CS 241
Data Organization
File IO

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File Pointers

- Opening a file returns a pointer to an object of type `FILE`
- This is a *file pointer*, also known as a *stream*.
- Default streams `stdin`, `stdout`, `stderr` are already open when program starts.

Opening a File

```
FILE* fopen(const char* filename, const char* mode)
```

Options for `fopen` include:

- `r` – open for reading
- `w` – open for writing (file need not exist)
- `a` – open for appending (file need not exist)

Add a `b` to the mode to indicate a binary file. (Text streams and binary streams differ on some systems.)
Example: `FILE* in = fopen("myfile","rb");` opens a binary file for reading.
If file can't be opened, `fopen` returns `NULL` pointer.

Closing a File

```
int fclose(FILE* stream);
```

- Returns `EOF` if error occurs, zero if success.
- Close file when you are done working with it.
- Caution: Don't close the default streams!

Formatted Input/Output

```
int fscanf(FILE* stream, const char* format, ...);
int fprintf(FILE* stream, const char* format, ...);
```

`printf(...)` is equivalent to `fprintf(stdout, ...)`

Character I/O

```
int getc(FILE* stream);
int putc(int c, FILE* stream);
```

`getchar()` is equivalent to `getc(stdin)`

Binary I/O

```
size_t fread(void *ptr,
             size_t size_of_elements,
             size_t number_of_elements,
             FILE *stream);
size_t fwrite(const void *ptr,
              size_t size_of_elements,
              size_t number_of_elements,
              FILE *stream);
```

- First argument is data to be read/written.
- Second is size of single item of the data.
- Third is number of items of data to read/write.
- Finally, file stream for read/write.
- Return value will be same as number of items if successful.

File positioning functions

- `fseek` – set file position for stream
- `ftell` – get current file position for stream
- `rewind` – Return to beginning of file.
- `fgetpos` – Store current position in a pointer for later use.
- `fsetpos` – Position stream at position previously recorded in a pointer.