



Day 3 exercises for  
**Building Enterprise  
Websites with Liferay**

Bootcamp 2024

# Exercises for Building Enterprise Websites with Liferay, 2024.Q2 Bootcamp, Day 3

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## Exercise 19a: Creating an Object Definition

Clarity wants to create a user-friendly contact form to streamline communication with non-employees users. Liferay Objects provides the tools to build and seamlessly integrate this form with their Contact Us page.

Here you'll create the [Contact Us](#) object and configure its fields for storing relevant information as the Clarity Admin user.

To do this,

1. Sign in as the Clarity Admin user.
  - Username: [admin@clarityvisionsolutions.com](#)
  - Password: [learn](#)
2. Open the *Global Menu* (), go to the *Control Panel* tab, and click *Objects*.
3. Click *Add* ().
4. Enter these details:

Field	Value
-------	-------

Field	Value
Label	Contact Us
Plural Label	Contact Us
Object Name	ContactUs

5. Click *Save*.

This creates a draft object definition with some default system fields. You can now configure the definition to determine how its data is stored and which features you want to enable.

6. From the Objects overview page, begin editing the *Contact Us* object definition.

7. In the Details tab, configure these settings:

Field	Value
Scope > Scope	Site
Scope > Panel Link	Content & Data
Configuration > Show Widget in Page Builder	False
Configuration > Enable Entry History in Audit Framework	True

8. Click *Save*.

Now that you've configured the object definition, you can add custom fields to determine the type of information you want to gather with the form.

9. Go to the *Fields* tab.

10. Click *Add* (+), enter these details, and click *Save*:

Field	Value
Label	Full Name
Field Name	fullName
Type	Text
Mandatory	Yes
Accept Unique Values Only	No

11. Repeat the previous step to create the remaining fields:

Label	Field Name	Type	Mandatory	Unique Values Only
Email Address	emailAddress	Text	Yes	No
Phone	phone	Text	Yes	No

Label	Field Name	Type	Mandatory	Unique Values Only
State or Province	stateOrProvince	Text	No	No
City	city	Text	No	No
Comment	comment	Long Text	No	N/A

12. Return to the *Details* tab and click *Publish*.

This creates the database tables for storing form submissions.

Next, you'll add the form to Clarity's Contact Us page.

## Exercise 19b: Building the Form

Liferay Objects generates a basic user interface automatically, but you can design and add forms to Clarity's pages.

Previously, you added and wireframed the Contact Us page. Here you'll add the form to the page as the Clarity Admin user.

To do this,

1. Go to Clarity's public enterprise website and begin editing the *Contact Us* page.
2. Drag and drop a *form container* fragment into the Contact Form container.
3. Click the drop-down menu and select the *Contact Us* object.

This populates the form with fields from the object automatically.

4. Select the form container and configure these settings:

Tab	Setting	Value
General > Frame	Width	400px
Styles	Padding	Spacer 4 (all sides)
Styles	Background	#FFFFFF
Styles	Border Radius	15px

5. Drag and drop the field fragments into this order:

- Full Name
- Email Address
- Phone
- State or Province
- City
- Comment

6. Select each of these field fragments and configure this setting:

Tab	Setting	Value
Styles	Padding	Spacer 3 (bottom)

7. Click *Publish*.

We would love to hear from you

If you would like to contact us, please fill the information below to direct your inquiry

Full Name \*

Email Address \*

Phone \*

State or Province

City

Comment

submit

8. Test the form by submitting an entry.

9. Go to *Site Menu* (☰), expand *Content & Data*, and click *Contact Us*. The entry you created should appear here.

ID ↑↓	City ↑↓	Comment ↑↓	Email Address ↑↓	Full Name ↑↓	Phone ↑↓	State or Province ↑↓	Status ↑↓
43939	San Francisco	Hello! I'd like t...	john.euangelos@co...	John Euangelos	+1 (555) 823-2494	California	APPROVED

20 Items ▾ Showing 1 to 1 of 1 entries. 1 < >

Great! You've fully set up the Contact Us page and made it available for Clarity's users.

Next, you can learn how to create a multi-step form or move to Lesson 20 to learn about Liferay Client extensions and how you can use them to add styling and functionality to your Liferay instance.

## Exercise 19c: Creating a Multi-Step Form (Bonus)

Using objects, form fragments, and display page templates, you can develop multi-step forms to allow users to fill a form in different display pages, which are connected to the same object entry.

Here you'll create a display page for the second step and link the Contact Us form container to it as the Clarity Admin user.

To do this,

1. Open the *Global Menu* (grid icon), go to the *Control Panel* tab, and click *Objects*.
2. Begin editing the *Contact Us* object definition.
3. In the Details tab, configure this setting:

Field	Value
Configuration > Allow Users to Save Entries as Draft	True

**Note:** When creating a multi-step form using objects, you must enable draft mode for the object definition.

4. Click *Save*.
5. Open the *Site Menu* (grid icon), expand *Design*, and click *Page Templates*.
6. Go to the *Display Page Templates* tab and click *New*.
7. Select the *Primary Master Page* template.
8. Enter *Contact Us - Step 2* for the name and select *Contact Us* for content type.
9. Click *Save*.
10. Drag and drop the *Contact Us Page* fragment composition into the template.
11. Repeat steps 2-5 from Exercise 19b to create the form.
12. Select the form container and configure these settings:

Tab	Setting	Value
General	Success Interaction	Go to Page
General	Page	Home
General	Show Notification when Form is Submitted	Yes

**ACTIONS AFTER SUBMIT** ▾**Success Action**

Go to Page

**Page**

Home



Show Notification After Submit

**Success Notification Text**

Your information was suc...



Preview

13. Click *Publish*.

14. Return to the *Contact Us* page and begin editing it.

15. Select the form container and configure these settings:

Tab	Setting	Value
General	Success Interaction	Go to Entry Display Page
General	Display Page	Contact Us - Step 2

16. Remove these fields from the container:

- State or Province
- City
- Comment

17. Select the *Submit Button* fragment and configure this setting:

Tab	Setting	Value

Tab	Setting	Value
General	Submitted Entry Status	Draft

**Note:** Now when users click this button, Liferay saves their entry as a draft and directs them to the next step to complete the form.

18. Double-click the *Submit Button* fragment to edit its text and enter **Next**.

19. Click *Publish*.

We would love to hear from you

If you would like to contact us, please fill the information below to direct your inquiry

Full Name \*

Email Address \*

Phone \*

Next

20. Test out the form.

Great! Now you've created a multi-step form using objects, form fragments, and display page templates. Next, you'll learn about Liferay Client extensions and how you can use them to add styling and functionality to your Liferay instance.

## Exercise 20a: Modifying a Theme Client Extension

Client Extensions separate customizations from the Liferay core. This helps simplify updates while freeing you to use your desired technologies and deployment models. As seen previously, the theme CSS client extension provides a way to override the current theme's CSS files. Here you'll update the client extension provided in the training workspace and deploy your changes as Walter Douglas.

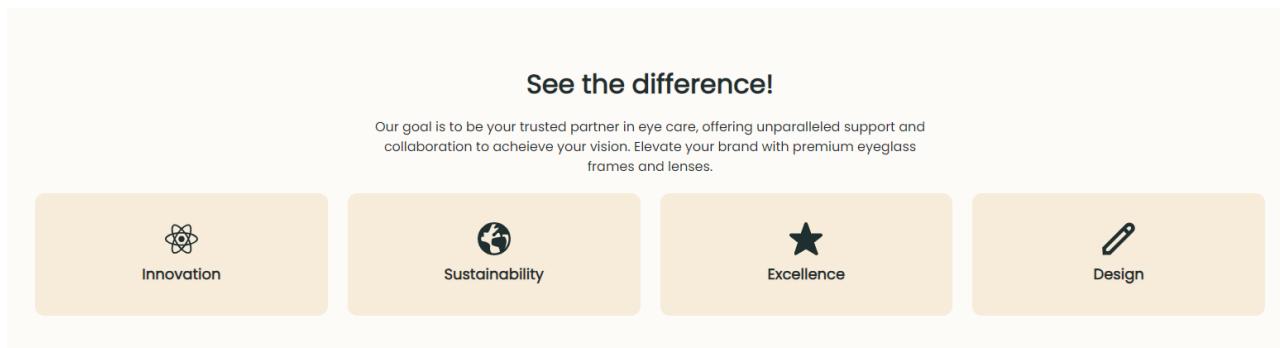
To do this,

## 1. Sign in as Walter Douglas.

- Email: [walter.douglas@clarityvisionsolutions.com](mailto:walter.douglas@clarityvisionsolutions.com)
- Password: [learn](#)

## 2. In the Clarity Public Enterprise Website, go to the Home page.

Note that Clarity's "See the Difference" banner uses a beige background (i.e., [#FCFBF8](#)). Let's make a change to Clarity's theme CSS client extension to update it.



