

Solution for DMCommunity Challenge June-2015
“Make a Good Burger”

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Now that the OMG's Decision Model and Notation (DMN) is a standard, I thought it would be interesting to share a solution using the standard and an internal Oracle research project/reference implementation.

Much has been written about the diagramming notation (Decision Requirements Diagrams) and decision tables, but little has been written about FEEL, the "friendly enough" expression language.

DMN is agnostic about the 'size' of a decision. The Burger challenge could be decomposed into several dependent decisions, each with some decision logic, or it can be modeled as a single decision containing all the logic. We choose the latter approach. The decision logic is in the form of a tabular context. Each row in the table is a context entry, and each entry consists of a name and an expression. The expression is either text, or another tabular expression. Expressions can reference prior context entries by name. Here is the context, entry by entry, with a brief comment about each entry.

Ingredients	Item	Sodium/mg	Fat/g	Calories	Cost/\$
	"Beef Patty" //	50 //	17 //	220 //	0.25 //
	"Bun" //	330 //	9 //	260 //	0.15 //
	"Cheese" //	310 //	6 //	70 //	0.10 //
	"Onions" //	1 //	2 //	10 //	0.09 //
	"Pickles" //	260 //	0 //	5 //	0.03 //
	"Lettuce" //	3 //	0 //	4 //	0.04 //
	"Ketchup" //	160 //	0 //	20 //	0.02 //
	"Tomato" //	3 //	0 //	9 //	0.04 //

Ingredients is a Relation containing the data from the challenge problem statement.

Make Burger	(patties, buns, cheese, onions, ketchup and lettuce, pickles and tomatoes)	
	patties	patties //
	buns	buns //
	cheese	cheese //
	onions	onions //
	ketchup and lettuce	ketchup and lettuce //
	pickles and tomatoes	pickles and tomatoes //
	sodium	patties * Ingredients[Item="Beef Patty"].Sodium/mg + buns * Ingredients[Item="Bun"].Sodium/mg + cheese * Ingredients[Item="Cheese"].Sodium/mg + onions * Ingredients[Item="Onions"].Sodium/mg + ketchup and lettuce * Ingredients[Item="Ketchup"].Sodium/mg + ketchup and lettuce * Ingredients[Item="Lettuce"].Sodium/mg + pickles and tomatoes * Ingredients[Item="Pickles"].Sodium/mg + pickles and tomatoes * Ingredients[Item="Tomato"].Sodium/mg //
	fat	patties * Ingredients[Item="Beef Patty"].Fat/g + buns * Ingredients[Item="Bun"].Fat/g + cheese * Ingredients[Item="Cheese"].Fat/g + onions * Ingredients[Item="Onions"].Fat/g + ketchup and lettuce * Ingredients[Item="Ketchup"].Fat/g + ketchup and lettuce * Ingredients[Item="Lettuce"].Fat/g + pickles and tomatoes * Ingredients[Item="Pickles"].Fat/g + pickles and tomatoes * Ingredients[Item="Tomato"].Fat/g //
	calories	patties * Ingredients[Item="Beef Patty"].Calories + buns * Ingredients[Item="Bun"].Calories + cheese * Ingredients[Item="Cheese"].Calories + onions * Ingredients[Item="Onions"].Calories + ketchup and lettuce * Ingredients[Item="Ketchup"].Calories + ketchup and lettuce * Ingredients[Item="Lettuce"].Calories + pickles and tomatoes * Ingredients[Item="Pickles"].Calories + pickles and tomatoes * Ingredients[Item="Tomato"].Calories //
	cost	patties * Ingredients[Item="Beef Patty"].Cost/\$ + buns * Ingredients[Item="Bun"].Cost/\$ + cheese * Ingredients[Item="Cheese"].Cost/\$ + onions * Ingredients[Item="Onions"].Cost/\$ + ketchup and lettuce * Ingredients[Item="Ketchup"].Cost/\$ + ketchup and lettuce * Ingredients[Item="Lettuce"].Cost/\$ + pickles and tomatoes * Ingredients[Item="Pickles"].Cost/\$ + pickles and tomatoes * Ingredients[Item="Tomato"].Cost/\$ //

Make Burger is a function (note the parenthesized parameter list) that returns a context with 10 entries, representing the ingredients used, sodium, fat, calories, and cost of the burger.

Item Count	[1, 2, 3, 4, 5] //
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Item Count is a list of permissible item counts used when making a burger.

All Burgers	<pre> for patties in Item Count, buns in Item Count, cheese in Item Count, onions in Item Count, ketchup and lettuce in Item Count, pickles and tomatoes in Item Count return Make Burger(patties, buns, cheese, onions, ketchup and lettuce, pickles and tomatoes),, </pre>
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All Burgers is the list of all burgers with the ingredients used 1-5 times. Each burger in the list is made by the Make Burger function.

Allowed Burgers by Cost	<pre> sort(All Burgers[sodium < 3000 and fat < 150 and calories < 3000], function(x,y) x.cost < y.cost) </pre>
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Allowed Burgers by Cost is the list of All Burgers, filtered by the condition in square brackets, and sorted by increasing cost.

Expensive Allowed Burger	<pre> Allowed Burgers by Cost[-1],, </pre>
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Finally, the most expensive allowed burger is the last element of the Allowed Burgers by Cost list. The most Expensive Allowed Burger is

Expensive Allowed Burger	context	patties	number	5
		buns	number	5
		cheese	number	1
		onions	number	5
		ketchup and lettuce	number	3
		pickles and tomatoes	number	1
		sodium	number	2967
		fat	number	146
		calories	number	2606
		cost	number	2.8