, technology, demand) with your business strategy and required capabilities, and view cross-portfolio analytics to see how your IT portfolios interrelate.

- Manage changes to IT portfolios in a consistent and transparent manner, and expose dependencies among them.
- Provide stakeholders with a collaborative planning platform, and conduct collaborative planning using road mapping, stakeholder-oriented views, and reporting.
- Create process workflows that align with your policies and timelines, maintain governance, and keep IT up to speed in the demand and portfolio processes.
- Use assessment indicators so you can base portfolio decisions on the value, cost, and risk across a number of possible IT investment alternatives.
- Perform state planning and change management, including on-demand generation of views of the IT landscape, for any date or timeframe.

6 Cross-Digital Business Platform (DBP) Tools

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The tools that support the Digital Business Platform are Command Central, Software AG Installer, Software AG Update Manager, Deployer and Asset Build Environment, and Digital Event Services and Universal Messaging.

Command Central

You use Command Central in distributed staging and production environments to install, patch, configure, manage, and upgrade Software AG products; create database components; and connect products to database components. With Command Central, you can perform these tasks on multiple remote machines from one location.

Command Central offers a browser-based user interface, but you can also automate tasks by using commands to remotely execute actions from a terminal or custom script (for example, CI servers such as Jenkins or generic configuration management tools such as Puppet or Chef).

Software AG Installer

You use Software AG Installer to install Software AG products locally on standalone development machines. With Software AG Installer you can do the following:

- Install the latest releases of products directly from the Software AG Empower Product Support website on one machine.
- Download products from Empower into a product installation image and then install them from the image on one or more machines.
- Record a product installation script of yourself installing products from Empower or from a product installation image, and then install the products with no user input on one or more machines.

Update Manager

You use Update Manager to install and uninstall fixes and support patches on Software AG products on one machine. Support patches include diagnostic collectors, test patches, and pre-QA fixes and are used to troubleshoot problems in Software AG product installations. With Update Manager you can do the following:

- Install the fixes and support patches directly from Software AG Empower Product Support website on one machine.
- Download fixes from Empower into a fix installation image and then install them from the image on one or more machines.
- Record a fix or support patch installation script of yourself installing fixes or support patches from Empower or from a fix or support patch installation image, and then install the fixes or support patches with no user input on one or more machines.

Deployer and Asset Build Environment

You use Deployer to deploy user-created assets that reside on source Software AG runtimes or repositories to target Software AG runtimes. For example, you might want to deploy assets you have developed on servers in a development environment (the source) to servers in a test or production environment (the target).

Deployer supports two scenarios for deploying assets:

- In a runtime-based deployment scenario, Deployer deploys assets from Software AG runtimes to which Deployer is connected for example, Integration Servers, My webMethods Server, and Trading Networks Servers).
- In a repository-based deployment scenario, Deployer deploys assets built from sources in a development environment or VCS and stored on a repository (for example, AgileApps, API Gateway, Rules Engine, and Universal Messaging. Asset Build Environment resides on the machines on which assets are created and supplies the scripts and libraries necessary to build assets into deployable units.

Digital Event Services

Software AG platforms are supported by an event-driven architecture (EDA). EDA is a software architecture pattern that supports the sharing of events across products - the production and detection of events, and the consumption of and reaction to events. The products that enable EDA are Digital Event Services and Universal Messaging.

Digital Event Services and Universal Messaging

Digital Event Services is the foundation for EDA in the Software AG environment; it enables Software AG products to communicate using events. With Digital Event Services, products can emit events in these ways:

- Business processes can emit events to other business processes.
- Parts of a product runtime can emit events to other parts.
- Products can persist events to an event store.

Digital Event Services enables you to define the format of events to be emitted by one product and consumed by another using the native tools for each product. For example, you could emit documents based on an existing Integration Server document type as events for complex pattern detection by Apama without coding anything in either product.

Events can be visualized in dashboards.

Universal Messaging

Event producers publish messages to Digital Event Services in the form of events; Universal Messaging delivers them to consumers. Each digital event is associated with an *event type*, a schema or schema-based definition that describes the event's structure and is carried on a separate Universal Messaging channel.

Universal Messaging allows for horizontal scalability, in which you specify a set of servers or clusters to connect to within a single logical session and then can publish or subscribe to the same queue or topic across multiple servers or clusters.

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IoT Platforms

IoT devices need to connect to other devices and applications, usually cloud-based, to relay data using internet transfer protocols. IoT platforms connect devices to data networks, monitor and manage those devices, and then use backend applications to extract and provide insight into the data generated by device sensors.

The product you use to connect IoT devices is Cumulocity.

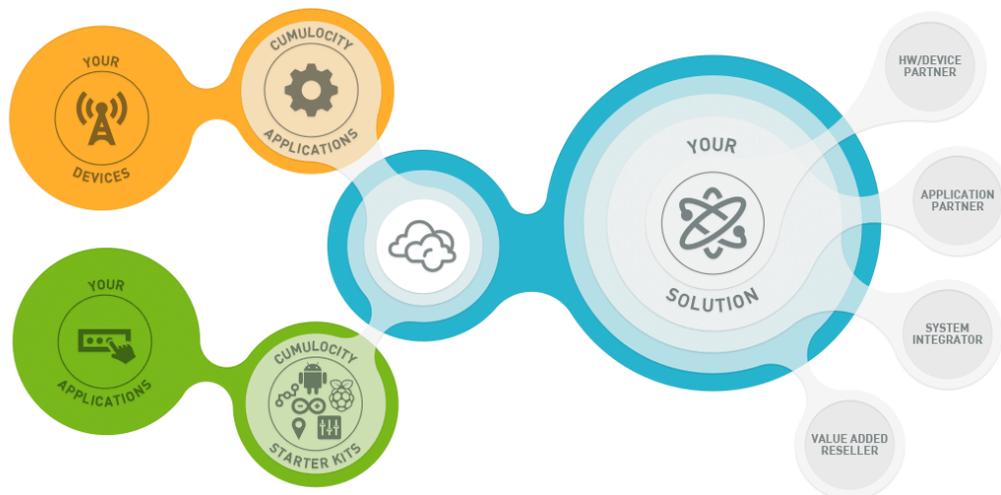
Cumulocity

Cumulocity gives you fast visibility and control over your remote assets, such as houses, cars, and machines. Cumulocity provides the following:

- Certified hardware kits and software libraries you can use to bring your remote assets into the cloud. These can be specialized devices for a particular use case, such as location trackers, OBUs, and vending telemetry devices. They can also be developer kits for building generic devices, such as Raspberry Pi, Cinterion boards, and Tinkerforge sensors. Other devices can also run the software with no or little modification, and there are generic client libraries for Java, JavaME, C/C++, and Lua for your own implementation. If your device uses a completely proprietary runtime environment, you can always use Cumulocity's REST interfaces.
- Mobile networking support. Cumulocity supports any type of Internet connectivity in a secure manner. It deals with intermittent, bandwidth-restricted, and uni-directional connections (such as communication through NAT). Cumulocity can control remote devices in real-time. Mobile Internet connectivity is ideal for machine-to-machine applications, since it works well nearly everywhere without requiring integration with a company's network infrastructure. This is especially true if your M2M SIM card allows for free roaming between mobile networks. With Cumulocity, you can benefit from mobile connectivity without requiring additional network provider services such as VPNs and public or even static IP addressing.
- Device management, data visualization, and remote control functionality through the web. This includes:
 - Hardware and modem information.
 - Connection monitoring, service level monitoring, and centralized fault management.
 - Configuration, software, and firmware management.
 - Frequently used remote controls (for example, restart button and switches).
 - Troubleshooting features such as event lists and operations queues.
- Rapid customization of the above. You can:

- Write alarm rules to re-prioritize or suppress alarms and to define your SLA parameters.
- Implement real-time business rules (for example, get an email when critical events happen, or trigger automated actions on devices).
- Set up a graphical dashboard with your most important KPIs.
- Subscribe to plugins that contribute new functionality to the Cumulocity application.
- APIs for extending existing functionality or interfacing Cumulocity with your other IT services such as ERP or CRM systems. Cumulocity can also host your HTML5 applications. Cumulocity uses HTTP/S and REST, which work on any Internet-connected device ranging from small embedded microcontrollers up to desktop PCs.

All this is provided through a cloud-based subscription service, making the creation of Internet of Things (IoT) solutions with Cumulocity fundamentally different from bespoke development and rapid application development (RAD). You can start immediately with a large amount of existing functionality. You do not need to worry about IT infrastructure (hosting, networking, security, storage and backup) and IT management; all software is available to your users.



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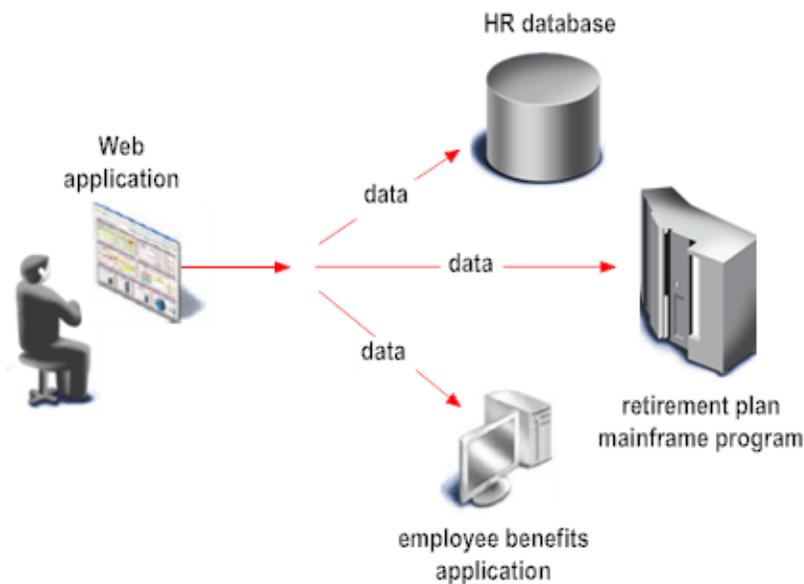
Integration Applications

Integration applications enable disparate resources to share business data. Resources include software applications such as SAP and Siebel, and systems such as databases and mainframe programs. Common integration patterns include:

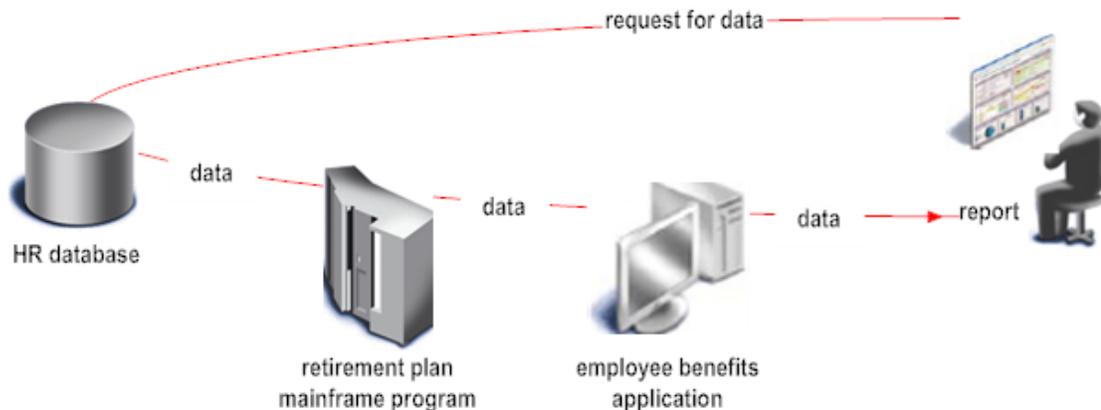
- Synchronization.** For example, two stores in a chain of retail stores maintain customer, product SKU, and product price information. One store maintains the information in a database and the other in a mainframe program. When information is added to or changed in the resource at one store, an integration application updates the resource at the other store.



- Propagation.** For example, a human resources (HR) person enters data for a new employee in a composite application and an integration application propagates the data to a human resources (HR) database, a retirement plan mainframe program, and an employee benefits application.



- **Composition.** For example, an HR person requests a report on an employee through a composite application. An integration application gathers the data for the report from an HR database, a retirement plan mainframe program, and an employee benefits application, and then returns the data to the web application for display in report format.



Developing Hybrid Integration Applications

The primary products you use to develop hybrid integration applications are Software AG Designer, Application Platform, CloudStreams, webMethods adapters, Integration Cloud, Integration Server, EntireX, and ApplinX.

