Stack and Heap memory

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Overview

Stack and Heap

- Memory model used so far is a simplification.
- Actually two places in memory that variables can go.
  - The stack and the heap.
- Both are just regions of the same physical memory.
  - Are managed differently.

The stack

- When program is run, block of memory is allocated.
  - Called the stack.
- Each program has it's own stack.
  - Each instance.
- As variables created and functions called they are put on the stack.
- When variables are destroyed/functions complete they are removed from the stack.
- Has limited size.
  - Recursive functions can fill the stack if not careful.

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{
   int result = a+b;
   return result;
}

int sub( int a, int b )
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   int result = a-b;
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int main()
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   int var1 = 42;
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   add(a,b);
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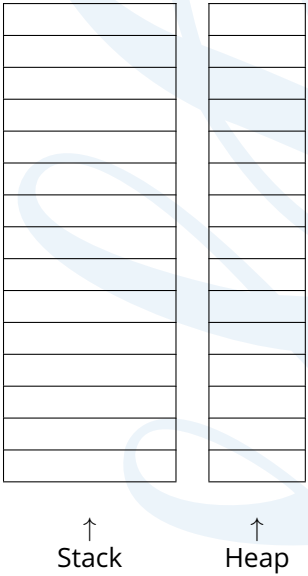

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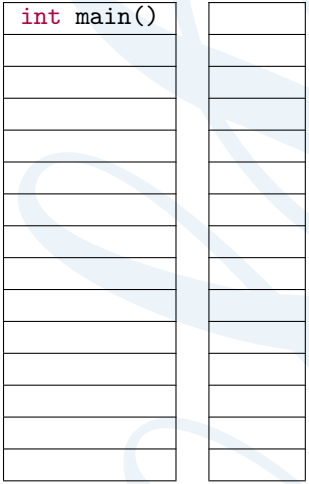

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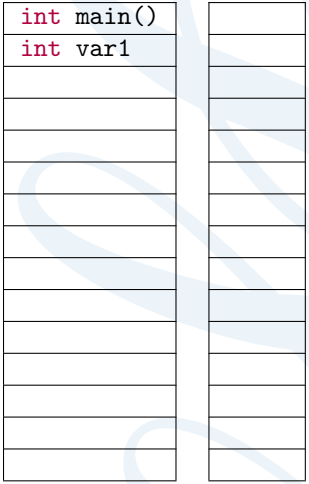

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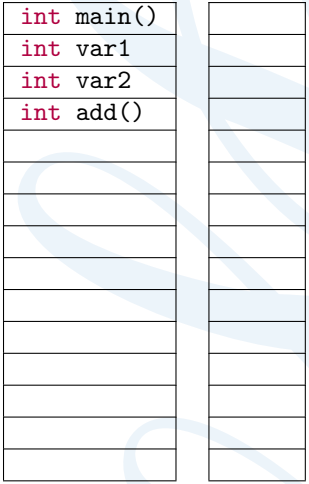

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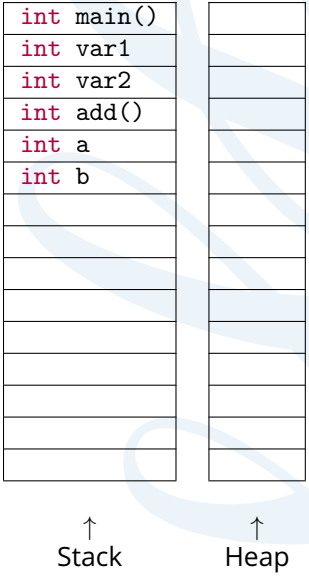

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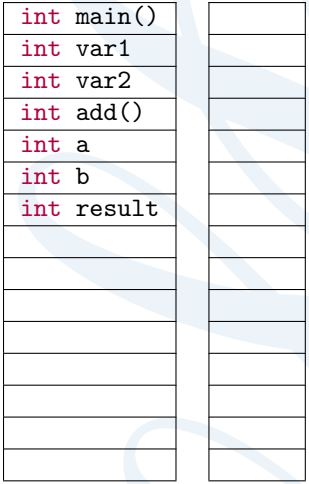

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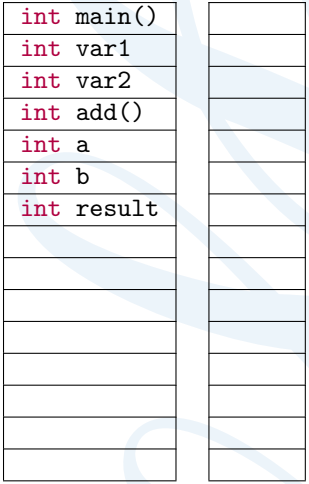

