WebSphere Commerce V7.0 Feature Pack 2 Search Solution Overview and Deployment

Search results by using a new set of search tools

Work with B2C and B2B scenarios

Understand search using index life-cycle management

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Preface

This IBM® Redbooks® publication focuses on the enhanced search capabilities of the newest release of WebSphere Commerce V7.0 Feature Pack 2. We divided this book into three parts to highlight search business-to-consumer (B2C) and search business-to-business (B2B) scenarios and a conceptual overview of the search solution.

This book can help you to enable the search features of WebSphere Commerce V7.0 Feature Pack 2 and set up the WebSphere Commerce search environment, experience the design and management of Solr indexes, and experience several B2C scenarios using the Madisons Feature Pack 2 (FEP2) store. Madisons store is an IBM product within WebSphere Commerce.

This book gives you a broad understanding of the WebSphere Commerce integrated search solution that provides control over search results through a new set of search management tools:

- Search term association in the Catalogs tool
- Marketing web activity tool
- Marketing dialog activity tool
- Search activity tool

This book describes search index life-cycle management and examines each area, such as index building, synchronization, configuration, and replication. This book describes the entitlement feature that is provided through the WebSphere Commerce search framework. We also discuss a B2B scenario and provide the implementation using catalog filters and contracts.

This book is designed for use by WebSphere Commerce developers, practitioners, and solution architects in various industries.

The team who wrote this book

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Part 1

Conceptual overview of the search solution

The WebSphere Commerce integrated search solution provides control over search results through a new set of search management tools. Chapter 3, “Search business rules” on page 11 discusses these search management tools:

- Search term association in the catalog tool for landing page, synonym, and replacements term management
- Marketing web activity tool to manage product recommendations, cross-sell, and up-sell based on user search terms
- Marketing dialog activity tool to manage triggers and actions for product recommendation-based user search terms
- Search activity tools to manage the business rules to rank, sort, and display the top search results

The first group of tools under the catalog tools are for general use by catalog managers. The second group of integrated search tools are part of the Management Center Marketing tool. Marketing managers use the Management Center Marketing tool to define business rules that influence the content and ranking of search results within the store. The combination of search term associations and search marketing rules determines the final search results that are displayed to the shopper. Chapter 3, “Search business rules” on page 11 covers multiple scenarios and the steps to implement them.

This part of the book also discusses search index life-cycle management and examines each area, such as index building, synchronization, configuration, and replication, in more detail in Chapter 4, “Search index life-cycle management” on page 93.

This part concludes with tips about troubleshooting search-related issues in Chapter 5, “Troubleshooting” on page 101. The troubleshooting information also covers the common issues that are encountered during search index life-cycle management, Solr deployment, and maintenance and the recommended solutions.
Introduction

In December 2010, IBM released WebSphere Commerce V7.0 Feature Pack 2 (FEP 2). This product update expands and extends the core web sales platform with a number of enhancements:

- **Customer-centric features:**
  - Integrated search
  - Social bridging
  - Co-shopping
- **Business-to-business (B2B) price rules**
- **Cross-channel optimization through integration with Sterling Commerce**
- **Additional foundational leadership features:**
  - Content version handling
  - Attribute dictionary
  - Catalog filter
  - Store management
  - Web feed integration

Primarily, this book focuses on search capabilities; however, we divided it into several parts to highlight Search business-to-consumer (B2C) and B2B scenarios. *Integrated search* discusses how to implement the new customer-centered search capabilities of the product. We describe social bridging in addition to how to expand the marketing presence of your e-Commerce website by using the features that are introduced in FEP 2: integrated search and social bridging.
Search solution architecture

WebSphere Commerce search provides enhanced search functionality in starter stores by providing enriched search engine capabilities, such as automatic search term suggestions and spelling correction. WebSphere Commerce search influences store search results by using search term associations and search-based merchandising rules.

WebSphere Commerce search provides the following key business benefits:

- Resides on the top of open architecture
- Contains a rich set of search functionality for shoppers in starter stores
- Provides integrated search management tooling for business users in the Management Center
- Lowers the total cost of deployment and ownership, because its functionality is included as a feature of WebSphere Commerce

WebSphere Commerce search runs as a search server for your starter store that helps deliver targeted search results, while enabling customers to find products more effectively. It provides advanced administration features, such as dynamic clustering, database integration, rich document handling, distributed search, and index replication.

Figure 2-1 on page 6 illustrates WebSphere Commerce search.
WebSphere Commerce search has these characteristics:

- WebSphere Commerce search works with the search index to provide search results consisting of structured and unstructured content, and external data.
- Structured content is obtained from the store’s product catalog using a product catalog adapter.
- Unstructured content is obtained as a document and file adapter and crawler.
- External content, such as product ratings from BazaarVoice, is obtained using an external data adapter and crawler.
- All content is merged and presented in starter store pages.

### 2.1 Understanding WebSphere Commerce search

WebSphere Commerce search is based around the search index, where an index is represented by a large flat table containing searchable fields that are optimized for search performance. The search index must be built before it can be used for any searches. The
search index is built with one or more documents, with documents containing fields. A field consists of a name, the content, and the metadata that tells WebSphere Commerce search how to handle the content. Typically, fields can contain boolean values, numbers, or strings. A field is flexible, enabling you to define your own type. Fields contain two important attributes: indexed and stored. If a field is indexed, it is searchable, sortable, and facetable. If an index is stored, its value is retrievable during a search.

WebSphere Commerce search uses a schema that is represented similarly to a database schema. The search schema defines the structure of the search index. Typically, the search configurations are performed in the search schema configuration file. This configuration file contains information about which fields your documents can contain, and how those fields must be processed when adding documents to the index, or when querying those fields.

The schema contains three major sections:

- **Data types**
  Enables you to define a list of field type declarations to use in your schema
- **Fields**
  Contains a list of the individual field declarations that you want to use in your documents
- **Miscellaneous**
  Contains miscellaneous information

WebSphere Commerce search uses HTTP requests to initiate indexing and searching. These requests are typically wrapped using the utilities that are provided with WebSphere Commerce search. During the indexing process, WebSphere Commerce search takes input documents as XML and builds an index using the information, and uses each field in the input document to build a searchable column. After the index is built, it can be queried using search commands. These search queries are HTTP requests, where if a match is found, it returns XML data as the search results.

### 2.2 Using WebSphere Commerce search to influence starter store search results

The following search tooling and features are available by default to influence search results in your starter store.

#### 2.2.1 Search term associations

The product manager is responsible for creating and managing search term associations. Search term associations include synonyms and search term replacements, and linking search terms with landing pages.

The following features help customers to search the storefront:

- **Synonyms** increase the scope of search results by adding additional search terms to the customer's search submission.
- **Replacement terms** modify the potential search results by changing the search terms from the customer's search submission.
- **Landing pages** promote certain products or activities in the store by directing the customer to specific store pages that are based on the customer's search submission.
See 3.1, “Search Term Association tool” on page 12 for more information to help you improve storefront search results.

### 2.2.2 Search-based merchandising rules

Search rules are managed by marketing managers. They are used when customers search the storefront to deliver customized search results and ordering.

For example, you can create the following search rules using the Search Rule Builder:

- When a customer searches the store, change the relative order of the search result by favoring catalog entries that belong to a specific brand or category, or sort catalog entries by price.
- When a customer searches the store, promote specific catalog entries to the top of the search result.
- When a customer searches the store, sort the catalog entries by the manufacturer names.


### 2.2.3 Integrating starter stores

You can deliver powerful search-based catalog browsing flows by enabling WebSphere Commerce search in starter stores. Starter store enhancements for the storefront, such as automatic search term suggestions, spelling correction, and search result highlighting, are provided.

See “Enabling the search-based navigation store function” on page 134 for more information about WebSphere Commerce search in starter stores.

### 2.2.4 Limitations

The following limitations exist in WebSphere Commerce search-enabled starter stores:

- Coremetrics is not supported by default, therefore analytics cannot be used to influence store behavior.
- You cannot preview the store changes that are made in workspaces by default, because the workspace schema is not indexed.
- If you consider integrating with third-party search solution functionality, you must consider the scope of the customization points that are listed in *Integrating WebSphere Commerce search with third-party search engines* at the following website:
  

- The Madisons mobile starter store does not support WebSphere Commerce search.

For more information regarding WebSphere Commerce search, visit the following web link:

Business-to-consumer (B2C) scenario

In this part of the book, we discuss how to enable the search features of WebSphere Commerce V7.0 Feature Pack 2 and set up the WebSphere Commerce search environment.

We discuss the design and management of Solr indexes, an overview of the IBM WebSphere Commerce V7.0 catalog index, and an example of how to customize the catalog index to handle inventory data.

We also describe the storefront, how to enable the search-based navigation for a storefront, and all the new features that are available as part of the predefined search when enabled. We implemented all the scenarios in this chapter in the Madison Feature Pack 2 (FEP2) business-to-consumer (B2C) store.
Search business rules

Search business rules are used to deliver custom results to the shopper when the shopper searches the store for specific keywords. This chapter describes the tools that are available in the Management Center of WebSphere Commerce that enable the marketing managers and catalog managers to create search rules.

In this chapter, we introduce the search rules, web activity, and dialog activity that are available in the Management Center. These tools provide the ability to create rules. This chapter discusses the following tools, which are used to complete the scenario, that are available in the Management Center:

- Search Term Association tool
- Search Marketing tool

This chapter also discusses the graphical editor called the Search Rule Builder, which is available in the Management Center. The Search Rule Builder is used to create search rules that are triggered by a customer submitting a search.

We implemented all the scenarios in this chapter in the Madison Feature Pack 2 (FEP2) business-to-consumer (B2C) store. We performed most of the search scenarios by entering the search term in the quick search tool in the header. The breadcrumb trail in the Search Results page displays the input search term that was used.
3.1 Search Term Association tool

The Search Term Association tool is a user interface that is defined in the Catalogs tool in Management Center. It allows business users to modify search queries and affect the search results. It is used to suggest similar, separate, or replacement products in the search results. The Search Term Association tool also is used to display a landing page as a search result instead of products.

The following association types are available:

► Synonyms (bidirectional)
► Replacements (unidirectional)
► Landing pages

The Search Term Association tool is only available if these conditions are true:

► Feature Pack 2 is installed and the store enhancements feature is enabled.
► The store’s master catalog is indexed for WebSphere Commerce search.
► The search server and index structure are deployed and built.

Open search term associations

Follow these steps to open the search term associations:

1. Log on to Management Center:

2. Open Catalogs tool, as shown in Figure 3-1.

![Figure 3-1 Open Catalogs tool](image)
3. Select the store from the upper-right drop-down list, as shown in Figure 3-2.

![Select MadisonsFEP2 store](image)

**Figure 3-2  Select MadisonsFEP2 store**

4. Click Search Term Associations in the explorer tree to open the Search Term Associations tool. You see a window similar to Figure 3-3.

![Open Search Term Associations tool](image)

**Figure 3-3  Open Search Term Associations tool**

### 3.1.1 Synonyms

*Synonyms* are used to indicate the keywords to search for apart from the input search terms. The search results include the submitted search term, plus the search results for the additional defined synonyms. One or more synonyms can be defined for a search term. Synonyms are bidirectional: searching for any of the search terms expands to also search for the other synonym search terms.

In scenarios where you have to search for products having keyword B, which is similar to another product having keyword A, you use synonyms. In the current scenario, the business has a requirement to search also for all products having the keyword *jeans* whenever the shopper searches for the keyword *pants*. Before defining the synonyms, the search results for the search term *pants* are shown in Figure 3-4 on page 14 and the search results for the search term *jeans* are shown in Figure 3-5 on page 15.
Figure 3-4  Search results for pants before adding the synonyms
Complete these steps to add synonyms for the search term pants:

1. Follow the steps in “Open search term associations” on page 12.
2. Click the Synonyms tab if it is not opened by default.
3. Click Create New Synonym, as shown in Figure 3-6 on page 16.
4. Enter the values **pants**, **jeans**, as shown in Figure 3-7.

---

**Figure 3-6**  Create New Synonym

**Figure 3-7**  Synonyms for pants added
5. Click **Save**.

The search results for pants in the storefront now contain the results for the synonym term **jeans** also, as shown in Figure 3-8.

![Figure 3-8 Search results for pants after defining jeans as a synonym](image-url)
3.1.2 Replacement terms

*Replacement terms* are used to change the search results by replacing the search term before submitting the search term for the search. The search submission can include the defined changed search terms, while optionally discarding the submitted search term. The search results only include the search results for the replacement terms, helping to target certain product types over others.

Replacement terms are unidirectional: the rule applies only when searching for the search term, but not when searching for any of the replacement terms.

There are two types of replacement terms:

- *Also Search For*: Selecting this type of replacement term searches for both the input search terms and the replacement search terms.
- *Instead Search For*: Selecting this type of replacement term ignores the input search terms and instead searches for the replacement search terms.

In the current scenario, the business requires that we search for all products having the keyword *cup* instead of *mug* and the keyword *sofa* instead of *couch*. Before defining replacement terms, we show the search results in the storefront for the search term *mug* in Figure 3-9 on page 19 and the search results in the storefront for the search term *couch* in Figure 3-10 on page 20.
Figure 3-9  Search results for the search term mug before adding the replacement term
Follow these steps to implement the replacement term function:

1. Complete the steps in “Open search term associations” on page 12.
2. Click the **Replacements** tab.
3. Click **Create New Replacement**, as shown in Figure 3-11 on page 21.
Figure 3-11   Create a new replacement term
4. Enter the following values, as shown in Figure 3-12:
   a. For Search Term, enter mug.
   b. For Replacement Type, select **Instead search for** from the drop-down list box.
   c. For Replacement Terms, enter cup.
5. Repeat Step 3 on page 20 and 4 on page 22 with the following values, as shown in Figure 3-13:
   a. For Search Term, enter couch.
   b. For Replacement Type, select Also search for from the drop-down list box.
   c. For Replacement Terms, enter sofa.

   ![Figure 3-13: Entering the replacement term sofa for the term couch](image)

6. Click Save.

   In the storefront, if the customer now enters the search term, the customer gets the results for cup, as shown in Figure 3-14 on page 24. And if the customer searches for couch, the customer gets the results for sofa, as shown in Figure 3-15 on page 25.
Figure 3-14   Search results for mug after adding the replacement term
3.1.3 Landing Page tab

If a shopper searches for a keyword, you can define the resulting landing page as a page of your choice, such as the related category in the store, as opposed to the search term’s Search Results page. Associating a landing page as the result for a search term result promotes certain products or activities in the store by directing shoppers to specific store pages that are based on their search submissions.

Follow these steps to add a landing page for the search term coffeemaker:

1. Complete the steps in “Open search term associations” on page 12.
2. Click the Landing Pages tab.
3. Click the New icon to create a new landing page row:
4. Enter the following values, as shown in Figure 3-16:

a. For Search Terms, enter coffeemaker.

b. For Landing Page, enter SearchLandingPage1.

When a shopper enters the keyword coffeemaker in the storefront, instead of the search results, the shopper is shown the Coffee Makers landing page, as shown in Figure 3-17 on page 27.
3.2 Search-driven merchandising and marketing

You can write search rules by creating search rules, triggers, web activities, dialog activities, and so on. You can only write search rules if the following conditions are true:

- Feature Pack 2 is installed and the store enhancements feature is enabled.
- The Stores master catalog is indexed for WebSphere Commerce search.
- The search server and index structure are deployed and built.

Search Rule Builder

Search Rule Builder facilitates creating search rules and is displayed whenever the user clicks New Search Rule in the Marketing tool in the Management Center. You can only include one trigger for each search rule. Search rules must contain an action, which modifies the shopper's original search request to influence the order or content of the search result. Optionally, the rule can contain a target, which is placed to the left of an action. The target defines which customers experience the action.
As shown in Figure 3-18, the Search Rule Builder is split into three areas:

- **Palette**
- **Work area**
- **General Properties view**

**Palette**

The palette to the left of the work area contains targets, actions, and branching elements that you can drag into the work area:

- **Targets**: Targets define which customers experience the defined search rule. To include a target in a rule, drag the target from the palette into the work area flow in the Search Rule Builder. Place the target to the left of the action element that you want to target.

The following targets are available:

- **Customer Segment** targets customers who belong or do not belong to specific customer segments.
- **Shopping Cart** targets customers whose current shopping cart contents meet certain criteria.
- **Purchase History** targets customers whose purchase history in the store meets certain criteria.
- **Catalog Browsing Behavior** targets customers who have browsed certain parts of the store catalog.
- **Online Behavior** targets customers whose recorded activities on the store meet certain criteria.
- **External Site Referral** targets customers who have entered the current session on the site from a link on an external site.
– Social Commerce Participation targets customers who have participated in social commerce on the site for a specified number of times.
– Day/Time specifies the days of the week or times of day that an activity is active.
– Search Criteria and Result targets customers who have selected specific search filters, or whose search results include specific catalog entries.

Actions: Actions define what to do, based on the previous sequence of triggers and, optionally, targets in the search rule flow. To include an action in a search rule, drag the action from the palette into the work area of the Search Rule Builder. The following actions are available:
– Add to or Remove from Customer Segment adds the customer to or removes the customer from an existing customer segment that is specified.
– Change Search Result Order changes the position of certain results within the search results list. Catalog entries that meet certain criteria can be ranked higher or lower to promote specific catalog entries over others for a specific customer search.
– Specify Top Search Results elevates specific catalog entries to display at the top of the search results list.
– Add or Replace Search Criteria replaces search keywords that are submitted by the customer with alternative search keywords.

Branches: A Branch element is an element that you can add to a Web or Dialog activity to split a single path into two or more paths. When a customer experiencing the activity reaches the Branch element, the customer proceeds down one or more of those paths based on the criteria that you define. As a result, a single activity can have multiple outcomes, and you can target each outcome to a separate set of customers.

Work area
The work area in the upper right displays the search rule as a horizontal line that represents the search rule flow.

The only trigger for all search rules is “Customer Submits Search”, which is added by default in all search rules into the work area. This option triggers the rule to start or continue. You need to define the search term matching rule for this trigger. When setting up this trigger, you must specify which keywords the customer submitted for the search. The keyword matching rules allow you to match a search phrase that contains specific keywords. The following matching rules are available:

– Search keyword or phrase can be anything.
– Search keyword or phrase is exactly one of the following values.
– Search phrase starts with one of the following words.
– Search phrase contains one of the following words.
– Search phrase ends with one of the following words.

General Properties view
The General Properties view in the lower right displays the properties of the search rule or the selected target, action, or branching.
**Search rule evaluation**

Several search rules can run at the same time for separate keywords. The search rules are evaluated and run in the following sequence:

- Search rules that target specific keywords or phrases are evaluated and run in order according to their Priority value.
- Search rules that target all keywords are evaluated and run in order according to their Priority value.

**Search rules:** A search rule influences the search results only if the customer reaches the action element in the search rule flow. If the search rule flow contains target elements before the action element, the customer must meet the target criteria before the search rule can influence the search result.

You can create multiple search rules with separate actions to be executed for a single search request. Table 3-1 summarizes the compatibility characteristics of the search rule actions. The actions that are listed in the first column of the table are run as part of a higher priority rule than the actions in the first row and, therefore, are run first.

<table>
<thead>
<tr>
<th>Action executed in a lower priority rule</th>
<th>Action executed in higher priority rule</th>
</tr>
</thead>
<tbody>
<tr>
<td>Change Search Result Order (sorting)</td>
<td>Change Search Result Order (ranking)</td>
</tr>
<tr>
<td>Specify Top Search Results</td>
<td>Add or Replace Search Criteria (add)</td>
</tr>
<tr>
<td>Add or Replace Search Criteria (replace)</td>
<td></td>
</tr>
</tbody>
</table>

**Table 3-1 Search rule evaluation**

<table>
<thead>
<tr>
<th>Action executed in a lower priority rule</th>
<th>Action executed in higher priority rule</th>
</tr>
</thead>
<tbody>
<tr>
<td>Change Search Result Order (sorting)</td>
<td>The result set is sorted according to the higher priority rule sorting criteria first, and lower priority rule sorting criteria second.</td>
</tr>
<tr>
<td>Change Search Result Order (ranking)</td>
<td>The ranking criteria from both actions are used. In the case of a collision when both actions have the same ranking criterion, the action from the higher priority rule takes precedence.</td>
</tr>
</tbody>
</table>
Customers can optionally choose to further sort their search results in the storefront after their initial search results are displayed. In this case, the customer's sorting order takes priority over the action's sorting orders.

### 3.2.1 Change Search Result Order

This action in a search rule is used to change the position of certain results within the search results list. Catalog entries that meet certain criteria can be ranked higher or lower to promote specific catalog entries over others for a specific customer search.
When using this action in search rules, you must select one of the following ordering options:

- Change how initial search results are ranked
- Change how initial search results are sorted

**Sorting order:** The sorting order specified by the shopper always takes precedence over the way that this action changes the search results order.

When ranking initial search results, you must specify a boost factor. You specify a *boost factor* as a positive number, which elevates catalog entries in the search results by increasing their relevancy scores. Store search results are ordered by default from the most relevant matches to the least relevant matches. Therefore, assigning higher boost factors typically corresponds to higher relevancy scores for catalog entries. As a result, the catalog entries with higher boost factors appear higher in store search results.

You can assign boost factors for the following ranking criteria:

- Manufacturer name
- Part number
- Manufacturer part number
- Catalog entry type
- Name
- Short description
- Category

**Boost factors:** Increasing boost factors increases the relevancy scores of catalog entries. It does not, however, guarantee elevating the catalog entries to the top of the search results. The boost factor that you specify in this action determines the position of the specified results relative to the other search results. However, if you specify a high boost factor value, for example, 999, the catalog entry likely appears at the top of the search result, provided that it is already returned in the initial search results.

**Scenario one**

In this scenario, a male customer searches for glasses and the search displays only wine glasses. For all other customers, the search results are displayed sorted by price in descending order.

Perform the following instructions to implement this scenario:

1. Log on to Management Center:
   

2. Open the Marketing tool, as shown in Figure 3-19 on page 33.
3. Select the store name MadisonsFEP2 from the upper-right drop-down list box. Alternatively, you can set a store as the default store to be opened for all tools in the Management Center by adding it as a preference. Refer to the following link in the WebSphere Commerce Information Center:


The rest of this book assumes that MadisonsFEP2 has been set as the preferred store.

4. Select Search Rule from the Create New toolbar icon, as shown in Figure 3-20.

![Figure 3-20 Select Search Rule](image_url)
5. Select the standard template named **Change Search Result Order** in the pop-up window and click **OK**, as shown in Figure 3-21.

![Figure 3-21 Click Change Search Result Order](image)

6. Enter the Name of the search rule as **Glasses Search result order** on the General Properties tab, as shown in Figure 3-22 on page 35.
Figure 3-22  Enter the search rule name

7. Click the **Customer Submits Search** trigger in the work area.
8. Select the Matching rule as **Search keyword or phrase is exactly one of the following values**, as shown in Figure 3-23.
9. Click the **Create New Keyword** icon and add **glasses** as a keyword, as shown in Figure 3-24.
10. Drag and drop the **Branching** icon and enter the following details, as shown in Figure 3-25:
   a. For Branch type, select **First path for which the customer qualifies.**
   b. For Paths Name, enter Male Customers and All other customers.
11. Perform the following steps in Path 1 (Male Customers):
   a. Drag and drop the target **Customer Segment** icon and enter the following properties as shown in Figure 3-26:
      i. For Target customers, select **Who are in any of the following customer segments**.
      ii. In the search field for Customer segments, for Name, enter **Male Customers**.
      iii. Click **Find and Add**.

![Figure 3-26 Add target Customer Segment]
b. Under Actions, click the **Change Search Result Order** icon:
   i. In the Properties view, under Change Search Result Order, select **Change how initial search results are ranked**.
   ii. For the Ranking criteria, click the **New** icon and select **Category**, as shown in Figure 3-27.

![Figure 3-27 Add Ranking criteria](image-url)
iii. In the pop-up Find and Add window, search the keyword *wine glasses* and click OK.

iv. Enter the boost factor 1.5.

v. Select the matching rule **Matches**, as shown in Figure 3-28.

![Figure 3-28 Select Matching rule](image-url)
12. Perform the following steps in Path 2 (All other Customers), as shown in Figure 3-29:
   a. Click the **Change Search Result Order** action.
   b. In the Properties view, under Change Search Result Order, select **Change how initial search results are sorted**.
   c. In Sort criteria, click the **Create New** Sort criteria icon.
   d. Select **Offer price** in the Sort by column.
   e. Select **Descending** in the Sequence column.

![Figure 3-29](image-url) Update the properties for path 2
13. Click **Save and Close**.

14. The list of search rules is displayed. Right-click the current search rule and click **Activate**, as shown in Figure 3-30.

![Figure 3-30   Activate the search rule](image)
15. Search for glasses in the store as a guest user without logging in. The search results display the results sorted by price in descending order, as shown in Figure 3-31.

Figure 3-31  Search rule-based search results for all users
16. Log in to the store as a male customer and search for glasses. The search results rank wine glasses higher than other glasses, as shown in Figure 3-32.

![Search rule-based search results for male customers](image)

**Scenario two**

For customers who viewed the coffee makers category at least three times within the last two days, boost the products from the coffee makers category when they search for steel.

Figure 3-33 on page 46 shows the search results for steel before boosting coffee makers.
Follow these steps to boost coffee makers to address the requirement in the scenario:

1. Log on to the Management Center and open the Marketing tool.
2. Select Search Rule from the Create New toolbar icon.
3. Select the Change Search Result Order template in the pop-up window and click OK.
4. Enter the search rule properties, as shown in Figure 3-34.

**Figure 3-34  General Properties for the search rule**
5. Click the **Customer Submits Search** trigger and enter the following values, as shown in Figure 3-35:
   a. For the Matching rule, select *Search keyword or phrase is exactly one of the following values.*
   b. For the Search keywords, enter steel.

![Figure 3-35 Properties for the trigger](image)

6. Drag and drop the target **Catalog Browsing Behavior** icon into the work area after the trigger.
7. Click **Catalog Browsing Behavior** and enter the following values in the properties view, as shown in Figure 3-36:
   a. For Customer behavior, select **Customer viewed a category**.
   b. For Target customers, select **Who viewed any of the following categories and satisfy the following conditions**.
   c. For Categories, click **Find and Add**, enter coffee makers.
   d. Make sure that **Include subcategories** is checked.
   e. For Frequency, select **At least the following number of times**.
   f. For Times, select **3**.
   g. For Time frame, select **Within the following number of days**.
   h. For Days, select **2**.

![Figure 3-36 Properties for the search rule target](image-url)
8. Click the **Change Search Result Order** icon and enter the following values in the properties view, as shown in Figure 3-39 on page 51:
   a. For Action, select **Change how initial search results are ranked**.
   b. Complete these steps for the Ranking criteria:
      i. Click **Category**, as shown in Figure 3-37.

![Figure 3-37 Select the ranking criteria for the action](image1)

   ii. In the Find and Add pop-up window, enter coffee makers and click **OK**, as shown in Figure 3-38.

![Figure 3-38 Find and add the category](image2)

   iii. Enter 25 for the Boost factor.
iv. For the Matching rule, select **Matches**, as shown in Figure 3-39.

![Figure 3-39 Properties for the search rule action](image)

9. Click **Save and Close**.
10. Right-click the current rule from the Search rules list view, and select **Activate**.
11. In the storefront, log in as a user, view the coffee makers category three times, and then search for steel. The search results show the products from the coffee makers category boosted to the top, as shown in Figure 3-40.

![Figure 3-40 Search rule-based search results for steel](image)

### 3.2.2 Specify Top Search Result

You use the Specify Top Search Result action in a search rule to elevate specific catalog entries to display at the top of the search results list. This action also allows you to specify more than one catalog entry as top search results. Add the catalog entries to the Catalog entries table in the order that you want them to be listed at the top of the search results.
When a customer submits a search, if all the catalog entries in the table have equal relevance to the customer's search, the order that you specify in the table is used in the search results.

When a customer submits a search, if certain catalog entries in the table are more relevant to the customer's search, those catalog entries are listed first in the search results, regardless of the order that you specify in the table.

When shoppers select specific catalog entries to exclude from the search results, those specific catalog entries do not appear in the search results, even if they are specified in this action.

You can configure the action to display products, items, or both. If your default store behavior is to exclude items from the search result, the items configured in this action are not displayed.

In rare cases, the catalog entries that you have configured might not appear at the top of the search result. In this case, you must change the default boost factor for the top search results.

In the current scenario, when a customer searches for table, the search results display the product Breakfast_table with the code FU00-04-BOY-0FF172800-FBON-RSN-00H0 as the first product in the results.

We show the search results before creating the search rule in Figure 3-41 on page 54.
Figure 3-41  Search results for table before implementing the search rule
Follow these steps to implement this scenario:

1. Log on to the Management Center and open the **Marketing** tool.
2. Select **Search Rule** from the Create New toolbar icon.
3. Select the **Specify Top Search Results** template in the pop-up window and click **OK** as shown in Figure 3-42.

![Figure 3-42 Select Specify Top Search Results](image-url)
4. On the General Properties tab, enter the properties for the search rule, as shown in Figure 3-43.

Figure 3-43 Enter Search Rule name
5. Click the **Customer Submits Search** trigger in the work area and enter the following values, as shown in Figure 3-44:

   a. For Matching rule, select **Search phrase contains one of the following words**.

   ![Figure 3-44 Select Matching rule](image)

   b. Click **Create New Keyword** and add **table** as a keyword.
6. Click **Specify Top Search Result** in the work area and enter the catalog entry ID for the Breakfast table, FU00-04-BOY-0FF172800-FB0N-RSN-Q0H0, in the input text box. Click **Find and Add**, as shown in Figure 3-45.

![Figure 3-45](image)

**Figure 3-45** Find and add the catalog entry to be specified as the top result in the search results

7. Click **Save and Close**.
8. The list of search rules is displayed. Right-click the current search rule and click **Activate**, as shown in Figure 3-46.

![Figure 3-46 Activate Search Rule](image)

9. Search for **table** in the storefront. Breakfast table is the first search result, as shown in Figure 3-47 on page 60.
Figure 3-47  Search rule-based search results
3.2.3 Add or replace search criteria

You can use this action if you need to add or replace the search criteria when customers submit searches in the store. By adding search criteria, you can filter the search results further. You can modify the search results by replacing the search criteria.

**Search term associations**: If you use this action to replace search terms and your search rule does not have any targets, you might consider creating search term associations instead.

In the current scenario, a shopper is searching for a table. That shopper has purchased products under the Furniture category within the most recent 10 orders. The system needs to restrict the search results to the Furniture category and filter out products from other categories, such as table glasses. Perform the following steps to implement this scenario:

1. Log on to the Management Center and open the Marketing tool.
2. Select the **Search Rule** from the Create New toolbar icon.
3. Select the **Blank Search Rule** template in the pop-up window and click **OK**, as shown in Figure 3-48.

![Figure 3-48 Select the Blank Search Rule template](image)
4. Enter the properties of the search rule on the General Properties tab, as shown in Figure 3-49.

Figure 3-49   Enter Search Rule name
5. Click the **Customer Submits Search** trigger in work area and enter the following values, as shown in Figure 3-50:
   
a. Select the matching rule **Search keyword or phrase is exactly one of the following values** in the properties view.
   
b. Add the search keyword table.

![Figure 3-50 Enter the trigger properties](image)

6. Drag and drop the target **Purchase history** into the work area.
7. Click **Purchase History** and enter the following values, as shown in Figure 3-51:

   a. For Purchase history focus, select **Purchases of catalog entries from specific categories**.

   b. For Target customers, select **Who have catalog entries from any of the following categories and satisfy the following conditions**.

   c. For Categories, click **Find and Add** for *furniture*.

   d. For Number of catalog entries, select **At least the following number**.

   e. For Number, select 1.

   f. For Value of catalog entries, select **Any value**.

   g. For Time frame, select **In the last number of orders**.

   h. For Number of orders, select 10.

---

**Figure 3-51  Enter Purchase History properties**
8. Drag and drop **Add or Replace Search Criteria** into the work area and enter the following values, as shown in Figure 3-52:
   a. For Action, select **Add search criteria**.
   b. For Search filters, select Category **Matches** Furniture.

![Figure 3-52  Enter the properties for the action](image)

9. Click **Save and Close**.
10. Right-click the search rule from the Search Rules - List and click **Activate**, as shown in Figure 3-53.

![Figure 3-53   Activate the search rule](image)
11. Log in to the store as a user who has previously placed an order that included products from the Furniture category. Figure 3-54 shows the order history of a user who purchased a product from the Furniture category.
12. Search for table. The search results do not contain the products from the tableware and table glasses categories, as shown in Figure 3-55.

Figure 3-55   Results for table after the search rule was enabled (observe the facet category)

3.2.4 Product recommendations

You can use the search-based activity of the shoppers to target customers for marketing activities. In the current scenario, when shoppers search for cup, the system needs to recommend the following products: Digital 12 cup coffee maker, Blue with SKU: KB-04B and Coffee and Espresso Bar with SKU: KIES-01. To implement this product recommendation process, you must create a new web activity that targets customers based on their search criteria and results. Follow these steps to these implement product recommendations:

1. Log on to the Management Center and open the Marketing tool.
2. From the **Create New** toolbar icon, select **Web Activity**, as shown in Figure 3-56.

