

# **Oracle® Retail Returns Management**

Operations Guide

Release 2.3

**E15801-01**

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Primary Author: Graham Fredrickson

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- Did you understand the context of the procedures?
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# Preface

The purpose of this document is to guide deployers of Oracle Retail Returns Management through the back end administration process. This document includes information about configuring the application as well as architectural information and information necessary to integrate or extend Oracle Retail Returns Management.

## Audience

The audience for this document consists of all deployers, administrators, and developers of Oracle Retail Returns Management.

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## Related Documents

For more information, see the following documents in the Oracle Retail Returns Management Release 2.3 documentation set:

*Oracle Retail Returns Management User Guide*

*Oracle Retail Returns Management Installation Guide*

*Oracle Retail Returns Management Release Notes*

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To contact Oracle Customer Support, access My Oracle Support at the following URL:

<https://support.oracle.com>

When contacting Customer Support, please provide the following:

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- Functional and technical description of the problem (include business impact)
- Detailed step-by-step instructions to re-create
- Exact error message received
- Screen shots of each step you take

## Review Patch Documentation

When you install the application for the first time, you install either a base release (for example, 2.2) or a later patch release (for example, 2.2.2). If you are installing the base release, additional patch, and bundled hot fix releases, read the documentation for all releases that have occurred since the base release before you begin installation.

Documentation for patch and bundled hot fix releases can contain critical information related to the base release, as well as information about code changes since the base release.

## Oracle Retail Documentation on the Oracle Technology Network

Documentation is packaged with each Oracle Retail product release. Oracle Retail product documentation is also available on the following Web site:

[http://www.oracle.com/technology/documentation/oracle\\_retail.html](http://www.oracle.com/technology/documentation/oracle_retail.html)

(Data Model documents are not available through Oracle Technology Network. These documents are packaged with released code, or you can obtain them through My Oracle Support.)

Documentation should be available on this Web site within a month after a product release.



# Conventions

The following text conventions are used in this document:

| Convention             | Meaning  |
|------------------------|--|
| <b>boldface</b>        | Boldface type indicates graphical user interface elements associated with an action, or terms defined in text or the glossary.         |
| <i>italic</i>          | Italic type indicates book titles, emphasis, or placeholder variables for which you supply particular values.                          |
| <code>monospace</code> | Monospace type indicates commands within a paragraph, URLs, code in examples, text that appears on the screen, or text that you enter. |



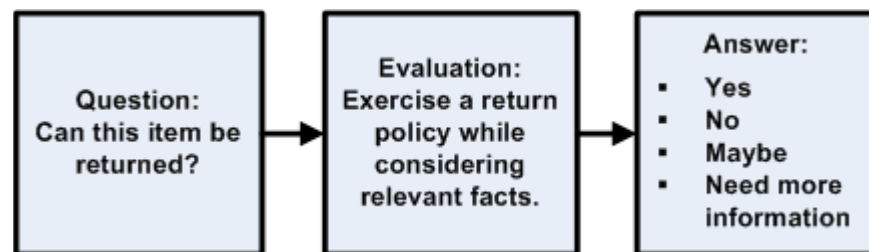
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# Introduction

Oracle Retail Returns Management is a centralized system designed to monitor and control the return of retail merchandise. Control is provided through a flexible set of rules that determine if a particular item is returnable. Monitoring is provided through pattern watches, enabling a retailer to uncover unusual return patterns indicative of fraud, poor product quality, and so forth.

At its most basic, Oracle Retail Returns Management enables you to centralize the knowledge and decision making of what is and what is not returnable.

**Figure 1–1 Oracle Retail Returns Management Decisions Process**



## Oracle Retail Returns Management

Oracle Retail Returns Management is packaged as a standalone product.

Oracle Retail Returns Management provides:

- A flexible and configurable set of rules
- The ability to collect differing rules into multiple policies
- The ability to assign different policies to different situations (for instance, one policy might apply to receipted items, another policy might apply to non-receipted items)
- A decision engine to initiate the policies
- A defined application-program interface (API) for evaluation of returnability
- A defined API for post-return information gathering
- A web-based user interface for administration

## Concept of a Return in Oracle Retail Returns Management

Occasionally, a customer might buy an item from a retailer and then decide that they no longer want the item. This could be for any number of reasons:

- Dissatisfaction with quality
- Finding a better price somewhere else
- Buying the wrong size

Most retailers allow customers to return items they have purchased under certain conditions. Conditions might include that the item was bought within the last 90 days, that the item is in an unopened state, or that the customer has a receipt. Additionally, a retailer might decide to charge a restocking fee, issue a return merchandise authorization (RMA) and a call tag, provide a discount on the customer's next purchase (in case of a quality problem), or other actions based around the return. Finally, returns can happen at different places in a retailer, such as at a point-of-sale, a separate returns desk, or at a remote call center.

With the act of returning, there are several steps that a retailer must go through.

- A retailer must determine what merchandise is being returned.
- A retailer must decide if the merchandise is returnable.
- A retailer must record that the item was returned, which affects financial and inventory calculations.
- Once the retailer accepts a return, the retailer must physically move the item to some place (such as placing it in a returns cage, or issuing pickup instructions to a carrier in the case of a remote call center). Afterwards, the item might undergo further actions, such as being returned to the vendor or destroyed.

Of these many aspects of the return process, Oracle Retail Returns Management focuses mainly on the conditions for return, sometimes referred to in this document as returnability. Returnability is determined by the rules and policies configured in Oracle Retail Returns Management. See ["Engine Data: Policies, Rules, And Return Activities"](#) in the ["Technical Architecture"](#) chapter. Oracle Retail Returns Management can associate metadata with return policies so Oracle Retail Returns Management can decide to use different policies in different situations. Each policy has its own set of rules which define returnability for that situation, for example, non-receipted returns might be more restrictive than receipted returns.

A policy is composed of one or more rules. Each policy has associated metadata that enables the service layer to choose the most appropriate policy for the current item in question.

Oracle Retail Returns Management does not prescribe for the point-of-return, what happens before or after a customer initiates a return, or the financial and inventory ramifications of the returns process. Furthermore, Oracle Retail Returns Management isolates itself from the majority of data found in the retail enterprise and restricts itself to knowing a prescribed set of facts. It is this set of facts that Oracle Retail Returns Management uses when evaluating a policy and determining if a product is returnable.

Oracle Retail Returns Management has been isolated to this degree in order to make Oracle Retail Returns Management applicable to a wide variety of situations. As long as a point-of-return can communicate with Oracle Retail Returns Management, it is immaterial where that point-of-return is located and what kind of point-of-return it is (register, returns desk, and so forth). The point-of-return provides the majority of the data that Oracle Retail Returns Management needs to make its decision, so Oracle Retail Returns Management is shielded from the format of transaction data in a retail enterprise.

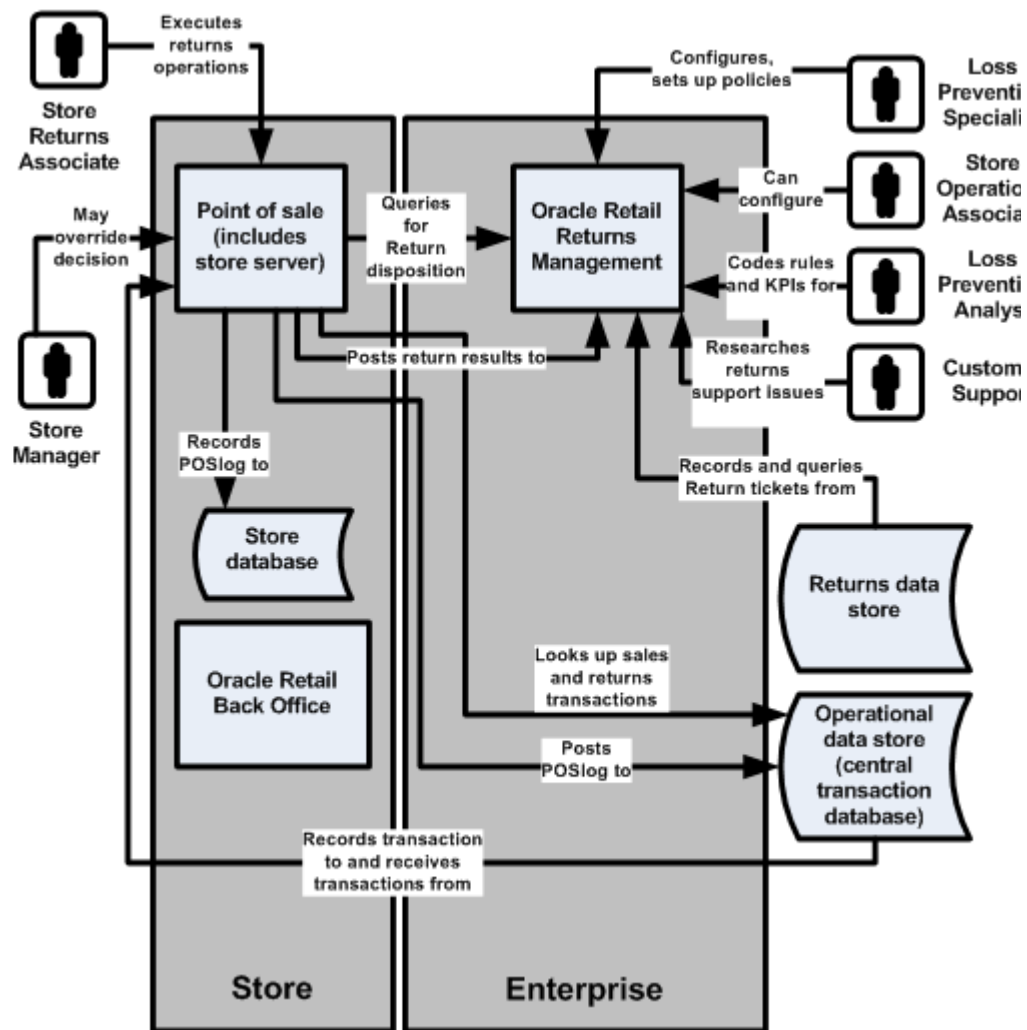
By configuring the rules and policies in Oracle Retail Returns Management, the retailer can enforce the same return policies across the enterprise. The return policies can be centrally administered. Since the policies are not compiled code, they can be quickly updated. Finally, Oracle Retail Returns Management records the steps it makes for each decision, allowing a customer to ask exactly why a return was accepted or declined.

As stated previously, Oracle Retail Returns Management focuses mainly on the conditions for return. The other main focus of Oracle Retail Returns Management is that it keeps a record of what was actually returned to the enterprise. This information is rolled up in both the return ticket data (there is a ticket for each return, each ticket having one or more line items corresponding to items on the return) as well as a list of exception activity. The exception file records unusual activity that might be fraudulent. Using these records, Oracle Retail Returns Management provides decision support to the enterprise. The retail enterprise can monitor these records to determine the volume of returns, the type of items being returned, and patterns of fraudulent behavior.

## Context Model

The following diagram identifies how Oracle Retail Returns Management exists with other existing Oracle Retail products. Also included in the context are the actors mentioned in [Table 1-1, "Oracle Retail Returns Management Actors"](#).

Figure 1–2 Oracle Retail Returns Management Context Model



## Oracle Retail Returns Management Actors

Table 1–1 lists the actors that Oracle Retail Returns Management expects to interact with, and their interactions. Although most of the actors are users, some items such as the point-of-return are expected to interact with Oracle Retail Returns Management without direct human intervention.

**Table 1–1 Oracle Retail Returns Management Actors**

|                                   | STORE           |                 |               |                  | CORPORATE            |                            |                    |
|-----------------------------------|-----------------|-----------------|---------------|------------------|----------------------|----------------------------|--------------------|
|                                   | Sales Associate | Point-of-return | Store Manager | Business analyst | Customer Service Rep | Loss Prevention Specialist | Software Developer |
| Request return                    | X               |                 |               |                  | X                    |                            |                    |
| Update return information         |                 | X               |               |                  |                      |                            |                    |
| Develop return policies           |                 |                 |               | X                |                      |                            | X                  |
| Monitor exception behaviors       |                 |                 | X             |                  |                      | X                          |                    |
| Monitor what is being returned    |                 |                 | X             | X                |                      | X                          |                    |
| Audit a specific returns decision |                 |                 |               | X                | X                    |                            |                    |

## Tax Responsibility in Oracle Retail Returns Management

Oracle Retail Returns Management evaluates data provided from the point-of-return as well as centrally stored historical data and provides a recommendation to the point-of-return for the handling of a potential return. Because Oracle Retail Returns Management is not transactional in nature, Oracle Retail Returns Management has no tax responsibility. All of the tax responsibility belongs to the point-of-return when the return transaction is created and processed.

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**Note:** Oracle Retail Returns Management operates using a single default currency. If operations require using multiple currencies, it is the responsibility of the point-of-return to convert from any other currencies to the single default currency being used by the system. Oracle Retail Returns Management does not provide services for the conversion of currency from one form to another.

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## Configuration

This chapter discusses required and optional configuration steps that must be performed after Oracle Retail Returns Management is deployed. This chapter also discusses how to run the application after it has been configured.

### Starting the Application

You must run the application in order to perform some final configuration tasks. To run Oracle Retail Returns Management, verify that the application is available in the Application Server environment. Then, access the following URL from a browser, specifying the correct application server host name and port number:

```
https://<app-server-hostname>:<app-server-SSL-port#>/returnsmanagement/
```

### Importing Data

Within Oracle Retail Returns Management, select **Data Management** to display a list of data import options. You can import data immediately or schedule an import for later. See the *Oracle Retail Returns Management User Guide*.

The following types of data can be imported:

- RM Customer Data
- Application Parameters

Application parameters are specific to Returns Management.

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**Note:** Application Parameters are imported as part of the install process. See the *Oracle Retail Returns Management Installation Guide* for more information.

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### Establishing a Store Hierarchy

Use the Data Import module to import store hierarchy information.

For more information about importing store hierarchy information through the Data Import module, see the *Oracle Retail POS Suite Implementation Guide – Oracle Retail POS Suite to Merchandising Products Integration, Volume 1*

## Scheduling Postprocessors

After installation, you must schedule postprocessor jobs as part of the configuration process. Postprocessors create summary data for use in reporting.

To schedule regular postprocessor jobs for Oracle Retail Returns Management:

1. Click the **Data Management** tab.
2. From the list of import options, click **Available Imports**.
3. From the available imports, click the **Schedule** link adjacent to the Returns Dashboard Processor. Oracle Retail Returns Management displays the Job Schedule page.
4. Choose the **Scheduled** option. Oracle Retail Returns Management displays additional scheduling options.
5. For Begin Date, enter the current date.
6. Check the **Repeating** box.
7. Leave the **No End** radio button selected.
8. Set a Repeating option.
9. Enter a Run Time in the appropriate box and click **Add**.
10. Click **Next**. Oracle Retail Returns Management displays a Notification page.
11. Add the e-mail addresses of anyone you want to be notified.
12. Click **Next**. The Distribution Summary screen is displayed.
13. Click **Submit Job**. The Distribution Confirmation screen is displayed.
14. Click **Done**.

## Configuring Security

Oracle Retail Returns Management has many individual security access points. This enables you to control the functionality to which any particular end user has access. You can also control workflow through approval permissions, enabling some employees to schedule tasks which others must approve.

For more information about security roles, see "Security and Errors" in the *Oracle Retail Returns Management User Guide*.

## Configuring Browser Options for Security

When multiple users use the same systems, savvy end-users could use the browser history trail to access data not appropriate for their access levels. You must configure the browsers used to access the application to remove access to the history function and the address bar to prevent this.

For more information about configuring security, see "Configuring Security" in the *Oracle Retail Returns Management User Guide*.

## Password Policy

One of the most efficient ways to manage user access to a system is through the use of a password policy. The policy can be defined in the database. One policy is defined

and applied to all users for Oracle Retail Returns Management. The Password Policy consists of the following set of out-of-the-box criteria.

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**Note:** Changes to Password Policy can be made by changing specific database field values using SQL commands. See the "Password Policy Parameters" in the Oracle Retail Returns Management Configuration Guide.

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In order to be PCI compliant, the Password Policy defaults to the following settings:

- Force user to change password after 90 days.
- Warn user of password expiration 5 days before password expires.
- Lockout user 3 days after password expires or password is reset.
- Lockout user after 6 consecutive invalid login attempts.
- Password must be at least 7 characters in length.
- Password must not exceed 22 characters in length.
- Password must not match any of the 4 previous passwords.
- Password must include at least 1 alphabetic character(s).
- Password must include at least 1 numeric character(s).

Once the desired password policy has been defined, it is applied to all authorized users of the Oracle Retail Returns Management database, which can be shared with other Oracle Retail applications. The password policy must be defined once per database.

## Password Reset

Users locked out of the system must request the assistance of an administrator to have their password reset. The administrator resets the password by selecting the reset password option in **Admin>Users>User Details**. When a user password is reset the system generates a temporary random password. The reset password status is immediately set to 'expired' prompting the user to change the temporary password at the next successful login.

Each time a password is changed, the previous password is stored subject to the 'Passwords must not match any of the N previous passwords' criteria set for the policy associated with the assigned user role. Temporary passwords may not comply with the password policy and are not stored in the password list.

An administrator must do the following to change the password of another user:

1. Log in.
2. Click **Admin**.
3. Click **Users**.
4. In the User Administration screen, search for the user whose password you are resetting. You can search by user ID or name. Click **Search**.
5. If the search yields multiple results, click on the user ID in the User Search Results screen. This opens the User Details screen.
6. Make sure User Info and Role Assignments information is accurate.

7. Click **Reset Password**.

You will see a message asking if you are sure you want to reset the password. Click **Yes**.

8. A screen with the user's new temporary password is shown.

---

**Note:** This temporary password is provided on this screen only. Record this temporary password. The password is not recorded or logged, and is not provided by email. Administrators must provide this temporary password to the user.

---

9. Click **Enter**.

## Password Change

Do the following to change your password:

1. Log in.
2. Click **Home**.
3. Click **Change Password** in the left navigation bar.
4. Type your current password.
5. Enter a new password.
6. Enter the new password again.
7. Click **Update**.
8. You will see a screen with the following message:

Your password has been changed.  
Use this password the next time you log in.

9. Click **Enter**.

## Adding a User

Do the following to add a user:

1. Log in.
2. Click **Admin**.
3. Click **Users**.
4. Click **Add**.
5. Enter the following:
  - First name
  - Last name
  - User ID
6. Provide a Role, for example, Administrator.
7. Provide a Status, for example, Active.
8. Provide a Hierarchy Assignment.
9. Click **Save**.

10. A screen with the new user's temporary password is shown.

---

**Note:** This temporary password is provided on this screen only. Record this temporary password. The password is not recorded or logged, and is not provided by email. Administrators must provide this temporary password to the user.

---

## Internationalization

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**Note:** The only language currently supported is United States English.

Returns Management supports date/time formats for US, UK and Canada.

Oracle Retail does not provide support for any customer extensions made to the base Returns Management product.

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**Note:** All dates and times stored and retrieved reflect the server time and timezone (not the browser time or Point-of-Return client time).

---

The following property in the application.properties file specifies the default locale:

```
locale_default=en_US
```

The application.properties file can be found in the following locations:

```
Oracle AppServer: <OAS install root>/j2ee/<RM instance>/applib
WebSphere AppServer: <WAS root>/profiles/<profile name>/properties
```

## Environment Entries in ejb-jar.xml

This section describes the `<env-entry>` section in the Oracle Retail Returns Management ejb-jar.xml file. These entries enable manipulation of some aspects of the system.

### Return Ticket Formatting Entries

The return ticket table is indexed using a composite key. This key is comprised of store number, workstation, business date, and a sequence number. To make this key end-user legible, it is formatted using the returnTicketIdPattern rather than passed as discrete data elements. The default pattern is `sssss-www-MMdd-yyyy-nnnnnnnnnn`:

- `sssss` marks the store ID.
- `www` marks the workstation ID.
- `nnnnnnnnnn` marks the sequence number
- `MMdd-yyyy` marks the business date

This `<env-entry>` element must be in sync with the other `<env-entry>` elements as follows:

- Note the ID divider. If you want to use a different divider, then the value `returnTicketIdDivider` must be changed to reflect the new divider used.
- Note the date format. If this format is changed, other than the divider character, the value `returnTicketIdDatePattern` must be changed to reflect this.
- Note the store pattern. If the store retrieved from the database is shorter than the value in `returnTicketStoreIdPersistPattern`, it is padded on the left hand side with the value in `returnTicketPersistPad` (default is 0).
- Note the sequence pattern. If the sequence number is smaller than the length of `returnTicketSeqNumberPersistPattern`, then it is padded with the value from `returnTicketIdPad` (default is 0).
- `returnTicketMaxSequenceValue` has no effect.
- `returnTicketBusinessDate` is used in an unused method in the `ReturnTicketKeyFormatter` class and can be safely ignored.

