

Introduction to Computer Science
W 1113 – Lab (C)
Lab13

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Questions about HW6

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Question about review session

- Wednesday or Thursday?

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Recap from Lab 11

- malloc
- free
 - Dangling pointers
- calloc
- Pointers and Linked Lists

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Recap from Lab 12

- Pointers and Linked Lists
- File *
 - fopen()
 - fclose()
- Input and Output to/from files
- strtok() and strdup()

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Short Lab today

- We will cover two topics
 - Modularity
 - Makefiles

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Modularity

- You would want to deal with modularity in two cases
 - If you have multiple people working on the same "project"
 - If you want to reuse one piece of code in multiple places

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Example – calendar.c

- Look at the solutions
- Now, imagine that each function in this piece of code needed to be written by a different programmer
- Separate out all the functions into separate files
- Each file gets a .h, but no main()
- The main file
 - contains the main() function
 - includes all the .h files (in " ")

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Let us look at a real example

- From the text book...
 - Ch. 18, pg 308, 311 and 318

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Makefiles

- How does Java compile pieces of code?
- How does C do it?
- How would you compile multiple files together
- Dependencies

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The GNU make utility

- http://www.gnu.org/manual/make-3.79.1/html_node/make_toc.html
- The make utility automatically determines which pieces of a large program need to be recompiled, and issues commands to recompile them.
- You have to have a Makefile
- Run make to start rules in the Makefile file.

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Example of a Makefile

```
edit : main.o kbd.o command.o display.o \  
      insert.o search.o files.o utils.o \  
      cc -o edit main.o kbd.o command.o display.o \  
          insert.o search.o files.o utils.o \  
  
main.o : main.c defs.h \  
      cc -c main.c \  
kbd.o : kbd.c defs.h command.h \  
      cc -c kbd.c \  
command.o : command.c defs.h command.h \  
          cc -c command.c \  
display.o : display.c defs.h buffer.h \  
          cc -c display.c \  
insert.o : insert.c defs.h buffer.h \  
          cc -c insert.c \  
search.o : search.c defs.h buffer.h \  
          cc -c search.c \  
files.o : files.c defs.h buffer.h command.h \  
          cc -c files.c \  
utils.o : utils.c defs.h \  
          cc -c utils.c \  
clean : \  
      rm edit main.o kbd.o command.o display.o \  
          insert.o search.o files.o utils.o
```

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From the example

- To use this makefile to create the executable file called 'edit', type: make
- make clean
- You can also define variables/macros
 - CC = gcc
 - \$(CC)

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The stuff I covered today

- This will not be on the final exam
- Good knowledge though

- Question about C or about the course in general

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Assignment

- HW6

- Have a good Final Exam!

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