

Enhancement Test Results Demonstration

NUS-ISS Machine Reasoning Course Individual Project

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Before Enhancement

Inlimit Machine Reasoning evaluation does not take
into account of Credit Rating Risk Grade

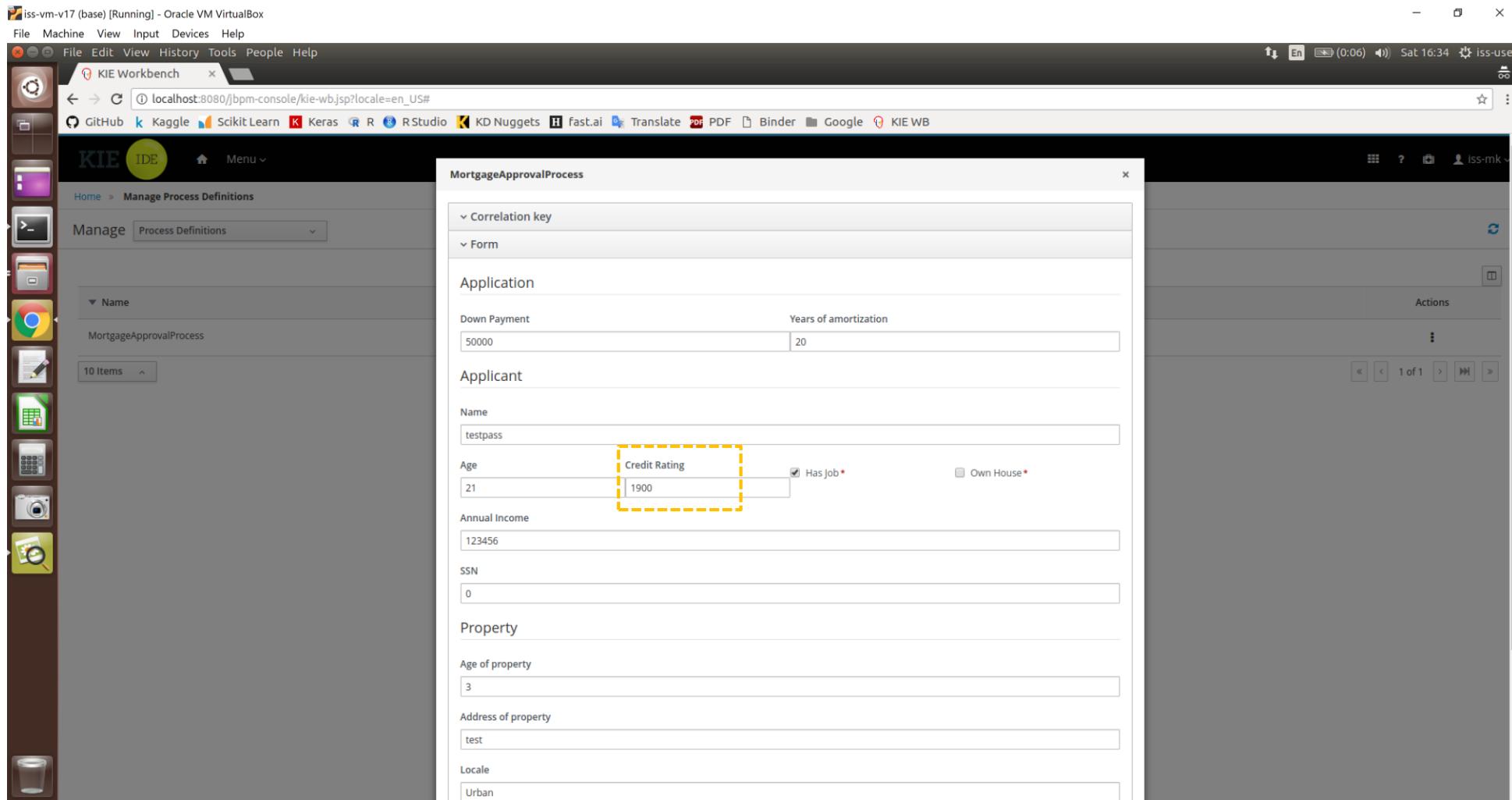
Before: Mortgage Process Guided Decision Table

The screenshot shows the KIE Workbench interface running in a virtual machine. The main window displays a Guided Decision Table (GDT) titled "MortgageMachineReasoningDT.gdst". The table has the following structure:

