Decision Model: "Vehicle Insurance – UServ Auto Insurance Product Derby" using OpenL Tablets

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1. Introduction: UServ objectives and Decision Model creation approach

UServ's objective is to satisfy the complete financial services of its clients including their families, their businesses and their business colleagues. With this focus on complete relationship services, clients are rewarded for their loyalty as they deepen their relationship with UServ by increasing their financial portfolio.

UServ plays a balancing act between rewarding their best clients and managing the risk inherent in providing on-going service to clients whose portfolios are profitable, but violate the eligibility rules of individual products.

For the complete description, please reference original UServ document.

The implementation of this decision model is named “Example 3 - Auto Policy Calculation” in OpenL Tablets product.

Creation of the Decision Model in OpenL usually consists of the several steps:

1. Calculation algorithm – the step by step definition of all calculation logic which can be split into multiple rules, e.g. Spreadsheet tables
2. Decision and Lookup logic – simple tables to define rates, discounts or factors based on one or multiple conditions
3. Domain and Vocabulary – hierarchal description of data input required for the calculation, includes definition of use attributes and limitations applied to them
4. Validations, Versioning and other – there are multiple ways how to enhance Decision Model with input verification logic, support of multiple effective dates and territories, etc. In this example such logic is not included

In the following chapters, you can find description of the Decision Model ‘AutoPolicyCalculation.xls’ for the Auto Premium calculation using OpenL Tablets product. Using this example, we would like you to understand how business requirements are translated into OpenL Tablets Decision Model.

Decision model for the Auto Policy Premium calculation:

AutoPolicyCalculation.xls

2. Rules for Auto Rating calculation

One of the main parts of the **Auto Rating** is creation of the **Decision and Lookup** tables. The ‘AutoPolicyCalculation’ example includes 9 categories of rule to determine rates and factor based on different attributes of Auto Policy. There are the following Excel sheets with corresponding Rules:

- Vehicle Eligibility
- Vehicle Scoring
- Driver Eligibility
- Driver Scoring
- Client Scoring
- Policy Eligibility

- Vehicle Premium
- Driver Premium
- Policy Premium

Below you can read about the logic of these Decision tables. Result values of these tables evaluation are used by the Auto Premium calculation algorithm which is located in the 'Calculation' sheet. In addition, results of these tables can influence the calculation of values that are located in the other Decision or Spreadsheet tables.

2.1. Vehicle Eligibility

This sheet consists of three Simple Rules tables:

- **VehicleTheftRating** – defines Theft Rating of vehicle in accordance with the following conditions:

Column name	Description of conditions
Body Type	Describes type of vehicle construction
Price	Shows price of vehicle
High Theft List	Shows whether vehicle is added to the list of vehicles which have high theft risk
Theft Rating	Column which shows a result of this table: Theft rating

- **VehicleInjuryRating** – defines Injury Rating of Vehicle in accordance with the following conditions:

Column name	Description of conditions
Body Type	Describes type of vehicle construction
Airbags	Describes airbag existence
Roll Bar	Describes Roll bar existence
Injury Rating	Column which shows a result of this table: Injury rating

- **VehicleEligibility** – defines whether this vehicle is eligible or not

Column name	Description of conditions

Injury Rating	Describes rating of damage to the vehicle
Theft Rating	Describes rating of theft to the vehicle
Vehicle Eligibility	Column which shows a result of this table: Vehicle Eligibility

2.2. Vehicle Scoring

This sheet consist of one Simple Rules table:

VehicleEligibilityScore – defines score of vehicle eligibility in accordance with the vehicle eligibility condition:

Column name	Description of condition
Vehicle	Describes type of vehicle eligibility, for example: • Not Eligible • Provisional • Eligible
Vehicle Score	Column which shows a result of this table: Score of Vehicle Eligibility

2.3. Driver Eligibility

This sheet consists of the three Simple Rules tables:

- **DriverAgeType –** defines Driver status in accordance with the following conditions:

