Lab4 Practice Report

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1

`ebreak` 触发一个断点中断。当中断触发后，系统首先捕捉到中断信号，然后进行现场保护，寄存器储存当前状态。然后cpu会寻找stvec寄存器 (中断向量表基址)中的值，然后跳转到这个位置进行中断处理。此程序再根据中断或异常的不同类型来处理，最后回到中断发生的现场继续执行。

2

epc寄存器为异常返回地址寄存器，在异常发生时它会记录触发中断的那条指令的地址，处理异常时，用于存储异常处理完后应该跳回的地址。

3


```
135
136 void exception_handler(struct trapframe *tf) {
137     switch (tf->cause) {
138         case CAUSE_MISALIGNED_FETCH:
139             break;
140         case CAUSE_FAULT_FETCH:
141             break;
142         case CAUSE_ILLEGAL_INSTRUCTION:
143             cprintf("illegal instruction: 0x%016llx\n",*(int *)tf->epc);
144             tf->epc += 4;
145             break;
146         case CAUSE_BREAKPOINT:
147             cprintf("ebreak caught at 0x%016llx\n", tf->epc);
148             tf->epc += 2;
149             break;
150         case CAUSE_MISALIGNED_LOAD:
151             break;
```

Open | init.c ~/oslab/lab4/lab/kern/init | Save

trap.c | init.c

```
 7 #include <pmm.h>
 8 #include <riscv.h>
 9 #include <stdio.h>
10 #include <string.h>
11 #include <trap.h>
12
13 int kern_init(void) __attribute__((noreturn));
14 void grade_backtrace(void);
15 static void lab1_switch_test(void);
16
17 int kern_init(void) {
18     extern char edata[], end[];
19     memset(edata, 0, end - edata);
20
21     const char *message = "os is loading ...\n";
22     cputs(message);
23
24     idt_init();
25     intr_enable();
26     asm volatile("mret"::);
27
28
29     // clock_init();
30     // ----------start-------------
```

os12011702@vmos-tony: ~/oslab/lab4/lab

```
+ ld bin/kernel
riscv64-unknown-elf-objcopy bin/kernel --strip-all -O binary bin/ucore.bin

OpenSBI v0.6
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Platform Name          : QEMU Virt Machine
Platform HART Features : RV64ACDFIMSU
Platform Max HARTs     : 8
Current Hart           : 0
Firmware Base          : 0x80000000
Firmware Size          : 120 KB
Runtime SBI Version    : 0.2

MIDELEG : 0x0000000000000222
MEDELEG : 0x000000000000b109
PMP0    : 0x0000000080000000-0x000000008001ffff (A)
PMP1    : 0x0000000000000000-0xffffffffffffffff (A,R,W,X)
os is loading ...

illegal instruction: 0x0000000030200073
```