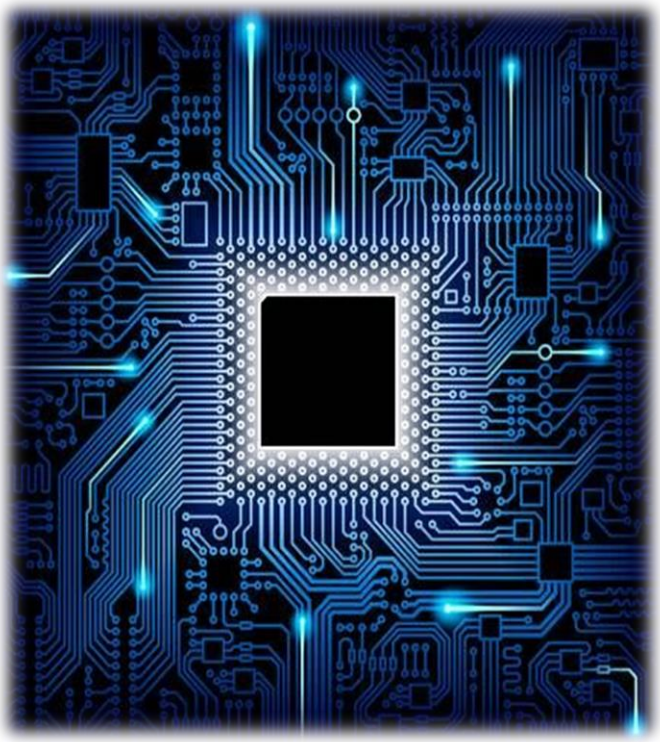
ILLINOIS INSTITUTE OF TECHNOLOGY

CAD TECHNIQUES FOR VLSI DESIGN

[ECE588]



# CAD TOOL DESIGN FOR STATIC TIMING ANALYSIS BY USING TCL/TK AND C PROGRAMMING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**Anirudha Behera**

# ABSTRACT

In this paper I designed a Static Timing Analysis tool using C programming and TCL/TK program. Here I completed two cases, one is only to find arrival time, required time and slack time from given input set using C programming. In second case I designed a CAD tool to find final results on display screen with nodes in graphical representation using c programming and TCL/TK. All required output results are attached sequentially.

Anirudha Behera

*SIGNATURE*

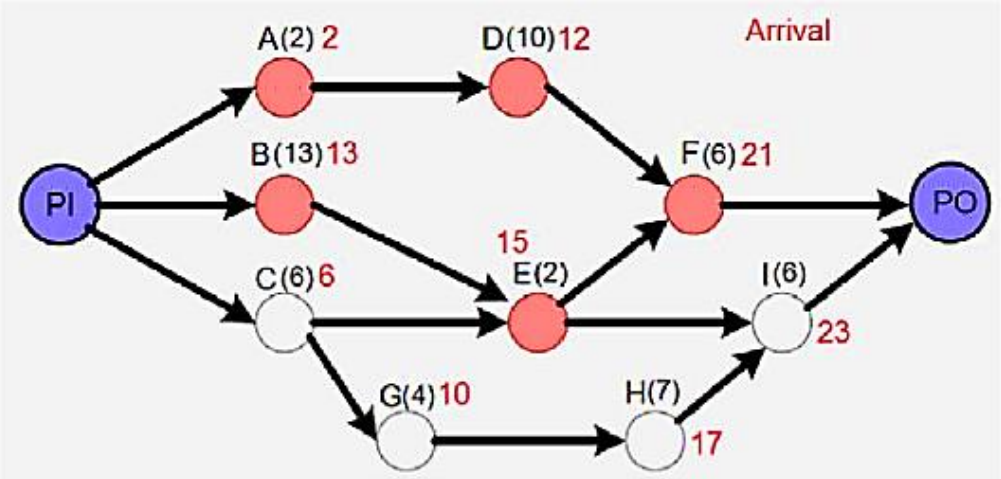
# INTRODUCTION

In this final Project we are going to design a CAD model to find out Static Time Analysis (STA).

Project is divided into two parts, first part is basically about creating a c-program which can generate arrival time, slack time and required time from given set of inputs.

