

# Stack Memory

I am sure a lot of you have used [stackoverflow.com](https://stackoverflow.com) right? Stack overflows is one of the hardest problems to catch and diagnose, and thus no wonder someone invented this creative website URL.

Stack memory is required for the following:

1. Local Variables: Stored in the stack frame and automatically cleaned up when the function exits.
2. Function Calls: When a function is called, a stack frame is created and pushed onto the stack.
3. Function Returns: When a function completes, its stack frame is popped off the stack.

Fundamentally, a single core CPU contains a "Stack Pointer" which is a hardware register keeping track of memory. When a compiler generates code for a local variable, the stack pointer is typically decremented to make space for that variable.

```
void example_function() {
    int local_variable;
}
// Assembly:
example_function:
    push {lr}                // Save the link register (return address)
    sub sp, sp, #4          // Decrement the stack pointer by 4 bytes to allocate space for localV
    ...
    add sp, sp, #4          // Clean up the stack by incrementing the stack pointer
    pop {pc}                // Restore the link register and return from the function
```

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