

**intra-mart WebPlatform/AppFramework
Ver.7.1**

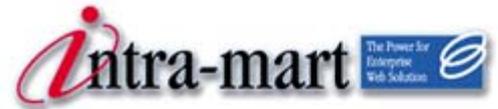
Introduction

❖ Revision History

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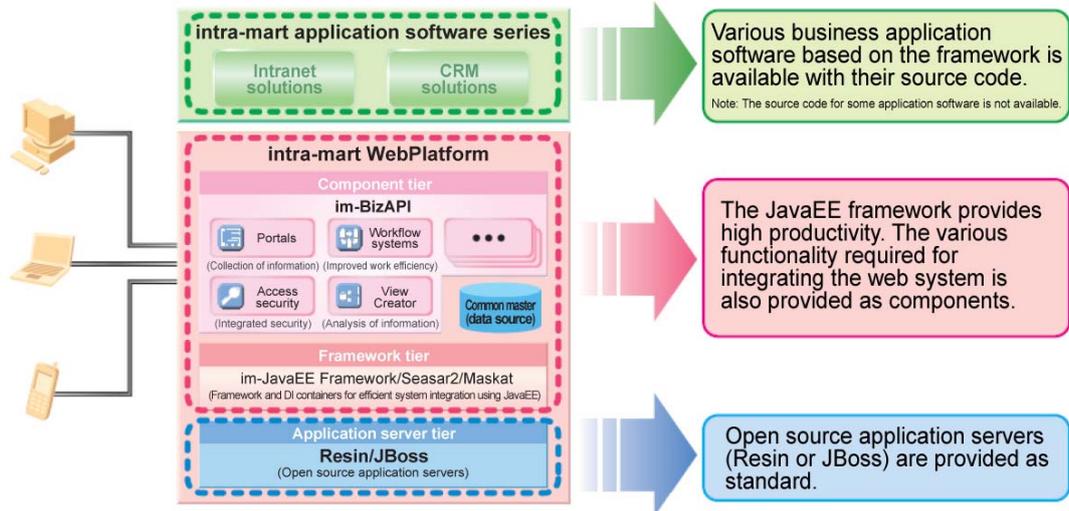
Chapter 1 What Is intra-mart?

1.1

intra-mart Overall Configuration

The intra-mart provides various solutions for implementing business web systems.

Core Solutions Using Comprehensive Framework & Applications



intra-mart WebPlatform
(Framework-based next-generation web application server)

The intra-mart WebPlatform allows you to develop complex web allocations easily in short timeframes using the framework. The framework is configured using various Java business components (generally known as the access security module, workflow module, etc., and called "im-BizAPI") and the JavaEE framework (im-JavaEE Framework). Furthermore, script-based development models can also be used through combined use with JavaEE-based development, making it possible to greatly reduce the web system integration threshold. In addition, JavaEE application server functions (Resin/JBoss), which provide great reliability such as a load balancing function with failover and round robin, are also built in as standard.

intra-mart AppFramework

The intra-mart WebPlatform is the only framework product that can be used on the application servers of other companies (IBM WebSphere, BEA WebLogic, NEC WebOTX, etc.) The productivity of web system integration on a JavaEE application server can be greatly increased.

intra-mart application software series

The intra-mart application software is a comprehensive web business application software series built using a powerful framework. All source code is open source which users can flexibly customize to extend functionality. Furthermore, operations are performed in tandem with basic information such as the company and organization information, and customer information, for each application. With this application software, business targets can be achieved in short timeframes by realizing company-wide information sharing which is interoperable with existing mission-critical systems.

The application software series are classified into the following two solutions.

Intranet solution

This is a web intranet development solution that achieved "indirect departmental cost reductions" and "company-wide information sharing (collaboration)", which have been extended by improved M&A and outsourcing needs. Company-wide intranet can be achieved.

CRM solution

The company-wide sharing of customer information such as negotiation information, support information, and claim information is the most important of corporate themes. CRM solution achieves an enterprise portal centered on customer information.

The intra-mart offers powerful and total backup through web application software products such as intranet and CRM. These application software series all use open source code, and are characterized by the users themselves being able to customize the source code easily.

This guide explains the intra-mart WebPlatform/AppFramework, which is the basic tool at the core of intra-mart products.

Refer to the individual guides for details of the intra-mart application software.



1.1.1 Product Configuration

The intra-mart WebPlatform/AppFramework comprises the following three products.

Function	Standard	Advanced	Enterprise for BPM
Application server *1	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
im-BizAPI	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Access security functions	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Portals	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Application development using script-based development models	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Application development using JavaEE-based development models	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
EJB server functions *1	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Workflow Modules		<input type="radio"/>	<input type="radio"/>
Format Creator		<input type="radio"/>	<input type="radio"/>
BPM Server BPM designer (Intalio)			<input type="radio"/>
ESB Mule			<input type="radio"/>

*1: This function is not included in the intra-mart AppFramework.

1.2

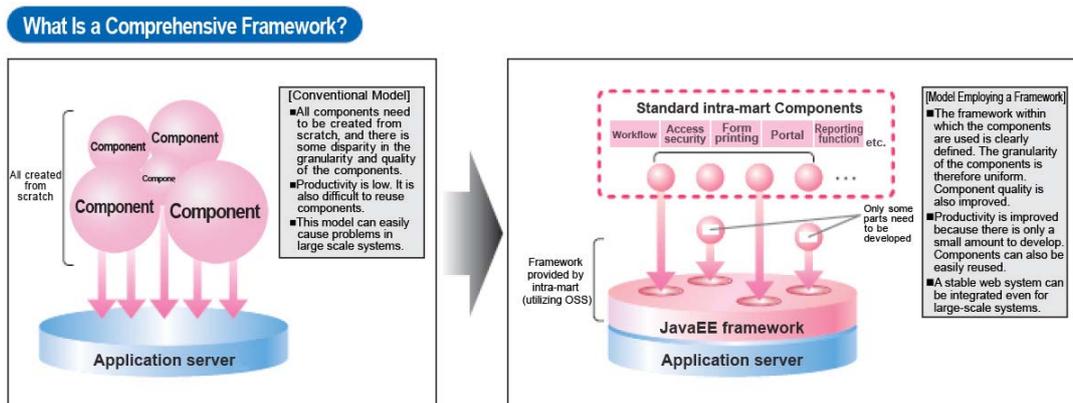
Features of intra-mart

The integration of highly demanding web systems involves the following issues.

- ❖ Demand for short delivery periods at low cost. (Rigorous evaluation of IT investment.)
- ❖ The rollout of open source software (OSS). (Escape from specific vendors.)
- ❖ Expectation for a system that can flexibly handle business changes.

In order to address these problems, the way that systems are integrated has been changing from a model of creating system completely from scratch to a model of combining components with OSS.

Integration timeframes can be reduced and integration costs slashed by using application frameworks. Application frameworks also promote standardization, thereby increasing quality. Because of these advantages, there is strong demand for the integrated framework which combines frameworks and components.



Companies requires a corporate strategy of effectively utilizing this integrated framework as a shared company-wide platform to succeed against fierce competition.

Using the intra-mart framework makes it possible to easily deliver sophisticated web application integration in short timeframes. It also allows you to create highly maintainable web systems that can flexibly handle changes in business.



1.2.1 Feature 1: Integrated framework that achieves great productivity

The integrated framework is configured using various Java business components (im-BizAPI) and the JavaEE framework (im-JavaEE Framework).

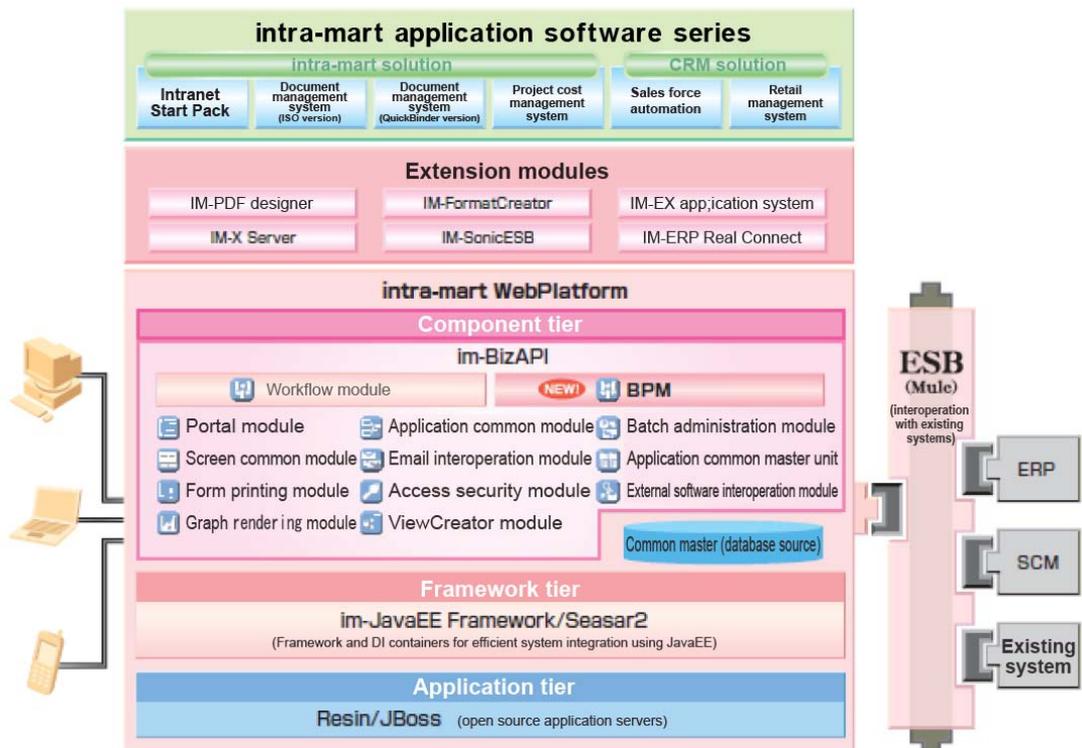
A script-based development model can be used side by side with a JavaEE-based development model, significantly reducing the barrier to web system integration.



1.2.1.1 Numerous Java Components (im-BizAPI)

One advantage of system integration using a J2EE-compliant web application server is that productivity can generally be increased by utilizing software components such as Java classes and EJB components. However, developing these software components requires special skills, and there is a barrier to software development which is hard to be reduced.

In the past, complicated functionality could not be implemented without developing from scratch or incorporating third-party products. But now, high-quality, large-scale web systems can be built over short timeframes by using the Java business components provided by the intra-mart framework. Furthermore, because the source code is public, you can extend the framework with your own custom functionality.



Note: The open source application server Resin/JBoss is enclosed with the "intra-mart WebPlatform". If you are using another application server (WebLogic, WebSphere, or WebOTX), use the "intra-mart AppFramework" product, which does not include the web application server.

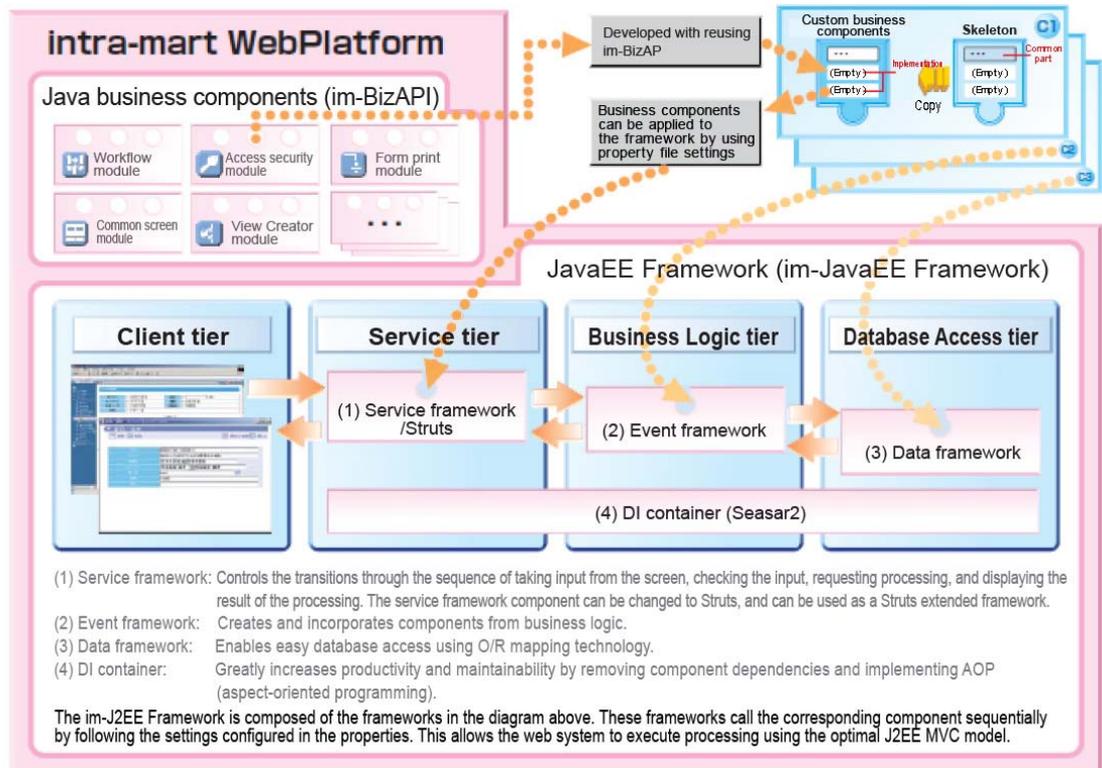
Combining the Java components built in as standard enables flexible customization according to your needs.



1.2.1.2 JavaEE-Based Development Framework (im-JavaEE Framework)

In order to improve the productivity of J2EE development, all of the common functionality that is required during J2EE development is provided as a framework (im-J2EE Framework).

Developers need to create custom components when additional functions are required. The components used in this framework are provided as “skeleton” patterns, meaning that the code for common functions is already implemented, so that the developer can create custom components only by copying one of these skeletons and implementing the parts that have not yet been implemented. Thus, productivity can be even further improved by using these skeletons. The custom components work by integrating the components into the framework.



Because components can be developed by using a skeleton, the developer does not need to have advance knowledge of developing using J2EE. The completed system automatically has the structure recommended by the J2EE architecture. In other words, the MVC model can be implemented easily. This uniform program structure increases component reusability and improves productivity and maintainability. Furthermore, because the system are built based on sets of components and property file settings, developers can flexibly customize and easily add functionality to the system.

JavaEE-Based Development Model

JavaEE (Java2 Enterprise Edition) is a platform launched in September 1999 by US Sun Microsystems that is composed of Servlets, JSP (JavaServer Page), and EJB (Enterprise JavaBeans), and allows developers to build a system using the MVC model (Model-View-Controller). It is particularly suited to processing high clusters of transactions, and also has the advantage that the business components can be reused.

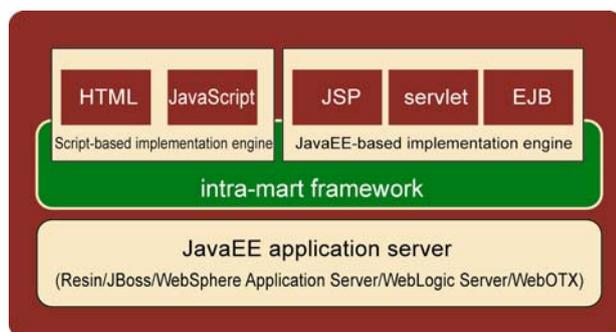


- The intra-mart WebPlatform/AppFrmework has built-in Seasar2, which is an open source DI container.
- HOT deploy, which is a Seasar2 function, can also be used.



1.2.1.3 Development Using Script-Based Development Models Is also Supported Simultaneously

The intra-mart WebPlatform/AppFramework is the first in the world to simultaneously support two web application software models. The two development models, "JavaEE-based development model" and "script-based development model" each have their own characteristics, and can be used depending on the application software. Furthermore, use of web application developed using the two models can be mixed within the same system.



Both development models can use Java components (im-BizAPI) such as the access security module and workflow module, which come with intra-mart as standard to assure high productivity. The development of web systems that need to be accomplished in short timeframes on a restricted budget mainly proceed using script-based development models. Actual and flexible development styles based on JavaEE can be obtained by cutting out reusable components created for different projects. Using this method, it is possible to solve problems with JavaEE-based development models. Thresholds are high and development costs grow, because high level skills such as class design are required and Java engineers should be secured.

■ Script-Based Development Model

This development model is mainly based on scripts such as PHP and Ruby. The intra-mart uses HTML which is used to create ordinary homepages and (server-side) JavaScript, to enable database-linked web system integration. System training costs for key personnel can be greatly reduced due to the simplicity that allows even a beginner to start. Even people who have only ever created simple web sites before can master and create web business screens in approximately two weeks to a month.

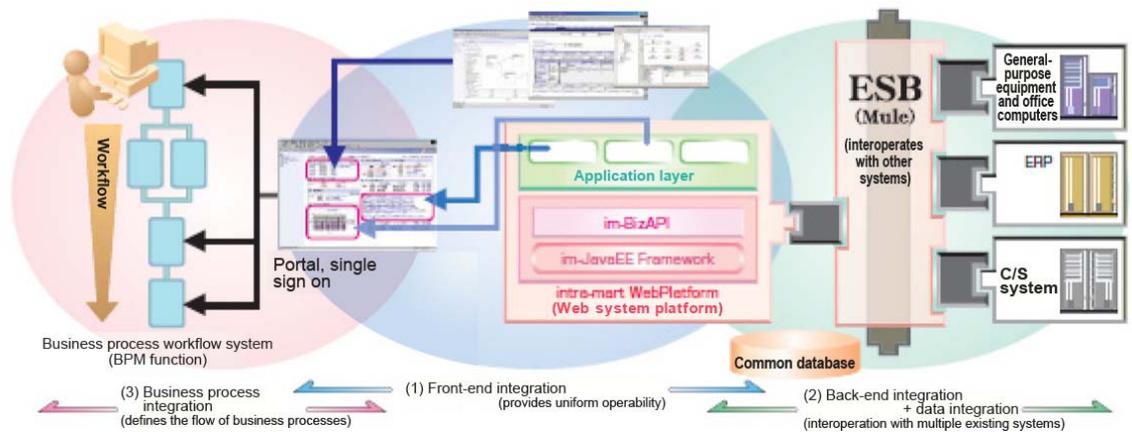
Development is as easy as creating and updating web sites, and has the advantage of being flexible with complex web systems that are updated frequently. In addition, Java (Class and EJB), C++, and stored procedures can be easily called from JavaScript according to the technical skills of the developer.



1.2.2 Feature 2: SOA system integration platform that can flexibly handle changing business needs

The importance of "systems that handle changes well" is increasing. Such system can cope flexibly with business changes such as M&A, corporate breakups, and changing business models. Without this idea, a business strategy would be shackled by the information systems. The intra-mart is a system integration platform, which provides various functions for system integration, including the framework, application common master, portal module, single sign-on, and business process management (BPM).

This allows building of web front systems which closely interoperate with mission-critical systems such as ERP and general-purpose equipments, in short timeframes while using existing systems. As business processes, system functions, and databases are independent of each other, reconfiguration of business systems can be accomplished in short timeframes even if the business processes change.





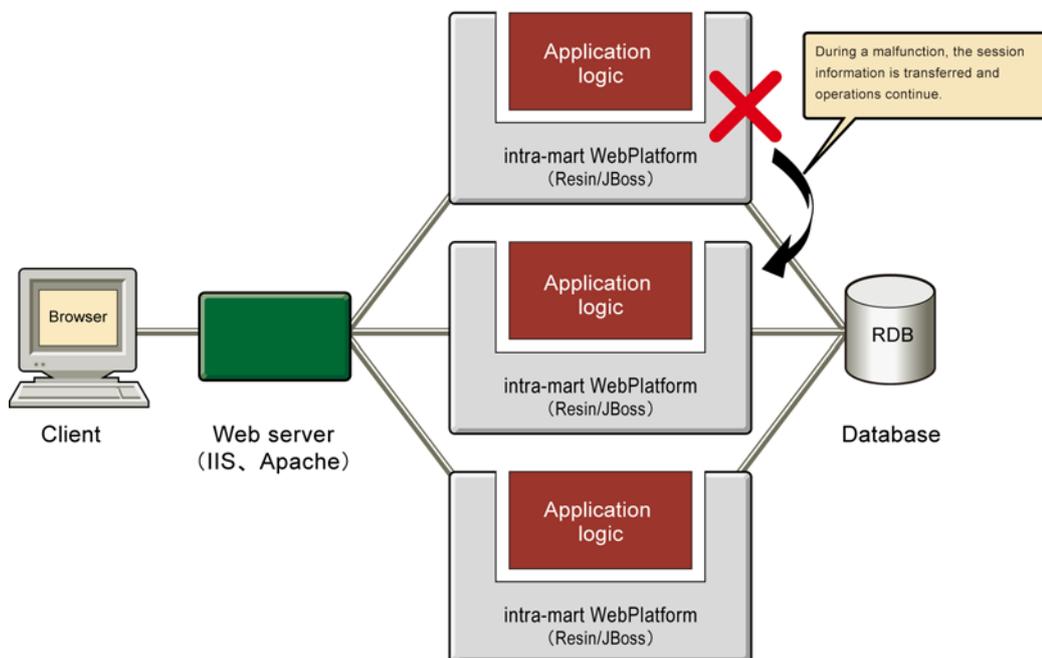
1.2.3 Feature 3: High speed, reliable OSS application server functions are also built in

The intra-mart framework functions are compatible with various application servers, and the intra-mart framework is equipped with powerful and reliable open source application server functionality (either JBoss or Resin, chosen before construction). The load can be distributed through an architecture that is divided into application servers that centrally process the business logic, Web servers, and DB servers (multi-tiered architecture).

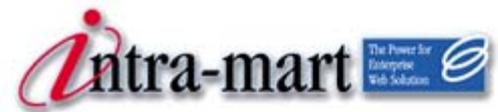
The intra-mart WebPlatform uses the "round robin function" (*1) when the OSS application server, which is built into the product, is used. The round robin function can spread out processing loads even further (load balancing) between multiple application servers sharing a single IP address. This function makes it possible to flexibly handle increases in the number of clients. Furthermore, systems can also be built with superior fault tolerance functionality such as session failover (*2).



