

MASTER OF TECHNOLOGY USER GUIDE

Mortgage Process System

CAO LIANG

MASTEROFTECHNOLOGY

INTELLIGENT REASONING SYSTEMS (IRS) - MACHINE REASONING (MR)



Mortgage Process System

User Guide

REQUIREMENTS:

RECOMMENDED BROWSERS

BTO Recommender system supports the following Web Browsers::

- Internet Explorer 11
- Microsoft Edge 39 and above
- Firefox 53 and 52 ESR and above
- Google Chrome Version 59 and above
- Safari Version 10 and above

SYSTEM OVERVIEW

The mortgage process system is the system used for the bank to approve the home mortgage application. The system utilizes the machine learning reasoning technics to automate the important steps to determine whether the home mortgage application meets the pre-defined criteria.

USER INTERFACE

The user interface runs in KIE web tool. The users should be pre-created and configured with the required roles and groups. The KIE web tool will be accessed through the web browser.

DEPLOYMENT

Our System is deployed in an Ubuntu server 16.04.4. In order to run the system, you will need to have java 1.8 or above to be installed, and download “jbpm-server-7.12.0.Final-dist.zip” and unzip to a sub folder “jbpm-server-7.12.0.Final-dist” at a folder (e.g /home/iss-user/iss-vm-program/).

Download “CaoLiang-Mortgage_Process_ISS_MR.zip” from Github or Individual project submission folder, and unzip it to a sub folder “CaoLiang-Mortgage_Process_ISS_MR” at a folder (e.g /home/iss-user/iss-vm-program/).

To run our system, open a terminal, enter:

- `cd <path of the unzipped folder, e.g. /home/iss-user/iss-vm-program/>`
- `jbpm-server-7.12.0.Final-dist/bin/standalone.sh`

START

Open up your preferred browser and go to the URL “http://localhost:8080/jbpm-console/”, login as user “iss-admin”. Note: The user “iss-admin” should be created and assigned with the “admin”, “analyst” and “developer” roles, and also assigned in the “iss-group-manager”, “iss-group-requester”, “iss-group-approver” and “kie-server”.

iss-admin [Edit](#)

[Groups](#) [Roles](#) [Permissions](#)

- iss-group-manager
- iss-group-requester
- iss-group-approver
- kie-server

Total 4 groups assigned

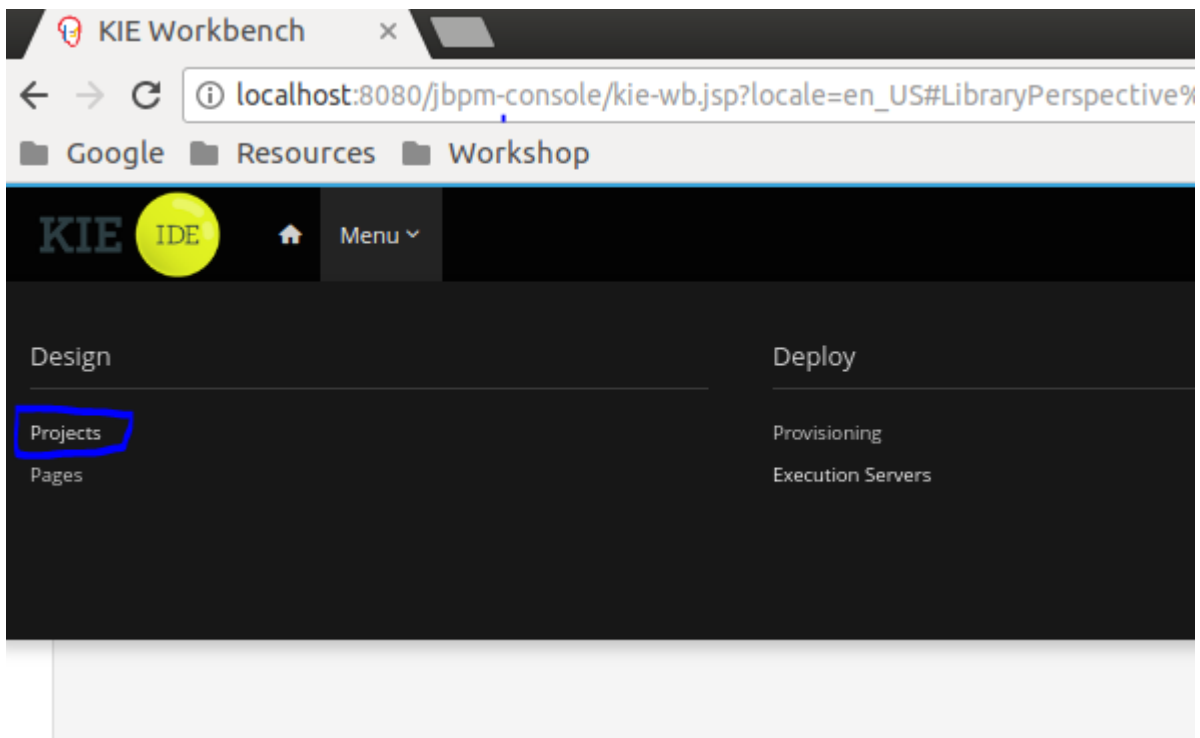
iss-admin [Edit](#)