If we find out the arrival time and required time, then slack time can be found out by subtracting required time from arrival time.

## CASE: I

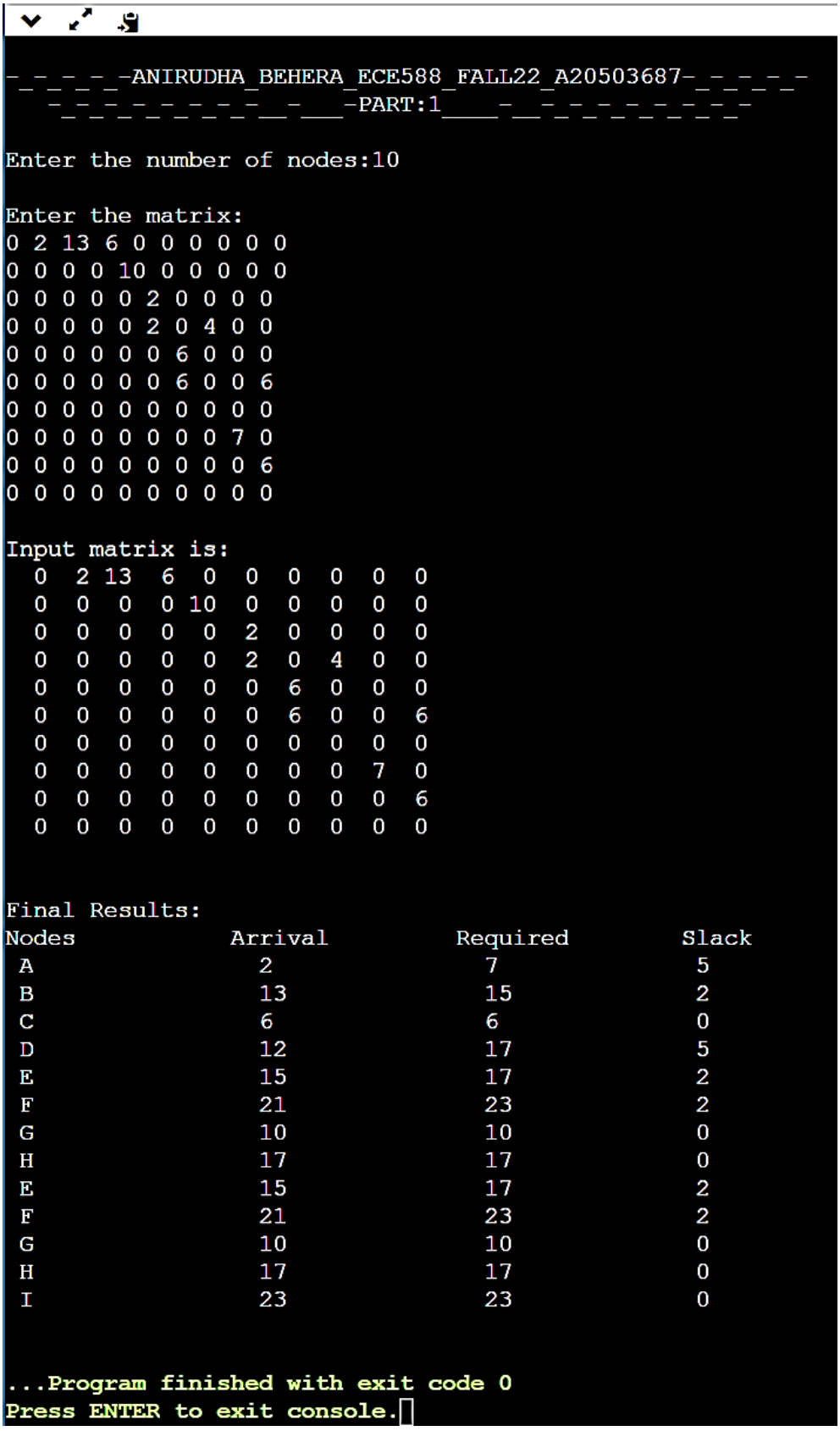



Input graph with nodes and their respective values

| | Pi | A | B | C | D | E | F | G | H | I |
|---|---|---|---|---|---|---|---|---|---|---|
| Pi | 0 | 2 | 13 | 6 | 0 | 0 | 0 | 0 | 0 | 0 |
| A | 0 | 0 | 0 | 0 | 12 | 0 | 0 | 0 | 0 | 0 |
| B | 0 | 0 | 0 | 0 | 0 | 15 | 0 | 0 | 0 | 0 |
| C | 0 | 0 | 0 | 0 | 0 | 8 | 0 | 10 | 0 | 0 |
| D | 0 | 0 | 0 | 0 | 0 | 0 | 18 | 0 | 0 | 0 |
| E | 0 | 0 | 0 | 0 | 0 | 0 | 21 | 0 | 0 | 21 |
| F | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| G | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 17 | 0 |
| H | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 23 |
