

Week 6.a

CS6640

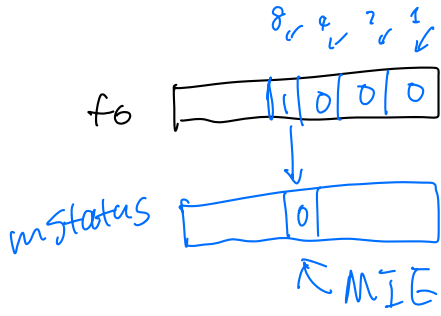
10/10 2023

<https://naizhengtan.github.io/23fall/>

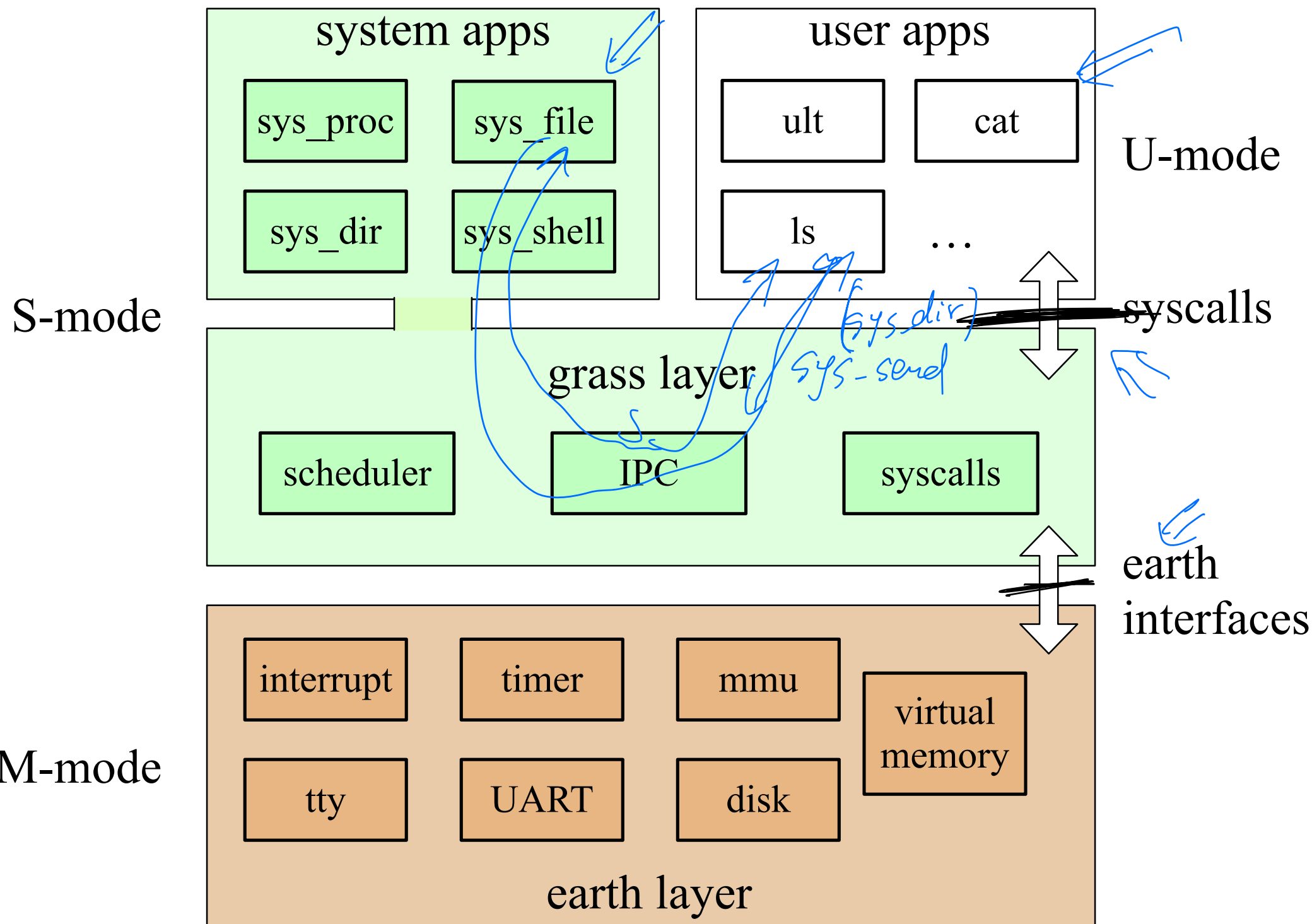
1. last time: egos design
  - \* starvation in MLFQ?
  - \* the "static" size of each component?
2. egos-2k+ implementation