[Groups](#) [Roles](#) [Permissions](#)

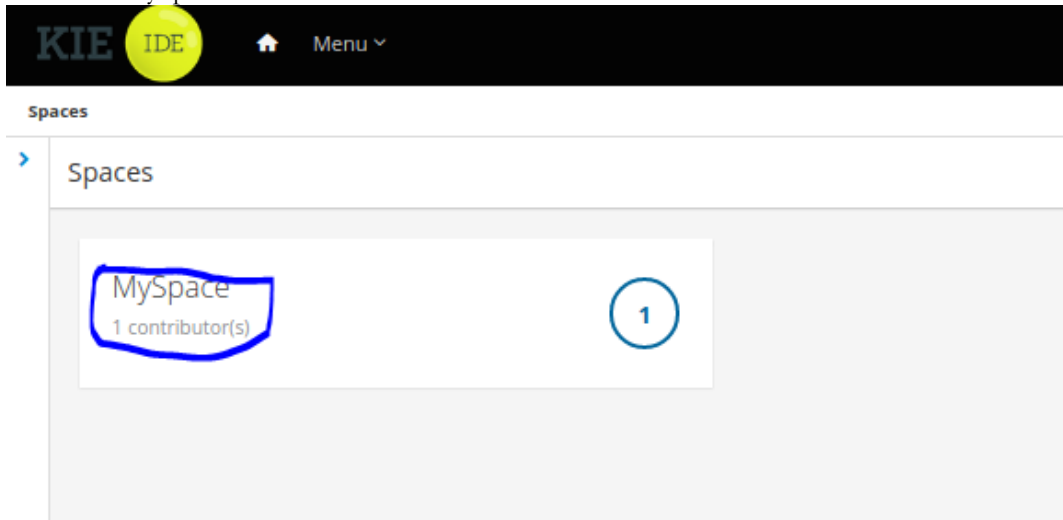
- process-admin
- admin
- analyst
- user

Total 4 roles assigned

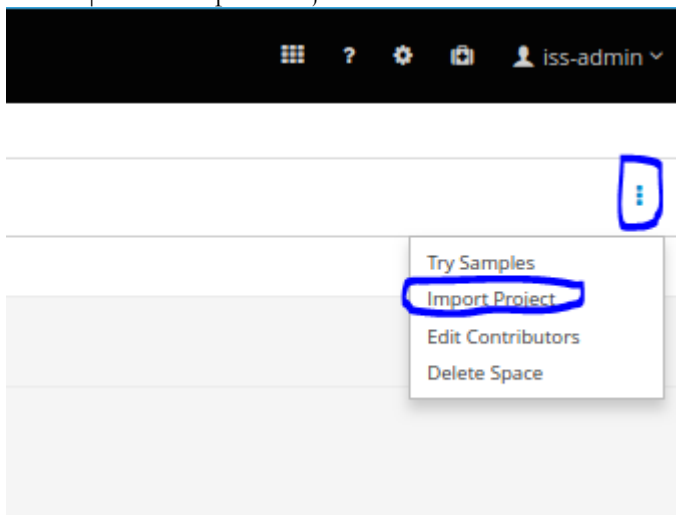
click “Menu” -> “Projects”.



