Lecture 10

Memory Management III

28 October 2011

Miscellaneous Left-overs

1. Optimal Page Size

s: average size of a process

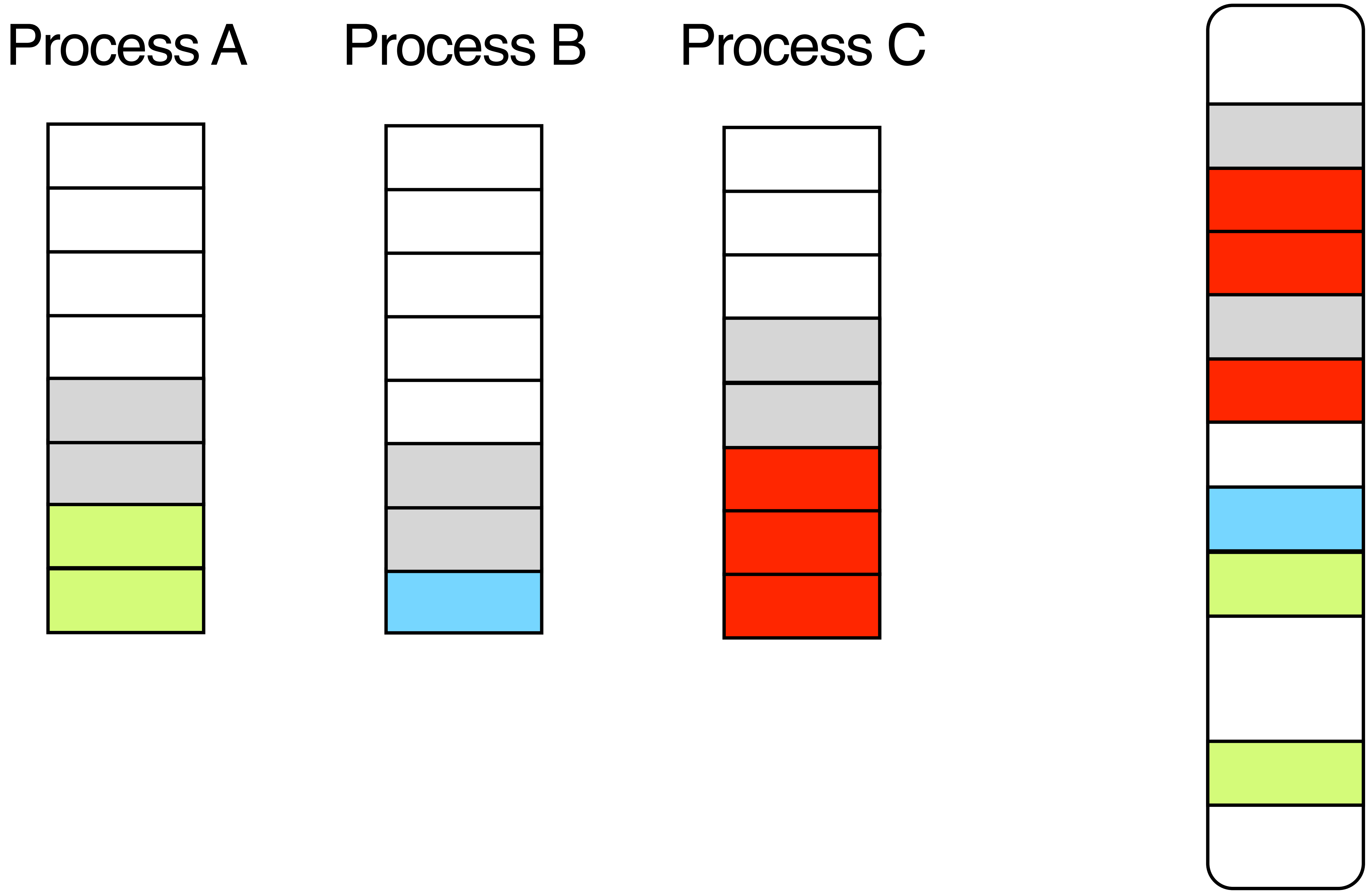
p: size of a page

e: size of a page entry