Column name	Description of conditions
Gender	Shows driver gender: • Male • Female
Age	Shows driver age
Driver Status	Column with result of this table: Driver status • Young driver • Standard driver • Senior driver

- **DriverEligibility –** defines Driver Eligibility in accordance with the following conditions:

Column name	Description of conditions
Driver Status	Shows driver gender: • Male • Female
Training	Shows whether driver passed a special training or not
Driver Eligibility	Column with result of this table: Driver eligibility • Not Eligible • Eligible

- **DriverRisk** – describes Driver Risk value in accordance with the following conditions:

Column name	Description of conditions
DUI	Shows number of DUI
Accidents	Shows number of Accidents
Moving Violations	Shows number of moving violations
Driver Risk	Column which shows a result of this table: Driver Risk • High Risk Driver • Standard Risk Driver

2.4. Driver Scoring

This sheet consists of two Simple Rules tables:

- **DriverTypeScore –** defines Score for Driver type in accordance with the following conditions:

Column name	Description of conditions
Driver Age	Shows driver status on the basis of driver age: • Young Driver • Senior driver
Eligible	Shows driver eligibility: • Eligible • Not Eligible • Provisional
Driver Type Score	Column with result of this table: Score of Driver type

- **DriverRiskScore –** defines Score of driver risk in accordance with the Driver Risk condition:

Column name	Description of condition
Driver Risk	Shows driver risk value
Driver Risk Score	Column with result of this table: Score of Driver risk

2.5. Client Scoring

This sheet consists of one Simple Rules table:

- **ClientTierScore –** defines Score of client tier in accordance with the Client type condition:

Column name	Description of condition
Client	Shows type of client: • Elite • Preferred • Other
Client Score	Column with result of this table: Score of client

2.6. Policy Eligibility

This sheet consists of one Simple Rules table:

- **PolicyEligibility –** defines Policy Eligibility value in accordance with the following conditions:

Column name	Description of conditions
Client	Shows client type
Policy Score	Shows Policy score
Policy Eligibility	Column which shows a result of this table: Policy Eligibility

2.7. Vehicle Premium

This sheet consists of six Simple Rules tables which determine:

- **BasePremium –** Base Premium in accordance with car type conditions
- **AgeSurcharge** – Surcharge to the Premium on the basis of the Vehicle Age
- **CoverageSurcharge –** Surcharge to the Premium on the basis of the Vehicle Coverage:
    - **Uninsured Motorist**
    - **Medical**
- **InjuryRatingSurcharge –** Surcharge to the Premium on the basis of the Vehicle Injury rating:
    - **Extremely High**
    - **High**
    - **Moderate**
    - **Low**
- **TheftRatingSurcharge –** Surcharge to the Premium in accordance with the Vehicle Theft Rating:
    - **High**
    - **Moderate**
    - **Low**
- **VehicleDiscount –** Vehicle discount in accordance with the following conditions:

Column name	Description of conditions
Air Bags	Shows Air Bags existence
Alarm	Shows Alarm existence
Vehicle Discount	Column which shows a result of this table: Vehicle Discount

2.8. Driver Premium

This sheet consists of three Simple Rules tables:

- **DriverPremium –** defines Driver Premium in accordance with the following conditions:

Column name	Description of conditions
Driver Age	Shows driver status on the basis of driver age: • Young Driver • Senior Driver
Marital Status	Shows marital status: • Married • Single
State	Shows state

Driver Premium	Column which shows a result of this table: Driver Premium

- **DriverRiskPremium** – defines Risk Premium which is calculated in accordance with the Driver Risk type:
  - **High Risk Driver**
  - **Standard Risk Driver**

- **AccidentPremium –** shows constant of Accident Premium

2.9. Policy Premium

This sheet consists of the one Simple Rules table:

- **ClientDiscount –** calculates Client Discount in accordance with the Client Tier value:
  - **Preferred**
  - **Elite**
  - **Other**

3. Auto Policy Premium calculation algorithm

This chapter explains the algorithm for Auto Premium calculation.

