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**2021-22**

**SWE5002**

**Data Structure and Algorithms**

**Assessment 001 (50%)**

***Due date:******02/05/2022***

**Subject: Produce an annotated software design that addresses the data needs of an appropriate business problem.**

**Learning Outcomes Assessed:**

LO1: Model the fundamental concepts of a range of data structures

L0 3: Identify the most appropriate data structure/s to be used in a given scenario

L0 4: Select and Categorise data in appropriate programmatic nonhierarchical structures

**For this assessment you will work individually.**

You will need to hand in (upload on the e-learning platform) a program and present in class your work.

**Important Note: Please be aware that any suspicion of copying or plagiarism will be fully investigated and punished. No extension will be given. If you face difficulties that are beyond your control, it is your responsibility to contact the course coordinator promptly.**

**Description:**

A custom Priority Queue class is supposed to perform jobs in the context of an operating system. Your priority queue will be represented as a list with specific size, in order to host jobs to be executed. Jobs are only described by a priority number, and they are removed from the list only if they have the highest priority. Specifically:

* The name of your class should be PriorityQueue, and the constructor of the class should contain only one input argument, which corresponds to the size of the queue.
* Your class should have two attributes. A list to contain the priority numbers of the jobs to be executed, and the maximum size of the queue’s list.
* Method insert should be implemented, in order to insert now job into queue, in case where maximum length of the queue has not been reached. Otherwise, an informative message should be printed. Insert method should have one input argument, which should correspond to the priority of the job to be inserted.
* Method find\_max\_priority should find the job with highest priority contained in the list and return its priority number.
* Method remove\_max\_priority is supposed to be used when a job is done and should remove from the queue, the job with the highest priority.
* A display\_queue method should only print current state of the queue.

You target is to:

* Implement class PriorityQueue and its method.
* Use PriorityQueue to implement following actions:
  + Define a PriorityQueue object with max size equal to 4.
  + Add jobs with priorities (order should be maintained): 7, 9, 6, 7, 2
  + Perform two consecutively calls to method removing higher-priority jobs.
  + Queue should be displayed between all methods calls described above, to see how queue is evolving.
* Describe what happens when (according to the steps above) job with priority 2 is inserted to the queue.
* For jobs with same priorities is FIFO or LIFO scheme applied when remove\_max\_priority is called?

**Assessment Criteria**

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| --- | --- |
| **Software design** | **20%** |
| **Code quality** | **30%** |
| **All requirements addressed** | **30%** |
| **Presentation** | **20%** |

**Notes concerning the presentation.**

You will present your work in the (virtual) class. You will have 10 minutes to present your case. For this reason, you should create a brief presentation using MS PowerPoint or other program/ web platform. The presentation should include the names of the creator, module name and topic.

**Specific Criteria for the presentation**

Relevance 15%

Knowledge 20%

Argument/Analysis 20%

Structure 10 %

Presentation 15%

Written English 10%

Research/Referencing 10%

***Successful submission:***

Upload files (the script files and the presentation) in a .zip folder on the e-learning platform under the Topic 9.

**\*Note:** For the “Guidelines for the Preparation and Submission of Written Assessments”, additional information concerning Assessments and Assessment criteria please refer to the module handbook.