

Liferay Practitioner - Level 01 - Day 03

Building Enterprise Websites with Liferay

Lesson Topics

- | | | |
|--|---|---|
| <input checked="" type="checkbox"/> Case Study | <input checked="" type="checkbox"/> Asset Management | <input checked="" type="checkbox"/> Publications and Workflow |
| <input checked="" type="checkbox"/> Deployment Options and Workspace | <input checked="" type="checkbox"/> Web Content Structures | <input checked="" type="checkbox"/> Search Basics |
| <input checked="" type="checkbox"/> Security and Permissions | <input checked="" type="checkbox"/> Content Display and Mapping | <input checked="" type="checkbox"/> Search++ with Blueprints |
| <input checked="" type="checkbox"/> Site Management | <input checked="" type="checkbox"/> Integrating with AI | <input type="checkbox"/> Building Applications with Objects |
| <input checked="" type="checkbox"/> Analytics Cloud | <input checked="" type="checkbox"/> Classifying Content with Taxonomies | <input type="checkbox"/> Client Extensions |
| <input checked="" type="checkbox"/> Pages and Page Templates | <input checked="" type="checkbox"/> Understanding Collections | <input type="checkbox"/> Segmentation and Experiences |
| <input checked="" type="checkbox"/> Menus and Navigation | <input checked="" type="checkbox"/> Commerce | <input type="checkbox"/> Performance Tuning and Mgmt. |
| <input checked="" type="checkbox"/> Fragments and Design Elements | <input checked="" type="checkbox"/> Headless APIs | <input type="checkbox"/> Certification Exam |

Day 03 | Agenda

30:00 mins	01	Building Applications with Objects
30:00 mins	02	Client Extensions
45:00 mins	03	Segmentation and Experiences
15:00 mins	04	Performance Tuning, Monitoring and Maintenance
50:00 mins	05	Certification Exam
15:00 mins	06	Final Q&A and Wrap up



Lesson 19

Building Applications with Objects



Clarity Business Requirements

- Provide site visitor with ability to get in touch with Clarity Vision Solutions
- Allow submissions to go through a workflow process
- Control who has access to submissions
- Send notifications when feedback is submitted
- Keep historical records of feedback requests
- Be flexible and configurable by business users, without deploying code



Application Development Pain Points



It Takes Time

There is no “Application Fairy” – it takes time to build real solutions



Need Developers

Not just anyone can do it – often requires individuals with special skills



Not Easy

Most solutions are being built to solve complex business problems and end up complex themselves

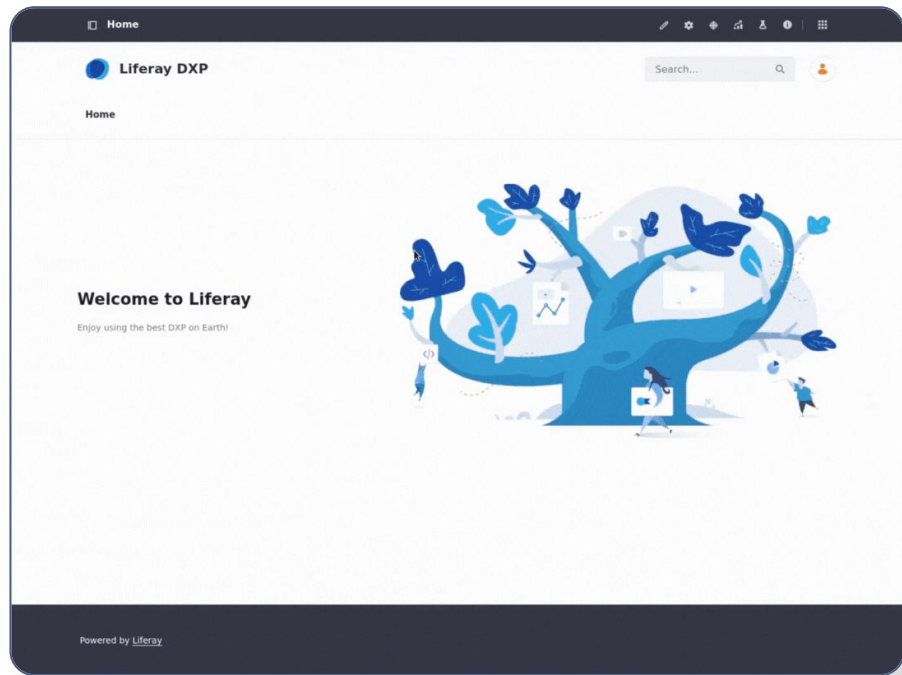
What if you could *leverage out of the box functionalities* of a Platform and even create new functionality without touching or writing a single line of code?



Objects 101

Liferay Objects fuel rapid development of custom applications, reducing costs and boosting agility. Objects simplify data management and accelerate creation of feature-rich solutions tailored to your business needs.

- Build models of the data in your business visually
- Define the attributes representing the different types of data you need/want to represent the model
- Decompose your business definition into discrete models and then define the relationships between them



Benefits of Objects

- **Rapid Application Development (RAD):** Objects enable creating custom business applications without writing extensive code or deploying modules.
- **Increased Business Agility:** Faster application development that allows businesses to adapt to changes quicker.
- **Simplified Data Management:** Provide a centralized way to define, manage, and store your application data.
- **Leverage existing features:** Allows you to leverage existing Liferay features to build robust and secure custom applications.
- **Event Driven Solutions Support:** Object actions allows for communication to external systems to support larger business process flows.



Liferay Framework Support

Built-in framework support lets you leverage them seamlessly within Liferay's functionalities, ensuring a cohesive user experience and faster time-to-value.

- Objects automatically integrates with Liferay frameworks
- Eliminates the need for custom (OSGI) service development to support out-of-the-box frameworks
- Frameworks include: Asset, Search, Audit, Widget, Workflow, Permissions, and more

Basic Info

Unique Composite Key

Fields

Info

A unique composite key validation checks if the combination of two or more fields can be used to uniquely identify a record. If not, the record cannot be created.