2. Shared Library

```
gcc savages.c -lpthread
gcc bush.c -lreadline
```

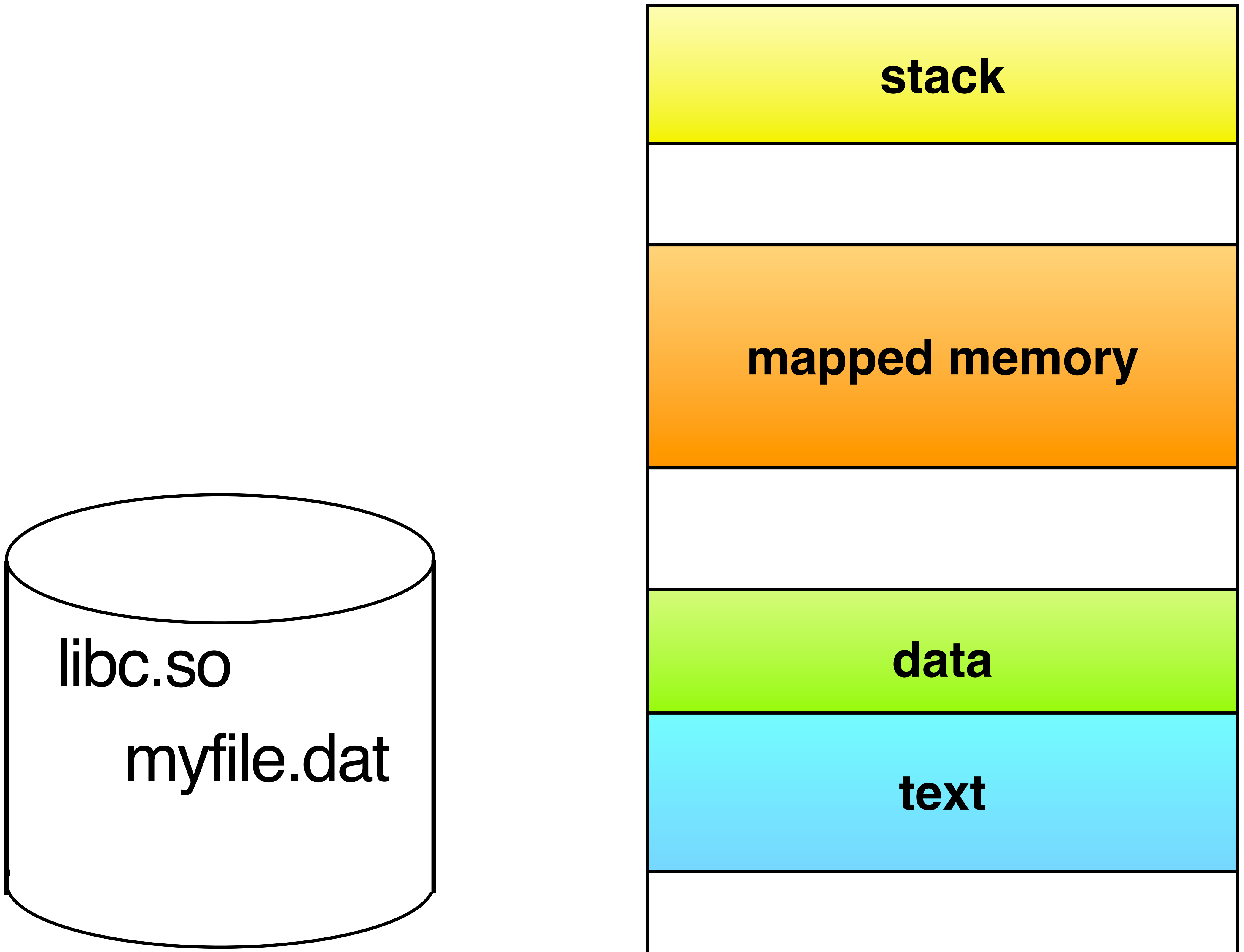
Physical Memory



position-independent code

3. Memory-mapped Files

