

PROO 3 - Assignment: Facility Management

Objective

Create a program for managing public facilities.

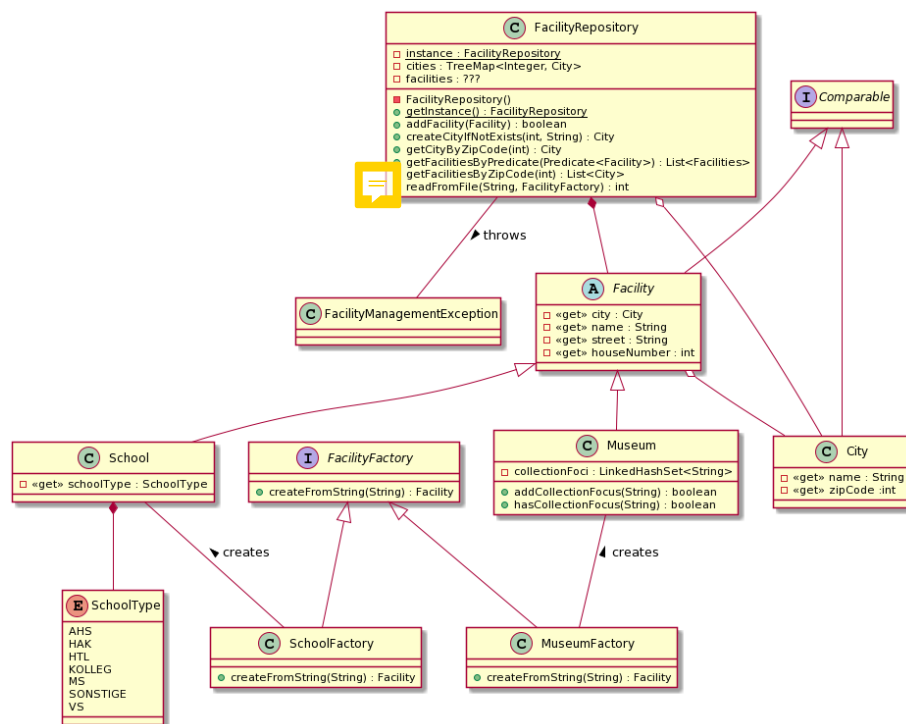
Things To Learn

- Working with various collections.
- Gaining a better understanding of the *Factory Pattern*.

Submission Guidelines

- Your implemented solution as **zipped IntelliJ**-project.

Task



For this assignment you'll be creating a program for reading and storing public facilities - in our case museums and schools - and the cities they belong to. The main focus of this assignment is for you to get a better understanding of the *Factory Pattern*, depicted on the bottom of the diagram above: Both facility types not only have their own class (**Museum** and **School**) inheriting from a general **Facility** - they also have their own *factory* implementing the

FacilityFactory interface. This allows us to easily extend our program by additional facilities - such as public pools, hospitals and so on.

Aside from the diagram, the supplied *unit tests* and a minimalistic **Main**-class, the following notes should give you some insights into the inner workings:

- Each **City** is represented by a city name and zip code and implements the **Comparable**-interface using the zip code for ordering. Two cities are equal if they have the same zip code.
- **Facility** is the base class for each facility. Besides the name it contains the exact address (using the **City** class) of the facility.
 - Facilities are ordered by their cities. In the same city they are ordered alphabetically by their street names. In the same street they are ordered by their house number.
 - Facilities are equal if they have the same address.
 - A **Museum** extends the base facility by a set of collection foci and provides two simple methods for checking if a museum is relevant to one's interests.
 - A **School** extends the base facility by its school type using the enum **SchoolType**. Two school objects are equal if they have the same address **and** the same school type - since there can be multiple school types in one building, as you surely know.
- Facilities can be created using their factories **MuseumFactory** and **SchoolFactory**, both implementing the interface **FacilityFactory** providing a method for creating a facility by its String representation - such as the ones in the supplied *comma-separated-value-files*.
 - For this task we want to make sure, that each city is created only once - i.e. cities from multiple facilities should not only be *equal* but also *identical*. Use the **FacilityRepository** below to check if a city with the same zip code has already been created.
- The **FacilityRepository** poses as the central point for storing and accessing cities and facilities. It is implemented using the *Singleton*-pattern with *lazy initialization*.
 - The cities should be stored in a **TreeMap**, since the zip code is a suitable key and we want the collection to be sorted for easy printing (see section below). You can choose an appropriate collection for storing the facilities yourself.
 - Using the **addFacility**-method it should be possible to add a facility - but only if it has not been added yet. The *boolean* return value should be used to signal the success of the method.
 - The **createCityIfNotExists**-method accepts a city name and zip code as parameters and either returns the relevant **City** object or creates it, if it doesn't yet exist.
 - **getCityByZipCode** returns the city with the passed zip code. If the city does not exist a **FacilityManagementException** with an appropriate message is thrown.
 - The method **getFacilitiesByZipCode** can be used to return a *sorted*