## 3. Navigate to the [\[repository-folder\]/exercises/lesson-20/](#) folder, open the [layout-background-color.scss](#) file, and copy its contents.

This file contains styling for overwriting the background color for the [.lfr-layout-structure-item-container](#) CSS class.

## 4. Navigate to the [\[repository-folder\]/client-extensions/liferay-clarity-theme-css](#) folder, open the [src/css/\\_custom.scss](#) file, add the copied CSS style to the end of the file, and save your changes.

## 5. Open a new terminal window, navigate to the [\[repository-folder\]/client-extensions/liferay-clarity-theme-css](#) folder, and run this command to build and deploy the theme client extension:

```
blade gw clean deploy
```

Or use Gradle Wrapper:

```
.../.../gradlew clean deploy
```

## 6. Verify the command executes successfully.

## 7. If necessary, log out of the Clarity portal. It may also be necessary to clear the cache in the browser if this change is not reflected automatically.

## 8. Verify the background of the container is now gray:

**Tip:** When making changes to theme CSS values, you may need to clear your browser's cache to see your changes.

- Now that you have seen how you can modify CSS styles using a theme client extension, remove the styling change just made from the `_custom.scss` file.

Next you'll learn how to use client extensions to update the site's favicon.

## Exercise 20b: Deploying a Client Extension for Favicon

In a previous exercise, you set the site favicon manually via the Liferay UI. With client extensions, you can streamline updates to your site by deploying the favicon along with your other frontend client extensions. Here you'll use a client extension to update Clarity's favicon as Walter Douglas.

To do this,

- Open a new terminal window and go to the `liferay-clarity-theme-favicon` folder in your local copy of the training workspace (i.e., `enablement-bootcamp-clarity/client-extensions/liferay-clarity-theme-favicon`)
- Run this command to build and deploy the client extension:

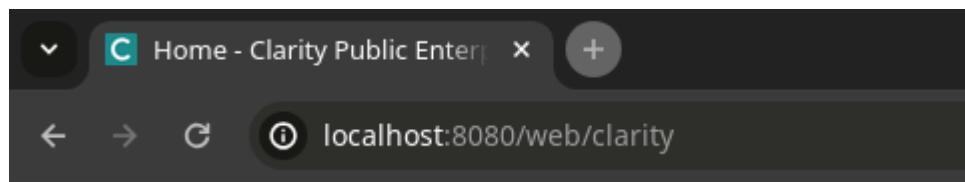
```
blade gw clean deploy
```

Or use Gradle Wrapper:

```
.../.../gradlew clean deploy
```

- Verify the command executes successfully.
- Open the *Site Menu* (grid icon), expand *Site Builder*, and select *Pages*.
- Click *Actions* (three dots icon) in the Application Bar and select *Configuration*.
- In the Design tab, click *Select Favicon* (link icon).
- In the modal window, go to the *Client Extension* tab and select *Liferay Clarity Theme Favicon*.
- Click *Save*.

9. Go to the Home page and verify the page's favicon was updated.



## Exercise 20c: Creating a New CSS Client Extension

Liferay provides the CSS client extension for adding a single CSS resource to site pages. Here you'll create one of these client extensions using an external cdnjs URL as Walter Douglas user.

To do this,

1. Open the *Global Menu* (grid icon), go to the *Applications* tab, and click *Client Extensions*.
2. Click *Add* (+) and select *Add CSS*.
3. For name, enter **Clarity Animation**.
4. For CSS URL, enter  
<https://cdnjs.cloudflare.com/ajax/libs/animate.css/4.1.1/animate.min.css>.

## New CSS

CSS defines a CSS resource that will be included after theme CSS resources.

[Learn more about browser based client extensions.](#)

### IDENTITY

#### Name \*

Clarity Animation



#### Description

Styles | B I U | List | Link | Image | Video | Source

### CONTENT

#### CSS URL \*

`https://cdnjs.cloudflare.com/ajax/libs/animate.css/4.1.1/animate.min.css`

This CSS is appended to theme.css.

### ADDITIONAL RESOURCES

**Publish**

**Cancel**

5. Click *Publish*.
6. Go to the *Home* page in the Clarity Public Enterprise Website.
7. Click *Configure Page* () and select the *Design* tab.
8. Scroll down and click *Add CSS Client Extensions*.
9. Choose *Clarity Animation* and click *Add*.

## Customization

CSS

JavaScript

### THEME CSS CLIENT EXTENSION

Use this client extension to fully replace the default CSS contained in the theme. Be aware that all the declared design tokens and CSS variables will be overridden. Therefore, style books will not provide a way to style pages anymore.

#### Theme CSS

Theme CSS is inherited from master.



### CSS CLIENT EXTENSIONS

Extend this page CSS with client extensions. They will be loaded after the theme CSS and after master extensions.

**+ Add CSS Client Extensions**

Order ⓘ	Name	Inherited	
1	<b>Clarity Animation</b>	-	⋮

10. Scroll down and click *Save*.

This saves the page as a draft. For the changes to take effect, you must publish the page.

11. Return to the Home page, click *Edit* (edit icon), and click *Publish*.

12. Open the *Site Menu* (site menu icon), expand *Design*, and click *Fragments*.

13. Under Fragment Sets, click *Clarity Components*.

14. Select the *Clarity Gradient Container* fragment to begin editing it.

15. In your file browser, navigate to the `[repository-folder]/exercises/lesson-20/` folder, open the `clarityanimation.html` file, and copy its content into the fragment's HTML field.

This adds three CSS animation classes to the fragment from the from the `animate.css` library on [cdnjs](#) (i.e., `animate__animated`, `animate__slower`, and `animate__fadeIn`).

```

1 <div class="clarity-gradient-container">
2   <div data-lfr-styles class="animate__animated animate__slower animate__fadeIn">
3     <lfr-drop-zone></lfr-drop-zone>
4   </div>
5 </div>

```

16. Click *Publish*.

Now that you've updated the fragment, you can propagate these changes to existing instances of the fragment in site pages.

17. Click *Actions* (⋮) for the Clarity Gradient Container fragment, and select *View Usages*.

18. Check all boxes and click *Propagate*.

## All (6)

<input checked="" type="checkbox"/> All Selected (6 of 6 Items Selected)	Propagate	⋮	
Name	Type	Using	Last Propagation
<input checked="" type="checkbox"/> Contact Us	Page	<a href="#">A PREVIOUS VERSION</a>	1 Month Ago
<input checked="" type="checkbox"/> Contact Us (Draft)	Page	<a href="#">A PREVIOUS VERSION</a>	1 Month Ago
<input checked="" type="checkbox"/> About Us	Page	<a href="#">A PREVIOUS VERSION</a>	1 Month Ago
<input checked="" type="checkbox"/> About Us (Draft)	Page	<a href="#">A PREVIOUS VERSION</a>	1 Month Ago
<input checked="" type="checkbox"/> Home	Page	<a href="#">A PREVIOUS VERSION</a>	1 Month Ago
<input checked="" type="checkbox"/> Home (Draft)	Page	<a href="#">A PREVIOUS VERSION</a>	1 Month Ago

Now, all fragments used throughout the site are updated with the new CSS classes.

19. Go to the Home Page and confirm the animation works.

The animation now plays every time you refresh or navigate to the Home page.

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Next, let's explore how you can use client extensions with Objects to build custom solutions with complex business logic.

