

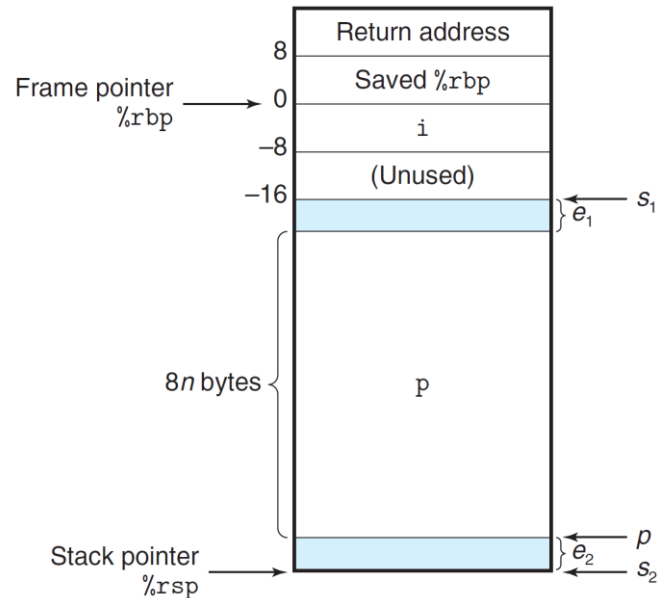
ICS Homework 12

Stack Frame

Consider the function `vframe` mentioned in class, given the exact `s1`(address of `-16(%rbp)`) and `n`(number of elements in the array), we can calculate the value of `e1`, `e2`, `s2` and `p` accordingly. Now some modifications are done for `vframe`, please read codes and the frame stack given below, and answer the following questions.

```
#define TYPE long
void vframe_new(long n) {
    long i;
    TYPE p[n];
    // do something...
}
```

```
1.vframe_new:
2.    pushq    %rbp
3.    movq     %rsp, %rbp
4.    subq     $16, %rsp
5.    leaq     22(,%rdi,8), %rax
6.    andq     $-16, %rax
7.    subq     %rax, %rsp
8.    // do something...
```



- Why there exists `e1` and `e2` has been discussed in class. For the given `n` and `s1` below, calculate the value of `e1`, `e2`, `s2` and `p`.

n	s1	s2	p	e1	e2
3	2145				
4	2146				
5	2146				
6	2145				

- For the following definition of `TYPE`, how will things become? (HINT: the assembly code may change)

a)

```
#define TYPE int
```

n	s1	s2	p	e1	e2
3	2145				
4	2146				
5	2146				
6	2145				

b)

```
struct f{
    int a;
    union{
        void *b_1;
        char b_2[10];
    }b;
};
#define TYPE struct f
```

n	s1	s2	p	e1	e2
3	2145				
4	2146				
5	2146				
6	2145				

Floating Point

Consider a 16-bit floating point representation based on the IEEE floating-point format, with 1 sign bit, 6 exp bits, 9 frac bits, called **Float16**.

Fill in the table below. Please represent M in the form x or x/y where x is an integer and y is an integral power of 2.

Description	Hex	M	E
-21/2	0xC4A0	21/16	3
5/8			
	0xBEA8		
$-3 \cdot 2^{-34}$			
	0x4800		
-0			
Largest negative normalized value			
$+\infty$		--	--
Largest denormalized value			