VILNIUS UNIVERSITY
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Solar system area 4 2022 TS

Technical specification

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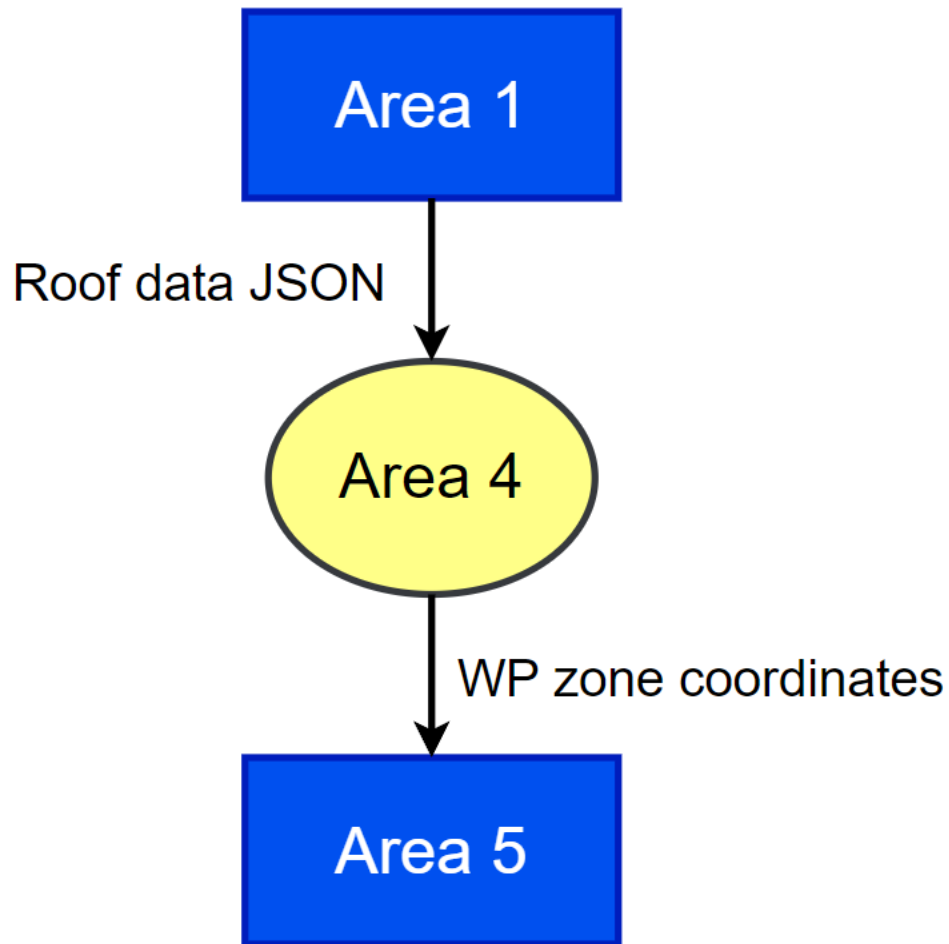
Vilnius
2022

