Mila University
Department of Computer Science
Year: 2025-2026

2nd year LMD Computer Science
Course : ASDD 3

Practical Work 4 : Sorting Algorithms

Context :

A logistics company needs to automate the ordering of packages before loading them into delivery trucks.

Each package is dynamically stored in a **singly linked list**, where each node represents a package.

The company must evaluate several sorting strategies to determine which is most efficient depending on package volume and characteristics.

For this purpose, you are asked to implement and compare sorting algorithms taught during the course.

Each package is characterized by the following attributes:

- A unique identifier (integer)
- A weight in kilograms (real, float)
- A priority index (0 = low, 1 = medium, 2 = urgent)

Sorting must operate **directly on the linked list**, without converting it into arrays.

Work Requested :

You must develop a C++ program allowing, from a menu, to perform the operations listed below :

1. **Data structure daclaration and creation :**

- Implement the structure of a package using a **singly linked list**.
- Insert packages into the list. The values are entered by the user ; Each id must be unique.
- Display all packages stored in the list (id, weight, priority).
- Search for a package by its id and display its information.

2. **Sorting Functionalities**

For the following three algorithms, sorting must be performed according to **weight in ascending order**:

- o **Selection Sort** on a linked list : Implement the selection mechanism directly on nodes.
- o **Insertion Sort** on a linked list : Insert nodes into their correct position.
- o **Bubble Sort** on a linked list : Compare adjacent nodes and swap them when necessary.

3. **Display Results for each sort Algorithm**

Constraint:

- ➢ Sorting must be performed on the linked list, without converting to an array .
- ➢ During sorting, the following metrics must be collected:
  - o Number of comparisons
  - o Number of swaps or node movements
  - o Execution time using <chrono>

Good luck