CSC 323-32: Project 6 <Dependency Graph > (C++)

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\*\*\*\* Algorithm steps for Dependency Job Scheduling:

Step 0: open input-1 (argv[1]) and input-2 (argv[2]) and output (argv[4])

0.1: numJobs <-- get from input1.

0.2: numProcessor <-- get from argv[3]

0.3: if numProcessor > numJobs

numProcessor <-- numJobs

0.4: Time <-- 1

Step 1: graphHashTable <-- dynamically allocated and initialized of all fields

Step 2: <ni, nj> <-- read from input-1

2.1: job <-- ni & child <-- nj

2.2: newNode <-- create a graphNode for <child>

2.3: push newNode on the top of graphHashTable[index].stackTop

2.4: graphHashTable[job].childCount ++

2.5: graphHashTable[child].fatherCount ++

Step 3: repeat step 2 until input-1 is end of file

Step 4: totalJobTime <-- 0

Step 5: <job, jobTime> <-- read from input-2

5.1: graphHashTable[job].jobTime <-- jobTime

5.2: totalJobTime += jobTime

Step 6: repeat step 5 until input-2 is end of file

Step 7: processorSchedule <-- dynamically allocated and initialized

Step 8: job <-- 1

Step 9: if graphHashTable[job].fatherCount == 0

9.1: orphan <-- job

9.2: newNode <-- create a graphNode for <orphan>

9.3: insert(OPEN, newNode)

9.4: graphHashTable[orphen].fatherCount --

Step 10: job++

Step 11: repeat step 9 - step 10 while job <= numJobs

Step 12: processor <-- 1

Step 13: if OPEN is not empty and processorSchedule[processor][0] <= 0

13.1: availProc <-- processor

13.2: processorSchedule[availProc][0]++

13.3: job <-- remove from Open

13.4: jobTime <-- graphHashTable[job].jobTime

Step 14: slot <-- Time

Step 15: processorSchedule[availProc][slot] <-- job

Step 16: slot ++

Step 17: repeat step 15 to step 16 while slot <= Time + jobTime

Step 18: processor ++

Step 19: repeat step 13 - step 18 while OPEN is \*NOT empty\* and (processor <= numProcessor)

Step 20: Time++

Step 21: processor <-- 1

Step 22: if (processorSchedule[processor][0] > 0) and (processorSchedule[processor][Time] <= 0)

doneJob <-- processorSchedule[processor][Time - 1]

22.1: graphHashTable[doneJob].fatherCount--

22.2: processorSchedule[processor][0] <-- 0

Step 23: processor ++

Step 24: repeat step 22 to 23 while processor <= numProcessor

Step 25: repeat which steps 8 to 24 while Time < totalJobTime

Input

*Dependencies*  *Times*

15 15

1 2 1 1

1 3 2 1

7 3 3 1

9 3 4 1

4 2 5 1

4 6 6 1

4 5 7 1

2 6 8 1

3 6 9 1

3 10 10 1

3 8 11 1

5 13 12 1

8 15 13 1

8 11 14 1

6 11 15 1

6 12

6 13

5 14

12 14

13 13

1 2 1 4

7 3 2 1

9 3 3 3

4 2 4 3

4 6 5 2

4 5 6 2

2 6 7 1

3 10 8 2

3 8 9 2

5 13 10 3

8 11 11 2

6 11 12 4

6 12 13 2

6 13

*Processors*

2

5

40

Output

T1 T2 T3 T4 T5 T6 T7 T8 T9 T10 T11 T12 T13 T14 T15

P1 4 5 9 3 6 12 14 11 0 0 0 0 0 0 0

P2 1 2 7 0 8 15 13 10 0 0 0 0 0 0 0

T1 T2 T3 T4 T5 T6 T7 T8 T9 T10 T11 T12 T13 T14 T15

P1 4 3 6 12 14 0 0 0 0 0 0 0 0 0 0

P2 1 5 8 15 0 0 0 0 0 0 0 0 0 0 0

P3 9 2 10 13 0 0 0 0 0 0 0 0 0 0 0

P4 7 0 0 11 0 0 0 0 0 0 0 0 0 0 0

P5 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0

T1 T2 T3 T4 T5 T6 T7 T8 T9 T10 T11 T12 T13 T14 T15

P1 4 3 6 12 14 0 0 0 0 0 0 0 0 0 0

P2 1 5 8 15 0 0 0 0 0 0 0 0 0 0 0

P3 9 2 10 13 0 0 0 0 0 0 0 0 0 0 0

P4 7 0 0 11 0 0 0 0 0 0 0 0 0 0 0

P5 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0

P6 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0

P7 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0

P8 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0

P9 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0

P10 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0

P11 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0

P12 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0

P13 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0

P14 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0

P15 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0

T1 T2 T3 T4 T5 T6 T7 T8 T9 T10 T11 T12 T13 T14 T15 T16 T17 T18 T19 T20 T21 T22 T23 T24 T25 T26 T27 T28 T29 T30 T31

P1 1 1 1 1 9 9 6 6 12 12 12 12 8 8 11 11 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0

P2 4 4 4 5 5 2 7 3 3 3 10 10 10 13 13 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0

T1 T2 T3 T4 T5 T6 T7 T8 T9 T10 T11 T12 T13 T14 T15 T16 T17 T18 T19 T20 T21 T22 T23 T24 T25 T26 T27 T28 T29 T30 T31

P1 1 1 1 1 2 10 10 10 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0

P2 4 4 4 5 5 6 6 12 12 12 12 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0

P3 9 9 3 3 3 8 8 13 13 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0

P4 7 0 0 0 0 0 0 11 11 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0

P5 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0

T1 T2 T3 T4 T5 T6 T7 T8 T9 T10 T11 T12 T13 T14 T15 T16 T17 T18 T19 T20 T21 T22 T23 T24 T25 T26 T27 T28 T29 T30 T31

P1 1 1 1 1 2 10 10 10 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0

P2 4 4 4 5 5 6 6 12 12 12 12 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0

P3 9 9 3 3 3 8 8 13 13 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0

P4 7 0 0 0 0 0 0 11 11 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0

P5 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0

P6 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0

P7 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0

P8 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0

P9 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0

P10 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0

P11 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0

P12 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0

P13 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0