Outline

- Announcements
  - HWII revised Monday, due Monday
  - Sign-up for CTC account
- Dynamic Libraries

Dynamic Libraries

- When we type
  - gcc -oFpca <.o files> -L<path> -llapack -lf77blas -latlas
- The compiler (actually the linker) goes through the lapack, blas, and atlas libraries, grabs the object code Fpca needs, and places it in the Fpca application
- If a new version of liblapack.a is installed, will Fpca to use this version?

Dynamic Libraries

- Using static libraries (.a), we need to rebuild our application to take advantage of library improvements
- Most UNIX systems can use things called "shared-object libraries" (lib<name>.so)
  - If you link to a .so library, the code from that library is linked to your program at runtime
  - This means
    - You're code will automatically take advantage of improvements in the library
    - You're program will be smaller

Creating Shared-object libraries

- Compile with -fPIC and -c flags
  - PIC stands for "Position Independent Code"
- Link explicitly with linker (ld) and some options:
  - ld -shared -soname lib<name>.so.1 -o lib<name>.so.1.0 -lc <name>.o
  - -shared says to make the library shared
  - -soname gives the library a soname
  - -o gives the library a name

Using Shared-object Libraries

- Compile your program (-c)
- Link it to your so-library (-L<path> -l<name>)
- Add <path> to your LD_LIBRARY_PATH:
  - CSH: setenv LD_LIBRARY_PATH $(LD_LIBRARY_PATH):<path>
  - BASH: export LD_LIBRARY_PATH= $(LD_LIBRARY_PATH):<path>
- For more info, check out
  - www-106.ibm.com/developerworks/library/l-shobj/

Creating DLL's on Windows

- Windows allows you to "hide" routines in DLLs from users.
- To "export" a routine, you must place __declspec(dllexport) in front of its prototype:
  - void PrintArray(…) becomes
  - __declspec(dllexport) void PrintArray(…)
- Link with the /dll flag
  - Creates 3 files:
    - .dll, .lib, .exp

Using DLL's on Windows

- Build your program, link to the .lib file
- To run, you need to place the .dll in your PATH or set your PATH to point to the DL
  - set PATH=%PATH%;<DLLPATH>
- For more info on DLL's, check out
  - www.tc.cornell.edu/services/edu/topics/libraries/more.asp