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Ontology for managing diets for Chronic Diabetes Disease

BACKGROUND

- Patients need to follow a diet that is suitable.
- Presenting an ontology that can be used to classify a snack or meal as good or bad.
- The goal is creating a nutritional Ontology that identifies whether a meal is a GoodMeal or a BadMeal.
- If a meal or food item is a BadMeal, what are the risks of having the meal between high, medium and low risk.
- It is expensive to consult a professional.
- In hospitals patients do not get enough information regarding their diet and are often confused and frustrated with the terminology used to explain ways to reduce the chronic disease

CHRONIC DIABETES DISEASE

- Diabetes is a disorder that affects the way that the body uses food for energy.
- It is a common hormonal problem that if untreated can lead to diabetes complications such as :
  - diabetic neuropathy
  - kidney problems
  - heart problems
  - retinopathy and other disorders.
- Earlier diagnosis for diabetes can prevent the serious cases.

TYPES OF DIABETES

Table 1: Different types of diabetes

Types of diabetes	Description of diabetes
Type 1 diabetes	• Type 1 diabetes is more frequent in children and young adults. • If you have type 1 diabetes, your body does not generate insulin. • People with type 1 diabetes must take insulin every day to stay alive.
Type 2 diabetes	• more common among middle-aged and older people. • The most common type of diabetes is type 2. • If you have type 2 diabetes, your body does not produce or use insulin properly. • Type 2 diabetes can attack anyone at any age, including children and teenagers.
Gestational diabetes	• more likely to get type 2 diabetes later. • Some women develop gestational diabetes while pregnant. • Once the baby is born, this kind of diabetes normally goes away. • It's possible that type 2 diabetes gets diagnosed during pregnancy.

SEMANTIC TECHNOLOGY

- **Semantic Technology** the word “semantic” refers to meaning in language.
- The goal of semantic technology is to help machines understand data.
- To enable the encoding of semantics with the data, well-known technologies is OWL.
- These technologies formally represent the meaning involved in information.
- Semantics gives meaning to entities and the relationships between them.
- It provides algorithms to compute results that will combine Syntax, Semantics, Queries, and Reasoning to develop an ontology [1].
- Encodes meanings separately from Metadata, content files, documents, web resources Services and it is mostly controlled by vocabulary [2].
- Semantics enables machines as well as people to understand, share, and reason with each other.

ONTOLOGY

- an ontology is an intelligent classifier.
- OWL is a formal language based on Description Logic.
- OWL is the most current advancement in standard ontology language.
- Describes the important concepts and interactions in a specific domain.
- By giving a domain-specific vocabulary as well as a computerized definition of the terms used in the vocabulary.
- By ignoring the details and focusing on the big picture, ontologies can make a domain easier to understand.
- Ontologies consist of :
  - Individuals
  - Properties
  - Classes

- Properties define the relationship between **individuals**.
- **Classes** define a concept.
- Instances are elements of classes and are linked to classes via **properties**.
- Are used to capture knowledge about some domain of interest.
- To make inferences that are added to the knowledge base, ontologies are employed with automated reasoners.
- Are flexible and efficient in storing information about concepts

PROTÉGÉ

- it is an ontology editor that allows a reasoner to reason over the contents.
- Supports Web Ontology Language (OWL).
- It have Graphical User Interface; and it is easy to use (no coding).
- The Reasoner eliminates inconsistence.
- Reasoner can help in maintain the hierarchy correctly.

