

# **Stevens Institute of Technology**

Department of Computer Science

## **CS590: Algorithms**

Prof. Iraklis Tsekourakis

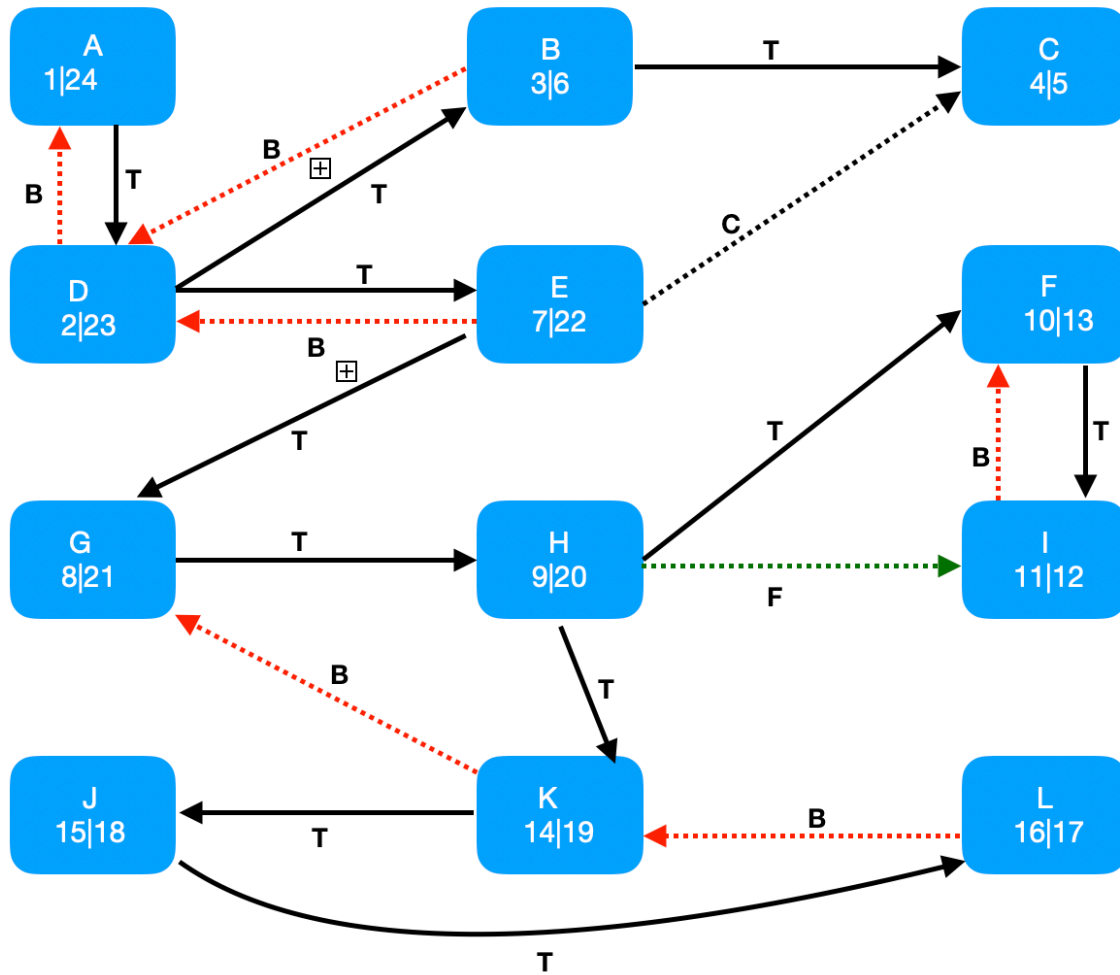
### **Homework Assignment 5**

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Submitted by: Malav Shastri, CWID:10456244

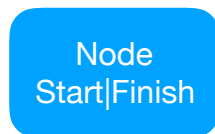
Question 1.

