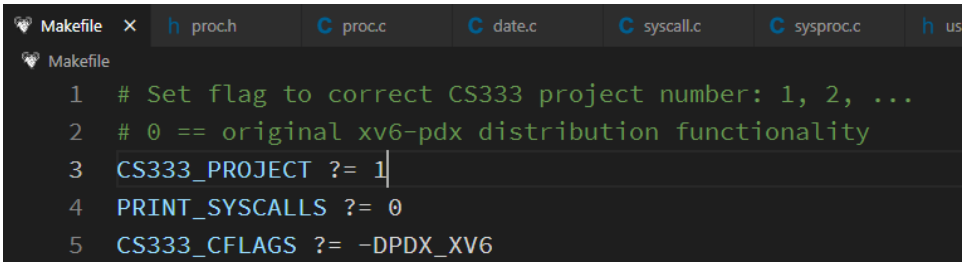
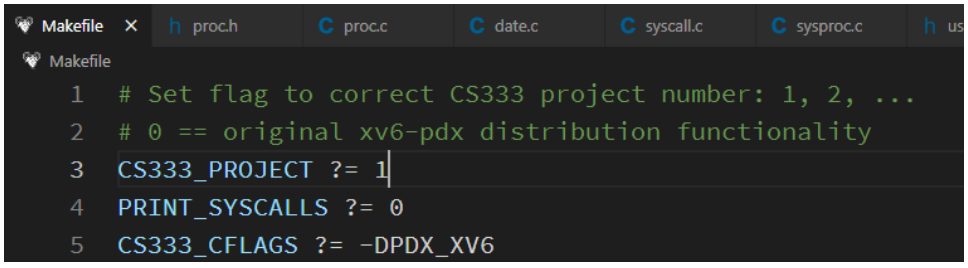
1. Compilation Test
   Makefile (line 3)
   a. Sebelum Perubahan

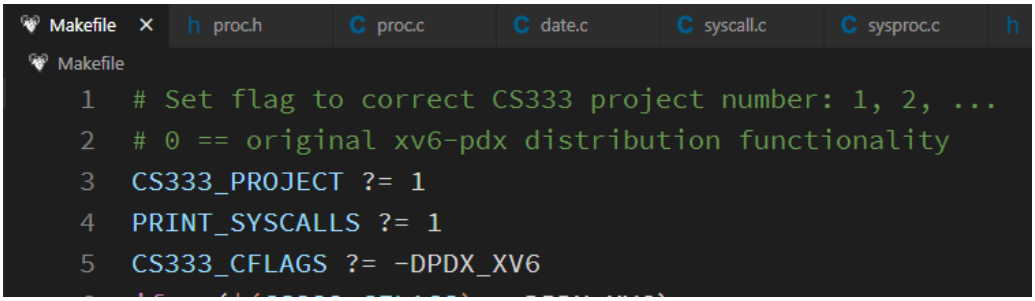
   b. Setelah Perubahan



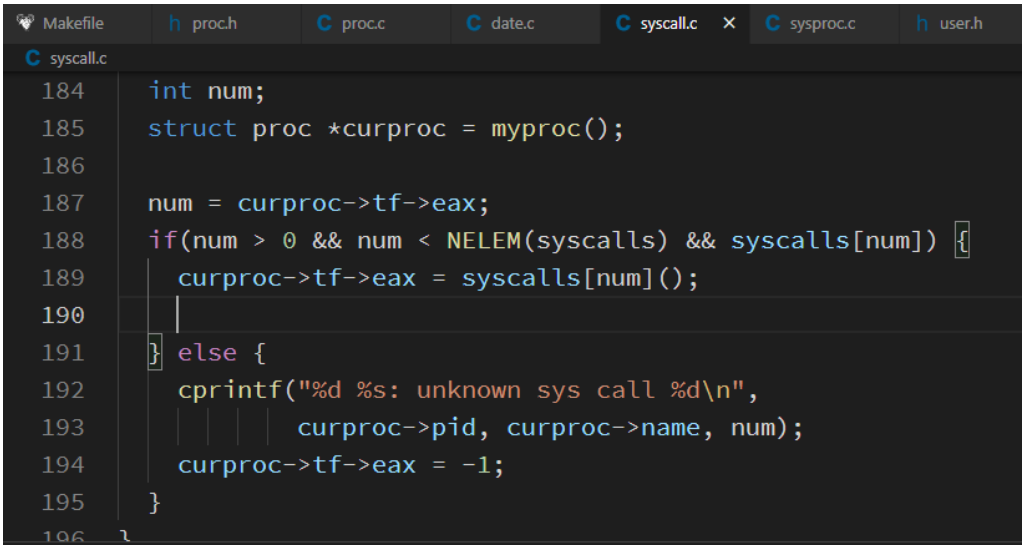
2. System Call Tracing
   - Makefile (line 4)
     a) Sebelum Perubahan



