



< Previous	✓	✓	✓	✓	✓	✓	✓	✓	Next >
------------	---	---	---	---	---	---	---	---	--------

LE12.2

🔖 Bookmark this page

LE12.2.1 Compiling a Procedure

4/4 points (ungraded)

You are given the following listing of a C program and its translation to Beta assembly code:

```
int ones(int x) {
    int lowbit = x & 1;    // low bit of x
    int rest = x >> 1;    // shift other bits right
    if (x == 0) return 0;
    else return ones(rest)+lowbit
}
```

```
[01]  ones:  PUSH(LP)
[02]          PUSH(BP)
[03]          MOVE(SP, BP)
[04]          ALLOCATE(2)
[05]          PUSH(R1)
[06]          LD(BP, -12, R0)
[07]          ANDC(R0, 1, R1)
[08]          ST(R1, 0, BP)
[09]          SHRC(R0, 1, R1)
[10]          ST(R1, 4, BP)
[11]          BEQ(R0, lab1)
[12]          LD(BP, 4, R1)
[13]          PUSH(R1)
[14]          BR(ones, LP)
[15]          DEALLOCATE(1)
[16]          LD(BP, 0, R1)
[17]          ADD(R0, R1, R0)
[18]  lab1:  POP(R1)
[19]          MOVE(BP, SP)
[20]          POP(BP)
[21]          POP(LP)
[22]          JMP(LP)
```

(A) Which line(s) of assembly language form the entry sequence? Include code responsible for allocating local variables and saving the values of registers used in the body of the procedure. Check all the applicable lines.

☒ [01] ones:PUSH(LP)

☒ [02] PUSH(BP)

☒ [03] MOVE(SP, BP)

☒ [04] ALLOCATE(2)

☒ [05] PUSH(R1)

☐ [06] LD(BP, -12, R0)

☐ [07] ANDC(R0, 1, R1)

☐ [08] ST(R1, 0, BP)

☐ [09] SHRC(R0, 1, R1)

☐ [10] ST(R1, 4, BP)

☐ [11] BEQ(R0, lab1)

☐ [12] LD(BP, 4, R1)

☐ [13] PUSH(R1)

☐

[14] BR(ones, LP)

☐

[15] DEALLOCATE(1)

☐

[16] LD(BP, 0, R1)

☐

[17] ADD(R0, R1, R0)

☐

[18] lab1:POP(R1)

☐

[19] MOVE(BP, SP)

☐

[20] POP(BP)

☐

[21] POP(LP)

☐

[22] JMP(LP)



(B) Which line(s) of assembly language form the exit sequence? Include code responsible restoring values saved by the entry sequence. Check all the applicable lines.

☐

[01] ones:PUSH(LP)

☐

[02] PUSH(BP)

☐

[03] MOVE(SP, BP)

☐

[04] ALLOCATE(2)

☐

[05] PUSH(R1)

☐

[06] LD(BP, -12, R0)

☐

[07] ANDC(R0, 1, R1)

☐

[08] ST(R1, 0, BP)

☐

[09] SHRC(R0, 1, R1)

☐

[10] ST(R1, 4, BP)

☐

[11] BEQ(R0, lab1)

☐

[12] LD(BP, 4, R1)

☐

[13] PUSH(R1)

☐

[14] BR(ones, LP)

☐

[15] DEALLOCATE(1)

☐

[16] LD(BP, 0, R1)

☐

[17] ADD(R0, R1, R0)

☒ [18] lab1:POP(R1)

☒ [19] MOVE(BP, SP)

☒ [20] POP(BP)

☒ [21] POP(LP)

☒ [22] JMP(LP)



(C) Which line(s) of assembly language were generated when compiling the recursive call ones(rest). Check all the applicable lines.

☐ [01] ones:PUSH(LP)

☐ [02] PUSH(BP)

☐ [03] MOVE(SP, BP)

☐ [04] ALLOCATE(2)

☐ [05] PUSH(R1)

☐ [06] LD(BP, -12, R0)

☐ [07] ANDC(R0, 1, R1)

☐ [08] ST(R1, 0, BP)

☐ [09] SHRC(R0, 1, R1)

☐ [10] ST(R1, 4, BP)

☐ [11] BEQ(R0, lab1)

☒ [12] LD(BP, 4, R1)

☒ [13] PUSH(R1)

☒ [14] BR(ones, LP)

☒ [15] DEALLOCATE(1)

☐ [16] LD(BP, 0, R1)

☐ [17] ADD(R0, R1, R0)

☐ [18] lab1:POP(R1)

☐ [19] MOVE(BP, SP)

☐ [20] POP(BP)

☐ [21] POP(LP)

☐ [22] JMP(LP)



(D) Which line(s) of assembly language were generated when compiling the statement "lowbit = x & 1;" Check all the applicable lines.

☐ [01] ones:PUSH(LP)

☐ [02] PUSH(BP)

☐ [03] MOVE(SP, BP)

☐ [04] ALLOCATE(2)

☐ [05] PUSH(R1)

☒ [06] LD(BP, -12, R0)

☒ [07] ANDC(R0, 1, R1)

☒ [08] ST(R1, 0, BP)

☐ [09] SHRC(R0, 1, R1)

☐ [10] ST(R1, 4, BP)

☐ [11] BEQ(R0, lab1)

☐ [12] LD(BP, 4, R1)

☐ [13] PUSH(R1)

☐ [14] BR(ones, LP)

☐ [15] DEALLOCATE(1)

☐ [16] LD(BP, 0, R1)

☐ [17] ADD(R0, R1, R0)

☐ [18] lab1:POP(R1)

☐ [19] MOVE(BP, SP)

☐ [20] POP(BP)

☐ [21] POP(LP)

☐ [22] JMP(LP)



Submit

Discussion

Topic: 12. Procedures and Stacks / LE12.2

Hide Discussion

Calculator

Add a Post

Show all posts

by recent activity

☒ Lines [10] and [12] redundant?

It seems to me that in line 10, we are storing R1 (the value our high-level program refers to as "rest") at location BP+4, then in line 12...

5

< Previous

Next >

© All Rights Reserved



edX

[About](#)

[Affiliates](#)

[edX for Business](#)

[Open edX](#)

[Careers](#)

[News](#)

Legal

[Terms of Service & Honor Code](#)

[Privacy Policy](#)

[Accessibility Policy](#)

[Trademark Policy](#)

[Sitemap](#)

Connect

[Blog](#)

[Contact Us](#)

[Help Center](#)

[Media Kit](#)

[Donate](#)



© 2021 edX Inc. All rights reserved.

深圳市恒宇博科技有限公司 [粤ICP备17044299号-2](#)

Calculator