Table 2–1 defines the return ticket format elements.

**Table 2–1 Return Ticket Format <env-entry>**

| Entry  | Default                                    |
|--|--|
| <code>returnTicketIdPattern</code>               | <code>sssss-www-MMdd-yyyy-nnnnnnnnn</code> |
| <code>returnTicketIdDivider</code>               | <code>-</code>                             |
| <code>returnTicketIdDatePattern</code>           | <code>MMddyyyy</code>                      |
| <code>returnTicketStoreIdPersistPattern</code>   | <code>sssss</code>                         |
| <code>returnTicketWorkstationIdPattern</code>    | <code>www</code>                           |
| <code>returnTicketSeqNumberPersistPattern</code> | <code>nnnnnnnnnn</code>                    |
| <code>returnTicketIdPad</code>                   | <code>0</code>                             |
| <code>returnTicketPersistPad</code>              | <code>0</code>                             |
| <code>returnTicketMaxSequenceValue</code>        | <code>999999999</code>                     |
| <code>returnTicketBusinessDate</code>            | <code>yyyy-MM-dd</code>                    |

## Auditing Entries

Table 2–2 identifies audit target format elements.

**Table 2–2 Audit Target <env-entry>**

| Entry                        | Default        |
|------------------------------|----------------|
| <code>journalDataPath</code> | <code>1</code> |

This integer value tells Oracle Retail Returns Management where to send audit log messages. Valid values are:

- 0 – no audit log
  - 1 – send log messages to a JMS queue (found using JNDI lookup at `java:comp/env/jms/JournalingMessage`)
  - 2 – send log messages directly to the EJB interface of the Journaling Service.
- Any other value results in no audit log being created and an error message logged.

---

## Technical Architecture

This chapter presents a concise description of the system's architecture. The system is considered a collection of run time behaviors, a set of software modules, and a member of a larger group of external systems and actors.

### General Technologies and Frameworks

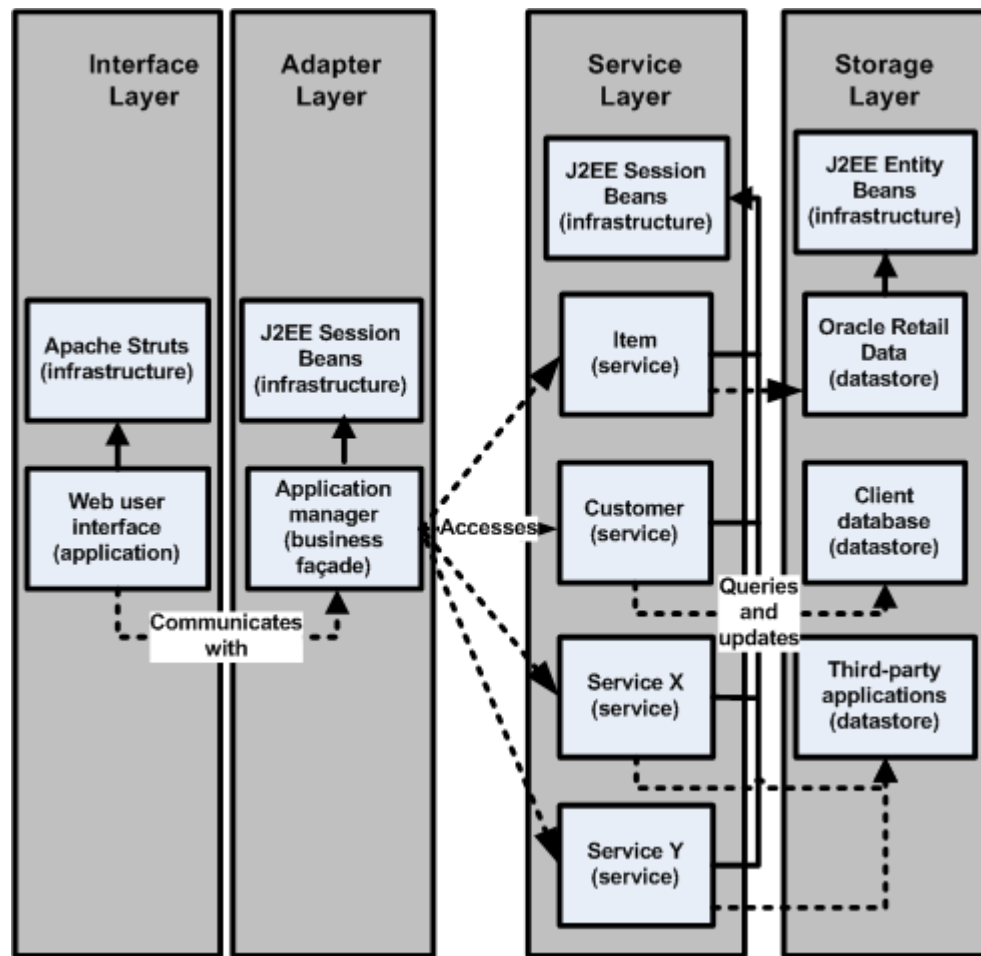
This section describes technologies and frameworks that are used by Oracle Retail Returns Management. These assets are not unique to Oracle Retail Returns Management but are key to its implementation.

### Architectural Styles and Patterns

The following information describes the architectural styles and patterns of Oracle Retail Returns Management and its component pieces.

#### Architectural Layers

The architectural layers design style is not unique to Oracle Retail Returns Management. It is a shared architecture across all of Oracle Retail's web applications.

**Figure 3–1 Oracle Retail Returns Management Architectural Layers**

This diagram shows the break down of the user interface and business logic across the application. The design uses both a model-view-controller pattern as well as a façade pattern to hide the implementation of business logic. The façade not only applies to the user interface, but to the other pieces of business logic as well.

As with all object construction, the goal is to reduce the dependency between the objects so that code might be more freely modified without adversely affecting other parts of the application.

Apache Struts is used at the graphical user interface layer to provide both a clear separation of the controller, view, and model as well as providing a well known technology for ease of extension. At the façade layer, an application manager is implemented using J2EE session beans to provide a coarse-grained view of business logic to the user interface. Each manager communicates directly with one or more services located in the service layer that provide fine-grained business operations. These service beans are also implemented using J2EE session beans. Each service bean can then communicate with other services or down to persistent storage in the data layer. By abstracting the storage away from the other layers, this not only enables the design to leverage J2EE entity beans but also allows for disparate storage mediums for integrating with third party data stores.



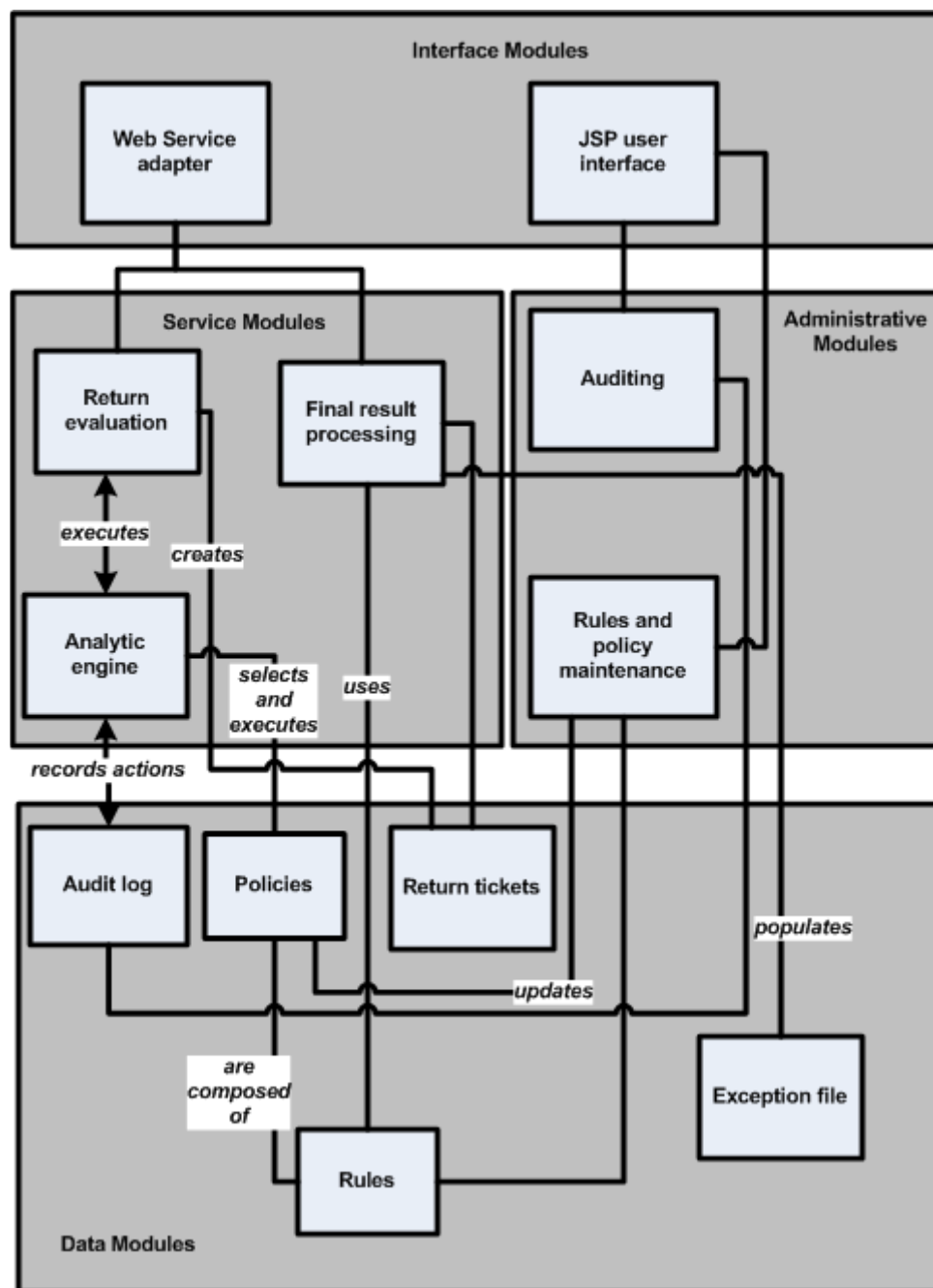
## Conceptual Modules

The following diagram is a conceptual view of the modules that make up the Oracle Retail Returns Management service. Here, a module corresponds to code that provides a discrete piece of functionality. For example, the Auditing module corresponds to the auditing function.

For illustrative purposes, the code has been split into four broad types:

- Interface modules
- Service modules
- Administrative modules
- Data modules

Figure 3–2 Oracle Retail Returns Management Conceptual Modules

**Interface modules**

Functionality to interact with an outside actor, such as the user or the point-of-return. These modules include:

- **Web Service Adapter**

The point-of-return is expected to talk to Oracle Retail Returns Management using a web service. An adapter is provided to enable this functionality out of the box.

- **JSP UI**

The user interface is HTML based, powered by JavaServer Pages (JSP) and Struts.

**Service modules**

Functionality that provides the core services offered by Oracle Retail Returns Management. These modules include:

- **Return Evaluation**

This is where the initial "Is this item returnable?" question is asked.

- **Final Result Processing**

This is where Oracle Retail Returns Management consumes results to maintain historical data.

- **Analytic Engine**

The decision engine that evaluates Oracle Retail Returns Management rules.

**Administrative modules**

Functionality to administer, monitor, and examine Oracle Retail Returns Management behavior and data. These modules include:

- **Auditing**

Provides the capability to examine the steps that went into a return decision.

- **Rules and Policy Maintenance**

Enables the user to add, modify, or delete policies and the rules which comprise them.

**Data modules**

Functionality tied to persistent storage. These modules include:

- **Audit Log**

The steps recorded by the engine as it processes a policy.

- **Policies**

Collections of rules that are bound to certain conditions, for example, some policies apply only to receipted items.

- **Rules**

Each rule evaluates a return-related question, for example, "How many returns has this customer attempted in the past week?" Rules are responsible for indicating to the point-of-return whether an item is returnable or not.

- **Return Tickets**

Oracle Retail Returns Management stores information about each return request for later manipulation by Final Result Processing.

- **Exception File**

Records that store information about exceptional behavior, which are created when a customer has exhibited behavior the retailer wants to track.

## Enabling Technologies

### J2EE

Oracle Retail Returns Management is built using the technologies of the Java 2 Enterprise Edition stack.

### Struts

Oracle Retail Returns Management uses the Apache Struts project to present its Java Server Pages in a J2EE compliant container. For more information, go to <http://struts.apache.org/>

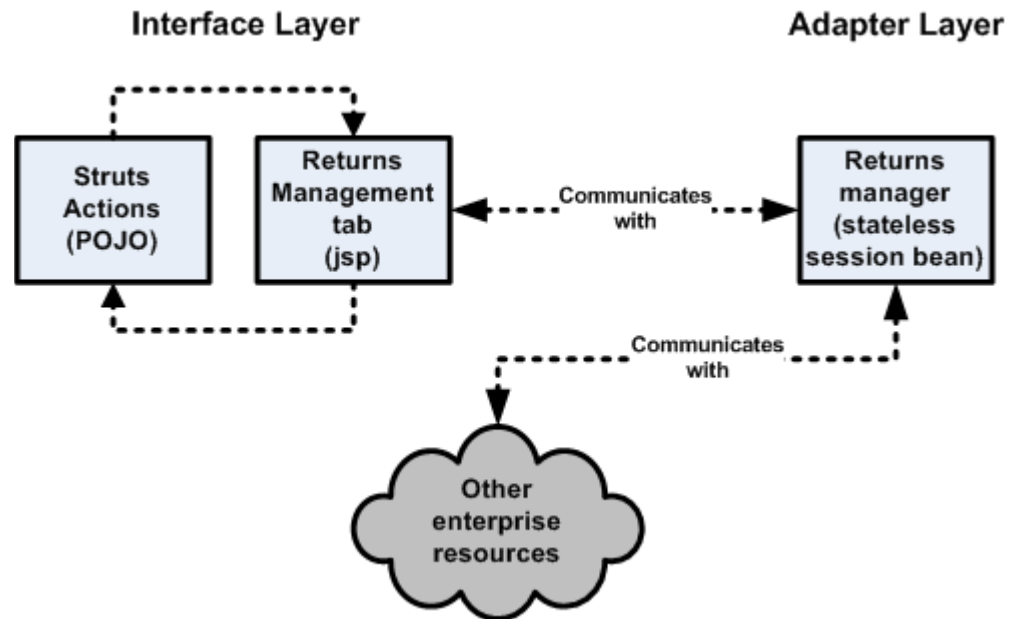
### Axis

Oracle Retail Returns Management uses Apache Axis to provide a container-neutral way of presenting web services. For more information, go to <http://ws.apache.org/axis/>

## Web-Based User Interface

The user interface for Oracle Retail Returns Management can be divided into two classes of components:

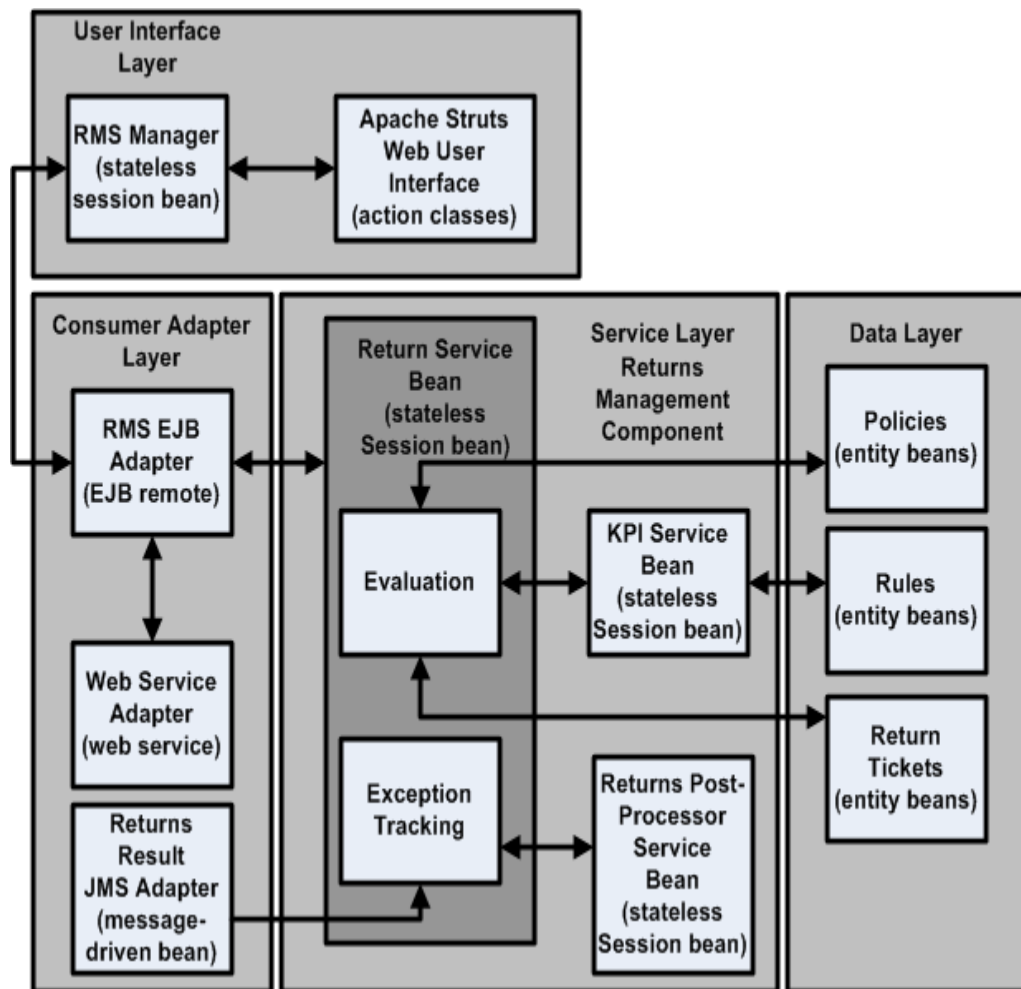
- JSPs and Action Classes
- The Returns Manager

**Figure 3–3 Oracle Retail Returns Management Web-based User Interface**

This diagram shows the general web user interface diagram as it relates to Oracle Retail Returns Management in particular. The interface layer is composed of the JSPs attached to the Oracle Retail Returns Management as well as their backing action classes. These actions attempt to provide user interface-level functionality such as flow control and rudimentary data checking. The class at the façade layer, the Returns Manager, exposes numerous coarse-grained methods to enable the Action classes to retrieve key performance indicators (KPIs)—also known as return activities, search the exception file, and other administrative tasks. The Returns Manager then communicates to whatever resources it needs to provide the necessary information to the interface layer. Since all of this work is hidden behind the façade, the Returns Manager has flexibility in deciding how to perform a certain task with minimal impact to the client classes in the interface layer.

## Physical Module View

The conceptual module view divided the system into modules based off of the functionality provided. The physical module view divides the modules along the notion of module type. For instance, rather than showing policy maintenance as a separate service, policy maintenance is included in the larger Returns Service.

**Figure 3–4 Oracle Retail Returns Management Physical Module View**

This diagram broadly divides the modules into four groups:

- The User Interface Layer, responsible for the web-based user interface.
- The Consumer Adapter Layer, responsible for communication with Oracle Retail Returns Management.
- The Service Layer, which provides the heavy lifting of Oracle Retail Returns Management functionality.
- The Data Layer, which provides access to persistent storage.

## User Interface Layer

As mentioned previously, the Oracle Retail Returns Management user interface is a web-based system implemented using Struts and Tiles. The presentation layer consists of a large number of JSPs, forms, actions, and other artifacts of the Struts system. Behind this presentation layer resides the Returns Manager façade, which provides the Struts actions with access to the business logic of the application.

