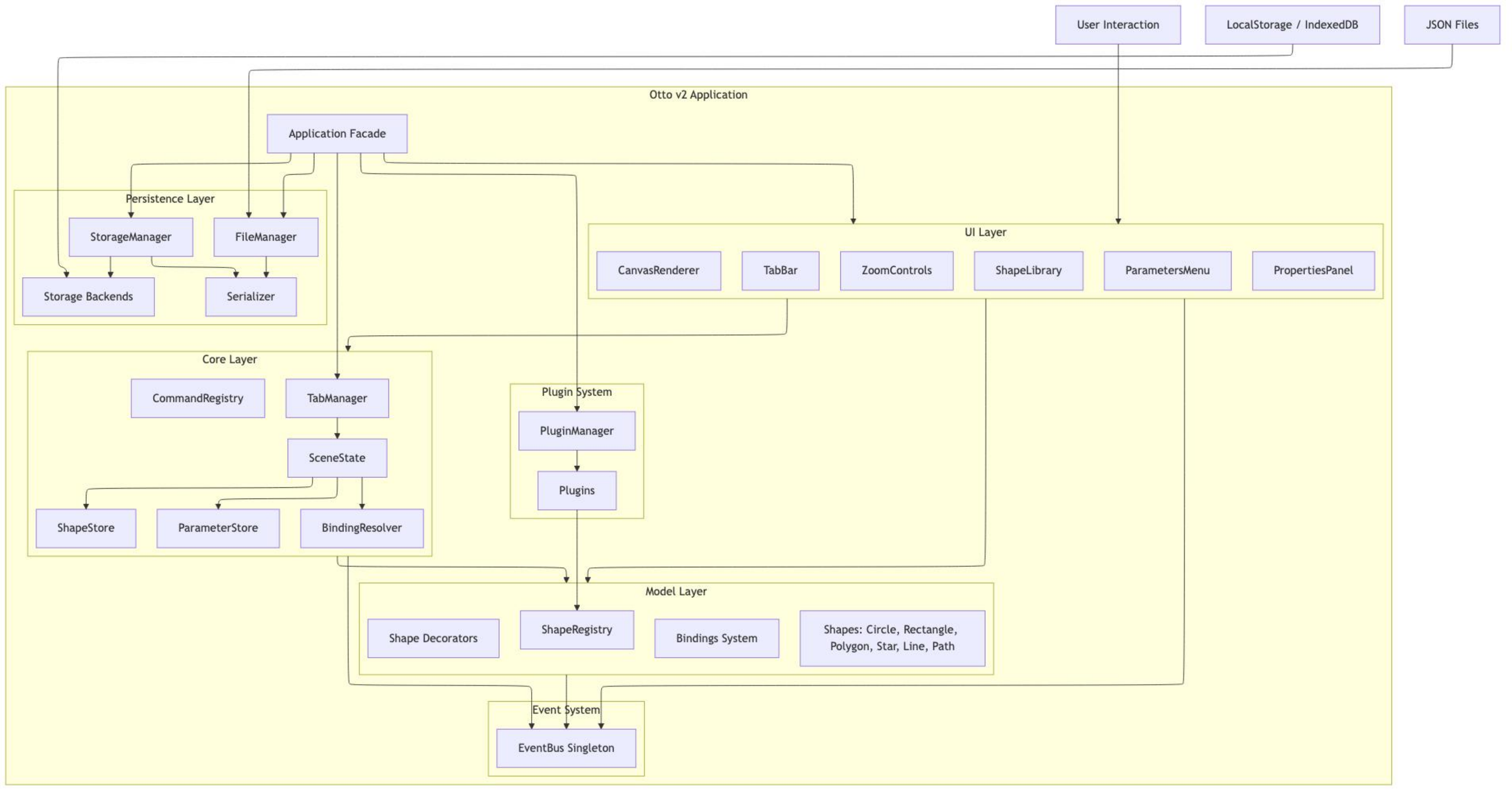

User Interaction
LocalStorage / IndexedDB
JSON Files
Otto v2 Application
Application Facade
Persistence Layer
StorageManager
FileManager
Storage Backends
Serializer
UI Layer
CanvasRenderer
TabBar
ZoomControls
ShapeLibrary
ParametersMenu
PropertiesPanel
Core Layer
CommandRegistry
TabManager
SceneState
ShapeStore
ParameterStore
BindingResolver
Plugin System
PluginManager
Plugins
Model Layer
Shape Decorators
ShapeRegistry
Bindings System
Shapes: Circle, Rectangle, Polygon, Star, Line, Path
Event System
EventBus Singleton

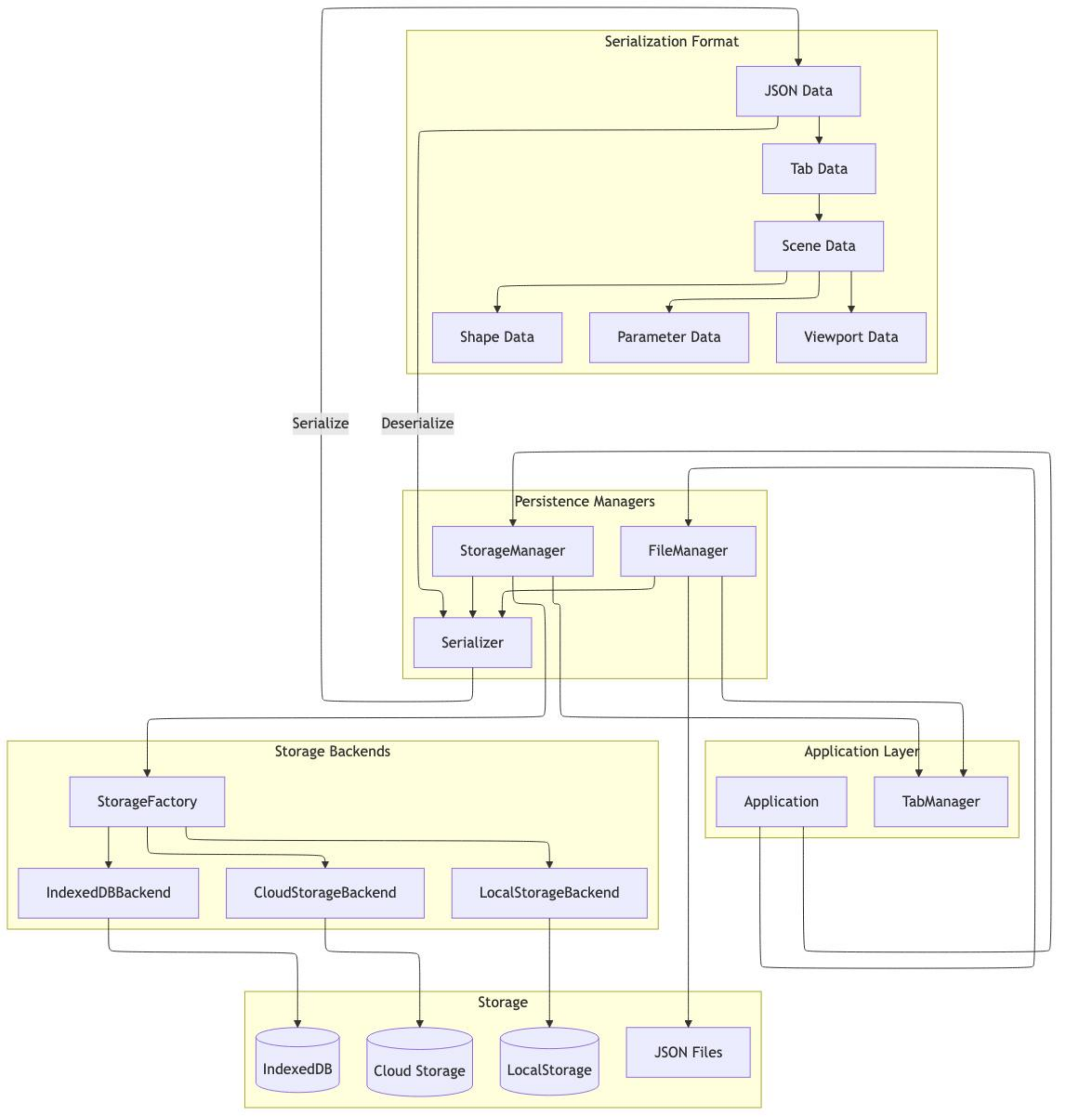
Application
-TabManager tabManager
-StorageManager storageManager
-FileManager fileManager
-SceneHistory sceneHistory
-SceneState currentSceneState
-CanvasRenderer canvasRenderer
-ShapeLibrary shapeLibrary
-ParametersMenu parametersMenu
-PropertiesPanel propertiesPanel
-TabBar tabBar
-ZoomControls zoomControls
-DragDropManager dragDropManager
+init()
+save()
+load()
+undo()
+redo()
+newTab()
+exportFile()
+importFile()
CommandRegistry
-Map registry
-Command[] history
-int historyIndex
+register(name, CommandClass)
+execute(name, args)
+undo()
+redo()
TabManager
-Tab[] tabs
-string activeTabId
-EventBus eventBus
+createTab(name)
+closeTab(id)
+switchTab(id)
+getActiveTab()
+getActiveScene()
+getAllTabs()
StorageManager
FileManager
Tab
+string id
+string name
+SceneState sceneState
SceneState
-ShapeStore shapeStore
-ParameterStore parameterStore
-BindingResolver bindingResolver
-Viewport viewport
+createMemento()
+restoreMemento()
+toJSON()
+fromJSON()
ShapeStore
-Map shapes
-ParameterStore parameterStore
-BindingResolver bindingResolver
-Set selectedShapeIds
-EventBus eventBus
+add(shape)
+remove(id)
+get(id)
+getAll()
+getResolved()
+setSelected(id)
+selectAll()
BindingResolver
-ParameterStore parameterStore
+resolve(shape)
+resolveAll(shapes)
+resolveBinding(binding)
ParameterStore
-Map parameters
-EventBus eventBus
+add(name, value)
+remove(name)
+get(name)
+set(name, value)
+getAll()
+has(name)