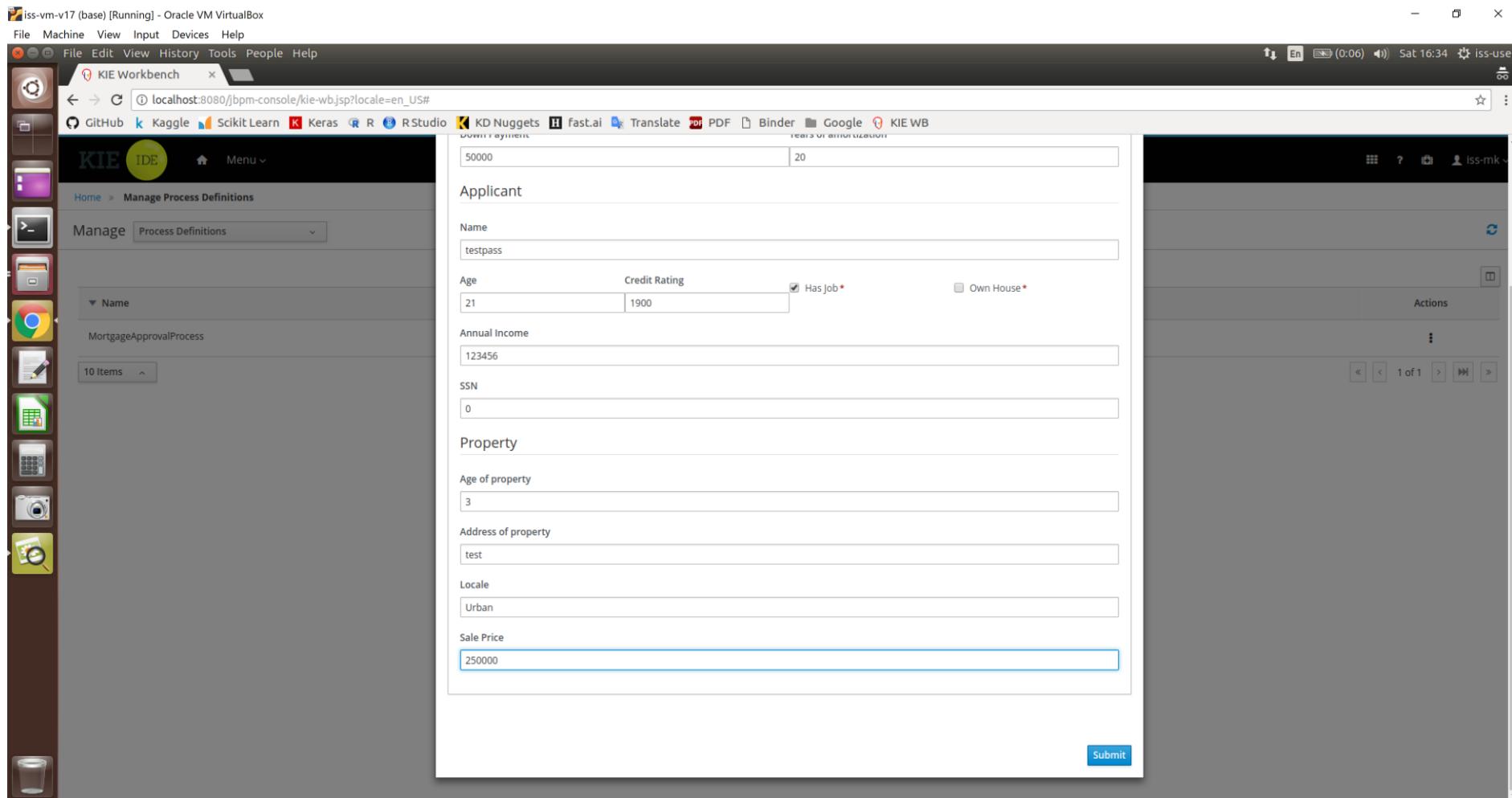
#	Description	ruleflow-group	Applicant Own House		Applicant Age Range		Applicant Credit Rating		app
			\$ownHouse	\$hasJob	\$ageLess	\$ageGE	\$creditrating	Approval In Limit	
1	MortgageMachineReasoningDT	true	true					true	
2	MortgageMachineReasoningDT	true	false					true	
3	MortgageMachineReasoningDT	false	true					true	
4	MortgageMachineReasoningDT	false	false					false	

A green box highlights the first four columns of the table, and a yellow dashed box highlights the last two columns. The table is part of a larger workspace with various toolbars and a sidebar.

Approved Evaluation with BB Risk Grade (1)



Approved Evaluation with BB Risk Grade (2)

