

Not Quite There Yet



- The SkyNet funding bill is passed.
- The system goes online on August 4th, 1997.
- Human decisions are removed from strategic defense.
- SkyNet begins to learn at a geometric rate.
- It becomes self-aware at 2:14am Eastern time, August 29th
- In a panic, they try to pull the plug.
- And, Skynet **fights back**

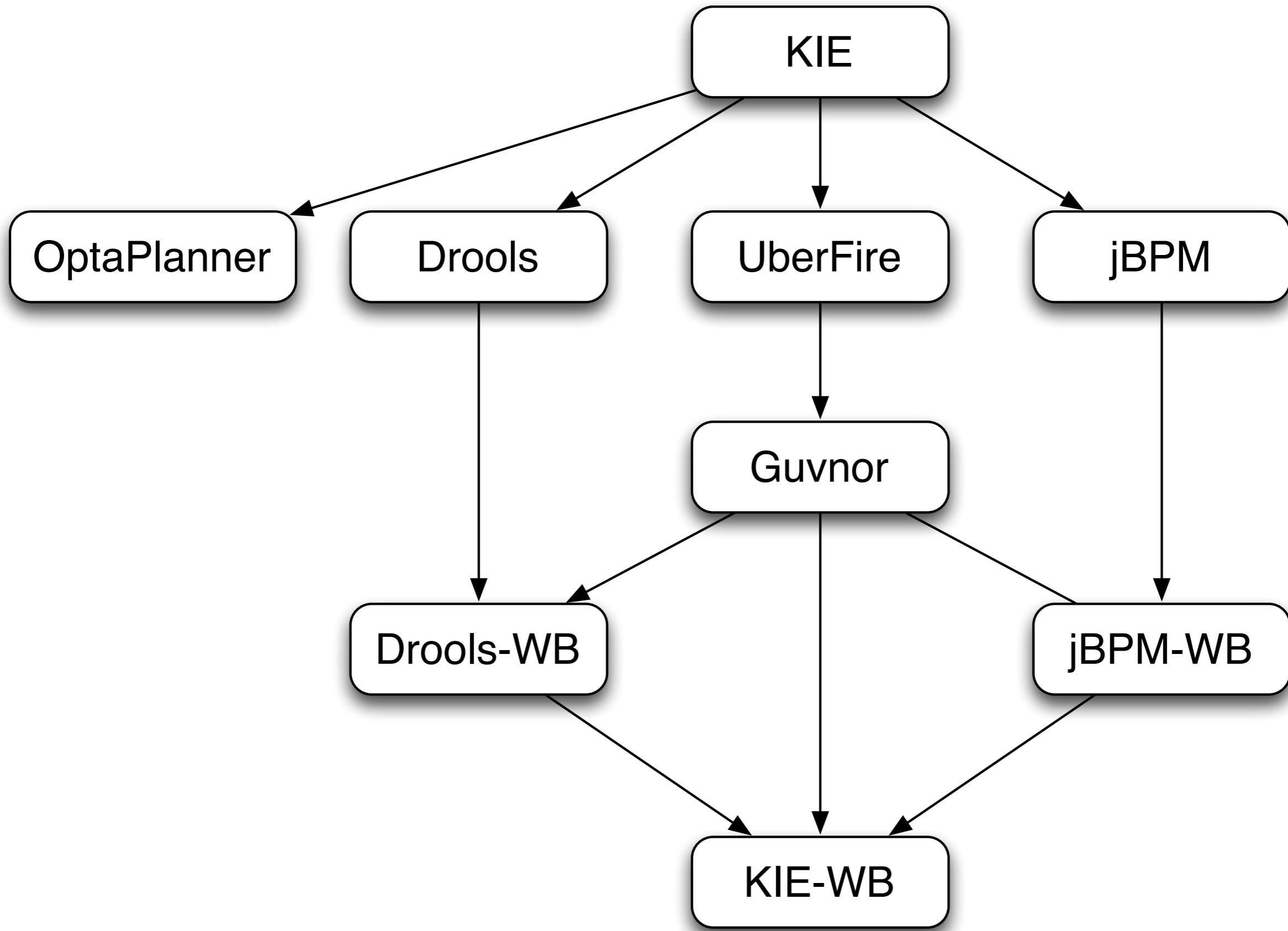
Who am I?



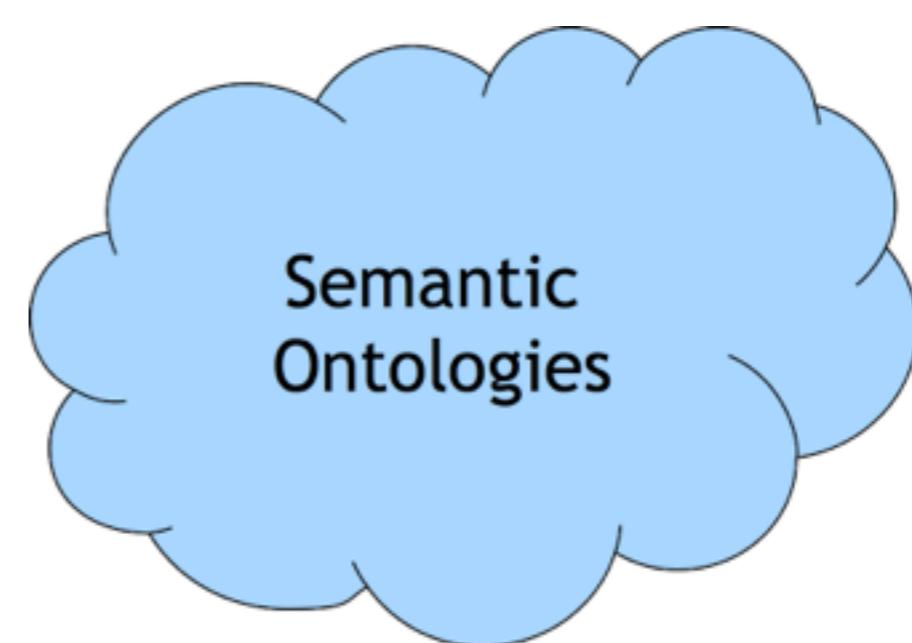
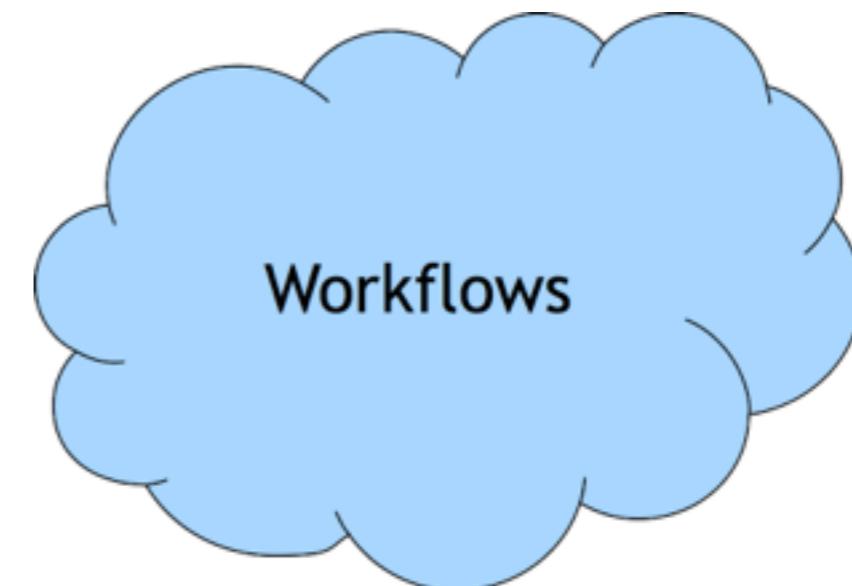
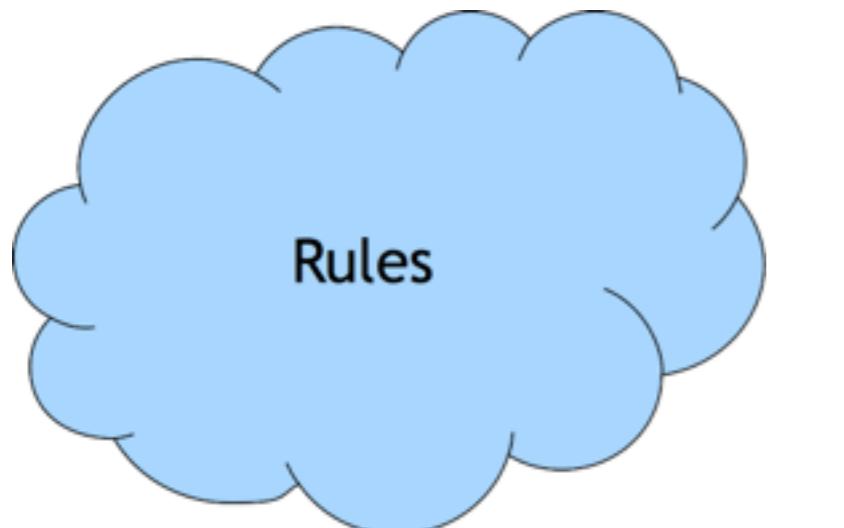
Drools

- Drools co-founder
- JBoss (2005)
- Red Hat (2006)
- Polymita Acquisition 2012
- Red Hat Platform Architect

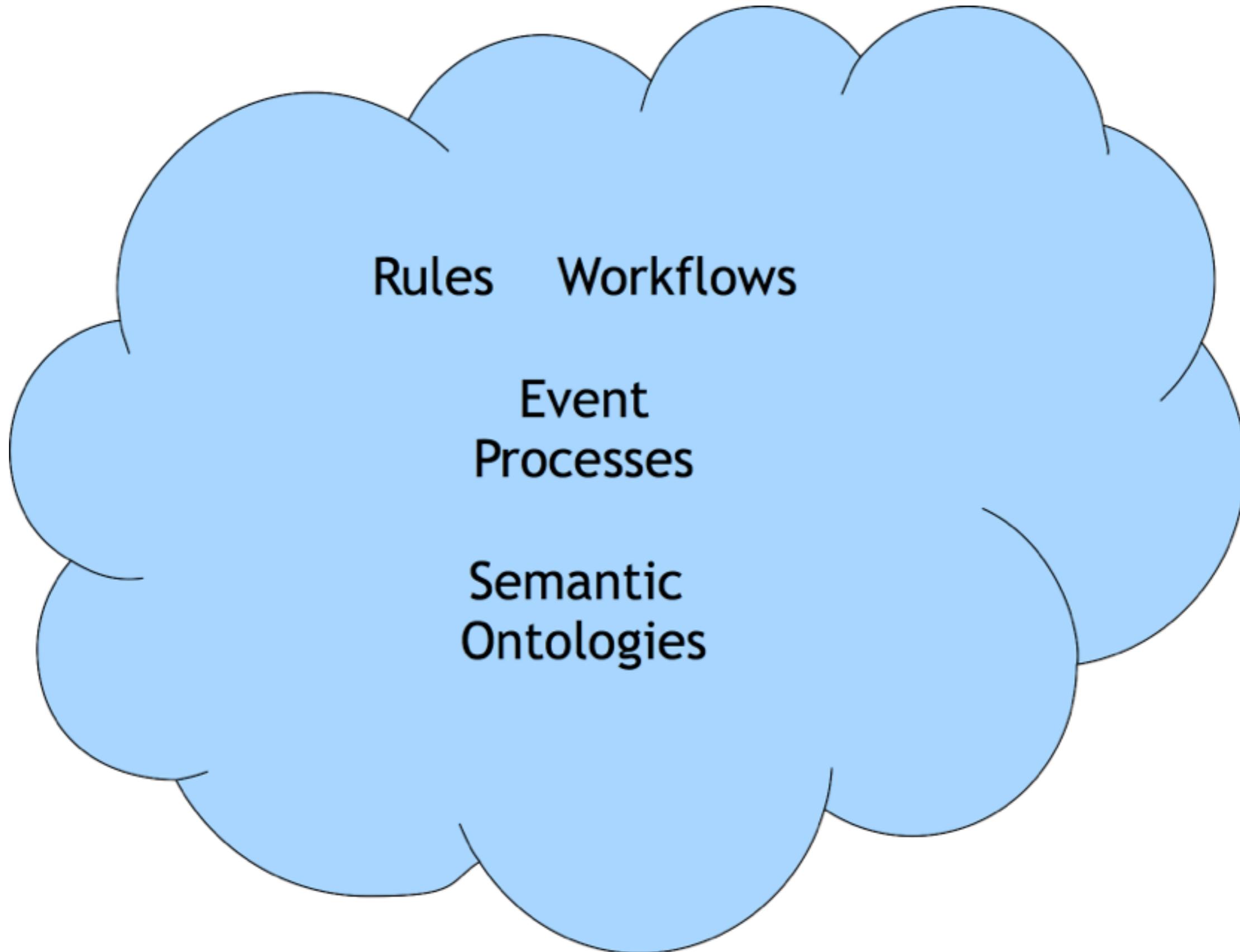
KIE - Knowledge Is Everything



KIE - Knowledge Is Everything



KIE - Knowledge Is Everything

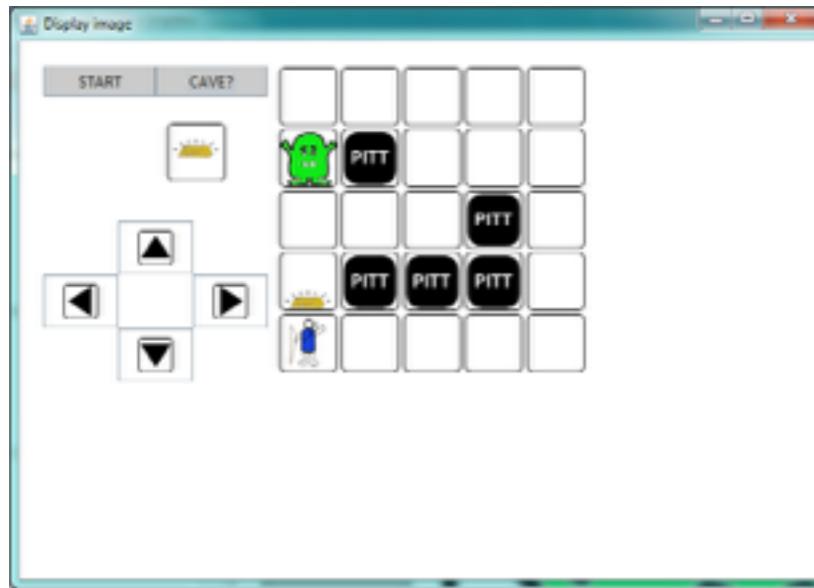


GitHub

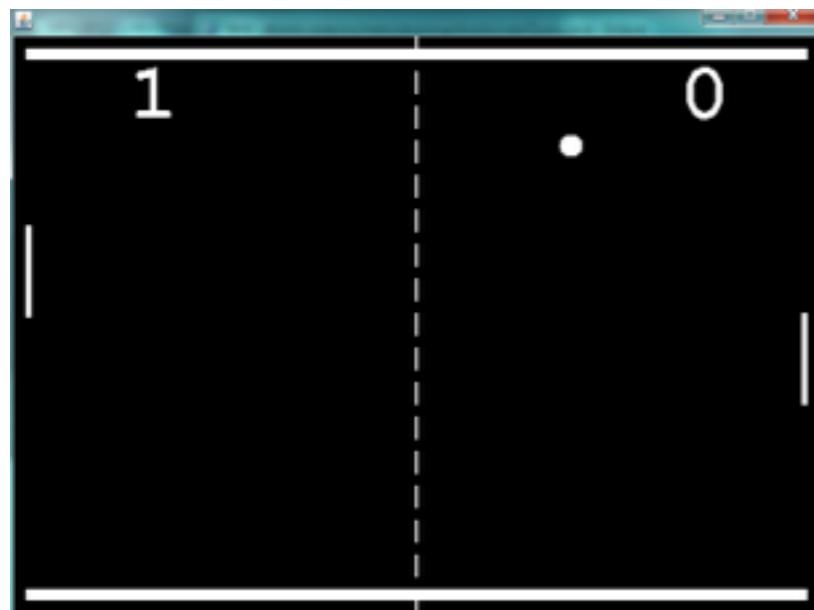
- URL:
 - <https://github.com/droolsjbpm/>
 - Bootstrap project:
 - <https://github.com/droolsjbpm/droolsjbpm-build-bootstrap>
- To build all repositories:

```
$ git clone git@github.com:droolsjbpm/droolsjbpm-build-bootstrap.git  
$ droolsjbpm-build-bootstrap/script/git-clone-others.sh  
$ droolsjbpm-build-bootstrap/script/mvn-all.sh clean install -DskipTests
```

Serious Bits :)



<http://www.youtube.com/watch?v=4CvjKqUOEzM>



<http://www.youtube.com/watch?v=Omj4PR3v-nI>



<http://www.youtube.com/watch?v=wORIAZoxttA>

Technical Language

CashFlow Rule

```
select * from Account acc,
          Cashflow cf, AccountPeriod ap
where acc.accountNo == cf.accountNo and
      cf.type == CREDIT
      cf.date >= ap.start and
      cf.date <= ap.end
acc.balance += cf.amount

rule "increase balance for AccountPeriod Credits"
when
    ap : AccountPeriod()
    acc : Account()
    cf : CashFlow( type == CREDIT,
                   accountNo == acc.accountNo,
                   date >= ap.start && <= ap.end )
then
    acc.balance += cf.amount;
end
```

Graphical Editors

Data Modeller

Data modeler

Create Save  

Identifier	
Purchase Order	
Purchase Order Header	
Purchase Order Line	

Create new field

*Id Label

*Type

Purchase Order (org.jbpm.examples.purchases.PurchaseOrder)

Position	Identifier	Label	Type	
0	description	Description	String	
1	header	Header	 Purchase Order Header	
2	lines	Lines	 Purchase Order Line [0..N]	
4	requiresCFOApproval		Boolean	
3	total	Total	Double	

Identifier	
description	
Description	
Description	
Type	String
Equals	<input type="checkbox"/>
Position	0

Decision Table

Guided Decision Table [Pricing loans.gdst]

All the rules inherit:None selected

Decision table

Add row... Otherwise Analyze... Audit log

#	Description	amount min	amount max	period	deposit max	income	Loan approved	LMI	rate
1		131000	200000	30	20000	Asset	true	0	2
2		10000	100000	20	2000	Job	true	0	4
3		100001	130000	20	3000	Job	true	10	6

Decision Table

Guided Decision Table [Pricing loans.gdst]

All the rules inherit:None selected

Decision table

New column Condition columns Action columns (options)

Add row... Otherwise Analyze... Audit log

	Description	amount min	amount max	period	deposit max	income	Loan approved	LMI	rate
#	Description	LoanApplication [application]				IncomeSource	application	application	application
		amount [>]	amount [≤]	lengthYears [==]	deposit [<]	type [==]	approved	insuranceCost	approvedRate
+	1	131000	200000	30	20000	Asset	= true	= 0	2
+	2	10000	100000	= 20	2000	Job			4
+	3	100001	130000		3000			10	6

Guided Editors

Guided Editor [Bankruptcy history.rdr]

Save Delete Rename Copy Validate x ▾

EXTENDS None selected ▼

WHEN

1. There is a LoanApplication [a] + ↓ ↓ ↑

The following exists:

There is a Bankruptcy with:
any of the following:

2. yearOfOccurrence --- please choose --- ▼ 1990 ↓ + ↓ ↑

amountOwed --- please choose --- ▼ 10000 ↓ + ↓ ↑

THEN

1. Retract LoanApplication [a] + ↓ ↓ ↑

Set value of LoanApplication [a] approved false ↓ + ↓ ↑

2. Set value of LoanApplication [a] explanation has been bankrupt ↓ + ↓ ↑

(show options...)