---

• earth.S



FlexSC



3. egos-2k+ memory layout II

HIGH MEM ADDR

	<- 0x8040_0000
	[FREE_MEM_END]
DTIM memory (4MB)	Free memory (4MB - 16KB)
	<- 0x8000_4000
	[FREE_MEM_START]
	earth interface (128B)
	<- 0x8000_3f80
	[GRASS_STACK_TOP]
	earth/grass stack (~8KB)
	\\/\
	<- 0x8000_2000
	[APPS_STACK_TOP]
	grass interface
	app stack (6KB)
	<- 0x8000_0800
	system call args (1KB)
	<- 0x8000_0400
	[SYSCALL_ARG]
	app args (1KB)
	<- 0x8000_0000
	[APPS_ARG]
...	
	<- 0x20c0_0000
	read-only fs w/ dirs & user app elfs (2MB)
	<- 0x20a0_0000
disk image (4MB)	grass elf and sys app elfs (1MB)
	<- 0x2090_0000
	[RESERVED]
	<- 0x2080_0000
boot ROM (4MB)	earth code
	<- 0x2040_0000

"PRIVATE"

kernel\_started

elf-load

cat, ls

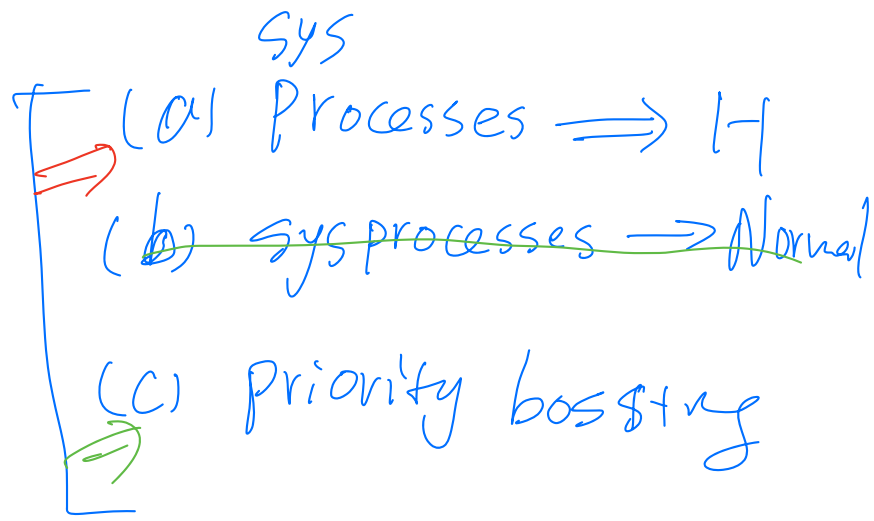
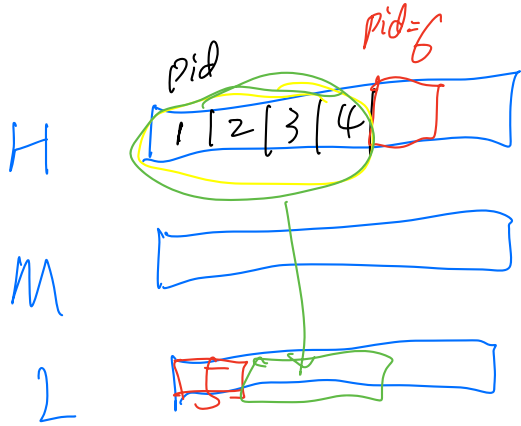
grass 5 pieces

$$\frac{1MB}{8} = 128KB$$

0x20000 Bytes

	<- 0x1001_4000
	UART0 (4KB)
	<- 0x1001_3000
	...
	<- 0x0a00_0000
	[ITIM_END]
	\\/\
	<- 0x0820_4000
	[APPS_ENTRY+APPS_SIZE]
ITIM (32MB)	app code+data (16KB)
	<- 0x0820_0000
	[APPS_ENTRY]
	grass code+data (1 MB)
	<- 0x0810_0000
	[GRASS_ENTRY]
	earth data (1 MB)
	<- 0x0800_0000
	[ITIM_START]
...	
	<- 0x0201_0000
	mtime (8B)
CLINT (64KB)	<- 0x0200_bff8
	mtimecp (8B)
	<- 0x0200_4000
	msip (4B)
	<- 0x0200_0000
LOW MEM ADDR	

