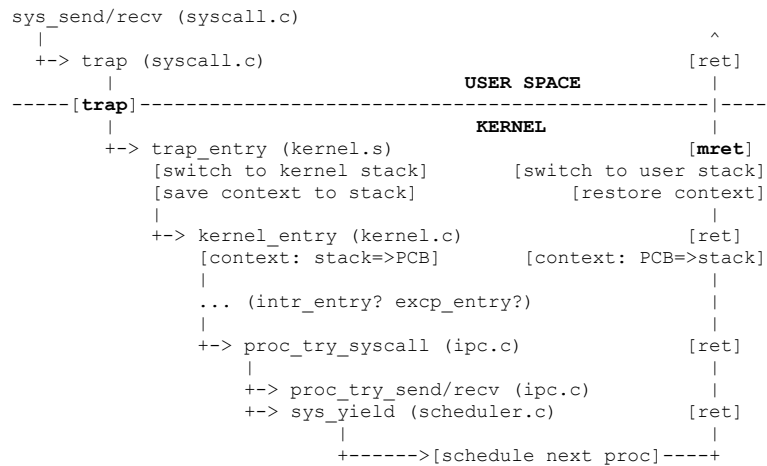


CS6640 Week 05b

1. egos-2k+ syscall workflow



2. Trap to kernel (grass/kernel.s)

trap_entry:

```

/*
 * A. switch to the kernel stack.
 * B. save all the registers on the kernel stack.
 * C. call kernel_entry().
 * D. restore all the registers.
 * E. switch back to the process stack.
 * F. mret, returning to the process context. */

/* A */
csw mscratch, sp
li sp, 0x80200000

/* B */
addi sp, sp, -128 /* now, sp == EGOS_STACK_TOP-32*4 */
sw a0, 0(sp)
...
sw a7, 28(sp)
sw t0, 32(sp)
...
sw t6, 56(sp)
sw s0, 60(sp)
...
sw s11, 104(sp)
sw ra, 108(sp)
sw gp, 112(sp)
sw tp, 116(sp)
csrr t0, mscratch /* Step-A has written sp to mscratch */
sw t0, 120(sp) /* t0 holds the value of the old sp before trap_entry */

/* C */
call kernel_entry

/* D */
lw a0, 0(sp)
...
lw a7, 28(sp)
lw t0, 32(sp)
...
lw t6, 56(sp)
lw s0, 60(sp)
lw s1, 64(sp)
...
lw s11, 104(sp)
lw ra, 108(sp)
lw gp, 112(sp)
lw tp, 116(sp)

/* E */
li sp, 120(sp)

/* F */
mret

```

3. Trap reason table

Interrupt	Exception Code	Description
1	0	<i>Reserved</i>
1	1	Supervisor software interrupt
1	2	<i>Reserved</i>
1	3	Machine software interrupt
1	4	<i>Reserved</i>
1	5	Supervisor timer interrupt
1	6	<i>Reserved</i>
1	7	Machine timer interrupt
1	8	<i>Reserved</i>
1	9	Supervisor external interrupt
1	10	<i>Reserved</i>
1	11	Machine external interrupt
1	12–15	<i>Reserved</i>
1	≥ 16	<i>Designated for platform use</i>
0	0	Instruction address misaligned
0	1	Instruction access fault
0	2	Illegal instruction
0	3	Breakpoint
0	4	Load address misaligned
0	5	Load access fault
0	6	Store/AMO address misaligned
0	7	Store/AMO access fault
0	8	Environment call from U-mode
0	9	Environment call from S-mode
0	10	<i>Reserved</i>
0	11	Environment call from M-mode
0	12	Instruction page fault
0	13	Load page fault
0	14	<i>Reserved</i>
0	15	Store/AMO page fault
0	16–23	<i>Reserved</i>
0	24–31	<i>Designated for custom use</i>
0	32–47	<i>Reserved</i>
0	48–63	<i>Designated for custom use</i>
0	≥ 64	<i>Reserved</i>