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Problem Statement 1:

Write a menu driven C++ program to implement a graph using adjacency list (linked list) without using STL. Perform following operations on the graph.

1. Insert edge

2. BFS traversal

3. DFS traversal

4. Cycle finding in the graph

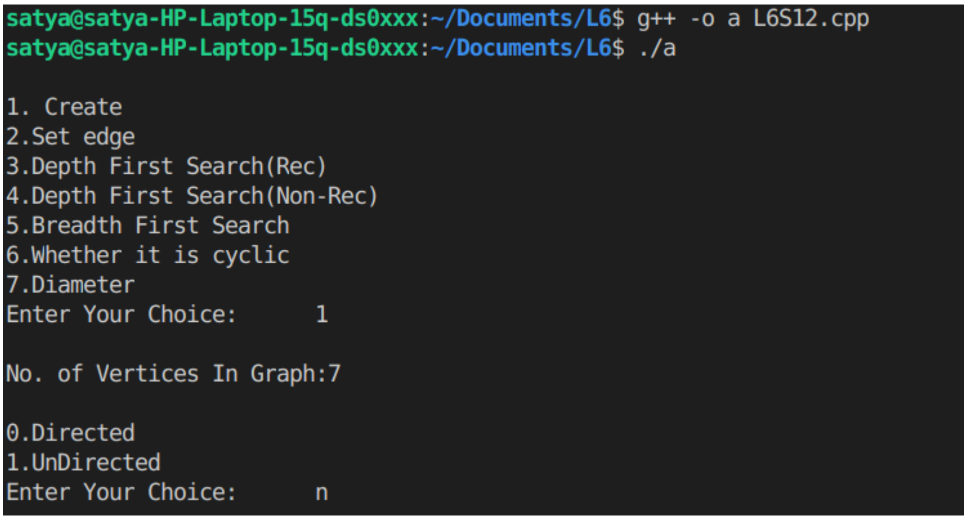
5. Calculate diameter of the graph

Algorithms:

Linked list

BFS

DFS



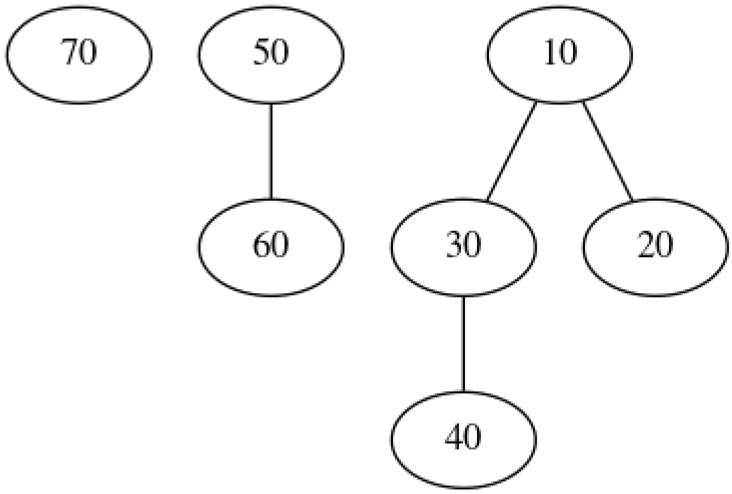
```
satya@satya-HP-Laptop-15q-ds0xxx:~/Documents/L6$ g++ -o a L6S12.cpp
satya@satya-HP-Laptop-15q-ds0xxx:~/Documents/L6$ ./a

1. Create
2.Set edge
3.Depth First Search(Rec)
4.Depth First Search(Non-Rec)
5.Breadth First Search
6.Whether it is cyclic
7.Diameter
Enter Your Choice:      1

No. of Vertices In Graph:7

0.Directed
1.UnDirected
Enter Your Choice:      n
```