Software AG Designer

Software AG Designer is an Eclipse-based graphical development tool you use to design and test services, the primary elements in integration applications. A service is logic that performs a unit of work. For example, a service could post a purchase order received from a customer to an ordering system, or perform a credit check for a loan application. You can develop these types of services:

- *Simple* services that perform one unit of work.
- *Aggregate* services, in which services call other services (for example, to propagate data from one resource to several other resources).
- *Composite* services, in which a service is wrapped around multiple simple or aggregate services that execute in sequential order (for example, to compose a report by gathering data from one resource after another). The wrapper service manages the flow of data from service to service.

You develop services in the Software AG Designer Service Development perspective, using `webMethodsflow` language or other languages such as Java. When you work in Software AG Designer, you are always connected to an Integration Server, a runtime server whose primary function in integration applications is to execute services. Software AG Designer builds and edits services directly on the Integration Server. In

addition, Integration Server comes with a library of built-in services that you can use in your integration applications.

Service development is an iterative process of building, testing, and correcting (debugging) your code. Software AG Designer provides a range of tools to assist you during the testing and debugging phases. You can test services with input values you specify manually, inspect the results, and investigate errors. You can compare differences between flow services, document types, JMS triggers, and adapter services and connections, and you can merge the differences between two flow services or two document types. You can set up audit logging for services and documents.

Multiple Software AG Designer users can collaborate on an integration application, developing different pieces of the integration application and then deploying the pieces to a single Integration Server for testing. Software AG Designer enables you to lock objects you are working with, and can interact with a third-party version control system (VCS) repository.

Another tool for collaboration is CentraSite, which operates as a shared database of metadata about assets that are stored in Software AG Designer, Integration Server, and CentraSite. Integration application developers can publish services and document types from Software AG Designer to CentraSite, and can drag and drop these assets from CentraSite into Software AG Designer. You can incorporate web services from CentraSite (and other SOA registries) into integration applications you build in Software AG Designer. Conversely, Software AG Designer can create web services from services that reside on Integration Server and can register the web services with CentraSite (and other SOA registries).

CloudStreams

CloudStreams is a multi-component product that enables you to develop and govern integration flows between software as a service (SaaS) providers such as Salesforce.com and on-premises applications such as CRM and ERP. CloudStreams includes a server, an analytics dashboard, and Software AG Designer perspectives.

The CloudStreams Server performs these functions:

- Runs on Integration Server and hosts *connectors*. Connectors contain assets that enable the CloudStreams Server to connect with and perform operations on SaaS providers. Software AG provides many connectors, including the Salesforce.com connector.
- Enables you to create custom cloud connectors for other SaaS applications. Using the dynamic operations capability in the CloudStreams framework, you can quickly create connectors that expose custom operations within a connector.
- Collects run-time performance metrics and events for your CloudStreams connectors and services. You can use the CloudStreams Analytics dashboard to monitor collected metrics and events.

For inbound processing (that is, from SaaS providers to on-premises applications), you use the Software AG Designer CloudStreams Development perspective to create virtual services and their governance policies. These services and policies perform user-defined

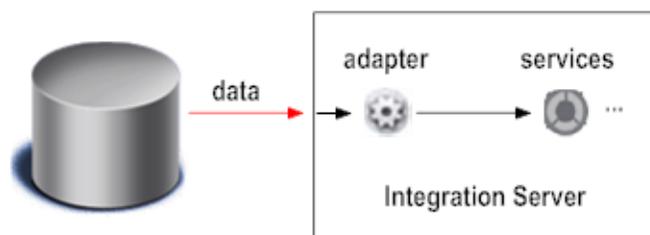
security checks and processing, send requests to on-premises applications, and handle the responses.

For outbound processing (that is, from on-premises applications to SaaS providers), you use the Software AG Designer Service Development perspective to create cloud connector services that perform SOAP operations or access REST resources. You use the CloudStreams Development perspective to create a special kind of virtual service, called a connector virtual service, that sends requests to SaaS providers and handles the responses

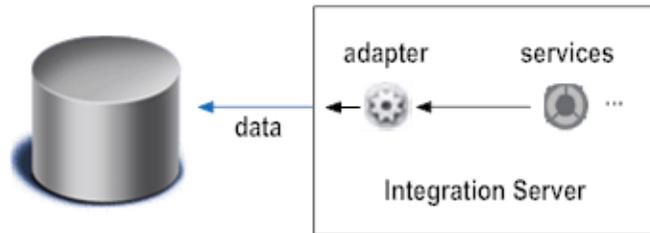
Adapters

If an integration application must interact with an application for which Software AG provides an *adapter*, you can create services that invoke services in the adapter. Adapters are software components with web browser-based interfaces that connect resources in your enterprise to Software AG products, and, through those products, to each other. While Integration Server supports a variety of standards such as XML, adapters support proprietary protocols for accessing packaged applications such as SAP, Siebel, Oracle Applications, and PeopleSoft; databases such as Oracle, SQL Server, Informix, Sybase, and DB2; and mission-critical programs on mainframes and UNIX systems. Adapters transform data from resource-specific format into the format used by the Software AG product, and vice versa. They enable you to incorporate resources into integration applications without having to build complex custom code. Adapters run on Integration Server.

Adapters convey data from resources to Software AG products. Adapters can either actively poll resources for new or changed data or passively receive new or changed data from resources. For example, the Adapter for JDBC can receive data from a database, transform it from the database-specific format into the appropriate Software AG internal format, and send the transformed data to services on Integration Server for further processing.



Adapters convey data from Software AG products to resources. For example, an Adapter for JDBC service can receive data from an Integration Server service, transform it from the Software AG internal format into the format required by the database, and insert it into the database.



Integration Cloud

Integration Cloud is a cloud-hosted integration Platform-as-a-Service (iPaaS) that provides connectivity between cloud-based SaaS providers such as Salesforce.com and on-premise applications such as CRM and ERP. Integration Cloud also enables you to define integrations that support use cases such as synchronization and propagation. Integration Cloud is hosted by Software AG and provides a browser-based user interface for managing users, connecting to applications, and defining integrations.

Integration Cloud offers the features below.

Function	Description
Connectivity	Software AG provides many connectors to SaaS applications including Salesforce, ServiceNow, and Marketo.
Service Orchestration	Integration Cloud lets you create integrations using the browser-based user interface. You can create either point-to-point integrations, or complex orchestrations among multiple endpoints.
Administration	Integration Cloud lets you define and administer users, including access rights, as well as product development life-cycle management stages such as promotion between dev, integration, staging, and production environments.
Hybrid connections	Integration Cloud supports secure connections between Integration Cloud on-premises applications by connecting to Integration Servers or light-weight Integration Agents.

Integration Cloud does not require any software to be installed on premise.

EntireX

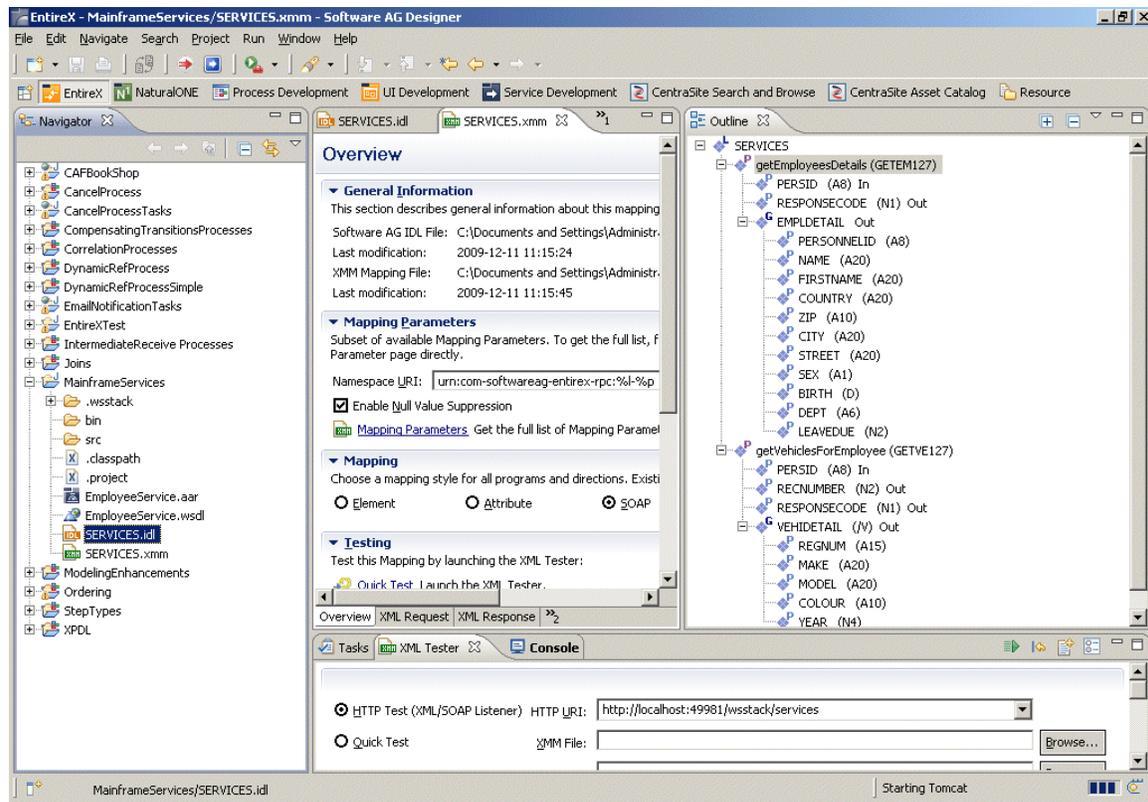
EntireX enables you to easily connect services that run on Integration Server to mission-critical programs written in languages like COBOL or Natural.

The EntireX runtime environment includes these main components:

- The EntireX Adapter, which runs on Integration Server.
- The EntireX Broker, which supports load balancing, security, large messages, and high availability.
- Client or Server endpoints, like CICS RPC Server.
- The EntireX perspective in Software AG Designer, which enables you to generate the necessary assets, like adapter services on Integration Server.

Suppose you want to call a CICS transaction programmed in COBOL from Integration Server. One architectural variant to implement this synchronous request-reply scenario with EntireX is EntireX Adapter to EntireX Broker to CICS RPC Server. You would use the EntireX perspective in Software AG Designer to extract the transaction's interface from the COBOL source, copybooks, or both. EntireX wizards guide you through interface extraction and code generation of the adapter service on an Integration Server that hosts the EntireX Adapter. EntireX creates all technical assets needed, relieving you from having to work with technical details. You can directly test the adapter service in Software AG Designer.

For advanced use cases, however, the technical details are still accessible. The illustration below shows extracted signatures for two mainframe programs in the EntireX perspective.



When you run the adapter service on Integration Server, it invokes the CICS transaction on the mainframe side using values you provide for the transaction's extracted inputs. You can use the adapter service in integration applications as you would any other Integration Server service. Software AG Designer can create a web service from the adapter service and can register the web service in SOA registries such as CentraSite. You can then easily use the web services to include mainframe resources in business-to-business integrations (B2B) and business processes.

Since the EntireX architecture is symmetric, it allows for outbound as well as inbound connectivity. For example, suppose your CICS transaction wants to call an Integration Server flow service (that is, mainframe outbound). EntireX helps you create the necessary assets in the same manner.

