Decision Model: “Borrowing PASS/FAIL Decision with Mitigation Criteria“

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1. Introduction

Borrowing PASS/FAIL decision with mitigation model consists of 2 rules with couple of conditions to determine transaction eligibility. Using OpenL Tablets these 2 rules are represented as Decision Tables and 1 new table is added to represent algorithm of evaluation. Evaluation algorithm includes 4 steps to determine transaction eligibility:

1. Determines new borrowings to total assets ratio
2. Checks if new borrowings do not exceed predefined ratio to total assets or if it meets executive override
3. Checks if new borrowings do not exceed 1-4Threshold or non-repo collateral
4. Combines and returns the result of 2 rules evaluation

Decision model includes one Data table with Banks test data and one Test table with 2 test cases for 2 Banks and sample new borrowings amounts.

Decision model also includes Bank datatype to represent the domain model for this POC.

In addition for Rule #2 named “ThresholdBorrowingDecision” the new decision table version was created to support “Change the mitigation rules to make the failed transactions to pass”. The changed table has modified non-repo collateral condition to allow 4 times overrun. Such change in rules is usually a response to adjusted market conditions so the change was made effective for all decisions starting from Jan 1, 2015. Whereas, the initial version of rule was marked as applicable to all decisions from Jan 1, 2014.

Borrowing Decision Model file: Borrowing Decision Model.xlsx

2. Borrowing Decision Model Screenshots

This document is accompanied with Excel file with the Decision Model. For the matter of convenience below there are screenshots for quick overview.

Borrowing PASS/FAIL Decision with Mitigation Criteria

Powered by OpenL

This document is designed to determine PASS/FAIL result for a new borrowings of a bank according to its financial statements . The main aspect of the Rating is to identify creditworthiness of the bank.
Creditworthiness is an ability of a borrower to repay loans and other bills on time, spending prudently, and generally showing that it can behave in a financially responsible way. It is based upon factors, such as borrowings to assets ratio, 1-4 threshold and non repo collateral.

Evaluation Algorithm

Spreadsheet Boolean **BorrowingDecision** (Bank bank, Double newBorrowingsAmount)

properties | autoType | yes

Steps	Value
Borrowings to Assets Ratio	= newBorrowingsAmount / totalAssetsAmount
Assets Evaluation	= **AssetsBorrowingDecision** ($Borrowings to Assets Ratio, execCommitteeExposureOverride, execCommitteeFlag)
Threshold Evaluation	= **ThresholdBorrowingDecision** (newBorrowingsAmount, threshold, nonRepoCollateral)
RETURN	= $Assets Evaluation and $Threshold Evaluation

Rule#1

Rules Boolean **AssetsBorrowingDecision** (Double borrowingsAssetsRatio, Double execCommitteeExposureOverride, Boolean execCommitteeFlag)

C1	C2	C3	RET1
borrowingsAssetsRatio	borrowingsAssetsRatio < execCommitteeExposureOverride	execCommitteeFlag	
DoubleRange			
Borrowings to Total Assets Ratio	**Meets Executive Committee Exposure Override?**	**Use Executive Committee Override?**	**Pass?**
<= 0.3			Yes
> 0.3	Yes	Y	Yes
			No

Rule#2

Rules Boolean **ThresholdBorrowingDecision** (Double newBorrowingsAmount, Double threshold, Double nonRepoCollateral)		
properties	startRequestDate	1/1/2014
C1	C2	RET1
newBorrowingsAmount <= threshold Boolean	newBorrowingsAmount < nonRepoCollateral	
Meets 1-4 Threshold?	**Meets Non Repo Collateral?**	**Pass?**
Yes		Yes
	Yes	Yes
		No

Rule#2 Changed

Rules Boolean **ThresholdBorrowingDecision** (Double newBorrowingsAmount, Double threshold, Double nonRepoCollateral)		
properties	startRequestDate	1/1/2015
C1	C2	RET1
newBorrowingsAmount <= threshold Boolean	newBorrowingsAmount < 4 * nonRepoCollateral	
Meets 1-4 Threshold?	**Meets Non Repo Collateral?**	**Pass?**
Yes		Yes
	Yes	Yes
		No

