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# MarkLogic Server

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## Application Builder Developer's Guide

MarkLogic 5  
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## 1.0 Application Builder Quick Start

This chapter gets you started using Application Builder. Application Builder is a browser-based application that enables you to create a fully functional search and analytics application quickly. The generated application is useful as-is and can be both customized and extended. This chapter includes the following sections:

- [Overview of Application Builder](#)
- [Setting Up and Starting Application Services](#)
- [Building the Oscars Sample Application](#)
- [Using the Oscars Sample Application](#)
- [Using Application Builder to Modify the Oscars Sample Application](#)

### 1.1 Overview of Application Builder

No coding is required to generate and deploy an application based on your content using Application Builder. You can define many aspects of the application, such as the following:

- Facets
- Details that appear on the search result page
- Item rendering to control how your content displays

Your generated search application has many high-end search features such as a search box with Google-style search grammar, faceted navigation, and search suggestions. The resulting application is designed to scale for huge database sizes and still be fast.

The user interface is simple, yet enables you to build complex components such as facets. The generated XQuery application uses the Search API and is designed to be used as generated or customized with your own XQuery code.

Typically, building an application is an iterative process. To start with, you must have a representative set of your content loaded in a database with any needed indexes already set up. If your content is not complete or not completely indexed, you can still generate an application and modify it as you modify your content.

In this chapter, you use Application Builder to generate a sample application based on data about the Oscar awards. For details, see “Building the Oscars Sample Application” on page 7 and “Using the Oscars Sample Application” on page 10.

## 1.2 Setting Up and Starting Application Services

Application Builder is bundled with MarkLogic Server Application Services. On a fresh installation of MarkLogic 5, Application Builder is preconfigured and ready to use. For an upgrade installation, your existing application data remains intact although some renaming of your Application database and App Server may occur during the installation process. This section describes the following scenarios:

- [Clean Installation](#)
- [Upgrade Installation](#)
- [Starting Application Services](#)

### 1.2.1 Clean Installation

When you install MarkLogic Server for the first time, the installation process does the following:

- Creates an HTTP App Server named `App-Services` on port 8000 for Application Services
- Creates a database named `App-Services` to store the Application Builder application documents

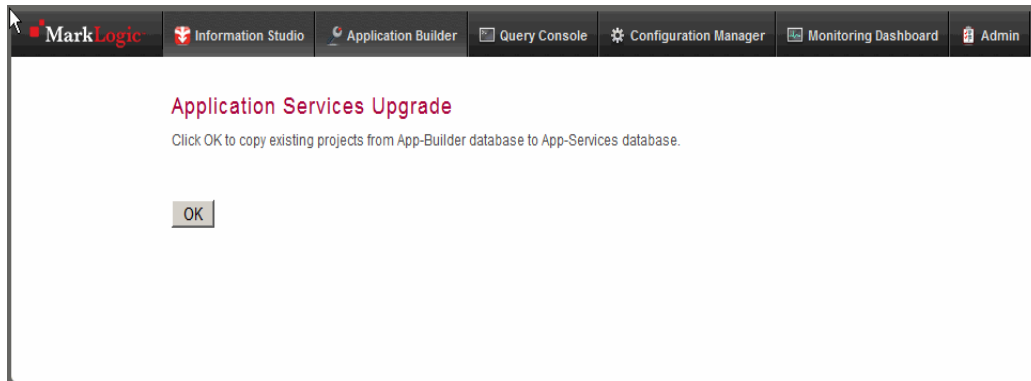
For a complete description of installing MarkLogic Server, see [Installing MarkLogic Server](#) in the *Installation Guide*.

## 1.2.2 Upgrade Installation

Doing an upgrade installation of MarkLogic Server varies slightly depending on your previous installation. For details on the Application Services portion of a 4.1 or 4.2 to MarkLogic 5, see [Prerequisites for Application Services Portion of the Upgrade](#) in *Installation Guide*.

- When upgrading from 4.1 to 5, if the previous installation had Application Builder configured, the upgrade installation does the following:
  - Renames the `App-Builder App Server` to `App-Services`
  - Creates a forest and database, named `App-Services` while keeping your application data intact.

When accessing Application Builder for the first time after an upgrade, a prompt asks you to confirm moving your existing projects and data from your old `App-Builder` database into the new `App-Services` database. Click OK to do so. You can then delete the old `App-Builder` database and forest.



- When upgrading from 4.2 to 5, your data and applications are immediately available without additional actions on your part. The `App-Services App Server`, runs on port 8000.

## 1.2.3 Starting Application Services

To start Application Services, open a browser and go to your server's port 8000. For example, if your browser runs on the same machine as MarkLogic Server, open the following URL:

```
http://localhost:8000/appservices
```

When MarkLogic Server prompts you for a username and password, enter user credentials for a user with either the `admin` role or the `app-builder` role.

For details on the roles that Application Builder uses, see “Predefined Roles for Application Builder” on page 40.

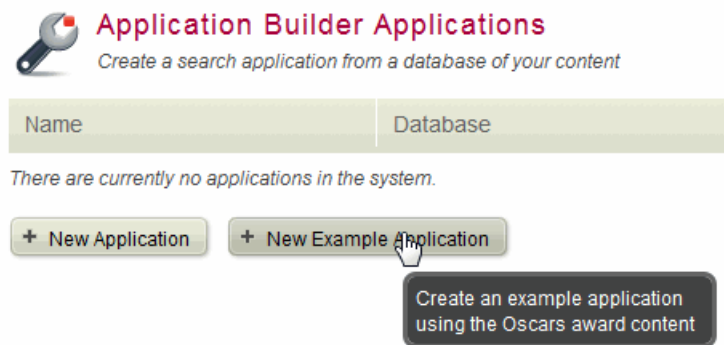
### 1.3 Building the Oscars Sample Application

Application Builder includes a template to build a sample application based on Oscar awards data from Wikipedia. To build the Oscars sample application, just go through the Application Builder wizard as follows:

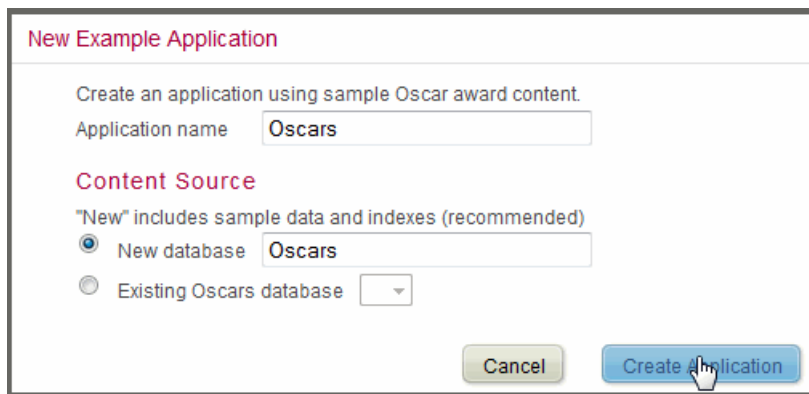
1. To deploy the full data set for the Oscars sample application on a 32-bit Microsoft Windows XP system, you need at least 3GB of system memory.
2. Start Application Builder by going to the following URL (If MarkLogic Server is installed on a different host or your App Server uses a different port, substitute those values):

`http://localhost:8000/appservices`

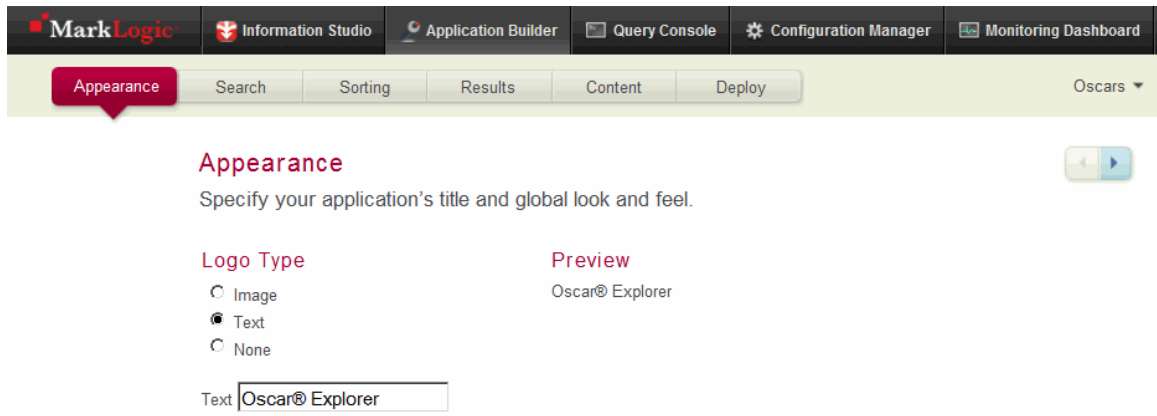
3. On the Application Builder Applications screen, click New Example Application.



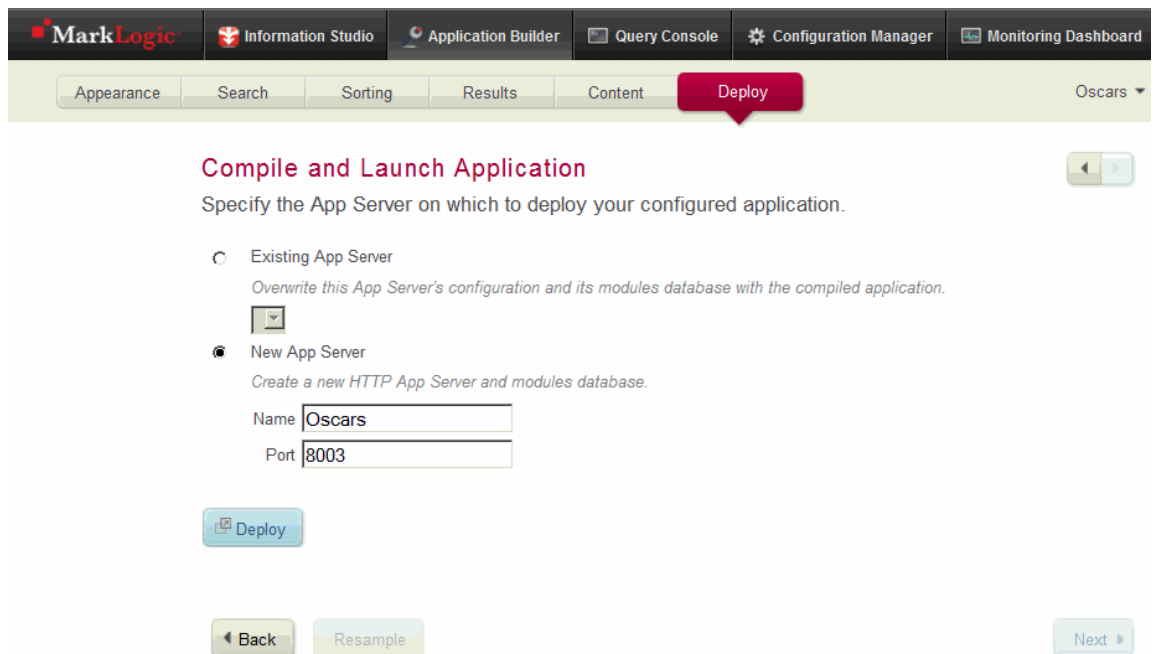
4. Enter a name for the application, in this case `Oscars`.
5. Select New Database and enter a database name, in this case `Oscars`. Click Create Application.



- Application Builder creates an Oscars App Server, forest, and database and displays the Appearance page.



- On the Appearance page, you can accept the defaults or change the settings.
- Click the Deploy tab. The Compile and Launch Application page appears.



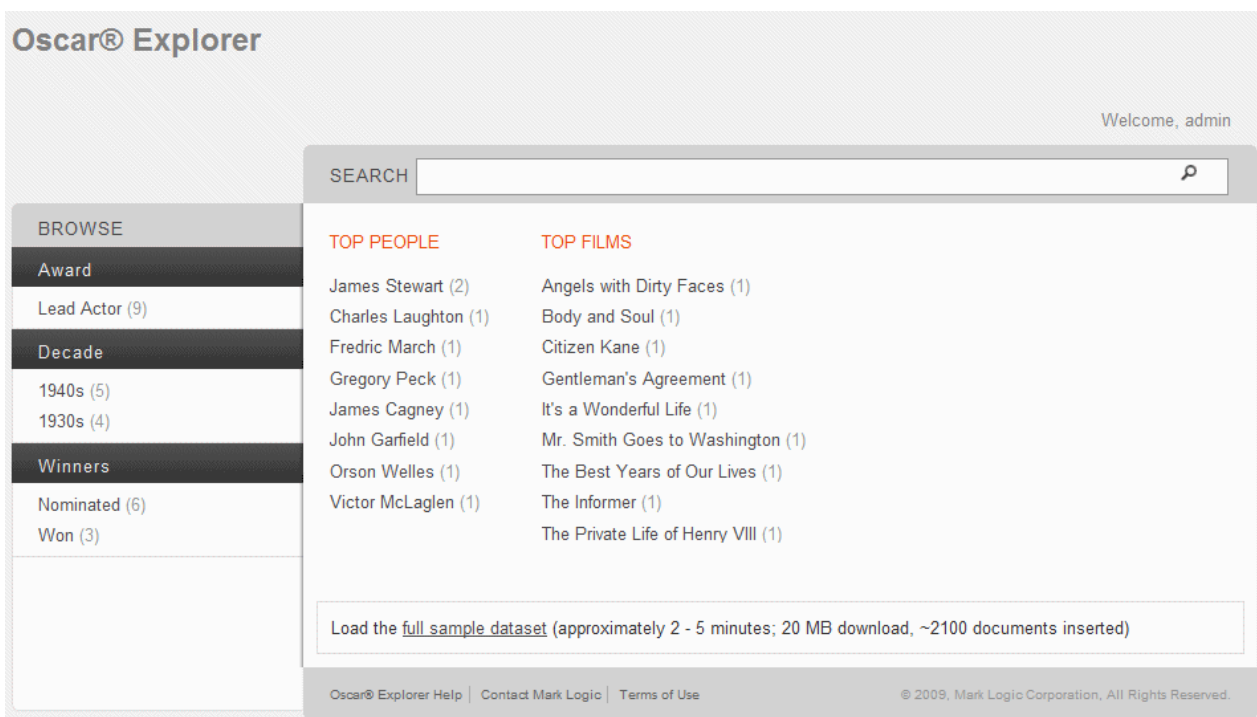
- On the Compile and Launch Application page, select New App Server. (You can only select Existing App Server if an App Server is already configured for this application.) Accept the default values or provide the App Server with a name and port number.