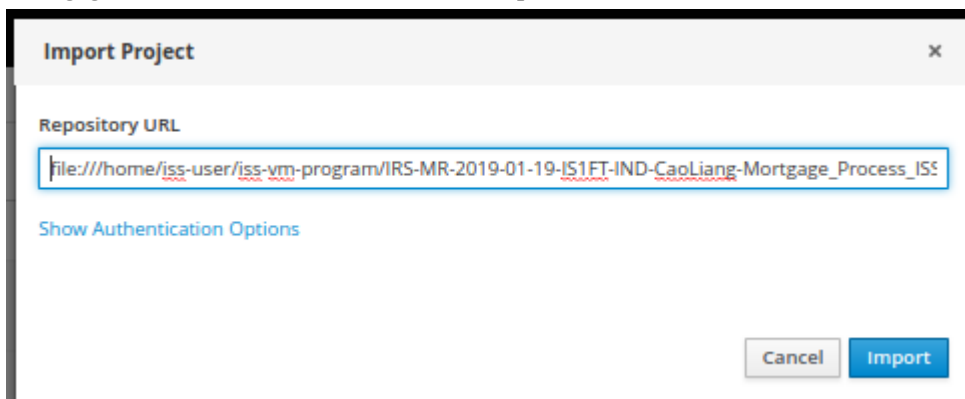
Click on “MySpace”.



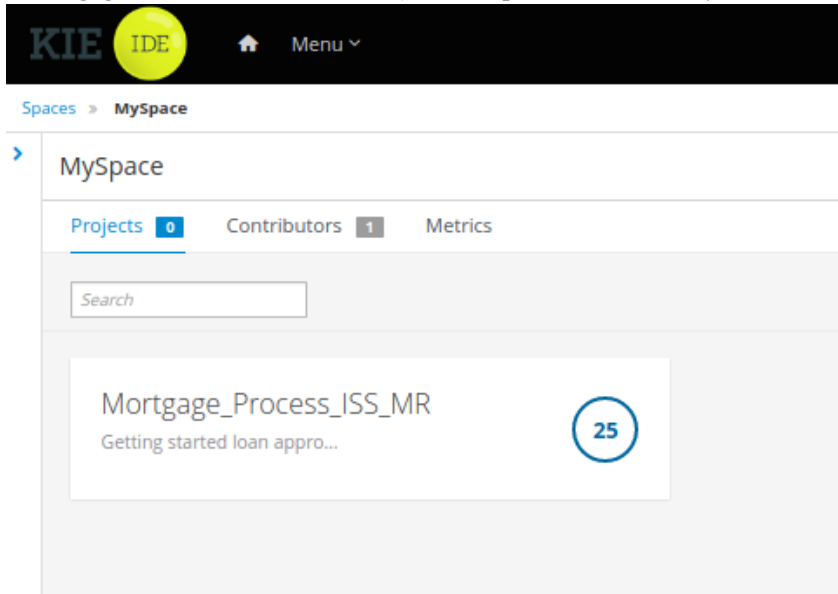
Click “|” and “Import Project”.



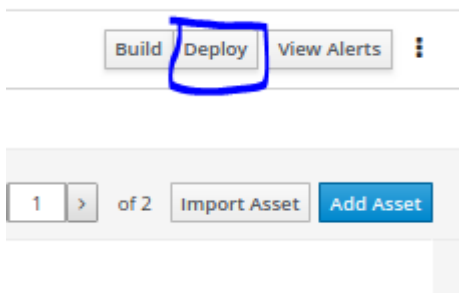
Type in file path with prefix e.g. “file:///home/iss-user/iss-vm-program/CaoLiang-Mortgage_Process_ISS_MR”, then click “Import”.



