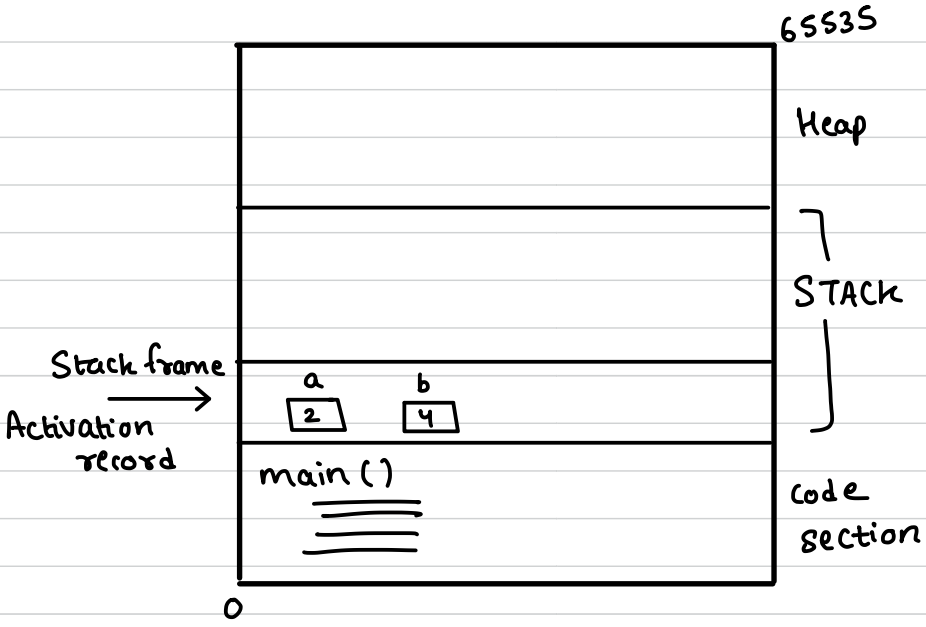
INTRODUCTION

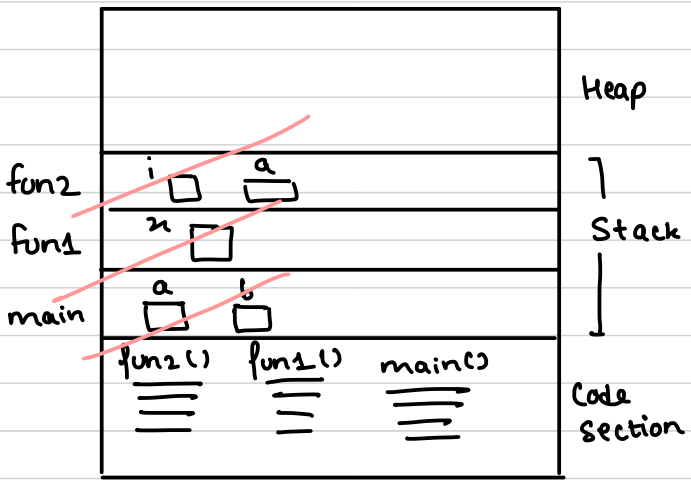
STATIC VS DYNAMIC MEMORY ALLOCATION

```
void main()
{
        int a;
        float b;
}
```



HOW DOES STACK WORK?

```
void fun2(int i)
{
        int a;
        ========
}

void fun1()
{
        int x;
        fun2(x);
}

void main()
{
        int a;
        float b;
        fun1();
}
```

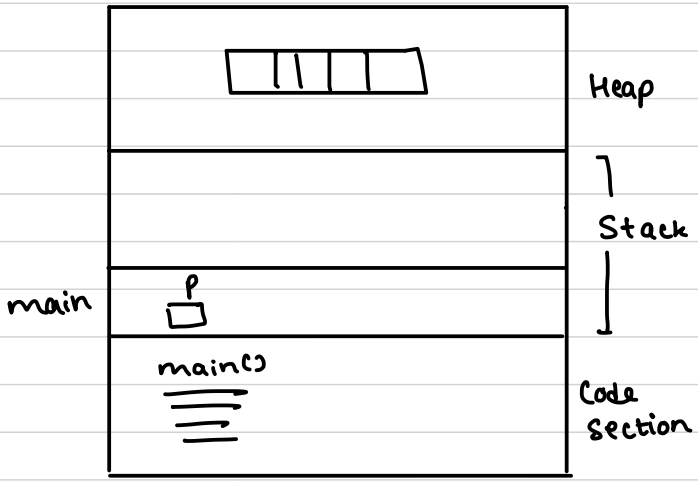


1. Stack is always organised memory.

HOW DOES HEAP MEMORY WORK?