![Create Web Activity](image)

*Figure 3-56  Create Web Activity*

3. Select the **Catalog Entry Recommendation** template and click **OK**, as shown in Figure 3-57.

![Select the Web activity template](image)

*Figure 3-57  Select the Web activity template*
4. Enter the following values, as shown in Figure 3-58, and keep all other default values:
   a. For Name, enter Recommendations for cup.
   b. For Priority, select 100.
   c. For Start date, select Today.

5. Select E-Marketing Spot.
6. Find and add the **RightSideBarFeaturedProducts** E-Marketing Spot (ESpot), as shown in Figure 3-59. In this ESpot, we want to show the recommended products in the rightmost sidebar on the search results page.

![Figure 3-59: Select the E-Marketing Spot to show the recommendations](Image)
7. Drag and drop the **Current Page** target into the work area and enter the following values, as shown in Figure 3-60, Figure 3-61 on page 73, and Figure 3-62 on page 74:

   a. For Customer behavior, select **Customer is viewing search results**.

   ![Figure 3-60: Select the Customer behavior](image)

   b. For Target customers, select **Who are searching for any of the following keywords**.

   c. For the Keyword matching rule, select **Search keyword is exactly one of the following values**.
d. For Search keywords, click the **New** icon and add *cup*.
Figure 3-62  Enter the keyword cup
8. Drag and drop the **Recommend Catalog Entry** action into the work area and enter the following values, as shown in Figure 3-63:
   a. For Recommendation method, select **Specify a list of catalog entries**.
   b. For Catalog entries, add the codes KIES-01 and KB-04B.

![Figure 3-63   Add the recommended catalog entries](image)

9. Click **Save and Close**.
10. Right-click the activity and click **Activate**, as shown in Figure 3-64.

![Figure 3-64   Activate the web activity](image)

If a shopper searches for *cup* before activating this rule, the search results contain the default recommendations for products under the furniture category, as shown in Figure 3-65 on page 77.
Figure 3-65  Recommendations E-Spot before activating the rule for the search term cup results

After activating this rule, the Search Results page shows the rightmost Recommendations tab with the coffee makers that were specified in the rule, as shown in Figure 3-66 on page 78.
3.2.5 Product promotion

In the current scenario, the system issues a 15% off of the total order coupon to customers who search for bodysuit within the specified time frame. To implement this product promotion, you must create a coupon promotion and it needs to be associated to a new dialog activity that defines the trigger to issue the coupon. You must create a new dialog activity to communicate the promotion information to the customer based on the search trigger.

Follow these steps to create the promotion:

1. Log on to the Management Center.
2. Open the **Promotions** tool, as shown in Figure 3-67.

![Figure 3-67 Open the Promotions tool](image)

3. Select **Promotion** from the Create New toolbar icon, as shown in Figure 3-68.

![Figure 3-68 Create a new promotion](image)

4. Select **Order promotions** from the Promotion Type Selector.
5. For Name, choose **Percentage off an order** and click **OK**, as shown in Figure 3-69.
6. Enter the following values in the Promotion Properties section, as shown in Figure 3-70:
   a. For Administrative name, enter 15% off orders.
   b. For Redemption method, select **Coupon promotion**.
   c. For Number of days until coupon expires, select 90.
   d. For Priority, select 200.

---

*Figure 3-70  Enter the promotion properties*
7. Enter the following values in the purchase condition and reward section as shown in Figure 3-71:
   
a. Minimum purchase condition:
   i. For Minimum Order Purchase, enter 10.00.
   ii. For Percentage Discount on Order (%), enter 15.
   iii. For Maximum Discount Amount, enter 5000.
   
b. For Target payment type, select **Any payment type.**

![Figure 3-71 Enter the purchase conditions](image-url)
8. In the **Descriptions** tab, enter the value *15% off orders* for the Customer viewable long description, as shown in Figure 3-72.

9. Click **Save and Close**.

10. Select **Promotions** in the explorer view.
11. Right-click the promotion from the Promotions - List view and click **Activate**, as shown in Figure 3-73.

![Figure 3-73   Activate the promotion](image)

Follow these steps to create the dialog activity that triggers the issue of the coupon promotion that was created:

1. Log on to the Management Center and open the **Marketing** tool.
2. Select **Dialog Activity** from the Create New toolbar icon, as shown in Figure 3-74.

![Figure 3-74  Create Dialog Activity](image)

3. Select the **Blank Dialog Activity** template and click **OK**, as shown in Figure 3-75.

![Figure 3-75  Select blank template](image)
4. On the Dialog Activity General Properties tab, enter the name as Apparel search coupon, as shown in Figure 3-76.

![Figure 3-76 Enter the dialog properties](image)

5. Drag and drop the **Customer Searches** trigger into the work area and click it.
6. Click the **Customer Searches** trigger to display its property panel. Enter the property values, as shown in Figure 3-77 and Figure 3-78 on page 88:

   a. For Keyword matching rule, select **Search keyword is exactly one of the following values**.

![Figure 3-77 Drag and drop the trigger and select the keyword matching rule](image)
b. For Search keywords, enter bodysuit.

c. Make sure that the Use synonyms option is checked. (By checking the Use synonyms check box, this activity will be triggered by the specified search keyword or any synonyms that are defined for the search keyword.)

d. For Times, select 1.

e. For Time frame, select At any time.

Figure 3-78 Enter the properties for the trigger

7. Drag and drop the Issue Coupon action into the work area after the trigger Customer Searches and click it.

8. Click the Issue Coupon action to display its property panel.
9. Type 15% off orders in the text box and click **Find and Add**, as shown in Figure 3-79.

![Figure 3-79  Add the Issue Coupon action](image)

10. Click **Save and Close**.
11. Open the Activities - List, right-click the current activity that was created, and select **Activate**, as shown in Figure 3-80.

![Figure 3-80 Activate the dialog activity](image)

For the trigger Customer Searches to work, the Management Center marketing features have to be enabled and WebSphere Commerce must be configured to track the online behavior of shoppers. To enable these functions, you must follow the steps that are described in the following WebSphere Commerce Information Center link:

- Persistent sessions and personalization ID (Step 3)
- Sensor Event Listener (Step 4a - c)

After restarting the WebSphere Commerce application or test server, log in to the storefront and search for bodysuit. The marketing activity is triggered and a coupon is issued to the customer.

The customer can view the coupon in the My Coupons section under the My Account page, as shown in Figure 3-81.

![Figure 3-81 My Coupons list](image1)

When you click the coupon, you see the coupon details, as shown in Figure 3-82.

![Figure 3-82 Coupon details](image2)
Search index life-cycle management

This section discusses the various tasks that must occur during index life-cycle management.
4.1 Full and delta index building

This section discusses full and delta index building.

4.1.1 Full versus delta index building

Making changes to a master catalog requires that the index is updated. You update the index in two steps: first run the `di-preprocess` utility and then run the `di-buildindex` utility. For more information about this updating process, refer to the WebSphere Commerce Information Center link:

```
http://publib.boulder.ibm.com/infocenter/wchelp/v7r0m0/topic/com.ibm.commerce.developer.doc/concepts/csdmanagesearchtop.htm
```

You can run these utilities to perform a delta update, or a full update. Full updates re-index the entire master catalog (you can specify which languages to re-index. The default is all). By default, the `di-preprocess` and `di-buildindex` utilities are configured to run a full re-index. To run a delta re-index, add the parameter `-fullbuild false` to the utility invocation.

Delta updates are tracked similarly to stagingprop; a table named `TI_DELTA_CATENTRY` records which catalog entries are updated. For example, if a product with `catentry_id 14401` is added to the master catalog via the Management Center, a record is inserted into the `TI_DELTA_CATENTRY` table, such as the record in Table 4-1.

<table>
<thead>
<tr>
<th>MasterCatalog_Id</th>
<th>Catentry_Id</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>10451</td>
<td>14401</td>
<td>'U'</td>
</tr>
</tbody>
</table>

The U under the Action column indicates a change or update. The actual update is not recorded here. Instead, the table is simply a list of which catentries need to be updated. Therefore, a delta update still needs to query the regular database tables (catentry, catgroup, and so on) to get the actual update during `di-preprocess`. Also, unlike the staglog table that is used in stagingprop, there is no processed field. After the `di-preprocess` completes, the updated entries are simply deleted from `TI_DELTA_CATENTRY`.

Certain changes to the master catalog require a full update. For example, assigning a category to a separate parent creates the following entry in the `TI_DELTA_CATENTRY` table (Table 4-2).

<table>
<thead>
<tr>
<th>MasterCatalog_Id</th>
<th>Catentry_Id</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>10451</td>
<td>-1</td>
<td>'F'</td>
</tr>
</tbody>
</table>

The F under the Action column indicates that a full update is required. Note the catentry here is -1.

For a list of which common business tasks require delta or full updates, refer to this WebSphere Commerce Information Center document:

```
http://publib.boulder.ibm.com/infocenter/wchelp/v7r0m0/topic/com.ibm.commerce.developer.doc/refs/rsdsearchindexhints.htm
```

When the table `TI_DELTA_CATENTRY` contains an F entry, it is best to perform a full re-indexing, instead of a delta re-index, because, with an F entry in the
TI_DELTA_CATENTRY table, no further U entries are recorded until the F entry is cleared. The F entry is only cleared after performing a full re-indexing. Remember, therefore, when making updates to the catalog, if the re-indexing window that is scheduled is only large enough to perform a delta update, leave the changes that cause an F update until later.

Perform full re-indexing periodically even if there is not an F requiring a full index build in the TI_DELTA_CATENTRY table. When many delta updates have been made to an index, without any full index builds, the index can start to degrade due to fragmentation, which affects performance. A full index update helps with fragmentation.

4.1.2 Automatic index synchronization

You can configure both delta and full index building to occur automatically, triggered when changes are made to the catalog. This automatic delta and full index building saves you from having to manually call di-preprocess and di-buildindex to update the indexes.

By default, only the delta updates are automatically triggered. With this function enabled, if any delta updates are added to the TI_DELTA_CATENTRY table, delta re-indexing triggers the next time that the storefront is queried.

You can toggle delta and full automatic index synchronization in the configuration file wc-search.xml, which is located at WC_ear_dir/xml/confil/com.ibm.commerce.catalog-fep/wc-search.xml.

Example 4-1 shows the section that controls automatic re-indexing.

Example 4-1  Automatic index synchronization

<_config:index name="CatalogEntry"
    object="com.ibm.commerce.catalog.facade.server.services.search.metadata.solr.SolrCatalogNavigationViewImpl"
    deltaUpdate="true" fullBuild="false">
  </_config:index>

Automatic index synchronization occurs in this sequence:

1. A business user performs an update to an existing product in the Management Center. This service request triggers a ChangeCatalogEntry event to be issued.
2. A pre-configured ChangeCatalogEntry event consumer then analyzes the request and determines which type of re-indexing is required.
3. After the re-indexing type is identified, a separate index update event, ChangeCatalogNavigationView, is generated for that product and queued for the next index synchronization.
4. When the business user previews the change from the storefront, the first search request triggers an index synchronization event, which causes the search index to be re-indexed through a separate background process.

You can read about this process at the following WebSphere Commerce Information Center page:
http://publib.boulder.ibm.com/infocenter/wchelp/v7r0m0/topic/com.ibm.commerce.developer.doc/concepts/csdsearchcontentstructureindex.htm
Events (for example, changing the price of a catentry) are defined as either Delta or Full through the use of event analyzers in the configuration file wc-event.xml, which is located under 

\(<WC-ear>/xml/config/com.ibm.commerce.catalog-fep./wc-event.xml\).

Example 4-2 shows several examples of event analyzers in wc-event.xml.

---

**Example 4-2 Several change analyzers in the wc-event.xml configuration file**

```
<config:param
    name="com.ibm.commerce.catalog.facade.server.event.analyzer.CatalogEntryEventForGeneralChangeAnalyzer" />

CatalogEntryEventForAttachmentChangeAnalyzer

This class is the implementation of the event analyzer for detecting changes in the catalog attachment. If so, a full update can be performed.

<config:param
    name="com.ibm.commerce.catalog.facade.server.event.analyzer.CatalogEntryEventForAttachmentChangeAnalyzer" />
```

---

### 4.1.3 Index building configuration

Index building is straightforward when there is only one search server and it is located on the same box as the commerce server. However, when working with multiple search servers that are located on remote machines, it is important to understand the configuration files and tables on both the commerce server and each of the search servers.

Depending on your search server configuration, you might have a search server that is dedicated to only building indexes, and not to serving queries. You can configure this dedicated search index server to push newly built indexes out to the dedicated search servers.

One possible configuration is to make the search indexer part of your staging environment. Configure this server to query the staging database during index building, rather than the production database. This setup is best for databases that are under a heavy, constant load and for servers that experience consistently high traffic.

Figure 4-1 on page 97 shows this configuration.
Regardless of the configuration, building indexes always starts with di-preprocess and di-buildindex. These indexing commands are initiated on the commerce server, not the search server. For these commands to work, WebSphere Commerce needs to know which server is the actual indexing machine, which is set up by running SetupSearchIndex.sh.

For advanced configurations in which the search server is remote from the commerce server, SetupSearchIndex.sh is called at least twice for each master catalog:

- On the commerce server
- On the search indexing machine
- And on each of the search machines that holds the catalog. (You can actually skip calling SetupSearchIndex.sh on these machines, because you can simply copy the Solr home directory from the search indexing machine.)

On the commerce server, SetupSearchIndex.sh needs to be called with the parameter action set to configWCforSolr. This action configures several sections in the wc-search.xml, and populates the table SRCHCONF. WebSphere Commerce uses the SRCHCONF table to look up which Solr server is responsible for building which index. For example, Table 4-3 on page 98 shows a section of the table for one catalog.
Table 4-3  IndexScope and Config column from SRCHCONF

<table>
<thead>
<tr>
<th>IndexScope</th>
<th>Config</th>
</tr>
</thead>
<tbody>
<tr>
<td>10001</td>
<td>IndexScopeTag=0,SearchServerPort=3737,SearchServerName=Linux-530s, PreProcessConfigDirectory=/opt/IBM/WebSphere/CommerceServer70/instances/demo/search/pre-processConfig/MC_10001/DB2</td>
</tr>
</tbody>
</table>

The IndexScope is for master catalog 10001. The Config column contains several pieces of information:

- The **IndexScopeTag** is used at the end of temporary tables, to identify which temporary tables belong to which index. The tables for the index, 10001, have 0 appended to them, for example, TI_CATENTRY_0.

- SearchServerPort and SearchServerName are used to point the **di-preprocess** and **di-buildindex** commands to the proper Java virtual machine (JVM).

- PreProcessConfigDirectory contains several files that were constructed during the **setupSearchIndex.bat** to be used during **di-preprocess**.

If the indexing machine is moved, the SRCHCONF table needs to be updated, to point again to the proper machine.

On the Solr machine, the **SetupSearchIndex.sh** (action - configSolrCores) command simply sets up the proper directory structure for the index. For this reason, after you have run this command on one machine, you can copy the directory structure to the other Solr servers, rather than running the command again.

### 4.1.4 Replication

If you use a dedicated indexing machine, after the dedicated indexer completes building an index, it needs to propagate this index to the dedicated search machines. You can obtain the steps to configure this replication in the following WebSphere Commerce Information Center document:

http://publib.boulder.ibm.com/infocenter/wchelp/v7r0m0/topic/com.ibm.commerce.developer.doc/tasks/tsdreplicatesearch.htm

With replication configured from the indexing machine to the dedicated search servers, you need to configure the **wc-search.xml** file for WebSphere Commerce to send queries to the proper machine. The **wc-search.xml** file contains the mapping instructions for WebSphere Commerce to know where to send each query. How you configure the **wc-search.xml** file really depends on your server configuration and index distribution. In this book, we outline a scenario in which two search servers each hold separate cores (see 6.17.1, “Setting up language cores on separate Solr servers” on page 173). Another perfectly valid scenario is to have every index on every search server and to set up a load balancer to equally distribute the search requests.

It is possible to cluster Solr JVMs. This search cluster is separate from the commerce cluster, because it has a separate profile and a separate enterprise archive (EAR) file. You can obtain the instructions to set up the clustering for Solr servers in the WebSphere Commerce Information Center:

http://publib.boulder.ibm.com/infocenter/wchelp/v7r0m0/topic/com.ibm.commerce.developer.doc/tasks/tsdfederatesearch.htm
**Important:** Even with clustered Solr servers, you still must set up all of the machines in the cluster for replication. A WebSphere Application Server cluster only manages the Solr application, not the search index data files. These data files reside locally on each node and are not shared across the cluster members.
Troubleshooting

This chapter provides an outline of how to approach troubleshooting search-related issues, on the Solr server and on the WebSphere Commerce server. The chapter concludes with issues, which we encountered during the Solr deployment and maintenance, and the recommended solutions.
5.1 Starting the Solr server

After you deploy and start the search server, check the SystemOut.log to verify that the search server started properly. In standard and advanced deployment mode, the search server has its own profile, which is separate from the commerce profile, and so has a separate set of logs. These logs are located on the Solr server machine, in the directory:

/opt/IBM/WebSphere/AppServer/profiles/search_profile/logs/solrServer/

In the SystemOut.log, search for this message:
WSVR0221I: Application started: solr

If the Solr server was unable to start, this message is printed in the log:
SolrDispatchF E org.apache.solr.servlet.SolrDispatchFilter init Could not start SOLR.

The message is followed by error details, for example:
SolrDispatchF E org.apache.solr.servlet.SolrDispatchFilter init Could not start SOLR. Check solr/home property

In Example 5-1, the /solr/home directory was not set in the Java Naming and Directory Interface (JNDI).

Example 5-1 SystemOut.log error details

[3/30/11 14:57:00:066 EDT] 0000001c SolrResourceL I org.apache.solr.core.SolrResourceLoader locateSolrHome solr home defaulted to 'solr/' (could not find system property or JNDI)
[3/30/11 14:57:00:068 EDT] 0000001c CoreContainer I org.apache.solr.core.CoreContainer$Initializer initialize looking for solr.xml:
/opt/IBM/WebSphere/AppServer/profiles/demo_solr/solr/solr.xml
[3/30/11 14:57:00:069 EDT] 0000001c SolrResourceL I org.apache.solr.core.SolrResourceLoader <init> Solr home set to 'solr/'
[3/30/11 14:57:00:072 EDT] 0000001c SolrDispatchF E org.apache.solr.servlet.SolrDispatchFilter init Could not start SOLR. Check solr/home property
java.lang.RuntimeException: Can't find resource 'solrconfig.xml' in classpath or 'solr/conf/',
cwd=/opt/IBM/WebSphere/AppServer/profiles/demo_solr

Adding the /solr/home location to the JNDI resolved this error. After the Solr server has been started, ensure that you can access the Solr server. In a browser, enter the URL:

http://host_name:3737/solr/Default/select?q=**3A*

In this URL, host_name is the name of the search server. Port 3737 is the default port that is opened during deployment.
You then see a response, similar to Example 5-2.

Example 5-2  Solr server response

```xml
<response>
  ...
  <lst name="responseHeader">
    <int name="status">0</int>
    <int name="QTime">140</int>
  </lst>
  <lst name="params">
    <str name="q">*:*</str>
  </lst>
  <result name="response" numFound="0" start="0"/>
</response>
```

If you see an error instead, try to narrow down where the problem is occurring. Try to access the web server in front of the Solr server directly. Check the SystemOut.log to see if solr is receiving the query. The generic solr query in Example 5-2 results in an entry that is similar to the following log entry in the SystemOut.log:

```
org.apache.solr.core.SolrCore execute [Default] webapp=/solr path=/select params={q=*:*} hits=0 status=0 QTime=0
```

5.2 Querying cores

You can query indexes directly from the Solr server by using only a browser, or you can run queries through the Commerce storefront. This section shows you both methods.

5.2.1 Querying cores directly on the Solr server

After indexing a master catalog, you can use a web browser to query the search server directly, instead of searching through the storefront. When troubleshooting indexes, first try the search queries directly on the search server. This step can help you determine if the issue is with the index data, or on the Commerce storefront side.

Queries on indexes use the following syntax:

```
http://host_name:3737/solr/core_name/select?q=query
```

The core_name is defined as a default by Commerce as:

`MC_MasterCatalogID_CatalogEntry_locale`

Indexes are separated by Master Catalog and locale. A master catalog with three languages has three separate cores for structured content.

The simplest query is field name: field value. For example, to search for a specific catalog Entry ID, for example, 100102, enter this command:

```
```

Make sure to use the field names as defined for the index, and not the associated database Column name. For example, in the table CATENTRY, there is a column called PARTNUMBER.
However, using the field name PARTNUMBER (that is, $q=PARTNUMBER:12102$) results in a “page not found” error.

Each core has a wc-data-config.xml configuration file that contains the field column mappings. You can locate this file in:

```
solr/home/MC_MasterCatalogID/language/CatalogEntry/conf/wc-data-config.xml
```

In this file, you can see that the database column PARTNUMBER maps to the index field partNumber_ntk:

```
<field column="PARTNUMBER" name="partNumber_ntk" />
```

The field names that are used in query searches are also case-sensitive. Using an uppercase $P$, for partNumber_ntk, for example, $q=PartNumber_ntk:12102$, results in “a page not found” error.

Look at the query result set. To search in master catalog 10001 in English for catentries with Jeans in the name, use this query:

```
http://host_name:3737/solr/MC_10001_CatalogEntry_en_US/select?q=name:Jeans
```

The query results set returns every full document where the field name contains Jeans. At the start of the result set, response statistics, which are useful for checking the overall performance of the query, are returned. See Example 5-3.

**Example 5-3  Response header**

```
<?xml version="1.0" encoding="UTF-8" ?>
<response>
  <lst name="responseHeader">
    <int name="status">0</int>
    <int name="QTime">0</int>
    <lst name="params">
      <str name="q">name:Jeans</str>
    </lst>
  </lst>
  <result name="response" numFound="21" start="0">
```

The response statistics are followed by the resulting documents. Example 5-4 displays one full document that is returned.

**Example 5-4  Solr document**

```
<doc>
  <int name="buyable">1</int>
  <arr name="catalog_id">
    <long>10451</long>
  </arr>
  <long name="catentry_id">12850</long>
  <str name="catenttype_id_ntk_cs">ProductBean</str>
  <str name="fullImage">images/catalog/apparel/apparel_160x160/IMG_0048_e.jpg</str>
  <long name="member_id">7000000000000000901</long>
  <str name="mfName">MapleWear</str>
  <str name="mfName_ntk">MapleWear</str>
  <str name="mfName_ntk_cs">MapleWear</str>
  <str name="name">Eagle jeans</str>
  <arr name="parentCatgroup_id_facet">
    <str>10451_10432</str>
  </arr>
```

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The URL can accept additional parameters to modify or simplify what is returned. For example, adding the `fl` parameter allows you to limit which fields are returned:

http://localhost/solr/MC_10001_CatalogEntry_en_US/select?q=name:Jeans&fl=name,catalogentry_id

Adding the `fl` parameter results in Example 5-5.

**Example 5-5  Simplified result set**

```
<doc>
  <long name="catalogentry_id">12850</long>
  <str name="name">Eagle jeans</str>
</doc>
<doc>
  <long name="catalogentry_id">12970</long>
  <str name="name">Eagle jeans</str>
</doc>
<doc>
  <long name="catalogentry_id">12971</long>
  <str name="name">Eagle jeans</str>
</doc>
...  
```

For further parameters, refer to Solr-specific documentation.

There are also search graphical user interfaces (GUIs) available for querying indexes, such as the GUI, Luke. Luke does not query the Solr server, instead it reads directly from the Lucene indexes. It completely bypasses Solr.

You can download Luke from this website:

http://code.google.com/p/luke/downloads/list

When opening Luke, you need to specify the index directory, as shown in Figure 5-1 on page 106.
You can browse documents individually, as shown in Figure 5-2 on page 107.
Also, you can run queries against the index using the Search tab, as shown in Figure 5-3 on page 108.
Note that the queries are constructed differently in Luke than they are in Solr. For example, using the earlier example of searching for jeans, in a Solr browser, you use the following Luke query:

http://host_name:3737/solr/MC_10001_CatalogEntry_en_US/select?q=name:jeans

Using the name:jeans query in the search field produces 0 results. Oddly enough, using name:jean produces the correct results. You can see the same result, for example, using coffee. Using name:coffee returns zero results, but using name:coffe returns the correct results. Luke seems to be configured, by default, to not return exact matches using this syntax. Adding a tilde ("~") after the complete search term returns the proper results, for example, name:coffee~.

5.2.2 Querying cores from the storefront

If you have determined that the problem is not with the indexes on the Solr server (for example, the query successfully returns the expected result set), run the query next from the storefront.

Queries on the storefront run differently than they run directly on the Solr server. The predefined, ready-to-use queries are configured in the Search Profiles option, which is located in the wc-search.xml configuration file in the following directory:

WC_ear_dir/xml/config/com.ibm.commerce.catalog-fep/wc-search.xml
Example 5-6 depicts a search profile that was taken from the predefined wc-search.xml.

```
<%_config:profile extends="IBM_findCatalogEntryByName" name="IBM_findCatalogEntryByNameAndShortDescription">
  <%_config:query inherits="true">
    <%_config:field name="defaultSearch"/>
    <%_config:field name="shortDescription"/>
  </_config:query>
  <%_config:highlight inherits="true">
    <%_config:field name="shortDescription"/>
  </_config:highlight>
</%_config:profile>
```

This profile, which is called IBM_findCatalogEntryByNameAndShortDescription, extends the IBM_findCatalogEntryByName profile. The IBM_findCatalogEntryByNameAndShortDescription profile inherits all the config parameters from IBM_findCatalogEntryByName and all the query parameters of that profile (in this case, the name field).

If a search for Jeans on the storefront is executed using this profile, Jeans is searched for against the fields: name, shortDescription, and defaultSearch. See the SystemOut.log, which is similar to Example 5-7, on the Solr server.

```
Example 5-7   Solr server query

000001d2 SolrCore I org.apache.solr.core.SolrCore execute [MC_10451_CatalogEntry_en_US]
webapp=null path=/select
params={q=%28\name%3A%28Jeans%29+defaultSearch%3A%28Jeans%29+shortDescription%3A%28Jeans%29\&fq=catalog_id%3A10451&fq=storeent_id%3A%2811051%29&fq=published%3A1&fq=-catenttype_id_ntk_cs%3AItemBean&start=0&rows=12&timeAllowed=3000&hl=on&highlightFieldMatch=true&highlight-field=field&highlight-highlightField=true&highlight-facets=true&highlight-params=price_USD%3A%28%7B*+100%7D+100%29&highlight-params=price_USD%3A%28%7B100+200%7D+200%29&highlight-params=price_USD%3A%28%7B200+300%7D+300%29&highlight-params=price_USD%3A%28%7B300+400%7D+400%29&highlight-params=price_USD%3A%28%7B400+500%7D+500%29&highlight-params=price_USD%3A%28%7B500+*%7D%29&highlight-sort=count&highlight-limit=10&highlight-check=true&highlight-check.collapse=false&debug Query=false}
```

The query that is shown in Example 5-7 is much more complex than the simple searches that we performed directly against the Solr server in the earlier examples. When debugging why a particular query does not produce the expected results on the storefront, do not forget to consider the added complexity.

For example, in the query in Example 5-7, multiple search parameters of type fq are added. An fq is a filter query, which imposes additional constraints against the result set. The simplest filter query in Example 5-7 is fq=published. This filter removes any catentries that are not published from appearing in the final search results.

The following WebSphere Commerce Information Center document gives more detailed information about the search interface that Commerce uses to construct the queries to send to the Solr server:

http://publib.boulder.ibm.com/infocenter/wchelp/v7r0m0/topic/com.ibm.commerce.developer.doc/concepts/csdsearchinterface.htm
Also, on the Commerce server, you can enable tracing for the search. See Example 5-8 on page 110.

**Example 5-8  Search trace string**

```
com.ibm.commerce.search.*=all: com.ibm.commerce.foundation.*=all
```

This trace prints to the `trace.log` file in your Commerce server, in the directory:

```
<App server install dir>/profiles/<profile_name>/logs/server1
```

Example 5-9 shows the fully constructed search query for `jeans` on the Commerce server, before it is sent to Solr. When looking through the trace, search for Final Solr query expression.

**Example 5-9  Search tracing on the Commerce side**

```
000001d7 solr          1
com.ibm.commerce.foundation.internal.server.services.search.processor.solr.SolrSearchExpressionProcessor getEntityObjects
Final Solr query expression:
q=+(name:(jeans) defaultSearch:(jeans) shortDescription:(jeans))&fq=catalog_id:10451&fq=storeent_id:(11051)&fq=published:1&fq=catenttype_id_ntk_cs:ItemBean&start=0&rows=12&timeAllowed=3000&hl.fl=name&hl=true&hl.simple.pre=<strong><span class=font2>&hl.simple.post=</span></strong>&hl.requireFieldMatch=true&facet.field=mnName_ntk_cs&facet.field=parentCatgroup_id_facet&facet=true&facet.query=price_USD:({* 100} 100)&facet.query=price_USD:({100 200} 200)&facet.query=price_USD:({200 300} 300)&facet.query=price_USD:({300 400} 400)&facet.query=price_USD:({400 500} 500)&facet.query=price_USD:({500 *})&facet.sort=count&facet.mincount=1&facet.limit=10&spellcheck.count=5&spellcheck=false&debugQuery=true
```

**Important:** Foundation tracing can affect performance. Do not enable foundation tracing on production during periods of heavy traffic, if possible.

### 5.3 Errors encountered during search life-cycle management

In this section, we describe several issues that you might encounter while building and deploying search indexes.

**Search features not working on storefront**

The following reasons explain why search features might not work on a newly published store:

- Publishing MadisonsEnhancements.sar onto the newly published Madisons store.
- Enabling search-based navigation.
- Indexing the master catalog.
- Browsing a sales catalog that was created after the indexes were built. Rebuild the index, which will include the sales catalog in the search index.

**Category-level stock keeping units (SKUs) not shown in search results**

Perform the following steps to reproduce this situation:

1. In the Management Center, under the Catalog tab, select New → category level SKU.
2. Rebuild the index.
3. On the storefront, search for the newly created category-level store keeping unit (SKU). It does not appear in the results.

Search is configured by default to return products, and not items, which is shown in the trace as the filter query: fq=-catenttype_id_ntk_cs:ItemBean. Category-level SKUs do not have any associated products, only items.

The best solution is to create an associated product bean for this item bean, rather than have item beans display. Products have a one-to-many relationship to items.

For example, assume that shirt X is available on your storefront. This shirt is available in three sizes and two colors. Therefore, this shirt has one product entry and six item entries. When searching for this shirt in the storefront, if displaying only product beans, the search appears one time in the search results. However, if displaying item beans, the shirt displays six times, one time for each item bean.

Alternatively, you can configure the search type to include SKUs or item beans in the search results, or you can configure the search type to show only SKUs (item beans) exclusively.

Navigate to the file: Stores.war/<Your store name>/Snippets/Search/SearchSetup.jspf.

Locate the section that is shown in Example 5-10.

Example 5-10 SearchSetup snippet section

```
<wcf:getData type="com.ibm.commerce.catalog.facade.datatypes.CatalogNavigationViewType" var="catalogNavigationView" expressionBuilder="${navigationView}" scope="request" varShowVerb="showCatalogNavigationView" maxItems="${pageSize}" recordSetStartNumber="${WCParam.beginIndex}" scope="request">
    <wcf:param name="searchProfile" value="${searchProfile}" />
    <wcf:param name="searchTerm" value="${newSearchTerm}" />
    <wcf:param name="searchType" value="${searchType}" />
</wcf:getData>
```

The field searchType can have the following possible meanings:

- 0: ANY (exclude SKU)
- 1: EXACT (exclude SKU)
- 2: ALL (exclude SKU)
- 3: NONE (exclude SKU)
- 10: ANY (include SKU)
- 11: EXACT (include SKU)
- 12: ALL (include SKU)
- 13: NONE (include SKU)
- 100: ANY (only SKU)
- 101: EXACT (only SKU)
- 102: ALL (only SKU)
- 103: NONE (only SKU)

EXACT, NONE, ALL, and ANY can be defined, for example, by two search terms t1 and t2, against two fields f1 and f2:

- EXACT +(f1:"t1 t2" f2:"t1 t2")
- NONE -(f1:"t1 t2" f2:"t1 t2")
For example, to make ANY of the search terms entered return exclusively SKUs, set the search type to 100:

```xml
<wcf:param name="searchType" value="100"/>
```

Setting the search type to 100 changes the filter query from

```
fq=-catenttype_id_ntk_cs:ItemBean to fq=+catenttype_id_ntk_cs:ItemBean.
```

**Sales categories do not display in e-site stores**

Perform the following steps:

1. In the Management Center Catalog tool, select **MadisonsEsite**, **Create Sales Catalog**, and **Sales** categories.
2. Link several products from the master catalog to the sales categories.
3. Build the full index.
4. Navigate to the storefront, with the sales catalog specified.