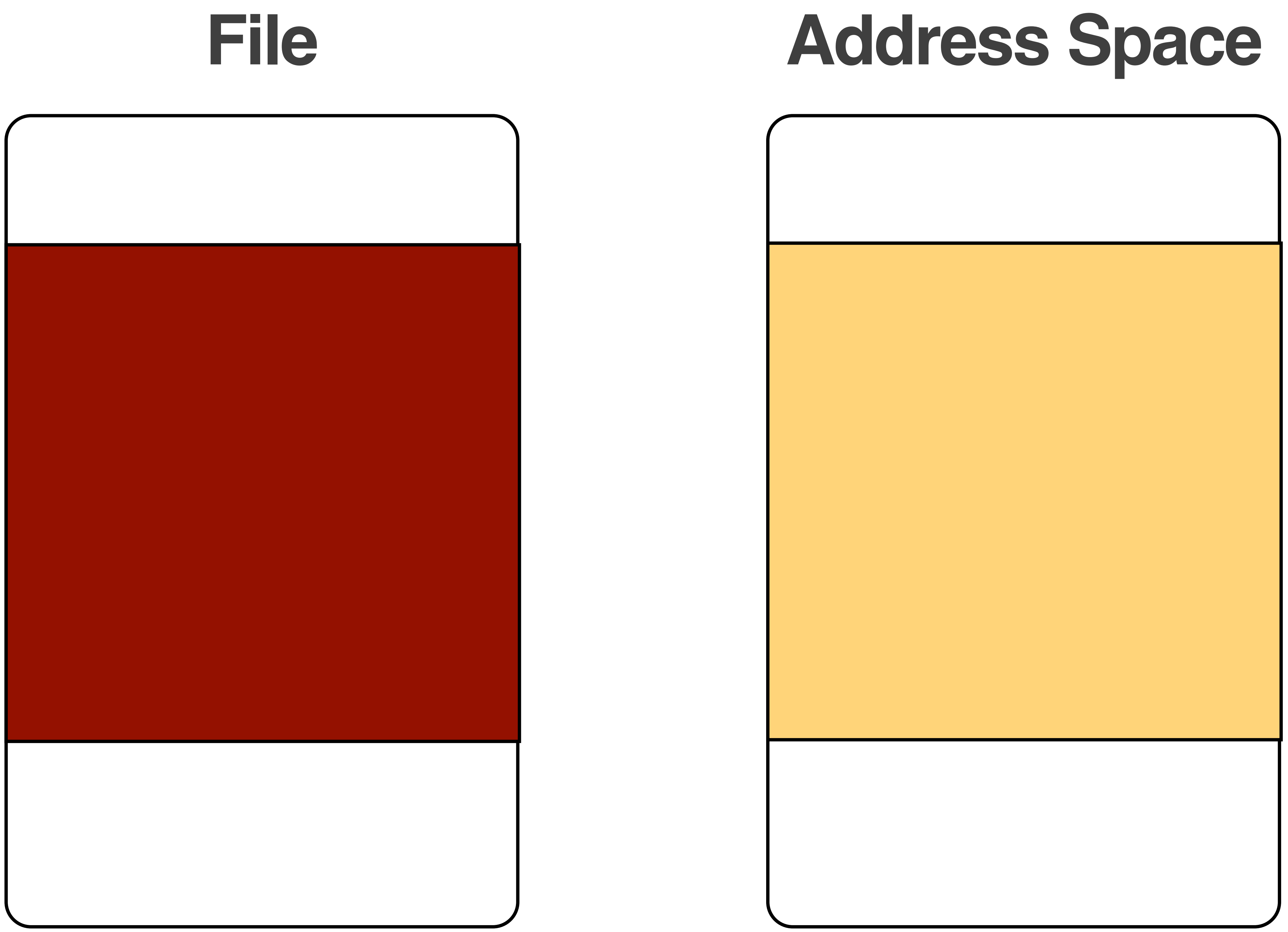
Address Space



load shared libraries
simplify file I/O
shared memory

System Calls

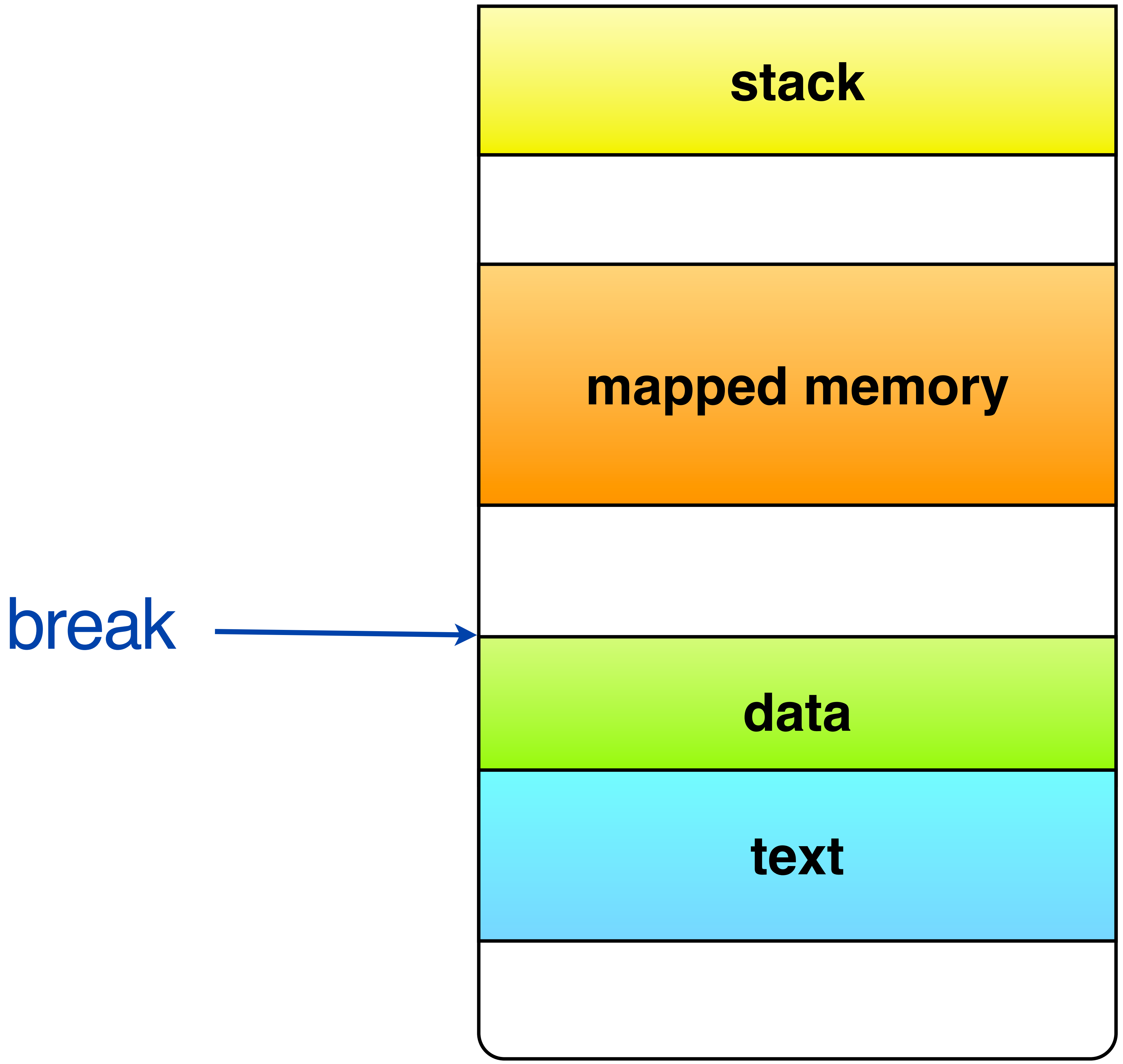
```
mmap()
munmap()
```



```
void *mmap(void *start, size_t length,
  int prot, int flags, int fd, off_t offset);
```

4. Dynamic Memory Allocation

Address Space



System Calls

`brk()`
`sbrk()`

(process request usable memory space from OS)

