

C for Linux

Session 4

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Your own .so

- gcc line – in the makefile
- Versioning
- Overview on how it works
 - Dynamic loader
 - Relocation - fPIC
 - Sharing - mmap



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Code Organization

- Public/Private includes
- Reflection of your abstractions
- Delivery: install, lib, bin



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Multi-file Makefiles

- Example
- .h Dependency
- Multiple directories



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Command Line Processing

- argc, argv
- usage()
- get_opt – libsysfs example
 - optarg
 - optind
- getopt_long – ls example
 - options structure



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File I/O Intro

- FILE * (stream) interface
 - fopen/fclose
 - fread/fwrite binary
 - fprintf/fscanf formatted
- Descriptor interface
 - open/close
 - read/write
- Note: Filesystem is an abstraction



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Function Pointers and Callback

- `ret (*name)(args)`
- Can store (ptr) and execute (fun)
- Callback concept
 - Flexible behavior
 - Decoupling/Abstraction



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User Configuration

- Simple guidelines:
 - Code encapsulates the parsing
 - Collect the data once
- (Attribute, value) pairs
 - Xinetd



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Logging

- Your eyes on the software
- Debug levels
 - Run-time (debug.on/msg in xinetd)
 - Compile-time
- Lookup tables with functions
 - Xinetd - parser



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API Examples - Libsysfs

- Safe string macros
- Attr/Device/Bus/Driver/Module structures and corresponding functions (forced by model)
- Private/public includes and functions
- dlist: generic, separate testing (could be opaque)
- Compare callback



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Linked List

- Concepts
 - Node
 - Next/prev
 - Head
 - Tail
 - Size
 - Singly vs Doubly Linked



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Linked List – Cont'd

- Operations
 - add/add_tail
 - remove
- Example from kernel list
- Example from libsysfs dlist



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BIGNUM

- Independent functionality
- Modularity
- Decoupling
- Testability
- Abstraction – dealing with bignums



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BIGNUM

- Some of what we have discussed
 - Initialization/Termination
 - Memory alloc macros
 - Expansion macro
 - Debug macro
 - BN_MASK2 -- SIXTY_FOUR



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Void * and Handle

- Void *
- Opaqueness
- Handle - Reference counting
- Handle - Pimpl Idiom (*)



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