10. Click the Deploy button and confirm. Application Builder creates and configures the new App Server and opens a new window where it launches the new application. This may take a short while.
11. When Application Builder prompts you to log in, enter a username and password and click OK.

For details about controlling access to the newly generated application, see “Controlling Access to Application Builder and to Generated Applications” on page 40.

**Note:** When you deploy an application, the newly generated application appears in a new browser window using a URL with the hostname that is stored in the MarkLogic Server configuration files (the result of an `xdmp:host-name` call). If you are running on a laptop computer that is changing networks, it is possible that the hostname is not available on your network, resulting in a 404 or similar error when the application launches (because it is trying to access a server name that is not available on your current network). In these cases, substituting `localhost` for the hostname in the URL should enable the application to launch.

12. You can test the Oscars application by entering search terms or clicking on the browse links to narrow the displayed results.



**Oscar® Explorer** Welcome, admin

SEARCH

BROWSE	TOP PEOPLE	TOP FILMS
Award	James Stewart (2)	Angels with Dirty Faces (1)
Lead Actor (9)	Charles Laughton (1)	Body and Soul (1)
Decade	Fredric March (1)	Citizen Kane (1)
1940s (5)	Gregory Peck (1)	Gentleman's Agreement (1)
1930s (4)	James Cagney (1)	It's a Wonderful Life (1)
Winners	John Garfield (1)	Mr. Smith Goes to Washington (1)
Nominated (6)	Orson Welles (1)	The Best Years of Our Lives (1)
Won (3)	Victor McLaglen (1)	The Informer (1)
		The Private Life of Henry VIII (1)

Load the [full sample dataset](#) (approximately 2 - 5 minutes; 20 MB download, ~2100 documents inserted)

Oscar® Explorer Help | Contact Mark Logic | Terms of Use © 2009, Mark Logic Corporation, All Rights Reserved.

13. Initially, only a few sample data files are loaded. To load the full 20 MB content set, click the Load Full Sample Dataset link toward the bottom of the page. The data downloads

automatically over your Internet connection. A spinning icon is visible until the load is complete. When it is done, you see different count values and additional facet values.

**Note:** While downloading the sample page, do not navigate away from the page or close the browser window until the spinning icon disappears and the page reloads, otherwise the download might be interrupted.

## 1.4 Using the Oscars Sample Application

The Oscars sample application enables you to search, browse, and display articles about Oscar award winners from the last nine decades. It is built using the standard features of the Search API, including query text parsing, faceted navigation, snippeteting, and many more. For details about the Search API, see [Search API: Understanding and Using](#) in the *Search Developer's Guide*.

While you can learn about the application by playing around with it, this section highlights some of its main features, including:

- [Keyword Searching, Search Suggestions, and Parsing](#)
- [Browsing with Facets](#)
- [Search Result Page](#)
- [Displaying Content Details](#)

### 1.4.1 Keyword Searching, Search Suggestions, and Parsing

You can enter keywords into the search box and press return to search the database. For example, a search for `raymond` shows snippets for the first 10 of 221 results.

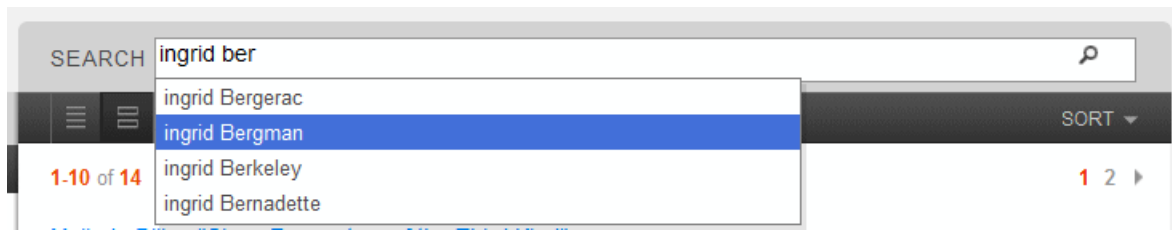
The screenshot shows a search interface with a search box containing 'raymond'. The results are displayed in a list format with facets on the left. The facets include 'Award' (Best Director: 50, Best Picture: 25, Lead Actor: 43, ...More), 'Decade' (2000s: 33, 1990s: 13, 1980s: 24, ...More), and 'Winners' (Nominated: 182, Won: 39). The search results show 1-10 of 221 results. The first three results are:

- Angela Lansbury "The Manchurian Candidate"**  
trigger in the mind of one soldier, Staff Sergeant **Raymond** Shaw. Brainwashed, the soldiers are covertly returned to their lines and, after reintegration...**Raymond's** mother, Eleanor Iselin (  
**Supporting Actress** - 1962
- Barry Levinson "Rain Man"**  
to his brother, **Raymond**, an as **Raymond** Babbitt, and as Charlie's girlfriend, Susanna. Morrow created the character of **Raymond** after meeting **Raymond** is an  
**Best Director** - 1988
- Dustin Hoffman "Rain Man"**  
to his brother, **Raymond**, an as **Raymond** Babbitt, and as Charlie's girlfriend, Susanna. Morrow created the character of **Raymond** after meeting **Raymond** is an  
**Lead Actor** - 1988

The fourth result is partially visible:

- "Rain Man"**  
to his brother, **Raymond**, an as **Raymond** Babbitt, and as Charlie's girlfriend, Susanna. Morrow created the character

As you type search terms, the application suggests things that might match your full search. For example, as you type `Ingrid Bergman`, you might see something like the following:



Because the application uses the Search API, you can use standard search grammar such as combining multiple terms with AND semantics, treating double-quoted phrases as phrases, and so on. For information about the search grammar for the Search API, see [Search API: Understanding and Using](#) in the *Search Developer's Guide*.

You can also search using constraints. For example, the following query text finds everything about the actor Dustin Hoffman:

```
actor:"Dustin Hoffman"
```

This is not a standard full-text search, but is a constraint showing all the documents matching where an particular value in the source XML has the content `Dustin Hoffman`. You can combine the constraint with other terms to further narrow the results:

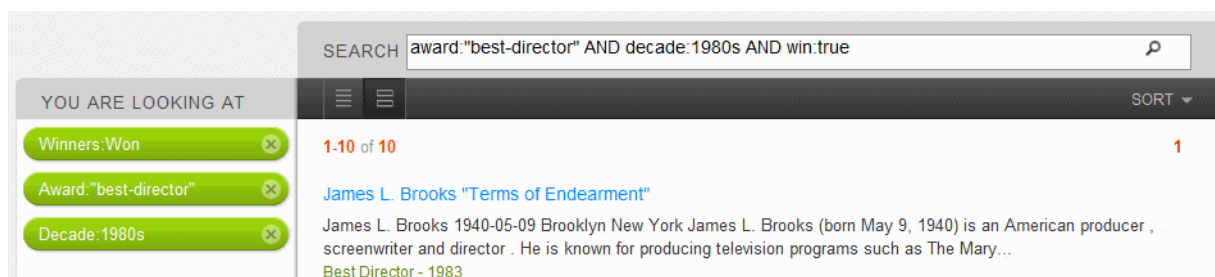
```
buck actor:"Dustin Hoffman"
```

When you click on any links in the user interface, notice that the query text in the search box shows the current query.

## 1.4.2 Browsing with Facets

The left side of the application shows facets for browsing through the content. When you click on a facet, it narrows the results to that category, while keeping the existing categories or search terms active.

For example, if you first click on the Best Director browse link, then on the 1980s link, and then on the Won link, you find all of the 1980s winners of the Best Director award.



Each of the browse facets has a count of how many of its results match your current query.

### 1.4.3 Search Result Page

The search result page shows a link with a text summary of the content, highlighted snippets of the content matching your search, and other information about the search match. Clicking the result link takes you to the content details.

### 1.4.4 Displaying Content Details

The content details page includes the complete content for the search result. The rendering is based on the configuration specified on Application Builder's Content Display page. The page's style is based on the skin you chose and on any custom CSS entered on the Appearance page.

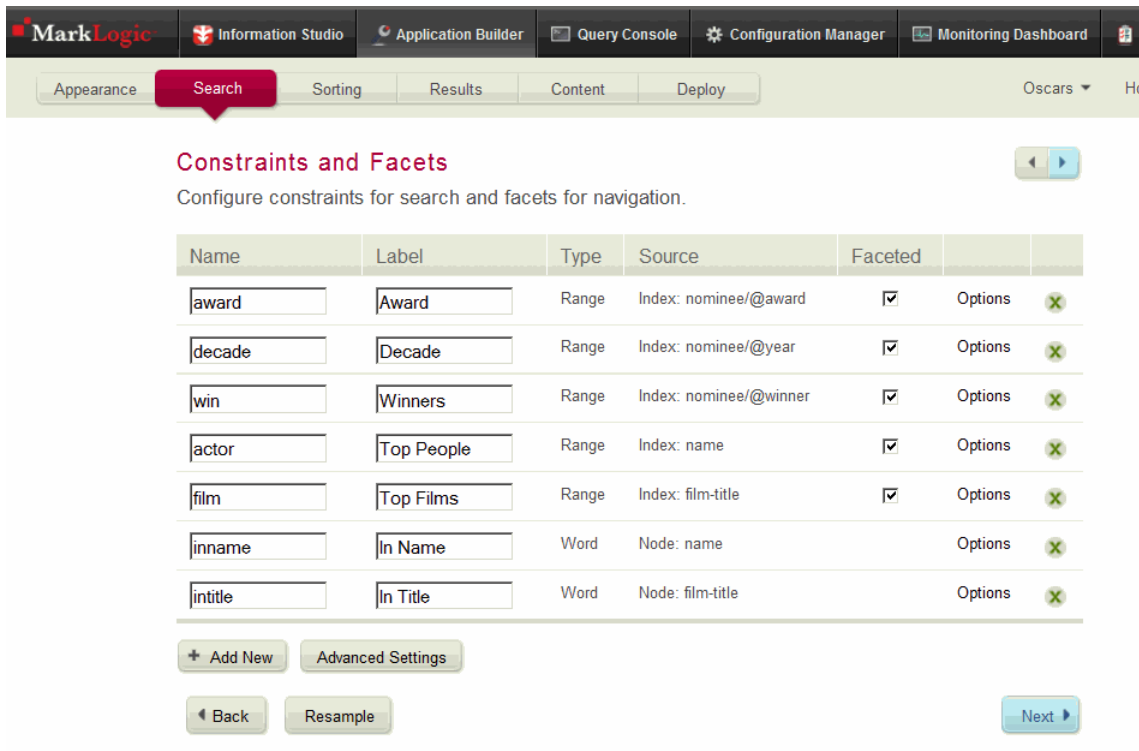
## 1.5 Using Application Builder to Modify the Oscars Sample Application

This section describes how to add a year facet to the Oscars application. With the year facet, you can first drill down on results with the decade facet, then drill down further on those results using the year facet. The year facet uses the same index as the decade facet.

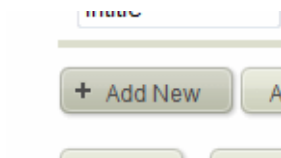
To create a year facet, do the following:

1. Start Application Builder (for example, open <http://localhost:8000/appservices> in a browser).
2. On the Application Builder Applications page, click the application name that you used for your Oscars sample application (for example, `Oscars`).

3. Click the Search tab. The Search page appears.



4. On the Search page, click Add New.



5. In the New Constraint dialog, click Range.

6. In the New Constraint dialog, enter `year` for the Name and select `year` for the Source Index.

**New Constraint**

**Range**  
Defines a facet and constrains searches to an element or attribute value or bucket of values.

**Word**  
Constrains searches to the text of a specific element, attribute, or field.

**Value**  
Constrains searches to the exact value of an element or attribute.

**Collection**  
Uses the collection lexicon to constrain searches to documents within a collection.

**Element Scope**  
Constrains searches to elements of a particular qname.

**Properties Scope**  
Constrains searches to the properties fragment.

---

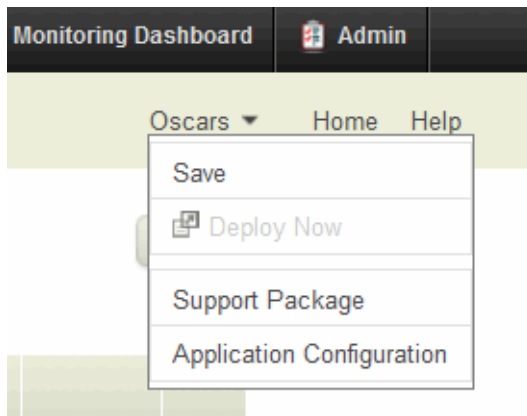
**Range Constraint**

Name:

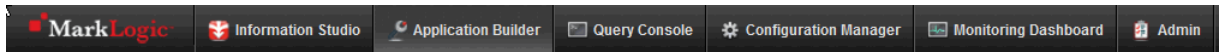
Source Index:

Requires a range index in the source database

7. Click Create Range Constraint. Application Builder creates the constraint.
8. In the application name menu, select Deploy Now from the options.