Search	
Label	Type
Bar to Foos	Relationship
Integer Field	Integer

Error Message

Message *

The field values are already in use. Please choose unique values.

Output Validation Type ?

☒ Full Validation (Form Summary)

☐ Partial Validation (Inline Field)



Demo: Liferay Objects





Exercises #19a - #19b: Object Driven Contact Us Form





Bonus Challenge

Challenge

Create a Multi-Step Form for collecting feedback from site visitors.

Requirements

- Use your existing Object
- Use Form Fragments
- Use Display Page Templates

Success Criteria

Users will be presented with a multi page form that collects their feedback on each page before finally being submitted.



Lesson 20

Client Extensions



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Some features may not be available in earlier releases.*

33/ Client Extensions 101





Client Extensions

Customizations that live outside
the Liferay portal container



Client Extensions offer a *new paradigm* for customizations for your Liferay solutions.



Client Extensions separate customizations from the [Liferay](#) core
simplifying updates and freeing you to **build solutions using**
your technology(ies) of choice *and* your deployment model
of choice.



Why are Client Extensions Important?

Upgrades

They run outside Liferay so they won't break when you upgrade or update

Self-Contained

One buggy extension can't bring down the entire server

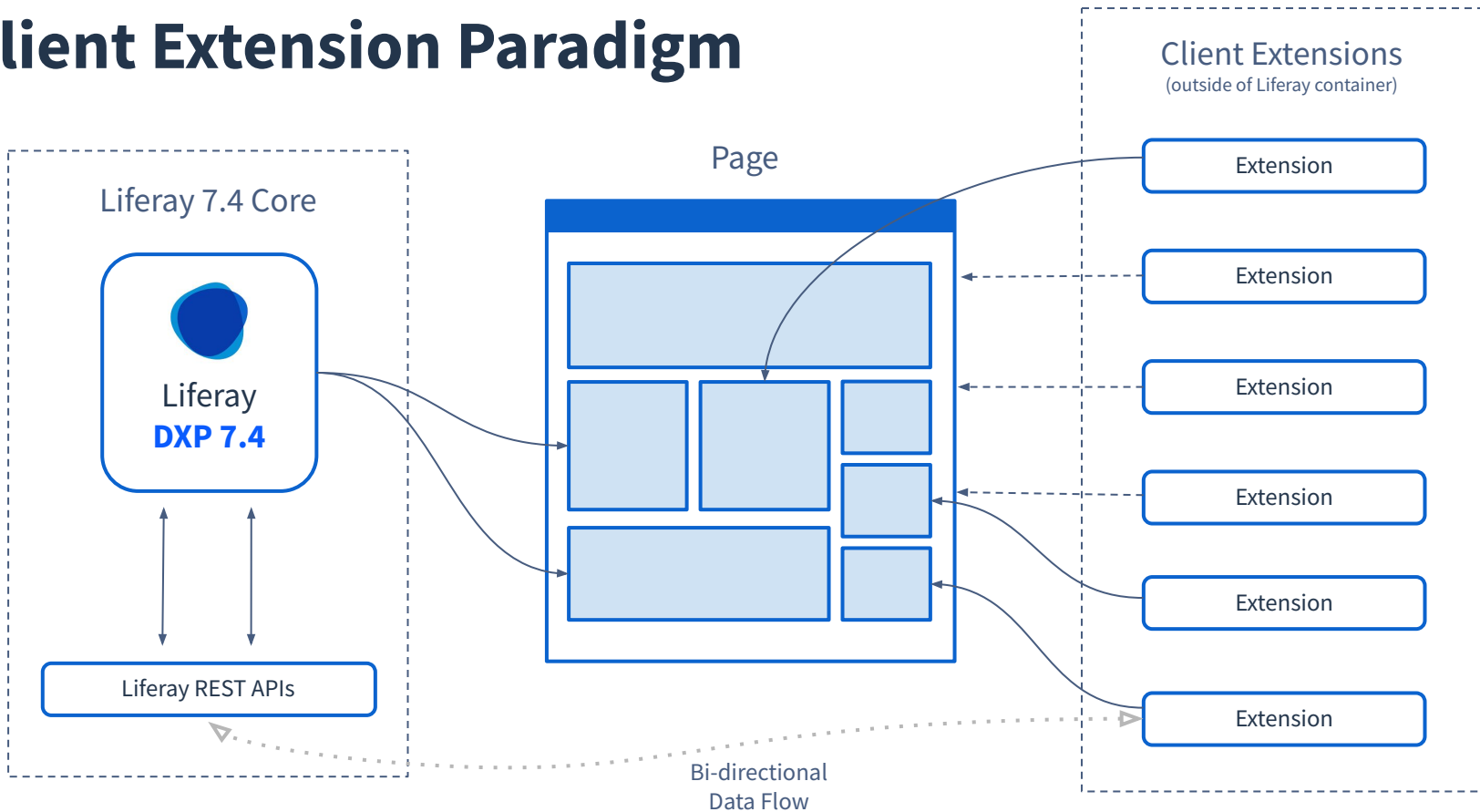
All Deployments

You can use them with SaaS, PaaS and Self-Hosted solutions

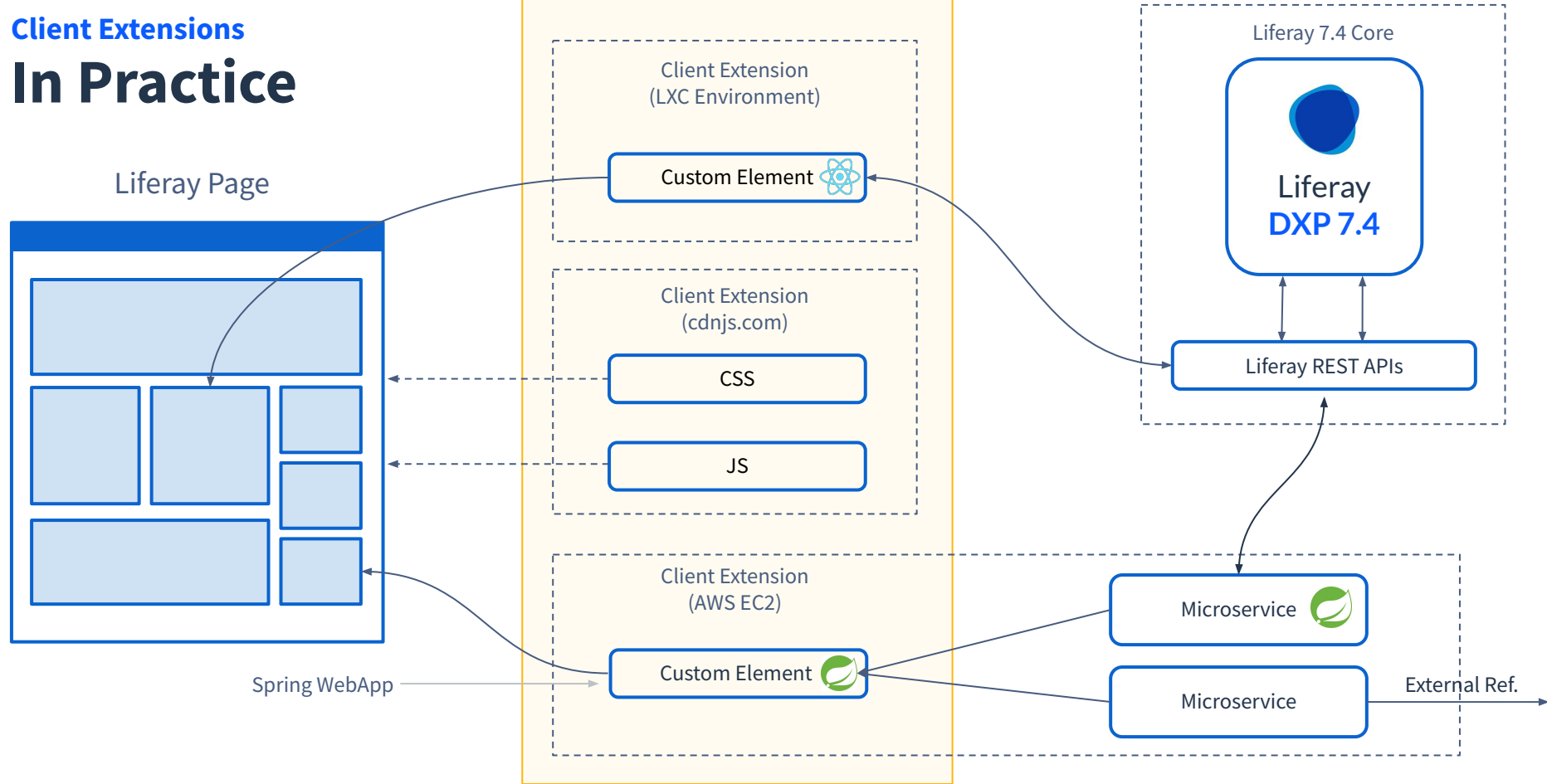
Cheaper

No Liferay specific development skills required - use any language you like