- *1: A round robin function is used to distribute loads to multiple servers by clustering multiple web servers.
- *2: A session failover function is used to switch access to the server to another server if the server functions do not work properly, such as when the server is down due to a malfunction (power failure, network failure, etc.) by clustering multiple web servers. The session information can also be passed to the other servers, so the system is completely non-stop.



The intra-mart WebPlatform/AppFramework is built using only standard internet technology such as HTML, Java, and JavaScript to achieve a highly flexible intranet development that does not depend on any particular manufacturer. These are important system elements particularly when building EC systems, which are linked to the consumer, or when building extranet systems that also encompass other company systems.



Chapter 2 intra-mart Standard

2.1

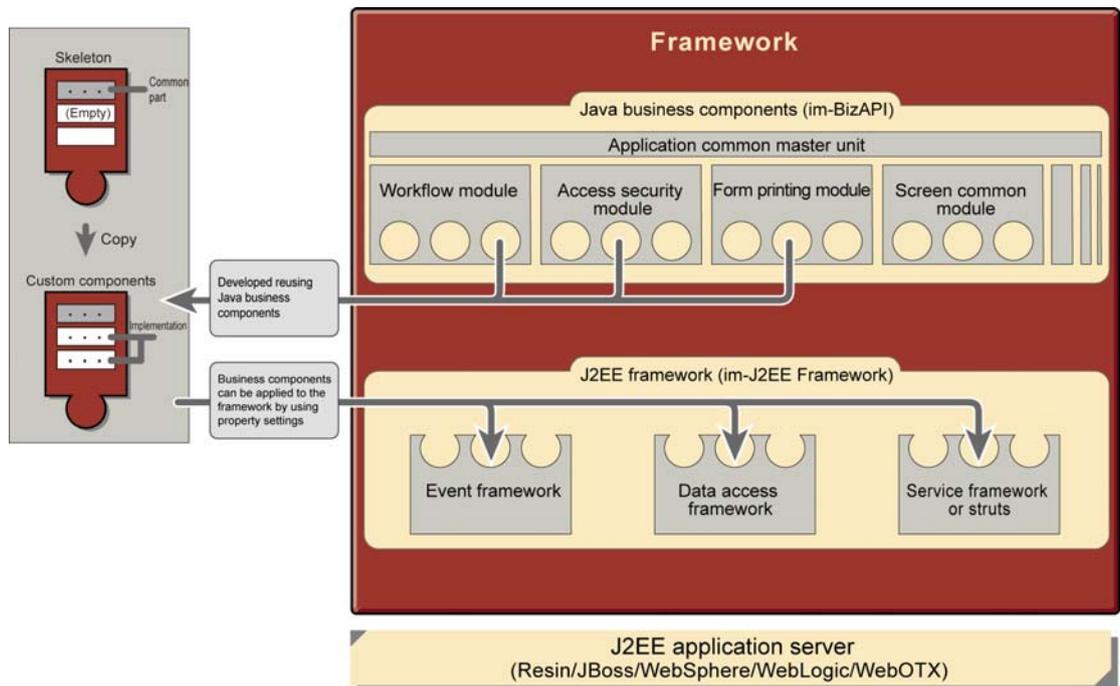
im-BizAPI (Java Business Components) Outline

The framework embedded in the intra-mart WebPlatform/AppFramework provides multiple functions that are widely used in web system development as "Java components". The framework can be reused as JavaClass or EJB components (the access security module, workflow module, and portal module, etc., and called "im-BizAPI"). Combining the built-in Java business components enables high quality functions that previously could not be achieved without developing from scratch or combining products from other companies to be built in short timeframes even on large-scale web systems. The im-BizAPI can be used by being called from the two application development models (script-based development model and JavaEE-based development model) in the same way.



2.1.1 Use Method 1: Using the JavaEE-Based Development Model

The framework (as shown in the following diagram) embedded in the intra-mart WebPlatform/AppFramework provides not only the "Java business components (im-BizAPI)", but also the "JavaEE framework (im-JavaEE Framework)". All common processing necessary during JavaEE-based development is concealed and implemented within the "JavaEE framework (im-JavaEE Framework)". Therefore, web system integration productivity can be greatly increased using JavaEE.



In particular, the development of components that use the JavaEE framework (im-JavaEE Framework) use templates ("skeletons") to improve productivity. The common parts are pre-implemented, so when creating unique components, the developer creates the components by copying the skeletons and embedding the parts that have not been implemented. The created components operate by being assigned to the JavaEE framework (im-JavaEE Framework) according to the property settings.



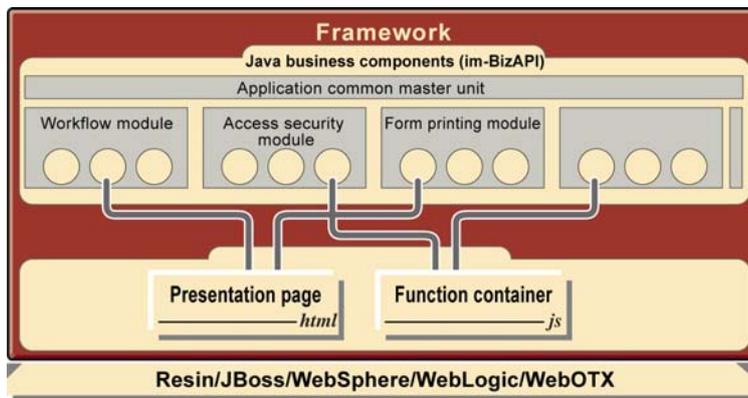
- "Struts", which are supplied from the Jakarta project, can be used as an open source framework instead of the service framework in the im-JavaEE Framework.



2.1.2 Use Method 2: Using the Script-Based Development Model

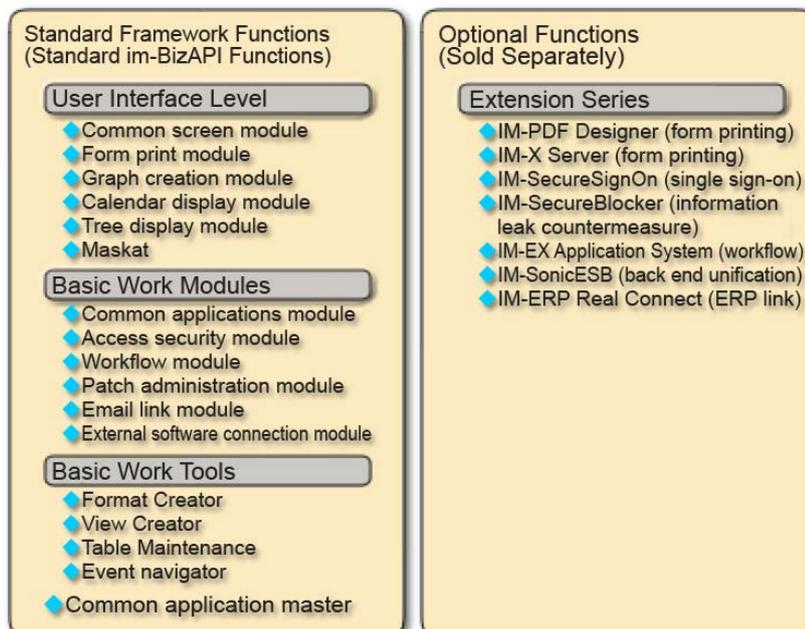
The script-based development model is a development model based on a framework that uses light programming language with excellent turnaround and easy code creation and revision. The intra-mart employs JavaScript. The development model has a facility that can be recommended even to beginners by achieving "development with a light touch for the programmer", and is mainly suited to web system integration in short timeframes. Using JavaScript as the development language has the great advantage of being able to unify the development languages on both the client and server sides. JavaScript is a language that is once more in the spotlight due to the spread of Ajax.

In the intra-mart, Java business components (im-BizAPI) built in beforehand as reusable "modules" can be used from the presentation page (HTML file that provides the user interface) and function container (JavaScript file that describes the business logic).



2.1.3 Java Business Components(im-BizAPI)

The "modules" built into the Java business components (im-BizAPI) are classified as described below according to their usage. Refer to the API list for the details of each module. For details on programming, refer to [Script-Based Development Model Programming Guide] and [JavaEE-Based Development Model Programming Guide]. Nearly all module source code is open, and the functions in the modules themselves can be customized and expanded.





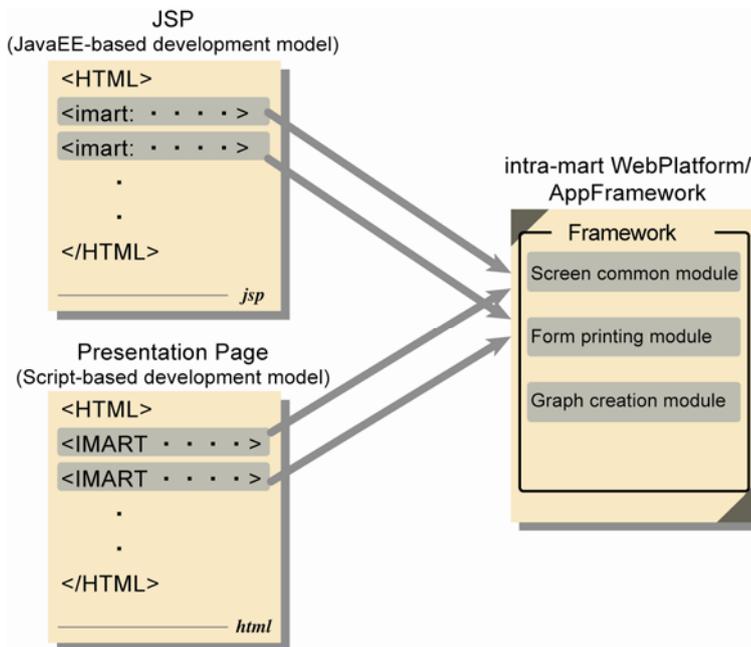
2.1.3.1 User Interface Tier

Common Screen Module

This is a module of screen components that are widely used in web-based GUI development (tag library for spreadsheets, inputs checks, popups, tabs, etc.)

A user interface linked to the database can be created easily by setting suitable properties in each module and calling it.

The following modules used in the presentation page in the script-based development model can all be called using the "<IMART> tag" in HTML documents. The JavaEE-based development model uses the "intra-mart tag library" in the JSP file.



● For details of the intra-mart tag library, refer to [API list].

Form Printing Module

Form printing has been said to be the most difficult in intranet system integration.

There is an extension series (sold separately) available for intra-mart.

IM-PDF Designer

This is an optional extension module that enables compatibility with more complicated form formats using PDF.

IM-X Server (Comprehensive Form Function)

A total solution using the "IM-X Server" for form issues, including web form electronification (PDF/XML), large volume server printing, and sending fax and mail.

- Detailed form creation can be performed easily, thus greatly reducing development man hours.

- Adding options enables history management and load spreading/redundancy functions for form creation and fax send function to be added.

■ Graph Creation Module

Using the graph creation module enables numerical data to be rendered graphically and displayed in HTML. The following five types of graph are available in the graph creation module. They can be used in both the script-based development model and JavaEE-based development model.

Useable Graph Types

- ❖ Line graph
- ❖ Bar graph
- ❖ Pie graph
- ❖ Radar chart
- ❖ Portfolio



<Graph display examples>



- For details, refer to [Script-Based Development Model Programming Guide] and [JavaEE-Based Development Model Programming Guide].

■ Calendar Display Module

The calendar display module is used to input date and provides ability to manage weekdays, holidays, and business days, etc. This module is implemented based on Ajax technology, and the server is interrogated for the calendar data only, which is displayed as a separate layer. Easily-useable screens can be created without any awareness of the data interoperation between windows.

Unique calendar data such as company holidays is managed using [Calendar settings] in [login group administration]. Calendars can have multiple settings, and used according to conditions such as headquarters or factory, or overseas branch office.



- For details, refer to [Script-Based Development Model Programming Guide] and [JavaEE-Based Development Model Programming Guide].

■ Tree View Module

Building in a tree view module enables hierarchical data to be displayed as a tree, which helps grasping the hierarchical structure and selecting menus.



<Example of a tree view unit>



- For details, refer to [Script-Based Development Model Programming Guide] and [JavaEE-Based Development Model Programming Guide].

■ Ajax Application Development Tool "Maskat"

Maskat is an open source framework for developing Ajax-based rich clients that operate in a web browser. Rich clients can be developed easily by interoperating with the two application development models (script-based development model and JavaEE-based development model) supported by the intra-mart WebPlatform/AppFramework.

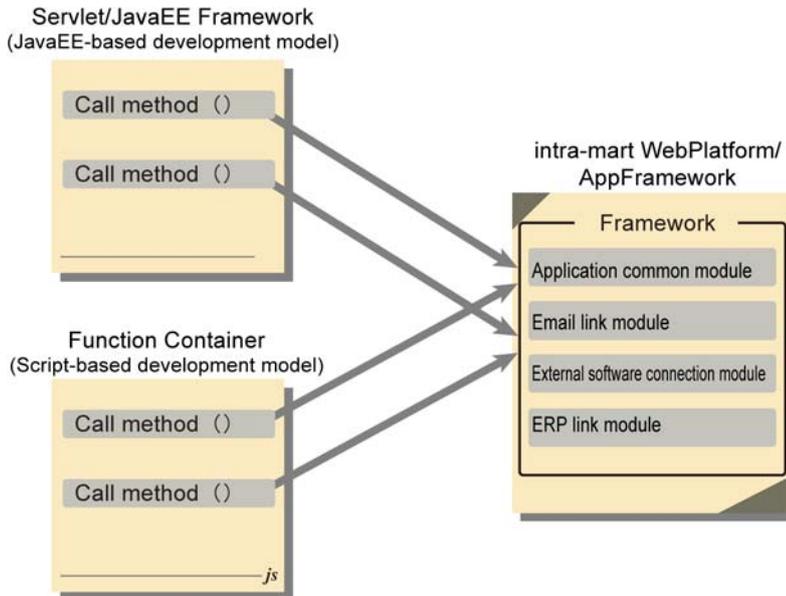


- For details, refer to [Maskat Interoperation Programming Guide].



2.1.3.2 Business Base Module

The business base module contains four modules: "application common module", "mail interoperation module", "external software connection module" and "ERP link module". In the script-based development model, these modules can be called from the function container in the form of an object. In the JavaEE-based development model, they can be used as JavaClass and EJB components from the Servlet.



■ Application Common Module

The processing logic module required for application development has been made into an easy-to-use object. Incorporating these objects into the business logic for editing enables web systems based on multi-tiered architecture to be developed in short timeframes without creating the logic.

<<Outline of the Objects in the Application Common Module Supplied>>

The processing logic module required for application development (session administration or database access) is supplied as an easy-to-use object. Using this object enables sessions to be managed across pages. Furthermore, information such as company name and login user names to the databases, used in the footers can also be used from this object. Incorporating these objects into the application logic for editing enables complex web systems to be developed in short timeframes without creating surplus logic.

In addition, numerous objects are built in, such as objects for accessing the settings, including the application software's environmental variables, objects for accessing the classification codes, general database-related objects, date-related objects, debug-related objects, and URL management objects. Using these object enables access to various information such as the codes for currently connected employees and the name of the HTML page displayed immediately prior.

Furthermore, high-level functions are also built in such as concurrent access to multiple databases, search streaming for the function to display the specified number of search results for large amounts of search data, an application lock function, and XML-compatible modules.

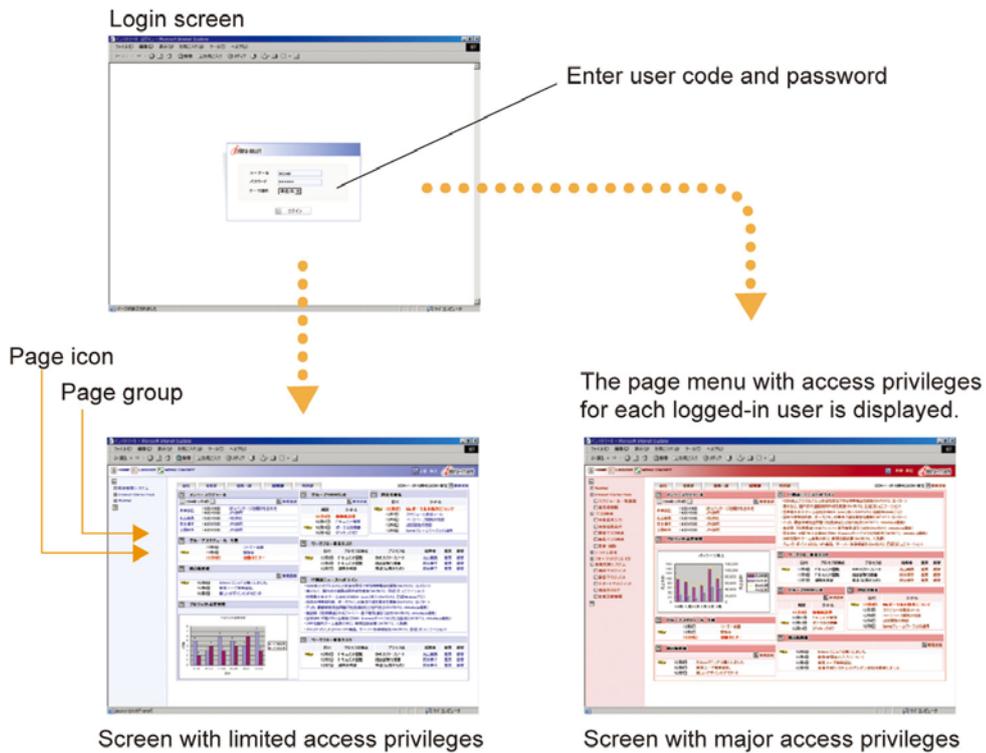


● For details of the application common module, refer to [API list].

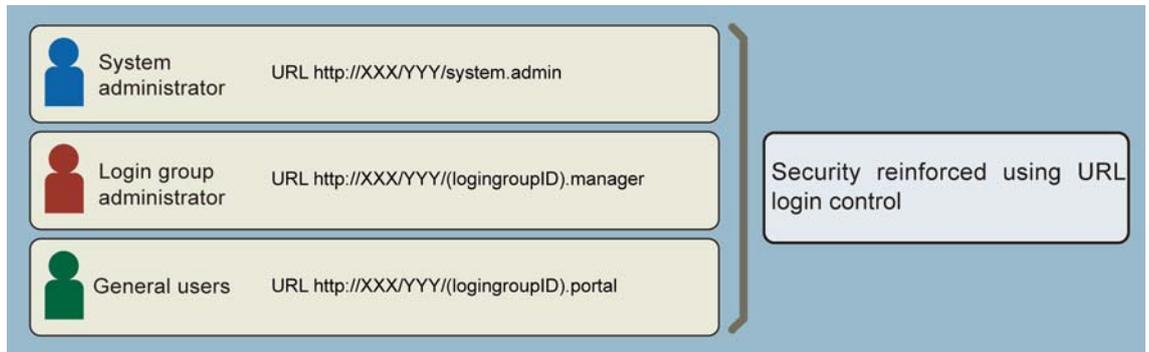
■ Access Security Module

This module operates login security information such as user and role. This module can authenticate a user who is logging in, and display the specific web pages corresponding to the user's access privileges. For example, when a general user accesses the system, pages for which they do not have access privileges are not displayed in the menu, so the user is not even aware of their existence. When an administrator accesses the system, the menus that can be used by the administrator is displayed on the very same page. Using the access security module enables the integration of pages with different content according to the user.

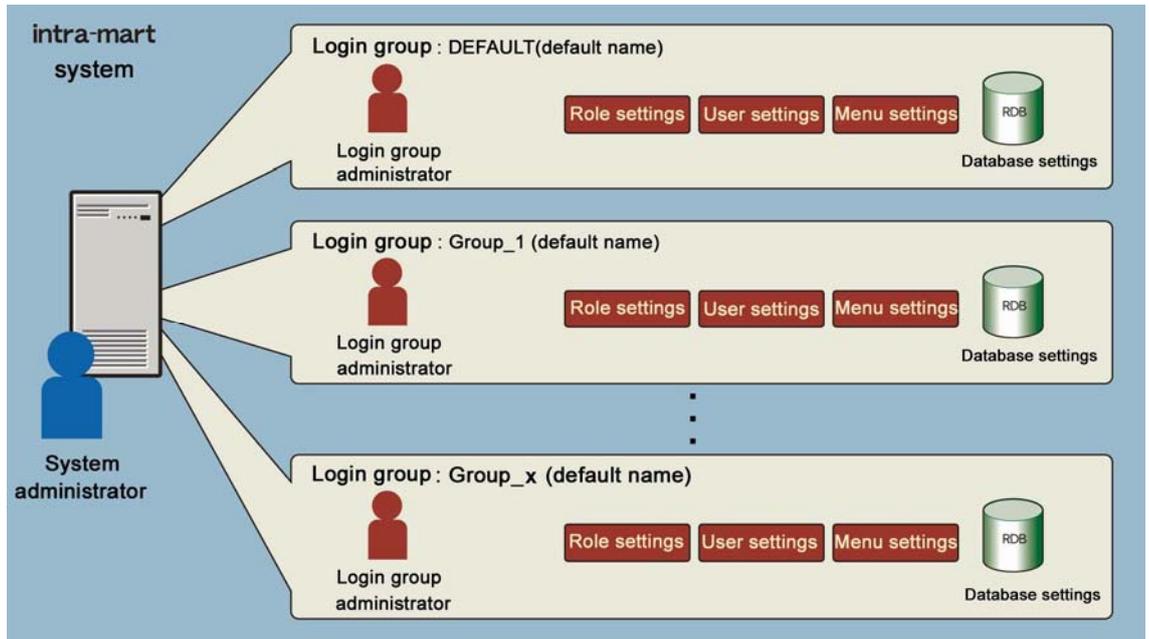
For the settings methods, refer to [Login Group Administrator Operation Guide].



<The page menu with the access privileges for the logged-in user is displayed>



Switching the language by user and selecting thematic colors for the screen are also possible. User information settings have all been performed by system administrators. Now it is possible to set the login group administrators under the system administrator, and enable the login group administrators to set the user information.