- Application Builder compiles and deploys the new application code to the modules database of your App Server. During deployment, the following appears in a new window:

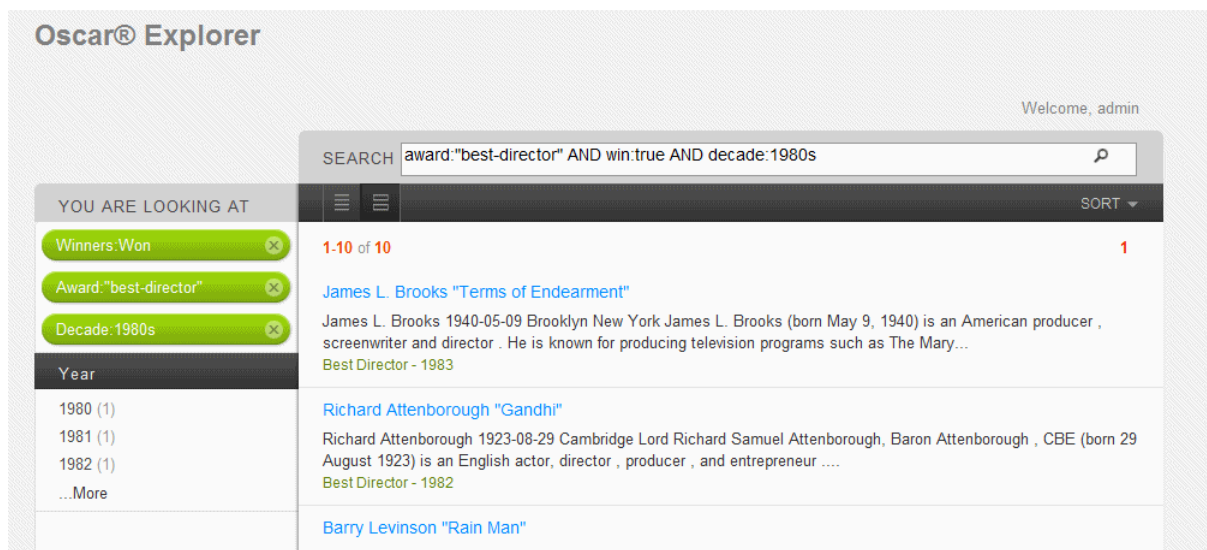


**Deploying your application...**

You will be automatically redirected when the deployment has completed.



When Application Builder is done, the newly modified application replaces the status page, including the new year facet. Test the facet by doing a search, selecting a decade, and then selecting a year to find the results for a single year from that decade.



**Note:** The year facet in this example is available at all times, whether or not you have clicked on the decade facet. To only display the year facet after selecting a decade, you need to add additional display logic. The Oscars example application is not set up to do hierarchical logic, but you can modify it to do so. For details on modifying the application, see “Extending Applications Built With Application Builder” on page 42.

## 2.0 Creating a Search Application With Application Builder

This chapter describes how to use Application Builder to create a search application.

- [Starting Application Services](#)
- [Navigating in Application Builder](#)
- [Page-By-Page Walkthrough](#)

### 2.1 Starting Application Services

Application Builder is bundled as part of the Application Services suite of applications. To start Application Services, open the following URL in a browser window:

```
http://localhost:8000/appservices
```

If your instance of MarkLogic Server is running on a different host, or if Application Services is configured on a different port, substitute the appropriate values for host and port.

To use Application Builder, you must have the `app-builder` role assigned to your login account. To use Information Studio, you must have the `infostudio-user` role. Users with the `admin` role have access to both applications.

Log in as a user with the `app-builder` role (or as a user with the `admin` role). For details about the `app-builder` role, see “Predefined Roles for Application Builder” on page 40.

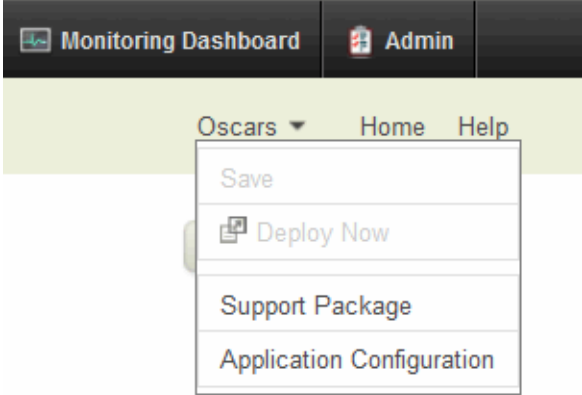

### 2.2 Navigating in Application Builder

The user interface for Application Builder is a straightforward tabbed interface, where each tab enables you to configure different functionality in the application.



You can click any tab to go to that page, and you can click the next and back buttons to navigate to the adjacent screens. The following table describes the navigation elements of the Application Builder User Interface that appear on most of the pages.

Navigation Element	Description
Tabs	Clicking a tab displays that page in Application Builder. Changing tabs automatically saves the state of the application.

Navigation Element	Description
<p>Application name menu</p>	<p>If you click on the name of the application towards the upper right corner of the screen, a menu of options appears in a drop-down list:</p>  <p>Save saves the application to the database.</p> <p>Deploy Now immediately deploys the application. This option is available only after the application has been deployed for the first time.</p> <p>Support Package generates a zip file of the application and the application (including all of the application code) in case you need to contact MarkLogic Support. The support zip file also includes a small sample of documents from your content database.</p> <p>Application Configuration displays the XML of the current application in a new window. The application XML includes the Search API options element, which is helpful if you are using Application Builder to help you generate Search API code.</p>
<p>Home</p>	<p>The Home button takes you back to the Application Services page.</p>
<p>Help</p>	<p>The Help button displays the help content for the current page.</p>
<p>Next/Back</p>	<p>These buttons enable you to navigate to the next page or to the previous page.</p> 

Navigation Element	Description
Resample	<p>When available, the Resample button enables you to sample random documents in the content database for use in building constraints, search results, and rendering the content.</p> <p><b>Note:</b> Resampling replaces many of the current settings on the page, so certain customizations you have configured are lost after resampling.</p>

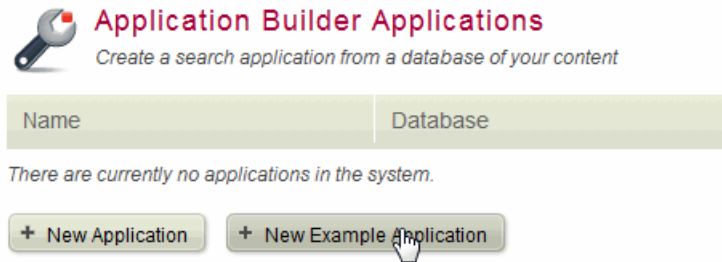
## 2.3 Page-By-Page Walkthrough

This section describes each page of Application Builder, and includes the following parts:

- [Selecting or Creating an Application](#)
- [Appearance Page](#)
- [Search Page](#)
- [Sorting Page](#)
- [Results Page](#)
- [Content Page](#)
- [Deploy Page](#)

### 2.3.1 Selecting or Creating an Application

When you start Application Services or when you click the Home link in the upper right part of the other pages of Application Builder, the Application Services page opens. The Application Builder Applications section is displayed at the top of the page.



The Application Builder Applications section lists all of the applications in the `App-Services` database and enables you to create new applications, new sample applications (such as the Oscars sample application), or modify existing applications. An application stores all of the information to generate an application, including constraints you have configured, settings for the results page, deployment options, and so on.

When you create an application, you specify the database to use with the application. If you are creating a new example application to build the Oscars example, you can create a new database for the application. You must load a representative sample of content and set up any indexes for the database outside of Application Builder. Your content should be indexed and ready to be searched before you use Application Builder. Application Builder looks at the indexes configured in your database and uses that information to help you configure the application. If your database structure is still evolving, that is OK, because you can modify the application as needed. To modify an existing application as you iteratively develop your search criteria, click the application name on the Application Services page.

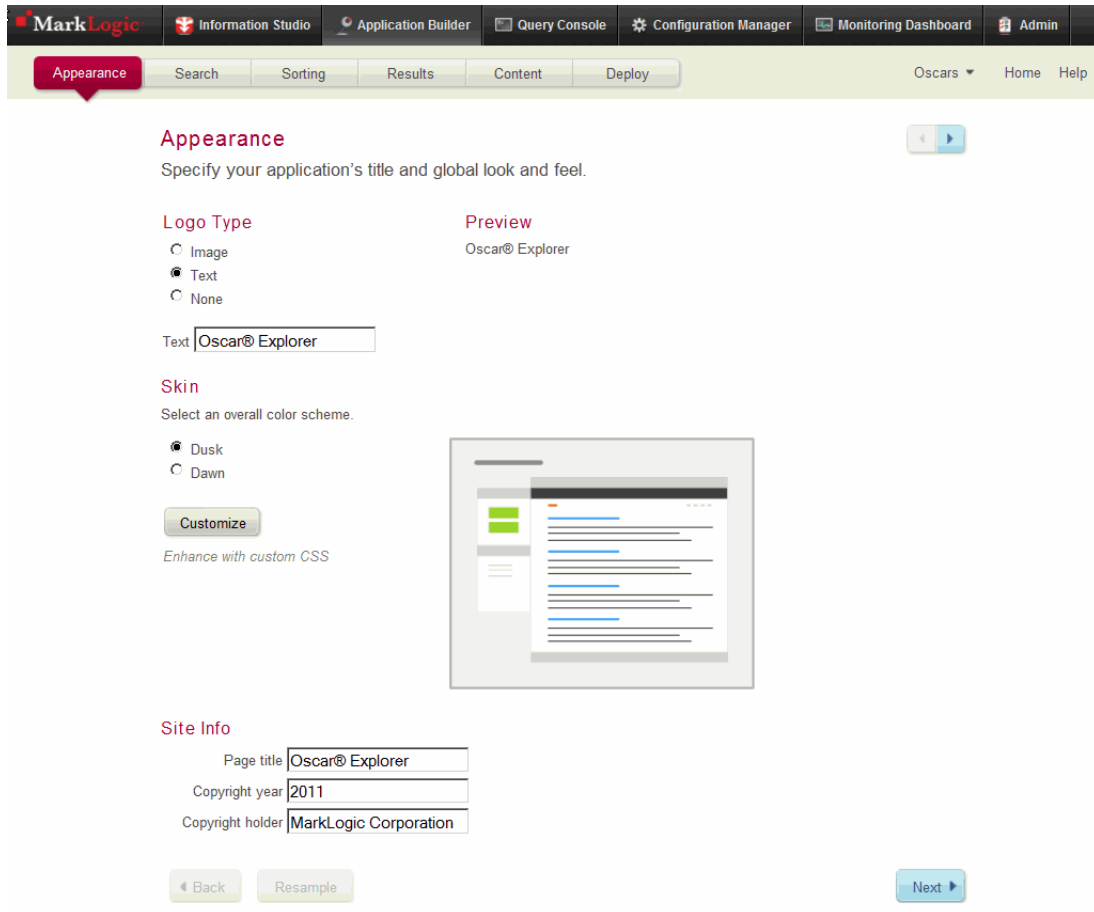
**Note:** Application Builder assumes there is no fragmentation in the database. If your database is fragmented, you might need to modify the generated application for it to work properly with fragmentation. For details on modifying the generated application, see “Extending Applications Built With Application Builder” on page 42.

The following table lists the actions on the Application Builder Applications section of the Application Services page:

Action	Description
New Application	Creates a new application. After clicking the New Application button, enter the name of the application and choose an existing database to use for the application.
New Example Application	Creates a new application designed to use the Oscars sample data. After clicking the New Sample Application button, enter the name of the application and choose a database to use for the Oscars content. Choosing a new database is the normal way to create the Oscars sample application. If you choose an existing database, it should have the settings used for the Oscars database. For more details on building the Oscars Sample, see “Building the Oscars Sample Application” on page 7.
Edit	Open an existing application to modify settings and/or deploy the application.
Delete	Permanently delete an application from the <code>App-Services</code> database. Deletes the application, but not the database or App Server used by the application.

### 2.3.2 Appearance Page

The Appearance page is where you configure the look-and-feel aspects of your application. For example, you can specify a title, add a logo, and add custom CSS code. Default values are supplied for all of the options, so you can use the defaults if they suit your application.