DESIGN TO IMPLEMENTATION

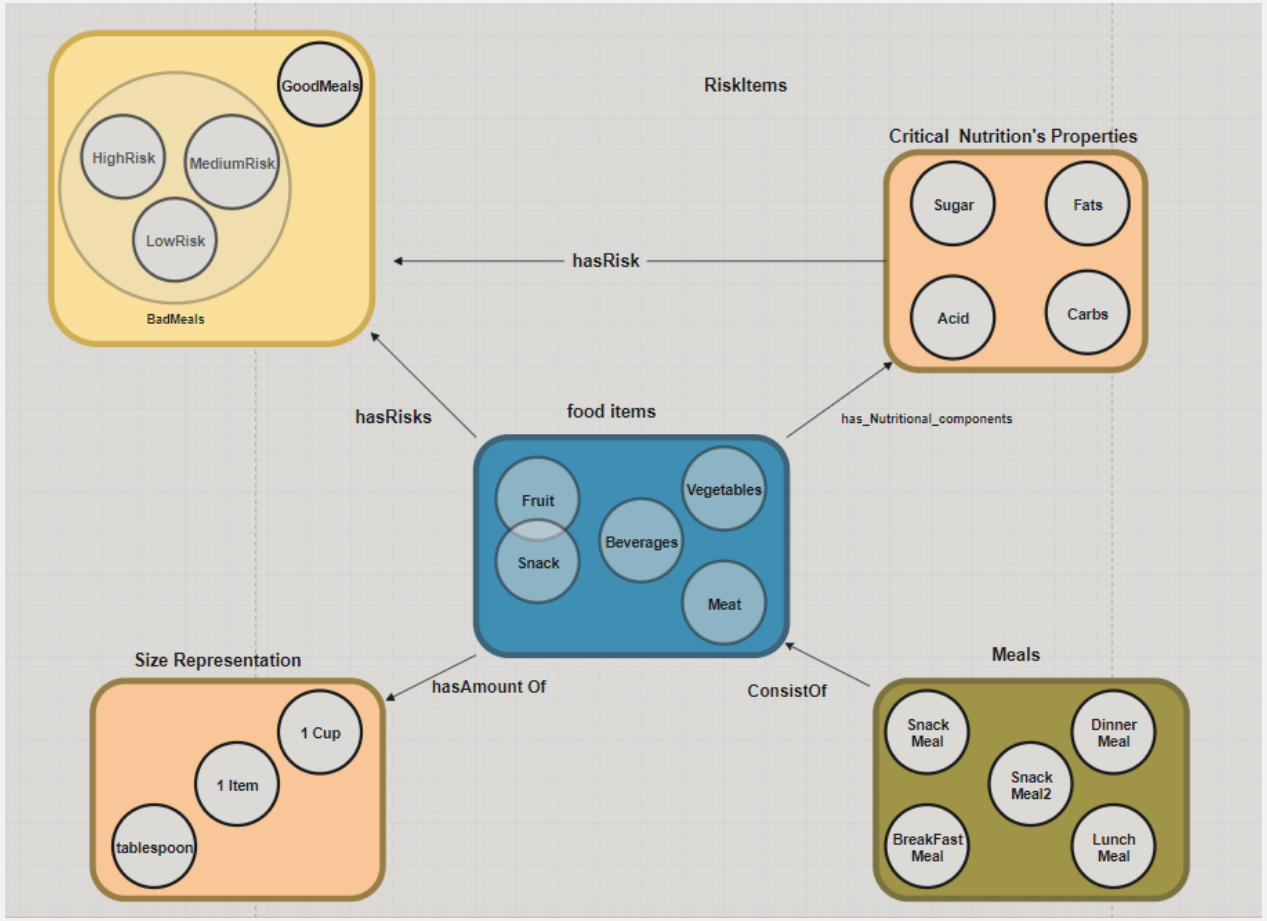


Figure 1: Menu structure breakdown with its critical Nutrition properties

IMPLEMENTATION (TOOLS AND RESOURCES)

protégé

A Practical Guide To Building OWL Ontologies
Using Protégé 4 and CO-ODE Tools
Edition 1.3

