Administrivia

- (By e-mail.)

Slide 1

Shared Libraries — Recap/Review

- Functions in libraries meant to be (and are) called by many, many programs. Could link a copy into every program that uses a library function, or could figure out how to share, with code linked in at runtime.

- Sharing attractive not only because it's more efficient but also because it means library code can be updated independently of programs that use it. (Mixed blessing, though.)

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Libraries in Linux (Review)

- Linker flag $-$l*foobar* tells linker to try to find functions in library file lib*foobar*.a (for static linking) or lib*foobar*.so (for dynamic linking).

- Somewhat elaborate scheme for naming shared libraries allows multiple versions to coexist. Programs that use them can reference latest version (default) or specify particular version.

- References to functions in shared libraries resolved when program is loaded into memory. Can also dynamically load functions at runtime. Both depend on system being able to find shared libraries.

- Standard places to find library code, or you can explicitly specify alternate places.

- Example under "sample programs" on course Web site. Also another example of a Makefile.

Slide 4

Libraries in Linux, Continued

- Creating a static library is relatively straightforward:

- Compile code as usual and then use ar to combine object code files into library.

- Example — make main-with-static.

Libraries in Linux, Continued

Slide 5

- Creating a shared library is less so:

- Compile code with flag to generate "position-independent code".

- Generate shared library and set up symbolic links following naming conventions (in which a library has a "real name", an "soname", and a name by which the linker normally finds it).

Libraries in Linux, Continued

Slide 6

- At runtime, must be sure system knows where to find library.

- Usual way is to use environment variable. `LD_LIBRARY_PATH`.
  Example — `make main-with-shared`.

- Or hardcode path when linking (less flexible but can be easier to use).
  Example — `make main-with-shared-rpath`.

Libraries in Linux, Continued

- One more option — link in shared library dynamically.

- Example — `make main-dynamic`, `make main-dynamic`.

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Minute Essay

- Questions? Otherwise just tell me you watched this one.

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