

ass4

Q1:

Time	HRRN	FIFO/FCFS	RR	SJF	PRiority
1	A	A	A	A	A
2	A	A	A	A	B
3	A	A	B	A	A
4	A	A	A	A	D
5	B	B	D	B	D
6	D	D	A	D	C
7	D	D	C	D	C
8	C	C	D	C	C
9	C	C	C	C	A
10	C	C	C	C	A
Avg. Turn-around Time	4.5	4.5	4.25	4.5	4.75

Q2:

modify `RR_pick_next` to choose process with the max good value

memory: 0x08800000, [0x80200000, 0x885fffff].

sched class: RR_scheduler

SWAP: manager = fifo swap manager

found proc 1 with good:6

The next proc is pid:1

found proc 2 with good:6

The next proc is pid:2

kernel_execve: pid = 2, name = "ex3".

Breakpoint

main: fork ok, now need to wait pids.

found proc 3 with good:6

The next proc is pid:3

set good 3 for pid 3 at ticks 0

found proc 4 with good:6

The next proc is pid:4

set good 1 for pid 4 at ticks 0

found proc 5 with good:6

The next proc is pid:5

set good 4 for pid 5 at ticks 0

found proc 6 with good:6

The next proc is pid:6

set good 5 for pid 6 at ticks 0

found proc 7 with good:6

The next proc is pid:7

set good 2 for pid 7 at ticks 0

found proc 6 with good:5

The next proc is pid:6

child pid 6, acc 4000001

found proc 2 with good:6

The next proc is pid:2

found proc 5 with good:4

The next proc is pid:5

set good 4 for pid 5 at ticks 0

found proc 5 with good:4



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found proc 5 with good:4
The next proc is pid:5
set good 4 for pid 5 at ticks 0
found proc 5 with good:4
child pid 5, acc 4000001
found proc 2 with good:6
The next proc is pid:2
found proc 3 with good:3
The next proc is pid:3
set good 3 for pid 3 at ticks 0
found proc 3 with good:3
child pid 3, acc 4000001
found proc 2 with good:6
The next proc is pid:2
found proc 7 with good:2
The next proc is pid:7
child pid 7, acc 4000001
found proc 2 with good:6
The next proc is pid:2
found proc 4 with good:1
The next proc is pid:4
child pid 4, acc 4000001
found proc 2 with good:6
The next proc is pid:2
main: wait pids over
found proc 1 with good:6
The next proc is pid:1
found proc 1 with good:6
all user-mode processes have quit.
The end of init_main
kernel panic at kern/process/proc.c:414:
initproc exit.

```

~/g/o/a/ex3 master ±

```

C init.c  U X  C default_sched.c  U  C syscall.c .../syscall  U  C sched.c  U  C syscall.c .../libs  U  C syscall.h  U  C ex3.c  U  C ulib.h  U  C ulib.c  U  C unistd.h  U
kern > init > C init.c > kern_init(void)
6  #include <trap.h>
7  #include <clock.h>
8  #include <intr.h>
9  #include <pmm.h>
10 #include <vm.h>
11 #include <ide.h>
12 #include <swap.h>
13 #include <proc.h>
14 #include <kmonitor.h>
15
16 int kern_init(void) __attribute__((noreturn));
17 int
18 kern_init(void) {
19     extern char edata[], end[];
20     memset(edata, 0, end - edata);
21     cons_init();           // init the console
22
23     const char *message = "OS is loading ...";
24     cprintf("%s\n\n", message);
25
26     pmm_init();           // init physical memory management
27
28     idt_init();           // init interrupt descriptor table
29
30     vm_init();           // init virtual memory management
31     sched_init();
32     proc_init();         // init process table
33
34     ide_init();          // init ide devices
35     swap_init();         // init swap
36
37     // clock_init();      // init clock interrupt
38     intr_enable();       // enable irq interrupt
39
40     cpu_idle();          // run idle process
41
42

```

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C init.c U C default_sched.c U X C syscall.c .../syscall U C sched.c U C syscall.c .../libs U C syscall.h U C ex3.c U C ulib.h U C ulib.c U C unistd.h U
kern > schedule > C default_sched.c > RR_dequeue(run_queue *, proc_struct *)
17 list_add_before(&(rq->run_list), &(proc->run_link));
18 if (proc->time_slice == 0 || proc->time_slice > rq->max_time_slice) {
19     proc->time_slice = rq->max_time_slice;
20 }
21 proc->rq = rq;
22 rq->proc_num ++;
23 }
24
25 static void
26 RR_dequeue(struct run_queue *rq, struct proc_struct *proc) {
27     assert(!list_empty(&(proc->run_link)) && proc->rq == rq);
28     list_del_init(&(proc->run_link));
29     rq->proc_num --;
30
31
32 static struct proc_struct *
33 RR_pick_next(struct run_queue *rq) {
34     const list_entry_t *start = &(rq->run_list);
35     list_entry_t *max = NULL;
36     list_entry_t *le = start->next;
37     while (le && le != start) {
38         if (!max) {
39             max = le;
40         }
41         else if (le2proc(le, run_link)->labschedule_good > le2proc(max, run_link)->labschedule_good) {
42             max = le;
43         }
44         le = list_next(le);
45     }
46     if (max) {
47         cprintf("found proc %d with good:%d\n", le2proc(max, run_link)->pid, le2proc(max, run_link)->labschedule_good);
48     }
49     return NULL;
50 }
51
52 return le2proc(max, run_link);
53
54 static void
55 RR_proc_tick(struct run_queue *rq, struct proc_struct *proc) {
56     if (proc->time_slice > 0) {
57         proc->time_slice --;
58     }
59     if (proc->time_slice == 0) {
60         proc->need_resched = 1;
61     }
62 }
63
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```