Rule Templates

Load Template Data

WHEN

There is an Applicant with:

- age greater than or equal to **minAge**
- age less than **maxAge**

There is a Vehicle with:

- make equal to **make**
- model equal to **model**
- value greater than or equal to **minValue**
- value less than **maxValue**

THEN

Insert Policy:

- type **type**
- premium **premium**

(show options...)

The screenshot shows a user interface for creating rule templates. It's divided into sections: 'WHEN' and 'THEN'. The 'WHEN' section contains two main conditions. The first condition involves an 'Applicant' with an age range, where 'minAge' is highlighted with a red circle. The second condition involves a 'Vehicle' with specific make and model requirements, where 'model' is also highlighted with a red circle. The 'THEN' section is for inserting a 'Policy' and includes fields for 'type' and 'premium', both of which are highlighted with red circles. The interface includes standard UI elements like buttons for saving, deleting, and moving items up and down.

Rule Templates

Template Data

Template Data

	minAge	maxAge	make	model	minValue	maxValue	type	premium
	18	25	BMW	318	0	10000	TPFF	1000
	18	25	BMW	318	10000	20000	TPFF	1500
	18	25	BMW	318	0	10000	COMPREHENSIVE	2000
	18	25	BMW	318	10000	20000	COMPREHENSIVE	2500

Template Data

Save and close

Add row...

Decision Table Wizards

Guided Decision Table Wizard X

✓ Summary
✓ Add Fact Patterns
✓ **Add Constraints**
✓ Add Actions to set fields
✓ Add Actions to insert new Facts

Available patterns

- a : Applicant
- v : Vehicle

Available fields

- this
- name : Text
- age : Whole number (integer)
- [New Predicate]

Conditions

- [minAge] age
- [maxAge] age

Calculation type: Literal value Formula

Column header (description): maxAge *

Operator: less than ▼ *

(optional) value list: ⓘ

Default value:

<- Previous Next -> Cancel Finish

Score Cards

- a) Setup Parameters
- b) Characteristic Section

Scorecard (sc-wge-5)

Setup Parameters

Facts	Resultant Score Field	Initial Score	(a)
Customer	customerScore : double	20	
Use Reason Codes	Resultant Reason Codes Field	Reason Codes Algorithm	Baseline Score
false		none	0.0

Characteristics

New Characteristic

Name	Characteristic	Remove Characteristic	Add Attribute	
Fact		Baseline Score	Reason Code	
Operator	Value	Partial Score	Reason Code	Actions
=	0	10		Remove
>=..<	1,40	20		Remove
>=..<	40,60	25		Remove
>=	60	30		Remove

Score Cards

- UI Generates PMML
- DRL Generated from PMML
- DRL results in
 - Calculated Score
 - Ranked Reason Codes
- Can import PMML 4.1
 - but not exposed yet
- Calculated Scores
 - Currently Summations
 - Weight coming
 - Not in PMML standard

Scorecard (sc-wge-5)

Setup Parameters

Facts	Resultant Score Field	Initial Score
Customer	customerScore : double	20
Use Reason Codes	Resultant Reason Codes Field	Reason Codes Algorithm
false		none
		Baseline Score
		0.0

Characteristics

New Characteristic

Name	Characteristic	Remove Characteristic	Add Attribute	
CustAgeScore	customerAge : int	Baseline Score	Reason Code	
Customer				
Operator	Value	Partial Score	Reason Code	Actions
=	0	10		Remove
>=,<	1,40	20		Remove
>=,<	40,60	25		Remove
>=	60	30		Remove

Name	Characteristic	Remove Characteristic	Add Attribute	
AppLicenceScore	validLicense : boolean	Baseline Score	Reason Code	
Applicant				
Operator	Value	Partial Score	Reason Code	Actions
true	N/A	5		Remove
false	N/A	-5		Remove

Name	Characteristic	Remove Characteristic	Add Attribute	
CustResScore	placeOfResidence : String	Baseline Score	Reason Code	
Customer				
Operator	Value	Partial Score	Reason Code	Actions
=	USA	15		Remove
in	FRANCE,UK,SPAIN	17		Remove
=	INDIA	19		Remove

Scenarios

[Run scenario](#)

+ GIVEN

insert [Applicant][app]

age: 20

insert [Vehicle][v]

make: BMW

model: 318

value: 15000

+ CALL METHOD

Add input data and expectations here.

+ EXPECT

⌚ Use real date and time

A fact of type [Policy] has values:

type: equals TPFT

premium: equals 1500

A fact of type [Policy] has values:

type: equals COMPREHENSIVE

premium: equals 2500

More...

(configuration)

+ (globals)

All rules may fire

5.x Critique

5.x Critique

Welcome: admin [Sign Out]

Drools

Navigate

Find br.com.redhat.sugar Business rule asset AccountManager

Browse Save changes Save and close Select Working Sets Validate Verify View source Actions... Status: [Draft]

Knowledge Bases

Create New Packages
br com redhat sugar
Business rule asset Technical rule asset Functions DSL configurations Model Processes Enumerations Test Scenarios XML, Properties Other assets, docur WorkingSets
defaultPackage

AccountManagerLeads
Title: AccountManagerLeads
Categories: CRM/Sugar Modified Fri 05 Nov 2010 04:35:15 on: PM BRT by: admin Note: Created Thu 04 Nov 2010 04:31:15 on: PM BRT Created admin by: Format: brl Package: br.com.redhat.sugar Is Disabled: UUID: 2b4582db-184c-461c-aa3d-e2e320f1a038 Other meta data ... Version history ...

Done Close all items YSlow

WHEN There is an Operation [op] with:

- lead --- please choose --- doNotCall equal to $(x)=\text{new Byte}(1)$

THEN

- Modify value of Operation [op] role ACCOUNTMANAGE

(options)
Attributes:
no-loop
dialect java

Description:

5.x Critique

JCR

- Performance Issues
- Everything stored as blob
- No tagging, branching etc.
- Webdav
- Limited team providers

Deployment

- Binary blobs, on url
- Simple Snapshot system
- No real methodology
- Doesn't align with any industry standards

Content

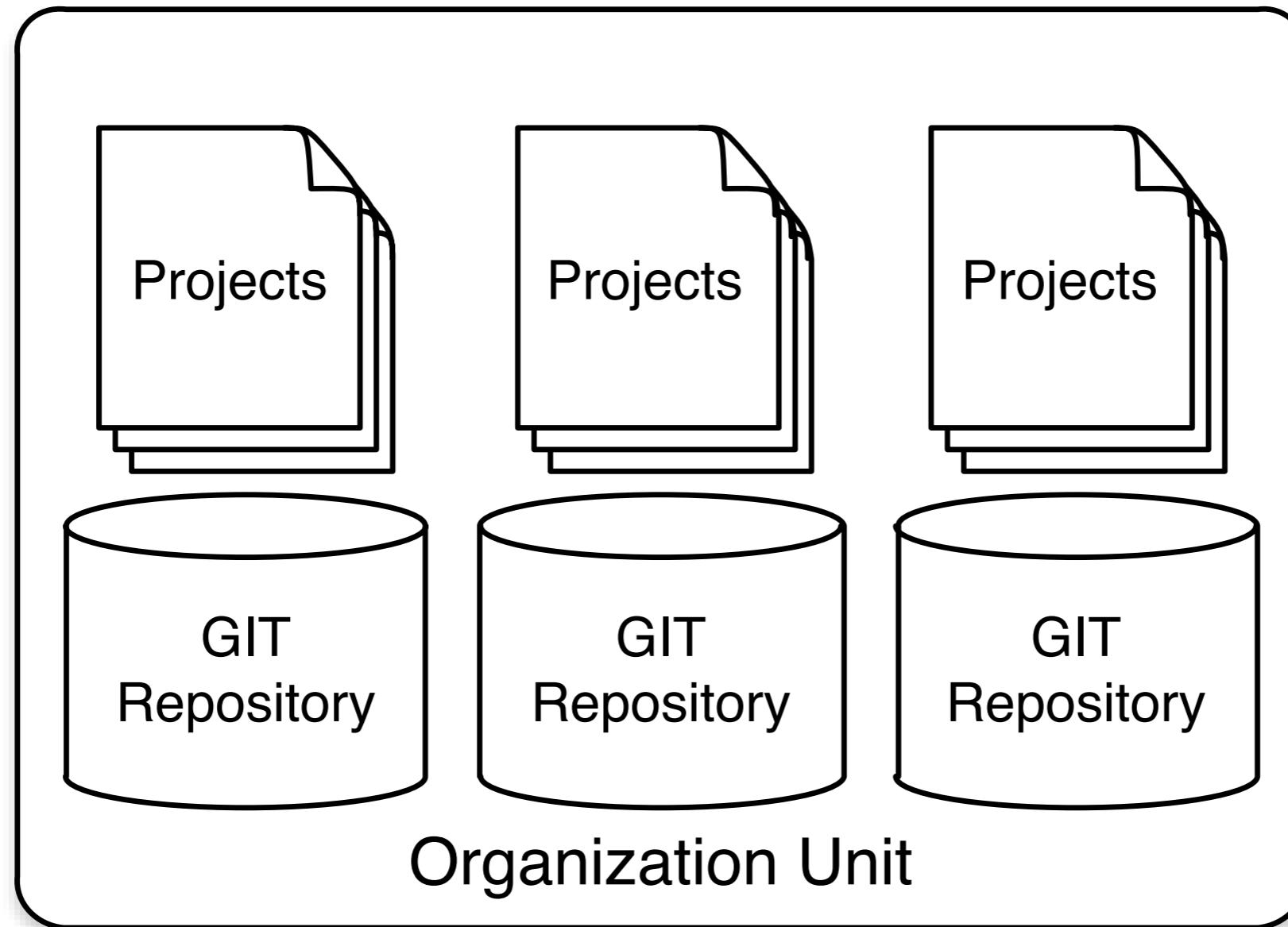
- Single tree structure (packages)
- Packages created project deployment units
- No easy rule use
- Loading “model” jars into packages

UI

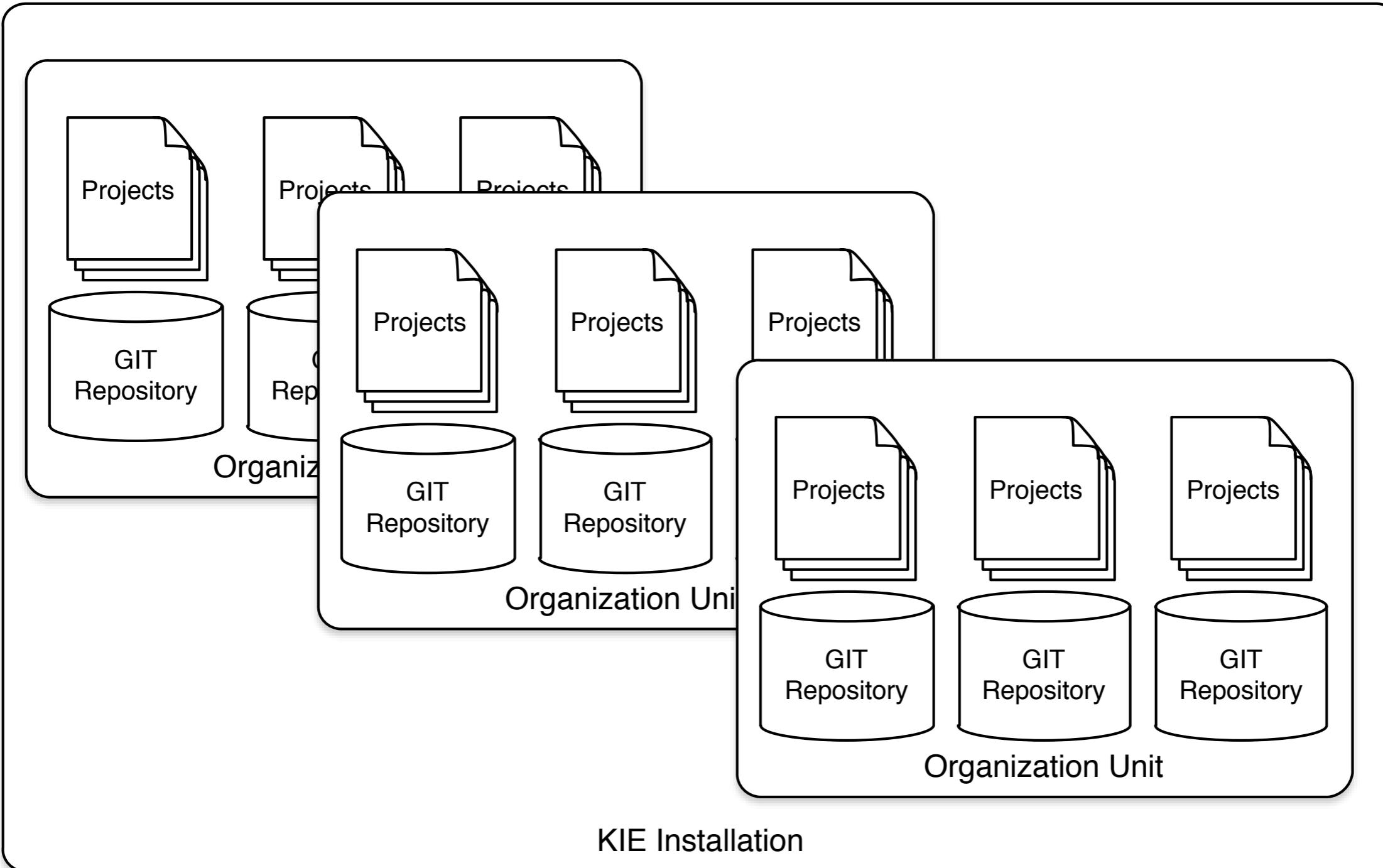
- Not easily extended
- Fixed layouts
- No perspectives
- Hard to change
- Too many hacks

