

OpenRules Response to DMCommunity Challenge Aug-2016

DMCommunity.org posted the challenge "[Greeting a Customer with Unknown Data](#)". While the problem by itself looks almost trivial, the fact that some data is unknown (like in real-world projects) adds a lot of complexities to the proper decision model. Here is our solution.

Our decision model "DetermineCustomerGreeting" consists of 4 sub-decisions:

1. Define Customer's Location (Zone ID)
2. Define Customer's Season and Current Hour
3. Define Greeting Word
4. Define Salutation Word

STEP 1. First we will try to define the decision variable "Customer's Zone ID". The implementation details of how to do it can be hidden from business users in Java methods supported by a Java class TimeUtil. From a business perspective we just want to call to proper methods when the variables "Phone Called From" and "Customer's State" are known or not. Here is the proper decision table:

DecisionTable DefineCustomerLocation				
Condition		Condition		Then
Phone Called From		Customer's State		Customer's Zone ID
Is Not	UNKNOWN			:= defineZoneIdByPhone(\${Phone Called From})
Is	UNKNOWN	Is Not	UNKNOWN	:= defineZoneIdByState(\${Customer's State})
Is	UNKNOWN	Is	UNKNOWN	UNKNOWN

It calls the method "defineZoneIdByPhone" when "Phone Called From" is not UNKNOWN. If it is UNKNOWN, it calls the method "defineZoneIdByState" when "Customer's State" is not UNKNOWN. If both variables are UNKNOWN it sets Customer's Zone ID as UNKNOWN. This is business (not implementation) logic. However, the fact that we call Java methods using "!=" is not hidden from a business user.

STEP 2. The second sub-decision is described by the following table:

Decision DefineCustomerSeasonAndCurrentHour		
Condition		ActionExecute
Customer's Zone ID		Execute Decision Table
Is	UNKNOWN	SetCustomerSeasonAndCurrentHourUnknown
Is Not	UNKNOWN	CalculateCustomerSeasonAndCurrentHour

This table calls either the decision table “SetCustomerSeasonAndCurrentHourUnknown”

DecisionTableAssign SetCustomerSeasonAndCurrentHourUnknown	
Variable	Value
Customer's Season	UNKNOWN
Current Hour Unknown	TRUE

or the decision table “CalculateCustomerSeasonAndCurrentHour”

DecisionTableAssign CalculateCustomerSeasonAndCurrentHour	
Variable	Value
Customer's Season	::= defineSeason(\${Customer's Zone ID})
Current Hour Unknown	FALSE
Current Hour	::= currentHour(\${Customer's Zone ID})

The calculation details are hardly belong to business logic and are hidden in Java methods:

- defineSeason: based on the known “Customer’s Zone ID” sets Customer’s Season to “Summer”, “Winter” or “UNKNOWN”
- currentHour: based on the known “Customer’s Zone ID” calculates “Current Hour” at the customer’s location.

This table also states that the variable “Current Hour Unknown” is FALSE.

STEP 3. Based on different combinations of variables “Customer’s Season” and “Current Hour Unknown” we define a greeting word by calling the proper decision tables:

Decision DefineGreeting		
If	If	ActionExecute
Customer's Season	Current Hour Unknown	Execute Decision Table
Summer	FALSE	DefineGreetingSummer
Winter	FALSE	DefineGreetingWinter
UNKNOWN		DefineDefaultGreeting
	TRUE	DefineDefaultGreeting

Here are 3 possible decision tables that define decision variable “Greeting”:

DecisionTable DefineGreetingSummer	
If	Then
Current Hour	Greeting
[0..11)	Good Morning
[11..17)	Good Afternoon
[17..22)	Good Evening
[22-24]	Good Night

DecisionTable DefineGreetingWinter	
If	Then
Current Hour	Greeting
[0..12)	Good Morning
[12..16)	Good Afternoon
[16..21)	Good Evening
[21-24]	Good Night

DecisionTable DefineDefaultGreeting	
	Then
	Greeting
	Hello

STEP 4. To define the variable “Salutation” we use the following single-hit decision table:

DecisionTable Define Salutation		
If	If	Then
Gender	Marital Status	Salutation
Male		Mr.
Female	Married	Mrs.
Female	Single	Ms.
Female		Ms.
	

This table covers all situations when Gender or Marital Status are UNKNOWN. The last rules will assign an empty string to the variable “Salutation” if all other rules are not satisfied.

To complete the decision model we collected all used decision variables in the glossary distributing them between two business concepts “Customer” and “Response”:

Glossary glossary		
Variable	Business Concept	Attribute
Gender	Customer	gender
Date of Birth		dob
Marital Status		maritalStatus
Is Child		isChild
Age		age
Phone Called From		phoneCalledFrom
Customer's State		state
Customer's Zone ID		zoneld
Customer's Season		season
Current Hour Unknown		currentHourUnknown
Current Hour		currentHour
Greeting	Response	greeting
Salutation		salutation
Result		result

Testing Results

Finally we created test cases using the following data tables in Excel:

Datatype Customer	
String	name
String	maritalStatus
String	gender
String	phoneCalledFrom
String	state
String	zoneld
String	season
boolean	currentHourUnknown
int	currentHour

Datatype Response	
String	greeting
String	salutation
String	result

Data Customer customers								
name	maritalStatus	gender	phoneCalledFrom	state	zoneld	season	currentHourUnknown	currentHour
Customer Name	Marital Status	Gender	Phone Called From	State	Zone ID	Season	Current Hour Unknown	Current Hour
Robinson	Married	Female	718-111-1111	NY	?	?	FALSE	20
Smith	Single	Male	323-111-1111	CA	?	?	FALSE	11
Somebody Unknown	UNKNOWN	UNKNOWN	UNKNOWN	UNKNOWN	?	?	TRUE	-1

Data Response responses		
greeting	salutation	result
Greeting	Salutation	Result
?	?	?
?	?	?
?	?	?