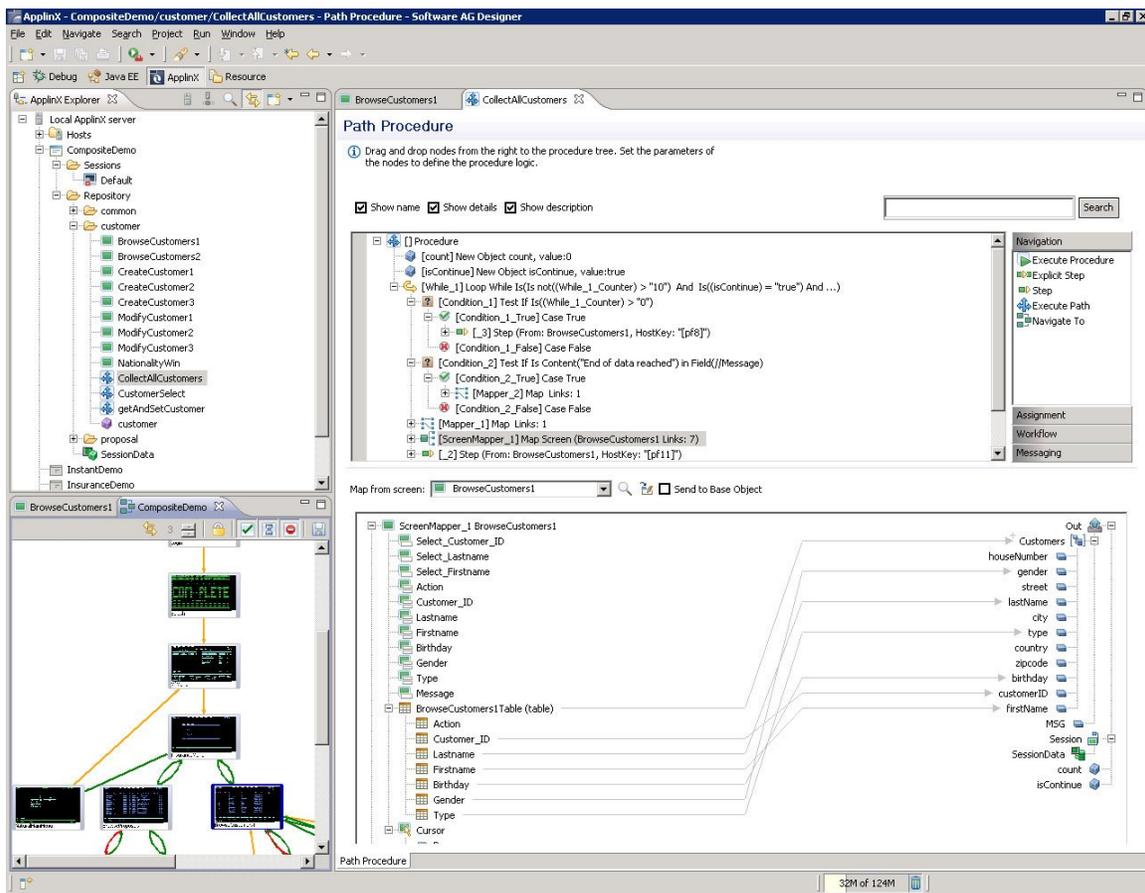
You can extract the signatures of programs written in COBOL, PL/I, or Natural. On the mainframe, EntireX supports CICS, IMS, and batch environments. You can set up zero server footprint scenarios for CICS, IMS, and AS/400. This may be useful when integration spans different organizational units.

ApplinX

ApplinX is a server-based technology that provides an efficient, robust, and easy way for web applications to access and integrate data and transactions from core system applications without changing those applications.

ApplinX exposes core system applications and encapsulates them in components such as web applications and web services using standard programmatic environments such as .NET or J2EE. You can then use these components as advanced building blocks in any modern development platform, for new or existing applications such as CRM applications. In this way, you can integrate core system applications into new strategic IT platforms, and can re-engineer your workflow using a more streamlined and efficient task-oriented and role-based approach.

ApplinX offers three types of solutions: web enablement, SOA enablement, and webpage integration. You use the ApplinX perspective in Software AG Designer for these types of development work. The illustration below shows the ApplinX perspective.



Web Enablement

Web enablement allows you to turn existing host 'green screens' into web interfaces. You can achieve a true web look and feel without touching existing applications or changing any code. ApplinX offers the web enablement solutions described below.

Instant Solution

The instant solution enables you to turn core system applications into modern-looking web applications with little or no coding. Simple configurations to the web applications can improve the general look and feel of the application; for example, you can design a template with top and side images and a company logo, and modify the style sheet using different fonts, colors, and so on. These changes enable the end user to access information more quickly and with improved visibility.

In Software AG Designer, you can use *screen groups*, which allow you to apply the same design to multiple screens. You can use transformations to convert host screen patterns into web components. Transformations can include formatting the screen's header area, message line, titles, and borders; transforming host function keys into hyperlinks, buttons, or images; converting input fields into GUI elements such as combo boxes, radio buttons, or check boxes; adding calendar components to date input fields; and removing unnecessary characters.

HTML Emulation Solution

ApplinX's thin client HTML emulation is available in .NET and J2EE environments. ApplinX can instantly turn a host terminal emulation into a web browser terminal emulation that provides host key and print support and maintains existing color schemes.

Composite Solution

The composite solution, available in .NET and J2EE environments, enables you to fully customize and extend your web applications. You can aggregate information from multiple core system applications into a single webpage. You can integrate legacy assets at the screen, transaction, or data level, and support various web environments using the ApplinX Base Objects API for customizing the web framework.

SOA Enablement

SOA enablement allows you to reuse core system application functionality and leverage the operational qualities of a system's transaction platform to new IT projects. You expose core system application functionality and data as web services at the screen or transaction level, and integrate with other environments that invoke web services.

In Software AG Designer, you can create procedures and use them to turn application functionality into web services. You can combine disparate data sources into web services using ApplinX entities such as screens, programs, databases, and external web services. ApplinX supports web service standards such as SOAP and WSDL, and JAXR for registering services in SOA registries such as CentraSite.

Webpage Integration

ApplinX offers a webpage integration solution that enables you to simulate web browser activity within ApplinX and expose it as a standard web service or integrate it with ApplinX procedures. Specifically, you use the simulation to record web content and create an ApplinX Web Procedure. The web procedure is designed to enable integration of webpage user interfaces within ApplinX. You can expose the web procedure as a service in the same way you can expose ApplinX procedures such as the Path and Flow Procedures.

Developing and Testing Integration Server Assets Locally

The collection of products that enable you to develop and test Integration Server assets locally is called webMethods Integration Server DevOps Edition. DevOps Edition enables continuous development and continuous integration. It contains features that improve development productivity and enable developers to locally develop, build, change, and test the services that eventually lead to continuous integration.

DevOps Edition includes Software AG Designer, Local Version Control Integration, Unit Test Framework, and Application Platform.

Local Version Control Integration

Local Version Control Integration is a feature in the Software AG Designer Service Development plug-in that you can use to develop Integration Server packages locally as Eclipse projects. With this feature, you can check package elements and their supporting files into and out of a version control system (VCS) directly from Software AG Designer. To facilitate local development, an Integration Server is installed locally in the same root directory as Software AG Designer. You can also use an Integration Server running in a Docker container as the local development server for this feature.

Unit Test Framework

Software AG Designer provides a range of tools to assist during the testing and debugging phases of development. Unit Test Framework is a service unit testing and regression testing tool for service developers to quickly assemble unit tests to improve overall development quality without custom development. Unit Test Framework facilitates automated unit and regression testing of services, and provides a mechanism for creating automated tools for continuous integration and delivery. Unit Test Framework can integrate with JUnit, leveraging a standard unit testing framework that already works well with continuous integration tools. In addition, Unit Test Framework provides a Java API for advanced users to create JUnit test cases. You can automate build deployment and execution of Jenkins tasks from Unit Test Framework.

The Unit Test Framework perspective in Software AG Designer enables you to do the following:

Testing	Description
Unit	Design, build, and execute unit test cases in the Software AG Designer Eclipse user interface. You can also execute test cases externally using Ant scripts. You can test flow services with input values you specify manually, inspect the results, and investigate errors.
Mock	Have a test case execute a mocked service using input values you specify, invoke an intermediary service instead of the mocked service, replace the output of the mocked service with a specified exception, or use a custom Java class to implement the mocked service
Regression	Save test cases, along with their inputs and outputs, in XML files, and then rerun these reusable artifacts to make sure your latest changes do not re-introduce errors that were fixed in earlier versions.

Testing	Description
Code coverage	Record and analyze which flow steps and map actions of your flow services are executed during a particular test launch. Helps to identify untested steps and improve the corresponding tests.

Application Platform

Application Platform enables you to develop application logic in Java without having to use proprietary webMethods APIs. You can use popular Java development models such as POJOs or Spring Beans for your application logic, and then deploy the logic to run in Integration Server or My webMethods Server.

You develop the application logic using the Application Platform perspective in Software AG Designer. You can also develop web UI applications based on Java servlet technology, and set authentication and authorization requirements in these applications. You can create JUnit tests and run them in Software AG Designer to verify application functionality. The tests are executed on a running Integration Server or My webMethods Server, and the execution results are displayed on the Software AG Designer JUnit view.

You can integrate Application Platform services with Integration Server services. You can use simple Java annotations to expose Application Platform services within Integration Server and make those services callable from Flow services, triggers, or web service connectors. You can create Java class wrappers for Integration Server services to make those services callable from Application Platform services without using proprietary Integration Server client APIs.

Executing Integration Applications

The products that execute integration applications include Integration Server, Integration Agent, Microservices Runtime, and Universal Messaging.

Integration Server

Integration Server is a run-time server with a web browser-based user interface whose primary function in integration applications is to execute services. Integration Server does the following:

1. Receives requests from client applications and authenticates and authorizes the requesting users.
2. Invokes the appropriate services and passes them input data from the requesting clients.
3. Receives output data from the services and returns it to the clients.

Integration Server supports a wide range of established and emerging standards so you can interact with virtually any business partner that is connected to the Internet.

Integration Server supports...	Such as...
Transport standards	HTTP, HTTPS, FTP, FTPS, SMTP
Message formats	MIME, S/MIME
Data standards	XML and XML Schema, custom flat file formats with delimited fixed- or variable-length records, JSON
Protocols	JMS, Kerberos, OData, OpenID Connect, SFTP, SOAP, SOCKS, Websocket, XML RPC
Specifications	Swagger, Web Service Description Language (WSDL)
Integration patterns	REST, web services, event-driven, request-reply
Authorization	OAuth, JWT

Integration Server hosts packages that contain services and related files, such as specifications, document types, triggers, and dynamic server pages (DSPs). Integration Server comes with many packages, and developers can create their own packages to hold services they create.

Integration Agent

Integration Agent is a light-weight Integration Server that provides a subset of Integration Server functionality. Integration Agent can be used in scenarios like these:

- By partners in hybrid integration scenarios that involve integrations in the cloud.
- At point-of-sale terminals, where there are constraints on hard drive space and RAM.

Universal Messaging

Universal Messaging is fast, reliable, scalable, and flexible Java message-oriented middleware (MOM) that provides messaging functionality such as clustering, scheduling, and interface plug-ins, with standard support for the messaging paradigms of publish/subscribe, and message queues, as well as support for JMS. Universal Messaging also supports a significant part of the AMQP 1.0 standard wire protocol for messaging, specifically the parts that are exposed through the JMS API.

Universal Messaging serves as the intermediary that routes data from publishers to subscribers. It can function as the messaging backbone for resources across your enterprise and can support an event-driven architecture, in which subscribers receive documents and then perform predefined actions. Integration Server can encode/decode those documents as protocol buffers.

Hosting and Delivering Microservices

Microservices is an architectural style for developing an application as a suite of small services called *microservices* that perform a single business function. A microservice is a collection of operations, effectively an API, that is remotely called but does not have a formal specification like a WSDL, yet that is meant to be independently deployable. It can be implemented in various ways, including as a set of services or as event and channel definitions.

Microservices Runtime enables you to deliver microservices as a package that includes a set of related services, interfaces, document types, and triggers that subscribe to topics or queues, or as a set of related packages of this kind (for example, five packages relating to Human Resources functions).

Each microservice can run in its own Microservices Runtime and can communicate with lightweight mechanisms such as an HTTP resource API. However, you can also execute multiple microservices in the same Microservices Runtime. This hybrid solution enables you to separate microservices when needed, but also to group them when necessary. Suppose you have two microservices that need to be scaled together in similar ways (that is, when you need a new instance of one, you need a new instance of the other). If you discover that one microservice is more heavily loaded than the other, or needs to be enhanced or updated more often, you could deploy the two microservices to separate Microservices Runtime. If both microservices tend to be updated at the same time, you could cohost them in the same Microservices Runtime.

Microservices Runtime is fully compatible with Integration Server and can host services you develop using Software AG Designer and Integration Server. While Microservices Runtime is optimized to have a reduced disk and memory footprint, you can convert it into a full Integration Server by installing additional modules, such as support for an external database.

Microservices Runtime provides out-of-the-box support for dynamic lookup of service endpoints using the open-source Consul service registry. You can register a package that functions as a microservice in the Consul service registry, or automate the registration process by adding the package endpoint during the package loading process. The corresponding removal of the endpoint information can occur when unloading the package. Microservices Runtime provides facilities to look up the endpoint information which can be used to call the microservice at run time. You can also create your own package that integrates with other service registry providers.

You can run a microservice or a set of related microservices in a Docker container, obviating the need to purchase expensive VMs. Docker images include configuration,

and enabling you to deploy the exact same configuration anywhere. The Docker image can include one package or a set of related packages.

Integration Application Examples

You can implement integration applications in a wide variety of ways. Below are some examples.