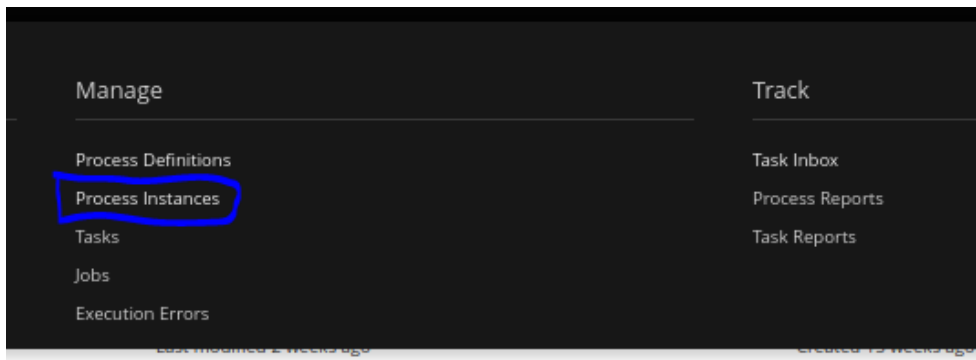
“Mortgage_Process_ISS_MR” Project is imported successfully.



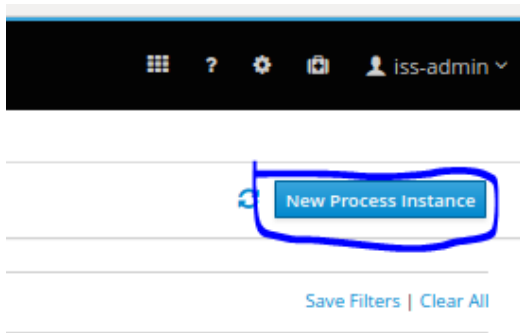
Click “Mortgage_Process_ISS_MR” Project, and click “Deploy” to deploy project.



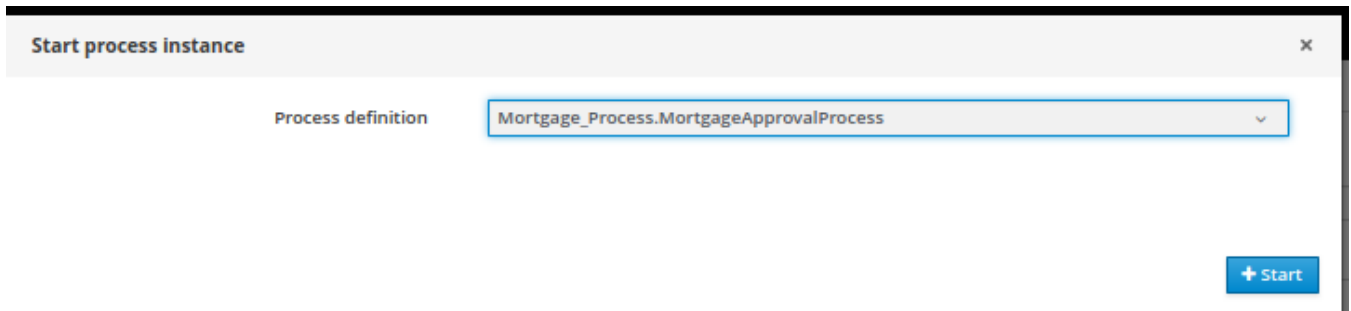
Click “Menu” -> “Process Instance”.



Click “New Process Instance”.



Click “Start”.