In addition, the access security functions have been made into API, and using them, it is possible to create unique menu screens.

The intra-mart provides complete Secure Sockets Layer (SSL) support. The contents sent in this way can be security encrypted. Additionally, user authentication can interoperate with LDAP.

In addition to the access security module built in as standard, an extension series "IM-SecureSignOn" (sold separately), which implements single sign-on, is available.

**Access security module
for single sign-on:
IM-SecureSignOn**

This is an extension module that implements single sign-on that has a broad scope of application software and is easy to introduce and operate using a unique agent-type reverse proxy method. Interoperation with other systems and software packages are also easy using the simple login authentication function.



- For details, refer to [System Administrator Operation Guide], [Group Administrator Operation Guide], and [Access Security Specifications].



Column

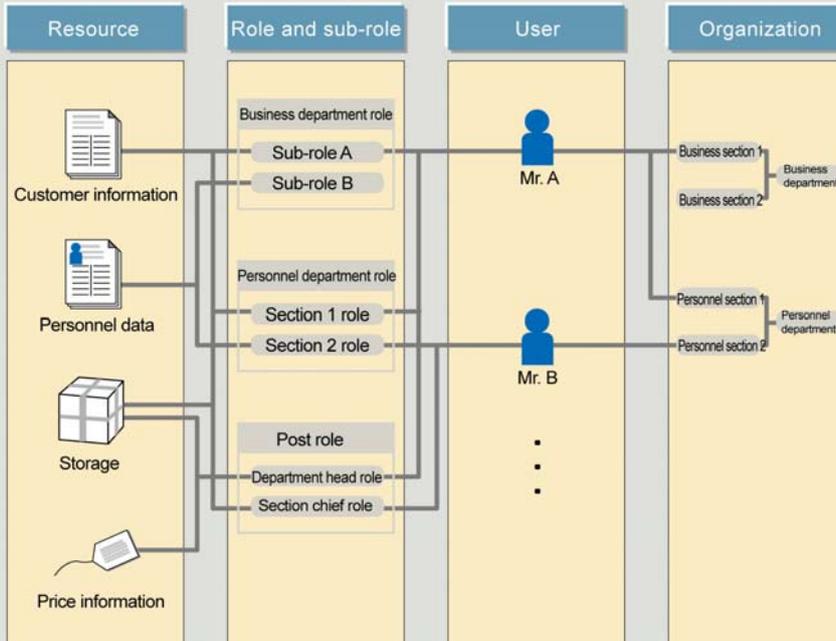
Concept of intra-mart Access Security

Properties such as roles, organizations, and job titles can be set for intra-mart users. Roles, organizations, and job titles can also be assigned as "access privileges" to the folders and pages on the intra-mart screens. When a user logs into intra-mart, only the folders and pages with access privileges matching the properties such as role, organization, and job title held by the user will be displayed.

The access security API is open source. The intra-mart access security function can be used from external user application software for uniform management of access security within the company.



Example of access security settings using roles

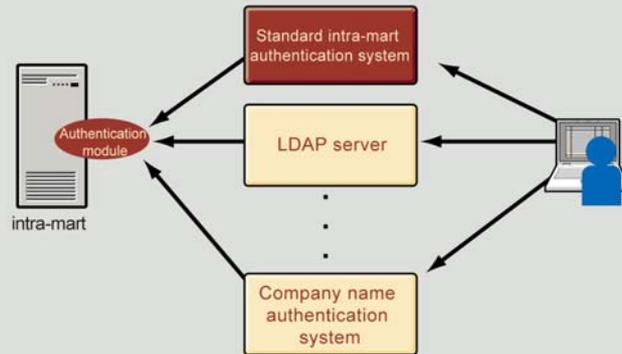




Column

Interoperability with LDAP

The intra-mart supports LDAP (Lightweight Directory Access Protocol) which is a protocol to provide standard access to directory services. The intra-mart uses an authentication module to connect to the intra-mart's standard authentication system, LDAP server, and other systems to authenticate users. This authentication module can be changed to support authentication systems of other manufacturers.



For interoperability with LDAP, refer to [System Administrator Operation Guide] and [Access Security Specifications].

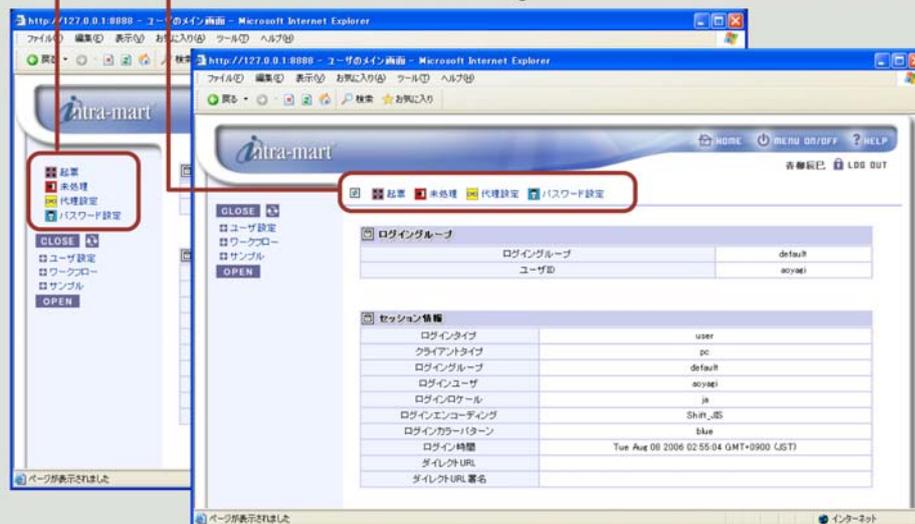


Column

"My menu settings" with Frequently Used Screens

Frequently-used screens can be registered as "My menu". The registered menu is displayed at the top of the menu displayed as standard or at the top of the screen as icons, and can be accessed with a single touch without traversing the menu hierarchy. Page registrations to "My menu" are performed using the [My menu settings] menu in [User settings].

My menu: The display can be set using either "User settings" or "Environment settings". Icons can be distributed in the menu





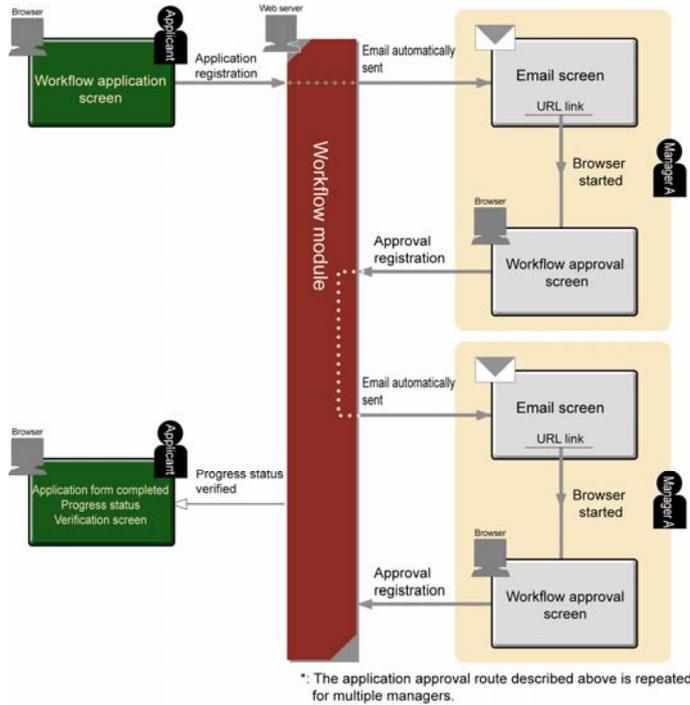
"Menu links" Displayed in the Portal Screen

The menu links are displayed as portlets, and user-specified intra-mart menus can be displayed in the group portal screen. While "My menu" is set for each individual user, the "Menu links" are set by the group administrator, and can be displayed in the portal screen for the specified user (access privileges control).



Workflow Modules

This module allows you to build the web browser-based workflow system. Using this module enables multi-level approval workflow system to be built on intranet environments. E-mails with the URL link on the approval page addressed to the approver are sent according to the approval routes that have been set in advance. From there, the approver starts their own approval page to implement approval. Furthermore, detailed workflow system, such as checking the approval progress status, can also be built. E-mails are compatible with commercially-available mail software compliant to URL link functionality and SMTP. In addition to the workflow module built in as standard, the "IM-EX application system" (sold separately) is also available as an extension module.



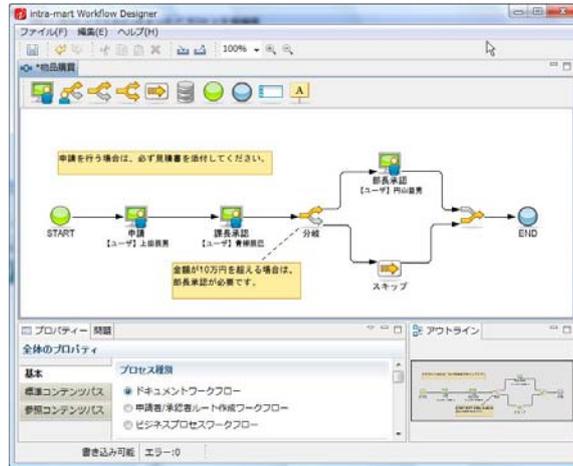
The approval route can be set beforehand, and the next approver can be set from the screen during application and approval. Linking with an existing personnel system simplifies complicated approval route settings.

An example of high-level functions in a workflow module is shown below.

Return function	This function returns a job to the applicant or the previous approver.
Delegated application approval function	This function enables delegators to approve applications when the applicant and approver are absent.
All-in-one approval function	This function enables multiple applications addressed to an approver to be approved or denied all at once.
Groundwork function	This function notifies other users by mail of the fact that there is currently a request pending approval.
Automatic reminder	This function sends notices urging an application for which the approval deadline is approaching to be processed (i.e., approved or denied) promptly.
Automatic path function	This function automatically approves applications for which the deadline is pending or has passed, and sends the application to the next approver.
Approver setting	The approver on the approval route can specify not only individual but also organization or job title. The approver can set a configuration route that is highly resistant to changes in personnel or organization restructuring.
Withdraw function	Jobs can be withdrawn.
Approval job transfer function	This function entrusts approval privileges for specific jobs to a third party.

Applicant/approver route creation workflow system

This workflow system implements a flexible process such as a circulation route for the application. The administrator creates the basic processes, and the applicant or approver can select the approver during processing.



Interim save function

This function is used to start from anywhere during the next application by saving the registration details in the interim before the application.

History of application common masters

This function is used to define routes corresponding to the history of application common masters. Route information can be created based on the organization information for future scheduled changes.

Terminable route selection

The terminable route can be select across the past and the future. If any changes occur, jobs can be issued using either the previous post or the present post.



Using direct menus according to the workflow status

This is an intuitively easy-to-understand menu as it uses the workflow status in the menu as is. Independent menus have also been prepared for delegated applications and approvals. (See diagram above.)

Advanced delegation settings

Furthermore, advanced delegation settings can be made "per process", "per version", or "per task" or using a combination of these.

Setting display items

The items displayed in the table screen, such as job issue, jobs issued, unprocessed, processed, and reference, can be changed. Workflow administrators can prepare a predefined set of display items beforehand, and general users can make selections from this set.

Workflow monitoring

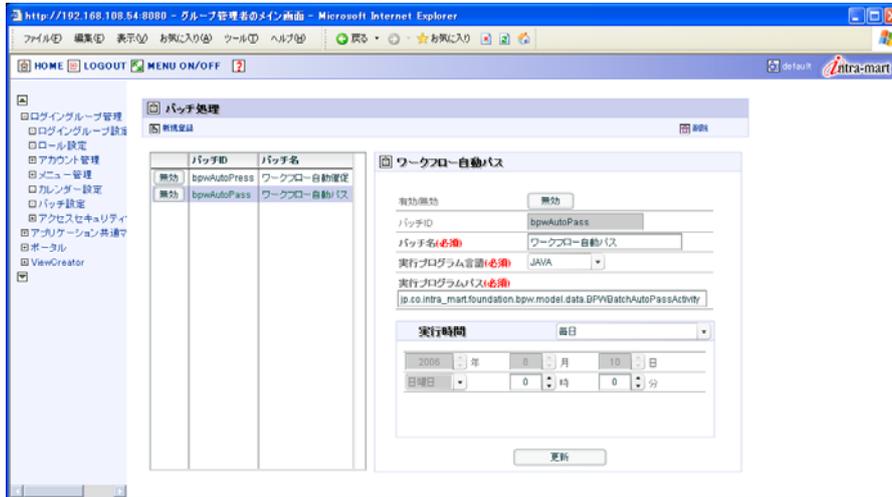
The status of completed and uncompleted jobs can be monitored in real time.



- The workflow function is available only in the "advanced version" and "enterprise version".
- For details on workflow, refer to [Workflow Operation Guide].

Batch Management Module

The web server itself has never been considered for batch processing. When building a business application software, there are times when implementing batch processing is desirable. The batch management module provides scheduler functions that can run in batches server side script programs and Java programs on the server to achieve this requirement. The batch program (JavaScript or Java) and the program start time can be set from the intra-mart settings screen.



● For details, refer to [Group Administrator Operation Guide].

Mail Interoperation Module

Using this module enables application software linked to email to be created easily, such as application software that sends emails to other SMTP-compliant mail servers. For example, application software can be built to create agents to distribute notice board information by email to designated users on a specified date, or to distribute sales information by email to employees periodically.



<Sales and other information can be distributed by E-mail automatically>

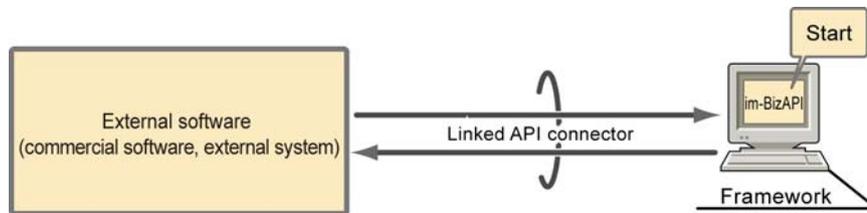


● For details, refer to [Script-Based Development Model Programming Guide] and [JavaEE-Based Development Model Programming Guide].

External software connection module

This module links intra-mart application software and external systems.

Using this module enables connections in real time from commercial software or external systems, and enables interoperation by calling im-BizAPI.



- For details, refer to [Script-Based Development Model Programming Guide] and [JavaEE-Based Development Model Programming Guide].



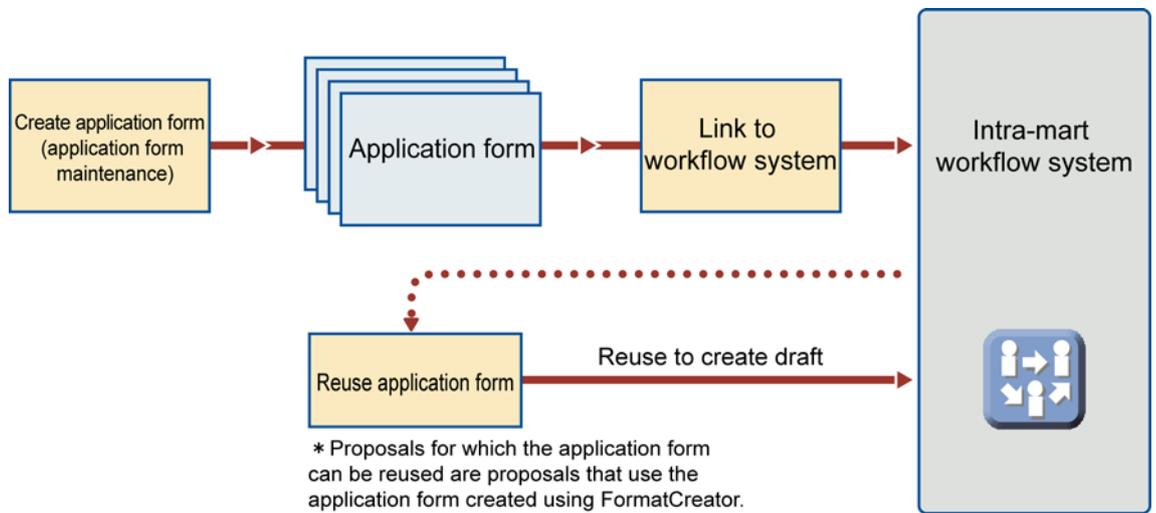
2.1.3.3 Business Base Tools

FormatCreator

FormatCreator is a solution for creating issue screens (applications) for document workflow that run on intra-mart without programming. Only by making the settings according to the onscreen wizard enables workflow application screens to be created without the knowledge of web screen creation languages such as HTML, JavaScript, or XML, or of databases. Input checks such as "input required" and "number of characters" for application input items are also enabled only by specifying settings.

The created application can be linked easily to the intra-mart workflow system using the special linkup screen.

Jobs that are issued periodically can be issued efficiently by reusing previously issued jobs from the special job issue screen.



<<Application Items>>

Applications can be created only by making settings according to the wizard. The various items required for applications have been prepared as shown in the following diagram. The settings that control the input checks have been built in. The items can be laid out by joining and deleting cells, and adding columns, in the same way as table creation.

Example of created application form (preview)

申請日 (必須)	2006/09/26	2006/09		Su Mo Tu We Th Fr Sa		1	2		
申請者 (必須)	申請者名								
品名	数量	3	4	5	6	7	8	9	小計
パソコン	20	10	11	12	13	14	15	16	自動計算
プリンタ	2	17	18	19	20	21	22	23	自動計算
ルータ	1	24	25	26	27	28	29	30	自動計算
スイッチ	6	52500		23500		自動計算			
合計金額	自動計算	消費税額		自動計算					

Fixed field (applicant's name)
 Date (Calendar is also displayed)
 Undefined (empty field)
 Fixed field (title)
 Values
 Auto calculation
 Text
 Text area
 Other: Combo boxes
 Check boxes
 Radio buttons

<<Menu Configuration>>

The following three functions are built into FormatCreator.

Application maintenance	This function creates and edits new applications. In addition to creating new applications, there is also a built-in function to create new applications efficiently by copying existing applications.
Workflow system interoperation	This function creates links to enable applications created using FormatCreator to be used in the job issue screen of intra-mart workflow system. You can select whether to use a new workflow system process or a new version of an existing process in the links.
Reuse application	When issuing a process that uses an application created using FormatCreator, it is listed in the reuse application screen. On this screen, new jobs can be efficiently issued by reusing jobs that have already been issued.



- For details, refer to [FormatCreator Operation Guide].
- The FormatCreator function is available only with the "advanced" and "enterprise for BPM" versions.

ViewCreator

ViewCreator is a tool that enables various tables and graphs to be created from the intra-mart screens using data from the databases. The login group database and the system database are available. The ViewCreator function is divided into two operations: query maintenance and data reference maintenance.

Query maintenance

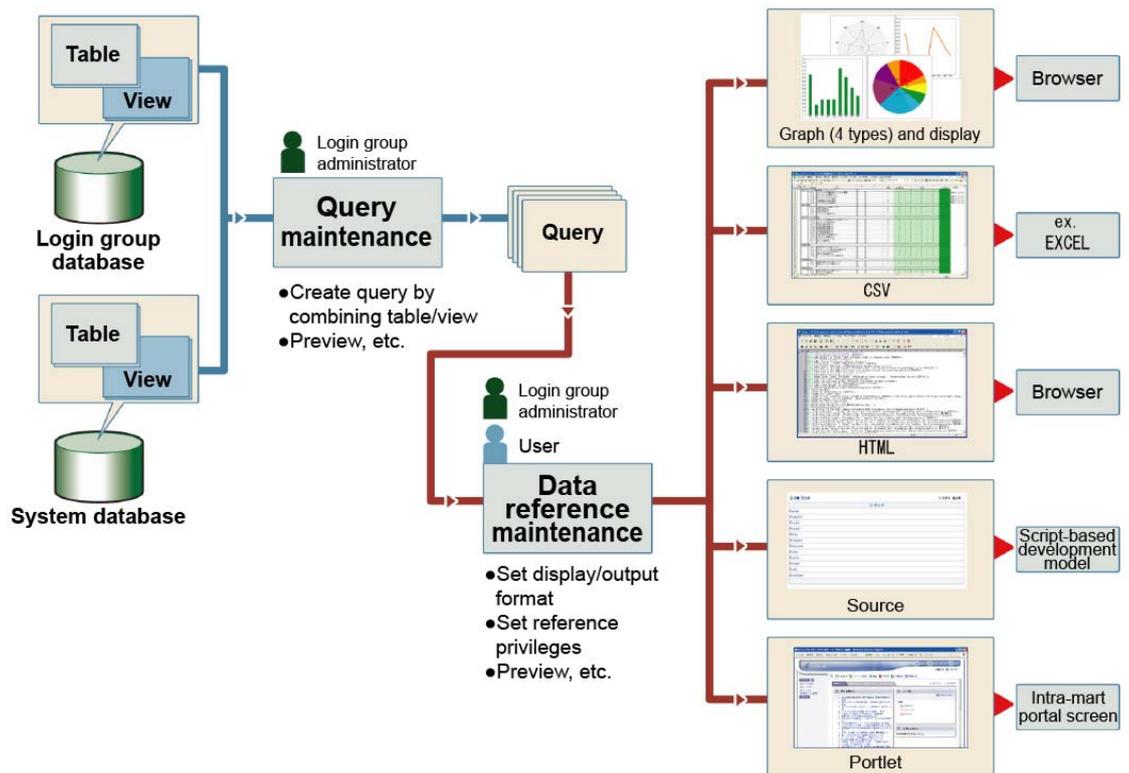
Query maintenance combines database tables and views, and creates tables used for data reference. You can display SQL of created queries, create views, or display previews of the tables.

Data reference maintenance

This functions makes settings concerning how to display the data created using query maintenance (graphs or tables), and data refining. Furthermore, reference privileges can also be set by data reference.

Using the created data references, search data, select display items, or change the sort order when displaying data. Data references can be added as portlets, output as files in CSV/HTML format, or output as program files for script-based development models. The output program source can be flexibly customized and reused.