**Solution (a):**



**Notations:**

Node(Start/Finish) -



Tree Edge -



Back Edge -



Forward Edge -



Cross Edge -



## Classification of Edges:

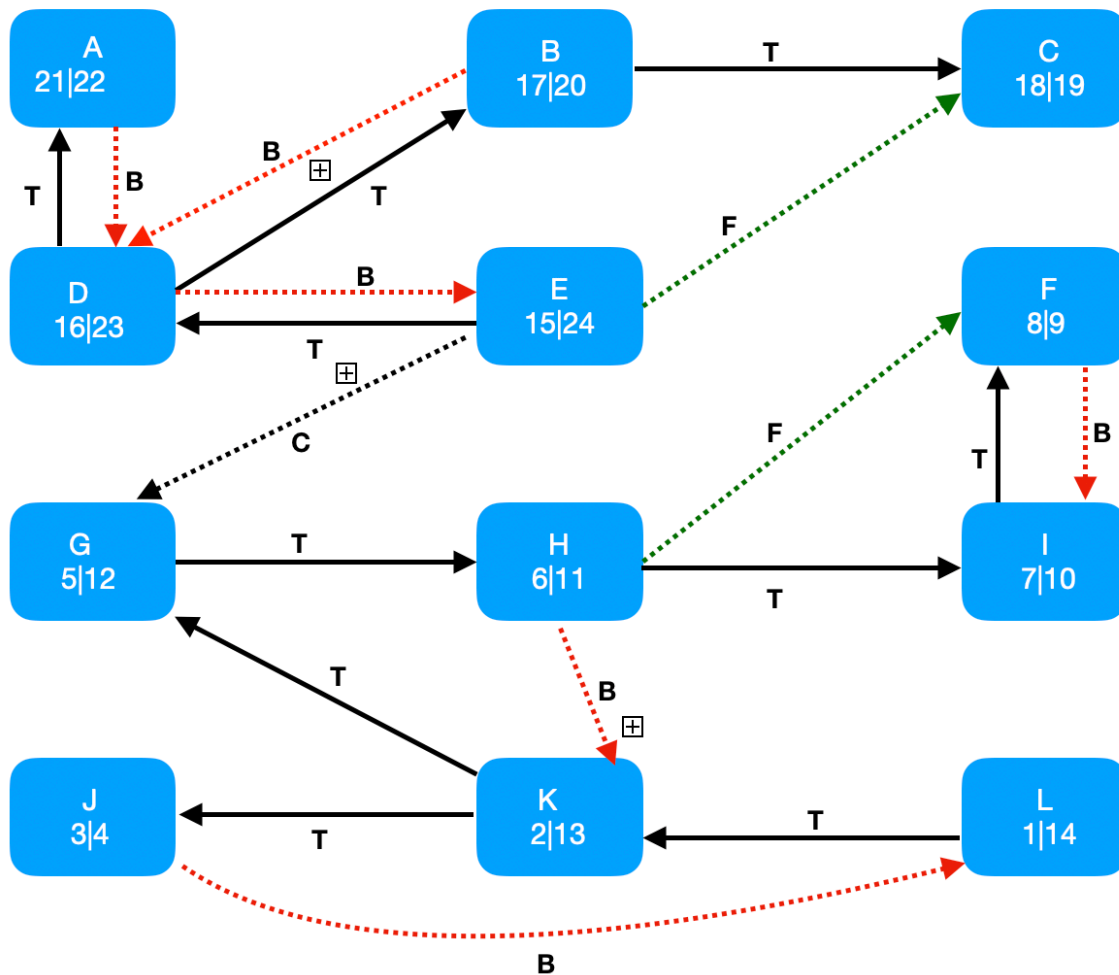
**Tree Edges** - (A,D), (D,B), (D,E), (B,C), (E,G), (G,H), (H,F), (F,I),  
(H,K), (K,J), (J,L)

**Back Edges** - (L,K), (K,G), (I,F), (E,D), (B,D), (D,A)

**Forward Edges** - (H,I)

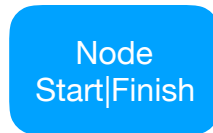
**Cross Edges** - (E,C)

