CSE 101 1-11-22

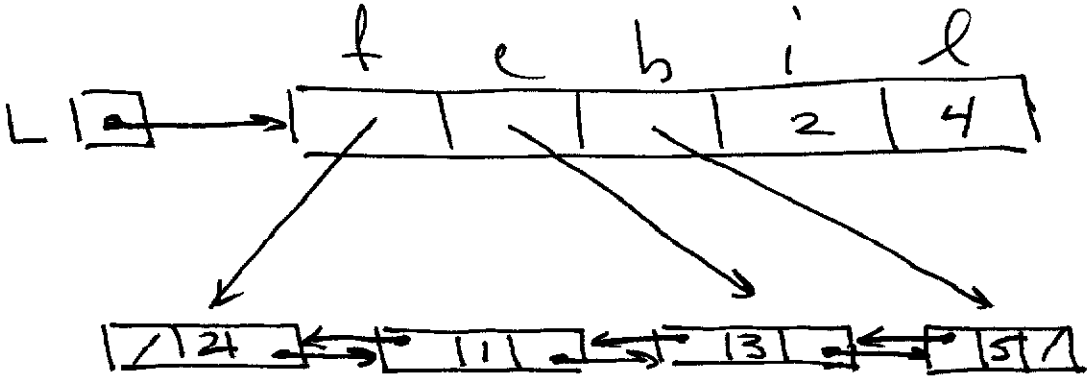
- remote through week 4
- Pa1 : Extended 1 day
- quiz 1 today.

List ADT in PA 1:

Ex.

client : (2 1 3 5)

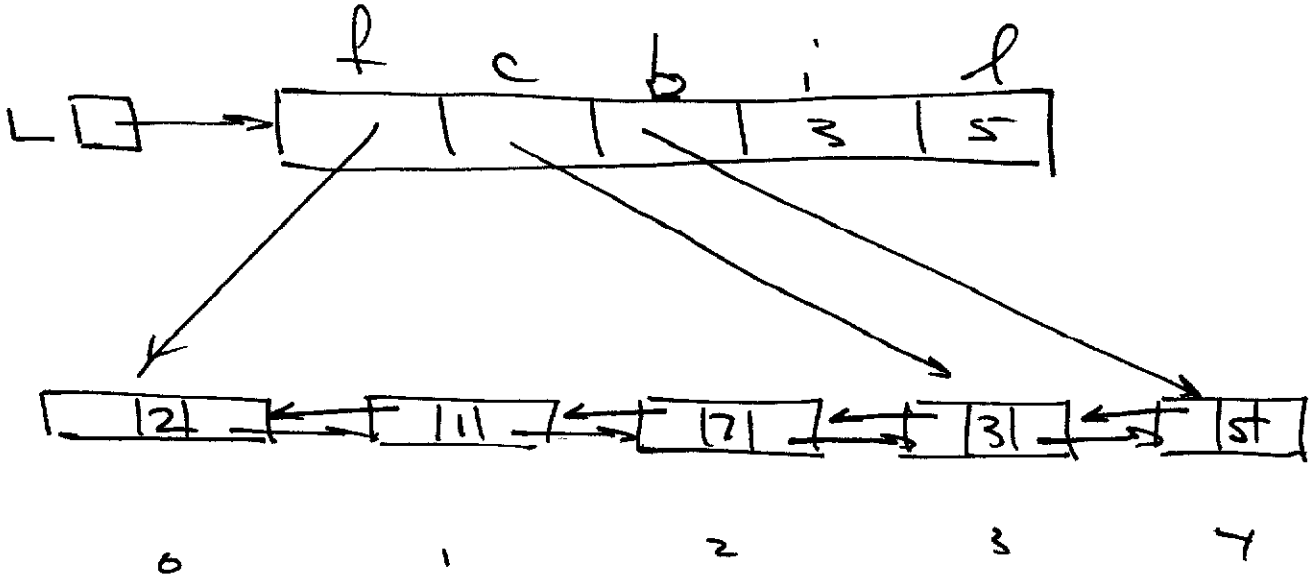
inside :



now DO : insertBefore(L, 7)

