**Lab Guide**

IBM Decision Manger Open Edition

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Hands-on Guide

DMN Beyond the Basics



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# Introduction

In this guide we go beyond basics of DMN to build real-world DMN.

The following topics are presented:

* **Why use DMN**
* **Advanced DRD**
* **Decision Table Hit Policies**
* **Using Data Types**
* **Advanced Feel**

By the end, you will be able to apply these real-world techniques to your DMN projects.

# Prerequisites

For this lab you will need **Kie Sandbox** with *Kie Sandbox Extended Services* running. If you have not already done so, download and install the *Kie Sandbox Extended Services*.

# What is DMN

DMN is a decision model based on a notation standard defined by the Object Management Group (OMG)

DMN uses a graphical decision requirements diagram (DRD) that traces business decision flows

DMN supports Friendly Enough Expression Language (FEEL) to define decision logic in DMN decision tables and DMN boxed expressions

DMN has an underlying XML schema that allows the DMN models to be shared between DMN-compliant platforms

Use DMN if you need a standard way of creating comprehensive, illustrative, and stable decision flows

# Advanced Decision Requirements Diagrams (DRD)

## Going beyond basics

When beginning your DMN journey, you probably use input data and decisions . This is good for simple models. But if you want full power, consider the following components:

|  |  |  |
| --- | --- | --- |
| Description | Notation | |
| Business knowledge model | Reusable function. Use this when decisions refer to common decisions or functions. |  |
| Decision service | Top-level decision containing a set of reusable decisions published as a service for invocation. A decision service can be invoked from an external application or a BPMN business process. |  |
| Text annotation | Explanatory note associated with an input data node, decision node, business knowledge model, or knowledge source. |  |
| Knowledge source | External authorities, documents, committees, or policies that regulate a decision. This component is not executable. |  |

An example where all the DRD components are used is shown below:

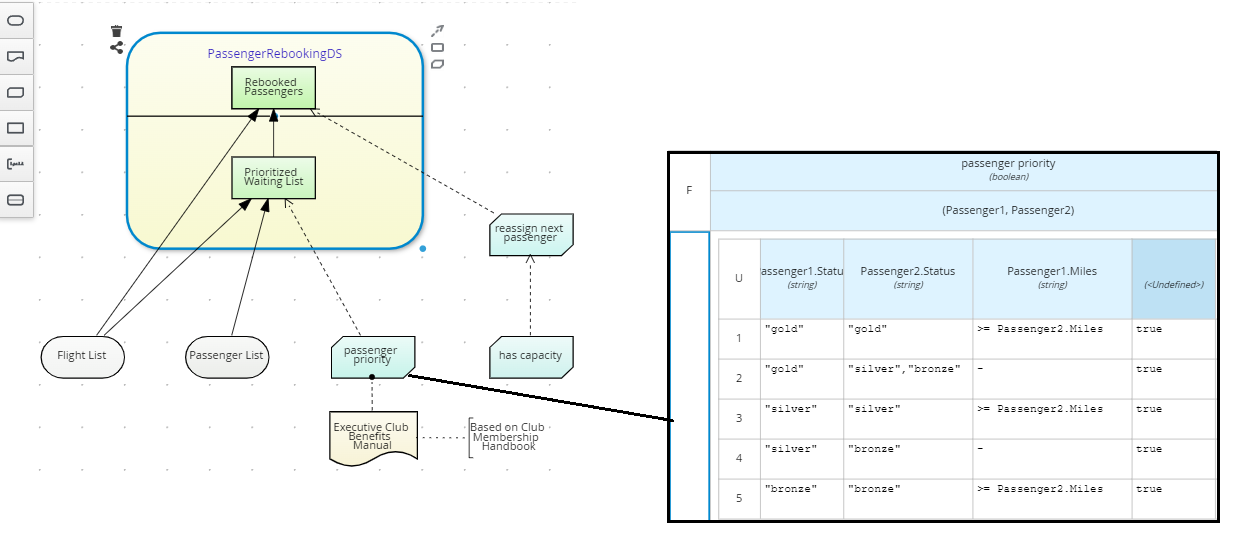


Figure 1: Advanced Passenger Booking DRD

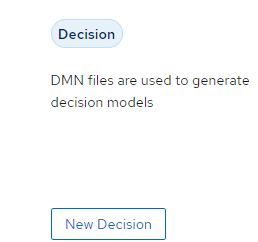
## Lab

### Import DMN project using Kie Sandbox

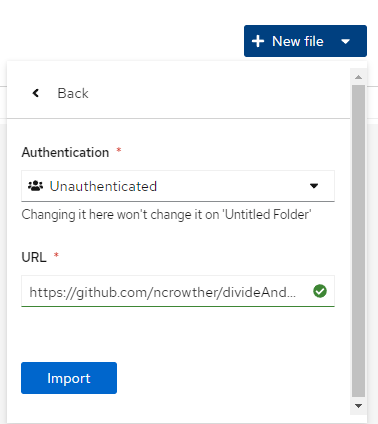
1. Open **Kie Sandbox** in Chrome:

<https://sandbox.kie.org/#/>

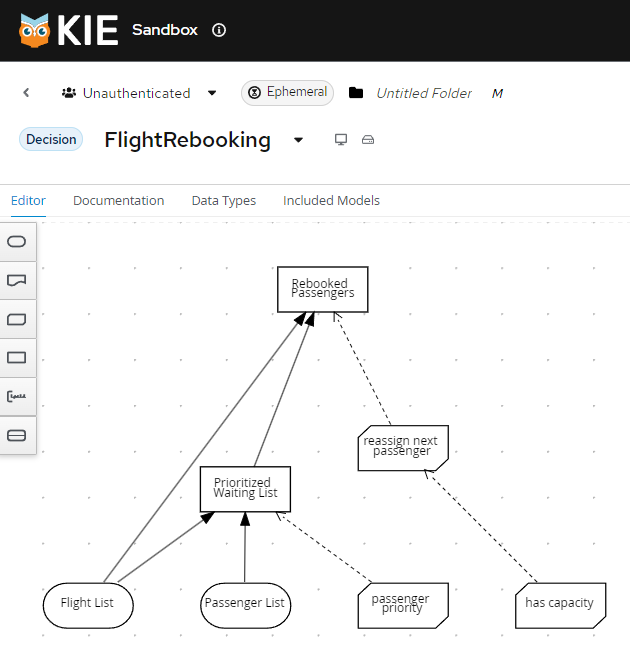
1. Create a new decision:



1. Click **
2. Select *From URL*.
3. Paste the text below into the URL: <https://github.com/ncrowther/divideAndConquerDMN/blob/main/Labs/Lab00/src/main/resources/org/acme/habitability/Lab00/FlightRebooking.dmn>
4. Click Import 

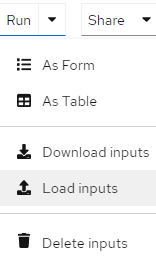


You should see the following:

