



## COSC 520 Assignment 2

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### Advanced Data Structures

The objective of the assignment is to: (1) explore advanced data structures, and (2) benchmark algorithms.

Consider the list of advanced data structures provided at <https://iq.opengenus.org/list-of-advanced-data-structures/>, and <https://www.geeksforgeeks.org/advanced-data-structures/> and at [https://en.wikipedia.org/wiki/List\\_of\\_data\\_structures](https://en.wikipedia.org/wiki/List_of_data_structures). Select 3 comparable data structures.

### Submission

To complete the assignment, submit the following:

1. A concise pdf report including
  - the time and space computational complexity of your data structures,
  - a table summarizing the measured performance,
  - plots showing the run time complexity for large enough data. You can generate synthetic dataset using Python functions. Aim for at least one million data points. Then, run your program with different implementations and compare their run time in a plot. Include this analysis in your pdf file and explain if it supports your analysis. Remember to upload your dataset on the web and include a link to the dataset in the pdf file.
  - an explanation of why you selected those data structures (what attracted them; this is totally subjective and personal).

Use appropriate parameters to describe the complexity. You do not need to justify the complexity; only to explain each parameters used and provide the formula with appropriate references.

2. Python code comparing the data structures selected. You are responsible for generating appropriate data sets for the performance profile. Provide any justification of your choices in the report. Do not hesitate to contact the instructor (a quick email can save you hours for misguided work!). Add the GitHub link of your implementations in the pdf file.



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As for Assignment 1, your code should

- Be well documented and clean.
- Include unit tests.
- follow common practises:
  - appropriate class/variable/method names (not too long and meaningful),
  - appropriate comments
  - comments for each method should indicate input, output, and a short explanation of the method
  - clear setup and running instructions.

Submit your PDF file to Canvas.

If you use online sources or GenAI to generate your code, first, make sure it is correct and executable. Second, make sure to include the resources you have used and/or mention that you used GenAI in your report. There is no penalty of using available code, the only drawback can be that you might not be engaged as writing the code yourself for your future references.

### Grading rubric

	Weights	Subtotals
<b>Report</b>		10
Complexity	5	
References	5	
<b>Code static</b>		40
naming	5	
comments	10	
running instructions	5	



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code design	20	
<b>Code execution</b>		50
syntax-error free, runs	10	
unit tests run	10	
convincing demo	10	
performance	10	
comparison of the data structures (item 2 in the above list)	10	
<b>Total</b>	100	100

**Submission deadline:**

March 7, 2025, at 8 PM.