| I | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

Given Input matrix

After designing the final source code, I got below output result from above inputs.




NOTE: My source code was not running on CMD may be due to some driver issue, so I used Visual Studio and trusted online compiler (Online C Compiler - online editor (onlinegdb.com)).

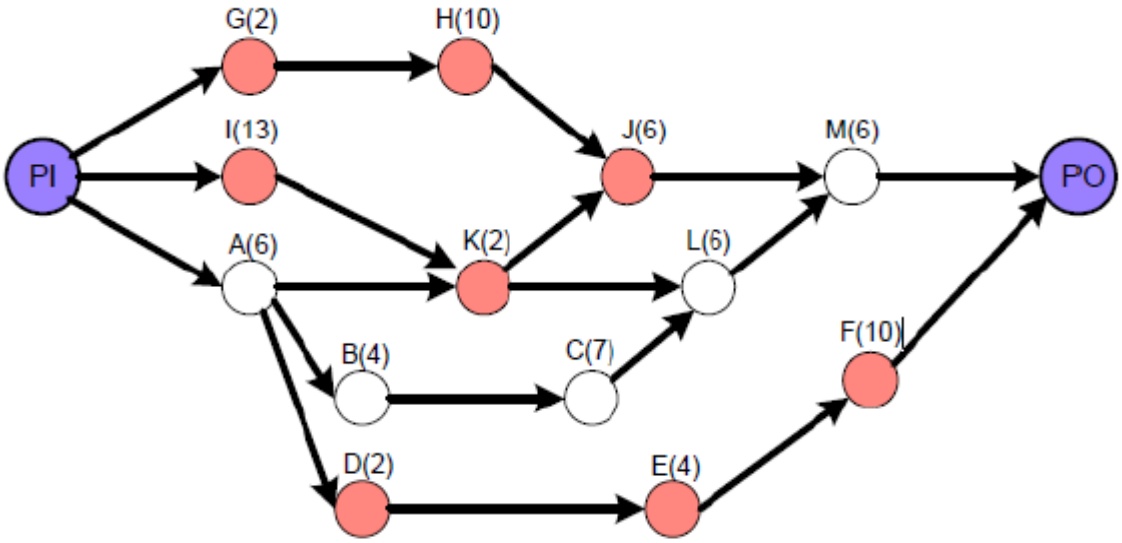
This is required for only CASE: I, CASE: II can run on TCL console or similar application.

# CASE: II

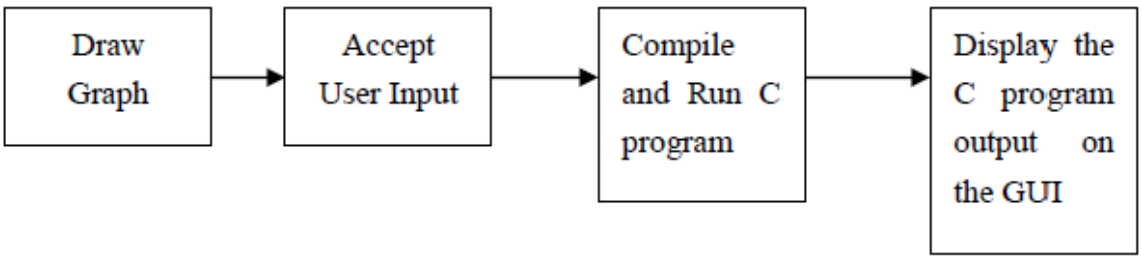
TCL is a general-purpose multi-paradigm system programming language. It is a scripting language that aims at providing the ability for applications to communicate with each other. On the other hand, TK is a cross platform widget tool kit use d for building GUI in many languages.