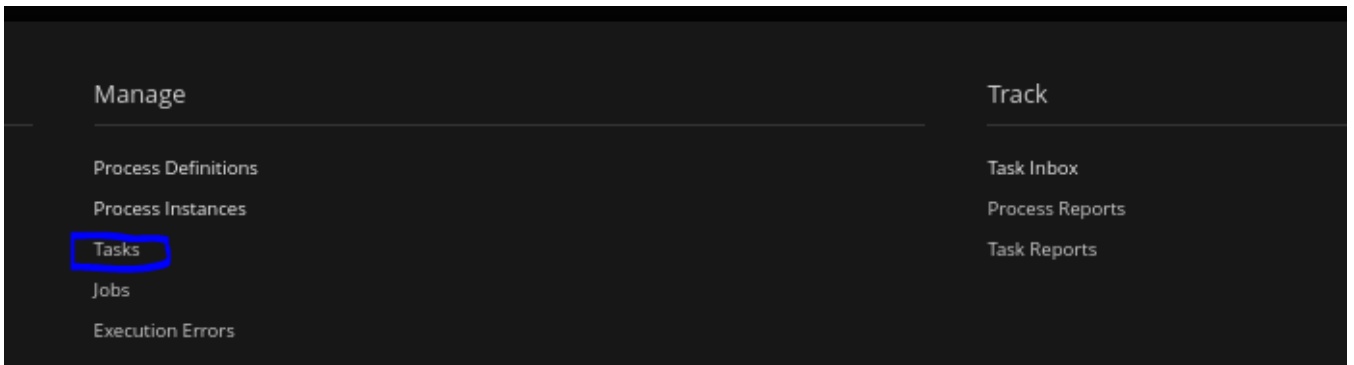
Fill in the mortgage application form, then click “Submit” to start process instance.

The mortgage application form is titled 'Start process instance' and contains the following sections and fields:

- Correlation key**: A dropdown menu.
- Form**: A section containing the application details.
 - Application**:
 - Down Payment: 50000
 - Years of amortization: 20
 - Applicant**:
 - Name: CL
 - Age: 20
 - Credit Rating: 3
 - Has Job (check): ☒
 - Own House (check): ☐
 - Annual Income: 111111
 - SSN: 123123
 - Property**:
 - Age of property: 5
 - Address of property: Jurong East
 - Locale: Urban
 - Sale Price: 200000

A blue 'Submit' button is located at the bottom right of the form.

Click “Menu” -> “Tasks”.



Click “Claim”.

Active filters: Status: Ready, InProgress, Reserved X Save Filters | C

Task	Process Definition Id	Status	Actual Owner	Created On	
Final Approval	Mortgage_Process.MortgageApprovalProcess	Ready		07-Mar-2019 22:11:03	<div> Claim Suspend View process </div>

Click Task.

Task	Process Definition Id	Status	Actual Owner	Created On	Errors	Actions
Final Approval	Mortgage_Process.MortgageApprovalProcess	Reserved	iss-admin	07-Mar-2019 22:11:03	0	⋮

Click “Start”.

8 - Final Approval

Amortization

20

Errors

Error

Error

Downpayment

50000

Applicant

Address

Address

Creditrating

3

☒ HasJob

Name

CL

☐ OwnHouse

Age

20

Annualincome

111111

Ssn

123123

Outputs:

☐ Inlimt

Release

Start

Check "InLimitMR" status.

8 - Final Approval

Address	Jurong East
Saleprice	200000
Locale	Urban
Age	5
<input checked="" type="checkbox"/> InlimitMR	
Mortgageamount	Mortgageamount
Amortization	20

Decide to approve by checking the “InLimit” checkbox, or reject it by leaving the “InLimit” checkbox unchecked, then click “Complete” to finish the whole process.