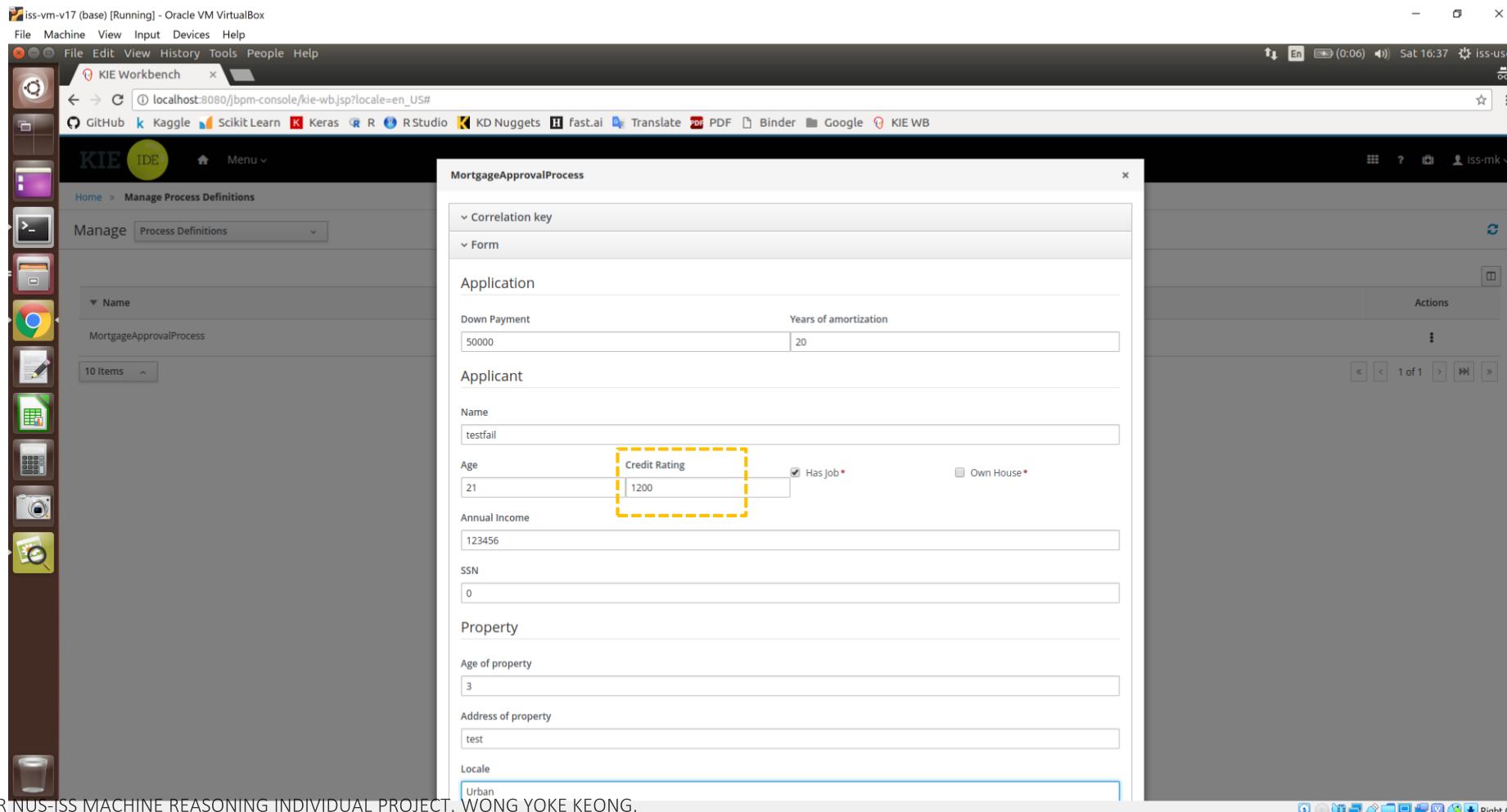


Approved Evaluation with BB Risk Grade (3)

The screenshot shows a web-based application running in a browser window titled "iss-vm-v17 (base) [Running] - Oracle VM VirtualBox". The application is a mortgage approval system within the KIE Workbench environment. The main page displays a "Task: 2" entry under the "Task Inbox". The form contains several input fields:

- Application**:
 - Mortgage amount: 200000
 - Down Payment: 50000
 - Years of amortization: 20
 - inlimit Machine Reasoning (highlighted by a yellow dashed box)
- Applicant**:
 - Name: testpass
 - Age: 21
 - Credit Rating: 1900 (highlighted by a yellow dashed box)
 - Has job:
 - Own House:
 - Annual Income: 123456
 - SSN: 0
- Property**:
 - Age of property: ?

Approved Evaluation with HH Risk Grade (1)



Approved Evaluation with HH Risk Grade (2)

The screenshot shows a web-based application for mortgage approval. The URL is `localhost:8080/jbpm-console/kie-wb.jsp?locale=en_US#`. The application interface includes a sidebar with various icons and a main form for entering applicant and property information.

Applicant Information:

- Years of Employment: 50000
- Age: 21
- Credit Rating: 1200
- Has Job:
- Own House:

Annual Income: 123456

SSN: 0

Property Information:

- Age of property: 3
- Address of property: test
- Locale: Urban
- Sale Price: 250000