TCL/TK is mostly inspired by C language. It is mostly used as a scripting language in industries.

In this project we are going to implement Static Timing Analysis CAD tool using C programming and TCL/TK.




Input graph with nodes and their respective values

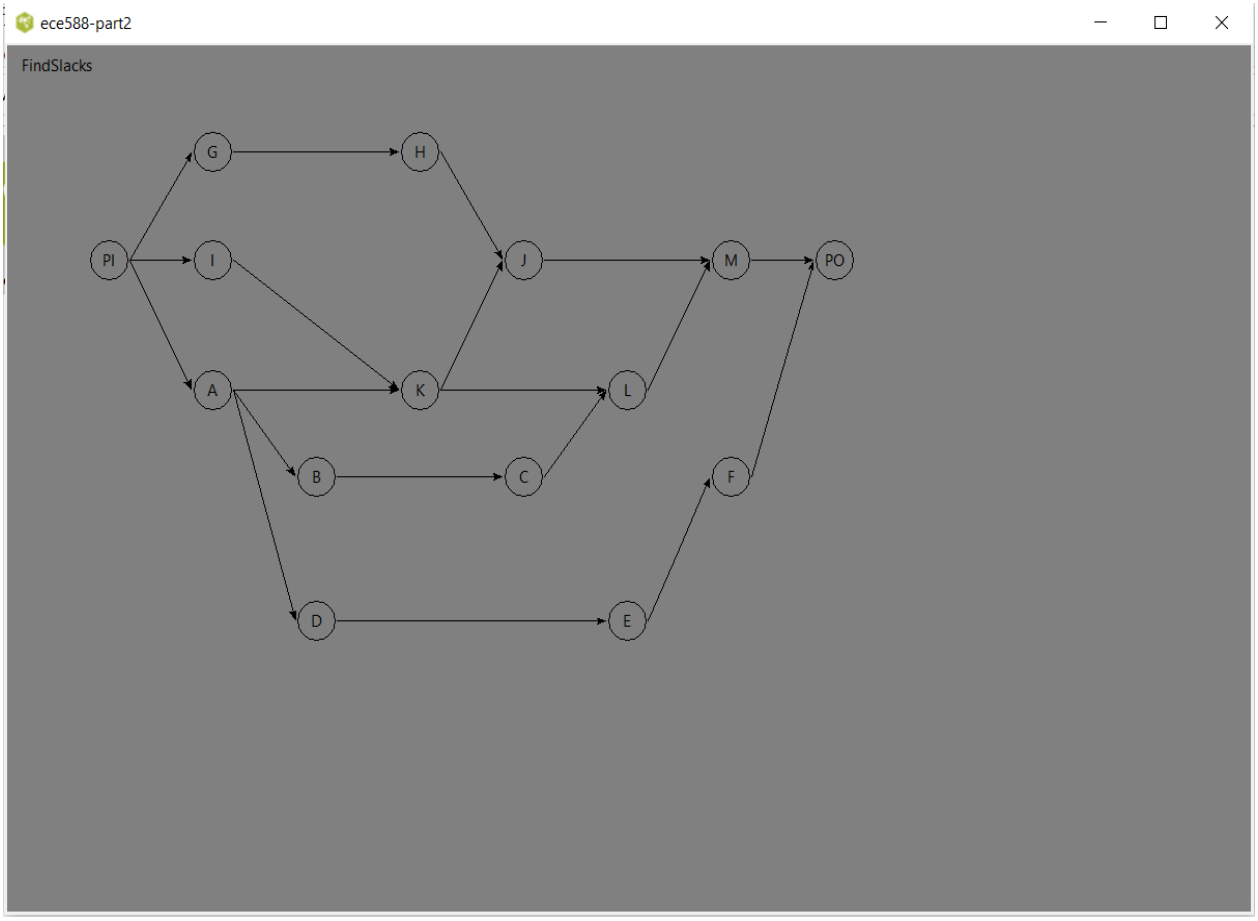



I followed this above sequence to obtain optimum result for given input set.