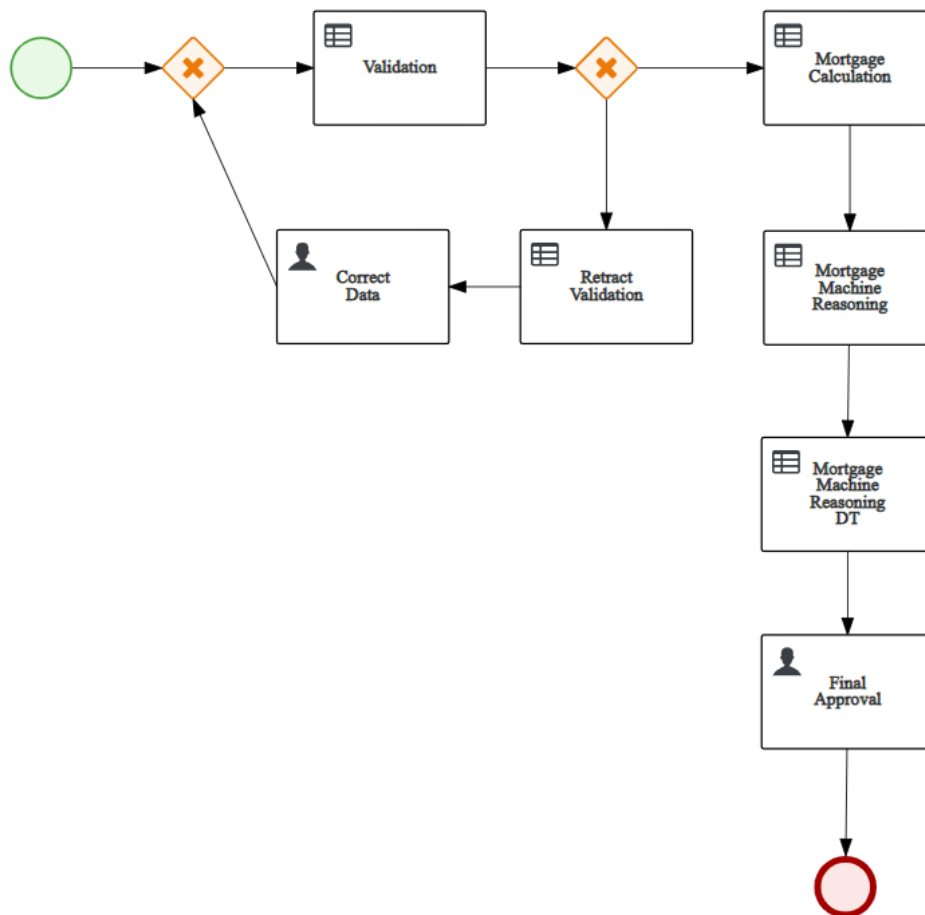
8 - Final Approval

Amortization	20
Errors	
Error	Error
Downpayment	50000
Applicant	
Address	Address
Creditrating	3
<input checked="" type="checkbox"/> Hasjob	
Name	CL
<input type="checkbox"/> OwnHouse	
Age	20
Annualincome	111111
Ssn	123123
Outputs:	
<input type="checkbox"/> Inlimit	
Save Release Complete	

BUSINESS SCENARIOS: SAMPLE INPUT & SYSTEM OUTPUT

In this section, the objective is to demonstrate the correctness of the mortgage process system. The process flow model and rules are shown below, and then three test scenarios are listed.

1. Process Flow model



2. Mortgage Machine Reasoning

EXTENDS	- None -		
WHEN	1. There is an Application [app] with: mortgageamount greater than or equal to $app.property.saleprice - app.downpayment$		
THEN	1. Set value of Application [app] inlimitMR true		
(options)			
Attributes:			
dialect	mvel		
ruleflow-group	mortgagemachinereasi		

3. Mortgage Machine Reasoning DT

MortgageMachineReasoningDT					
#	Description	ruleflow-group	Is Applicant Own House?	Is Applicant Has Job?	application
			\$ownHouse	\$hasJob	Is Approval In Limit?
1		bankmortgagecalculationdt	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
2		bankmortgagecalculationdt	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
3		bankmortgagecalculationdt	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
4		bankmortgagecalculationdt	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