Client Extension Paradigm



Client Extensions In Practice





Liferay
Self Hosted



Liferay
PaaS



Liferay
SaaS

*Where possible, **always choose a Client Extension** over a traditional OSGI Plugin.*



Extensions Types



Front End

(Configurable in Admin as well)



Micro Service



Configuration



Batch

Getting Started

1. Clone latest sample workspace
2. Copy required client-extension sample to your workspace
3. Modify the name and properties to identify your extension
 - e.g. clarity-theme-css
4. Build the client-extension and customize according to your requirements
5. Deploy your client extension (see below)

```
lcp deploy --ext [path-to-zip-file]
```

1. Download and unzip the workspace in a folder of your choice using these commands:

```
curl -O com.liferay.sample.workspace-latest.zip https://repository.liferay.com/nexus/service/local/artifact/maven/resolve?g=com.liferay&a=sample&v=latest&type=zip
```

```
unzip com.liferay.sample.workspace-latest.zip
```

2. After extracting the workspace, go to the `client-extensions/` folder.

```
cd |workspace-root|/client-extensions/
```

3. Run this command to build the client extensions:

```
../gradlew clean build
```

The compiled `.zip` files appear in each project's `dist/` folder.

```
[project-name]
├─ batch
├─ build
├─ dist
├─ |
├─ |─ [project-name].zip
└─ client-extension.yaml
```

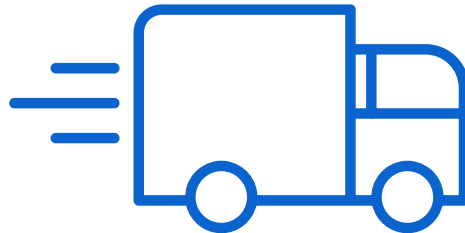

34/ Registering Client Extensions



Client Extensions Deployed

Liferay deployment of client extensions streamlines development by enabling bulk registration and updates, reducing manual effort, improving consistency, and minimizing errors compared to UI registration.