## Exercise 20d: Setting Up and Deploying the Distributor Application

The training workspace includes a batch client extension for quickly setting up two object definitions and their related picklists. The specific process for deploying client extensions depends on your Liferay hosting model (i.e., Self-Hosted, PaaS, or SaaS). However, in all cases, you must add the compiled `.zip` file to the Liferay server's `[Liferay Home]/osgi/client-extensions/` folder. Here you'll deploy the batch client extensions and explore what they include as the Clarity Admin user.

1. In your training workspace, go to the `[repository-root]/client-extensions/liferay-clarity-batch/` folder.
2. Run this command to build and deploy the client extension:

```
blade gw clean deploy
```

Or use Gradle Wrapper:

```
.../.../gradlew clean deploy
```

3. Verify the command executes successfully.

Two new object definitions and their picklists were added to your Liferay instance. Let's explore them.

4. While logged in as the Clarity Admin user, open the *Global Menu* (grid icon), go to the *Control Panel* tab, and click *Picklists*.

Picklists are predefined lists of items that you can use for single select and multi-select fields in object definitions. Here are picklists imported by the batch client extension:

- D4B8 Annual Purchase Volumes
- D4B8 Application States

- D4B8 Assessment Scores
- D4B8 Business Types
- D4B8 Decisions
- D4B8 Distribution Channels
- D4B8 Distribution Regions
- D4B8 Order Types
- D4B8 Product Labels
- D4B8 Product Types
- D4B8 Recommendations

**Picklists**

Name	Source	
D4B8 Annual Purchase Volumes	CUSTOM	⋮
D4B8 Application States	CUSTOM	⋮
D4B8 Assessment Scores	CUSTOM	⋮
D4B8 Business Types	CUSTOM	⋮
D4B8 Decisions	CUSTOM	⋮
D4B8 Distribution Channels	CUSTOM	⋮
D4B8 Distribution Regions	CUSTOM	⋮
D4B8 Order Types	CUSTOM	⋮
D4B8 Product Labels	CUSTOM	⋮
D4B8 Product Types	CUSTOM	⋮
D4B8 Recommendations	CUSTOM	⋮

5. Open the *Global Menu* (grid icon), go to *Control Panel*, and click *Objects*.

Here you'll see two new object definitions imported by the batch client extension:

- D4B8 Distributor Application
- D4B8 Application Evaluation

The screenshot shows a table of object definitions with the following columns: Label, Scope, System, Modified Date, and Status. The table contains 9 entries:

Label	Scope	System	Modified Date	Status
Postal Address	company	Yes	Jun 5, 2024, 6:50:40 PM	APPROVED
Organization	company	Yes	Jun 5, 2024, 6:50:40 PM	APPROVED
Account	company	Yes	Jun 5, 2024, 6:50:40 PM	APPROVED
User	company	Yes	Jun 5, 2024, 6:50:40 PM	APPROVED
Commerce Product	company	Yes	Jun 5, 2024, 6:50:40 PM	APPROVED
Commerce Order	company	Yes	Jun 5, 2024, 6:50:40 PM	APPROVED
Commerce Product Group	company	Yes	Jun 5, 2024, 6:50:40 PM	APPROVED
<b>D4B8 Distributor Application</b>	company	No	Jun 5, 2024, 6:50:40 PM	APPROVED
<b>D4B8 Application Evaluation</b>	company	No	Jun 5, 2024, 6:50:41 PM	APPROVED

20 Items ▾ Showing 1 to 9 of 9 entries.

As we're adding more object definitions, let's add a folder for organizing our objects and place the D4B8 objects into it.

6. Click *Add* (+) for Object Folders.
7. For label, enter **Distributor Applications**.
8. Click *Create Folder*.

The screenshot shows the 'New Object Folder' dialog box with the following fields:

- Label \***: Distributor Applications
- Name \***: DistributorApplications

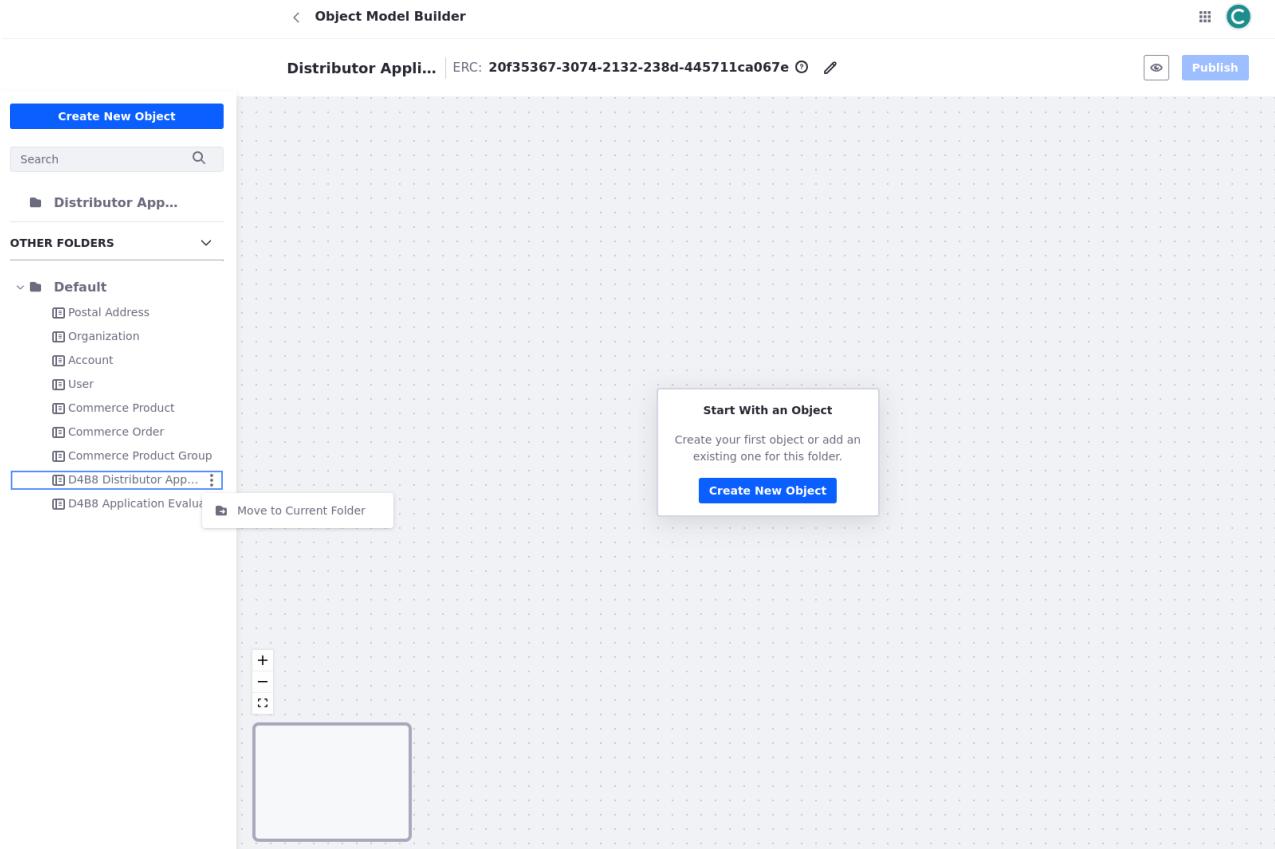
At the bottom right of the dialog box are two buttons: **Cancel** and **Create Folder**.

9. Click *View in Model Builder*.

The Objects Model Builder is a graphical interface that displays each object definition as a card and visualizes relationships between them. With it, you can create, manage, and extend data models in

the Objects application and quickly configure definitions, fields, and relationships.

10. In the left side panel, click *Actions* (  ) for D4B8 Distributor Application and select *Move to Current Folder*.



11. Repeat this step for D4B8 Application Evaluation.

12. Drag and drop the cards to reposition them and better see their relationship.

## Exercise 20e: Testing the Distributor Application

In the following lessons, you'll learn more about these objects and how they're configured. Here you'll create and review a Distributor Application entry as the Clarity Admin user.