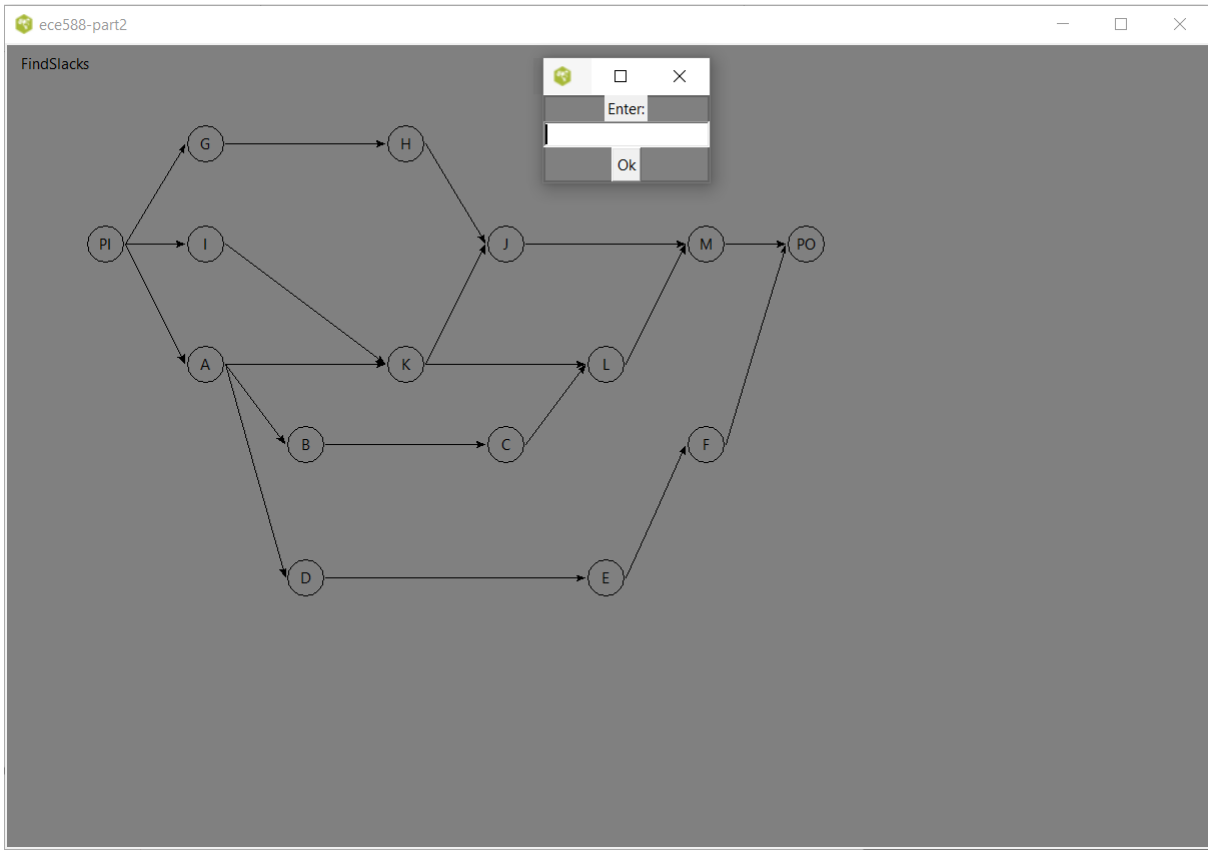
| | Pi | G | I | A | B | D | H | K | J | C | L | E | M | F |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Pi | 0 | 2 | 13 | 6 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| G | 0 | 0 | 0 | 0 | 0 | 0 | 10 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| I | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 0 |
| A | 0 | 0 | 0 | 0 | 4 | 2 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 0 |
| B | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 7 | 0 | 0 | 0 | 0 |
| D | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 4 | 0 | 0 |
| H | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 6 | 0 | 0 | 0 | 0 | 0 |
| K | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 6 | 0 | 6 | 0 | 0 | 0 |
| J | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 6 | 0 |
| C | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 6 | 0 | 0 | 0 |
| L | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 6 | 0 |
| E | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 10 |
| M | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| F | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