The major characteristic of ViewCreator is that it can easily create various tables and graphs in a web browser based on the data in the databases.



<ViewCreator>

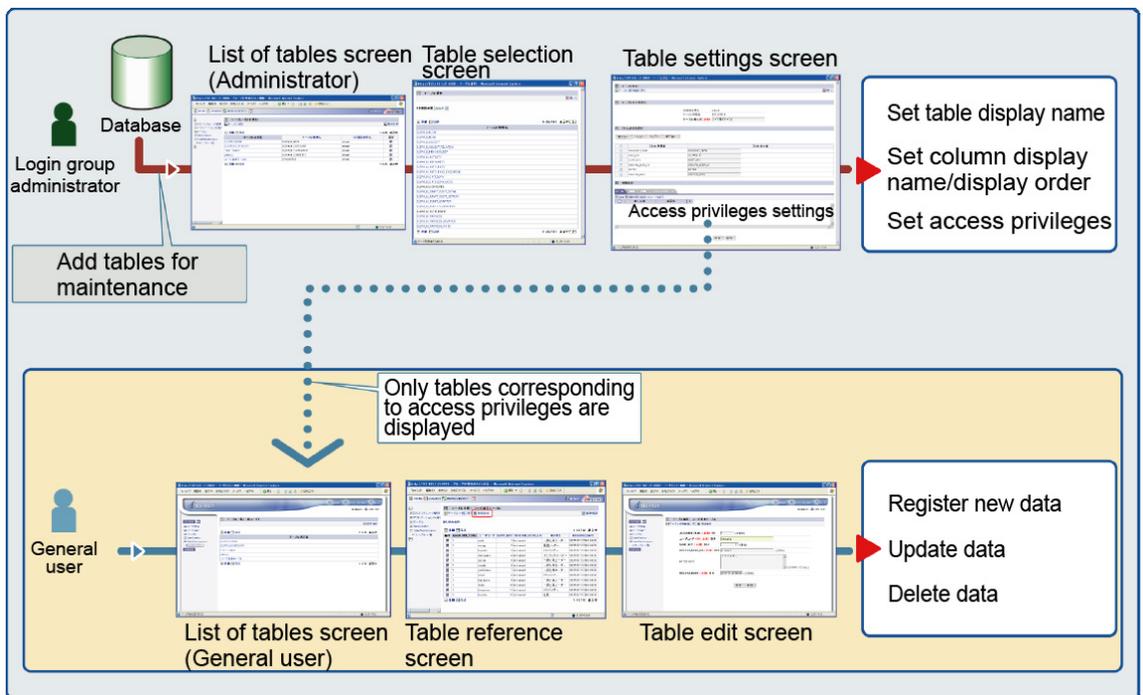
For details, refer to [ViewCreator Administrator Operation Guide] and [ViewCreator User Operation Guide].

■ TableMaintenance

TableMaintenance enables records to be newly created, updated, and deleted from existing database tables. Master maintenance functions frequently required when application software has been created using the database can be implemented easily by making simple settings. Login group administrators can restrict the tables that general users can reference by setting the access privileges for the tables being maintained. The databases that can be handled by TableMaintenance are the login group database and the system database.

TableMaintenance operations can be classified into two, as described below.

Table Management	Database tables can be added as tables to be maintained. Specify users who can operate the tables by setting the access privileges. This operation is performed by the "login group administrator".
Data editing	Users granted access privileges by the administrator can add, update, and delete table data.



<TableMaintenance outline>

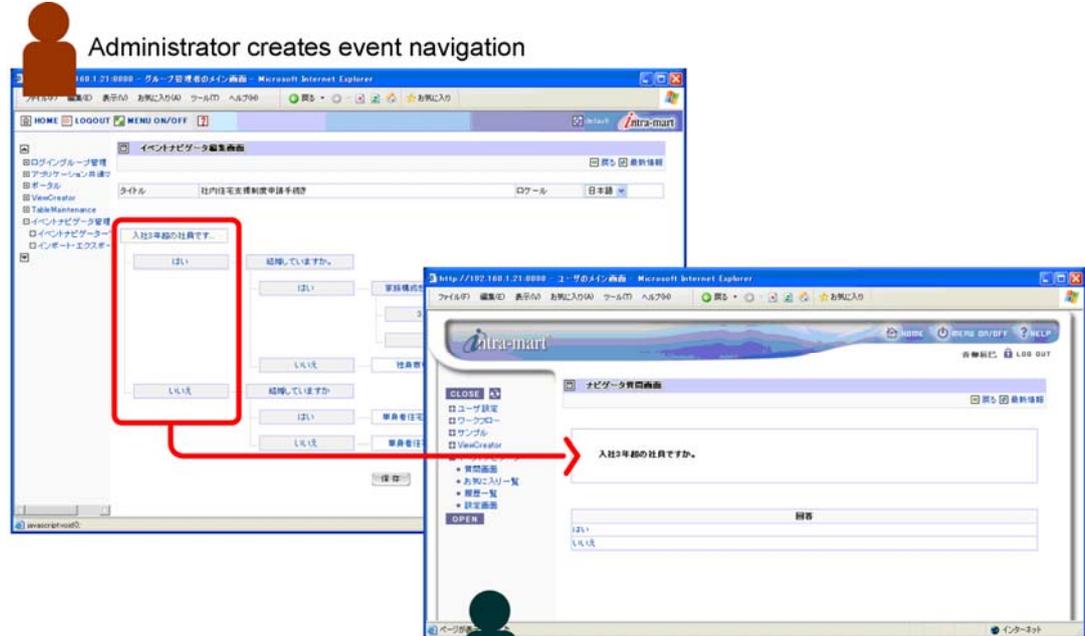


● For details, refer to [TableMaintenance Administrator Operation Guide].

Event navigator

The event navigator is a menu for creating screens in wizard format to direct the approach to screens such as applications that have complex branches depending on the conditions.

The following example is a samples that leads to the correct application based on in-house company housing rules. Only answering the displayed questions leads to the optimum application.



Administrator creates event navigation

When started by the user, questions are displayed according to the navigation



The implemented results remain in the "history"



Can also be saved to "Favorites"



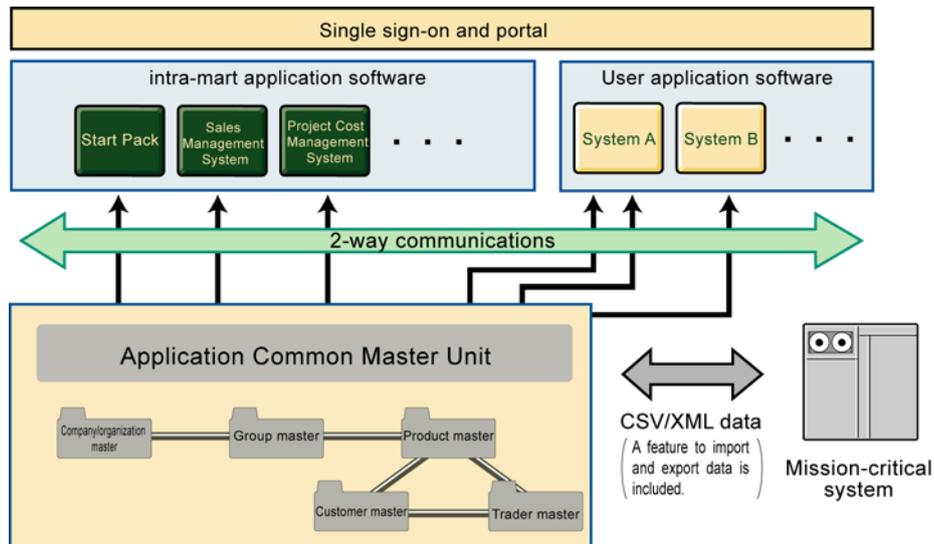
Navigation results screen Leads to Q&A history, and to various screens

<Event navigator outline>



2.1.3.4 Application Common Master

Masters commonly used in system integration such as company data, organization data, group data, customer data, product data are provided as standard. Using these masters enables system integration, including the design process, in short timeframes. Furthermore, the intra-mart application software series are all built based on application common masters to enable system integration that is linked to the intra-mart application software. In addition, API for accessing the masters are also built in as standard.



These masters and the database specifications are all open source and additional built-in API is provided to enable user application software to be created. Moreover, the intra-mart application software series are built upon application common masters to enable application software to be expanded while creating two-way links with the required data.



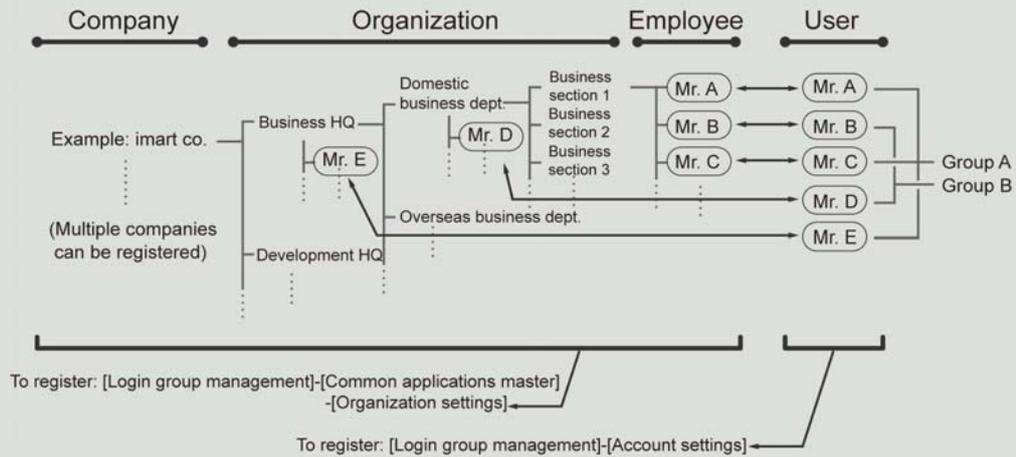
- For details, refer to [Application Common Master Specifications] and [Application Common Master API Guidelines].



Column

Organizations Defined Using Application Common Masters

An "organization" is a hierarchy of data, which is company-organization (division, department, or section)-user. First, register a company, and then its organizations such as divisions, departments, and sections. Organizations can be hierarchized, and be linked to users at any hierarchical level of the organization structure.



Note: "Group A" and "Group B" in the above diagram are equivalent to public groups.



Column

Public Groups Defined Using Application Common Masters

Public groups can be used to form a user group which is not bound to organization elements.



Column

Private Groups Defined Using Application Common Masters

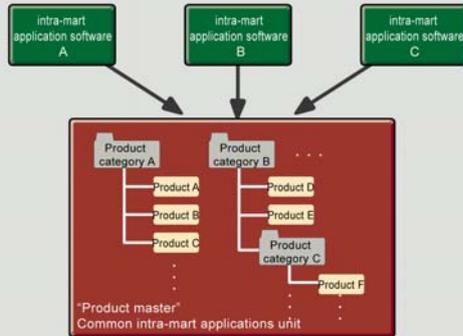
Private groups are user groups that can be created without reference to organizations in the same way as public groups. This function is built in to enable users to create user groups by themselves.



Column

Product Masters Defined Using Application Common Masters

Product masters that can be used jointly from multiple application software created using intra-mart are built in as standard.



Column

Internationalization of Application Common Masters

Application common masters are internationalized. For example, company names and organization names can be registered using multiple languages. The registered data can be searched for and handled in the required language according to the situation by specifying the locale. In addition, application software can be internationalized by linking to the locale of the login session using the access security API.



2.1.4 Creating Standard Screens (Common Screen Designs)

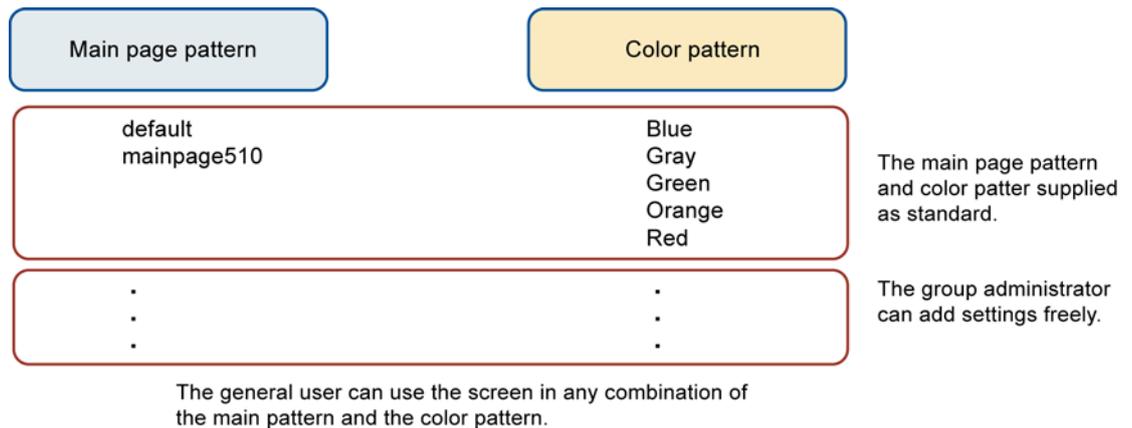
As for the standard intra-mart screens, application software can be developed with custom screen designs by the built-in common API. The screen design consists of two patterns: the "main page pattern" and the "color pattern". The main page pattern is a screen page designed with HTML or JSP, and the color pattern is specified by a CSS file. These files are prepared by the group administrator. The "main page pattern" and "color pattern" prepared by the group administrator are displayed in the general user screens to enable the screens to be customized using any combination thereof.

Two main page patterns and five color patterns are provided for the standard screens.

When designs are made common, the appearance and operability of screens is unified, which has the advantage of the user being able to operate application software without any sense of strangeness when they are called from the menu, so when developing application software, consider using these guidelines as a method of unifying the designs. The following documents are available for screen creation.

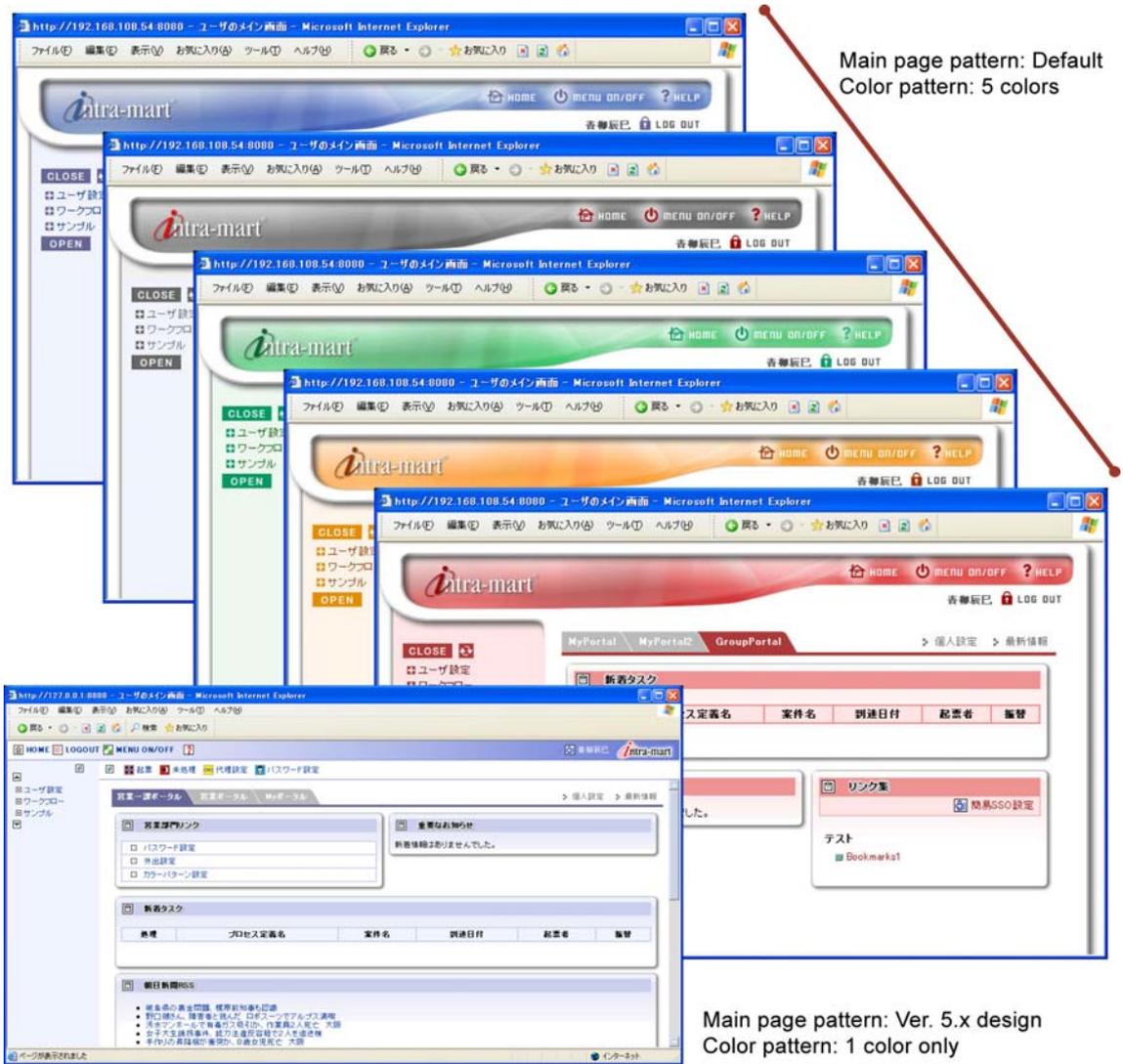
- ❖ Screen Design Guidelines
- ❖ Screen Design Style Sheet Specifications
- ❖ Access Security Specifications

APIs complying with the screen design guidelines are also provided.



- For the API specifications, refer to [Screen Design Guidelines] or [API list].
- Screen sources of WebPlatform/AppFramework are nearly all installed in plain condition. Use these sources as examples of how to use the screen design guidelines and API.

2.1 im-BizAPI (Java Business Components) Outline



<Two main patterns and five color patterns are provided as standard>



Column

Rules for Using the intra-mart WebPlatform/AppFramework

There are several rules for building application software using the intra-mart WebPlatform and AppFramework.

1. Using user settings screens

The [User settings] screen is used to manage user logins to intra-mart. This screen should be used to manage user logins when building application software. The access security module and workflow module operate on the presumption that the account information is created using [User settings]. These modules use the account information from [User settings]. (See the next column.)

For user administration master registrations, refer to [Group Administrator Operation Guide].

2. Folder/page menu configuration

The use of menu tree frames is presumed in intra-mart menu configuration. In particular, the access security module is presumed to follow the menu configuration. For registrations to folders and pages, refer to [Group Administrator Operation Guide]. The API for the access security functions are provided. By using the API, it is possible to create unique menu screens.

It is also possible to use functions that link the intra-mart to the databases without using these login user administration functions and folder/page functions.



Column

Dependence on Account Information for Modules (im-BizAPI) Supplied Using intra-mart

Some parts of the intra-mart modules can only be used when using intra-mart account information (user management using the [User settings] screen). Refer to the following table. Note that some modules may require other modules. Refer to the following precautions.

intra-mart module (im-BizAPI)	Without account information: ○ useable, △ use disabled in parts, × not usable
Common Screen Module	△*3
Portal Module *1	×
Graph Creation Module	○
Calendar Display Module	○
Tree View Module	○
Application Common Module	△
Mail Interoperation Module	○
Workflow Module *1	×
Access Security Module	×
Batch Management Module	○
Application Common Master	×
Extension Module	
IM-PDF Designer	○

*1 This module presumes the use of the access security module. This module internally uses the intra-mart account information.

*3 Design tags are dependent on the account information.



● For the account information specifications, refer to [Access Security Specifications].



2.1.5 Extension Series

The extension series are extension modules (optional products) that are available separately from the standard modules built into the intra-mart WebPlatform and the intra-mart AppFramework. They exist for users who require higher functioning modules, and can be used in the same way as standard modules when necessary. The currently available modules are described below.



2.1.5.1 IM-PDF Designer (Sold Separately)

This module supports more complex form formats and page control using PDF, and is compatible with both single and continuous sheets. It creates form formats using the "IOWebDoc" visual form design creation tool. Data is received from the user application software either in CSV format or via memory, and after the PDF file has been created, Acrobat is started for printing. In environments where multiple application servers are deployed, PDF files created by running the IM-PDF designer on the Storage Service are managed uniformly, and can be downloaded to the client.

The image displays two sample PDF documents generated by IM-PDF Designer. The left document is a payroll summary titled "勤怠一覧表 1999年 5月分" (Attendance Summary for May 1999). It includes a header with the date "印刷日1999年5月6日" and a table with columns for employee ID, name, department, and attendance status. Below this is a detailed table listing dates from 5/1 to 5/31, with columns for day type (e.g., 休日, 出勤), start/end times, and shift status.

The right document is an invoice titled "御見積書" (Quote/Invoice) dated 2001年06月14日. It is issued by "株式会社横浜ソフトウェアサービス" (Yokohama Software Service Co., Ltd.). The invoice includes a table summarizing the total amount (¥480,585) and a detailed item list:

項目	数量	単位	単価	金額
IOWebDOC	1	式	¥290,000	¥290,000
ASP用インターフェース	1	式	¥100,000	¥100,000
年間保守費	1	式	¥22,885	¥22,885

The invoice also features a summary table with columns for "本体価格" (¥457,700), "消費税" (¥22,885), and "合計金額" (¥480,585). A barcode is visible at the bottom of the invoice.

