COSC520 Final Project Report

implementation of **Van Emde Boas tree**

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1. Reasons for choosing the data structure

- A very efficient data structure for almost all the operations with competitive complexities
- I never know this before and am interested in exploring more of its details

2. Complexities

- U: the universe size of the data
- Time complexity: Find, insert, delete, successor, predecessor: O(log2log2U)
- Space complexity: O(U)

3. Implementation notes

- Installation:

Download the zip file and unzip. Open the vEB.html locally and you can start playing!

- Notice:

Because of the required predefined universe size of the vEB tree (i.e. U=2^(2^k)) where k is a positive integer), I only implemented and tested the cases when U=4 and U=16. When U=256, it takes long to simulate and there would be too many nodes so that the canvas won't fit. The width size of each node should be further adjusted to adapt to larger U values.

4. References

- Complexities and algorithm:
  https://iq.opengenus.org/van-emde-boas-tree/
  https://www.geeksforgeeks.org/proto-van-emde-boas-tree-set-2-construction/?ref=lbp
- Animation Library and simulation pages
  https://cmps-people.ok.ubc.ca/ylucet/DS/Algorithms.html