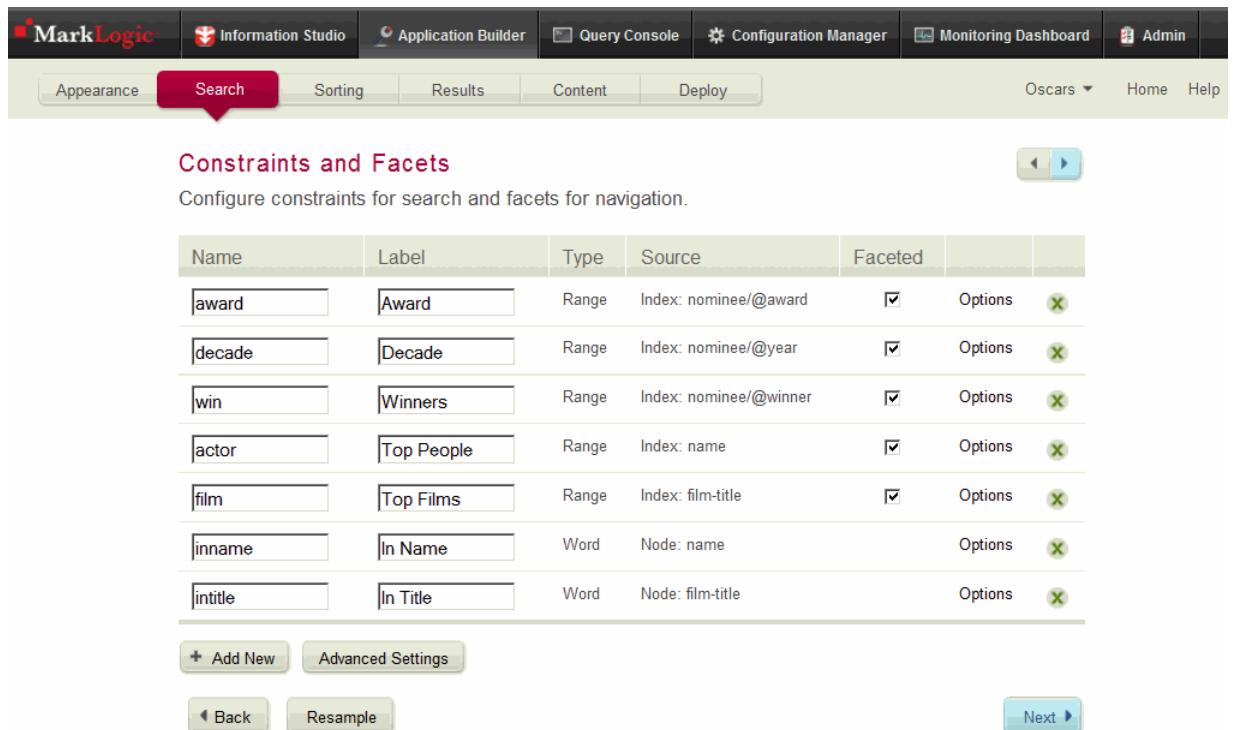


The following table lists the actions on the Appearance page:

Action	Description
Logo Type	Select an image and a URL for the image, or enter text in place of the logo. This becomes the title or logo of your application on the main page.
Skin	Affects the look and feel of the application. Select one of the available skins. Click the Customize button to enter CSS code in addition to the selected skin CSS.
Site Info	Metadata about the site. The page title appears in the top bar of the browser window for the application (the <code>html/head/title</code> element), and the copyright information appears in the footer.

### 2.3.3 Search Page

The Search page is where you configure constraints and facets for your application. The facets in the application enable you to drill down on your result set, narrowing the search to a given category.



You can configure existing constraints or add new constraints. You can use Range and Collection constraints to create facets, and all constraints can be used as query text with the constraint name and value. For example, the following query text in the generated Oscars sample application returns all awards that are from the 1980s:

```
decade:1980s
```

There are several kinds of constraints you can add or modify on the Search page. The following parts describe those constraints as well as modifying other options to search in the application:

- [Add/Modify Range Constraints](#)
- [Add/Modify Value Constraints](#)
- [Add/Modify Word Constraint](#)
- [Add/Modify Collection Constraint](#)
- [Modifying Search Options](#)

### 2.3.3.1 Add/Modify Range Constraints

A range constraint uses range indexes to support queries and create facets.

To add a new constraint, click Add New.

To edit an existing constraint, click the Options link on the row for the existing constraint.

**New Constraint**

<b>Range</b> Defines a facet and constrains searches to an element or attribute value or bucket of values.	<b>Word</b> Constrains searches to the text of a specific element, attribute, or field.	<b>Value</b> Constrains searches to the exact value of an element or attribute.
<b>Collection</b> Uses the collection lexicon to constrain searches to documents within a collection.	<b>Element Scope</b> Constrains searches to elements of a particular qname.	<b>Properties Scope</b> Constrains searches to the properties fragment.

---

**Range Constraint**

Name

Source index **award** ▼  
*Requires a range index in the source database*

Range constraints can be faceted, and can be used in queries with query text like the following:

```
decade:1980s
```

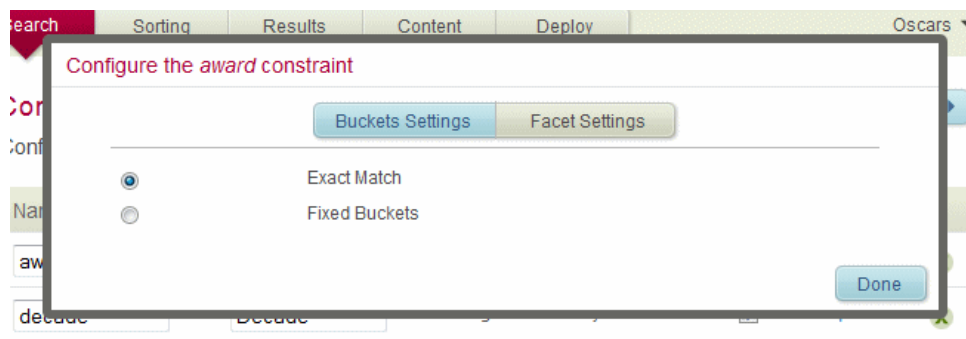
You can create a range constraint on an element, attribute, or a field. There are three types of Range constraints:

- Exact Match
- Fixed Buckets
- Relative Buckets. This constraint is only available for date ranges.

You can modify existing buckets by editing the fields in the table that lists the buckets.

### **Exact Match Range Constraints**

Exact match Range constraints match on each individual value of the specified Range index. Exact match constraints are useful if you want every value to have significance in constraints and facets.



### **Fixed Buckets Range Constraints**

Fixed buckets constraints enable you to specify labels that correspond to ranges of values. Fixed buckets are useful when you want to specify ranges of values (decades on time-based ranges, for example) for queries and facets.

Configure the decade constraint

Buckets Settings Facet Settings

Exact Match  
 Fixed Buckets

Bucket name   
 Match items greater than   
 and less than

+ Add Bucket

Name	Label	Greater Than	Less Than	
2000s	2000s	2000		X
1990s	1990s	1990	2000	X
1980s	1980s	1980	1990	X
1970s	1970s	1970	1980	X
1960s	1960s	1960	1970	X
1950s	1950s	1950	1960	X
1940s	1940s	1940	1950	X
1930s	1930s	1930	1940	X
1920s	1920s	1920	1930	X

Done

### **Relative Buckets Range Constraints**

Relative buckets constraints are used with date ranges (that is, elements or attributes of type `xs:date` or `xs:dateTime`). You can create constraints for various ranges of dates. You can see the relative buckets if you have a range index set up for one of the date type elements in your database.

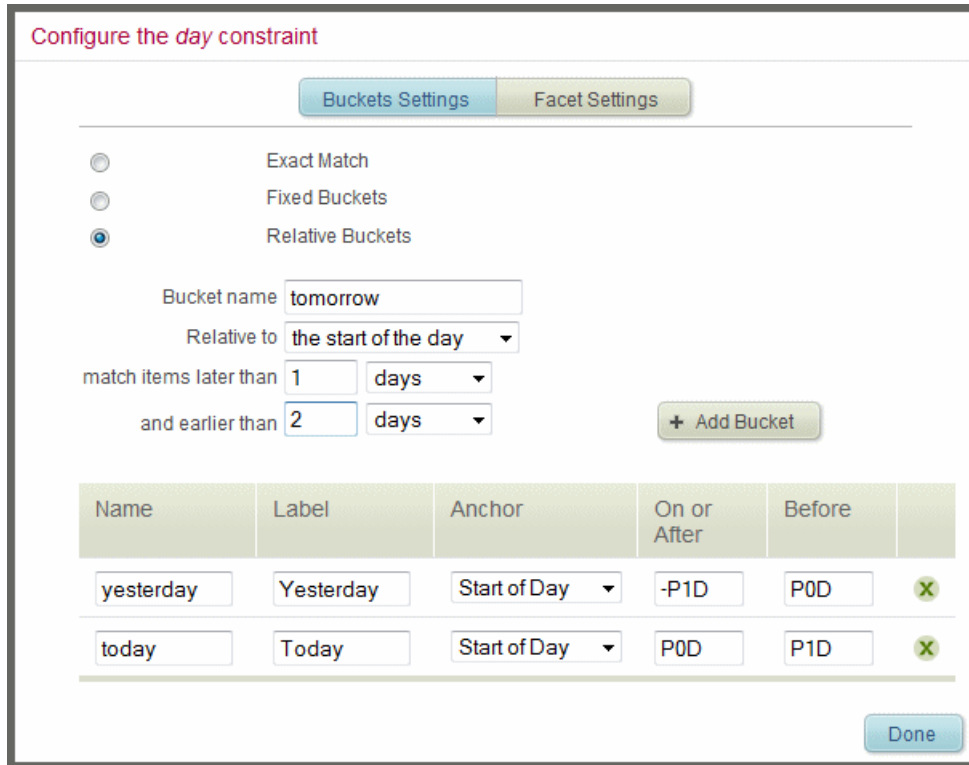
To create a new bucket that represents a range of dates, fill in the items in the form and click the Add Bucket button. A new row is added to the bucket table with the range you specified.

The fields in the Anchor column in the Relative Buckets Configuration dialog specify what part of the `date` or `dateTime` value to start counting where the bucket boundaries are.

The On, After, and Before fields in the relative buckets table must be represented as durations. Durations are used to specify time periods, and it is possible to do arithmetic on durations. For information about the syntax of durations, see [http://en.wikipedia.org/wiki/ISO\\_8601#Durations](http://en.wikipedia.org/wiki/ISO_8601#Durations) or see the appropriate section of the XML Schema specification (<http://www.w3.org/TR/2001/REC-xmlschema-2-20010502/#isoformats>). For example, a duration of `P0D` means zero days from the specified value, a duration of `P1D` means one day after the specified value, and a duration of `-P1D` means one day before the specified value. Similarly, a duration of `P1Y` means one year later, a duration of `-P3M` means three months earlier, and a duration of `P10H` means ten hours later.

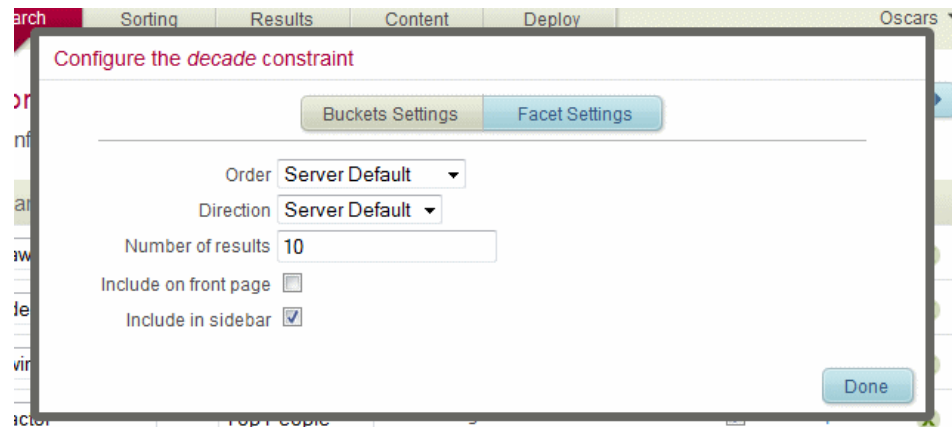
To see the Relative Buckets Configuration dialog using the Oscar content, create an element range index on `wiki:date` of type date. (You need to use the admin interface or Information Studio to create the index.) For more details on element range indexes see [Element and Attribute Range Indexes and Lexicons](#) in the *Administrator's Guide*.

The following example shows a Relative Buckets constraint dialog:



**Facet Settings**

Each range constraint, if faceted, also has Facet Settings that control things such as the number of facets that appear in the results.



### 2.3.3.2 Add/Modify Value Constraints

A value constraint uses element, attribute, or field values to create a constraint.

To add a new constraint, click Add New.

To edit an existing constraint, click the Options link on the row for the existing constraint.

On the New Constraint page, enter a name for the constraint and enter either select a field from the Source Field drop-down list or enter an element or attribute name to match on. When you click Find for elements or attributes, Application Builder searches through sample documents in your database to find wildcard-matching elements or attributes.

**Note:** To configure a field value constraint, the field must be configured and you must have Field Value Searches enabled, either for the database or for the individual field. For information on configuring fields, see [Fields Database Settings](#) in the *Administrator's Guide*.

**New Constraint**

<b>Range</b> Defines a facet and constrains searches to an element, attribute or field value, or a bucket of values.	<b>Word</b> Constrains searches to the text of a specific element, attribute, or field.	<b>Value</b> Constrains searches to the exact value of an element, attribute, or field.
<b>Collection</b> Uses the collection lexicon to constrain searches to documents within a collection.	<b>Element Scope</b> Constrains searches to elements of a particular qname.	<b>Properties Scope</b> Constrains searches to the properties fragment.

---

**Value Constraint**

Name:

Source field

Only fields configured for value

Element or attribute

Find matching elements or attributes in the source content.

Value constraints differ from range constraints in the following ways:

- You do not need a range indexes for value constraints, you need range indexes for range constraints.
- You cannot create facets from value constraints, you can facet range constraints.
- Value constraints are text queries, range constraints are type-aware matches.