Buttons: Submit

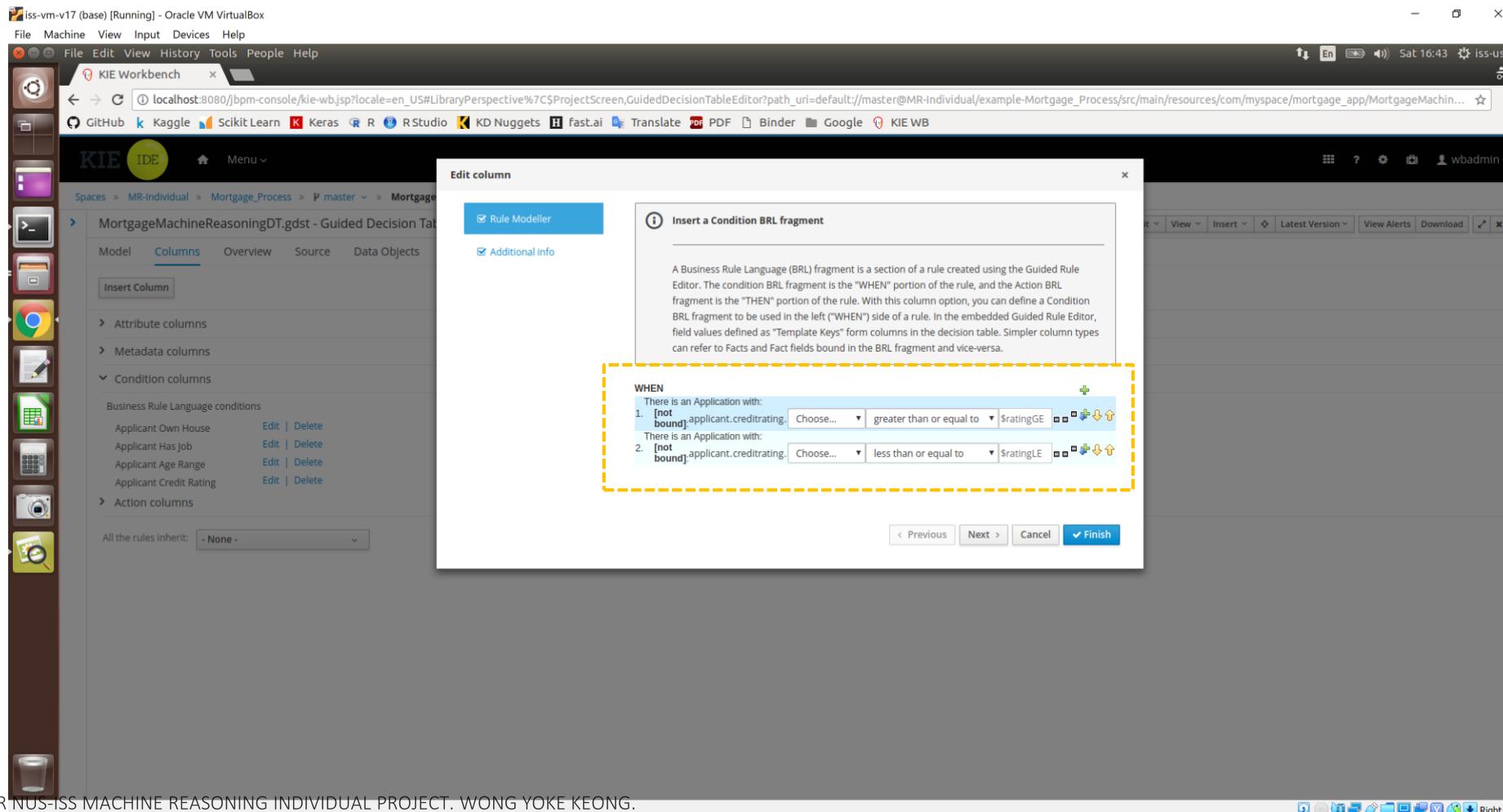
Approved Evaluation with HH Risk Grade (3)

The screenshot shows a KIE Workbench application window running on a Linux desktop. The title bar indicates it's on a VM named 'iss-vm-v17'. The main window displays a 'Task Details Screen' for 'Task: 3 - Final Approval'. The form contains fields for 'Mortgage amount' (200000), 'Down Payment' (5000), and 'Years of amortization' (20). A checkbox labeled 'inlimit Machine Reasoning' is checked and highlighted with a yellow dashed box. Another yellow dashed box highlights the 'Credit Rating' field, which has a value of 1200. The 'Applicant' section includes fields for 'Name' (testfall), 'Age' (21), 'Annual Income' (123456), 'SSN' (0), and 'Property' (Age of property). Checkboxes for 'Has job*' and 'Own House*' are also present. The left sidebar lists various tools and services like GitHub, Kaggle, Scikit Learn, Keras, R, R Studio, KD Nuggets, fast.ai, Translate, PDF, Binder, Google, and KIE WB.

After Enhancement

Inlimit Machine Reasoning evaluation takes into account of Credit Rating Risk Grade

After: Mortgage Process Guided Decision Table (1)



After: Mortgage Process Guided Decision Table (2)

The screenshot shows the KIE Workbench interface running in a virtual machine. The main window displays a Guided Decision Table (GDT) titled "MortgageMachineReasoningDT". The table has the following structure:

#	Description	ruleflow-group	Applicant Own House		Applicant Has Job		Applicant Age Range		Applicant Credit Rating Range		app	
			\$ownHouse	\$hasJob	\$ageLess	\$ageGE	\$ratingGE	\$ratingLE	Approval In Limit			
1	MortgageMachineReasoningDT	true	true				1825	2000	true			
2	MortgageMachineReasoningDT	true	false				1825	2000	true			
3	MortgageMachineReasoningDT	false	true				1825	2000	true			
4	MortgageMachineReasoningDT	false	false				1000	2000	false			
5	MortgageMachineReasoningDT	true	true				1000	1824	false			
6	MortgageMachineReasoningDT	true	false				1000	1824	false			
7	MortgageMachineReasoningDT	false	true				1000	1824	false			

A yellow dashed box highlights the "app" section of the table, specifically the columns for \$ratingGE, \$ratingLE, and Approval In Limit. The last three rows (5, 6, 7) have their \$ratingGE values highlighted in green.