Synchronization

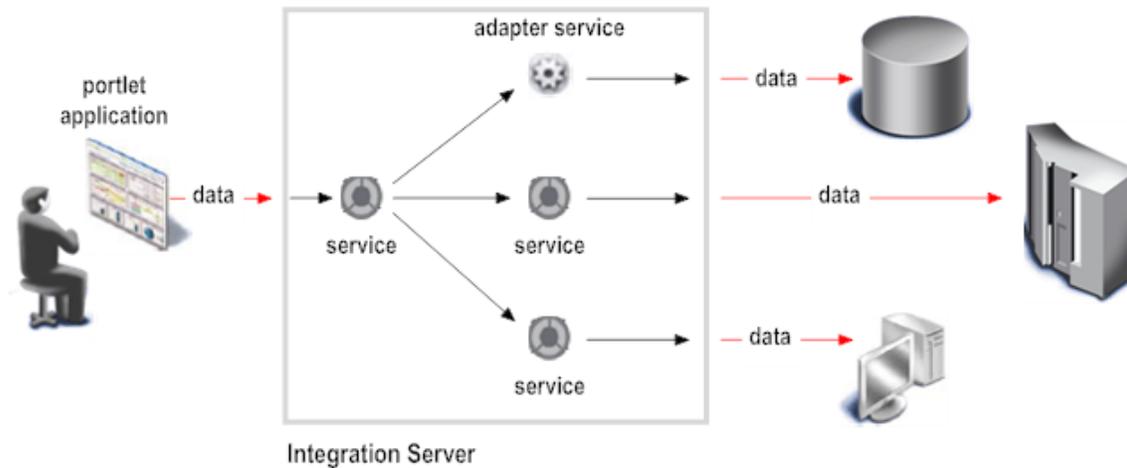
Suppose you want to synchronize customer information between Siebel and a mainframe program. You set up the Siebel Adapter to interact with the Siebel application and the EntireX Adapter to interact with the mainframe program. Since EntireX architecture is symmetric, you can use push or pull methods.

To get data from Siebel to the mainframe program, you have the Siebel Adapter monitor the Siebel application for new or changed data. The adapter transforms the data from Siebel's proprietary format into the appropriate Software AG internal format and passes it to Integration Server. Integration Server processes the data and then passes it to the EntireX Adapter, which transforms it into the mainframe program's format and inserts it into the system. To get data from the mainframe program to Siebel, you use the same process, in reverse.

Propagation

Suppose you want to change employee information using a composite application, and you want to propagate the changes to the human resources (HR) database, the employee benefits application, and the retirement plan mainframe program. You develop the following:

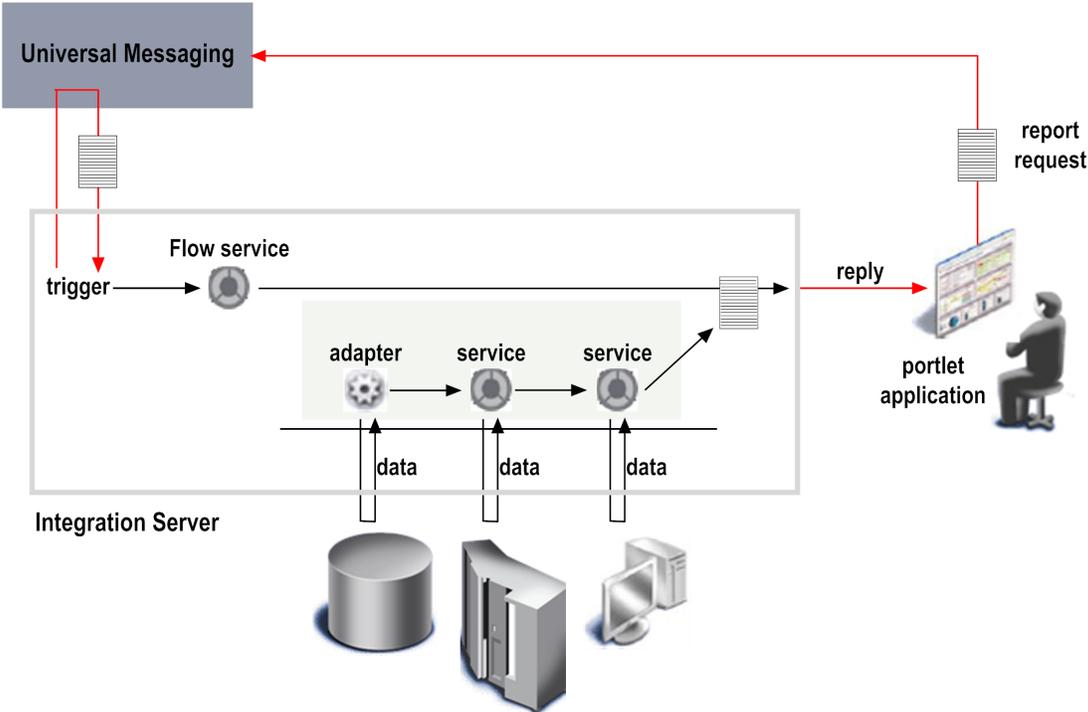
- A composite application in Software AG Designer that provides a user interface for entering employee information, and passes data entered on the form to Integration Server for processing.
- A synchronous service that receives the data from Integration Server, simultaneously invokes the three services described below, waits for confirmation from the three services, and then returns the confirmation to the composite application to display to the user.
- An Adapter for JDBC service and two other services that insert the data into the database, mainframe program, and benefits application, respectively, and return confirmations to the synchronous service described above.



Composition

Suppose HR wants to create reports containing employee information from the HR database, the retirement plan mainframe program, and the employee benefits application. You want to use Universal Messaging and its publish/subscribe model to route the information. You develop the following:

- A composite application in Software AG Designer that provides a user interface for requesting the report, publishes the request to Universal Messaging, and displays the returned data in report form to the user.
- A synchronous Adapter for JDBC service to extract data from the database.
- Two synchronous services that extract data from the mainframe program and the benefits application.
- An asynchronous flow service that wraps the three services described above, maps the data from service to service, and produces the reply.
- A *trigger* on Integration Server that subscribes to the report request on Universal Messaging and invokes the flow service when Integration Server receives the request.



9 In-Memory Data Management

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In-Memory Data Management

The Terracotta Ehcache API is an open-source, standards-based caching API that enables applications to fetch frequently used data from memory (or another nearby resource) rather than having to retrieve it from a database or other back-end system. Information on how Software AG products use in-memory data management is provided in the other chapters in this guide.

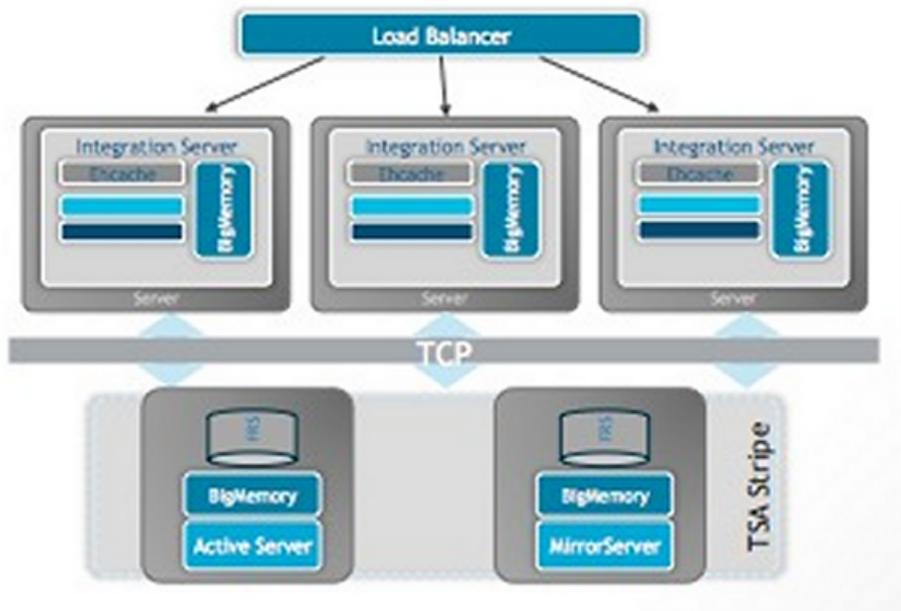
Terracotta BigMemory Max

Terracotta BigMemory Max extends the Terracotta Ehcache API so applications can create very large in-memory caches outside the Java heap and share cached data with other applications on the network. Using Terracotta BigMemory Max, you can create much larger caches than with local on-heap memory alone. You can use terabytes for caching, depending on the platform you use. Caches that you create using Terracotta BigMemory Max also perform more predictably and consistently than on-heap caches, because they are not subject to the JVM garbage-collection process.

For details on the ways in which webMethods products use Terracotta BigMemory Max, see *Using Terracotta with webMethods Products*.

Terracotta Server Array

Terracotta Server Array is a feature of Terracotta BigMemory Max that enables distributed caching. With Terracotta Server Array, you can use a shared cache for multiple applications. A Terracotta Server Array generally consists of an active Terracotta Server and a mirror Terracotta Server for high availability.



Terracotta DB

Terracotta DB is a comprehensive, distributed, in-memory data management solution that handles caching and operational storage use cases and enables transactional and analytical processing. Terracotta DB has one of the most powerful query and computation capabilities in its class, leveraging native JDK features such as Java Streams, collections, and functions. Terracotta DB offers a storage subsystem called TCStore that provides operational store and compute functionality, and a caching subsystem called Ehcache that provides caching functionality. Both subsystems are backed by the Terracotta Server, which supplies a common platform for distributed in-memory data storage with scale-out, scale-up, and high availability features.

The webMethods Adapter for Terracotta DB enables you to connect a wide variety of enterprise applications and some Software AG to Terracotta DB.

10 Master Data Management

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Master Data Management

Master data is business information that is critical to the operation of an enterprise. Business information might include data about customers, trading partners, employees, suppliers, products, materials, and assets.

In a large organization, different departments might have different versions of the same master data. The data might also be inaccurate or incomplete. The use of this data can therefore cause serious problems. Master data management (MDM) offers an organization the ability to create and maintain a single, trusted, shareable version of master data. MDM offers processes and tools that collect, aggregate, persist, and distribute master data consistently throughout an organization.

The products you use for MDM are OneData and Locate.

OneData

OneData reconciles, cleanses, synchronizes, and stores all your master data, as well as all your data definitions, structures, workflow, processes, and rules. Enterprises deploy OneData as the MDM solution to improve process performance and enable better business decisions.

OneData provides a repository in which to store your master data, and a web browser-based user interface that lets you search for and work with that data. It also provides the capability for data interchange with other systems using mechanisms such as schedulable data interchange jobs for importing and export data in multiple formats and REST-based service layers calls.

OneData has an open, extensible data model. You can import your existing model, or use built-in templates. Any domain or subject area that is in the data model becomes part of the solution; there are no proprietary structures. You can easily modify or extend the model at any time, and changes are reflected immediately in the OneData user interface.

OneData supports multiple MDM architectural styles. These architecture styles include centralized, consolidated, coexistence, and hybrid, as well as combinations of these styles. OneData supports both operational and analytical MDM use cases.

OneData offers data cleanser APIs that include a generic cleanser, a cleanser that uses OneData-defined cleansing projects, and a cleanser that uses OneData-defined cleansing projects for a given data object. OneData also offers data matcher APIs, which include a generic matcher, a matcher that uses OneData matching projects, a matcher that uses OneData matching rules, and a matcher that uses OneData matching projects for a given data object.

OneData objects support JSON schema. You can use JSON as the payload format in HTTP POST calls to OneData REST data; the object definition in OneData allows you to generate a JSON schema for such calls. You can also retrieve this schema in an API call.

OneData uses Elasticsearch as its search engine.

OneData interacts with the Software AG products described below.

Product	Description
Locate	Provides address reference data for more than 240 countries worldwide, verifies international addresses, checks address data for errors and omissions, and fills in missing address attributes when needed. Performs geocoding.
Integration Server	Executes services called by OneData (for example, to perform data validation or enrichment).
Universal Messaging	JMS provider for data acquisition and deployment in real time. If you modify data in OneData, OneData can publish a message to JMS topics or queues for subscribers to pick up. Conversely, OneData can subscribe to JMS topics and queues for messages about data changes in back-end systems such as CRM.
Terracotta	Maintains in-memory databases, which are cached versions of data objects. When you enable caching for a data object, OneData stores the records associated with the object in cache as well as in the release area. Caching improves the performance of REST services that use the data object, because the services interact with the cache instead of the database.
webMethods Business Process Management (BPM)	Define advanced workflow processes.

OneData also integrates with any industry-standard enterprise service bus (ESB) or service-oriented architecture (SOA) environment, to share and reuse the same master data both in operative systems and in data warehousing and reporting systems.