The sales categories are not displayed. This issue is resolved with authorized program analysis report (APAR) JR38606. You can download this APAR from Fix Central, or you can request this APAR from IBM Support. Note the additional steps that are listed in the APARs readme.html file when installing this APAR. After the APAR is installed, make sure to re-index the catalog.

**Minor Catalog Entry changes no longer updated automatically in the search index**

When you make minor updates, such as a price change, to the catalog, the predefined behavior is to process these updates automatically in the search index, to have the update show up in the storefront. (We discuss this process in greater detail in Chapter 4, “Search index life-cycle management” on page 93). The automatic update consists of two parts:

1. Processing the event as either delta or full, and adding this update to the **TI_DELTA_CATENTRY** table
2. Automatically synchronizing the index when the storefront is queried

For example, if a price change for catentry 12001 occurs, an event monitor picks up this change and determines that a delta update has occurred for catentry 12001. An update of type **U** is made to the **TI_DELTA_CATENTRY** table. The next time that the store is queried, the run time notices that there are delta updates to process. These updates are made to the search index in a separate process.

By default, only delta updates are automatically indexed. If a full update has been identified by the event monitor and added to the **TI_DELTA_CATENTRY** table, this full update is not automatically re-indexed. Furthermore, if an update of type **F** is made to the **TI_DELTA_CATENTRY** table, further **U** updates are no longer added to this table. So, using the configuration that ships, having an **F** in the **TI_DELTA_CATENTRY** table stops further delta catentry changes from automatically updating the index.

To determine if this situation is why updates are not appearing automatically on your storefront, simply query the **TI_DELTA_CATENTRY** table. If you see an entry of type **F**, you can see what is blocking further delta catentry changes from automatically updating the index.
You have several possible resolutions:

- Simply run `di-preprocess` and `di-buildindex` manually. This action clears the `TI_DELTA_CATENTRY` table, and delta updates appear and are processed again.

- Modify the `wc-search.xml` file to get full index builds to also synchronize the index automatically. Navigate to the index section, and locate the line `"deltaUpdate="true" fullBuild="false">"`. Set `fullBuild="true"`. Depending on how often large changes are made to the catalog, this solution can cause full re-indexing to run more often than desired.

Another possible reason changes might not appear on the storefront is caching. Query the Solr server directly to see if the expected updates appear in the query set. If the expected results are returned, the issue is outside the search index (and is likely a problem with caching). See the following Websphere Commerce Information Center topic to learn how to set up cache invalidation:

http://publib.boulder.ibm.com/infocenter/wchelp/v7r0m0/topic/com.ibm.commerce.admin.doc/concepts/cdc_cacheinv.htm
Search environment setup

This chapter describes in detail how to enable the search features of WebSphere Commerce V7.0 Feature Pack 2. This chapter also explains how to set up the WebSphere Commerce search environment by using an advanced configuration that is suitable for a production environment.

First, we describe in detail how to enable WebSphere Commerce V7.0 Feature Pack 2 search features on a local Commerce machine.

Then, we explain how to use an advanced deployment model to deploy the search on a remote search server.

At the end of the chapter, we explain several advanced scenarios of the search deployment related to clients’ needs, the number of master catalogs, and multiple languages.
6.1 WebSphere Commerce search deployment overview

IBM WebSphere Commerce V7.0 Feature Pack 2 delivers customer-centric commerce with integrated search.

WebSphere Commerce search runs as a search server for your starter store that helps deliver targeted search results, while enabling customers to find products more effectively. When a shopper enters the search term, it is passed into the WebSphere Commerce integrated search framework. The search framework communicates with the WebSphere Commerce precision marketing engine to identify any business rules to apply to the query. The search query is then run using the search engine. There are many advantages to using the search engine over a traditional database search. We describe the advantages in this chapter and the following chapters.

The architecture of the search framework allows additional search adapters or vendor search engines to be used. We describe using the open source Apache Solr search engine.

WebSphere Commerce search provides advanced administration features, such as dynamic clustering, database integration, rich document handling, distributed search, and index replication.

This chapter describes the distributed search model that is based on the Apache Solr search engine. Solr is a Java application that runs as a stand-alone full-text search server within a servlet container. Solr is built on the Lucene search library that is used for indexing and search functions and the Representational State Transfer (REST)-like API that is responsible for communication. Solr is easy to install and configure in any environment and configuration. Solr comes with an HTTP-based administrative interface.

In our examples, we use WebSphere Application Server V7.0 to deploy the solr.war file on a separate search machine, and we configure WebSphere Commerce to communicate with this search server.

WebSphere Commerce search works with the search index to provide search results that consist of structured and unstructured content, and external data. Search index is a large flat table that contains searchable fields that are optimized for search performance. The search index must be built before it can be used for any searches.

Deploying WebSphere Commerce search involves deploying the search server run time and setting up the search index structure for a specific master catalog. Typically, deploying the search run time is performed only one time, during feature enablement. Setting up the index for specific master catalogs is run when introducing a new master catalog that you want indexed.

6.1.1 WebSphere Commerce environment and search configuration

Figure 6-1 on page 117 and Figure 6-2 on page 117 show a simplified view of the hardware and software products and components that are used in our search examples.

http://lucene.apache.org/solr/#intro
To present the full power and advanced capabilities of the WebSphere Commerce V7.0 Feature Pack 2 search engine, we used an advanced hardware configuration and search servers on separate physical machines.
Figure 6-2 on page 117 shows the software components that are related to the WebSphere Commerce product, WebSphere Application Server product, and Apache Solr product.

The web server is the first point of contact with the customer and the incoming HTTP search requests for the e-commerce application. To interface efficiently with the WebSphere Application Server, the web server uses the WebSphere Application Server plug-in to manage the connections between the two components.

The WebSphere Commerce Server runs within the WebSphere Application Server. The database server holds the data of most of the applications, including the catalog data, product data, and customer data.

In our examples, we use the advanced (remote) search configuration, which means that the search servers are not on the same machine as the Commerce server. Each search server resides on a separate machine and runs in its own profile within the WebSphere Application Server.

6.1.2 Deployment options

The Apache Solr search platform does not come with its own deployment. To simplify the deployment of the application’s solr.war file, WebSphere Commerce V7.0 Feature Pack 2 provides scripts that assist with the deployment.

Before deploying your search index, you must consider the available deployment options. There are three available deployment options for the WebSphere Commerce search solution:

- **Embedded mode** (WebSphere Commerce Developer only). WebSphere Commerce Server and WebSphere Commerce search run on a single machine and in the same Java virtual machine (JVM). The WebSphere Commerce search WAR (solr.war) becomes part of the WebSphere Commerce EAR file (wc.ear) that is deployed on the test server.

- **Standard (local) configuration**. WebSphere Commerce server and WebSphere Commerce search are deployed on a single machine, but they use separate JVMs. In order to function normally, additional memory is required. This configuration is suitable for small sites with low traffic volumes. In this case, Solr is configured to run in another profile of an existing application server. Similar to the embedded mode, you can configure the standard local configuration option automatically during the feature enablement.

- **Advanced configuration**. WebSphere Commerce Server and WebSphere Commerce search run on separate machines. Solr is deployed on its own WebSphere Application Server, in a separate profile, which provides greater flexibility and scalability. Scripts are provided to assist in the manual deployment. Most companies use this configuration for a production environment. The WebSphere Application Server cluster, with multiple WebSphere Commerce server and WebSphere Commerce search nodes, is deployed for scalability and failover support. We describe this configuration in detail in this chapter.

6.1.3 Deploying the search server

The first step is to deploy the search application, which is the solr.war file, which, for the embedded and standard deployments, is included in the WebSphere Commerce foundation feature enablement.

The WebSphere Commerce foundation feature adds new groups of services to the WebSphere Commerce Server. The WebSphere Commerce foundation feature is required when enabling features after installing a WebSphere Commerce Feature Pack. Enabling the WebSphere Commerce foundation ensures that the enabled features can function correctly.
with WebSphere Commerce. It provides the groups of services that are required to support
the new functionality.

The advanced configuration deployment is a manual process with provided scripts, which we
describe in detail in this chapter. The next step for the standard and advanced deployments is
to configure the web server for the Solr application. WebSphere Commerce must be able to
send search requests to the search server. We describe the installation and usage of the IBM
HTTP server, and we describe the installation and updating of the WebSphere Application
Server V7.0 for this purpose later in this chapter.

6.1.4 Deployment illustrations

Figure 6-3 illustrates deploying the WebSphere Commerce search in the advanced
configuration, where the WebSphere Commerce Server and WebSphere Commerce search e
run on separate machines.

For more information, see the information center pages for administering WebSphere
Commerce search and deploying WebSphere Commerce search:
http://publib.boulder.ibm.com/infocenter/wchelp/v7r0m0/topic/com.ibm.commerce.deve
loper.doc/concepts/csdmanagesearch.htm

![Diagram of deployment](image)

Figure 6-3  Deploying WebSphere Commerce search in the advanced configuration

The flow chart in Figure 6-4 on page 120 describe the flow to set up the standard and
advanced search configurations.

The flow includes two major steps:

1. Deploying the WebSphere Commerce search server and deploying the search on
WebSphere Application Server.
2. Setting up the WebSphere Commerce search index structure. After the search server is deployed in WebSphere Application Server, you can use the `setupSearchIndex` utility to set up the search index structure. You configure the WebSphere Commerce server and create the Solr home and Solr core structure for a specific master catalog.

![Diagram showing setup process](image)

**Figure 6-4  Standard and advanced configuration setup flow**

### 6.1.5 Publishing the store after the search deployment

After deploying WebSphere Commerce search, the next step is to publish the store. The `enhancements.sar` file that is provided with WebSphere Commerce V7.0 Feature Pack 2 contains examples of the storefront code that is needed to call the catalog search services. After the store is published, it is important to document the masterCatalogId that was used.

The `setupSearchIndex.sh` script that is provided with WebSphere Commerce V7.0 Feature Pack 2 identifies the languages that are supported by the store and creates each required index. A search index is created for each combination of master catalog and supported language. With the advanced deployment option that is described in this chapter, creating the search index is a two-part process. The `setupSearchIndex.sh` script is run on both the WebSphere Commerce server and the search server using separate parameters.

You must enable the Search-Based Navigation option for the store. The store function selection option is enabled by using the Store Management tool, which is located in the Catalog tab.
6.2 Deploying the WebSphere Commerce search using the advanced configuration

In the following sections, we describe in detail the complete deployment process for the WebSphere Commerce integrated search. This process is suitable for a real production environment. This configuration can greatly improve search performance. It also provides flexibility and makes maintenance much easier.

6.2.1 Deployment procedure overview

To complete the deployment procedure, you must perform all the following activities:

- Preparing the local WebSphere Commerce machine and feature enablement
- Preparing the remote search machine
- Creating the mappings from the WebSphere Commerce server to the remote server for search term associations
- Testing the search deployment

6.3 Preparing the local WebSphere Commerce machine and feature enablement

The installation of WebSphere Commerce V7.0 is the first step in a multiple-step procedure that has to be performed in order to fully enable the WebSphere Commerce V7.0 Feature Pack 2 features, and to prepare the environment for advanced search. Refer to the installation plan in the following section to prepare your environment.

6.3.1 Installing and updating the plan for WebSphere Commerce V7.0 Server and its components

This section provides information to help you plan your configuration of WebSphere Commerce V7.0. We provide the software update procedures and necessary download links to complete the configuration and feature enablement of the WebSphere Commerce V7.0 Feature Pack 2 server for the advanced search model.

We used the SUSE Linux Enterprise Server 11.4 64-bit operating system on all machines in our environment. We installed the WebSphere Commerce V7.0 product from the appropriate compact disc or distribution media.

**WebSphere Application Server V7.0 product updates**

You can obtain the details about the preparation of the Linux operating system for the WebSphere Application Server V7.0 product installation at this website:


After installation, the first part of the update plan relates to WebSphere Application Server V7.0. After you update the WebSphere Application Server V7.0 Installer, you use this updated installer to update the WebSphere Application Server, plug-ins, HTTP IBM Server (HIS), and Java software development kit (SDK). You can obtain the download help links and instructions for the WebSphere Application Server V7.0 updates at this website:
Installing WebSphere Application Server, creating a default profile, and updating the server to the latest version

Refer to 6.5, “Installing WebSphere Application Server with default profile creation and update” on page 137.

WebSphere Commerce V7.0 product updates and FEP2 enablement

The second part of the update plan relates to WebSphere Commerce V7.0 Feature Pack 2.

Perform the following steps to update your version of WebSphere Commerce V7.0 and enable Feature Pack 2:

1. Update WebSphere Commerce Installer to WebSphere Commerce Fix Pack 2 (7.0.0.2) for Server:
   - Download the link:
     ftp://public.dhe.ibm.com/software/websphere/commerce/70/updi7002/download.up
dii.7002.linux.amd64.zip
   - Refer to this Help link:
     http://www-01.ibm.com/support/docview.wss?uid=swg24013502
   You use the WebSphere Commerce Update Installer tool to apply fix packs and authorized program analysis reports (APARs) to your WebSphere Commerce installation. The WebSphere Commerce Update Installer is packaged as a separate program. You must first install the Update Installer before you can apply the WebSphere Commerce maintenance packages (.pak files) to your WebSphere Commerce configuration.

2. Install the WebSphere Commerce V7.0.0.2 Fix Pack:
   - Download this link:
ak
   A fix pack is applied on top of a specific version or release.

3. Create a WebSphere Commerce instance:
   - Create the WebSphere Commerce instance using Configuration Manager or ANT targets.
   - Refer to this Help link:
     http://publib.boulder.ibm.com/infocenter/wchelp/v7r0m0/topic/com.ibm.commerc
e.install.doc/tasks/tig_part_create_instances.htm
   In this step, we connect to the database. Ensure that you can connect to the DB2® server. After successfully creating an instance, we can install Feature Pack 2.

4. Install IBM WebSphere Commerce V7.0 Feature Pack 2.0 (FEP2) for Multiplatform Multilingual:
   - Download these instructions:
     Refer to IBM Passport Advantage® and locate the CZN2EML package.

5. Enable the Feature Pack 2 features:
   WebSphere Commerce V7.0 Feature Pack 2 includes all the features that were previously released with Feature Pack 1.0. The WebSphere Commerce V7.0 Feature Pack 2 Version 2.0.0.0 includes the following features:
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– Foundation 7.0.2.0
– Management-center 7.0.2.0
– Store-enhancements 7.0.2.0
– Social-commerce 7.0.2.0
– Content-version 7.0.2.0
– Sterling-integration 7.0.2.0

After installing Feature Pack 2, you can choose which of these features you want to enable. You can enable several of these features automatically.

In the following two sections, we describe the enablement of the WebSphere Commerce foundation feature and starter store-enhancements feature.

**Tip:** You do not need to perform the foundation feature enablement for this procedure to succeed. Enabling the store enhancement features only automatically enables the dependent features, which are a part of the management-center and foundation features.

If you need to enable any other feature and if you understand the dependencies between the features and their automatic enablement, visit this information center page and prepare your environment, as suggested:


### 6.3.2 WebSphere Commerce foundation feature enablement procedure

Prepare your WebSphere Commerce machine for feature enablement. Perform the following procedure:

1. Log on as a WebSphere Commerce non-root user.
2. Navigate to the following directory:
   
   cd /opt/IBM/WebSphere/AppServer/bin

3. Start the server1 instance:
   
   ./startServer server1

4. Increase the file handle limit.
   
   Switch to the root user and issue the command:
   
   ulimit -n 8192

   Switch back to the non-root user.

5. Run the enablement script for search WebSphere Commerce foundation feature.

   Enable the WebSphere Commerce foundation feature change working directory:
   
   cd /opt/IBM/WebSphere/CommerceServer70/bin

6. Execute the script in Example 6-1.

   **Example 6-1   Enable the WebSphere Commerce foundation feature**

   ```
   ./config_ant.sh -buildfile
   /opt/IBM/WebSphere/CommerceServer70/components/common/xml/enableFeature.xml
   -DinstanceName=demo -DfeatureName=foundation -DdbUserPassword=inst1pas
   -DremoteSearchEngine=true
   ```

   We define the parameters in Example 6-1:
**DinstanceName**  
The name of the WebSphere Commerce instance.

**DfeatureName**  
The name of the FEP2 feature for enablement.

**DdbUserPassword**  
The password for the DB2 user connecting to the database.

**DRemoteSearchEngine**  
To deploy the search server on a remote server, specify the value of this flag parameter to true. This value is necessary for our remote deployment configuration.

7. Ensure that the script runs successfully. If the script runs successfully, you see the BUILD SUCCESSFUL message displayed in the console ().

![Figure 6-5](image)

**Figure 6-5**  
Console output for the execution of the config_ant.sh script

8. You can locate the complete log file at this location:

```
/opt/IBM/WebSphere/CommerceServer70/instance/demo/logs/enablefoundation_2011.03.29_00.34.27.557.log
```
6.3.3 Madisons starter store enhancement enablement procedure

The Madisons starter store enhancements include co-shopping functionality, search integration, subscriptions and recurring orders, Coremetrics Intelligent Offer functionality, and support for Management Center price lists and price rules.

In this section, you complete the following steps:
1. Run the enablement script for starter store enhancements.
2. Publish the Madisons starter store archive.
3. Publish the Madisons enhancements store archive.
4. Enable the search-based navigation store function.

Running the enablement script for starter store enhancements

Perform these steps to enable WebSphere Commerce starter store enhancements in the Madisons store:
1. Ensure that you are logged on as the WebSphere Commerce non-root user.
2. Increase the file handle limit.
   Switch to the root user and issue the command:
   ```bash
   ulimit -n 8192
   ```
   Switch to the non-root user.
3. Run the enablement script.
   Running the starter store enhancements enablement script also enables the Management Center feature. If the Management Center feature is currently disabled, it is enabled after running the starter store enhancements enablement script.
   Use this command to enable the store-enhancements feature change working directory:
   ```bash
   cd /opt/IBM/WebSphere/CommerceServer70/bin
   ```
   Execute the script in Example 6-2.
   ```bash
   Example 6-2 Enabling store-enhancements feature
   ./config_ant.sh -buildfile
   /opt/IBM/WebSphere/CommerceServer70/components/common/xml/enableFeature.xml
   -DinstanceName=demo -DfeatureName=store-enhancements -DdbUserPassword=inst1pas
   ```
4. Ensure that the script runs successfully. If the script runs successfully, the BUILD SUCCESSFUL message is displayed in the console (Figure 6-6 on page 126).
You can see the complete log file at this location:

```
/opt/IBM/WebSphere/CommerceServer70/instance/demo/logs/enablestore_enhancements_2011.03.29_01.47.05.179.log
```

**Tip:** There is no need to add the following parameters to the enablement script for our example, because the WebSphere Commerce foundation feature is enabled in previous step:

```
[-DremoteSearchEngine=true] [-DsolrHome=solrhome]
```

**Publishing the Madisons starter store archive**

Use the publish wizard to publish the Madisons-FEP.sar store archive that was updated in Feature Pack 2.

Complete the following steps:

1. Open the Administration Console (Figure 6-7 on page 127). Enter the user name and password and click Log On.
2. Select the **Site** option (Figure 6-8) and click **OK**.
3. Go to the Store Archives menu and select **Publish** (Figure 6-9).

![Figure 6-9 Selecting the Publish option from the Store Archives menu](image)

The Store Archive page shows list of store archives that can be published.
4. Select **Madisons-FEP.sar** from the list (Figure 6-10).

![Figure 6-10 Selecting the Madisons-FEP.sar archive](image)

5. Click **Next**. You see a window that is similar to Figure 6-11.

![Figure 6-11 Parameters page](image)

A page with parameters is displayed (Figure 6-11). Depending on the store archive that you selected, various parameters are displayed.
6. Click **Next**. You see a window similar to Figure 6-12.

![Figure 6-12 Summary page](image1)

**Figure 6-12** Summary page

The **Summary page** displays.

7. Click **Finish** and you see a window that is similar to Figure 6-13.

![Figure 6-13 Publish status page](image2)

**Figure 6-13** Publish status page

The **Publish Status** confirmation page displays with a job number.
8. Click **Refresh**.
   Verify that the field Publish Status displays **Successful** for its value (Figure 6-14).

You have successfully published the Madisons starter store archive.

---

**Figure 6-14  Publish Status page: Successful publishing**

**Publishing the Madisons enhancements store archive**

The MadisonsEnhancements.sar file is a store archive that adds features to the Madisons starter store.

Here, we describe the steps of the Publish wizard in the Administration Console that are needed to publish this store archive on top of the Madisons starter store.

Complete the following steps:

1. Repeat steps 1 on page 126 and 2 on page 127 from the Publishing the Madisons starter store archive section for opening the Administrative Console and the Selecting the Site option.
2. From the menu Store Archives, select **Publish** (Figure 6-15).

![Figure 6-15 Selecting the Publish option from Store Archives menu](image)

3. On that Store Archives page that is displayed, from the **View** list box, select **Add on Feature** (Figure 6-16).

4. Select **MadisonsEnhancements.sar** by clicking the check box field next to its name.

![Figure 6-16 Selecting the Add On Feature from the View list box on the Store Archives page](image)
5. Click **Next**.

The Publish Wizard publishes the Madisons enhancements store archive on top of the Madisons starter store. Continue performing the following steps:

1. On the Parameters page that is displayed, select the Madisons starter store (Marketing store identifier) called **MadisonsFEP2** (Figure 6-17).

![Figure 6-17 Parameters page](image)

2. Click **Next**. You see a window similar to Figure 6-18.

![Figure 6-18 Summary page](image)
3. The summary page displays a listing of the selected store archive parameters and the location to which the archive is to be published. Complete these tasks:
   a. Review the summary information and click **Finish**.
   b. In the Publish Status window, click **Refresh** to check the publishing status (Figure 6-19).

4. Verify that the value of the field **Publish Status** is **Successful**.

You have successfully published the Madisons enhancements store archive.

**Enabling the search-based navigation store function**

This section describes how to enable the search-based navigation for a storefront.

*Search-based navigation* enhances starter stores by performing searches against categories when a shopper browses a storefront catalog. All immediate categories and products are returned in the results, and you can also include the related subcategories to increase the scope.

Complete the following steps to enable the catalog-based navigation:

1. Log on to the Management Center.
2. From the Management Center Tools drop-down menu, select **Store Management** (Figure 6-20).

![Figure 6-20 Store Management selection](image)

3. Click **Stores** in the explorer view (Figure 6-21).

![Figure 6-21 Selecting Stores in the explorer view](image)
4. Right-click the displayed **MadisonsFEP2** store in the Stores - List and click **Open** (Figure 6-22).

![Image](image_url)

**Figure 6-22** List of options in the store menu for the selected store MadisonsFEP2

5. The MadisonsFEP2 store is now opened. Complete these tasks:
   a. With the MadisonsFEP2 store open, select the **Catalog** tab (see Figure 6-23).
   b. Select **Search-based navigation**, which is the last check box in the list.

![Image](image_url)

**Figure 6-23** Checking Search-based navigation for MadisonsFEP2
6. Click **Save and Close**. See Figure 6-24.

![Image of Management Center](image.jpg)

*Figure 6-24  Saving and closing the MadisonsFEP2*

Your storefront now has search-based navigation enabled.

### 6.4 Preparing the remote search server

Now, you set up the Solr search on the remote search server and prepare it to work with the WebSphere Commerce machine. First, you install and update WebSphere Application Server on the remote search machine, on which `solr.war` will be deployed and configured to communicate with the Commerce server and DB server. Next, you install and test the DB2 client on the remote search machine. Then, you set up the IBM HTTP Server and Plug-in component on the remote search machine and configure the server for Solr. The last step is to run the command that creates a WebSphere Application Server search profile and all the necessary objects and deploys the `solr.war`.

#### 6.4.1 Preparing the remote search machine procedure

In order to complete the remote search machine preparation, you have to perform all the following activities:

- Installation of WebSphere Application Server with default profile creation and update.
- Installation of the database client.
- Installation of the web server.
- Deployment of the Solr application.
- Configuration of the web server for the Solr application.

### 6.5 Installing WebSphere Application Server with default profile creation and update

Make sure that the **default** profile is created during the WebSphere Application Server V7.0 installation. You can obtain information about the default profile in the following directory:

```
/opt/IBM/WebSphere/AppServer/profiles
```

The profile that is named `AppSrv0` is created. You can obtain details about this profile in this file:

```
/opt/IBM/WebSphere/AppServer/profiles/AppSrv01/logs/AboutThisProfile.txt
```
After completing all the updating steps in this section, the WebSphere Application Server V7.0 is updated to IBM Update Installer V7.0.0.15 for WebSphere Application Server V7.0 Fix Pack 15 for Linux 64-bit version.

There are two parts in this section. In the first part, we explain how to update the WebSphere Application Server V7.0 Installer product. And in the second part, we explain how to update the Installer to update the WebSphere Application Server V7.0 product with all necessary packages.

### 6.5.1 Updating the WebSphere Application Server V7.0 Installer

You must update the WebSphere Application Server V7.0 Installer to the IBM Update Installer V7.0.0.15 for WebSphere Software for Linux 64-bit version. For Help, see this link at the information center:


Complete the following steps to install the prerequisites:

1. Install the WebSphere Application Server V7.0 product.
2. Locate this package on the download page:
   - 64-bit x86 AMD/Intel (tar.gz)
3. Download the package using this download link for openSUSE 64bit:
   [ftp://public.dhe.ibm.com/software/websphere/appserv/support/tools/UpdateInstaller/7.0.x/LinuxAMD64/7.0.0.15-WS-UPDI-LinuxAMD64.tar.gz](ftp://public.dhe.ibm.com/software/websphere/appserv/support/tools/UpdateInstaller/7.0.x/LinuxAMD64/7.0.0.15-WS-UPDI-LinuxAMD64.tar.gz)

Perform the following steps after the download:

1. Extract the downloaded Update Installer package (*.tar.gz) file to a temporary directory.
2. Navigate to the UpdateInstaller subdirectory.
3. Use the installation wizard to install the Update Installer. To launch the Wizard interface, run the command:
   ```bash
   ./install
   ```
4. After the installation is complete, change to your working directory and run the following update script to install all four update packages for WebSphere Application Server V7.0: AppServer, Plug-ins, IBM HTTP Server (IHS), and software development kit (SDK) (Example 6-3).

   **Example 6-3  Running the script for Update Installer**
   ```bash
   cd /opt/IBM/WebSphere/UpdateInstaller
   ./update.sh
   ```

### 6.5.2 Updating WebSphere Application Server V7.0

You need to update WebSphere Application Server V7.0 to the 7.0.0.15: WebSphere Application Server V7.0 Fix Pack 15 for Linux version. See the Help link:

Use the Update Installer to install updates for all of these WebSphere Application Server V7.0 packages:

- 64-bit x86 AMD/Intel® AppServer
- 64-bit x86 AMD/Intel Plug-ins
- 64-bit x86 AMD/Intel IBM HTTP Srvr
- 64-bit x86 AMD/Intel Java SDK

Use this FTP download link list to download update packages for WebSphere Application Server V7.0, Plug-in, IHS, and SDK:

- WebSphere Application Server V7.0:
  [ftp://public.dhe.ibm.com/software/websphere/appserv/support/fixpacks/was70/cumulative/cf70015/LinuxX64/7.0.0-WS-WAS-LinuxX64-FP0000015.pak](ftp://public.dhe.ibm.com/software/websphere/appserv/support/fixpacks/was70/cumulative/cf70015/LinuxX64/7.0.0-WS-WAS-LinuxX64-FP0000015.pak)

- Plug-in:
  [ftp://public.dhe.ibm.com/software/websphere/appserv/support/fixpacks/was70/cumulative/cf70015/LinuxX64/7.0.0-WS-PLG-LinuxX64-FP0000015.pak](ftp://public.dhe.ibm.com/software/websphere/appserv/support/fixpacks/was70/cumulative/cf70015/LinuxX64/7.0.0-WS-PLG-LinuxX64-FP0000015.pak)

- IBM HTTP Server:
  [ftp://public.dhe.ibm.com/software/websphere/appserv/support/fixpacks/was70/cumulative/cf70015/LinuxX64/7.0.0-WS-IHS-LinuxX64-FP0000015.pak](ftp://public.dhe.ibm.com/software/websphere/appserv/support/fixpacks/was70/cumulative/cf70015/LinuxX64/7.0.0-WS-IHS-LinuxX64-FP0000015.pak)

- SDK:
  [ftp://public.dhe.ibm.com/software/websphere/appserv/support/fixpacks/was70/cumulative/cf70015/LinuxX64/7.0.0-WS-WASSDK-LinuxX64-FP0000015.pak](ftp://public.dhe.ibm.com/software/websphere/appserv/support/fixpacks/was70/cumulative/cf70015/LinuxX64/7.0.0-WS-WASSDK-LinuxX64-FP0000015.pak)

This is the complete Linux 64-bit update package list with file names:

- 7.0.0-WS-WAS-LinuxX64-FP0000015.pak
- 7.0.0-WS-WASSDK-LinuxX64-FP0000015.pak
- 7.0.0-WS-PLG-LinuxX64-FP0000015.pak
- 7.0.0-WS-IHS-LinuxX64-FP0000015.pak

**Tip:** Do not try to unpack downloaded *.pak files. Copy all these files to the `/opt/IBM/WebSphere/UpdateInstaller/maintenance` folder. Then, during the installation process, point to this location when asked for the Installer maintenance folder.
See Figure 6-25 for the names of the *.pak files and the Installer maintenance folder path in the file system.

Figure 6-25   Names of package files and Installer maintenance folder path

Perform all the steps in the installation wizard. Verify that your update is successful.

6.6 Installing the database client

WebSphere Commerce V7.0 Feature Pack 2 is set to work with the DB2 Universal Database™ Enterprise Server Edition V9.5.4 for Linux 64-bit version of DB2.

For the search machine, it is necessary to install the database client that matches the WebSphere Commerce machine’s database. You need to obtain and install IBM Data Server Client Version 9.5 Fix Pack 4 for Linux 64-bit.

The client installation is straightforward, but there are two important steps that we describe here to make the installation possible on SUSE Linux Enterprise Server 11.4 64-bit. After that, we show you how to connect the installed client to the WebSphere Commerce database server.
Troubleshooting: Make sure that installation path for the client does not contain any blank characters.

Before starting the client installation, make sure that you have installed the necessary libraries. In our example, we need to download and install the `libstdc++33` library, as shown in Figure 6-26.

![Figure 6-26 Library libstdc++33](image)

Run the command in Figure 6-27 to install the package.

```
$ rpm -i libstdc++33-3.3.3-7.10.x86_64.rpm
```

![Figure 6-27 Installing libstdc++33](image)

You can use the openSuse administration tool called Yast to locate the `libstd` installed library and to make sure that no files are missing (Figure 6-28).

![Figure 6-28 Searching for the installed library using the openSUSE tool Yast](image)
After you install your client, try to connect to the remote DB server.

### 6.6.1 Connecting to the remote DB2 server

On the DB2 server side, you configure the instance for TCP/IP communication and port 50002 is opened to allow remote clients to access data. On the client-side, the DB2 instance is created and the instance name is the same as the user name. You use the installation wizard to set up the DB2 client. The instance owner's information and credentials are provided as step 9 of the installation wizard, and they are shown in Example 6-4 and in Figure 6-29.

**Example 6-4   DB2 instance details**

- **Username:** db2inst1
- **Password:** inst1pas
- **Home directory:** /home/db2inst1

![DB2 client installation wizard Step 9: Setting up the instance owner's credentials](image)
Perform these steps to connect from the DB2 client on the search machine to the remote Commerce DB2 server:

1. On the remote search machine, where the DB2 client is installed, switch to the `db2inst1` user and issue the command line processor (CLP) invocation command: `db2` (Figure 6-30).

   ![Figure 6-30](image)

   ```
   find /opt/ibm/db2v9.5/for_linux/installed->_dir -name 'bin' | head -n 1
   su - db2inst1
   db2inst1@Linux-01:~$ db2
   | (c) Copyright IBM Corporation 1993,2007
   Command Line Processor for DB2 Client 9.5.4
   You can issue database manager commands and SQL statements from the command prompt. For example:
   db2 -> connect to sample
   db2 -> bind sample.bnd
   For general help, type: ?.
   For command help, type: ? command, where command can be the first few keywords of a database manager command. For example:
   ? CATALOG DATABASE for help on the CATALOG DATABASE command
   ? CATALOG for help on all of the CATALOG commands.
   To exit db2 interactive mode, type QUIT at the command prompt. Outside interactive mode, all commands must be prefixed with 'db2'.
   To list the current command option settings, type LIST COMMAND OPTIONS.
   For more detailed help, refer to the Online Reference Manual.
   db2 ->
   ```

   ![Figure 6-30](image)

2. Run the `catalog tcpip node` and `catalog database` commands using the IP address of the remote DB2 server and the proper port (Figure 6-31). The port number is set during the DB2 server installation.