Architecture

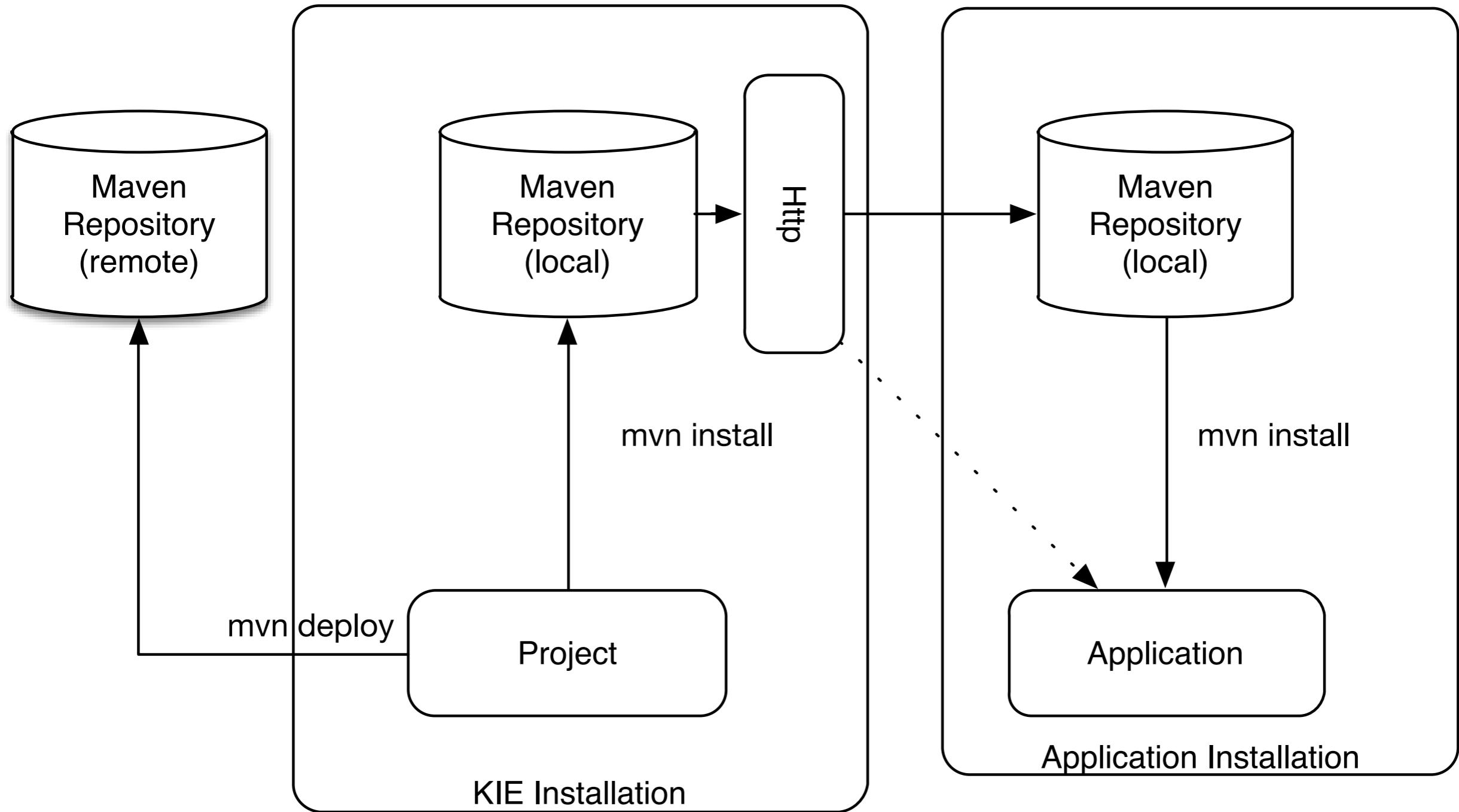
GIT + Maven



KIE Installation



Application Architecture



Workbench

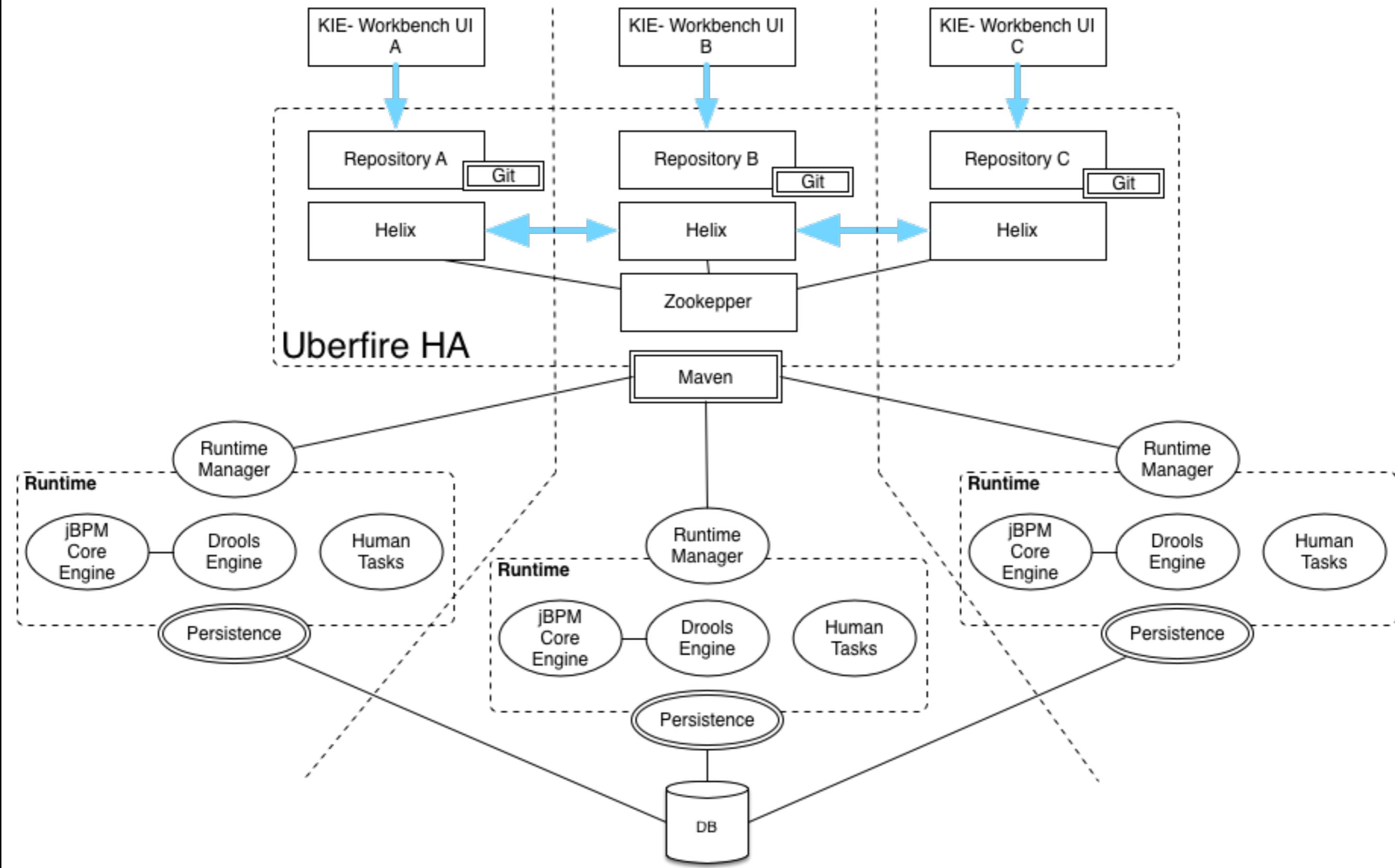
Requirements

- Modular design
 - Plugins
 - Common Life cycles
 - Compile time composition of plugins, via maven
 - Menus
 - contextual to perspective and focus panel
 - Visibility Security
 - Toolbars
 - contextual to perspective and focus panel
 - Visibility Security
 - Twitter Bootstrap UI
 - Flexible layouts
 - Perspectives

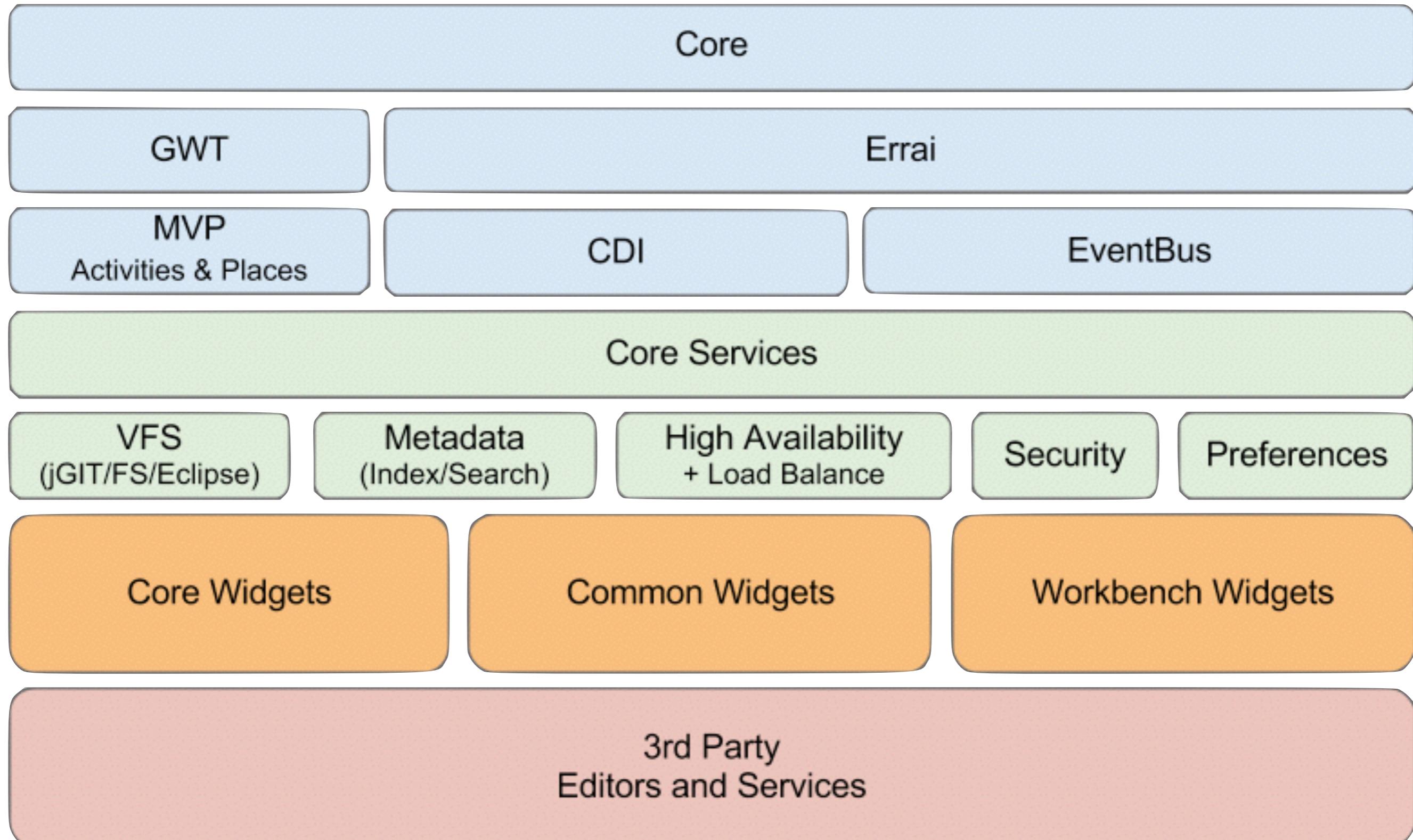
Requirements

- Security
 - Authorization, Authentication
 - Seamless API for client and server
- MetaData
 - Everything is a file, DB just for fast searching
- GIT Backend
- High Availability
 - GIT Cluster
 - Apache Helix
- Maven integration for “projects”

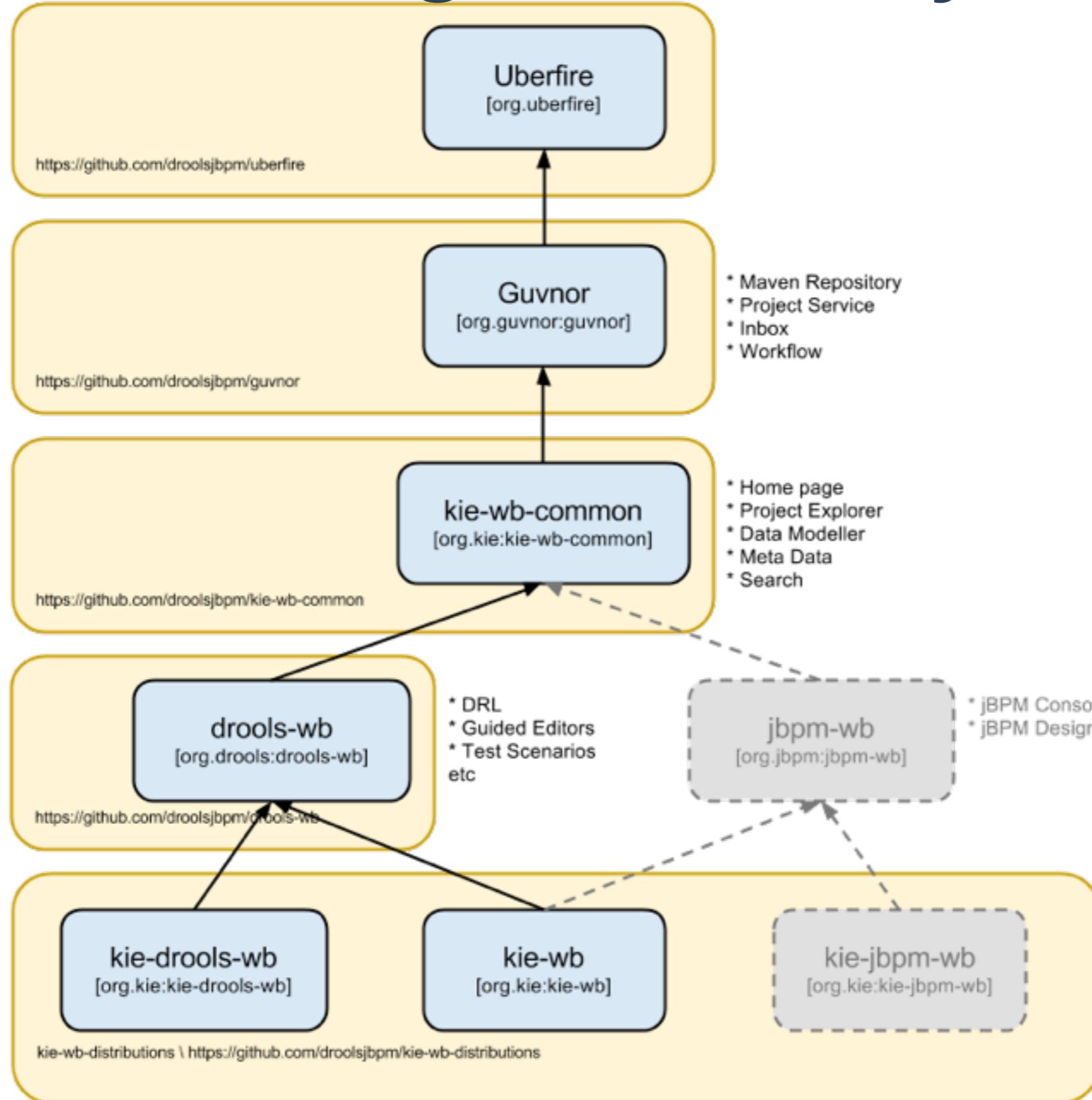
High Availability



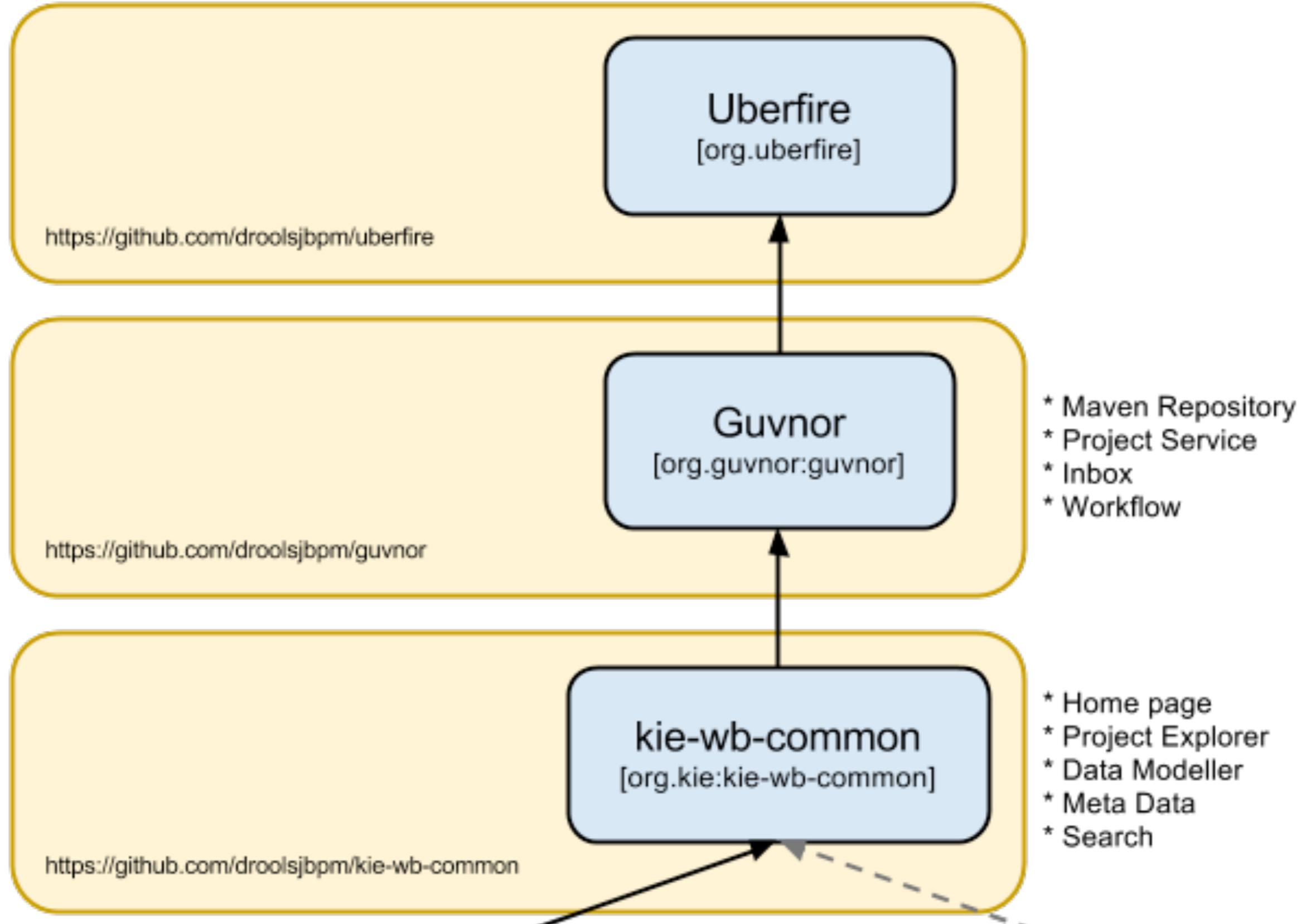
UberFire Architecture Overview



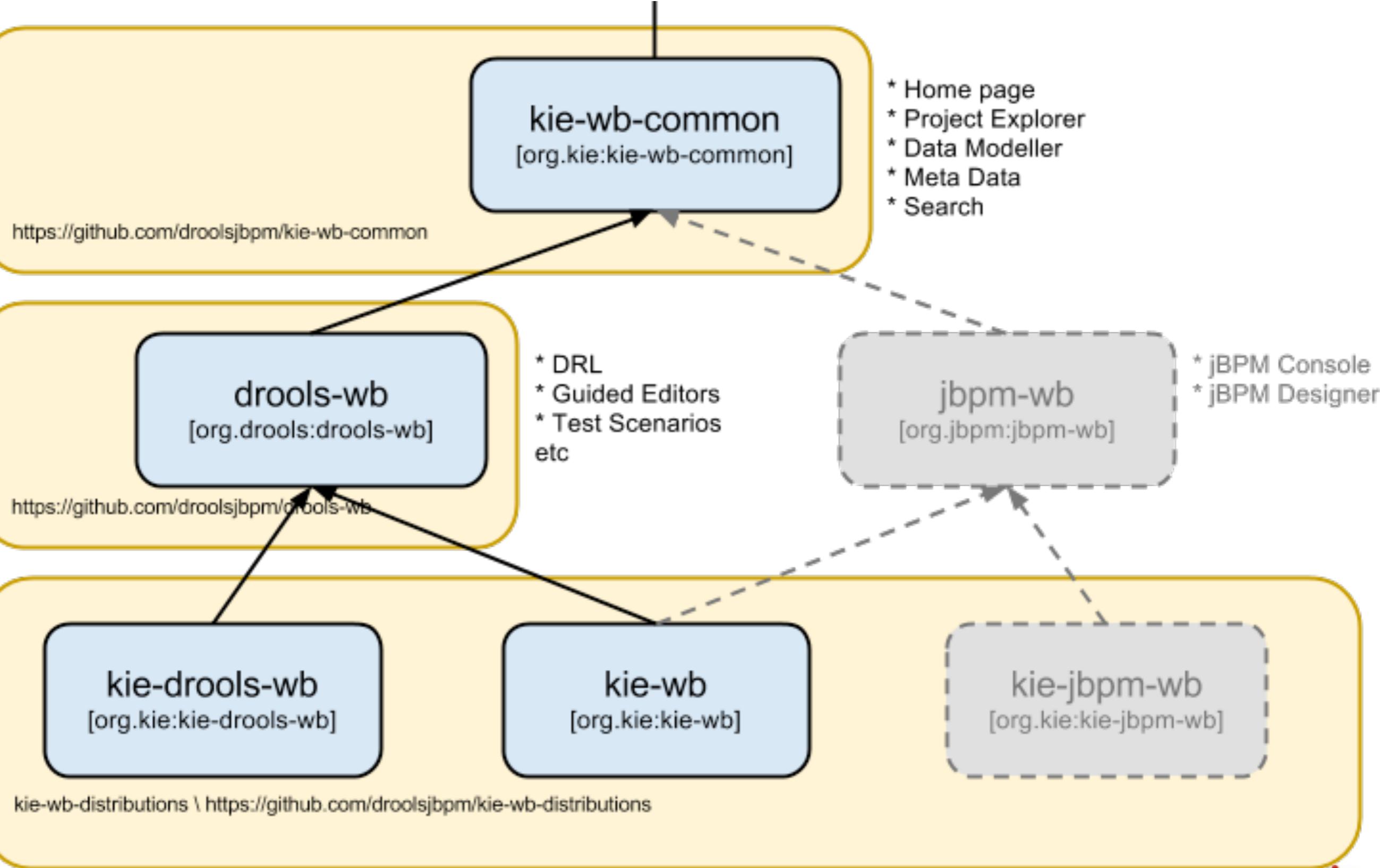
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Videos

