

CSE320 System Fundamentals II

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Lecture overview

Extra topics:

The make utility

Using c libraries, linking

More on gdb

Returning multiple values from functions

make

Utility that builds applications and systems

- Tree db only rebuilds modules that need it
- Adds switches and options where needed
- Built-in rules help make specification simple

Intro video: https://www.youtube.com/watch?v=_r7i5X0rXJk

libraries

Including a sharable library:

- In c source, `#include` header (i.e. `#include math.h`)
- When building, in link step, include a `-l` for the library (i.e. `-lm`)

More on gdb: gdb commands [print & stack]

Printing data and registers

- **info registers** – This dumps the cpu registers
- **p <addr>** – Print value in memory location <addr>
- **x/<format> <addr>** - eXamine value in <addr> as <format> (char, short, instruction, etc.)

Stack status/contents

- **bt** – Backtrace – This command shows the list of stackframes for invoked functions.
- **up** – Go to previous (caller's) stack frame. Commands from this point will look at symbols from that stack frame's point of view.
- **down** – Go to the stack frame of the function called by the current stack frame (this has no effect if the stack frame is of the function containing the breakpoint.)

Closer look at 'x' (examine)

- `x/<format> <addr>` - eXamine value in <addr> as a <format> (char, short, instruction, etc.)

Format letters:

- o – octal
- x – hex
- d – decimal
- u – unsigned decimal
- f – float
- i – instruction
- c – char
- s – string

Size format letters:

- b – byte
- h – halfword
- w – word
- g – giant (8 bytes)

Returning multiple values

See: `quad.c`

Questions?