   ![Figure 6-31](image)

   ```
   db2 -> catalog tcpip node nodeb remote 9.42.171.192 server 50002
   DB2000G The CATALOG TCP/IP NODE command completed successfully.
   DB22004W Directory changes may not be effective until the directory cache is refreshed.
   db2 -> catalog database mall as mall at node nodeb
   DB2000G The CATALOG DATABASE command completed successfully.
   DB22004W Directory changes may not be effective until the directory cache is refreshed.
   db2 ->
   ```

   ![Figure 6-31](image)

We describe the commands:

- **CATALOG TCP/IP NODE**

  This command adds a TCP/IP node entry to the node directory. The command is run on a client.

- **CATALOG DATABASE**

  This command stores the database location information in the system database directory. The database can be located either on the local workstation or on a remote node.

For the command parameters, Commerce’s database name in this example is `mall` and the node name that is used is `nodeb`. 

---

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3. Using the DB2 CLP, run the commands as shown in Example 6-5 to list the node and database directory, and check the results in Figure 6-32.

Example 6-5  DB2 commands for listing the database directory and node directory

<table>
<thead>
<tr>
<th>Command</th>
</tr>
</thead>
<tbody>
<tr>
<td>list database directory</td>
</tr>
<tr>
<td>list node directory</td>
</tr>
</tbody>
</table>

```plaintext
* Output Example *

db2 => list database directory
System Database Directory
Number of entries in the directory = 1
Database 1 entry:
  Database alias       = MALL
  Database name        = MALL
  Node name            = NODEB
  Database release level = 2.00
  Comment              =
  Directory entry type = Remote
  Catalog database partition number = -1
  Alternate server hostname =
  Alternate server port number =
db2 => list node directory
Node Directory
Number of entries in the directory = 1
Node 1 entry:
  Node name            = NODEB
  Comment              =
  Directory entry type = LOCAL
  Protocol             = TCP/IP
  Hostname             = 9.42.171.192
  Service name         = 50002
```

Figure 6-32  Executing the list database directory and list node directory commands

The verification step ensures that both commands executed successfully.

4. Issue the command in Example 6-6 to connect to the remote database named `mall`. Execute the `select` query from a Commerce database table to get the example data (Figure 6-33 on page 145).

Example 6-6  Connecting to the Commerce database and running the select query

<table>
<thead>
<tr>
<th>Command</th>
</tr>
</thead>
<tbody>
<tr>
<td>connect to mall user db2inst1 using inst1pas</td>
</tr>
<tr>
<td>select * from userreg</td>
</tr>
</tbody>
</table>

In Example 6-6, the name of the Commerce database is `mall`, the database user name is `db2inst1`, and the database password is `inst1pas`. 
Chapter 6. Search environment setup

6.7 Installing the web server

In our search example, we use the remote search machine with the Solr application deployed. The Solr application must use a separate web server; therefore, you must install and configure another web server and point it to the Solr profile plug-in file.

On the same search machine where WebSphere Application Server V7.0 with Solr is installed, install IBM HTTP Server Version 7.0.0.15 of the web server. The installation is straightforward. We only show two steps from the installation wizard here. Those two steps affect the overall configuration.

The DB2 client on the remote search machine is installed successfully now and ready to use with WebSphere Commerce.
We install the IBM HTTP Server Plug-in for IBM WebSphere Application Server with the following details (Figure 6-34).

![Figure 6-34 Web Server installation wizard showing the plug-in installation details](image)

Figure 6-34  Web Server installation wizard showing the plug-in installation details

Figure 6-35 shows the installation summary.

![Figure 6-35 Web server installation summary](image)

Figure 6-35  Web server installation summary
You can access the web server configuration file here:
/opt/IBMIHS/HTTPServer/conf/http.conf

**Important:** Do not try to run the Solr deployment script (ws_ant.sh) before making sure that your solr-deploy.properties file contains the proper Web Server Definition Properties. Refer to the Web Server Definition Properties section of the solr-deploy.properties file. Locate all web server configuration-related key/value pairs and make sure that they match the proper values in the web server configuration file named http.conf.

### 6.8 Deploying the Solr application

The deployment of the WebSphere Commerce search solr.war file is a manual process with provided scripts. We describe this deployment in detail in this chapter.

The WebSphere Commerce FEP2 features enablement generated the relevant property files for search and placed them on the file system of the WebSphere Commerce machine. To deploy the search in advanced mode and on a separate remote search machine, the search files have to be moved from the WebSphere Commerce machine to the remote search machine and updated with the proper, specific values for remote configuration.

On the remote search machine, to deploy solr.war to WebSphere Application Server, the deployment script ws_ant.sh must perform a set of operations described in the deploySearch.xml file. We use the updated values in the solr-deploy.properties file during script execution.

The deploySearch.xml file is located in working_dir/search/deploy/deploySearch.xml.

Example 6-7 lists the tasks in the deploySearch.xml file.

**Example 6-7  Deployment tasks**

create “solr home” on the file system.
update solr.war/WEB-INF/web.xml by specifying the solr home string.
create a profile with name <instanceName>_solr.
create authAlias.
create JDBC driver.
create dataSource.
create virtual hosts.
deploy solr.war with application name ‘solr’.
create web server definition.
generate web server plug-in file.

For more information, see the information center pages for administering and deploying the WebSphere Commerce search:
http://publib.boulder.ibm.com/infocenter/wchelp/v7r0m0/topic/com.ibm.commerce.developer.doc/concepts/csdmanagesearch.htm

**Troubleshooting:** The file location paths, directory paths, script paths, and command examples with parameters that are presented in our examples are unique for our search-specific environment. To understand and use them properly in your environment, see the previous information center link and locate the generic and relative file and directory paths and the full command format for help.
We use these steps in the deployment procedure:

- Copying the search component from the Commerce machine to the remote search machine
- Updating the property values in the `solr-deploy.properties` file
- Running the Solr deployment script

### 6.8.1 Copying the search component from the WebSphere Commerce machine to the remote search machine

Select the following directory from your WebSphere Commerce machine:

```
/opt/IBM/WebSphere/CommerceServer70/components/foundation/subcomponents/search
```

Copy it to the working directory, which is `/home/redbooks/INSTALL/` in our example, on your remote search machine:

```
/home/redbooks/INSTALL/search
```

### 6.8.2 Updating the property values in the `solr-deploy.properties` file

Open the properties file:

```
/home/redbooks/INSTALL/search/deploy/properties/solr-deploy.properties
```

Review the property values that were generated during the feature enablement and update them.

**Important:** Updates in the `solr-deploy.properties` file are necessary, because properties for WebSphere Application Server V7.0 and IHS contain local Commerce file path values. You must change these file path values to reflect the installation paths of WebSphere Application Server V7.0 and IHS on the remote search server.

In the next example, there are five key/value pairs that need to be updated for this specific remote configuration. They all relate to WebSphere Application Server V7.0 and IHS. All other key/value pairs are unchanged and not displayed in following file extract that is shown in Example 6-8.

**Example 6-8  Updated values in the `solr-deploy.properties` file**

```
# System properties for WebSphere Commerce Solr Integration

# Fully qualified WebSphere Application Server hostname, e.g., wcsmachine.torolab.ibm.com
WASHostName=linux-530s.site

# Web Server Definition properties

# Important: Updates in the `solr-deploy.properties` file are necessary, because properties for WebSphere Application Server V7.0 and IHS contain local Commerce file path values. You must change these file path values to reflect the installation paths of WebSphere Application Server V7.0 and IHS on the remote search server.

In the next example, there are five key/value pairs that need to be updated for this specific remote configuration. They all relate to WebSphere Application Server V7.0 and IHS. All other key/value pairs are unchanged and not displayed in following file extract that is shown in Example 6-8.

**Example 6-8  Updated values in the `solr-deploy.properties` file**

```
# System properties for WebSphere Commerce Solr Integration

# Fully qualified WebSphere Application Server hostname, e.g., wcsmachine.torolab.ibm.com
WASHostName=linux-530s.site

# Web Server Definition properties

```
6.8.3 Running the Solr deployment script

The following script creates the new WebSphere Application Server profile, all necessary objects, and deploys the solr.war.

To deploy the solr.war, perform these steps:

1. Navigate to the bin directory on WebSphere Application Server:
   ```bash
cd /opt/IBM/WebSphere/AppServer/bin
   ```
2. Run the deployment script that is shown in Example 6-9.
   ```bash
   ./ws_ant.sh -buildfile /home/redbooks/INSTALL/search/deploy/deploySearch.xml -DdbUserPassword=inst1pas -DsolrHome=/home/redbooks/solr_search/
   ```

In Example 6-9, these parameters have these meanings:

- **dbuserpwd** The password for the user connecting to the db2inst1 database.
- **solrhome** Optional: The location of the Solr Home directory path, which contains the index data of Solr. The value must be an absolute path.

For this example, we created and used the new directory, /home/redbooks/solr_search/.

3. Verify that the build was successful by looking at the log file. See Appendix A, “Log file lookup” on page 251.

**Solr deployment results**

The solr application installed successfully. Next, we describe the most important details of the Solr deployment:

- Details of Solr Home:
  ```latex
  name="solr.solr.home" value="/home/redbooks/solr_search/
  ```

- The new WebSphere Application Server profile demo_solr is created. For more information about this profile, look at this website:
  ```latex
  /opt/IBM/WebSphere/AppServer/profiles/demo_solr/logs/AboutThisProfile.txt
  ```
In Figure 6-36, you can see both profiles on WebSphere Application Server. The first profile, which is called AppSrv01, was created during the WebSphere Application Server V7.0 installation.

![WebSphere Application Server V7.0 profiles on the remote search machine](image)

Figure 6-36   WebSphere Application Server V7.0 profiles on the remote search machine

The server named solrServer was ready to use or “opened for e-business” during the ws_ant.sh script execution.

**Tip:** Before you start the initial testing of solr search in your browser, restart solrServer.

To restart solrServer and check the server status, perform all steps that are in Example 6-10.

**Example 6-10   Restarting solrServer**

```bash
cd /opt/IBM/WebSphere/AppServer/profiles/demo_solr/bin/
./stopServer.sh solrServer
./startServer.sh solrServer
./serverStatus.sh solrServer
```

Use this file for troubleshooting:
```
/opt/IBM/WebSphere/AppServer/profiles/demo_solr/logs/solrServer/SystemOut.log
```

6.9 Configuring the web server for the Solr application

To configure the web server for the Solr application, you have to update the web server configuration. Port 3737 needs to be opened and you have to point to the Plug-in configuration file path.

Complete the following steps:

1. Open the configuration file:

   ```bash
   /opt/IBM/HTTPServer/conf/httpd.conf
   ```

2. In the Listen section in the `httpd.conf` configuration file, add a new value for port 3737 (Figure 6-37).

![Listen section in httpd.conf file](image)
3. In the LoadModule section in the `httpd.conf` configuration file, point to the plug-in configuration file, as shown in Example 6-11.

```
Example 6-11  Load Module section of httpd.conf file

LoadModule was_ap22_module
/opt/IBMIHS/HTTPServer/Plugins/bin/32bits/mod_was_ap22_http.so

/opt/IBM/WebSphere/AppServer/profiles/demo_solr/config/cells/demo_search_cell/nodes/demo_search_node/servers/solrWebserver/plugin-cfg.xml
```

After changing the `httpd.conf` file, always restart the web server using the steps in Example 6-12.

```
Example 6-12  Restarting the web server

cd /opt/IBMIHS/HTTPServer/bin/
./apachectl.sh stop
./apachectl.sh start
```

6.10 Creating the mappings from the WebSphere Commerce server to the remote server for search term associations

This step is necessary for search term associations to function properly when deploying search remotely. We did not use it in our examples. For more information, refer to the information center:

```
http://publib.boulder.ibm.com/infocenter/wchelp/v7r0m0/topic/com.ibm.commerce.developer.doc/tasks/tsdsearchbuilddeployremote.htm
```

6.11 Testing the search deployment

If all previous steps were successful, you can test search deployment.

Follow these steps:
1. Ensure that your search server is up and running.
2. Test your search deployment by navigating to the following URL:

```
http://<hostname>:3737/solr/Default/select?q=*%3A*
```

If successful, you receive a response in XML format, which is similar to Example 6-13.

```
Example 6-13  Testing the search on the Solr server using browser

<response>
  <lst name="responseHeader">
    <int name="status">0</int>
    <int name="QTime">9</int>
    <lst name="params">
      <str name="q">*:*</str>
    </lst>
  </lst>
</response>
```
6.12 Setting up and deploying the search index

This section describes how to set up the search index and deploy the index structure on the remote search machine, after the successful Solr deployment. If you performed all previous advanced deployment steps with no errors, you can run your WebSphere Commerce server and WebSphere Commerce search on separate machines and be able to communicate and perform search operations.

Figure 6-38 shows setting up the WebSphere Commerce search index structure for a specific master catalog in the standard and advanced configuration.

![Diagram showing the process of setting up and deploying the search index.](image-url)
6.12.1 Complete indexing procedure description

The indexing procedure requires these steps:
1. Setting up the WebSphere Commerce search index remotely
2. Preprocessing the WebSphere Commerce search index data
3. Building the WebSphere Commerce search index
4. Replicating WebSphere Commerce search

6.13 Setting up the WebSphere Commerce search index remotely

This section describes how to set up the search index structure for a specific master catalog remotely. You can deploy your search index structure on your remote search machine and configure WebSphere Commerce to use the Solr index by running the search index setup utility. This utility ensures that your index is built successfully using your WebSphere Commerce master catalog data.

You run the search index setup utility on the WebSphere Commerce machine first and then on the remote search machine.

6.13.1 Index setup preparation

Make sure that you have finished all the steps in the previous sections for deploying Solr on the remote search machine.

Examine the catalog data model in your Commerce database and make sure that you are familiar with the search-related tables, languages, stores, and catalogs after the enablement of FEP2.

If you do not know the details about your catalog, run the following SQL:

```
select * from catalog where IDENTIFIER='YOUR_STORE_IDENTIFIER'
```

In our example (Example 6-14), we use the following master catalog ID.

```
Example 6-14 SQL query to obtain the master catalog ID based on the store identifier

select catalog_id from catalog where IDENTIFIER='MadisonsFEP2'
```

<table>
<thead>
<tr>
<th>Result:</th>
</tr>
</thead>
<tbody>
<tr>
<td>catalog_id</td>
</tr>
<tr>
<td>10001</td>
</tr>
</tbody>
</table>

Run this SQL script to find the initial data in the search-related tables, as shown in Example 6-15.

```
Example 6-15 SQL scripts for search-related tables

select * from srchattr
select * from srchattrprop
select * from srchconf
```
6.13.2 Preparing the WebSphere Commerce machine

On the WebSphere Commerce machine, perform the following steps:
1. Log on as a WebSphere Commerce non-root user.
2. Navigate to the following directory:
   ```
   cd /opt/IBM/WebSphere/CommerceServer70/components/foundation/subcomponents/search/bin
   ```
3. Run the search index setup utility, as shown in Example 6-16.

   ```
   ./setupSearchIndex.sh -instance demo -action configWCforSolr -masterCatalogId 10001 -dbuser db2inst1 -dbuserpwd inst1pas -searchServerName linux-530s -searchServerPort 3737 -searchServiceContextRoot /solr
   ```

   Example 6-16  Running the search index setup utility

   In Example 6-16, the parameters have these definitions:

   - **instance_name**: The name of the WebSphere Commerce instance with which you are working.
   - **masterCatalogId**: The ID of the master catalog.
   - **dbuser**: The name of the DB2 user connecting to the database.
   - **dbuserpwd**: The password for the DB2 user connecting to the database.
   - **searchServerName**: The remote search server host name, where Solr is deployed.
   - **searchServerPort**: The search server port. The default value is 3737.
   - **searchServiceContextRoot**: The search service context root. For the Solr-related action, such as configSolrCores or configWCforSolr, the default value is /solr.
   - **indextype**: Optional: Search engine index to set up. The default value is CatalogEntry.

   Tip: Review all the values in the configuration database table SRCHCONF after performing the indexing procedure. You can obtain the detailed configuration of the index in the column SRCHCONF.CONFIG.

4. Ensure that the utility runs successfully and that the search index setup successfully completes without any errors.

5. If the setup does not complete successfully and displays warnings or errors, use the wc-search-index-setup.log file (Figure 6-39) for help with debugging.

   Figure 6-39  Location of wc-search-index-setup.log file

   The log file contains the details about all the executed steps (Example 6-17 on page 155).
Example 6-17  setupSearchIndex.sh utility execution result

=================================================================
WebSphere Commerce Search Index Setup Utility
=================================================================

Utility started at 2011-04-05 01:22:57
Configuration initialization started at 2011-04-05 01:22:57
Configuration initialization finished at 2011-04-05 01:22:58
Database initialization started at 2011-04-05 01:22:58
Database initialization finished at 2011-04-05 01:22:58
Initialization completed in 1.578 seconds.
Build and execute process job started at 2011-04-05 01:22:58

******************************************************************************
Started configuring WebSphere Commerce for Solr cores
******************************************************************************
Master Catalog Id: 10001
Index Type: CatalogEntry
Languages: [en_US]
******************************************************************************
   --- Started configuring pre-process. ---
   --- Finished configuring pre-process. ---
   --- Started configuring classic attribute. ---
   --- Finished configuring classic attribute. ---
   --- Started configuring attribute dictionary. ---
   --- Finished configuring attribute dictionary. ---
   --- Started configuring delta update. ---
   --- Finished configuring delta update. ---
   --- Started configuring wc-search.xml. ---
 Started exporting the wc-search.xml from EAR. It will take a few minutes.
profileName=demo
registry=/opt/IBM/WebSphere/AppServer/properties/profileRegistry.xml
profileHome=/opt/IBM/WebSphere/AppServer/profiles/demo
Finished exporting the wc-search.xml from EAR.

Started updating the wc-search.xml.
Finished updating the wc-search.xml.

Started importing the updated wc-search.xml to EAR. It will take a few minutes.
profileName=demo
registry=/opt/IBM/WebSphere/AppServer/properties/profileRegistry.xml
profileHome=/opt/IBM/WebSphere/AppServer/profiles/demo
Finished importing the updated wc-search.xml to EAR.
   --- Finished configuring wc-search.xml. ---

******************************************************************************
Finished configuring WebSphere Commerce for Solr cores

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Build and execute process job finished at 2011-04-05 01:25:14

Program exiting with exit code: 0.
Search index setup successfully completed without errors.

Utility stopped at 2011-04-05 01:25:14
Total running time is 137.361 seconds.

Procedure results
The search index setup is complete, the file wc-search.xml is updated, and one record was inserted into the database table SRCHCONF.

You can access the file wc-search.xml in this folder:
/opt/IBM/WebSphere/AppServer/profiles/demo/installedApps/WC_demo_cell/WC_demo.ear/xml/config/com.ibm.commerce.catalog-fep

In Example 6-18, you can see an extract from the wc-search.xml file with the advanced (remote) configuration details and core details.

Example 6-18 File wc-search.xml extract with configuration and core details

```xml
<config:server name="AdvancedConfiguration">
  <config:common-http URL="http://linux-530s:3737/solr/"
    allowCompression="true" connectionTimeout="5000"
    defaultMaxConnectionsPerHost="100" followRedirects="false"
    maxRetries="2" maxTotalConnections="100" soTimeout="2000"/>
</config:server>

Search indexes to be used for references

<config:index deltaUpdate="true" fullBuild="false"
  name="CatalogEntry"
  object="com.ibm.commerce.catalog.facade.server.services.search.metadata.solr.SolrCatalogNavigationViewImpl"/>
<config:index name="UnstructuredContent"
  object="com.ibm.commerce.catalog.facade.server.services.search.metadata.solr.SolrCatalogNavigationViewImpl"/>

<config:cores>
  <config:core catalog="10001" indexName="CatalogEntry"
    language="en_US" name="MC_10001_CatalogEntry_en_US"
    path="/MC_10001/en_US/CatalogEntry"
    serverName="AdvancedConfiguration" synonym="/conf/synonyms.txt"/>
```
The configuration table for the WebSphere Commerce search integration was changed during the script `setupSearchIndex.sh` execution. One record was inserted into the database table `SRCHCONF`, as shown in Example 6-19.

**Example 6-19  Search configuration in database**

```sql
select * from srchconf
```

<table>
<thead>
<tr>
<th>INDEXTYPE</th>
<th>INDEXSCOPE</th>
<th>LANGUAGE</th>
<th>CONFIGOPT</th>
<th>COUNTER</th>
</tr>
</thead>
<tbody>
<tr>
<td>CatalogEntry10001-1</td>
<td>IndexScopeTag=0,SearchServerPort=3737,SearchServerName=linux-530s,PreProcessConfigDirectory=/opt/IBM/WebSphere/CommerceServer70/instances/demo/search/pre-processConfig/MC_10001/DB2</td>
<td>0</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

1 record(s) selected.

### 6.13.3 Preparing the remote search machine

On the remote search machine, perform all the steps in the following procedure.

**Preparation steps**

Before running the search index setup utility, you need to review all the values in the `solr-deploy.properties` file and you must use the proper libraries in order for this step to succeed:

1. Open the `solr-deploy.properties` properties file:
   ```bash
   /home/redbooks/INSTALL/search/deploy/properties/solr-deploy.properties
   ```
   Review the property values that were generated during the feature enablement and update them to match your remote search machine configuration.

2. The database initialization uses the native library named `db2jcc2`. To prevent a failure in loading this library during the execution of the index setup utility, run this command:
   ```bash
   export LD_LIBRARY_PATH=/home/db2inst1/sqllib/lib64:$LD_LIBRARY_PATH
   ```

Perform the following steps:

1. Log on as a non-root user.
2. Navigate to the `bin` directory:
   ```bash
   cd /home/redbooks/INSTALL/search/bin
   ```
3. Run the search index setup utility from the `working_dir/search` directory, as shown in Example 6-20 on page 158.
Example 6-20 Running the search index setup utility

```
./setupSearchIndex.sh -instance demo -setupMode remote -action configSolrCores -masterCatalogId 10001 -dbuser db2inst1 -dbuserpwd inst1pas -wcServerName linux-fnai -wcServerPort 80 -wasHome /opt/IBM/WebSphere/AppServer -solrhome /home/redbooks/solr_search/
```

In Example 6-20, the parameters have these meanings:

- **instance_name**: The name of the WebSphere Commerce instance with which you are working.
- **setupMode remote**: Required for WebSphere Commerce Developer to be set up as remote on WebSphere Commerce. Optional for run time to indicate explicitly that a remote setup is used.
- **masterCatalogId**: The ID of the master catalog.
- **dbuser**: The name of the DB2 user connecting to the database.
- **dbuserpwd**: The password for the DB2 user connecting to the database.
- **dbname**: Optional: The DB2 database name to be connected.
- **dbport**: Optional: The DB2 database port to be connected.
- **dbserver**: Optional: The DB2 database server host location.
- **dbtype**: Optional: The database type, for example, cloudscape, DB2, or Oracle.
- **wcServerName**: The WebSphere Commerce Web Server host name.
- **wcServerPort**: The port of your WebSphere Commerce Web Server.
- **WAS_home**: The WebSphere Application Server home directory.
- **solrhome**: Optional: The location of the Solr Home directory path, which contains the index data of Solr. The value must be an absolute path. The default value is:
  
  `working_dir/search/instance_name/search/solr/home`

  For this example, we created and used this directory for Solr Home:
  
  `/home/redbooks/solr_search/`

- **indextype**: Optional: Search engine index to set up. The default value is `CatalogEntry`.

4. Ensure that the utility runs successfully and that the search index setup successfully completes without warnings or errors. If setup does not complete or it shows warnings or errors, use the `wc-search-index-setup.log` file for help with debugging. See Example 6-21 for details.

Example 6-21 Script setupSearchIndex.sh utility execution result

```
Using remote setup mode.
Using WAS Java. [Recommend]

=================================================================
WebSphere Commerce Search Index Setup Utility
=================================================================

Utility started at 2011-04-05 05:09:57
Configuration initialization started at 2011-04-05 05:09:57
```
Configuration initialization finished at 2011-04-05 05:09:58
Database initialization started at 2011-04-05 05:09:58
Database initialization finished at 2011-04-05 05:09:58
Initialization completed in 0.54 seconds.
Build and execute process job started at 2011-04-05 05:09:58

******************************************************
Started setup for Solr cores
******************************************************

Master Catalog Id: 10001
Index Type: CatalogEntry
Languages: [en_US]

******************************************************
--- Started checking directories for setup Solr cores. ---
--- Finished checking directories for setup Solr cores. ---

******************************************************
The following languages passed directory validation:
  - en_US

The following Solr cores will set up:
  - MC_10001_CatalogEntry_en_US
  - MC_10001_CatalogEntry_Unstructured_en_US

******************************************************
--- Started copying Solr core files. ---
--- Finished copying Solr core files. ---

--- Started configuring DIH (wc-data-config.xml). ---
--- Finished configuring DIH (wc-data-config.xml). ---

--- Started registering Solr core in solr.xml. ---
--- Finished registering Solr core in solr.xml. ---

Build and execute process job finished at 2011-04-05 05:09:58

Program exiting with exit code: 0.
Search index setup successfully completed without errors.

Utility stopped at 2011-04-05 05:09:58
Total running time is 0.887 seconds.

5. Notice the change in the file system on the remote search machine, as shown in Figure 6-40 on page 160.
Figure 6-40  Solr home with MC_10001 folder and solr.xml file created on remote search machine

6. Figure 6-41 shows the content of the MC_10001 folder.

Two core instance tags were added to the /home/redbooks/solr_search/solr.xml file, under the default instance, as shown in Figure 6-42.

Figure 6-42  The solr.xml file with two new cores

After setting up the search index structure for a specific master catalog, you must preprocess the search index data, which we describe in the next section.

6.14 Preprocessing the WebSphere Commerce search index data

You must preprocess the search index data to prepare your WebSphere Commerce data for indexing.

The preprocess utility extracts and flattens WebSphere Commerce data and then outputs the data into a set of temporary tables inside the WebSphere Commerce database. The data in the temporary tables is from the base schema and is then used by the index building utility to populate the data into Solr indexes using Solr’s Data Import Handler (DIH).
Complete the following steps:

1. Ensure that you have completed setting up the WebSphere Commerce search index structure for a specific master catalog as described in the previous chapter.

2. On the WebSphere Commerce machine, log on as a non-root user.

3. Navigate to the following directory:
   ```
   cd /opt/IBM/WebSphere/CommerceServer70/bin>
   ```

4. Run the preprocessing utility, as shown in Example 6-22.

   ```
   Example 6-22  Running preprocessing utility
   
   ./di-preprocess.sh
   /opt/IBM/WebSphere/CommerceServer70/instances/demo/search/pre-processConfig/MC_10001/DB2 -instance demo -dbuser db2inst1 -dbuserpwd inst1pas -fullbuild true
   ```

   In Example 6-22, the following parameters have these definitions:

   - **full-path**: Required: The full path location of the load order configuration file, for example:
     ```
     WC_installdir/instances/demo/search/pre-processConfig/MC_10001/DB2
     ```
     `MC_10001` represents masterCatalogID 10001.

   - **instance_name**: The name of the WebSphere Commerce instance.

   - **dbuser**: The name of the DB2 user connecting to the database.

   - **dbuserpwd**: The password for the DB2 user connecting to the database.

   - **fullbuild**: The flag indicating whether it is a full index build. The accepted values are either `true` or `false`. The default value is `true`.

   - **locaname**: The locale to index. The default value is `All`. The accepted values are either `All` or one of the following values:
     ```
     en_US, fr_FR, de_DE, it_IT, es_ES, pt_BR, zh_CN, zh_TW, ko_KR, ja_JP, ru_RU, ro_RO, pl_PL, or ar_EG
     ```

5. Ensure that the preprocessing utility runs successfully without errors or warnings.

### 6.14.1 Result

The preprocessing utility extracted WebSphere Commerce data and put the data into a set of temporary tables inside the WebSphere Commerce database.

You can obtain the path to the log file `wc-dataimport-preprocess.log` in Appendix A, “Log file lookup” on page 251. Example 6-23 shows an extract of the log file with the preprocessing script execution details.

```
Example 6-23  Extract of preprocess utility log

Apr 5, 2011 5:38:29 AM
com.ibm.commerce.foundation.dataimport.preprocess.DataImportPreProcessorMain logStartDate
INFO: Data import pre-processing started: Tue Apr 05 05:38:29 EDT 2011

Apr 5, 2011 5:38:30 AM
com.ibm.commerce.foundation.dataimport.preprocess.DataImportPreProcessorMain main
INFO: Data import pre-processing initialization completed in 0.539 seconds.
```
Apr 5, 2011 5:38:31 AM
com.ibm.commerce.foundation.dataimport.preprocess.AbstractDataPreProcessor
populateTable(PreparedStatement, Long, Connection)
INFO: The batch is being executed...

Apr 5, 2011 5:38:32 AM
com.ibm.commerce.foundation.dataimport.preprocess.DataImportPreProcessorMain
processDataConfig
INFO: Data import pre-processing completed in 1.707 seconds for table TI_CATENTRY_0.

Apr 5, 2011 5:38:40 AM
com.ibm.commerce.foundation.dataimport.preprocess.CatalogHierarchyDataPreProcessor
process(DataProcessingConfig, Connection, boolean, String)
INFO: Sales catalog processing complete.

Apr 5, 2011 5:38:40 AM
com.ibm.commerce.foundation.dataimport.preprocess.CatalogHierarchyDataPreProcessor
process(DataProcessingConfig, Connection, boolean, String)
INFO: Sales catalog processing complete.

Apr 5, 2011 5:38:40 AM
com.ibm.commerce.foundation.dataimport.preprocess.DataImportPreProcessorMain
processDataConfig
INFO: Data import pre-processing completed in 1.089 seconds for table TI_APGROUP_0.

INFO:
Program exiting with exit code: 0.
Data import pre-processing completed successfully with no errors.

For a complete list of temporary tables and their definitions, follow this link:

After preprocessing the search index data, you must build the search index, which we describe in the next section.

6.15 Building the WebSphere Commerce search index

You can build the WebSphere Commerce search index by using the index building utility.

The index building utility is a wrapping utility that updates the information in the master index using the Data Import Handler (DIH) service to build the index, either partially through delta index updates or completely through full-index builds. When there are multiple indexes, for example, each language using its own separate index, the index is built multiple times.
Chapter 6. Search environment setup

Preparation steps

Ensure that you have finished all the steps from the previous section, 6.14, “Preprocessing the WebSphere Commerce search index data” on page 160. Ensure that you have published wc.ear on the Commerce server and ensure that your Commerce server is started.

Complete the following steps:

1. On the WebSphere Commerce machine, log on as a non-root user.
2. Navigate to the bin directory:
   ```bash
cd /opt/IBM/WebSphere/CommerceServer70/bin>
   ```
3. Run the index building utility, as shown in Example 6-24.

   **Example 6-24** Running the index building utility
   ```bash
   ./di-buildindex.sh -instance demo -masterCatalogId 10001 -dbuser db2inst1
   -dbuserpwd inst1pas
   ```

   In Example 6-24, the parameters have the following definitions:

   - `masterCatalogId`: The ID of the master catalog.
   - `dbuser`: The name of the DB2 user connecting to the database.
   - `dbuserpwd`: The password for the DB2 user connecting to the database.
   - `fullbuild`: The flag indicating whether this build is a full-index build. The accepted values are either true or false. The default value is true.
   - `statusInterval`: The interval in milliseconds that the utility uses to check the index building status. The default value is 10,000 milliseconds.
   - `localename`: The locale to index. The accepted values are either All or one of the following values: en_US, fr_FR, de_DE, it_IT, es_ES, pt_BR, zh_CN, zh_TW, ko_KR, ja_JP, ru_RU, ro_RO, pl_PL, or ar_EG

4. Ensure that the index build is successful.

5. Result: The utility reports the status of the indexing progress based on the statusInterval parameter and by default prints every 10 seconds the number of documents indexed in each index, how long the utility has run, and the current indexing status. After the utility completes, it reports how many index builds failed. In Example 6-25, you can see the details from the build index utility log showing how Commerce, DB2, and search servers communicate.

   **Example 6-25** Build index utility log
   ```log
   Apr 5, 2011 5:53:19 AM
   com.ibm.commerce.foundation.dataimport.process.DataImportProcessorMain logStartDate(Date)
   INFO: Data import process started:Tue Apr 05 05:53:19 EDT 2011
   Apr 5, 2011 5:53:19 AM
   com.ibm.commerce.foundation.dataimport.process.DataImportProcessorMain
   buildSearchConfigFromDBJ2SE
   Apr 5, 2011 5:53:19 AM
   com.ibm.commerce.foundation.dataimport.process.DataImportProcessorMain
   executeDIH
   INFO: The Solr server is linux-530s, the port is 3737.
   Apr 5, 2011 5:53:20 AM
   com.ibm.commerce.foundation.dataimport.process.DataImportProcessorMain executeDIH
   INFO: Solr server core MC_10001_CatalogEntry_Unstructured_en_US status is initialized.
   Apr 5, 2011 5:53:20 AM
   com.ibm.commerce.foundation.dataimport.process.DataImportProcessorMain executeDIH
   INFO: Solr server core MC_10001_CatalogEntry_en_US status is initialized.
   ```
6. On Figure 6-43 on page 165 and Figure 6-44 on page 165, you can see changes in the file system on the remote search machine in the Solr Home directory, after the build index script completes.
Figure 6-43  Solr home and folder structure after building index

Figure 6-44  Solr home and created files after building index
After building the search index, you can replicate the WebSphere Commerce search, which we describe in the next section.

### 6.16 Replicating the WebSphere Commerce search

*Replication* is the process of synchronizing a local copy of an index with changes that have been made on a remote search machine.

The search index data (index files) that were created in the previous section during the building an index process can be replicated from one search machine (master) to another search machine (slave) to improve reliability, fault-tolerance, and performance.

Replicating WebSphere Commerce search maintains your search index data in more than one location, and involves copying designated changes for one location to another and synchronizing the data in both locations. For more information, go to a Solr replication presentation using this link:


#### 6.16.1 Preparation

Ensure that you have completed building the WebSphere Commerce search index that was described in the previous section. After this preparation, perform all the steps on the master (source) search machine first and then on the slave (target) search machine described next, considering the Solr Home setting.

The Solr Home on the source machine is set to `home/redbooks/solr_search/`. The Solr Home on the target machine is set to `/home/redbooks/search/demo/search/solr`.

#### 6.16.2 Configuring the search master machine

Perform the following steps:

1. On the search master machine, go to the solr profile directory:
   ```bash
cd /opt/IBM/WebSphere/AppServer/profiles/demo_solr/bin
```
2. Stop the solr search server:
   ```bash
./stopServer.sh solrServer
```
3. Open the following file:
   ```bash
/home/redbooks/solr_search/MC_10001/en_US/CatalogEntry/conf/solrconfig.xml
```
   In this file, replication is set up for United States English (`en_US`). If you want to replicate for another language, change `en_US` to the locale of your choice.
4. In the `solrconfig.xml` file, locate the following snippet that is shown in Example 6-26.