­

### Run the service

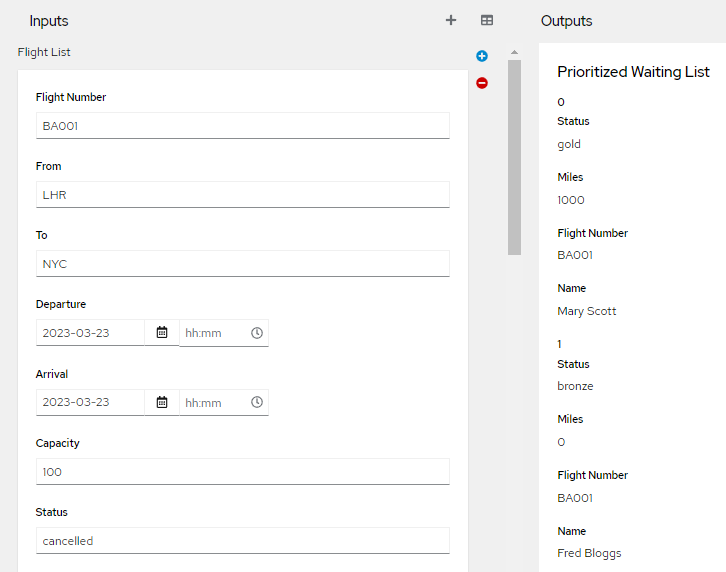
1. Click *Run->Load Inputs*



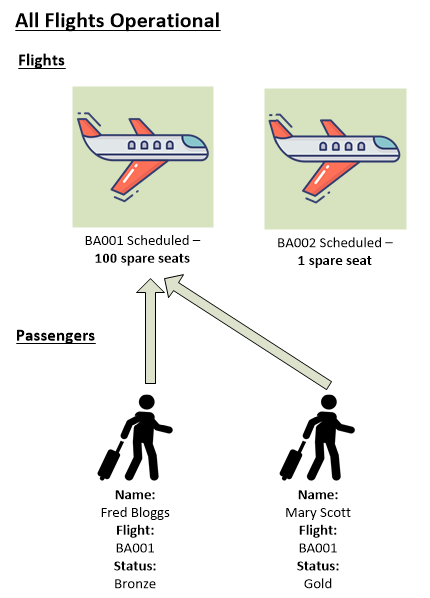
1. Download the following file to your local drive:



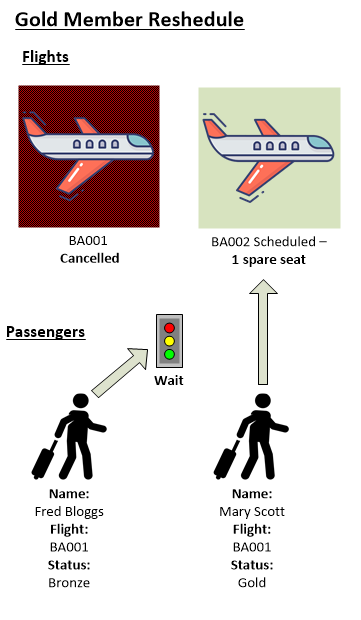
1. Open the downloaded file above.
2. The service will run using the test data. You should see the results in the Outputs section.



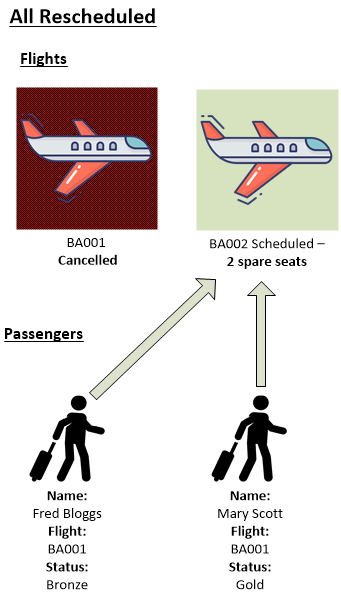
The test data represents the following scenario, where all flights are operational, and no rescheduling required:



Now change the status of flight BA001 to *cancelled* (all lower case). You should see that only Mary Scott is rescheduled on flight BA002. Fred Bloggs must wait as there is only one spare seat. Mary is a gold member and has priority.



Now change the number of spare seats on flight BA002 to 2. You should see that both Mary and Fred are scheduled to fly on BA002:



### Extend the diagram

Modify the DRG so that is formatted as shown in Figure 1. (to be expanded)

Modify the service (to be expanded)

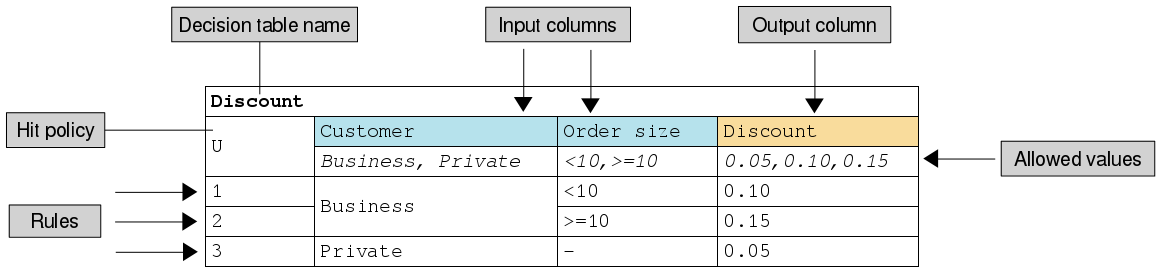
# Hit Policies and Decision Table Analysis