Contents

1 Context diagram

Figure 1: context diagram

Here, parts of the system which interact area 4 are presented. As the diagram depicts, area 1 creates a JSON file, in which all the necessary roof data is stored. Our area reads the roof's point and edge data from the JSON file, after which wind pressure zone coordinates are calculated. Finally, area 5 uses our output to create a visual representation of wind pressure zones.
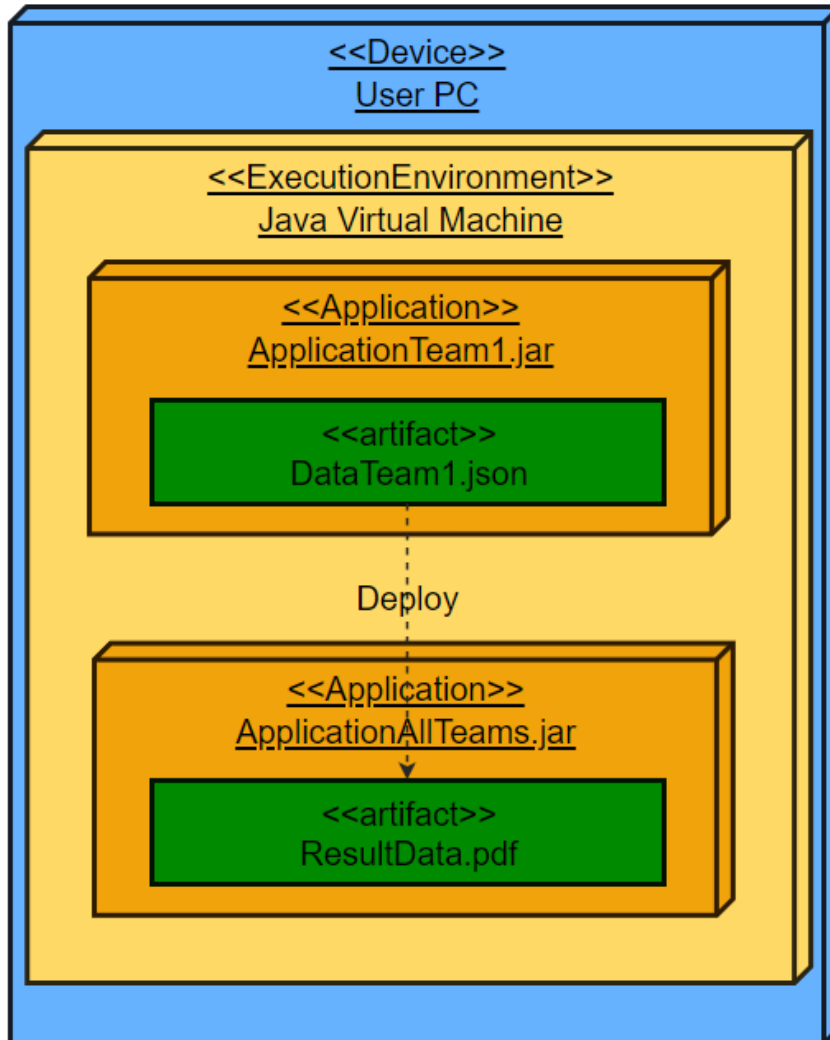
2 UML deployment diagram

Figure 2: deployment diagram

Our application reads roof edge and point data from the JSON file, which is provided by area 1.

The data is then used in our application's calculations and WP zone coordinates are created.