To do this,

1. Sign in as the Clarity Admin user.
  - Email: [admin@clarityvisionsolutions.com](mailto:admin@clarityvisionsolutions.com)
  - Password: [learn](#)
2. Open the *Global Menu* (  ) and go to the *Control Panel* tab. Both D4B8 Application Evaluations and D4B8 Distributor Applications should appear in the Object category.

3. Open *D4B8 Distributor Applications*.

4. Click *Add* (+) to create an entry.

5. Fill out the required fields and click *Save*.

**Note:** You must enter a business name. We'll use this value with client extensions in a later exercise.

6. Return to the Distributor Applications overview page and verify your entry appears in the table.

ID ↑↓	Applicant Name ↑↓	Business Name ↑↓	Create Date ↑↓	Application State ↑↓	Status ↑↓	⋮
43454	Boris Bobbins	Oculus Distributors	Jun 5, 2024, 9:43 AM	Approved	APPROVED	⋮

Now you can create an evaluation for this entry.

7. Open the *Global Menu* (grid icon), go to the *Control Panel* tab, and click *D4B8 Application Evaluations*.

8. Click *Add D4B8 Application Evaluation* to create an evaluation for the application.

9. In the Application to Evaluations field, select the application you created. It is identified by the Business Name field.

10. Fill out the evaluation form and click *Save*.

11. Return to the Application Evaluations overview page and verify the entry appears in the table.

ID ↑↓	Distributor Application	Author ↑↓	Assessment Score ↑↓	Decision ↑↓	Create Date ↑↓	Modified Date ↑↓	⋮
43488	Oculus Distribut...	Clarity Admin	Excellent	Approved	Jun 5, 2024, 9:57 AM	Jun 5, 2024, 9:57 AM	⋮

This evaluation is automatically related to the selected application. You can confirm these entries are related by returning to *Distributor Applications* overview page, selecting the application, and going to the *Evaluation Notes* tab.

The screenshot shows a user interface for managing applications. At the top, there are tabs: 'Application', 'References', and 'Evaluation Notes' (which is underlined, indicating it's the active tab). Below the tabs is a search bar with a magnifying glass icon and a blue '+' button. The main area is a table with two columns: 'ID' and 'Label'. There is one row visible with the ID '43488' and the label 'Clarity Admin'. In the top right corner of this row, there is a small vertical ellipsis menu.

## Exercise 20f: Adding Fields to the Distributor Applications Object

The Distributor Applications object already contains a bunch of custom fields, but Clarity needs one for applicants to list other brands they offer. Here you'll add a field to the Distributor Applications Object as the Clarity Admin user.

To do this,

1. Open the *Global Menu* (grid icon), go to the *Control Panel* tab, and click *Objects*.
2. Click the *Distributor Applications* folder.
3. Click *View in Model Builder*.
4. Look for the *D4B8 Distributor Application* object, click *Add Field or Relationship*, then select *Add Field*.
5. Enter these values and click *Save*:

Field	Value
Label	Business Other Brands Offered
Field Name	<b>businessOtherBrandsOffered</b>
Type	Long Text
Enable Entry Translation	False
Mandatory	False

## New Field

**Label \***

Business Other Brands Offered

**Field Name \***

businessOtherBrandsOffered

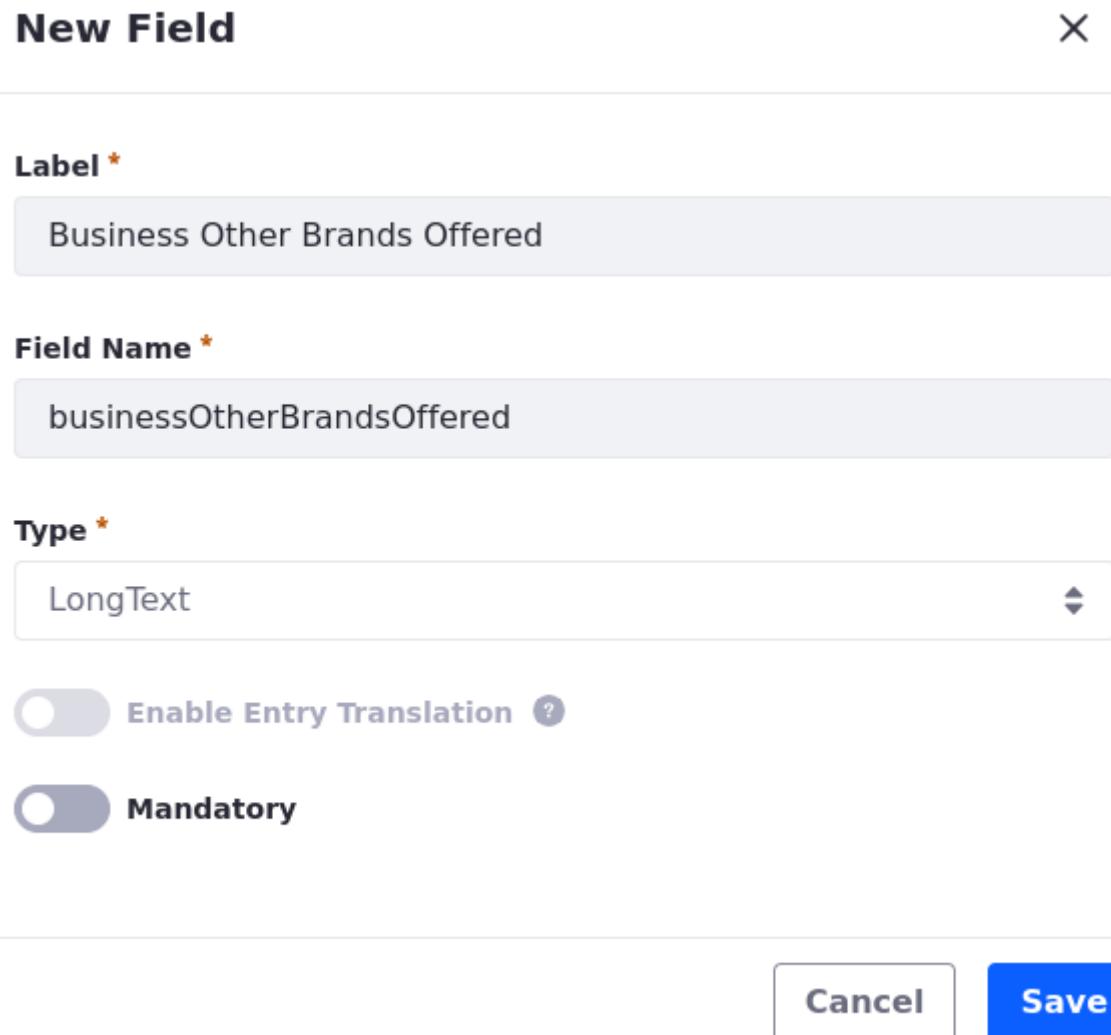
**Type \***

LongText

Enable Entry Translation ?

Mandatory

**Cancel** **Save**



Each saved field is added immediately to the object and automatically appears in its default layout when creating entries. However, the Distributor Application object has a custom layout that must be modified to include the new field.