In the Model-View-Controller paradigm, Struts provides all three pieces:

- Actions provide the model.

- JSPs are the view.
- Struts classes and configuration files provide the controller.

However, the action classes are not the model used by Oracle Retail Returns Management. The action classes exist primarily to marshall data from the presentation layer down to the business logic, and to provide coarse-grained flow control over a business process. It is important to realize that the real model of Oracle Retail Returns Management has little to do with the action classes. The real model is implemented behind the Manager façade in the service and data layers.

JavaServer Pages (JSPs) are text files which correspond to the normal JavaServer Page formatting restrictions. Actions and forms are normal Java classes while the Manager is implemented as a stateless session bean.

## Consumer Adapter Layer

The consumer adapter layer provides the different interfaces into the Oracle Retail Returns Management system. This layer is specifically split from the service layer in the design to decouple the interface of communication from the implementation classes. Therefore, regardless of underlying changes in how Oracle Retail Returns Management is implemented, the interface expected by clients can remain static. The separation provides a well-defined contract with which service consumers can interact, and enables future custom adapters to be integrated with minimal effort.

**Figure 3–5 Oracle Retail Returns Management Consumer Adapter Layer**



There are three ways to communicate with the Oracle Retail Returns Management system:

- Return Request and Return Response are exposed using a Web Services interface.
- Return Results are collected using a JMS queue.
- The EJB remote interface, which enables arbitrary methods to be invoked on the service bean.

For more information about communicating with Oracle Retail Returns Management, see [Chapter 5, "Integration Methods and Communication Flow"](#).

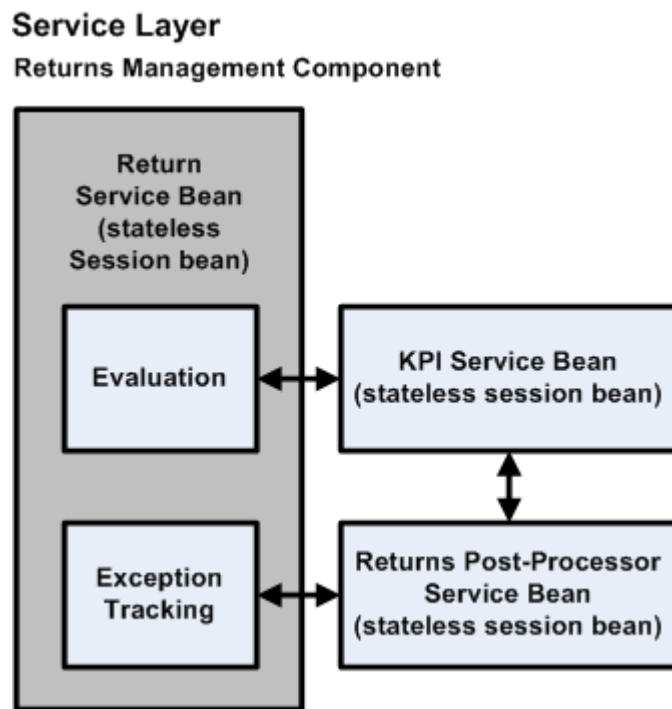
The first two interfaces mentioned enable flexible client implementations while providing clear interfaces for interaction. The EJB remote interface is available when some system needs to operate with Oracle Retail Returns Management outside of the normal API-type transactions, for example, the Returns Manager makes liberal use of the remote interface for inquiring and maintaining Oracle Retail Returns Management data.

## Service Layer

The term service is used in two different ways when describing Oracle Retail Returns Management.

- The first way is the abilities provided by Oracle Retail Returns Management in its role as a service in a service-oriented architecture. These abilities are restricted to the two interfaces of evaluation (return request) and exception tracking (return result).
- The second way is used to describe the interoperable commerce services that form the core of Oracle Retail Returns Management functionality. These are the services that live in the service layer. These services are generally not client accessible. They provide discrete business functions available to other services and Application Managers living in the façade layer.

**Figure 3–6 Oracle Retail Returns Management Service Layer**



When describing Oracle Retail Returns Management in terms of service-oriented architecture, the services provided by Oracle Retail Returns Management are implemented primarily in one class, the Return Service Bean. These services are exposed in the Consumer Adapter Layer for access from client routines.

When describing Oracle Retail Returns Management in terms of its commerce service modules, then not only would the return service bean be included but also the modules which exist to provide support to Oracle Retail Returns Management, such as the KPI Service and the Returns Post-Processor Service.

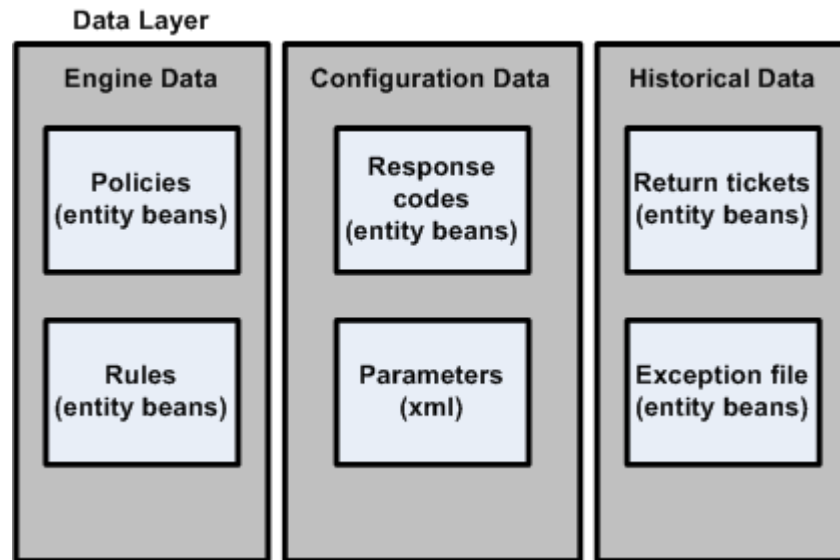


## Data Layer

For purposes of discussion, this document splits the data used by Oracle Retail Returns Management into three types:

- Engine data used to determine returnability.
- Configuration data used to control behavior.
- Historical data used to record information.

**Figure 3–7 Oracle Retail Returns Management Data Layer**

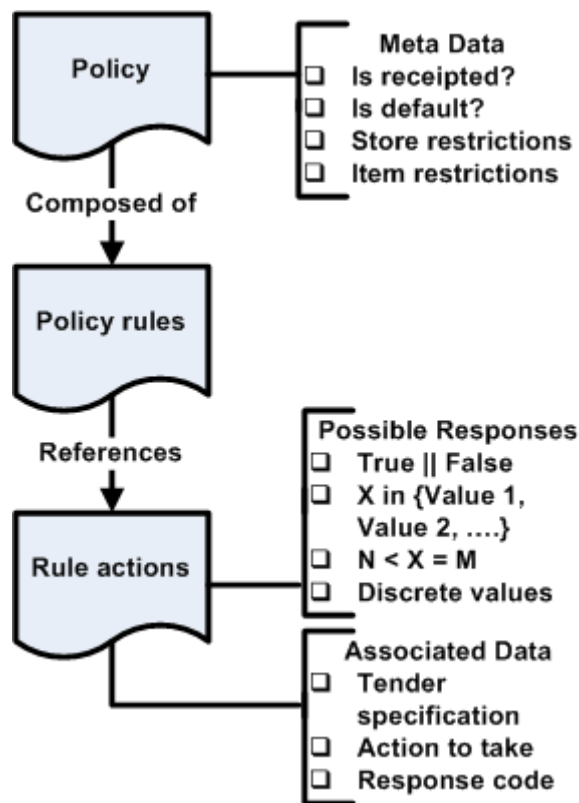


These types of data are generally stored in an RDBMS and accessed using an entity bean layer. Each general type is covered briefly in the following sections.

### Engine Data: Policies, Rules, And Return Activities

Oracle Retail Returns Management uses a decision engine to codify and enforce returns policies. The decision engine operates on sets of rules, which are collected into policies. The rules operate on a set of facts that the engine supplies at run time. These facts are evaluated by the rules, which eventually return an answer back from the engine. See "Determining Return Policies" in the *Oracle Retail Returns Management User Guide*.

Figure 3–8 Oracle Retail Returns Management Policies and Rules



This diagram shows how policies, rules, and rule actions are conceptually related.

A **policy** is composed of one or more rules. Each policy has associated metadata that enables the service layer to choose the most appropriate policy for the current item in question.

A **rule** is configured to ask a certain question about the current item or customer in question. Each rule references several possible rule actions.

A **rule action** has two distinct functions:

- Identify an answer to a question. Each rule action corresponds to a value returned from the rule's question.
- Tell the analytic engine (for example, the service layer) what action to take in response to this answer, for example, whether to continue or stop policy evaluation and determine what response to return to the client.

## Configuration Data

Oracle Retail Returns Management has a list of valid response codes that can be returned to a client. This list is maintained in the data store and is accessed using entity beans. Oracle Retail Returns Management also maintains a list of receipt messages which are accessed in a similar fashion.

Following an established pattern in Oracle Retail products, Oracle Retail Returns Management uses an XML parameter file to maintain a list of configuration options and choices that can be modified for a particular customer deployment. These parameters control a variety of behaviors as well as providing a place for some of the data used during processing (for instance, the list of acceptable tenders).

---

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**Note:** For more information on specific parameters, see the *Oracle Retail Returns Management Configuration Guide*.

---

---

## Historical Data

Oracle Retail Returns Management maintains a set of historical data. To record a particular decision during the evaluation phase, Oracle Retail Returns Management creates a return ticket that records what item is being returned, who wants to return the item, and the Oracle Retail Returns Management decision about the returnability of an item. This return ticket is later updated during the return result process to reflect what was actually returned at the point-of-return.

An exception file that counts up the total number of times an instance of a tracked behavior occurs, for example, a customer with a non-receipted return or a customer with a tender override, is maintained by Oracle Retail Returns Management during the return result phase.

The following are grouped in the exception file:

- Customer exceptions, such as line items that reflect customer return activities being violated.
- Customer exception counts and freeze dates.
- Customer Service Overrides, that is, a count of overrides, per day, per customer.

For more information, see the following:

- "Selecting Customer Exceptions to Track" in the *Oracle Retail Returns Management User Guide*.
- ["Exception Files"](#).

## Messaging

This section describes the interface of the two main services provided by Oracle Retail Returns Management:

- Evaluation of the return request
- Processing of the return result

These services are expected to be invoked from an external source, usually the point-of-return.

In order to provide language neutrality, these two services are accessed in a stateless fashion using XML documents. Return request is a synchronous message, that is, the invoker is expected to wait on a return response message. Return result is an asynchronous message that can be invoked in a fire-and-forget fashion.

Although both services are exposed using a web service interface, a message-driven bean exists to collect return result messages asynchronously as a best practice. More details about messaging are provided in [Chapter 5, "Integration Methods and Communication Flow"](#).

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## Functional Design and Overview

This chapter addresses the functional aspects of Oracle Retail Returns Management. This chapter provides the following:

- Conceptual Service Flow
- Conceptual Data Flow
- Functional Assumptions
- Functional Overviews

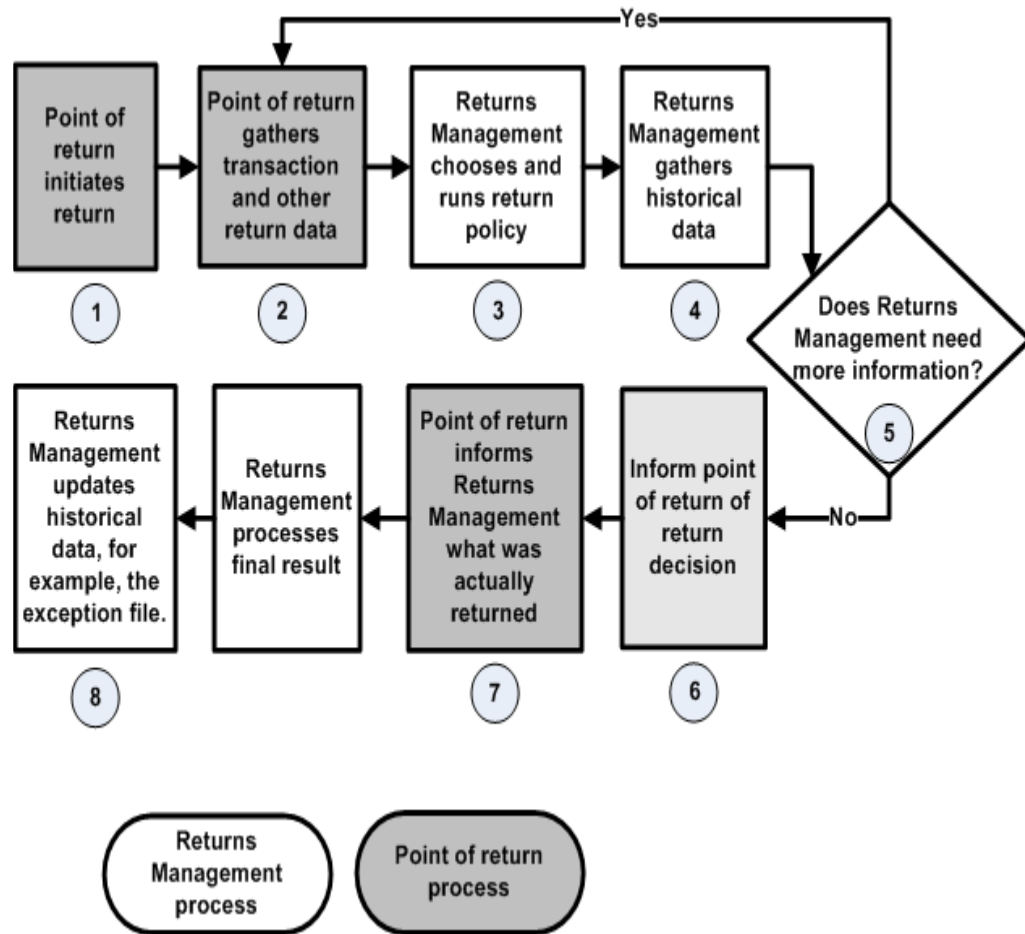
### Conceptual Service Flow

The following flowchart illustrates the steps in a typical Oracle Retail Returns Management session, including which steps are initiated by Oracle Retail Returns Management and which steps are initiated by the point-of-return (the point at which a return is initiated, for example, a cashier at a retailer).

---

**Note:** This flowchart is a simplified representation of the service flow and does not attempt to explain the technologies used to implement Oracle Retail Returns Management.

---

**Figure 4–1 Oracle Retail Returns Management Conceptual Service Flow**

The following sequence is a typical Oracle Retail Returns Management round-trip session:

1. A point-of-return initiates a merchandise return.
2. A message is sent from the point-of-return to the Oracle Retail Returns Management system indicating the item to be returned, if the customer has a receipt, and possibly other data. See ["Point of Return to Returns Management—Initial Return Request"](#).
3. Oracle Retail Returns Management chooses which policy to initiate. A policy is comprised of one or more rules, and each policy has associated metadata that enables the service layer to choose the most appropriate policy for the current item in question. See "Determining Return Policies" in *Oracle Retail Returns Management User Guide*.
4. Oracle Retail Returns Management gathers together relevant server-side historical information, such as entries related to the customer in the exception file.
5. The policy might require additional data from the point-of-return, such as a positive ID from the customer. In this case, a message is sent back to the point-of-return asking for the additional data. See ["Returns Management to Point of Return—Initial Return Response: Need Positive ID"](#).

6. The policy decides if the item is returnable or not. Oracle Retail Returns Management informs the point-of-return of its decision, and provides a tender recommendation.

The point-of-return ultimately decides to accept the return or not. For example, Oracle Retail Returns Management might say that an item is non-returnable, but a local manager might override that decision. A local manager can also ignore a tender recommendation.

7. The point-of-return informs Oracle Retail Returns Management of its decision. See ["Point of Return to Returns Management—Return Result from Second Response"](#).
8. Oracle Retail Returns Management uses information from the point-of-return to update its historical records such as the exception file. The exception file acts as a constantly evolving knowledge base that can help the analytic engine decide which customers, items, cashiers, or stores are at higher risk for return fraud.

## Conceptual Data Flow

To understand how the various modules relate to each other at run time, imagine the flow of data through the system.

- The four main processes (return request, return results, policy administration, and auditing) operate on an intersecting set of data.
- Return requests are sent to Oracle Retail Returns Management and cause return tickets to be created and rules to be read.
- Rule initiation creates entries in the audit log.
- Return responses are sent back to the point-of-return.
- Return results update existing return tickets, and create entries in the exception file.

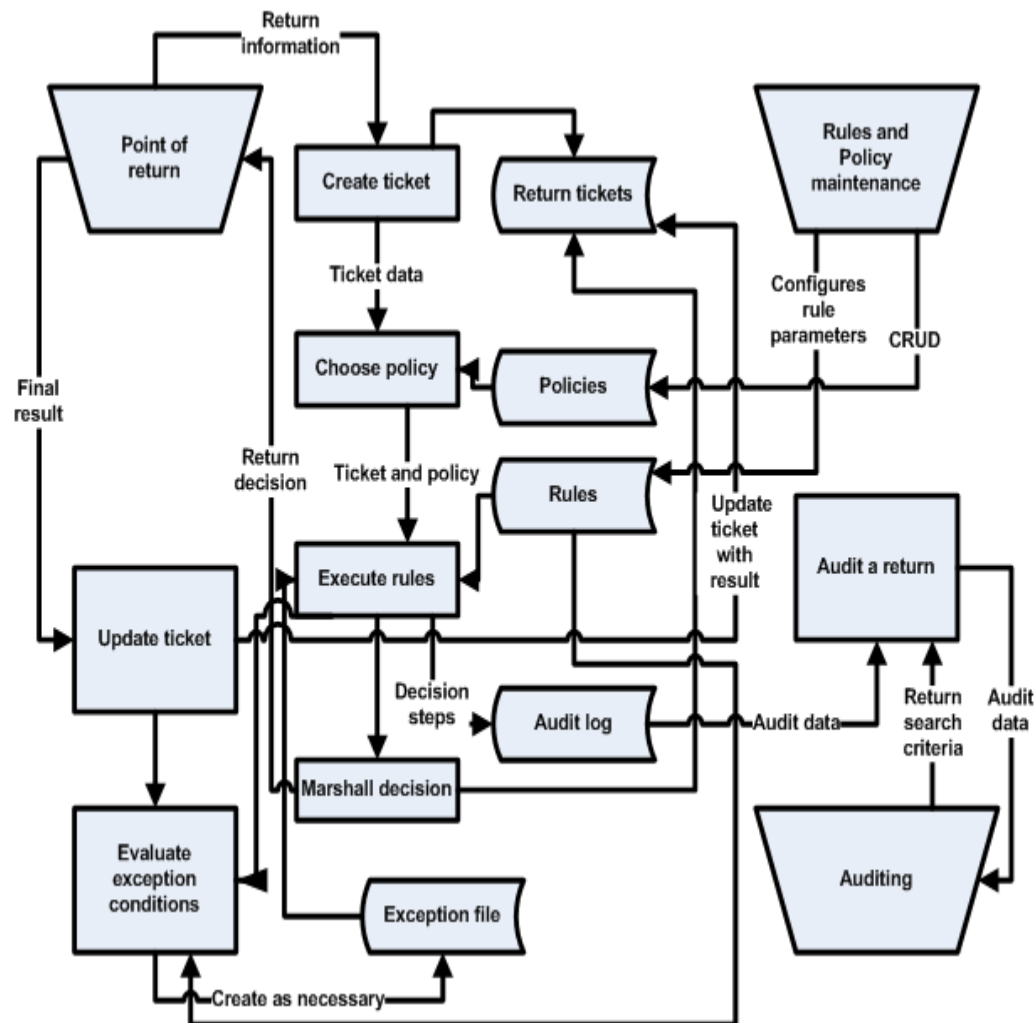
Policy administration enables the creation and maintenance of policies. See *"Determining Return Policies"* in the *Oracle Retail Returns Management User Guide*.

Auditing applications read the audit entries created during the evaluation phase.

The following data flow diagram lists the four main processes and the flow of the data that they create and consume.

