Cache Lab Helpful Hints

Jeannie Albrecht

- **Code samples taken from www.tutorialspoint.com**

fgets and fopen

- FILE *fp is a file pointer
- fopen opens files for reading/writing
- fgets reads file from *stream* and stores in char array
- fclose closes file pointer (always close file pointers!)

```
#include <stdio.h>

int main () {
  FILE *fp;
    char str[60];

    /* opening file for reading */
    fp = fopen("file.txt" , "r");
    if(fp == NULL) {
       perror("Error opening file");
       return(-1);
    }

    if( fgets (str, 60, fp)!=NULL ) {
       /* writing content to stdout */
      printf(“%s\n”,str);
    }
    fclose(fp);

    return(0);
}
```

sscanf

- sscanf reads formatted *input* from string

```
#include <stdio.h>
#include <stdlib.h>
#include <string.h>

int main () {
   int day, year;
   char weekday[20], month[20], dtm[100];

   strcpy(dtm, "Saturday March 25 1989");
   sscanf(dtm, "%s %s %d  %d", weekday,
          month, &day, &year );

   printf("%s %d, %d = %s\n",
          month, day, year, weekday );

   return(0);
}
```

Pointers!

getopt

- Used to parse **command line options**
- ./hello –a –c 4
- “:” in getopt string “ac:” indicates that an additional piece of info is expected after “c”

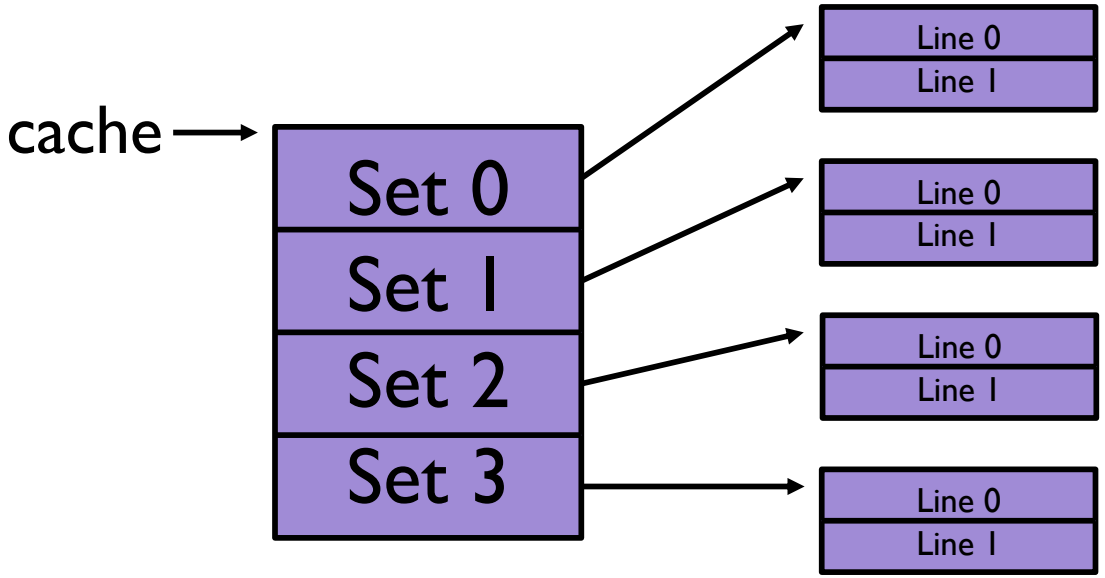
```
int main (int argc, char **argv) {
    int c;
    char *cvalue = NULL;

    while ((c = getopt
            (argc, argv, “ac:”)) != -1)
      switch (c) {
         case 'a’:
                //do something
                break;
         case 'c':
                cvalue = optarg;
                break;
         default:
                //do something
    }
}
```

Cache lab in a nutshell

- Define a struct(s) for representing your cache
- Write/review functions for:
  - main (get command line options, open trace file, read trace file, etc)
  - Initializing cache (i.e., malloc space for cache)
  - Freeing cache (i.e., any allocated memory must be freed)
  - Running simulation (update the flags of our cache accordingly)
  - Other helper functions as needed

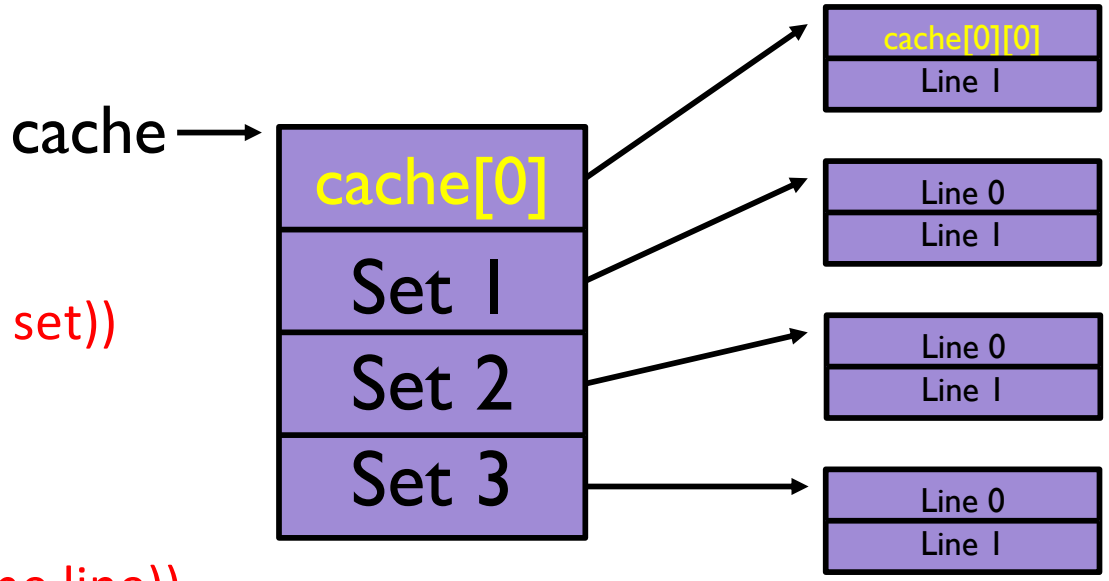
Hints

- What is a cache?
  - An array of cache sets
- What is a cache set?
  - An array of cache lines
- What is a cache line?
  - Valid bit, tag, block
  - Note that we are only ***simulating*** a cache in Lab 5, **so we don't need to represent the actual data blocks**
  - Might need a little extra info to implement LRU
  - Probably want a struct to keep track of this!



Hints

- What is a cache?
  - An array of cache sets
  - cache = malloc(S * sizeof(cache set))
- What is a cache set?
  - An array of cache lines
  - cache[i] = malloc(E * sizeof(cache line))
- What is a cache line?
  - Valid bit, tag, block
  - Note that we are only ***simulating*** a cache in Lab 5, **so we don't need to represent the actual data blocks**
  - Might need a little extra info to implement LRU
  - Probably want a struct to keep track of this!



Getting Started

- Figure out how to read from trace files
- Plan cache line struct
- Think about how you'll implement LRU algorithm