<IM-PDF Designer sample screen>

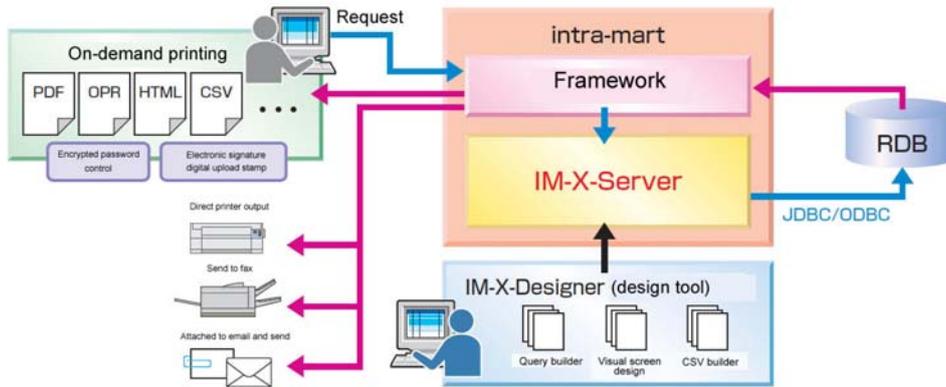


2.1.5.2 IM-X Server (Sold Separately)

This module supports large volumes of form output, direct output to the printer, electronic signatures, and time stamps. It is an XML-compatible sophisticated business form solution that provides various functions such as on-demand printing and direct output.

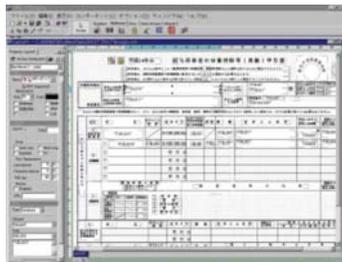
<<Enables the Creation, Output, and Distribution of Forms in Various Formats>>

Forms are defined using XML in IM-X-Server, so single source data can be used to create multiple formats, everything from electronic forms (PDF, HTML, CSV, and OPR) and printing (either direct printing or sending faxes) to search/input forms, enabling the development work hours to be reduced. The module supplies a total solution from mission-critical form creation to the business reports necessary for daily work.

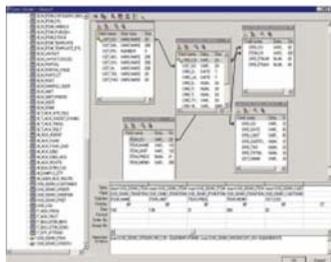


<<Provided in Conjunction with Design Tools that Enable Detailed Form Creation>>

IM-X Server supports design of complex ruled lines, reports by page, continuous and single sheets, sub-reports, labels, and custom sizes that peculiar to Japan. IM-X Server supports various business forms with flexible display, such as dynamic graph creation, dynamic bar code creation, electronic signatures, table calculations, and column layout by grouping multiple objects.



[Screen design]
Enables intuitive operations using GUI parts distribution and property inputs. Using the wizards makes settings unnecessary.



[Query builder]
Enables settings without consideration of database formats. Database, CSV, and XML data are obtained using GUIs.

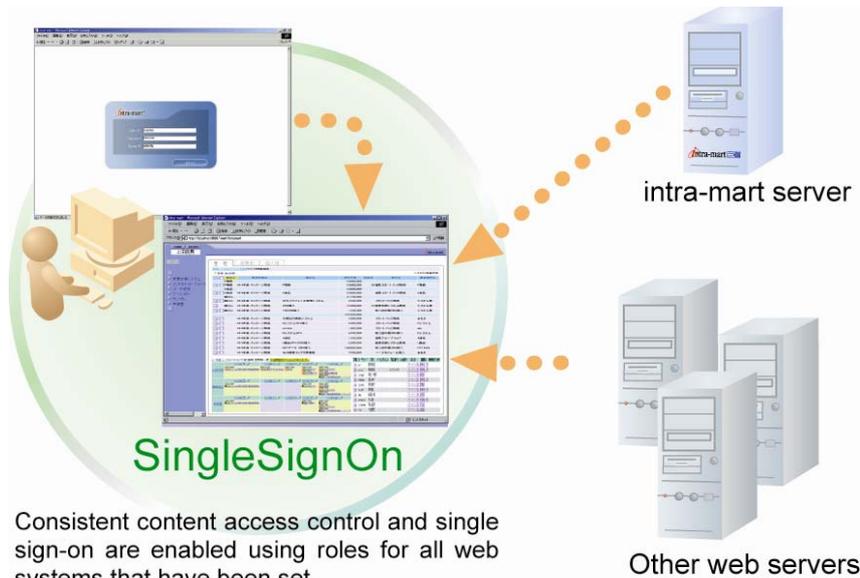


[Compatible with access control]
Compatible with PDF sample/document security and electronic signatures. On-demand passwords.



2.1.5.3 IM-SecureSignOn (Secure Sign-On) (Sold Separately)

IM-SecureSignOn is a tool that enables single sign-on. All authentications for logging in to various in-house web systems can also be completed only by logging in once to SecureSignOn. This system is easy to introduce and operate, and can be applied to various scenarios using its unique agent-type reverse proxy method*. Interoperation with other systems and software packages are also easy using the simple login authentication function.



Consistent content access control and single sign-on are enabled using roles for all web systems that have been set.

<<Agent-type Reverse Proxy Method>>

To implement single sign-on, there are generally two methods: the reverse proxy method and the agent module method. IM-SecureSignOn uses a unique agent-type reverse proxy method that combines the advantages of both methods.

Format	Main Application	Characteristics	Basic System Diagram
Reverse agent proxy format	Decentralized administration Single sign-on formats suitable for intranets	<ul style="list-style-type: none"> • No concentrated load • Each agent receives direct access • Can handle multiple users • Can handle distributed web server configurations • Web server and host OS type do not matter 	<p>The diagram shows a 'User' (represented by a browser icon) interacting with a 'Web wrapper' (server icon). The 'Web wrapper' is connected to a 'Web wrapper administration server' (server icon). The 'Web wrapper' also sends a 'Verification request' (dotted arrow) to a 'Verification server' (server icon). The 'Verification server' performs 'Verification processing' and sends a response back to the 'Web wrapper'. The 'Web wrapper' is also connected to an 'intra-mart base module/framework' (server icon).</p>

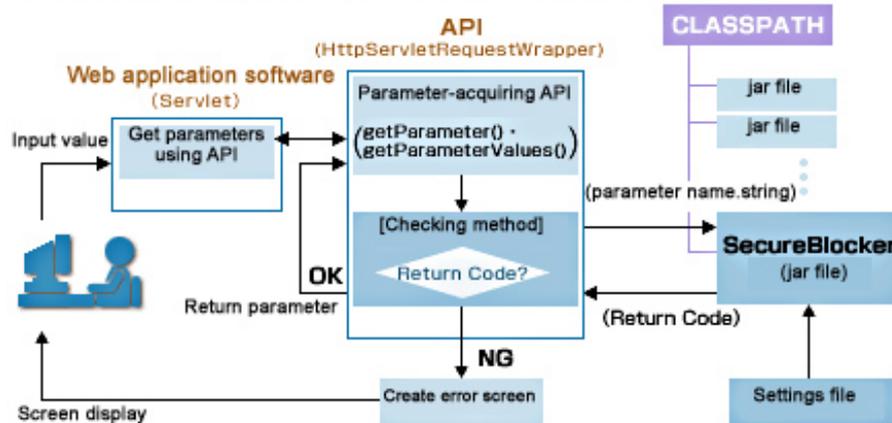


2.1.5.4 IM-SecureBlocker (Sold Separately)

Security measures for web application software published to the web can be achieved at low cost. As IM-SecureBlocker can be used in a pinpoint manner to target only vulnerable points, the effects of IM-SecureBlocker introduction on the overall web application software can be minimized.

IM-SecureBlocker is a Java class library that examines the input parameters to automatically render application software harmless.

Servlet developers do not have to modify any servlets because IM-SecureBlocker is implemented and hidden inside the API.



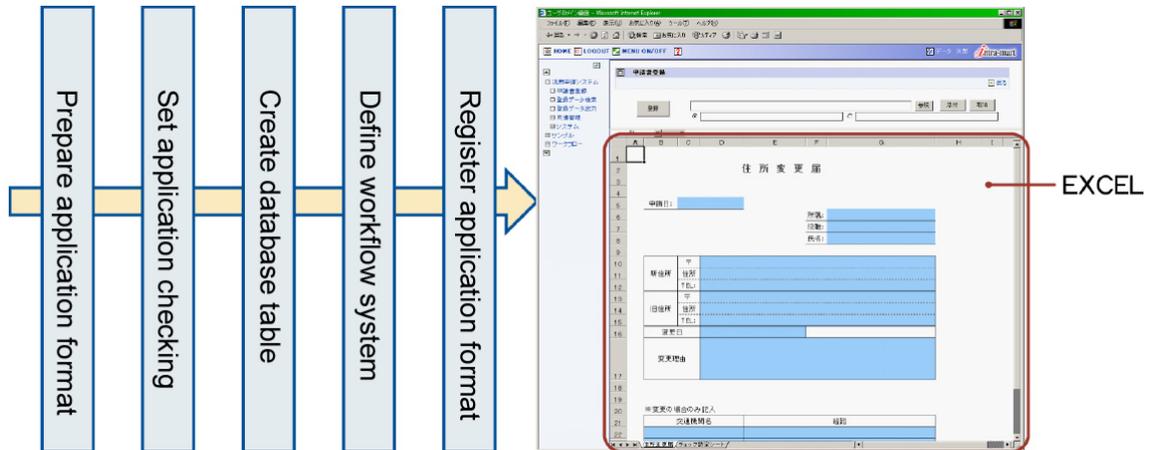
Introducing IM-SecureBlocker will yield the following effects.

- ❖ The costs of examining and implementing input value check functions for HTTP Request parameters can be reduced.
- ❖ Countermeasures to web application software vulnerability can be implemented without relying on the developer's skills.
- ❖ Checks can be controlled for each parameter used by the web site.
- ❖ Cross-site scripting, OS command injection, directory traversal, and SQL injection checks are possible.



2.1.5.5 IM-EX Application System (Sold Separately)

This solution uses Excel sheets in the application format screen for electronic applications. Using this in combination with intra-mart workflow system enables application workflow system to be created only by specifying settings without any programming. You can use Excel functions of format settings and macros, thus enabling input checks. The entered information can be stored in the designated database tables.



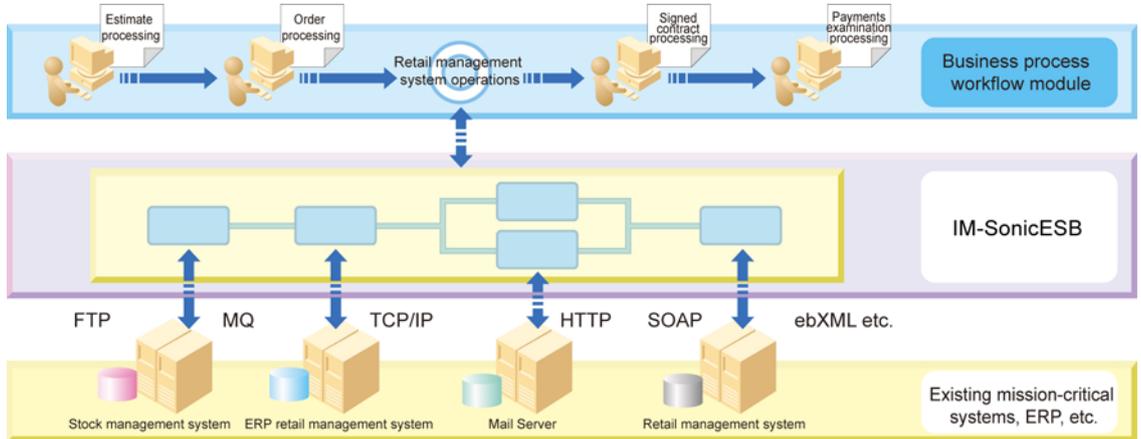
- ❖ Only by using Excel format, Web application software can be made in short timeframes.
- ❖ Excel format can be used in the input screen and interoperate with intra-mart workflow system.
- ❖ By configuring the Excel format settings and macros inputs can be checked on the client side.
- ❖ Information entered to Excel can be stored in the designated database tables.
- ❖ Information stored in the databases can be output using the specified Excel format.
- ❖ Registrations of Excel formats and input checks can all be performed only by specifying settings, so no knowledge of programming languages is required.



2.1.5.6 IM-SonicESB (Sold Separately)

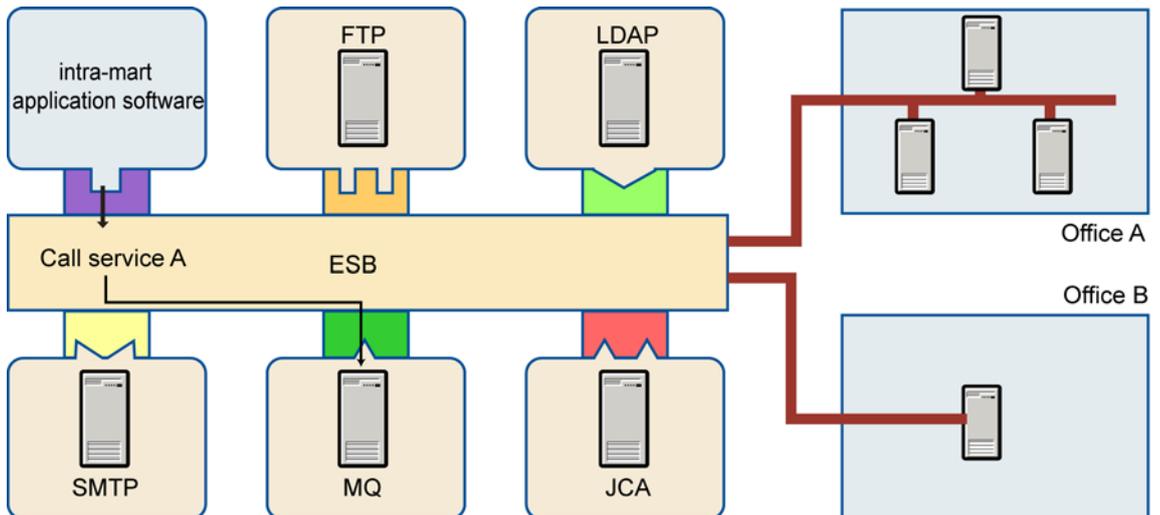
IM-SonicESB is a back-end system integration platform (ESB) that links multiple existing systems distributed within the company. Functions to verify data consistency between systems are also built in to enable the easy development of highly reliable application software that link web services.

Linking to business process workflow modules achieves dynamic and mission-critical system integration, including the back-end.



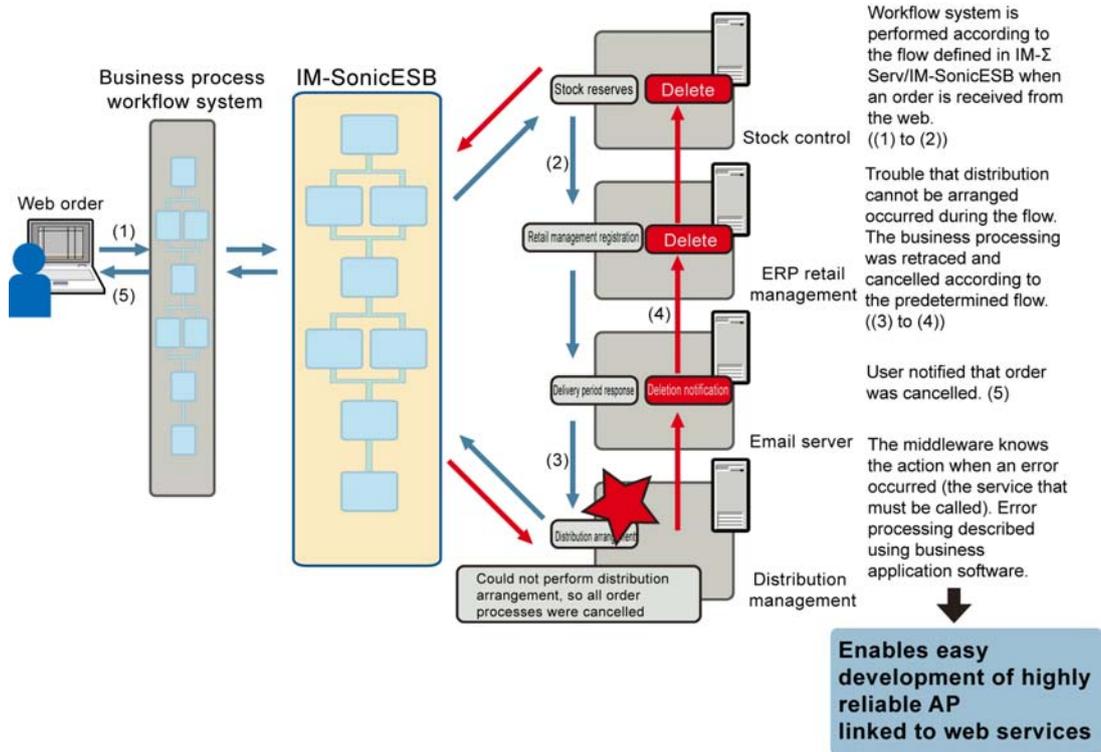
<<Achieves Systems that Support both Short and Long-Running Transactions>>

The intra-mart business process workflow system can flexibly link various web systems according to the workflow. So-called long-running transactions are thereby achieved. Meanwhile, IM-ΣServ achieves highly reliable "short- running transactions" that link various existing systems within the company. In addition, linking to IM-ΣServ from the intra-mart business process workflow system unifies, controls, and automates multiple business processes and business systems to achieve a business process management (BPM) that optimizes the overall workflow system.



<<IM-SonicESB High Reliability – Transactions>>

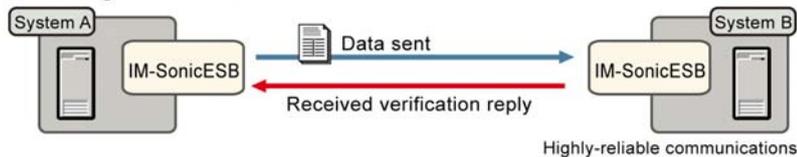
IM-SonicESB provides a function to ensure the consistency of data between linked systems if an error occurs.



<<IM-SonicESB High Reliability - Message Assurance>>

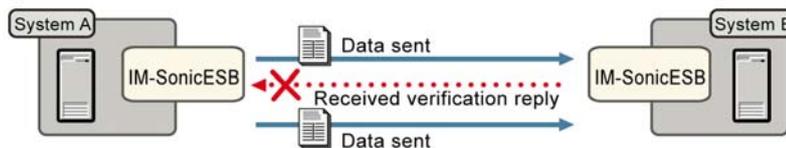
IM-SonicESB provides various functions to achieve highly reliable messages in HTTP.

● Message received notice



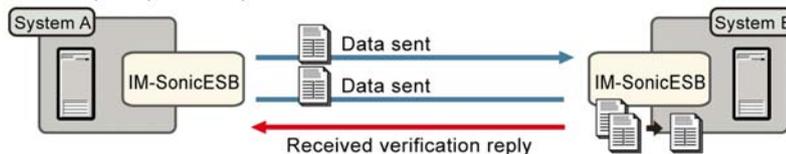
When the recipient receives a message, a reply verifying receipt is sent to the sender.

● Resend function



If a receipt verification is not returned to the sender, the sender resends the data.

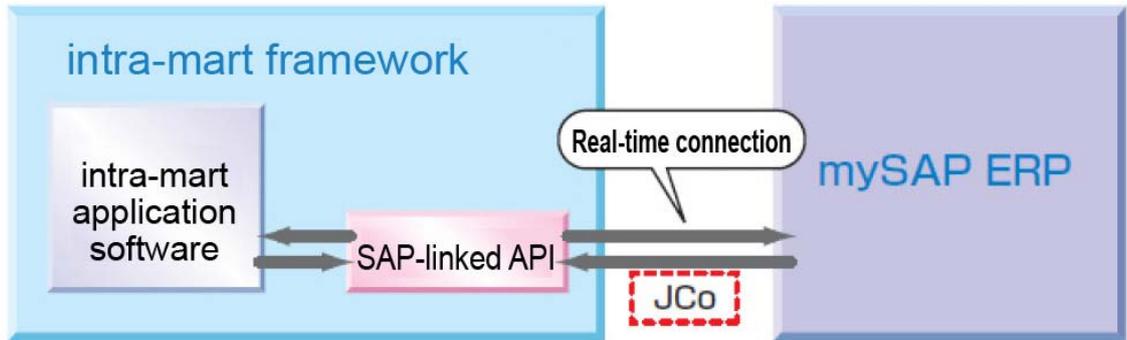
● Receipt duplication prevention function



Prevents the data from being delivered twice.

2.1.5.7 IM-ERP Real Connect (Sold Separately)

The intra-mart has a built-in extension module that can interoperate with ERP in real time. A SAP interoperation API library is provided using SAP JCo technology. Add-ons can be developed at low cost using standard Java technology. The potential of the Web expands greatly, from interoperation centering on existing batches to real-time transaction interoperation.



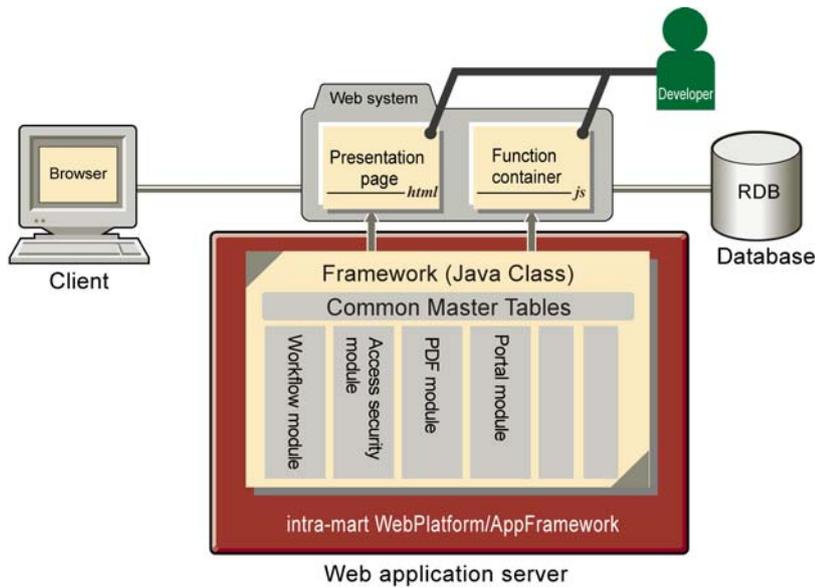
- The IM-ERP real connect that is currently provided has a wide array of built-in APIs that can interoperate with SAP. Other ERP interoperation modules are also scheduled to be added.
- For details, refer to the following data.
 - Programming guides to interoperate with SAP R/3 and ERP6.0 in real time (included with the product) [SAP R/3 Interoperation Programming Guide] and [SAP ERP6.0 Interoperation Programming Guide]
- SAP, mySAP ERP, SAP R/3, SAP ERP6.0, SAP JCO, and SAP products and service names described in the products are all trademarks or registered trademarks of SAP AG in Germany and other countries.
- SAP Certified Integration and Powered by SAP NetWeaver™ certification were obtained in June 2004.