Approved Evaluation with BB Risk Grade (1)

The screenshot shows a Linux desktop environment with a window titled "iss-vm-v17 (base) [Running] - Oracle VM VirtualBox". Inside the window, the KIE Workbench interface is displayed. The main area shows a process definition named "MortgageApprovalProcess". The form contains fields for "Down Payment" (50000), "Years of amortization" (20), "Name" (testpass-enhanced), "Age" (21), "Annual Income" (123456), "SSN" (0), and "Property" details (Age of property: 3, Address of property: test, Locale: Urban). A "Credit Rating" field between "Age" and "Has Job" is highlighted with a yellow dashed box. A checkbox for "Has Job" is checked. A checkbox for "Own House" is unchecked. The status bar at the bottom right shows "Right Click for More Options".

Approved Evaluation with BB Risk Grade (2)

The screenshot shows a KIE Workbench application window running on a Linux desktop environment. The window title is "iss-vm-v17 (base) [Running] - Oracle VM VirtualBox". The main content area displays a form for a "MortgageApprovalProcess".

Form Fields:

- Down Payment:** 50000, 20
- Applicant:**
 - Name: testpass-enhanced
 - Age: 21, Credit Rating: 1900, Has job: checked, Own House: unchecked
 - Annual Income: 123456
 - SSN: 0
- Property:**
 - Age of property: 3
 - Address of property: test
 - Locale: Urban
 - Sale Price: 250000

Buttons: Submit

Toolbar: File Edit View History Tools People Help

Left Sidebar: KIE IDE Home > Manage Process Definitions, Manage Process Definitions, MortgageApprovalProcess, 10 Items.

Top Bar: GitHub, Kaggle, Scikit Learn, Keras, R, R Studio, KD Nuggets, fast.ai, Translate, PDF, Binder, Google, KIE WB, Sat 16:48, iss-user.

Approved Evaluation with BB Risk Grade (3)

The screenshot shows the KIE Workbench interface running in a Oracle VM VirtualBox window. The title bar indicates the session is 'iss-vm-v17 (base) [Running] - Oracle VM VirtualBox'. The browser tab shows the URL [localhost:8080/bpm-console/kie-wb.jsp?locale=en_US#Tasks%7CTaskListScreen%SBWTaskListBasicFiltersScreen,%5D\\$TaskDetailsScreen](http://localhost:8080/bpm-console/kie-wb.jsp?locale=en_US#Tasks%7CTaskListScreen%SBWTaskListBasicFiltersScreen,%5D$TaskDetailsScreen). The main content area displays a 'Task Details' screen for 'Task: 4' titled '4 - Final Approval'. The form includes sections for 'Inputs:' (Application and Applicant), 'Property', and 'Comments'. Two specific input fields are highlighted with yellow dashed boxes: 'inlimit Machine Reasoning' under 'Application' and 'Credit Rating' under 'Applicant'. Both highlighted fields have a checked checkbox next to them.

4 - Final Approval

Work Details Assignments Comments Admin Logs

Inputs:

Application

Mortgage amount
200000

Years of amortization
20

inlimit Machine Reasoning

Down Payment
50000

Applicant

Name
testpass-enhanced

Age
21

Credit Rating
1900

Has job*

Own House*

Annual Income
123456

SSN
0

Property

Age of property
3

Rejected Evaluation with HH Risk Grade (1)

The screenshot shows a KIE Workbench interface running in a Linux desktop environment. The main window displays a form for the 'MortgageApprovalProcess'. A yellow dashed box highlights the 'Credit Rating' field, which contains the value '1200'. This value is considered invalid, leading to a rejection. The form also includes fields for 'Down Payment' (50000), 'Years of amortization' (20), 'Name' (testfail-enhanced), 'Age' (21), 'Annual Income' (123456), 'SSN' (0), 'Property Age of property' (3), 'Address of property' (test), and 'Locale' (Urban). A checkbox for 'Has Job' is checked. The status bar at the bottom indicates 'PREPARED FOR NUS-ISS MACHINE REASONING INDIVIDUAL PROJECT. WONG YOKE KEONG.'