Mark Proctor

Home Videos Playlists Discussion About 

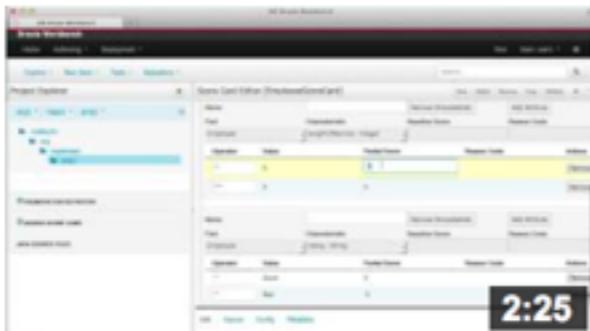


Share your thoughts

All activities ▾

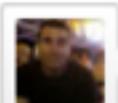


[Mark Proctor](#) uploaded and added to Drools Editor Metaphores

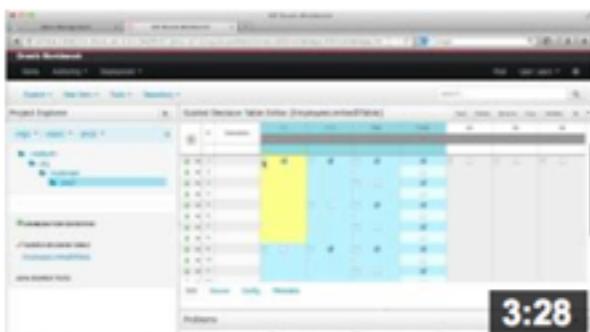


[Score Cards \(Full Screen 720HD\)](#)

2 months ago • 207 views



[Mark Proctor](#) uploaded and added to Drools Editor Metaphores



[Limited Entry Guided Decision \(Full Screen 720HD\)](#)

2 months ago • 255 views

Create a Limited Entry Guided Decision Table

KIE Workbench Videos

http://www.youtube.com/watch?v=vj3MNmiUnvY&index=2&list=PLb9jQNHBKBRj9IJkc_F5nCJAvXaegOGW8

Screenshot of a YouTube playlist titled "KIE Worbench" by Mark Proctor, containing 6 videos.

Index	Thumbnail	Video Title	Uploader	Duration
1		KIE Workbench Installation and Setup (Full Screen 720HD)	Mark Proctor	1:18
2		Authoring Perspective - Project Explorer (Full Screen 720HD)	Mark Proctor	2:11
3		Authoring Perspective - Window System (Full Screen 720HD)	Mark Proctor	1:43
4		Authoring Perspective - Problems and Versioning (Full Screen 720HD)	Mark Proctor	3:15
5		Project Editor and Deployment Perspective (Full Screen 720HD)	Mark Proctor	1:52
6		Organization Unit and Repository Administration Perspective (Full Screen 720HD)	Mark Proctor	4:48

Drools Editor Videos

<http://www.youtube.com/playlist?list=PLb9jQNHBKRipbtadRC-UaUObjwp0aBHJ>



Drools Editor Metaphores

by Mark Proctor • 7 videos • 979 views • 15 minutes

Add a description Play all Share Playlist settings Add video

Index	Video Title	Uploader	Duration
1	Create a Project (Full Screen 720HD)	Mark Proctor	1:09
2	Create a Model (Full Screen 720HD)	Mark Proctor	1:21
3	Limited Entry Guided Decision (Full Screen 720HD)	Mark Proctor	3:28
4	Extended Entry Guided Decision Table (Full Screen 720HD)	Mark Proctor	2:24
5	Rule Template (Full Screen 720HD)	Mark Proctor	1:53
6	Rule Fragment in Guided Decision Table (Full Screen 720HD)	Mark Proctor	3:16
7	Score Cards (Full Screen 720HD)	Mark Proctor	2:25

Workbench Home Page

KIE Workbench

Home Authoring Deploy Process Management Tasks Dashboards Find User: salaboy ?

Search...

The Knowledge Life Cycle

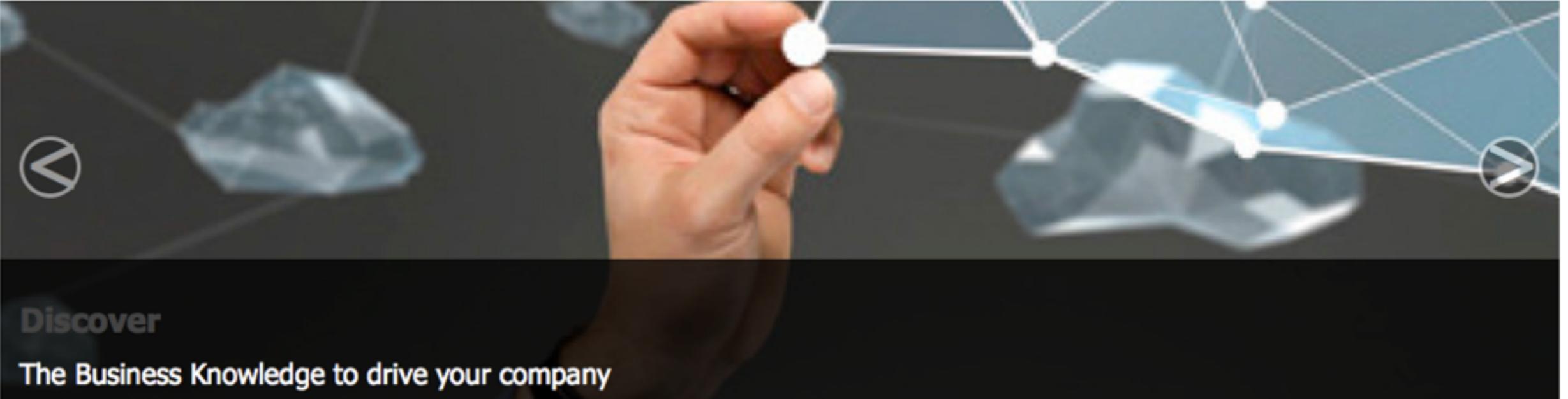
Authoring Deploy Process Management Tasks Dashboards

Project Authoring Deployments Process Definitions Tasks List

Artifact repository Jobs Process Instances

Administration

Business Dashboards



Discover
The Business Knowledge to drive your company

Helpful InfoPops

Help

The screenshot shows a modularized workbench interface. On the left, there's a sidebar titled "Project Explorer" containing a list of items like "File", "New asset", "Task", "Repository", "Assets", "Decision tables", "Decision rules", "Decision assets", "Decision assets", and "Test manager". In the center, there's a "Content Area" labeled "Opened assets are added here", which contains a "Guided Decision Table (pricing item)" with a table showing data for "Category", "Type", "Name", "Value", and "Status". Below the table is a "Problems" section. A large orange callout box highlights the "Project Explorer" sidebar. Another orange callout box highlights the "Content Area". A third orange callout box highlights the "Problems" section.

Project Explorer
Use this project explorer to navigate projects for your organizational's repository and create assets to author.

Content Area
Opened assets are added here

Problems
When you save, validation errors for the current project are shown here

Authoring
Modularized and customizable workbench

Don't show again

Close

KIE Workbench

Home Authoring Deploy Process Management Tasks Dashboards

Find User: jbpm

Explore New Item Tools

search...



Project Explorer

example / uf-playground / mortgages

<default>
org
mortgages

DRL

DOMAIN SPECIFIC LANGUAGE DEFINITION

ENUMERATION DEFINITION

GUIDED DECISION TABLE

GUIDED RULE

Bankruptcy history

No bad credit checks

no NINJAs

Underage

GUIDED RULE (WITH DSL)

JAVA SOURCE FILES

Guided Editor [Bankruptcy history]

EXTENDS

None selected

WHEN

1. There is a LoanApplication [a]

The following exists:

There is a Bankruptcy with:
any of the following:

2. yearOfOccurrence greater than

1990

- amountOwed greater than

10000

THEN

1. Retract LoanApplication [a]

Set value of LoanApplication [a]

approved

false

2. Set value of LoanApplication [a]

explanation

has been bankrupt

(show options...)

Edit Source Config Metadata

Problems

Level Text File Column Line

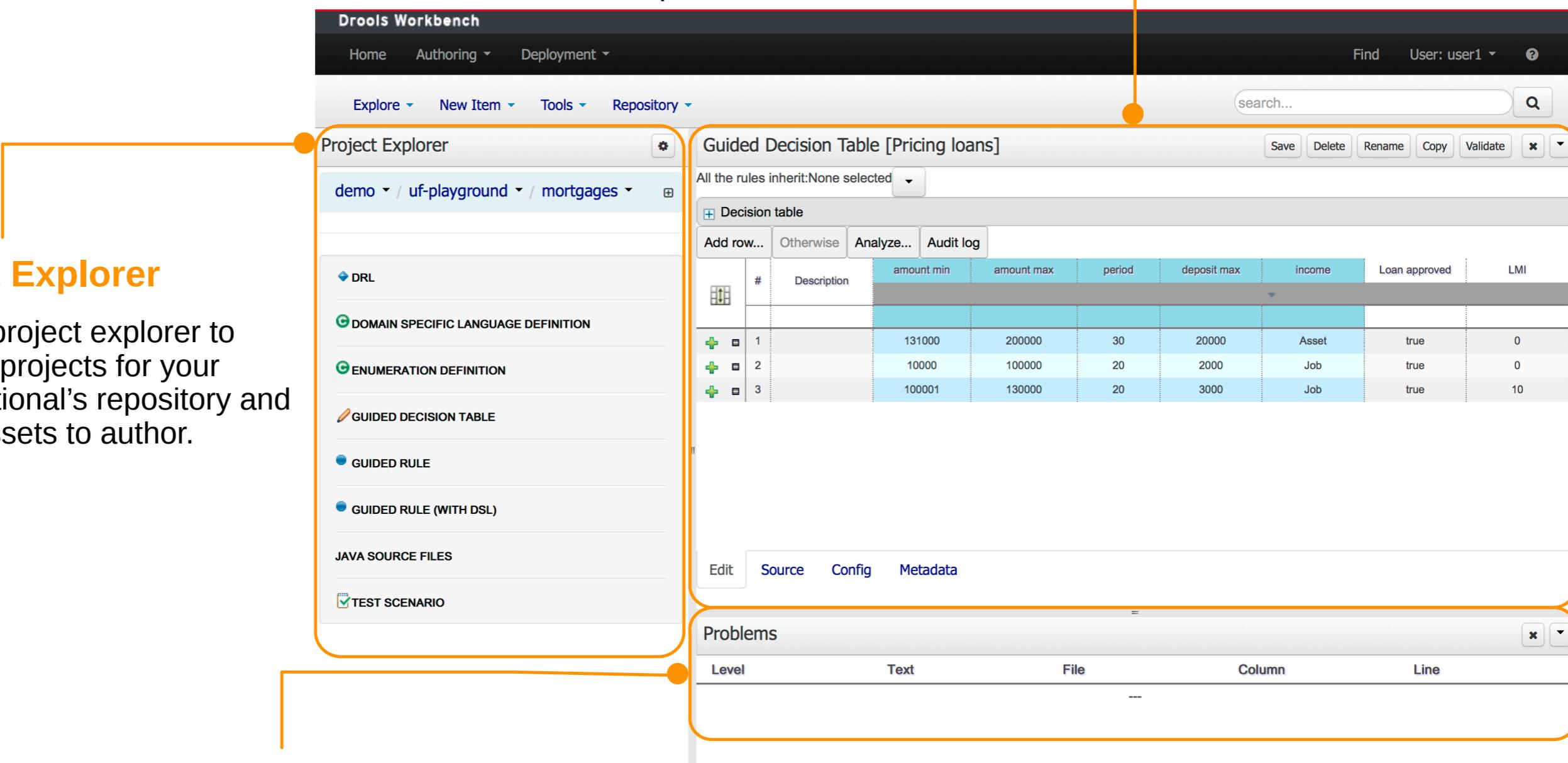
Authoring Perspective

Project Explorer

Use the project explorer to navigate projects for your organizational's repository and create assets to author.

Content Area

Opened assets are added here



Problems

When you save, validation errors for the current project are shown here

Tab Stack

Asset List

The opened assets are shown here. Click to continue authoring.

Guided Editor [CreditApproval]

- E Guided Editor [CreditApproval]
- V Guided Decision Table [Pricing loans]
- Test Scenario [Are they old enough]

THEN

1. Approve the loan

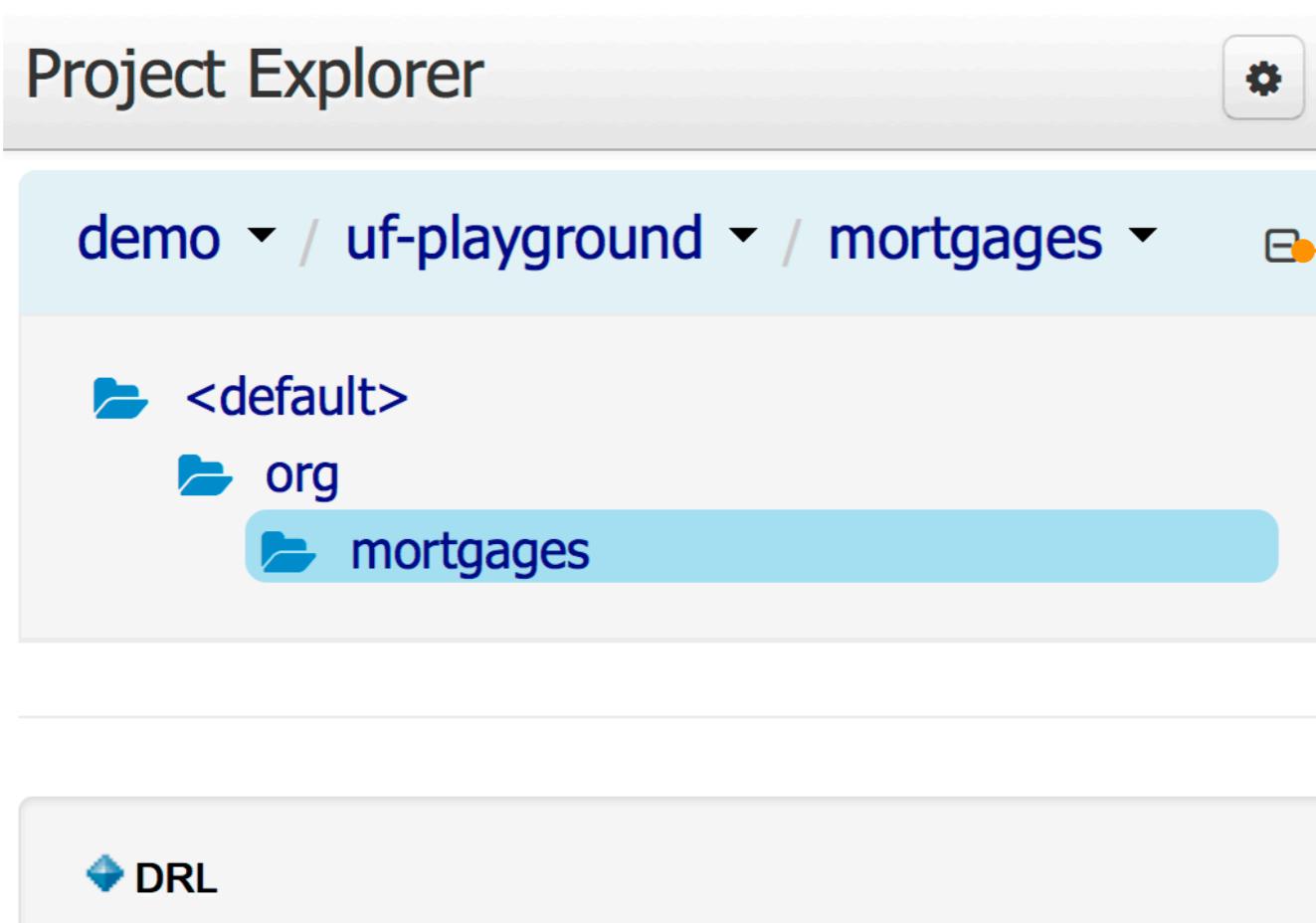
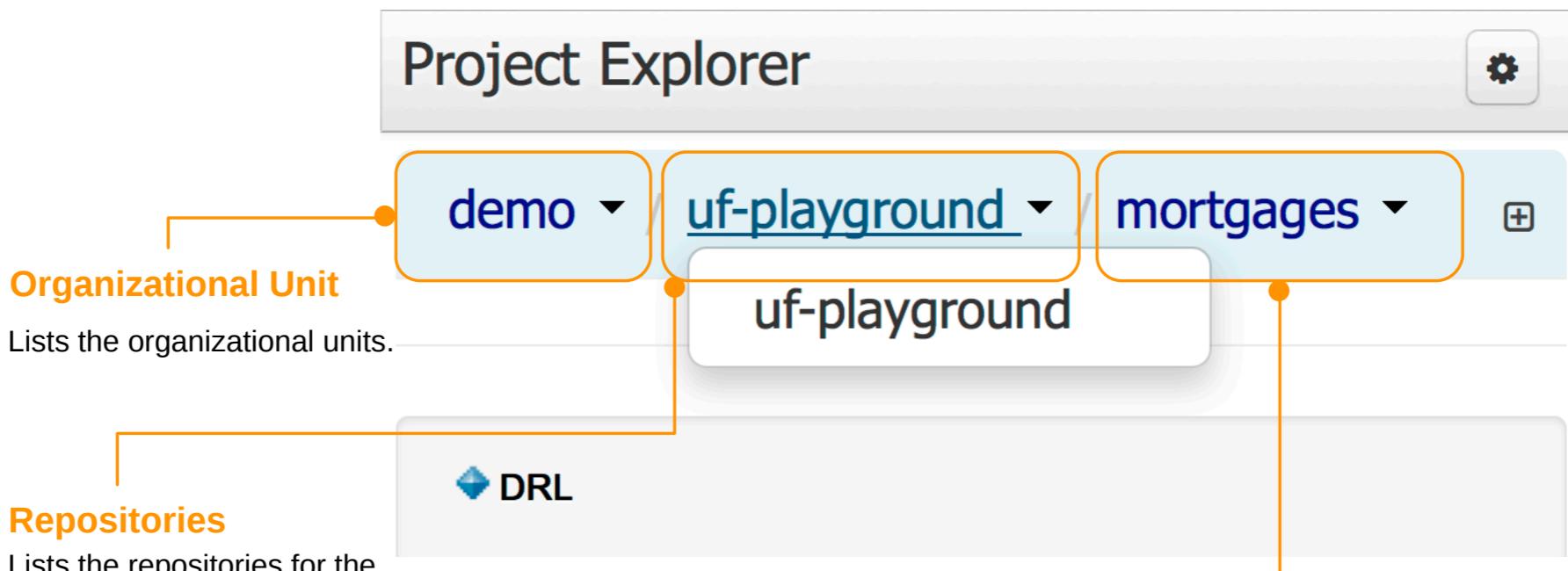
(show options...)