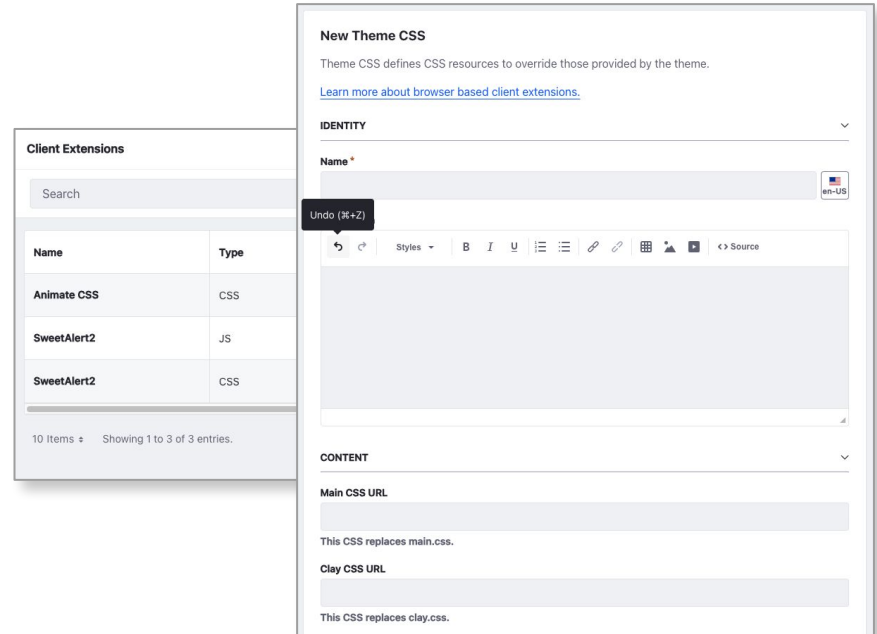
- Starter kits (samples) found in github *liferay-portal*
- Developed in (your) local Liferay Workspace
- Built locally, deployed locally using Liferay Workspace and/or BLADE tooling
- Built locally, deployed remotely using Liferay Cloud CLI
- Supports CI/CD processes and can be used to automate setup and configuration of Liferay Sites



Client Extensions Registered

Manual registration of client extensions offers a granular control for one-off customizations and can be useful for scenarios with shared resources.

- Can be added manually through configuration UI, or via deployment (zip containing metadata in YAML)
- Liferay administrative UI allows you to choose where and which extensions to be applied
- Supports granular approach (application at page level) or something more broad
- Can be used to augment existing resources or replace them (the theme) entirely
- Remember – these can be used in place of traditional Theme plugins



Client Extensions Configured

Avoid the trap of loading everything everywhere by selectively using the resources you need when and where you need them.

- Supported by both Widget Pages and Content Pages
- Accessible from the Page Settings, under the Design section
- Support multiple items meaning you can have more than one external resource listed (no need to manually merge)
- Control the order in which added entries are loaded into the page (when more than one configured)
- JavaScript extensions can be loaded in either the head or bottom of the page

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

No theme CSS client extension was loaded.

+

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

No CSS Client extensions were loaded.

THEME SPRITEMAP CLIENT EXTENSION ▾

Info To add or edit the existing spritemap, simply copy/paste and make changes as needed to your registered extension.

Use this client extension to fully replace the default spritemap contained in the theme.

Theme Spritemap Client Extension

Name

+



Demo: Client Extensions Workspaces Tour





Exercises #20a - #20k: Customizations using Client Extensions



Lesson 21

Segmentation and Experiences



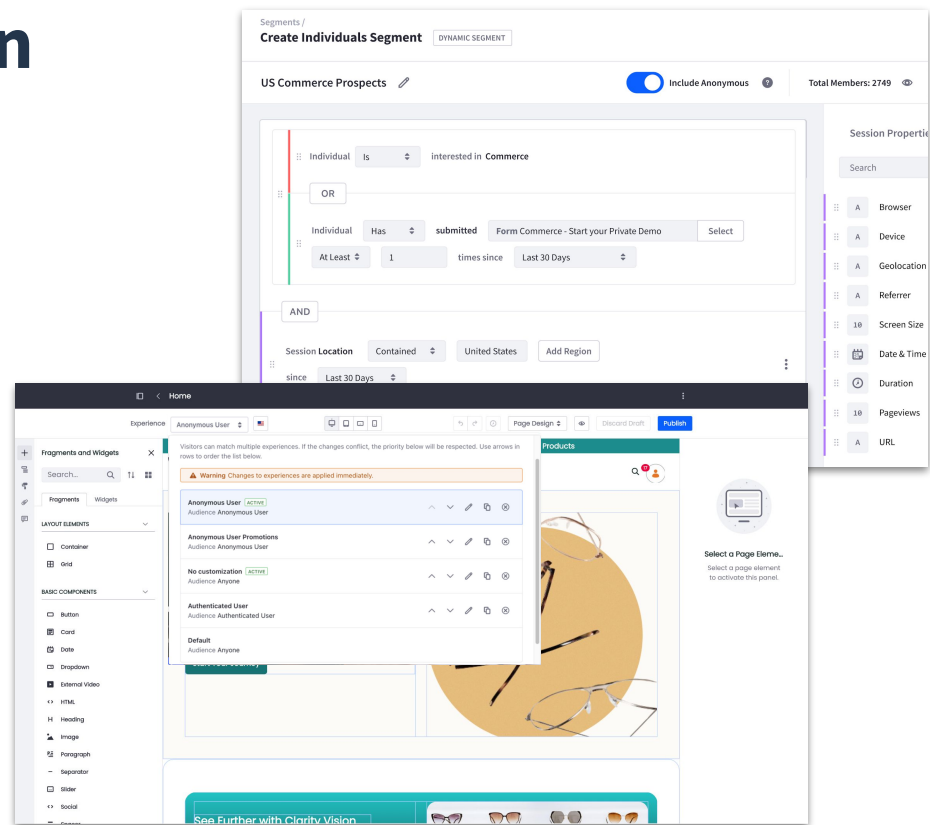
35/ User Segmentation



Personas and Segmentation

Segment users and personalize experiences with data powered by analytics and drawn from real-time interaction and long term behavior.