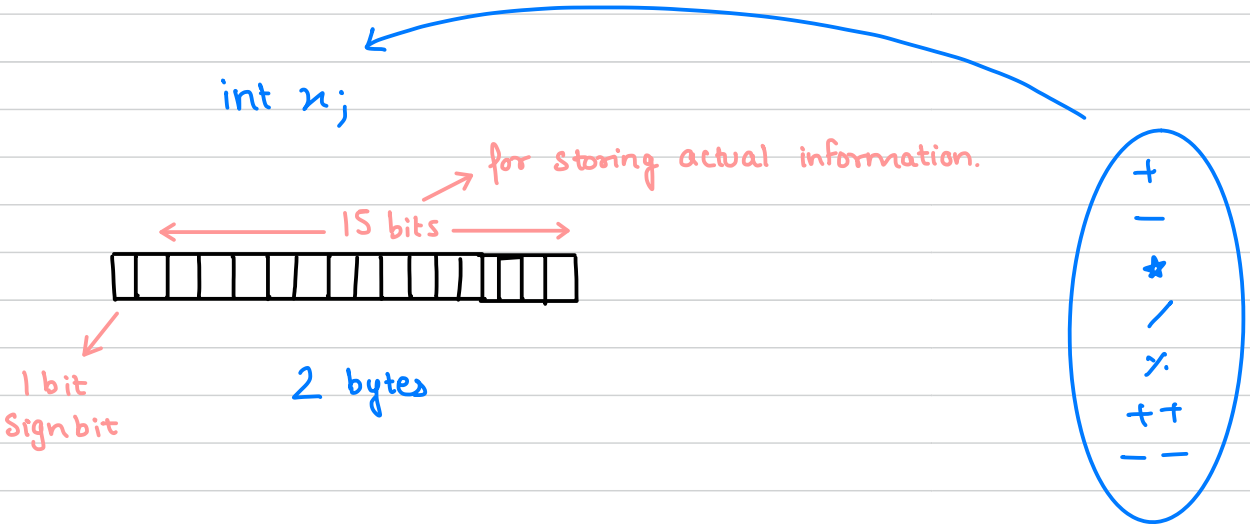
1. Heap may be organised memory or unorganised memory.
2. Heap must be treated as a resource i.e when it is needed, we must use it and when not needed, free it so that it can be used by other applications.
   For eg- printer is a resource.

```
void main()
{
        int *p;

for C++ p= new int[5];
 for C  p= (int*) malloc(2*5);
                  ⟶ for array

DEALLOCATION delete []p;
        p= NULL;
}
```



DATATYPE?

↳ 1. Representation of data.
  2. Operation on data.



ABSTRACT DATATYPE

↳ hiding internal details

(part of object oriented programming)

What does log mean?

$\log_2 n$ → This gets divided by this until it reaches 1.

Time and Space complexity

```
void swap(x,y)
{
    int t;
    t=x;      ——— 1
    x=y;      ——— 1
    y=t;      ——— 1
}                 3
```

O(1)

```
int sum(int A[], int n)
{
    int s,i;
    s=0;                    ——— 1
    for(i=0; i<n; i++)      ——— n+1
    {        1      n
        s=s+A[i];           ——— n
    }
    return s;               ——— 1
}                           2n+3
```

O(n)

because i will be initialized (+1) and i will be incremented for n no of times and 1 time it will fail too (+n)

// because one time it will fail too.

```
Void  Add (int n)
{
      int i,j ;
      for(i=0 ;i<n;i++)
      {
          for(j=0 ;j<n ;j++)
          {
              c[i][j] = A[i][j] + B[i][j] ;
          }
      }
}
```

for(i=0 ;i<n;i++) ——— n+1

for(j=0 ;j<n ;j++) ——— n*(n+1)

because the nested loop will run again and again for (n+1) no of times.

c[i][j] = A[i][j] + B[i][j] ; ——— n * n

$f(n) = 2n^2+2n+1$

$O(n^2)$