Value constraints match when the text you search for matches the element or attribute value. For example, the following value-constraint query text matches the element

`<author>Raymond Carver</author>`, assuming it is set up to be case-insensitive (which is the default).

```
author:"raymond carver"
```

### 2.3.3.3 Add/Modify Word Constraint

A word constraint uses elements, attributes, or fields to find words. When the constraint is used, it matches documents with the word specified in the constraint. For example, if you have create a word constraint on the `ABSTRACT` element, the following search would find documents with the word `hello` in an `ABSTRACT` element:

```
abstract:hello
```

To add a new constraint, click Add New.

To edit an existing constraint, click the Options link on the row for the existing constraint.

**New Constraint**

<div style="border: 1px solid #ccc; background-color: #f0f0f0; padding: 2px; text-align: center; margin-bottom: 5px;"><b>Range</b></div> <p>Defines a facet and constrains searches to an element or attribute value or bucket of values.</p>	<div style="border: 1px solid #ccc; background-color: #e0f0ff; padding: 2px; text-align: center; margin-bottom: 5px;"><b>Word</b></div> <p>Constrains searches to the text of a specific element, attribute, or field.</p>	<div style="border: 1px solid #ccc; background-color: #f0f0e0; padding: 2px; text-align: center; margin-bottom: 5px;"><b>Value</b></div> <p>Constrains searches to the exact value of an element or attribute.</p>
<div style="border: 1px solid #ccc; background-color: #f0f0f0; padding: 2px; text-align: center; margin-bottom: 5px;"><b>Collection</b></div> <p>Uses the collection lexicon to constrain searches to documents within a collection.</p>	<div style="border: 1px solid #ccc; background-color: #f0f0f0; padding: 2px; text-align: center; margin-bottom: 5px;"><b>Element Scope</b></div> <p>Constrains searches to elements of a particular qname.</p>	<div style="border: 1px solid #ccc; background-color: #f0f0f0; padding: 2px; text-align: center; margin-bottom: 5px;"><b>Properties Scope</b></div> <p>Constrains searches to the properties fragment.</p>

---

**Word Constraint**

Name

Source field

Element or attribute

*Find matching elements or attributes in the source content.*

Word constraints cannot be faceted. No special indexes are required for a word constraint, although if you specify an element, attribute, or field that does not exist, queries using the constraint return no results.

### 2.3.3.4 Add/Modify Collection Constraint

A collection constraint constrains a search to items in the specified collection and enables facets on the collection.

To add a new constraint, click Add New.

To edit an existing constraint, click the Options link on the row for the existing constraint.

**New Constraint**

**Range**  
Defines a facet and constrains searches to an element or attribute value or bucket of values.

**Word**  
Constrains searches to the text of a specific element, attribute, or field.

**Value**  
Constrains searches to the exact value of an element or attribute.

**Collection**  
Uses the collection lexicon to constrain searches to documents within a collection.

**Element Scope**  
Constrains searches to elements of a particular qname.

**Properties Scope**  
Constrains searches to the properties fragment.

---

**Collection Constraint**

Name

Requires enabling the collection lexicon in the source database.

A Collection constraint requires that the collection lexicon is enabled in the database. You can also create facets with a collection constraint.

You can optionally specify a prefix to be used to concatenate with the collection constraint value. To create a collection prefix, clicking the Options link for the constraint and set a prefix in the constraint dialog as shown in the following screen capture.

**Configure the *subject* constraint**

Enter an optional collection prefix

actor | Top People | Range | Index: name |  Options

For example, assume that all documents in your database have collection URIs that begin with the string `/my-collections/` similar to the following:

```
/my-collections/math
/my-collections/economics
/my-collections/zoology
```

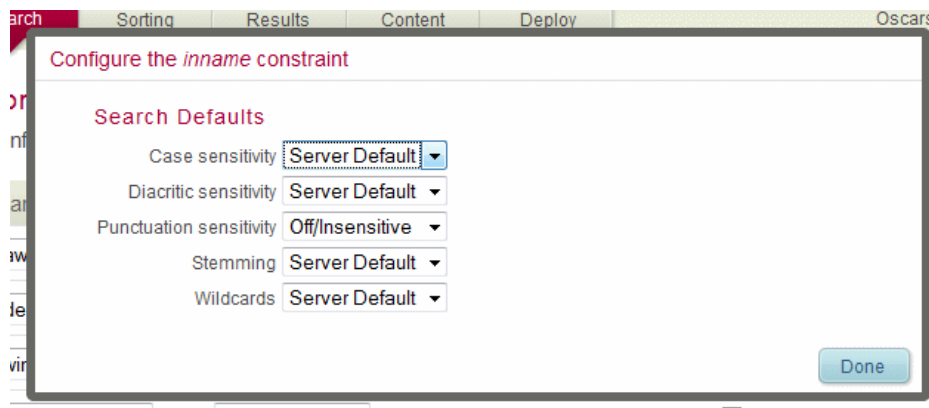
In this case, the following query text examples match documents in the corresponding collections:

```
subject:math
subject:economics
subject:zoology
```

In the constraint dialog, you can also click Facet Settings to create facets on the collections.

### 2.3.3.5 Modifying Search Options

For word and value constraints, you can modify the search options (case sensitive/insensitive, diacritic sensitive/insensitive, and so on) by clicking the Options link for the constraint. By default, most of the options are set to the MarkLogic Server defaults as shown in the following screen capture.



For details on the MarkLogic Server defaults for query behavior, see the documentation for the individual `cts:query` constructors in the *XQuery Built-In and Module API Documentation*.

Additionally, clicking the Advanced settings button on the Search page displays a dialog enabling you to modify the search grammar and search options (case sensitive/insensitive, diacritic sensitive/insensitive, and so on) for everything besides the constraints in your application (some constraints enable you to set their search options independently). By default, many of the options are set to the Search API and MarkLogic Server defaults. The advanced settings dialog looks similar to the following screen capture:

**Advanced Settings**

**Search Grammar**

Support AND queries  foo AND bar

Support OR queries  foo OR bar

Support grouping  foo OR (bar AND baz)

Support negation  -foo

Empty query behavior **Return All Results** ▾

Filter results

**Suggestions**

Default Source **Off** ▾  
*Requires a range index in the source database*

**Search Defaults**

Case sensitivity **Server Default** ▾

Diacritic sensitivity **Server Default** ▾

Punctuation sensitivity **Off/Insensitive** ▾

Stemming **Server Default** ▾

Wildcards **Server Default** ▾

Done

In the Advanced Settings dialog, you can select the Filter Results check box to specify whether the searches should be run unfiltered or filtered. Filtered searches are more accurate in some cases. Unfiltered searches are always faster.

For details on the various search options in MarkLogic Server, see the *Search Developer's Guide*.

### 2.3.4 Sorting Page

Use the sorting page to create different sorting operators for your application. By default, searches sort in relevance order (ordered by score).

The sorting page enables you to configure other operators for different sorting orders. Each line in the sort table represents a sort operator, and the green rounded buttons represent a key on which to sort.

**Search Result Sorting**

Customize search results ordering options.

Name	Label	Sorting Criteria
relevance	Relevance	Score X + Add X
year	Year	nominee/@year X Score X + Add X

+ Add New

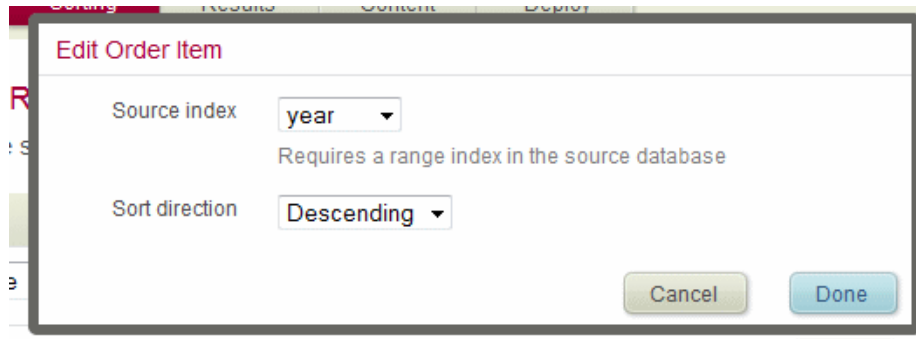
Back Resample Next

The Sorting page enables the following actions:

- To specify the order of your results, use the name of the sorting criteria with a sort operator. For example, the following specifies sorting by year:
 

```
sort:year
```
- To create different sort orders, create range indexes on the keys you want to use for sorting. To add a new sort key to an existing sort operator, click Add. The new field is placed after any existing sort keys.
- To remove a key, click the X in the key's labeled button.
- To remove the sort operator, click the X at the right end of the row.

- To specify a custom sort order, add new keys or delete existing keys.
- To edit the source index or sort order of an existing key, click the key.



## 2.3.5 Results Page

Use the Results page to configure individual search results, including the title, the snippet, and the metadata you want to show.

The screenshot shows the MarkLogic Application Builder interface for configuring search results. The top navigation bar includes MarkLogic, Information Studio, Application Builder, Query Console, Configuration Manager, Monitoring Dashboard, and Admin. Below this is a secondary navigation bar with tabs for Appearance, Search, Sorting, Results (highlighted), Content, and Deploy. On the right of this bar are links for Oscars, Home, and Help.

The main content area is titled "Search Results" and includes a description: "Configure the contents of the individual search results." Below this is a "Live Preview" section showing a search result for Gregory Peck in the movie "Gentleman's Agreement". The preview includes the title, a snippet of text, and a lead actor role.

Below the preview are three configuration sections:

- Title:** "The text for the result link." It shows a configuration bar with two items: "name" and "film-title", each with a close button (X). Below this is a "+ Item" button.
- Snippet:** "The elements from the result that the snippeting will favor." It shows a configuration bar with one item: "p", with a close button (X). Below this is a "+ Element" button.
- Metadata:** "Additional information about the result." It shows a configuration bar with two items: "nominee/@award" and "nominee/@year", each with a close button (X). Below this is a "+ Item" button.

At the bottom of the configuration area are three buttons: "Back", "Resample", and "Next".

As you make changes, the changes appear in the preview area. Not all changes appear, depending on which pieces of content Application Builder has sampled. For example, if you change a preferred element, depending on the content in the sample documents, there might not be a match in those elements and the snippet shown in the preview would therefore not change. To test the snippeting, it is best to test it on the deployed application with different searches and with a more robust sampling of content in your database.

The title is a link to the result content. You can add parts of the content from elements or attributes and literal text, and you can concatenate them together in any order. When you add a new item, it displays to the right of any existing items. To delete an item, click the X button corresponding to the item.

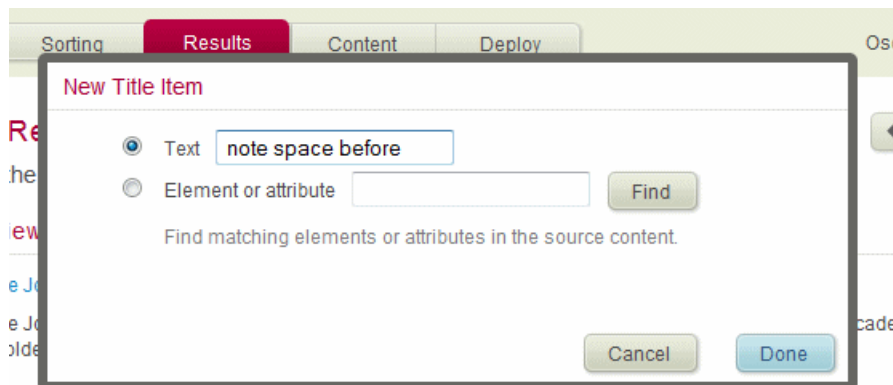
### Title

The text for the result link.

name X   " X   film-title X   " X

+ Item

When you add literal text, if you want a space to appear at the beginning of the item, add a space at the beginning.



You can configure snippets by adding one or more elements that the snippeting algorithm will favor. It uses these to try and choose the best parts of the document to show in the snippets, based on the elements you specified as preferred.

### Snippet

The elements from the result that the snippeting will favor.

p X

+ Element

The metadata displays below the snippet, and you configure it the same way as the title.

**Metadata**

Additional information about the result.

nominee/@award X - X nominee/@year X

---

+ Item

**2.3.6 Content Page**

The content page enables you to control the rendering of the search content. This controls how the content is rendered to XHTML in the generated application. Application Builder looks at the content and divides it up into *container elements* (elements that have children) and *simple elements* (elements with no children). You can choose None (no rendering), Div, Span, or Para for each container element, and None (no rendering), Div, Span, Header1, Header2, Para, Strong, and Emphasis for each simple element.



**Content Display**

Control how the application renders content as XHTML for web browsers.

Default Custom XSLT

XHTML pass-through

**Container Elements**

Element	Render as
nominee	Div
person	Div
oscar	None
birth	None
death	None
place	None
date	None

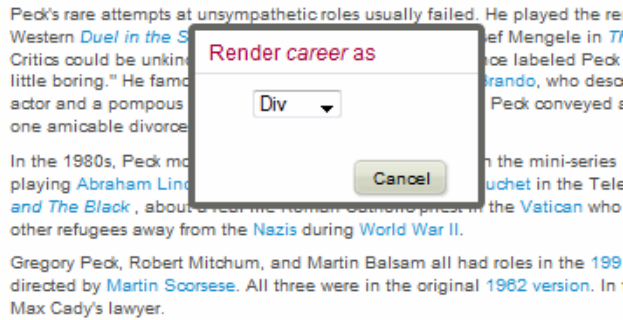
**Live Preview**  
Click to edit inline.

