MITx 6.004.3x
Computation Structures 3: Computer Organization

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LE18.1

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LE18.1.1: ReadKey() SVC
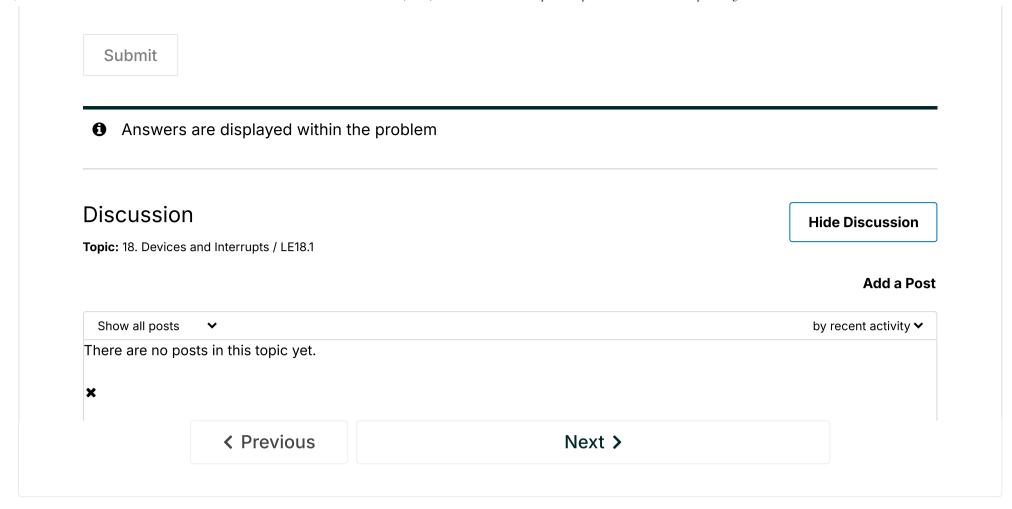
0.0/1.0 point (ungraded)

Les Smart, a summer intern at Beta Co., has managed to delete some lines from the source for the ReadKey supervisor call. You remember that ReadKey returns the next character from the keyboard buffer in R0 but that the instruction following the ReadKey isn't executed until a character is available. Please help Les out by adding the appropriate lines below. Les hopes your code will have good CPU utilization and reminds you that the user's register "j" can be accessed at UserMState.Regs[j]. Select the correct choice of instructions to include in the **if** and **else** clauses of the ReadKEY_h() stub shown below. Make sure to include all the required instructions. Assume that the selected instructions are executed in the order they appear.

```
ReadKEY_h() {
  int kbdnum = ProcTbl[Cur].DPYNum;
  if (BufferEmpty(kbdnum)) {
    // if clause code

  } else {
    int ch = ReadInputBuffer(kbdnum);
    // else clause code

  }
}
```

if clause code (select all that apply):

- [ ] R0 = ch;

- [ ] UserMState.Regs[0] = ch;

- [ ] UserMState.Regs[XP] = UserMState.Regs[XP] - 4; ✔

- [ ] UserMState.Regs[LP] = UserMState.Regs[LP] - 4;

- [ ] Scheduler(); ✔

else clause code (select all that apply):

- [ ] R0 = ch;

- [ ] UserMState.Regs[0] = ch; ✔

- [ ] UserMState.Regs[XP] = UserMState.Regs[XP] - 4;

- [ ] UserMState.Regs[LP] = UserMState.Regs[LP] - 4;

- [ ] Scheduler();

Explanation

In order to have good CPU utilization, if keyboard buffer is empty, then we want to retry the ReadKEY supervisor call after letting other processes run. This is achieved by decrementing the UserMState.Regs[XP] register by 4 and calling Scheduler() in the if clause.

Once a character is available, then we want to return it in register UserMState.Regs[R0] and go back to the waiting process.

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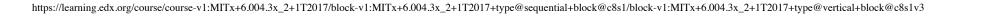
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