

Query data and construc ontology by handling OOP concepts

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Abstract

Report of the OOP project of group 6.

1 Job assignment

Name	Student id	Task	Percentage of contribution
Dang Trong Luat	20205187	Integrate data into GUI Adding dynamic data manipulation	25%
Vu Chi Thanh	20200597	Query data Transfer data into object	33%
Nguyen Viet Hung	20205157	Design and implement GUI	21%
Nguyen Hoang Huy	20205183	Create SPARQL query design	21%

2 Class dependency diagram

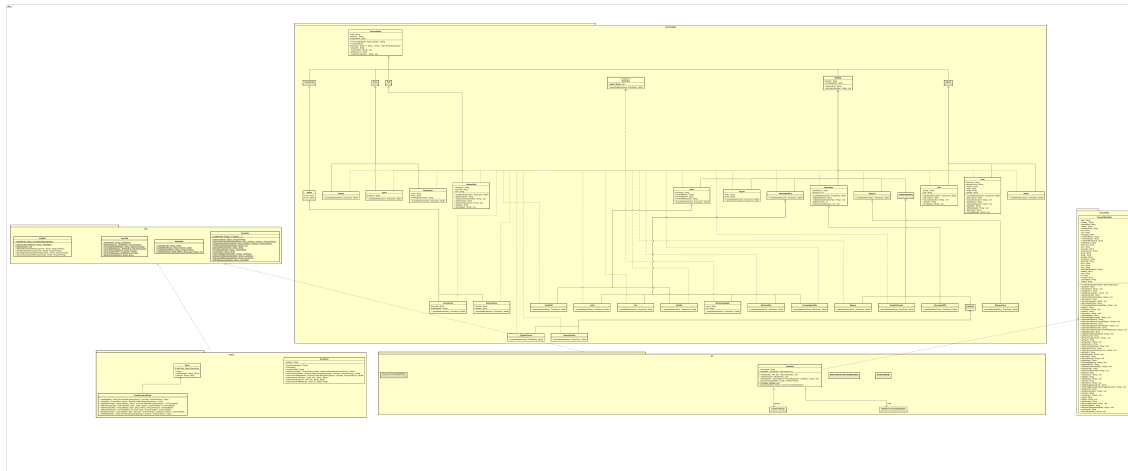


Figure 1: VN Tourism class dependency diagram

For better resolution you can visit this link: [class dependency diagram](#) to download svg file.

3 Explanation

3.1 Source code explanation

Source code has 2 main concepts: data display through GUI and store data under turtle format.

3.1.1 Data display through GUI

This is main page of our GUI for this project. By running Main.java in package src.main.java, the program will auto generate query text for fetching appropriate data in dbpedia.org and display a GUI window for user.