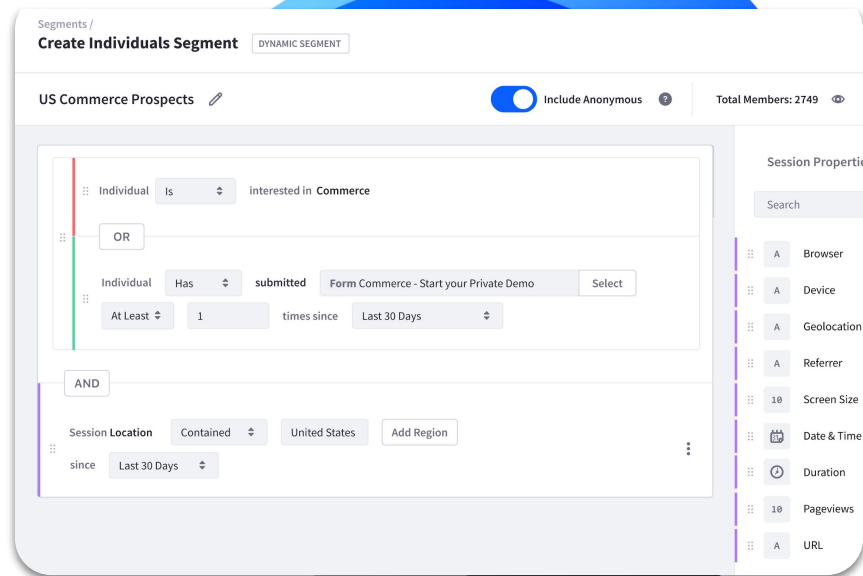
- Segmentation can be performed in DXP on user, organization, session attributes
- Segments are defined in Analytics Cloud and are synced with Liferay DXP
- Any page can be mapped to a segment by creating an Experience
- Experiences allow complete control over changes to fragments, adding/replacing fragments, widgets, etc.



Analytics Capabilities

Use a semantically driven administrative experience to intuitively create and manage target audiences based on common characteristics and behaviors.

- **Segment based on behaviors:** actions taken by a person (e.g., submitted a form, viewed a blog, ...)
- **Segment based on attributes:** user attributes, interests, session attributes, and organization attributes
- **Simple intuitive criteria builder:** criteria are defined with intuitive drag and drop and include productivity tools like *duplicate*, *move*, etc.
- Perform optimization experiments with an OOTB A/B testing.



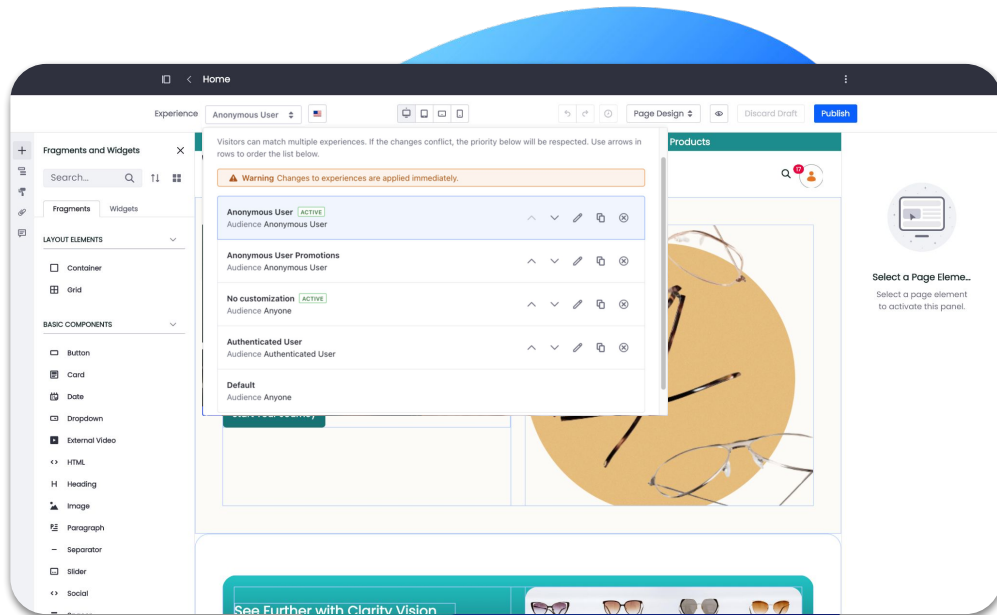
36/ Personalized Experiences



Personalized Experiences

Create new experiences and easily customize any page and content to align with the understood goals for different user segments.

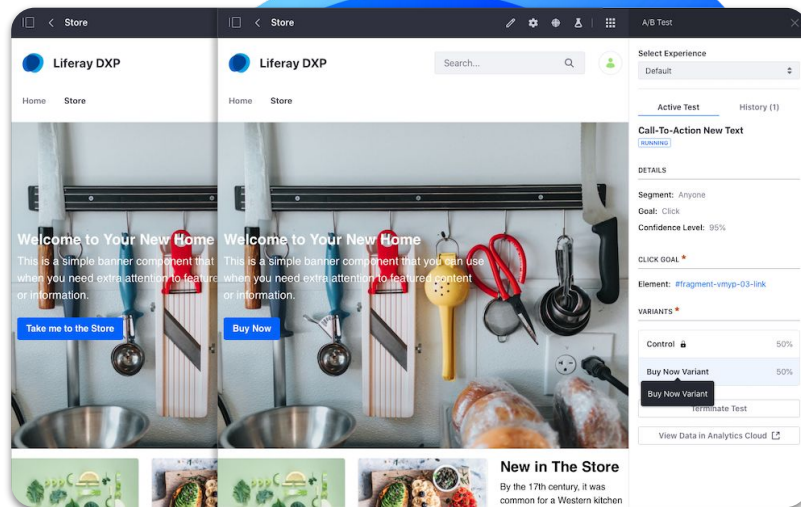
- Supports known and anonymous users
- Based on a range of criteria from the session (browser) to the authenticated user
- Integrates with Analytics Cloud capabilities for advanced segmentation based on historical behavior and interests
- Segmentation by Geolocation, Session, Organization, compound segments, or custom developed criteria



A/B Testing

Make data-driven decisions by comparing different versions of your portal content and features, optimizing user experience and maximizing engagement.

- Allow marketers to create and run tests
- Enable them to determine the optimal option to drive visitor behaviour
- The A/B test automatically synchronizes with Analytics Cloud
- Liferay DXP and Analytics Cloud show your test's status and the results of the variant
- You manage other aspects of your A/B test in Analytics Cloud (test history, statistics, variant performance, etc.)





