NCKU Programming Contest Training Course
Stack & Queue
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Stack

- A stack is an ordered list in which insertions and deletions are made at one end called the top.
- If we add the elements A, B, C, D, E to the stack, in that order, then E is the first element we delete from the stack
- A stack is also known as a First-In-First-Out (LIFO) list.

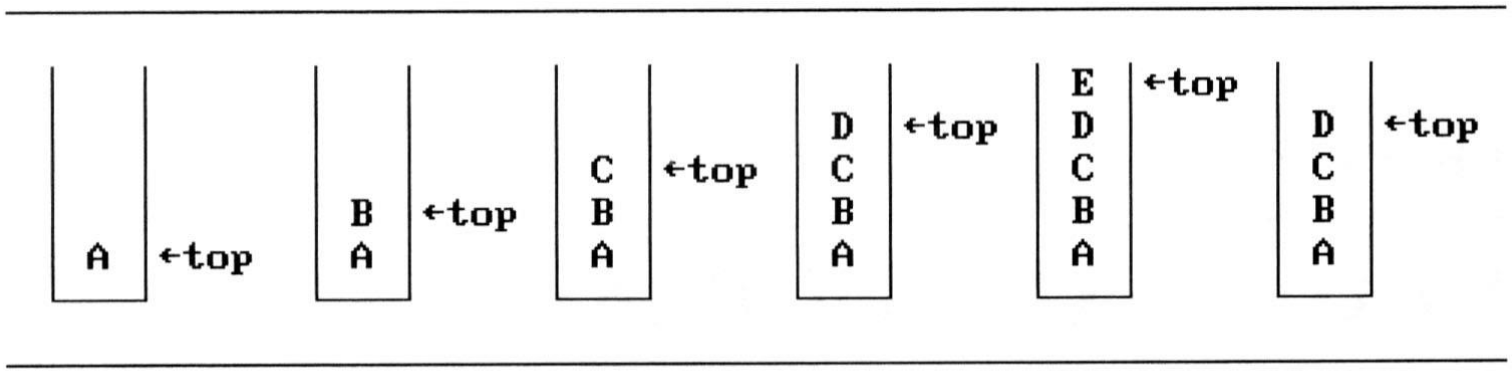
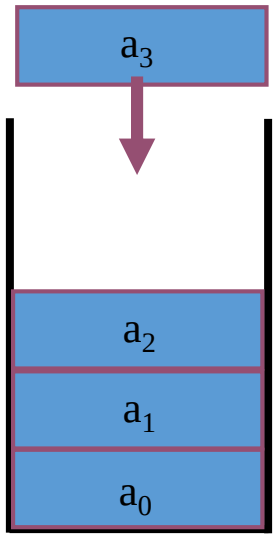


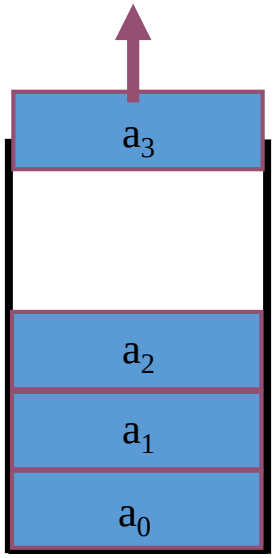
Figure 3.1: Inserting and deleting elements in a stack

Stack - STL

- STL - Standard Template Library
- 參考：http://www.cplusplus.com/reference/stack/stack/
- Mermber Function:
  - **push**
  - **pop**
  - **top**
  - **empty**
  - **size**



Push (Add)



Pop (Delete)