**Note:** The Rules and Policy Maintenance interface is shown as directly updating the policy rules using Create, Read, Update, Delete (CRUD).

**Figure 4–2 Oracle Retail Returns Management Conceptual Data Flow**





## Functional Assumptions

- Though Oracle Retail Returns Management needs to be informed of returns performed, it is not a requirement that the point-of-return itself informs Oracle Retail Returns Management. This means that this information can be conveyed by a separate process, such as a scheduled transaction parsing routine. This also means that the point-of-return does not need to have direct access to the process final result API of Oracle Retail Returns Management.
- The historical data read by Oracle Retail Returns Management at the beginning of a return request is the data that is updated by the return information delivered after a successful return.
- The historical data recorded by Oracle Retail Returns Management is not the same as purely transactional data, for example, POSLog. The historical data is data that reflects inferred customer behavior, such as too many returns over a specified amount of time.
- The retail transaction data is read by the point-of-return, not by Oracle Retail Returns Management.

## Functional Overviews

### Return Tickets Functional Overview

Return tickets enable an operator to inquire about the particulars of a specific return approval or denial. A return ticket is any attempt by a customer to return one or more items, from one or more originating transactions or from no identifiable transaction. The return ticket carries a unique identifier that can consist of the store number and workstation ID from which the return attempt occurs, an eight-digit date in *MMDD-YYYY* format, and sequence number. The operator can search for a return ticket by the unique identifier or other information, such as cashier, customer, or item information.

The operator can be a loss prevention operator researching potentially fraudulent return activity, or a customer service person researching why a particular customer's return was denied.

## Exception Files Functional Overview

The Oracle Retail Returns Management exception file is created and maintained by Oracle Retail Returns Management for use in detecting and preventing fraud at the point-of-return. The exception file acts as a constantly evolving knowledge base that can help the authorization engine decide which customers or cashiers are at higher risk for return fraud.

Exceptions are instances of a behavior that a retailer has selected to track for a customer or cashier. The exception file holds an exception counter for a customer; the exception counter is incremented based on suspicious return activity. If a return activity is selected for inclusion in the exception counter, the system increments the exception count for each suspicious shopping activity. Likewise, return activities can be configured for cashiers.

When an exception occurs, a record is written to the exception file and the activity is available for research on that customer or cashier using the exception inquiry search and display screens. All exceptions are based on return ticket data.

Exception counts are based on real-time refund attempt activities occurring at the point-of-return, using the return result message that is sent by the point-of-return to Oracle Retail Returns Management at the conclusion of a transaction with an attempted refund. Return activities include activities that increment counters such as a return transaction by the customer without a receipt and with no retrieval of the original transaction, five same-day returns as purchases within the last three days, and three returns today. In turn, normal activity levels might be exceeded and counting generated based on those counters.

## Messages and Responses Functional Overview

The message and response component of Oracle Retail Returns Management includes the messages sent from the point-of-return that might trigger action in Oracle Retail Returns Management and an appropriate response message. Oracle Retail Returns Management communicates with brick and mortar, e-commerce, and call center point-of-return environments using a messaging interface to receive return authorization requests, use retailer-defined return policies to determine authorization or denial of items and valid return tenders, and respond with the applicable approval or denial code.

## Policies and Rules Functional Overview

A return policy consists of multiple rules that ask a question about an attempted return. The retailer sets the order in which the rules are evaluated upon a return. The retailer determines the action to take based on the answer to the question. The action taken based on the answer to the question is:

- Continue
- Continue At Rule Number
- Stop Processing

## Analytic Engine Functional Overview

### Configuration

A return policy consists of multiple rules that ask a question about an attempted return, such as some of the following:

- Does the customer have a receipt?
- Is the item serialized?
- Does the serial number on the item being returned match the serial number of the item as originally purchased?
- What is the customer's cumulative exception count?
- What is the condition of the item?

The retailer sets the order in which the rules are evaluated upon a return.

The retailer determines through the front end the action to take based on the answers to the questions.

The answer can be **Yes** or **No** (Boolean), a certain numeric or currency number (Range), or one possible response from a valid list of responses (Discrete), based on the type of question being asked. For example, "Does the customer have a receipt?" has a **Yes** or **No** response. "What is the customer's cumulative exception count?" has a numeric response that would fall within a range configured by the retailer. "What is the condition of the item?" maps to a response chosen by the point-of-return operator, such as one of the following:

- Excellent
- Good
- Fair
- Poor
- Open Box
- Damaged
- Used

The analytic engine uses one of these items to decide returnability.

The action taken based on the answer to the question is one of the following:

- Continue—Check the next rule within the policy.
- Continue At Rule Number—Check a particular rule within the policy and then continue.
- Stop Processing—Do not continue checking rules. Processing complete.

## Response Codes

The retailer can set a configurable response code to be returned with every action. Response codes consist of a required positive numeric code, response type, response priority within that type, short description, and an optional long description that can be used for scripting customer service responses to customer inquiries. The response type for each response code is selected from the following, which are listed in priority order:

- Denial.
- Manager Overridden Denial—The engine has denied the item but the denial can be overridden at the point-of-return by a properly authorized user.
- Contingent Authorization—The engine has approved the item contingent upon capture of an override at the point-of-return by a properly authorized user.
- Authorization.

Response codes are prioritized within response types. No two response codes of the same response type can have the same priority. As the analytic engine evaluates policy rules, the system holds the highest priority response code within that response type as the response, until a rule resulting in a higher response type, with a higher priority, supersedes it, thus the retailer can control whether the most favorable or least favorable response is returned to the point-of-return.

## Tender Determination

The retailer also determines the tenders that are enabled for a return. When the response is Continue or Continue At Rule Number, the tenders set for the rule carry forward until they are superseded by the response to a following rule. If there is no following rule that must be evaluated, then the tenders collected as a response to that rule are the available tenders that are returned to the point-of-return in the response message.

## Collection of Customer Demographics

An indicator can be set on a policy rule response that indicates positive ID is required in order to check this rule, and the policy cannot be evaluated unless the positive ID is obtained and the exception file checked. In this case, an additional call to Oracle Retail Returns Management is made, for another evaluation once customer positive ID is obtained.

## Determination of the Policy for Use on a Return Attempt

The collection of rules (policy) is assigned to a combination of location (node of the store reporting hierarchy, ad hoc store groups, or individual stores) and items, which can be designated by item or merchandise hierarchy. When a return is attempted at a point-of-return, the system determines the appropriate policy to apply based on the item being returned and the store where the return is being performed. The item designation supersedes the store designation in the case where two policies might otherwise be equivalent.

Two default policies must be defined for the analytic engine to use:

- Receipted items
- Non-receipted items

Exception policies can then be set to cover specific items, such as serialized items that include warranties, or articles of clothing that cannot be returned under any condition. When the system does not find a policy applying specifically to the line item being returned, the system falls back to the appropriate default receipted or non-receipted policy to evaluate returnability.

When the returnability has been determined based on the appropriate policy, the system checks for any other items that the customer is attempting to return at that time. When the responses have been determined for all items in the attempted return, the system sends the return response message with the evaluation results for the attempted return. The response for an attempted line item return includes a response code and description that are determined by the retailer.

The point-of-return can then use the response information to control flow to complete the return, such as prompting for a manager override, presenting the enabled tenders, or displaying information for why a return is not allowed.

### **Customer Service Overrides**

Customer service overrides are granted to a customer using the Customer Exception Details screen. The presence of a customer service override for a particular positive ID is checked at the end of return engine evaluation if any line item evaluates to a Manager Overridden Denial, or Denial. Customer service overrides are associated and used with a return ticket. If the return ticket is subsequently voided, the customer service override is considered unused and might be used with a subsequent return authorization. If more than one customer service override exists, the system applies them to the return in order from oldest to newest, by date.

Customer service overrides can consist of more than one allowed return within an override. The Max Customer Service Overrides parameter limits the number of allowed returns within the override and the total number of overrides granted to a customer.



---

## Integration Methods and Communication Flow

The main integration point of Oracle Retail Returns Management is with an external point-of-return. To communicate between the systems, Oracle Retail Returns Management provides methods which accept and return messages in a predefined format. This chapter discusses the methods and the messages. This section also discusses some of the implications of the chosen implementations.

### Methods of Contact

Oracle Retail Returns Management has two primary methods of contact with the point-of-return:

- The point-of-return requests return authorization from Oracle Retail Returns Management (evaluation).
- The point-of-return notifies Oracle Retail Returns Management of what was actually returned (exception tracking).

Both of these methods use XML messages. The call to evaluation is a synchronous call that returns a separate XML message. The call to scoring is an asynchronous call.

### Oracle Retail Returns Management Messages

The three messages defined by Oracle Retail Returns Management are:

- Return Request
- Return Response
- Return Result

The return request is passed from the point-of-return to Oracle Retail Returns Management when evaluation is invoked. The Return Response is returned by Oracle Retail Returns Management to show the result of evaluation. The return result is passed by the point-of-return to Oracle Retail Returns Management to initiate scoring.

This chapter describes the integration of Oracle Retail Returns Management with an external point-of-return, using an example transaction and sample XML messages that are sent between the point-of-return and Oracle Retail Returns Management.

To more clearly illustrate the XML messages, this chapter provides a scenario of a customer returning items under different situations. Each situation has a sample of the XML message with details around each element in the XML. There is a sample XML file for each of the three basic messages:

- Return Request
- Return Response
- Return Result

Each of these messages has a corresponding XSD that defines the valid XML for each message.

## Sample XML for Return Transaction Scenarios

John Smith wants to return some sporting equipment he has purchased. We will examine the message sent from the point-of-return to Oracle Retail Returns Management when he first wants to return the items. Oracle Retail Returns Management will respond asking for positive ID. A second return request is made from the point-of-return to Oracle Retail Returns Management with the additional ID information. Oracle Retail Returns Management then responds with its decision.

The customer decides he wants to return the items. Then, for whatever reason, the return is voided. Finally, the customer decides to re-return the items when Oracle Retail Returns Management is offline.

All XSD's referenced are provided in the Oracle Retail Returns Management installation material. [Table 5–1](#) identifies XSD file locations within the EPD install package.

**Table 5–1 XSD Locations**

| Document Name   | Location   |
|-----------------|--|
| Return Request  | returnsmgmt/api/returnsSchemas.zip/RM-ReturnRequest.xsd  |
| Return Response | returnsmgmt/api/returnsSchemas.zip/RM-ReturnResponse.xsd |
| Return Result   | returnsmgmt/api/returnsSchemas.zip/RM-ReturnResult.xsd   |

## Point of Return to Returns Management—Initial Return Request

In this scenario, John Smith has decided he wants to return some baseballs. He goes to the point-of-return which emits the following message:

### Example 5–1 Initial Return Request

```
<ReturnRequest>
  <itemReturnInfo>
    <itemTransactionInfo>
      <receipted>true</receipted>
      <transactionID>
        <storeID>12345</storeID>
        <workstationID>124</workstationID>
        <sequenceNumber>2</sequenceNumber>
        <businessDate>2005-12-31</businessDate>
      </transactionID>
      <found>true</found>
      <validAtPointOfReturn>true</validAtPointOfReturn>
      <giftReceipt>false</giftReceipt>
      <purchaseDate>2005-12-31</purchaseDate>
    </itemTransactionInfo>
  </itemReturnInfo>
</ReturnRequest>
```



```

        <deliveryDate>2006-01-01</deliveryDate>
        <validationAmount>40.00</validationAmount>
        <originalTender>
            <tenderType>
                <type>CASH</type>
                <amount>12.00</amount>
            </tenderType>
            <tenderType>
                <type>CRDT</type>
                <amount>38.00</amount>
                <cardNumber>1234567812345678</cardNumber>
            </tenderType>
        </originalTender>
        <saleQuantity>10</saleQuantity>
    </itemTransactionInfo>
    <itemIdentifier>
        <itemID>40020002</itemID>
        <itemDescription>MLB Baseball</itemDescription>
        <itemType>Sporting Good</itemType>
    </itemIdentifier>
    <returnReason>Customer Satisfaction</returnReason>
    <quantity>10.00</quantity>
    <amountPaidPerUnit>4.00</amountPaidPerUnit>
    <requestedAdjustedPrice>4.00</requestedAdjustedPrice>
    <itemCondition>New</itemCondition>
    <manuallyEntered>false</manuallyEntered>
</itemReturnInfo>
<returnStoreID>04241</returnStoreID>
<returnWorkstationID>123</returnWorkstationID>
<employeeID>20051</employeeID>
<customerInfo>
    <customerID>80012</customerID>
</customerInfo>
    <transactionType>Return</transactionType>
</ReturnRequest>

```

The entire request has a root element of **<ReturnRequest>**.

The following sub- elements, unless specified otherwise, are of type String and are required.

#### **<itemReturnInfo> complex type**

Each return request is based around returning a discrete number of items. Each unique type of item has a corresponding itemReturnInfo element. This means that if a customer is returning ten baseballs and two bats, then there are two itemReturnInfo elements, not twelve.

#### **<itemTransactionInfo> complex type, sub-element of <itemReturnInfo>**

This complex type describes the transaction during which the item was originally purchased.

#### **<receipted> Boolean, sub-element of <itemTransactionInfo>**

This Boolean element tells Oracle Retail Returns Management whether the customer has a receipt for this item. Non-receipted returns are allowed, but can trigger a different return policy.

#### **<transactionID>, optional, complex type, sub-element of <itemTransactionInfo>**

This complex type identifies the ARTS-compliant transaction of the original purchase, if any.

**<storeId>, <workstationID>, <sequenceNumber>, <businessDate>, sub-elements of <transactionID>**

These elements correspond to the parts of the ARTS-compliant transaction ID.

---

**Note:**

- The sequence number is a positive integer and the business date is a date.
  - The store ID and workstation ID of these elements do not need to match the store ID and workstation ID of <returnStoreID> and <returnWorkstationID>. Therefore, the item can be purchased at one store and returned at another.
- 

**<found> Boolean, sub-element of <itemTransactionInfo>**

This Boolean element tells Oracle Retail Returns Management if the transaction ID from the <transactionID> element was found. This element exists because it is possible to have a transaction number, for example, from a receipt, that is not found by the point-of-return when it queries existing transaction data. This element is required, but is only relevant if there is a transaction ID. If there is no <transactionID> element, this value should be set to **false**.

**<validAtPointOfReturn> Boolean, sub-element of <itemTransactionInfo>**

This Boolean element tells Oracle Retail Returns Management if the transaction ID from the <transactionID> element is considered valid by the point-of-return. Any transaction ID that is found should set this value to **true**. If the ID is not found, the point-of-return should decide if the transaction ID appears to be legitimate and set this value accordingly.

**<giftReceipt> optional, Boolean, sub-element of <itemTransactionInfo>**

This Boolean element tells Oracle Retail Returns Management if the receipt presented at the point-of-return is a gift receipt. This element should not be included in the message if the <receipted> element is **false**.

**<purchaseDate>, <deliveryDate>, optional, date, sub-element of <itemTransactionInfo>**

These date elements refer to the purchase and delivery dates of the item being returned, respectively. If this data cannot be determined at the point-of-return, these elements should be omitted.

**<validationAmount>, optional, decimal, sub-element of <itemTransactionInfo>**

This optional element represents the dollar amount of the items being returned. This is only included when there is no found transaction but there is a valid transaction ID. This could happen if, for example, a customer has a receipt with a transaction number and amount on it, but the point-of-return cannot find the transaction in storage.

**<originalTender>, complex type, sub-element of <itemTransactionInfo>**

This complex type represents the original tenders used to purchase these items. Though this type is required, the list of original tenders can be empty, for example, for a non-receipted, non-transaction ID return.

**<tenderType>, optional, complex type, sub-element of <originalTender>**

For each original tender that the point-of-return knows about, there is a tender type entry.

---

**Note:** There might be no tender type entries (for example, for non-receipted returns), one entry, or many entries (for a split-tender scenario, such as an item that was bought partially with a gift card and partially with cash).

---

**<type>, <amount>, <cardNumber>, sub-elements of <tenderType>**

These three elements describe the tender used. The <type> element is the only required element and is expected to match the standard four letter Oracle Retail tender types, for example, CASH. The <amount> element is an optional decimal value. The <cardNumber> element is listed as optional, but should be filled in with the appropriate card number if the tender type is CRDT.

**<saleQuantity>, optional, decimal, sub-element of <itemTransactionInfo>**

This element represents the original quantity of items sold to the customer. A customer might want to return only one out of ten items they have bought. This original sale quantity is compared to previous returns Oracle Retail Returns Management knows about. If the sum of items from previous returns plus the items from this return is greater than the sale quantity, Oracle Retail Returns Management can flag and deny this return attempt.

**<itemIdentifier> sub-element of <itemReturnInfo>**

This complex type identifies which item is being returned.

**<itemID>, <itemDescription> sub-elements of <itemIdentifier>**

Oracle Retail Returns Management relies on the <itemID> when referring to an item that it can look up in the AS\_ITM table of the Oracle Retail data model. Though the XSD enables <itemDescription> to be included, it is unused by the code.

**<itemType> optional, sub-element of <itemIdentifier>**

The <itemType> element describes the type of the item as evaluated by ItemTypeEvaluator. The user interface uses the ItemTypes parameter. The point-of-return and Oracle Retail Returns Management must agree on valid values for this element.

**<returnReason>, sub-element of <itemReturnInfo>**

The reason for which the item is being returned. This required element is used by the class ReturnReasonEvaluator. Based on the text provided here, the evaluator can choose various responses during policy initiation. The user interface uses the ReturnReasons parameter. The point-of-return and Oracle Retail Returns Management must agree on valid values for this element.

**<quantity>, decimal, sub-element of <itemReturnInfo>**

This is the quantity being returned. Non-unitary units of measure, for example, feet, should be expressed in a decimal format, such as 1.5 feet for 18 inches.

**<amountPaidPerUnit>, decimal, optional, sub-element of <itemReturnInfo>**

The amount paid per item on this return.

**<serialNumber>, optional, sub-element of <itemReturnInfo>**

This element is currently unused by Oracle Retail Returns Management.

**<requestedAdjustedPrice>, optional, decimal, sub-element of <itemReturnInfo>**

This element is set to the price at which the point-of-return wants to return the item. For instance, the point-of-return might request to return the item for less than the original sales price. This value is compared to the original price in PriceAdjustmentAmountEvaluator class. That rule initiates different actions depending on the ratio of the adjusted price to the original price per unit.

**<itemCondition>, optional, sub-element of <itemReturnInfo>**

This element reflects the condition of the item. This value is used by the ItemConditionEvaluator class. Like the <returnReason> element, the legal values for this element need to be agreed upon by the point-of-return and Oracle Retail Returns Management. The user interface uses the ItemConditions parameter. The point-of-return and Oracle Retail Returns Management must agree on valid values for this element.

**<manuallyEntered>, Boolean, sub-element of <itemReturnInfo>**

This required Boolean element denotes if the information in the <transactionID> element was manually entered at the point-of-return. This element should be **false** if there is no transaction ID.

**<returnStoreID>, <returnWorkstationID>, <employeeID>**

These are the IDs of the store, workstation, and employee that are initiating the return, respectively. The employee ID is used for tracking cashier exceptions and is expected to correspond to an entry into the Oracle Retail employee table.

**<customerType>, optional**

This element type is optional for loyalty. This value is used by the CustomerTypeEvaluator class.

**<customerInfo>, <moreCustomerInfo>**

These complex element types represent information about the customer returning the items.

---

---

**Note:** Only one of these info types can be present in the return request.

---

---

**<customerID>, sub-element of <customerInfo>**

The <customerID> element corresponds to the Oracle Retail customer ID.

---

---

**Note:** This element is different from the Returns Customer ID in the Oracle Retail Returns Management customer table, which is keyed off of positive ID.

---

---

**<transactionType>**

The <transactionType> element corresponds to the type of return requested by the point-of-return. Valid values are defined by the parameter RefundTypes. The point-of-return and Oracle Retail Returns Management must agree on valid values for this element. This parameter is defined in `returnsmgmt.xml`. Default values are:

- Return
- Layaway\_Cancellation
- Order\_Cancellation
- Price\_Adjustment

## Returns Management to Point of Return—Initial Return Response: Need Positive ID

After the initial return request has been submitted, Oracle Retail Returns Management determines that it needs a positive ID from the customer. Oracle Retail Returns Management responds, indicating that the point-of-return should obtain the ID from Mr. Smith.