Rejected Evaluation with HH Risk Grade (2)

The screenshot shows the KIE Workbench interface running in a Linux desktop environment. The main window displays a form for a 'MortgageApprovalProcess'. The form includes fields for an 'Applicant' (Name: testfail-enhanced, Age: 21, Credit Rating: 1200, Has Job: checked, Own House: unchecked) and a 'Property' (Age of property: 3, Address of property: test, Locale: Urban, Sale Price: 250000). A 'Submit' button is at the bottom right. The status bar at the bottom right shows 'Sat 16:51 iss-user'.

iss-vm-v17 (base) [Running] - Oracle VM VirtualBox

KIE Workbench

localhost:8080/jbpm-console/kie-wb.jsp?locale=en_US#

File Edit View History Tools People Help

GitHub Kaggle Scikit Learn Keras R R Studio KD Nuggets fast.ai Translate PDF Binder Google KIE WB

Down Payment

50000 20

Applicant

Name: testfail-enhanced

Age: 21 Credit Rating: 1200 Has Job: Own House:

Annual Income: 123456

SSN: 0

Property

Age of property: 3

Address of property: test

Locale: Urban

Sale Price: 250000

Submit

Actions

1 of 1

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Rejected Evaluation with HH Risk Grade (3)

The screenshot shows a KIE Workbench application running in a virtual machine. The main window displays a task titled "5 - Final Approval". The application form includes fields for "Mortgage amount" (200000), "Down Payment" (5000), "Name" (testfail-enhanced), "Age" (21), "Annual Income" (123456), "SSN" (0), and "Property" (Age of property). Two specific input fields are highlighted with yellow dashed boxes: "Credit Rating" (containing 1200) and "Years of amortization" (containing 20). The "Credit Rating" field is also associated with a note: "inlimit Machine Reasoning".

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After Enhancement

Additional validation for the Credit Rating field is added to check for valid values

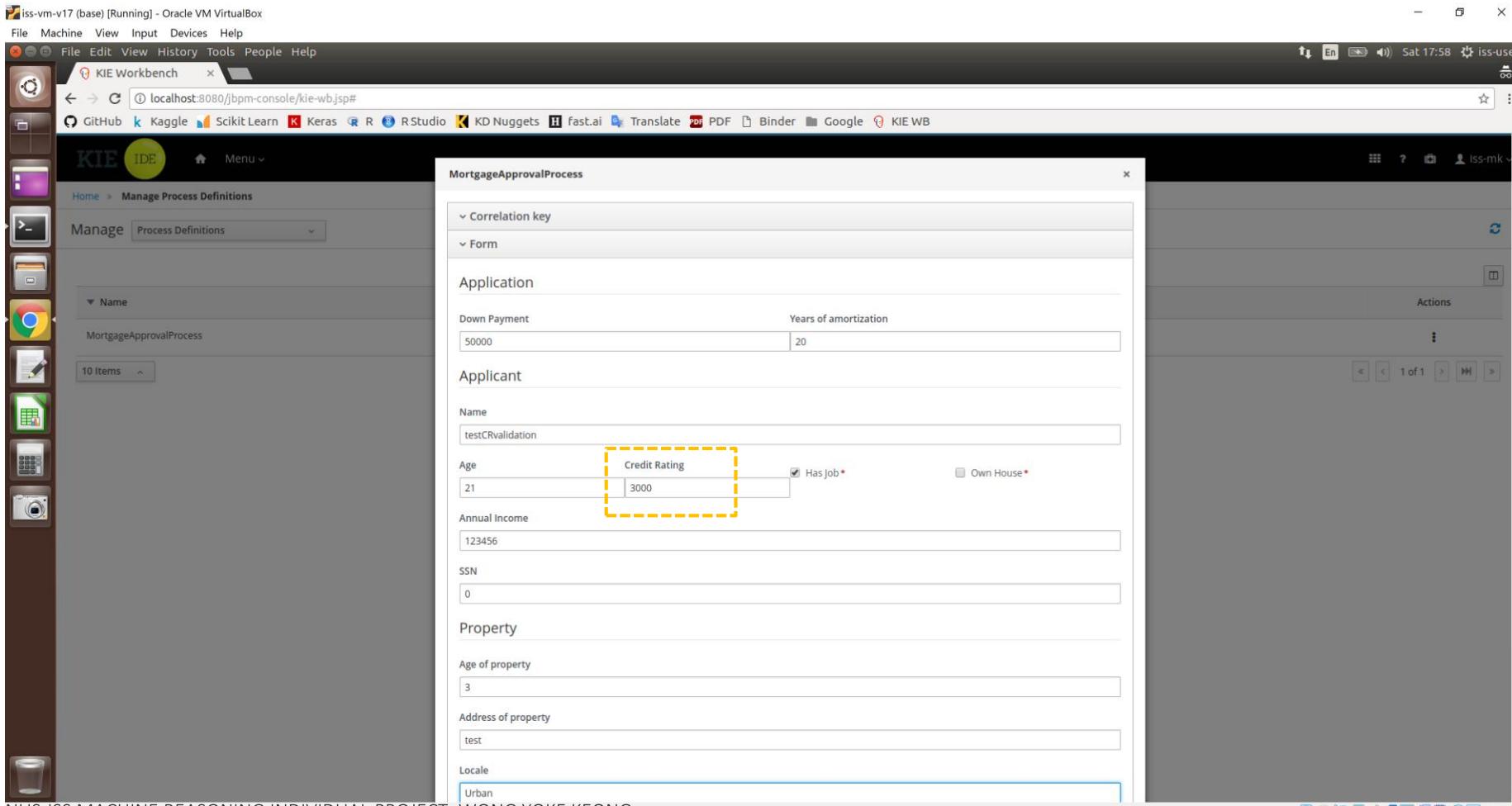
After: Validate Credit Rating Guided Rule added