Demo: Building Segments and Experiences





Exercise #21a: Segmented Data and Experiences



Lesson 22

Performance Tuning, Monitoring and Maintenance



37/ Performance Tuning



Liferay Settings

Liferay has settings to review which can affect performance, so it's important to review what will be used in the production environment and disable those things that will not be needed.

- **Servlet Filters:** Make sure only the filters that you need are enabled. In high traffic solutions these can add up and consume unnecessary resources.
- **Cache:** Liferay has 3 levels of cache. It's important to understand your data and access frequency to tune the caches accordingly.
- **And, and, and...**



Adaptive Media

Adaptive Media in Liferay automatically resizes images for different devices, reducing page load times and performance.

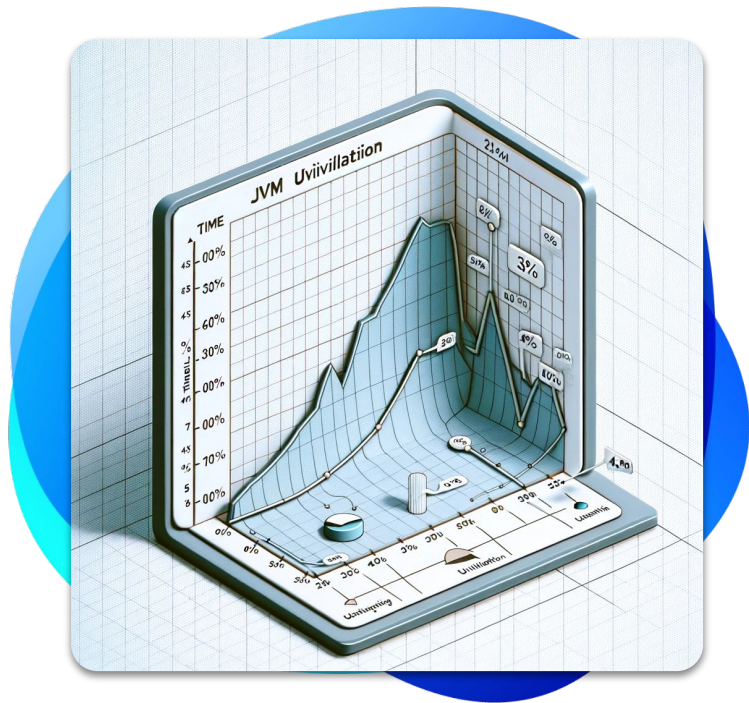
- **Increased Accessibility:** Adaptive Media ensures users on all devices, including desktops, tablets, and smartphones, can easily view content.
- **Reduced Bandwidth Consumption:** Smaller images require less data to download, which is beneficial for users with limited data plans or on slower networks.
- **Reduced Bandwidth Consumption:** Faster loading times are a ranking factor in search engines.
- **Simplified Content Management:** Content creators work with a single image (file) and let Liferay manage the resizing.



JVM Tuning

Optimize Java application performance, leading to reduced infrastructure costs and improved resource utilization. This translates to operational efficiency gains and a competitive advantage through a highly responsive and reliable application.

- **Optimize Resource Allocation:** Based on monitoring data, adjust JVM settings (heap size, thread pools) to ensure efficient resource utilization and prevent bottlenecks.
- **Garbage Collection (GC) Activity:** Monitor GC frequency, duration, and types to optimize GC settings and minimize pauses that can impact application responsiveness.
- **Thread Pools:** Monitor thread creation, utilization, and contention to identify potential deadlocks or inefficient thread usage patterns.



Liferay Deployment Checklist

<https://www.liferay.com/resources/product-info/Liferay+DXP+7.4+Deployment+Checklist>



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Importance of Performance Testing

- **Web Applications Drive Business:** They are the gateways for users to interact with our services and products.
- **Performance Impacts User Experience:** Slow loading times, bugs, and crashes can frustrate users and hurt business.
- **Performance Testing is Proactive:** It ensures applications can handle expected load, respond quickly, and deliver a seamless user experience.
- **Formal Performance Requirements are Key:** Clearly defined, measurable benchmarks to gauge success of testing efforts.

There are 5 key components to ensure a successful outcome



How do we ensure success? (part 1)

Step number **one** is to work with the stakeholders and project managers to make sure that the planning and requirements are well understood and complete.

- **Define Performance Goals:** Clearly outline what you want to achieve with the testing. Is it response times, scalability under load, or resource utilization?
- **Establish Realistic Requirements:** Set measurable performance benchmarks based on user expectations and application traffic patterns.
- **Identify Target Audience and Usage Patterns:** Understand who will be using the application and how they will interact with it. This helps create realistic user scenarios for testing.



How do we ensure success? (part 2)

Step number **two** is to setup an environment for testing that mirrors the intended production use environment. Not testing with a representative environment makes the results irrelevant.

- **Mirror Production Environment:** Configure the testing environment to closely resemble the actual production setup (hardware, software, network).
- **Utilize Performance Testing Tools:** Leverage tools like JMeter or LoadRunner to simulate user load and capture performance metrics.
- **Prepare Test Data:** Populate the testing environment with realistic test data that reflects production volumes and types.



How do we ensure success? (part 3)

Step number **three** is to make sure that the test design and execution is robust enough that it accounts for more than just the intended usage. Consider outlier conditions or edge cases.

- **Create Diverse Test Scenarios:** Develop test cases that cover various user actions, functionalities, and load conditions (low, medium, peak).
- **Focus on Critical User Journeys:** Prioritize testing core functionalities and user flows that are crucial for user experience and business goals.
- **Monitor Performance Metrics:** Track key metrics like response times, throughput, error rates, and resource utilization to identify problem areas and bottlenecks.



How do we ensure success? (part 4)

Step number **four** is to do a thorough analysis of the results that were collected, fine tune the test data/criteria and then repeat step number three.

- **Analyze Test Results:** Carefully evaluate the collected performance data to identify areas where the application falls short of requirements.
- **Identify Root Causes:** Don't just focus on symptoms; dig deeper to understand the underlying reasons behind performance issues.
- **Communicate Findings Clearly:** Document test results, identified issues, and recommendations for improvement in a clear and concise manner. Share this information with developers and stakeholders for informed decision-making.