**Gregory Peck**

Gregory Peck (5 April 1916 – 12 June 2003) was an American [film actor](#). He was one of 20th C most popular film stars, from the 1940s to the 1960s, and played important roles well into the 1 most notable performances was as [Atticus Finch](#) in the 1962 film version of *To Kill a Mockingbird*. He won his [Academy Award](#). President [Lyndon Johnson](#) honored Peck with the [Presidential Medal of Freedom](#) in 1969 for his lifetime [humanitarian](#) efforts. In 1999, the [American Film Institute](#) named Peck among its [100 Greatest Male Stars of All Time](#), ranking at #12.

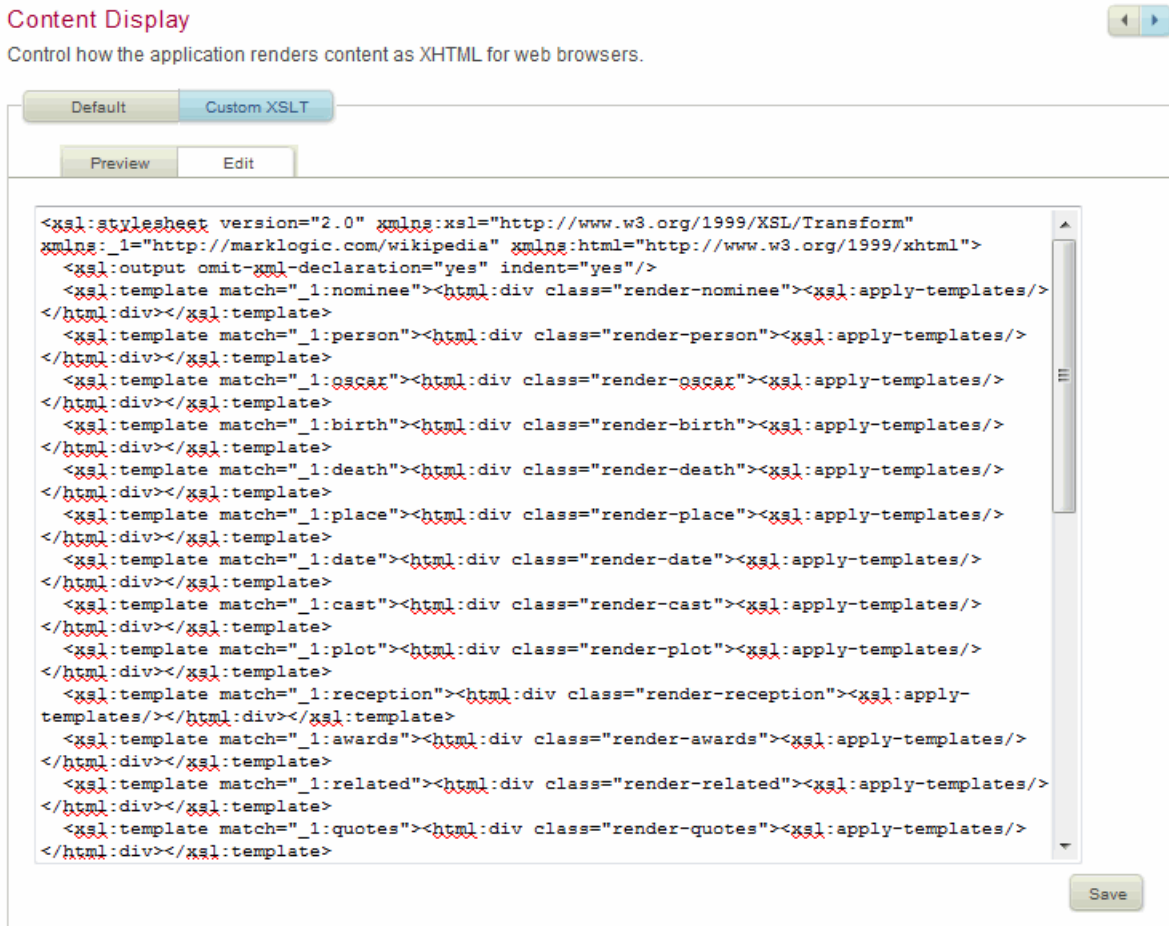
Peck was born [Eldred Gregory Peck](#) in [San Diego, California](#)'s seaside community of [La Jolla, California](#). He was the son of [Missouri-born](#) Bernice Mae "Bunny" Ayres and Gregory Pearl Peck, who was a chemist and physicist. Peck's father was of English (paternal) and Irish (maternal) heritage, and his mother was of Scottish (maternal) ancestry. Peck's father was a [Catholic](#) and his mother converted upon marrying Peck's Irish-born paternal grandmother, Catherine Ashe, who took part in the [Easter Rising](#) less than three weeks after Peck's birth and died while on [hunger strike](#) in 1917. He was divorced by the time he was six years old and he spent the next few years being raised by his (

The rendering choices appear in the live preview window. If you click on a part of the preview, a menu appears enabling you to change the rendering for that element.



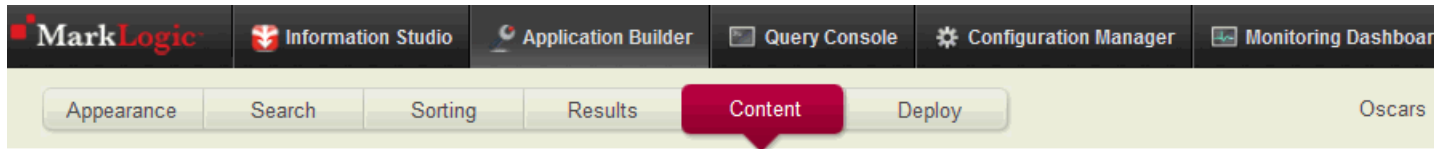
If the XHTML pass-through checkbox is selected, then any content in the XHTML namespace (<http://www.w3.org/1999/xhtml>) is passed through without change to the displayed application.

To display the XSLT stylesheet used to render the content page, select the Custom XSLT tab, then click Edit. Here you can make more detailed modifications to the XSLT.



Click Preview to preview the results of your changes to the XSTL stylesheet. When you are satisfied with the results, click Edit to return to the XSL stylesheet and click Save.

**Note:** If you navigate away from the Custom XSLT pages without saving your changes, the changes are lost.



## Content Display

Control how the application renders content as XHTML for web browsers.

Default Custom XSLT

Preview Edit

### Gregory Peck

Gregory Peck (5 April 1916 – 12 June 2003) was an American [film actor](#). He was one of [20th Century Fox's](#) most popular film stars, from the 1940s and played important roles well into the 1990s. One of his most notable performances was as [Atticus Finch](#) in the 1962 film version of [To Kill a Mockingbird](#), which he won his [Academy Award](#). President [Lyndon Johnson](#) honored Peck with the [Presidential Medal of Freedom](#) in 1969 for his lifetime [humanitarianism](#). In 1999, the [American Film Institute](#) named Peck among the [Greatest Male Stars of All Time](#), ranking at #12.

Peck was born [Eldred Gregory Peck](#) in [San Diego, California's](#) seaside community of [La Jolla](#), the son of [Missouri-born](#) Bernice Mae "Bunny" Ayre Pearl Peck, who was a chemist and pharmacist. Peck's father was of English (paternal) and Irish (maternal) heritage, and his mother was of Scots (English (maternal) ancestry). Peck's father was a [Catholic](#) and his mother converted upon marrying his father. Peck's Irish-born paternal grandmother, [Ashe](#), was related to [Thomas Ashe](#), who took part in the [Easter Rising](#) less than three weeks after Peck's birth and died while on [hunger strike](#) in 1916. Peck's parents divorced by the time he was six years old and he spent the next few years being raised by his grandmother.

To further customize the rendering, you can customize the application after it is built by using the XSLT files in the `/application/custom` directory as described in “Extending Applications Built With Application Builder” on page 42.

### 2.3.7 Deploy Page

Use the deploy page to select or configure the App Server where you want to deploy your generated application. When you click the Deploy button, Application Builder performs the following actions:

- Compiles the application based on the application settings.
- Deploys the compiled application code to the modules database of the specified App Server.
- Launches the newly compiled application.

If you use an existing App Server, it must be configured to use a modules database with a root of `/application/`; Application Builder does not deploy code to an App Server with any other root or with its root on the filesystem.

If you create a new App Server, Application Builder also creates a modules database for the new App Server, and configures the database with a root of `/application/`.

**MarkLogic** Information Studio Application Builder Query Console Configuration Manager Monitoring Dashboard Admin

Appearance Search Sorting Results Content **Deploy** Oscars Home Help

### Compile and Launch Application

Specify the App Server on which to deploy your configured application.

Existing App Server  
*Overwrite this App Server's configuration and its modules database with the compiled application.*

Oscars (8003)

New App Server  
*Create a new HTTP App Server and modules database.*

Name: Oscars-1  
Port: 8004

Deploy

Back Resample Next

**Note:** When you deploy an application, the newly generated application opens in a new browser window using a URL with the hostname that is stored in the MarkLogic Server configuration files (the result of an `xdrm:host-name` call). If you are running on a laptop computer that is changing networks, it is possible that the hostname is not available on your network, resulting in a 404 or similar error when the application launches (because it is trying to access a server name that is not available on your current network). In these cases, substituting `localhost` for the hostname in the URL should enable the application to launch.

## 3.0 Controlling Access to Application Builder and to Generated Applications

Application Builder enables you to configure and generate search applications without writing any code. Both Application Builder and the applications it generates use the MarkLogic Server security model to control access. This chapter describes the security roles needed to run Application Builder and to run the applications it generates, and includes the following sections:

- [Predefined Roles for Application Builder](#)
- [Permissions on Documents](#)
- [Modifying Roles to Meet Your Requirements](#)

### 3.1 Predefined Roles for Application Builder

Application Builder uses the following three predefined roles:

- [app-user Role](#)
- [app-builder Role](#)
- [app-builder-internal Role](#)

For details about the MarkLogic Server security model and about configuring users and roles, see *Understanding and Using Security Guide* and [Security Administration](#) in the *Administrator's Guide*.

#### 3.1.1 app-user Role

The `app-user` role is a minimally privileged role that is needed to run any application that Application Builder generates. You must grant this role to all users who are allowed to run the generated application.

#### 3.1.2 app-builder Role

Assign the `app-builder` role to users who are allowed to run Application Builder and generate applications with Application Builder. Application Builder performs many administrative tasks on MarkLogic Server (for example, creating databases and App Servers), and the `app-builder` role has the necessary privileges to perform those tasks. The privileges of the `app-builder` role are minimized to the needed functions and to amped functions, however, users with this role are allowed to create these resources on MarkLogic Server. Therefore, only trusted users (users who are assumed to be non-hostile, appropriately trained, and follow proper administrative procedures) should be granted the `app-builder` role.

#### 3.1.3 app-builder-internal Role

The `app-builder-internal` role is used by Application Builder to amp certain functions that Application Builder performs. You should not explicitly grant the `app-builder-internal` role to any user; it is only for internal use by Application Builder.

## 3.2 Permissions on Documents

To enable users to search the applications generated from Application Builder, all documents in that database must have read permission for a role the users have. If you want to permit all users to search everything in the database, you can add a permission to every document for the `app-user` role with the `read` capability. You can give different users different access to content by having permissions on documents based on the level of access control you want to maintain.

For the Oscar sample application, Application Builder adds a `read` permission for the `app-user` role and an `update` permission for the `app-builder` role to all of the documents in the generated Oscars database.

To add a `read` permission for the `app-user` role and an `update` permission for the `app-builder` role to a document, perform an update to the document as in the following example:

```
xdmp:document-add-permissions("/example.xml",
  (xdmp:permission("app-user", "read"),
   xdmp:permission("app-builder", "update")))
```

For your applications, you should define a security policy and add the appropriate permissions to the documents in your database to implement that security policy.

For more details on permissions, see [Permissions on Documents](#) in the *Understanding and Using Security Guide*.

## 3.3 Modifying Roles to Meet Your Requirements

For applications generated by Application Builder, the `app-user` role provides sufficient privileges for any user to run the application. If you modify the application to perform other actions, however, you might need to provide additional privileges to your users.

There are two techniques for providing additional privileges to your users:

- Add another role with the privileges and assign that role to the application user.
- Modify the existing `app-user` role.

Depending on your requirements, it might make sense to add the necessary privileges to another role and grant that role to your users. This is a safer technique, because it leaves the `app-user` role intact and does not affect future applications you might create with Application Builder.

In some cases, if you are comfortable with the security implications, it might make sense to modify the `app-user` role by adding other permissions to it.

**Warning** If you modify the `app-user` role, use caution. All applications generated by Application Builder use the `app-user` role.

## 4.0 Extending Applications Built With Application Builder

Application Builder generates search applications according to certain templates. The applications can be extended and modified in a number of ways. This chapter describes how to extend and modify the generated applications and contains the following sections:

- [Viewing the Generated Code](#)
- [The Custom Directory](#)
- [Customizing Applications Generated by Application Builder](#)
- [Making Further Modifications to the Application](#)
- [Removing Modifications to an Application](#)

### 4.1 Viewing the Generated Code

When you deploy an application, Application Builder deploys the code to the modules database for the App Server specified on the Deploy page of Application Builder. To view your code, look in the modules database in the `/application/` directory. You can look at the documents in the modules database by setting up a WebDAV server to the modules database or by using any other method for looking at documents in a database. The entire application is there, including all of the images, libraries, and other components.

Another way to view the code is to generate a support package from Application Builder, as described in “Navigating in Application Builder” on page 16. The support package is a zip file that contains the entire generated application. The application code is in the `application` directory of the support package.

The following tables list the files of interest in the `lib`, `css` and `js` directories under the `application` directory.