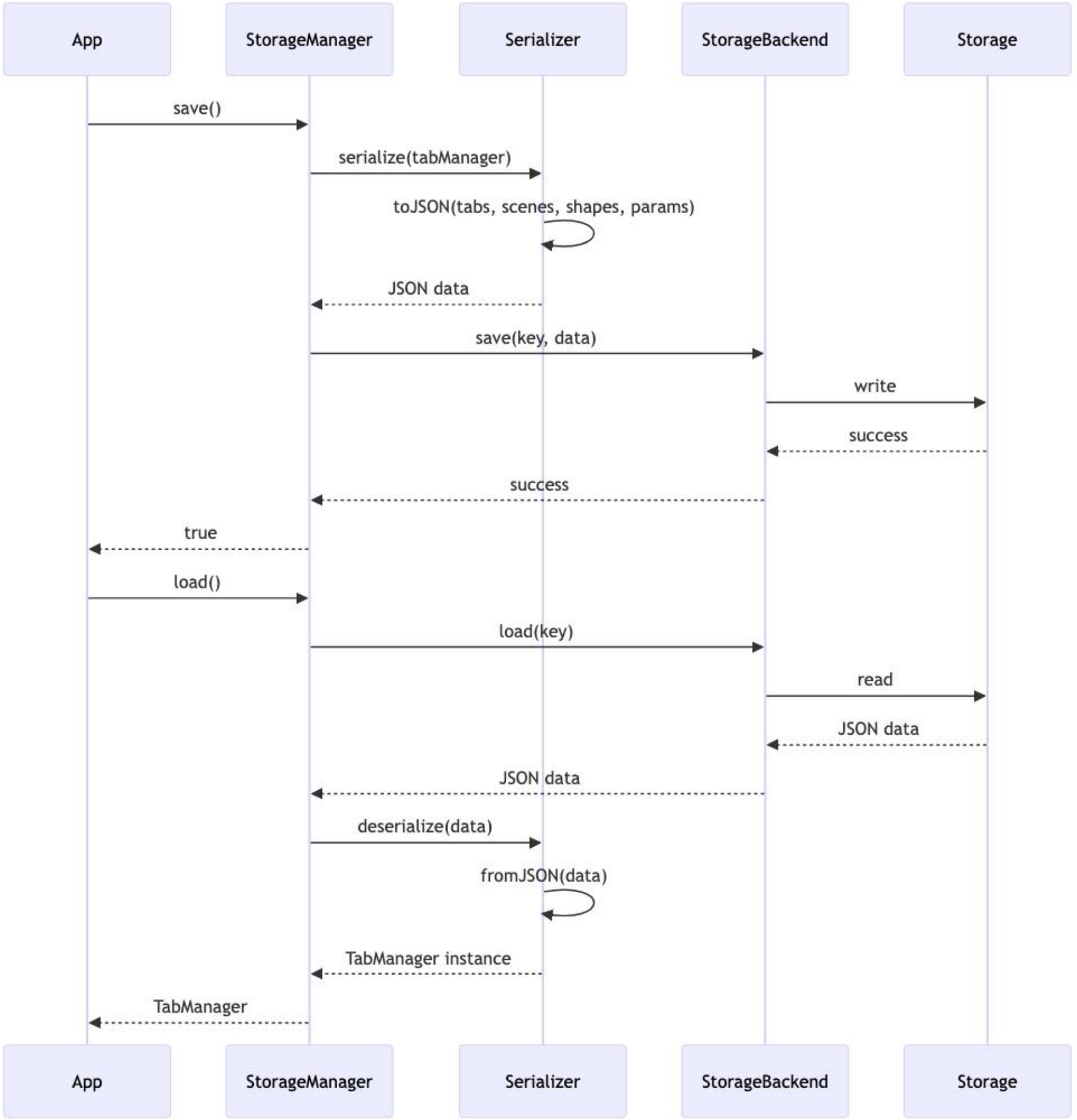
User Action
UI Component
Edit Parameter
Select Shape
Create Shape
Modify Property
DragDropManager
PropertiesPanel
ShapeRegistry
Update Binding
SceneState
Create Instance
Notify
ParametersMenu
Undo/Redo
Shape Object
Persistence Flow
Storage Backend
ShapeStore
Load
Save
JSON
JSON
Restore
Undo/Redo
Set Binding
Storage
Serializer
Restore
Binding Object
Rendering Pipeline
CanvasRenderer
BindingResolver
Notify
Resolve Values
ParameterStore
Emit Event
Memento
Resolved Shapes
HTML Canvas
Emit Event
EventBus
Create Snapshot
SceneHistory