Tests and Data

Test BorrowingDecision **BorrowingDecisionTest**

_id_	_context_.requestDate	bank > testBankData	newBorrowingsAmount	_res_
Test Case ID	**Borrowings Request Date**	**Bank**	**New Borrowings Amount**	**Should Pass?**
Test ABC Bank	10/15/2014	ABC Bank	1,000,000	Yes
Test Bank One Fail	10/15/2014	Bank One	10,000,000	No
Test Bank One Pass	4/1/2015	Bank One	10,000,000	Yes

Data Bank **testBankData**

name	totalAssetsAmount	execCommitteeExposure Override	execCommitteeFlag	threshold	nonRepoCollateral
Bank Name	**Total Assets Amount**	**Executive Committee Exposure Override**	**Executive Committee Flag**	**Threshold**	**Non Repo Collateral**
ABC Bank	20,000,000	35%	Y	1,000,000	2,500,000
Bank One	50,000,000	0%	N	3,000,000	3,250,000

Domain Model

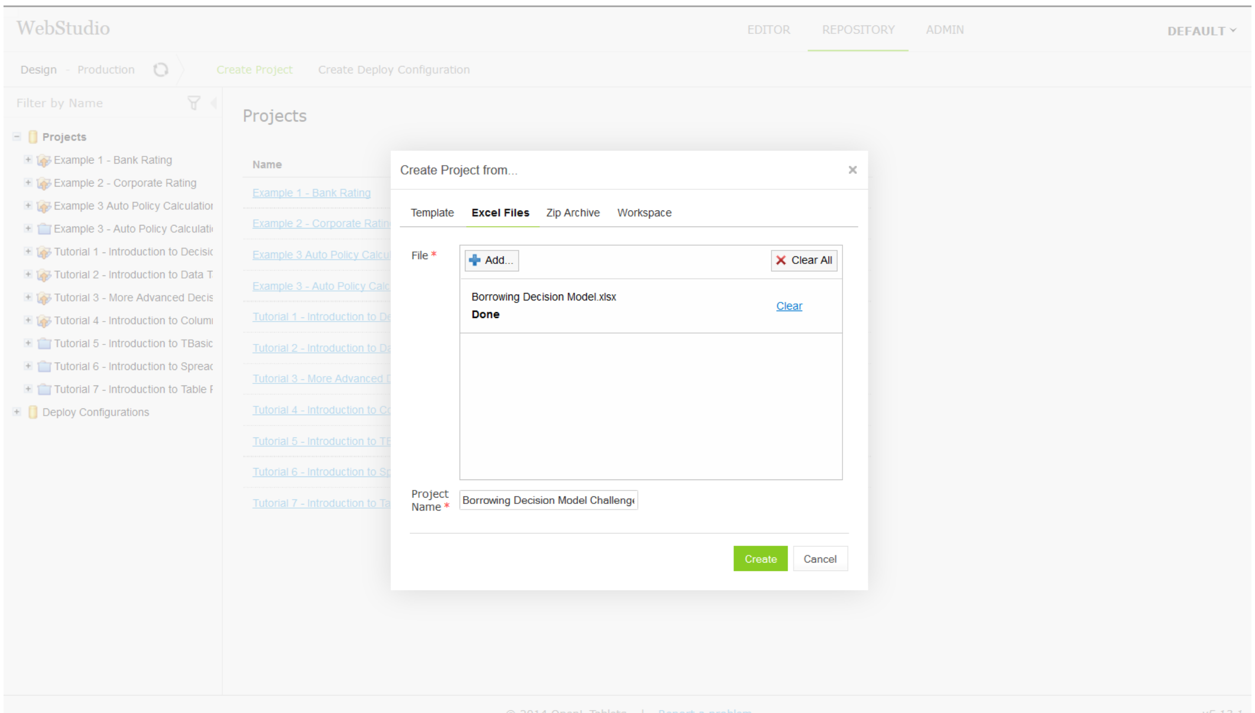
Datatype **Bank**		
String	name	
Double	totalAssetsAmount	
Double	execCommitteeExposureOverride	
Boolean	execCommitteeFlag	N
Double	threshold	
Double	nonRepoCollateral	