OneData supports end-to-end master data life-cycle capabilities, such as:

- Creation and maintenance of data through the OneData user interface.
- Modeling and configuration, with no coding needed. OneData implementations typically can be accomplished in a matter of weeks.
- Data acquisitions from and data deployment to data sources such as databases, flat files, and XML files.

- Hierarchy management.
- Data change request and approval workflows.
- Data quality (that is, cleansing, matching, and survivorship). OneData can also integrate with third-party data quality tools.
- Data security, auditing, and reporting.

The illustration below shows a hierarchy in the OneData user interface. Details for a node in the hierarchy appear on the right.

The screenshot displays the webMethods OneData user interface. On the left, a tree view shows the hierarchy: Products by Brand and Product Family > webMethods > Product Family > webMethods Master Data Management Products > Products > webMethods OneData Multi-Domain MDM Bundle > Bundled Products. The right pane shows details for the selected product:

- Product Name:** webMethods OneData Multi-Domain MDM Bundle
- Product Code:** ODEMD
- Product Family:** webMethods Master Data Management Products
- Description:** webMethods OneData is licensed as a complete, one-price, multi-domain software solution, or ?bundle?. This differs from some of our existing software licensing models, as it is not based on the number of processor cores, but rather the number of webMethods OneData Repositories used to store webMethods OneData objects. The bundle includes one webMethods OneData Server, 50 Objects, 10 Read/Write User licenses and 10 Read-Only User licenses. Multi-domain MDM pricing is extended by increasing the number of licenses of objects, users and optional modules (e.g. MDR).
- Licensing:**
 - *Sales Status:** Y0 - UNRESTRICTED SALE
 - *Pricing Model:** Each
 - *Bundle Type:** Technology Bundle
- License Restrictions:** The webMethods OneData Server has three separate areas (schemas in Oracle): the Work area, containing the data that is work-in-progress (not yet approved); the Release area, which contains all approved data; and the metadata area, containing internal metadata and user details. A license of webMethods OneData entitles a customer to a single instance of a webMethods OneData Server and one or more instances of the OneData MDM Software (application logic) executed inside a Java J2EE application server. Each OneData Server may be
- Additional Capacity Licensing:** To license additional Objects, User licenses, and Viewer licenses, use the following product codes: o webMethods OneData Objects (ODEOB) o webMethods OneData Read-Write Users (ODEUL) o webMethods OneData Read-Only Users (ODEVL)
- Third Party Obligations:** None

The illustration below shows a data grid whose contents reflect a data object created in OneData.

The screenshot shows a web browser window displaying the webMethods OneData application. The user is logged in as 'admin' in the 'Demo Repository (Project: Software AG Product master) (Work Area)'. The interface includes a navigation menu with options like 'Define', 'Manage', 'View', 'Collaborate', 'Administer', 'Data Interchange', 'Personalize', and 'Favorites'. The main content area shows a table of products with columns for 'Product Name' and 'Product Family'. The table lists various products such as 'webMethods OneData MDR Module', 'webMethods Trading Networks', and 'webMethods Reverse Invoke Server', each associated with a specific product family like 'webMethods Master Data Management Products' or 'webMethods B2B Products'.

	Product Name	Product Family
<input type="checkbox"/>	webMethods OneData MDR Module	webMethods Master Data Management Products
<input type="checkbox"/>	webMethods Trading Networks	webMethods B2B Products
<input type="checkbox"/>	webMethods Reverse Invoke Server	webMethods ESB Products
<input type="checkbox"/>	webMethods Integration Server	webMethods ESB Products
<input type="checkbox"/>	webMethods Integration Server for BPMS Bundle	webMethods ESB Products
<input type="checkbox"/>	webMethods ESB	webMethods ESB Products
<input type="checkbox"/>	webMethods ESB Component	webMethods ESB Products
<input type="checkbox"/>	webMethods Broker	webMethods ESB Products
<input type="checkbox"/>	webMethods Broker for BPMS Bundle	webMethods ESB Products
<input type="checkbox"/>	webMethods Integration Platform Project	webMethods ESB Products
<input type="checkbox"/>	webMethods Ariba Supplier OnRamp	webMethods ESB Products
<input type="checkbox"/>	webMethods OnRamp for Commerce One MarketSite	webMethods ESB Products
<input type="checkbox"/>	webMethods Enterprise JavaBeans Adapter	webMethods ESB Products
<input type="checkbox"/>	webMethods PeopleSoft Enterprise Adapter	webMethods ESB Products
<input type="checkbox"/>	webMethods Remedy Adapter	webMethods ESB Products
<input type="checkbox"/>	webMethods Siebel Adapter	webMethods ESB Products
<input type="checkbox"/>	webMethods Test	webMethods ESB Products
<input type="checkbox"/>	webMethods Communicate Server Software Base Package	webMethods BPMS products
<input type="checkbox"/>	webMethods Workflow	webMethods BPMS products
<input type="checkbox"/>	webMethods B2B Quickstart Edition	webMethods B2B Products
<input type="checkbox"/>	webMethods B2B Quickstart - Additional Adapters	webMethods B2B Products
<input type="checkbox"/>	webMethods CAF Designer	webMethods CAF Products
<input type="checkbox"/>	webMethods Designer	Common Products
<input type="checkbox"/>	webMethods Communicate Add-on for Integration Server	webMethods BPMS products

OneData and the OneData APIs are protected against cross-site script (XSS) attacks.

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Mobile Integrations

Mobile integrations enable you to extend your integrations and business processes into the mobile space, so users anywhere in the world can interact with those integrations and business processes from their mobile devices.

The products you use to develop mobile integrations are Software AG Designer, Mobile Designer, and Mobile Support in the Mobile Suite. The Mobile Suite fully supports Mobile Enterprise Application Platform (MEAP) requirements and spans the full mobile life-cycle, from developing and deploying mobile apps to securely integrating and managing them. The Mobile Suite can also bring existing IT services and processes to mobile devices in an efficient way.

Software AG Designer

You can develop mobile apps using the Mobile Development perspective in Software AG Designer. Mobile Development provides logic that reduces the amount of code you must write to develop a mobile app.

Mobile Development uses the principles of model-view-controller (MVC) architecture, which separates user interfaces from business logic and data. With Mobile Development, mobile app developers design a user interface and then generate Java code that displays the user interface and responds to user-initiated events, such as the clicking of a button. The developers code business logic separately from the user interface, in Java classes created by Mobile Development.

Mobile Designer

You can develop mobile apps using Mobile Designer. With Mobile Designer, mobile app developers create mobile apps in Java and then automatically convert the apps for any mobile device, from an iPad to an Android to a Windows Phone. The converted apps provide the user experience that each device owner expects. Mobile Designer reduces the need for in-house mobile knowledge, which in turn reduces development and maintenance costs. Mobile Designer is integrated with the Software AG Designer Service Development perspective so you can browse and add services from Integration Server to the application model.

Mobile Support

Mobile Support is a set of tools that enable mobile app developers and business integration developers to create mobile data synchronization solutions. Such solutions transfer data between mobile devices and backend enterprise applications and resolve conflicts that occur when backend data is updated by multiple sources at the same time.

Mobile Support includes two components:

- Mobile Support Client provides a Java client library of classes composed of methods that initiate requests to synchronize data. Mobile app developers incorporate the synchronization methods in their apps.
- Mobile Support package runs on Integration Server and provides a service that synchronizes data sent by mobile devices. Business integration developers incorporate the synchronization service in their integration services.

Mobile apps submit synchronization requests to Mobile Support Client, which asks Integration Server to execute the services that process the requests. Mobile apps can submit either of the following synchronization requests:

- Download changed data from the backend application to the mobile device.
- Upload changed data from the mobile device to the backend application, synchronize that data with the backend data, and download changed data from the backend application to the mobile device.

12 Process & Applications

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Business Process Management

A business process is a series of business activities that are performed in a specific order by a variety of applications, systems, employees, and external businesses. Examples of business processes include handling a purchase order from receipt through fulfillment, taking a product from inception to market, and preparing for a new employee. Business processes are more complex and long-running than application integrations and can include activities performed by humans.

Business process management enables you to automate business processes. For example, the process of preparing for a new employee could be automated as follows:

1. The hiring manager submits an online form that contains information about the new employee.
2. The submission of the form triggers the first step in the process. This step adds the employee's information to the internal human resources (HR) database and registers the employee in various systems and applications, such as the enterprise's e-mail application.
3. The next step in the process uses the enterprise's trading network to notify the external payroll company to set up an account for the employee.
4. The next step sends the facilities department a task to assign office space and provide office equipment before the employee's start date.

Business processes typically involve many variables and conditions, and the longer they run, the more likely the variables and conditions are to change. For example, a supplier might temporarily run out of parts needed to fill orders. Business process management enables you to act on running processes in response to such changes; in the example above, you could suspend order fulfillment processes until parts are available again.

Designing Business Processes

Experts in company procedures create *business process models* that are the designs for business processes. These business process designers define the steps in business processes and dictate the order of the steps and the conditions under which each step should run.

The product that business process designers use to create business process models is Software AG Designer.

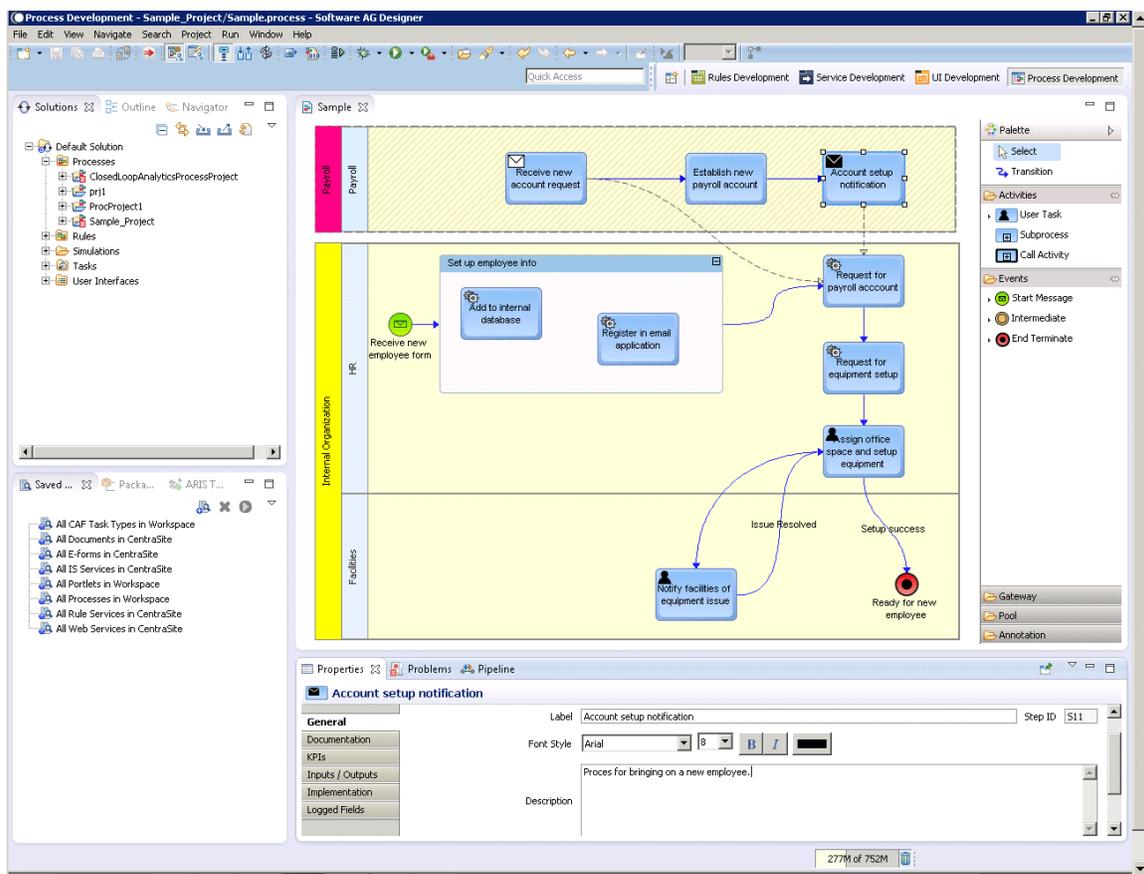
Software AG Designer

Software AG Designer is an Eclipse-based graphical development tool that offers *perspectives* for different types of work. The Business Analyst capability of the Software AG Designer Process Development perspective enables business analysts to document

the requirements of the business process. This documentation helps guide the business process developers who implement the business process model. For example, documentation can:

- Specify the input that each process step requires and the output that each process step should produce.
- Identify humans who are involved in the process (for example, a facilities manager, to set up office space).
- Specify how to handle errors.
- List KPIs to track to measure the effectiveness of the process (for example, the period of time it took to set up the office space).