---

**Note:** The following positive ID types are supported in the base integration between the point-of-return and Oracle Retail Returns Management:

- Driver's License
- Passport
- Military ID
- State/Region ID

Any other positive ID types set up in the point-of-return are not supported in the base integration between the point-of-return and Oracle Retail Returns Management.

---

### **Example 5–2 Return Response Requesting Positive ID**

```
<ReturnResponse>
  <returnTicketID>04241-123-1025-2006-005021791</returnTicketID>
  <responseApproveDenyCode>Denial</responseApproveDenyCode>
  <languagePreference>en</languagePreference>
  <itemReturnResponse>
    <itemIdentifier>
      <itemID>40020002</itemID>
    </itemIdentifier>
    <responseCode>10</responseCode>
    <approveDenyCode>Denial</approveDenyCode>
    <responseDescription>Insufficient quantity</responseDescription>
    <refundTenders/>
    <customerInfoRequired>true</customerInfoRequired>
  </itemReturnResponse>
</ReturnResponse>
```

The entire request has a root element of **<ReturnResponse>**.

The following sub- elements, unless specified otherwise, are of type String and are required.

**<returnTicketID>**

This element refers to the return ticket created by Oracle Retail Returns Management. The point-of-return needs to use this element in future communications with Oracle Retail Returns Management about this return (for example, in response to a request for positive ID or when sending a final result).

**<responseApproveDenyCode>**

If there are multiple item responses, then the most cautious <approveDenyCode> value is used.

There are exceptions to the behavior of this element. If a current entry is found in the customer service override table (RM\_CT\_SV\_ORD) that matches this Oracle Retail Returns Management customer and is active for the same date as the return, and the response would be a denial, then this value is set to **Approved** and the optional <availableCustomerServiceOverride> element is set.

**<languagePreference>**

This element informs the client in which language the <responseDescription>, <receiptMessage>, and other elements are sent. Currently this is always **en** for English.

**<itemReturnResponse>, complex type**

This element contains the detailed information about each of the items to which Oracle Retail Returns Management is responding. There can be many of these elements in a transaction.

**<itemIdentifier>, complex type, sub-element of <itemReturnResponse>**

This complex type identifies which item is being returned.

---

---

**Note:** Oracle Retail Returns Management sets the <itemID> sub-element only.

---

---

**<responseCode>, <approveDenyCode>, <responseDescription> sub-elements of <itemReturnResponse>**

Oracle Retail Returns Management has a response associated with each item. These response codes are configured by the rule actions of the policy that Oracle Retail Returns Management chose to execute. The codes are contained in the table RM\_RSPS\_RC.

The three values here correspond to the ID\_RPSS\_RC, TY\_RSPS, and DE\_RSPS respectively. The <responseCode> element itself is an integer that corresponds to an ID of a response code. The <approveDenyCode> is one of **Denial**, **Mgr Overridable Denial**, **Contingent Authorization**, or **Authorization**. The <responseDescription> is the short description of the response. Though these fields are required, in the message they can be ignored by the point-of-return since the <customerInfoRequired> element is **true**.

**<customerInfoRequired>, optional, Boolean, sub-element of <itemReturnResponse>**

If this value is set to **true**, Oracle Retail Returns Management is asking the point-of-return to prompt for positive ID. If this value is not present the point-of-return should assume that it is **false**.

## Point of Return to Returns Management—Second Return Request

Once the point-of-return has gotten a positive ID for Mr. Smith, it returns that information to Oracle Retail Returns Management along with the data from the original return request.

---

**Note:** The <itemreturnInfo> content is the same as in Example 5-1 and has been left out for brevity.

---

### Example 5-3 Second Return Request

```
<ReturnRequest>
  <itemReturnInfo>
    ...
  </itemReturnInfo>
  <returnStoreID>04241</returnStoreID>
  <returnWorkstationID>123</returnWorkstationID>
  <employeeID>20051</employeeID>
  <moreCustomerInfo>
    <lastName>Smith</lastName>
    <firstName>Carlos</firstName>
    <middleName>Juan</middleName>
    <gender>Male</gender>
    <birthDate>1972-06-25</birthDate>
    <address1>1234 Example Blvd</address1>
    <address2/>
    <city>Miami</city>
    <state>FL</state>
    <postalCode>33056</postalCode>
    <country>United States</country>
    <countryCode>US</countryCode>
    <telephoneAreaCode>888</telephoneAreaCode>
    <telephoneLocalNumber>5551212</telephoneLocalNumber>
  </moreCustomerInfo>
  <positiveID>
    <number>12345678</number>
    <type>DriversLicense</type>
    <issuer>US_MN</issuer>
    <issued>2004-01-01</issued>
    <expiration>2007-01-01</expiration>
  </positiveID>
  <transactionType>Return</transactionType>
  <returnTicketID>04241-123-1025-2006-005021791</returnTicketID>
</ReturnRequest>
```

The entire request has a root element of **<ReturnRequest>**.

Oracle Retail Returns Management works with two different customer data stores. The first data store is the Oracle Retail Returns Management customer data store, which is keyed off of positive IDs. This is the set of customers used for exception tracking. The second data store is the standard Oracle Retail customer data store. Oracle Retail Returns Management will attempt to link customers for which it has a positive ID to customers in the Oracle Retail customer data store, creating customers if necessary.

For purposes of the Oracle Retail Returns Management customer, only the `<positiveID>` element is relevant. Oracle Retail Returns Management either looks up or creates the customer corresponding to the positive ID. For the Oracle Retail customer, there are two elements which matter: `<customerID>` (underneath `<customerInfo>`) and `<moreCustomerInfo>`. If the `<customerID>` is passed in, Oracle Retail Returns Management assumes that this is the Oracle Retail customer relevant to the message. If the `<customerID>` element is absent, and both the `<positiveID>` and the `<moreCustomerInfo>` elements are present, then Oracle Retail Returns Management not only looks up or creates the Oracle Retail Returns Management customer, but it also creates a new Oracle Retail customer and associates it with the Oracle Retail Returns Management customer.

These examples are contrived to display the `<customerInfo>` and `<moreCustomerInfo>` elements. In the first message, the point-of-return had a valid customer ID. In this message, the XML is constructed to imply that Oracle Retail Returns Management should create a new customer matching the positive ID. In a real usage scenario, if the point-of-return knew the Oracle Retail customer but just needed to collect positive ID, the point-of-return would send the `<customerInfo>` element again rather than the `<moreCustomerInfo>` element.

**`<moreCustomerInfo>`, optional, complex type**

This element contains the information necessary to create an Oracle Retail customer.

**`<lastName>`, `<firstName>`, sub-elements of `<moreCustomerInfo>`**

These elements contain the last and first names (respectively) of the new Oracle Retail customer.

**`<middleName>`, `<gender>`, `<birthDate>`, optional, sub-elements of `<moreCustomerInfo>`**

These optional elements contain the middle name, the gender, and the birth date of the new Oracle Retail customer. Notice that these elements are all strings, including birth date. Also notice that the gender element is constrained to either male or female.

**`<address1>`, `<address2>` sub-elements of `<moreCustomerInfo>`**

These elements correspond to the usual two address lines of a customer. In this example, though `<address2>` is present, it is blank.

**`<city>`, `<state>`, `<postalCode>`, sub-elements of `<moreCustomerInfo>`**

These elements are further parts of the customer address. In the US, the state and postal code would correspond to the state and zip code. In Canada, they would correspond to the province and postal code.

**`<country>`, optional, sub-element of `<moreCustomerInfo>`**

This element corresponds to the country in which the customer resides.

**`<telephoneAreaCode>`, `<telephoneLocalNumber>`, optional, sub-elements of `<moreCustomerInfo>`**

These two optional elements reflect the telephone number and area code. For a number such as "888-555-1212", the "888" would be in the `<telephoneAreaCode>` element while the "5551212" would be in the `<telephoneLocalNumber>` element.



**<positiveID>, complex type**

Positive ID refers to a customer presenting credentials (such as a driver's license) to authenticate their identity. The positive ID is used to reference the Oracle Retail Returns Management customer. This element encodes information about the type of positive ID gathered by the point-of-return. See above for a discussion of the Oracle Retail Returns Management customer versus the Oracle Retail customer.

**<number>, sub-element of <positiveID>**

The unique identifier on the positive ID.

**<type>, sub-element of <positiveID>**

The type of identification presented. Valid types are DriversLicense, MilitaryID, Passport, and StateCard.

**<issuer>, sub-element of <positiveID>**

This is the issuing authority of the identification. For StateCard, this is the state which issued the card. For Passport, this is the country which issued the passport.

**<issued>, <expiration>, optional, date, sub-elements of <positiveID>**

These two optional date elements reflect the date of issue and the date of expiration, respectively, of the positive ID.

**<transactionType>**

This element is the same as the element in the initial return request.

**<returnTicketID>, optional**

By setting the <returnTicketID> element, the point-of-return lets Oracle Retail Returns Management know that it is responding to a request for more information. The element should be set to the ticket ID sent from Oracle Retail Returns Management in the previous return response. In this case, the element has been set to 04241-123-1025-2006-005021791 to match our previous message.

## Returns Management to Point of Return—Second Return Response

Now that Oracle Retail Returns Management has obtained a positive ID, it can tell the point-of-return about its decision of whether to allow the return of the items.

In this scenario, Mr. Smith has been returning a lot of items lately and has had an entry put into the exception file. This would normally result in a denial. However, Mr. Smith's agent has called the customer service center and asked them to accept the return. They have entered an entry into the customer service override table for Mr. Smith. Oracle Retail Returns Management checks for these entries while it creates the final response. In this case, since it has found one, Oracle Retail Returns Management authorizes the return but marks it as using a customer override.

**Example 5-4 Second Return Response**

```
<ReturnResponse>
  <returnTicketID>04241-123-1025-2006-016085229</returnTicketID>
  <responseApproveDenyCode>Authorization</responseApproveDenyCode>
  <availableCustomerServiceOverride>true</availableCustomerServiceOverride>
  <receiptMessageNumber>1</receiptMessageNumber>
  <receiptMessageDescription>Thank you for shopping!</receiptMessageDescription>
  <languagePreference>en</languagePreference>
  <itemReturnResponse>
    <itemIdentifier>
      <itemID>40020002</itemID>
    </itemIdentifier>
  </itemReturnResponse>
</ReturnResponse>
```

```
<responseCode>150</responseCode>
<approveDenyCode>Mgr Overridable Denial</approveDenyCode>
<responseDescription>Exception file match</responseDescription>
<receiptMessageNumber>1</receiptMessageNumber>
<receiptMessageDescription>Thank you for
shopping!</receiptMessageDescription>
<refundTenders/>
</itemReturnResponse>
</ReturnResponse>
```

---

**Note:** The return ticket ID in this response is different from the one sent in the first response. Each new return request generates a new return ticket ID.

---

**<availableCustomerServiceOverride>, optional, Boolean**

This optional Boolean element is only set when:

- The overall approve or denial code is a denial.
- This Oracle Retail Returns Management customer has an active entry in the customer service override table.

When this item is present, it is always **true**. For details about the approve and deny code process, refer to the “<responseApproveDenyCode>” on page 8 under the initial return response.

**<receiptMessageNumber>, positive integer**

Oracle Retail Returns Management has a number of receipt messages that it can send back to the point-of-return. These messages are intended to be printed on the receipt, but obviously the point-of-return can do what it would like with them. Each message has both a number and a description. The number is provided for internationalization purposes and the message is provided to make the XML more human readable.

Note that there is both a receipt message associated with both the overall return response as well as with each item on the response. The overall message is determined in the same manner as the overall response code. That is, the most cautious individual response code determines both the overall response as well as the overall receipt message.

**<receiptMessageDescription>**

This is the text associated with the receipt message number. This text will be in the language of the <languagePreference> element. Currently, this text is always in English.

**<languagePreference>**

This is the same element as detailed in the initial return response.

**<itemReturnResponse>, complex type**

This is the same element as returned in the first return response. In this case, the sub-elements of this complex type contain detailed information about the decision of Oracle Retail Returns Management regarding the returnability of this item.

**<approvedQuantity>, decimal, optional sub-element of <itemReturnResponse>**

This element is currently unused.

**<receiptMessageNumber>, sub-element of <itemReturnResponse>**

This is the receipt message number associated with the individual item. See "[<receiptMessageNumber>, positive integer](#)" on previous page.

**<itemDispositionCode>, optional, sub-element of <itemReturnResponse>**

This element corresponds to the disposition of the item after it has been returned, for example, "keep frozen". It corresponds to the table in ID\_DPSN\_CD in the ARTS schema. However, this element is currently not set.

**<receiptMessageDescription>, sub-element of <itemReturnResponse>**

This is the receipt message text associated with the individual item. See "[<receiptMessageDescription>](#)" on previous page.

**<restockingFee>, optional, decimal, sub-element of <itemReturnResponse>**

This element is currently unused.

## Point of Return to Returns Management—Return Result from Second Response

Once the positive ID has been collected and Oracle Retail Returns Management has told the point-of-return about the returnability of the item, the point-of-return processes the return as necessary. Once the return has been completed, the point-of-return sends Oracle Retail Returns Management a return result message.

### Example 5-5 Return Result

```
<ReturnResult>
  <returnTicketID>04241-123-1025-2006-016085229</returnTicketID>
  <returnTransactionID>
    <storeID>04241</storeID>
    <workstationID>123</workstationID>
    <sequenceNumber>250</sequenceNumber>
    <businessDate>2006-10-25</businessDate>
  </returnTransactionID>
  <itemReturnResult>
    <itemIdentifier>
      <itemID>40020002</itemID>
    </itemIdentifier>
    <quantityReturned>10</quantityReturned>
    <finalResultCode>Authorized</finalResultCode>
    <overrideInfo>
      <managerID>20008</managerID>
      <overrideObtained>true</overrideObtained>
      <tenderOverride>false</tenderOverride>
    </overrideInfo>
    <originalTransactionID>
      <storeID>12345</storeID>
      <workstationID>124</workstationID>
      <sequenceNumber>2</sequenceNumber>
      <businessDate>2005-12-31</businessDate>
    </originalTransactionID>
    <returnTender>
      <tenderType>
        <type>CASH</type>
        <amount>40.00</amount>
      </tenderType>
    </returnTender>
  </itemReturnResult>
</ReturnResult>
```

Once again, note the return ticket ID. It is the ticket ID referring to the second return response.

**<returnTransactionID>, optional, complex type**

This element refers to the ARTS-compliant return transaction generated by the point-of-return. It has the same format as the <transactionID> element of the return request.

**<itemReturnResult>, complex type**

This complex element represents detailed information about each item returned.

**<quantityReturned>, sub-element of <itemReturnResult>**

This number reflects the quantity actually returned by the point-of-return.

**<finalResultCode>, sub-element of <itemReturnResult>**

This element has one of two values, **Authorized** or **Denial**. For items that are returned, the value is set to **Authorized**.

**<overrideInfo>, optional, complex type, sub-element of <itemReturnResult>**

This complex type is included in the result if the point-of-return decided to override a return decision rendered either by Oracle Retail Returns Management or locally.

**<managerID>, sub-element of <overrideInfo>**

The ID (from the ARTS-compliant table PA\_EM) that corresponds to the employee ID of the manager who overrode the return decision.

**<overrideObtained>, Boolean, sub-element of <overrideInfo>**

This element is set to **true** if the override was about the returnability of the item.

**<tenderOverride>, Boolean, sub-element of <overrideInfo>**

This element is set to **true** if the override was about which tenders to return money on.

**<originalTransactionID>, optional, complex type, sub-element of <itemReturnResult>**

This element refers to the ARTS-compliant transaction associated with the original sale. This element has the same format as the <transactionID> element of the return request. This element is currently unused by Oracle Retail Returns Management.

**<returnTender>, complex type**

This element is a list of tenders. It describes the number of tenders, and the amount of each one, used by the point-of-return to return money to the client. It has the same format as the <originalTender> element of the return request.

## Point of Return to Returns Management—Void Return

Mr. Smith has proven to be indecisive and decides that he wants to have his baseballs after all. He wants to void the return and receive the items back. To accommodate this, the point-of-return voids the previous return and informs Oracle Retail Returns Management of the fact.

### **Example 5–6 Void Return Result**

```
<ReturnResult>
  <returnTicketID>04241-123-1025-2006-016085229</returnTicketID>
  <returnTransactionID>
    <storeID>04241</storeID>
    <workstationID>123</workstationID>
    <sequenceNumber>250</sequenceNumber>
    <businessDate>2006-10-25</businessDate>
```

```

    </returnTransactionID>
    <returnVoided>true</returnVoided>
  </ReturnResult>

```

In this message, we see the same return ticket ID and the same return transaction ID of the return result above. This is used to let Oracle Retail Returns Management know which return is being voided. The only new element is the `<returnVoided>` element.

#### **<returnVoided>, optional, Boolean**

This element shows that the return referenced by the `<returnTicketID>` element has been voided. Though this element is optional, exactly one of either `<returnVoided>` or `<itemReturnResult>` must appear in the return result. Thus, when this element is present, it must always be **true**.

## Offline Return Result

Finally, Mr. Smith decides that he does, in fact, want to return the baseballs. When he returns to do so, the point-of-return is offline from Oracle Retail Returns Management. The point-of-return makes its own decisions about the returnability of the items. For the sake of illustration, the point-of-return makes exactly the same decisions that Oracle Retail Returns Management did previously, though there is no requirement for this.

---

**Note:** The `<itemReturnInfo>` content is the same as in Example 5-1 and has been left out for brevity.

---

#### **Example 5-7 Offline Return Result**

```

<ReturnResult>
  <offlineDate>2006-05-16</offlineDate>
  <offlineRequest>
    <itemReturnInfo>
      ...
    </itemReturnInfo>
    <returnStoreID>04241</returnStoreID>
    <returnWorkstationID>123</returnWorkstationID>
    <employeeID>20051</employeeID>
    <customerInfo>
      <customerID>8885551212</customerID>
    </customerInfo>
    <positiveID>
      <number>12345678</number>
      <type>DriversLicense</type>
      <issuer>US_MN</issuer>
      <issued>2004-01-01</issued>
      <expiration>2007-01-01</expiration>
    </positiveID>
    <transactionType>Return</transactionType>
  </offlineRequest>
  <returnTransactionID>
    <storeID>04241</storeID>
    <workstationID>123</workstationID>
    <sequenceNumber>263</sequenceNumber>
    <businessDate>2006-10-25</businessDate>
  </returnTransactionID>
  <itemReturnResult>
    <itemIdentifier>
      <itemID>40020002</itemID>
    </itemIdentifier>

```

```
<quantityReturned>10</quantityReturned>
<finalResultCode>Authorized</finalResultCode>
<overrideInfo>
  <managerID>20008</managerID>
  <overrideObtained>true</overrideObtained>
  <tenderOverride>false</tenderOverride>
</overrideInfo>
<originalTransactionID>
  <storeID>12345</storeID>
  <workstationID>124</workstationID>
  <sequenceNumber>2</sequenceNumber>
  <businessDate>2005-12-31</businessDate>
</originalTransactionID>
<returnTender>
  <tenderType>
    <type>CASH</type>
    <amount>40.00</amount>
  </tenderType>
</returnTender>
</itemReturnResult>
</ReturnResult>
```

The offline result is effectively a return result with two additional elements. The first element is the date of the offline return. The second element is a return request message encapsulated in the `<offlineRequest>` element.

**`<offlineDate>`, optional, date**

This element is the original date of the offline return. Though this element is optional in the XSD, it is required when processing an offline return.

**`<offlineRequest>`, complex type**

The `<offlineRequest>` element is an embedded return request. It has the exact same format as a normal return request message except that the root `<ReturnRequest>` element is replaced by the `<offlineRequest>` element.

---

---

**Note:** The XSD specifies that the result message has either an `<offlineRequest>` element or a `<returnTicketID>` element, but not both.

---

---

**`<returnTransactionID>`, optional, complex type**

This element refers to the ARTS-compliant return transaction generated by the point-of-return. It has the same format as the `<transactionID>` element of the return request.

**`<itemReturnResult>`, complex type**

This element contains the detailed data about the items returned in this offline request. It has the same format as the original return result described above.

