CSC 500 Project 2

Minimum Cost Flow Program
Due: 11:59pm 10/23 Wednesday

In this project, each group needs to write a couple of programs that converts the specific research problem in fattree data center into a flow network. This flow network, represented using the format as 'sample.inp', is then computed by the minimum cost flow program to find the optimal solution.

Paper 4: Power-Efficient Virtual Machine Replication in Data Centers

When executing your program,

- First, it asks the user to input the following parameters:
  - k: number of ports each switch has, or number of PODs in this fattree data center;
  - p: number of original VMs that are randomly placed onto the PMs initially
  - m: the initial storage capacity of each PM in the data center
  - R: number of replica copies each original VM has

- Then, it will generate an output file called mcf_replication.inp, which represents the generated flow network, Fig.2 in the paper

- Finally, execute the MCF program using this input. It will print out the

  - The minimum energy consumption of this VM replication
  - The detailed flow solutions

Paper 5: LB-MAP: Load-Balanced Middlebox Assignment in Policy-Driven Data Centers

When executing your program,

- First, it asks the user to input the following parameters:
  - k: number of ports each switch has, or number of PODs in this fattree data center;
  - l: number of VM pairs that are randomly placed onto the PMs initially

    - m: number of middlebox instances (MBs), of the same type, in the data center
    - kapa: capacity of each MB instance; each MB instance can only accommodate kapa VM pairs

- Then, it will generate an output file called mcf_lb.inp, which represents the generated flow network, Fig.3 in the paper.

- Finally, execute the MCF program using this input. It will print out the

    - The total minimum energy consumption of all the VM pairs
    - The detailed flow solutions

Paper 6: PAM & PAL: Policy-Aware Virtual Machine Migration and Placement in Dynamic Cloud Data

When executing your program,

- First, it asks the user to input the following parameters:
    - k: number of ports each switch has, or number of PODs in this fattree data center;
    - l: number of VM pairs that are randomly placed onto the PMs initially
    - m: number of middleboxes, of different type, in the data center
    - rc: the initial resource capacity of each PM
    - lambda: the communication frequency of each VM pair is a random number between [0, lambda]
    - mu: migration coefficient

- Then, it will generate an output file called mcf_migration.inp, which represents the generated flow network, Fig.5 in the paper.

- Finally, execute the MCF program using this input. It will print out the

    - The total migration and communication cost of all the VM pairs
    - The detailed flow solutions