The screenshot shows the KIE Workbench IDE interface. The title bar indicates the session is running on 'iss-vm-v17 (base) [Running] - Oracle VM VirtualBox'. The main window displays a 'Validate Credit Rating.rdrl - Guided Rules' editor. The rule is defined as follows:

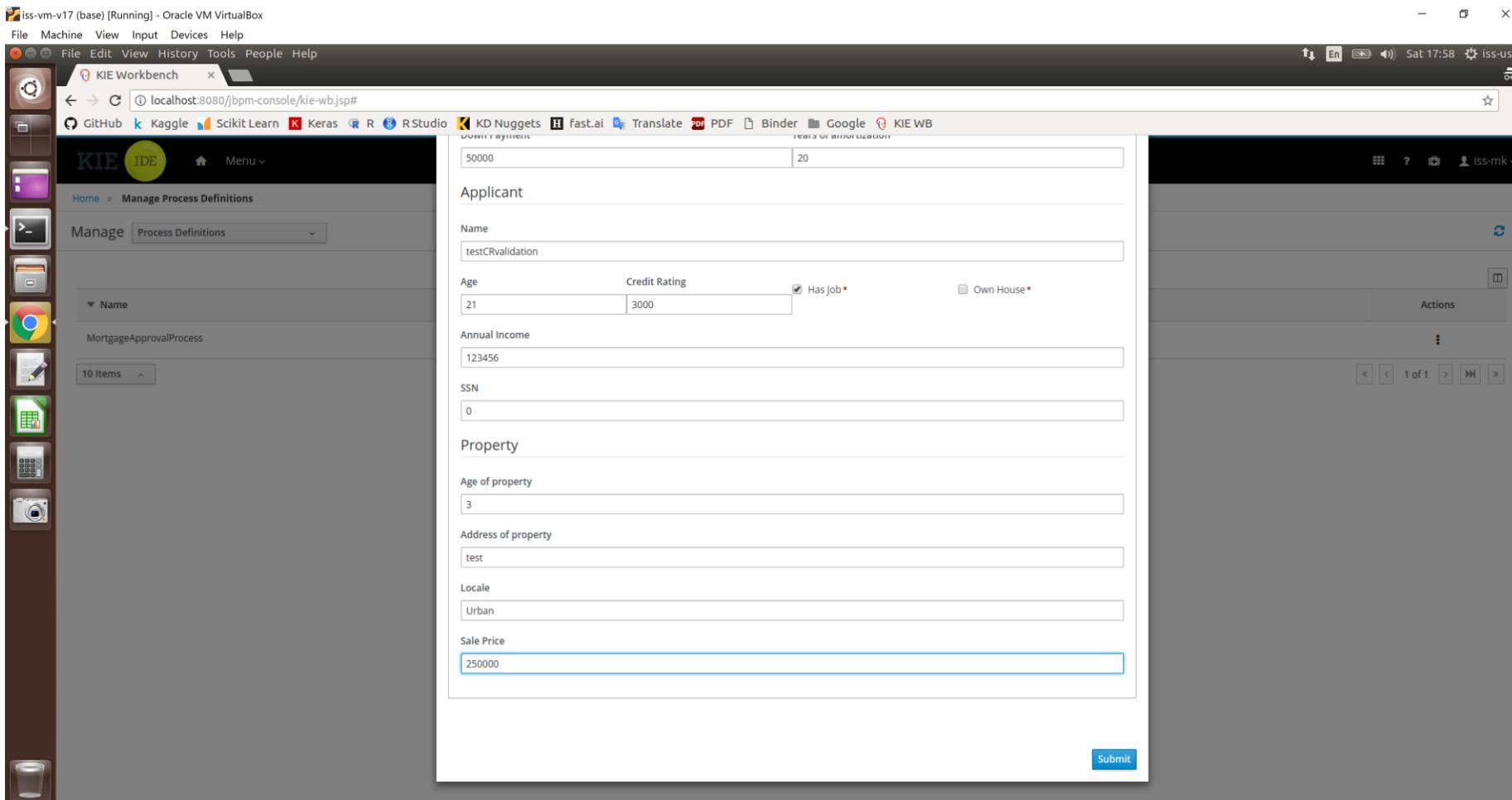
```
WHEN
    There is an Application [app] with:
        any of the following:
    1. [not bound] applicant.creditrating. Choose... less than or equal to 999
    1. [not bound] applicant.creditrating. Choose... greater than or equal to 2001
THEN
    Insert ValidationErrorDO [fact1]
        error Credit Rating must be between 1000 and 2000
    1. System.out.println("Executed Rule: " + drools.getRule().getName());
    2. Set value of Application [app]
        errors fact1
    (options)
        Attributes:
            dialect mvel
            ruleflow-group validation
```

The 'THEN' section contains validation logic using the 'Insert ValidationErrorDO [fact1]' action. It includes an 'error' message and two System.out.println statements. The 'Set value of Application [app]' action is also present. The 'Attributes' section shows 'dialect' set to 'mvel' and 'ruleflow-group' set to 'validation'. The bottom of the screen shows an 'Alerts' table with one entry: 'Build of module 'Mortgage_Process' (requested by wbadmin) completed. Build: SUCCESSFUL.'