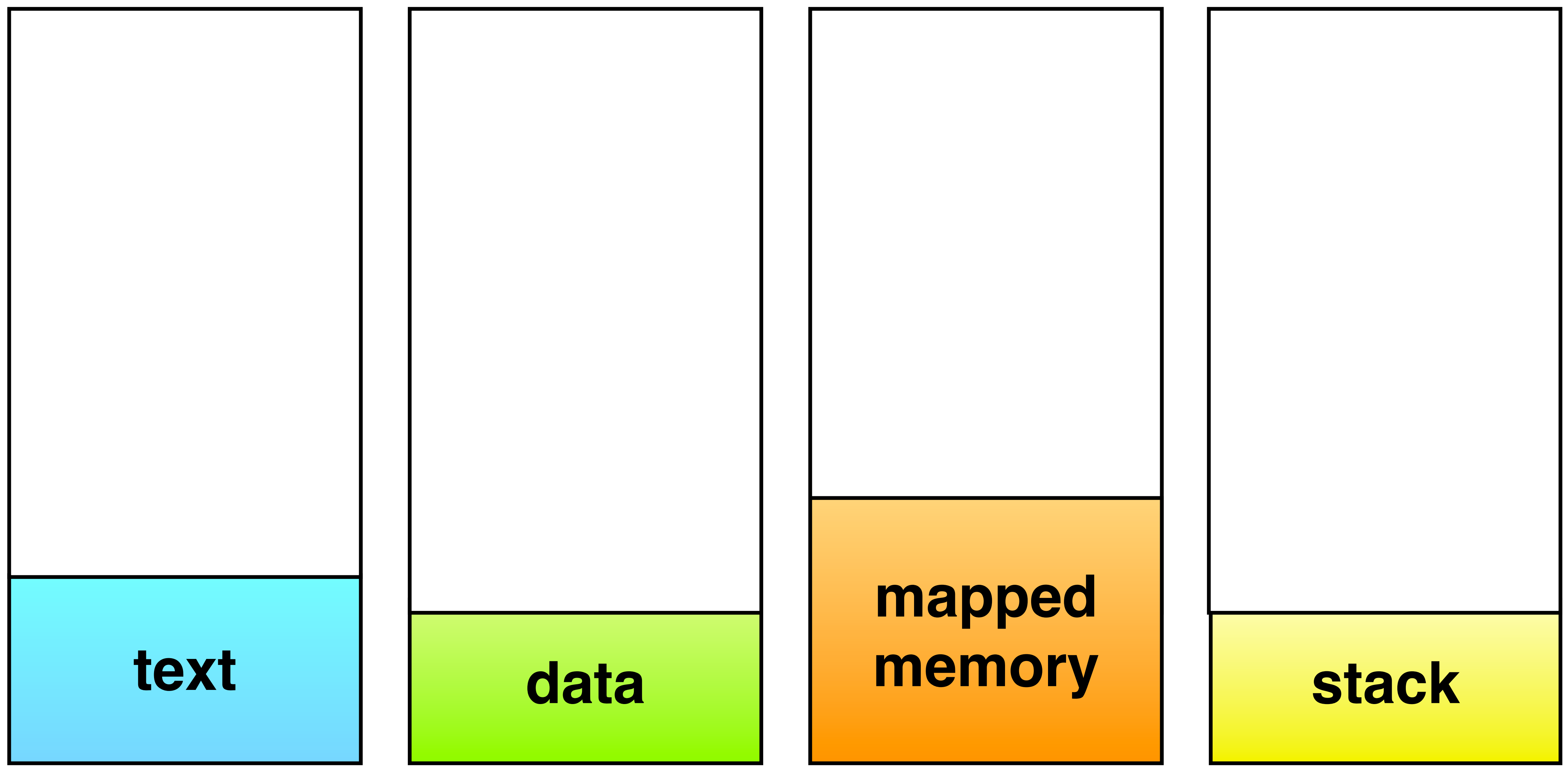
C library calls

```
malloc()
free()
```

Anonymous
Memory Maps

5. Memory Segmentation

Address Space per Segment



segment table

(segment id, base, limit, ..)

