C++ Programming
STL Intro

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Teaching, Training and Coaching since more than a decade!

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Computer Science Basics

- The 4 core fundamental topics in CS
    - Programming
    - Algorithms
    - Data Structures
    - OOP
- Side note: Other fundamental topics
    - Software Engineering, Design Patterns, Databases, Operating Systems, Networking

Recall Queue Data Structure

- It has internally an array and support following operations
  - void add_end(int value): add to the end of current array
  - void add_front(int value): add to the front of this array
  - int remove_front(): remove the front value and remove it.
    - Return the value
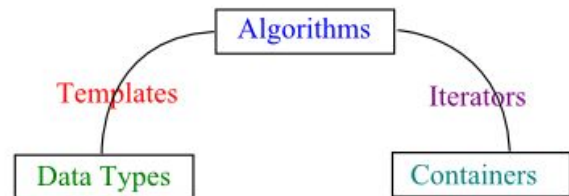 - void print(): print the array

```cpp
int main() {
    queue my_queue;

    my_queue.add_end(10);
    my_queue.add_end(20);
    my_queue.add_end(30);
    my_queue.print();

    my_queue.add_front(1);
    my_queue.add_front(4);
    my_queue.print();

    cout<<my_queue.remove_front();

    return 0;
}
```

Data Structure

- In many cases, you will need to organize, process and retrieve data in some specific way, similar to our queue
- You typically define a class, inside it data (e.g. array) and operations on data
- We call this class a data structure
- In practice, same data structure needs repeat.
  - This is what a data structure course teaches
    - Basic structures: queue, dequeue, stack, vector, linked list, binary search tree
    - Advanced: Has table, balanced binary search tree, trie, segment tree

STL

- STL: Implemented very efficient data structures to directly use
  - They are called containers
  - Learning them = makes studying data structures course easier
  - Using templates: Generic containers
- STL also provides set of algorithms to act on these containers

1. Templates
make algorithms independent of the data types
2. Iterators
make algorithms independent of the containers

"Acquire knowledge and impart it to the people."

"Seek knowledge from the Cradle to the Grave."