# ① MLFQ Starvation

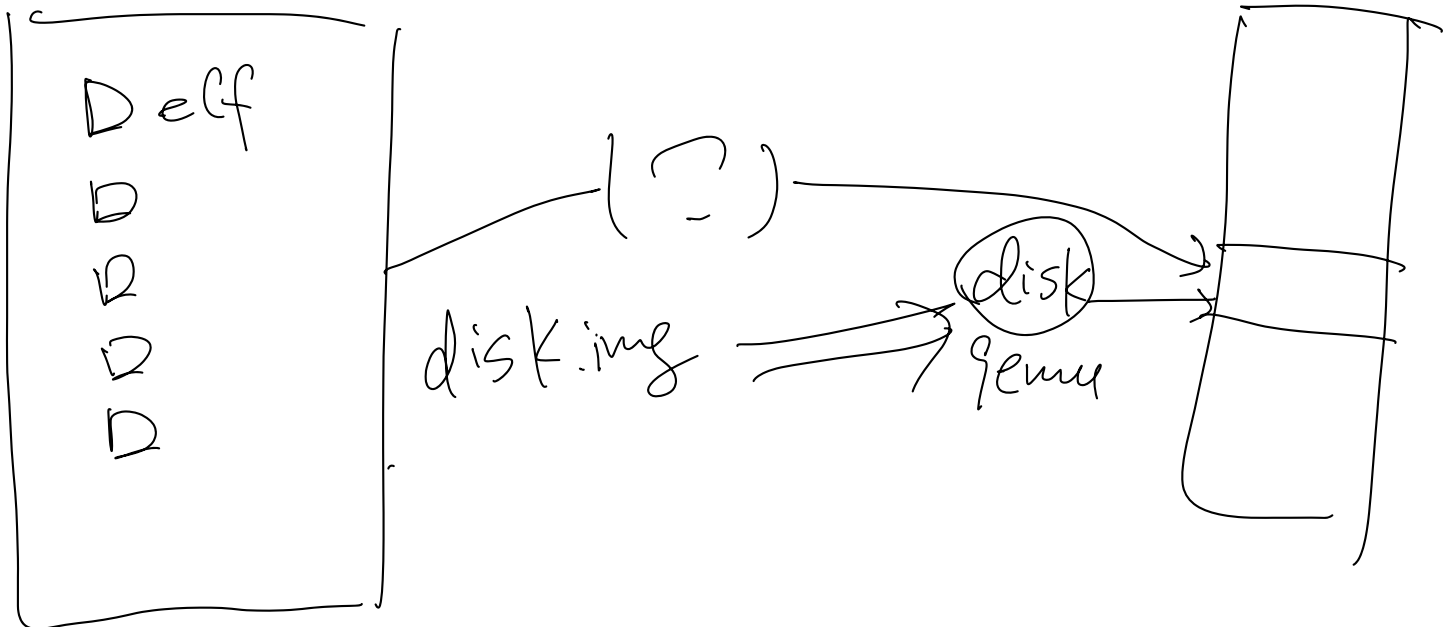


[talk to sys-file]

loop 2 ; (5) (6)

# ② sizes of each component (grass etc)?

build/release



# egos-2k+ booting process

```
1 ----- Simulate on QEMU-RISCV -----
2 cp build/release/earth.elf tools/qemu/qemu.elf
3 riscv64-unknown-elf-objcopy --update-section .image=tools/disk.img
4 tools/qemu/qemu.elf qemu-system-riscv32 -bios none -readconfig
5 tools/qemu/sifive-e31.cfg -kernel tools/qemu/qemu.elf -nographic

6 [CRITICAL] ----- Booting ----- ← qemu
7 [SUCCESS] Finished initializing the tty device
8 [INFO] Use direct mode and put the address of trap_entry() to mtvec
9 [SUCCESS] Finished initializing the CPU interrupts
10 [SUCCESS] Finished initializing the timer function
11 [SUCCESS] Finished initializing the disk device
12 [SUCCESS] Finished initializing the CPU memory management unit
13 [INFO] Grass kernel file size: 0x00002700 bytes
14 [INFO] Grass kernel memory size: 0x00002c88 bytes
15 [CRITICAL] Enter the grass layer
16 [INFO] Load kernel process #1: sys_proc
17 [INFO] App file size: 0x00001330 bytes
18 [INFO] App memory size: 0x00001740 bytes
19 [SUCCESS] Enter kernel process GPID_PROCESS
20 [INFO] Load kernel process #2: sys_file
21 [INFO] App file size: 0x000027c0 bytes
22 [INFO] App memory size: 0x00002814 bytes
23 [SUCCESS] Enter kernel process GPID_FILE
24 [INFO] sys_proc receives: Finish GPID_FILE initialization
25 [INFO] Load kernel process #3: sys_dir
26 [INFO] App file size: 0x00000fb4 bytes
27 [INFO] App memory size: 0x000013bc bytes
28 [SUCCESS] Enter kernel process GPID_DIR
29 [INFO] sys_proc receives: Finish GPID_DIR initialization
30 [INFO] Load kernel process #4: sys_shell
31 [INFO] App file size: 0x000006e0 bytes
32 [INFO] App memory size: 0x000006e0 bytes
33 [CRITICAL] Welcome to the egos-2k+ shell!
34 [INFO] proc 5 died after 0 yields, turnaround time: 0.00,
    response time: 0.00, cputime: 0.00
35 → /home/cs6640
```

↓  
EARTH  
↑

↓  
GRASS

↓  
SYS.PROC

↓  
SHELL

“cd”