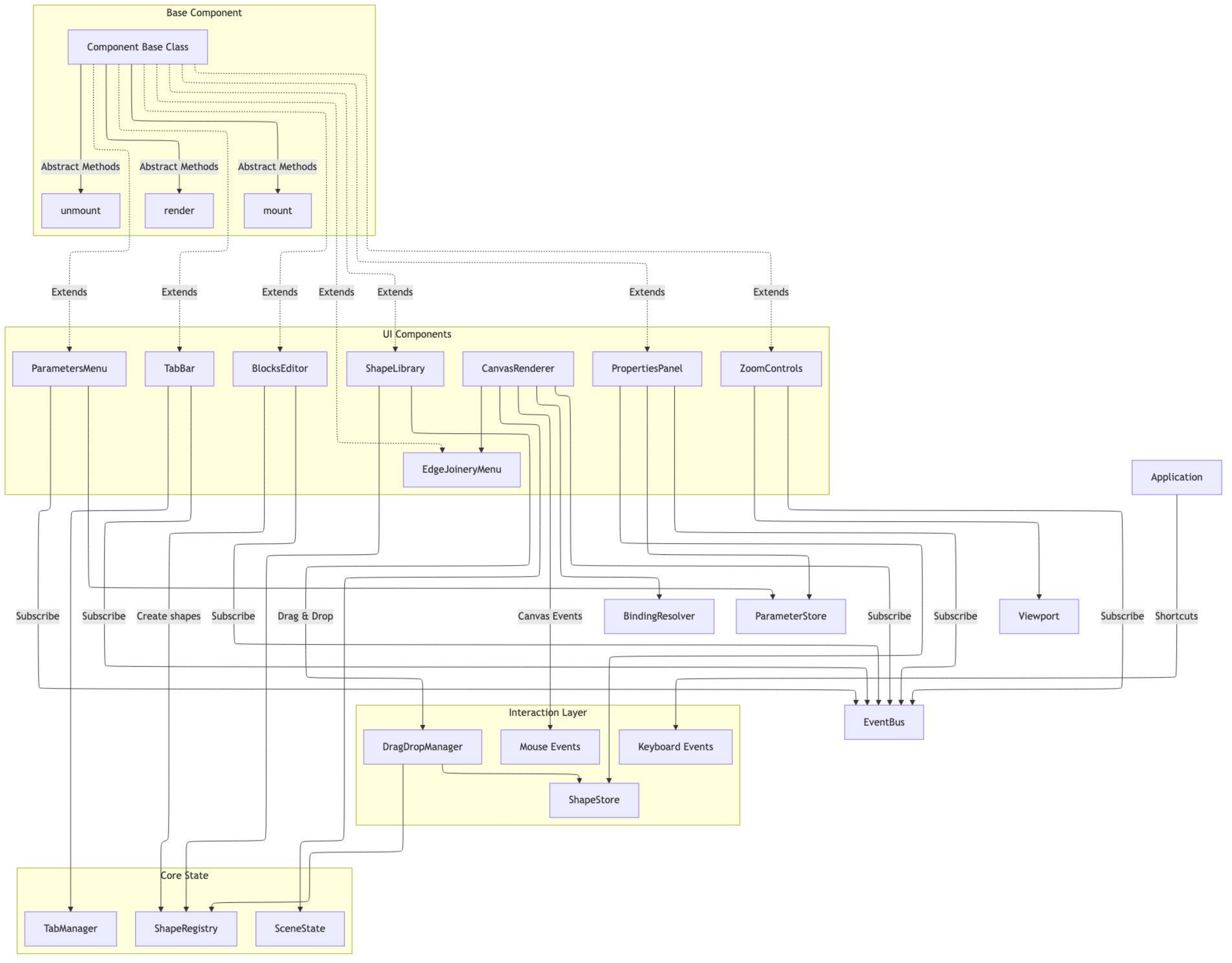
«enumeration»

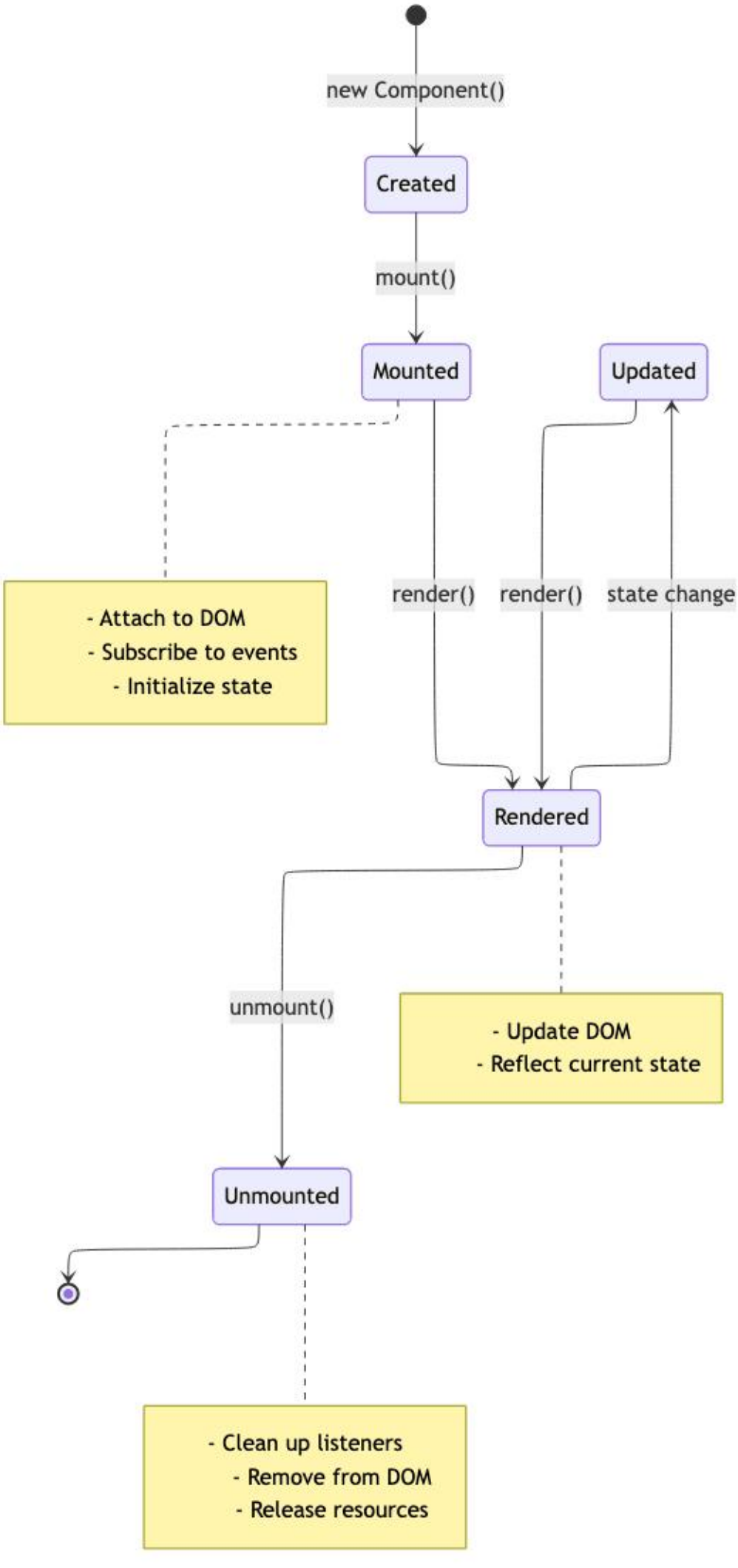
EVENTS

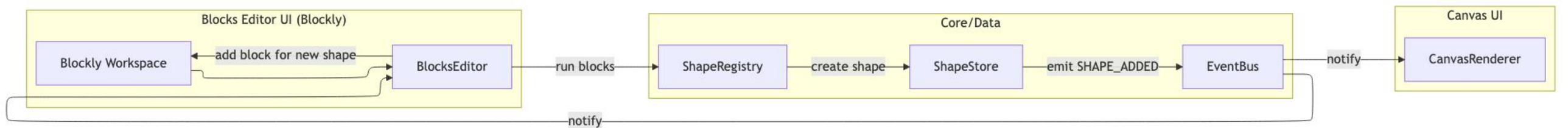
PARAM_CHANGED
PARAM_ADDED
PARAM_REMOVED
SHAPE_ADDED
SHAPE_REMOVED
SHAPE_MOVED
SHAPE_SELECTED
TAB_SWITCHED
TAB_CREATED
TAB_CLOSED
SCENE_LOADED
SCENE_SAVED
VIEWPORT_CHANGED
NODE_LINK_CREATED
NODE_LINK_REMOVED
NODE_MODULE_EDITED
NODE_PARAM_CREATED
NODE_EXPRESSION_CHANGED

