

4.47

A

```
void bubble_a(long *data, long count)
{
    long *curr;
    long *last;
    for(last=data+count-1; last>data; last--){
        for(curr=data; curr<last; curr++){
            if(*(curr+1)<*curr){
                long t = *(curr+1);
                *(curr+1)=*curr;
                *curr=t;
            }
        }
    }
}
```

B

```
bubble_a:
    rrmovq    %rsi, %r10
    addq      %r10, %r10
    addq      %r10, %r10
    irmovq    $8, %r9
    subq      %r9, %r10
    addq      %rdi, %r10
    jmp       .L2

.L3:
    irmovq    $8, %r9
    addq      %r9, %rax

.L5:
    rrmovq    %r10, %r9
    subq      %rax, %r9
    jle       .L7
    mrmovq    8(%rax), %rdx    // rdx = data[i+1]
    mrmovq    (%rax), %rcx    // rcx = data[i]
    rrmovq    %rdx, %r9
    subq      %rcx, %r9        // r9 = data[i+1]-data[i]
    jge       .L3
    rmmovq    %rcx, 8(%rax)
    rmmovq    %rdx, (%rax)
    jmp       .L3

.L7:
    irmovq    $8, %r9
    subq      %r9, %r10

.L2:
    rrmovq    %r10, %r8    // r8 = 存last
    subq      %rdi, %r8
    jle       .L8
    rrmovq    %rdi, %rax    // rax = 存curr
    jmp       .L5

.L8:
    ret

main:
    irmovq    $5, %rsi
    irmovq    arr, %rdi
    callq     bubble_a
    irmovq    $0, %rax
    ret
```

arr:

```
.quad 2
.quad 7
.quad 5
.quad 1
.quad 10
```

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.L5:

```
rrmovq    %r10, %r9
subq      %rax, %r9
jle       .L7
rrmovq    8(%rax), %rdx    // rdx = data[i+1]
rrmovq    (%rax), %rcx     // rcx = data[i]
rrmovq    %rdx, %r9
subq      %rcx, %r9       // r9 = data[i+1]-data[i]
##### diff here
cmovl     %rdx, %r11
cmovl     %rcx, %rdx
cmovl     %r11, %rcx
rrmovq    %rdx, 8(%rax)
rrmovq    %rcx, (%rax)
##### diff end
jmp       .L3
```

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```
.L5:
    rrmovq    %r10, %r9
    subq     %rax, %r9
    jle      .L7
    mrmovq   8(%rax), %rdx    // rdx = data[i+1]
    mrmovq   (%rax), %rcx    // rcx = data[i]
    rrmovq    %rdx, %r9
    subq     %rcx, %r9      // r9 = data[i+1]-data[i]
##### diff here
    rrmovl    %rdx, %r11    //存下来rdx的值
    xorq      %rcx, %rdx    //rdx=rdx^rcx
    cmovl     %r11, %rcx    //rcx=r11=原rdx
    xorq      %rdx, %rcx    //rcx=rdx^rcx
    xorq      %rcx, %rdx    //rdx=rcx^rdx
    rmmovq    %rdx, 8(%rax)
    rmmovq    %rcx, (%rax)
##### diff end
    jmp      .L3
```