## Implementation Decisions

### Asynchronous Versus Synchronous Communication

Synchronous communication involves a client sending a message to a server and then pausing while it waits for a response. Asynchronous communication enables a client to send a message to the server and then immediately resume operations. Synchronous communication is usually more straightforward than asynchronous communication, but increases binding between a client and a server and can degrade concurrency. Asynchronous communication has the opposite problems: it is usually more complicated, but encourages decoupling and throughput.

Additionally, synchronous communication is necessary when a client needs a time-sensitive response to a message.

Oracle Retail Returns Management prefers to use asynchronous communication. This is mainly due to concurrency. When communication is asynchronous, it can be off-loaded onto a lightly loaded machine or scheduled to run at a time when there is relatively little system activity. Also, the communication can be more easily chained, for example, by inserting an arbitrary number of message forwarders between the client and server, or by inserting a message broadcaster. This enables greater flexibility in future system growth. However, asynchronous messaging is poorly suited for real time responses to messages.

Because asynchronous messaging provides greater latitude at installation and higher concurrency, the result message is implemented as an asynchronous call. Evaluation, however, has a strong requirement for a rapid response, for example, a customer is physically waiting at the point-of-return for a return approval. This evaluation is implemented as a synchronous call.

### XML Versus JavaBean Messages

Extensible markup language (XML) is a text format that is language independent and human legible. It has wide support in a variety of programming languages and a robust description language, XML Schema Definition (XSD). Being a text format, XML is capable only of encoding data.

JavaBeans are Java language constructs that mainly encapsulate data in an object class. Being objects, however, JavaBeans can optionally contain behavior as well as data. Also because they are objects, both the originator and the receiver of a JavaBean must have access to compatible versions of the .class file.

JavaBeans are a well known Java idiom and have a great deal of support in the Java Development Kit (JDK). However, they are a Java-specific solution. Furthermore, XML is more accessible to a non-technical audience than either Java source or Java runtime debugging environments. Also, XML is the standard of Web Service communication. Therefore, the messages that Oracle Retail Returns Management passes are XML based rather than JavaBean (or Java Object) based. The XML is eventually transformed into JavaBeans. This transformation to and from JavaBeans is facilitated by Java XML Binding (JAXB) code.

### Web Service Versus Enterprise JavaBeans and Remote Method Invocation Call

Web Services are language neutral, similar to XML. Web Services also provide a well-defined publishing and discovery mechanism: Universal Description, Discovery and Integration (UDDI).

## Elements

The previous sections have discussed details of the XML messages. This section will provide more information about important elements.

### Return Request

In [Table 5–2](#), the marks (x) indicate that the element is required and needs to have an appropriate value for that scenario. A value **true** or **false** indicates that this element should be set to this explicit value.

The **Element** column represents the various elements; the other columns represent the different scenarios. The XPath expressions clarify where the elements are in relationship to the entire message.

---

**Note:** In subsequent Positive ID messages, all original scenario elements should be sent.

---

**Table 5–2 Required Elements By Return Request**

|   |               |                     | Received                       |                             |             |
|---|---------------|---------------------|--------------------------------|-----------------------------|-------------|
| Element   | Non-receipted | No transaction data | Has data, no transaction found | Has data, transaction found | Positive ID |
| /ReturnRequest/itemReturnInfo/itemTransactionInfo |               |                     |                                |                             |             |
| receipted   | false         | true                | true                           | true                        |             |
| transactionID                                     |               |                     | X                              | X                           |             |
| found   | false         | false               | false                          | true                        |             |
| validAtPointOfReturn                              | false         | false               | X                              | true                        |             |
| validationAmount                                  |               |                     | X                              |                             |             |
| originalTender                                    | X             | X                   | X                              | X                           |             |
| /ReturnRequest/itemReturninfo                     |               |                     |                                |                             |             |
| itemIdentifier                                    | X             | X                   | X                              | X                           |             |
| returnReason                                      | X             | X                   | X                              | X                           |             |
| quantity  | X             | X                   | X                              | X                           |             |
| manuallyEntered                                   | false         | false               | X                              | false                       |             |
| /ReturnRequest                                    |               |                     |                                |                             |             |
| returnStoreID                                     | X             | X                   | X                              | X                           |             |
| returnWorkStationID                               | X             | X                   | X                              | X                           |             |
| employeeID  | X             | X                   | X                              | X                           |             |
| customerInfo or moreCustomerInfo                  | X             | X                   | X                              | X                           |             |
| positiveID  |               |                     |                                |                             | X           |
| transactionType                                   | X             | X                   | X                              | X                           |             |
| returnTicketID                                    |               |                     |                                |                             | X           |



## Return Response

In [Table 5–3](#), the **Element** column refers to the elements in the return response. The remaining columns describe the various use cases. A mark (x) means that the point-of-return should be concerned with this data point when encountering it. A **true** or **false** value means that the point-of-return will examine this data point for this value to determine the use case. The XPath expressions help the reader orient themselves with the elements.

This is the minimum amount of data a point-of-return needs to implement. Additionally, the point-of-return must decide how to interpret the approval or denial of the <responseApproveDenyCode> element.

Keep in mind that some items might be approved while others are denied.

**Table 5–3 Required Elements By Return Response**

| Element                                   | Approval or Denial | Positive ID Required | CS Override |
|---|--------------------|----------------------|-------------|
| <b>/ReturnResponse</b>                    |                    |                      |             |
| returnTicketID                            | X                  | X                    | X           |
| responseApproveDenyCode                   | X                  |                      | X           |
| availableCustomerServiceOverride          |                    |                      | true        |
| <b>/ReturnResponse/itemReturnResponse</b> |                    |                      |             |
| itemIdentifier                            | X                  | X                    | X           |
| approveDenyCode                           | X                  |                      |             |
| refundTenders                             | X                  |                      | X           |
| customerInfoRequired                      |                    | true                 |             |

## Return Result

In [Table 5–4](#), the **Element** column is the list of elements the point-of-return needs to send in the ReturnResult message. A mark (x) indicates that this element should be present when sending this type of response to Oracle Retail Returns Management. A **true** or **false** value indicates that this element should be set explicitly to this value when sending this type of message. The XPath expressions help orient the reader.

**Table 5–4 Required Elements By Return Result Use Case**

| Element                               | Standard Result | Offline Return | Voided Return |
|---------------------------------------|-----------------|----------------|---------------|
| <b>/ReturnResult</b>                  |                 |                |               |
| returnticketID                        | X               |                | X             |
| offlineDate                           |                 | X              |               |
| offlineRequest                        |                 | X              |               |
| returnTransactionID                   | X               | X              | X             |
| returnVoided                          |                 |                | true          |
| <b>/ReturnResult/itemReturnResult</b> |                 |                |               |
| itemIdentifier                        | X               | X              |               |
| quantityReturned                      | X               | X              |               |

**Table 5–4 (Cont.) Required Elements By Return Result Use Case**

| Element                   | Standard Result | Offline Return | Voided Return |
|---------------------------|-----------------|----------------|---------------|
| finalResultCode           | X               | X              |               |
| overrideInfo <sup>1</sup> | X               | X              |               |
| returnTender              | X               | X              |               |

<sup>1</sup> The <overrideInfo> element should be included only if there was an override.

## Web Service Interface

The web service exposes two methods. Table 5–5 describes these methods, with their parameters.

**Table 5–5 Web Service Methods**

| Method Name           | Input                  | Output                  |
|-----------------------|------------------------|-------------------------|
| evaluateReturnRequest | String (ReturnRequest) | String (ReturnResponse) |
| processFinalResult    | String (ReturnResult)  | None                    |

Note that though the web services expect to produce and consume XML, the XML is passed and returned as a simple string rather than a DOM object.

By default, the web service will be accessed at:

`http://hostname:port/retwebsvc/services/ReturnsManager`

Where *hostname:port* is replaced with the host and port to which the web service .ear file is deployed. The retwebsvc context can be modified by changing the context-root element of the WebModule\_Returns\_WebServices module in the `application.xml` of the deployed ear.

## Relationship of Oracle Retail Returns Management Data to ARTS Transaction Data

The Association for Retail Technology Standards (ARTS) is an international membership organization dedicated to reducing the costs of technology through standards. ARTS has four standards:

- The Standard Relational Data Model
- UnifiedPOS
- IXRetail
- Standard RFPs

For more information about ARTS, go to:

<http://www.nrf-arts.org/>

One of the design goals of Oracle Retail Returns Management is to reduce its dependency on external systems. At the same time, customers will need traceability of Oracle Retail Returns Management data back to original transaction data.

To account for this, the return request and return result messages sent to Oracle Retail Returns Management contain the ARTS-compliant transaction IDs for the relevant transactions. Therefore, when a return request is made, Oracle Retail Returns Management is told of the transaction ID, if any, of the original sale. When a return result is sent, Oracle Retail Returns Management is told of the transaction ID of the return transaction. This ID is stored with the return ticket.



---

## Exception Files

The Oracle Retail Returns Management exception file is created and maintained by Oracle Retail Returns Management for use in detecting and preventing fraud at the point-of-return. The exception file acts as a constantly evolving knowledge base that can help the Authorization Engine decide which customers, items, cashiers, or stores are at higher risk for return fraud.

The exception file holds an exception counter for a customer that is incremented based on suspicious return activity. If an activity is selected for inclusion in the exception counter, the system adds 1 to the exception count for each suspicious shopping activity. Likewise, activities can be configured for cashiers.

Exceptions and counting are based on real-time refund attempt activities occurring at the point-of-sale or return using the return result message that is sent by the point-of-sale or return to Oracle Retail Returns Management at the conclusion of a transaction with an attempted refund. Return activities include activities that increment counters such as a return transaction by the customer without a receipt and with no retrieval of the original transaction, five same day returns as purchases within the last three days, and three returns today. In turn, activity thresholds might be breached and counting generated based on those thresholds.

The exception file holds an entry for each factor that triggers a count addition.

### Exception File and Count Calculation

This section describes exception file count calculation for the following:

#### **Customer**

- Customer positive ID consisting of ID type, number, and issuer
- Exception count

#### **Cashier**

- Cashier ID
- Exception count

**Exceptions triggered**

- Exception (the return activity that was breached)
- Target of the return activity (the customer ID, cashier ID)
- Date/Time of the exception

---

**Note:** Oracle Retail Returns Management requires the use of a unique cashier ID for exception tracking.

---

## Definition of Return, for Calculation

A return, for purposes of calculation, refers to an attempted return of a line item quantity.

---

**Note:** Returns count by type at the transaction level (unique line item level). This accommodates variations between points of sale that allow mixed situations or inherently disallow mixed situations. Counting at the quantity level could abnormally inflate exceptions, for example, returning a quantity of 8 china plates. Counting at the transaction level could exclude appropriate return or non-return counts due to the ability to mix returns from multiple original receipted transactions, or no receipt, within one Oracle Retail Returns Management point-of-sale transaction.

---

Counting unique exceptions at the transaction level is conducted so that the customer is not penalized twice for the same situation within one transaction. If an exception occurs multiple times in a single transaction, that is counted as a single exception. For example, if a customer returns three different items without a receipt in a single return transaction, only one exception is generated.

Table 6–1 offers exception counting examples.

**Table 6–1 Exception Counting Examples**

| Scenario   | Exceptions Counted            |
|--|-------------------------------|
| Return attempt for 5 different items:  | 1 count for without a receipt |
| <ul style="list-style-type: none"> <li>1111 quantity 1 without receipt (no original transaction retrieved)</li> <li>2222 quantity 1 without receipt</li> <li>3333 quantity 1 without receipt</li> <li>4444 quantity 1 without receipt</li> <li>5555 quantity 1 with receipt (original transaction retrieved)</li> </ul>  | 1 count for with a receipt    |
| Return attempt for 4 different items, total quantity 5:  | 1 count for without a receipt |
| <ul style="list-style-type: none"> <li>1111 quantity 1 without receipt</li> <li>2222 quantity 2 without receipt</li> <li>3333 quantity 1 without receipt</li> <li>5555 quantity 1 with receipt</li> </ul>  | 1 count for with a receipt    |
| Return attempt for 2 different items:  | 1 count for without a receipt |
| <ul style="list-style-type: none"> <li>1234 attempted return quantity of total 4 with two different receipts. Quantity 2 comes from original transaction 042419999999 and another quantity 2 comes from 042418888888. Split as two separate lines in Oracle Retail Returns Management's point-of-sale because they would be selected from two different original transactions.</li> <li>5555 quantity 1 without a receipt</li> </ul>   | 1 count for with a receipt    |
| Two renter line items and one non-renter line item on the same receipted return attempt:   | 1 renter return               |
| <ul style="list-style-type: none"> <li>One item from the renter file is returned in the renter time frame, resulting in potential authorization, override, or denial.</li> <li>A second item from the renter file is returned in the renter time frame, resulting in potential authorization, override, or denial.</li> <li>Another item, not listed in the renter file, is being returned and is sent to Oracle Retail Returns Management for evaluation, resulting in authorization, override, or denial.</li> </ul> | 1 expired receipted return    |
| The receipt is older than a parameterized number of days old (hence an expired receipt).   |                               |
| Can mix returns both with and without receipts in the same transaction, as well as returns received from multiple transactions.  | 1 count for without a receipt |
| In one return transaction, six line items could consist of:  | 1 count for with a receipt    |
| <ul style="list-style-type: none"> <li>Two returns without receipt—sample: resolve this one to authorized</li> <li>Two receipted—quantity available—sample: resolve this one to authorized</li> </ul>  |                               |

## Exceptions

### Customer Exceptions

Customer Exceptions can be flagged as behaviors that are tracked in the application, for use in Return Policies, using the Customer Exceptions to Track screen.

An exception is any activity that can be discerned from Return Ticket data, such as a non-receipted return, a return of an item contained in the Return Pattern Watch file, or a particular type of refund transaction such as a Price Adjustment.

When a customer exception occurs, a record is written to the exception file and the activity is available for research on that customer using the Customer Exception Search and Customer Exception Search Results screens.

The total number of exceptions that have occurred can be checked using a rule that can be included in return policies.

All of the exceptions are based on return ticket data.

### Cashier Exceptions

Cashier Exceptions can be flagged as behaviors that are tracked in the application, for use in Return Policies, using the Cashier Exceptions to Track screen.

When a cashier exception occurs, a record is written to the exception file and the activity is available for research on that cashier using the Cashier Exception Search and Cashier Exception Search Results screens.

The total number of exceptions that have occurred can be checked using a rule that can be included in return policies.

All of the exceptions are based on return ticket data.

Cashier in this case is considered to be anyone captured as the employee on the return ticket, regardless of whether they have a cashier, associate manager, manager, or other store role.



---

## Extensibility Framework

The purpose of the extensibility framework is to simplify the creation and deployment of new rules and calculators. The framework uses Apache Ant to automate library extraction, code compilation, and packaging of the extensions.

The framework is packaged in the `returnsExtensibility.zip` file that is contained within the EPD application archive under `returnsmgmt/api`. To use the framework simply unzip the archive to a working directory. In most cases, you can simply update the input and output directory properties in the `extensibility.properties` file. If you want to compile and package the samples that are provided in the framework, all you need to do is run the `build` target.

### Adding a New Rule

Rules get executed during the `evaluateReturnRequest()` method call. This section demonstrates how to create a rule that is based off of the item's technical check condition. This section also demonstrates how to make use of the `MessageExtension` elements.

First, make a new `Evaluator` class. For ease of implementation, subclass the `DiscreteRuleEvaluator` class. This enables you to reuse the `getMatchingAction()` method, which looks through the rule actions for the discrete value desired. This class figures out that discrete value.

There are only two methods to be implemented:

- `evaluate()`
- `getDiscreteRuleValues()`

The `evaluate()` method is the method that provides the meat of the `Evaluator` implementation. The `getDiscreteRuleValues()` method returns a list of string values. These strings constitute the list of valid values for this particular class. Start with a skeleton class:

```
package com.yourcompany.returns.rules;

import oracle.retail.stores.commerceservices.returns.ejb.ReturnServiceRemote;
import
oracle.retail.stores.commerceservices.returns.journal.ItemAuthorizationJournalEntry;
import oracle.retail.stores.commerceservices.returns.policy.PolicyRuleDTO;
import oracle.retail.stores.commerceservices.returns.rule.RuleActionIfc;
import oracle.retail.stores.commerceservices.returns.rule.RuleProcessingException;
import oracle.retail.stores.commerceservices.returns.xml.ReturnRequestType;

import java.util.List;
```

```

/**
 * A discrete rule evaluator that checks the value of the
 * techCheckCondition extensible attribute.
 */
public class TechCheckConditionEvaluator extends DiscreteRuleEvaluator
{
    public RuleActionIfc evaluate(ReturnServiceRemote returnService,
        PolicyRuleDTO rule, ReturnRequestType returnRequest,
        int itemIndex, Integer rmCustomerID,
        String evaluationBusinessDate,
        ItemAuthorizationJournalEntry journalEntry)
        throws RuleProcessingException
    {
        return null;
    }

    public List getDiscreteRuleValues()
    {
        return null;
    }
}

```

Figure out what the technical check condition is. This is the discrete value used to find a rule action.

In this case, parse through the returnRequest object to find the extensible value associated with this item in the request. Here is the new class, with the changes in bold:

```

public class TechCheckConditionEvaluator extends DiscreteRuleEvaluator
{
    public RuleActionIfc evaluate(ReturnServiceRemote returnService,
        PolicyRuleDTO rule, ReturnRequestType returnRequest,
        int itemIndex, Integer rmCustomerID,
        String evaluationBusinessDate,
        ItemAuthorizationJournalEntry journalEntry)
        throws RuleProcessingException
    {
        String techCheckReason = null;
        // find the item in the request
        ItemReturnInfo item = (ItemReturnInfo)
            returnRequest.getItemReturnInfo().get(itemIndex);
        // get the extensible attributes for the item
        MessageExtension ext = item.getMessageExtension();
        // find the techCheckCondition attribute
        if (ext != null) {
            for (Iterator it = ext.getExtensionEntry().iterator();
                it.hasNext();)
            {
                ExtensionEntry entry = (ExtensionEntry) it.next();

                if (entry.getName().equals("techCheckCondition")) {
                    techCheckReason = entry.getValue();
                }
            }
        }
        // return the action for this value
        return super.getMatchingAction(rule.getActions(),
            techCheckReason);
    }
}

```

```

    }

    public List getDiscreteRuleValues() {
        return null;
    }
}

```

Next, ensure that this class records its actions into the journal entry, like other Evaluators do. Add a call to the journal entry. Now the class looks like the following, again with the changed portions in bold:

```

public class TechCheckConditionEvaluator extends DiscreteRuleEvaluator
{
    public RuleActionIfc evaluate(ReturnServiceRemote returnService,
        PolicyRuleDTO rule, ReturnRequestType returnRequest,
        int itemIndex, Integer rmCustomerID,
        String evaluationBusinessDate,
        ItemAuthorizationJournalEntry journalEntry)
        throws RuleProcessingException
    {
        String techCheckCondition = null;
        // find the item in the request
        ItemReturnInfo item = (ItemReturnInfo)
            returnRequest.getItemReturnInfo().get(itemIndex);
        // get the extensible attributes for the item
        MessageExtension ext = item.getMessageExtension();
        // find the techCheckCondition attribute
        if (ext != null) {
            for (Iterator it = ext.getExtensionEntry().iterator();
                it.hasNext();)
            {
                ExtensionEntry entry = (ExtensionEntry) it.next();

                if (entry.getName().equals("techCheckCondition")) {
                    techCheckCondition = entry.getValue();
                }
            }
        }
        // log the rule and result value
        journalEntry.addRuleResult(rule.getName(),
            techCheckCondition == null ? "No condition found."
            : techCheckCondition);
        // return the action for this value
        return super.getMatchingAction(rule.getActions(),
            techCheckCondition);
    }

    public List getDiscreteRuleValues() {
        return null;
    }
}

```

Finally, fill the list of allowed values. This list is used to fill in the menu box in the Returns Management UI, for configuring the allowed values for this rule.

```

public class TechCheckConditionEvaluator extends DiscreteRuleEvaluator
{
    public RuleActionIfc evaluate(ReturnServiceRemote returnService,
        PolicyRuleDTO rule, ReturnRequestType returnRequest,
        int itemIndex, Integer rmCustomerID,
        String evaluationBusinessDate,

```

```

        ItemAuthorizationJournalEntry journalEntry)
        throws RuleProcessingException
    {
        // ... lines removed ...
    }

    public List getDiscreteRuleValues()
    {
        String[] values = new String[] {
            "All Tests Passed",
            "Partial Test Failure",
            "Complete Test Failure"
        };
        return Arrays.asList(values);
    }
}

```

Obviously, a static set of strings is not the ideal implementation. The rules that are shipped with Oracle Retail Returns Management rely on parameters to define their valid values and make use of the `ParameterDiscreteRuleEvaluator`. This solution allows for the values to be changed independently of the class at runtime. However, this is not the only possible implementation. Since the evaluator only needs to implement the `getDiscreteRuleValues()` method, the implementer has a great deal of latitude in deciding how the list of strings is generated.