- list of facilities in a certain city, specified by its zip code.
- The `readFromFile`-method accepts the path to a *comma-separated-value*-file and a `FacilityFactory`-object to be used to parse the lines with.
 - * If an exception occurs *while loading* the file (i.e. an `IOException` of some sorts), wrap it inside of a `FacilityManagementException` and rethrow it with an appropriate message.
 - * If something happens *while parsing* the rows (i.e. corrupt data or values) catch the exception and continue processing the other lines as if nothing happened. **Count the number of problems** and return it.
- Override the `toString`-method to create an output like the one seen below.
- We're introducing a new concept in this exercise: **Predicates**, representing boolean functions with one parameter. We can use them as filters, as demonstrated in the `Main` class. Use the following implementation of the `getFacilitiesByPredicate`-method in the `FacilityRepository` and experiment with own filters in the `Main` class!

```
public List<Facility> getFacilitiesByPredicate(Predicate<Facility> predicate) {
    return this.facilities.stream().filter(predicate).toList();
}
```

Output Example

4010 Linz:

Francisco Carolinum Linz (Museumstraße 14, 4010 Linz) - Sammlungsschwerpunkte: Kunst

4020 Linz:

OÖ. Literaturmuseum im StifterHaus (Adalbert-Stifter-Platz 1, 4020 Linz) - Sammlungsschwerpunkte: Literatur, Kunst
 Nordico Stadtmuseum Linz (Dametzstraße 23, 4020 Linz) - Sammlungsschwerpunkte: Kunst, Volkskunde
 Lentos Kunstmuseum Linz (Ernst-Koref-Promenade 1, 4020 Linz) - Sammlungsschwerpunkte: Kunst
 Zahnmuseum Linz (Pfarrgasse 9, 4020 Linz) - Sammlungsschwerpunkte: Gesundheit
 Schlossmuseum Linz (Schlossberg 1, 4020 Linz) - Sammlungsschwerpunkte: Volkskunde, Natur
 Geschichteclub Stahl (Stahlstraße 33, 4020 Linz) - Sammlungsschwerpunkte: Industrie, Technik
 Zeitgeschichte MUSEUM voestalpine (voestalpine-Straße 1, 4020 Linz) - Sammlungsschwerpunkte: Industrie
 voestalpine Stahlwelt (voestalpine-Straße 4, 4020 Linz) - Sammlungsschwerpunkte: Industrie

4021 Linz:

Oö. Landesbibliothek - Schatzkammer (Schillerplatz 2, 4021 Linz) - Sammlungsschwerpunkte: Literatur, Kunst

4030 Linz/Pichling:

Zweierschützen Archiv (Schloss Ebelsberg, Schlossweg 7, 4030 Linz/Pichling) - Sammlungsschwerpunkte: Kunst, Literatur
 Cowboy-Museum Fatsy (Traundorfer Straße 266, 4030 Linz/Pichling) - Sammlungsschwerpunkte: Kunst, Literatur

4040 Linz:

Ars Electronica Center (Ars-Electronica-Straße 1, 4040 Linz) - Sammlungsschwerpunkte: Kunst, Literatur
 Biologiezentrum Linz (J.-W.-Klein-Straße 73, 4040 Linz) - Sammlungsschwerpunkte: Natur, Umwelt

4050 Traun:

Höhere technische Bundeslehranstalt für Informations- und Kommunikationstechnologie und