## **Solution (b):**



### Notations:

Node(Start/Finish) -



Tree Edge -



Back Edge -



Forward Edge -



Cross Edge -



### Classification of Edges:

**Tree Edges** - (D,A), (D,B), (E,D), (B,C), (G,H), (H,I), (I,F),  
(K,J), (K,G), (L,K)

**Back Edges** - (J,L), (H,K), (F,I), (D,E), (B,D), (A,D)

**Forward Edges** - (H,F), (E,C)

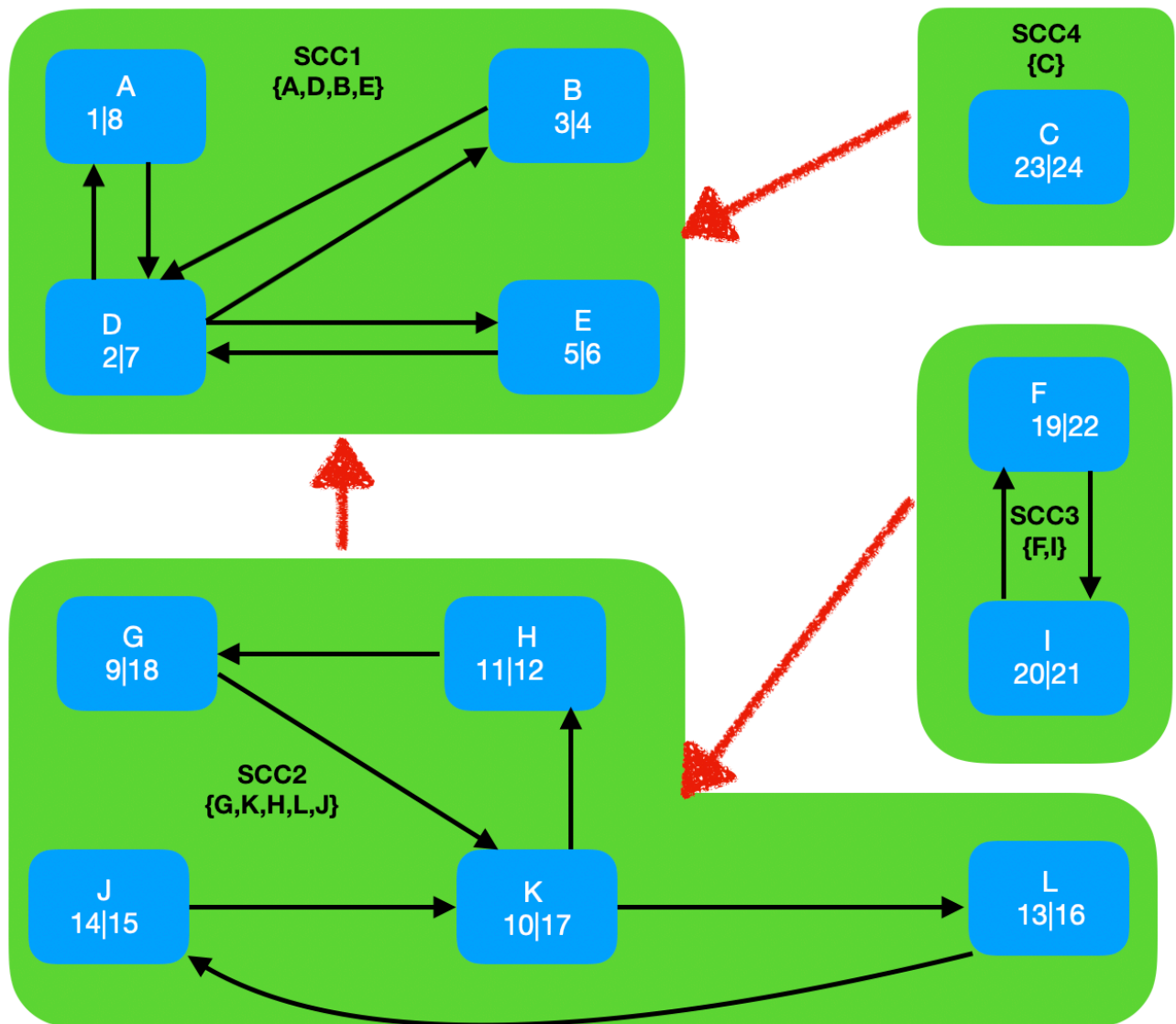
**Cross Edges** - (E,G)

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### Solution (c):

From question a. arranging vertices in decreasing order of finishing time, order of vertices to be followed in the main loop of DFS algorithm : {A,D,E,G,H,K,J,L,F,I,B,C}