The calculated coordinates are outputed and used by area 5.
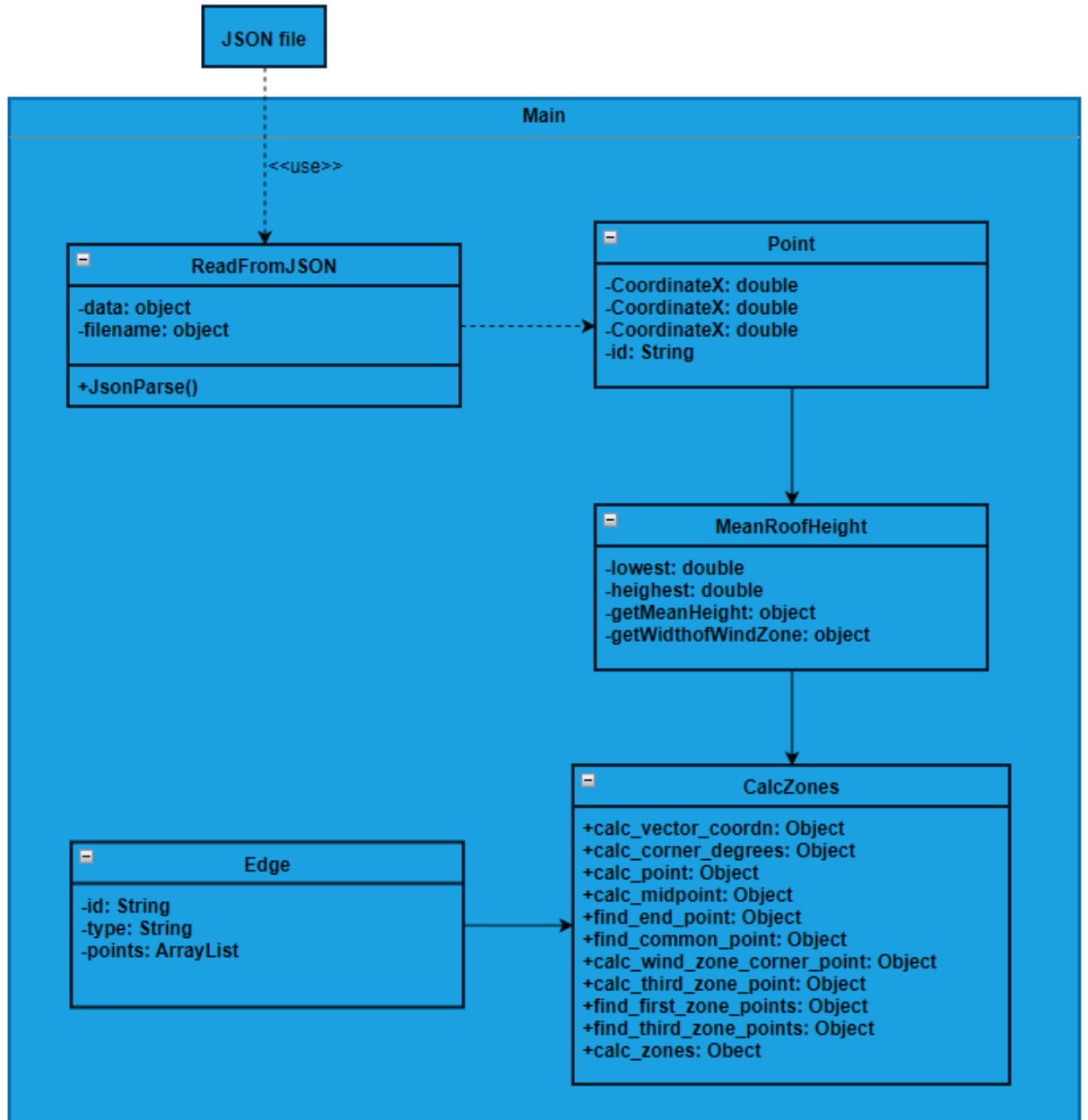
3 UML class diagram

Figure 3: class diagram

The software's classes are visually represented in this diagram.
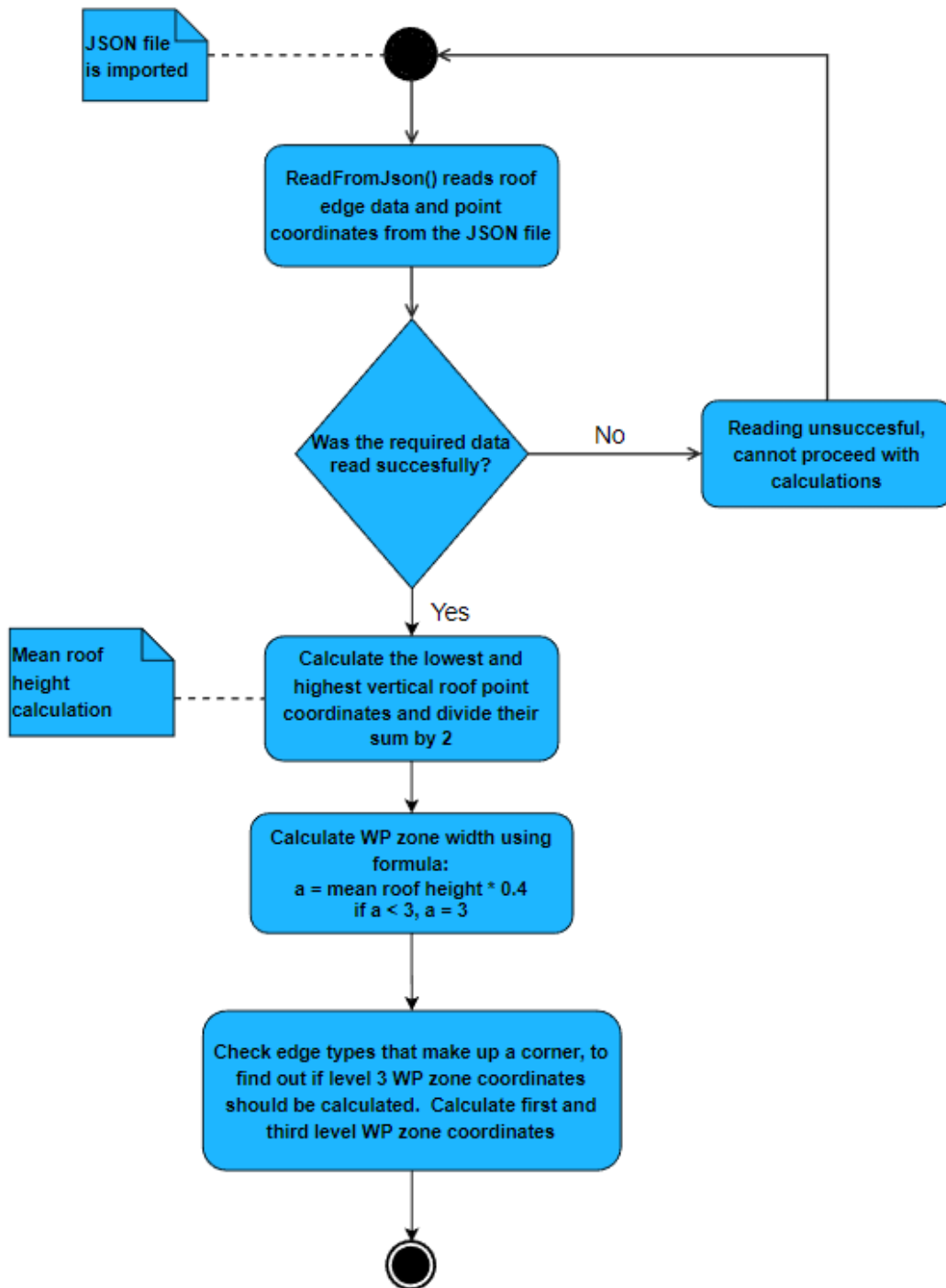
4 UML activity diagram