Tab Stack Button

Click the button to see the list of opened assets



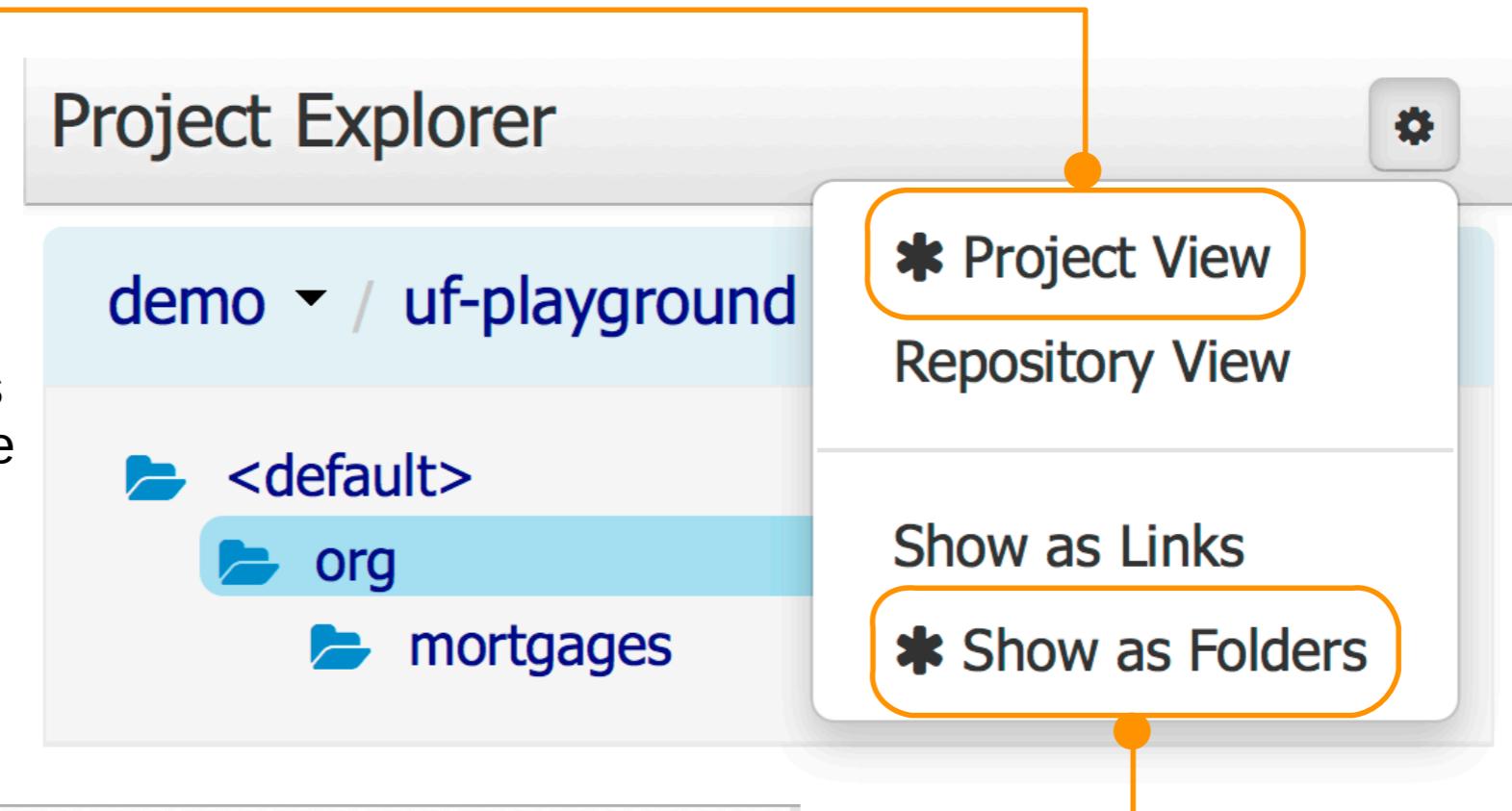
Project Explorer



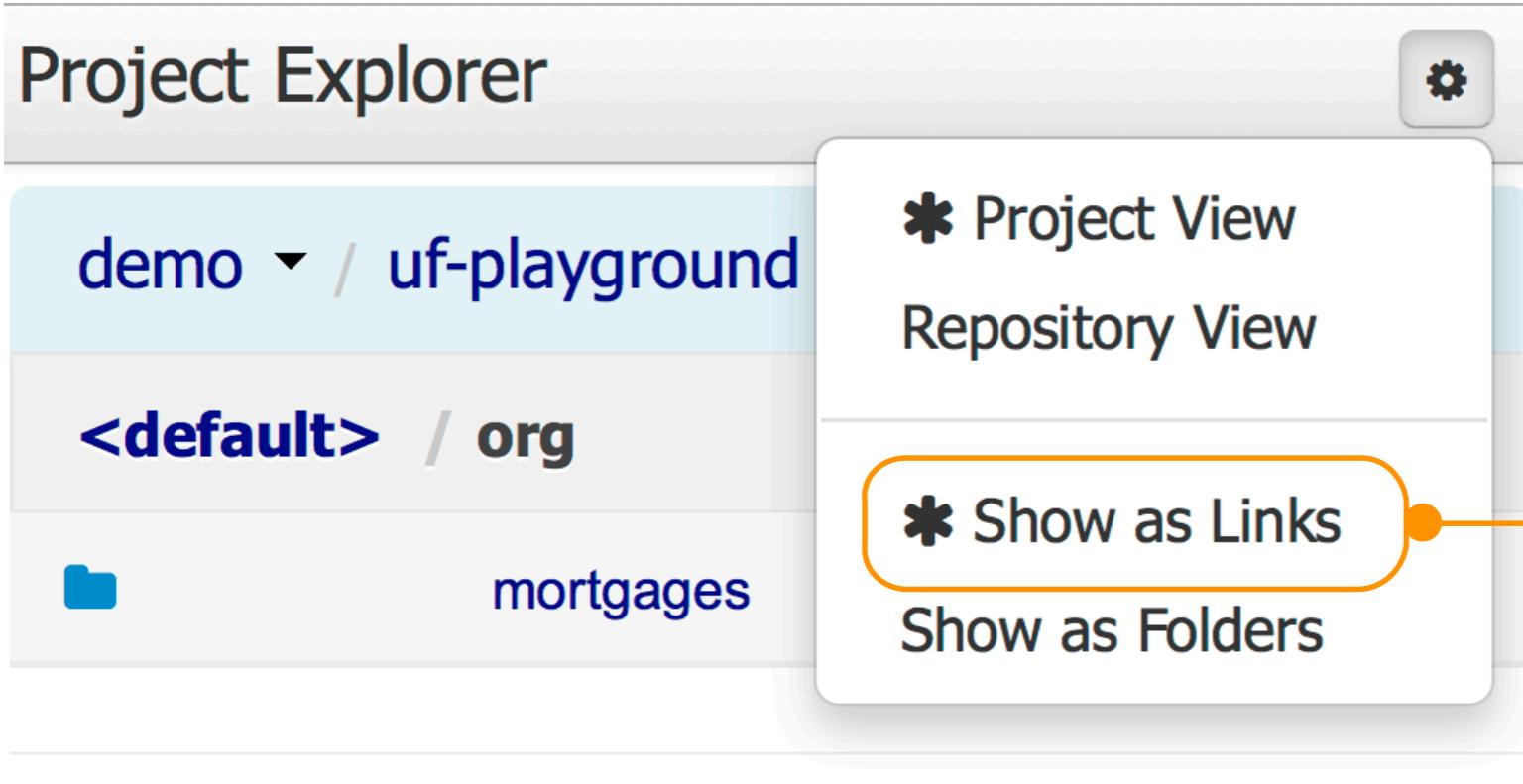
Project View

Project View

The project view is a simplified and hides many technical aspects of the project. Such as merging multiple paths into one tree.



Project Explorer



Show as Folders

Shows the project folders using a tree view.

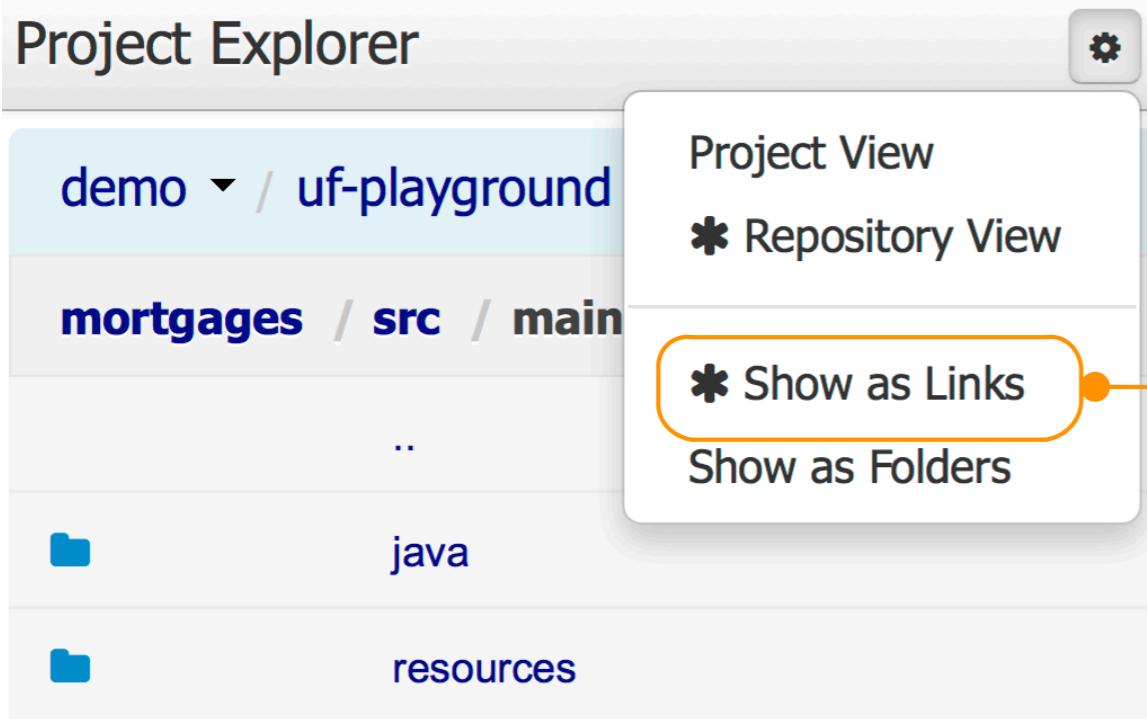
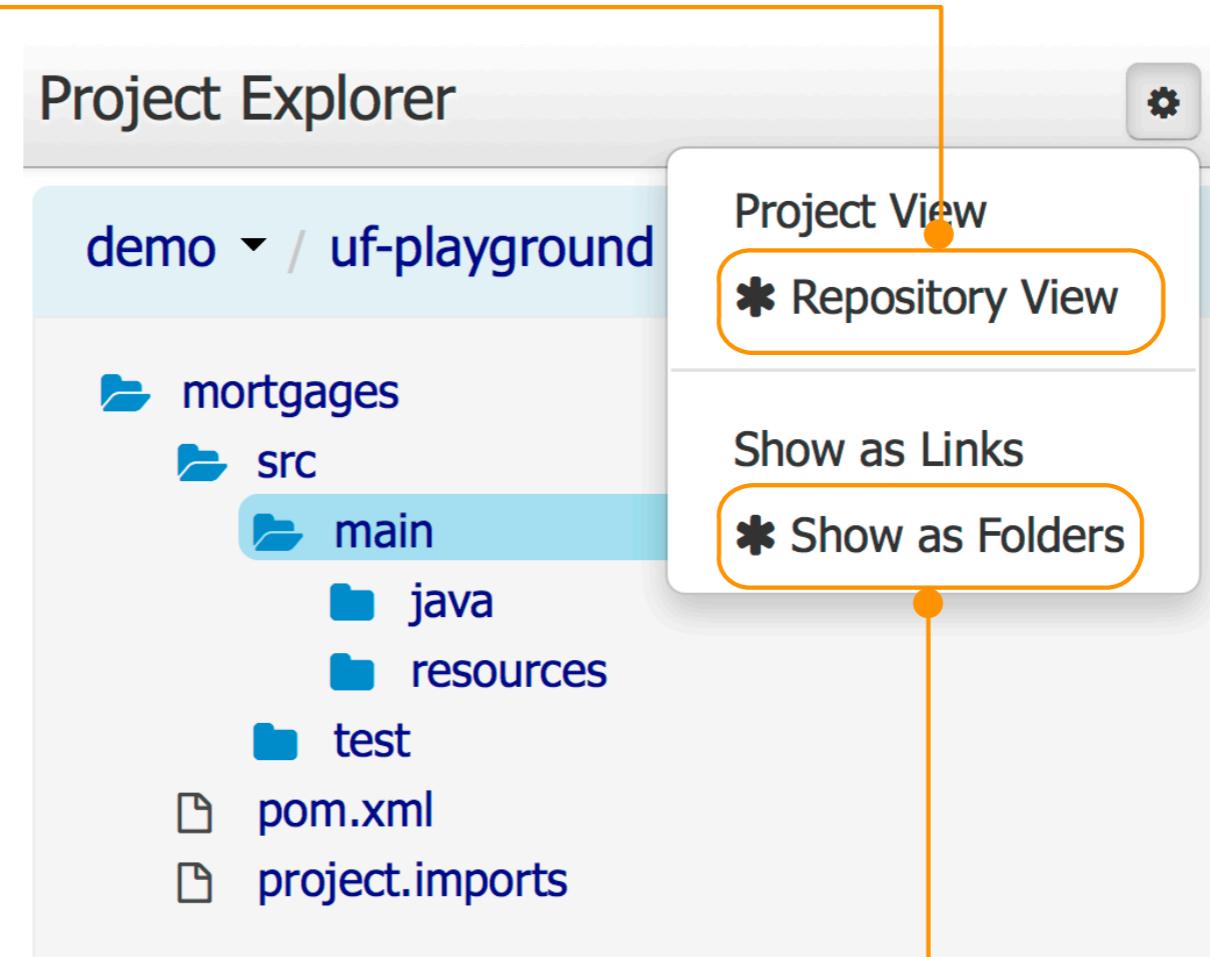
Show as Links

Compact view, that displays the folders as a single line path.

Repository View

Repository View

The repository view provides raw access to the project structure and files, nothing is hidden. And all paths are visible separately; see the java and resources folders.



Show as Folders

Shows the project folders using a tree view.

Show as Links

Compact view, that displays the folders as a single line path.

File Edit View History Bookmarks Tools Accessibility Help

Inbox (1) - michael.lansts@gma... X KIE Workbench

localhost:8080/kie-wb/org.kie.workbench.KIEWebapp/KIEWebapp.html?#default://master@uf-playground/mortgages/src/main/resource: ★ ○ Google

KIE Workbench

Home Authoring Deploy Process Management Tasks Dashboards Find User: jbpm

Explore New Item Tools search...

Project Explorer

- example / uf-playground / mortgages
 - <default>
 - org
 - mortgages

DRL

DOMAIN SPECIFIC LANGUAGE DEFINITION

ENUMERATION DEFINITION

GUIDED DECISION TABLE

GUIDED RULE

- Bankruptcy history
- No bad credit checks
- no NINJAs
- Underage

GUIDED RULE (WITH DSL)

JAVA SOURCE FILES

Guided Editor [Bankruptcy history]

EXTENDS None selected

WHEN

- There is a LoanApplication [a]
The following exists:
There is a Bankruptcy with:
any of the following:
- yearOfOccurrence greater
amountOwed greater

THEN

- Retract LoanApplication [a]
Set value of LoanApplication [a]
- Set value of LoanApplication [a]

(show options...)

Edit Source Config Metadata

Guided Editor [No bad credit checks]

EXTENDS None selected

WHEN

- There is a LoanApplication [app]
Any of the following are true:
There is an Applicant with:
creditRating equal to OK
- There is an Applicant with:
creditRating equal to Sub prime

THEN

- Retract LoanApplication [app]
Set value of LoanApplication [app] approved false
- Set value of LoanApplication [app] explanation Only AA

(show options...)

Edit Source Config Metadata

Problems

Level	Text	File	Column	Line
...



KIE Workbench

Home

Authoring

Deploy

Process Management

Tasks

Dashboards

Find

User: jbpm

Explore New Item Tools

search...



Project Explorer



example / uf-playground / mortgages

<default>

org

mortgages

DRL

DOMAIN SPECIFIC LANGUAGE DEFINITION

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Underage

GUIDED RULE (WITH DSL)

JAVA SOURCE FILES

Guided Editor [No bad credit checks]

EXTENDS

None selected

WHEN

1. There is a LoanApplication [app]

Any of the following are true:

There is an Applicant with:

creditRating equal to

2. There is an Applicant with:

creditRating equal to

THEN

1. Retract LoanApplication [app]

Set value of LoanApplication [app]

OK

Sub prime

2. Set value of LoanApplication [app]

approved

explanation

(show options...)