3. View and Deploy Borrowing Decision Model

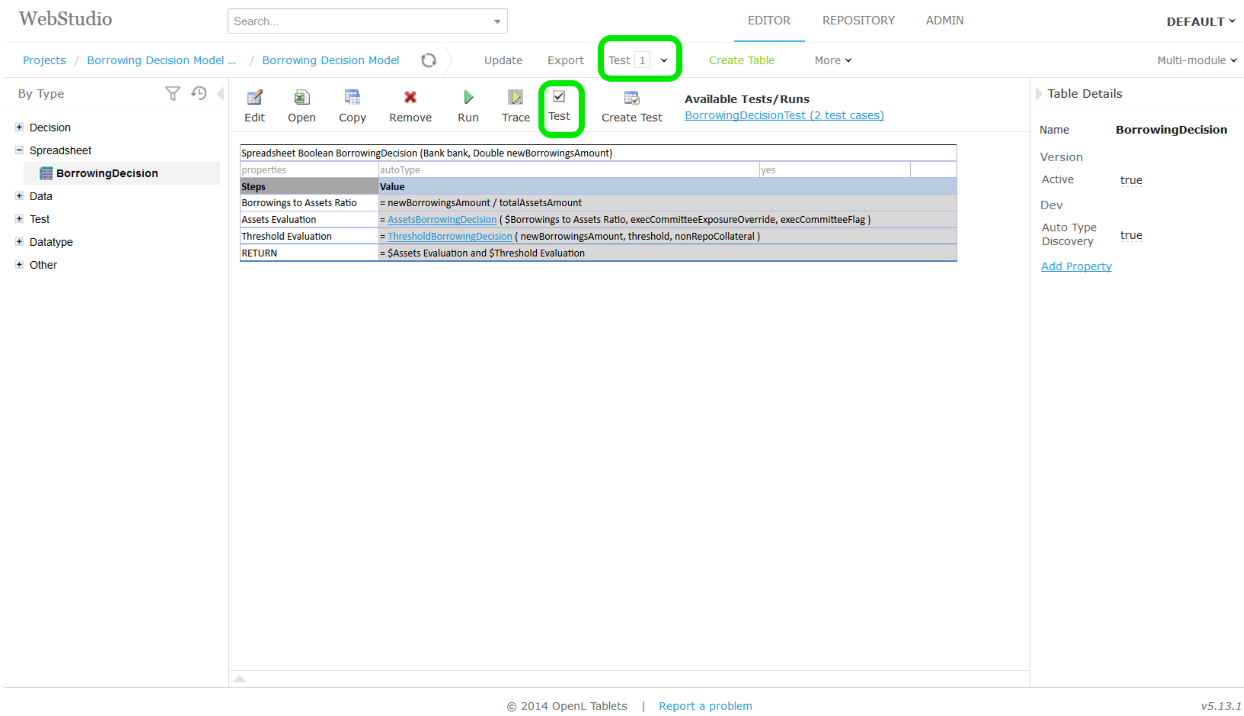
The Decision Model is ready to be used right away. Follow the step by step instruction below to see how to work with the Decision Model in WebStudio and how to deploy it as a Web Service to use from other applications.