How do we ensure success? (part 5)

Step number **five** is to repeat this process multiple times in a continuous or scheduled fashion so that as the application changes over time performance is maintained.

- **Performance Testing is an Ongoing Process:** Integrate performance testing into your development lifecycle. Re-test after code changes or infrastructure upgrades to ensure performance remains optimal.
- **Performance Testing is Not a One-Time Fix:** Continuously monitor real-world application performance after deployment.



That's a lot. We can do all that, **OR ...**





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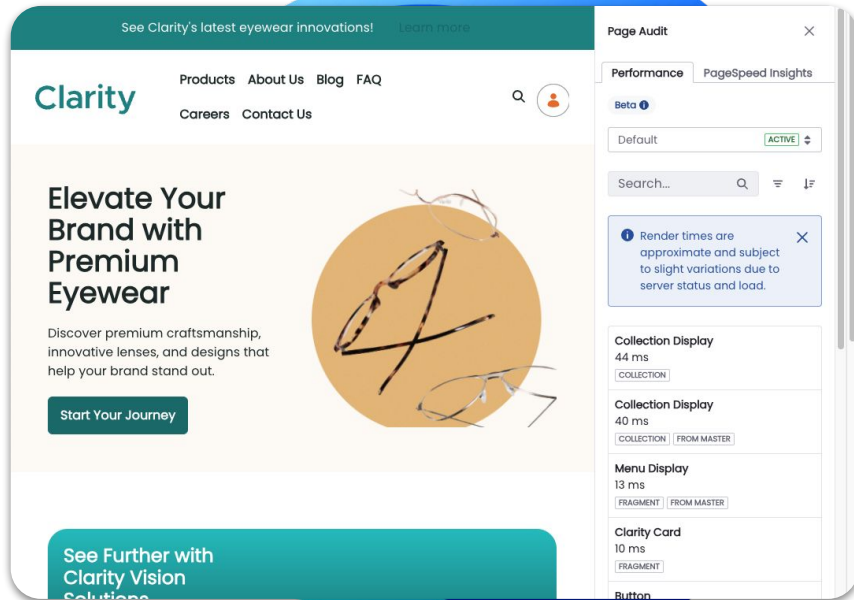
38/ Monitoring



Page Auditing

Liferay Page Auditing allows admins to optimize website performance, SEO, and accessibility by identifying issues that can be addressed to improve results and increase user satisfaction.

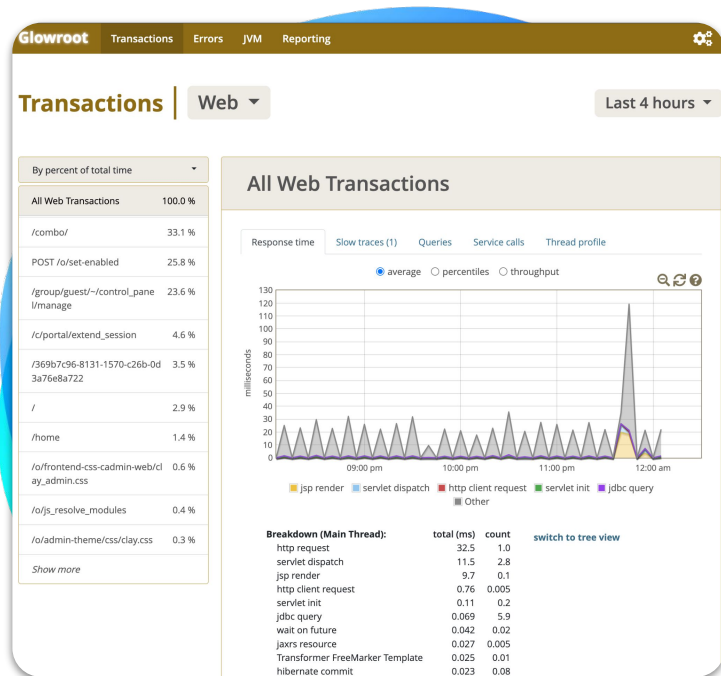
- **Enhanced Website Performance:** Audits can pinpoint issues that slow down page load times, such as large images, inefficient code, or unnecessary resources.
- **Actionable Insights and Recommendations:** Liferay's page audits don't just identify problems; they also offer suggestions and best practices to fix them.
- **Improved Search Engine Optimization (SEO):** Page audits identify areas for improvement in areas like page titles, meta descriptions, and header tags..



Glowroot

Glowroot helps pinpoint performance bottlenecks in Java applications. This translates to faster troubleshooting, reduced downtime, smoother user experience, and improved operational efficiency, saving time and money.

- **Faster Problem Identification:** Provides real-time insights into application performance.
- **Detailed Performance Analysis:** Offers comprehensive performance data, including transaction timings, SQL queries, and database calls.
- **Proactive Performance Management:** By continuously monitoring application performance, Glowroot allows you to identify potential issues before they become critical.



I mean, I suppose we could do all that, OR ...