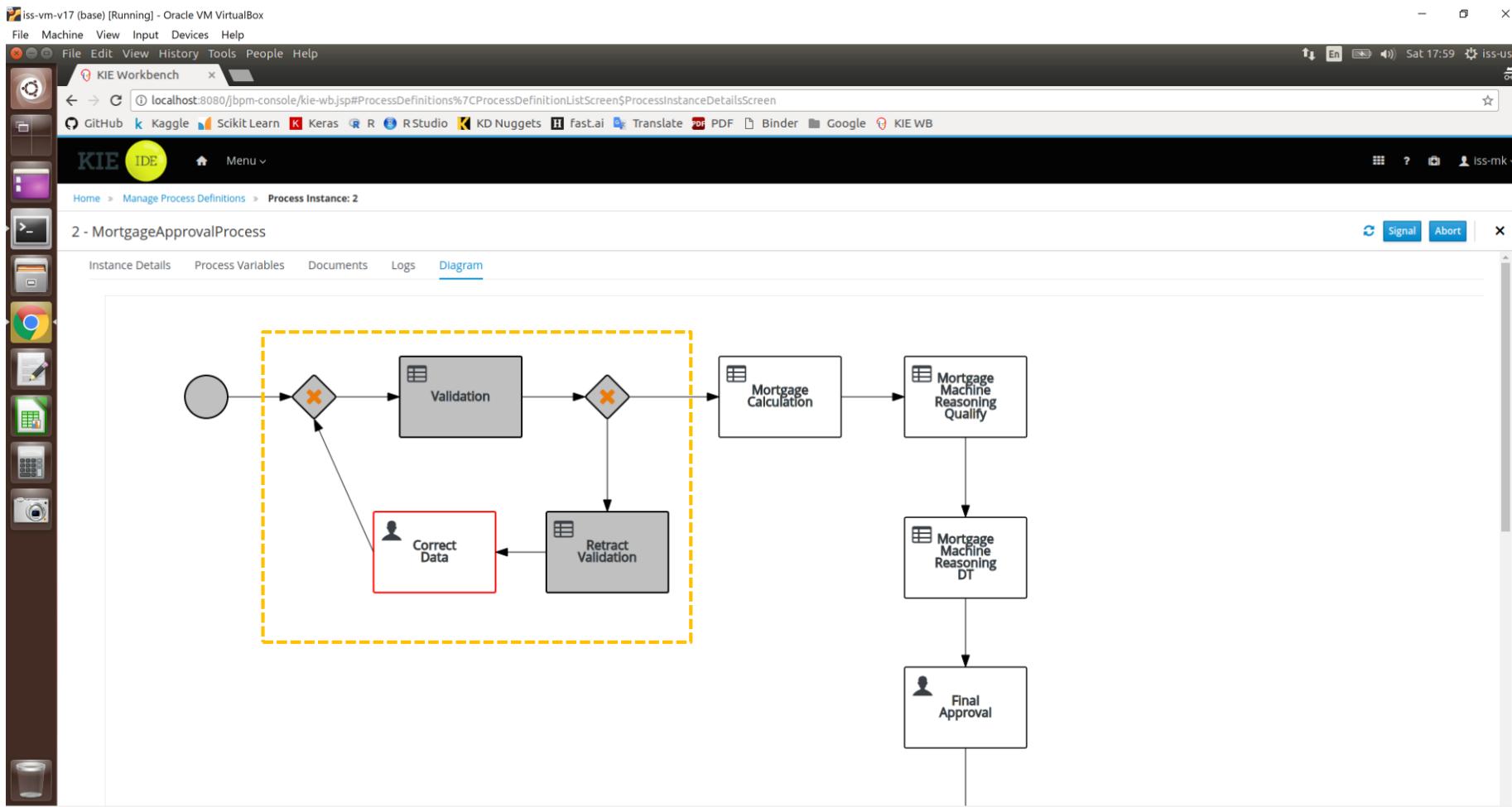
Validation of Invalid Credit Rating (1)



Validation of Invalid Credit Rating (2)



Validation of Invalid Credit Rating (3)



Validation of Invalid Credit Rating (4)

The screenshot shows a KIE Workbench interface running in a VM. The main window displays a form titled "2 - Correct Data". The "Work" tab is selected. The "Outputs:" section shows an "Application" icon. The "Error details" section contains a box labeled "Error and cause" with the message "Credit Rating must be between 1000 and 2000". A yellow dashed box highlights this error message. The "Down Payment" field contains "50000" and the "Years of amortization" field contains "20". The "Applicant" section includes fields for "Name" (testOrvalidation), "Age" (21), "Credit Rating" (3000), "Has Job*" (checked), and "Own House*" (unchecked). The "Annual Income" field contains "123456" and the "SSN" field contains "0". The "Property" section is partially visible at the bottom.