Given Input matrix

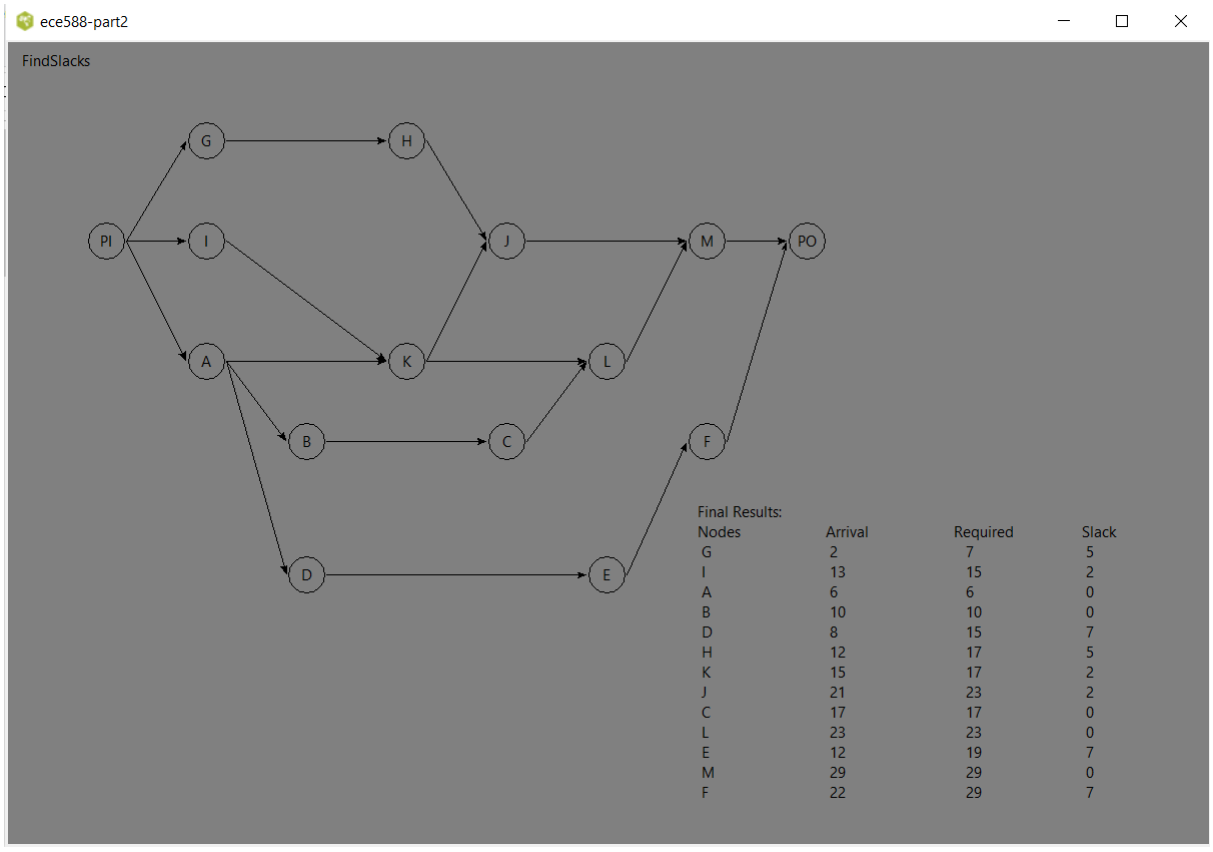
## OUTPUT SCREEN SHORTS




Graph with assigned nodes




Assigning input values to each node




Final output screen with Final result matrix.

# CONCLUSION

In this final project we designed an advanced CAD tool using C programming and TCL/TK programming. After successfully writing the code and running it, we are able to find the optimum result for slack time, arrival time and required time.