The illustration below shows a business process model in the Business Analyst capability in Software AG Designer.



Implementing Business Process Models

The primary product that business process developers use to implement business process models is Software AG Designer. Developers might also use CentraSite, Task Engine, and AgileApps.

Software AG Designer

Business process developers receive a new business process model from a business analyst and use the Software AG Designer to implement business process models. Software AG Designer offers two perspectives for implementing business process models for two different types of business processes:

- The new Dynamic Process Development perspective. Dynamic business process models are all-inclusive and can be executed without any compilation. You can deploy new versions quickly, and easily modify individual instances of processes in-flight.
- The classic Process Development perspective. Classic business process models must be compiled into run-able elements before you can actually execute processes. Specifically, you must build and upload the model to create the XML scripts, triggers, flows, and metadata that will initiate and control a process instance at runtime. Each time you need to modify these models, you must edit and recompile.

Both Software AG Designer perspectives offer an extensive set of programming tools that enable a technical user to focus on the detailed implementation of a business process model.

Developers implement a business process model in Software AG Designer by dragging and dropping graphical representations of process steps onto a design canvas, then configuring each step to perform a specific function. For example, process steps can:

- Receive data. Data can be in the form of documents from Software AG products, JMS messages, and output data from web services and services such as database query services.
- Subscribe to business documents on or publish business documents to Universal Messaging.
- Subscribe to business events on or publish business events to the event-driven architecture (see [“Analytics & Decisions” on page 21](#)).
- Invoke services such as flow services, web services, or rule services, or adapter services that in turn invoke programs on mainframes and UNIX systems.
- Invoke rules, tasks, other business processes, or Trading Networks.
- Publish data for other business processes and services to consume.
- Assign activities, called *tasks*, to a user or group of users to perform. Tasks in turn can invoke rules, rule sets, and services.
- Queue case instances in AgileApps.

Business process developers define the way data passes through and is handled by your business processes. They define the order of steps in the processes, and the conditions under which the steps start, run, pass data, and end. Business Process Modeling Notation (BPMN) provides a graphical representation of the underlying model and of the functionality and behavior of its steps.

Business process developers can also define milestones within a business process model by defining stages. A stage spans process steps, has a start milestone step, and has a complete milestone step that must be reached within a specified period of time. For example, a stage might be defined as starting at the Receive Purchase Order step (start milestone), completing at the Ship Product step (complete milestone), and transpiring within three days.

Developing Services

Developers can develop services such as flow, web, and adapter services using the Software AG Designer Service Development perspective.

After you develop the services, you can drag and drop them onto the business process model design canvas. In a collaborative design environment, you can also drag and drop assets from CentraSite. CentraSite operates as a shared SOA registry/repository of metadata about assets that were developed in Software AG Designer and that are stored on run-time servers such as Integration Server.

Developing Rules

Developers can develop business rules using the Software AG Designer Business Rules Development perspective. Rules can do the following:

- Invoke services.
- Operate on processes (for example, start or stop, or suspend or resume processes).
- Operation on tasks (for example, assign tasks to users).
- Invoke Predictive Analytics models and use their output for further rule evaluation.

Rules can be expressed as decision tables, decision trees, or event rules. Rule expressions can contain function calls, literals, parameter references, the mathematical operators + - * /, and groups of parentheses.

- A decision table is made up of rows and columns, and each row defines a rule. A rule includes one or more condition columns and one or more result columns. For example, a decision table for health care insurance premiums could include a rule that specifies condition columns for gender, age, and smoker/non-smoker, and a result column that contains premiums to be paid. Result columns can also contain lists such as string or document lists. For every column, you can specify a REST service that provides a list of valid values, to make sure the cell content is valid from a business perspective.
- A decision tree displays conditions and results in a tree-like structure that consists of nodes that are linked to each other. A node can represent the root, a condition (the IF part), or a result (the THEN part) of a rule. A link can be a root link or a condition link. A root node can be linked to one or more condition nodes, and a condition node can be linked to one or more condition nodes or result nodes.
- An event rule consists of an event and one or more results. A result can assign a value or execute an action. For example, an event rule for an automobile parts

distributor could specify that when inventory on parts decreases to certain levels, the event rule creates a data action. This data action creates data that is evaluated by rules in a decision table. Depending on the content of the new data, one of the rules in the decision table fires. Some of the rules launch a business process to replenish the stock in a result column.

You can group multiple decision tables and event rules into a *rule set*, and invoke the rule set from a process step or task. The rules in a rule set interact with each other, so that the conclusion drawn from one rule (the result) is used as input information (the condition) for a second rule. This is called *forward chaining*. In the example above for the automobile parts distributor, the event rule and the decision table could be grouped into a rule set. The illustration below shows the decision table and event rule in the rule set named LowInventoryRuleSet.

The screenshot displays the Software AG Designer interface. The central pane shows a decision table with the following data:

ItemName	Quantity	StockNumber	stockInventory()
= I100	0 <=...<= 2000	= A300	X
= I100	1001 <=...<= 2000	= A401	✓
= I200	< 200	= A502	X
= I200	> 200	= A502	✓
= I301	2 <...<= 4	= A503	✓
= I302	= 5		✓
= I303	4 <...<= 25		✓

Below the table, the 'InventoryLowEvent' configuration is shown. The event is defined as 'Whenever a PartInventoryShor tage has occurred'. The results section contains a single action: 'createStockItem()' with a checkmark.

The right-hand pane shows the 'Rules Explorer' with a tree view of the project structure, including 'InventoryRules', 'Decision Tables', and 'Event Models'. The 'LowInventoryRuleSet' is highlighted in the tree.

After you develop rules in Software AG Designer, you can drag and drop them onto the business process model design canvas. In a collaborative design environment, you can also drag and drop assets from CentraSite. CentraSite operates as a shared SOA registry/repository of metadata about assets that were developed in Software AG Designer and that are stored on run-time servers such as Integration Server and My webMethods Server.

You export rules developed in Software AG Designer to Integration Servers equipped with a Rules Engine. Each Rules Engine execute the rules that it hosts when those rules are invoked by process steps or tasks.

Software AG offers a web browser-based user interface that allows business administrators to make simple changes to rules you develop. You make business rules available to business administrators by exporting them to the My webMethods Server content repository. You export rules projects to My webMethods Server using the Business Rules RESTful API. Business administrators use the web browser-based user

interface call the Rules Management Console to edit the rules and then to redeploy the rules to the appropriate Rules Engines, and also to customize the dates and times when rules are to take effect. The Rules Management Console has been separated into several independent portlets, and can be customized using CSS stylesheets.

Developing Tasks

Developers can develop tasks (that is, activities performed by humans as part of a business process) as specialized composite applications using the Software AG Designer UI Development perspective. Within task applications, you develop user interfaces that present the tasks to end users. You can also define actions to occur in response to specified conditions. For example, you can define an action that assigns critical priority to tasks that are not completed within a specified period of time. Software AG Designer provides a variety of built-in actions the task can use, or the task can invoke a service.

The user interfaces for a task can be displayed as webpages in the My webMethods Server user interface. The illustration below shows a task user interface.

My Inbox > New_Employee_Setup Details

Data View | Details View | Audit View | Comments | Collaboration | Content

Employee Data:

Employee Name:

Office Number:

Telephone:

Furnishings:

Delivered

Pending

Toggle Task Info

Task Info:

Name: Setup: ssmith

Description: New employee setup for Sam Smith.

Created On: 3/8/2011 8:27 AM By My webMethods Administrator

Last Modified On: 3/8/2011 8:32 AM By My webMethods Administrator

Expires On:

Status: Active

Complete | Assign to Users... | Submit | Return

You can also develop your own user interfaces with technology such as Grails and Google Widget Toolkit and access the task with the Task Engine RESTful services.

Some tasks require the performance of multiple activities. You could construct detailed logic within a task to anticipate all possible outcomes, but such logic would be labor intensive, error prone, and difficult to maintain. Instead, you can define *collaboration tasks*; that is, tasks configured to operate in a collaborative work environment. You can implement collaboration tasks in these ways:

- Automatic (within a *collaboration process*). You can configure a task so that when it receives specific business data, it creates child collaboration tasks and assigns them to specific roles or users. Suppose a satellite television company has a new order

process that includes a task to install a dish and receiver. Different installation teams and equipment are required depending on the service ordered by the customer. You can configure the parent task to queue one collaboration task to the appropriate installation team and another to the appropriate equipment team based on specific information in the customer order. You can configure the parent task to complete automatically when the collaboration tasks are completed.

- Manual (by a user). You can configure a task so that a user who opens the task in his inbox can create child collaboration tasks and assign them to other users to help complete the parent task. Suppose a support person from a magazine company receives a task to resolve a customer complaint that issues of a magazine have stopped arriving. The support person could create and assign collaboration tasks to the database administrator and the circulation manager that request information needed to determine the problem.

You can use business rules to assign tasks to users.

Task Engine

The Task Engine provides APIs that enable you to search and manipulate tasks from services or other applications. These APIs are provided as Java classes and as services on the Integration Server to which the Task Engine is connected (see [“Executing Business Processes” on page 101](#)). The Java APIs are created when you create a task application portlet. The APIs provided as services are as follows:

- Built-in Java service API. You can use these services as templates to create custom services in Software AG Designer that can create, modify, locate, queue, and delete tasks on the Task Engine to which Integration Server is connected. You can also use these services to schedule tasks.
- RESTful service API. You can use these services with the REST service capabilities of Integration Server and My webMethods Server. The services enable you to develop your own user interfaces using technology such as Grails and Google Widget Toolkit. You can also use these services to schedule tasks.
- Web service API. You can use these services to add, delete, locate, and update tasks on a Task Engine from a client program. The Task Engine hosts a version of the task web service for .NET clients and a version for regular web service clients.

AgileApps

AgileApps is an application Platform-as-a-Service (aPaaS) product that enables you to visually build and deploy process-driven application solutions in weeks rather than months. AgileApps applications have enterprise capabilities such as a robust process modeler, flexible business rules, document assembly, drag-and-drop e-forms creation, customized reports, interactive dashboards, social collaboration, and mobile access. You can create database and case management pattern applications, including service request, incident management, and investigative. All applications are instantly mobile-enabled so users can access data everywhere.

In case management applications, users can collaborate to resolve cases and can define their own lightweight processes to guide the resolution. Case management applications can interact with other web-based applications that run on the AgileApps platform, and the web-based applications can use Integration Server services or user-defined web services to get data from the Internet. With SLA management, tasks are automatically created and monitored with escalation notifications. Integrated analytics, interactive dashboards, and reporting support business insights and improved decisions.

AgileApps is the entry point for process applications that are ad hoc, situational, and forms-based, where the primary designers are line of business and subject matter experts. You can deploy it in the cloud or in on-premises environments.

You can invoke an AgileApps case from a business process. Conversely, you can invoke a business process from an AgileApps case; you map the case document to the process start document, and the case status is updated with the process execution status.

AgileApps is available as an on-premises product or as a cloud-hosted solution.

Executing Business Processes

The products that execute business processes are Integration Server (equipped with Dynamic Business Orchestrator for the new dynamic business processes or Process Engine for classic business processes), and My webMethods Server.

Integration Server with Dynamic Business Orchestrator or Process Engine

Integration Server is a run-time server that has several functions in business process management.

- Run-time logic for business process models developed in Software AG Designer is created on Integration Server. Integration Server executes business processes.
 - Integration Servers that execute classic business processes are equipped with a Process Engine that controls and directs process execution. You can design a classic business process to execute on a single Integration Server or you can distribute the process steps across multiple Integration Servers. In the distributed scenario, Universal Messaging is required to route process data across the Integration Servers.
 - Integration Servers that execute dynamic business processes are equipped with a Dynamic Business Orchestrator that controls and directs process execution. You can design a dynamic business process to execute on a single Integration Server or you can use a cluster of Integration Servers to execute the process.

Dynamic business process execution on clustered Integration Servers is simpler, more scalable, and faster than classic business process execution that involves

distributed process steps on multiple Integration Servers and requires the use of Universal Messaging as a router.

- Services such as flow, web, and adapter services that are developed in Software AG Designer are built on Integration Server. Integration Server executes the services when they are invoked by process steps, tasks, or services.
- Business rules developed in Software AG Designer are exported to Integration Servers. The Rules Engines on the Integration Servers execute the rules when they are invoked by process steps or tasks.
- If a process step exchanges documents with an external trading partner, the step sends the document to Integration Server, which sends the document to the partner. The partner returns a document to Integration Server, which returns the document to the process so it can continue to its next step.