label	abstract	area	areaTotal	buildingType	ceased	completedDate	date	depth	discovery	entranceCount	floorCount	founded	geology	homepage	host
10th Vietnam Film Festival	The 10th Vietnam Film Festival was...						--11-09								
11th Vietnam Film Festival	The 11th Vietnam Film Festival was...						--11-08								
12th Vietnam Film Festival	The 12th Vietnam Film Festival was...						--03-25								
13th Vietnam Film Festival	The 13th Vietnam Film Festival was...						--12-06								
14th Vietnam Film Festival	The 14th Vietnam Film Festival was...						--11-04								Thiếu Anh Dương
15th Vietnam Film Festival	The 15th Vietnam Film Festival was...						--11-20								Tuấn Tú, Lê Thanh Huyền
16th Vietnam Film Festival	The 16th Vietnam Film Festival was...						--12-08								Thanh Bạch, Hồng Phương
17th Vietnam Film Festival	The 17th Vietnam Film Festival was...						--12-14								Phạm Minh, Giang Mỹ, Hồng Anh, Tuấn Bắc
18th Vietnam Film Festival	The 18th Vietnam Film Festival was...						--10-14								Bình Minh, Giang Mỹ, Anh Quân
19th Vietnam Film Festival	The 19th Vietnam Film Festival was...						--12-01								Thanh Lộc, Thu Hằng, Mỹ Linh
1st Vietnam Film Festival	The 1st Vietnam Film Festival was...						--08-17								
20th Vietnam Film Festival	The 20th Vietnam Film Festival was...						--11-24								Nguyễn Khang, Mỹ Linh
21st Vietnam Film Festival	The 21st Vietnam Film Festival was...						--11-23								Đại Dương, Thanh Thanh Huyền, Bảo Như
22nd Vietnam Film Festival	The 22nd Vietnam Film Festival was...						--11-18								
2nd Vietnam Film Festival	The 2nd Vietnam Film Festival was...						--02-28								
3rd Vietnam Film Festival	The 3rd Vietnam Film Festival was...						--03-15								
4th Vietnam Film Festival	The 4th Vietnam Film Festival was...						--04-14								
5th Vietnam Film Festival	The 5th Vietnam Film Festival was...						--05-12								
6th Vietnam Film Festival	The 6th Vietnam Film Festival was...						--04-22								
7th Vietnam Film Festival	The 7th Vietnam Film Festival was...						--10-14								
8th Vietnam Film Festival	The 8th Vietnam Film Festival was...						--03-15								
9th Vietnam Film Festival	The 9th Vietnam Film Festival was...						--11-28								
Air Mekong	Mekong Aviation Joint Stock Com...				2013							2009			
Air Vietnam	Active from 1946 to 1975, Air Viet...				1975-04-30							1946		https://www.amen.com/resorts/amenol	
Amekong	Amekong is a free star franchised...														
An Giang Airport	An Giang Airport is a planned airp...														
Apun Ha Lake	Apun Ha Lake (Vietnamese: Hồ Ấp...														
B-52 Victory Museum, Hanoi	The B-52 Victory Museum, Hanoi ...														
Ba Bể Lake	Ba Bể Lake (Vietnamese: Hồ Ba Bể...														
Ba Bể National Park	Ba Bể National Park (Vietnamese: ...														
Ba Vi National Park	Ba Vi National Park (Vietnamese: V...														
Bach Mai Airfield	Bach Mai Airfield (Vietnamese: Sân...														
Bamboo Airways	Bamboo Airways JSC, operating at...											2017			
Best Actor Award (Vietnam F...	Best Actor Award (Vietnamese: GI...														
Best Actress Award (Vietnam...	Best Actress Award (Vietnamese: G...														
Best Director Award (Vietna...	Best Director Award (Vietnamese: ...														
Best Screenplay Award (Viet...	Best Screenplay Award (Vietname...														
Bidoup Nui Ba National Park	Bidoup Nui Ba National Park (Viet...	64800													
Bien Hoa Air Base	Bien Hoa Air Base is a Vietnam B...														

Figure 2: Homepage for displaying all data

By using navigation bar data can be seen in each concept.

label	abstract	area	areaTotal	buildingType	ceased	completedDate	date	depth	discovery	entranceCount	floorCount	founded	geology	homepage	host
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Ba Bể National Park	Ba Bể National Park (Vietnamese: ...														
Ba Vi National Park	Ba Vi National Park (Vietnamese: V...														
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Best Screenplay Award (Viet...	Best Screenplay Award (Vietname...														
Bidoup Nui Ba National Park	Bidoup Nui Ba National Park (Viet...	64800													
Bien Hoa Air Base	Bien Hoa Air Base is a Vietnam B...														

(a) All sub categories in VN TOURISM

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Best Director Award (Vietna...	Best Director Award (Vietnamese: ...														
Best Screenplay Award (Viet...	Best Screenplay Award (Vietname...														
Bidoup Nui Ba National Park	Bidoup Nui Ba National Park (Viet...	64800													
Bien Hoa Air Base	Bien Hoa Air Base is a Vietnam B...														

