Homework 8

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Exercise 1

针对以下 C 程序及其汇编代码: 补全下划线部分的 C 语句或汇编代码

```
cmpl
                                                      $0, 8(%ebp)
int test(int i, int j)
                                              jе
                                                       .L4
{
                                                      $20, 8(%ebp)
                                              cmpl
    int score;
                                              jg
                                                       .L3
                                          .L4:
        score = 100;
                                                      $100, 8(%ebp)
                                              cmpl
    else
                                                       .L3
                                              jg
                                                      $99, 12(%ebp)
                                              cmpl
        score = 60;
                                              jle
                                                       .L2
    return score;
                                              cmpl
                                                      $40, 8(%ebp)
}// C 程序
                                              jg
                                                       .L2
                                                      $20, 12(%ebp)
                                              cmpl
.text
                                              jle
                                                       .L3
.globl test
                                                      $-10, 8(%ebp)
                                              cmpl
           test, Ofunction
    .type
                                              jge
                                                       .L3
test:
                                                       .L2
                                              jmp
            %ebp
    pushl
                                          .L3:
            %esp, %ebp
    movl
                                                      $100, -4(%ebp)
                                              movl
                                              jmp
                                                       .L5
            8(%ebp), %eax
    movl
                                          .L2:
            12(%ebp), %eax
    cmpl
                                                      $60, -4(\%ebp)
                                              movl
    jle
            .L4
                                          .L5:
            $0, 12(%ebp)
    cmpl
            .L4
    jе
                                              leave
            $10, 12(%ebp)
    cmpl
                                              ret
    jle
            .L4
```

解 补全后的代码如下

```
.text
                                          .globl test
                                                       test, @function
                                               .type
                                          test:
                                              pushl
                                                       %ebp
                                                       %esp, %ebp
                                              movl
                                               subl
                                                       $16, %esp
                                                       8(%ebp), %eax
                                              movl
                                                       12(%ebp), %eax
                                               cmpl
                                                       .L4
                                               jle
                                                       $0, 12(%ebp)
                                               cmpl
                                               jе
                                                       .L4
                                                       $10, 12(%ebp)
                                               cmpl
int test(int i, int j)
                                                       .L4
                                               jle
                                                       $0, 8(%ebp)
                                               cmpl
    int score;
                                                       .L4
                                               jе
                                                       $20, 8(%ebp)
    if(i > j && j != 0 && j > 10 &&
                                               cmpl
                                                       .L3
                                               jg
        i != 0 && i > 20 || i > 100 ||
                                          .L4:
        (j >= 100 && i <= 40) &&
                                                       $100, 8(%ebp)
                                               cmpl
        (j \le 20 \mid | i \ge -10))
                                                       .L3
                                               jg
        score = 100;
                                                       $99, 12(%ebp)
                                               cmpl
    else
                                               jle
                                                       .L2
        score = 60;
                                                       $40, 8(%ebp)
                                               cmpl
                                                       .L2
                                               jg
    return score;
                                                       $20, 12(%ebp)
                                               cmpl
}// C 程序
                                                       .L3
                                               jle
                                                       $-10, 8(%ebp)
                                               cmpl
                                                       .L3
                                               jge
                                                       .L2
                                               jmp
                                          .L3:
                                                       $100, -4(%ebp)
                                               movl
                                               jmp
                                                       .L5
                                          .L2:
                                               movl
                                                       $60, -4(\%ebp)
                                          .L5:
                                                       -4(%ebp), %eax
                                               movl
                                               leave
                                               ret
```

Exercise 2

给出生成如下 C 风格for语句中间代码的翻译方案; 假定代码生成的顺序不变。

```
S \rightarrow \text{for}(E_1; E_2; E_3) S_1
                                                     据此给出一个翻译方案如下
解 首先给出中间代码的结构
                                                 S \rightarrow \text{for}(E_1; M_1 E_2; M_2 E_3) N S_1
                                                           emit('goto', M_2.next);
                                                           backpatch(E_2.truelist, N.next);
                                                           backpatch(S_1.nextlist, M_2.next);
                                                           backpatch(N.nextlist, M_1.next);
     E_1
                                                           S.\mathtt{nextlist} = E_2.\mathtt{falselist};
L1: if E_2 goto L3
                                                       }
L2: E_3
                                                M \to \varepsilon
    goto L1
L3: S_1
                                                       { M.next = nextstmt;} }
    goto L2
                                                 N \to \varepsilon
                                                       {
                                                           N.nextlist = makelist(nextstmt);
                                                           emit('goto');
                                                           N.\mathtt{next} = \mathtt{nextstmt};
                                                       }
```