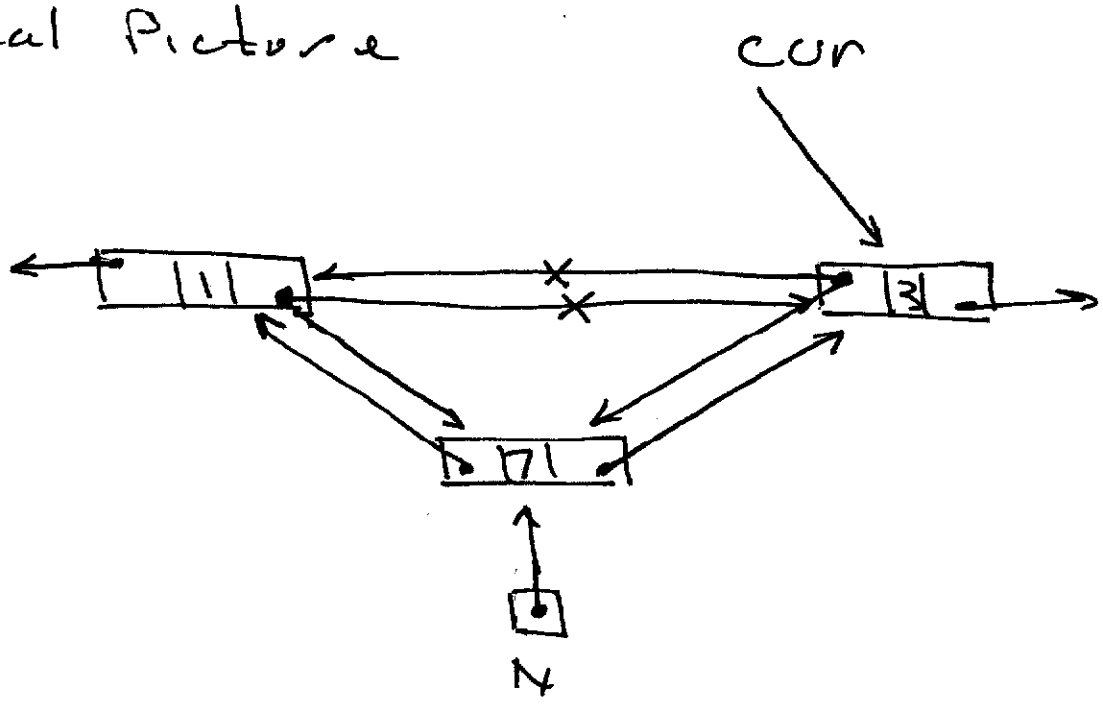
client : (2 1 7 3 5)

inside :



How to splice in the new node?

local Picture




```
L->cur->prev = N;
```

⋮

Pal example:

How to use the list to indirectly sort an array

A = ["c", "a", "b", "d"]

want L = (1 2 0 3)

start: L = ( )

insert 0: L = (0)

insert 1: L = (0)

L = (1 0)

insert 2: L = (1 0)

L = (1 0)

L = (1 2 0)

insert 3: L = (1 2 0)

L = (1 2 0)

L = (1 2 0)

L = (1 2 0)

L = (1 2 0 3)

Quiz 1 example

write a client function (for List ADT in Pair) that searches a list L for a target x, and returns a List containing all indices at which x resides in L.

Solution.

```
List Search(List L, int x){
    int e, i;
    List R = newList();

    for(moveFront(L); index(L)>=0; moveNext(L)){
        e=get(L)
        if (e==x){
            i = index(L);
            append(R, i)
        }
    }
    return R;
}
```

Graph Theory (short version)

Defn

A **Graph** is an ordered Pair of sets

$$G = (V, E)$$

where

- $V = V(G)$ is a non-empty finite set of **vertices**.
- $E = E(G)$ is a set of unordered Pairs of vertices

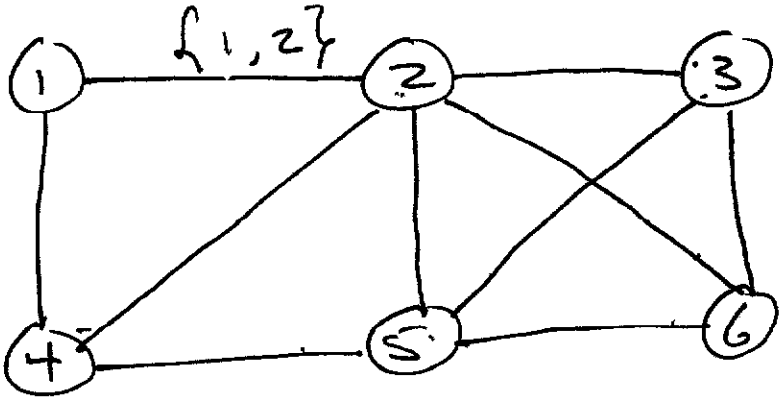
$$e = \underbrace{\{x, y\}}_{xy} \in V^{(2)}$$

called **edges**.

Ex.

$V(G) = \{1, 2, 3, 4, 5, 6\}$

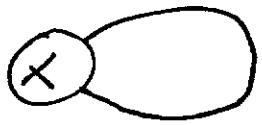
$E(G) = \{12, 14, 23, 24, 25, 26, 35, 36, 45, 56\}$



$\deg(5) = 4$

$\deg(6) = 3$

note:



not allowed

not allowed.

we say:

- 1 is <u>adjacent</u> to 2
- $\{1,2\} = 12$ has <u>ends</u> 1 and 2
- $\{1,2\} = 12$ <u>joins</u> vertices 1 and 2
- $\{1,2\}$ is <u>incident</u> with 1
- $\{1,2\}$ is <u>adjacent</u> to $\{2,5\}$
- <u>deg</u>-ree of 5 is 4
- an $x-y$ path is a seq. of vertices

$$x = v_0, v_1, v_2, \ldots, v_k = y$$

where vertices are distinct (except if $x = y$, and each consecutive pair are adjacent $\{v_{i-1}, v_i\} \in E$.

Ex. 1 – 3 Path

1, 2, 4, 5, 3

length = $k = 4$