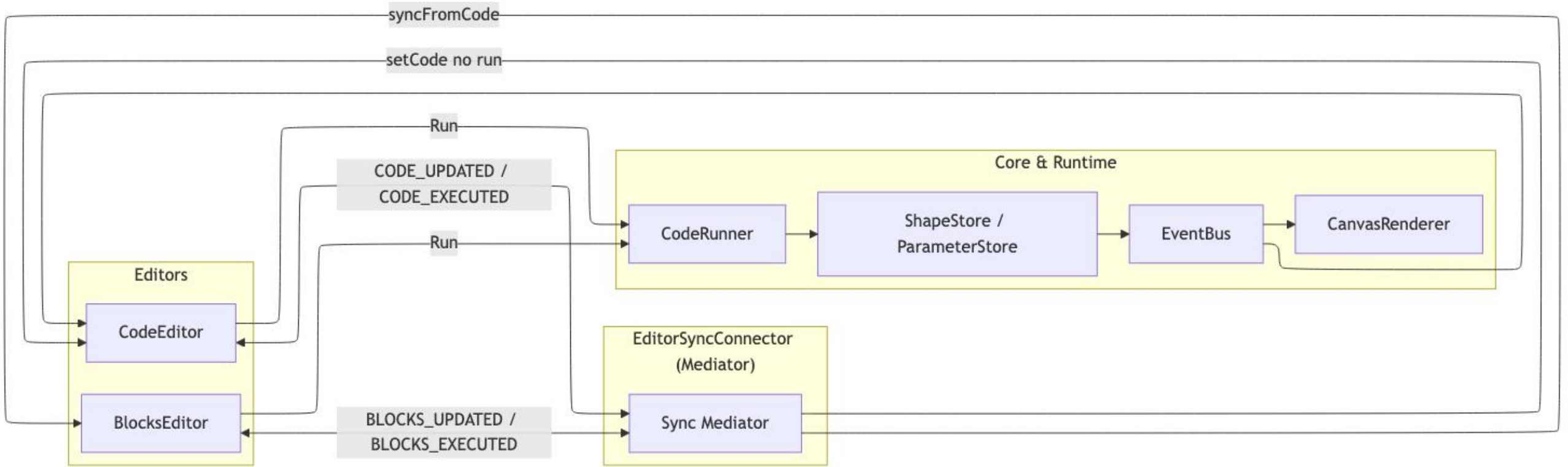

Serialization Format
JSON Data
Tab Data
Scene Data
Shape Data
Parameter Data
Viewport Data
Serialize
Deserialize
Persistence Managers
StorageManager
FileManager
Serializer
Storage Backends
StorageFactory
IndexedDBBackend
CloudStorageBackend
LocalStorageBackend
Application Layer
Application
TabManager
Storage
IndexedDB
Cloud Storage
LocalStorage
JSON Files

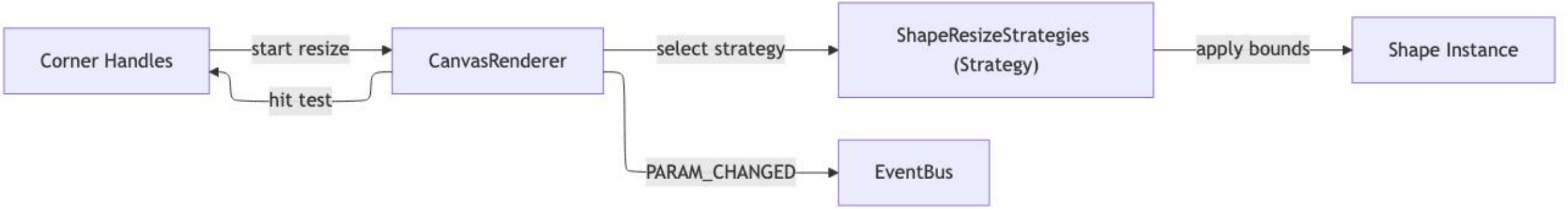

App
StorageManager
Serializer
StorageBackend
Storage
save()
serialize(tabManager)
toJSON(tabs, scenes, shapes, params)
JSON data
save(key, data)
write
success
success
true
load()
load(key)
read
JSON data
JSON data
deserialize(data)
fromJSON(data)
TabManager instance
TabManager
App
StorageManager
Serializer
StorageBackend
Storage

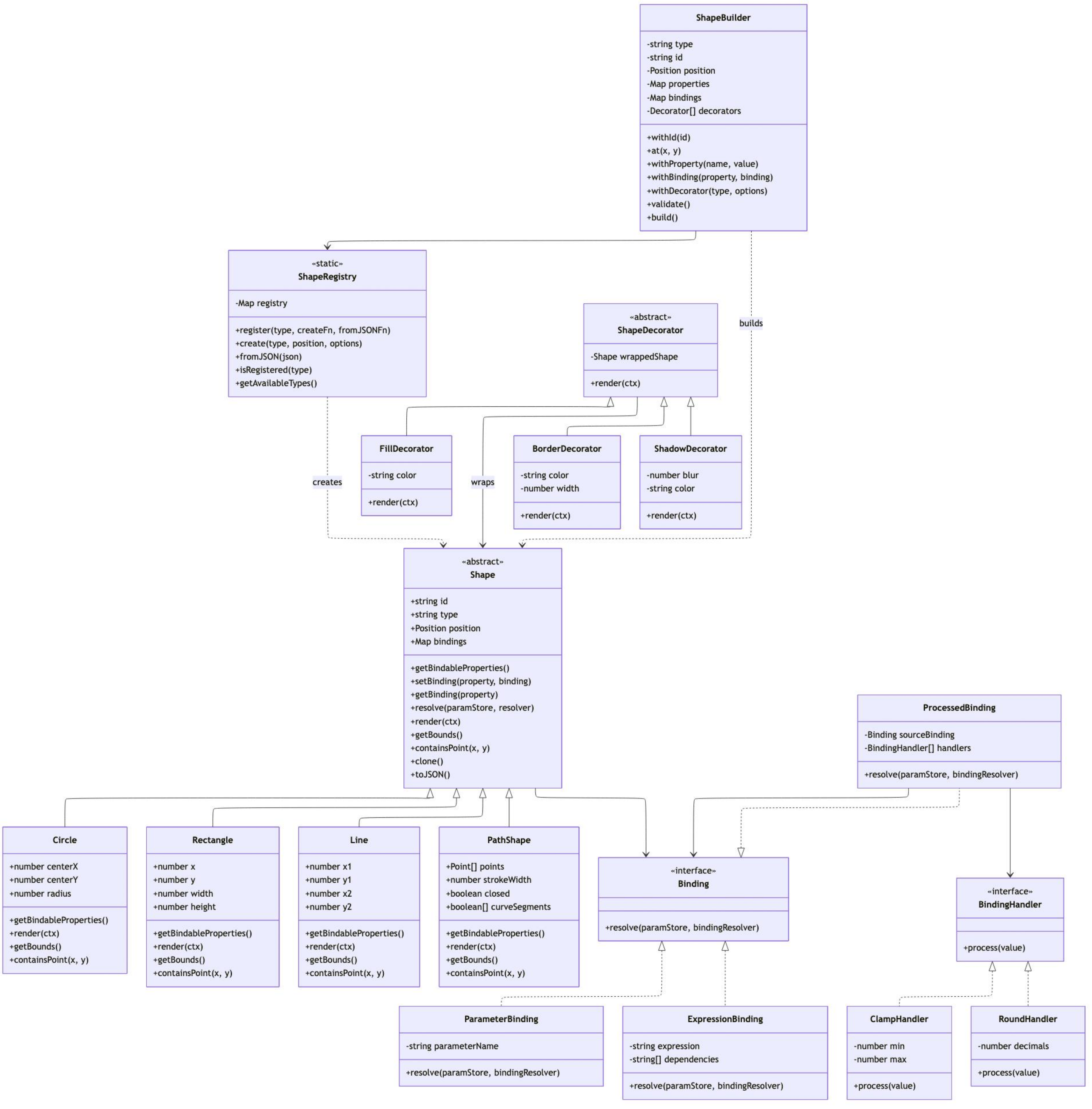

Base Component
Component Base Class
Abstract Methods
Abstract Methods
Abstract Methods
unmount
render
mount
Extends
Extends
Extends
Extends
Extends
Extends
Extends
UI Components
ParametersMenu
TabBar
BlocksEditor
ShapeLibrary
CanvasRenderer
PropertiesPanel
ZoomControls
EdgeJoineryMenu
Application
Subscribe
Subscribe
Create shapes
Subscribe
Drag & Drop
Canvas Events
BindingResolver
ParameterStore
Subscribe
Subscribe
Viewport
Subscribe
Shortcuts
EventBus
Interaction Layer
DragDropManager
Mouse Events
Keyboard Events
ShapeStore
Core State
TabManager
ShapeRegistry
SceneState