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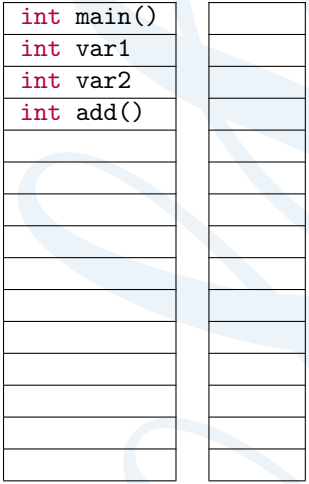

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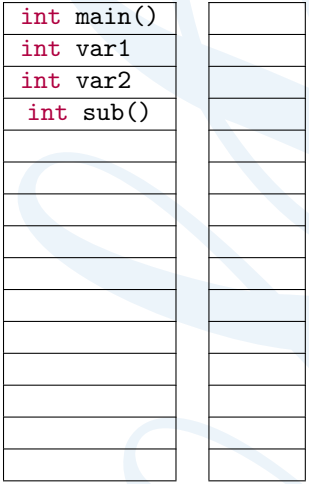

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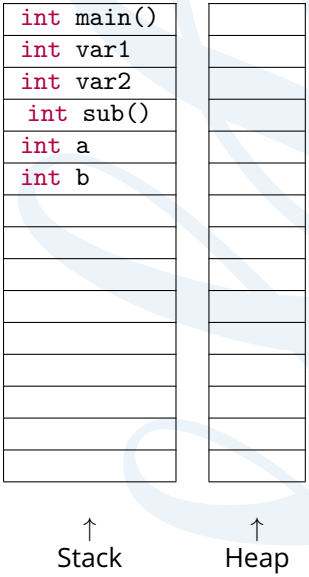

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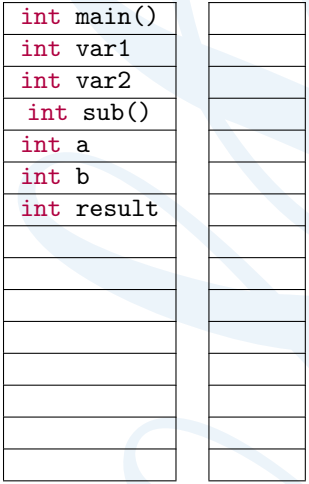

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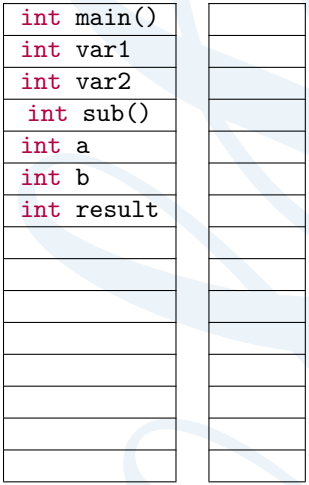

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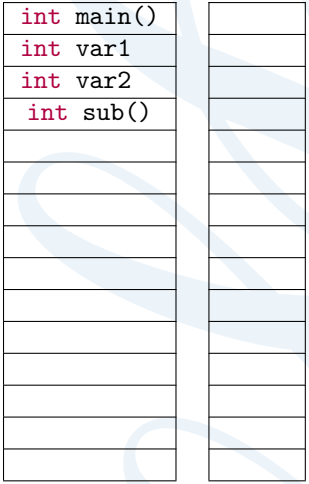

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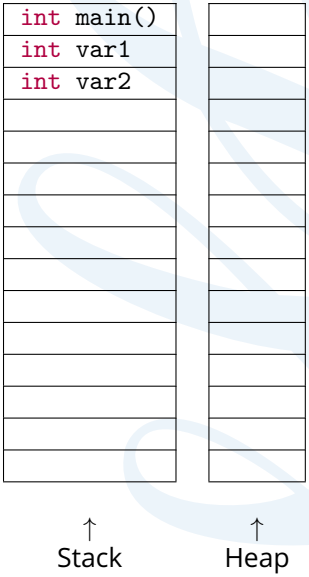