4. Test Scenarios

SCENARIO 1

Application Details	Down Payment: S\$50,000 Mortgage Amount: S\$300,000 Property Sale Price: S\$350,000 Applicant has job
1 st Stage	InLimitMR checked: Mortgage Amount (300,000) >= Property Sale Price (350,000) – Down Payment (50,000)
2 nd Stage	InLimitMR checked: applicant has job
System output	<div> <div> <h4>9 - Final Approval</h4> <p>Inputs:</p> <p>Application</p> <p>Property</p> <p>Address Jurong East</p> <p>Saleprice 350000</p> <p>Locale Urban</p> <p>Age 5</p> <p><input checked="" type="checkbox"/> InlimitMR</p> <p>Mortgageamount Mortgageamount</p> <p>Amortization 20</p> </div> <div> <p>Applicant</p> <p>Address Address</p> <p>Creditrating 3</p> <p><input checked="" type="checkbox"/> Hasjob</p> <p>Name CL</p> <p><input type="checkbox"/> OwnHouse</p> <p>Age 20</p> <p>Annualincome 111111</p> <p>Ssn 1234</p> <p>Outputs:</p> <p><input type="checkbox"/> Inlimit</p> <p>Save Release Complete</p> </div> </div>

SCENARIO 2

Application Details	Down Payment: S\$50,000 Mortgage Amount: S\$300,000 Property Sale Price: S\$350,000 Applicant has no job but own a house	
1 st Stage	InLimitMR checked: Mortgage Amount (300,000) >= Property Sale Price (350,000) – Down Payment (50,000)	
2 nd Stage	InLimitMR checked: applicant has no job but own house	
System output	<div> <div>10 - Final Approval</div> <div> <div>Inputs:</div> <div>Application</div> <div>Property</div> <div>Address</div> <div>Jurong East</div> <div>Saleprice</div> <div>350000</div> <div>Locale</div> <div>Urban</div> <div>Age</div> <div>5</div> <div><input checked="" type="checkbox"/> InlimitMR</div> <div>Mortgageamount</div> <div>Mortgageamount</div> <div>Amortization</div> <div>20</div> </div> </div>	<div> <div>10 - Final Approval</div> <div> <div>Applicant</div> <div>Address</div> <div>Address</div> <div>Creditrating</div> <div>3</div> <div><input type="checkbox"/> Hasjob</div> <div>Name</div> <div>CL</div> <div><input checked="" type="checkbox"/> OwnHouse</div> <div>Age</div> <div>20</div> <div>Annualincome</div> <div>111111</div> <div>Ssn</div> <div>1111</div> <div>Outputs:</div> <div><input type="checkbox"/> Inlimt</div> <div>Save Release Complete</div> </div> </div>

SCENARIO 3

Application Details	Down Payment: S\$50,000 Mortgage Amount: S\$300,000 Property Sale Price: S\$350,000 Applicant has no job and no	
1 st Stage	InLimitMR checked: Mortgage Amount (300,000) >= Property Sale Price (350,000) – Down Payment (50,000)	
2 nd Stage	InLimitMR checked: applicant has no job and not owing house	

System output	11 - Final Approval	11 - Final Approval
	Application <hr/> Property <hr/> Address <input type="text" value="Jurong East"/> <hr/> Saleprice <input type="text" value="350000"/> <hr/> Locale <input type="text" value="Urban"/> <hr/> Age <input type="text" value="5"/> <hr/> <input type="checkbox"/> InlimitMR <hr/> Mortgageamount <input type="text" value="Mortgageamount"/> <hr/> Amortization <input type="text" value="20"/> <hr/>	Applicant <hr/> Address <input type="text" value="Address"/> <hr/> Creditrating <input type="text" value="3"/> <hr/> <input type="checkbox"/> HasJob <hr/> Name <input type="text" value="Tim"/> <hr/> <input type="checkbox"/> OwnHouse <hr/> Age <input type="text" value="20"/> <hr/> Annualincome <input type="text" value="0"/> <hr/> Ssn <input type="text" value="111111"/> <hr/> Outputs: <input type="checkbox"/> Inlimit <div> <input type="button" value="Save"/> <input type="button" value="Release"/> <input type="button" value="Complete"/> </div>