8.6 Memory regions: Heap/Stack

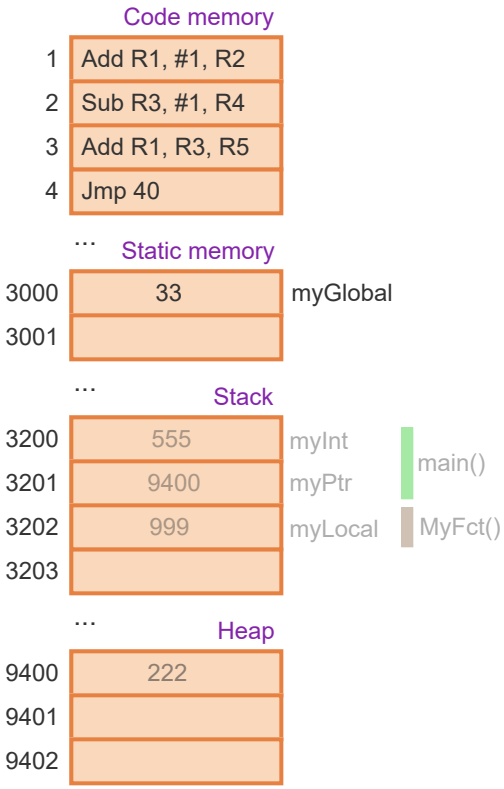
A program's memory usage typically includes four different regions:

- ***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. The name "static" comes from these variables not changing (static means not changing); they are allocated once and last for the duration of a program's execution, their addresses staying the same.
- ***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 8.6.1: Use of the four memory regions.

1 2 3 4 5 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;
}
```



When main() completes, main's local variables are removed from the stack.

Feedback?

PARTICIPATION ACTIVITY 8.6.2: Stack and heap definitions.

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

Reset

Feedback?