

VE477

Introduction to Algorithms

Lab 4

Manuel — UM-JI (Fall 2019)

Goals of the lab

- Course application
- Data structures
- Python Object Oriented Programming

Unless specified otherwise, all the programs are expected to be completed in Python.

1. In a class implement *all* the following operations for the Fibonacci Heap data structure.

- MakeHeap
- Insert
- Minimum
- ExtractMin
- Union
- DecreaseKey
- Delete

Note: define a clean and clear API as Fibonacci Heaps are to be reused in a future lab.

2. Present the time complexity of each operation.
3. Comparing the Fibonacci heap to the simple min-heap and identify the advantages and disadvantages of Fibonacci heap.
4. Explain in which circumstances Fibonacci heaps should be preferred over other types of heap.