stackmem.c

```
char f(int i) {
    char a[] = "happy tuesday!";
    return a[i];
}
int main() {
    char s = f(4);
}
```

→ Stack-allocated array

char a[]

```
child process 30376 In: f                              Line: 3   PC: 0x10418
Starting program: /home/linux/ieng6/cs30f/cs30f/lectures/stackmem/a.out
dl-debug.c:74: No such file or directory.
dl-debug.c:74: No such file or directory.
dl-debug.c:74: No such file or directory.

Breakpoint 1, f (i=4) at stackmem.c:2
(gdb) s
(gdb) x/20x $sp
0x7efffae0:  0x00000000   0x00000004   0x70706168   0x75742079
0x7efffaf0:  0x61647365   0x00002179   0x00000000   0x7efffb0c
0x7efffb00:  0x00000000   0x00000000   0x00000000   0x76e90294
0x7efffb10:  0x76fb5000   0x7efffc64   0x00000001   0x001043c
0x7efffb20:  0x76fb9318   0x76fb9000   0x00000000   0x00000000
(gdb)
```
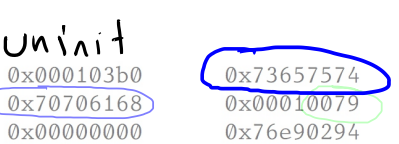
ppah

4   local var for parameter

```
pp ah
ut wy
`adse
\0!y
...
ret addr
```

twostrs.c

```
void f(int i) {
    char s1[] = "happy";
    char s2[] = "tuesday!";

    int main() {
        f(4);
    }
```
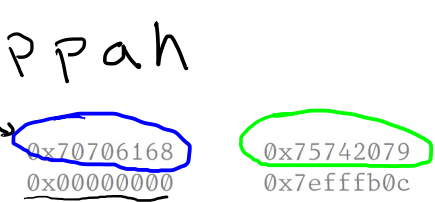
```
child process 30044 In: f                              Line: 4   PC: 0x10424
(gdb) s
(gdb) s
(gdb) x/40x $sp
0x7efffae0:  0x00000000   0x00000004   0x00000000   0x73657574
0x7efffaf0:  0x21796164   0x00010000   0x70706168   0x00010079
0x7efffb00:  0x00000000   0x7efffb0c   0x00000000   0x76e90294
0x7efffb10:  0x76fb5000   0x7efffc64   0x00000001   0x00010438
0x7efffb20:  0x76fb9318   0x76fb9000   0x00000000   0x00000000
0x7efffb30:  0x000102c0   0x00000000   0x00000000   0x00000000
0x7efffb40:  0x76fff000   0x00000000   0xcc42e7a2   0xcc4541ee2
0x7efffb50:  0x00000000   0x00000000   0x00000000   0x00000000
0x7efffb60:  0x00000000   0x00000000   0x00000000   0x00000000
0x7efffb70:  0x00000000   0x00000000   0x00000000   0x00000000
(gdb)
```

4   Uninit

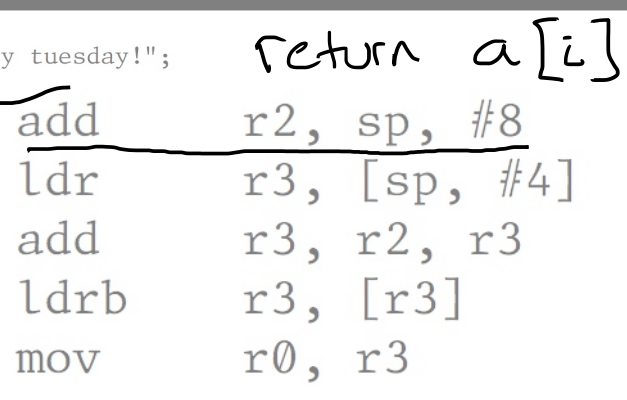Do you <u>want</u> this to be the same on all C impls/arch?   A: Yes   B: No

```
4
(scribble)
seut
!yad
(scribble) \0
ppah
(scribble) \0y
...
```
increasing addrs

manyvars.c

```
void f(int i) {
    char s1[] = "happy";
    int fs = 0xffff;
    char s2[] = "tuesday!";
    int ds = 0xdddd;
}
int main() {
    f(4);
}
```