To view the Decision Model in WebStudio follow these steps:

1. Go to OpenL Tablets WebStudio at http://dev2openldemo01.eqxdev.exigengroup.com/webstudio
2. Open ‘Repository’ tab and click ‘Create Project’ button
3. Switch in ‘Create Project from…’ dialog to Excel Files tab and upload the file with the Decision Model (see screenshot below):



4. The rules project is created and switched to status ‘In Editing’. It becomes available in ‘Editor’ tab.
5. Open Borrowing Decision Model in ‘Editor’ tab to view it by clicking on its name and navigate to evaluation algorithm table

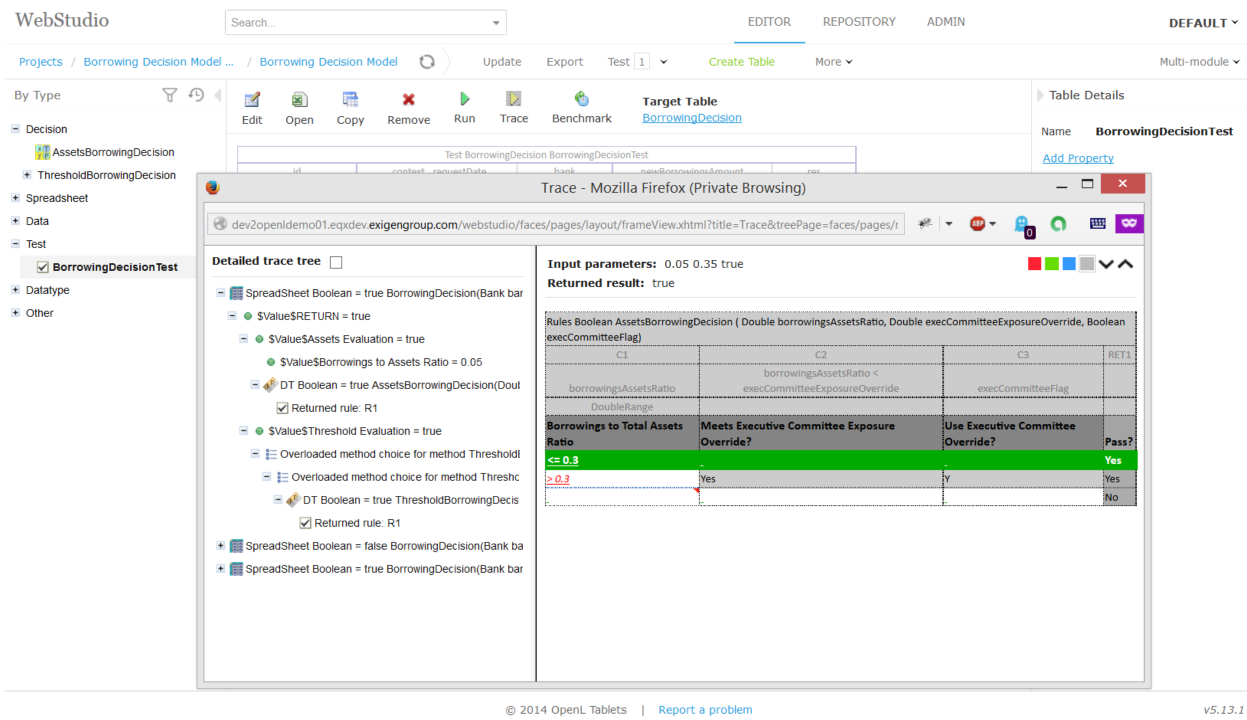


6. Click ‘Test’ button to see that rules return expected results

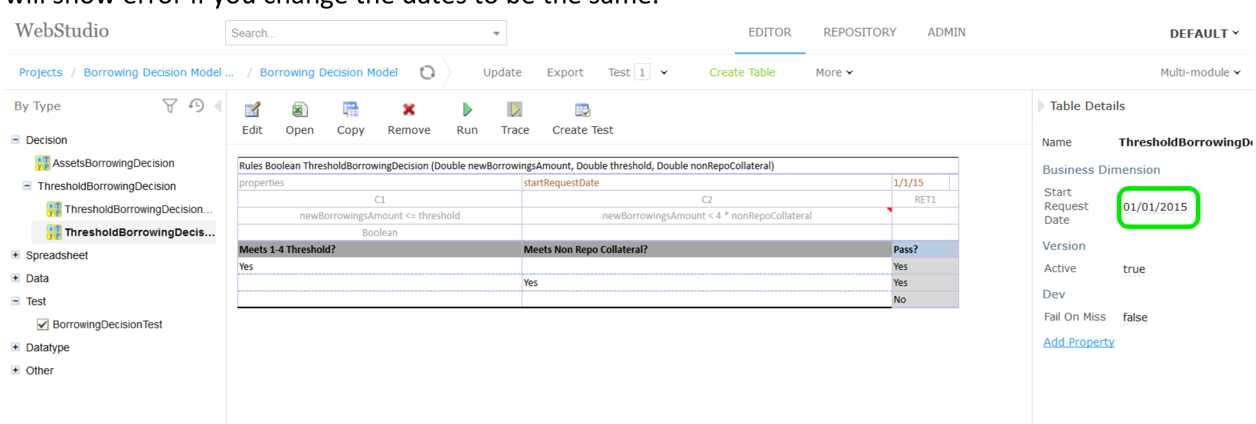
BorrowingDecisionTest 3 test cases

ID	Borrowings Request Date	Bank	New Borrowings Amount	Should Pass?
Test ABC Bank	10/15/2014	+ Bank (ABC Bank)	1000000	✔ true
Test Bank One Fail	10/15/2014	+ Bank (Bank One)	10000000.	✔ false
Test Bank One Pass	04/01/2015	+ Bank (Bank One)	10000000.	✔ true

7. Click on ‘BorrowingDecisionTest’ name to navigate to Test table. Click ‘Trace’ button to see detailed execution of ‘BorrowingDecision’