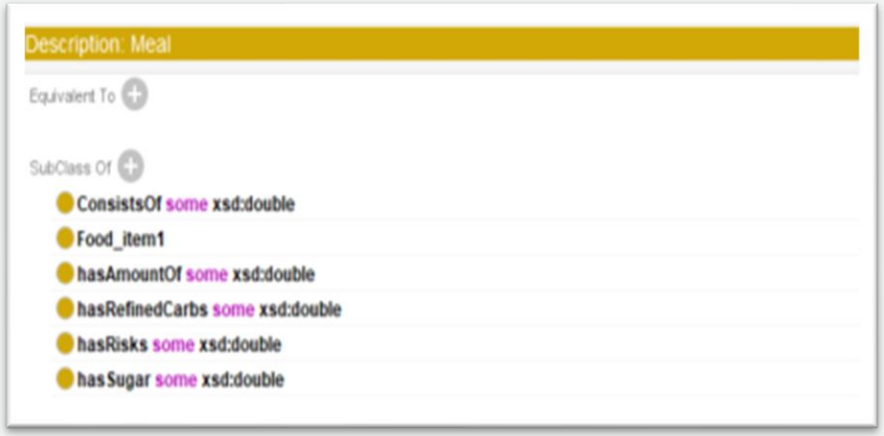
eat THIS / not THAT

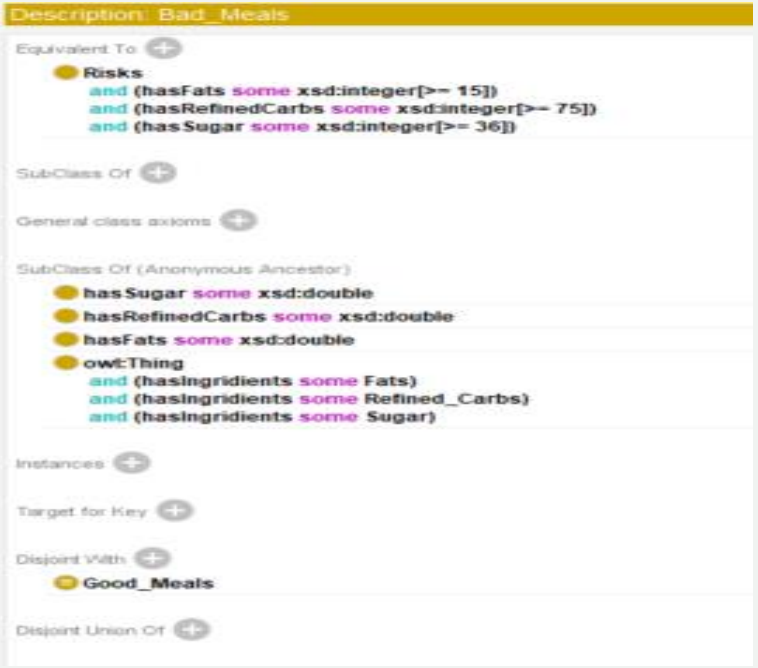
MNT
MEDICAL NEWS TODAY

diabetes
new zealand

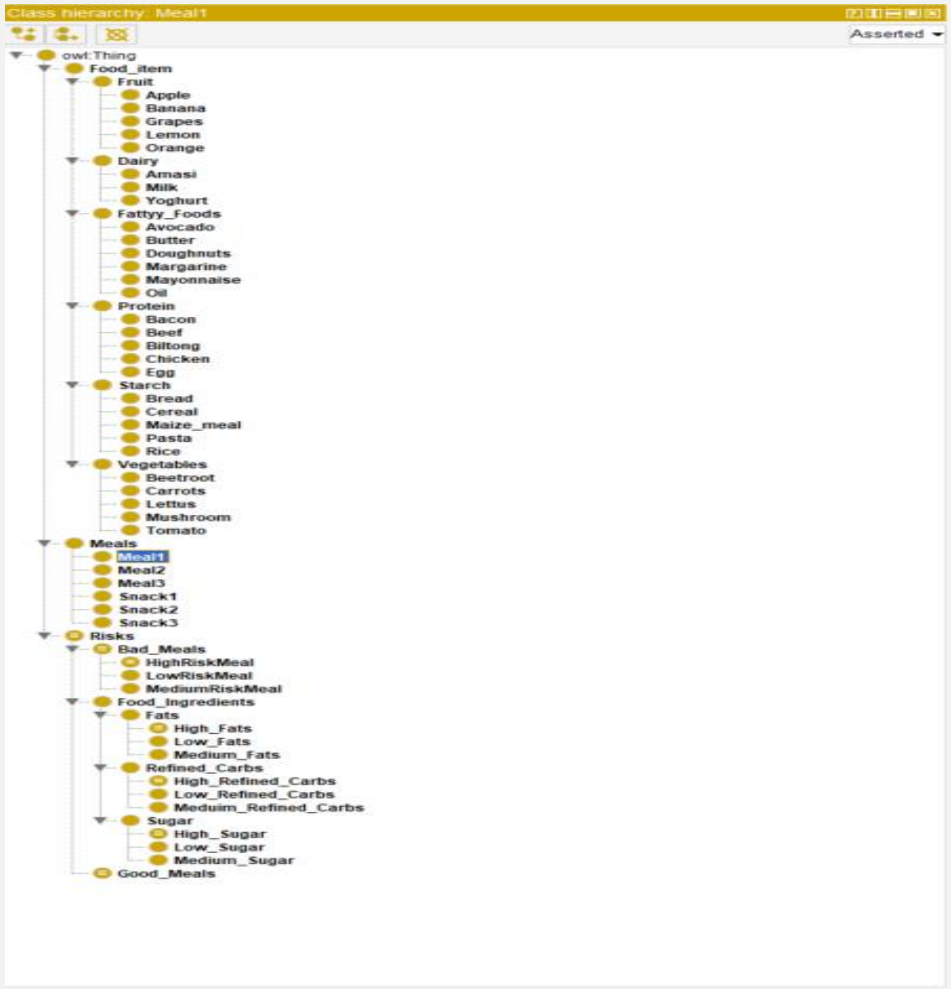
RenalSmart
Nutritional Information System