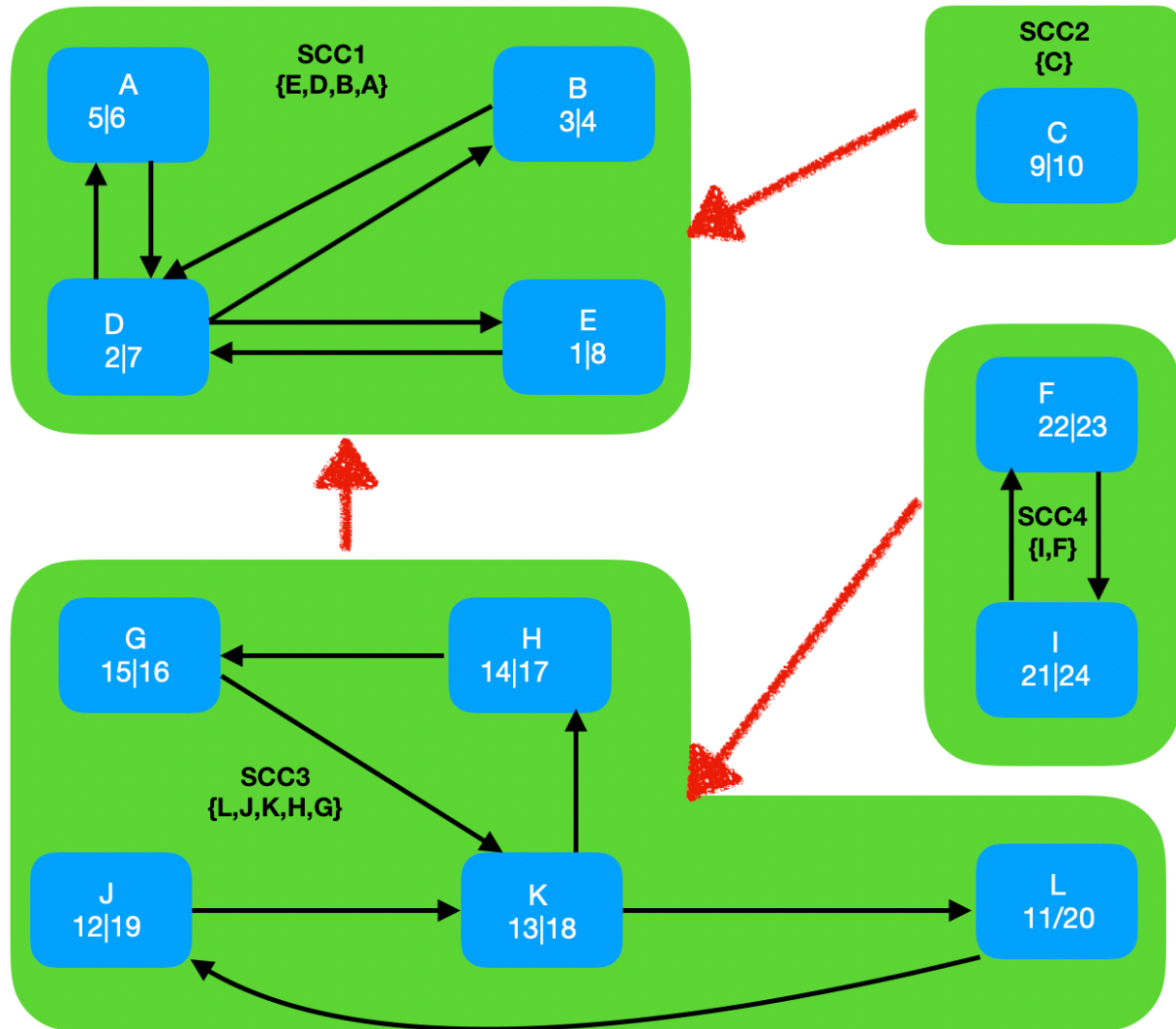


### Strongly Connected Components:

SCC1:{A,D,B,E}, SCC2:{G,K,H,L,J}, SCC3:{F,I}, SCC4:{C}

**Solution (d):**

From question b. arranging vertices in decreasing order of finishing time, order of vertices to be followed in the main loop of DFS algorithm : {E,D,A,B,C,L,K,G,H,I,F,J}

**Strongly Connected Components:**

SCC1:{E,D,B,A}, SCC2:{C}, SCC3:{L,J,K,H,G}, SCC4:{I,F}