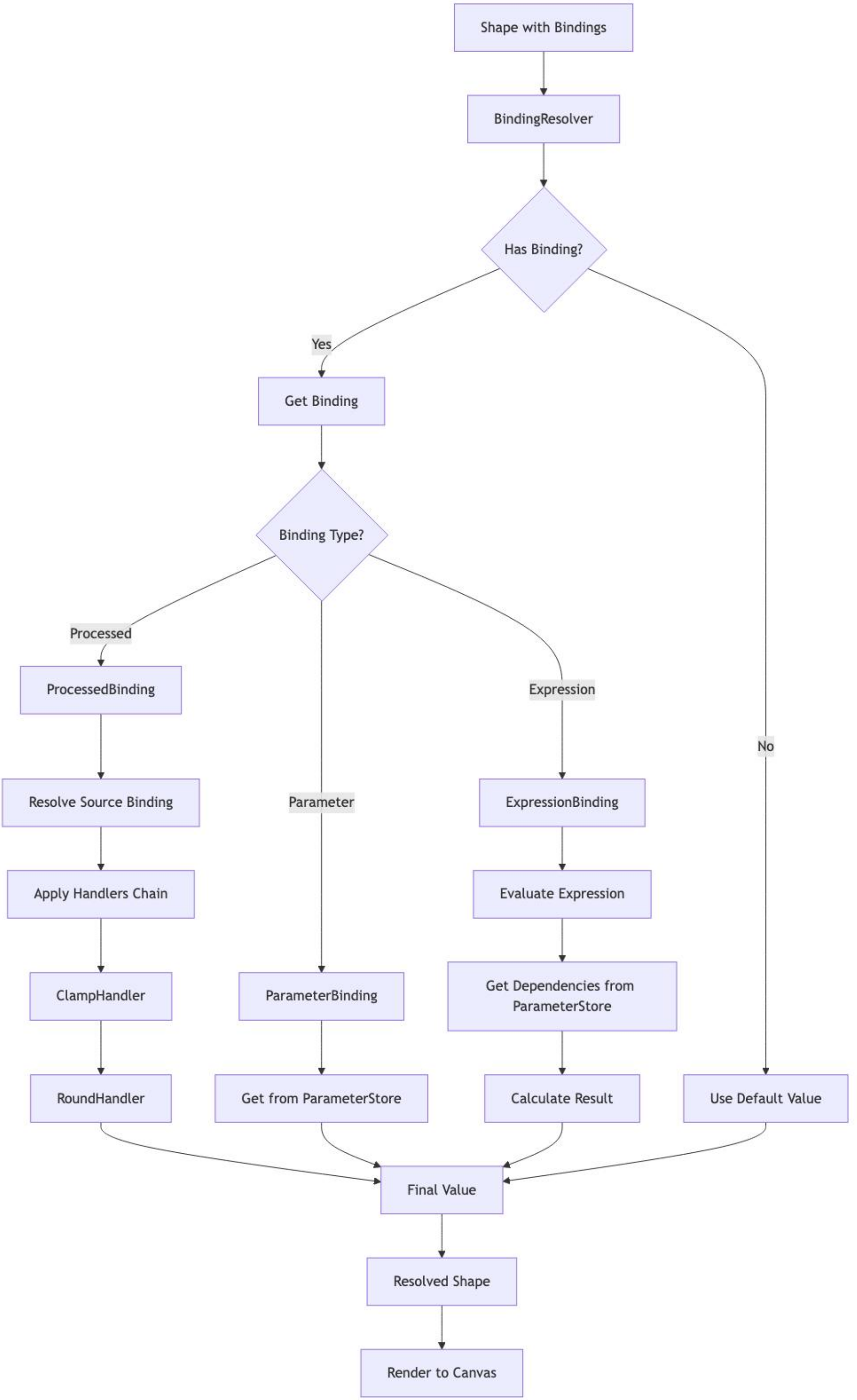

new Component()
Created
mount()
Mounted
Updated
- Attach to DOM
- Subscribe to events
- Initialize state
render()
render()
state change
Rendered
unmount()
- Update DOM
- Reflect current state
Unmounted
- Clean up listeners
- Remove from DOM
- Release resources

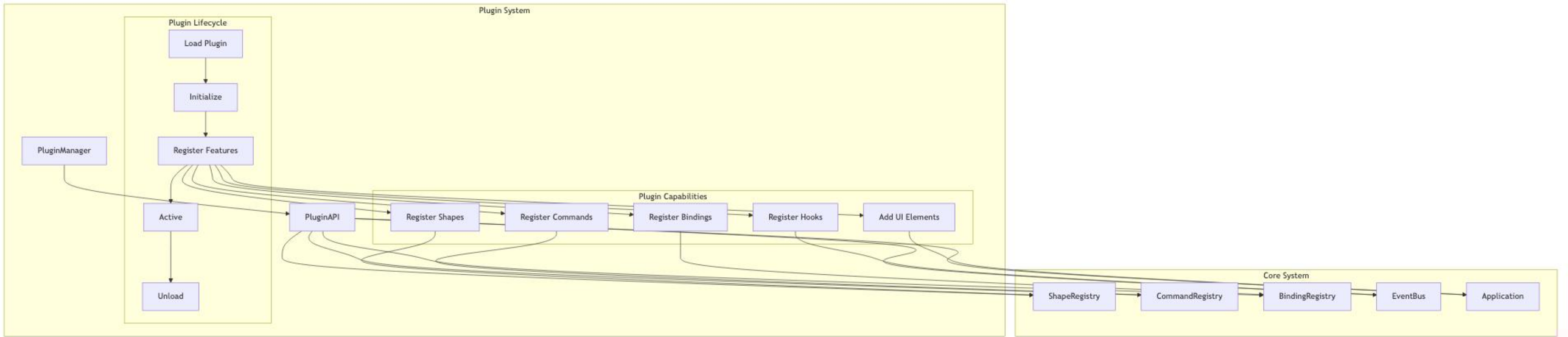

Blocks Editor UI (Blockly)
Blockly Workspace
add block for new shape
BlocksEditor
run blocks
Core/Data
ShapeRegistry
create shape
ShapeStore
emit SHAPE_ADDED
EventBus
notify
Canvas UI
CanvasRenderer
notify