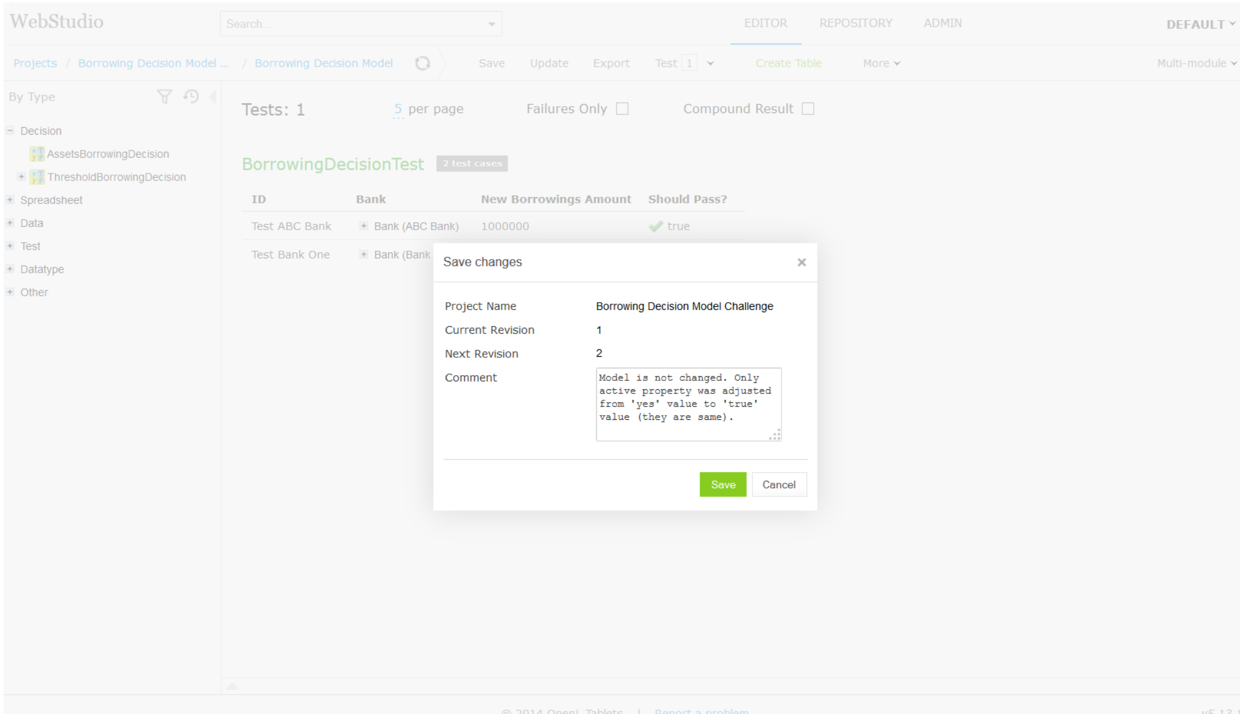


8. Navigate to 'ThresholdBorrowingDecision' decision tables and see both versions contain property 'Start Request Date'. OpenL Tablets validates gaps and overlaps in property values and will show error if you change the dates to be the same.

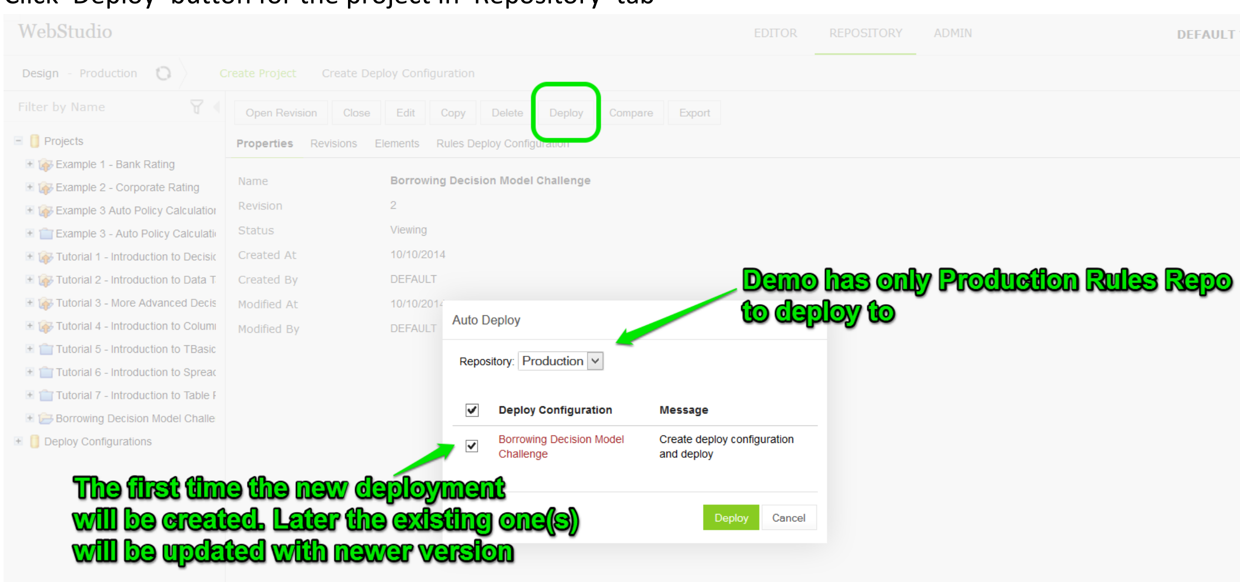


To deploy the Decision Model as Web Service follow these steps:

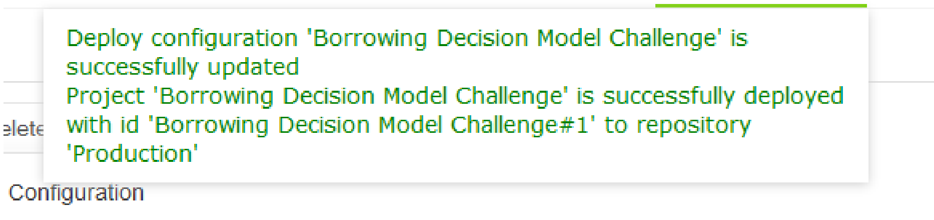
1. It is assumed you have already loaded Borrowing Decision Model into WebStudio and have checked all test pass successfully.
2. Save any changes in the project or close the project without saving