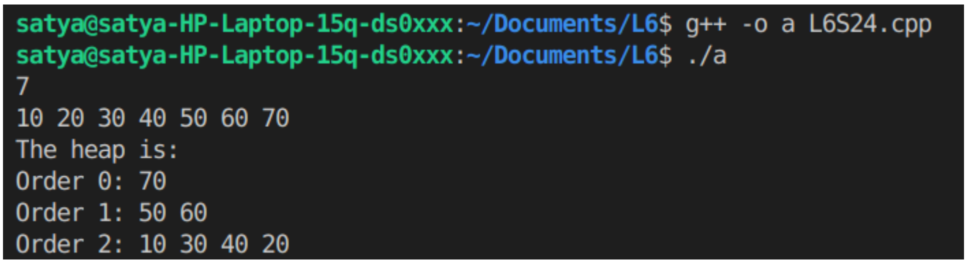
Problem Statement 2:

Write a C++ program to implement a binomial heap using heap data structures (without using STL). Print the order of each binomial heap and use Graphviz to show the forest of binomial heap.

Algorithms:

Heaps





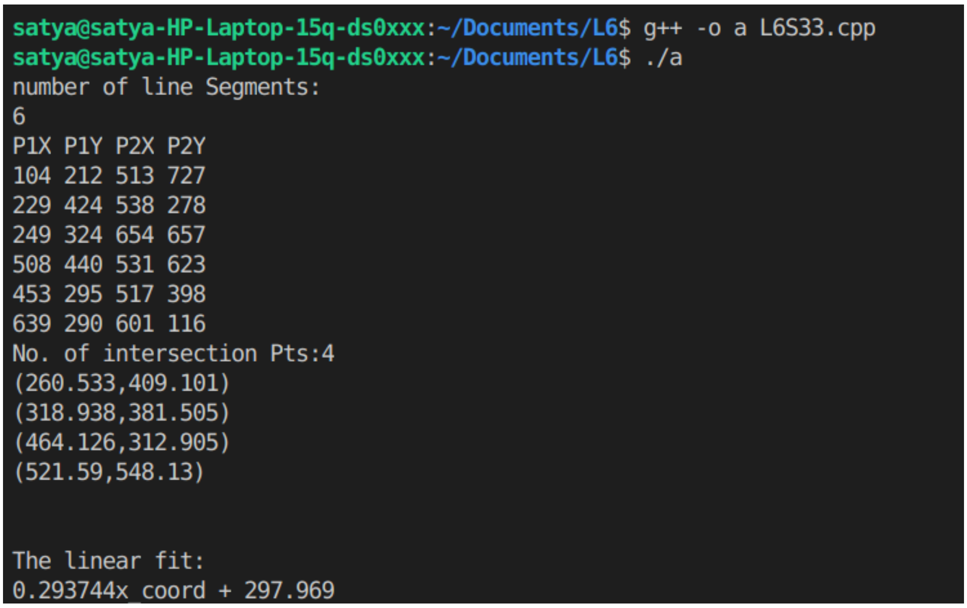
```
satya@satya-HP-Laptop-15q-ds0xxx:~/Documents/L6$ g++ -o a L6S24.cpp
satya@satya-HP-Laptop-15q-ds0xxx:~/Documents/L6$ ./a
7
10 20 30 40 50 60 70
The heap is:
Order 0: 70
Order 1: 50 60
Order 2: 10 30 40 20
```

Problem Statement 3:

Write a C++ program to implement Bentley-Ottmann Algorithm to find and print all the intersection points of n given lines. Use of STL is allowed. The specific type of data structure that must be used include Priority Queue and BST. Using least square method find the linear fit of the M found intersection points and print the line in the form ax+b. The student should demonstrate this on a GUI using QT library.

Algorithms:

Bentley-Ottmann



```
satya@satya-HP-Laptop-15q-ds0xxx:~/Documents/L6$ g++ -o a L6S33.cpp
satya@satya-HP-Laptop-15q-ds0xxx:~/Documents/L6$ ./a
number of line Segments:
6
P1X P1Y P2X P2Y
104 212 513 727
229 424 538 278
249 324 654 657
508 440 531 623
453 295 517 398
639 290 601 116
No. of intersection Pts:4
(260.533,409.101)
(318.938,381.505)
(464.126,312.905)
(521.59,548.13)


The linear fit:
0.293744x_coord + 297.969
```