Liferay SaaS



39/ Troubleshooting



Three Rules for Working with Liferay Support

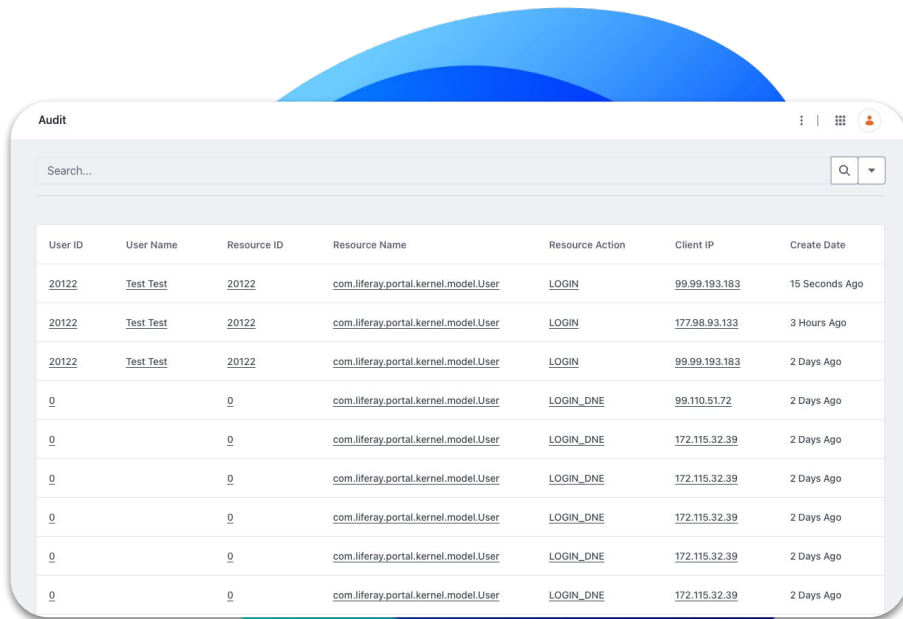
1. **Be proactive:** Open Support tickets *as soon as possible*
2. **Be explicit:** Provide the ticket with as much context and information as possible
3. **Be timely:** Keep your tickets “fresh”. When Support asks for something, provide it as soon as quickly as you can



Auditing Records

Auditing enhances security by providing an audit trail for potential breaches, simplifies regulatory compliance by demonstrating adherence to data access policies, and fosters accountability by tracking user actions.

- **Identifying Responsible Users:** If an issue arises or a change needs to be explained, audit records can pinpoint the user who performed the action.
- **Investigate Security Incidents:** In case of suspicious activity or a potential security breach, audit records provide a timeline of actions taken, helping identify the source and take corrective measures.
- **Simplified Compliance:** Many regulations require organizations to maintain audit trails of user activities related to sensitive data.



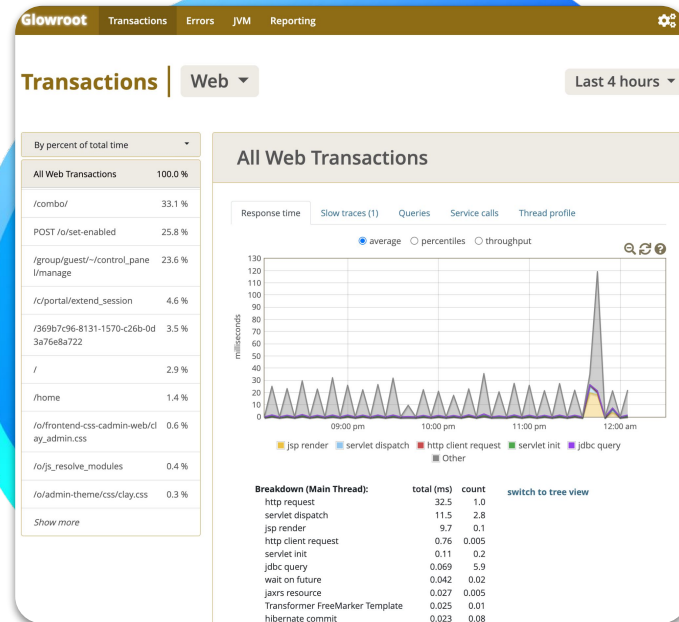
The screenshot displays the Liferay Audit interface. At the top, there is a search bar labeled "Search...". Below it is a table with the following columns: User ID, User Name, Resource ID, Resource Name, Resource Action, Client IP, and Create Date. The table contains several rows of audit records, including successful logins and failed login attempts (LOGIN_DNE).

User ID	User Name	Resource ID	Resource Name	Resource Action	Client IP	Create Date
20122	Test Test	20122	com.liferay.portal.kernel.model.User	LOGIN	99.99.193.183	15 Seconds Ago
20122	Test Test	20122	com.liferay.portal.kernel.model.User	LOGIN	177.98.93.133	3 Hours Ago
20122	Test Test	20122	com.liferay.portal.kernel.model.User	LOGIN	99.99.193.183	2 Days Ago
0		0	com.liferay.portal.kernel.model.User	LOGIN_DNE	99.110.51.72	2 Days Ago
0		0	com.liferay.portal.kernel.model.User	LOGIN_DNE	172.115.32.39	2 Days Ago
0		0	com.liferay.portal.kernel.model.User	LOGIN_DNE	172.115.32.39	2 Days Ago
0		0	com.liferay.portal.kernel.model.User	LOGIN_DNE	172.115.32.39	2 Days Ago
0		0	com.liferay.portal.kernel.model.User	LOGIN_DNE	172.115.32.39	2 Days Ago
0		0	com.liferay.portal.kernel.model.User	LOGIN_DNE	172.115.32.39	2 Days Ago

APM Tools

APM tools allow you to proactively monitor application performance, identify and troubleshoot issues before they impact users.

- Glowroot
- Elastic APM (built on top of ELK Stack)
- Dynatrace (Liferay PaaS)
- AppDynamics
- Datadog
- New Relic



OR ...





Liferay SaaS



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40/ Upgrades



Upgrades

Best Practices and Guidance

- Avoid upgrades in the middle of a project implementation when possible.
- Upgrades should be treated as a development project: Plans, lower lanes, testing, promotion, practice...
- Test, Test, Test and, when you think you're done, Test again.
- SaaS applies the upgrade for you, you're responsible for testing and problem resolution. Pre-Prod recommended.
- Upgrade regularly to spread the upgrade cost and effort over a longer period.
- Embrace CX and OOTB features to reduce costs and effort.





Demo: Auditing Tools





Exercises #22a - #22d: Testing & Tuning





DEV/CON

NOVEMBER 11 - 14, 2024

BUDAPEST, HUNGARY

Discount Code: LR1114_Bootcamp



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IT'S TIME FOR THE ...

Certification Exam!



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Answers

Questions?



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Thank You!

What's Next?



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