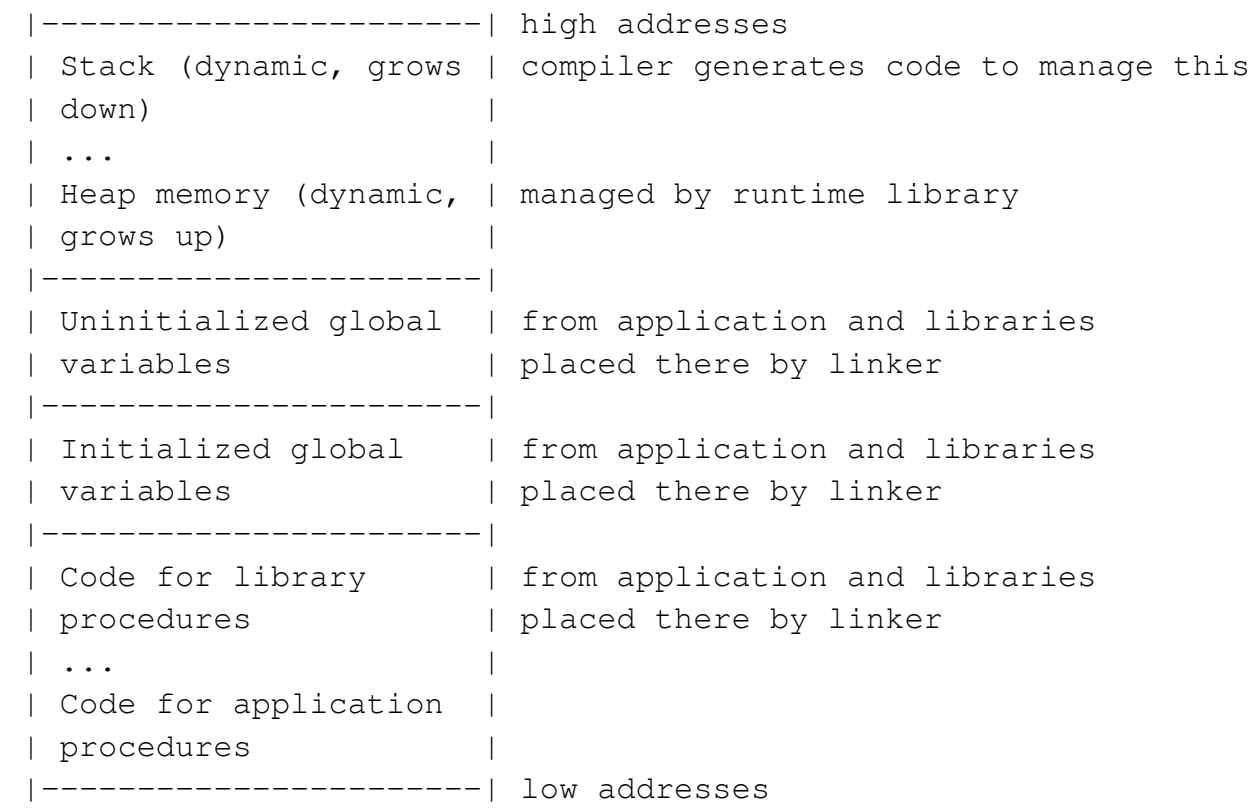
Compilers Course
Lecture 17: Runtime Environment

Typical memory layout for a process:



Registers at program start:
SP = points to the initial stack top
PC = points to the initial code (main)
R0 ... Rn = junk or zeros

Runtime Library
Typically there is a layer of code between the application and the machine or operating system: *the runtime library*.

- At start, some initialization may need to occur. The linker selects a procedure in the runtime library as the program's starting point. That procedure initializes things and then calls the application's starting point.
- There may be a special protocol to terminate a process. The runtime startup procedure can catch a return from *main()* and then do a proper termination (e.g. s*yscall exit)*.
- During execution the application and libraries will need to make system calls. The runtime library provides procedures that act as wrappers around the low-level system call mechanism (typically a software interrupt or trap instruction).

Compiler support library

High-level languages typically implement some functionality in libraries rather than having the compiler outputs a lot of code for that functionality:

- Dynamic memory management, garbage collection
- Exception handling
- Standard procedures for I/O, networking, data structures, etc