**Warning** Do not update the files in any of these directories. Otherwise, the next time you make changes to your application in App Builder, the changes you made to these modules are overwritten. Instead, modify the files described in “The Custom Directory” on page 45.

The files in the `/application/lib` directory are shown below:

File	Description
<code>config.xqy</code>	Contains the variable declarations that use function values to specify the code to run for various features in the application. Many of the variables in this file can be overridden by the <code>/application/custom/appfunctions.xqy</code> module.
<code>standard.xqy</code>	Contains the functions that are called from <code>config.xqy</code> .
<code>transform-detail.xsl</code>	Contains the XSLT used to render the detail page in your application.
<code>transform-abstract-metadata.xsl</code>	Contains the XSLT used to render the meta section of individual search results in your application.
<code>transform-abstract-title.xsl</code>	Contains the XSLT used to render the title section of individual search results in your application.

The files in the `/application/css` directory are shown below:

File	Description
<code>master.css</code>	Contains the generic style information for applications
<code>custom.css</code>	Contains the style information customized in App Builder
<code>ie_6.css</code>	Contains the style information specific the Internet Explorer, Version 6.
<code>ie_7.css</code>	Contains the style information specific the Internet Explorer, Version 7.

The files in the `/application/js` directory are shown below:

File	Description
<code>application.js</code>	<p>Contains the JavaScript code used by your applications.</p> <p>You can extend on the JavaScript in this file by adding your extensions to the <code>application/custom/appjs.js</code> file. If you want to override the JavaScript in this file, do the following:</p> <ul style="list-style-type: none"> <li>• Copy the <code>application.js</code> file to the <code>/application/custom</code> directory and modify the copied file as needed.</li> <li>• Uncomment the <code>app.js</code> function in the <code>application/custom/appfunctions.xqy</code> file.</li> <li>• Change the script tag in the <code>app.js</code> function in the <code>appfunctions.xqy</code> file from:           <pre data-bbox="673 863 1182 890">&lt;script src="/js/application.js"</pre> <p>to:</p> <pre data-bbox="673 1003 1243 1031">&lt;script src="/custom/application.js"</pre> </li> </ul> <p><b>Note:</b> The script tag looks different for the sample application.</p>
<code>sample- application.js</code>	<p>Contains the JavaScript code used by the Sample applications.</p>

## 4.2 The Custom Directory

Use the files in the `/application/custom` directory to override the code in the `config.xqy` and `standard.xqy` files and preserve your changes when the application is redeployed by Application Builder.

The files in the `/application/custom` directory are shown below:

File	Description
<p><code>appfunctions.xqy</code></p>	<p>This module contains most of the variables in the <code>config.xqy</code> module and the same functions as the <code>standard.xqy</code> module. Unlike the <code>standard.xqy</code> or <code>config.xqy</code> modules, any changes you make to a variable or function in the <code>appfunctions.xqy</code> module survive redeployment.</p> <p>Modifying a variable in this module overrides the respective variable in the <code>config.xqy</code> module.</p> <p>Each function in the <code>appfunctions.xqy</code> module is commented out. Removing the comments from a function in the <code>appfunctions.xqy</code> module overrides the respective function in the <code>standard.xqy</code> module.</p>
<p><code>appcss.css</code></p>	<p>Styles added to this file override those in the CSS files located in the <code>/application/css</code> directory.</p> <p>Note that the <code>\$ADDITIONAL-CSS</code> variable in the <code>appfunctions.xqy</code> module points to this file. If you want to add other CSS files for your application, you can put the files in <code>/custom</code> and update the <code>\$ADDITIONAL-CSS</code> variable to load them in the desired order.</p>
<p><code>appjs.js</code></p>	<p>JavaScripts added to this file extend (but do not override) the scripts located in the <code>/application/js</code> directory.</p> <p>Note that the <code>\$ADDITIONAL-JS</code> variable in the <code>appfunctions.xqy</code> module points to this file. If you want to support jQuery or other frameworks, you can put the files in <code>/custom</code> and update the <code>\$ADDITIONAL-JS</code> variable to load them in the desired order.</p>
<p><code>apptransform-detail.xsl</code></p>	<p>XSLT added to this file overrides the XSLT in the <code>/application/lib/transform-detail.xsl</code> file. This XSLT is used to render the detail page in your application.</p>

File	Description
apptransform-abstract-metadata.xsl	XSLT added to this file overrides the XSLT in the /application/lib/transform-abstract-metadata.xsl file. This XSLT is used to render the meta section of individual search results in your application.
apptransform-abstract-title.xsl	XSLT added to this file overrides the XSLT in the /application/lib/transform-abstract-title.xsl file. This XSLT is used to render the title section of individual search results in your application.

### 4.3 Customizing Applications Generated by Application Builder

This section describes how to customize the application generated using Application Builder, and contains the following parts:

- [Basic Design Pattern](#)
- [Accessing the Code in the Custom Directory](#)
- [Road Map for Application Page Functions](#)
- [Customizing the Footer](#)
- [Customizing the Content Display](#)
- [Customizing the Detail Page](#)
- [Customizing the Generated Search Options Node](#)

**Note:** To modify the Application Builder generated applications, make your changes to the files located in the /application/custom directory, as described in “The Custom Directory” on page 45.

### 4.3.1 Basic Design Pattern

The applications generated from Application Builder are designed to be extensible so you can easily modify them. The basic design pattern to modify the generated application is as follows:

- Find the variables and functions in `/application/custom/appfunctions.xqy` that correspond to the part of the application you want to modify.
- Remove the comments from the function in the `/application/custom/appfunctions.xqy` file and modify. This function then overrides the respective function in the `/application/lib/standard.xqy` file. For examples, see “Customizing the Footer” on page 51 and “Customizing the Content Display” on page 52.
- Modify the `/application/custom/appfunctions.xqy` variable declaration(s) to override the variables in the `/application/lib/config.xqy` file. For examples, see “Customizing the Generated Search Options Node” on page 54.
- Similar modifications can be made to override the other files generated by Application Builder. For example, you can override the XSL in the `/application/lib/transform-detail.xsl` file used to render the detail page by adding XSL to the `/application/custom/apptransform-detail.xsl` file, as shown in “Customizing the Detail Page” on page 53.

### 4.3.2 Accessing the Code in the Custom Directory

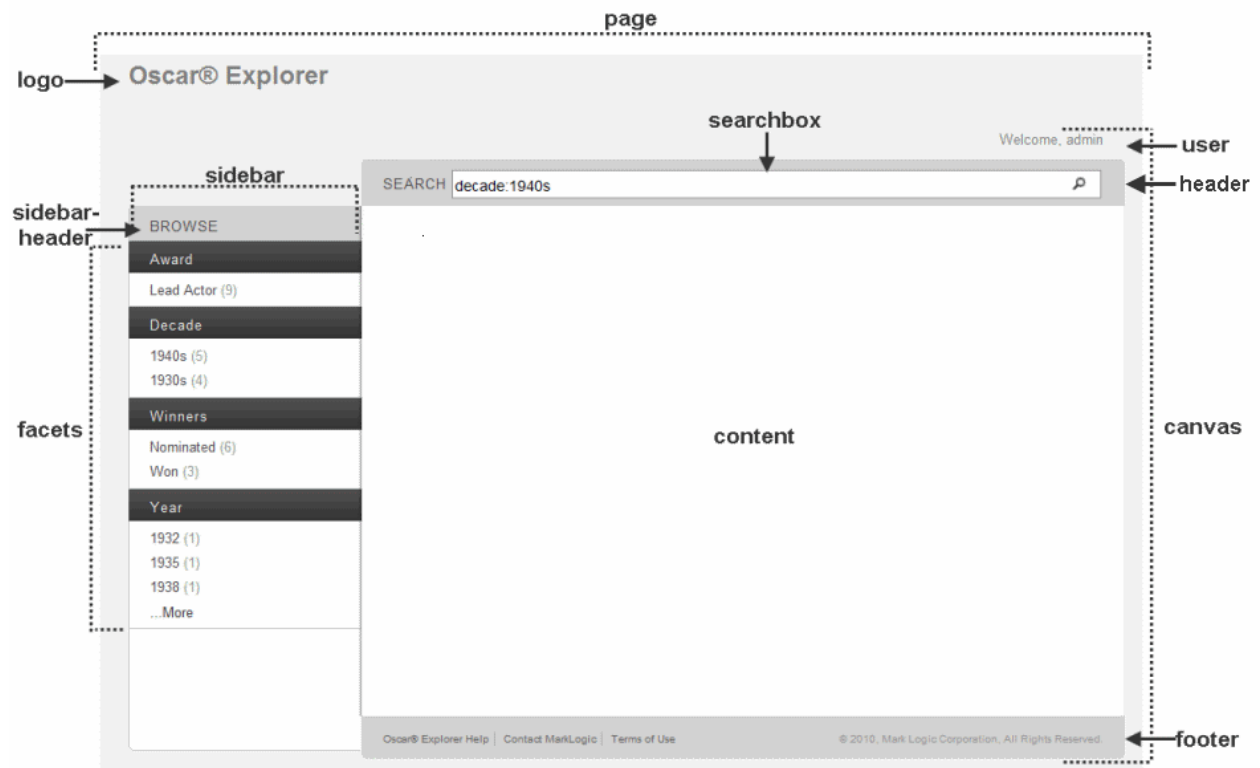
To modify the code for a generated application, you must gain access to the files in the `/application/custom` directory in the application’s modules database. One common way is to create a WebDAV App Server to the modules database, and then use that WebDAV App Server to access and modify the code. Many code development tools support WebDAV for editing. For details on WebDAV Servers, see [WebDAV Servers](#) in the *Administrator’s Guide*.

Another option is to copy the files in `/application/custom` to your filesystem, then create an HTTP App Server using the same content database as your Application Builder-generated application. Set the root of the new App Server to the location of your copied code.

### 4.3.3 Road Map for Application Page Functions

This section shows the functions that control the specific sections of the application pages. All of the functions shown in this section can be modified in the `custom/appfunctions.xqy` file.

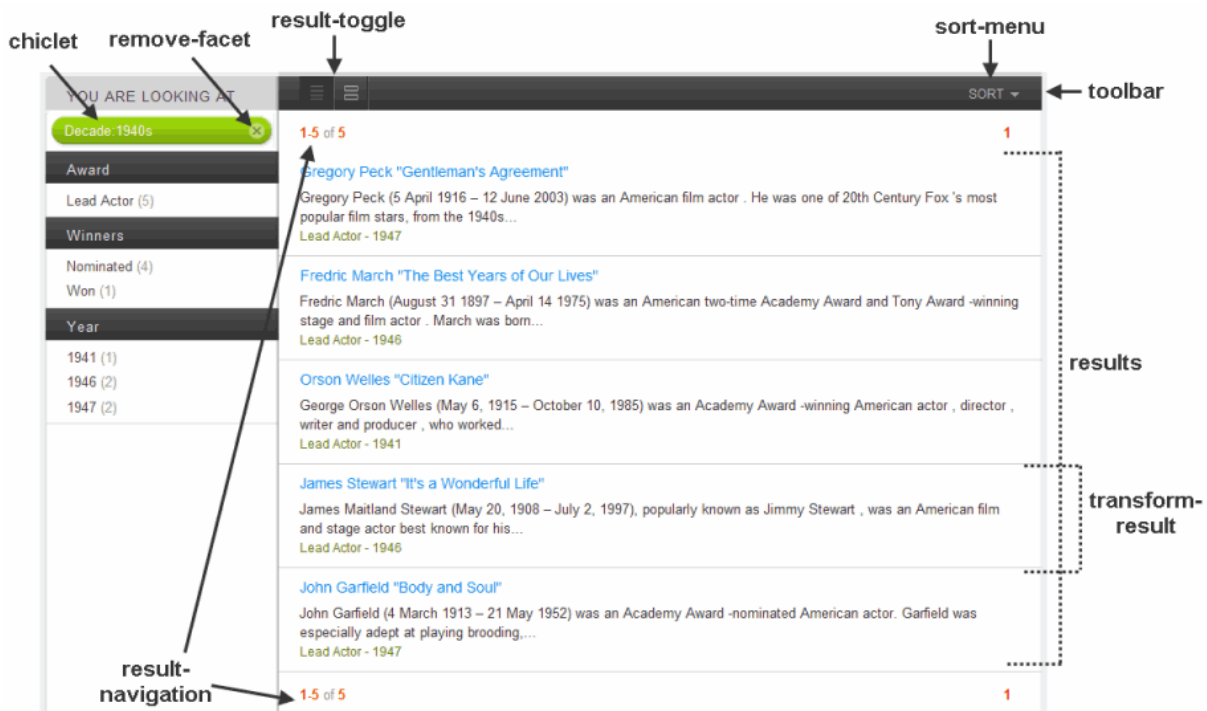
The functions illustrated below are common to all of the application pages. The illustrations that follow show the content sections for the default, search, and detail pages, along with any specific renditions of the sidebar.



The content portion of the default page is controlled by the functions shown below:



The content and sidebar portions of the search page is controlled by the functions shown below:



The content portion of the detail page is controlled by the functions shown below:

The diagram illustrates a detail page for Gregory Peck. At the top, a dark grey horizontal bar is labeled "toolbar" with an arrow pointing left. Below this bar, the page content begins with the heading "Gregory Peck". The main body of the page contains three paragraphs of text, each with blue hyperlinks. A dashed line on the right side of the page is labeled "item-render", indicating the component responsible for rendering the content.