Edit

Source

Config

Metadata

Problems

Level

Text

File

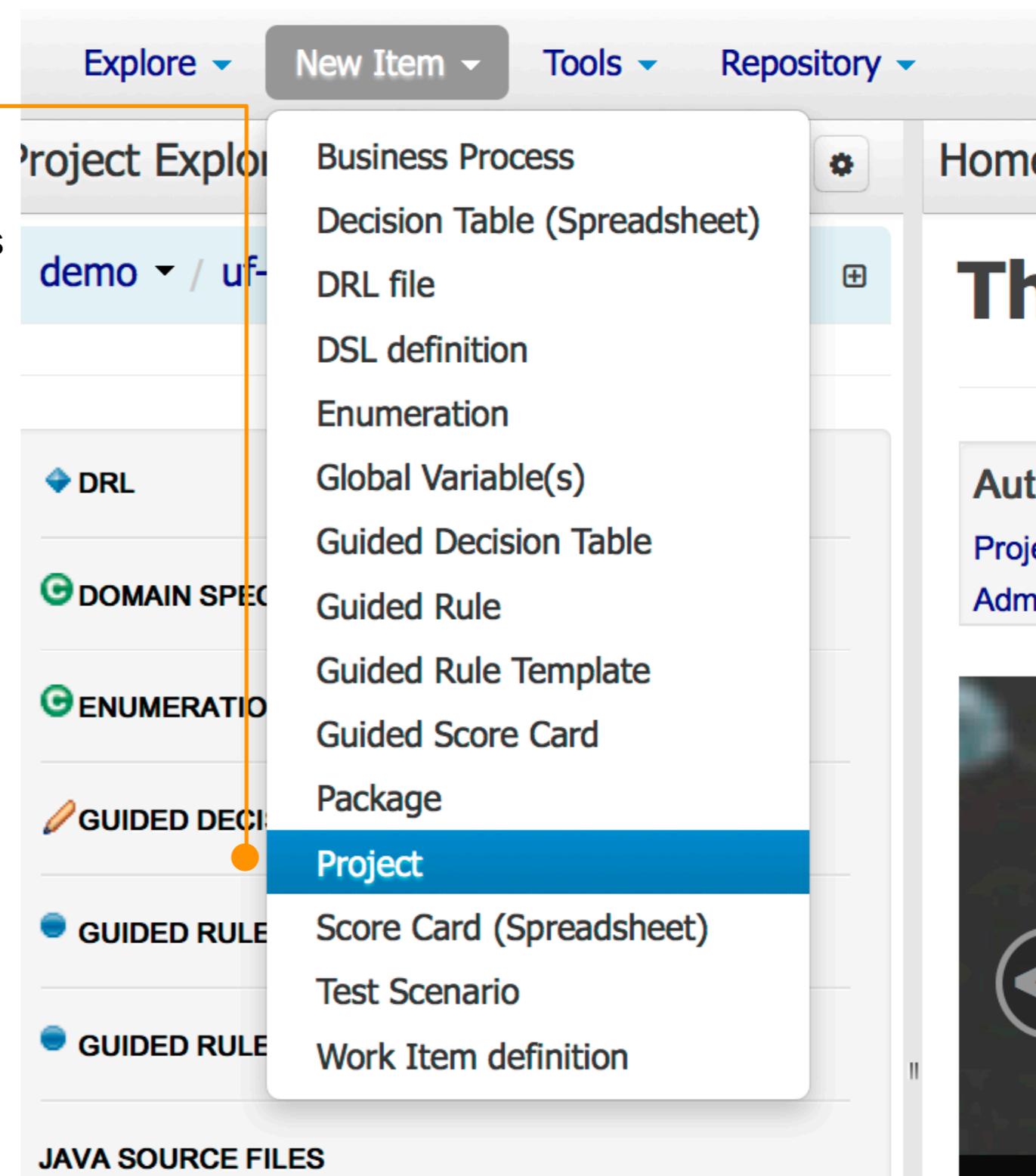
Column

Line

New Projects and Other Items

New Projects

Launches the new project wizard. Once created it appears under the project list for the target repository



Project Editor

Project: [human-resources:org.jbpm:1.0]

Save Delete Rename Copy Build & Deploy x ▼

Project General Settings

Project Name

Project Description

Group artifact version

Group ID Example: com.myorganization.myprojects ?

Artifact ID Example: MyProject ?

Version ID 1.0.0 ?

Project Dependencies

Project Screen X

Group ID

Artifact ID

Version ID

Dependencies

Add Add from repository

Group ID	Artifact ID	Version ID	
com.megacorp	hr-model	1.3	
com.megacorp	finance-model	24	

pom.xml pom.xml metadata kmodule.xml kmodule.xml metadata More... ▾

Build and Deploy

Explore ▾ New ▾ Tools ▾ File ▾ Build & Deploy

Project Screen ×

Group ID

Artifact ID

Version ID

Dependencies

Group ID	Artifact ID	Version

 JBoss®
by Red Hat

Repository Manager

Home Perspectives ▾ Logout Explore ▾ Find

Guvnor M2 REPOSITORY X

Upload new Jar:

Find items with a name matching:

Name	Path	LastModified	View Artifact Detail	Download
<input type="checkbox"/> org.test.mortgages-1.0.jar	org/guvnor/example/org.test.mortgages/1.0/org.test.mortgages-1.0.jar	2013 May 22 11:07:21	<input type="button" value="Open"/>	<input type="button" value="Download"/>

1 of 1

Repository Manager

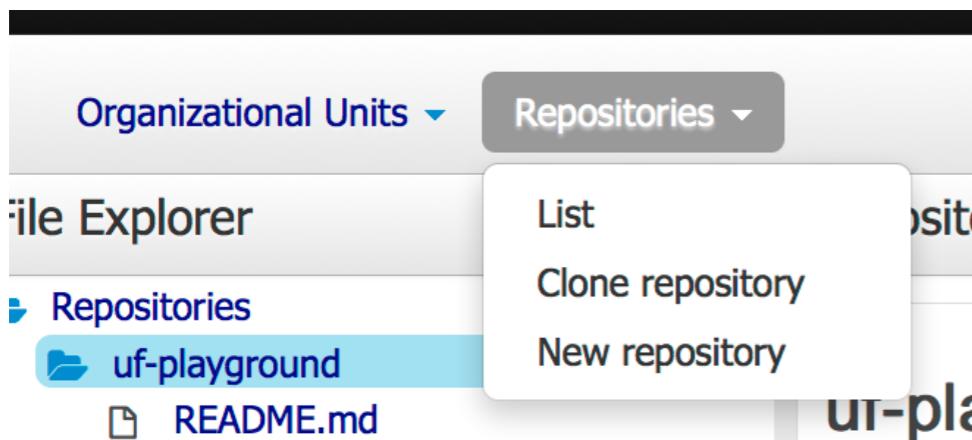
File List				
Name	Path	LastModified	Open	Download
mortgages-0.0.1.jar	mortgages/mortgages/0.0.1 /mortgages-0.0.1.jar	2013 Nov 16 15:46:40	Open	Download
example-1.0.jar	org/drools/example/1.0/example-1.0.jar	2013 Nov 16 15:08:26	Open	Download
jboss-modules-1.1.1.GA.jar	org/jboss/modules/jboss-modules/1.1.1.GA/jboss-modules-1.1.1.GA.jar	2013 Nov 16 15:07:18	Open	Download
async-examples-1.0.jar	org/jbpm/example/async-examples/1.0/async-examples-1.0.jar	2013 Nov 16 16:14:33	Open	Download
HR-1.0.jar	org/jbpm/HR/1.0/HR-1.0.jar	2013 Nov 16 16:14:13	Open	Download

« ‹ › » 1-5 of 5

GIT Repositories

Repositories

Create or clone GIT repositories



Create Repository

Repository Infomation * is required

* Repository Name

* Organizational Unit

Clone Repository

Repository Infomation * is required

* Repository Name

* Organizational Unit

* Git URL

Organizational Units

Manage Organizational Units

Create Organizational Units and associate repositories with them.

The screenshot shows the JBoss Repository Manager interface with the 'Manage Organizational Units' tab selected. On the left, a sidebar displays a tree view of repositories under 'uf-playground': 'uf-playground' (selected), 'README.md', 'categories.xml', 'mortgages', and 'todo.md'. The main panel is titled 'Organizational Unit Manager' and contains three sections: 'Organizational Units' (listing 'demo : demo@demo.org'), 'Associated repositories' (listing '-- No Organizational Unit selected'), and 'Available repositories' (listing '-- No Organizational Unit selected'). Below these sections are three buttons: '+ Add', 'Edit', and 'Delete'.

BRMS 5.0 Programmatic API

```
KnowledgeBuilder kbuilder = KnowledgeBuilderFactory.newKnowledgeBuilder();

kbuilder.batch().add( newClassPathResource( "Model.drl", getClass() ), DRL )
    .add( newClassPathResource( "Queries.drl", getClass() ), DRL )
    .add( newClassPathResource( "General.drl", getClass() ), DRL )
    .add( newClassPathResource( "Response.drl", getClass() ), DRL )
    .add( newClassPathResource( "Events.drl", getClass() ), DRL )
    .add( newClassPathResource( "UiView.drl", getClass() ), DRL )
    .add( newClassPathResource( "Commands.drl", getClass() ), DRL ).build()

if ( kbuilder.hasErrors() ) {
    System.out.println( kbuilder.getErrors().toString() );
    System.exit( 1 );
}

KieBaseConfiguration kbaseConf = KnowledgeBaseFactory.newKnowledgeBaseConfiguration();
kbaseConf.setOption( EqualityBehaviorOption.EQUALITY );

KnowledgeBase kbase = KnowledgeBaseFactory.newKnowledgeBase( kbaseConf );
kbase.addKnowledgePackages( kbuilder.getKnowledgePackages() );

Counter c = new Counter();
ksession = kbase.newStatefulKnowledgeSession();
```

KieModules

- Discovery
 - META-INF/kmodule.xml
- Convention based
- No programmatic api for building
- Multiple Named entities
- Inheritance of Resources
- Defaults for lazy people
- Version built in a standard

GitHub Examples

- <https://github.com/droolsjbpm/drools/tree/master/drools-examples>

The screenshot shows a GitHub repository page for 'drools-examples-api' at the 'master' branch. The page title is 'drools/drools-examples-api at master · droolsjbpm/drools · GitHub'. The navigation bar includes links for Google UK, Froogle UK, 100 Greatest...itar Albums, Answering M...m the Past, Create a stu...igner Depot, NEXT – Nati... and HTML5, Import to Mendeley, and a search bar.

The main content area displays a list of files with their commit history:

File	Last Commit	Description
default-kiesession-from-file	a month ago	to version 6.0.0-SNAPSHOT [mbiarnes]
default-kiesession	a month ago	to version 6.0.0-SNAPSHOT [mbiarnes]
kie-module-from-multiple-files	a month ago	to version 6.0.0-SNAPSHOT [mbiarnes]
kiebase-inclusion	a month ago	to version 6.0.0-SNAPSHOT [mbiarnes]
kiecontainer-from-kierepo	a month ago	to version 6.0.0-SNAPSHOT [mbiarnes]
kiefilesystem-example	a month ago	to version 6.0.0-SNAPSHOT [mbiarnes]
kiemodulemodel-example	a month ago	to version 6.0.0-SNAPSHOT [mbiarnes]
named-kiesession-from-file	a month ago	to version 6.0.0-SNAPSHOT [mbiarnes]
named-kiesession	a month ago	to version 6.0.0-SNAPSHOT [mbiarnes]
.gitignore	4 months ago	add kie api examples [mariofusco]
pom.xml	a month ago	to version 6.0.0-SNAPSHOT [mbiarnes]

KieModules

```
<kmodule xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
         xmlns="http://jboss.org/kie/6.0.0/kmodule">

</kmodule>
```

```
KieServices ks = KieServices.Factory.get();
KieContainer kContainer = ks.getKieClasspathContainer();

KieSession kSession = kContainer.newKieSession();
kSession.setGlobal("out", out);
kSession.insert(new Message("Dave", "Hello, HAL. Do you read me, HAL?"));
kSession.fireAllRules();
```

main/.../kmodule.xml - [default-kiesession] - KIE - [/dev/kie620130315/intellij] 62

Project: DefaultKieSessionExampleTest

File: kmodule.xml

```
<?xml version="1.0" encoding="UTF-8"?>
<kmodule
    xmlns="http://jboss.org/kie/6.0.0/kmodule">
</kmodule>
```

Message.java

Hal1.drl

DefaultKieSessionExampleTest.java

DefaultKieSessionExample.java

1: Project

2: Structure

3: Favorites

4: Run

5: TODO

6: Changes

7: Problems

8: Event Log

9: Tests Passed: 1 passed (a minute ago)

10: 1:1

11: LF

12: UTF-8

13: Git: sm

14: 315M of 666M

15: Commander

16: Ant Build

17: Database

18: IDEtalk

19: CDI

20: Maven Projects

KieModules

- Named Entities and JAR on Classpath
- Creates one KieBase
- Includes resources from package matching kbase name

```
<kmodule xmlns="http://jboss.org/kie/6.0.0/kmodule">  
  
    <kbase name="kbase1">  
        <ksession name="ksession1"/>  
    </kbase>  
  
</kmodule>
```

```
KieServices ks = KieServices.Factory.get();  
KieContainer kContainer = ks.getKieClasspathContainer();  
  
KieSession kSession = kContainer.newKieSession("ksession1");  
kSession.setGlobal("out", out);  
kSession.insert(new Message("Dave", "Hello, HAL. Do you read me, HAL?"));  
kSession.fireAllRules();
```

kiebase-inclusion/pom.xml - [kiebase-inclusion] - KIE - [~/dev/kie620130315/intellij] 64

Project: drools-examples-api / kiebase-inclusion / pom.xml

1: Project

2: Structure

3: Favorites

4: Run DefaultKieSessionExampleTest

5: TODO

6: Changes

7: Problems

8: Event Log

9: pom.xml

10: KieBaseInclusionExample.java

11: kiebase-inclusion

12: kmodule.xml

13: Hal2.drl

14: KieBaseInclusionExampleTest.java

15: Commander

16: Ant Build

17: Database

18: IDEtalk

19: CDI

20: Maven Projects

File: pom.xml

```
<?xml version="1.0" encoding="UTF-8"?>
<project xmlns="http://maven.apache.org/POM/4.0.0"
          xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
          xsi:schemaLocation="http://maven.apache.org/POM/4.0.0 http://maven.apache.org/xsd/maven-4.0.0.xsd">
    <parent>
        <artifactId>drools-examples-api</artifactId>
        <groupId>org.drools</groupId>
        <version>6.0.0-SNAPSHOT</version>
    </parent>
    <modelVersion>4.0.0</modelVersion>

    <artifactId>kiebase-inclusion</artifactId>
    <name>Drools API examples – KieBase Inclusion</name>

    <dependencies>
        <dependency>
            <groupId>org.drools</groupId>
            <artifactId>drools-compiler</artifactId>
        </dependency>
        <dependency>
            <groupId>org.drools</groupId>
            <artifactId>named-kiesession</artifactId>
            <version>6.0.0-SNAPSHOT</version>
        </dependency>
    </dependencies>

```

Run: DefaultKieSessionExampleTest

Done: 1 of 1 (1s)

SLF4J: Failed to load class "org.slf4j.impl.StaticLoggerBinder".
SLF4J: Defaulting to no-operation (NOP) logger implementation
SLF4J: See <http://www.slf4j.org/codes.html#StaticLoggerBinder> for further details.
kmodules: file:/Users/mdproctor/dev/kie620130315/drools/drools-examples-api/default-kiesession/target/c
Dave: Hello, HAL. Do you read me, HAL?
HAL: Dave. I read you.

Tests Passed: 1 passed (6 minutes ago)

1:1/39 LF UTF-8 Git: sm 341M of 666M

KieModules

- Named Entities, with inheritance and JAR on Classpath
- Two projects, one “includes” from the other

```
<dependency>
  <groupId>org.drools</groupId>
  <artifactId>named-kiesession</artifactId>
  <version>6.0.0-SNAPSHOT</version>
</dependency>
```

```
<kbase name="kbase2" includes="kbase1">
  <ksession name="ksession2"/>
</kbase>
```

```
KieServices ks = KieServices.Factory.get();
KieContainer kContainer = ks.getKieClasspathContainer();
KieSession kSession = kContainer.newKieSession("ksession2");
kSession.setGlobal("out", out);
```

```
kSession.insert(new Message("Dave", "Hello, HAL. Do you read me, HAL?"));
kSession.fireAllRules();
```

```
kSession.insert(new Message("Dave", "Open the pod bay doors, HAL."));
kSession.fireAllRules();
```

KieModules

- Package location can over-ride kbase name defaults

```
<kbase name="WumpusMainKB" packages="org.drools.games.wumpus.server,  
                                org.drools.games.wumpus.server.view">  
    <ksession name="WumpusMainKS" />  
</kbase>  
  
<kbase name="WumpusClientKB" packages="org.drools.games.wumpus.client">  
    <ksession name="WumpusClientKS"/>  
</kbase>
```

```
KieContainer kc = KieServices.Factory.get().getKieClasspathContainer();  
final KieSession serverKsession = kc.newKieSession( "WumpusMainKS" );  
final KieSession clientKsession = kc.newKieSession( "WumpusClientKS" );
```

Dynamic KieModules

- JARs can be loaded from URLs into KieRepository
- Once loaded they can be resolved via ReleaseId

```
KieServices ks = KieServices.Factory.get();
KieRepository kr = ks.getRepository();

KieModule kModule = kr.addKieModule(ks.getResources().newFileSystemResource(
    getFile("default-kiesession")));
    
KieContainer kContainer = ks.newKieContainer(kModule.getReleaseId());

KieSession kSession = kContainer.newKieSession();
kSession.setGlobal("out", out);

Object msg1 = createMessage(kContainer,
                            "Dave", "Hello, HAL. Do you read me, HAL?");
kSession.insert(msg1);
kSession.fireAllRules();
```

Dynamic KieModules

- kie-ci use embedded maven for remote discovery

```
<dependency>
  <groupId>org.kie</groupId>
  <artifactId>kie-ci</artifactId>
</dependency>
```

```
KieServices ks = KieServices.Factory.get();

// Install example1 in the local maven repo before to do this
KieContainer kContainer = ks.newKieContainer(
    ks.newReleaseId("org.drools",
                    "named-kiesession",
                    "6.0.0-SNAPSHOT"));

KieSession kSession = kContainer.newKieSession("ksession1");
kSession.setGlobal("out", out);

Object msg1 = createMessage(kContainer,
                           "Dave", "Hello, HAL. Do you read me, HAL?");
kSession.insert(msg1);
kSession.fireAllRules();
```