2.2

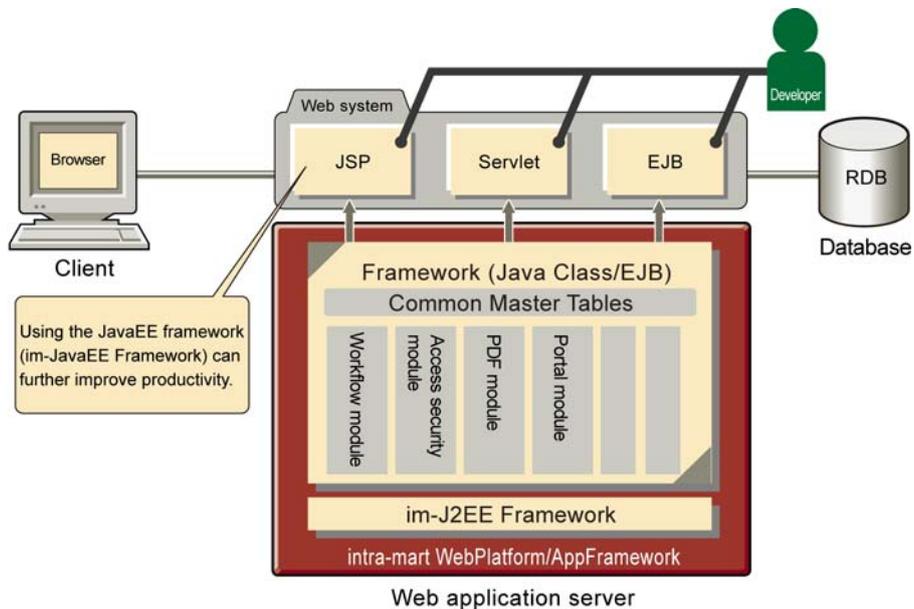
Outline of intra-mart Application Development

In application development using the intra-mart WebPlatform or intra-mart AppFramework, the developer creates user interfaces that are displayed in the browser and business logic that runs on the web server.

The two types of files, presentation pages (HTML files) and function containers (server-side JavaScript files) are created in the script-based development model. Productivity can be further increased by using the modules (im-BizAPI) built into the framework.



In the JavaEE-based development model, JSP files, Servlets, and EJB components are used in development. Using the (im-BizAPI) modules built into the framework together with the JavaEE framework (im-JavaEE Framework) promotes the reuse of business components and makes web system integration using complicated JavaEE more efficient.





Column

Discrete Use of 2 Development Models

JavaEE-Based Development Model

Reusing components and parallel and distributed development improve productivity in large-scale system integration.

Script-Based Development Model

Describing the business processes in one file rather than in the component architecture, improves productivity in small team system integration.

- * Even in large-scale development, costs can be reduced by combining both models, for example, by using lightweight programming for screens that do not require component reusability such as master maintenance screens. Developing everything in JavaEE leads to major overheads.
- * im-BizAPI (Java business components) can be used in both models.



2.2.1 Application development using script-based development models

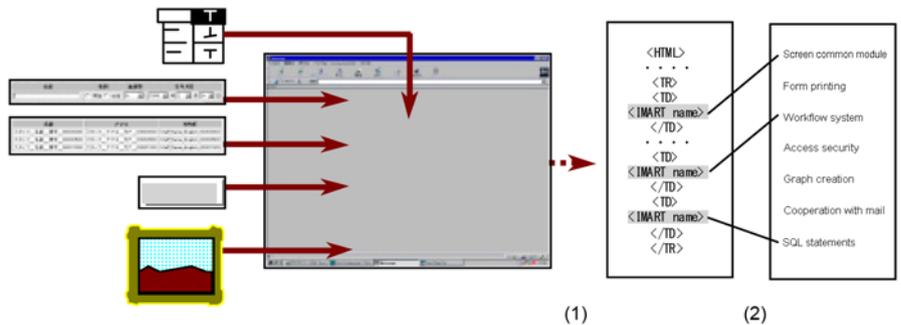
Business logic is coded in the "function container" in JavaScript, and intra-mart functions as a bridge to call and run the business logic from the "presentation page".



2.2.1.1 Presentation page

The presentation page is equivalent to the user interface. Its extension is ".html" and fixed. Developers or end users create web-based presentation pages using eBuilder (Script Producer)".

Multimedia-rich screens with embedded video and sound can be built in the browser-based user interface. Because the presentation page is an HTML file, it is also possible to take out only the user interface parts and ask web page designers for the work during web system integration, . Adding <IMART> tags to the HTML files created using the homepage creation tool enables JavaScript in the function container to be linked and called. <IMART> extension tags that call user-defined functions can also be added. Finished HTML files are linked to the database immediately only by registering the page, and run at high speed.



- (1) Create presentation page templates using commercially available homepage creation tools (Microsoft FrontPage or HOMEPAGE BUILDER) or eBuilder (Script Producer).
- (2) Enter <IMART> tags into the HTML source that is automatically created by the home page creation tool using either eBuilder (Script Producer) or a text editor. The tags are linked to the JavaScript functions and WebPlatform objects in the function container

A sample presentation page is shown below.

The modules are called using the <IMART> extension tags, which are unique to intra-mart.

```

<社員マスタからのデータ取得用HTML (一覧表示用) 一項目を拡張>
1: <HTML>
2: <BODY>
3: <TABLE border="1">
4: <TR>
5:   <TD>社員コード</TD>
6:   <TD>社員名</TD>
※ 7:   <TD>社員名 (カナ) </TD>
8: </TR>
9: <IMART type="repeat" list=staffList item="record">
10: <TR>
11:   <TD><IMART type="string" value=record.staff_cd</IMART></TD>
12:   <TD><IMART type="string" value=record.stf_name_kanji</IMART></TD>
※ 13:   <TD><IMART type="string" value=record.stf_name_kana</IMART></TD>
14: </TR>
15: </IMART>
16: </TABLE>
17: </BODY>
18: </HTML>
    
```

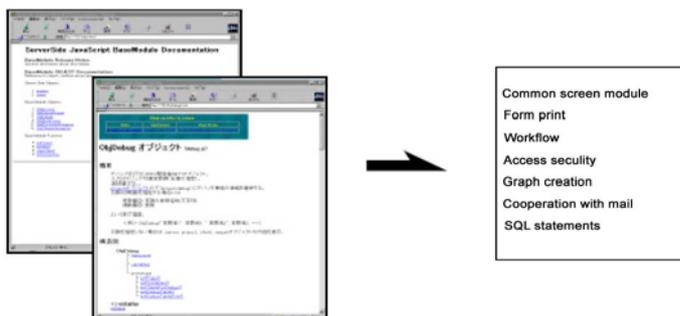
The modules are called using the unique <IMART> extension tags.



2.2.1.2 Function Container

The function container is equivalent to the business logic that runs on Application Runtime in the multi-tiered architecture. Its extension is ".js" and fixed. A function container and a presentation page comprise a single set, so the same name is used for the file label. Developers write the JavaScript called from the presentation page in the function container. Specifically, developers select the required objects and functions from the framework functions provided in the intra-mart WebPlatform and intra-mart AppFramework, and write business logic which runs on the server side using these objects and functions in JavaScript using "eBuilder (Script Producer)". SQL statements to the database are also written in the function container. Actual connection to the RDB and the issuing of SQL is performed by the intra-mart WebPlatform and intra-mart AppFramework, so the developer does not require any knowledge of detailed session or transaction management.

The business logic that has been created is called and run using the <IMART> tags in the presentation page. The details of the framework functions built into the intra-mart WebPlatform and intra-mart AppFramework are tabled in [intra-mart API list]. These script can be written in JavaScript, so the serious web systems linked to databases can be developed only by extending the traditional homepages. The knowledge of Java or ActiveX, which are difficult to learn, is not required.





2.2.2 Application development using JavaEE-based development models

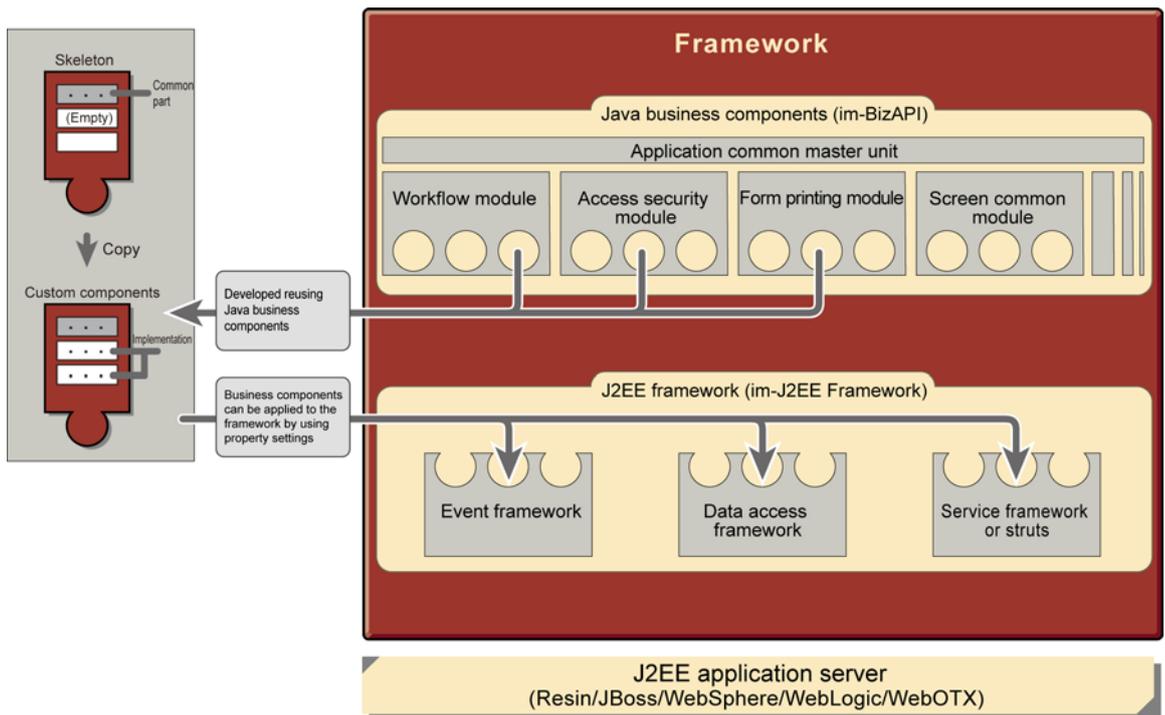
Web system integration using JavaEE is spreading as a common platform that is not dependent on the OS or web application server. Development using JavaEE, however, is Java-based, so a high level of knowledge and experience in object-oriented, or a prior knowledge of JavaEE are required. That makes a threshold high. Moreover, although developers can program at will as long as they conform to the rules of JavaEE development, this becomes a burden for beginners and causes disparate development styles between software engineers.

The intra-mart WebPlatform and intra-mart AppFramework solve these problems using the JavaEE framework (im-JavaEE Framework), which greatly improves the productivity of JavaEE-based development models.



2.2.2.1 JavaEE-Based Development Framework

There are many common configuration components in web system integration using JavaEE, and using this fact, you can greatly improved productivity. In the intra-mart WebPlatform and intra-mart AppFramework, common processes required in JavaEE development are all built in as part of the JavaEE framework, and developers create components as for the part entrusted to them.



<Outline of intra-mart framework use>

As shown in the above diagram, the framework is broadly divided into "Java business components (im-BizAPI)" and "JavaEE framework (im-JavaEE Framework)". All Java component modules (workflow module, access security module, etc.) belong to "Java business components (im-BizAPI)". All common processes required in JavaEE-based development belong to the "JavaEE framework (im-JavaEE Framework)".

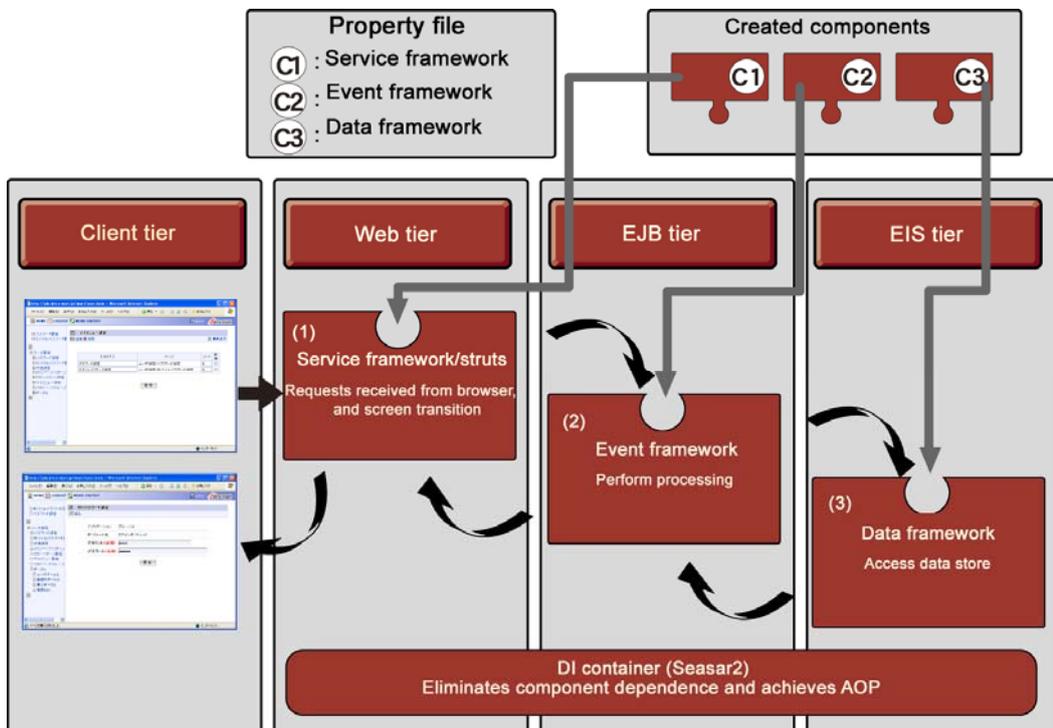
In particular, the components that use the framework are prepared as template ("skeletons") to further improve productivity. (The common parts are pre-installed, so when creating unique components, the developer creates the components by copying the skeletons and coding the parts that have not been implemented.) The created components are placed in the framework by configuring the property settings.

The frameworks also comprise common configurations using the four tiers defined by JavaEE (client tier, web tier, EJB tier, and EIS tier, conforming to Sun's Blueprint), but developers do not need to take this fast into consideration. It is possible to change the configuration later according to the size of the system only by modifying the settings file.

The intra-mart framework functions are configured from the following frameworks.

- | | |
|--|--|
| <ul style="list-style-type: none"> (1) Service framework (2) Event framework (3) Data framework (4) DI container | <ul style="list-style-type: none"> Screen transition when accepting requests from the client-tier browser (web tier)
(Refer to the notes below.) Mainly performs database processing (EJB tier) Accesses the database (EIS tier) Eliminates component dependency and achieves AOP (by incorporating Seasar2) |
|--|--|

These frameworks call the relevant components according to the property settings. In this way, processing is achieved using the JavaEE MVC model optimum for the web system.



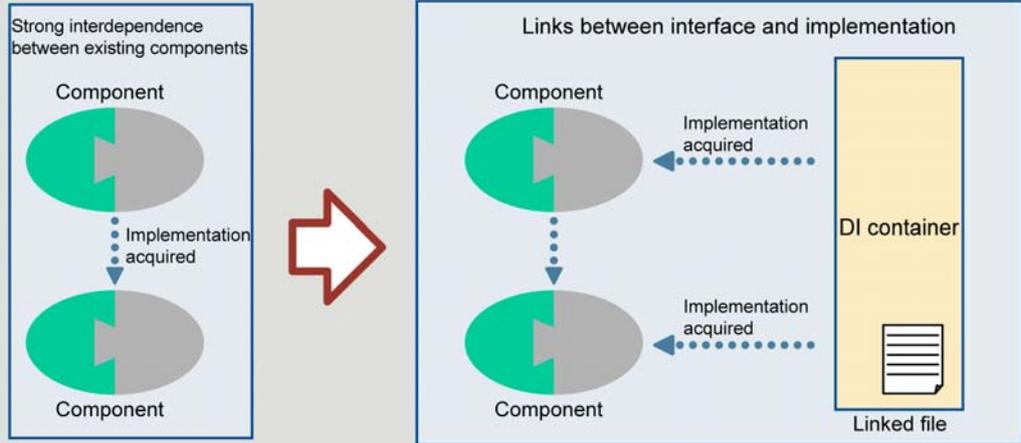
Using these framework functions enables the system in development to be divided into components and the structure that is based on the property file settings. As a result, developers can flexibly customize the system and add functions.



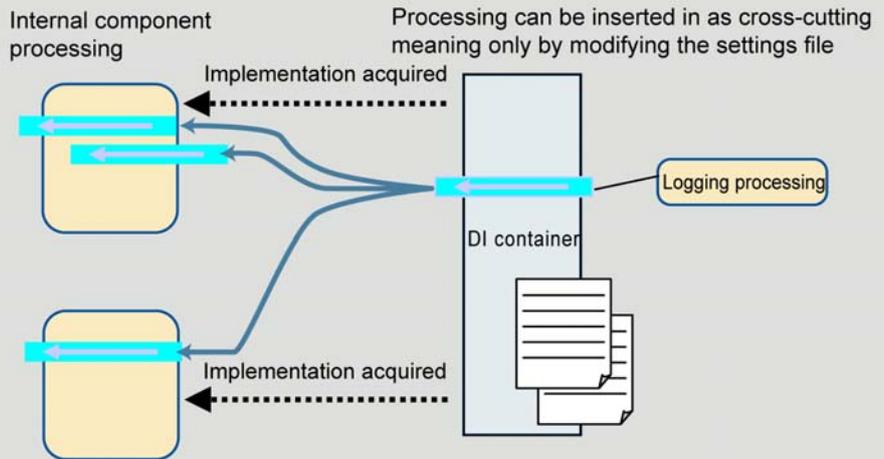
Column

DI Container

The DI container eliminates internal dependency between components, and configures the dependent relationships in the DI container.



Aspect-oriented programming (AOP) is possible, which allows developers to insert functions and processes after components are created.



2.2.2.2 Advantages when Using Frameworks in JavaEE-Based Development Models

Using the JavaEE framework during JavaEE-based development has the following advantages.

JavaEE-based development

The parts which require high-level knowledge are not visible, and the developer implements the application logic in the skeleton. Even with no prior knowledge, the completed system is in the recommended JavaEE structure, so MVC models can be achieved easily. The uniform program structure improves maintainability.)

Improved productivity

All common items are built into the framework, so component reusability increases, and overall team productivity is improved (Timeframes shortened by teams sharing components and parallel distributed development).

Improved maintainability

This mechanism makes absolutely no changes to the original application software even when new components are added. When updating functions, only the relevant components are changed while not affecting other parts.

<Differences in sphere of customization depending on presence or absence of framework applications: ○ shows affected areas>

Order	Changes	Framework applications: No			Framework applications: Yes		
		JSP	Servlet	Bean	JSP	Servlet	Bean
Screen Customize	Change screen layout	○			○		
	Add screen display items	○	○	○	○		○
	Change screen display format	○	○	○	○		
	Delete screen display items	○	○	○	○		
	Split screen frames	○	○	○	○		
	Join screen frames	○	○	○	○		
Work processing add-ons	Add work processes	○	○	○			○
	Change work processes	○	○	○			○
Database Customize	Add database items		○	○			○
	Delete database items		○	○			○

Reduced test process time and improved quality

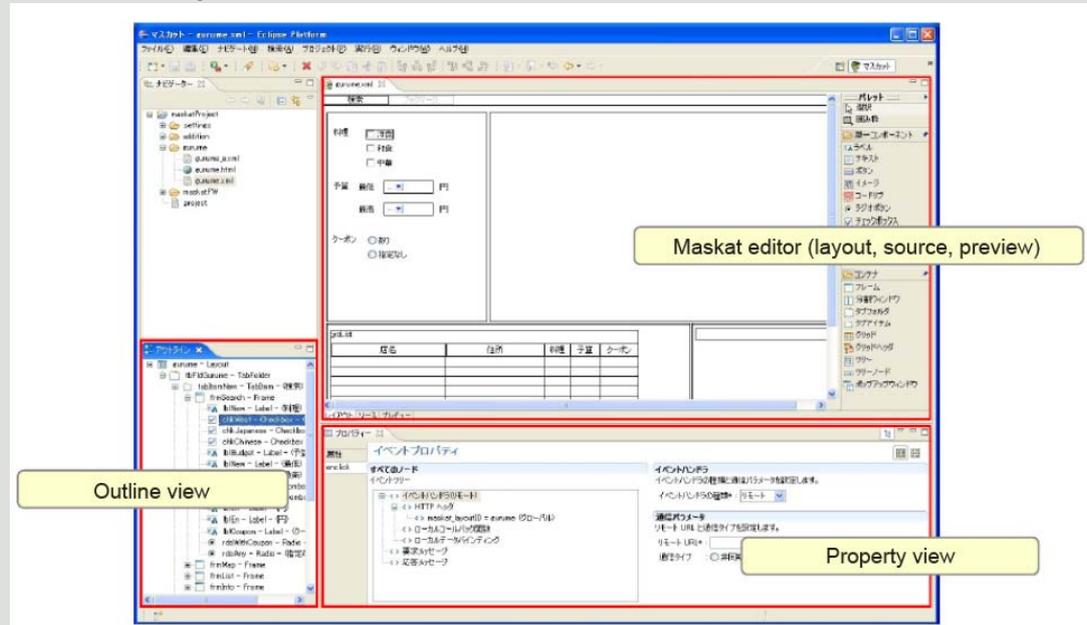
Checking frameworks in the test process is unnecessary. Even if an error occurs, finding the root cause is easy. The DI container provides easy switching between mockups (model or temporary implementation) for tests and actual components, so mockups can be used easily.