To add the field to the object's layout,

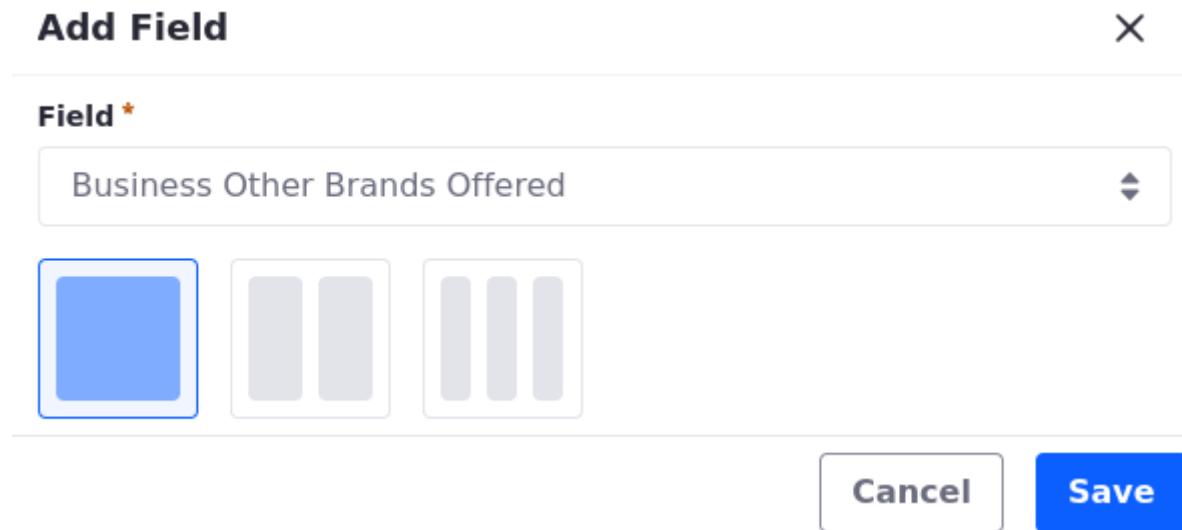
1. Click *Actions* (  ) for D4B8 Distributor Application and select *Edit in Page View*.
2. When prompted, select *Open Page View*.
3. Go to the *Layouts* tab and click *Application Layout*.
4. Go to the *Layout* tab.
5. Find the Business Details block and click *Add Field*.

### Business Details

Collapsible Add Field ⋮ ⌄

<b>Business Name</b> Text   <span>OPTIONAL</span>	⋮
<b>Business Type</b> Picklist   <span>OPTIONAL</span>	⋮
<b>Business Website URL</b> Text   <span>OPTIONAL</span>	⋮
<b>Business Phone Number</b> Text   <span>OPTIONAL</span>	⋮
<b>Business Established Date</b> Date   <span>OPTIONAL</span>	⋮
<b>Business Employee Number</b> Integer   <span>OPTIONAL</span>	⋮
<b>Business Annual Revenue (In USD)</b> Text   <span>OPTIONAL</span>	⋮
<b>Distribution Channels</b> Multiselect Picklist   <span>OPTIONAL</span>	⋮

6. Select *Business Other Brands Offered* as an option, choose the single column box for the field size, and click *Save*.



7. Click *Save* at the bottom of the panel.

Now the new field appears in the layout when creating entries.

## Exercise 20g: Adding Picklist Items

Clarity uses picklists to create predefined options for the applicants to choose from. Currently, the Product Types picklist is empty and does not include any options. Here you'll add items to the picklist as the Clarity Admin user.

To do this,

1. Open the *Global Menu* (grid icon), go to the *Control Panel* tab, and click *Picklists*
2. Select *D4B8 Product Types*.
3. Click *Add* and create these items:

Name	Key
Eyeglasses	eyeglasses
Sunglasses	sunglasses
Lenses	lenses
Contacts	contacts
Other	other

4. Click each item and replace their External Reference Code with these values:

Name	External Reference Code
Eyeglasses	PRODUCT_TYPE_EYEGLASSES
Sunglasses	PRODUCT_TYPE_SUNGASSES

Name	External Reference Code
Lenses	PRODUCT_TYPE_LENSES
Contacts	PRODUCT_TYPE_CONTACTS
Other	PRODUCT_TYPE_OTHER

Name	Key	External Reference Code	⋮
Eyeglasses	eyeglasses	PRODUCT_TYPE_EYEGLASSES	⋮
Sunglasses	sunglasses	PRODUCT_TYPE_SUNGASSES	⋮
Lenses	lenses	PRODUCT_TYPE_LENSES	⋮
Contacts	contacts	PRODUCT_TYPE_CONTACTS	⋮
Other	other	PRODUCT_TYPE_OTHER	⋮

5. Click *Save*.

Once saved, the Distributor Application's **Products of Interest** custom field is updated with the selected picklist values. This allows applicants to choose their desired products from the updated list.

## Exercise 20h: Assigning Object Permissions

Clarity wants to allow all authenticated users to submit distributor applications. Here you'll grant the default *User* role permission to access Distributor Applications and add entries as the Clarity Admin user.

To do this,

1. Open the *Global Menu* (grid icon), go to the *Control Panel* tab, and click *Roles*.
2. Select the *User* role and go to the *Define Permissions* tab.
3. In the left menu, go to *Control Panel* → *Object* → *D4B8 Distributor Applications*.
4. Add these permissions:

### Permission

---

Application Permissions: Add to Page

---

Application Permissions: View

---

Resource Permissions > D4B8 Distributor Applications: Add Object Entry

---

Resource Permissions > D4B8 Distributor Application: Delete

---

## Permission

### Resource Permissions > D4B8 Distributor Application: Update

The screenshot shows the Liferay Control Panel interface. On the left, there's a sidebar with 'Control Panel' and 'Object' dropdowns, and a main menu with 'D4B8 Distributor Applications' selected. The main content area is titled 'D4B8 Distributor Applications' and contains three sections: 'APPLICATION PERMISSIONS', 'RESOURCE PERMISSIONS', and 'D4B8 DISTRIBUTOR APPLICATION'. Each section has a table with an 'Action' column and several checkboxes.

Action
<input type="checkbox"/> Access in Control Panel
<input checked="" type="checkbox"/> Add to Page
<input type="checkbox"/> Configuration
<input type="checkbox"/> Permissions
<input type="checkbox"/> Preferences
<input checked="" type="checkbox"/> View

Action
<input checked="" type="checkbox"/> Add Object Entry
<input type="checkbox"/> Permissions

Action
<input type="checkbox"/> action.setUpAccount
<input checked="" type="checkbox"/> Delete
<input type="checkbox"/> Permissions
<input checked="" type="checkbox"/> Update
<input type="checkbox"/> View

5. Click *Save*.
6. Verify the User role has the desired permissions.

## Summary

Permissions	Sites and Asset Libraries
D4B8 Distributor Applications: <b>Add to Page</b>	<a href="#">Remove</a>
D4B8 Distributor Applications: <b>View</b>	<a href="#">Remove</a>
D4B8 Distributor Applications > D4B8 Distributor Application: <b>Delete</b>	<a href="#">Remove</a>
D4B8 Distributor Applications > D4B8 Distributor Application: <b>Update</b>	<a href="#">Remove</a>
D4B8 Distributor Applications > D4B8 Distributor Applications: <b>Add Object Entry</b>	<a href="#">Remove</a>

Clarity also wants to allow members of their business development team to review all applications and fill out evaluations. To achieve this, let's grant the Business Development Manager role the necessary permissions.

7. Return to the *Roles* overview page and select *D4B8 Business Development Manager*.
8. Go to the *Define Permissions* tab.
9. In the left menu, go to *Control Panel* → *Object* → *D4B8 Distributor Applications*.
10. Add these permissions, and click *Save*:
  - D4B8 Distributor Applications

### Permission

---

Application Permissions: Access in Control Panel

---

Application Permissions: View

---

Resource Permissions > D4B8 Distributor Application: Update

---

Resource Permissions > D4B8 Distributor Application: View

- D4B8 Application Evaluations

### Permission

---

## Permission

---

Application Permissions: Access in Control Panel

---

Application Permissions: View

---

Resource Permissions > D4B8 Application Evaluations: Add Object Entry

---

Resource Permissions > D4B8 Application Evaluation: Add Discussion

---

Resource Permissions > D4B8 Application Evaluation: Delete

---

Resource Permissions > D4B8 Application Evaluation: Delete Discussion

---

Resource Permissions > D4B8 Application Evaluation: Update

---

Resource Permissions > D4B8 Application Evaluation: Update Discussion

---

Resource Permissions > D4B8 Application Evaluation: View

The screenshot shows the Liferay Control Panel with the 'Summary' tab selected. On the left, there's a sidebar with sections like 'Control Panel', 'Commerce', and 'Applications Menu'. The main area is titled 'Summary' and contains two tabs: 'Permissions' and 'Sites and Asset Libraries'. The 'Permissions' tab is active, displaying a list of items under 'D4B8 Application Evaluations' with 'Remove' links next to them. The 'Sites and Asset Libraries' tab is also visible. At the bottom, there's a pagination bar showing '20 Entries' and 'Showing 1 to 14 of 14 entries'.