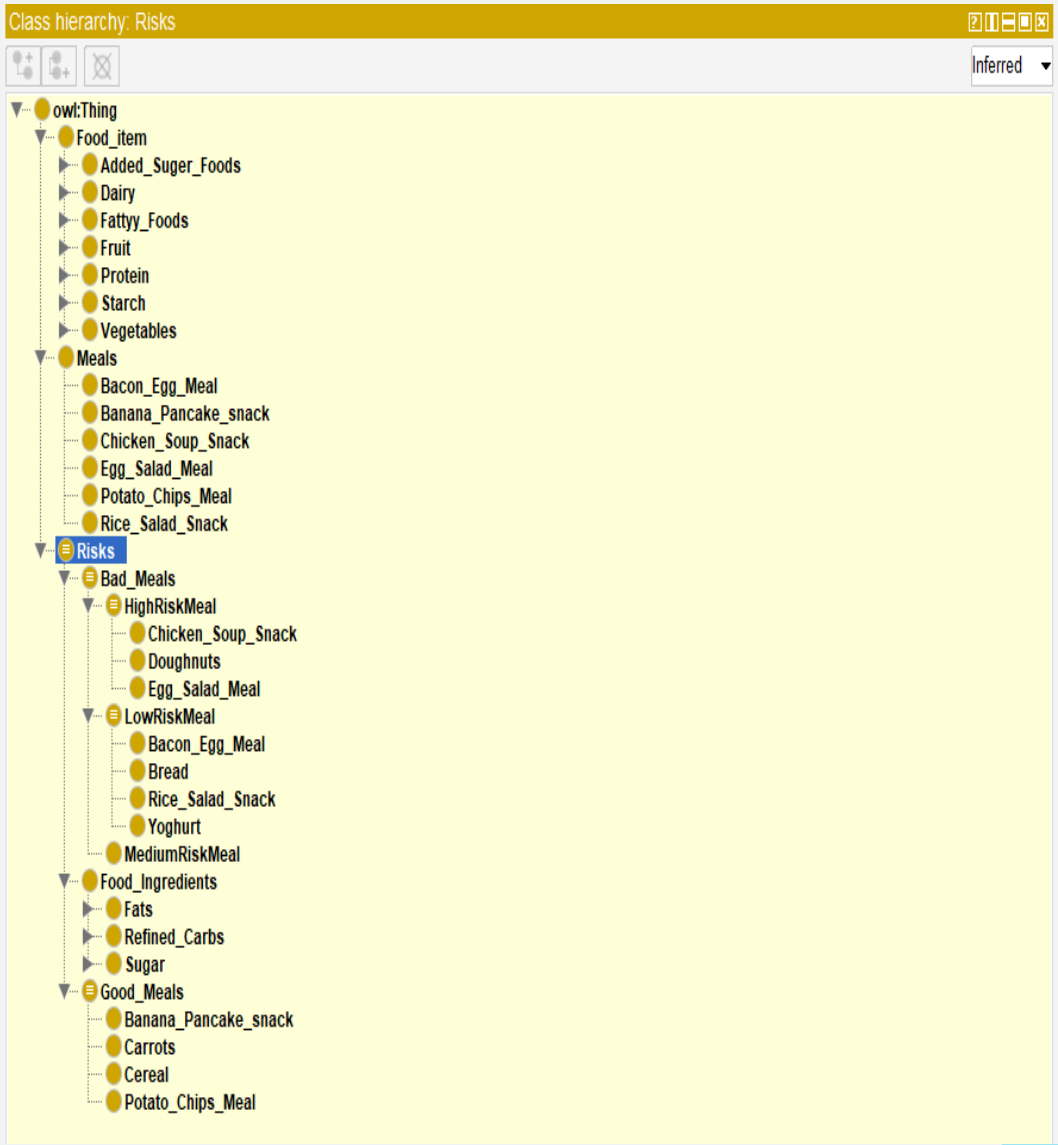
DEFINITIONS OF CLASSES AND SUBCLASSES