Now that the class is written, you need to do two things:

1. Compile and deploy the new class in the application server. Using the extensibility framework simplifies this task.
2. Configure the database so that we can see the new evaluator in action.

For a rule, there is only one database table to configure, the rule table (RM\_RU). [Table 7-1](#) identifies the columns in the RM\_RU table.

**Table 7-1** *RM\_RU Columns*

| Column Name | Data Type | Description   | Notes  |
|-------------|-----------|---------------|--|
| ID_RU       | Integer   | Primary Key   | Must be unique.  |
| RU_TY_EVAL  | VARCHAR   | Type of Rule  | One of: <ul style="list-style-type: none"> <li>■ BOOLEAN</li> <li>■ DISCRETE</li> <li>■ RANGE</li> </ul> |
| NM_RU       | VARCHAR   | Display Name  |  |
| LU_RU_CLS   | VARCHAR   | Class Name    | Fully qualified classname.   |
| ID_KPI      | Integer   | KPI Reference | ID of associated KPI. Otherwise null.  |

Create a new discrete rule for the class. It does not have a KPI reference. The following SQL creates this new discrete rule:

```

INSERT INTO rm_ru
    (id_ru, ru_ty_eval, nm_ru, lu_ru_cls, id_kpi, fl_pnty_bx)
VALUES
    (100, 'DISCRETE', 'What is the item technical check condition?',
    'com.yourcompany.returns.rules.TechCheckConditionEvaluator', null, '0');

```

Ensure that the rule ID is unique, and that the class name is both fully qualified and correct.

Once you have updated the database, navigate to the desired policy in the Returns Management UI. Then click the **change rules/order** button next to **Policy Rules**. You can see the new rule at the bottom of the list.

Once you click the **Done** button, you can click on the rule name and add actions and response codes for the various conditions you want to configure.

**Figure 7-1 Example Rule Configuration Screen**

|   |  |                      |          |               |
|---|--|----------------------|----------|---------------|
| 1 | <a href="#">What is the item technical check condition? (discrete)</a> | All Tests Passed     | CONTINUE | Author        |
|   |  | Partial Test Failure | CONTINUE | Contin Author |
|   |  | Default              | CONTINUE | Mgr O Denial  |

Be sure to save the policy after configuring the rule.

The following is the complete source for the TechCheckConditionEvaluator:

```
package com.yourcompany.returns.rules;

import oracle.retail.stores.commerceservices.returns.ejb.ReturnServiceRemote;
import
oracle.retail.stores.commerceservices.returns.journal.ItemAuthorizationJournalEntr
y;
import oracle.retail.stores.commerceservices.returns.policy.PolicyRuleDTO;
import oracle.retail.stores.commerceservices.returns.rule.RuleActionIfc;
import oracle.retail.stores.commerceservices.returns.rule.RuleProcessingException;
import
oracle.retail.stores.commerceservices.returns.rule.evaluator.DiscreteRuleEvaluator
;
import oracle.retail.stores.commerceservices.returns.xml.ReturnRequestType;
import oracle.retail.stores.commerceservices.returns.xml.ItemReturnInfo;
import oracle.retail.stores.commerceservices.returns.xml.MessageExtension;
import oracle.retail.stores.commerceservices.returns.xml.ExtensionEntry;

import java.util.List;
import java.util.Iterator;
import java.util.Arrays;
/**
 * A discrete rule evaluator that checks the value of the
 * techCheckCondition extensible attribute.
 */
public class TechCheckConditionEvaluator extends DiscreteRuleEvaluator
{

    public RuleActionIfc evaluate(ReturnServiceRemote returnService,
        PolicyRuleDTO rule, ReturnRequestType returnRequest,
        int itemIndex, Integer rmCustomerID,
        String evaluationBusinessDate,
        ItemAuthorizationJournalEntry journalEntry)
```

```

        throws RuleProcessingException
    {
        String techCheckCondition = null;
        // find the item in the request
        ItemReturnInfo item = (ItemReturnInfo)
            returnRequest.getItemReturnInfo().get(itemIndex);
        // get the extensible attributes for the item
        MessageExtension ext = item.getMessageExtension();
        // find the techCheckCondition attribute
        if (ext != null) {
            for (Iterator it = ext.getExtensionEntry().iterator();
                 it.hasNext();)
            {
                ExtensionEntry entry = (ExtensionEntry) it.next();

                if (entry.getName().equals("techCheckCondition")) {
                    techCheckCondition = entry.getValue();
                }
            }
        }
        // log the rule and result value
        journalEntry.addRuleResult(rule.getName(),
            techCheckCondition == null ? "No condition found."
                : techCheckCondition);
        // return the action for this value
        return super.getMatchingAction(rule.getActions(),
            techCheckCondition);
    }

    public List getDiscreteRuleValues()
    {
        String[] values = new String[] {
            "All Tests Passed",
            "Partial Test Failure",
            "Complete Test Failure"
        };
        return Arrays.asList(values);
    }
}

```

## Adding a New KPI Calculator

Now that you have added a new rule evaluator, explore a new KPI Calculator. One of the things that a KPI can do is add to the cumulative exception count. Exceptions are triggered during the `processFinalResult()` method. Consider a trivial exception that simply counts up the number of times a certain item has been returned. Each time this item is returned, a row is added into the exception count.

To create a new KPI, do the following:

1. Create the new class.
2. Configure the database.
3. Create some JSP fragments to manipulate the parameters for the new KPI.

## The Calculator Class

First of all, you need to make a new instance of the `KPICalculatorIfc` interface, or more specifically a new subclass of the class `BaseKPICalculator`.

Because you are using the abstract class, there are three methods to implement:

- `initialize()` – Called on each KPI Calculator to set up an initial state. In practice, this usually means parsing KPI instance parameters or getting a reference to the `KPIService` from the EJB `Handle` passed in. The abstract base class has a method to achieve the latter called `initializeServiceFromHandle()`.
- `hasMatchingBehavior()` – This method enables the `KPIValueDTO` to indicate, ex-post-facto, if the KPI was fired for a particular return ticket. Does this return match the behavior that I’m looking for? This method must not rely on any values computed by the `calculate` method because that method might not be called depending on the calculator type.
- `calculate()` – This is the workhorse method of the class. Calculate is sent in a set of facts, using the `Map` object, with which it can make a decision or use to perform some kind of count of historical data. This decision or count is then returned as a `BigDecimal`.

For this simple class, first make a skeletal stub class:

```
package com.yourcompany.returns.kpis;

import oracle.retail.stores.commerceservices.returns.kpi.CalculatorException;
import oracle.retail.stores.commerceservices.returns.kpi.KPIInstanceIfc;
import oracle.retail.stores.commerceservices.returns.kpi.impl.BaseKPICalculator;
import oracle.retail.stores.commerceservices.returns.ticket.ReturnTicketDTO;

import javax.ejb.Handle;
import java.math.BigDecimal;
import java.util.Map;

/**
 * A KPI Calculator used for exception tracking purposes.
 */
public class SpecificItemCalculator extends BaseKPICalculator
{

    public void initialize(Handle handle, KPIInstanceIfc kpiInstance)
        throws CalculatorException
    {

    }

    public BigDecimal calculate(Map params)
    {
        return null;
    }

    public boolean hasMatchingBehavior(ReturnTicketDTO returnTicket)
        throws CalculatorException
    {
        return false;
    }
}
```

Now we need to fill in some blanks. Tackle the `calculate()` method first. In most cases the calculator accesses the database to answer this question. For this example KPI that only counts exceptions, this method returns a default zero value.

The map passed in contains the return information. It is somewhat awkward to withdraw data from the non-type-safe map. The map is populated with default values

depending on the context in which the KPI is called. Generally, two values are populated:

```
mapIDs.put(KPIParameterIfc.CUSTOMER_ID, rmCustomerID);
mapIDs.put(KPIParameterIfc.RETURN_TICKET, returnTicket);
```

However, when the KPI is called from the `KPIRangeEvaluator` or the `KPICashierRangeEvaluator`, then only the customer or cashier, respectively, is populated.

Each KPI also might have *instance* parameters that correspond to this particular KPI. In this case, the instance parameters can be withdrawn during the initialization phase. The parameters are part of the `kpiInstance` class and can be accessed by the method `getInstanceParameters()`. This method returns a `TreeSet` rather than a map, though order is not important here. The set contains a group of `KPIInstanceParameterDTO` classes. Using the `getName()` method, a KPI can determine which of these parameters satisfy which criteria.

In this case, determine if a certain item is in a return ticket. First, pull the item from the KPI instance parameters. To do this, define a new constant for the parameter name and get it out of the parameters passed in to the initialize function.

```
protected String itemID = null;
public static final String PARAM_ITEM_ID = "itemID";

public void initialize(Handle handle, KPIInstanceIfc kpiInstance)
    throws CalculatorException
{
    if (! isInitialized()) {
        TreeSet kpiParams = kpiInstance.getInstanceParameters();
        Iterator iter = kpiParams.iterator();
        while (iter.hasNext())
        {
            KPIInstanceParameterDTO param =
                (KPIInstanceParameterDTO) iter.next();
            String paramName = param.getName();
            if (paramName.equals(PARAM_ITEM_ID))
            {
                itemID = param.getInstanceValue();
                break;
            }
        }

        setInitialized(true);
    } else {
        throw new IllegalStateException("Initializing a " +
            "calculator which is already initialized");
    }
}
```

Notice that two variables are added: a constant to indicate the parameter (used later to update the SQL, and in the JSP) and an instance variable to hold the value being sought.

Add in the simplified `calculate()` method. In this case, return a default value of zero.

```
public BigDecimal calculate(Map params)
{
    return BigDecimalConstants.ZERO;
}
```



Because we are only interested in exception counting, the significant part of the code goes in the `hasMatchingBehavior()` method.

```
public boolean hasMatchingBehavior(ReturnTicketDTO returnTicket)
    throws CalculatorException
{
    for (Iterator it = returnTicket.getReturnTicketItems()
        .iterator(); it.hasNext();)
    {
        ReturnTicketItemDTO item = (ReturnTicketItemDTO) it.next();
        if (item.getItemID().equals(itemID))
        {
            return true;
        }
    }
    return false;
}
```

Now the class is ready. Compile and deploy the new class.

The following is the complete source for the `SimpleItemCalculator`:

```
package com.yourcompany.returns.kpis;

import oracle.retail.stores.commerceservices.returns.kpi.CalculatorException;
import oracle.retail.stores.commerceservices.returns.kpi.KPIInstanceIfc;
import oracle.retail.stores.commerceservices.returns.kpi.KPIInstanceParameterDTO;
import oracle.retail.stores.commerceservices.returns.kpi.impl.BaseKPICalculator;
import oracle.retail.stores.commerceservices.returns.ticket.ReturnTicketDTO;
import oracle.retail.stores.commerceservices.returns.ticket.ReturnTicketItemDTO;
import oracle.retail.stores.common.utility.BigDecimalConstants;

import javax.ejb.Handle;
import java.math.BigDecimal;
import java.util.Map;
import java.util.TreeSet;
import java.util.Iterator;
/**
 * A KPI Calculator used for exception tracking purposes.
 */
public class SpecificItemCalculator extends BaseKPICalculator
{
    protected String itemID = null;
    public static final String PARAM_ITEM_ID = "itemID";

    public void initialize(Handle handle, KPIInstanceIfc kpiInstance)
        throws CalculatorException {
        if (!isInitialized()) {
            TreeSet kpiParams = kpiInstance.getInstanceParameters();
            Iterator iter = kpiParams.iterator();
            while (iter.hasNext())
            {
                KPIInstanceParameterDTO param =
                    (KPIInstanceParameterDTO) iter.next();
                String paramName = param.getName();
                if (paramName.equals(PARAM_ITEM_ID))
                {
                    itemID = param.getInstanceValue();
                    break;
                }
            }
        }
    }
}
```

```

        setInitialized(true);
    } else {
        throw new IllegalStateException("Initializing a " +
            "calculator which is already initialized");
    }
}

public BigDecimal calculate(Map params)
{
    // exception counting only KPI
    return BigDecimalConstants.ZERO;
}

public boolean hasMatchingBehavior(ReturnTicketDTO returnTicket)
    throws CalculatorException
{
    for (Iterator it = returnTicket.getReturnTicketItems()
        .iterator(); it.hasNext();)
    {
        ReturnTicketItemDTO item = (ReturnTicketItemDTO) it.next();
        if (item.getItemID().equals(itemID))
        {
            return true;
        }
    }
    return false;
}
}

```

## Database Configuration

The next step is to update the database. In this case, update two tables. These tables are the KPI table (RM\_KPI) and the KPI parameter table (RM\_KPI\_PRMR).

[Table 7-2](#) identifies the six columns to update in the KPI table.

**Table 7-2 RM\_KPI Columns**

| Column Name | Data Type | Description  | Notes  |
|-------------|-----------|--------------|--|
| ID_KPI      | Integer   | Primary Key  | Must be unique   |
| NM_KPI      | VARCHAR   | Logical Name | Displayed in exception lists   |
| DE_DISP_NM  | VARCHAR   | Display Name | Name displayed in the UI during user configuration   |
| NM_KPI_CLS  | VARCHAR   | Class Name   | Fully qualified name   |
| CAT_KPI     | Integer   | KPI Category | One of: <ul style="list-style-type: none"> <li>Customer</li> <li>Cashier</li> <li>Store</li> <li>Item</li> <li>A combination of the above</li> </ul> |
| TY_KPI      | Integer   | KPI Type     |  |

The KPI type column is an integer value in the database. The value of this column, however, is interpreted as a series of bit flags. That is, a value of 7 in one of these fields

means that the first three flags are set while the others are all blank (for example, DEC 7 = BIN 0111).

Table 7–3 identifies the three possible KPI type values.

**Table 7–3 KPI Type Flags**

| Flag Value | Flag Type                  |
|------------|----------------------------|
| 1          | Rule Evaluation            |
| 4          | Cumulative Exception Count |
| 8          | Alert                      |

Types determine when a KPI is evaluated. A rule needs to have the rule evaluation type flag set.

Categories affect when a KPI is executed during the scoring phase, if it's executed at all. Customer and Cashier KPIs, for example, are executed in two different routines.

Note that the numeric values for both the categories and the types are defined in the interface `KPIIfc`.

For this class, create a new customer KPI that is used during cumulative exception counting. The SQL to do this looks like the following:

```
INSERT INTO rm_kpi
(id_kpi, nm_kpi, de_disp_nm, nm_kpi_cls, cat_kpi, ty_kpi)
VALUES
(100, 'Specific Item KPI', 'When a specific item is returned',
'oracle.retail.stores.commerceservices.returns.kpi.impl.SpecificItemCalculator',
1, 4);
```

Make sure that the ID is unique and that the class name is both fully qualified and correct.

The next table to update is the `RM_KPI_PRMR` table. In this case, add in a parameter for the specific item being searched for.

Table 7–4 identifies the columns in the `RM_KPI_PRMR` table.

**Table 7–4 RM\_KPI\_PRMR Columns**

| Column Name | Data Type | Description          | Notes  |
|-------------|-----------|----------------------|--|
| ID_KPI_PRMR | Integer   | Primary Key          | Must be unique   |
| ID_KPI      | Integer   | Foreign Key          | Non-null   |
| NM_PRMR     | VARCHAR   | Parameter Name       | Used to identify parameters from the <code>getInstanceParameters()</code> method   |
| TY_PRMR_VAL | Integer   | Data Type            | <ul style="list-style-type: none"> <li>■ Integer</li> <li>■ String</li> <li>■ Boolean</li> <li>■ Date</li> <li>■ List</li> </ul> |
| DE_DFLT_VAL | VARCHAR   | Default Value        |  |
| FL_CFG_PRMR | CHAR      | Configurability Flag | <ul style="list-style-type: none"> <li>■ 0 – configurable</li> <li>■ 1 – not configurable</li> </ul>                             |
| TY_PRMR     | Integer   | Usage Type           | Bit flag with same scheme as <code>TY_KPI</code>   |

Most of these are obvious. One important note is that the NM\_PRMR value here is what is used in the KPI method to extract the parameter. So the name in the database must match the name that you have coded. In this case, that name is **itemID**.

The last two values also bear discussion. The configurable flag, though set in the database, has no effect on where the KPI appears in the exceptions to track screen. The UI determines if a return activity KPI is configurable by counting the number of parameters associated with it. If there are one or more, then the KPI is configurable. If zero, then the KPI is not configurable. If the KPI is used for rules corresponding to a rule, this flag controls if the parameter should be displayed on the Edit Return Policy Rule page. If the parameter is not already in use by other KPIs, additional customization in ruleKPICfg.jsp might be necessary to have the parameter appear in the rule editor.

Finally, the TY\_PRMR method is another bit field. The idea is that the same KPI can use different parameters in different situations. This field allows the developer to set at which times which parameters will be used.

The following SQL creates an exception tracking only KPI:

```
INSERT INTO rm_kpi_prmr
(id_kpi_prmr, id_kpi, nm_prmr, ty_prmr_val, de_dflt_val, fl_cfg_prmr, ty_prmr)
VALUES
(1000, 100, 'itemID', 2, '1234', '1', 4);
```

Now start the app server and see the new KPI in action by going to **Returns --> Configuration --> Exceptions to Track --> Customer**.

**Figure 7-2 Example Customer KPI Screen**

| Configurable Return Activities  |  |
|---|--|
| Track   | Exceptions                                       |
| <input type="checkbox"/> Returns without receipt greater than or equal to 500.00    |  |
| <input type="checkbox"/> Returns with receipt greater than or equal to 500.00       |  |
| <input type="checkbox"/> Returns greater than or equal to 500.00                    |  |
| <input type="checkbox"/> Merchandise returns from Sales Reporting>Root>Multi-Media  | <input type="button" value="Edit"/> greater than |
| <input checked="" type="checkbox"/> Expired receipts (older than 30 days)           |  |
| <input checked="" type="checkbox"/> Refunds with a refund type of Price_Adjustment  |  |
| <input checked="" type="checkbox"/> Refunds with a refund type of Return            |  |
| <input type="checkbox"/> Engine response code tracking 300 Authorized               |  |
| <input type="checkbox"/> Nonreceipted returns from Sales Reporting>Root>Multi-Media | <input type="button" value="Edit"/>              |
| <input type="checkbox"/> Merchandise returns from Sales Reporting>Root>Multi-Media  | <input type="button" value="Edit"/> purchased    |
| <input type="checkbox"/> 1/1/04 and 1/2/04  |  |
| <input type="checkbox"/> When a specific item is returned                           |  |

## Creating the JSP

To display something here, the application does one of the following:

- The JSP tag class BaseKPITag tries to find a JSP along the path of `/returns/kpi/classname.jsp`, where `classname` is the non-qualified name of the class. In this case, the JSP is named `SpecificItemCalculator.jsp`.
- If the JSP tag class BaseKPITag cannot find a file of this name it then checks for `/returns/kpi/extensions/classname.jsp`.
- If the JSP tag class BaseKPITag cannot find the JSP there, the JSP tag class BaseKPITag defaults to using the display name value from the KPI and displays it using the JSP `/returns/kpi/displayName.jsp`. That is what is occurring here.

To remedy this, create and deploy a new `SpecificItemCalculator.jsp`. When creating this JSP, consider the following:

- The JSP is responsible for formatting the remaining table cells for the row.
- The JSP itself is responsible for enabling and disabling the KPI.
- The JSP needs to create an **Add** button if necessary.
- The JSP needs to create a **Remove** button if necessary.

---

**Note:** **Add** and **Remove** buttons are used only in the case of cloneable KPIs.

---

- The JSP is required to provide role-based security.