Permissions	Sites and Asset Libraries
<a href="#">D4B8 Application Evaluations:</a>	
<a href="#"><b>Access in Control Panel</b></a>	<a href="#">Remove</a>
<a href="#">D4B8 Application Evaluations:</a>	
<a href="#"><b>View</b></a>	<a href="#">Remove</a>
<a href="#">D4B8 Application Evaluations &gt;</a>	
<a href="#">D4B8 Application Evaluation:</a>	
<a href="#"><b>Add Discussion</b></a>	<a href="#">Remove</a>
<a href="#">D4B8 Application Evaluations &gt;</a>	
<a href="#">D4B8 Application Evaluation:</a>	
<a href="#"><b>Delete</b></a>	<a href="#">Remove</a>
<a href="#">D4B8 Application Evaluations &gt;</a>	
<a href="#">D4B8 Application Evaluation:</a>	
<a href="#"><b>Delete Discussion</b></a>	<a href="#">Remove</a>
<a href="#">D4B8 Application Evaluations &gt;</a>	
<a href="#">D4B8 Application Evaluation:</a>	
<a href="#"><b>Update</b></a>	<a href="#">Remove</a>
<a href="#">D4B8 Application Evaluations &gt;</a>	
<a href="#">D4B8 Application Evaluation:</a>	
<a href="#"><b>Update Discussion</b></a>	<a href="#">Remove</a>
<a href="#">D4B8 Application Evaluations &gt;</a>	
<a href="#">D4B8 Application Evaluation:</a>	
<a href="#"><b>View</b></a>	<a href="#">Remove</a>
<a href="#">D4B8 Application Evaluations &gt;</a>	
<a href="#">D4B8 Application Evaluations:</a>	
<a href="#"><b>Add Object Entry</b></a>	<a href="#">Remove</a>
<a href="#">D4B8 Distributor Applications:</a>	
<a href="#"><b>Access in Control Panel</b></a>	<a href="#">Remove</a>
<a href="#">D4B8 Distributor Applications:</a>	
<a href="#"><b>View</b></a>	<a href="#">Remove</a>
<a href="#">D4B8 Distributor Applications &gt;</a>	
<a href="#">D4B8 Distributor Application:</a>	
<a href="#"><b>Update</b></a>	<a href="#">Remove</a>
<a href="#">D4B8 Distributor Applications &gt;</a>	
<a href="#">D4B8 Distributor Application:</a>	
<a href="#"><b>View</b></a>	<a href="#">Remove</a>
<a href="#">Portal: View Control Panel</a>	
<a href="#"><b>Menu</b></a>	<a href="#">Remove</a>

11. For test purposes, go to the *Assignees* tab and assign this role to Harper Roberts.

Great! Now Clarity can make sure the business development team's manager can view submitted applications, create evaluations, and approve or deny applications. Next, let's finish setting up Clarity's workflow.

## Exercise 20i: Enabling the Approval Workflow

Clarity has already implemented a workflow process for reviewing and approving changes made to applications, but this workflow depends on a [microservice client extension](#) to function properly. Currently, all updates to the *Application State* field are approved automatically. However, the workflow is supposed to require a final manager review before allowing users to set the *Application State* field to [Approved](#) or [Denied](#).

Here you'll deploy the microservice client extension and finish configuring the workflow definition in the Liferay UI as the Clarity Admin user.

To do this,

1. Open your terminal and go to the `[repository-root]/client-extensions/liferay-clarity-etc-spring-boot/` folder.
2. Build and deploy the client extension project into your Liferay instance. Make sure the deployment was successful.

```
blade gw clean deploy
```

Or use Gradle Wrapper:

```
.../.../gradlew clean deploy
```

3. Run this command from the `liferay-clarity-etc-spring-boot/` folder to start the Spring Boot application:

```
blade gw bootRun
```

Or use Gradle Wrapper:

```
.../.../gradlew bootRun
```

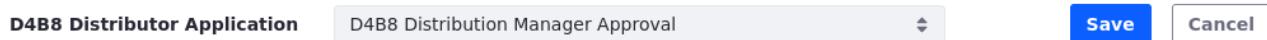
4. When the application starts, go to `http://localhost:58081/ready`. If the application is ready for use, the page says "READY."
5. In your Liferay instance, open the *Global Menu* (grid icon), go to the *Applications* tab, and click *Process Builder*.

Title	Description
PUBLISHED	
<u>Single Approver</u>	<u>A single approver can approve a workflow content.</u>
<u>D4B8 Distribution Manager Approval</u>	<u>An automated approval process that requires manager review when specified.</u>

The Distribution Manager Approval workflow is already fully configured. All you have to do is enable it for the Distributor Application object.

6. Go to the *Configuration* tab.

7. Click *Edit* for D4B8 Distributor Application, select *D4B8 Distribution Manager Approval*, and click *Save*.



This enables the workflow. Now you can test it by editing an object entry and setting its state field to *Under Review*. This update should be approved automatically by the workflow action. Next, update the state field to *Approved*. The entry's status should be *Pending*. You can then impersonate Harper Roberts and check for a workflow notification. You can then assign the task to Roberts and approve it. Once finished, the entry's status should be *Approved*.

## Exercise 20j: Automating Account Creation

To complete the onboarding flow, Clarity wants to automate account creation for approved applications. The client extension you deployed in the previous exercise includes an object action client extension for this. When triggered, this action creates an account using the application's business name, associates the applicant with the account, and assigns the applicant the Account Administrator role. Since the client extension is already deployed and the microservice is running, all you have to do is create an object action to finish setting it up as the Clarity Admin user.

To do this,

1. Begin editing the *D4B8 Distributor Application* object.
2. Go to the *Actions* tab and click *Add* (+).
3. Enter these values in the Basic Info tab:

Field	Value
Action Label	Set Up Account
Action Name	setUpAccount
Description	Standalone, create a business account for an approved application.
Active	True

4. Go to the *Action Builder* tab and set these values:

Field	Value
Trigger	Standalone
Action	object-action-executor[function#liferay-clarity-etc-spring-boot-object-action-account]
Error Message	Failed to create the business account.

5. Click *Save*.

The screenshot shows the 'Actions' tab of the 'D4B8 Distributor Application' configuration page. The table lists five actions:

Label	Description	Active	Source	Last Execution
Application Approved	On after update, send notifications to applicants when state is approved.	Yes	CUSTOM	SUCCESS
Application Denied	On after update, send notifications to applicants when state is denied.	Yes	CUSTOM	NEVER RAN
Application Received	On after add, send notifications to applicants.	Yes	CUSTOM	SUCCESS
Set Up Account	Standalone, create a business account for an approved application.	Yes	CUSTOM	NEVER RAN

6. Open the *Global Menu* (grid icon), go to the *Control Panel* tab, and click *Roles*.

7. Add the Set Up Account action permission to the D4B8 Business Development Manager role.

8. In the left menu, go to *Control Panel* → *Object* → *D4B8 Distributor Applications*.

## Permission

Resource Permissions > D4B8 Distributor Application: action.setUpAccount

When saved, Liferay adds the Set Up Account action as an option in each object entry's *Actions* menu (⋮), so you can trigger it manually. Now you can try it out!

The screenshot shows a table with columns: ID, Applicant Name, Business Name, Create Date, Application State, Status, and a more options button. A context menu is open over the first row, listing: View, Delete, Permissions, and Set Up Account. The 'Set Up Account' option is highlighted with a yellow box.

ID ↑↓	Applicant Name ↑↓	Business Name ↑↓	Create Date ↑↓	Application State ↑↓	Status ↑↓	⋮
43454	Boris Bobbins	Oculus Distributors	Jun 5, 2024, 9:43 AM	Approved	APPROVED	⋮

20 Items ⌂ Showing 1 to 1 of 1 entries.

After triggering the action, open the *Global Menu* (grid icon), go to the *Control Panel* tab, and click *Accounts*. If successful, the new account should appear and the Clarity Admin user should be assigned to it as the account manager.

