

## Exercice : Tris bulles et Shell

### 6.1 Tri bulles

```
#include <iostream>
#include <vector>
#include <utility> // pour swap
using namespace std;

typedef int type_el;
typedef vector<type_el> Tableau;

void affiche(const Tableau& tab)
{
    for (auto el : tab) cout << el << " ";
}

void tri_bulle(Tableau& tab)
{
    const size_t k(tab.size()-1);
    for (size_t i(0); i < k; ++i) {
        for (size_t j(k); j > i; --j) {
            if (tab[j-1] > tab[j]) {
                swap(tab[j-1], tab[j]);
                // affiche(tab);
            }
        }
    }
}

int main()
{
    Tableau tab({ 3, 5, 12, -1, 215, -2, 17, 8, 3,
                 5, 13, 18, 23, 5, 4, 3, 2, 1 });
    cout << "A trier : "; affiche(tab); cout << endl;
    tri_bulle(tab);
    cout << "Résultat : "; affiche(tab); cout << endl;
    return 0;
}
```

### 6.2 Tri de Shell

```
#include <iostream>
#include <vector>
#include <utility> // pour swap
using namespace std;

typedef int type_el;
typedef vector<type_el> Tableau;

void affiche(const Tableau& tab)
{
    for (auto el : tab) cout << el << " ";
}

void tri_Shell(Tableau& tab)
{
    for (size_t k(tab.size()/2); k >= 1; k /= 2)
        for (size_t i(k+1); i <= tab.size(); ++i) {
            int j(i-k);
            while (j > 0) {
                if (tab[j-1] > tab[j+k-1]) {
                    swap(tab[j-1], tab[j+k-1]);
                    affiche(tab); cout << endl;
                }
            }
        }
}
```

```
    j -= k;
} else {
    j = 0;
}
    }
}

int main()
{
    Tableau tab({ 3, 5, 12, -1, 215, -2, 17, 8, 3,
                 5, 13, 18, 23, 5, 4, 3, 2, 1 });
    tab = { 5, 4, 1, 2, 3 };
    cout << "A trier : "; affiche(tab); cout << endl;
    tri_Shell(tab);
    cout << "Résultat : "; affiche(tab); cout << endl;
    return 0;
}
```