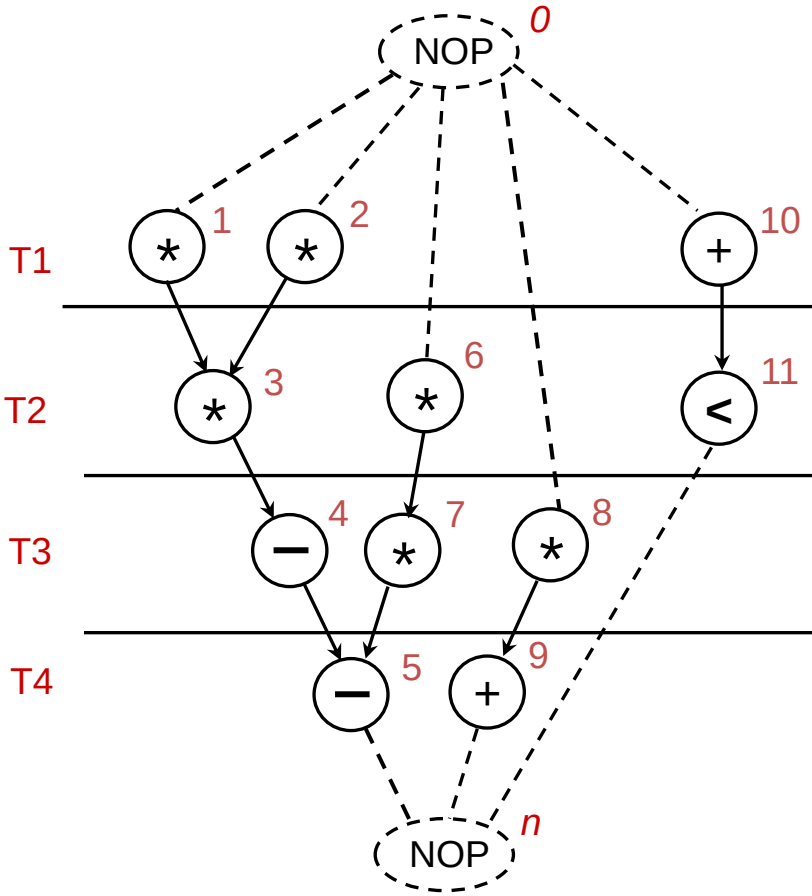
Homework #1

- **Due 10/31 23:59**
- Language
  - Please use C++ language to implement your program.
- Program
  - Use Left-Edge Algorithm to minimize the resource usage.
    - Sort intervals in a *list* by their *left* edge coordinates.
    - Consider one color at a time and assign as many intervals as possible to the color by scanning the list.
    - Increase color counter when possible intervals are exhausted, and repeat.

Homework #1

- Problem statement
  - You are given a sequencing graph consisting of v vertices including two NOP nodes which are the *source* and *sink*.
  - The vertices are numbered from 0 to n (i.e, $n = v - 1$), the source is the vertex 0 and the sink is the vertex n.
  - Each vertex represents an operation with specific period.
  - What's the minimum usage of resources of this graph?



Homework #1

- Input
  - The first line contains two integers v and r (where $2 < v < 100$, $0 < r < 5$) denoting the number of vertices (from 0 to $v-1$) in the sequencing graph and the number of resource types provided (from 1 to r).
  - Following v lines show the information of an adjacent matrix, where the non-zero element in each line denotes a directed edge (r, c) from v_r to v_c .
  - v lines follow. The i-th line contains three integers r_i, $t1_i$ and $t2_i$ denoting that the i-th vertex uses the r_i-resource type and its period is $t1_i$ to $t2_i$.
  - Note that the resource type of v_0 and v_n are always marked 0 (NOP).
- Output
  - You need to iterative report the number of resource r_i used in this sequencing graph following sequences of vertices shared these resource.
  - You need to output your report to a file named with benchmarkName.txt (Don't forget to replace benchmarkName with actual benchmark name).

Homework #1

- Example

The demand of r_2 is 2,
following with resource bindings.

- Input

```
6 2          c=2
0 1 1 0 0 0  ←r=0
0 0 0 1 0 0  (0, 2) = 1 describes
0 0 0 1 1 0  a directed edge
0 0 0 0 1 0  from v0 to v2.
0 0 0 0 0 1
0 0 0 0 0 0
0 0 0
1 0 1  → v1 require resource r1
2 0 1    whose period is [0, 1].
2 1 2
2 1 2  v5 is NOP
0 2 2  → whose period is [2, 2].
```

- Output

```
Demand of resource1: 1
1
Demand of resource2: 2
2 3
4
```

v_2 and v_3
share the same resource.
Note that:
2 4
3
is also accepted.

Homework #1

- Note
  - There are 4 public and 1 hidden benchmarks to evaluate your program.
  - We give a score to a benchmark when the result is correct.
  - Runtime is not counted, but your runtime should not exceed 5 seconds per test.
  - Please use the following format to run your program:
    - `LE_STUDENTID.exe  path_to_benchmark`
  - Do not use absolute path!

Homework #1

- Upload data
  - Please upload a zip file.
  - The zip file contains a folder which is named by LE_StudentID.
  - The folder must contain your source code and header file(if exists).
  - We compile source code with the following command:
    - `g++ LE_StudentID.cpp –o LE_StudentID`
  - If your source code have special requirements, please provide your makefile and readme.