

Data Structures and Algorithms

Laboratory rules

1. Laboratory Schedule

- Laboratory is structured as 2 hour classes every two weeks.
- Lab assignments received at a given laboratory have to be turned in at the next laboratory, with the exception of the first two labs.

Lab	Lab topic description	Week received – Week delivered
L1	Dynamic Array	1/2 - 5/6
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L2	Linked list with dynamic allocation	5/6 – 7/8
L3	Linked list on arrays	7/8 – 9/10
L4	Hash table	9/10 – 11/12
L5	Binary search tree	11/12 – 13/14

2. Laboratory activity and grading

Each of the laboratories L1-L5 focuses on a data structure. Students will receive a container (ADT) and will have to realize an application in C++ to implement the given **container** using a given representation and the given **data structure**.

Requirements:

- The interface of every ADT (together with the description of the operations) has to be respected (they can be found at in the Interfaces folder on MS Teams).
- **It is not allowed to implement a separate class for the data structure. The data structure will be used directly for implementing the given container.**
- Elements of the container will be of the generic type **TElem** (or **TComp** for sorted containers).
- For testing the implementation, **TElem = int** (and **TComp = int**) will be used.
- Every implemented operation will be followed (or preceded) in the .cpp file by a line of comment, containing the best, worst and total complexity of the algorithm.
- The archives containing the interface of every ADT contain files for testing the implementation as well. When the laboratory is delivered, the application will be tested by the student (in front of the lab teacher) on the 2 test sets (**ShortTest** and **ExtendedTest**) provided for the container.

Lab delivery process:

- In the first part of the lab (30 - 40 minutes) every student who wants to deliver an assignment:
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- will make sure that the implementation passes the provided test sets (**ShortTest** and **ExtendedTest**). This can be checked at home as well.
- will receive a new functionality and:
 - has to implement and test it (in C++)
 - has to deduce the complexity of the functionality (best case, worst case, total complexity).
- When the allocated time is over, the lab teacher will check the application and the extra requirements presented above.

Lab grading:

- Lab assignments are graded in the following way:
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 - 1 point: Start
 - 3 points: Application works correctly for the provided tests (1 point if only for short tests)
 - 3 point: Explanations regarding the implementation
 - 1 point: Complexities (0.25 for complexities of the ADT operations, 0.25 for each of best/worst/total case).
 - 2 point: Testing and explanations for the new functionality

Obs: For maximum grade, the operations of the container need to be implemented efficiently.

The first two labs:

- In the first lab every student will be assigned a problem from L1. This will have to be presented in the third lab. In order to make the implementation of L1 easier, we have prepared a video tutorial, which is available on MS Teams. During the first lab, the lab teacher will give more details about this video. Until the second lab every student will have to watch the video, follow the instructions from it, and implement the example (ADT FixedCapBiMap implemented on an array). In your second lab, students will have to show their implementation to the lab teacher and they can discuss any issues/problems that appeared during the implementation.

3. Laboratory rules

- A plagiarized laboratory assignment will receive a grade of **0**.
- In case of a delay of one lab (two weeks) the grade for the assignment will be **multiplied by 0.8**. Delays greater than one lab (two weeks) are not accepted.
- Laboratory attendance is mandatory for **90% of the labs** (6 out of 7 labs). Students who do not have at least 6 attendances at the laboratory cannot participate at the written exam, neither in the regular, nor in the retake session and they cannot pass this course.
- **At most one laboratory attendance** can be recovered with a different group, but only with the explicit agreement of the lab teacher. In this case the assignment grade is computed according to the points from *Lab grading*. In case of illness, absences will be motivated by the lab teacher,

based on a medical certificate. Medical certificates have to be presented at most one week after the absence, after that period they will not be accepted. The lab teacher needs to be announced about the reason for being absent and a scan/photo of the medical certificate has to be sent by mail to him/her in order to get the absence motivated.

- During a laboratory **at most 2 assignments** can be presented.
- **Final laboratory grade**, LG, will be computed as the weighted average of the grades received for the 5 lab assignments. If a lab assignment is not delivered, its grade is 0.

$$LG = \frac{12 * L1 + 12 * L2 + 22 * L3 + 27 * L4 + 27 * L5}{100}$$

- In order to be able to participate at the written exam in the exam session, **LG has to be at least 5** (no rounding). Students having $LG < 5$, can only participate at the exam during the retake session, and they will have to present the lab assignments (for which they can receive at most 5).