Auto Policy Premium is calculated at the 'Calculation' sheet. To describe formulas for Premium calculation the **'Spreadsheet'** tables are used.

Spreadsheet table components description:

Table columns	Description
Step	Shows values which are included into the calculation of the Premium
Description	Shows short description of values. Just for better understanding the business logic of these values
Value	Shows a reference to the other tables which values will be used in the Premium calculation

In this example to determine Auto Policy Premium, it is necessary to determine Driver and Vehicle Premiums, and then used these values in the Auto Premium calculation.

3.1. Driver Premium calculation

To determine Driver Score and Total Driver Premium the '**DriverPremium'** Spreadsheet table is created the following steps :

1. Determines Driver status by driver age and gender
2. Determines Driver eligibility by Driver status and whether Training is passed or not
3. Determines Driver risk by numbers of DUI, Accidents and Moving Violations
4. Determines Driver Score by Driver status and eligibility
5. Determines Driver Score by Driver risk
6. Determines Driver Premium by Driver status, marital Status and state
7. Determines Driver Risk Premium by Driver risk
8. Determines Accident Premium

All mentioned above values can be found in the corresponding **Simple Rules** tables which are specified in the 'Value' column:

Spreadsheet SpreadsheetResult **DriverPremium** (Driver driver)

Step	Description	Value
DriverType	Determine Driver status by driver age and gender	= DriverAgeType (gender, age)
Eligibility	Determine Driver eligibility by Driver status and whether Training is passed or not	= DriverEligibility ($DriverType, hadTraining)
DriverRisk	Determine Driver risk by numbers of DUI, Accidents and Moving Violations	= DriverRisk (numDUI, numAccidents, numMovingViolations)
DriverTypeScore	Determine Driver Score by Driver status and eligibility	= DriverTypeScore ($DriverType, $Eligibility)
DriverRiskScore	Determine Driver Score by Driver risk	= DriverRiskScore ($DriverRisk)
DriverPremium	Determine Driver Premium by Driver status, maritalStatus and state	= DriverPremium ($DriverType, maritalStatus, state)
DriverRiskPremium	Determine Driver Risk Premium by Driver risk	= DriverRiskPremium ($DriverRisk)
AccidentPremium	Determine Accident Premium	= AccidentPremium ()
Score	**Calculate Driver Score**	**= sum ($DriverTypeScore:$DriverRiskScore)**
Premium	**Calculate Total Driver Premium**	**= sum ($DriverPremium:$AccidentPremium)* numAccidents**

Figure 1. Driver Premium calculation algorithm

3.2. Vehicle Premium calculation

To determine Vehicle Premium the '**VehiclePremium'** Spreadsheet table is created with the following steps:

1. Determines Vehicle age
2. Determines Vehicle Theft Rating
3. Determines Vehicle Injury Rating
4. Determines Vehicle Eligibility by Injury Rating and Theft Rating
5. Determines Vehicle Score by Vehicle Eligibility
6. Determines Surcharge by Vehicle age
7. Determines Surcharge by Injury Rating
8. Determines Surcharge by Theft Rating
9. Determines Base Premium by Car Type
10. Gets Coverage Surcharge based on coverage type
11. Gets Total Surcharge

12. Determines Vehicle Discount by Air Bag type and whether Alarm is set or not

All mentioned above values can be found in the corresponding **Simple Rules** tables which are specified in the 'Value' column:

Spreadsheet SpreadsheetResult **VehiclePremium** (Vehicle vehicle)