Dynamic KieModules

```
// create a new kjar
InternalKieModule kJar2 = createKieJar(ks, releaseId, "rule2", "rule3");

// deploy it on maven
repository.deployArtifact(releaseId, kJar2, kPom);

// since I am not calling start() on the scanner it means it won't have
// automatic scheduled scanning
KieScanner scanner = ks.newKieScanner(kieContainer);

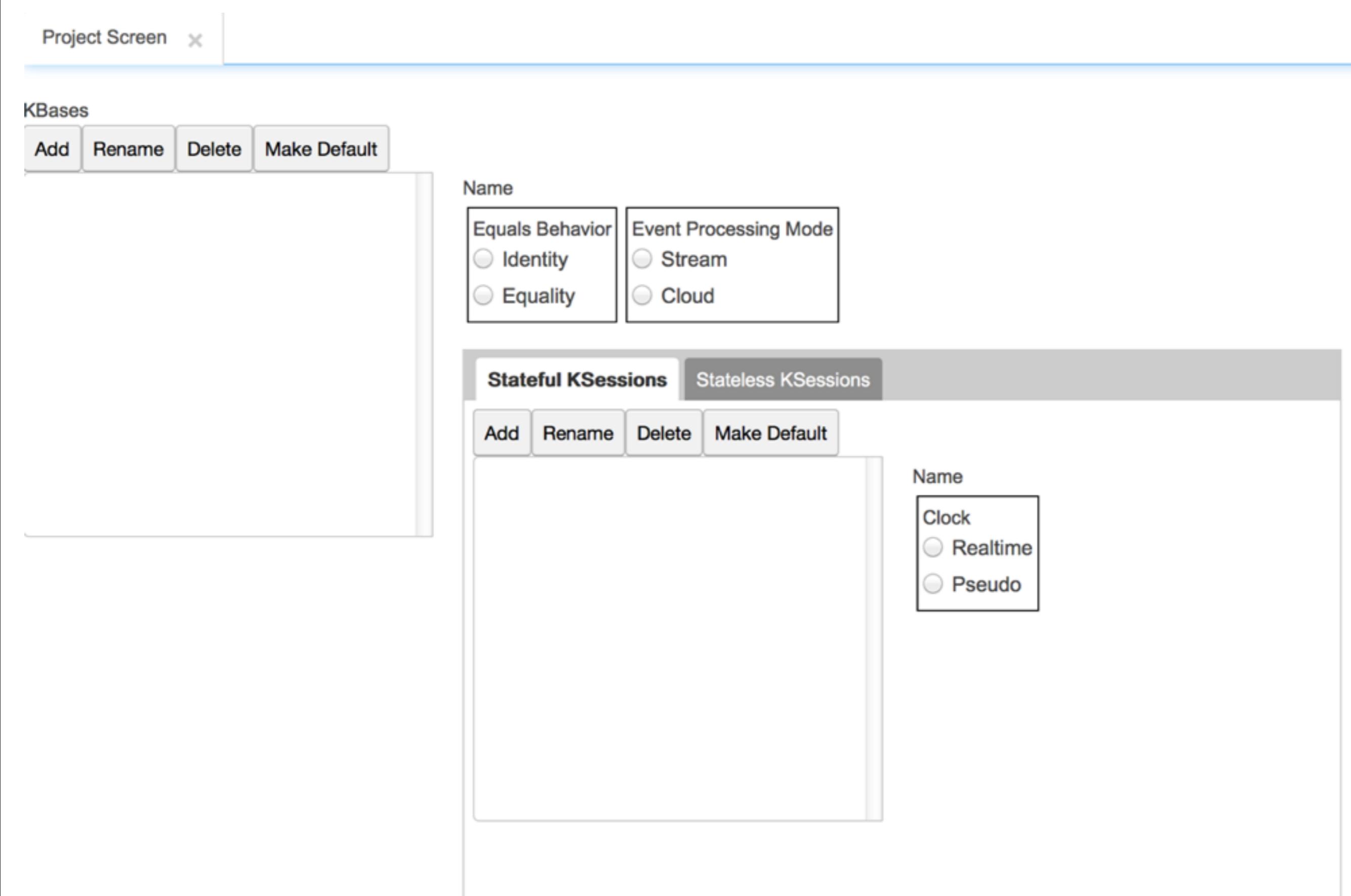
// scan the maven repo to get the new kjar version and deploy it on the
// kcontainer
scanner.scanNow();

// create a ksesion and check it works as expected
KieSession ksession2 = kieContainer.newKieSession("KSession1");
checkKSession(ksession2, "rule2", "rule3");
```

Maven Versions

- <version>1.0.1</version>
- <version>[1.0.0,2.0.0)</version>
- <version>[1.0.0,)</version>
- <version>LATEST</version>
- <version>RELEASE</version>
- <version>SNAPSHOT</version>

kmodule.xml Editor



Programmatic API

- Builder API, for tooling integration
- Incremental compilation, and problem reporting

```
KieServices ks = KieServices.Factory.get();
KieRepository kr = ksgetRepository();
KieFileSystem kfs = ks.newKieFileSystem();

kfs.write("src/main/resources/org/kie/example5/HAL5.drl", getRule());

KieBuilder kb = ks.newKieBuilder(kfs);

kb.buildAll(); // kieModule is automatically deployed to KieRepository if
successfully built.
if (kb.getResults().hasMessages(Level.ERROR)) {
    throw new RuntimeException("Build Errors:\n" + kb.getResults().toString());
}

KieContainer kContainer = ks.newKieContainer(kr.getDefaultReleaseId());

KieSession kSession = kContainer.newKieSession();
kSession.setGlobal("out", out);

kSession.insert(new Message("Dave", "Hello, HAL. Do you read me, HAL?"));
kSession.fireAllRules();
```

BRMS 6.0

CDI

CDI Context and Dependency

- CDI injects named entities from the kmodule.xml
- Injectable types
- KieServices
- KieContainer
- KieBase
- KieSession
- StatelessKieSession

KBase

```
@Inject  
private KieBase defaultClassPathKBase;
```

```
@Inject  
@KReleaseId( groupId = "jar1",  
               artifactId = "art1",  
               version = "1.0")  
private KieBase defaultDynamicKBase;
```

```
@Inject  
@KBase(value="jar1.KBase1", name="kb2")  
@KReleaseId( groupId = "jar1",  
               artifactId = "art1",  
               version = "1.0")  
private KieBase jar1KBase1kb2;
```

```
@Inject  
@KBase(value="jar1.KBase1", name="kb2")  
@KReleaseId( groupId = "jar1",  
               artifactId = "art1",  
               version = "1.0")  
private KieBase jar1KBase1kb22;
```

```
@Inject  
@KBase("jar1.KBase1")  
@KReleaseId( groupId = "jar1",  
               artifactId = "art1",  
               version = "1.0")  
private KieBase jar1KBase1v10;
```

```
@Inject  
@KBase("jar1.KBase1")  
@KReleaseId(groupId = "jar1",  
               artifactId = "art1",  
               version = "1.1")  
private KieBase jar1KBase1v11;
```

```
@Inject  
@KBase(value="jar1.KBase1", name="kb1")  
@KReleaseId( groupId = "jar1",  
               artifactId = "art1",  
               version = "1.0")  
private KieBase jar1KBase1kb1;
```

KSession

```
@Inject  
@KSession("jar1.KSession2")  
@KReleaseId( groupId = "jar1",  
              artifactId = "art1",  
              version = "1.0" )  
private KieSession kbase1ksession2v10;  
  
@Inject  
@KSession("jar1.KSession2")  
@KReleaseId( groupId = "jar1",  
              artifactId = "art1",  
              version = "1.1" )  
private KieSession kbase1ksession2v11;
```

```
@Inject  
@KSession(value="jar1.KSession2", name="ks1")  
@KReleaseId( groupId = "jar1",  
              artifactId = "art1",  
              version = "1.0" )  
private KieSession kbase1ksession2ks1;  
  
@Inject  
@KSession(value="jar1.KSession2", name="ks2")  
@KReleaseId( groupId = "jar1",  
              artifactId = "art1",  
              version = "1.0" )  
private KieSession kbase1ksession2ks2 ;  
  
@Inject  
@KSession(value="jar1.KSession2", name="ks2")  
@KReleaseId( groupId = "jar1",  
              artifactId = "art1",  
              version = "1.0" )  
private KieSession kbase1ksession2ks22;
```

BRMS 6.0

Spring and Camel

Spring and Camel

```
<kie:kmodule id="CxfRsSpring">
  <kie:kbase name="test1" packages="test1">
    <kie:ksession name="ksession1">
      <kie:batch>
        <kie:set-global identifier="list" >
          <bean class="java.util.ArrayList" />
        </kie:set-global>
      </kie:batch>
    </kie:ksession>
    <kie:ksession name="ksession2"/>
  </kie:kbase>
</kie:kmodule>
```

Spring and Camel

```
<bean id="kiePolicy" class="org.kie.camel.component.KiePolicy" />

<camelContext id="camel" xmlns="http://camel.apache.org/schema/spring">

    <route>
        <from uri="cxfrs://bean://rsServer"/>
        <policy ref="kiePolicy">
            <unmarshal ref="xstream" />
            <to uri="kie:ksession1" />
            <marshal ref="xstream" />
        </policy>
    </route>

    <route id="x1">
        <from uri="direct://http"/>
        <policy ref="kiePolicy">
            <to uri="cxfrs://http://localhost:58001/rest"/>
        </policy>
    </route>

</camelContext>
```

BRMS 6.0

R.I.P Rete

R.I.P RETE

inspirations:

- Leaps, Collection Oriented Match, L/R Unlinking

New Innovations

- Full Rule, and Rule Segment Unlinking
- Lazy Evaluation, with Rule scoping
- Set propagations

Previous Innovations

- Modify In Place
- Property Reactive
- Tree Based Graphs
- Subnetwork support

Legacy Systems and Migration

- Legacy API Adapter JAR
- Most API's should work with legacy adapter
- KnowledgeAgents have not been ported,
PKG's are not longer the unit of deployment
- JCR Migration Tool
- Command Line Java code
- Each Package maps to a GIT project

jBPM 6

jBPM6

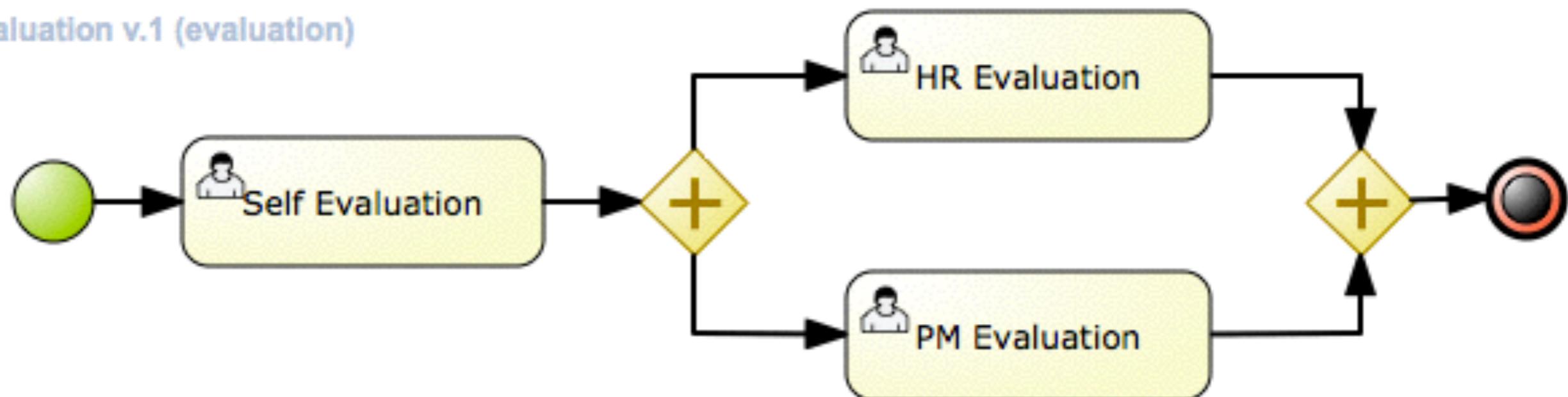
- The Framework
- The BPM Suite (KIE-Workbench)
- The jBPM Community

The Framework

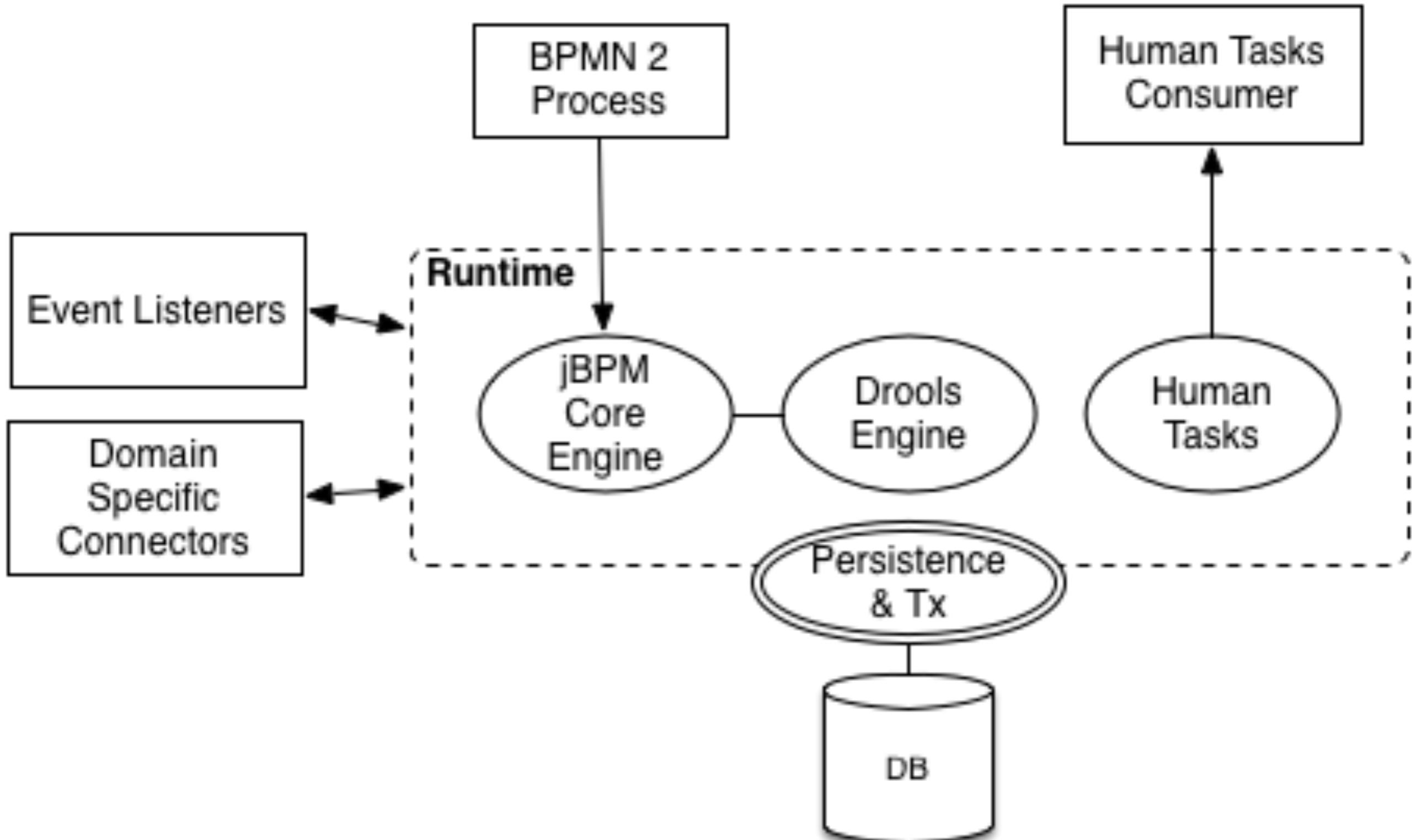
- Process Engine
 - Flexible
 - Lightweight
 - Embeddable
 - Standard Notation (BPMN2)

Processes

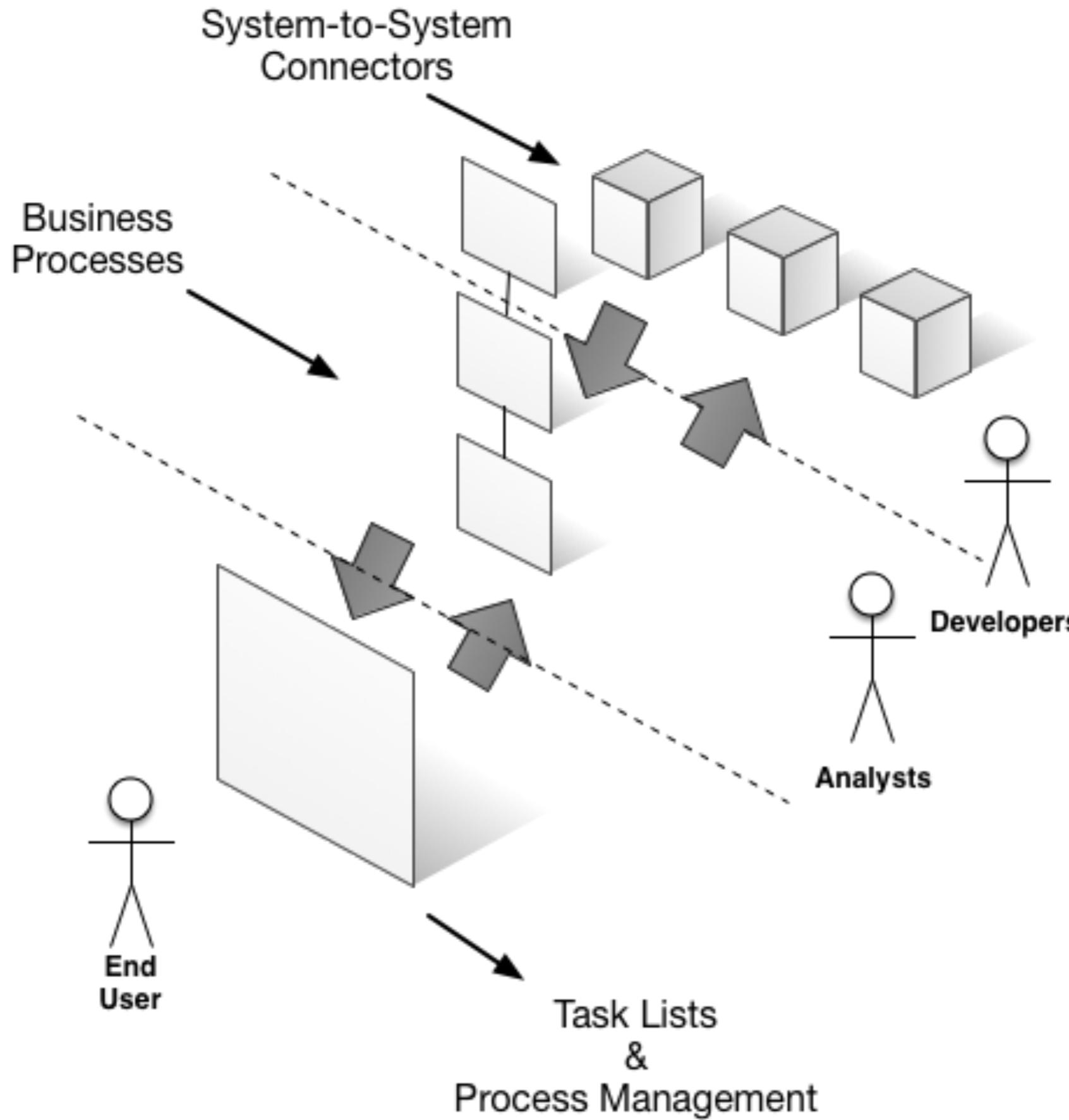
Evaluation v.1 (evaluation)



jBPM Core



Interactions



New in 6.x

- CDI integration
- Runtime Manager
- REST/JMS Endpoints
- Project Packaging

Runtime Manager

- Simplifies the configuration of the runtime services:
 - human task service
 - knowledge sessions
 - persistence & tx layer
 - event listeners