Hit policies change the evaluation order of a decision table. Each hit policy requires different ways of reasoning over the table. Therefore, it is important to be able to select the right hit policy for your application.

## Why use Hit Policies?

Not all decisions are the same! Some some count outcomes, some require a go / no go decision and others require exact reasoning. You need a different hit policy for each of these.

In DMN the hit policy is specified in the top left of the decision table. See below:



The commonly used hit policies are:

|  |  |  |
| --- | --- | --- |
| Hit Policy | Description | When to use |
| ****Unique (U)**** | Permits only one rule to match. Any overlap raises an error. | For detailed reasoning. Ensures your rules cover all cases and are complete |
| First (F) | Rules are evaluated from top to bottom. Rules may overlap, but only the first match counts. | For concise decision tables where a go / no go decision is needed rather than complete reasoning. |
| ****Any (A)**** | Permits multiple rules to match, but they must all have the same output. If they do not, an error is raised. | Where many conditions lead to identical actions |
| ****Collect (C)**** | Aggregates values in an arbitrary list. | For multiple row satisfaction. Works for strings (which are cast into a list) and numbers which can be summed, cast to a list, or return the smallest/highest number. |

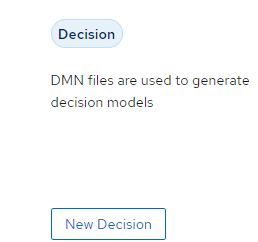
Other less commonly used hit policies are **Priority**, **Rule Order** and **Output Order** which have similar behaviour to **Collect.**

## Lab

Open **Kie Sandbox** in Chrome:

<https://sandbox.kie.org/#/>

Create a new decision:



Click *New File,* thenimport the following DMN as a URL. For each hit policy, run the rules and examine the results. Which algorithm is most appropriate for this use case?

Any hit policy:

<https://github.com/ncrowther/divideAndConquerDMN/blob/main/Labs/Lab01/src/main/resources/org/acme/habitability/Lab01/HabitabilityLab00-Any.dmn>

String collection policy:

<https://github.com/ncrowther/divideAndConquerDMN/blob/main/Labs/Lab01/src/main/resources/org/acme/habitability/Lab01/HabitabilityLab00-Collect.dmn>

Numeric Count policy:

<https://github.com/ncrowther/divideAndConquerDMN/blob/main/Labs/Lab01/src/main/resources/org/acme/habitability/Lab01/HabitabilityLab00-Count.dmn>

First Policy:

<https://github.com/ncrowther/divideAndConquerDMN/blob/main/Labs/Lab01/src/main/resources/org/acme/habitability/Lab01/HabitabilityLab00-First.dmn>

Unique Policy:

<https://github.com/ncrowther/divideAndConquerDMN/blob/main/Labs/Lab01/src/main/resources/org/acme/habitability/Lab01/HabitabilityLab00-Unique.dmn>

# Using Data Types

## Why use Data Types?

The quickest win to improve DMN readability and maintainability is to replace primitive inputs with one or more data structures. This helps declutter the DMN diagram.

## Data Type Example

For example, below are two versions of a functionally identical decision service. The top DMN uses primitive attributes, the bottom DMN replaces this with a data structure which makes the design clearer and allows additional attributes to be added without changing the diagram.

