



# Jmix Framework Training

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<sup>1</sup> Topics in italics are free for self-study. The cost is indicated for training with a tutor.



# Introduction to Jmix

Duration: 2 hours

This course is designed to familiarize you with the Jmix framework, its main features, and the Jmix Studio development environment.

## Course program:

- What is Jmix. The purpose and architecture of the framework
- Application data model. Creating a data model in Jmix Studio
- Database versioning. Database versioning scripts creation
- Administrative user interface. Generating screens for working with data
- Security basics. Jmix role types. User creation
- Working with data. Using DataManager
- Business logic creation. Using Business Logic in the administrative user interface
- FatJar. Application deployment

# Jmix security basics

Duration: 1 hour

This course is designed to study the main elements of the Jmix security subsystem, and the rules of building a role model providing access to the data and functionality.

## Course program:

- Structure of the Jmix security subsystem
- The "User" entity. Purpose and usage
- Obtaining information about current user
- Resource roles. Defining resource roles in code, using in the application
- Row-level roles. Defining in code, using in the application
- Jmix built-in roles
- Roles combining. Roles structuring in the project



# Jmix Applications deployment basics

Duration: 1 hour

This course covers the basic ways to deploy Jmix applications.

Course program:

- Deployment format: WAR and JAR
- Creation of an executable file
- Execution profiles. Configuration options specific for a deployment environment
- Deployment format guidelines





# Working with files in Jmix

Duration: 1 hour

This course covers the API and ways to work with files in Jmix.

Course program:

- Storing files in the application - approaches and Jmix implementation
- The byte[] field in an entity
- The FileStorage service - architecture and usage
- Working with files in the administrative user interface. FileUploadField, FileStorageUploadField, and Image components



The course details the architecture and services of the Jmix data access layer.

## Course program:

- Entity types in Jmix
- Jmix framework annotations for entities
- Data store. Supported databases
- Multiple data stores. Referencing entities from different data stores
- Traits: Versioned, Audit, HasUUID, SoftDelete
- Key-value entities
- Entity states
- Database versioning. Liquibase Tool
- Non-standard data types (JPA converters)
- Entity Manager service. Usage and transaction management
- Entity graph for data fetch
- DataManager and EntityManager services. Similarities and differences
- Data Security and DataManager
- Data and Query Cache. Cache customization
- JPA callbacks
- Entity lifecycle events
- Optimistic and pessimistic locks

## Additional Topics:

- Data change audit
- Dynamic attributes

# Access control subsystem

Duration: 8 hours

This course examines in detail the architecture and functionality of the security and access control subsystem of the Jmix framework.

## Course program:

- Roles - advanced topics
  - Scopes
  - Specific policies
- Data access restrictions
  - Application of restrictions
  - Overriding data access checks in business logic
- Anonymous access to the application UI
- Programmatic user management
  - Data model of users and roles
  - User creation
  - Role assignment
  - Implementing a scenario of user registration and activation
- Additional security features
  - System authentication
  - Authentication events
  - User substitution
- Accessing users in Jmix add-ons. UserDetails, UserRepository, UserManager
- External authentication services
  - Integration with LDAP and Active Directory
  - Integration with KeyCloak SSO
  - Login and registration via social networks (Google and GitHub)



# Jmix applications deployment

Duration: 4 hours

This course covers various ways to deploy Jmix applications.

## Course program:

- Preparing the application for deployment
  - Deployment checklist
- Execution profiles
- Types of artifacts for deployment
  - Fat Jar
  - War
  - Docker image
- Application runtime overview
  - Dedicated server
  - Container
- Application deployment options
- Ensuring fault tolerance
  - Application clustering
  - Database replication
- Application monitoring and diagnostics tools

# Developing user interface for Jmix applications

Duration: 14 hours

This course focuses on developing an administrative user interface: from placing elements on views to creating custom visual components.

## Course program:

- Views in Jmix
- Opening Views – ViewsNavigation and DialogWindows APIs
- Routing and Navigation
- Notifications and Dialogs
- Background tasks
- Facets – non-visual view components
- Views extensions and working with view template
- Event Bus – global events in Jmix
- Lazy loading in views
- Styling
- Layout rules
- Creating Custom Action class
- Creating UI components

## Optional section:

- Creating views programmatically

# Creating reports

Duration: 4 hours

This course discusses the capabilities of the Jmix framework report generator.

## Course program:

- Jmix report generator overview
  - YARG
  - Templates
  - Fetch data
- Report Wizard
- Creating a simple report
  - XLS format
  - DOC format
- Using Groovy to fetch data
- Displaying graphic files in a report
- Generating a Master-detail report
- Creating a matrix report
- APIs for working with reports
  - Standard Actions
  - Services

# Using the Jmix Business Process Execution engine

Duration: 12 hours

This course covers the Flowable Business Process Execution module and the capabilities of Jmix to create, run, and execute processes using this engine.

## Course program:

- Jmix BPM component overview
- Creating and executing a simple business process
- Integration of the administrative user interface with BPM
- Using Jmix software components as part of business processes
- Asynchronous task execution
- Parallel task execution
- Handling business process execution errors
- Role-based access and security
- Jmix execution event handlers
- Programming interfaces for working with business processes

# Full-text search

Duration: 2 hours

This course covers the Full-text search module: connecting, configuring, and using in Jmix applications.

## Course program:

- Full-text search system architecture
  - Elastic search
  - The concept of a "document"
  - Indexes
- Integration with Jmix
  - Configuring an application
  - Starting indexing processes
  - Indexing data in a database
  - Indexing uploaded files
- Scaling the full-text search engine

# Maps add-on

Duration: 2 hours

This course covers the module for working with maps: programming interfaces, layers, and maps in the administrative user interface.

## Course program:

- General information about add-on
- Component elements
- Raster layers and their sources
- Working with data
- Feature styling
- Cluster
- Heatmap
- Map interactivity
- Map projection
- Real-time data update

# Charts add-on

Duration: 4 hours

This course covers the module for displaying diagrams in the administrative user interface of Jmix applications.

## Course program:

- Types of charts used in the module
- Data binding
  - Data containers
  - Programming interfaces
- Event Handling
- Incremental refresh for datasets

# Emailing functionality

Duration: 2 hours

This course covers the possibilities of working with email in Jmix applications.

## Course program:

- Features of the module for sending emails
- Customization
- Creating messages
  - Creating simple messages
  - Using templates
  - Creating attachments
- Administrative interface
- Program interface of the module



# Multi-tenant applications

Duration: 1 hours

This course covers the possibilities of creating multi-tenant Jmix applications.

## Course program:

- Definition of multitenancy. Approaches to building multitenant applications
- Implementation in Jmix
- Data model design features
  - Shared data
  - Client data
- Administration of multitenant applications
  - User creation
  - Local administration
  - Authorization from URL
- Multi-tenancy module API



# Testing Jmix applications

Duration: 2 hours

This course covers tools, libraries, and software components designed for testing Jmix applications, and their usage methodology.

## Course program:

- Server-side testing
  - Rules for tests writing
  - JUnit
  - SpringBootTest
- Administrative interface testing
  - Selenide Library
- API testing
- BDD: using the Gauge Library



# Using Jmix Studio efficiently

Duration: 2 hours

This course covers the unique features of Jmix Studio, which allow you to speed up the development and reduce the number of errors in the code.

Course program:

- Code refactoring capabilities
- Code generation (Intentions)
- Inspections
- Jmix Studio configuration



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