## Exercise 20k: Setting Up Notifications

Currently, Clarity's solution only includes notifications for notifying applicants of changes in their application's status. But they do not have notifications for alerting their business development team of new submissions. Relying on team members to manually check for new submissions does not scale and leaves room for human error, resulting in missed opportunities or poor user experience.

Here you'll add a notification template and set up an object action for triggering it as the Clarity Admin user.

To do this,

1. Open the *Global Menu* (grid icon), go to the *Control Panel* tab, and click *Templates* under Notifications.

The provided solution includes these templates:

- Application Approved
- Application Denied
- Application Received

The screenshot shows a table with columns: Name, Source, Type, and a more options button. Three rows are listed: D4B8 Application Approved, Applicant, Email (Source: CUSTOM, Type: Email); D4B8 Application Denied, Applicant, Email (Source: CUSTOM, Type: Email); and D4B8 Application Received, Applicant, Email (Source: CUSTOM, Type: Email).

Name	Source	Type	⋮
D4B8 Application Approved, Applicant, Email	CUSTOM	Email	⋮
D4B8 Application Denied, Applicant, Email	CUSTOM	Email	⋮
D4B8 Application Received, Applicant, Email	CUSTOM	Email	⋮

20 Items ⌂ Showing 1 to 3 of 3 entries.

2. Click *Add* and select *User Notification*.

Here you can begin designing the template.

**Tip:** You can access object field references to populate notifications dynamically with data for the entry or user who triggers the notification action. To view available variables, scroll down to Definition of Terms and select *D4B8 Distributor Application* object in the dropdown menu.

3. Enter these values for Basic Info:

Field	Value
Name	D4B8 Application Submitted, Admin, User
Description	Sends user notifications to an administrative role whenever a distributor application is submitted.

4. Enter these values for Settings:

Field	Value
Recipients	Role
Role	D4B8 Business Development Manager

5. Enter this value for Content:

Field	Value
Subject	APP - [%D4B8DISTRIBUTORAPPLICATION_ID%] : [%D4B8DISTRIBUTORAPPLICATION_APPLICANTNAME%] submitted a distributor application for [%D4B8DISTRIBUTORAPPLICATION_BUSINESSNAME%].

6. Click *Save*.

Now you can add a notification action to the Distributor Applications object that uses this template.

7. Open the *Global Menu* (grid icon), go to the *Control Panel* tab, and click *Objects*.

8. Select *D4B8 Distributor Application* and go to the *Actions* tab.

The provided solution includes three notification actions:

- Application Received
- Application Approved
- Application Denied

Details	Fields	Relationships	Layouts	Actions	Views	Validations	State Manager
Search <span style="float: right;">🔍 +</span>							
Label ↑↓	Description	Active	Source	Last Execution			⋮
<b>Application Approved</b>	On after update, send notifications to applicants when state is approved.	Yes	CUSTOM	SUCCESS			⋮
<b>Application Denied</b>	On after update, send notifications to applicants when state is denied.	Yes	CUSTOM	NEVER RAN			⋮
<b>Application Received</b>	On after add, send notifications to applicants.	Yes	CUSTOM	SUCCESS			⋮
<b>Set Up Account</b>	Standalone, create a business account for an approved application.	Yes	CUSTOM	SUCCESS			⋮

20 Items ⚡ Showing 1 to 4 of 4 entries. ◀ 1 ▶

9. Click *Add* to create a new object action.

10. Enter these values in the Basic Info tab:

Field	Value
Action Label	Application Submitted
Action Name	applicationSubmitted
Description	On After Add, send notifications to administrative users.
Active	True

**Basic Info**

Action Label \*  en\_US

Action Name \*

Description

Active

11. Go to the *Action Builder* tab and set these values:

Field	Value
Trigger	On After Add
Condition	N/A

Field	Value
Action	Notification
Notification Template	D4B8 Application Submitted, Admin, User

**Trigger**

When    On After Add

**Condition**

Enable Condition

**Action**

Then    Notification    Application Submitted, Admin, User

12. Click *Save*.

Now whenever users submit an application, employees with the Business Development Manager role are automatically notified. To test the notification, create another application entry and impersonate Harper Roberts. You should see a platform notification.



## Exercise 21a: Tailoring Experiences by User Group and Role

Segmentation involves grouping website visitors and users into categories based on shared characteristics or behaviors. Segmenting your audience allows you to tailor the website experience, delivering more relevant content and ultimately boosting engagement.

Here, you'll create a segment specifically for Distributor users as the Clarity Admin user.

To do this,

1. Sign in as the Clarity Admin user.

- Email: [admin@clarityvisionsolutions.com](mailto:admin@clarityvisionsolutions.com)
- Password: [learn](#)

2. Add a new user with the following attributes.

Field	Value
-------	-------

Field	Value
Screen Name	terrencewheatley
Email Address	terrence.wheatley@distributor.com
Job Title	Distributor
First Name	Terrence
Last Name	Wheatley
Password	learn

3. Create a new user group called *Distributors*.
4. Add Terrence Wheatley to the group.
5. Create a new regular role called *Distributor*.
6. Assign the role of Distributor to the Distributors User Group.
7. Open the *Site Menu* (grid icon), expand *People*, and select *Segments*.
8. Click *New* to create a segment.
9. For title, enter **Distributors**.
10. From the Properties menu, use the User section and drag the *Regular Role* into the main part of the screen.
11. Leave the condition as **equals** and use the Select button to choose the Distributor role.
12. From the Properties menu, use the User section and drag the *User Group* into the main part of the screen.
13. Leave the condition as **equals** and use the Select button to choose the Distributors user group.
14. Change the conjunction to **Or**.

We cover both scenarios here: users in the user group and those with the directly assigned Distributor role.

**Conditions**      Conditions Match 1 Member      View Members

**USER WITH PROPERTY**

Regular Role equals Distributor      User Group equals Distributors

Or

15. Click *View Members* to validate Terrence Wheatley meets the segment condition.
  16. Click *Save*.
  17. Go to the home page and click *Edit* (edit icon).
  18. Click the *Experience* drop down at the top of the page and choose *New Experience*.
  19. For the Experience Name enter *Distributor*.
  20. For the Audience, choose the *Distributors* option.
  21. Click *Save*.
  22. Use the up arrow on the Distributor row to position the segment above the Default item so that the Distributor entry shows first.
- Note:** The experience order determines their priority. Internally, Liferay checks the segments a user belongs to and uses the match with the highest priority.
- Once the Distributor role is re-positioned, the label on the record should now read Active.
23. Modify the title text in the Banner to say **Welcome Back! Elevate Your Inventory with Premium Eyewear**.
  24. Hide the **Distributor Promo** container, since distributors don't need to apply.
  25. Click *Publish*.

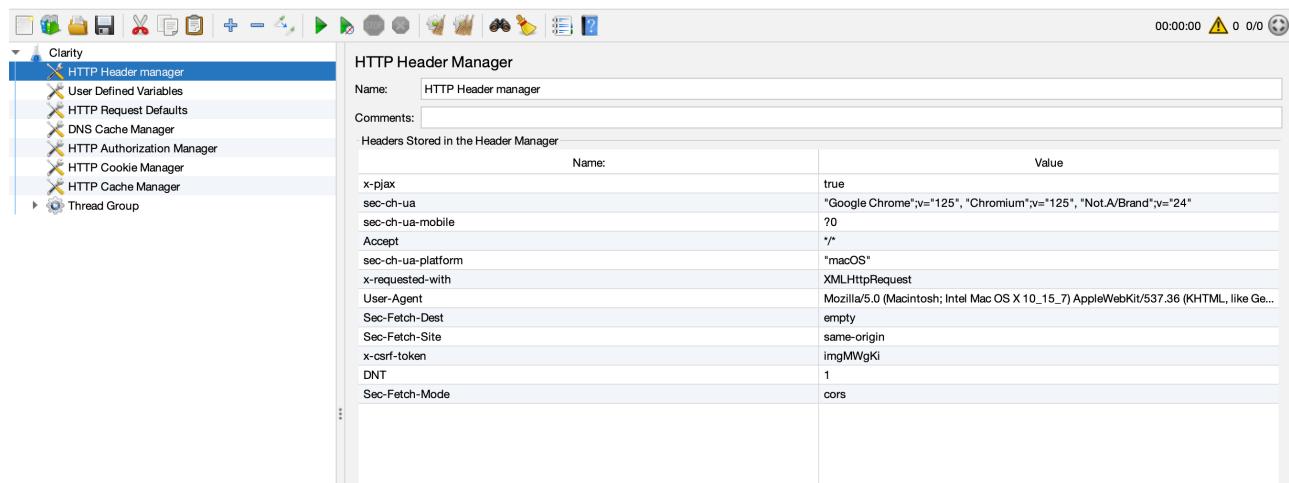
26. You can test the different experiences using the Simulation (🌐) menu.
27. Choose to Preview By Segments. Then, use the Segment dropdown menu to toggle between **Anyone** and **Distributor** and view the corresponding changes in the main window.
28. Impersonate Terrence Wheatley to see the changes.

