

# Memory Management in C

## Heap and Stack

# Outline

- Understanding how Stack and Heap work

# Program Memory Stack

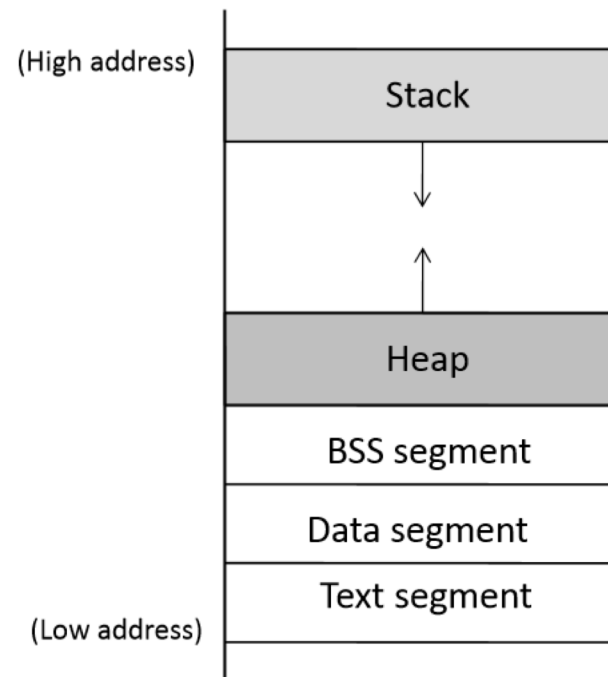
```
int x = 100;
int main()
{
    // data stored on stack
    int a=2;
    float b=2.5;
    static int y;

    // allocate memory on heap
    int *ptr = (int *) malloc(2*sizeof(int));

    // values 5 and 6 stored on heap
    ptr[0]=5;
    ptr[1]=6;

    // deallocate memory on heap
    free(ptr);

    return 1;
}
```



# Program Memory Stack

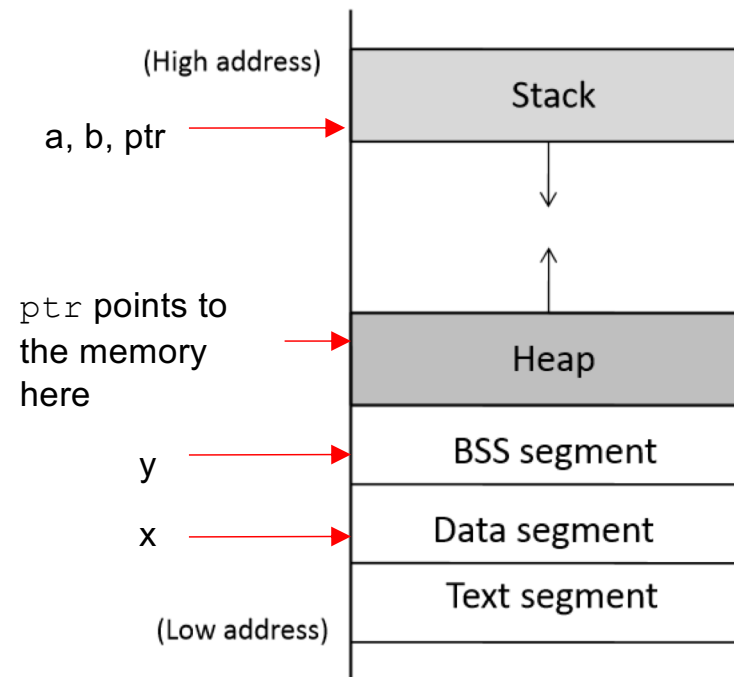
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    return 1;
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```



## Order of the function arguments in stack

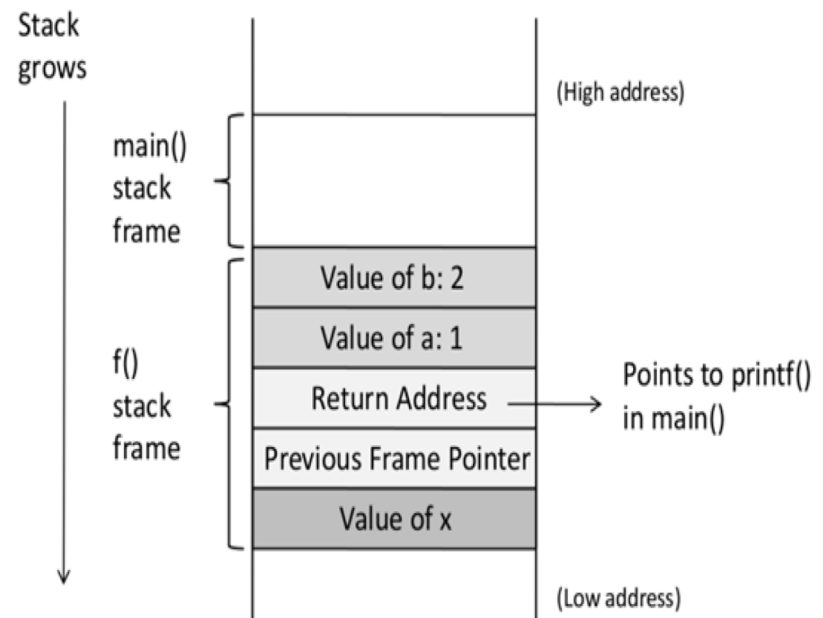
```
void func(int a, int b)
{
    int x, y;

    x = a + b;
    y = a - b;
}
```

```
movl    12(%ebp), %eax    ; b is stored in %ebp + 12
movl    8(%ebp), %edx     ; a is stored in %ebp + 8
addl    %edx, %eax
movl    %eax, -8(%ebp)    ; x is stored in %ebp - 8
```

# Function Call Stack

```
void f(int a, int b)
{
    int x;
}
void main()
{
    f(1,2);
    printf("hello world");
}
```



# Stack Layout for Function Call Chain