(b) Data in a sub category

3.1.2 Store data

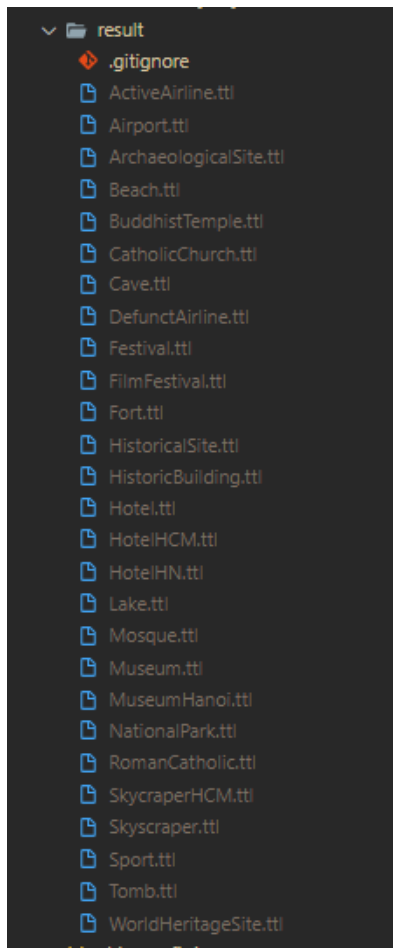
The program will also store data, which can be accessed at `src.main.resources.result`, under turtle format.

3.1.3 Approach

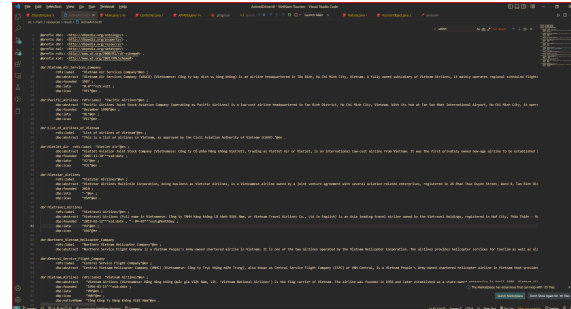
The classes in **tourismobject** package have inherent properties. Root class is **TourismObject**, its sub-classes are **Building**, **Natural**, etc., and each of these class will have their subclasses.

We will create and execute query for each classes that implement **Queryable** interface in **tourismobject** package, then store the result in TURTLE format with the corresponding class's name.

GUI will analyze request from user, read corresponding .ttl file(s), save it as JSON file in cache folder so that if user request the same resource, the program can get data from JSON files without process .ttl files again



(a) All .ttl files which be queried



(b) Example turtle format data

Figure 4: Store data

3.1.4 In-depth package analyze

- Package **sparql**

This package contains **Query**, **CreateQuery**, **ExecQuery**

- **Query**: have some generic method and fields for all type of query, such as Select, Construct, etc.
- **CreateConstructQuery**: inherited from responsible for creating Construct Query object
- **ExecQuery**: responsible for executing query with a given endpoint

- Package **utils** This package contains some utility classes: **API4GUI**, **ClassUtils**, **JsonUtils**, **ModelUtils**

- **API4GUI**: supplies some functions for GUI
- **ClassUtils**: supplies class-related functions
- **JsonUtils**: supplies JSON-related functions
- **ModelUtils**: supplies Jena Model-related functions

- Package **tourismobject** This package contains many tourism-related objects

- Package **gui** and package **tourismdata** This package contains GUI's implementation

4 OOP techniques explanation

4.1 Method overloading

We implement many method overloading with an aim to expand code easier in the future. For example:

```
public ExecQuery()  
public ExecQuery(String endpoint)
```

4.2 Class organization

We organize classes into package, such as **package sparql** only have classes that responsible for sparql query

4.3 Inheritance

We implement many inheritance relationship to improve re-usability and better class organization. For example, we create class **Query** containing some generic functions and fields, so that in the future if we want to create a **CreateSelectQuery**, we will just need to extends **Query** to avoid code duplication

4.4 Polymorphism

We implement both **Method polymorphism** and **Object polymorphism**.

1. Method polymorphism

This technique is the same as method overloading

2. Object polymorphism

We implement **Object polymorphism** in a way that it behave in multiple behaviors and have a multiple type. The **Queryable interface** exemplify this technique.

- Up-casting an object that implement **Queryable interface** to **Queryable interface**. For example:
Queryable object = (Queryable) ClassUtils.strToObj(className);
- Dynamic binding, for example: both **Hotel** and **HotelHN** (which extends **Hotel**) implement method **Model queryModel(ExecQuery execQuery)**. So the method in **HotelHN** will override the method in **Hotel**, meaning when we create two object **Hotel o1**, **HotelHN o2** and up-casting it to **Queryable** (or any of their supperclasses), **o1.queryModel()** and **o1.queryModel()** behave differently.