char s1[]
int fs,
char s2[]
int ds

```
child process 29014 In: f                              Line: 6   PC: 0x10434
(gdb) x/20x $sp
0x7efffad8:  0x7efffb10   0x00000004   0x00000000   0x73657574
0x7efffae8:  0x21796164   0x000010dd   0x70706168   0x00010079
0x7efffaf8:  0x0000dddd   0x0000ffff   0x00000000   0x7efffb0c
0x7efffb08:  0x00000000   0x76e90294   0x76fb5000   0x7efffc64
0x7efffb18:  0x00000001   0x00010450   0x76fb9318   0x76fb9000
(gdb)
```
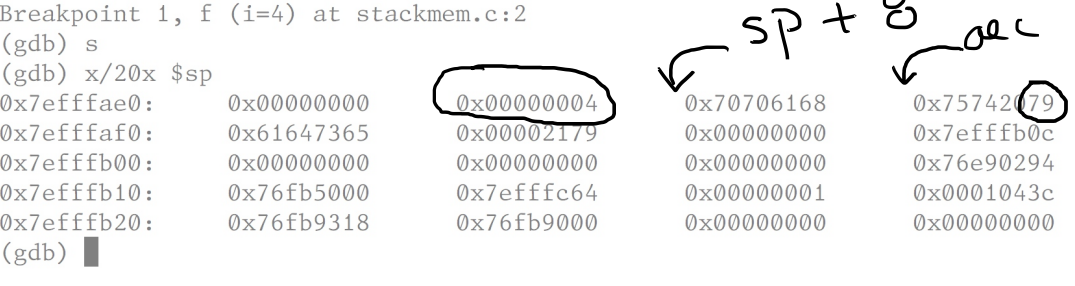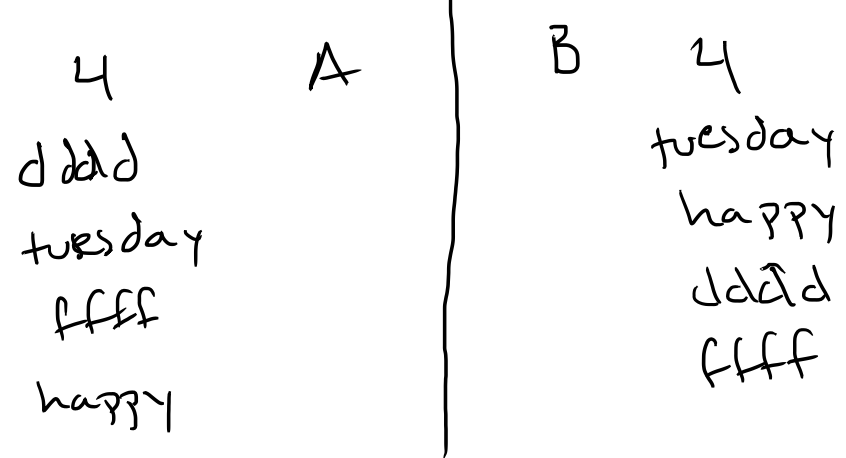
Which layout do we get

A
```
4
dddd
tuesday
ffff
happy
```

B
```
4
tuesday
happy
dddd
ffff
```

```
4
seut
!yad
\0
ppah
\0y?
0xdddd
0xffff
```
arrays
local decl

stackmem.c

```
char f(int i) {
    char a[] = "happy tuesday!";
    return a[i];
}
int main() {
    char s = f(4);
}
```

return a[i]

```
add   r2, sp, #8
ldr   r3, [sp, #4]
add   r3, r2, r3
ldrb  r3, [r3]
mov   r0, r3
```

```
child process 30376 In: f                              Line: 3   PC: 0x10418
Starting program: /home/linux/ieng6/cs30f/cs30f/lectures/stackmem/a.out
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0x7efffb10:  0x76fb5000   0x7efffc64   0x00000001   0x001043c
0x7efffb20:  0x76fb9318   0x76fb9000   0x00000000   0x00000000
(gdb)
```

sp + 8   aec

```
r2 = 0x....ae8
r3 = 0x....aec
```
"y" 0x79