Stack

- **Stack Usage in STL**

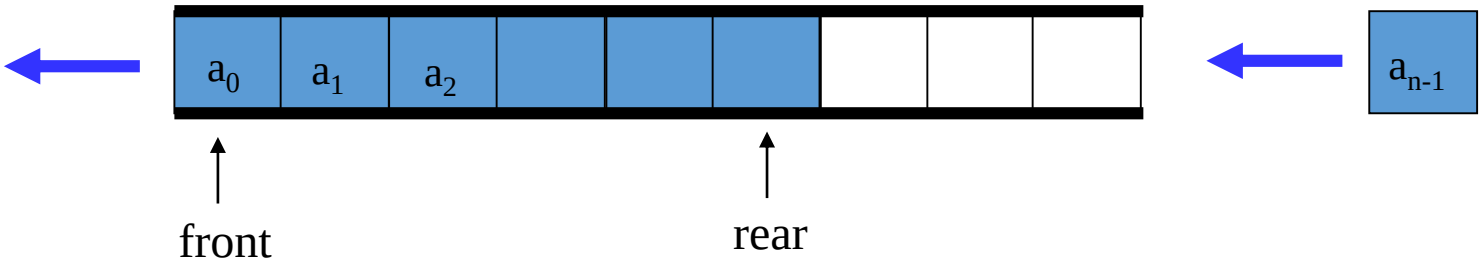
```cpp
#include <stack>
#include <cstdio>
using namespace std;

int main()
{
    stack<int> stk;
    stk.push(1);
    stk.push(2);
    while (stk.empty() == false) {
        printf("%d\n", stk.top());
        stk.pop();
    }
}
```

Practice

UVA 673
Parentheses Balance

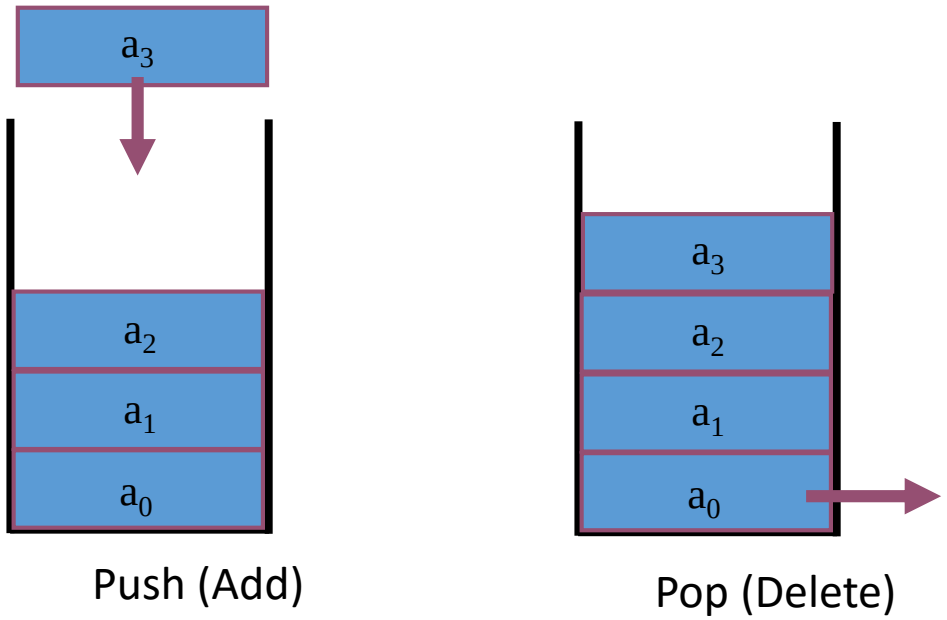
Queue

- A queue is an ordered list in which insertions and deletions are made at one end called the front.
- If we add the elements A, B, C, D, E to the stack, in that order, then A is the first element we delete from the queue.
- A queue is also known as a First-In-First-Out (LIFO) list.



Queue - STL

- 參考：http://www.cplusplus.com/reference/queue/queue/
- Member Function:
  - **push**
  - **pop**
  - **front**
  - **back**
  - **empty**
  - **size**



Queue

- **Queue Usage in STL**

```cpp
#include <queue>
#include <cstdio>
using namespace std;
int main()
{
    queue<int> q;
    q.push(1);
    q.push(2);
    while (!q.empty()) {
        printf("%d\n", q.front());
        q.pop();
    }
}
```

Practice

UVA 11995
I Can Guess the Data Structure!

補充: Priority Queue

- Priority queues are a type of container adaptors, specifically designed such that its first element is always the greatest of the elements it contains.
- http://www.cplusplus.com/reference/queue/priority_queue/
- Member function
  - **push**
  - **pop**
  - **top**
  - **empty**
  - **size**

```cpp
#include <queue>
#include <cstdio>
using namespace std;
int main()
{
    priority_queue<int> pq;
    pq.push(1);
    pq.push(3);
    pq.push(2);
    printf("%d\n", pq.top());
}
// result: 3
```