Column

Ajax Application Development Tool "Maskat"

Maskat is an open source framework from NTT DATA CORP. for developing Ajax-based rich clients. Maskat is built into intra-mart. The user can easily develop rich clients that run on the intra-mart environment using Maskat.



<Maskat development screen>

Advantages of using Maskat with intra-mart

- Rich client screens using Ajax can be developed easily in intra-mart
- Maskat can be linked to both the JavaEE-based development model and the script-based development model
- Complicated operations of parts placed on the screen and difficult-to-understand communication controls are all hidden
- Developers achieve rich clients only by setting definition files and creating business logic

2.2 Outline of intra-mart Application Development

The screenshot shows a web application interface for a pet store. The main window is titled "Mask@ Pet Store" and "Shopping Cart". It contains a table with the following data:

Item ID	Product ID	Description	Quantity	List Price
EST-28	K9-RT-01	Adult Female Golden	1	\$155
EST-18	AV-CB-01	Adult Male Amazon P	1	\$193

Annotations in Japanese provide additional context:

- "テーブルのコラム幅も調整できる" (Table column widths can also be adjusted)
- "商品リストデータをサーバーから取得して表示する" (Retrieve product list data from the server and display it)
- "商品詳細情報フレームはトランプ&トロップできる" (Product detail information frames can be dragged and dropped)
- "商品を選んで、詳細情報が表示される" (Select a product, and detailed information is displayed)

The interface also includes a "Pet Information" section with a "Pet Information" button and a "Product table" with columns for "Product ID" and "Name". The "Pet Information" section shows details for "EST-28 Adult Female Golden Retriever" and "EST-4 Spotted Koi".

<Implementation example developed using maskat>

2.3

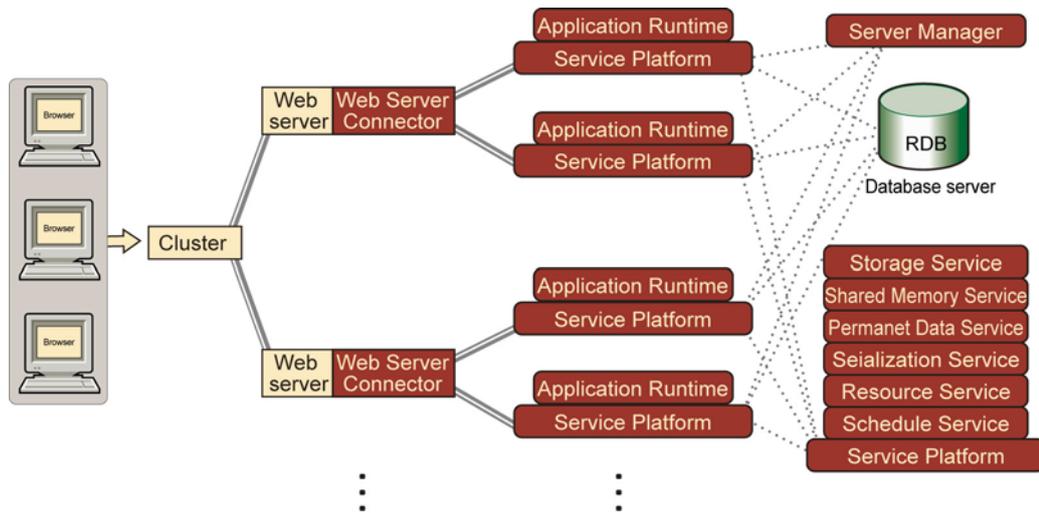
The intra-mart System Architecture

The architecture of the intra-mart WebPlatform or the intra-mart AppFramework is described below.



2.3.1 The intra-mart WebPlatform System Architecture

The intra-mart WebPlatform system architecture is described below.



<The intra-mart WebPlatform system architecture: Example of a configuration that distributes load among four servers>

Web Server Connector
: Web server connection module

Service Platform
: the platform of services

Application Runtime
: Run application software

This module is built into the web server. It functions as an interface between the web server and the intra-mart service platform to send user requests from the web browser to the service platform, or to receive the execution results of the service platform and pass them to the web server. If there are multiple service platforms, automatic allocation is also performed by the round robin function.

Performs the intra-mart services.

A runtime service that runs web application software by interoperating with the Web Server Connector. When running in standalone mode, Application Runtime itself becomes an HTTP server. No web server is necessary. To use the Application Runtime function, it is necessary for all services except for the Schedule Service to be operating correctly. (The Schedule Service is required only when running batch management functions.)

In the script-based development model, the program files (presentation page (*.html) and application container (*.js)) are stored in the Resource Service, and are distributed when necessary, and run by the Application Runtime. In the JavaEE-based development model the program files do not use the Resource Service, and load and run programs (*.jsp, *.xtp, and *.class) mapped by the URL.

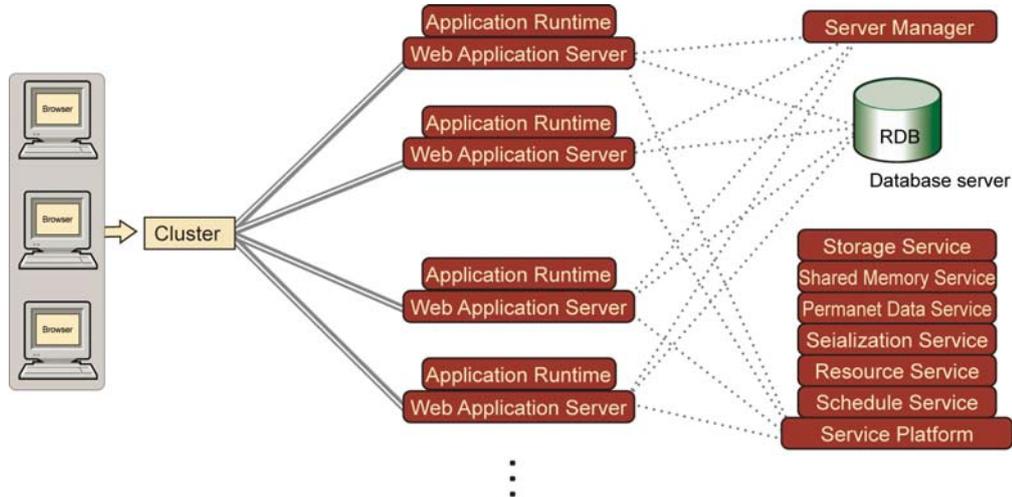
Application Runtime can connect to multiple databases using JDBC. Application Runtime can be flexibly expanded according to the load of application software to be built and number of clients. With multiple Application Runtimes, even if server trouble occurs, the Application Runtimes, which are distributed in parallel, can mutually compensate for each other by a session failover function. During development, the HTTP server is housed in the server, so it is not necessary to prepare a separate web server.

Resource Service : Program distribution	Provides centralized management of presentation page (*.html) and function container (*.js) program files required to run the intra-mart system. Additionally, it distributes the programs required by Application Runtime automatically. This service is used only by the script-based development model.
Shared Memory Service : Data storage to memory	Used to store data temporarily. The information management provided by this service is session-less, so the data loss will not occur, for example, by a time out. The information is stored in the Shared Memory Service, and is extracted and deleted by the program as necessary.
Permanent Data Service : System settings information management	Manages the settings information required to operate the intra-mart system. This service stores the information in files, so even if the service stops, the previously-stored data can be recovered at the next startup. Consequently, it can also be used as a simple database. The intra-mart system settings information such as accounts and menus also uses this function. The information files are stored in the treasure/ directory under the Permanent Data Service installation directory.
Serialization Service : Overall system uniqueness assurance	A collection of functions that are used comprehensively throughout the entire system. Application lock functions are managed by this service.
Storage Service : Centralized file management	Used when intra-mart is used on a distributed system with multiple Application Runtimes. This service provides centralized management of the uploaded files and files shared in the system (mainly data files). If an extension module is used, PDF file is also created by this service. The files are stored under storage/ in the directory to which the Storage Service has been installed.
Schedule Service : Scheduling of running batch	Schedules the batch program running. This service calls the Application Runtime using the designated URL to run the relevant batch program at the specified time. Consequently, batch programs are run using Application Runtime.
Server Manager : Operations status monitoring	Manages the operations status of the intra-mart services and Application Runtime. The status of each intra-mart service can be monitored, and the services started and stopped, via the "IM-Administrator" monitoring tool built in as standard.



2.3.2 intra-mart AppFramework System Architecture

The intra-mart AppFramework system architecture is described below.



Service Platform
: Services platform

Web Application Server
: Run application software

Application Runtime
: Run application software

Resource Service
: Program distribution

Shared Memory Service
: Data storage to memory

Permanent Data Service
: System settings information management

Serialization Service
: Overall system uniqueness assurance

Runs the intra-mart services.

Runs web application software. Server products that conform to JavaEE standards should be used. For officially compatible products, refer to the release notes enclosed with the product.

To use the Application Runtime function, it is necessary for all services except for the Schedule Service to be operating correctly. (The Schedule Service is required only when running batch management functions.) In the script-based development model, the program files (presentation page (*.html) and application container (*.js)) are stored in the Resource Service, and are distributed when necessary, and run by the Application Runtime.

In the JavaEE-based development model the program files do not use the Resource Service, and load and implement programs (*.jsp and *.class) mapped by the URL. Application Runtime can connect to multiple databases using JDBC.

Application Runtime can be flexibly expanded according to the load of the configured application software and number of clients.

Provides centralized management of the presentation page (*.html) and function container (*.js) program files required to run the intra-mart system. Additionally, it distributes the programs required by the Web Application Server automatically.

This service is used only by the script-based development model.

Used to store data temporarily. The information management provided by this service is session-less, so the data loss will not occur, for example, by a time out. The information is stored in the Shared Memory Service, and is extracted and deleted by the program as necessary.

Manages the settings information required to operate the intra-mart system. This service stores the information in files, so even if the service stops, the previously-stored data can be recovered at the next startup. Consequently, it can also be used as a simple database. The intra-mart system settings information such as accounts and menus also uses this function.

The information files are stored in the treasure/ directory under the Permanent Data Service installation directory.

A collection of functions that are used comprehensively throughout the entire system. Application lock functions are managed by this service.

Storage Service
: Centralized File management

Used when intra-mart is used on a distributed system using multiple Web Application Servers. This service provides centralized management of the uploaded files and files shared in the system (mainly data files). If an extension module is used, PDF and XRF file are also created by this service. The files are stored under storage/ in the directory to which the Storage Service has been installed.

Schedule Service
: Scheduling of running batch

Schedules the batch program running.
This service calls the Web Application Server using the designated URL to run the relevant batch program at the specified time. Consequently, batch programs are run using the Web Application Server.

Server Manager
: Operations status monitoring

Manages the operations status of the intra-mart services and Application Runtime, etc.

The status of each intra-mart service can be monitored, and the services started and stopped, via the "IM-Administrator" monitoring tool built in as standard.

2.4

Other intra-mart Features

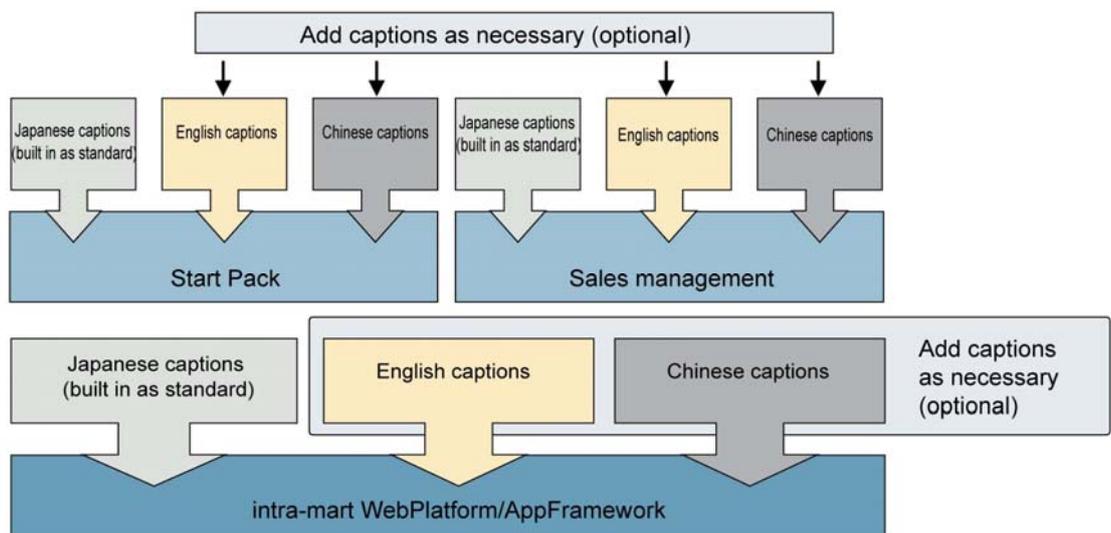
The intra-mart WebPlatform/AppFramework contains the following advantages.

- ❖ Multi-lingual function
- ❖ Ease of operation
- ❖ Powerful security
- ❖ Building ASP-type application software
- ❖ Product line-up and configuration editions



2.4.1 Multiple Language Support

Application software which can switch the language used for each login user can be developed. When the language is switched, the menu item names are switched to the user-designated language.





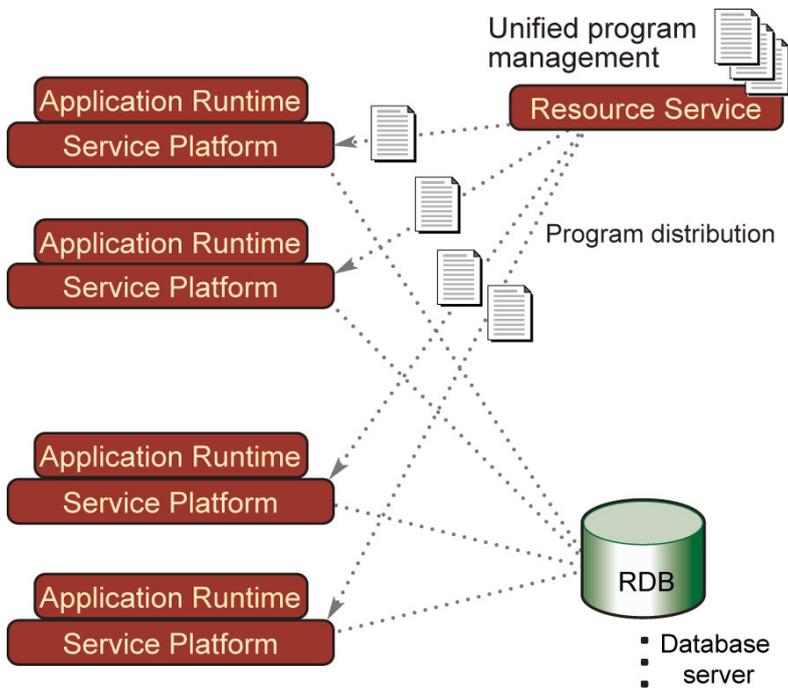
2.4.2 Ease of operation

Managing distribution of user applications is a concern for large-scale systems running multiple Application Runtimes (for the intra-mart WebPlatform) or web application servers (for the intra-mart AppFramework). In the script-based development model, the Resource Service automatically distributes the user applications to the application servers. Therefore only the latest user application needs to be saved to the Resource Service and there is no operational workload. With the JavaEE-based development model (JSP, Servlet, and EJB components), however, it is necessary to distribute on the Application Runtimes for the intra-mart WebPlatform, and on the web application server for the intra-mart AppFramework.

Even when expanding the Application Runtime or web application servers, the latest operating environment can be obtained only by connecting a machine to the network and starting intra-mart.

The character codes sent to the browser can be specified using the intra-mart application server and there is no character corruption even when mixing models such as Windows, UNIX, and mobile phones.

In addition, the operating information for the intra-mart servers can be displayed visually using IM-Administrator, which is a monitoring tool (built in as standard) The server status monitoring, settings changes, and auto recovery settings can be performed remotely.



<System configuration extension example: intra-mart WebPlatform>



• For details, refer to [System Administrator Operation Guide].



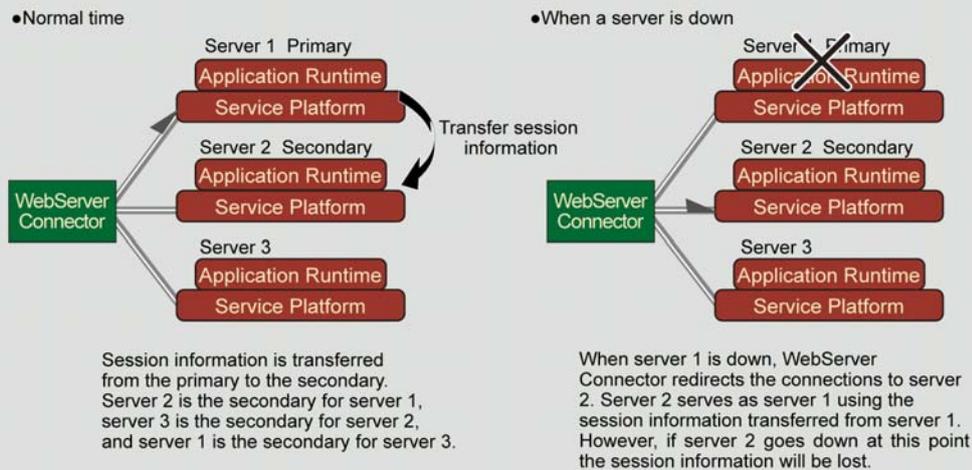
Column

HttpSession Failover

When you have multiple Application Runtimes, the HttpSession (client login session information) failover can be performed. This function can be used on the intra-mart WebPlatform, but not the intra-mart AppFramework. It is dependent on the functions of the application servers. There are two types of session failover on the WebPlatform, as described below.

For details, refer to [HttpSession fault tolerance settings method] in [intra-mart WebPlatform Setup Guide].

- Memory-to-memory method

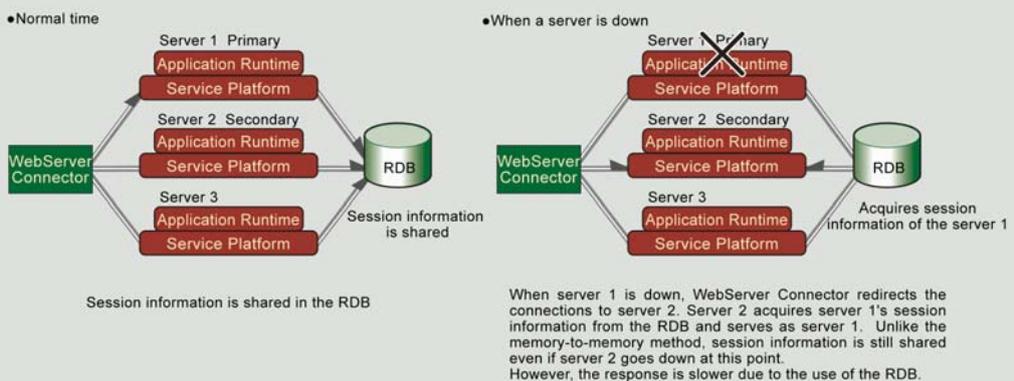


Advantages Can be built only by setting the Application Runtime. Processing load is light compared to memory-to-RDB.

Disadvantages If both of the back servers are down, the session will be lost.

Settings are complicated compared to memory-to-RDB. Other Application Runtime memories are stored and the consumption of Application Runtime memory increases.

- Memory-to-RDB method



Advantages No matter how many Application Runtime servers are down, the session can continue as long as at least one is still operating.

Settings are easy compared to memory-to-memory.

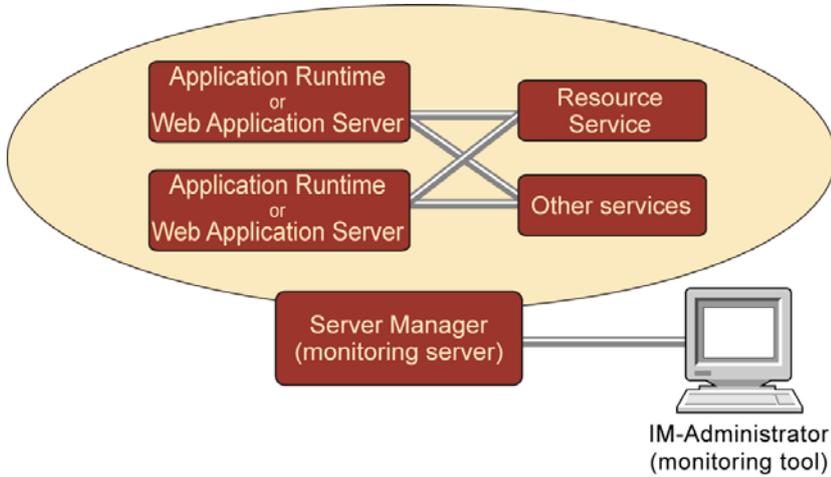
Disadvantages Requires a database.

If operating with a round robin configuration using commercially-available cluster products, memory-to-RDB is recommended. For a more secure system configuration, memory-to-RDB is recommended.



2.4.2.1 IM-Administrator

This is a monitoring tool (built in as standard) that displays visually the operating information for the intra-mart services collected by the monitoring server (which is a function included in Server Manager). The server status monitoring, settings changes, and auto recovery settings can be performed remotely.



Connect/Disconnect
Connects to/disconnects from
the server manager ..

Start
Starts the service platform ..

Stop
Stops the service platform ..

Restart
Restarts the service platform ..

Basic screen (round robin)

Basic screen (standalone)

<Basic IM-Administrator (monitoring tool) screen>



2.4.3 Powerful security

■ Verification using the access security module

System users are limited as a countermeasure against information leaks

- ❖ Login user verification function (can be linked to LDAP)
- ❖ Access control <<Individual level user restrictions>>
- ❖ Login group settings <<Group level user restrictions>>

■ Access log storage

Who is using the system, and when, and what operations they performed, is recorded for tracing and monitoring the information outflow.