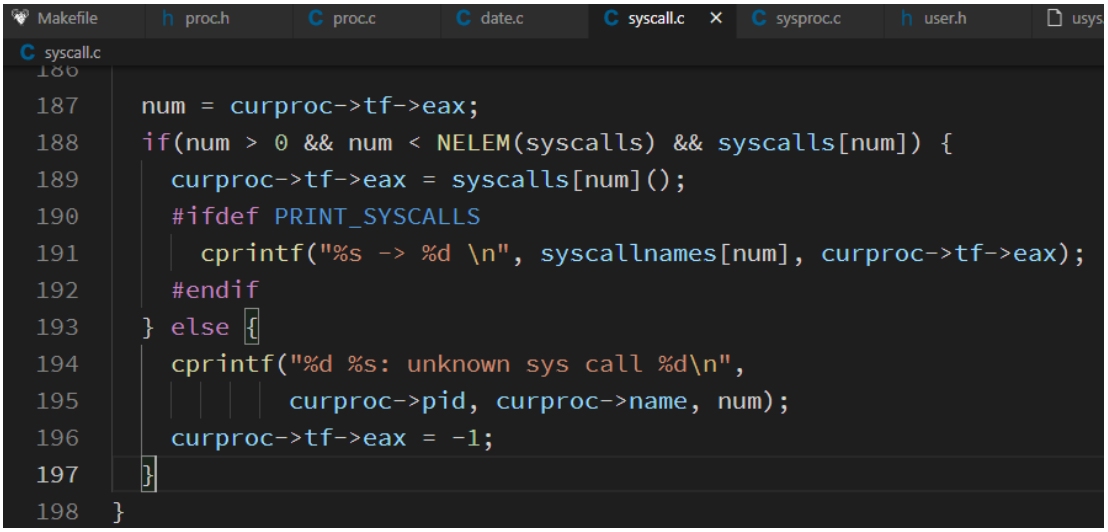
     b) Setelah Perubahan



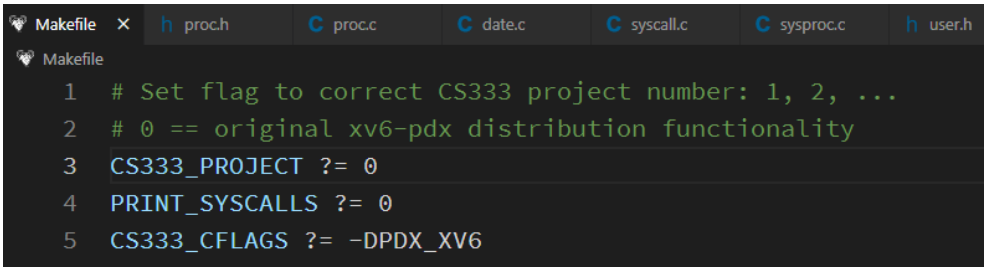
- Syscall.c (line 190 – 192)
  a) Sebelum Perubahan