DecisionTableTest testCases			
#	ActionUseObject	ActionUseObject	ActionExpect
Test ID	Customer	Response	Salutation
Test 1	:= customers[0]	:= responses[0]	Mrs.
Test 2	:= customers[1]	:= responses[1]	Mr.
Test 3	:= customers[2]	:= responses[2]	

When we executed these test cases we received the following results:

```
*** Decision DetermineCustomerGreeting ***
Decision has been initialized
```

RUN TEST: Test 1

```
Decision Run has been initialized
Decision DetermineCustomerGreeting: Show Customer
Customer(id=0) {
  name=Robinson
  currentHour=20
  currentHourUnknown=false
  gender=Female
  maritalStatus=Married
  phoneCalledFrom=718-111-1111
  season=?
  state=NY
  zoneId=?
}
Decision DetermineCustomerGreeting: Define Customer's Location
Assign: Customer's Zone ID = America/New_York [America/New_York]
Decision DetermineCustomerGreeting: Define Season and Current Time
Decision DefineCustomerSeasonAndCurrentHour: Calculate Customer's Season And Current
Hour
Assign: Customer's Season = Summer [Summer]
Assign: Current Hour Unknown = false [false]
Assign: Current Hour = 15 [15]
Decision DetermineCustomerGreeting: Define Greeting Word
Assign: Greeting = Good Afternoon [Good Afternoon]
Decision DetermineCustomerGreeting: Define Salutation Word
Assign: Salutation = Mrs. [Mrs.]
Decision DetermineCustomerGreeting: Define Result
Assign: Result = Good Afternoon, Mrs. Robinson! [Good Afternoon, Mrs. Robinson!]
Decision DetermineCustomerGreeting: Show Result
Good Afternoon, Mrs. Robinson!
Decision has been finalized
```

Validating results for the test <Test 1>
Test 1 was successful

RUN TEST: Test 2

Decision Run has been initialized
Decision DetermineCustomerGreeting: Show Customer
Customer(id=0) {
 name=Smith
 currentHour=11
 currentHourUnknown=false
 gender=Male
 maritalStatus=Single
 phoneCalledFrom=323-111-1111
 season=?
 state=CA
 zoneId=?
}
Decision DetermineCustomerGreeting: Define Customer's Location
Assign: Customer's Zone ID = America/Los_Angeles [America/Los_Angeles]
Decision DetermineCustomerGreeting: Define Season and Current Time
Decision DefineCustomerSeasonAndCurrentHour: Calculate Customer's Season And Current
Hour
Assign: Customer's Season = Summer [Summer]
Assign: Current Hour Unknown = false [false]
Assign: Current Hour = 12 [12]
Decision DetermineCustomerGreeting: Define Greeting Word
Assign: Greeting = Good Afternoon [Good Afternoon]
Decision DetermineCustomerGreeting: Define Salutation Word
Assign: Salutation = Mr. [Mr.]
Decision DetermineCustomerGreeting: Define Result
Assign: Result = Good Afternoon, Mr. Smith! [Good Afternoon, Mr. Smith!]
Decision DetermineCustomerGreeting: Show Result
Good Afternoon, Mr. Smith!
Decision has been finalized

Validating results for the test <Test 2>
Test 2 was successful

RUN TEST: Test 3

Decision Run has been initialized
Decision DetermineCustomerGreeting: Show Customer
Customer(id=0) {
 name=Somebody Unknown
 currentHour=-1
 currentHourUnknown=true
 gender=UNKNOWN
 maritalStatus=UNKNOWN
 phoneCalledFrom=UNKNOWN
 season=?
 state=UNKNOWN
 zoneId=?
}
Decision DetermineCustomerGreeting: Define Customer's Location
Assign: Customer's Zone ID = UNKNOWN [UNKNOWN]
Decision DetermineCustomerGreeting: Define Season and Current Time

Decision DefineCustomerSeasonAndCurrentHour: Set Customer's Season And Current Hour
as Unknown

Assign: Customer's Season = UNKNOWN [UNKNOWN]

Assign: Current Hour Unknown = true [true]

Decision DetermineCustomerGreeting: Define Greeting Word

Assign: Greeting = Hello [Hello]

Assign: Greeting = Hello [Hello]

Decision DetermineCustomerGreeting: Define Salutation Word

Assign: Salutation = "" []

Decision DetermineCustomerGreeting: Define Result

Assign: Result = Hello, Somebody Unknown! [Hello, Somebody Unknown!]

Decision DetermineCustomerGreeting: Show Result

Hello, Somebody Unknown!

Decision has been finalized

Validating results for the test <Test 3>

Test 3 was successful

All 3 tests succeeded!