```
C init.c U C default_sched.c U C syscall.c .../syscall U X C sched.c U C syscall.c .../libs U C syscall.h U C ex3.c U C ulib.h U C ulib.c U C unistd.h U
kern > syscall > C syscall.c > sys_set_good(uint64_t[])
55 static int
56 sys_putc(uint64_t arg[]) {
57     int c = (int)arg[0];
58     cputc(c);
59     return 0;
60 }
61
62 static int sys_gettime(uint64_t arg[]) {
63     return (int)ticks*10;
64 }
65
66 static int sys_set_good(uint64_t arg[]) {
67     uint32_t good = (uint32_t)arg[0];
68     assert(current!=NULL);
69     current->labschedule_good = good;
70     cprintf("set good %d for pid %d at ticks %d\n", good, current->pid, ticks);
71     current->need_resched = 1;
72     schedule();
73     return 0;
74
75
76 static int (*syscalls[]) (uint64_t arg[]) = {
77     [SYS_exit] sys_exit,
78     [SYS_fork] sys_fork,
79     [SYS_wait] sys_wait,
80     [SYS_exec] sys_exec,
81     [SYS_yield] sys_yield,
82     [SYS_kill] sys_kill,
83     [SYS_getpid] sys_getpid,
84     [SYS_putc] sys_putc,
85     [SYS_gettime] sys_gettime,
86     [SYS_set_good] sys_set_good,
87 };
88
89 #define NUM_SYSCALLS ((sizeof(syscalls) / (sizeof(syscalls[0])))
90
91 void
92 syscall(void) {
93     struct trapframe *tf = current->tf;
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C init.c U X C default_sched.c U C syscall.c ../syscall U C sched.c U C syscall.c ../libs U C syscall.h U X C ex3.c U C ulib.h U C ulib.c U C unistd.h U
user > libs > C syscall.h > set_good(uint32_t)
1 #ifndef __USER_LIBS_SYSCALL_H__
2 #define __USER_LIBS_SYSCALL_H__
3
4 int sys_exit(int64_t error_code);
5 int sys_fork(void);
6 int sys_wait(int64_t pid, int *store);
7 int sys_yield(void);
8 int sys_kill(int64_t pid);
9 int sys_getpid(void);
10 int sys_putc(int64_t c);
11 int sys_gettime(void);
12 int sys_set_good(uint32_t good);
13
14
15 #endif /* !__USER_LIBS_SYSCALL_H__ */
16
17
```

```
C init.c U C default_sched.c U C syscall.c ../syscall U C sched.c U C syscall.c ../libs U C syscall.h U C ex3.c U C ulib.h U X C ulib.c U C unistd.h U
user > libs > C ulib.h > set_good(uint32_t)
1 #ifndef __USER_LIBS_ULIB_H__
2 #define __USER_LIBS_ULIB_H__
3
4 #include <defs.h>
5
6 void __warn(const char *file, int line, const char *fmt, ...);
7 void __noreturn __panic(const char *file, int line, const char *fmt, ...);
8
9 #define warn(...) \
10 __warn(__FILE__, __LINE__, __VA_ARGS__)
11
12 #define panic(...) \
13 __panic(__FILE__, __LINE__, __VA_ARGS__)
14
15 #define assert(x) \
16 do { \
17     if (!(x)) { \
18         panic("assertion failed: %s", #x); \
19     } while (0)
20
21 // static_assert(x) will generate a compile-time error if 'x' is false.
22 #define static_assert(x) \
23 switch (x) { case 0: case (x): ; }
24
25 void __noreturn exit(int error_code);
26 int fork(void);
27 int wait(void);
28 int waitpid(int pid, int *store);
29 void yield(void);
30 int kill(int pid);
31 int getpid(void);
32 unsigned int gettime_msec(void);
33 void set_good(uint32_t good);
34
35
36 #endif /* !__USER_LIBS_ULIB_H__ */
37
38
```

```
C init.c U C default_sched.c U C syscall.c ../syscall U C sched.c U C syscall.c ../libs U C syscall.h U C ex3.c U C ulib.h U C ulib.c U X C unistd.h U
user > libs > C ulib.c > gettime_msec(void)
37 }
38
39 int
40 getpid(void) {
41     return sys_getpid();
42 }
43
44 unsigned int
45 gettime_msec(void) {
46     return (unsigned int)sys_gettime();
47 }
48
49 void set_good(uint32_t good){
50     sys_set_good(good);
51 }
52
```

```
C init.c U C default_sched.c U X C syscall.c ../syscall U C sched.c U C syscall.c ../libs U C syscall.h U C ex3.c U C ulib.h U C ulib.c U C unistd.h U X
libs > C unistd.h > SYS_set_good
1 #ifndef __LIBS_UNISTD_H__
2 #define __LIBS_UNISTD_H__
3
4 #define T_SYSCALL 0x80
5
6 /* syscall number */
7 #define SYS_exit 1
8 #define SYS_fork 2
9 #define SYS_wait 3
10 #define SYS_exec 4
11 #define SYS_clone 5
12 #define SYS_yield 10
13 #define SYS_sleep 11
14 #define SYS_kill 12
15 #define SYS_gettime 17
16 #define SYS_getpid 18
17 #define SYS_brk 19
18 #define SYS_mmap 20
19 #define SYS_munmap 21
20 #define SYS_shmem 22
21 #define SYS_putc 30
22 #define SYS_pgid 31
23 #define SYS_set_good 254
24 /*only for labschedule*/
25 #define SYS_labschedule_set_priority 255
26
27 /* SYS_fork flags */
28 #define CLONE_VM 0x00000100 // set if VM shared between processes
29 #define CLONE_THREAD 0x00000200 // thread group
30
31 #endif /* !__LIBS_UNISTD_H__ */
32
33
```