```xml
<!-- Please refer to http://wiki.apache.org/solr/SolrReplication for details on configuring replication -->
<!-- remove the <lst name="master"> section if this is just a slave -->
<!-- remove the <lst name="slave"> section if this is just a master -->
<!--
<requestHandler name="/replication" class="solr.ReplicationHandler" >
  <lst name="master">
```

[Example 6-26 Replication snippet in solrconfig.xml as an XML comment](http://example.com)
5. Edit the snippet from Example 6-26 on page 166, providing the details of the master section and deleting all other sections in this tag, as shown in Example 6-27.

**Example 6-27  Replication snippet in solrconfig.xml for master**

```xml
<requestHandler name="/replication" class="solr.ReplicationHandler">
  <lst name="master">
    <str name="replicateAfter">commit</str>
    <str name="replicateAfter">startup</str>
    <str name="confFiles">schema.xml,stopwords.txt</str>
  </lst>
</requestHandler>
```

6. Save your changes and close the file.

7. Restart your search server:

   ```bash
   ./startServer.sh solrServer
   ```

   Ensure that all steps were successful.

### 6.16.3 Configuring the search slave machine

Perform these steps on your search slave machine:

1. Stop your search server:

   ```bash
   ./stopServer.sh solrServer
   ```

2. Open the following file:

   ```bash
   /home/redbooks/search/demo/search/solr/MC_10001/en_US/CatalogEntry/conf/solrconfig.xml
   ```

3. Similar to the previous steps for the master search, find the requestHandler tag, remove the master details, and provide only the slave details, as shown in Example 6-28.

**Example 6-28  Replication snippet in solrconfig.xml for slave**

```xml
<requestHandler name="/replication" class="solr.ReplicationHandler">
  <lst name="slave">
    <str name="masterUrl">http://linux-530s:3737/solr/MC_10001_CatalogEntry_en_US/replication</str>
    <str name="pollInterval">00:00:60</str>
  </lst>
</requestHandler>
```

4. Save your changes and close the file.
5. Browse through the file system on slave machine and ensure that the folder named data does not exist at this moment on this folder path:

/home/redbooks/search/demo/search/solr/MC_10001/en_US/CatalogEntry/data

Folder data will be created and populated with the replicated data after you hit this URL on the search slave machine:

http://linux-ekfn:3737/solr/MC_10001_CatalogEntry_en_US/select?q=*:* *

If you do not encounter any errors or warnings during this procedure, you can see the result of the replication by querying the slave search machine, as shown in Figure 6-45 and Figure 6-46 on page 169.

Figure 6-45  Querying the slave search machine
After you have set up the replication to push indexes to dedicated search machines, you need to set up WebSphere Commerce to direct the queries to this dedicated search machine. Currently, queries are still being sent to the dedicated indexing machine.

You can set up WebSphere Commerce to direct the queries to the dedicated search machine by modifying the `wc-search.xml` file, which is located here:  

```
WC_ear_dir/xml/config/com.ibm.commerce.catalog-fep/wc-search.xml
```

You must not directly modify this file, but instead create a copy. Then, place and modify this copy in a new directory, `com.ibm.commerce.catalog-ext`. Refer to the information center document:

```
http://publib.boulder.ibm.com/infocenter/wchelp/v7r0m0/topic/com.ibm.commerce.developer.doc/tasks/tsdwcssearchcom.htm
```

Two sections need to be changed in the `wc-search.xml`: the Server section and the Core Section.
In the `wc-search.xml`, locate the Server section (see Example 6-29).

**Example 6-29  wc-search.xml snippet server section**

```
<_config:server name="AdvancedConfiguration">
  <_config:common-http URL="http://linux-530s:3737/solr/"
                        allowCompression="true" connectionTimeout="5000"
                        defaultMaxConnectionsPerHost="100" followRedirects="false"
                        maxRetries="2" maxTotalConnections="100" soTimeout="2000"/>
</_config:server>
```

This section is the HTTP configuration for sending queries to the dedicated index (Master) machine. Add the following tag directly after this section (see Example 6-30).

**Example 6-30  wc-search.xml Server section addition**

```
<_config:server name="DedicatedSearch">
                        allowCompression="true" connectionTimeout="5000"
                        defaultMaxConnectionsPerHost="100" followRedirects="false"
                        maxRetries="2" maxTotalConnections="100" soTimeout="2000"/>
</_config:server>
```

The second line Example 6-30 is the URL for reaching the dedicated search (slave) machine. The first line is the naming identifier. Now, locate the following lines in the Core section in the `wc-search.xml` (see Example 6-31).

**Example 6-31  wc-search.xml Core section**

```
<_config:cores>
  <_config:core catalog="10001" indexName="CatalogEntry"
               language="en_US" name="MC_10001_CatalogEntry_en_US"
               path="/MC_10001/en_US/CatalogEntry"
               serverName="AdvancedConfiguration" synonym="/conf/synonyms.txt"/>
  <_config:core catalog="10001" indexName="UnstructuredContent"
               language="en_US"
               name="MC_10001_CatalogEntry_Unstructured_en_US"
               path="/MC_10001/en_US/CatalogEntry/unstructured"
               serverName="AdvancedConfiguration" synonym="/conf/synonyms.txt"/>
</_config:cores>
```

Change the bolded "AdvancedConfiguration" values to "DedicatedSearch". Save the changes. The EAR must be updated with these changes. You can use a single file update in the WebSphere Application Server console to update the EAR with these changes. For instructions to perform a single file update, refer to this information center page:

[http://publib.boulder.ibm.com/infocenter/wchelp/v7r0m0/topic/com.ibm.commerce.developer.doc/tasks/tdpdeploying_j2ee_assets_single.htm](http://publib.boulder.ibm.com/infocenter/wchelp/v7r0m0/topic/com.ibm.commerce.developer.doc/tasks/tdpdeploying_j2ee_assets_single.htm)

After the file is updated, run a quick query on the storefront. Then, check the `systemOut.log` file in both the dedicated indexing machine, and the dedicated search machine. The search query is now visible in the dedicated search machine.
6.17 Advanced search configuration and heterogeneous deployment scenarios

We provide a brief overview of four heterogeneous deployment scenarios and then we describe the last example scenario in detail. All scenarios are based on important decisions that can make a big impact on your search solution and its real-time performance, reliability, and maintenance.

The advanced search configuration gives you the flexibility and scalability for your search solution. You can have multiple WebSphere Commerce server nodes and WebSphere Commerce search nodes with the workload balancer managing traffic to the servers.

With this advanced configuration, your search servers do not need to have all the search data for each catalog. Each master catalog has at least two cores: one core for structured content and one core for unstructured content. These cores can be split among the servers. This section discusses core distribution among your servers, considerations when distributing cores, and possible configurations.

Never distribute the cores among the search Java virtual machines (JVMs) in a way that will minimize the load to any one server. For example, assume that you have three stores, each with its own master catalog, and two search servers. One master catalog, master catalog A, gets 50% of all traffic. One possible configuration is to have master catalog A on its own search server, and place the other two catalog cores on the other search server.

There are other considerations, for example, such as failover. Putting a core on only one search machine means that if that search machine goes down, so does the search for that core. From a failover perspective, it is best to have several machines responsible for a core.

Another possible factor to consider is how often your various catalogs are updated. If one catalog is rarely updated, and another catalog is updated frequently, it might make sense to split these cores up. You can then greatly decrease the synchronization checks on the servers containing the core with the infrequent updates.

Additionally, each language has its own core. For example, if you have a master catalog in three languages, you have six cores for that master catalog (one structured core and one unstructured core for each language). It is also possible to split up languages onto separate search JVMs.

Maintaining separate index cores for each language offers these major benefits:

- Clean schema design
  - The text search schema is language-dependent. For example, separate languages contain separate analyzers. Certain languages contain spell checking or stemming, while others do not.
- Runtime query performance
  - Shoppers typically only search using one language. The query then only needs to run against one index.
- Easier maintenance for language dictionaries
  - Each language contains separate synonyms, stop words, and rules.

In the next four charts, we provide four possible scenarios to show you several possible configurations: Figure 6-47 on page 172, Figure 6-48 on page 172, Figure 6-49 on page 172,
and Figure 6-50 on page 173. Both Solr servers can be set up remotely, but you can always set up one Solr server locally and a second Solr server remotely.

**Figure 6-47** Separate master catalogs on separate Solr servers (one local and one remote)

**Figure 6-48** Separate master catalogs on separate Solr servers with both Solr servers set up remotely

**Figure 6-49** Separate languages on separate Solr servers: one local server and one remote Solr server
6.17.1 Setting up language cores on separate Solr servers

This example builds on the scenario setup that we have used throughout this chapter. As a brief overview, currently, there are two search servers set up remotely from the Commerce server: a dedicated indexing (master) machine and a dedicated search (slave) machine. This example adds a language to the store, and a new search server. We configure this search server to serve all queries for this new language.

Figure 6-51 on page 174 shows the overall configuration.
Adding a language to the storefront

The Madisons sample store, by default, includes multiple languages that can be displayed on the storefront. The languages to display are configurable through the Management Center.
To add a new language, navigate to the **Store Management** tab in the Management Center. Locate the Supported languages section, and add a new language, as shown in Figure 6-52.

![Figure 6-52 Store Properties tab](image)

Save your changes.

Now, Romanian is displayable in the storefront. Or it might be, except that search-based navigation has already been selected for this store. Search-based navigation requires search indexes to be built for your store. As of yet, no cores exist for the Romanian language.

**Adding search cores for the Romanian language**

When `setupSearchIndex.sh` was run, it was only run for the English language. Now that Romanian has been added, `setupSearchIndex` needs to be run again. It needs to be run on the **WebSphere Commerce** machine, as well as the **dedicated indexing machine**. `SetupSearchIndex.sh` needs to be run on the new search machine as well; alternatively, you can copy the search directory structure from the **dedicated indexing machine** to the new search machine.

You can obtain the instructions for running `setupSearchIndex` on the **WebSphere Commerce** machine in 6.13.2, “Preparing the **WebSphere Commerce** machine” on page 154. After `setupSearchIndex.sh` completes, you see that the new language (-21) has been added to the `srchconf` table (see Example 6-32 on page 176).
Now, run `SetupSearchIndex.sh` on the dedicated indexing machine, as described in 6.13.3, “Preparing the remote search machine” on page 157. After `SetupSearchIndex.sh` completes successfully, you see the new `ro_RO` directory tree under /home/redbooks/solr_search/MC_10001/. Make sure to restart the Solr server after running `setupSearchIndex.sh`. If you do not, an error occurs during `di-buildindex.sh`.

Next, run `di-preprocess.sh` and `di-buildindex.sh` by following the instructions in 6.14, “Preprocessing the WebSphere Commerce search index data” on page 160 and 6.15, “Building the WebSphere Commerce search index” on page 162. You can build indexes for both languages, or you can specify only the new language to be built by adding the parameter `-localename ro_RO`.

At this point, the storefront works for the Romanian language, although all queries are being served directly on the dedicated search machine.

Next, configure a new Solr server. Adding additional search servers is a relatively easy, quick procedure. For this example, the new server is set up on an entirely separate machine, by following the instructions that are in 6.5, “Installing WebSphere Application Server with default profile creation and update” on page 137 through 6.8, “ Deploying the Solr application” on page 147. Then, run `setupSearchIndex.sh` again by following the instructions that are in 6.13.3, “Preparing the remote search machine” on page 157.

After the new search server is up and running, configure replication from the dedicated indexer to the new dedicated search machine. The dedicated indexing machine is already set up for replication, so only the new search server needs to be set up, by following the instructions that are in 6.16.3, “Configuring the search slave machine” on page 167.

The modified `solrConfig.xml` section for the new search server looks like Example 6-33.

```xml
Example 6-33    solrConfig.xml section

    <requestHandler name="/replication" class="solr.ReplicationHandler">
      <lst name="slave">
        <str name="masterUrl">http://linux-530s:3737/solr/MC_10001_CatalogEntry_ro_RO/replication</str>
        <str name="pollInterval">1:00:00</str>
      </lst>
    </requestHandler>
```

The final step is to set up the `wc-search.xml` to get WebSphere Commerce to direct queries to the proper machines. The Server and Core sections need to be updated.

The newly modified server section looks like Example 6-34 on page 177.
Chapter 6. Search environment setup

Example 6-34   Server section in wc-search.xml

<_config:server name="AdvancedConfiguration">
  <_config:common-http URL="http://linux-530s:3737/solr/">
    allowCompression="true" connectionTimeout="5000"
    defaultMaxConnectionsPerHost="100" followRedirects="false"
    maxRetries="2" maxTotalConnections="100" soTimeout="2000"/>
</_config:server>

<_config:server name="DedicatedSearch">
    allowCompression="true" connectionTimeout="5000"
    defaultMaxConnectionsPerHost="100" followRedirects="false"
    maxRetries="2" maxTotalConnections="100" soTimeout="2000"/>
</_config:server>

<_config:server name="DedicatedRomanian">
  <_config:common-http URL="http://linux-l0fe:3737/solr/">
    allowCompression="true" connectionTimeout="5000"
    defaultMaxConnectionsPerHost="100" followRedirects="false"
    maxRetries="2" maxTotalConnections="100" soTimeout="2000"/>
</_config:server>

The host name of the new Solr server is http://linux-l0fe:3737/solr/. DedicatedRomanian is the new Solr server identifier.

The newly configured core section looks like Example 6-35.

Example 6-35   wc-search.xml core section

<_config:cores>
  <_config:core catalog="10001" indexName="CatalogEntry"
    language="en_US" name="MC_10001_CatalogEntry_en_US"
    path="/MC_10001/en_US/CatalogEntry"
    serverName="DedicatedSearch" synonym="/conf/synonyms.txt"/>
  <_config:core catalog="10001" indexName="UnstructuredContent"
    language="en_US"
    name="MC_10001_CatalogEntry_Unstructured_en_US"
    path="/MC_10001/en_US/CatalogEntry/unstructured"
    serverName="DedicatedSearch" synonym="/conf/synonyms.txt"/>
  <_config:core catalog="10001" indexName="CatalogEntry"
    language="ro_RO"
    name="MC_10001_CatalogEntry_ro_RO"
    path="/MC_10001/ro_RO/CatalogEntry"
    serverName="DedicatedRomanian" synonym="/conf/synonyms.txt"/>
  <_config:core catalog="10001" indexName="UnstructuredContent"
    language="ro_RO"
    name="MC_10001_CatalogEntry_Unstructured_ro_RO"
    path="/MC_10001/ro_RO/CatalogEntry/unstructured"
    serverName="DedicatedRomanian" synonym="/conf/synonyms.txt"/>
</_config:cores>

Deploy the newly modified wc-search.xml to the ear by using the single file update in the WebSphere Application Server console. After this configuration, query the store both in English and Romanian to ensure that the queries are being sent to the proper search server. You can check the SystemOut.log on each search server to ensure that the query is properly received.
Index design and data load

In this chapter, we provide an overview of the design and management of Solr indexes, an overview of the IBM WebSphere Commerce V7.0 catalog index, and an example of how to customize the catalog index to handle inventory data. Additionally, we demonstrate using Solr's Data Import Handler (DIH) to process delta updates using XML documents.
7.1 Solr V1.3 indexes

Solr is a stand-alone enterprise search server with a Representational State Transfer (REST)-like application programming interface (API). You put documents in the Solr server, which is called indexing, via XML, JavaScript Object Notation (JSON), or binary over HTTP. You query it via HTTP GET and receive XML, JSON, or binary results. Solr uses the Lucene search engine API.

7.2 IBM WebSphere Commerce V7.0 index

WebSphere Commerce V7.0 search uses one index configuration, the catalog index. Multiple catalog instances, or cores, exist in a production environment. For our exercise, we deploy the index inside the WebSphere Commerce Developer Edition 7.0 in embedded mode.

7.2.1 Catalogs

Search tools to work with indexes require a master catalog to be used, and they index the sales catalogs correctly. When a Solr query is received, you must always use a master catalog and not a sales catalog. You still have full use of sales catalogs for search driven navigation and searching, by continuing to use catalogId=<sales catalog id> when making requests. Commerce adds a filter query, fq=catalog_id:<catalogId>. This filter query causes the response to contain only documents in that catalog.

7.2.2 Setting up the search index

In this section, we run the setupSearchIndex.bat to set up the catalog index. The setupSearchIndex.bat creates the configuration files that are needed to preprocess the index data. Follow these steps:

1. Start the WebSphere Commerce Developer Edition test server (see Figure 7-1 on page 181). Complete these tasks:
   a. Start Rational® Application Developer for WebSphere Software.
   b. Select the Servers tab.
   c. Select WebSphere Commerce Test Server.
   d. Right-click, and then, select Start.
Figure 7-1  Starting WebSphere Commerce Developer Edition test server
2. Open the command window. See Figure 7-2.

3. Change the directory:
   
   ```
   c:\cd \IBM\WCDE_ENT70\components\foundation\subcomponents\search\bin
   ```

4. Run `setupSearchIndex.bat`:

   ```
   C:\IBM\WCDE_ENT70\components\foundation\subcomponents\search\bin\setupSearchIndex.bat -masterCatalogId 10451
   ```
5. Ensure that `setupSearchIndex.sh` ran successfully:
   a. Check the log file `wc-search-index-setup.log` for errors:
      i. Change the directory:
         
         ```bash
         c:\ cd \IBM\WCDE_ENT70\components\foundation\subcomponents\search\log
         ```
      ii. View the log file:
         
         ```bash
         notepad wc-search-index-setup.log
         ```
      iii. Verify that the following assets were created (see Figure 7-3 and Figure 7-4 on page 184):
         
         ```bash
         cd /opt/IBM/WebSphere/CommerceServer70/instances/demo/search/solr/home
         ```

![Figure 7-3 Preprocess search assets](image)
7.2.3 Preprocessing the index data

Preprocess the search index data to prepare your WebSphere Commerce V7.0 data for indexing. The preprocess utility, `di-preprocess.bat`, extracts, flattens, and imports your data into a set of temporary tables inside the WebSphere Commerce V7.0 database. This preprocessed data is then used by the index building utility, `di-buildindex.bat`, to create the indexes using Solr’s Data Import Handler (DIH). The preprocessed data in the temporary tables is from the WebSphere Commerce V7.0 base schema. Follow these steps:

1. Start the WebSphere Commerce Developer Edition test server (see step 1 on page 180).
2. Change the directory:
   ```
c:\cd \IBM\WCDE_ENT70\bin
```
3. Run `di-preprocess.bat`:
   ```
   C:\IBM\WCDE_ENT70\bin\di-preprocess.bat
   “C:\IBM\WCDE_ENT70\search\pre-processConfig\MC_10051\Cloudscape” -fullbuild
   true -localename en_US
   ```

4. Ensure that `di-preprocess.bat` ran successfully:
   a. Check the log file `wc-search-index-setup.log` for errors:
      i. Change the directory:
         ```
         c:\cd \IBM\WCDE_ENT70\logs
         ```
      ii. View the log file:
         ```
         notepad wc-dataimport-preprocess.log
         ```
   b. Verify that the TI_<NAME>_0 tables were created and populated:
      ```
      http://localhost/webapp/wcs/admin/servlet/db.jsp
      ```

Additional Information: For more information, go to this website:
```
http://publib.boulder.ibm.com/infocenter/wchelp/v7r0m0/topic/com.ibm.commerce.developer.doc/tasks/tsdsearchbuildpre.htm
```  

7.2.4 Building the search index

You build the WebSphere Commerce search index using the index building utility, `di-buildindex.bat`. It is a wrapping utility that updates the information in the master index using Solr's Data Import Handler (DIH) service to build the index, either partially through delta index updates or completely through full-index builds. When there are multiple indexes, for example, each language using its own separate index, the index is built multiple times. Follow these steps:

1. Start the WebSphere Commerce Developer Edition V7 test server (see step 1 on page 180).
2. Change the directory:
   ```
   c:\cd \IBM\WCDE_ENT70\bin
   ```
3. Run `di-buildindex.bat`:
   ```
   C:\IBM\WCDE_ENT70\bin\di-buildindex.bat -masterCatalogId 10051 -localename en_US
   ```

   Important: Running `di-buildindex.bat` with a non-master catalogId raises this exception:
   ```
   com.ibm.commerce.foundation.dataimport.exception.DataImportApplicationException: An error occurred while setting up the search configuration.
   ```

4. Ensure that `di-buildindex.bat` ran successfully:
   a. Change the directory:
      ```
      c:\cd \IBM\WCDE_ENT70\logs
      ```
   b. View the log file (see Example 7-1 on page 186):
      ```
      notepad wc-dataimport-preprocess.log
      ```
Example 7-1  wc-dataimport-preprocess.log

logStartDate(Date)
INFO: Data import process started: Wed Apr 13 11:25:56 EDT 2011
buildSearchConfigFromSearchConfigFileJ2SE
INFO: Build search configuration from configuration file: c:\IBM\WCDE_E\10\workspace\WCxml\config\com.ibm.commerce.catalog-fep\wc-search.xml.

Important: Do not skip this step:
- The di-buildindex.bat utility overwrites the preprocess log file.
- Before running di-buildindex.bat, back up wc-dataimport-preprocess.log.

executeDIH
INFO: The Solr server is localhost, the port is 80.

fullDataImport
INFO: Solr server core MC_10051_CatalogEntry_Unstructured_en_US status is
{responseHeader={status=0,QTime=0},initArgs={defaults={config=wc-data-config.xml}},command=statuses,stats=idle,importResponse=,statusMessages={Total Requests made to DataSource=1, Total Rows Fetched=8, Total Documents Skipped=0, Full Dump Started=2011-04-13 11:25:57, Indexing completed. Added/Updated: 4 documents. Deleted 0 documents., Committed=2011-04-13 11:25:57, Optimized=2011-04-13 11:25:57, Total Documents Processed=4, Time taken =0:0:0.313},WARNING=This response format is experimental. It is likely to change in the future.).

fullDataImport
INFO:

fullDataImport
INFO: Solr server core MC_10051_CatalogEntry_en_US status is
{responseHeader={status=0,QTime=0},initArgs={defaults={config=wc-data-config.xml}},command=statuses,stats=idle,importResponse=,statusMessages={Total Requests made to DataSource=3, Total Rows Fetched=693, Total Documents Skipped=0, Full Dump Started=2011-04-13 11:26:08, Indexing completed. Added/Updated: 687 documents. Deleted 0 documents., Committed=2011-04-13 11:26:09, Optimized=2011-04-13 11:26:09, Total Documents Processed=687, Total Documents Failed=2, Time taken =0:0:1.735},WARNING=This response format is experimental. It is likely to change in the future.).

fullDataImport
INFO:

logExitCode
INFO:

-----------------------------------------------
c. Verify that the MC_10051_CatalogEntry_en_US index is on the disk. See Figure 7-5.

![Image of structured index]

**Figure 7-5** MC_10051_CatalogEntry_en_US structured index

d. Execute the query and view the result (Example 7-2):

```
http://localhost/solr/MC_10051_CatalogEntry_en_US/select?q=red&fl=*  
```

**Example 7-2** Query response

```
<?xml version="1.0" encoding="utf-8"?>
<response>
 <lst name="responseHeader">
  <int name="status">0</int>
  <int name="QTime">15</int>
  <lst name="params">
   <str name="fl">*</str>
   <str name="q">red</str>
  </lst>
</response>
```
7.2.5 Maintenance

The WebSphere Commerce V7.0 search index falls out of synchronization with the latest production data over time. To maintain the accuracy of the search result data, you must perform re-indexing during normal business operation.

Additional Information: For more information, go to this website:
http://publib.boulder.ibm.com/infocenter/wchelp/v7r0m0/topic/com.ibm.commerce.developer.doc/tasks/tsdsearchbuildindex.htm
7.3 Scenario: Display only products with inventory

A common business requirement is to display only products that have inventory on the storefront. Using WebSphere Commerce V7.0 search requires performing an index update. There is always a period of time, $t_1$, when products in the catalog index potentially have no inventory. Our implementation minimizes $t_1$ and gives the shopper a better shopping experience. We describe the process:

1. An order is placed for product X.
2. The order is fulfilled for product X. Product X now has 0 inventory.
3. Start $t_1$.
4. Perform delta re-indexing:
   a. For each product that has 0 inventory, generate and fire a ChangeCatalogEntry event.
   b. Generate and fire an index synchronization event.
5. Stop $t_1$.

7.3.1 Adding the inventory field to the catalog index

For this solution, we customize the WebSphere Commerce V7.0 index by adding an additional field for inventory. We must flatten the catalog entry/inventory data, which involves creating a custom preprocess and custom temporary index tables.

**Customizing:** Your table name must start with an X to avoid conflict with the default WebSphere Commerce tables, for example, XI_INVENTORY_0.

Follow these steps:

1. Configure the search preprocessor:
   a. Create a new custom preprocess configuration file:
      i. Open the Notepad.
      ii. Select File → Save As:
         c:\IBM\WCDE_ENT70\search\pre-processConfig\MC_10051\Cloudscape\wc-dataimport-preprocess-custom-inventory.xml
      iii. Add the code (Example 7-3 on page 190).
Example 7-3  wc-dataimport-preprocess-custom-inventory.xml

<?xml version="1.0" encoding="UTF-8"?>
<config:DIHPreProcessConfig
 xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"

<!-- one level PRODUCT_ITEM catentry parent -->
<config:data-processing-config processor="com.ibm.commerce.foundation.dataimport.preprocess.StaticAttributeDataPreProcessor"
 batchSize="500">
  <config:table definition="CREATE TABLE XI_DPCATENTRY_PRODUCT_ITEM_0 (CATENTRY_ID BIGINT NOT NULL, CATENTRY_ID_PARENT BIGINT, PRIMARY KEY (CATENTRY_ID))" name="XI_DPCATENTRY_PRODUCT_ITEM_0"/>
  <config:query sql="SELECT CATENTRY_ID_CHILD, CATENTRY_ID_PARENT FROM CATENTREL R, TI_CATENTRY_0 C WHERE R.CATENTRY_ID_CHILD = C.CATENTRY_ID AND R.CATRELTYPE_ID='PRODUCT_ITEM' ORDER BY CATENTRY_ID_CHILD"/>
  <config:mapping>
    <config:key queryColumn="CATENTRY_ID_CHILD" tableColumn="CATENTRY_ID"/>
    <config:column-mapping>
      <config:column-column queryColumn="CATENTRY_ID_PARENT" tableColumn="CATENTRY_ID_PARENT"/>
    </config:column-mapping>
  </config:mapping>
</config:data-processing-config>

<!-- one level BUNDLE_COMPONENT catentry parent -->
<config:data-processing-config processor="com.ibm.commerce.foundation.dataimport.preprocess.StaticAttributeDataPreProcessor"
 batchSize="500">
  <config:table definition="CREATE TABLE XI_DPCATENTRY_BUNDLE_COMPONENT_0 (CATENTRY_ID BIGINT NOT NULL, CATENTRY_ID_PARENT BIGINT, PRIMARY KEY (CATENTRY_ID))" name="XI_DPCATENTRY_BUNDLE_COMPONENT_0"/>
  <config:query sql="SELECT CATENTRY_ID_CHILD, CATENTRY_ID_PARENT FROM CATENTREL R, TI_CATENTRY_0 C WHERE R.CATENTRY_ID_CHILD = C.CATENTRY_ID AND R.CATRELTYPE_ID='BUNDLE_COMPONENT' ORDER BY CATENTRY_ID_CHILD"/>
  <config:mapping>
    <config:key queryColumn="CATENTRY_ID_CHILD" tableColumn="CATENTRY_ID"/>
    <config:column-mapping>
      <config:column-column queryColumn="CATENTRY_ID_PARENT" tableColumn="CATENTRY_ID_PARENT"/>
    </config:column-mapping>
  </config:mapping>
</config:data-processing-config>

<!-- ItemBean inventory -->
<config:data-processing-config processor="com.ibm.commerce.foundation.dataimport.preprocess.StaticAttributeDataPreProcessor"
 batchSize="500">
  <!-- leaving ffmcenterId out as any inventory is inventory -->
  <config:table definition="CREATE TABLE XI_ITEM_INVENTORY_0 (CATENTRY_ID BIGINT NOT NULL, STORE_ID BIGINT NOT NULL, QUANTITY BIGINT, PRIMARY KEY (CATENTRY_ID,STORE_ID))" name="XI_ITEM_INVENTORY_0"/>
  <config:query sql="SELECT I.CATENTRY_ID, I.STORE_ID, SUM( CAST(I.QUANTITY as BIGINT) ) quantity FROM INVENTORY I, XI_DPCATENTRY_PRODUCT_ITEM_0 CE WHERE I.STORE_ID IN ( SELECT STOREENT_ID from STORECAT WHERE CATALOG_ID=10001 ) AND I.CATENTRY_ID = CE.CATENTRY_ID GROUP BY I.CATENTRY_ID, I.STORE_ID ORDER BY I.CATENTRY_ID"/>
  <config:mapping>
    <config:key queryColumn="CATENTRY_ID" tableColumn="CATENTRY_ID"/>
    <config:column-mapping>
      <config:column-column queryColumn="STORE_ID" tableColumn="STORE_ID" /> <config:column-column queryColumn="QUANTITY" tableColumn="QUANTITY" /> </config:column-mapping>
  </config:mapping>
</config:data-processing-config>

<!-- ProductBean inventory: this is the inventory of the ItemBean(s) with a PRODUCT_ITEM relationship -->
<config:data-processing-config processor="com.ibm.commerce.foundation.dataimport.preprocess.StaticAttributeDataPreProcessor"
 batchSize="500">
  <!-- leaving ffmcenterId out as any inventory is inventory -->
  <config:table definition="CREATE TABLE XI_PRODUCT_INVENTORY_0 (CATENTRY_ID BIGINT NOT NULL, CATENTRY_ID_PARENT VARCHAR(512), QUANTITY BIGINT, PRIMARY KEY (CATENTRY_ID))" name="XI_PRODUCT_INVENTORY_0"/>
  <config:query sql="SELECT T.CATENTRY_ID, T.CATENTRY_ID_PARENT, X.QUANTITY FROM XI_ITEM_INVENTORY_0 X INNER JOIN XI_DPCATENTRY_PRODUCT_ITEM_0 T ON X.CATENTRY_ID = T.CATENTRY_ID ORDER BY T.CATENTRY_ID"/>
  <config:mapping>
    <config:key queryColumn="CATENTRY_ID" tableColumn="CATENTRY_ID"/>
    <config:column-mapping>
      <config:column-column queryColumn="CATENTRY_ID_PARENT" tableColumn="CATENTRY_ID_PARENT" /> <config:column-column queryColumn="QUANTITY" tableColumn="QUANTITY" /> </config:column-mapping>
  </config:mapping>
</config:data-processing-config>

<!-- BundleBean inventory: this is the inventory of the ItemBean(s) with a BUNDLE_COMPONENT relationship -->
</config:data-processing-config>
</config:DIHPreProcessConfig>
Chapter 7. Index design and data load

2. Configure the Data Import Handler mapping:

a. Open the Notepad.

b. Click File → Open and open this file:
   c:\IBM\WCDE_ENT70\search\solr\home\MC_10051\en_US\CatalogEntry\conf\schema.xml

c. Find the //schema[@name='WebSphereCommerceSolrSchema']/fields node.

d. Insert the new field node (see Example 7-4).

Example 7-4  Inventory field definition

<!-- Inventory's quantity: map to table: INVENTORY -->
<field name="xquantity" type="long" indexed="true" stored="true" multiValued="false" />

e. Save your changes.

f. Select File → Open and open this file:
   C:\IBM\WCDE_ENT70\search\solr\home\MC_10051\en_US\CatalogEntry\conf\wc-data-config.xml

2. Configure the Data Import Handler mapping:

a. Open the Notepad.

b. Click File → Open and open this file:
   c:\IBM\WCDE_ENT70\search\solr\home\MC_10051\en_US\CatalogEntry\conf\schema.xml

c. Find the //schema[@name='WebSphereCommerceSolrSchema']/fields node.

d. Insert the new field node (see Example 7-4).

Example 7-4  Inventory field definition

<!-- Inventory's quantity: map to table: INVENTORY -->
<field name="xquantity" type="long" indexed="true" stored="true" multiValued="false" />

e. Save your changes.

f. Select File → Open and open this file:
   C:\IBM\WCDE_ENT70\search\solr\home\MC_10051\en_US\CatalogEntry\conf\wc-data-config.xml

2. Configure the Data Import Handler mapping:

a. Open the Notepad.

b. Click File → Open and open this file:
   c:\IBM\WCDE_ENT70\search\solr\home\MC_10051\en_US\CatalogEntry\conf\schema.xml

c. Find the //schema[@name='WebSphereCommerceSolrSchema']/fields node.

d. Insert the new field node (see Example 7-4).

Example 7-4  Inventory field definition

<!-- Inventory's quantity: map to table: INVENTORY -->
<field name="xquantity" type="long" indexed="true" stored="true" multiValued="false" />

e. Save your changes.

f. Select File → Open and open this file:
   C:\IBM\WCDE_ENT70\search\solr\home\MC_10051\en_US\CatalogEntry\conf\wc-data-config.xml

Troubleshooting: The following exception sometimes occurs when running the di-preprocess.bat utility while any of the TI_XXXX or XI_XXXX tables are in use by another application, for example, a query in the DB2 V9.7 Control Center:

com.ibm.commerce.foundation.dataimport.preprocess.DataImportPreProcessorMain
handleExecutionException

SEVERE: CWFDIH0002: An SQL exception was caught. The following error occurred:
DB2 SQL Error: SQLCODE=-601, SQLSTATE=42710,
SQLERRMC=DB2INST1.<TABLE_NAME>;TABLE, DRIVER=4.7.85.
g. Find the //dataConfig/document/entity[@name='Product'] node:

  i. Update the query attribute value (see Example 7-5).

Example 7-5  Query attribute value