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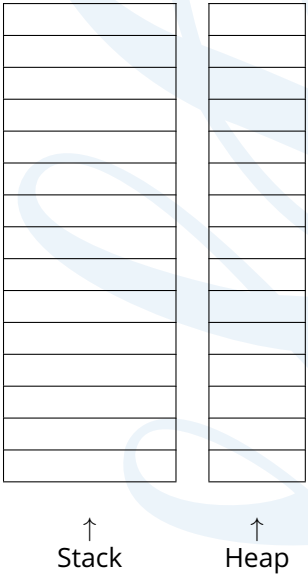

The Heap

- Shared memory between all running programs.
- Very big in comparison to the stack.
- Dangerous, must remember to deallocate our memory.
  - Memory leaks.

```
int main()
{
  int variable = 42;
  int *pointer1;
  pointer1 = new int[6];

  int *pointer2;
  pointer2 = new int[3];

  delete [] pointer1;
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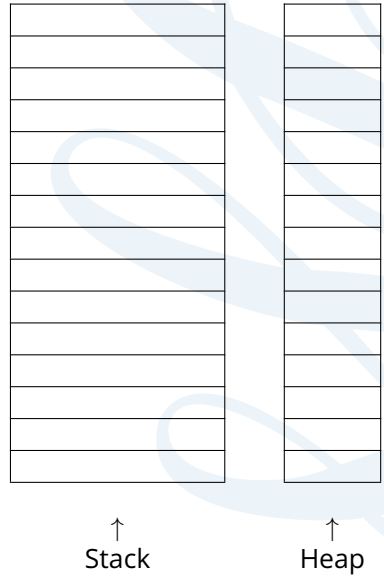

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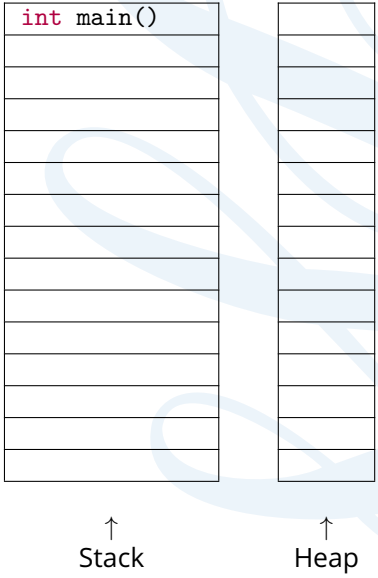

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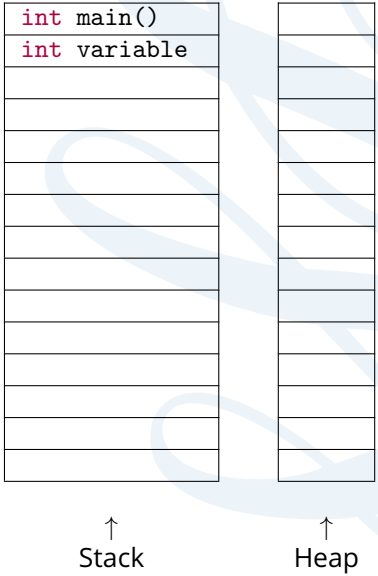