Step	Description	Value
Age	Determine Vehicle age	= CurrentYear() - year
TheftRating	Determine Vehicle Theft Rating	= VehicleTheftRating (bodyType, price, onHighTheftProbabilityList)
InjuryRating	Determine Vehicle Injury Rating	= VehicleInjuryRating (bodyType, airbagType, hasRollBar)
Eligibility	Determine Vehicle Eligibility by Injury Rating and Theft Rating	= VehicleEligibility ($InjuryRating, $TheftRating)
Score	Determine Vehicle Score by Vehicle Eligibility	= VehicleEligibilityScore ($Eligibility)
AgeSurcharge	Determine Surcharge by Vehicle age	= AgeSurcharge ($Age)
InjuryRatingSurcharge	Determine Surcharge by Injury Rating	= InjuryRatingSurcharge ($InjuryRating)
TheftRatingSurcharge	Determine Surcharge by Theft Rating	= TheftRatingSurcharge ($TheftRating)
BasePremium	Determine Base Premium by Car Type	= BasePremium (carType)
CoverageSurcharges	Get Coverage Surcharge based on coverage type	= sum (CoverageSurcharge (coverages))
OtherSurcharges	Get Total Surcharge	= sum ($AgeSurcharge:$TheftRatingSurcharge)
VehicleDiscount	Determine Vehicle Discount by Air Bag type and whether Alarm is set or not	= VehicleDiscount (airbagType, hasAlarm)
Premium	**Calculate Total Vehicle Premium**	**= sum ($BasePremium:$OtherSurcharges) * (1 - $VehicleDiscount)**

Figure 2. Vehicle Premium calculation algorithm

3.3. Auto Policy Premium calculation

When Driver and Vehicle premiums are determined, the system can calculate Auto Policy Premium. To determine:

- Policy Eligibility
- Policy Score
- Total Policy Premium

the **'PolicyPremium'** Spreadsheet table is created with the following steps:

1. Execute Premium calculation for each Vehicles
2. Execute Premium calculation for each Drivers
3. Get Total Vehicles Premium
4. Get Total Drivers Premium
5. Determine Client discount based on Client tier
6. Get Total Vehicles Score based on Vehicle eligibility
7. Get Total Drivers Score based on Driver type, eligibility and risk
8. Determine Client score by Client tier

All mentioned above values are taken from the corresponding **Simple Rules** tables which are specified in the 'Value' column:

Spreadsheet SpreadsheetResult **PolicyPremium** (Policy policy)

Step	Description	Value
Vehicles	Execute Premium calculation for each Vehicles	= VehiclePremium (vehicles)
Drivers	Execute Premium calculation for each Drivers	= DriverPremium (drivers)
VehiclesPremium	Get Total Vehicles Premium	= sum ($Value$Premium ($Vehicles))
DriversPremium	Get Total Drivers Premium	= sum ($Value$Premium ($Drivers))
ClientDiscount	Determine Client discount based on Client tier	= ClientDiscount (clientTier)
VehiclesScore	Get Total Vehicles Score based on Vehicle eligibility	= sum ($Value$Score ($Vehicles))
DriversScore	Get Total Drivers Score based on Driver type, eligibility and risk	= sum ($Value$Score ($Drivers))
ClientTierScore	Determine Client score by Client tier	= ClientTierScore (clientTier)
Eligibility	**Calculate Policy Eligibility**	**= PolicyEligibility (clientTerm, $Score)**
Score	**Calculate Policy Score**	**= sum ($VehiclesScore:$ClientTierScore)**
Premium	**Calculate Total Policy Premium**	**= sum ($VehiclesPremium:$DriversPremium) - $ClientDiscount**

Figure 3. Policy Premium calculation algorithm

Description of the **Simple Rules** tables you can find in the 'Rules for Auto Policy Premium calculation' chapter.

4. View and Deploy Auto Policy 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 OpenL Tablets 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 (as alternative you can use Example 3) and upload the AutoPolicyCalculation.xls Decision Model file (see screenshot below):