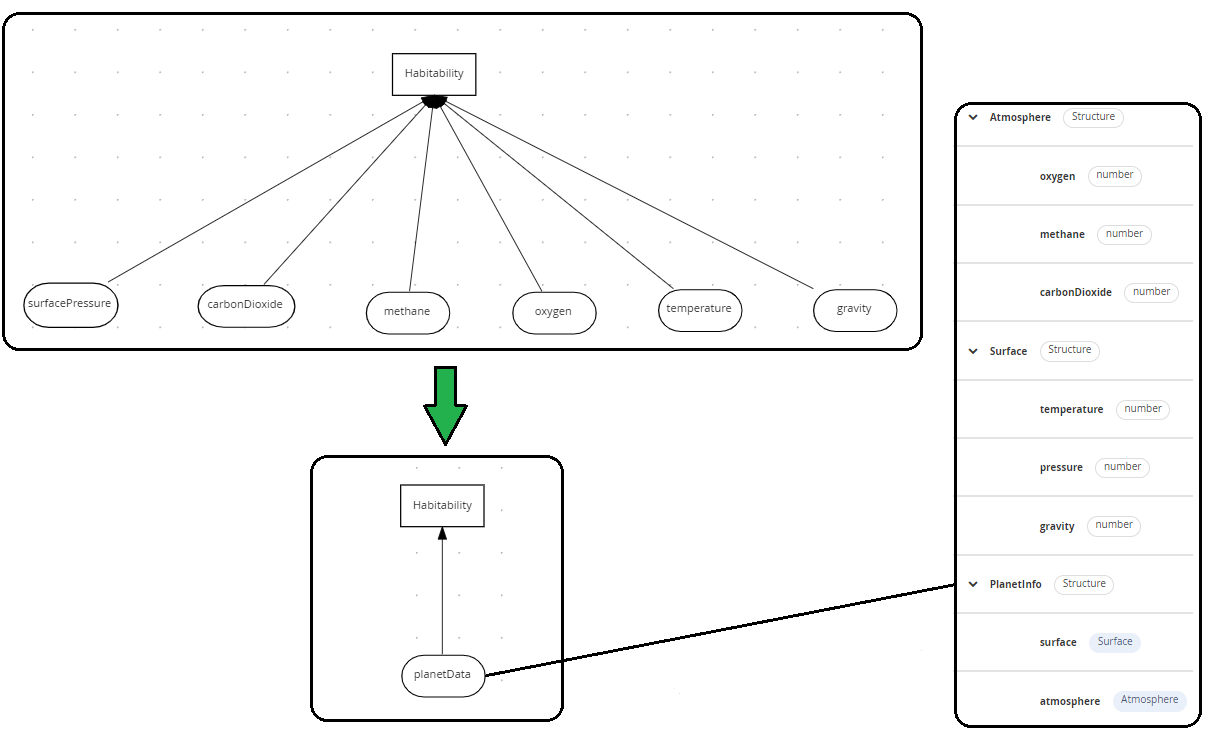


Figure 1: Structured Versus Unstructured Data

## Lab

See xxx for lab.

# Defining Logic in Feel

Friendly Enough Expression Language (FEEL) is an expression language defined by the Object Management Group (OMG). FEEL expressions define the logic of a decision in a DMN model. FEEL is designed to facilitate both decision modeling and execution by assigning semantics to the decision model constructs. FEEL expressions are written inside boxed expressions and business knowledge models.

## Why use Feel?

The following is a real-world DMN model example that demonstrates how to use FEEL to reach a complex decision. In this scenario, a flight from San Diego to New York is canceled, requiring the affected airline to find alternate arrangements for its inconvenienced passengers.

First, the airline collects the information necessary to determine how best to get the travelers to their destinations:

Input data

List of flights

List of passengers

Decisions

Prioritize the passengers who will get seats on a new flight

Determine which flights those passengers will be offered

Business knowledge models

The company process for determining passenger priority

Any flights that have space available

Company rules for determining how best to reassign inconvenienced passengers

The airline then uses the DMN standard to model its decision process in the following decision requirements diagram (DRD) for determining the best rebooking solution:

## Lab

See xxx for lab.

# Managing large DMN projects

# Conclusion

In this lab we presented tips and techniques for building real world DMN projects. Consider applying these DMN patterns to help you scale!