```
SELECT CATENTRY.CATENTRY_ID, CATENTRY.MEMBER_ID, CATENTRY.CATENTTYPE_ID, CATENTRY.PARTNUMBER,
  CATENTRY.MFNUMBER, CATENTRY.NAME, CATENTRY.BUYABLE, STORECENT.STOREENT_ID,
  CATENTDESC.NAME, CATENTDESC.DESCRIPTION, CATENTDESC.THUMBNAIL, CATENTDESC.FULLIMAGE,
  CATENTDESC.KEYWORD, CATENTDESC.PUBLISHED, TI_DPGROUP.CATGROUP DPCATGROUP,
  TI_APGROUP.CATGROUP APCATGROUP, TI_PRODUCTSET.PRODUCTSET,
  TI_OFFERPRICE.PRICE_USD, TI_OFFERPRICE.PRICE_EUR, TI_OFFERPRICE.PRICE_CAD,
  TI_OFFERPRICE.PRICE_JPY, TI_OFFERPRICE.PRICE_KRW, TI_OFFERPRICE.PRICE_BRL,
  TI_OFFERPRICE.PRICE_TWD, TI_OFFERPRICE.PRICE_PLN, TI_OFFERPRICE.PRICE_PLN,
  TI_OFFERPRICE.PRICE_PHN, TI_OFFERPRICE.PRICE_EGP,
  TI_OFFERPRICE.PRICE_GBP, TI_DPCATENTRY.CATENTRY_PARENT,
  TI_CATALOG.CATALOG PARENT_CATALOG_ID, FROM CATENTRY
```

FROM CATENTRY

INNER JOIN TI_CATENTRY_0 TI_CATENTRY ON (CATENTRY.CATENTRY_ID=TI_CATENTRY.CATENTRY_ID)
LEFT OUTER JOIN STORECENT ON (CATENTRY.CATENTRY_ID=STORECENT.CATENTRY_ID)
LEFT OUTER JOIN CATENTDESC ON (CATENTDESC.CATENTRY_ID=CATENTRY.CATENTRY_ID AND CATENTDESC.LANGUAGE_ID=-1)
LEFT OUTER JOIN TI_DPGROUP_0 TI_DPGROUP ON (CATENTRY.CATENTRY_ID=TI_DPGROUP.CATENTRY_ID)
LEFT OUTER JOIN TI_APGROUP_0 TI_APGROUP ON (CATENTRY.CATENTRY_ID=TI_APGROUP.CATENTRY_ID)
LEFT OUTER JOIN TI_PRODUCTSET_0 TI_PRODUCTSET ON (CATENTRY.CATENTRY_ID=TI_PRODUCTSET.CATENTRY_ID)
LEFT OUTER JOIN TI_OFFERPRICE_0 TI_OFFERPRICE ON (CATENTRY.CATENTRY_ID=TI_OFFERPRICE.CATENTRY_ID)
LEFT OUTER JOIN TI_DPCATENTRY_0 TI_DPCATENTRY ON (CATENTRY.CATENTRY_ID=TI_DPCATENTRY.CATENTRY_ID)
LEFT OUTER JOIN TI_CATALOG_0 TI_CATALOG ON (CATENTRY.CATENTRY_ID=TI_CATALOG.CATENTRY_ID)
LEFT OUTER JOIN XI_PRODUCT_INVENTORY_0 XI_PRODUCT_INVENTORY ON (CATENTRY.CATENTRY_ID=CAST(XI_PRODUCT_INVENTORY.CATENTRY_ID_PARENT AS BIGINT) )
LEFT OUTER JOIN TI_CASTB1_0_1 TI_CASTB1 ON (CATENTRY.CATENTRY_ID=TI_CASTB1.CATENTRY_ID)
LEFT OUTER JOIN TI_CAITB1_0_1 TI_CAITB1 ON (CATENTRY.CATENTRY_ID=TI_CAITB1.CATENTRY_ID)
LEFT OUTER JOIN TI_CAFTB1_0_1 TI_CAFTB1 ON (CATENTRY.CATENTRY_ID=TI_CAFTB1.CATENTRY_ID)
LEFT OUTER JOIN TI_ADSTB1_0_1 TI_ADSTB1 ON (CATENTRY.CATENTRY_ID=TI_ADSTB1.CATENTRY_ID)
LEFT OUTER JOIN TI_ADITB1_0_1 TI_ADITB1 ON (CATENTRY.CATENTRY_ID=TI_ADITB1.CATENTRY_ID)
LEFT OUTER JOIN TI_ADFTB1_0_1 TI_ADFTB1 ON (CATENTRY.CATENTRY_ID=TI_ADFTB1.CATENTRY_ID)
WHERE CATENTRY.CATENNTYPE_ID='ProductBean'

ii. Update the deltaImportQuery attribute value (see Example 7-6).

Example 7-6  deltaImportQuery attribute value

SELECT CATENTRY.CATENTRY_ID, CATENTRY.MEMBER_ID, CATENTRY.CATENNTYPE_ID, CATENTRY.PARTNUMBER, CATENTRY.MFPARTNUMBER, CATENTRY.MNAME, CATENTRY.BUYABLE, STORECENT.STOREENT_ID, CATENTDESC.NAME, CATENTDESC.SHORTDESCRIPTION, CATENTDESC.THUMBNAIL, CATENTDESC.FULLIMAGE, CATENTDESC.KEYWORD, CATENTDESC.PUBLISHED, TI_DPGROUP.CATGROUP DPCATGROUP, TI_APGROUP.CATGROUPS APCATGROUP, TI_PRODUCTSET.PRODUCTSET, TI_OFFERPRICE.PRICE_USD, TI_OFFERPRICE.PRICE_EUR, TI_OFFERPRICE.PRICE_CAD, TI_OFFERPRICE.PRICE_CNY, TI_OFFERPRICE.PRICE_JPY, TI_OFFERPRICE.PRICE_KRW, TI_OFFERPRICE.PRICE_BRL, TI_OFFERPRICE.PRICE_TWD, TI_OFFERPRICE.PRICE_PLN, TI_OFFERPRICE.PRICE_RON, TI_OFFERPRICE.PRICE_EGP, TI_OFFERPRICE.PRICE_GBP, TI_DPCATENTRY.CATENTRY_PARENT, TI_CATALOG.CATALOG PARENT_CATALOG_ID,

XI_PRODUCT_INVENTORY.QUANTITY XQUANTITY,

TI_CASTB1.CAS_F1 CAS_F1ATTR, TI_CASTB1.CAS_F2 CAS_F2ATTR, TI_CASTB1.CAS_F3 CAS_F3ATTR, TI_CASTB1.CAS_F4 CAS_F4ATTR, TI_CASTB1.CAS_F5 CAS_F5ATTR,
TI_CASTB1.CAS_F6 CAS_F6ATTR, TI_CASTB1.CAS_F7 CAS_F7ATTR, TI_CASTB1.CAS_F8 CAS_F8ATTR, TI_CASTB1.CAS_F9 CAS_F9ATTR, TI_CASTB1.CAS_F10 CAS_F10ATTR,
TI_CASTB1.CAS_F11 CAS_F11ATTR, TI_CASTB1.CAS_F12 CAS_F12ATTR, TI_CASTB1.CAS_F13 CAS_F13ATTR, TI_CASTB1.CAS_F14 CAS_F14ATTR, TI_CASTB1.CAS_F15 CAS_F15ATTR,
TI_CASTB1.CAS_F16 CAS_F16ATTR, TI_CASTB1.CAS_F17 CAS_F17ATTR, TI_CASTB1.CAS_F18 CAS_F18ATTR, TI_CASTB1.CAS_F19 CAS_F19ATTR, TI_CASTB1.CAS_F20 CAS_F20ATTR,
TI_CASTB1.CAS_F21 CAS_F21ATTR, TI_CASTB1.CAS_F22 CAS_F22ATTR, TI_CASTB1.CAS_F23 CAS_F23ATTR, TI_CASTB1.CAS_F24 CAS_F24ATTR, TI_CASTB1.CAS_F25 CAS_F21ATTR,
iii. Add the child node (see Example 7-7).

Example 7-7  Child nodes

```xml
<field column="CATENTRY_ID" name="catentry_id" />
<field column="MEMBER_ID" name="member_id" />
<field column="CATENTTYPE_ID" name="catenttype_id_ntk_cs" />
```
### Index design and data load

<table>
<thead>
<tr>
<th>Field</th>
<th>Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>PARTNUMBER</td>
<td>partNumber_ntk</td>
</tr>
<tr>
<td>MFPARTNUMBER</td>
<td>mfPartNumber_ntk</td>
</tr>
<tr>
<td>MFNAME</td>
<td>mfName</td>
</tr>
<tr>
<td>BUYABLE</td>
<td>buyable</td>
</tr>
<tr>
<td>STOREENT_ID</td>
<td>storeent_id</td>
</tr>
<tr>
<td>NAME</td>
<td>name</td>
</tr>
<tr>
<td>SHORTDESCRIPTION</td>
<td>shortDescription</td>
</tr>
<tr>
<td>THUMBNAIL</td>
<td>thumbnail</td>
</tr>
<tr>
<td>FULLIMAGE</td>
<td>fullImage</td>
</tr>
<tr>
<td>KEYWORD</td>
<td>keyword</td>
</tr>
<tr>
<td>PUBLISHED</td>
<td>published</td>
</tr>
<tr>
<td>parentCatgroup_id_facet</td>
<td>sourceColName=&quot;DPCATGROUP&quot;</td>
</tr>
<tr>
<td>parentCatgroup_id_search</td>
<td>sourceColName=&quot;APCATGROUP&quot;</td>
</tr>
<tr>
<td>parentCatentry_id</td>
<td>sourceColName=&quot;CATENTRY_PARENT&quot;</td>
</tr>
<tr>
<td>catalog_id</td>
<td>sourceColName=&quot;PARENT_CATALOG_ID&quot;</td>
</tr>
<tr>
<td>productset_id</td>
<td>sourceColName=&quot;PRODUCTSET&quot;</td>
</tr>
<tr>
<td>PRICE_USD</td>
<td>price_USD</td>
</tr>
<tr>
<td>PRICE_EUR</td>
<td>price_EUR</td>
</tr>
<tr>
<td>PRICE_CAD</td>
<td>price_CAD</td>
</tr>
<tr>
<td>PRICE_CNY</td>
<td>price_CNY</td>
</tr>
<tr>
<td>PRICE_JPY</td>
<td>price_JPY</td>
</tr>
<tr>
<td>PRICE_KRW</td>
<td>price_KRW</td>
</tr>
<tr>
<td>PRICE_BRL</td>
<td>price_BRL</td>
</tr>
<tr>
<td>PRICE_TWD</td>
<td>price_TWD</td>
</tr>
<tr>
<td>PRICE_PLN</td>
<td>price_PLN</td>
</tr>
<tr>
<td>PRICE_RON</td>
<td>price_RON</td>
</tr>
<tr>
<td>PRICE_RUB</td>
<td>price_RUB</td>
</tr>
<tr>
<td>PRICE_EGP</td>
<td>price_EGP</td>
</tr>
<tr>
<td>PRICE_GBP</td>
<td>price_GBP</td>
</tr>
<tr>
<td>XQUANTITY</td>
<td>xquantity</td>
</tr>
<tr>
<td>CAS_F1ATTR</td>
<td>CAS_F1ATTR</td>
</tr>
<tr>
<td>CAS_F1</td>
<td>sourceColName=&quot;CAS_F1ATTR&quot;</td>
</tr>
<tr>
<td>CAS_F1_ntk_cs</td>
<td>sourceColName=&quot;CAS_F1ATTR&quot;</td>
</tr>
<tr>
<td>CAS_F2ATTR</td>
<td>CAS_F2ATTR</td>
</tr>
<tr>
<td>cas_f2</td>
<td>sourceColName=&quot;CAS_F2ATTR&quot;</td>
</tr>
<tr>
<td>cas_f2_ntk_cs</td>
<td>sourceColName=&quot;CAS_F2ATTR&quot;</td>
</tr>
<tr>
<td>CAS_F30ATTR</td>
<td>CAS_F30ATTR</td>
</tr>
<tr>
<td>CAS_F30</td>
<td>sourceColName=&quot;CAS_F30ATTR&quot;</td>
</tr>
<tr>
<td>cas_f30_ntk_cs</td>
<td>sourceColName=&quot;CAS_F30ATTR&quot;</td>
</tr>
<tr>
<td>CAF_F1ATTR</td>
<td>CAF_F1ATTR</td>
</tr>
<tr>
<td>CAF_F1</td>
<td>sourceColName=&quot;CAF_F1ATTR&quot;</td>
</tr>
<tr>
<td>CAF_F10</td>
<td>sourceColName=&quot;CAF_F10ATTR&quot;</td>
</tr>
<tr>
<td>ADS_F1ATTR</td>
<td>ADS_F1ATTR</td>
</tr>
<tr>
<td>ADS_F1</td>
<td>sourceColName=&quot;ADS_F1ATTR&quot;</td>
</tr>
<tr>
<td>ads_f1_ntk_cs</td>
<td>sourceColName=&quot;ADS_F1ATTR&quot;</td>
</tr>
</tbody>
</table>

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3. Add our quantity filter query to all queries:
   a. Open the Notepad.
   b. Click File → Open to open this file:
      c:\IBM\WCDE_ENT70\search\solr\home\MC_10051\en_US\CatalogEntry\conf\solrconfig.xml
   c. Find the //config/requestHandler[@name='standard'] node.
   d. Add the quantity filter query (see Example 7-8).
   e. Restart the WebSphere Commerce Developer Edition V7 test server.
   f. Verify the quantity filter:
      http://localhost/solr/MC_10051_CatalogEntry_en_US/select?q=*&fl=*  

Example 7-8  solrconfig.xml snippet

```xml
<config>
  <!-- content removed for clarity -->
  <!-- WebSphere Commerce default search request handler -->
  <requestHandler name="standard" class="solr.StandardRequestHandler" default="true">
    <!-- default values for query parameters -->
    <lst name="defaults">
      <str name="echoParams">explicit</str>
      <!--
      <int name="rows">10</int>
      <str name="fl">*</str>
      <str name="version">2.1</str>
      -->
    </lst>
  </requestHandler>
</config>
```

Troubleshooting: If your XI_<TABLENAME> is missing data in a column, check that you have all of your column/column mappings.

h. Save and close the file.

i. Restart the WebSphere Commerce Developer Edition V7 test server.

j. Build the search index. See 7.2.4, “Building the search index” on page 185.

k. Verify the data:
   http://localhost/solr/MC_10051_CatalogEntry_en_US/select?q=catenttype_id_ntk_cs:ItemBean&fl=*
<lst name="appends">
  <str name="fq">xquantity:[1 TO *]</str>
</lst>

<arr name="last-components">
  <str>wc_spellcheck</str>
</arr>

7.3.2 Index maintenance

Automatic re-indexing is an event-driven process in WebSphere Commerce V7.0. When a message is received to mutate the base schema, ChangeCatalogEntry events are raised and handled by WebSphere Commerce V7.0. These handlers parse the event and mutate TI_DELTA_CATENTRY. Then, when a CategoryNavigationView message is received, it raises a SynchronizeIndexEvent if the table is not empty. Neither case raises a ChangeCatalogEntry event; therefore the TI_DELTA_CATENTRY table is not mutated and we must use the following re-indexing strategies.

The maintenance for our customized index introduces two separate index update cases:

- The inventory update feed is received and loaded into the WebSphere Commerce V7.0 database. We run a full re-index after each inventory feed load to handle this case.
- An inventory update is caused by a storefront order. We set up a scheduled job, RBInventoryDeltaUpdateIndexCmd, which is a sample exercise, that generates an XML message for all catalog entries that have INVENTORY.QUANTITY = 0. Then, we HTTP/POST the message to the WebSphere Commerce V7.0 search server.

Follow these steps:

1. Schedule RBInventoryDeltaIndexCmd to run at a certain frequency, $f_1$, that will generate an inventory_update_message.xml (see Example 7-9).

Example 7-9 inventory_update_message.xml

```xml
<?xml version="1.0" encoding="UTF-8"?>
<update>
  <add>
    <doc>
      <field name="buyable">1</field>
      <field name="catalog_id">10001</field>
      <field name="catentry_id">10246</field>
      <field name="catenttype_id_ntk_cs">ProductBean</field>
      <field name="fullImage">images/catalog/apparel/apparel_160x160/IMG_0054_e.jpg</field>
      <field name="member_id">7000000000000000002</field>
      <field name="mfName">MapleWear</field>
      <field name="mfName_ntk">MapleWear</field>
      <field name="mfName_ntk_cs">MapleWear</field>
      <field name="name">Bodysuit</field>
      <field name="parentCatgroup_id_facet">10001_10031</field>
    </doc>
  </add>
</update>
```

<!-- handle arrays by flattening and repeating the field name element -->
<field name="parentCatgroup_id_search">10001_10031</field>
<field name="parentCatgroup_id_search">10001_10029</field>
<field name="partNumber_ntk">MW-0054</field>
<field name="price_USD">6.99</field>
<field name="published">1</field>
<field name="shortDescription">Short-sleeved bodysuit.</field>
<field name="storeent_id">10001</field>
<field name="thumbnail">images/catalog/apparel/apparel_70x70/IMG_0054_e.jpg</field>
<field name="xquantity">30</field>
</doc>

<!-- you can have multiple <doc> ... </doc> in one add element -->
</add>
<!-- inside the update element you can have add's and delete's
<delete>
 <id>10245</id>
</delete>
</update>

2. HTTP/POST the inventory_update_message.xml to the search server using post.sh (see Example 7-10):
redbooks@linux-8sjm:~>./post.sh inventory_update_message.xml

Example 7-10 post.sh
#!/usr/bin/sh
# Licensed to the Apache Software Foundation (ASF) under one or more
# contributor license agreements. See the NOTICE file distributed with
# this work for additional information regarding copyright ownership.
# The ASF licenses this file to You under the Apache License, Version 2.0
# (the "License"); you may not use this file except in compliance with
# the License. You may obtain a copy of the License at
# http://www.apache.org/licenses/LICENSE-2.0
#
# Unless required by applicable law or agreed to in writing, software
# distributed under the License is distributed on an "AS IS" BASIS,
# WITHOUT WARRANTIES OR CONDITIONS OF ANY KIND, either express or implied.
# See the License for the specific language governing permissions and
# limitations under the License.
FILES=$*

echo $URL

for f in $FILES; do
    echo Posting file $f to $URL
    curl $URL --data-binary @$f -H 'Content-type:application/xml'
echo
done

#send the commit command to make sure all the changes are flushed and visible
curl $URL --data-binary '<commit/>' -H 'Content-type:application/xml'
echo "complete"
7.4 Building catalog indexes from XML files

Solr V1.3 provides an interface to build indexes from XML files. The challenge is how to resolve the WebSphere Commerce V7.0 metadata information. WebSphere Commerce depends on the metadata in the index, for example, store_id, catalog_id, and productset_id, to filter out the entitled products based on the user’s business context. This metadata is the internal ID of the objects. Most metadata is generated by the WebSphere Commerce key manager function. So, if the XML is built from a non-WebSphere Commerce authoring system, it can be challenging to resolve the metadata.

Another consideration for building the index from the XML files is that part of the catalog data is still required to be loaded in the WebSphere Commerce database to allow WebSphere Commerce components, such as order and promotion, to function properly.

In general, when the client manages the product information in a non-WebSphere Commerce authoring system, we suggest that the client first load the product data to the WebSphere Commerce database and then build the WebSphere Commerce search index from the WebSphere Commerce database. Use these high-level steps:

1. Identify the products that need to be extracted from the non-WebSphere Commerce authoring system.
2. Extract the products from the authoring system to files (use comma-separated value (CSV) files).
3. Load the CSV files into the WebSphere Commerce database with the WebSphere Commerce data load utility. The utility resolves and generates the WebSphere Commerce internal IDs, including the metadata internal IDs.
4. Verify the data in the WebSphere Commerce system.
5. Prepare the index building data with the WebSphere Commerce index preprocess utility (see 7.2.3, “Preprocessing the index data” on page 184).
6. Build the search index with the WebSphere Commerce index building utility (see 7.2.4, “Building the search index” on page 185).

In this process, the WebSphere Commerce dataload is used to generate the internal IDs and to load the data into the WebSphere Commerce database.

Often, clients want to load external data (for example, the product rating and reviewing information) into the search index, but they do not necessarily need to load the data into the WebSphere Commerce database. In these cases, using the XML file to load the data into the catalog and unstructured content indexes can be appropriate, provided that the metadata is also loaded into the index properly.
7.5 Reference

In this section, we document the WebSphere Commerce V7.0 index information.

7.5.1 WebSphere Commerce V7.0 search metadata

Table 7-1 lists the fields that comprise the CatalogEntry index and the database tables that populate the fields.

<table>
<thead>
<tr>
<th>Number</th>
<th>Index metadata</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>catentry_id</td>
<td>The CATENTRY_ID column of the CATENTRY table.</td>
</tr>
<tr>
<td>1</td>
<td>member_id</td>
<td>This is the owner's ID of the product. The MEMBER_ID column of the CATENTRY table.</td>
</tr>
<tr>
<td>2</td>
<td>catenttype_id_ntk_cs</td>
<td>The CATENTTYPE_ID column of the CATENTRY table.</td>
</tr>
<tr>
<td>3</td>
<td>partNumber_ntk</td>
<td>The PARTNUMBER column of the CATENTRY table.</td>
</tr>
<tr>
<td>4</td>
<td>mfPartNumber_ntk</td>
<td>The MFPARTNUMBER column of the CATENTRY table.</td>
</tr>
<tr>
<td>5</td>
<td>mfName</td>
<td>The MFNAME column of the CATENTRY table.</td>
</tr>
<tr>
<td>6</td>
<td>buyable</td>
<td>The BUYABLE column of the CATENTRY table.</td>
</tr>
<tr>
<td>7</td>
<td>storeent_id</td>
<td>This is the store to which the product belongs. For example, if the product belongs to catalog asset store 10, only store 10 is indexed. When e-site stores inherit the product, the index does not need to be updated. The STOREENT_ID column of STORECENT table for the catentry_id.</td>
</tr>
<tr>
<td>8</td>
<td>name</td>
<td>The NAME column of the CATENTDESC table for the catentry_id and the specified language_id.</td>
</tr>
<tr>
<td>9</td>
<td>shortDescription</td>
<td>The SHORTDESCRIPTION column of the CATENTDESC table for the catentry_id and the specified language_id.</td>
</tr>
<tr>
<td>10</td>
<td>thumbnail</td>
<td>The THUMBNAIL column of the CATENTDESC table for the catentry_id and the specified language_id.</td>
</tr>
<tr>
<td>11</td>
<td>fullImage</td>
<td>The FULLIMAGE column of the CATENTDESC table for the catentry_id and the specified language_id.</td>
</tr>
<tr>
<td>12</td>
<td>keyword</td>
<td>The KEYWORD column of the CATENTDESC table for the catentry_id and the specified language_id.</td>
</tr>
<tr>
<td>13</td>
<td>published</td>
<td>The PUBLISHED column of the CATENTDESC table for the catentry_id and the specified language_id.</td>
</tr>
<tr>
<td>Number</td>
<td>Index metadata</td>
<td>Comment</td>
</tr>
<tr>
<td>--------</td>
<td>----------------</td>
<td>---------</td>
</tr>
<tr>
<td>14</td>
<td>parentCatgroup_id_facet</td>
<td>This is a multiple value field. Each value has two parts connected by &quot;,&quot;, the first part is the CATALOG_ID, and the second part is the CATGROUP_ID, to which the catalog entry directly belongs, for example, 10101_10200. The sql to get the data is: SELECT CATGPENREL.CATENTRY_ID CATENTRY_ID, rtrim(cast(catgpenrel.catalog_id as char(16)))</td>
</tr>
<tr>
<td>15</td>
<td>parentCatgroup_id_search</td>
<td>This is the product's parent group list (including all levels in the category hierarchy tree). From the CATGPENREL table, find the direct parent catgroup_id, after, based on the catgroup_id, using the CATGRPREL table to find all its ancestors for the catalog entry.</td>
</tr>
<tr>
<td>16</td>
<td>parentCatentry_id</td>
<td>This is the catentry's parent catentry, for example, an item's parent product. It is easy to find the catentry's parent catentry from the CATENTREL table. The sql to get the data is: SELECT CATENTRY_ID_CHILD, CATENTRY_ID_PARENT FROM CATENTREL R WHERE R.CATENTRY_ID_CHILD = XXXXX Where XXXXX is the catentry_id.</td>
</tr>
<tr>
<td>17</td>
<td>catalog_id</td>
<td>This is the catalog to which the product belongs. The sql to get the data is: SELECT DISTINCT R.CATENTRY_ID CATENTRY_ID, R.CATALOG_ID CATALOG_ID FROM CATGPENREL R WHERE R.CATENTRY_ID = XXXXX Where XXXXX is the catentry_id.</td>
</tr>
<tr>
<td>18</td>
<td>productset_id</td>
<td>This is the product set to which the product belongs. It is easy to find the product sets from the PSSETCEREL table. The sql to get the data is: SELECT PRSETCEREL.CATENTRY_ID, PRODUCTSET.PRODUCTSET_ID FROM PRSETCEREL, PRODUCTSET WHERE PRODUCTSET.PRODUCTSET_ID = PRSETCEREL.PRODUCTSET_ID AND PRODUCTSET.MARKFORDELETE = 0 AND PRSETCEREL.CATENTRY_ID=XXXXX Where XXXXX is the catentry_id.</td>
</tr>
<tr>
<td>Number</td>
<td>Index metadata</td>
<td>Comment</td>
</tr>
<tr>
<td>--------</td>
<td>----------------</td>
<td>---------</td>
</tr>
<tr>
<td>19</td>
<td>price_USD</td>
<td>The offer price in USD (US dollars). The offer price for a catalog entry, which is not a “BundleBean”, is the PRICE column in the OFFERPRICE table for the offer, which has the highest PRECEDENCE, and the MINIMUMQUANTITY column has either 1 or 0, or is null. The sql to get the offer_id is:&lt;br&gt;1. select o.offer_id offer_id, o.catentry_id catentry_id from offer o, TRADEPOSCN T, CATGRP TPC C, STORECENT S,&lt;br&gt;(select max(PRECEDENCE) as maxpre, offer_id from offer where (MINIMUMQUANTITY IN (1, 0) OR MINIMUMQUANTITY IS NULL) group by offer_id) o2 where O.TRADEPOSCN_ID=T.TRADEPOSCN_ID and T.TRADEPOSCN_ID=C.TRADEPOSCN_ID and C.STORE_ID=S.STOREENT_ID and o.catentry_id=S.catentry_id and o.offer_id=XXXXX and o.offer_id=o2.offer_id order by offer_id&lt;br&gt;Where XXXXX is the catentry_id.&lt;br&gt;The sql to get the offer price is:&lt;br&gt;2. select o.catentry_id catentry_id, p.currency currency, p.price price from offerprice p, where p.offer_id = YYYYY AND p.currency in ('USD') AND CE.CATENTTYPE_ID &lt;&gt; 'BundleBean'&lt;br&gt;AND CE.CATENTRY_ID=XXXXX&lt;br&gt;Where XXXXX is the catentry_id and YYYYY is the offer_id from the getting offer_id sql shown before this sql.&lt;br&gt;For the catalog entry that has the type of “BundleBean”&lt;br&gt;The price is the sum of all the catalog entries that belong to the bundle. Using the CATENTREL, where the CATENTREL.CATRELTYPE_ID='BUNDLE_COMPONENT' and CATENTREL.CATENTRY_ID_PARENT=XXXXX&lt;br&gt;Where XXXXX is the catentry_id.</td>
</tr>
<tr>
<td>20</td>
<td>price_EUR</td>
<td>The offer price for EUR (Euro). How to get the price is the same as the price_USD except the currency is “EUR”.</td>
</tr>
<tr>
<td>21</td>
<td>price_CAD</td>
<td>The offer price for CAD (Canadian Dollar). How to get the price is the same as the price_USD except the currency is &quot;CAD&quot;.</td>
</tr>
<tr>
<td>22</td>
<td>price_CNY</td>
<td>The offer price for CNY (Chinese Yen). How to get the price is the same as the price_USD except the currency is &quot;CNY&quot;.</td>
</tr>
<tr>
<td>23</td>
<td>price_JPY</td>
<td>The offer price for JPY (Japanese Yen). How to get the price is the same as the price_USD except the currency is “JPY”.</td>
</tr>
<tr>
<td>24</td>
<td>price_KRW</td>
<td>The offer price for KRW (Korean Won). How to get the price is the same as the price_USD except the currency is &quot;KRW&quot;.</td>
</tr>
<tr>
<td>25</td>
<td>price_BRL</td>
<td>The offer price for BRL (Brazilian Real). How to get the price is the same as the price_USD except the currency is &quot;BRL&quot;.</td>
</tr>
<tr>
<td>26</td>
<td>price_TWD</td>
<td>The offer price for TWD (New Taiwan Dollar). How to get the price is the same as the price_USD except the currency is “TWD”.</td>
</tr>
<tr>
<td>27</td>
<td>price_PLN</td>
<td>The offer price for PLN (Polish Zloty). How to get the price is the same as the price_USD except the currency is &quot;PLN&quot;.</td>
</tr>
<tr>
<td>28</td>
<td>price_RON</td>
<td>The offer price for RON (Romanian Lei). How to get the price is the same as the price_USD except the currency is &quot;RON&quot;.</td>
</tr>
</tbody>
</table>
| 29     | price_RUB      | The offer price for RUB (Russian Ruble). How to get the price is the same as the price_USD except the currency is “RUB”.

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<table>
<thead>
<tr>
<th>Number</th>
<th>Index metadata</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>30</td>
<td>price_EGP</td>
<td>The offer price for EGP (Egyptian Pound). How to get the price is the same as the price_USD except the currency is “EGP”.</td>
</tr>
<tr>
<td>31</td>
<td>price_GBP</td>
<td>The offer price for GBP (British Pound). How to get the price is the same as the price_USD except the currency is “GBP”.</td>
</tr>
<tr>
<td>32-61</td>
<td>ads_f1 to ads_f30</td>
<td>The attribute values for the string type of classic attributes. The classic attribute mapping information is stored in the ATTRDICTSRCHCONF table. You need to populate the correct information for the ATTR_ID column into this table for the attribute in your master catalog ID. You will know which solr index field is for which attribute. The product has all the values of its SKUs.</td>
</tr>
<tr>
<td>62-71</td>
<td>adi_f1 to adi_f10</td>
<td>The attribute values for the integer type of classic attributes. The classic attribute mapping information is stored in the ATTRDICTSRCHCONF table. You need to populate the correct information for the ATTR_ID column into this table for the attribute in your master catalog ID. You will know which solr index field is for which attribute. The product has all the values of its SKUs.</td>
</tr>
<tr>
<td>72-81</td>
<td>adf_f1 to adf_f10</td>
<td>The attribute values for the integer type of classic attributes. The classic attribute mapping information is stored in ATTRDICTSRCHCONF table. You need to populate the correct information for the ATTR_ID column into this table for the attribute in your master catalog ID. You will know which solr index field is for which attribute. The product has all the values of its SKUs.</td>
</tr>
<tr>
<td>82-111</td>
<td>cas_f1 to cas_f30</td>
<td>The attribute values for the string type of classic attributes. The classic attribute mapping information is stored in the CLSATTRSRCHCONF table. You need to populate the correct information for the ATTRNAME column into this table for the attribute in your master catalog ID and language. You will know which solr index field is for which attribute. The product has all the values of its SKUs.</td>
</tr>
<tr>
<td>112-121</td>
<td>cai_f1 to cai_f10</td>
<td>The attribute values for the integer type of classic attributes. The classic attribute mapping information is stored in the CLSATTRSRCHCONF table. You need to populate the correct information for the ATTRNAME column into this table for the attribute in your master catalog ID and language. You will know which solr index field is for which attribute. The product has all the values of its SKUs.</td>
</tr>
<tr>
<td>122-131</td>
<td>caf_f1 to caf_f10</td>
<td>The attribute values for the float type of classic attributes. The classic attribute mapping information is stored in the CLSATTRSRCHCONF table. You need to populate the correct information for the ATTRNAME column into this table for the attribute in your master catalog ID and language. You will know which solr index field is for which attribute. The product has all the values of its SKUs.</td>
</tr>
</tbody>
</table>
Storefront

This chapter describes how to enable the search-based navigation for a storefront and discusses all the new features that are available as part of the predefined search when enabled. We implemented all the scenarios in this chapter in the MadisonsFEP2 business-to-consumer (B2C) store.

**Names:** The following company names appearing in this publication are fictitious. We use these names for instructional purposes only.

We use these search terms in this chapter:

- **Facet:** A property common to a set of search results. It can be static or dynamic, such as a brand name, price, or so on.
- **Unstructured content:** Content that is associated with a product, such as an instruction manual.
- **Landing page:** A predefined destination web page in the storefront.
- **Stop word:** Words that are filtered out prior to submitting the search, for example, “the” or “this”.

The storefront, by default, enables shoppers to navigate the catalog in the following ways:

- **Quick search (by keyword):** A search field with an automatic suggestion feature, which is integrated into the store’s header at the top of the page. This method allows shoppers to perform quick searches from any store page within the site.
- **Taxonomy navigation (by category):** A category-based navigation technique, which is driven by the header’s top navigation menu. This method is only effective when the shopper knows exactly in which category the desired products are located.
- **Faceted navigation (by facet):** This method is used for accessing product information that is represented using a faceted classification. This technique allows shoppers to explore by filtering information. A faceted classification system allows the assignment of multiple classifications to an object, enabling the classifications to be ordered in multiple ways, rather than in a single, predetermined, and taxonomic order. Each facet typically corresponds to the possible values of a property that is common to a set of objects.
Advanced search (by keyword): This method is a variation of the quick search that allows you to specify more detailed searching criteria. This method is useful when the shopper knows a certain range of criteria or conditions to use to narrow the scope of the search results.
8.1 Enabling search-based navigation

Before using the enhanced search features that are provided in Feature Pack 2, we need to make sure that the store’s master catalog is indexed for WebSphere Commerce search and the search server and that index structure is deployed and built.

To enable catalog-based navigation, perform the following steps:
1. Log on to the Management Center.
2. Select Store Management from the menu, as shown in Figure 8-1.

![Figure 8-1 Opening the Store Management tool](image1)

3. Click Stores in the explorer view, as shown in Figure 8-2.

![Figure 8-2 Selecting Stores list view](image2)
4. Right-click the store and click **Open**, as shown in Figure 8-3.

![Figure 8-3 Opening MadisonsFEP2 store](image)

5. Select the **Catalog** tab.
6. Select **Search-based navigation**, as shown in Figure 8-4.

![Figure 8-4 Enabling Search-based navigation](image)

The storefront now has the following features enabled:

- Full-text search
- Auto suggest
- Spell correction
- Phrase search
- Wild cards
- Interactive breadcrumb trail with facet selected
- Search term highlighting
- Facets display
- Search unstructured content
- Multiple views (grid and list view)
- Displayed price can be indexed or calculated
- Configurable sort options
- Results can be dragged and dropped
- Results can be bookmarked

Most of the search scenarios in this chapter are performed by entering the search term in the quick search tool in the header. The breadcrumb trail in the Search Results page displays the input search term that was used.
8.2 Full-text search

Shoppers can enter a full word or a set of words in the quick search text box. For example, if the shopper enters coffee maker, the search is performed on the full text, as it was entered, and the results are displayed, as shown in Figure 8-5.

Figure 8-5  Search results for coffee maker
8.3 Auto suggest

The storefront provides shoppers with type-ahead functionality. Suggested keyword matches are automatically displayed and selectable underneath the search field when entering search terms in the store.

For example, when the shopper starts typing so into the quick search text box, the system shows a list of suggested terms, as shown in Figure 8-6.

Figure 8-6  Auto suggest results for “so”

8.4 Spelling correction and search term suggestion

If the shopper enters a search term that is not found in the index, the system automatically runs the spell-checker at run time and suggests the nearest search term. It displays the results for the first spelling match that is returned. For example, if the shopper types soaf instead of soap, the system suggests the words: soaps, soft, star, sofa, and seat.
The system automatically displays the results for the first match, which is soaps, as shown in Figure 8-7.

![Figure 8-7 Search term suggestions in the Search Results page for "soaf"](image)

The variable `limit` under the spellcheck node in `wc-search.xml` allows the configuration of the maximum number of suggestions to be returned and displayed in *Did you mean*. The variable `limit` is assigned a default value of 5, as shown in Example 8-1.

**Example 8-1 Search term configuration**