## Exercise 22a: Using JMeter to Run Load Tests

JMeter is an open-source, performance and load testing tool. Here you'll use it to check the performance of Clarity's site.

To do this,

1. Open JMeter on your machine. (For installation, see the [Enablement Bootcamp Prerequisite](#).)
2. From the *File* menu, click *Open*.
3. From the downloaded course bundle, navigate to the **[repository-folder]/exercises/lesson-22/** folder and select the **Clarity.jmx** file.



4. From the *Run* menu, click *Start*.

The test will take a few minutes to run depending on your setup. The clock in the upper right corner displays the time while the test is running. Once the time stops, the test is complete.

5. In the left menu, click *Thread Group* to expand the section and click *Summary Report*.
6. Review the report to find any performance outliers.

Label	# Samples	Average	Min	Max	Std. Dev.	Error %	Throughput	Received KB/sec	Sent KB/sec	Avg. Bytes
home request	1000									
Start	1000									
contact-us requ...	1000									
about-us	1000									
about-us request	1000									
products	1000									
products request	1000									
blog	1000									
blog request	1000									
careers	1000									
careers request	1000									
back-home	1000									
back-home req...	1000									
back-home	1000									
<b>TOTAL</b>	<b>14000</b>									

## RESULTS

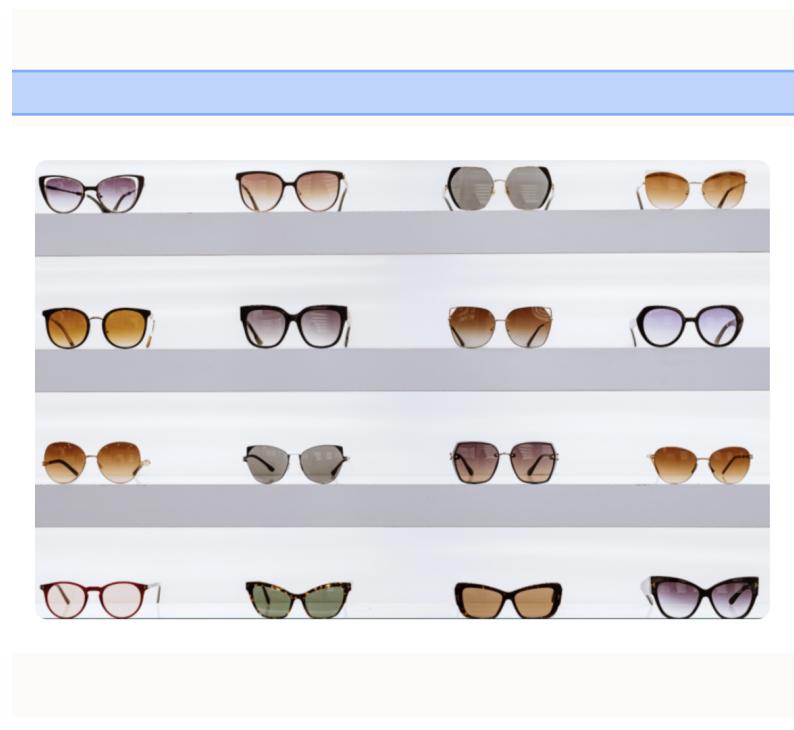
7. In the left menu, click *Response Time Graph*. Under the *Settings* tab, click *Display Graph*. This graph can also be used to identify any performance outliers.

## Exercise 22b: Auditing Page Performance

While logged in as the Clarity Admin user, use the Page Audit Tool to investigate the problem page.

1. Back in Liferay, open the *Global Menu* (grid icon), go to the *Control Panel* tab, and click *Instance Settings*.
2. Click *Feature Flags* and go to the *Beta* tab.
3. Enable **Render Times in Page Audit (LPS-187284)**.
- Tip:** Use the search bar to quickly find the feature flag.
4. Return to Clarity's enterprise website.
5. Go to problem page to investigate the performance issue.
6. Click the *Page Audit Tool* button (magnifying glass icon) just left of the Global Menu.

The Page Audit side panel displays a list of all page fragments sorted by the load time from longest to shortest.



Page Audit X

Performance PageSpeed Insights

Beta i

Search...  ≡ ↓

# RESULTS

7. In the Performance tab, identify the fragments with the longest load time.

Next, you'll examine this fragment and fix it.

## Exercise 22c: Fixing the Performance Issue

Here you'll edit the slow fragment to fix the performance issue as the Clarity Admin user.

To do this,

1. In Liferay, open the *Site Menu* (grid icon), expand *Design*, and click *Fragments*.
2. Under Fragment Sets, click *Clarity Components*.
3. Begin editing the problem fragment you identified in the previous exercise.
4. In the HTML window, delete the `[#assign x = sleeper.sleep(3) /]` line.

The screenshot shows the Liferay Page Audit Tool interface. It has three tabs at the top: 'Code', 'Configuration', and 'Publish'. The 'Code' tab is active, displaying three sections: 'HTML', 'CSS', and 'JavaScript'. The 'HTML' section contains a snippet of Liferay JSP code. The 'CSS' section contains a snippet of CSS. The 'JavaScript' section contains a snippet of JavaScript. To the right of the code tabs is a preview area showing a heading with the text 'Heading Title' underlined. Below the preview are several small icons.

5. Click *Publish*.

6. Click *Actions* (  ) for the fragment and select *View Usages*.

7. Check all usages and click *Propagate*.

This applies your changes to all instances of the fragment currently being used in Clarity's site.

With the problem fragment fixed, you can retest the Clarity site.

## Exercise 22d: Reassessing Performance with JMeter

Run another performance test with JMeter to verify the fix.

1. Back in JMeter, from the *Run* menu, click *Clear All*.
2. From the *Run* menu, click *Start* to run the load test again.
3. When finished, review the Summary Report and the Response Time Graph again. Notice that the page that previously had a performance issue no longer has a problem.

The screenshot shows the JMeter interface. On the left is the 'Test Plan' tree, which includes a 'Clarity' folder containing various HTTP and Thread Group elements. The 'Thread Group' node is expanded. On the right is the 'Summary Report' table. The table has columns for 'Label', '# Samples', 'Average', 'Min', 'Max', 'Std. Dev.', 'Error %', 'Throughput', 'Received KB/sec', 'Sent KB/sec', and 'Avg. Bytes'. The table data is as follows:

Label	# Samples	Average	Min	Max	Std. Dev.	Error %	Throughput	Received KB/sec	Sent KB/sec	Avg. Bytes
home request	1000									
Start	1000									
contact-us request	1000									
contact-us	1000									
about-us request	1000									
about-us	1000									
products request	1000									
products	1000									
blog request	1000									
blog	1000									
careers request	1000									
careers	1000									
back-home request	1000									
back-home	1000									
<b>TOTAL</b>	<b>14000</b>									

**RESULTS**

While logged in as the Clarity Admin user, check the problem page again with the Page Audit Tool.

1. In Liferay, go to the problem page. Notice that the slow loading fragment issue has been resolved.

Congratulations! You've completed day three of Building Enterprise Websites with Liferay. Next, we'll test what you've learned.