SIT323 Practical Software Development, Trimester 2, 2019

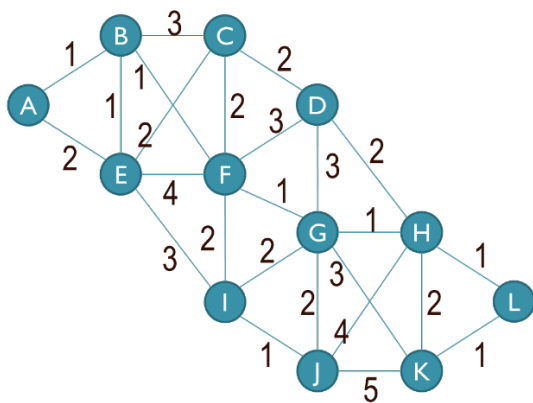## Week 6 – Practical 5

Introduction

This practical can be performed using pen and paper, or any software, as there is no need to write any programming code.

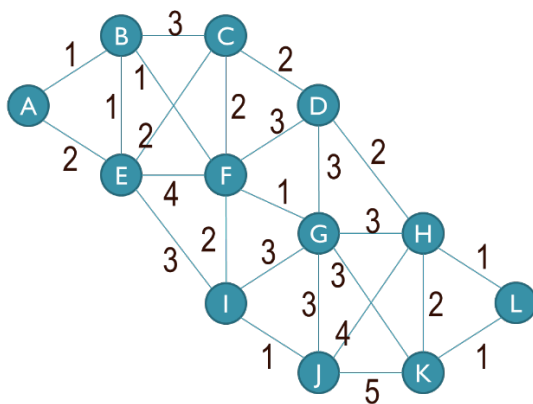This practical is about familiarising yourself with the Greedy algorithm that was presented in class 5.

Task 1

Based on the Greedy algorithm, what is the minimum distance from node A to node L in the following graph?

Task 2

Based on the Greedy algorithm, what is the minimum distance from node A to node L in the following graph?
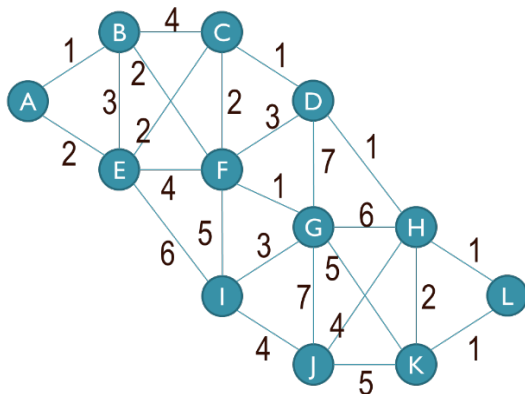
Task 3

Based on the Greedy algorithm, what is the minimum distance from node A to node L in the following graph?

Based on the heuristic of removing edges with highest weights first, what is the minimum distance from node A to node L in the following graph?

What is the actual minimum distance?

Task 4

The following Greedy algorithm for Task Allocation was presented in Class 5.

- Choose the task (T) with the smallest runtime and choose the processor (P) with smallest frequency.
- If the sum of all runtimes for tasks on P, including T, is <= the overall program runtime,
    - allocate T to P
    - otherwise, P is full, and allocate T to another processor that has the smallest frequency

Based on this algorithm and the following data, what is the allocation of tasks to processors that consumes the least energy?

PROGRAM-MAXIMUM-DURATION	7
RUNTIME-REFERENCE-FREQUENCY	2

TASK-ID	RUNTIME
1	1
2	2
3	3
4	4
5	5

PROCESSOR-ID	FREQUENCY
1	1.5
2	2.0
3	2.5

COEFFICIENT-ID	VALUE
0	25
1	-25
2	10

Task 5

As in Task 4, what is the allocation of tasks to processors that consumes the least energy?

PROGRAM-MAXIMUM-DURATION	5
RUNTIME-REFERENCE-FREQUENCY	2
TASK-ID	RUNTIME
1	5
2	4
3	3
4	2
5	1
PROCESSOR-ID	FREQUENCY
1	2.0
2	3.0
3	4.0
COEFFICIENT-ID	VALUE
0	25
1	-25
2	10

Task 6

As in Task 4, what is the allocation of tasks to processors that consumes the least energy?

PROGRAM-MAXIMUM-DURATION	6
RUNTIME-REFERENCE-FREQUENCY	2
TASK-ID	RUNTIME
1	1
2	1
3	2
4	2
5	3
6	3
7	4
PROCESSOR-ID	FREQUENCY
1	1.8
2	2.5
3	2.8
4	3.5
COEFFICIENT-ID	VALUE
0	25
1	-25
2	10

Task 7

As in Task 4, what is the allocation of tasks to processors that consumes the least energy?

PROGRAM-MAXIMUM-DURATION	10
RUNTIME-REFERENCE-FREQUENCY	2
TASK-ID	RUNTIME
1	1
2	1
3	1
4	2
5	2
6	2
7	3
8	3
9	3
10	4
11	4
12	5
13	5
14	6
15	6
PROCESSOR-ID	FREQUENCY
1	1.5
2	1.8
3	2.3
4	2.7
5	3.3
6	3.9
COEFFICIENT-ID	VALUE
0	25
1	-25
2	10

Task 8

In Task 7 above, 15 tasks and 6 processors were used. Ignoring constraints, what is the total number of ways that 15 tasks can be allocated to 6 processors?