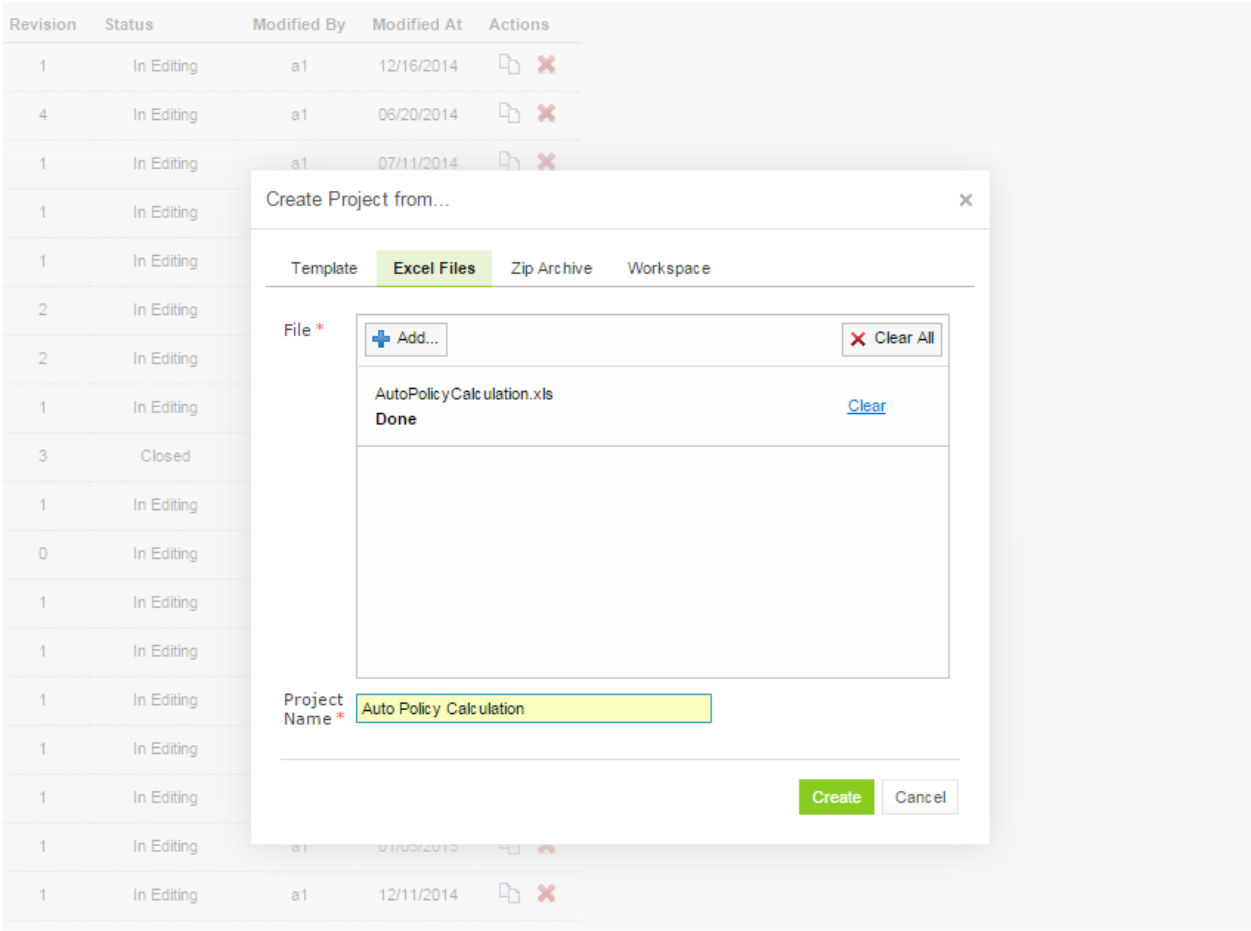

Figure 4. Create a project for the Auto Policy calculation Decision Model

4. The rules project is created and switched to status 'In Editing'. It becomes available in 'Editor' tab.
5. Open Auto Policy Decision Model in 'Editor' tab to view it by clicking on its name and navigate to the Auto Policy calculation algorithm tables:
   - DriverPremium
   - VehiclePremium
   - PolicyPremium