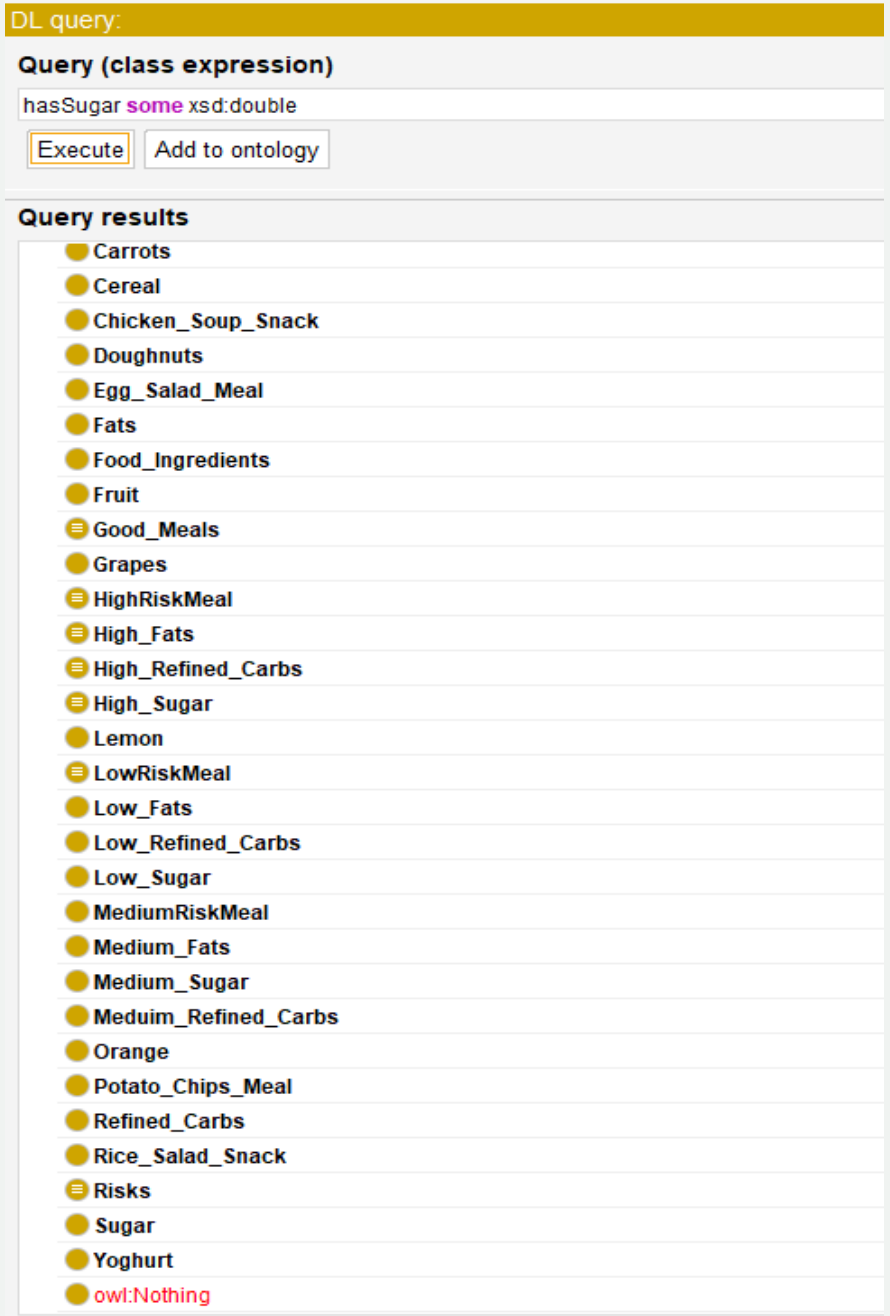
CLASS HIERARCHY (ASSERTED AND INFERRED CLASSES)