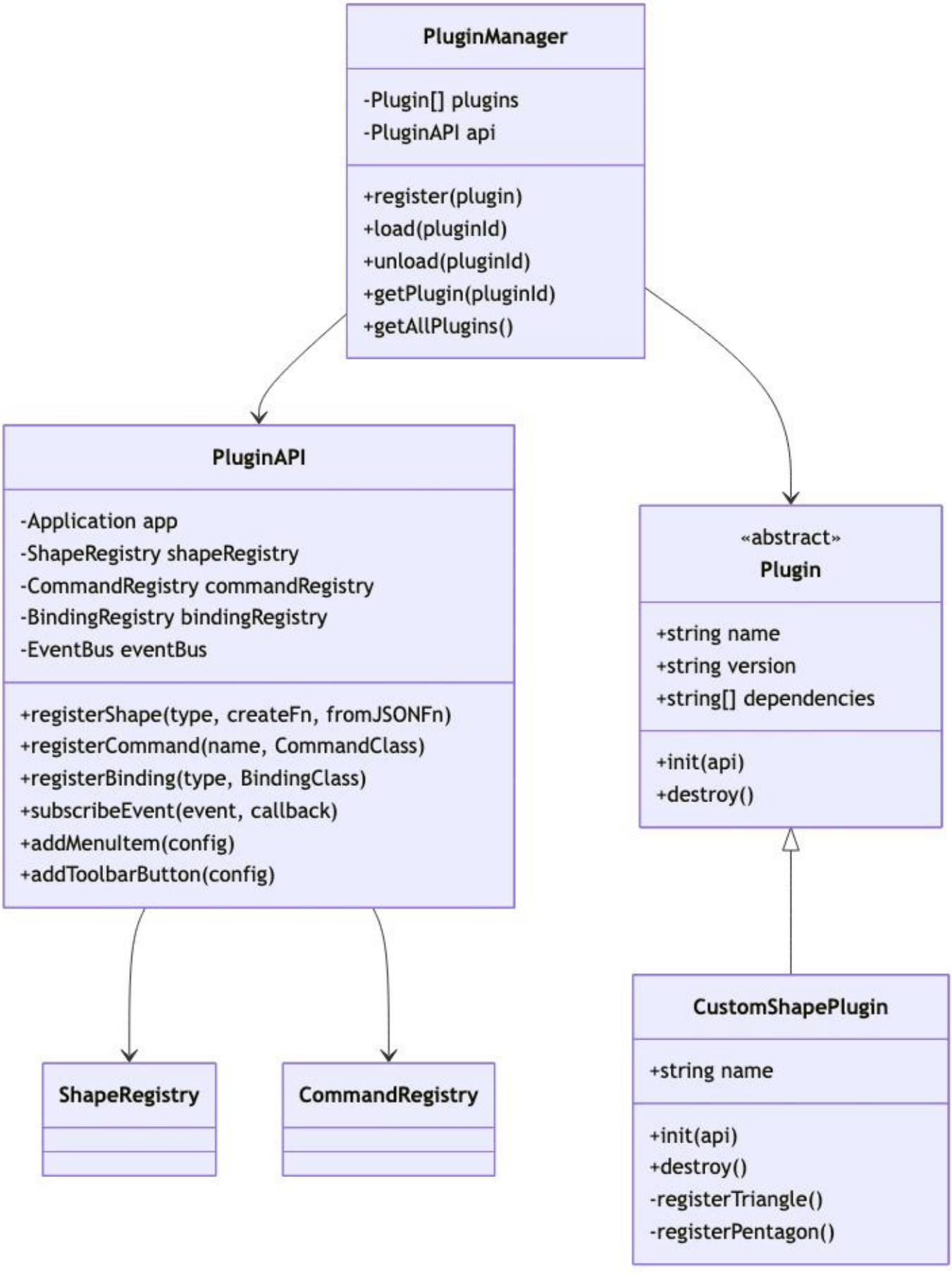

syncFromCode
setCode no run
Run
CODE_UPDATED /
CODE_EXECUTED
Run
Core & Runtime
CodeRunner
ShapeStore /
ParameterStore
EventBus
CanvasRenderer
Editors
CodeEditor
EditorSyncConnector
(Mediator)
BlocksEditor
BLOCKS_UPDATED /
BLOCKS_EXECUTED
Sync Mediator

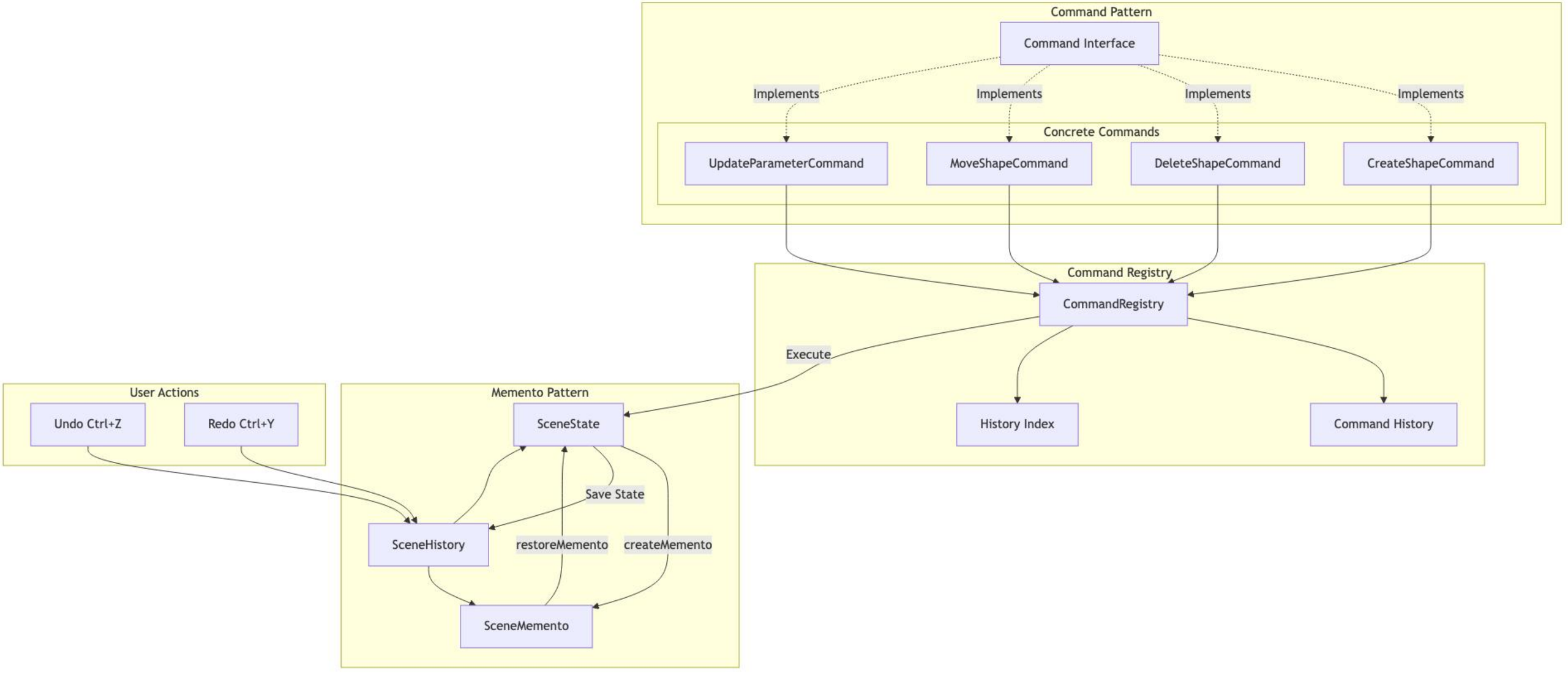

Corner Handles
start resize
hit test
CanvasRenderer
select strategy
ShapeResizeStrategies
(Strategy)
apply bounds
Shape Instance
PARAM_CHANGED
EventBus

