Homework 8

PB17000297 罗晏宸

November 6 2019

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

```
int test(int i, int j)
{
    int score;
    if(_________________)
        score = 100;
    else
        score = 60;
    return score;
}// C 程序
```

```
.text
.globl  test
    .type   test, @function
test:
    pushl   %ebp
    movl    %esp, %ebp
    ___________________
    movl    8(%ebp), %eax
    cmpl    12(%ebp), %eax
    jle     .L4
    cmpl    $0, 12(%ebp)
    je      .L4
    cmpl    $10, 12(%ebp)
    jle     .L4
    cmpl    $0, 8(%ebp)
    je      .L4
    cmpl    $20, 8(%ebp)
    jg      .L3
.L4:
    cmpl    $100, 8(%ebp)
    jg      .L3
    cmpl    $99, 12(%ebp)
    jle     .L2
    cmpl    $40, 8(%ebp)
    jg      .L2
    cmpl    $20, 12(%ebp)
    jle     .L3
    cmpl    $-10, 8(%ebp)
    jge     .L3
    jmp     .L2
.L3:
    movl    $100, -4(%ebp)
    jmp     .L5
.L2:
    movl    $60, -4(%ebp)
.L5:
    _____________
    leave
    ret
```

解 补全后的代码如下

```
int test(int i, int j)
{
    int score;
    if(i > j && j != 0 && j > 10 &&
        i != 0 && i > 20 || i > 100 ||
        (j >= 100 && i <= 40) &&
        (j <= 20 || i >= -10))
         score = 100;
    else
         score = 60;
    return score;
}// C 程序
```

```
.text
.globl  test
    .type   test, @function
test:
    pushl   %ebp
    movl    %esp, %ebp
    subl    $16, %esp
    movl    8(%ebp), %eax
    cmpl    12(%ebp), %eax
    jle     .L4
    cmpl    $0, 12(%ebp)
    je      .L4
    cmpl    $10, 12(%ebp)
    jle     .L4
    cmpl    $0, 8(%ebp)
    je      .L4
    cmpl    $20, 8(%ebp)
    jg      .L3
.L4:
    cmpl    $100, 8(%ebp)
    jg      .L3
    cmpl    $99, 12(%ebp)
    jle     .L2
    cmpl    $40, 8(%ebp)
    jg      .L2
    cmpl    $20, 12(%ebp)
    jle     .L3
    cmpl    $-10, 8(%ebp)
    jge     .L3
    jmp     .L2
.L3:
    movl    $100, -4(%ebp)
    jmp     .L5
.L2:
    movl    $60, -4(%ebp)
.L5:
    movl    -4(%ebp), %eax
    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。

$$S \to \texttt{for(}E_1\texttt{;}\ E_2\texttt{;}\ E_3\texttt{)}\ S_1$$

解 首先给出中间代码的结构

```
    E1
L1: if E2 goto L3
L2: E3
    goto L1
L3: S1
    goto L2
```

据此给出一个翻译方案如下

$S \to$ `for(`E_1`;` M_1 E_2`;` M_2 E_3`)` N S_1

```
{
    emit('goto', M2.next);
    backpatch(E2.truelist, N.next);
    backpatch(S1.nextlist, M2.next);
    backpatch(N.nextlist, M1.next);
    S.nextlist = E2.falselist;
}
```

$M \to \varepsilon$

```
{ M.next = nextstmt; }
```

$N \to \varepsilon$

```
{
    N.nextlist = makelist(nextstmt);
    emit('goto');
    N.next = nextstmt;
}
```