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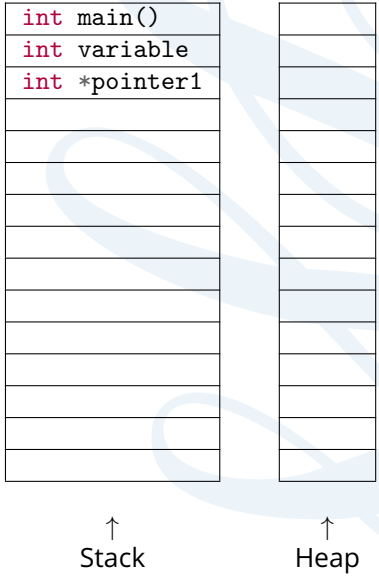

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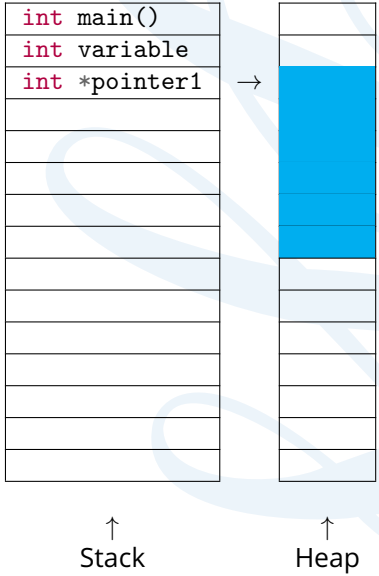

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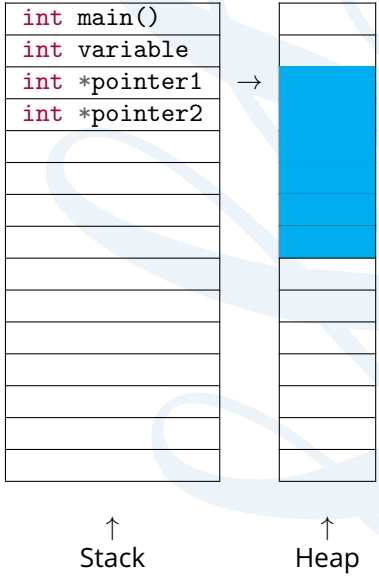

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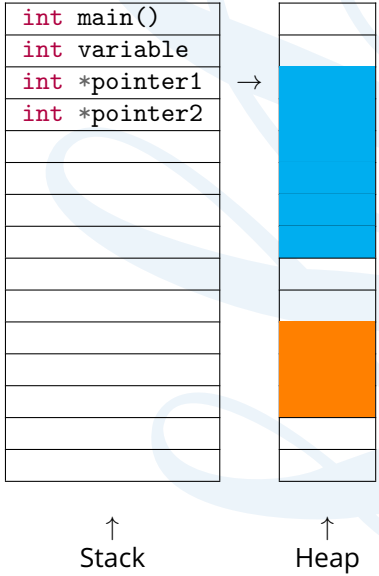

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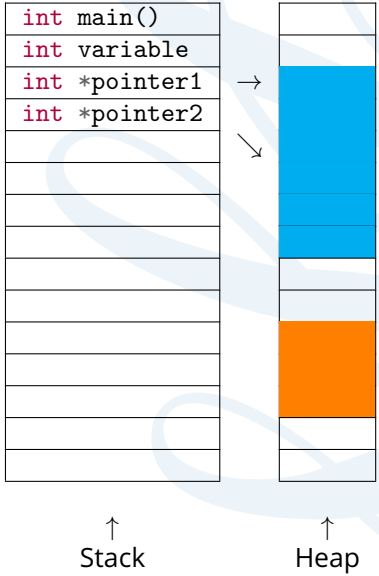

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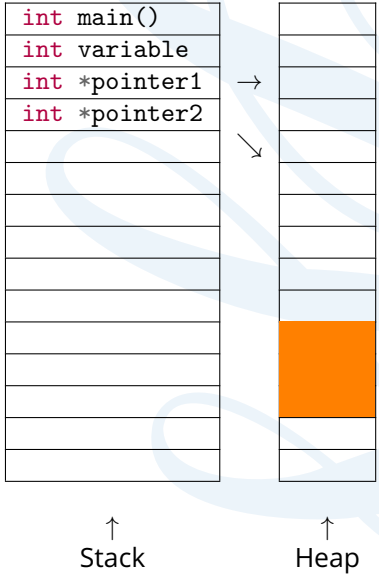

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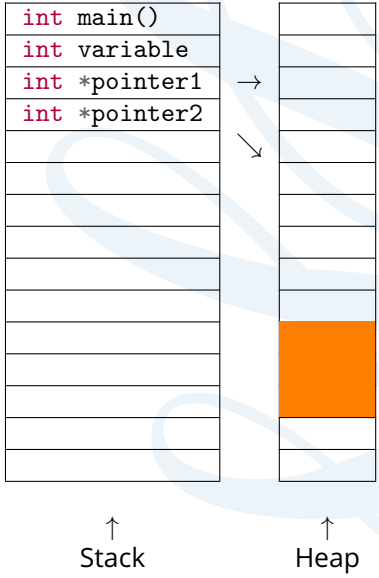

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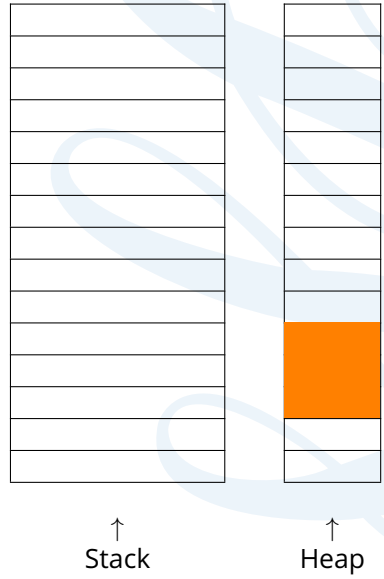

Recap

The End