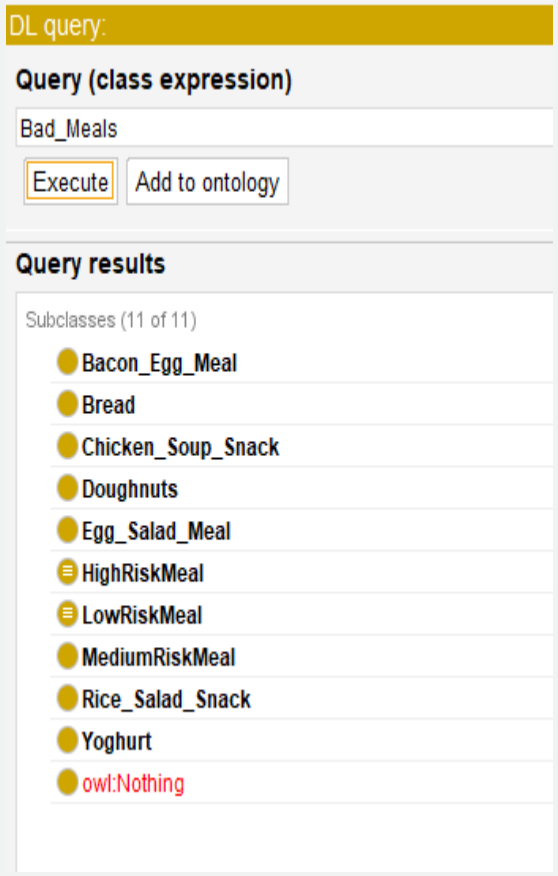
QUERIES

- GoodMeals
- BadMeals
- High sugar food items
- High fat food items
- High refined carbs food items
- Meals containing food items
- HighRisk food items
- MediumRisk food items
- LowRisk food items

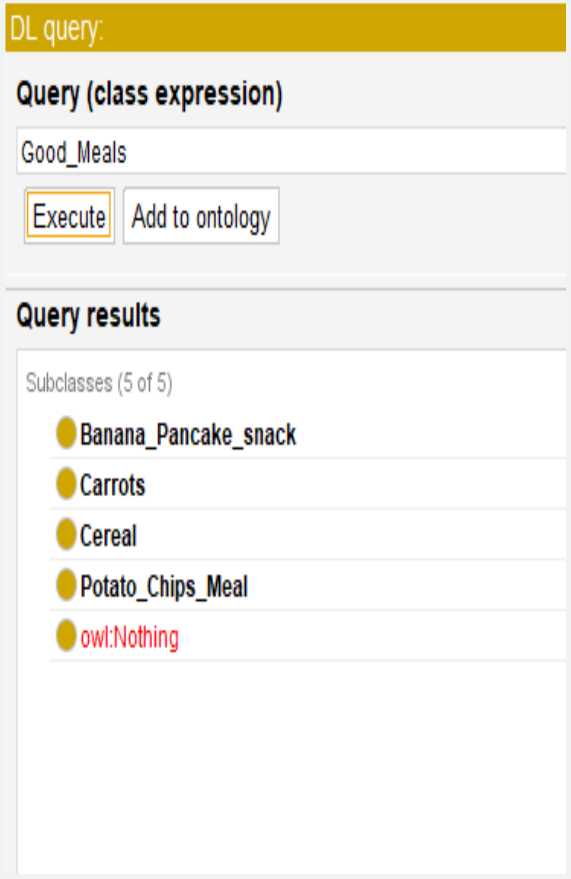


DL QUERIES (CONT…)