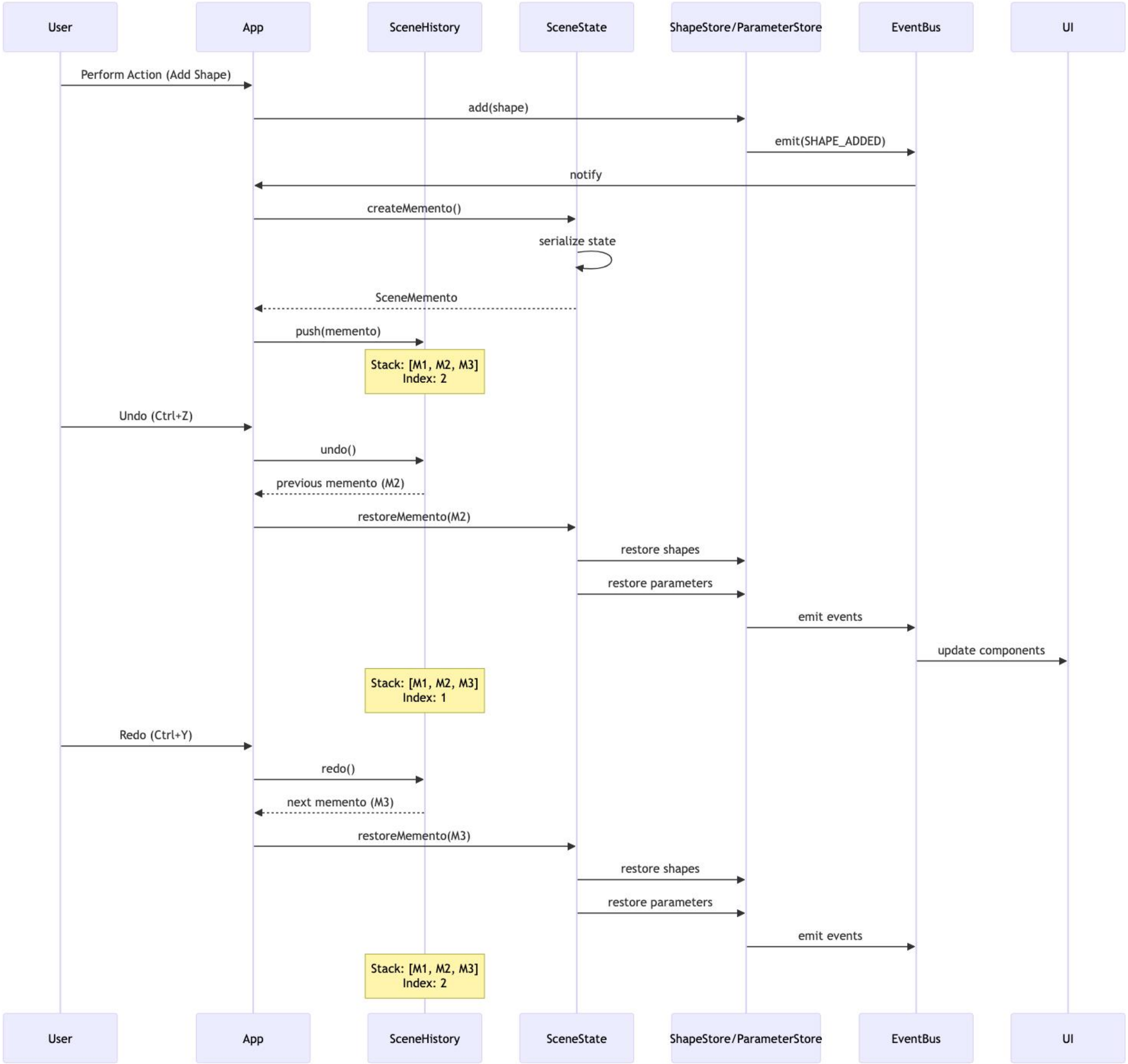

ShapeBuilder
-string type
-string id
-Position position
-Map properties
-Map bindings
-Decorator[] decorators
+withId(id)
+at(x, y)
+withProperty(name, value)
+withBinding(property, binding)
+withDecorator(type, options)
+validate()
+build()
builds
«static»
ShapeRegistry
-Map registry
+register(type, createFn, fromJSONFn)
+create(type, position, options)
+fromJSON(json)
+isRegistered(type)
+getAvailableTypes()
creates
«abstract»
ShapeDecorator
-Shape wrappedShape
+render(ctx)
wraps
FillDecorator
-string color
+render(ctx)
BorderDecorator
-string color
-number width
+render(ctx)
ShadowDecorator
-number blur
-string color
+render(ctx)
«abstract»
Shape
+string id
+string type
+Position position
+Map bindings
+getBindableProperties()
+setBinding(property, binding)
+getBinding(property)
+resolve(paramStore, resolver)
+render(ctx)
+getBounds()
+containsPoint(x, y)
+clone()
+toJSON()
ProcessedBinding
-Binding sourceBinding
-BindingHandler[] handlers
+resolve(paramStore, bindingResolver)
Circle
+number centerX
+number centerY
+number radius
+getBindableProperties()
+render(ctx)
+getBounds()
+containsPoint(x, y)
Rectangle
+number x
+number y
+number width
+number height
+getBindableProperties()
+render(ctx)
+getBounds()
+containsPoint(x, y)
Line
+number x1
+number y1
+number x2
+number y2
+getBindableProperties()
+render(ctx)
+getBounds()
+containsPoint(x, y)
PathShape
+Point[] points
+number strokeWidth
+boolean closed
+boolean[] curveSegments
+getBindableProperties()
+render(ctx)
+getBounds()
+containsPoint(x, y)
«interface»
Binding
+resolve(paramStore, bindingResolver)
«interface»
BindingHandler
+process(value)
ParameterBinding
-string parameterName
+resolve(paramStore, bindingResolver)
ExpressionBinding
-string expression
-string[] dependencies
+resolve(paramStore, bindingResolver)
ClampHandler
-number min
-number max
+process(value)
RoundHandler
-number decimals
+process(value)

