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University of Klagenfurt
Artificial Intelligence and Cybersecurity
M. El-Kholany · M. Morak

UE Algorithms and Data Structures
SS 2024
Exercise dates: see Moodle

Delivery 2

Delivery date: 16.06.2024

Aim of the task: In this practical programming task, the given Java
To implement interfaces according to the description specified in the Java comments:

a) Ab2: This interface provides a factory pattern for creating the remaining interfaces
ready.

b) AuDHashSet This interface specifies a simplified hash table.

c) AuDQueue This interface specifies a simplified FIFO or LIFO queue.

d) AuDTreeSet This interface specifies the data structure of a sorted tree.

The points are distributed as follows: 4 points for the hash table, 4 points for the implementation of the queue, and 7 points for the implementation of the sorted tree.

Preparation: Download the Ab2 ZIP file provided in Moodle. The build tool **gradle** is used, which supports you in working and also in creating your uploaded ZIP file. The ZIP file contains the following components:

- Interface **Ab2** in the Java package **ab2,** as well as other interfaces to be implemented.
- "Empty" implementation (as a basic framework) of the above-mentioned Ab2 interface in the package **ab2.impl.Surname** (hereinafter referred to as *implementation package).* Its task is to implement the corresponding interface.
- A test class **Ab2Tests** in the **ab2** package that you can use to test your implementations. This test class (with additional test cases) is also used to evaluate your submission (see point "Testing").

Integration into your IDE (optional): You can import the contents of the ZIP file as a Gradle project (e.g. in Eclipse or IntelliJ). Your IDE then has all the necessary information.

Implementation: The programming task can be completed in groups of up to 3 people. All names must be included in the submission (see "Submission" below).
The required algorithms must be implemented in the implementation package (impl) without using Java libraries and system packages (except **java.lang) .** In particular, the **java.util** package must not be used. No changes may be made to the specified interfaces and the test class, except for renaming your implementation package. Only change the file "Ab2Impl.java" (or, if necessary,

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new files can also be created in the folder “ab2/impl”). If you have any questions about the task, please contact your course leader.

Testing: Call ./**gradlew test** or **gradlew.bat test** to run the test cases. Alternatively, you can run the tests in your development environment.
Additional, undistributed test cases will be used to evaluate your submission. It is therefore beneficial if you implement additional test cases yourself and test your solution with them.

Submission: Run ./**gradlew zip** or **gradlew.bat zip .** You will now find the uploadable ZIP file in the **build folder.** Submit the ZIP file via Moodle. Only one submission is required per group. Before submitting, rename the package **ab2.impl.Surname** accordingly by replacing **Surname** with the surnames of your group members (e.g. **ab2.impl.HuberMeierMueller).**

Assessment: This programming task is assessed with a maximum of 15 points. The number of points achieved is credited equally to all group members. If there are more than 3 people, the points achieved are reduced proportionately per person. The assessment is based on the following components:

- Functionality of your code. The number of successful unit tests is crucial here. Note that not only the test cases of the output test class are used for the evaluation, but also additional, extended test cases.

  When testing, only the implementation package from your ZIP file is used.

- Quality of your source code (inspection). Make sure your source code is commented, easy to understand and efficient. The use of **System.out** is not permitted.

- Honesty: If you use illegal Java libraries (see above) or you submit the same source code as another group, your submission may be scored 0 points.

- Formatting: Format your code (standard formatting of your IDE is sufficient) and make sure that you do not use unused imports.