The information can be saved to files and databases.

Logs saved to the database can be referenced by using View Creator.

- ❖ The access source can be specified in the access log
- ❖ Saves the login/logout history
- ❖ Saves the user operations log

■ Using IM-SecureBlocker (extension series)

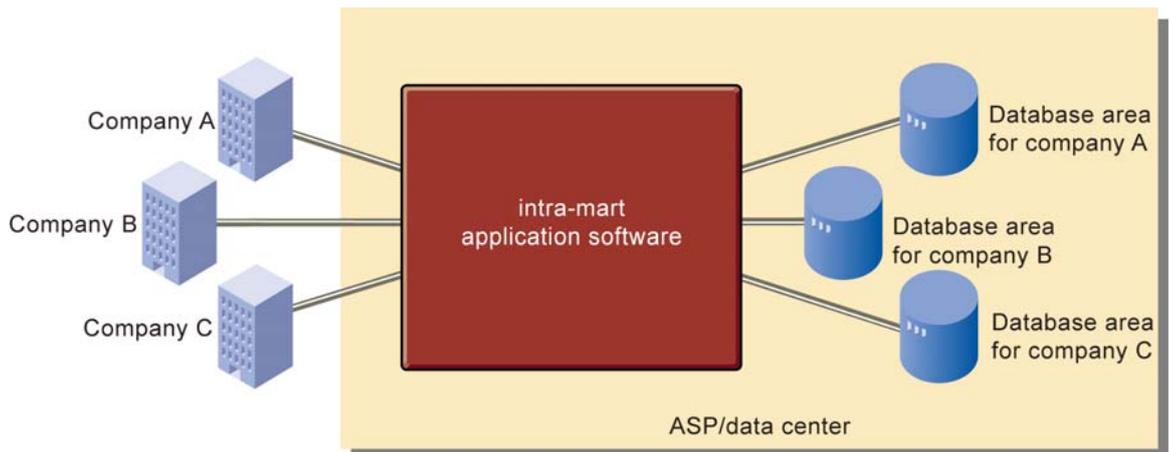
Blocks illegal attacks from the outside as a countermeasure against web application vulnerability.

- ❖ Prevents attacks using SQL injections and cross-site scripting



2.4.4 Building ASP-type application software

The roles, users, menus, links, messages, and databases can be used for each login user group by using different settings. Using this function enables ASP-type (multi-share platform) application software that enable common use between multiple companies to be built easily only by settings.



All intra-mart settings can be set for the each group or company and each group can use the intra-mart system as if they have individual one. Using with the multi-database function enables each group to use database servers respectively. When the multi-group function is set, the input item for multi-group ID is displayed on the login screen.

2.5

intra-mart "eBuilder"

eBuilder is implemented as a plug-in for Eclipse, which is an open source integrated development environment. Using the both functions with Eclipse and functions as eBuilder greatly improves development efficiency. Both the "script-based development model" and "JavaEE-based development model" are supported, therefore "eBuilder" can be used as a integrated development environment in all development scenarios.



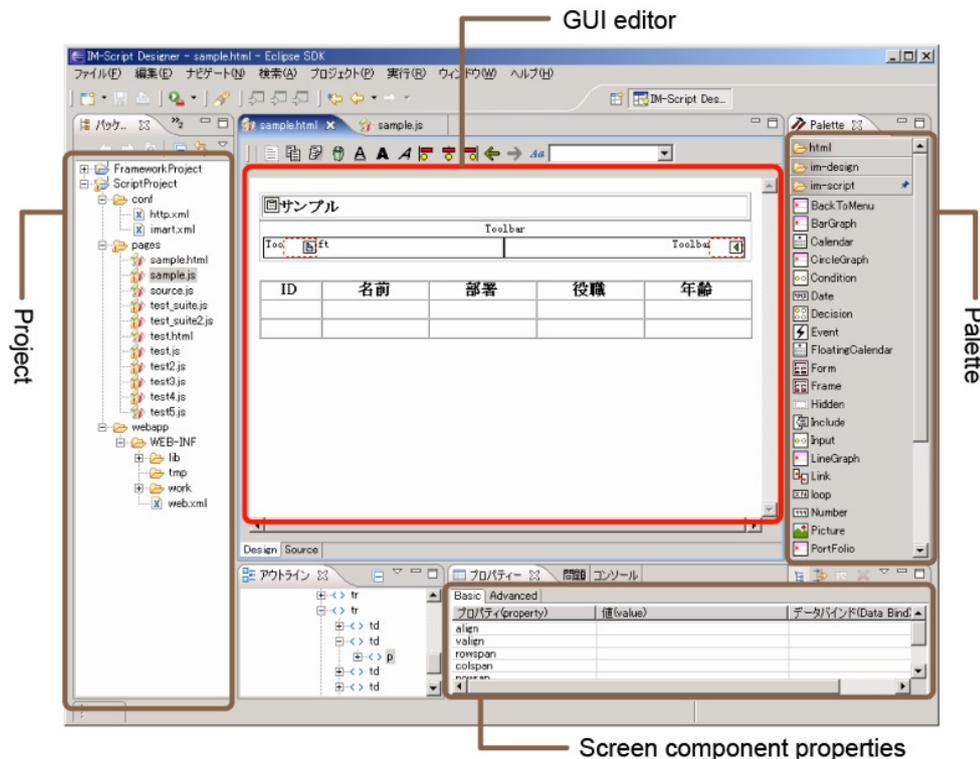
- The intra-mart "eBuilder" trial version is enclosed with the intra-mart WebPlatform/AppFramework. We recommend trying "eBuilder".



2.5.1 Script Producer

Various development support functions are built into the Script Producer for script-based development models. This tool greatly improves development efficiency using the presentation page and function container, which use HTML and JavaScript.

- ❖ GUI editor supplied for screen creation - Various screen components built in
- ❖ Powerful coding support using JavaScript - API input support and real-time syntax checks
- ❖ Debugging environment supplied during performing - Tracing and variable references, etc.
- ❖ Single test environment supplied (im-JsUnit) - All test cases are completed using JavaScript only
- ❖ Functions linked to Maskat IDE supplied - Client and server logic developed uniformly

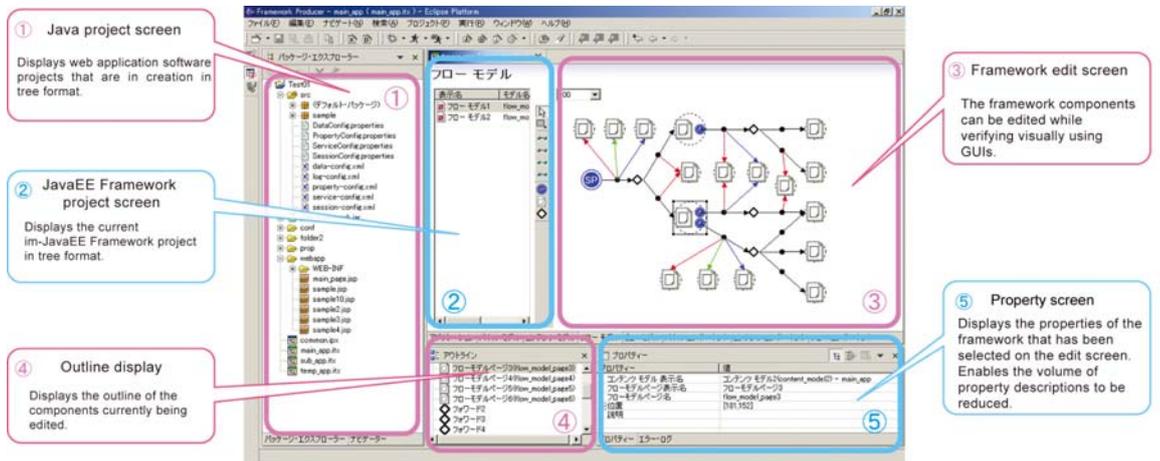


Drag and drop screen components that are available in the palette, such as buttons and tables, calendars, graphs, and HTML standard tags, into the GUI editor to create screens while checking the actual layout. Development by source editing is also possible.



2.5.2 FrameworkProducer

This is the most suitable tool for JavaEE-based development. The settings files (property files) used by the intra-mart JavaEE Framework are automatically created by the GUI tool and the skeleton codes are created automatically. Authoring tools, which enable JavaEE frameworks to be edited visually, are supplied to improve complicated JavaEE-based development efficiency.

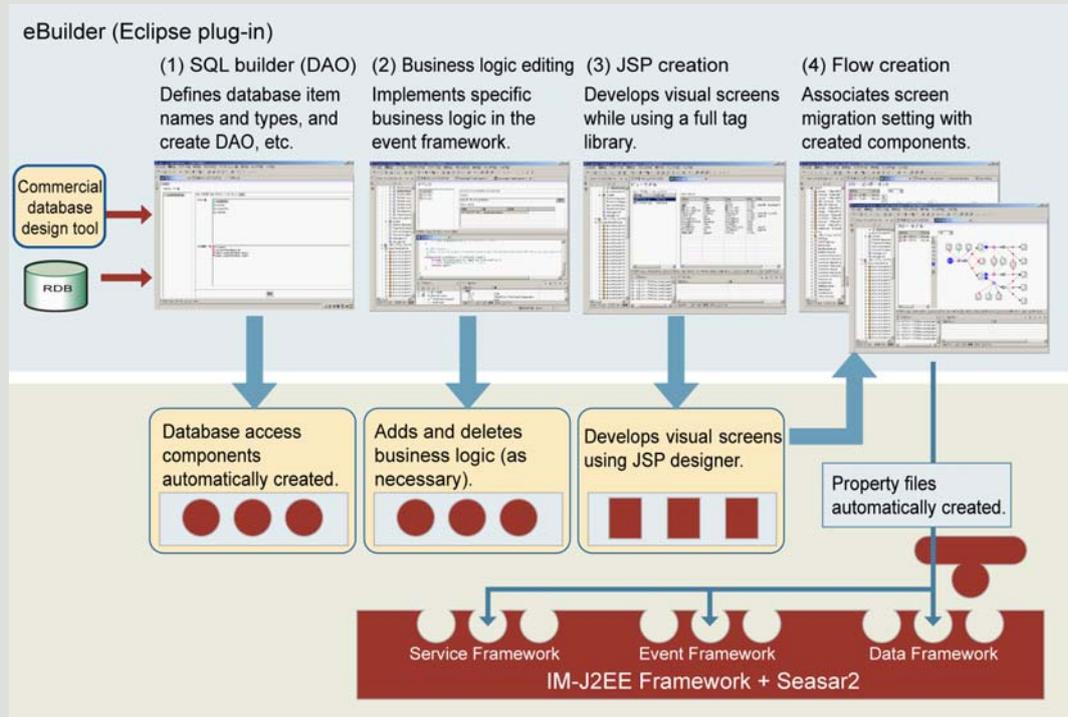


2.5.3 FrameworkProducer Source Code Auto Creation and Visual Screen Definitions Functions

Functions that automatically create screen-related components, business logic, and database-related components are supplied in FrameworkProducer as standard. The JavaEE source code can be created only by only entering the required items from the edit screens. The created source code can be used as components that run on intra-mart JavaEE Framework. Even developers with little experience of Java coding can easily and efficiently progress in web system integration.



Procedure from Source Code Auto Creation to performing



(1) Create DAO components using SQL builder

Create the components that run on the database framework. The database (DB) configuration is defined and it is also possible to import data from a commercially-available database design tool. Register the table information such as database item names and types using the built-in edit screens, and define the database queries visually to automatically create the classes that enable database access (supporting to OR mapping).

(2) Create the business logic

Create the components that run on the event framework. By using eBuilder, create as components the business logic used in the system.

(3) Create JSP

The screens can be developed visually by using the full tag library.

(4) Create the flow (Create screen and screen migration, and links to components)

Visually call the components created as described above, and define the two-way component calls. The property files are output automatically.

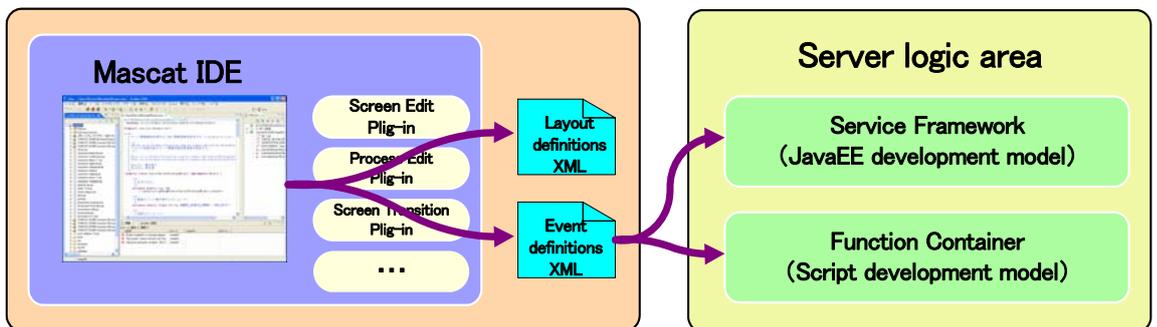
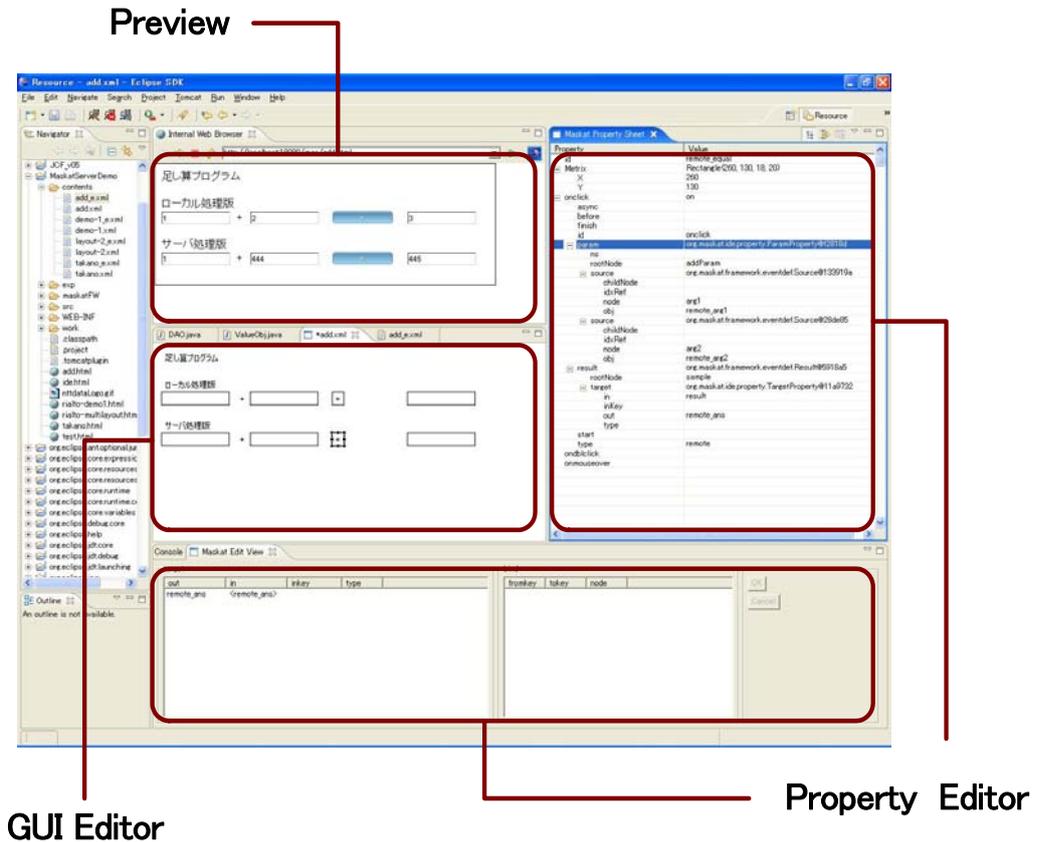
(5) Distribute, implement, run/edit, and add the completed source code components on the JavaEE Framework

The 70% to 80% of all the necessary source code is automatically created by using the auto source code creation function. This function greatly improves development efficiency.



2.5.4 Visual Screen Definitions Function Using Maskat IDE

Maskat IDE is built into FrameworkProducer and Script Producer as standard. Using Maskat, the developer can configure rich clients only by creating two XML files: the "layout definition XML", which defines the screens, and the "event definitions XML", which defines the operations. Using intra-mart, it is possible to link the "event definitions XML" and the two development models ("script-based development model" and "JavaEE-based development model"). The server logic model is created from the "event definitions XML", so rich clients can be developed easily by writing the business logic to the model.



2.6

Compatibility with Obsolete Versions

This version has a mechanism for assuring compatibility with application software created using previous versions.



2.6.1 API Compatibility

API compatibility is assured between both versions, except for some APIs.

- For details, refer to [Release notes] and [API list].



2.6.2 Database Configuration Compatibility

Part of the database configuration has changed and a "data migration tool" has been supplied.



2.6.3 Compatibility with Obsolete Versions (Revisions)

APIs are compatible with the immediately previous version (revision), but the database configuration has changed. Refer to [Migration Guide] for the migration method.



2.6.4 JumpUp Module (Ver. 3/Ver. 4->Ver. 5.0 and Later)

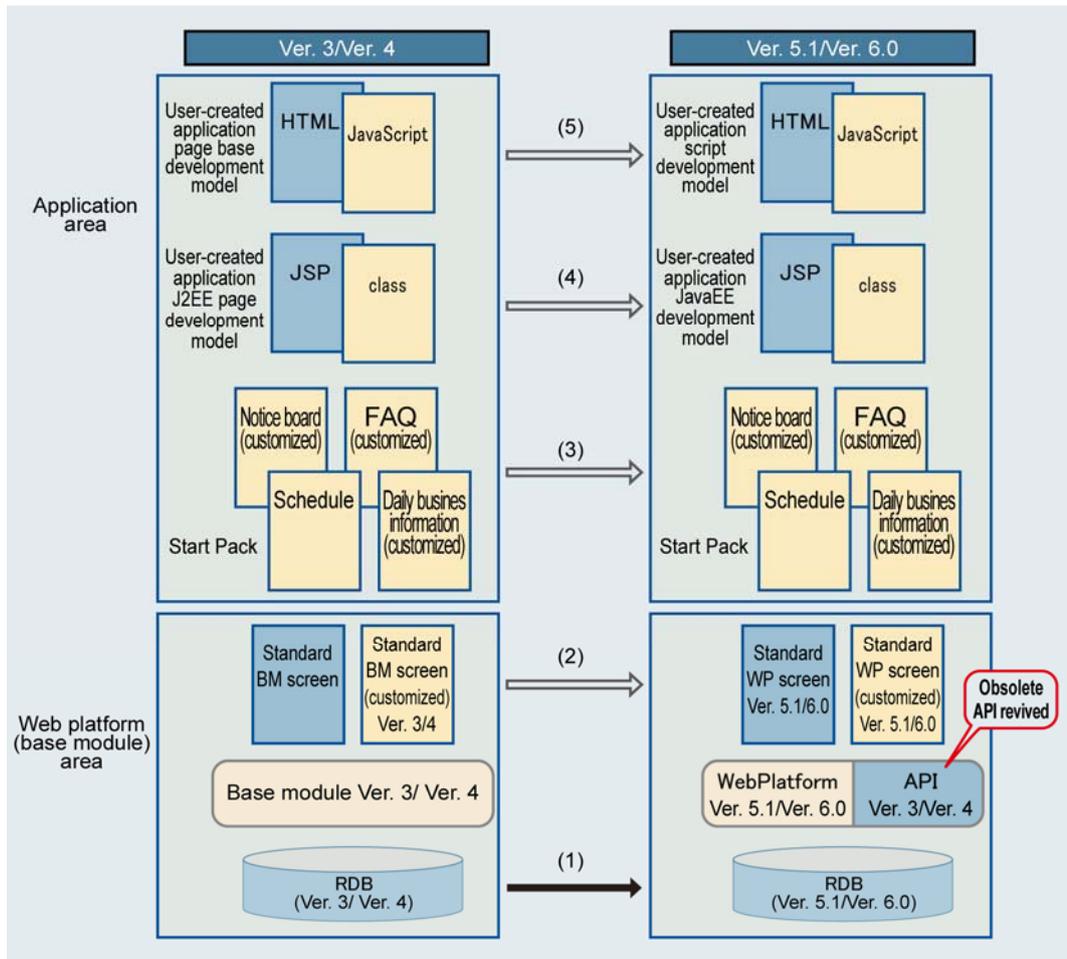
A JumpUp module is built in to upgrade from intra-mart version 3 or 4 to version 5.0 or later. The JumpUp module can upgrade (3) and (4) as shown in the diagram below.

The precautions when upgrading from version 3 or 4 to version 5.0 or later are described below.

- (1) The AP common master can be migrated during database migration.
- (2) When intra-mart based modules (WebPlatform) are customized, recustomize after reinstalling the new version 5.0 or later.
- (3) Application software created by the user using Ver. 3.2 or later can be migrated and operated with version 5.0 or later. (Script-based development model only.)
- (4) Application software created by the user using Ver. 4.0 or later can be migrated and operated with version 5.0 or later. (im-JavaEE Framework parts only.)
- (5) Customized intra-mart application software can be migrated and operated on version 5.0 or later.

<<Notes>>

- ❖ (3), (4), and (5) use the intra-mart JumpUp module. (A optional consulting contract must be purchased.)
- ❖ Migration as is only supports the previous AP common master (not supports the history).
- ❖ To support the new AP common master (supports history), it is necessary to switch API and change the SQL used.
- ❖ Some APIs may require switching for multi-lingual support.
- ❖ Deprecated APIs are not supported. If you are using a deprecated API, switching is necessary.
- ❖ During database migration, workflow transaction data cannot be migrated, but previous workflow runs by migrating it as is.
- ❖ Depending on the database server, problems may occur.
- ❖ The environment needs to be resized, using a consultant is recommended.
- ❖ Some of the APIs do not have compatibility with the interfaces. The implementation that uses incompatible interfaces requires modification.



● Contact your dealer for the JumpUp module.

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Introduction

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