```xml
<config:spellcheck>
    <config:param name="limit" value="5"/>
</config:spellcheck>
```

### 8.5 Phrase search

Shoppers can enter a phrase in the quick search text box and the system returns results with products that have this phrase in the description. The system removes the *stop* words, which are defined in `stopword.txt`. 
For example, if shoppers search for This sofa offers, the system removes the stop word this and displays the results for the phrase sofa offers, as shown in Figure 8-8.

8.6 Wild cards

Search terms can contain a wildcard character, an asterisk (*), to increase the scope of the search results. The wildcard indicates that all products containing the surrounding partial search term must be returned in the search results. Wild card searching can help more advanced search users quickly find and display large amounts of search results.
For example, submitting a search for coff* returns search results for all items that contain the term coff, including any terms following it, such as coffee or coffee maker, as shown in Figure 8-9.

When compared with the sample search results for automatic search term suggestions and spelling correction, instead of producing no search results using the search term coff, wild card searching produces several search results simply by adding the asterisk to the search term.

Wild card searching is enabled by default, but if necessary, you can disable it for runtime performance or security reasons:

- A prohibited words list stops the search request from further searching. You configure the prohibited words list in the wc-component.xml file. For example, when a shopper searches for * by default, the resulting page is routed to the Prohibited Characters store page.

- The following configuration is the default:

  ```xml
  <config:property name="StopPatterns" value="\*,\~,\?,&apos;,&quot;\,*\|\.\|.*\|.*\|.*\|.*\|.*" />
  ```

- You can update the configuration by using the regular expression format.

![Figure 8-9   Search results for coff*](image)

The prohibit function is used together with the following configuration, which is also in the wc-component.xml file:

- `&lt;config:property name="RequestFields" value="searchTerm,filterTerm,manufacturer,minPrice,maxPrice,categoryId" />

The "searchTerm,filterTerm,manufacturer,minPrice,maxPrice,categoryId" comes from the JavaServer Pages (JSP) field names, as marked in Figure 8-10 on page 215.

The meaning of the string is to concatenate all the values in these fields into one input string(StringA), and StringA will be matched against the prohibit list parts. If the concatenate StringA matches the prohibit string like "**", it will go to the Prohibit Error page.

This function is used for both advanced search and basic search.
8.7 Facets display

Shoppers can find products easily in the storefront using faceted navigation. Facets group similar items and attributes together in the left section in the Search Results page to target meaningful product results. The groups and shared attributes are displayed with the number of products contained in each facet. Facets help filter the search results and are displayed as links in the left section of the Search Results page, such as brands, prices, and features.

Facets: All content that is displayed in facets must be indexed in the WebSphere Commerce search. For example, offer prices for separate currencies must be indexed to enable price facets and sorting.

Brands are not translated, by default, in search facets. Standard offer prices are indexed by default. That is, price facets are based on the standard offer price, where any adjustments from price rules or contract prices are not reflected on the price facets.
For example, when the shopper searches for coffee, the system returns 31 products and displays the facets, category, brand, and price, in the left section of the Search Results window, as shown in Figure 8-11.

Figure 8-11  Facets shown in left section of the Search Results window
Selecting the facet **Less than 100** filters the results by price and it returns 25 products. It also displays the available facets, category and brand, as shown in Figure 8-12.

![Search results with a price facet of Less than 100 selected](image-url)
Selecting the facet **Kitchen’s Best** further filters the data by brand and displays six products, as shown in Figure 8-13.

You can configure the facet display in `wc-server.xml`. The `<config:facets>` node declares a list of search index fields to be used for faceting and their associated faceting behavior at runtime. The following parameters are available to customize the facet display:

- **sort**: This parameter determines the ordering of the facet field constraints. Assigning a value to `count` means to sort the constraints by the count (highest count first) and `index` means to return the constraints sorted in their index order. The default value is `count`.
- **mincount**: This parameter indicates the minimum counts for facet fields that need to be included in the response. The default value is 0.
- **limit**: This parameter indicates the maximum number of constraint counts that need to be returned for the facet fields. A negative value means unlimited. The default value is 100.

Example 8-2 shows the default values that are assigned for these variables.

```
<config:facets>
  <config:param name="sort" value="count" />
  <config:param name="minCount" value="1" />
```

---

**Figure 8-13  Search results with brand facet Kitchen’s Best selected**

---
8.8 Interactive breadcrumb trail

The breadcrumb trail maintains the current navigation structure as the shopper navigates throughout the store. It contains the current navigation facets that are selected by the shopper, with the category always shown first.

Facets previously selected by the shopper are shown in the breadcrumb trail. Seeing the previously selected facets enables the shopper to quickly identify what facets have been selected up to this point. These facets can also be cancelled by clicking [X] (remove) to the right of the facet in the breadcrumb trail, which will return more general search results.

For example, when the shopper searches for coffee, the system returns 31 products. The shopper then selects the facet price Less than 100 and then selects the facet brand name Kitchen's Best from the search results.
The Search Results page contains the breadcrumbs, as shown in Figure 8-14.

![Figure 8-14](image)

Selected facets are shown in the breadcrumb trail in the upper-left corner of the Search Results page.

The shopper can now remove the facet Less than 100 by clicking [X] in the breadcrumb trail, as shown in Figure 8-15.

![Figure 8-15](image)

Removing the Less than 100 facet
8.9 Search term highlight

The search term highlight enables customers to browse easily where their submitted search term appears for each search result. Figure 8-16 shows the highlighting of the search term sofa.

![Search Results page with highlighted search results](image)

Figure 8-16  Search term sofa highlighted in search results

You configure the list of search index fields to use for highlighting and their associated highlighting behavior at run time in `wc-search.xml`, as shown in Example 8-3.

**Example 8-3  Search term highlight configuration**

```
<_config:highlight simplePost="&lt;/span&gt;&lt;/strong&gt;"
  simplePre="&lt;strong&gt;&lt;span class=font2&gt;"/>
```

8.10 Multiple views

The Search Results page has two display modes:

- Grid view
- Details view
8.10.1 Grid view

The grid view allows more results to be displayed on a page, reducing the total number of results pages. It includes high-level information about the product, such as the name and price, as shown in Figure 8-17. Hovering the mouse over the result allows a quick view of the product.

Figure 8-17  Search Results grid view
To change the view, click the details view image, as shown in Figure 8-18.

**Figure 8-18  Switching between views**

### 8.10.2 Details view

The details view shows more information for the search result products, such as name, short description, and price. It also shows the search term highlighting and unstructured content results, as shown in Figure 8-19 on page 224.
8.11 Index or calculate displayed price

You define the display mode for showing prices in the storefront in `wc-search.xml`. The prices can be computed, indexed, or a mixture of both:

- **Computed**: Prices only for the current page are calculated at run time and the page hides the price facets. The system shows the computed price in each result. It hides the price range search in the Advanced Search page. *Use the computed price when prices are not populated in the search index.* Assign a value of 0 in the configuration file `wc-search.xml`.

- **Indexed**: In this mode, all prices are retrieved from the search index and the system shows the price facets with the price range configured in the facet configuration table. It shows the indexed price in each search result. It shows the price range search in the Advanced Search page. *Use this mode when the prices are populated in the search index.* Assign a value to 1 in the configuration file `wc-search.xml`.

- **Mixed**: In this mode, the search result contains the computed prices and the price facets use the indexed prices. The system shows the price facets with the price range configured.
in the facet configuration table. It shows the computed price in each result. It shows the 
price range search in the Advanced Search page. *Use this mode when the prices for all 
supported currencies are populated in the search index.* Assign a value of 2 in the 
configuration file `wc-search.xml`.

Example 8-4 shows configuring the prices to be indexed.

*Example 8-4  Prices are indexed*

```
<config:param name="price" value="1"/>
```

### 8.12 Configurable sort options

You can define sorting for the search results in `wc-search.xml`. The sort section is for defining 
the sorting options and their corresponding values, which can be used directly from the 
storefront (Example 8-5).

*Example 8-5  Sort options*

```
<config:sort inherits="false">
  <config:field name="1" value="mfName_ntk_cs asc"/>
  <config:field name="2" value="name_ntk asc"/>
  <config:field name="3" value="price_* asc"/>
  <config:field name="4" value="price_* desc"/>
</config:sort>
```
8.13 Drag and drop results

Shoppers can drag search results to the Compare view or to the shopping cart.

For example, shoppers can search for sofa. From the Search Results page, drag and drop Classic Fabric Sofa to the Compare view, as shown in Figure 8-20.

Figure 8-20 Drag and drop Classic Fabric Sofa to the Compare view
Now, from the Search Results page, drag and drop **Wing Tip Leather Sofa** to the quick cart, as shown in Figure 8-21. This action adds the product to the shopping cart.

![Figure 8-21 Drag and drop Wing Tip Leather Sofa to the quick cart](image)

### 8.14 Bookmark results

You can bookmark the search results pages like any other web pages. Shoppers can view these bookmarked pages directly by selecting the bookmark. For storefronts that require the shopper to log in before viewing the catalog, the shopper can be prompted to log in before seeing the search results bookmark.
Business-to-business (B2B) scenario

In this part, we discuss the entitlement feature that is provided through the WebSphere Commerce search framework. We also discuss a B2B scenario and provide the implementation using catalog filters and contracts.

A **catalog filter** is a set of user-defined conditions that calculate the categories and catalog entries to which a customer is entitled. The catalog filter provides an entitlement search expression as part of the search criteria. This entitlement check uses the WebSphere Commerce search framework. It is integrated with the search solution to provide fast and dynamic catalog filtering. Without customization, the search framework uses Solr.

You need to perform the following prerequisites to use catalog filters:

1. Install WebSphere Commerce V7.0 Fix Pack 2 and WebSphere Commerce V7.0 Feature Pack 2.
2. Enable the Foundation and Management Center feature.
3. Publish the stores and corresponding enhancement SAR (store archive) files.
4. Configure search.
5. Enable search:
   a. Enable product entitlement:
      i. Enable the storefront for search.
      ii. Enable the search-based navigation flow.
   b. Create the product-sensitive policies, such as “Use in price rules”:
      i. Enable the storefront for search.

By default, all stores have store default filters created and assigned.
Building search expressions

Figure 8-22 shows the interface that is used to build up the search expression in String format using contract IDs (either from input, or from the business context if there is no input contract).

The internal logic determines whether ProductSet TC or CatalogFilter TC is used, and then, it composes the search expression based on it.

Business users can create catalog filters that are based on categories, catalog entries, product properties, and attribute dictionary attribute conditions. E-site managers can assign catalog filters to e-site stores. Business-to-business (B2B) sales managers can assign catalog filters to default or buyer contracts.

When creating catalog filters, you can combine one or more filtering criteria to achieve your business goals. You can include or exclude categories from your catalog. If you include a category, any catalog entry and child category under this category are included, unless you explicitly exclude the catalog entry or category. You can apply conditions on the categories that are added to your catalog filter. The condition can be composed of attribute dictionary attributes or catalog entry properties. You can include or exclude catalog entries from your catalog. The catalog entry-based criteria takes higher precedence over the other filtering criteria. You can allow separate customers to view and purchase separate catalog entries on separate stores by assigning catalog filters to contracts. When you assign catalog filters to a contract, the customers that are shopping under the contract can browse, search for, and purchase the catalog entries that are defined in the catalog filter. For example, in a B2B business model, you can create catalog filters and then assign separate catalog filters to each business contract. The customers shopping under the specific contract only can see the catalog entries to which they are entitled.
Product entitlement

Product entitlement consists of the following functions:

- Assign catalog filters to contracts in Accelerator.
- Product entitlement within contracts:
  - Base contract
  - B2B buyer contract
  - Store default contract
- For B2B direct stores, you can assign a catalog filter to the following contracts:
  - The default contract for the store
  - A base contract
  - A customer contract
- For e-site stores (B2B direct and consumer direct), you can also assign a catalog filter to these contracts:
  - The default base contract of the storefront asset store
  - The default contracts of extended site stores

**Important:** Catalog filters cannot be assigned to hosting contracts. The channel manager role, which is responsible for hosting contracts, does not have access to the catalog filter and pricing tool.

- For business-to-consumer (B2C) direct stores, assign the catalog filter to the default store contract.

In this part of the book, we describe this scenario. EliteFEP2 is a B2B automotive parts store that sells products, such as brake components, electrical systems, suspension components, transmission components, and accessories. The EliteFEP2 storefront has to provide separate contract entitlements based on the organization to which the user belongs:

- Customers under the ITSO Distributor A company must be able to view and order all products, except for products that are made by the Brakin Brothers company.
- Customers under the ITSO Generic distributor organization must not be able to view and order products under Transmission components, except for one product, which is Spur gears (part number A00001560).
- Customers under the ITSO Electrical Systems distributor organization must be able to view and order all products that are under Electrical systems only (exclude all other categories).
Catalog entitlement

This chapter provides a step-by-step implementation of the scenario that is introduced in Part 3, “Business-to-business (B2B) scenario” on page 229.

This chapter assumes that the users, organizations, and contracts, which are shown in Table 9-1, Table 9-2, and Table 9-3, are already created in the system.

Table 9-1  Organizations

<table>
<thead>
<tr>
<th>Organization name</th>
<th>Parent organization</th>
<th>Organization type</th>
</tr>
</thead>
<tbody>
<tr>
<td>ITSO Generic</td>
<td>EliteFEP2 Organization</td>
<td>Organization</td>
</tr>
<tr>
<td>ITSO Distributor A</td>
<td>EliteFEP2 Organization</td>
<td>Organization</td>
</tr>
<tr>
<td>ITSO Electrical Systems</td>
<td>EliteFEP2 Organization</td>
<td>Organization</td>
</tr>
</tbody>
</table>

Table 9-2  Users

<table>
<thead>
<tr>
<th>User ID</th>
<th>Organization</th>
<th>Role</th>
</tr>
</thead>
<tbody>
<tr>
<td>Jim</td>
<td>ITSO Generic</td>
<td>Registered Customer</td>
</tr>
<tr>
<td>Chris</td>
<td>ITSO Distributor A</td>
<td>Registered Customer</td>
</tr>
<tr>
<td>Nikit</td>
<td>ITSO Electrical Systems</td>
<td>Registered Customer</td>
</tr>
</tbody>
</table>

All contracts are created under the Buyer A Organization Account for EliteFEP2 account.

Table 9-3  Contracts

<table>
<thead>
<tr>
<th>Contract name</th>
<th>Participants (Organizations)</th>
</tr>
</thead>
<tbody>
<tr>
<td>ITSO Generic contract</td>
<td>ITSO Generic</td>
</tr>
<tr>
<td>ITSO Distributor A contract</td>
<td>ITSO Distributor A</td>
</tr>
<tr>
<td>ITSO Electrical Systems distributor contract</td>
<td>ITSO Electrical Systems</td>
</tr>
</tbody>
</table>
9.1 Catalog entitlement

Before assigning catalog filters to the contracts, we need to create three catalog filters to satisfy the requirement. Perform these steps to create the catalog filters:

1. Log on to Management Center:
   

2. Open the Catalog Filter and Pricing tool, as shown in Figure 9-1.

   Figure 9-1   Open Catalog Filter and Pricing tool
3. Create a catalog filter 1 (CF1) to include all products in the master catalog, except for products that are made by Brakin Brothers:
   a. Create a new catalog filter by clicking the **New** icon and selecting **Catalog Filter**.
   b. Specify the following fields under General Properties, as shown in Figure 9-2:
      i. For **Name**, type **CF1**.
      ii. For **Description**, type **Include all products except those with manufacturer name ‘Brakin Brothers’**.
   c. Expand **Filter by Categories, Attributes, and Properties**.
   d. Select **Tree view** mode.
e. Right-click **EliteFEP2** in Categories and select **Include**, as shown in Figure 9-3.

![Figure 9-3  Include the master catalog](image-url)
f. In the Condition groups, create a new condition group called CG1.

g. Click the condition group CG1 and add the following attribute condition:

i. Click a new property in Attributes and properties conditions, as shown in Figure 9-4.
ii. Select **Manufacturer Name** under the Name column.

iii. Select Matching rule as **not equals**.

iv. For Value, enter Brakin Brothers, as shown in Figure 9-5.

![Figure 9-5 Selecting the property conditions](image)

h. Click **Save and Close**.

4. Create catalog filter 2 (CF2) to exclude all products under the category Transmission components, except for one product called Spur gears (part number A00001560):
   a. Create a new catalog filter by clicking the **New** icon and selecting **Catalog Filter**.
   b. Specify the following fields under General Properties:
      i. For **Name**, enter CF2.
      ii. For **Description**, enter **Exclude all products under Transmission components except Spur gears**.
   c. Expand Filter by **Categories, Attributes, and Properties**.
   d. Select **Tree view** mode.
   e. Right-click **EliteFEP2** in Categories and select **Include**.
f. Right-click the **Transmission components** category and select **Exclude**, as shown in Figure 9-6.

![Figure 9-6 Excluding the Transmission components category](image)

**Figure 9-6**  Excluding the Transmission components category

g. **Expand Filter by Catalog Entries.**
h. In the Catalog entries to include section, enter A00001560 for Code and click **Find and Add**, as shown in Figure 9-7.

![Figure 9-7 Adding the catalog entry to include](image)

i. Click **Save and Close**.

5. Create catalog filter 3 (CF3) to include all products under the Electrical systems category and exclude all other categories:

a. Create a new catalog filter by clicking the **New** icon and selecting **Catalog Filter**.

b. Specify the following fields under General Properties:

i. For **Name**, type CF3.

ii. For **Description**, type *Include only Electrical systems category products.*

c. Expand **Filter by Categories, Attributes, and Properties**.

d. Select **Tree view** mode.
e. Right-click **EliteFEP2** in Categories and select **Exclude**, as shown in Figure 9-8.

*Figure 9-8  Excluding the master catalog*
f. Right-click the **Electrical systems** category and select **Include**, as shown in Figure 9-9.

![Figure 9-9 Including only the Electrical systems category](image)

**g.** Click **Save and Close**.

To entitle certain customers to a subset of your catalog on the storefront, you must assign the catalog filter that we created to a contract by using WebSphere Commerce Accelerator. This requirement applies to all business models (business-to-business (B2B) direct stores, consumer direct stores, and extended site stores). As a result, customers shopping under the contract are only entitled to see and purchase the set of catalog entries that is defined in the catalog filter. A catalog filter is one of the terms and conditions that a contract can have.

**Important:** For a specific contract, only a single catalog filter can be in effect at one time. When assigning new catalog filter to a contract, the new catalog filter overrides the WebSphere Commerce Accelerator catalog filter.

Perform these steps to assign the catalog filters to contracts:

1. Log on to WebSphere Commerce Accelerator to assign these catalog filters to the contracts. For more information, see this website:


2. Select the **EliteFEP2** store from the stores list during the logon.
3. Select **Sales → Accounts**, as shown in Figure 9-10.

![Figure 9-10 Opening the Contracts view](image)

4. Select the business account, **Buyer A Organization**, that has the contract to which you want to assign the catalog filter, and then click **Contracts**, as shown in Figure 9-11.

![Figure 9-11 Selecting the base contract](image)
5. Select the target contract, **ITSO Distributor A contract**, and then click **Update Extended TC**, as shown in Figure 9-12.

![Figure 9-12 Updating contract terms and conditions](image)

6. In the Catalog Filter tab, select **CF1** from the Property Value list box, and click **OK**, as shown in Figure 9-13.

![Figure 9-13 Selecting the catalog filter to be assigned to the current contract](image)

7. Select the target contract, **ITSO Generic contract**, and then click **Update Extended TC**.
8. Select CF2 from the Property Value list box and click OK.

9. Select the target contract, ITSO Electrical Systems contract, and then click Update Extended TC.

10. Select CF3 from the Property Value list box and click OK.

If Jim, who belongs to the ITSO Generic organization (ITSO Generic contract), logs into the storefront, Jim can see only one subcategory called gears under the Transmission category and it has only the product, Spur Gears, as shown in Figure 9-14.

![Figure 9-14 Storefront based on catalog filter CF1](image-url)
If Chris, who belongs to the ITSO Distributor A organization (ITSO Distributor A contract), logs in to the storefront, Chris can see all the categories (except the products that are made by Brakin Brothers, Semi-metallic Brake pads and Organic Brake pads) under the Brake Pads subcategory, as shown in Figure 9-15.

![Figure 9-15 Storefront based on catalog filter CF2](image-url)
If Nikit, who belongs to the ITSO Electrical systems organization (ITSO Electrical systems contract), logs in to the storefront, Nikit can see only Electrical category products, as shown in Figure 9-16.

![Figure 9-16 Storefront based on catalog filter CF3](image-url)
Appendixes
Log file lookup

Table A-1 maps an activity to its associated log file.

<table>
<thead>
<tr>
<th>Activity</th>
<th>Log file</th>
</tr>
</thead>
<tbody>
<tr>
<td>Installing Feature Pack 2</td>
<td>WC_installdir/logs/FEP2/*</td>
</tr>
<tr>
<td>Creating the Search Profile (running ws-ant)</td>
<td>WAS_install_dir/logs/manageprofiles/*</td>
</tr>
<tr>
<td>Enabling WebSphere Commerce foundation feature</td>
<td>WC_installdir/instances/instance_name/logs/enablefoundation_timestamp.log</td>
</tr>
<tr>
<td>Enabling StoreEnhancement feature</td>
<td>WC_installdir/instances/instance_name/logs/enablestore-enhancements_timestamp.log</td>
</tr>
<tr>
<td>setupsearchIndex.sh on WebSphere Commerce server</td>
<td>WC_installdir/components/foundation/subcomponents/search/log/wc-search-index-setup.log</td>
</tr>
<tr>
<td>setupsearchIndex.sh on remote search server</td>
<td>working_dir/search/log/wc-search-index-setup.log</td>
</tr>
<tr>
<td>di-preprocess.sh</td>
<td>WC_installdir/logs/wc-dataimport-preprocess.log</td>
</tr>
<tr>
<td>di-buildindex.sh</td>
<td>WC_installdir/logs/wc-dataimport-preprocess.log</td>
</tr>
<tr>
<td>Replication on Master and Slave machines</td>
<td>WAS_installdir/profiles/search_profile_name/logs/search_server_name/SystemOut.log</td>
</tr>
<tr>
<td>Solr server</td>
<td>WAS_installdir/profiles/search_profile_name/logs/search_server_name/SystemOut.log</td>
</tr>
<tr>
<td>Commerce server</td>
<td>WAS_installdir/profiles/commerce_profile_name/logs/server1/trace.log</td>
</tr>
</tbody>
</table>

**Trace search:** To get the trace search on the Commerce server, add the following trace string:

```java
com.ibm.commerce.search.*=all: com.ibm.commerce.foundation.*=all
```
Back up files: Running di-buildindex.sh writes to the same log file as di-preprocess.sh. Running di-buildindex.sh after di-preprocess.sh overwrites the contents from di-preprocess.sh.

This behavior can be changed by increasing the number of wc-dataimport-preprocess.logs that are kept. Navigate to the directory named WC_installdir/instances/<instancename>/xml/config/dataimport, and open the file logging.properties. Find the line:

```
# Number of output files to cycle through
java.util.logging.FileHandler.count=1
```

And, increase the count value.

The logging.properties file is also where the logging detail can be changed.

Find the line:

```
# Default global logging level, INFO
.level=INFO
```

And, change .level=INFO to .level=FINEST
Appendix B. Configuration files

The following list shows the major configuration files that we have discussed:

- **wc-search.xml**
  
  This file is the major configuration file that is used to define and map interactions between the WebSphere Commerce and search servers. This file is located at:

  `WC_ear_dir/xml/config/com.ibm.commerce.catalog-fep/wc-search.xml`

- **wc-dataimport-preprocess-*.xml files**
  
  These files set up and populate the temporary tables that are used during `di-preprocess.sh`. There are multiple files used, for example, `wc-dataimport-preprocess-attribute-dictionary.xml` and `wc-dataimport-preprocess-common.xml`. All of these files are located at:

  `WC_installdir/instances/instance_name/search/pre-ProcessConfig/MC_catalog_ID/database_type/`

- **schema.xml**
  
  This file defines the fields that are used in the search index, and it sets up the field properties, for example, indexed, MultiValued, and so on. This file is located at:

  `WC_installdir/instances/instance_name/search/solr/home/MC_Icatalog_ID/language/CatalogEntry/conf/schema.xml`

- **wc-data-config.xml**
  
  This file is used to merge the temporary tables into a single index, and it maps the columns to field names. This file is located at:

  `WC_installdir/instances/instance_name/search/solr/home/MC_Icatalog_ID/language/CatalogEntry/conf/wc-data-config.xml`

- **solrconfig.xml**
  
  This file is the Solr-specific configuration file. This file is used to set up replication, the default request handler, and so on. This file is located on the WebSphere Commerce and Search machines. On the WebSphere Commerce machine, this file is located at:

  `WC_installdir/instances/instance_name/search/solr/home/MC_Icatalog_ID/language/CatalogEntry/conf/solrconfig.xml`
On the Search machines, this file is located at:

```
solrhome/MC_masterCatalogId/language/CatalogEntry/conf/solrconfig.xml
```

- **SRCHCONF table**

  This table is used in `di-preprocess` and `di-buildindex` to point the Commerce server to the proper Indexing machine. This file is located in the commerce database.

- **solr-deploy.properties**

  This file contains the configuration information that is used when deploying the Solr application on a remote machine. This file is created during foundation enablement, and it is located at:

  ```
  WC_installdir/components/foundation/subcomponents/search/deploy/properties/solr-deploy.properties
  ```
Index design and data load

This appendix is a WebSphere Commerce V7.0 runtime version of Chapter 7, “Index design and data load” on page 179.
C.1 IBM WebSphere Commerce V7.0 catalog index SQL

The WebSphere Commerce V7.0 search uses the catalog index. We deployed our index locally with the standard configuration on SUSE 11 Enterprise.

C.1.1 Setting up the search index

Run the `setupSearchIndex.sh` to both deploy your catalog index structure to the WebSphere Commerce V7.0 server and configure WebSphere Commerce V7.0 to use the Solr index. This utility ensures that your index is built successfully using your WebSphere Commerce master catalog data. Follow these steps:

1. Start servers (see Example C-1):
   a. Log on as `reduser/passw0rd`.
   b. Open the Konsole terminal.

   **Example C-1  Start servers**
   
   ```
   redbooks@linux-8sjm:~>su - db2inst1
   Password: passw0rd
   db2inst1@linux-8sjm:~> ./sqllib/adm/db2start
   db2inst1@linux-8sjm:~> exit
   logout
   redbooks@linux-8sjm:~> su
   Password: passw0rd
   linux-8sjm:/home/redbooks #
   linux-8sjm:/home/redbooks #/opt/IBMHS/bin/apachectl -k start -f
   /opt/IBM/WebSphere/CommerceServer70/instances/demo/httpconf/httpd.conf
   linux-8sjm:/home/redbooks #exit
   logout
   redbooks@linux-8sjm:~>
   redbooks@linux-8sjm:~>/opt/IBM/WebSphere/AppServer/profiles/demo/bin/startServer.sh server1
   redbooks@linux-8sjm:~/opt/IBM/WebSphere/AppServer/profiles/demo_solr/bin/startServer.sh solrServer
   ```

2. Log on as a WebSphere Commerce non-root user.

3. Change the directory:

   ```
   cd
   /opt/IBM/WebSphere/CommerceServer70/components/foundation/subcomponents/search/bin
   ```

4. Run `setupSearchIndex.sh`:

   ```
   ./setupSearchIndex.sh -instance demo -masterCatalogId 10001 -dbuser db2inst1 -dbuserpwd passw0rd
   ```
5. Ensure that `setupSearchIndex.sh` ran successfully:
   a. Check the log file `wc-search-index-setup.log` for errors:
      i. Change the directory:
         ```
         cd
         /opt/IBM/WebSphere/CommerceServer70/components/foundation/subcomponents/search/log
         ```
      ii. View the log file:
         ```
         vi wc-search-index-setup.log
         ```
   b. Verify that the following assets were created (see Figure C-1):
      ```
      cd /opt/IBM/WebSphere/CommerceServer70/instances/demo/search/solr/home
      ```

![Figure C-1 Commerce search assets](image)

   Verify the following DB2 assets:
   ```
   select * from SRCHATTR;
   select * from SRCHATTRPROP;
   select * from SRCHCONF;
   select * from SRCHSTATS;
   select * from SRCHTERM;
   select * from SRCHTERMASSOCS;
   ```

6. Restart the WebSphere Commerce V7.0 search server.
C.1.2 Preprocessing the index data

Preprocess the search index data to prepare your WebSphere Commerce V7.0 data for indexing. The preprocess utility, `di-preprocess.sh`, extracts, flattens, and imports your data into a set of temporary tables inside the WebSphere Commerce V7.0 database. This preprocessed data is then used by the index building utility, `di-buildindex.sh`, to create the indexes using Solr’s Data Import Handler (DIH). The preprocessed data in the temporary tables is from the WebSphere Commerce V7.0 base schema.

Follow these steps:

1. Start the servers. See Example C-1 on page 256.
2. Log on as a WebSphere Commerce non-root user.
3. Change the directory:
   ```bash
cd /opt/IBM/WebSphere/CommerceServer70/bin
   ```
4. Run `di-preprocess.sh`:
   ```bash
   ./di-preprocess.sh ../instances/demo/search/pre-processConfig/MC_10001/DB2
   -instance demo -dbuser db2inst1 -dbuserpwd passw0rd -fullbuild true -localename en_US
   ```

Additional Information: For more information, go to this website:

http://publib.boulder.ibm.com/infocenter/wchelp/v7r0m0/topic/com.ibm.commerce.developer.doc/tasks/tsdsearchsetuplocal.htm
5. Ensure that `di-preprocess.sh` ran successfully:
   a. Change the directory:
      ```
      cd /opt/IBM/WebSphere/CommerceServer70/logs/
      ```
   b. View the log file:
      ```
      vi wc-dataimport-preprocess.log
      ```
   c. Verify the following DB2 changes (see Figure C-2).

![Figure C-2 Updated DB2](image)

**Figure C-2 Updated DB2**

### Additional information
For more information, go to this website:
http://publib.boulder.ibm.com/infocenter/wchelp/v7r0m0/topic/com.ibm.commerce.developer.doc/tasks/tsdsearchbuildpre.htm

### C.1.3 Building the search index

You build the WebSphere Commerce search index using the index building utility, `di-buildindex.sh`. It is a wrapping utility that updates the information in the master index using Solr's Data Import Handler (DIH) service to build the index, either partially through delta index updates or completely through full index builds. When there are multiple indexes, for example, each language using its own separate index, the index is built multiple times. Follow these steps to build the index:

1. Start the servers (see Example C-1 on page 256).
2. Log on as a WebSphere Commerce non-root user.
3. Change the directory:
   ```
   cd /opt/IBM/WebSphere/CommerceServer70/bin
   ```
4. Run `di-buildindex.sh`:

```bash
./di-buildindex.sh -instance demo -masterCatalogId 10001 -dbuser db2inst1
-dbuserpwd passw0rd -localename en_US -fullbuild true
```

**Important:** Running `di-buildindex.sh` with a non-master catalogId raises this exception:

```java
com.ibm.commerce.foundation.dataimport.exception.DataImportApplicationException:
An error occurred while setting up the search configuration.
```

5. Ensure that `di-buildindex.sh` ran successfully:
   a. Change the directory:
      ```bash
cd /opt/IBM/WebSphere/CommerceServer70/logs
```
   b. View the log file (see Example C-2 and Figure 7-4 on page 184):
      ```bash
vi wc-dataimport-preprocess.log
```

**Important:**
- The `di-buildindex.sh` utility overwrites the preprocess log file.
- Before running `di-buildindex.sh`, back up `wc-dataimport-preprocess.log`.

---

**Example C-2  wc-dataimport-preprocess.log**

Mar 30, 2011 2:29:27 PM
com.ibm.commerce.foundation.dataimport.preprocess.DataImportPreProcessorMain logStartDate
INFO: Data import pre-processing started:Wed Mar 30 14:29:27 EDT 2011
Mar 30, 2011 2:29:28 PM
com.ibm.commerce.foundation.dataimport.preprocess.DataImportPreProcessorMain main
INFO: Data import pre-processing initialization completed in 1.034 seconds.
Mar 30, 2011 2:29:31 PM
com.ibm.commerce.foundation.dataimport.preprocess.AbstractDataPreProcessor
populateTable(PreparedStatement, Long, Connection)
INFO: The batch is being executed...
Mar 30, 2011 2:29:31 PM
com.ibm.commerce.foundation.dataimport.preprocess.AbstractDataPreProcessor
populateTable(PreparedStatement, Long, Connection)
INFO: Batch execution completed.
Mar 30, 2011 2:29:31 PM
com.ibm.commerce.foundation.dataimport.preprocess.AbstractDataPreProcessor
populateTable(PreparedStatement, Long, Connection)
INFO: The batch is being executed...
Mar 30, 2011 2:29:31 PM
com.ibm.commerce.foundation.dataimport.preprocess.AbstractDataPreProcessor
populateTable(PreparedStatement, Long, Connection)
INFO: Batch execution completed.
Mar 30, 2011 2:29:34 PM
com.ibm.commerce.foundation.dataimport.preprocess.DataImportPreProcessorMain processDataConfig
INFO: Data import pre-processing completed in 2.156 seconds for table TI_CATENTRY_0.
Mar 30, 2011 2:29:34 PM
com.ibm.commerce.foundation.dataimport.preprocess.DataImportPreProcessorMain processDataConfig
INFO: Data import pre-processing completed in 3.014 seconds for table TI_ADSTB1_0_#lang_tag#. 
Appendix C. Index design and data load

Mar 30, 2011 2:29:34 PM
com.ibm.commerce.foundation.dataimport.preprocess.DataImportPreProcessorMain processDataConfig
INFO: Data import pre-processing completed in 0.662 seconds for table TI_ADITB1_0.#lang_tag#.
Mar 30, 2011 2:29:35 PM
com.ibm.commerce.foundation.dataimport.preprocess.DataImportPreProcessorMain processDataConfig
INFO: Data import pre-processing completed in 0.88 seconds for table TI_ADFTB1_0.#lang_tag#.
Mar 30, 2011 2:29:36 PM
com.ibm.commerce.foundation.dataimport.preprocess.AbstractDataPreProcessor populateTable(PreparedStatement, Long, Connection)
INFO: The batch is being executed...
Mar 30, 2011 2:29:36 PM
com.ibm.commerce.foundation.dataimport.preprocess.AbstractDataPreProcessor populateTable(PreparedStatement, Long, Connection)
INFO: Batch execution completed.
Mar 30, 2011 2:29:36 PM
com.ibm.commerce.foundation.dataimport.preprocess.DataImportPreProcessorMain processDataConfig
INFO: Data import pre-processing completed in 0.77 seconds for table TI_CATALOG_0.
Mar 30, 2011 2:29:37 PM
com.ibm.commerce.foundation.dataimport.preprocess.AbstractDataPreProcessor populateTable(PreparedStatement, Long, Connection)
INFO: The batch is being executed...
Mar 30, 2011 2:29:37 PM
com.ibm.commerce.foundation.dataimport.preprocess.AbstractDataPreProcessor populateTable(PreparedStatement, Long, Connection)
INFO: Batch execution completed.
Mar 30, 2011 2:29:37 PM
com.ibm.commerce.foundation.dataimport.preprocess.DataImportPreProcessorMain processDataConfig
INFO: Data import pre-processing completed in 0.881 seconds for table TI_DPCATENTRY_0.
Mar 30, 2011 2:29:38 PM
com.ibm.commerce.foundation.dataimport.preprocess.AbstractDataPreProcessor populateTable(PreparedStatement, Long, Connection)
INFO: The batch is being executed...
Mar 30, 2011 2:29:38 PM
com.ibm.commerce.foundation.dataimport.preprocess.AbstractDataPreProcessor populateTable(PreparedStatement, Long, Connection)
INFO: Batch execution completed.
Mar 30, 2011 2:29:38 PM
com.ibm.commerce.foundation.dataimport.preprocess.DataImportPreProcessorMain processDataConfig
INFO: Data import pre-processing completed in 1.035 seconds for table TI_DP_GROUP_0.
Mar 30, 2011 2:29:39 PM
com.ibm.commerce.foundation.dataimport.preprocess.DataImportPreProcessorMain processDataConfig
INFO: Data import pre-processing completed in 0.754 seconds for table TI_PRODUCTSET_0.
Mar 30, 2011 2:29:40 PM
com.ibm.commerce.foundation.dataimport.preprocess.AbstractDataPreProcessor populateTable(PreparedStatement, Long, Connection)
INFO: The batch is being executed...
Mar 30, 2011 2:29:40 PM
com.ibm.commerce.foundation.dataimport.preprocess.AbstractDataPreProcessor populateTable(PreparedStatement, Long, Connection)
INFO: Batch execution completed.
INFO: Data import pre-processing completed in 1.579 seconds for table TI_OFFER_0.
Mar 30, 2011 2:29:41 PM  
com.ibm.commerce.foundation.dataimport.preprocess.AbstractDataPreProcessor  
populateTable(PreparedStatement, Long, Connection)  
INFO: The batch is being executed...
Mar 30, 2011 2:29:41 PM  
com.ibm.commerce.foundation.dataimport.preprocess.AbstractDataPreProcessor  
populateTable(PreparedStatement, Long, Connection)  
INFO: Batch execution completed.
Mar 30, 2011 2:29:41 PM  
com.ibm.commerce.foundation.dataimport.preprocess.DataImportPreProcessorMain processDataConfig  
INFO: Data import pre-processing completed in 1.035 seconds for table TI_OFFERPRICE_0.
Mar 30, 2011 2:29:43 PM  
com.ibm.commerce.foundation.dataimport.preprocess.AbstractDataPreProcessor  
populateTable(PreparedStatement, Long, Connection)  
INFO: The batch is being executed...
Mar 30, 2011 2:29:43 PM  
com.ibm.commerce.foundation.dataimport.preprocess.AbstractDataPreProcessor  
populateTable(PreparedStatement, Long, Connection)  
INFO: Batch execution completed.
Mar 30, 2011 2:29:43 PM  
com.ibm.commerce.foundation.dataimport.preprocess.DataImportPreProcessorMain processDataConfig  
INFO: Data import pre-processing completed in 1.632 seconds for table TI_BUNDLEPRICE_0.
Mar 30, 2011 2:29:45 PM  
com.ibm.commerce.foundation.dataimport.preprocess.CatalogHierarchyDataPreProcessor  
process(DataProcessingConfig, Connection, boolean, String)  
INFO: Process the master catalog...
Mar 30, 2011 2:29:45 PM  
com.ibm.commerce.foundation.dataimport.preprocess.CatalogHierarchyDataPreProcessor  
populateTable(PreparedStatement, Long, Connection)  
INFO: Beginning flush to database of 777 catalog entries...
Mar 30, 2011 2:29:45 PM  
com.ibm.commerce.foundation.dataimport.preprocess.CatalogHierarchyDataPreProcessor  
populateTable(PreparedStatement, Long, Connection)  
INFO: The batch is being executed...
Mar 30, 2011 2:29:45 PM  
com.ibm.commerce.foundation.dataimport.preprocess.CatalogHierarchyDataPreProcessor  
populateTable(PreparedStatement, Long, Connection)  
INFO: Batch execution complete.
Mar 30, 2011 2:29:45 PM  
com.ibm.commerce.foundation.dataimport.preprocess.CatalogHierarchyDataPreProcessor  
populateTable(PreparedStatement, Long, Connection)  
INFO: End flush to database.
Mar 30, 2011 2:29:45 PM  
com.ibm.commerce.foundation.dataimport.preprocess.CatalogHierarchyDataPreProcessor  
process(DataProcessingConfig, Connection, boolean, String)  
INFO: Master catalog processing complete.
Mar 30, 2011 2:29:45 PM  
com.ibm.commerce.foundation.dataimport.preprocess.CatalogHierarchyDataPreProcessor  
process(DataProcessingConfig, Connection, boolean, String)  
INFO: Process the sales catalogs...
Mar 30, 2011 2:29:45 PM  
com.ibm.commerce.foundation.dataimport.preprocess.CatalogHierarchyDataPreProcessor  
populateTable(PreparedStatement, Long, Connection)  
INFO: Beginning flush to database of 34 catalog entries...
Mar 30, 2011 2:29:45 PM  
com.ibm.commerce.foundation.dataimport.preprocess.CatalogHierarchyDataPreProcessor  
populateTable(PreparedStatement, Long, Connection)  
INFO: The batch is being executed...
Mar 30, 2011 2:29:45 PM  
com.ibm.commerce.foundation.dataimport.preprocess.CatalogHierarchyDataPreProcessor  
populateTable(PreparedStatement, Long, Connection)
INFO: Batch execution complete.
Mar 30, 2011 2:29:45 PM
com.ibm.commerce.foundation.dataimport.preprocess.CatalogHierarchyDataPreProcessor populateTable
INFO: End flush to database.
Mar 30, 2011 2:29:45 PM
com.ibm.commerce.foundation.dataimport.preprocess.CatalogHierarchyDataPreProcessor process(DataProcessingConfig, Connection, boolean, String)
INFO: Sales catalog processing complete.
Mar 30, 2011 2:29:45 PM
com.ibm.commerce.foundation.dataimport.preprocess.CatalogHierarchyDataPreProcessor process(DataProcessingConfig, Connection, boolean, String)
INFO:
=====================================================================  
Catalog hierarchy search index data pre-processor  
=====================================================================  
Batch size: 10000
Total catalog entries that have had their hierarchy determined: 811
=====================================================================  
Mar 30, 2011 2:29:45 PM
com.ibm.commerce.foundation.dataimport.preprocess.DataImportPreProcessorMain processDataConfig
INFO: Data import pre-processing completed in 2.264 seconds for table TI_APGROUP_0.
Mar 30, 2011 2:29:47 PM
com.ibm.commerce.foundation.dataimport.preprocess.DataImportPreProcessorMain processDataConfig
INFO: Data import pre-processing completed in 1.305 seconds for table TI_CEATCHT_0_lang_tag.
Mar 30, 2011 2:29:49 PM
com.ibm.commerce.foundation.dataimport.preprocess.DataImportPreProcessorMain processDataConfig
INFO: Data import pre-processing completed in 2.016 seconds for table TI_CASTB1_0_lang_tag.
Mar 30, 2011 2:29:50 PM
com.ibm.commerce.foundation.dataimport.preprocess.DataImportPreProcessorMain processDataConfig
INFO: Data import pre-processing completed in 0.681 seconds for table TI_CAITB1_0_lang_tag.
Mar 30, 2011 2:29:50 PM
com.ibm.commerce.foundation.dataimport.preprocess.DataImportPreProcessorMain processDataConfig
INFO: Data import pre-processing completed in 0.655 seconds for table TI_CAFTB1_0_lang_tag.
Mar 30, 2011 2:29:50 PM
com.ibm.commerce.foundation.dataimport.preprocess.DataImportPreProcessorMain logExitCode
INFO: Program exiting with exit code: 0.
Data import pre-processing completed successfully with no errors.
Mar 30, 2011 2:29:50 PM
com.ibm.commerce.foundation.dataimport.preprocess.DataImportPreProcessorMain logEndDateAndTime
INFO: Data import pre-processing ended:Wed Mar 30 14:29:50 EDT 2011
Mar 30, 2011 2:29:50 PM
com.ibm.commerce.foundation.dataimport.preprocess.DataImportPreProcessorMain logEndDateAndTime
INFO: Data import pre-processing completed in 23.128 seconds.
c. Verify that the MC_10001_CatalogEntry_en_US index is on the disk (see Figure C-3).

![Figure C-3  MC_10001_CatalogEntry_en_US index assets](image)

Figure C-3  MC_10001_CatalogEntry_en_US index assets

d. Check the MC_10001_CatalogEntry_en_US index status (see Example C-3):

```ruby
firefox
```

Example C-3  Status response

```
<response>
  <lst name="responseHeader">
    <int name="status">0</int>
    <int name="QTime">10</int>
  </lst>
  <lst name="status">
    <lst name="MC_10001_CatalogEntry_en_US">
      <str name="name">MC_10001_CatalogEntry_en_US</str>
      <str name="instanceDir">/opt/IBM/WebSphere/CommerceServer70/instances/demo/search/solr/home/MC_10001/en_US/CatalogEntry/</str>
    </lst>
  </lst>
</response>
```

264  WebSphere Commerce V7.0 Feature Pack 2 Search Solution Overview and Deployment
<date name="startTime">2011-03-31T20:27:20.149Z</date>
<long name="uptime">43528016</long>
<lst name="index">
  <int name="numDocs">777</int>
  <int name="maxDoc">777</int>
  <long name="version">1301508646147</long>
  <bool name="optimized">true</bool>
  <bool name="current">true</bool>
  <bool name="hasDeletions">false</bool>
  <str name="directory">
  </str>
  <date name="lastModified">2011-03-30T19:12:43Z</date>
</lst>

e. Query the MC_10001_CatalogEntry_en_US index (see Example C-4):
  http://linux-8sjm.site:3737/solr/MC_10001_CatalogEntry_en_US/select/?q=red&fl=* 

Example C-4  Query response

<response>
  <lst name="responseHeader">
    <int name="status">0</int>
    <int name="QTime">38</int>
    <lst name="params">
      <str name="fl">*</str>
      <str name="q">red</str>
    </lst>
  </lst>
  <result name="response" numFound="30" start="0">
    <doc>
      <int name="buyable">1</int>
      <arr name="catalog_id">
        <long>10001</long>
      </arr>
      <long name="catentry_id">10727</long>
      <str name="catenttype_id_ntk_cs">ProductBean</str>
      <str name="fullImage">
        images/catalog/grocery_health/grocery_health_160x160/Red_Cabbage.jpg
      </str>
      <long name="member_id">7000000000000000002</long>
      <str name="mfName">MadisonsGrocer</str>
      <str name="mfName_ntk">MadisonsGrocer</str>
      <str name="mfName_ntk_cs">MadisonsGrocer</str>
      <str name="name">Red Cabbage</str>
      <arr name="parentCatgroup_id_facet">
        <str>10001_10053</str>
      </arr>
      <arr name="parentCatgroup_id_search">
        <str>10001_10053</str>
        <str>10001_10052</str>
      </arr>
    </doc>
  </result>
</response>
C.1.4 Maintenance

Over time, the WebSphere Commerce V7.0 search index becomes out of sync with the latest production data. To maintain the synchronization of the search result data, you must perform re-indexing during normal business operations.

Additional information: For more information, go to this website:
http://publib.boulder.ibm.com/infocenter/wchelp/v7r0m0/topic/com.ibm.commerce.developer.doc/tasks/tsdsearchbuildindex.htm

C.2 Scenario: Display only products with inventory

A common business requirement is to only display products on the storefront that have inventory. When using WebSphere Commerce V7.0 search, this capability requires performing an index update. There is always a period of time, \( t_1 \), when products in the catalog index potentially have no inventory. Our implementation minimizes this time period and gives the shopper a better shopping experience. Follow this sequence of steps:

1. The order is placed for product \( X \).
2. The order is fulfilled for product \( X \). Product \( X \) now has 0 inventory.
3. Start \( t_1 \).
4. Perform the delta re-indexing:
   a. For each product that has 0 inventory, generate and execute a ChangeCatalogEntry event.
   b. Generate and execute an index synchronization event.
5. Stop \( t_1 \).

Additional information: For more information, go to this website:
C.2.1 Adding the inventory field to the catalog index

For this solution, we customize the WebSphere Commerce V7.0 index by adding an additional field for inventory. We must flatten out the catalog entry/inventory data, which involves creating a custom preprocessor and custom temporary index tables.

**Customizing:** Your table name must start with an X to avoid conflict with the default WebSphere Commerce tables, for example, XI_INVENTORY_0.

Follow these steps to add the inventory field to the catalog index:

1. Configure the search preprocessor:
   a. Create a new custom preprocess configuration file:
      i. Launch **Kickoff → Applications → Utilities → Editor → KWrite.**
      ii. Click **File → Save As:**
         /opt/IBM/WebSphere/CommerceServer70/instances/demo/search/pre-processConfig/MC_10001/DB2/wc-dataimport-preprocess-custom-inventory.xml
      iii. Add our code, which is shown in Example C-5.

**Example C-5  wc-dataimport-preprocess-custom-inventory.xml**

```xml
<?xml version="1.0" encoding="UTF-8"?>
  <!-- one level PRODUCT_ITEM catentry parent -->
  <config:data-processing-config processor="com.ibm.commerce.foundation.dataimport.preprocess.StaticAttributeDataPreProcessor" batchSize="500">
    <config:table definition="CREATE TABLE XI_DPCATENTRY_PRODUCT_ITEM_0 (CATENTRY_ID BIGINT NOT NULL, CATENTRY_ID_PARENT BIGINT, PRIMARY KEY (CATENTRY_ID))" name="XI_DPCATENTRY_PRODUCT_ITEM_0"/>
    <config:query sql="SELECT CATENTRY_ID_CHILD, CATENTRY_ID_PARENT FROM CATENTREL R, TI_CATENTRY_0 C WHERE R.CATENTRY_ID_CHILD = C.CATENTRY_ID AND R.CATRELTYPE_ID='PRODUCT_ITEM' ORDER BY CATENTRY_ID_CHILD"/>
    <config:mapping>
      <config:key queryColumn="CATENTRY_ID_CHILD" tableColumn="CATENTRY_ID"/>
      <config:column-mapping>
        <config:column-column queryColumn="CATENTRY_ID_PARENT" tableColumn="CATENTRY_ID_PARENT"/>
      </config:column-mapping>
    </config:mapping>
  </config:data-processing-config>

  <!-- one level BUNDLE_COMPONENT catentry parent -->
  <config:data-processing-config processor="com.ibm.commerce.foundation.dataimport.preprocess.StaticAttributeDataPreProcessor" batchSize="500">
    <config:table definition="CREATE TABLE XI_DPCATENTRY_BUNDLE_COMPONENT_0 (CATENTRY_ID BIGINT NOT NULL, CATENTRY_ID_PARENT BIGINT, PRIMARY KEY (CATENTRY_ID))" name="XI_DPCATENTRY_BUNDLE_COMPONENT_0"/>
    <config:query sql="SELECT CATENTRY_ID_CHILD, CATENTRY_ID_PARENT FROM CATENTREL R, TI_CATENTRY_0 C WHERE R.CATENTRY_ID_CHILD = C.CATENTRY_ID AND R.CATRELTYPE_ID='BUNDLE_COMPONENT' ORDER BY CATENTRY_ID_CHILD"/>
    <config:mapping>
      <config:key queryColumn="CATENTRY_ID_CHILD" tableColumn="CATENTRY_ID"/>
      <config:column-mapping>
        <config:column-column queryColumn="CATENTRY_ID_PARENT" tableColumn="CATENTRY_ID_PARENT"/>
      </config:column-mapping>
    </config:mapping>
  </config:data-processing-config>

  <!-- ItemBean inventory -->
  <config:data-processing-config processor="com.ibm.commerce.foundation.dataimport.preprocess.StaticAttributeDataPreProcessor" batchSize="500">
    <config:table definition="CREATE TABLE XI_ITEM_INVENTORY_0 (CATENTRY_ID BIGINT NOT NULL, STORE_ID BIGINT NOT NULL, QUANTITY BIGINT, PRIMARY KEY (CATENTRY_ID,STORE_ID))" name="XI_ITEM_INVENTORY_0"/>
  </config:data-processing-config>
</config:DIHPreProcessConfig>
```

Appendix C. Index design and data load 267
b. Preprocess the search index data. See C.1.2, “Preprocessing the index data” on page 258.

c. Verify the custom index tables with SQL:

```sql
select * from XI_DPCATENTRY_PRODUCT_ITEM_0;
select * from XI_DPCATENTRY_BUNDLE_COMPONENT_0;
select * from XI_ITEM_INVENTORY_0;
select * from XI_PRODUCT_INVENTORY_0;
select * from XI_BUNDLE_INVENTORY_0;
```
2. Configure the Data Import Handler mapping:
   a. Launch **Kickoff → Applications → Utilities → Editor → KWrite**.
   b. Click **File → Open**:
      `/opt/IBM/WebSphere/CommerceServer70/instances/demo/search/solr/home/MC_10001/en_US/CatalogEntry/conf/schema.xml`
   c. Locate `<field name="defaultSearch" type="wc_text" indexed="true" stored="false" multiValued="true"/>` and insert our code, which is shown in Example C-6.

d. **Save your changes.**
   e. Launch **Kickoff → Applications → Utilities → Editor → KWrite**.
   f. Click **File → Open**:
   g. Add the following columns and tables in Example C-7 to the select SQL.
   h. **Save and close the file.**
   i. Restart the WebSphere Commerce V7.0 search server.
   j. Build the search index. See C.1.3, “Building the search index” on page 259.
   k. Verify the data:
      ```javascript
      firefox
      http://linux-8sjm.site:3737/solr/MC_10001_CatalogEntry_en_US/select/?q=catentty
      ```

**Troubleshooting:** If your `XI_<TABLENAME>` is missing data in a column, check that you have all of your column/column mappings.
3. Add our quantity filter query to all queries:
   a. Launch **Kickoff** → **Applications** → **Utilities** → **Editor** → **KWrite**.
   b. Click **File** → **Open**:
      ```
      /opt/IBM/WebSphere/CommerceServer70/instances/demo/search/solr/home/MC_10001/en_US/CatalogEntry/conf/solrconfig.xml
      ```
   c. Locate `<requestHandler name="standard"... and insert our code in Example C-8 on page 271.
   d. Save and close the file.
   e. Restart the WebSphere Commerce V7.0 search server.

```
```
f. Verify the quantity filter. This operation is successful if 744 documents are returned:

```
firefox
http://linux-8sjm.site:3737/solr/MC_10001_CatalogEntry_en_US/select/?q=*&fl=*  
```

Example C-8  solrconfig.xml

```xml
<!-- WebSphere Commerce default search request handler -->
<requestHandler name="standard" class="solr.StandardRequestHandler" default="true">
  <!-- default values for query parameters -->
  <lst name="defaults">
    <str name="echoParams">explicit</str>
    <!--
      <int name="rows">10</int>
      <str name="fl">*</str>
      <str name="version">2.1</str>
    -->
  </lst>

  <!-- Filter all queries to ensure returned catalog entries have quantity -->
  <lst name="appends">
    <str name="fq">xquantity:[1 TO *]</str>
  </lst>

  <!-- Filter all queries to ensure returned catalog entries have quantity -->
  <lst name="last-components">
    <str>wc_spellcheck</str>
  </lst>
</requestHandler>
```

C.2.2 Index maintenance

See Chapter 7, “Index design and data load” on page 179.
Related publications

The publications listed in this section are considered particularly suitable for a more detailed discussion of the topics covered in this book.

IBM Redbooks publications

The following IBM Redbooks publications provide additional information about the topic in this document. This publication might be available in softcopy only.

- *Selling and Fulfillment Solutions using WebSphere Commerce and Sterling Order Management, SG24-7930-00*

You can search for, view, or download IBM Redbooks, Redpapers, webdocs, draft publications and additional materials, as well as order hardcopy IBM Redbooks publications, at this Web site:

`ibm.com/redbooks`

Online resources

These Web sites are also relevant as further information sources:

- WebSphere Commerce search
  

- Opening the Management Center
  

- Changing your preferences
  

- Enabling the Management Center marketing features
  

- Managing WebSphere Commerce search: Populating and building the search index data
  
  [http://publib.boulder.ibm.com/infocenter/wchelp/v7r0m0/topic/com.ibm.commerce.developer.doc/concepts/csdsranchsearchtop.htm](http://publib.boulder.ibm.com/infocenter/wchelp/v7r0m0/topic/com.ibm.commerce.developer.doc/concepts/csdsranchsearchtop.htm)

- Common business tasks and their effect on the WebSphere Commerce search index
  
  [http://publib.boulder.ibm.com/infocenter/wchelp/v7r0m0/topic/com.ibm.commerce.developer.doc/refs/rsdsrchindexhnts.htm](http://publib.boulder.ibm.com/infocenter/wchelp/v7r0m0/topic/com.ibm.commerce.developer.doc/refs/rsdsrchindexhnts.htm)

- Index synchronization and delta updates in WebSphere Commerce search
  
  [http://publib.boulder.ibm.com/infocenter/wchelp/v7r0m0/topic/com.ibm.commerce.developer.doc/concepts/csdsrchcontentstrcindex.htm](http://publib.boulder.ibm.com/infocenter/wchelp/v7r0m0/topic/com.ibm.commerce.developer.doc/concepts/csdsrchcontentstrcindex.htm)
- Replicating WebSphere Commerce search
  http://publib.boulder.ibm.com/infocenter/wchelp/v7r0m0/topic/com.ibm.commerce.developer.doc/tasks/tsdreplicatesearch.htm

- Setting up WebSphere Commerce search in a clustered environment
  http://publib.boulder.ibm.com/infocenter/wchelp/v7r0m0/topic/com.ibm.commerce.developer.doc/tasks/tsdfederatesearch.htm

- Luke - Lucene Index Toolbox
  http://code.google.com/p/luke/downloads/list

- Cache invalidation
  http://publib.boulder.ibm.com/infocenter/wchelp/v7r0m0/topic/com.ibm.commerce.admin.doc/concepts/cdc_cacheinv.htm

- Apache Solr
  http://lucene.apache.org/solr/#intro

- Administering WebSphere Commerce search
  http://publib.boulder.ibm.com/infocenter/wchelp/v7r0m0/topic/com.ibm.commerce.developer.doc/concepts/csdmanagesearch.htm

- Preparing the operating system for product installation

- 7.0.0.15: WebSphere Application Server V7.0 Fix Pack 15 for Linux

- WebSphere Commerce Update Installer Version 6.1 and 7.0
  http://www-01.ibm.com/support/docview.wss?uid=swg24013502

- Creating a WebSphere Commerce instance
  http://publib.boulder.ibm.com/infocenter/wchelp/v7r0m0/topic/com.ibm.commerce.install.doc/tasks/tig_part_create_instances.htm

- Setting up the WebSphere Commerce search index structure for a specific master catalog locally
  http://publib.boulder.ibm.com/infocenter/wchelp/v7r0m0/topic/com.ibm.commerce.developer.doc/tasks/tsdsearchsetuplocal.htm

- Preprocessing the WebSphere Commerce search index data
  http://publib.boulder.ibm.com/infocenter/wchelp/v7r0m0/topic/com.ibm.commerce.developer.doc/tasks/tsdsearchbuildpre.htm

- Building the WebSphere Commerce search index
  http://publib.boulder.ibm.com/infocenter/wchelp/v7r0m0/topic/com.ibm.commerce.developer.doc/tasks/tsdsearchbuildindex.htm

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WebSphere Commerce V7.0 Feature Pack 2 Search Solution Overview and Deployment

Search results by using a new set of search tools

Work with B2C and B2B scenarios

Understand search using index life-cycle management

This IBM Redbooks publication focuses on the enhanced search capabilities of the newest release of WebSphere Commerce V7.0 Feature Pack 2. We divided this book into three parts to highlight search business-to-consumer (B2C) and search business-to-business (B2B) scenarios and a conceptual overview of the search solution.

This book can help you to enable the search features of WebSphere Commerce V7.0 Feature Pack 2 and set up the WebSphere Commerce search environment, experience the design and management of Solr indexes, and experience several B2C scenarios using the Madisons Feature Pack 2 (FEP2) store.

This book gives you a broad understanding of the WebSphere Commerce integrated search solution that provides control over search results through a new set of search management tools:

- Search term association in the Catalog tool
- Marketing web activity tool
- Marketing dialog activity tool
- Search activity tool

This book describes search index life-cycle management and examines each area, such as index building, synchronization, configuration, and replication. This book describes the entitlement feature that is provided through the WebSphere Commerce search framework. We also discuss a B2B scenario and provide the implementation using catalog filters and contracts.

This book is designed for use by WebSphere Commerce developers, practitioners, and solution architects in various industries.

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