My webMethods Server

My webMethods Server has two functions in business process management:

- Execution of tasks. Software AG Designer publishes tasks applications, to My webMethods Server, where they are invoked by processes at run time. You equip each My webMethods Server that runs tasks with a Task Engine that controls and directs task execution. At run time, data and control pass from Process Engines to Task Engines and back again until the business process completes.
- User interfaces for editing rules developed in Software AG Designer.

Business Process Model Implementation Details

This section provides a high-level description of the activities a business process developer performs to implement a business process model.

A major feature of Software AG Designer is its collaborative focus, which allows users with different types of expertise to work together on different aspects of a process. The Software AG Designer perspectives that business process developers use to implement business process models are the Process Development, Process Debugging, Process Simulation, Service Development, UI Development, and Rules Development. Each of these perspectives supplies the tools needed by a particular category of users.

Creating Documents, Services, Tasks, and Rules

Some Software AG products provide data to processes in the form of *documents*. Each document is associated with a *document type*, a schema-like definition that describes the document's structure. For example, a document type named PurchaseOrder might describe the structure of data in a purchase order document.

In Software AG Designer, you can identify existing document types, services, tasks, and rules, or you can create the document types, services, tasks, and rules required by a business process, as follows:

- Browse Integration Servers for existing document types and services, and drag and drop them onto the design canvas.
- Browse CentraSite for document types, services, tasks, rules, and business processes, and reference these assets from process steps.
- Import supported electronic form (*e-form*) templates from a file system folder, a web server, or a My webMethods Server configured as a JSR-170 content repository. Software AG Designer converts the imported templates into Integration Server document types.
- Use the Software AG Designer Service Development perspective to develop flow services and create document types for service inputs and outputs.
- Use the Software AG Designer UI Development perspective to develop tasks (see [“Developing Tasks Within a Process” on page 103](#), below).
- Use the Software AG Designer Rules Development perspective to develop rules.
- If you are working in a collaborative design environment, publish assets you develop in Software AG Designer to CentraSite.

Developing Tasks Within a Process

If a business process you are developing includes human activities, you use the Software AG Designer UI Development perspective to develop tasks. Tasks are created within a special type of composite application called *task application projects*. You can create a single task within a project, or you can group multiple related tasks within a project. In the UI Development perspective, you can test and debug tasks you develop.

You can define how you want a task to behave when certain events occur. For example, you can specify that the task status should change to Critical when an uncompleted task reaches its expiration date. Software AG Designer provides a variety of built-in actions you can use, or you can call a service.

You can create a task application that uses data from a supported e-form as some or all of the task's business data. You can also implement e-form-enabled tasks with download and upload capability. This capability lets the task user:

- Connect to My webMethods Server to download the e-form data from the task in its original e-form format.
- Disconnect from My webMethods Server and work with the e-form in the local environment.
- Reconnect to My webMethods Server and upload the e-form. My webMethods Server applies the modifications to the task business data.

User interfaces present tasks to end users. You can use the Software AG Designer UI Development perspective to design task user interfaces, which end users then view in the web browser-based My webMethods. Alternatively, you can use non-Software AG technologies such as Grails or Google Widget Toolkit to design task user interfaces. In this case, you use RESTful services to create the interaction between the user interface and tasks that are executing in the Task Engine.

After you develop a task, you drag and drop it onto a business process. If you have a complicated task, you might want to break it up into a series of simpler tasks, connected into a *task workflow*. For the end user, the task workflow appears as a seamless flow of task user interfaces in My webMethods. As the user completes each task in the workflow, the next user interface appears, eliminating the need for the user to locate each new task and open it manually.

When you are done developing a business process, you use Software AG Designer to deploy tasks to a My webMethods Server equipped with a Task Engine, so the process can invoke the tasks at run time.

Simulating and Debugging Business Processes

Detailed business process model implementation is an iterative procedure that involves developing, testing, and correcting your code. The Software AG Designer Process Simulation perspective enables you to test a business process by sending a document through it. Among other things, simulation enables you to:

- Discover business process bottlenecks, points of failure, and time lags.
- Predict business process behavior in multiple scenarios.
- Compare the behavior (performance, utilization, cost, and so on) of two or more different processes, or of two or more versions of the same process.

You can use actual historical run-time data in simulations.

You can debug the business process using the debugging tools offered by the Software AG Designer Process Debugging perspective and then simulate the process again, and so on until the process meets your requirements.

Logging and Monitoring Processes

Within each business process model, you set the maximum level for audit logging for that process. The business administrator who monitors processes will refine this setting later to suit his needs. You also define quality of service settings that determine how the process executes at run time and that let you balance process performance, reliability, visibility, and control. For example, you can choose between improving performance by storing process run-time data in RAM or improving reliability by persisting the data.

Mapping Process Steps to Run Times

When you are done developing a classic business process model, you work with your system administrator to map process steps to the Integration Servers equipped with Process Engines on which the steps should run. For a dynamic business process, no mapping is necessary because clustered Integration Servers route process steps to appropriate nodes automatically.

Deploying Process Steps

You deploy process steps from Software AG Designer to Integration Server. Software AG Designer creates a package containing run-time execution information on Integration Server.

Developing in a Collaborative Environment

Software AG offers a variety of tools and methods you can use to create a collaborative development environment in which developers can easily share and reuse assets.

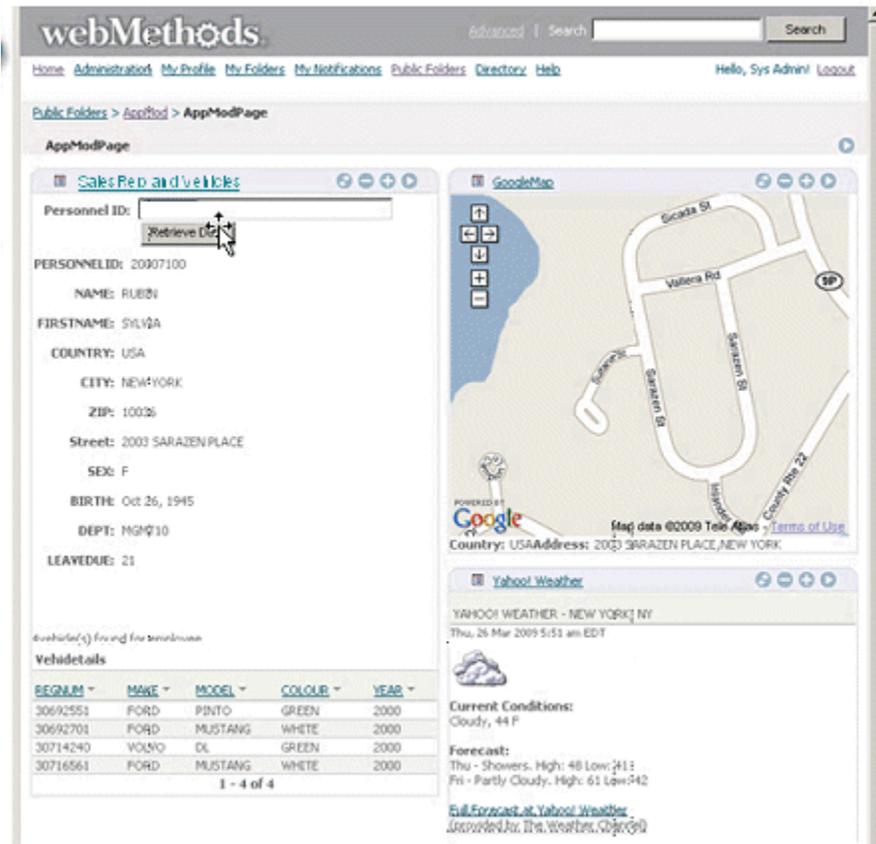
- A main tool for collaboration is CentraSite, which operates as a shared database of metadata about assets that are stored in Software AG Designer, Integration Server, and CentraSite. Business process developers can publish services, document types, and business processes from Software AG Designer to CentraSite, and can drag and drop these assets from CentraSite into Software AG Designer.
- Task application developers can define child collaboration tasks and processes that help complete a parent task. Developers can configure a parent task so that:
 - When the task receives specific business data, it creates child collaboration tasks and assigns them to specific roles or users. The task application developer can configure the parent task to complete automatically when the collaboration tasks are completed.
 - A user who opens the task in his inbox can create child collaboration tasks and assign them to other users. When the child tasks are completed, the user can complete the parent task.

For more information on tools and methods you can use to create a collaborative development environment, contact Software AG Global Consulting Services.

Developing Composite Applications

A *composite application* is made up of portlet applications and services that present data from multiple resources on one or more webpages for the end user. Composite applications are also used to create modernized front ends for legacy systems. Suppose you have a mainframe program that stores customer orders and the names of sales representatives. You could create a customer management composite application that

pulls that data from the mainframe program and displays it on a webpage. When the end user clicks an order, the composite application gets the order details from the mainframe program and displays it on another webpage. When the end user clicks a sales representative, the composite application gets customer data from the mainframe program and displays the locations and contact information for the sales representative's customers on a Google map.



The primary products that developers use to develop composite applications are Software AG Designer and Application Platform. Developers might also use CentraSite. The products that execute composite applications are My webMethods Server and Integration Server.

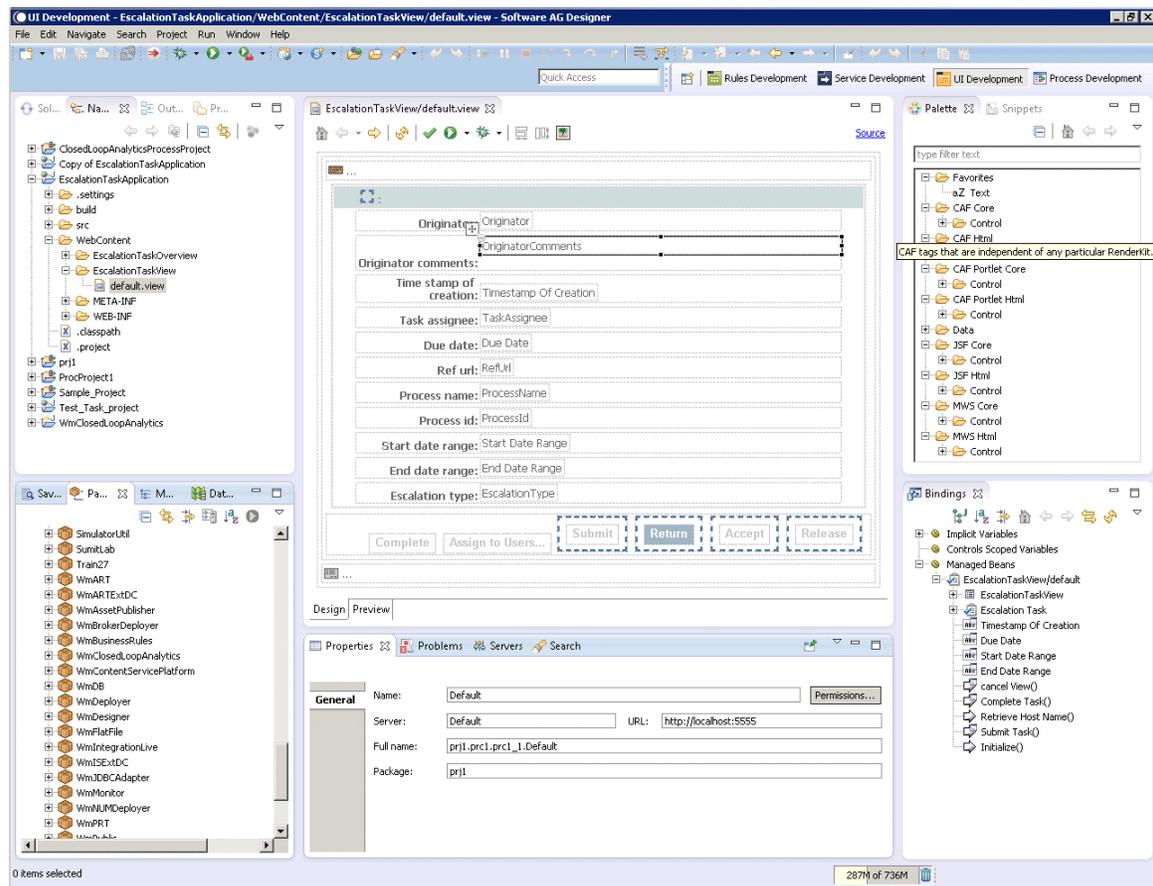
Software AG Designer

Software AG Designer offers software developers a UI Development perspective for designing composite applications.