Figure 4: activity diagram

The software reads data from the JSON, if it is done succesfully, calculations are done to find mean roof height and WP zone width. The results of said calculations are then used to generate wind pressure zones.

5   Structural aspects

The essential components will be:

- Main – connects and calls every class.

- ReadFromJSON – a class that reads the house roof edge data and point coordinates from the JSON file.

- MeanRoofHeight – a calculation class that calculates the mean roof height by finding the highest and the lowest Z coordinate of the roof and dividing their sum, also finds the WP (Wind Pressure) zone width using the formula:
a = 0.4 * mean roof height (if the result is less than 3, a = 3).

- CalcZones - the most complicated calculation class. It calculates wind pressure zones based on corners. First, it calculates vector coordinates of the edges that make up the corner, then it finds the angle of the corner, finds the first level WP zone's point near the corner, checks if third level WP zone's points should be generated and if they should be, it calculates them as well.

6   Dynamic aspects

- The JSON file - this component will depend and vary based on the client's use.

- The data from the JSON will be read and used in the software's classes to calculate the WP zone coordinates.

- Our calculated WP zone coordinate data will vary based on the edge types and point coordinates.

7   An overview of testing

These parts of the software will be automatically tested:

- Mean roof height calculation.

- Wind pressure zone width calculation.

- First level WP zone coordinate calculation.

- Third level WP zone coordinate calculation.

8 Technologies and tools

1. The programming language will be Java, since the majority of the project members have the most experience working with it.

2. The coding will be done using IntelliJ, as it is one of the most useful and well known IDEs for JAVA.

3. Testing will be implemented using JUnit, because it is highly efficient and is supported by IntelliJ.

4. The code and documentation of the software will be reposited in a shared GitHub project repository, so that it would be more convenient to store data and collaborate with other teams, working on this project.

5. To improve planning, distribute tasks and track the work progress, the project will be managed in JIRA.

6. The documentation will be prepared using LaTeX, since that will allow us to make use of the given template and prepare a more proper document.

7. The communication tool used for the project will be Discord, because it is extremely simple to use and has great communication management features.

8. Since the overall project will be coded using JAVA, our software will work as a part of a Java application.

9. The software will be supported on Windows/Linux, because the majority of computer users use these computer operating systems.

10. As per standard practice, the software will run on a computer, since the client did not specify on what device it should work.