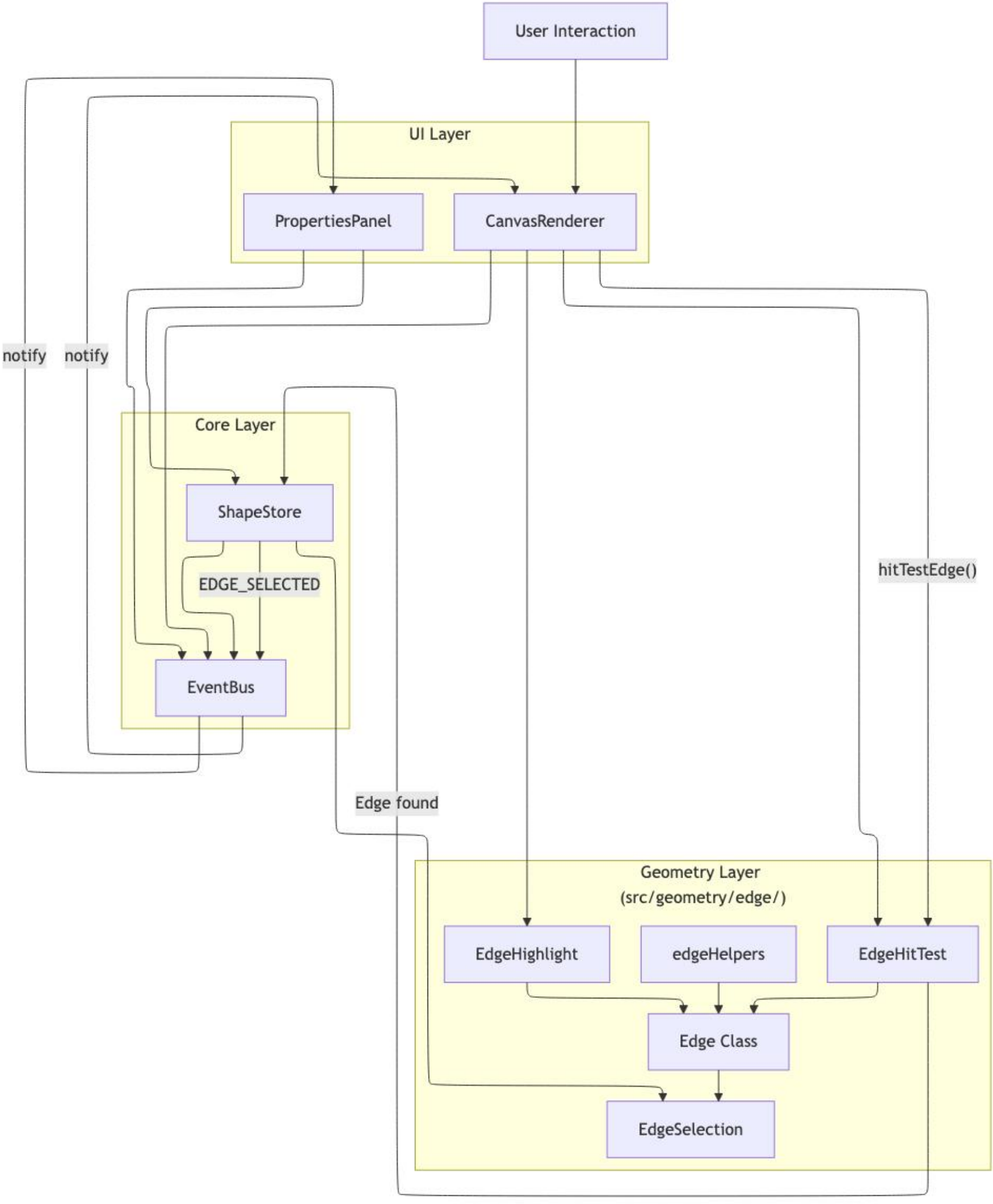

Shape with Bindings
BindingResolver
Has Binding?
Yes
No
Get Binding
Binding Type?
Processed
Parameter
Expression
ProcessedBinding
Resolve Source Binding
Apply Handlers Chain
ClampHandler
RoundHandler
ParameterBinding
Get from ParameterStore
ExpressionBinding
Evaluate Expression
Get Dependencies from ParameterStore
Calculate Result
Use Default Value
Final Value
Resolved Shape
Render to Canvas

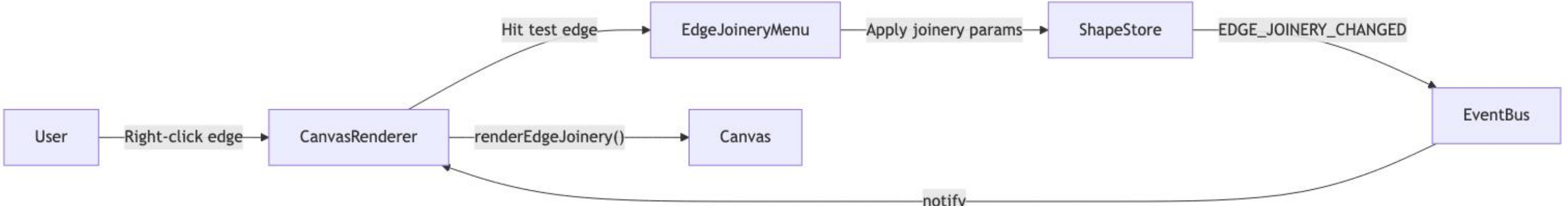

Plugin System
Plugin Lifecycle
Load Plugin
Initialize
Register Features
Active
Unload
PluginManager
PluginAPI
Plugin Capabilities
Register Shapes
Register Commands
Register Bindings
Register Hooks
Add UI Elements
Core System
ShapeRegistry
CommandRegistry
BindingRegistry
EventBus
Application

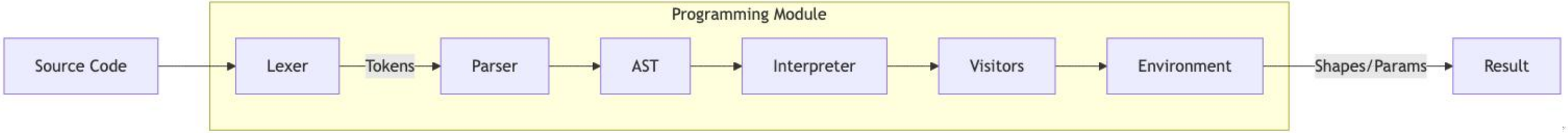

PluginManager
-Plugin[] plugins
-PluginAPI api
+register(plugin)
+load(pluginId)
+unload(pluginId)
+getPlugin(pluginId)
+getAllPlugins()
PluginAPI
-Application app
-ShapeRegistry shapeRegistry
-CommandRegistry commandRegistry
-BindingRegistry bindingRegistry
-EventBus eventBus
+registerShape(type, createFn, fromJSONFn)
+registerCommand(name, CommandClass)
+registerBinding(type, BindingClass)
+subscribeEvent(event, callback)
+addMenuItem(config)
+addToolbarButton(config)
«abstract»
Plugin
+string name
+string version
+string[] dependencies
+init(api)
+destroy()
ShapeRegistry
CommandRegistry
CustomShapePlugin
+string name
+init(api)
+destroy()
-registerTriangle()
-registerPentagon()

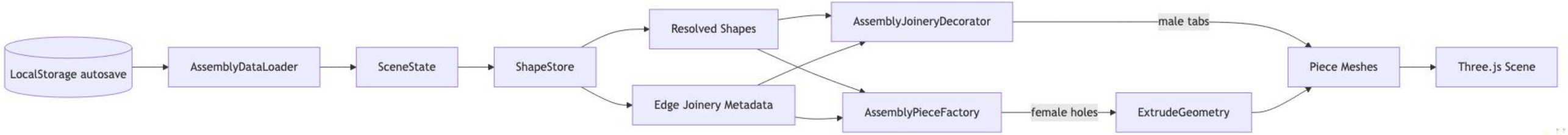

Command Pattern
Command Interface
Implements
Implements
Implements
Implements
Concrete Commands
UpdateParameterCommand
MoveShapeCommand
DeleteShapeCommand
CreateShapeCommand
Command Registry
CommandRegistry
Execute
History Index
Command History
User Actions
Undo Ctrl+Z
Redo Ctrl+Y
Memento Pattern
SceneState
Save State
SceneHistory
restoreMemento
createMemento
SceneMemento


User
App
SceneHistory
SceneState
ShapeStore/ParameterStore
EventBus
UI
Perform Action (Add Shape)
add(shape)
emit(SHAPE_ADDED)
notify
createMemento()
serialize state
SceneMemento
push(memento)
Stack: [M1, M2, M3]
Index: 2
Undo (Ctrl+Z)
undo()
previous memento (M2)
restoreMemento(M2)
restore shapes
restore parameters
emit events
update components
Stack: [M1, M2, M3]
Index: 1
Redo (Ctrl+Y)
redo()
next memento (M3)
restoreMemento(M3)
restore shapes
restore parameters
emit events
Stack: [M1, M2, M3]
Index: 2
User
App
SceneHistory
SceneState
ShapeStore/ParameterStore
EventBus
UI


User Interaction
UI Layer
PropertiesPanel
CanvasRenderer
notify
notify
Core Layer
ShapeStore
EDGE_SELECTED
EventBus
hitTestEdge()
Edge found
Geometry Layer
(src/geometry/edge/)
EdgeHighlight
edgeHelpers
EdgeHitTest
Edge Class
EdgeSelection


User
Right-click edge
CanvasRenderer
Hit test edge
EdgeJoineryMenu
Apply joinery params
ShapeStore
EDGE_JOINERY_CHANGED
EventBus
renderEdgeJoinery()
Canvas
notify


Programming Module
Source Code
Lexer
Tokens
Parser
AST
Interpreter
Visitors
Environment
Shapes/Params
Result


LocalStorage autosave
AssemblyDataLoader
SceneState
ShapeStore
Resolved Shapes
Edge Joinery Metadata
AssemblyJoineryDecorator
AssemblyPieceFactory
male tabs
female holes
ExtrudeGeometry
Piece Meshes
Three.js Scene