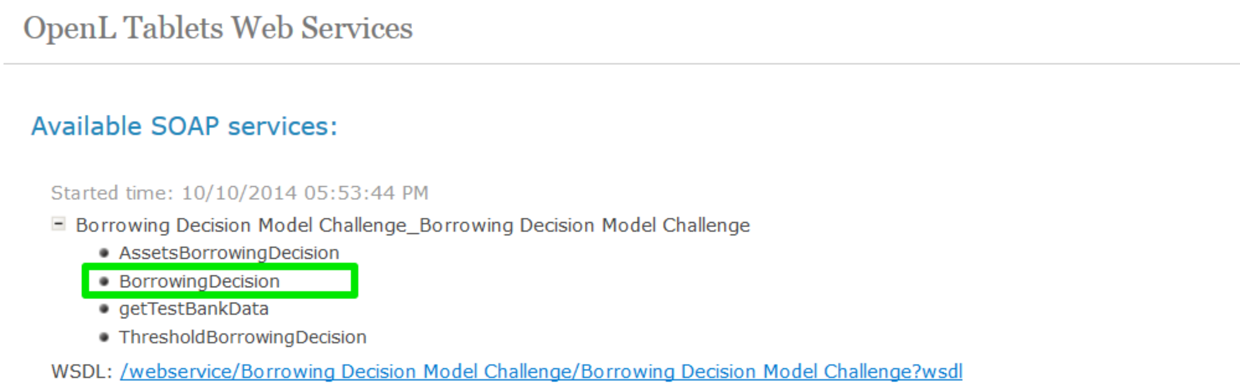
3. The project will change status to 'Viewing' and other users will see the changes made to the project (demo WebStudio works in single user mode for simplicity). The project can be deployed when it's not 'In Editing' status.
4. Click 'Deploy' button for the project in 'Repository' tab



5. WebStudio will show the message about successful deployment



6. Now you can open Web Services application at http://dev2openldemo01.eqxdev.exigengroup.com/webservice and see that the Web Service for Borrowing Decision Model is available



7. You can call the decision from any application and get the result for any transaction you want. To call Web Service use any applications or tools you like, e.g. you can use SoapUI to test the web service.
8. Notice that by default OpenL Tablets will create the service which supports versioning based on business dimensions. So the 'BorrowingDecision' will expect proper value of 'requestDate' in the first parameter which will be automatically added to service interface.

4. Summary

OpenL Tablets allows creating and using Decision Models in an intuitive and easy to use environment. It brings self-service capabilities for decision model editing and management to enable quick business response to market changes. The product is created to allow deep involvement of business users and subject matter experts into decision model authoring and maintenance.

OpenL Tablets employs lot of technics to increase decision model authoring and maintenance process by bringing such features as:

- Different rules table formats for expressiveness
- Testing and test data capturing to insure stability of production systems
- Trace - to analyze step by step rules execution and find issues with algorithms
- Deployment management to support complete decision model lifecycle
- And all these features support massive enterprise scale decision models with engine optimized for high-performance execution

Appendix A: More Complex Financial Models

Samples of more complex decision models implemented with OpenL Tablets:

- Limit for transactions that are subject to credit risk evaluation from bank-counterparties: http://openl-tablets.sourceforge.net/downloads/examples/Example%201%20-%20Bank%20Rating.zip
- Corporate Rating to a company according to its financial statements (Financial Rating) and estimated risk of collaboration with the company (Risk of Work with Corporate): http://openl-tablets.sourceforge.net/downloads/examples/Example%202%20-%20Corporate%20Rating.zip

Both examples are available for live demo at OpenL Tablets public demo instance: http://dev2openldemo01.eqxdev.exigengroup.com/