



Students:
Section 6.25 is a part of 1 assignment: **CSC108 CH06.10-6.29 P6B**

Includes: PA
Due: 05/06/2025, 11:59 PM EDT

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6.25 Memory regions: Heap/Stack

A program's memory usage typically includes four different regions:

- **Code** — The region where the program instructions are stored.
- **Static memory** — The region where global variables (variables declared outside any function) as well as static local variables (variables declared inside functions starting with the keyword "static") are allocated. Static variables are allocated once and stay in the same memory location for the duration of a program's execution.
- **The stack** — The region where a function's local variables are allocated during a function call. A function call adds local variables to the stack, and a return removes them, like adding and removing dishes from a pile; hence the term "stack." Because this memory is automatically allocated and deallocated, it is also called **automatic memory**.
- **The heap** — The region where the "new" operator allocates memory, and where the "delete" operator deallocates memory. The region is also called **free store**.

PARTICIPATION ACTIVITY

6.25.1: Use of the four memory regions.

Start

☐ 2x speed

```
#include <iostream>
using namespace std;

// Program is stored in code memory

int myGlobal = 33;    // In static memory

void MyFct() {
    int myLocal;      // On stack
    myLocal = 999;
    cout << " " << myLocal;
}

int main() {
    int myInt;         // On stack
    int* myPtr = nullptr; // On stack
    myInt = 555;

    myPtr = new int;    // In heap
    *myPtr = 222;
    cout << *myPtr << " " << myInt;
    delete myPtr; // Deallocated from heap

    MyFct(); // Stack grows, then shrinks

    return 0;
}
```

Code memory

1

Add R1, #1, R2

2

Sub R3, #1, R4

3

Add R1, R3, R5

4

Jmp 40

...

Static memory

3000

33

myGlobal

3001

...

Stack

3200

555

myInt

3201

9400

myPtr

3202

999

myLocal

3203

...

Heap

9400

222

9401

9402

Captions

Feedback?

PARTICIPATION ACTIVITY

6.25.2: Stack and heap definitions.

How to use this tool

Free store

The stack

Automatic memory

Code

Static memory

The heap

	A function's local variables are allocated in this region while a function is called.
	The memory allocation and deallocation operators affect this region.
	Global and static local variables are allocated in this region once for the duration of the program.
	Another name for "The heap" because the programmer has explicit control of this memory.
	Instructions are stored in this region.
	Another name for "The stack" because the programmer does not explicitly control this memory.

Reset

Feedback?

How was this section? | [Provide section feedback](#)

Activity summary for assignment: CSC108 CH06.10-6.29 P6B

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