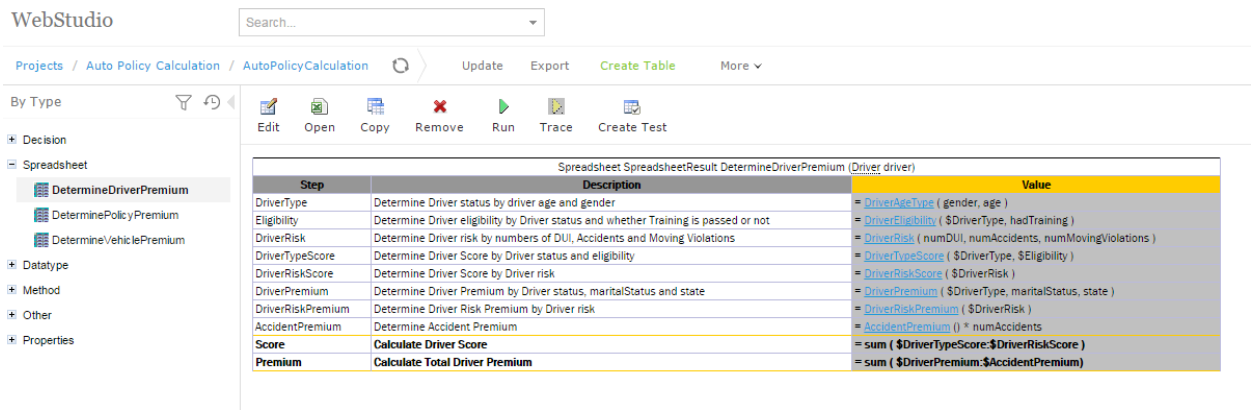

Figure 5. Algorithm to determine Driver Premium

6. To test execution of the Auto Policy algorithm calculation you need to upload the test data file: AutoPolicyTests.xls. To do it, you need to follow three described above steps.

Auto Policy Tests file

AutoPolicyCalculation
Tests.xls

7. Click the 'DriverPremiumTest' name to navigate to Test table
8. Click the 'Run' button to see that rules return expected results for Driver Premium:

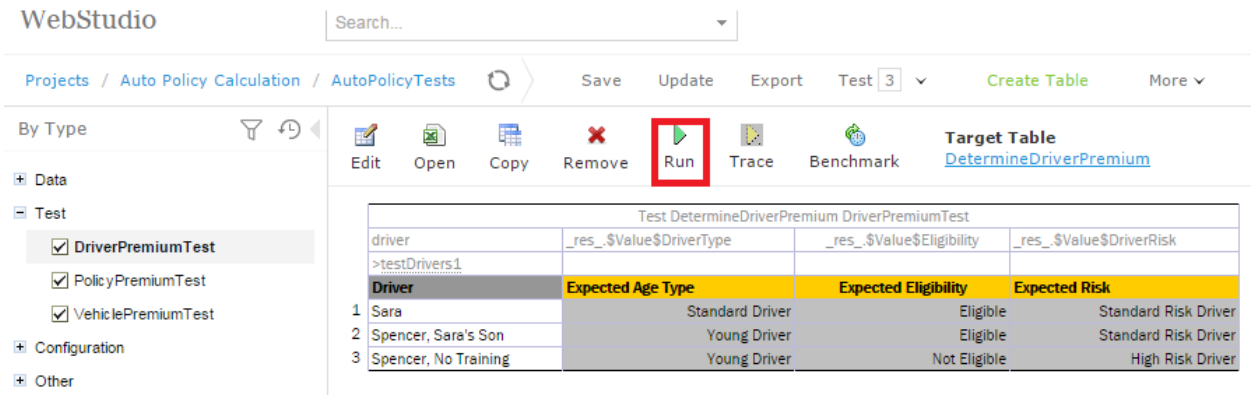

Figure 6. Execution of the 'DriverPremiumTest'

9. Click 'Trace' button to see detailed execution of 'DriverPremium'
10. Repeat the steps 7-9 with the 'VehiclePremiumTest' and 'PolicyPremiumTest' test tables

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

1. It is assumed you have already loaded Auto Policy Decision Model into WebStudio and have checked all test pass successfully.