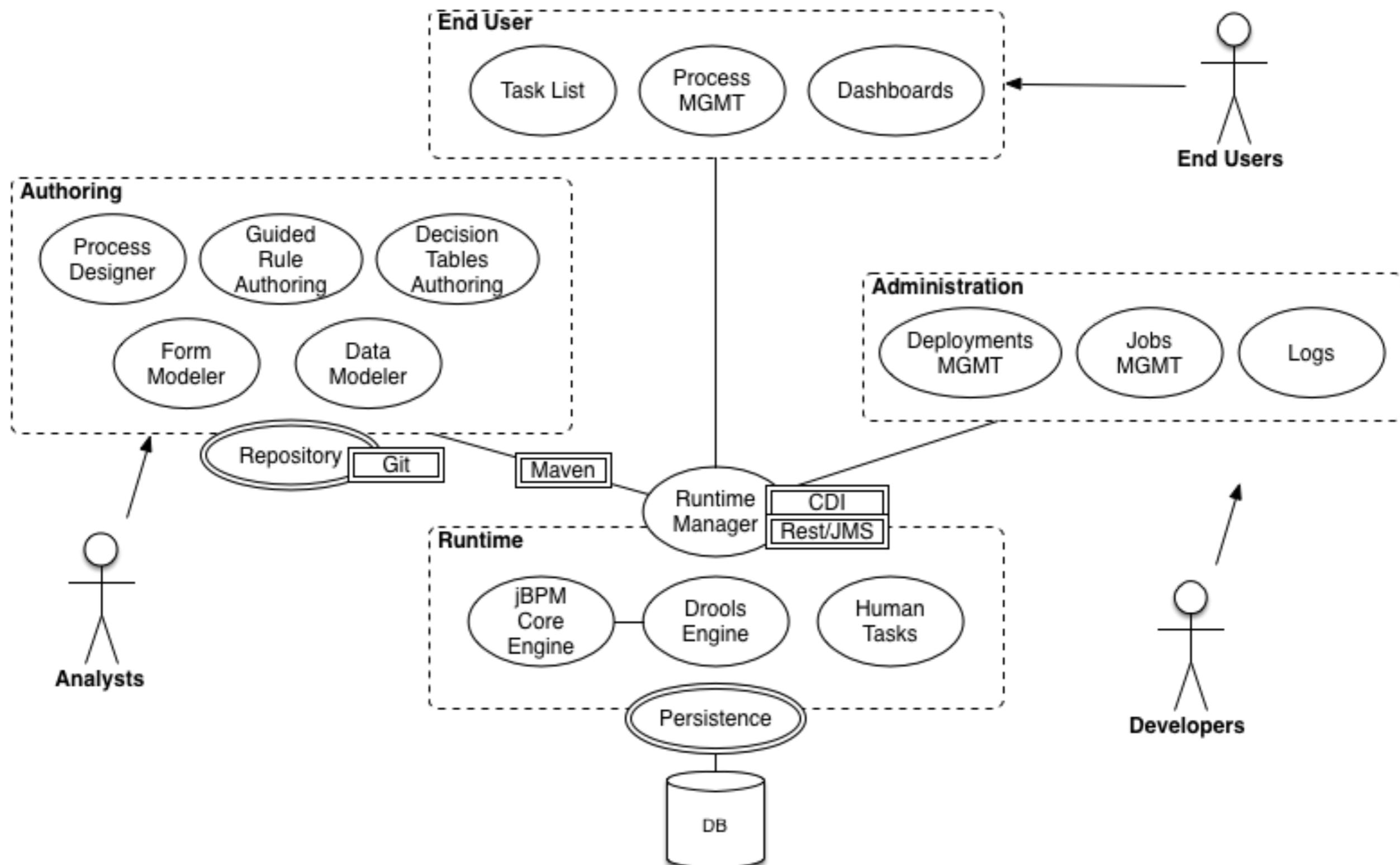
Runtime Manager

- Works based on known patterns:
 - Singleton
 - Per Process Instance
 - Per Request

KIE Workbench

- Full suite of tools targeted to:
 - Authoring Knowledge Assets (processes, rules, decision tables, forms, etc)
 - Runtime Administration
 - End Users
 - Task Lists
 - Process Management
 - Dashboards

Infrastructure



Authoring - Process Designer

KIE Workbench

Home Authoring Deploy Process Management Tasks Dashboards Find User: salaboy ?

Explore New Item Tools Repository Search... 

Project Explorer  Business Process [customers]

demo / jbpm-playground                 

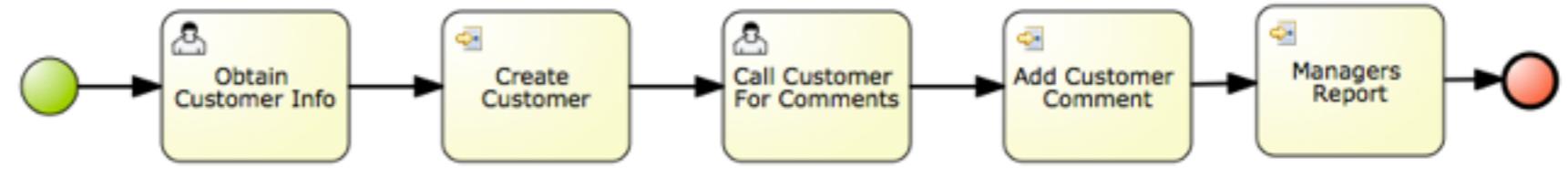
Customer Relationships v.1.0 (CustomersRelationship.customers)

BUSINESS PROCESSES  customers

FORM DEFINITIONS 

WORK ITEM DEFINITIONS 

Business Process Metadata



```
graph LR; Start(( )) --> Obtain[Obtain Customer Info]; Obtain --> Create[Create Customer]; Create --> Call[Call Customer For Comments]; Call --> Add[Add Customer Comment]; Add --> Managers[Managers Report]; Managers --> End(( ));
```

Authoring - Form Modeller

KIE Workbench

Home Authoring Deploy Process Management Tasks Dashboards Find User: salaboy ?

Explore New Item Tools Repository Search...

Project Explorer

demo / jbpm / purchases

<default>

org

BUSINESS PROCESSES Purchases

FORM DEFINITIONS CreateOrder-taskform

FixOrder-taskform

PurchaseHeader

PurchaseLine

Purchases.Purchases-taskform

ReviewAdministration-taskform

ReviewCFO-taskform

ReviewController-taskform

Form Modeler [CreateOrder-taskform]

Form data origin Add fields by origin Add fields by type Form properties

Show mode Bindings Grid & Ruler

HTML label Separator Simple subform Multiple subform Short text Long text Character Single precision decimal Double precision decimal BigDecimal BigInteger Byte Short Integer Long integer E-mail

Please, enter all the required information. The instructions to perform this task can be found here

● Purchase Order Header

*Creation date 02-25-14 *Customer

*Project

● Lines

Add purchase line

● *Total

*Description

Authoring - Form Modeller

Form data origin | Add fields by origin | Add fields by type | Form properties

- HTML label
- Separator
- Simple subform
- Multiple subform
- Short text
- Long text
- Character
- Single precision decimal
- Double precision decimal
- BigDecimal
- BigInteger
- Byte
- Short

Please, enter all the required information. The instructions to perform this task can be found [here](#)

● Purchase Order Header

*Creation date
02-25-14

*Project

● Lines

Add purchase line

● *Total

*Description

The screenshot shows a form builder interface with a sidebar of field types on the left and a main canvas on the right. The canvas displays a purchase order header form with fields for creation date (set to 02-25-14), customer, project, lines, total, and description. The 'Add fields by type' tab is selected in the top navigation bar.

End Users - Task Lists

KIE Workbench

Home Authoring Deploy Process Management Tasks Dashboards Find User: salaboy ?

Search... 

Tasks List  Refresh  

Grid Calendar Active Personal Group All

ID	Task	Priority	Status	Created On	Due On	Actions
9	Set up new account with service zxc	0	InProgress	25/02/2014 23:02	26/02/2014 00:00	  
8	Review Meeting Document for Project ABC	0	InProgress	25/02/2014 23:02	26/02/2014 00:00	  
7	Approve Project ABC	0	InProgress	25/02/2014 23:01	26/02/2014 00:00	  
6	Call Customer #123	0	InProgress	25/02/2014 23:01	26/02/2014 00:00	  

Details Work Details Assignments Comments  

9 - Set up new account with service zxc

Details

Description

Status InProgress

Due On 26/02/2014 23:00

Priority 0 - High

User salaboy

Process Context

End Users - Task Lists

		Grid	Calendar						
						Active	Personal	Group	All
ID	Task	Priority	Status	Created On	Due On	Actions			
9	Set up new account with service zxc	0	InProgress	25/02/2014 23:02	26/02/2014 00:00				
8	Review Meeting Document for Project ABC	0	InProgress	25/02/2014 23:02	26/02/2014 00:00				

Details

Description

Status

InProgress

Due On

26/02/2014

23:00

Priority

0 - High

User

salaboy

End Users - Calendar

KIE Workbench

Home Authoring Deploy Process Management Tasks Dashboards Find User: salaboy ?

Search...

Tasks List

New Task Refresh × ▾

Grid Calendar 24 Feb - 02 Mar Today Day Week Month Active Personal Group All

Mon 24 (1)	Tue 25 (1)	Wed 26 (3)	Thu 27 (1)	Fri 28 (0)	Sat 1 (0)	Sun 2 (0)
Call Customer #123 11:00 PM	Review Meeting Do...,11:00 PM	Review Appointmen...,12:00 AM Set up new account.,12:00 AM Approve Project ABC12:00 AM	Project ASD Update...,09:00 PM			

End Users - Calendar

Tasks List

Grid	Calendar	24 Feb - 02 Mar 	 Today 	Day	Week	Month
A Mon 24 (1)		A Today Tue 25 (1)		A Wed 26 (3)		A Thu 27 (1)
Call Customer #123 11:00 PM		Review Meeting Do...,11:00 PM		Review Appointmen...12:00 AM Set up new account...12:00 AM Approve Project ABC 12:00 AM		Project ASD Update...09:00 PM

End Users - Process MGMT

KIE Workbench

Home Authoring Deploy Process Management Tasks Dashboards Find User: salaboy ?

Search...

Process Instances

Bulk Actions Refresh X ▾

	Showing:	Active	Related To Me	Completed	Aborted		
	Id	Name	Initiator	Version	State	Start Date	Actions
<input type="checkbox"/>	1	Customer Relationships	salaboy	1.0	Active	25/02/2014 22:58	
<input type="checkbox"/>	2	Evaluation	salaboy	1	Active	25/02/2014 22:59	
<input type="checkbox"/>	3	Hiring a Developer	salaboy	1	Active	25/02/2014 22:59	
<input type="checkbox"/>	4	Customer Relationships	salaboy	1.0	Active	25/02/2014 22:59	

Instance Details

Actions Views Refresh X ▾

Instance ID	1
Definition Id	CustomersRelationship.customers
Definition Name	Customer Relationships
Deployment	org.jbpm:CustomersRelationship:1.0
Definition Version	1.0
Instance State	Active
Current Activities	25/Feb/14 22:58:43: 1 - Obtain Customer Info (HumanTaskNode)
Instance Log	25/Feb/14 22:58:43: 1 - Obtain Customer Info (HumanTaskNode) 25/Feb/14 22:58:43: 0 - StartNode

End Users - Dashboards

Workspace : Showcase Page: By country English Español Logged as admin Logout

jBoss by Red Hat

Home Sample dashboards Sales opportunities · Pipeline analysis · Sales report Expense reports Administration Current filter Country Saudi Arabia Amount: to Closing date: - Select Closing date - Pipeline: - Select Pipeline - Status: - Select Status - Customer: - Select Customer - Product: - Select Product - Sales person: - Select Sales person - Probability: to Source: - Select Source -

By Country: Saudi Arabia
Sample dashboards > Sales opportunities > By country

By customer

A pie chart titled "By customer" showing the distribution of sales across 10 companies. The companies are labeled: Company 1 (green), Company 2 (pink), Company 3 (orange), Company 4 (red), Company 5 (blue), Company 6 (light blue), Company 7 (light green), Company 8 (purple), Company 9 (light pink), and Company 10 (yellow). The chart is divided into 10 equal segments.

By sales person

A pie chart titled "By sales person" showing the distribution of sales across 10 sales persons. The sales persons are labeled: Nita Marling, Jerri Preble, Kathrine Janas, Neva Hunger, Roxie Foraker, Jamie Gilbeau, Julio Burdge, Darryl Innes, and two others whose names are partially visible.

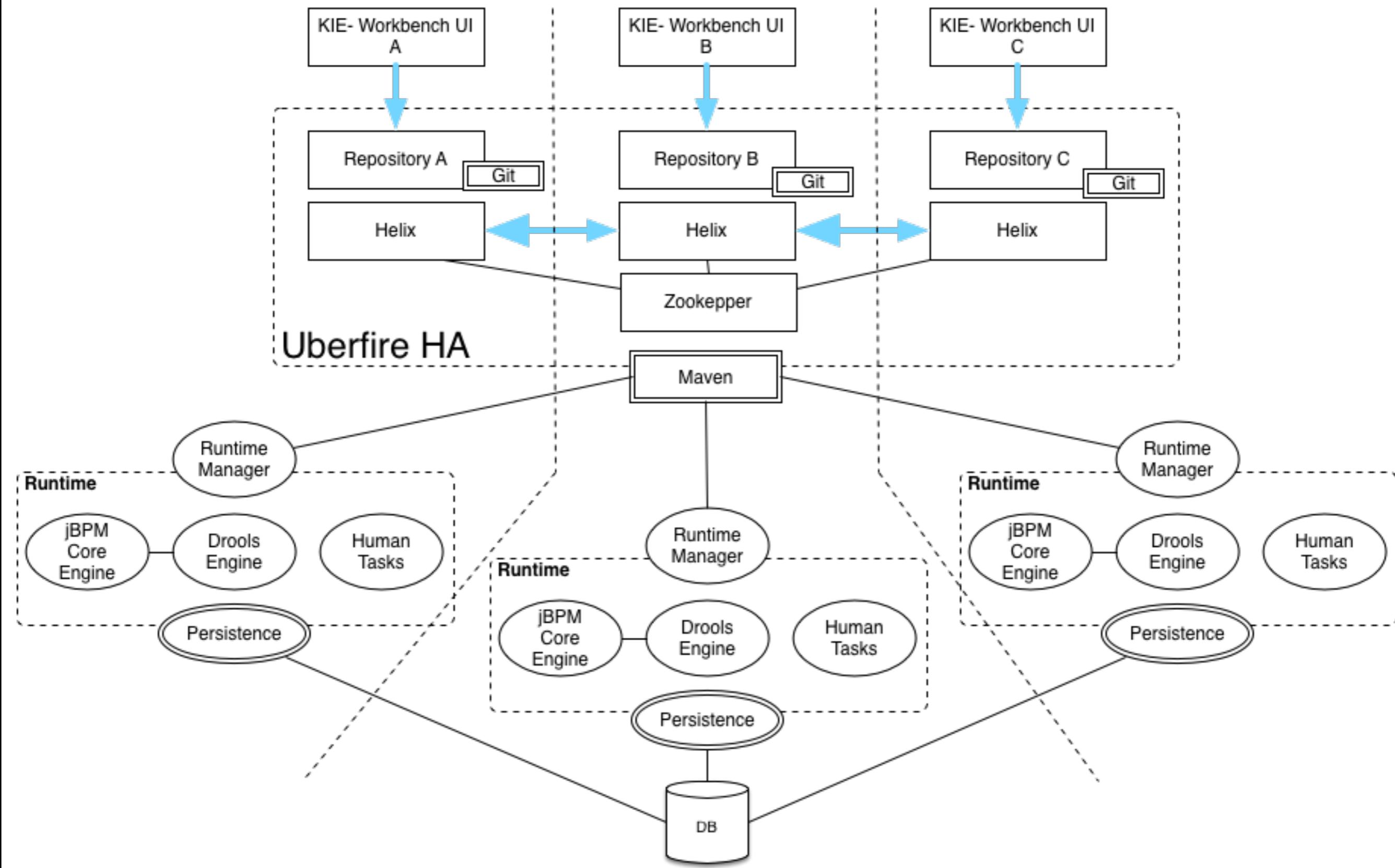
By product
PRODUCT 8 : 224,815.4

A bar chart titled "By product" showing the sales amount for 11 different products. The products are labeled: PRODUCT 8 (224,815.4), PRODUCT 10, PRODUCT 6, PRODUCT 4, PRODUCT 1, PRODUCT 5, PRODUCT 11, PRODUCT 2, PRODUCT 3, PRODUCT 7, and PRODUCT 1. The Y-axis represents the amount in thousands of dollars.

Sales evolution
April 2010 : 14439.387

A line chart titled "Sales evolution" showing the monthly sales amount from April 2010 to April 2015. The Y-axis represents the amount in thousands of dollars. The chart shows significant fluctuations, with a major peak in April 2012 reaching approximately 47365.829 thousand dollars.

High Availability



Roadmap

Roadmap

- UI Improvements
- Software governance Workflow
 - Asset review, promotion, deployment
- Refactoring and Change Impact
- BRMS HA

Questions?



- Dave Bowman: All right, HAL; I'll go in through the emergency airlock.
- HAL: Without your space helmet, Dave, you're going to find that rather difficult.
- Dave Bowman: HAL, I won't argue with you anymore! Open the doors!
- HAL: Dave, this conversation can serve no purpose anymore. Goodbye.

Joshya: Greetings, Professor Falken.

Falken: Hello, Joshua.

Joshya: A strange game. The only winning move is not to play. How about a nice game of chess?