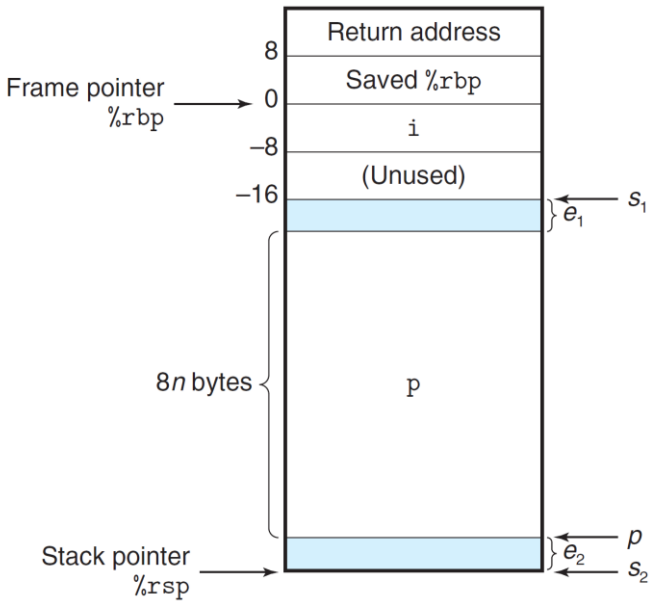
ICS Homework 12 Solution

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…
```



1. 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	2113	2120	1	7
4	2146	2098	2104	10	6
5	2146	2098	2104	2	6
6	2145	2081	2088	9	7

2. 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	2129	2132	1	3
4	2146	2114	2116	14	2
5	2146	2114	2116	10	2
6	2145	2113	2116	5	3

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	2065	2072	1	7
4	2146	2034	2040	10	6
5	2146	2018	2024	2	6
6	2145	1985	1992	9	7