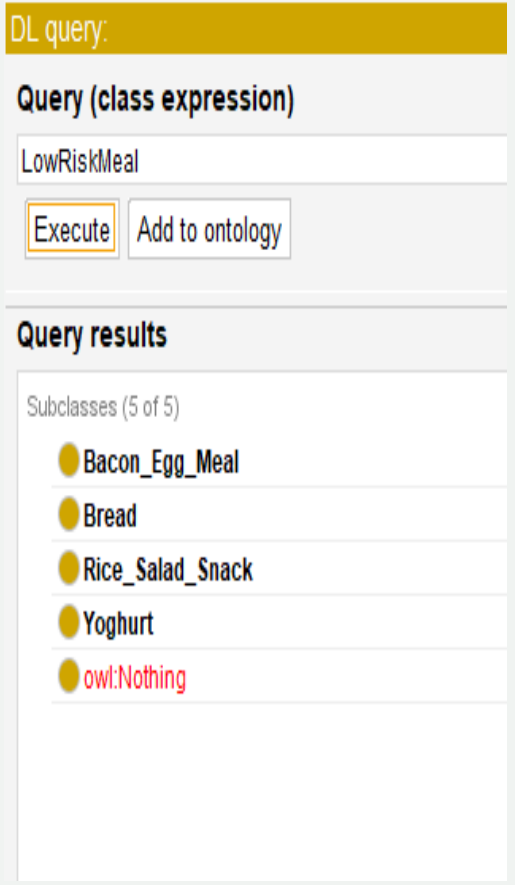
- BadMeal

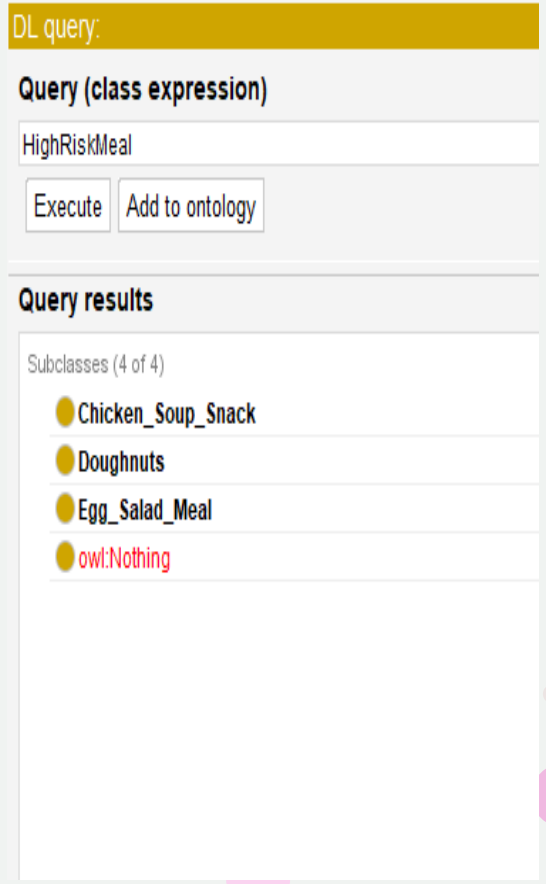


- GoodMeal

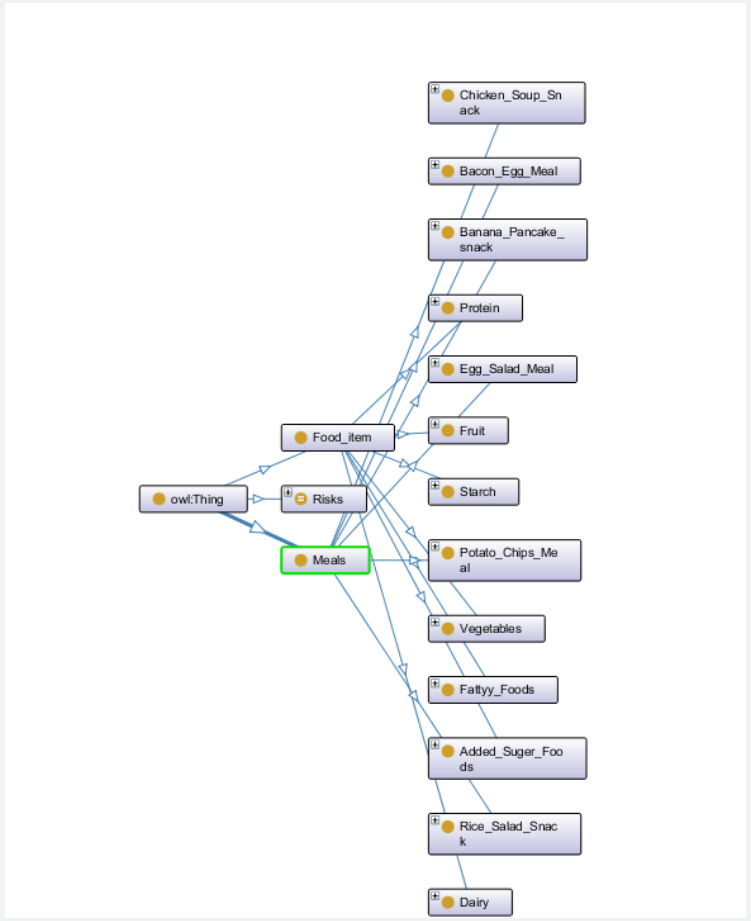


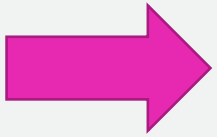
- LowRiskMeal and HighRiskMeal