**Gregory Peck**

Gregory Peck (5 April 1916 – 12 June 2003) was an American [film actor](#). He was one of [20th Century Fox's](#) most popular film stars, from the 1940s to the 1960s, and played important roles well into the 1990s. One of his most notable performances was as [Atticus Finch](#) in the 1962 film version of *To Kill a Mockingbird*, for which he won his [Academy Award](#). President [Lyndon Johnson](#) honored Peck with the [Presidential Medal of Freedom](#) in 1969 for his lifetime [humanitarian](#) efforts. In 1999, the [American Film Institute](#) named Peck among the [Greatest Male Stars of All Time](#), ranking at #12.

Peck was born [Eldred Gregory Peck](#) in [San Diego, California's](#) seaside community of [La Jolla](#), the son of [Missouri-born](#) [Bernice Mae "Bunny" Ayres](#) and [Gregory Pearl Peck](#), who was a chemist and pharmacist. Peck's father was of English (paternal) and Irish (maternal) heritage, and his mother was of Scots (paternal) and English (maternal) ancestry. Peck's father was a [Catholic](#) and his mother converted upon marrying his father. Peck's Irish-born paternal grandmother, [Catherine Ashe](#), was related to [Thomas Ashe](#), who took part in the [Easter Rising](#) less than three weeks after Peck's birth and died while on [hunger strike](#) in 1917. Peck's parents divorced by the time he was six years old and he spent the next few years being raised by his grandmother.

Peck was sent to a [Roman Catholic](#) military school, [St. John's Military Academy](#), in [Los Angeles](#) at the age of 10. His grandmother died while he was enrolled there, and his father again took over his upbringing. At 14, Peck attended [San Diego High School](#) and lived with his father. When he graduated, enrolled at [San Diego State University](#) (then called [San Diego State Teacher's College](#)), joined the college's track team, took his first theatre and public-speaking courses, and joined [Epsilon Eta](#) fraternity. He stayed for just one academic year, thereafter obtaining admission to his first-choice college, the [University of California, Berkeley](#). For a short time, he took a job driving a truck for an oil company. In 1936, he declared himself a pre-medical student at Berkeley, and majored in English. Since he was 6'3" and very strong, he also decided to row on the university crew. Partly because of his great stature, the Berkeley

### 4.3.4 Customizing the Footer

To modify the footer in your generated application, find the `app:footer` function in `/application/custom/appfunctions.xqy`:

```
(:~
 : Default footer content

declare function app:footer()
as element(div)
{
  <div class="footer" arysize="0 0 5 5">
    <span class="copyright">&copy;
      {$config:SLOTS/slots:copyright-year/string()},
      {$config:SLOTS/slots:copyright-holder/string()},
      All Rights Reserved.
    </span>
  </div>
};
:)
```

To create your own footer, simply remove the comments from the `app:footer` function definition and add your own `copyright-year` and `copyright-holder` text. For example, to change the footer from the default:

```
© 2010, MarkLogic Corporation, All Rights Reserved.
```

to:

```
© 2011, My Company, All Rights Reserved.
```

Remove the comments around the function and modify as follows:

```
(: Default footer content :)

declare function app:footer()
as element(div)
{
  <div class="footer" arysize="0 0 5 5">
    <span class="copyright">&copy;
      {$config:SLOTS/slots:copyright-year/string("2011")},
      {$config:SLOTS/slots:copyright-holder/string("My Company")},
      All Rights Reserved.
    </span>
  </div>
};
```

When you run your application, it now uses your new footer and the change persists after redeploying the application in Application Builder.

### 4.3.5 Customizing the Content Display

To modify the content display in your generated application, find the `app:content` function in `/application/custom/appfunctions.xqy`:

```
(:~
: Page content

declare function app:content ()
as element (div)
{
  <div class="content">
  <div class="content-background"><!-- --></div>
    { asc:get-content () }
  </div>
};
:)
```

For example, to change the background of the content display to yellow, you can uncomment the function and modify the `<div>` tag as follows:

```
(: Page content :)

declare function app:content ()
as element (div)
{
  <div class="content">
  <div class="content-background" style="background: yellow">
    <!-- -->
  </div>
    { asc:get-content () }
  </div>
};
```

### 4.3.6 Customizing the Detail Page

You can modify the look of the detail page by adding XSL to the `apptransform-detail.xml` file. This overrides the XSL in the `/application/lib/transform-detail.xml` file. For example, you want to change the links in the Oscars application to the Wikipedia pages from this:

#### James Stewart

**James Maitland Stewart** (May 20, 1908 – July 2, 1997), popularly known as **Jimmy Stewart**, was an [American film](#) and [stage actor](#) best known for his self-effacing persona. Over the course of his career, he starred in many films widely considered classics and was nominated for five [Academy Awards](#), winning one in competition and one Lifetime Achievement award. He was a major [MGM](#) contract star. He also had a noted military career, rising to the rank of [Brigadier General](#) in the [United States Air Force Reserve](#).

to look like this:

#### James Stewart

**James Maitland Stewart** (May 20, 1908 – July 2, 1997), popularly known as **Jimmy Stewart**, was an [American film](#) and [stage actor](#) best known for his self-effacing persona. Over the course of his career, he starred in many films widely considered classics and was nominated for five [Academy Awards](#), winning one in competition and one Lifetime Achievement award. He was a major [MGM](#) contract star. He also had a noted military career, rising to the rank of [Brigadier General](#) in the [United States Air Force Reserve](#).

You can add the following code to the `apptransform-detail.xml` file:

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

<xsl:stylesheet extension-element-prefixes="xdmp" version="2.0"
  xmlns:xsl="http://www.w3.org/1999/XSL/Transform"
  xmlns:config="http://marklogic.com/appservices/config"
  xmlns:translate="http://marklogic.com/translate"
  xmlns:html="http://www.w3.org/1999/xhtml"
  xmlns:xdmp="http://marklogic.com/xdmp">
<xsl:import href="../../lib/transform-detail.xml"/>

  <xsl:template match="html:a">
    <xsl:choose>
      <xsl:when test="starts-with(@href, 'http://example.com/')">
        <xsl:apply-imports/>
      </xsl:when>
      <xsl:otherwise>
        <span style="text-decoration: underline;">
          <xsl:apply-templates/>
        </span>
        <a href="{@href}" title="External link">â~</a>
      </xsl:otherwise>
    </xsl:choose>
  </xsl:template>
</xsl:stylesheet>
```

### 4.3.7 Customizing the Generated Search Options Node

Application Builder generates an options node which is passed into the various search API calls. You can modify the options node in the generated application by means of the `$OPTIONS` and `$ADDITIONAL-OPTIONS` variables in the `appfunctions.xqy` file. For details about the options node and about the Search API, see [Search API: Understanding and Using](#) in the *Search Developer's Guide*.

This section describes the process for adding options to the `options` node and modifying existing options in the `options` node:

- [Adding a searchable-expression Option](#)
- [Modifying the transform-results Option](#)

#### 4.3.7.1 Adding a searchable-expression Option

If you do not want to search over the whole database, you can add a `searchable-expression` option in the `search:options` node. For example, if you want the application to return `/root/my-node`, you can add a `searchable-expression` to the `options` node by adding it to the `$ADDITIONAL-OPTIONS` variable in the `appfunctions.xqy` file:

```
declare variable $ADDITIONAL-OPTIONS := (  
  <searchable-expression  
    xmlns="http://marklogic.com/appservices/search">  
      /root/my-node  
    </searchable-expression>  
  );
```

It is a good idea for the `searchable-expression` value to be a fragment root. If you do search below a fragment root, it is a good idea to filter your output. These settings affect the accuracy of the various counts in the search results for your application. You can set whether to filter results in the search options, as described in “Modifying Search Options” on page 30. For more details on filtered and unfiltered searches, see [Fast Pagination and Unfiltered Searches](#) in *Query Performance and Tuning Guide*.

### 4.3.7.2 Modifying the transform-results Option

Snippetting is often specific to a particular content set or application. You can modify the `transform-results` option in the `options` node to specify that the Search API execute your own snippet code to generate the result display.

For example, the following option specifies that the application use the `my-snippet` function in the library module `/my-module.xqy` under the App Server root.

```
<transform-results apply="my-snippet" ns="my-namespace"
  at="/my-module.xqy" />
```

To modify the `transform-results` option, copy the entire `options` node from the `config.xqy` file and paste it into the `$OPTIONS` variable in the `appfunctions.xqy` file. Then change the `transform-results` option as follows:

```
declare variable $OPTIONS := (
  <options xmlns="http://marklogic.com/appservices/search">
    .....
    <transform-results apply="my-snippet" ns="my-namespace"
      at="/my-module.xqy" />
    .....
  </options>
);
```

For more details about modifying snippets, including the function signature that your code must be compatible with, see [Modifying Your Snippet Results](#) in the *Search Developer's Guide*.

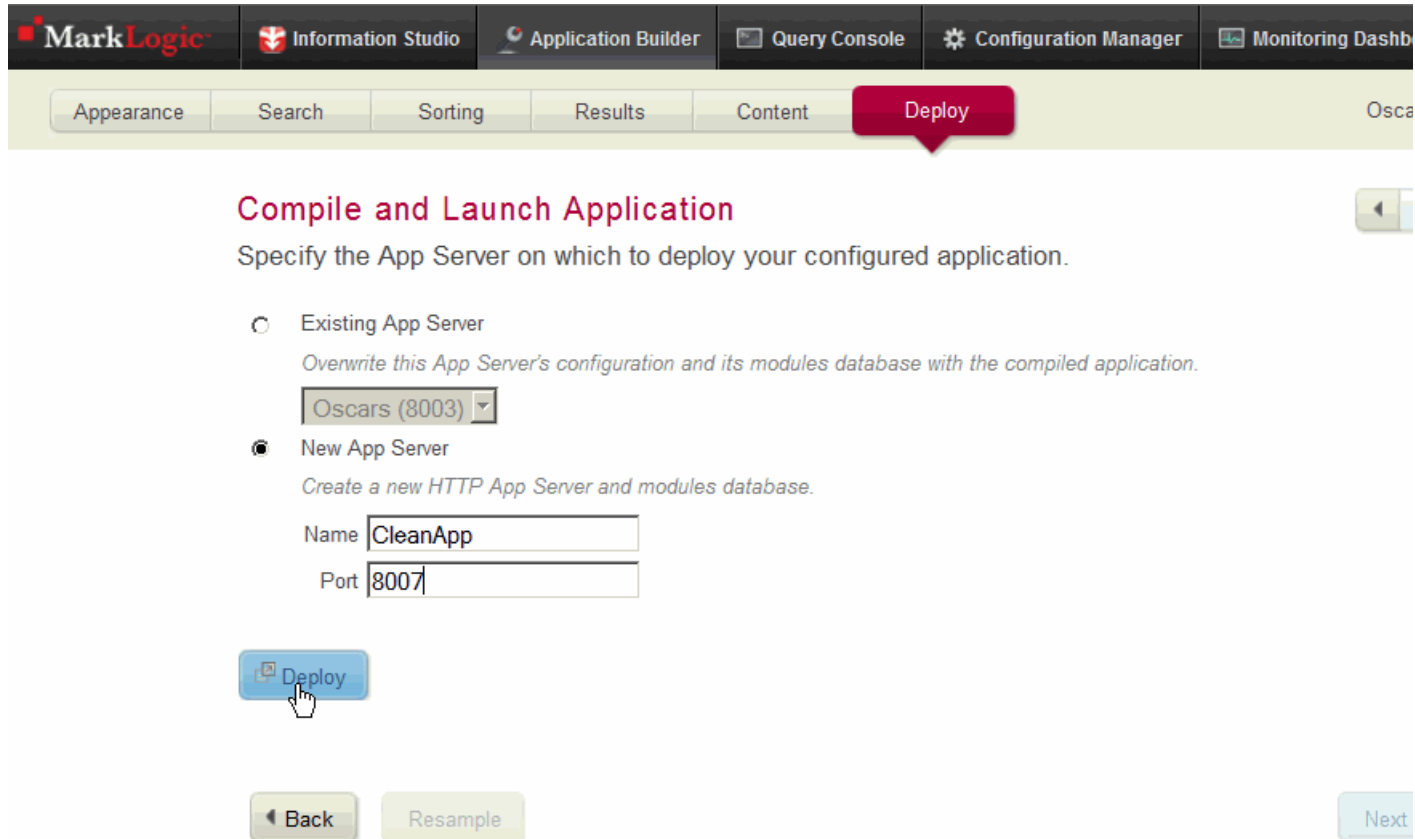
## 4.4 Making Further Modifications to the Application

The generated application is an XQuery application and you can make any modifications to it that you want. It is designed to make modifications like the ones already described in “Customizing Applications Generated by Application Builder” on page 46 and “Customizing the Generated Search Options Node” on page 54. There are many more such modifications you can make. You can also take the application code as a starting point and make more substantial modifications. Consider your application requirements and decide what level of modification is right for your application.

## 4.5 Removing Modifications to an Application

You can remove all of the modifications you made to an application in the `/application/custom` directory by redeploying the application to another App Server.

For example, to redeploy an existing application to a new App Server, named CleanApp, navigate to the Deploy page, select New App Server, enter the new name, and click the Deploy button:



**MarkLogic** Information Studio Application Builder Query Console Configuration Manager Monitoring Dashb

Appearance Search Sorting Results Content **Deploy** Ospa

### Compile and Launch Application

Specify the App Server on which to deploy your configured application.

Existing App Server  
*Overwrite this App Server's configuration and its modules database with the compiled application.*  
Oscars (8003)

New App Server  
*Create a new HTTP App Server and modules database.*  
Name   
Port

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If you have questions or comments, you may contact MarkLogic Technical Support at the following email address:

[support@marklogic.com](mailto:support@marklogic.com)

If reporting a query evaluation problem, please be sure to include the sample XQuery code.

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