First, make a simple skeletal file. The first thing to know is that the enclosing JSP expects the JSP in the configurable section to contain three table cells (for example, `<TD>` elements). Create a new file that looks like the following:

```
<%@ page contentType="text/html; charset=UTF-8" language="java" %>
<%@ taglib uri="/WEB-INF/struts-nested.tld" prefix="nested" %>

<td width="83%" height="20" class="normal">
New content here!
 
</td>

<td width="5%" height="20" class="normal">
<!-- place holder for an add button -->
 
</td>

<td width="5%" height="20" class="normal">
<!-- place holder for a delete button-->
 
</td>
```

Save this as `/returns/kpi/extensions/SpecificItemCalculator.jsp`, redeploy, and now see something a little better looking:

**Figure 7-3 Example Customer KPI Screen, continued**

Now that the page is ready, add in some editable value to it. In this case, that value is the item ID to track.

The JSP makes use of the nested functionality of the Struts framework. By the time you are in this JSP, you are already nested inside the specific parameter. By continuing to use this idiom, the parameter updates painlessly.

The JSP now looks like the following, with changes in bold:

```
<%@ page contentType="text/html; charset=UTF-8" language="java" %>
<%@ taglib uri="/WEB-INF/struts-nested.tld" prefix="nested" %>

<%@ page
import="oracle.retail.stores.commerceservices.returns.kpi.impl.SpecificItemCalculator" %>

<td width="83%" height="20" class="normal">
    <nested:iterate property="allParams"
        id="viewKpiParam"

type="oracle.retail.stores.webmodules.returns.app.kpi.ViewKpiParameterBean">
    <nested:nest property="kpiParam">
        <nested:equal property="name"
            value="<%= SpecificItemCalculator.PARAM_ITEM_ID %>">
            <!-- include I18N message -->
            Enter the item ID here:
            <!-- include enabled stuff -->
            <nested:text property="value"
                value="<%=viewKpiParam.getValue()%>"/>
        </nested:equal>
    </nested:nest>
</nested:iterate>
</td>
<td width="5%" height="20" class="normal">
<!-- place holder for an add button -->
    &nbsp;
</td>

<td width="5%" height="20" class="normal">
<!-- place holder for a delete button-->
    &nbsp;
</td>
```

Notice the default item ID is displayed here in an editable text box. Notice that you can update the item ID and it now gets saved into the database.

**Figure 7-4 Example Customer KPI Screen, continued**

The code is updating properly due to the use of the nested tags. The section for the KPI looks something like this:

```
<input type="text"
      name="kpiCfgColl[6].kpiBean2.allParams[0].kpiParam.value"
      value="1234">
```

The long name, `kpiCfgColl[6].kpiBean2.allParams[0].kpiParam.value`, is used by Struts on the server side. It lets Struts figure out which KPI bean is being talked about and update the bean accordingly.

Now that the KPI is displayed in a reasonable fashion, address security. Returns Management has a weak notion of security at the UI level. In this case, only check to see if the current user has the role necessary to modify KPIs. Check if this is a customer or cashier KPI and set the Boolean flag accordingly. Later, use this to enable or disable the input.

The following is what the JSP now looks like with the security code, with changes in bold:

```
<%@ page contentType="text/html; charset=UTF-8" language="java" %>
<%@ taglib uri="/WEB-INF/struts-nested.tld" prefix="nested" %>

<%@ page import="oracle.retail.stores.commerceservices.returns.kpi.KPIIfc,
               oracle.retail.stores.commerceservices.returns.kpi.impl.SpecificItemCalculator,
               oracle.retail.stores.webmodules.returns.ui>ReturnsConstantIfc,
               oracle.retail.stores.webmodules.returns.ui.kpi.EditKpiForm"
%>

<%
    EditKpiForm form = (EditKpiForm)
request.getSession().getAttribute(ReturnsConstantIfc.EDIT_KPI_TAG_FORM);
    boolean disabledIfNoPrivilege =
!(request.isUserInRole(ReturnsConstantIfc.EDIT_KPI_CUSTOMER_PRIVILEGE));
    if (form.getCategory() == KPIIfc.CATEGORY_CASHIER)
    {
        disabledIfNoPrivilege = !(request.isUserInRole(ReturnsConstantIfc.EDIT_
KPI_CASHIER_PRIVILEGE));
    }
%>

<td width="83%" height="20" class="normal">
    <nested:iterate property="allParams"
                  id="viewKpiParam"

type="oracle.retail.stores.webmodules.returns.app.kpi.ViewKpiParameterBean">
        <nested:nest property="kpiParam">
            <nested:equal property="name"
                          value="<%= SpecificItemCalculator.PARAM_ITEM_ID %>">
                <!-- include I18N message -->
                Enter the item ID here:
            <nested:text
```

```

                disabled="<%=disabledIfNoPrivilege%>"
                property="value"
                value="<%=viewKpiParam.getValue()%>" />
            </nested:equal>
        </nested:nest>
    </nested:iterate>
</td>

<td width="5%" height="20" class="normal">
<!-- place holder for an add button -->
&nbsp;
</td>

<td width="5%" height="20" class="normal">
<!-- place holder for a delete button-->
&nbsp;
</td>

```

Finally, this KPI is a candidate for being cloneable. That is, being able to track returns on multiple item IDs.

In order to add in the cloning functionality, call one of two javascript functions on the page. The first is selAddSubmit(). The second is selDelSubmit(). These two methods submit the page back to the EditKpiAction class with the appropriate values to either create a clone of the selected KPI or to delete the currently selected clone.

The JSP encoding is currently a bit awkward for this functionality. The following is what the page looks like in final form when the cloneable code is added:

```

<%@ page contentType="text/html; charset=UTF-8" language="java" %>
<%@ taglib uri="/WEB-INF/struts-nested.tld" prefix="nested" %>

<%@ page import="oracle.retail.stores.commerceservices.returns.kpi.KPIIfc,
oracle.retail.stores.commerceservices.returns.kpi.impl.SpecificItemCalculator,
oracle.retail.stores.webmodules.returns.ui>ReturnsConstantIfc,
oracle.retail.stores.webmodules.returns.ui.kpi.EditKpiForm"
%>

<%
    EditKpiForm form = (EditKpiForm)
request.getSession().getAttribute(ReturnsConstantIfc.EDIT_KPI_TAG_FORM);
    boolean disabledIfNoPrivilege =
!(request.isUserInRole(ReturnsConstantIfc.EDIT_KPI_CUSTOMER_PRIVILEGE));
    if (form.getCategory() == KPIIfc.CATEGORY_CASHIER)
    {
        disabledIfNoPrivilege = !(request.isUserInRole(ReturnsConstantIfc.EDIT_
KPI_CASHIER_PRIVILEGE));
    }

    // please be careful with the quotation...

    // This is a funky work around the problem of JspC not translating the
parameter inside of
    // a substitution.
    // It is a one pass, and we really need it to be a two pass like compiler.

    // Because the kpi.jsp page itself could contain more than one kpi with
merchandise hierarchy, and the user
    // could edit any one of those, we need a way to distinguish which kpi
parameter is being edited.

```



```

String endString = new String('');
String comma = new String(', ');
String callingAddCloneFunction = new String("selAddSubmit('');
String callingDeleteCloneFunction = new String("selDelSubmit('');
%>

<td width="83%" height="20" class="normal">
  <nested:define id="templateKpiId" property="templateId"/>
  <nested:define id="instanceKpiId" property="instanceId"/>

  <nested:iterate property="allParams"
    id="viewKpiParam"

type="oracle.retail.stores.webmodules.returns.app.kpi.ViewKpiParameterBean">
  <nested:nest property="kpiParam">
    <nested:equal property="name"
      value="<%= SpecificItemCalculator.PARAM_ITEM_ID %>">
      <!-- include I18N message -->
      Enter the item ID here:
      <nested:text
        disabled="<%=disabledIfNoPrivilege%>"
        property="value"
        value="<%=viewKpiParam.getValue()%>" />
      </nested:equal>
    </nested:nest>
  </nested:iterate>
  &nbsp;
</td>

<td width="5%" height="20" class="normal">
  <nested:submit disabled="<%=disabledIfNoPrivilege%>"
    onclick="<%=callingAddCloneFunction + templateKpiId +
endString%>">
    <nested:message key="button.add"/>
  </nested:submit>
</td>

<!-- allow removal of clone if we have more than one of the same template type -->
<nested:equal property="allowedRemovalClone" value="true">
  <td width="5%" height="20" class="normal">
    <nested:submit disabled="<%=disabledIfNoPrivilege%>"
      onclick="<%=callingDeleteCloneFunction + templateKpiId +
comma + instanceKpiId + endString%>">
      <nested:message key="button.remove"/>
    </nested:submit>
  </td>
</nested:equal>
<nested:equal property="allowedRemovalClone" value="false">
  <td width="5%" class="normal">&nbsp;</td>
</nested:equal>

```

And, finally, see the **Add** and **Remove** buttons:

**Figure 7-5 Example Customer KPI Screen, continued**

|                          |                         |      |  |
|--------------------------|-------------------------|------|--|
| <input type="checkbox"/> | Enter the item ID here: | 1234 |  |
| <input type="checkbox"/> | Enter the item ID here: | 5001 |  |
| <input type="checkbox"/> | Enter the item ID here: | 1600 |  |

## Appendix: Extension Guidelines

In order to pass arbitrary data, the schemas used for return request and return result contain an optional element called `MessageExtension`. This optional element contains zero or more sub elements known as `ExtensionElements` that are simple name/value pairs of string data.

### Element Location and Schema Definition

The `MessageExtension` element is attached to multiple parent elements in the two schemas. [Table A-1](#) summarizes the `MessageExtension` elements.

**Table A-1** `MessageExtension` Locations

| Schema               | Type                |
|----------------------|---------------------|
| RM-ReturnRequest.xsd | ReturnRequestType   |
|                      | ItemReturnInfo      |
|                      | ItemTransactionInfo |
| RM-ReturnResult.xsd  | ReturnResultType    |
|                      | ItemReturnResult    |

The following example is a schema definition for the `MessageExtension` and `ExtensionElement`. For reference, we can also see the relevant section of the `ReturnRequestType` schema.

**Note:** The names and values are strings.

#### Example A-1 `Message Extension`

```
<xsd:complexType name="MessageExtension">
  <xsd:sequence>
    <xsd:element name="extensionEntry" type="ExtensionEntry"
      minOccurs="0" maxOccurs="unbounded"/>
  </xsd:sequence>
</xsd:complexType>

<xsd:complexType name="ExtensionEntry">
  <xsd:attribute name="name" type="xsd:string"/>
  <xsd:attribute name="value" type="xsd:string"/>
</xsd:complexType>

<xsd:complexType name="ReturnRequestType">
```

```
<xsd:sequence>
... lines omitted ...
  <xsd:element name="messageExtension" type="MessageExtension" minOccurs="0"
maxOccurs="1"/>
</xsd:sequence>
</xsd:complexType>
```

## Element Usage and Retrieval

To use this optional element, the message sent to Oracle Retail Returns Management needs to include a `MessageExtension` with as many `ExtensionEntry` elements as necessary. For example, an XML message using the extension to pass custom data might look similar to the following example:

### **Example A-2 XML Message Using The MessageExtension**

```
<?xml version="1.0" encoding="UTF-8" standalone="yes"?>
<ReturnRequest>
... lines omitted ...
  <transactionType>Return</transactionType>
  <messageExtension>
    <extensionEntry name="LegacyID" value="sun"/>
    <extensionEntry name="LegacyTransaction" value="moon"/>
  </messageExtension>
</ReturnRequest>
```

Here we see that the message contains two values for "LegacyID" and "LegacyTransaction."

Once the values have been added to the message, the message is then sent to Oracle Retail Returns Management using the desired transport (such as through a web service or a direct API call). The XML is placed by JAXB into a list accessible through the appropriate element. In this case, the element is the `ReturnRequest` object. The user can then search through this list to find the values the user wants. The following example demonstrates searching the `MessageExtension` elements.

### **Example A-3 Searching The MessageExtension Elements**

```
MessageExtension ext = returnRequest.getMessageExtension();

if (ext != null) {
    for (Iterator it = ext.getExtensionEntry().iterator(); it.hasNext();) {
        ExtensionEntry entry = (ExtensionEntry) it.next();

        if (entry.getName().equals("LegacyID")) {
            // do something
        }
    }
}
```

---

**Note:** If the `MessageExtension` element is not included with the `ReturnRequest` or `ReturnResult`, the `getMessageExtension()` method returns a null. If the element exists but does not have any child elements, then the list returned by `getExtensionEntry()` is zero length.

---

---

## Appendix: Customer Data Import

The Oracle Retail Returns Management customer import feature is a way for a retailer to import a large amount of pre-existing customer data into the data-store accessed by Returns Management. Besides the usual customer information, such as Name, Address and Phone, this feature also enables the retailer to assign an *exception count* to a customer, based on third-party information about an individual (for example, information from credit bureaus, information about criminal records and so forth). In Returns Management, higher exception counts are indicative of customers whose past behavior is of concern from a returns standpoint.

Most of the customer information imported is the same as the customer information sent in the Returns Management Return Request XML message. The XML schema definition of this information was contained in the `RM-ReturnRequest.xsd` file. In order that both schema files can share the same customer schema definitions, these definitions have been removed from `RM-ReturnRequest.xsd`, and placed in a new file:

`RM-CustomerInfo.xsd`

The Customer Import XML is defined by the following new schema file:

`RM-CustomerImport.xsd`

The xsd files can be found in the

`<Install_DIR>/returnsmgmt/api/returnsSchemas.zip` archive.

The following is a listing of the `RM-CustomerImport.xsd` file:

### **Example B-1** *RM-CustomerImport.xsd*

```
<xsd:include schemaLocation="RM-CustomerInfo.xsd"/>
<xsd:element name="ReturnsCustomers" type="ReturnsCustomersType"/>

<xsd:complexType name="ReturnsCustomersType">
  <xsd:sequence>
    <xsd:element name="ReturnsCustomer" type="ReturnsCustomerType"
maxOccurs="unbounded"/>
  </xsd:sequence>
</xsd:complexType>
```

---

```

<xsd:complexType name="ReturnsCustomerType">
  <xsd:sequence>
    <xsd:element name="positiveID" type="PositiveID"/>
    <xsd:element name="customerInfo" type="MoreCustomerInfo"/>
    <xsd:element name="exceptionCount" type="xsd:integer"/>
    <xsd:element name="notes" type="xsd:string"/>
  </xsd:sequence>
</xsd:complexType>

```

Notice that the `RM-CustomerImport.xsd` file refers to the `RM-CustomerInfo.xsd` file.

### **Example B-2 RM-CustomerInfo.xsd**

```

<?xml version="1.0" encoding="UTF-8"?>
<xsd:schema xmlns:xsd="http://www.w3.org/2001/XMLSchema">

  <xsd:annotation>
    <xsd:documentation>
      Defines the PositiveID and MoreCustomerInfo elements.
    </xsd:documentation>
  </xsd:annotation>

  <xsd:complexType name="PositiveID">
    <xsd:sequence>
      <xsd:element name="number" type="xsd:string" minOccurs="1"
maxOccurs="1"/>
      <xsd:element name="type" minOccurs="1" maxOccurs="1">
        <xsd:simpleType>
          <xsd:restriction base="xsd:string">
            <xsd:enumeration value="DriversLicense"/>
            <xsd:enumeration value="MilitaryID"/>
            <xsd:enumeration value="Passport"/>
            <xsd:enumeration value="StateCard"/>
          </xsd:restriction>
        </xsd:simpleType>
      </xsd:element>
      <xsd:element name="issuer" type="xsd:string" minOccurs="1"
maxOccurs="1"/>
      <xsd:element name="issued" type="xsd:date" minOccurs="0"
maxOccurs="1"/>
      <xsd:element name="expiration" type="xsd:date" minOccurs="0"
maxOccurs="1"/>
    </xsd:sequence>
  </xsd:complexType>

  <xsd:complexType name="MoreCustomerInfo">
    <xsd:sequence>
      <xsd:element name="lastName" type="xsd:string" minOccurs="1"
maxOccurs="1"/>
      <xsd:element name="firstName" type="xsd:string" minOccurs="1"
maxOccurs="1"/>
      <xsd:element name="middleName" type="xsd:string" minOccurs="0"
maxOccurs="1"/>
      <xsd:element name="gender" minOccurs="0" maxOccurs="1">
        <xsd:simpleType>
          <xsd:restriction base="xsd:string">
            <xsd:enumeration value="Male"/>
            <xsd:enumeration value="Female"/>
          </xsd:restriction>
        </xsd:simpleType>
      </xsd:element>
    </xsd:sequence>
  </xsd:complexType>

```

---

```

        </xsd:simpleType>
    </xsd:element>
    <!-- format of yyyyMMdd -->
    <xsd:element name="birthDate" type="xsd:string" minOccurs="0"
maxOccurs="1"/>
    <xsd:element name="address1" type="xsd:string" minOccurs="1"
maxOccurs="1"/>
    <xsd:element name="address2" type="xsd:string" minOccurs="0"
maxOccurs="1"/>
    <xsd:element name="city" type="xsd:string" minOccurs="1"
maxOccurs="1"/>
    <xsd:element name="state" type="xsd:string" minOccurs="1"
maxOccurs="1"/>
    <!-- zip code-->
    <xsd:element name="postalCode" type="xsd:string" minOccurs="1"
maxOccurs="1"/>
    <xsd:element name="country" type="xsd:string" minOccurs="1"
maxOccurs="1"/>
    <xsd:element name="telephoneAreaCode" type="xsd:string" minOccurs="0"
maxOccurs="1"/>
    <xsd:element name="telephoneLocalNumber" type="xsd:string"
minOccurs="0" maxOccurs="1"/>
    </xsd:sequence>
</xsd:complexType>

</xsd:schema>

```

The following is an example of the Returns Management Customer Import XML file.

**Example B-3 RMCustomerImport.xml**

```

<?xml version="1.0" encoding="UTF-8"?>
<ReturnsCustomers>

    <ReturnsCustomer>
        <positiveID>
            <number>TX004</number>
            <type>DriversLicense</type>
            <issuer>US_TX</issuer>
            <issued>2004-04-01</issued>
            <expiration>2012-04-01</expiration>
        </positiveID>
        <customerInfo>
            <lastName>TX004</lastName>
            <firstName>Joe</firstName>
            <address1>Some address line 1</address1>
            <address2>Some address line 2</address2>
            <city>Austin</city>
            <state>TX</state>
            <postalCode>78701</postalCode>
            <country>USA</country>
            <telephoneAreaCode>512</telephoneAreaCode>
            <telephoneLocalNumber>555-5100</telephoneLocalNumber>
        </customerInfo>
        <exceptionCount>100</exceptionCount>
        <notes>Test import</notes>
    </ReturnsCustomer>

    <ReturnsCustomer>
        <positiveID>

```

```

        <number>TX002</number>
        <type>DriversLicense</type>
        <issuer>US_TX</issuer>
    </positiveID>
    <customerInfo>
        <lastName>TX002</lastName>
        <firstName>Joe</firstName>
        <address1>Some address</address1>
        <address2>Some address2</address2>
        <city>Austin</city>
        <state>TX</state>
        <postalCode>78701</postalCode>
    </customerInfo>
    <exceptionCount>200</exceptionCount>
    <notes>Import TX002</notes>
</ReturnsCustomer>

</ReturnsCustomers>

```

The following new parameter has been added for the customer import feature:

ReturnsCustomerImportDuplicateRecordAction

For more information about this parameter, see the Oracle Retail Returns Management Configuration Guide.

Customer data imported through this feature is stored in one or more of the tables identified in [Table B-1](#).

**Table B-1 Customer Information Tables**

| Table name    | Information held in table                        |
|---------------|--|
| RM_CT         | Returns Customer ID and Positive ID              |
| RM_CT_ID      | Returns Customer ID to Customer ID mapping       |
| RM_CT_SCR     | Customer exception count                         |
| RM_CT_SV_OVRD | Comments (notes) when exception count is changed |
| PA_CT         | Customer ID                                      |
| PA_PRTY       | Customer ID to Party ID mapping                  |
| PA_CNCT       | Customer last and first name                     |
| LO_ADS        | Customer address                                 |
| PA_PHN        | Customer phone number                            |