Advantages of Segmentation

1. separate protection
2. easier sharing

Lecture 10

File Systems

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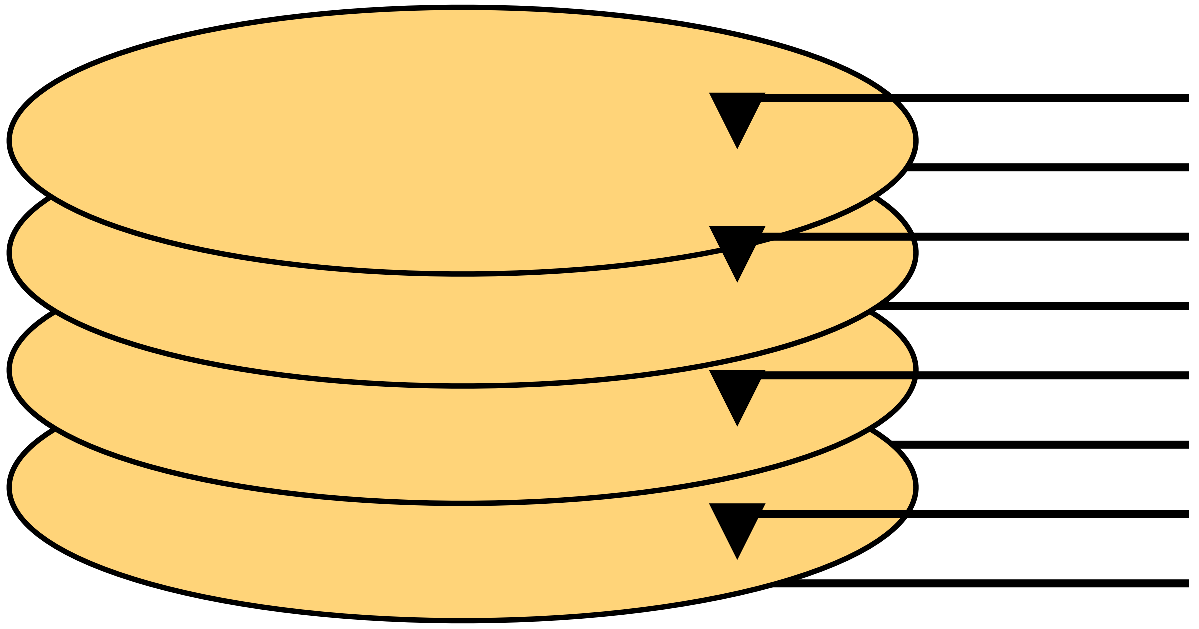
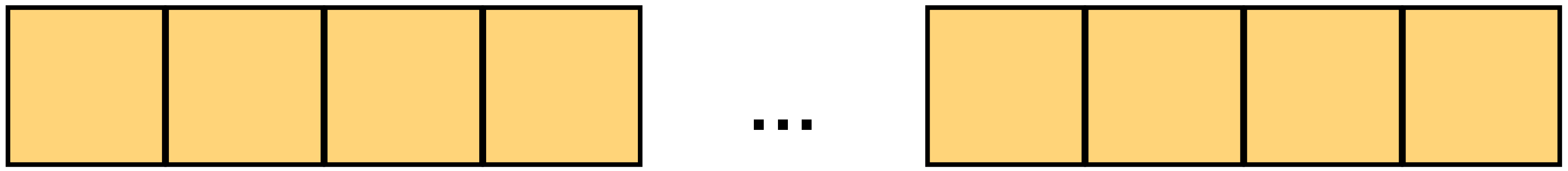
persistent storage
large storage
concurrent access

Magnetic Disks



seek, rotate, transfer

Disk Blocks



which data stored where?
which blocks are free?
who owns the block?

Abstraction: File System

directories

files

cwd

abs path

relative path

permissions

:

System Calls

creat	stat
open	fstat
close	pipe
read	dup
write	fcntl
lseek	

```
mkdir
rmdir
link
unlink
```

```
chdir
opendir
closedir
readdir
rewinddir
```

file descriptor table

special file descriptor

0

1

2

file system calls in action

(demo: strace cp foo bar)

a child process **inherit** the file descriptor table of its parent

system call: dup2()

system call: pipe()