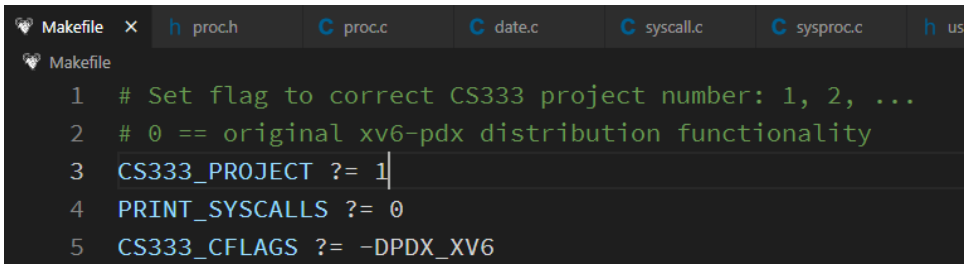
  b) Setelah Perubahan



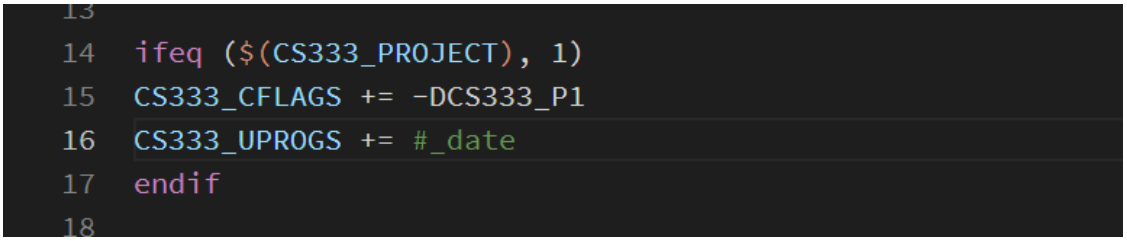
3. Conditional Compilation
   - Makefile
     a) Pada saat CS333_PROJECT ?= 0



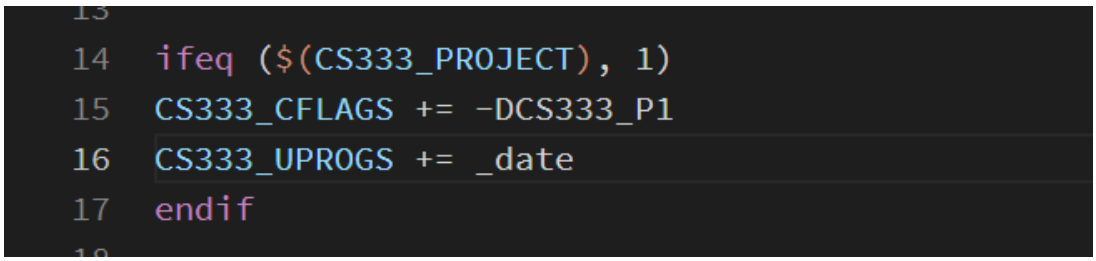
b) Pada saat CS333_PROJECT ?= 1



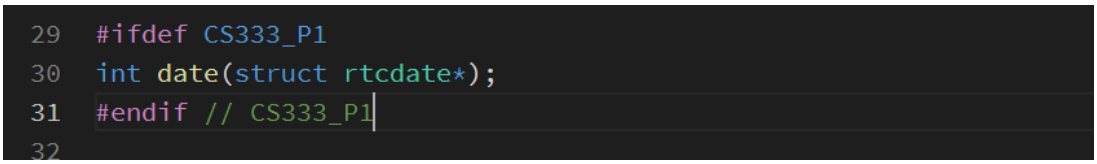
4. Date System Call
   - Makefile (line 16)
     a) Sebelum Perubahan



     b) Setelah perubahan



   - user.h (penambahan pada line 29-31)



- usys.S (Penambahan SYSCALL(date) pada line 33)

```
23  SYSCALL(fstat)
24  SYSCALL(link)
25  SYSCALL(mkdir)
26  SYSCALL(chdir)
27  SYSCALL(dup)
28  SYSCALL(getpid)
29  SYSCALL(sbrk)
30  SYSCALL(sleep)
31  SYSCALL(uptime)
32  SYSCALL(halt)
33  SYSCALL(date)
34
```

