

C for Linux

Session 2

BY:

Eng. Ahmed Teirelbar

Software Engineer

Shuja' Consulting



EGLUG

جنتو لينكس مصر

Examples

Preprocessing, Compilation and Linking

- `cpp` example
- `gcc` example with a `-o` and `-c`
- `objdump` of a `.o` and an ELF



EGLUG

جنو لینکس مصر

Your program as a process

- Every executing piece of code (outside the kernel) is running in or as a process
 - including yours
- ps and top example

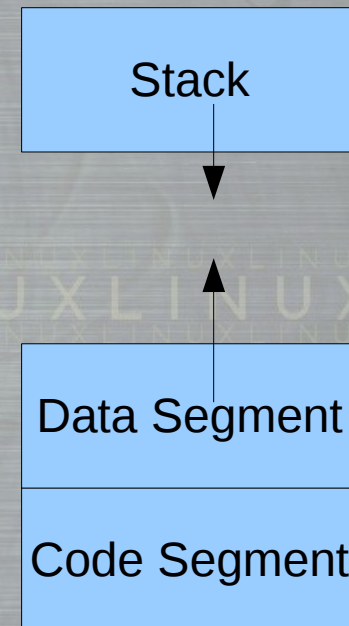


EGLUG

جنو لینکس مصر

Process Address Space

- Concept of address space
 - why per process?
 - why segmented?
 - A very simplified view
 - what does this have to do with C?



EGLUG

جنو لینکس مصر

Stack and Scope again

- What's a stack?
 - SP, push and pop
- Scoping in
 - SP stored
- Scoping out
 - stack unwinds, SP retrieved
- What does this mean for declarations



EGLUG

جنو لینکس مصر

Libraries

- A piece of code that encapsulates some functionality - Modularity
- Dynamic and Static
 - run-time vs build-time -- functional scalability
 - Linking
- Sharing
 - One copy in memory – size
- In Linux: Static libraries and Shared Objects



EGLUG

جنتو لينكس مصر

Using a shared object

- `lib<x>.so`
- gcc example with `libm.so`
 - `gcc -l<m>`
- The library search path
- `objdump` of this new program
- `ldd`



EGLUG

جنو لینکس مصر

Makefiles

- Builds get complex:
 - Files
 - Flags and directives
 - Stages
- make utility
- Reference
 - http://www.linuxtopia.org/online_books/programming



EGLUG

جنو لینکس مصر

Makefile Basics

- variables
- rules
- dependencies
- variable defaults
- wild characters



EGLUG

جنتو لینکس مصر

Makefile Example

- Same program from earlier
- Add the shared object example



EGLUG

جنو لینکس مصر

gdb Basics

- -g
- In execution
 - run
 - continue
 - step
 - breakpoint
 - variables
 - directives
 - execute code



EGLUG

جنو لینکس مصر

Pointer Concepts

- An array is a pointer to the first element
- Pointer subscript access
- Scope issues – Back to the stack picture
- NULL pointer



EGLUG

جنتو لینکس مصر

Pointers

- SEGV
- Memory overwrites
- null termination issues
- Core dump
- More gdb
 - dumping memory
 - casting



EGLUG

جنو لینکس مصر