You create the composite application interfaces in Software AG Designer by dragging and dropping JavaServer Faces (JSF) controls onto a design canvas. You configure each JSF control to perform a specific function, such as submitting a command, alerting a user, obtaining user input (for example, through check boxes or drop-down lists), or adding rendering logic to webpages. Other JSF controls enable you to link and navigate among portlets and webpages. Software AG Designer offers an extensive library of

JSF controls. You can then add other components such as Java or web services to the composite application to retrieve and manipulate data. You can completely control the look and feel of these applications by importing HTML templates and CSS style sheets. You can enrich the user experience using your favorite Java script libraries.

The illustration below shows a view from a portlet application in Software AG Designer.



The webpages in your composite applications can invoke services such as Flow, web, adapter, and rule services. Within Software AG Designer, you can develop Flow, web, and rule services, and you can create adapter services that invoke programs on mainframes and UNIX systems. Software AG Designer builds its services on Integration Server.

You can drag and drop the services you want the webpages to invoke onto the design canvas from Integration Server. In a collaborative design environment, you can also drag and drop services from CentraSite. CentraSite operates as a shared SOA registry/repository of metadata about assets that were developed in Software AG Designer and that are stored on run-time servers such as Integration Server and My webMethods Server.

The webpages in your composite applications can also access and display data stored in databases. You can connect to a database from Software AG Designer and then drag and drop database-related items, such as database tables, that you want to use in the webpages onto the design canvas.

Composite applications run on My webMethods Server. Composite applications built in Software AG Designer can use Asynchronous JavaScript and XML (Ajax) technology. With this technology, an Ajax engine acts as the intermediary between the user and My webMethods Server, significantly improving My webMethods Server's response to user input. Alternatively you can use modern client-side tools like AngularJS to develop parts of your composite application.

Application Platform

Application Platform enables you to develop application logic in Java without having to use proprietary webMethods APIs. You can use popular Java development models such as POJOs or Spring Beans for your application logic, and then deploy the logic to run in My webMethods Server. You develop the application logic using the Application Platform perspective in Software AG Designer. You can also develop web UI applications based on Java servlet technology.

You can use simple Java annotations to add business logic to composite applications and OpenUI applications by discovering and calling the services from the application user interfaces. With Application Platform, there is no need to resort to third-party application servers or complex Java deployments.

My webMethods Server

Software AG Designer publishes composite applications to My webMethods Server. My webMethods Server also hosts composite applications that provide web browser-based user interfaces for many Software AG run-time products.

My webMethods Server is a run-time server with a web browser-based user interface that lets you customize the look and feel of webpages and control user access to them. My webMethods Server user management also provides a single location from which to define and manage users for many Software AG products.

My webMethods Server provides a built-in Jetty web server that supports both HTTP and HTTPS. You can use an external web server, or cluster of web servers, with My webMethods Server (for example, if an external web server better complies with your corporate IT security policies). My webMethods Server can integrate with the leading web servers, such as Microsoft Internet Information Server or Apache HTTP Server.

Integration Server

Services developed in Software AG Designer are built on Integration Server. Integration Server's function in composite applications is to execute services that are invoked by the composite application's webpages.

Developing in a Collaborative Environment

Software AG offers a variety of tools and methods you can use to create a collaborative development environment in which developers can easily share and reuse assets. A main tool for collaboration is CentraSite, which operates as a shared database of metadata about assets that are stored in Software AG Designer, Integration Server, and CentraSite. Composite applications developers can publish services, document types, and composite applications from Software AG Designer to CentraSite, and can drag and drop these assets from CentraSite into Software AG Designer.

For more information on tools and methods you can use to create a collaborative development environment, contact Software AG Global Consulting Services.

Administering and Monitoring Business Processes

Several instances of a business process or task can run at the same time. For example, your enterprise could hire several new employees at one time, and each new employee would trigger a new instance of the new employee process. For tasks, you could have a purchase order process that sends out an approval request task instance to three different managers. You administer business process models and task applications, but you monitor process instances and task instances.

The primary products process administrators use to administer classic business process models and task applications, and process owners and participants use to monitor classic process instances and task instances, are Monitor, Task Engine, and Business Console.

The primary products process administrators use to administer dynamic business process models and task applications, and process owners and participants use to monitor dynamic process instances and task instances, are the products listed above and the Dynamic Business Orchestrator user interface, which is part of the Business Console.

Administering Business Processes

Monitor is a web browser-based user interface that displays data logged by Integration Server and Optimize for Process for services, documents, and business processes. You can use Monitor to:

- Allow business process instances to run or prevent business process instances from running.
- Resubmit process steps when problems occur.
- Define time-outs that alert you when process steps or tasks run too long.
- Set up audit logging so you can track when process instances and steps start running, change status, end successfully, or fail, and so you can record the path that each process instance took at run time.

- Delete business processes.

You can use Task Engine to:

- Assign tasks to users or roles.
- Allow task instances to run or prevent task instances from running.
- Manually start tasks (for example, to kick off business process instances).
- Delete tasks.

Monitoring Business Process Instances

You can use Monitor to monitor classic business processes as follows:

- View process instances, find problems, and determine whether the problems are caused by system resources, services, or documents.
- Suspend, resume, or stop problematic process instances, and edit data values and resubmit process instances.
- Create, modify, and delete process model stages, and view the status of stages in process instances and whether the milestones were reached within the specified time periods.
- View projections of when a process instance might complete based on percent complete, and view the average cycle time for running instances.

You can use the Dynamic Business Orchestrator user interface to monitor and control dynamic business processes as follows:

- View process instances, find problems, and determine whether the problems are caused by system resources, services, or documents.
- Suspend, resume, stop, or restart problematic process instances, and edit data values and resubmit process instances.
- Dynamically inject another process into a running process.
- Cancel, skip, pause, or restart process steps.
- Create, modify, and delete process model stages, and view the status of stages in process instances and whether the milestones were reached within the specified time periods.
- View projections of when a process instance might complete based on percent complete, and view the average cycle time for running instances.

Mobile Monitor is an application for mobile devices and tablets that provides real-time information about the status of executed business processes. You can use Mobile Monitor:

- View process instances, find problems, and determine whether the problems are caused by system resources, services, or documents.

- View and work on tasks that are assigned to you as you would using Task Engine (see below).

You can use Task Engine to:

- Assign task instances to users or roles.
- Suspend, resume, or delete task instances.
- View task status and the audit log for tasks assigned to you.

You can use Optimize for Process to create, modify, and delete process model stages, and to view the status of stages in process instances, and whether the milestones were reached within the specified time periods. You can also use MashZone NextGen to view stage status. For information about Optimize for Process and MashZone NextGen, see [“Analytics & Decisions” on page 21](#).

Administering and Working with Business Processes and Tasks

Business Console is a web- and tablet-friendly user interface that provides role-based administration, monitoring, and social guidance for business process owners and participants to manage business processes and tasks. You can use Business Console to:

- Work on tasks that are assigned to you, collaborate with other task assignees and process participants, and save and re-use task searches.
- Endorse other task and process participants and network with experts who can help you complete tasks more quickly and effectively.
- Schedule task instances using Business Console or the Task Engine built-in or RESTful services.
- Customize and personalize workbenches using custom gadgets you create using JavaScript.
- Monitor process and task instances in real time using a web browser.
- View trending information relating to business processes on social media, and view process analytics.
- View decision tables that have been invoked by a process.
- View processes that include an AgileApps case and its related activity (also known as case tasks) and workflow status (also known as case process).

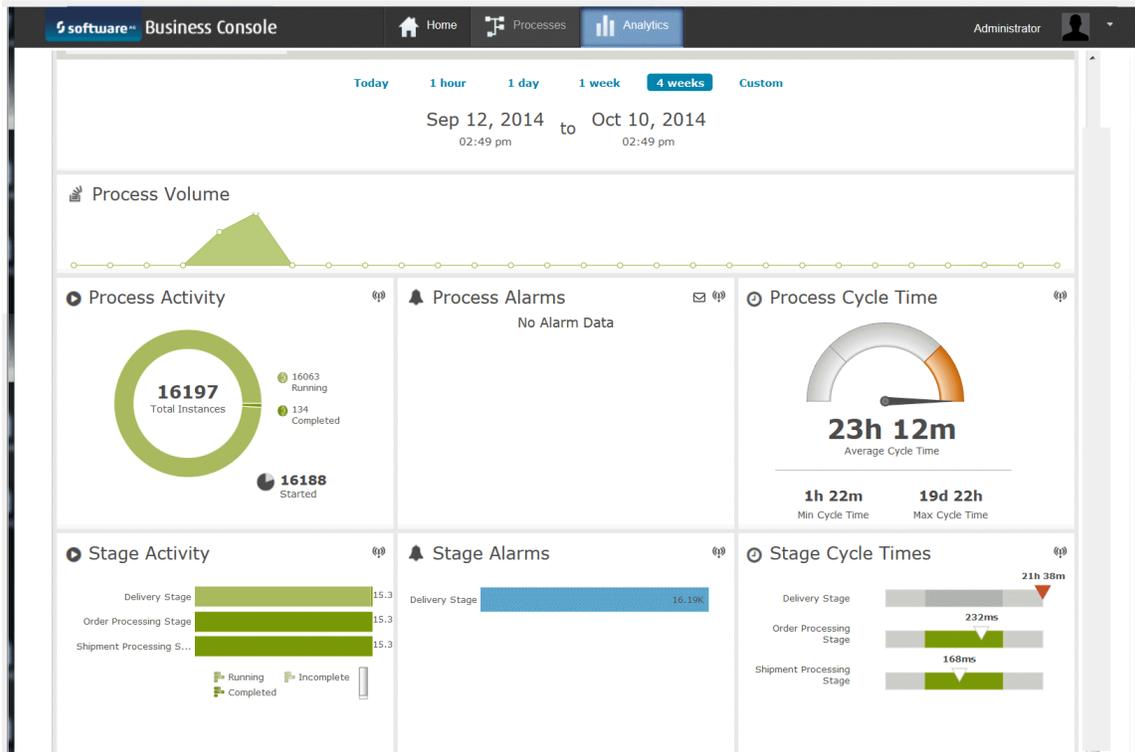
If you are logged in to AgileApps or My webMethods Server, you can use Business Console without having to log in again.

Mobile Business Console is an application for mobile devices and tablets that enables business process owners and participants to collaborate on tasks and workflows, get real-time insights, and make time critical decisions. You can use Mobile Business Console to:

- Work on tasks that are assigned to you, collaborate with other task assignees and process participants, and network with business process experts.
- Add instant tasks, to-do lists, comments, and task attachments to process instances.
- Monitor process and task instances in real time.

Solving Problems with Closed Loop Analytics

Closed Loop Analytics is a solution that enables you to quickly and easily improve the performance of your business processes. Closed Loop Analytics collects data about process health from products involved in business process execution and analysis. For example, it collects data on process volume and cycle times from Process Engine, and data on SLA or KPI rule violations from Optimize for Process. Closed Loop Analytics then displays the data on the business process analytics dashboard, called an AppSpace, in Business Console (see illustration below).



Process administrators review the data on the AppSpace and escalate problems to users in the form of escalation tasks. Users find the escalation tasks in their inboxes, perform root cause analyses, and write the results in the tasks. Process administrators review the results and use them to improve the processes. The illustration below shows a user task inbox.

Task Name	Task ID	Status	Accept	Priority	Assigned To	Created By	Created Date	Description	Task Type	Actions
Escalation ...	26032		Accept	None	thomas	administrator	10-10-2014, ...	LuxuryLine...	26BBC3A6-...	
Escalation ...	26031		Accept	None		administrator	10-10-2014, ...	LuxuryLine...	26BBC3A6-...	
Escalation Tas...	26030			None	thomas	administrator	10-10-2014, 1...	LuxuryLineOrder	26BBC3A6-99...	
Escalation Tas...	26029			None		administrator	10-10-2014, 1...	LuxuryLineOrder	26BBC3A6-99...	
Escalation Tas...	26028			None		administrator	10-10-2014, 1...	LuxuryLineOrder	26BBC3A6-99...	
Escalation Tas...	26027			None	thomas	administrator	10-10-2014, 1...	LuxuryLineOrder	26BBC3A6-99...	
Escalation Tas...	26026			None	thomas	administrator	10-10-2014, 1...	LuxuryLineOrder	26BBC3A6-99...	
Escalation Tas...	26025			None		administrator	10-10-2014, 1...	LuxuryLineOrder	26BBC3A6-99...	
Escalation Tas...	26024			None		administrator	10-10-2014, 1...	LuxuryLineOrder	26BBC3A6-99...	
Escalation Tas...	26023			None	thomas	administrator	10-10-2014, 1...	LuxuryLineOrder	26BBC3A6-99...	

For information about Optimize for Process, see [“Defining Baselines, Metrics, and Alerts”](#) on page 26.