- syscall.h (Penambahan (#define SYS_date SYS_halt+1) pada line 24)

```
15  #define SYS_uptime  SYS_sleep+1
16  #define SYS_open    SYS_uptime+1
17  #define SYS_write   SYS_open+1
18  #define SYS_mknod   SYS_write+1
19  #define SYS_unlink  SYS_mknod+1
20  #define SYS_link    SYS_unlink+1
21  #define SYS_mkdir   SYS_link+1
22  #define SYS_close   SYS_mkdir+1
23  #define SYS_halt    SYS_close+1
24  #define SYS_date    SYS_halt+1
25  // student system calls begin here. Follow the existing pattern.
26
```

- syscall.c
  a) menambahkan SYS_date pada line 141 - 143

```
135  [SYS_close]   sys_close,
136  #ifdef PDX_XV6
137  [SYS_halt]    sys_halt,
138  #endif // PDX_XV6
139
140  //Adding new SYS_date
141  #ifdef CS333_P1
142    [SYS_date]  sys_date,
143  #endif // CS333_P1
144
145  };
146
```

  b) Menambahkan SYS_date pada line 175 - 177

```
168    [SYS_mkdir]   "mkdir",
169    [SYS_close]   "close",
170  #ifdef PDX_XV6
171    [SYS_halt]    "halt",
172  #endif // PDX_XV6
173
174  //Adding new SYS_date
175  #ifdef CS333_P1
176    [SYS_date]  "date",
177  #endif // CS333_P1
178  };
179  #endif // PRINT_SYSCALLS
180
```

- sysproc.c (menambahkan fungsi sys_date(void) pada line 101 - 112)

```
101  int
102  sys_date(void)
103  {
104    struct rtcdate *d;
105
106    if(argptr(0, (void*)&d, sizeof(struct rtcdate)) < 0)
107      return -1;
108    else{
109      cmostime(d);
110      return 0;
111    }
112  }
113
```

5. Process Information
   - proc.h (menambahkan uint stary_tricks; pada line 52)

```
43   uint pid;                  // Process ID
44   struct proc *parent;       // Parent process. NULL indicates no parent
45   struct trapframe *tf;      // Trap frame for current syscall
46   struct context *context;   // swtch() here to run process
47   void *chan;                // If non-zero, sleeping on chan
48   int killed;                // If non-zero, have been killed
49   struct file *ofile[NOFILE];  // Open files
50   struct inode *cwd;         // Current directory
51   char name[16];             // Process name (debugging)
52   uint start_ticks;
53 };
54
```

   - proc.c

     a) line 152

```
144   sp -= 4;
145   *(uint*)sp = (uint)trapret;
146
147   sp -= sizeof *p->context;
148   p->context = (struct context*)sp;
149   memset(p->context, 0, sizeof *p->context);
150   p->context->eip = (uint)forkret;
151
152   p -> start_ticks = ticks;
153
154   return p;
155 }
156
```

b) Line 568 - 584

```
564  #elif defined(CS333_P1)
565  void
566  procdumpP1(struct proc *p, char *state_string)
567  {
568    int digunakan_s;
569    int digunakan_ms = ticks - (p -> start_ticks);
570    digunakan_s = digunakan_ms/1000;
571    digunakan_ms = digunakan_ms % 1000;
572
573    char* mulai= "";
574    if(digunakan_ms < 100 && digunakan_ms > 10){
575      mulai = "0";
576    }
577    if(digunakan_ms < 10){
578      mulai = "00";
579    }
580
581    cprintf("%d\t%s\t%s%d.%s%d\t%s\t%d\t",
582    p->pid, p->name, "     ",
583    digunakan_s, mulai, digunakan_ms,
584    states[p->state], p->sz);
585    return;
586  }
587  #endif
588
```