Volksschule Traun (Linzerstraße 7, 4050 Traun) - VS
 Museum im Steinhumergut (Neubauerstraße 75, 4050 Traun) - Sammlungsschwerpunkte: Industriekultur, Natur, Religion
 Schloss Traun (Schlossstraße 8, 4050 Traun) - Sammlungsschwerpunkte: Volkskunde, Geschichte, Natur
 Integratives Schulzentrum Traun (Schulstraße 11, 4050 Traun) - SONSTIGE
 Musikmittelschule Traun (Schulstraße 11, 4050 Traun) - MS
 Bundesrealgymnasium Traun (Schulstraße 59, 4050 Traun) - AHS
 Bundeshandelsakademie und Bundeshandelsschule Traun (Schulstraße 59, 4050 Traun) - HAK
 Volksschule Oedt (Traunerstraße 80, 4050 Traun) - VS
 Mittelschule St. Martin (Untere Dorfstraße 145, 4050 Traun) - MS
 Polytechnische Schule Traun (Untere Dorfstraße 145, 4050 Traun) - SONSTIGE
 Volksschule Traun-St. Martin (Untere Dorfstraße 147, 4050 Traun) - VS
 Volksschule St. Dionysen (Weidfeldstraße 104, 4050 Traun) - VS
 4052 Ansfelden:
 Volksschule Ansfelden (Anton Brucknerstraße 10, 4052 Ansfelden) - VS
 Anton-Bruckner-Museum (Augustinerstraße 3, 4052 Ansfelden) - Sammlungsschwerpunkte: Person, Musik, Kunst, Literatur, Natur
 Anton Bruckner Neue Mittelschule Ansfelden (Haiderstraße 8, 4052 Ansfelden) - MS
 4053 Haid:
 Sportmittelschule 2 Haid (Dr.-Adolf-Schärf-Straße 23, 4053 Haid) - MS
 Landwirtschaftliche Berufs- und Fachschule Ritzlhof (Kremstalstraße 125, 4053 Haid) - SONSTIGE
 Volksschule Haid (Schulstraße 5, 4053 Haid) - VS
 Mittelschule 1 Haid (Schulstraße 5, 4053 Haid) - MS
 Volksschule Kremsdorf (Volksheimstraße 11, 4053 Haid) - VS
 4055 Pucking:
 Volksschule Pucking (Puckinger Straße 8, 4055 Pucking) - VS
 4060 Leonding:
 Volksschule Leonding (Alhartinger Weg 8, 4060 Leonding) - VS
 TURM 9 - Stadtmuseum Leonding (Daffingerstraße 55, 4060 Leonding) - Sammlungsschwerpunkte: Natur, Kultur, Geschichte
 Volksschule Doppl (Haidfeldstraße 29, 4060 Leonding) - VS
 Mittelschule Doppl (Haidfeldstraße 31, 4060 Leonding) - MS
 Volksschule Haag (Herderstraße 36, 4060 Leonding) - VS
 Mittelschule Hart (Limesstraße 2, 4060 Leonding) - MS
 Volksschule Hart (Limesstraße 4, 4060 Leonding) - VS
 Allgem. Sonderschule Hart (Limesstraße 6, 4060 Leonding) - SONSTIGE
 Höhere Technische Bundeslehranstalt Leonding (Limesstraße 12, 4060 Leonding) - SONSTIGE
 Kolleg für EDV/Organisation (Limesstraße 12, 4060 Leonding) - KOLLEG
 Höhere Technische Bundeslehranstalt Leonding (Limesstraße 12, 4060 Leonding) - HTL
 Musikmittelschule Leonding (Ruflingerstraße 14, 4060 Leonding) - MS
 Allgem. Landessonderschule 1 für lernschwache und leistungsbehinderte Kinder im Kinderdorf Leonding
 Landesschulzentrum für Bewegung und Sprache St. Isidor (St. Isidor 17, 4060 Leonding) - SONSTIGE

[...]

All museums with religious foci:
 Schlossmuseum Linz (Schlossberg 1, 4020 Linz) - Sammlungsschwerpunkte: Volkskunde, Natur, Religion, Kunst
 Stiftsmuseum Wilhering (Linzer Straße 4, 4073 Wilhering) - Sammlungsschwerpunkte: Kunst, Religion, Natur
 Basilika Enns-St. Laurenz (Lauriacumstraße 4, 4470 Enns) - Sammlungsschwerpunkte: Religion, Kunst, Natur

All elementary schools between Traun and Haid:
Volksschule Traun (Linzerstraße 7, 4050 Traun) - VS
Volksschule Oedt (Traunerstraße 80, 4050 Traun) - VS
Volksschule Traun-St. Martin (Untere Dorfstraße 147, 4050 Traun) - VS
Volksschule St. Dionysen (Weidfeldstraße 104, 4050 Traun) - VS
Volksschule Ansfelden (Anton Brucknerstraße 10, 4052 Ansfelden) - VS
Volksschule Kremsdorf (Volksheimstraße 11, 4053 Haid) - VS