2. Save any changes in the project or close the project without saving

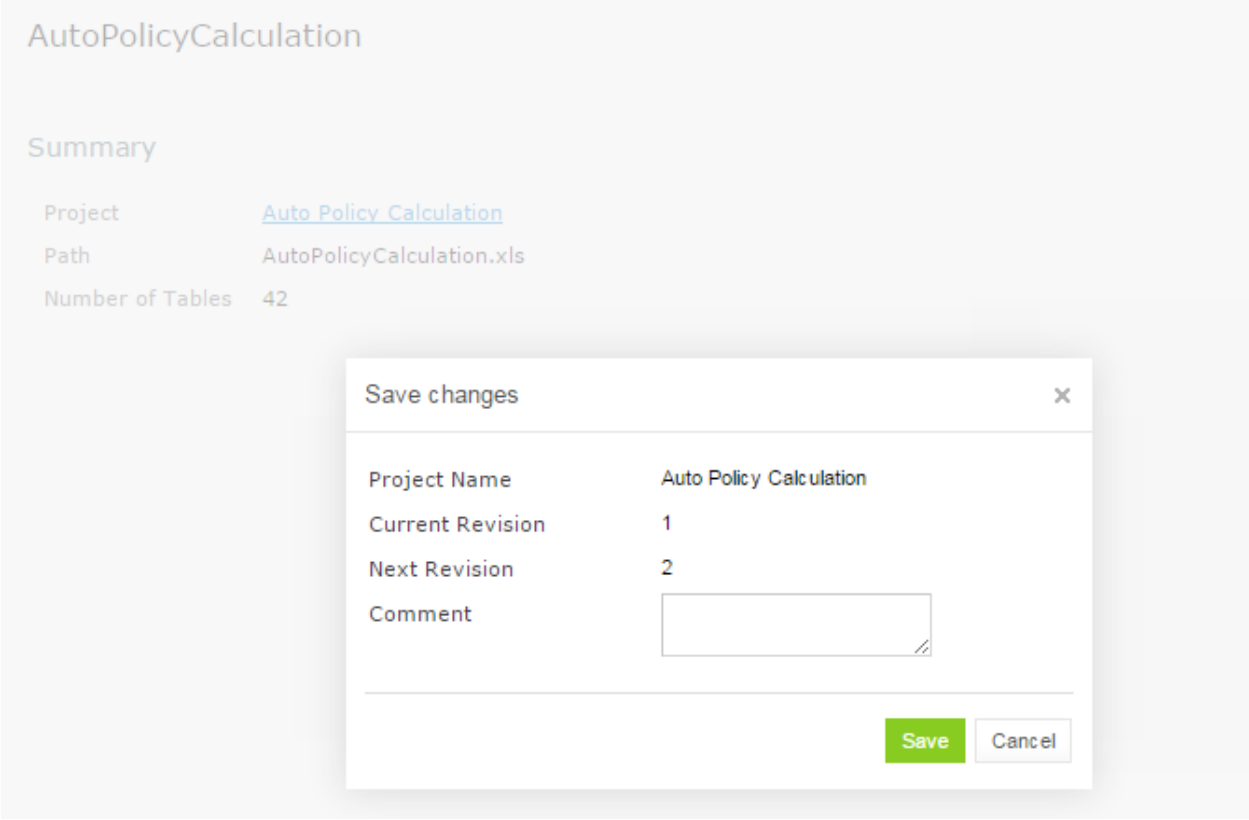

Figure 7. Saving changes

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 Auto Policy Decision Model is available

5. Summary

OpenL Tablets allows creation and usage of Auto Rating in an intuitive and easy to use environment. It allows easily add new business requirements into OpenL tables or change the existing one without any development involvement. Intuitively understandable algorithm of the Auto Premium calculation allows Business users review data which is needed for the Auto Premium calculation either in Rating Excel files or using the OpenL WebStudio application. All business requirements are shown in Decision model tables which are located in Excel files.