VRIJE
UNIVERSITEIT
BRUSSEL

E-COMMERCE PROJECT

Open Information Systems

Ardavan Khalij, Amadou Sarjo Jallow, Brenda Ordoñez Lujan,
Florent Nicolas J Grimau, and Milan Pavle Ilić

26 December 2021

Academic year: 2021 - 2022
Student number: Brenda 0571129, Milan 0545802
VUB-email-address: brenda.ordonez.lujan@vub.be,
milan.pavle.ili@vub.be

1st master computer science

Contents

1 Introduction

The goal of this project is to design and implement an e-commerce platform. The backbone of this platform is an information system. This system consists out of 5 modules: Products, Warehouses, Costumers, Suppliers and Delivery Services.

Each person was assigned to one module. Firstly we started thinking about the information needs of the database users by creating features and an ER diagram[1] for a module. Once this was achieved, each person created a database with queries, based on the created ER diagram, in standard SQL[2]. We then created one information system by combining the SQL databases. After that, everyone created an ontology, using Protoge, for their module. Then we combined the ontologies to create one information system. Then everyone created a mapping using the R2RML[3] mapping language. Again, we combined our mappings to generate one mapping that represented the whole system. Finally everyone created one SPARQL[4] query, based on one of their features. This SPARQL query was tested using the Ontop system. Ontop translates SPARQL queries into SQL queries, and relies on R2RML mappings [1].

1.1 Modules

As metioned before, this project consists of 5 modules:

1. The module Product is about the physical product itself and the properties it has.
2. The module Warehouses is primarily about the management of an inventory.
3. The module Costumers is concerned with reviews, payments, and other things regarding an online costumer.
4. The module Suppliers is primarily about a supplier that supplies to a warehouse.
5. The module Delivery services is about delivering the product from a warehouse to a costumer.

1.2 Features

Product features:

1.

Warehouses features:

1. Product quantity: An employee of the inventory management wants to find out how much of a certain product there is left in stock. An online costumer wants to know if the product is available for purchase.
2. Warehouse shipments: An employee wants to know how many shipments will arrive/departure on a certain day. An accountant wants to keep track of all the arriving and departing products.

[1] Entity-Relation diagram
[2] Structured Query Language
[3] RDB to RDF Mapping Language
[4] SPARQL Protocol and RDF Query Language

3. Shipment products: A warehouse employee checks if an outgoing/incoming shipment has all the packages. A costumer wants to check if his product has already left the warehouse.

4. Shipment delivery time: The employee of a warehouse wants to know when a shipment arrives. A costumer wants to know how long it will take for his package to arrive.

5. Business information: An employee of a certain business wants to contact another business. A business needs to deliver to another business.

Costumers features:

1.

Suppliers features:

1. Response time per supplier: An employee of the logistics area needs the average response time of an order to know when he needs to fill his stock if required. A manager of the logistics area needs it to know the performance of the supplier and to be able to follow up on it.

2. The supplier that gives more facilities: A manager of the logistics area needs it to make the decision to reduce costs if it's possible or choose between suppliers in the future.

3. Maximum payment flexibility: An employee of the logistics area needs it to make budget plans. A manager of the logistics area needs it to make decisions such as changing the payday if necessary or choose between suppliers in the future.

4. Minimum cost of the most product requested: An employee of the logistics area needs it to calculate the necessary budget and predict the days that needs to place orders. A manager of the logistics area needs it to compare with other prices on the market and make decisions between new suppliers.

5. Higher and lower delivery costs per supplier: An employee in the logistics area can reduce transportation costs from that value. Analyze whether it is convenient to have a transportation service and present it to the manager as an alternative in the future. It is also an important factor in choosing between providers.

Delivery services features:

1. Real-time package Tracking: A costumer wants to track their order in real time.

2. Delivery Time Estimation by packet: A delivery service wants to give the costumer an idea when the package will arive.

3. Delivery Price Estimation: Delivery service wants to request an extra fee to the costumer.

4. Average amount of delivery trip made by each delivery companies in all the warehouses: A delivery service wants to track with which companies it is worth having delivery contracts, based on the amount of delivery trips they make for the company.

5. Average Packet loss during delivery trips sorted by company: A delivery service wants to increase its trust.

1.3 Data

1.4 Work division

Ardavan Khalij: Costumer database and queries, Costumer ontology, Costumer mapping, SPARQL query, ...

Amadou Sarjo Jallow: Product database and queries, Product ontology, Product mapping, SPARQL query, ...

Brenda Ordoñez Lujan: Supplier database and queries, Supplier ontology, Supplier mapping, SPARQL query, ...

Florent Nicolas J Grimau: Delivery service database and queries, Delivery service ontology, Delivery service mapping, SPARQL query, ...

Milan Pavle Ilic: Warehouses database and queries, Warehouse ontology, Warehouse mapping, SPARQL query, Report introduction and template.

2 Ontology

3 Mapping

4 Queries

5 Discussion

References

[1] Guohui Xiao, Davide Lanti, Roman Kontchakov, Sarah Komla-Ebri, Elem Güzel-Kalayci, Linfang Ding, Julien Corman, Benjamin Cogrel, Diego Calvanese, and Elena Botoeva. (2020) *The Virtual Knowledge Graph System Ontop*, International Semantic Web Conference.

[2] Diego Calvanese, Benjamin Cogrel, Sarah Komla-Ebri, Roman Kontchakov, Davide Lanti, Martin Rezk, Mariano Rodriguez-Muro, and Guohui Xiao. (2017) *Ontop: Answering SPARQL Queries over Relational Databases*, Semantic Web Journal 8.3, pp. 471–487.