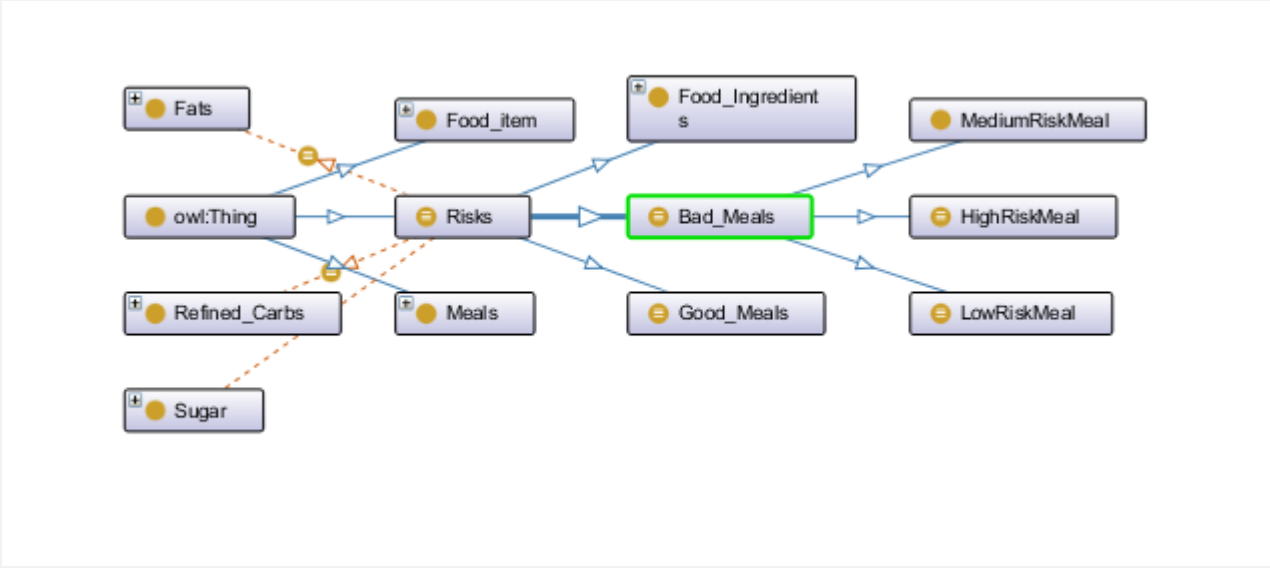




Partial tree of the knowledge base(OntoGraph)







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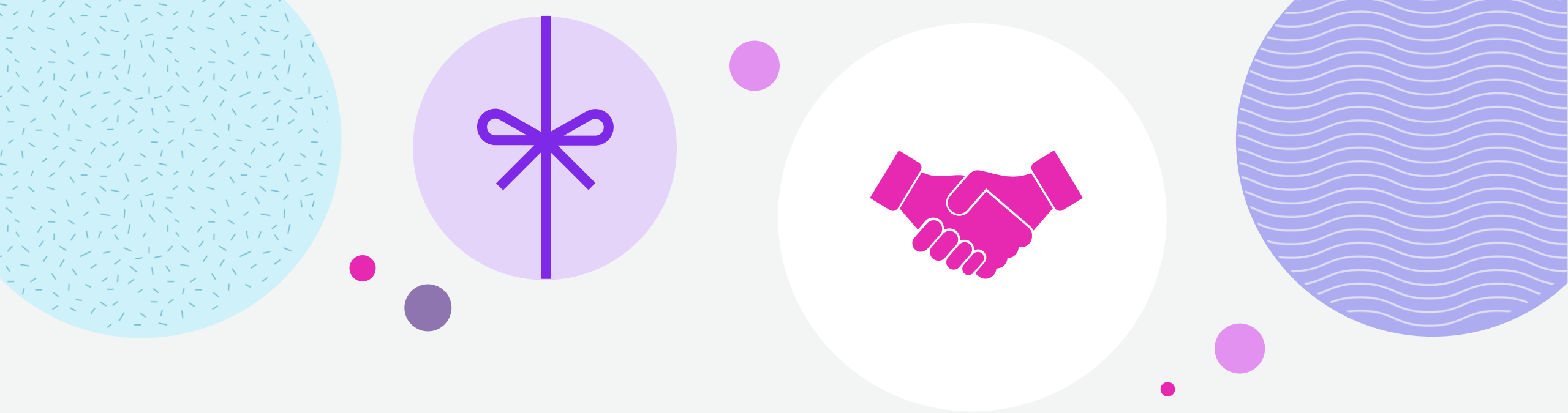

THANK YOU