CS 4104

Fastest-Way Pseudocode — Class Version

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Pseudocode for FASTEST-WAY, the dynamic programming solution[1] of the Assembly-Line Scheduling problem, is found on page 329 in the textbook. The pseudocode for the version of the FASTEST-WAY algorithm developed in class is found in Figure 1. Descriptive comments have been added at the top, and the body of the primary **for** loop (lines 9-16) has been simplified. Array notation has been replaced by mathematical notation with subscripts. And the values returned by the algorithm are explicitly given in the **return** statement (line 22).

```
FASTEST-WAY(a, t, e, x, n)
1   ▷ n is the number of assembly stations in each assembly line
2   ▷ a_ij, where i = 1, 2 and 1 ≤ j ≤ n, is the assembly time for station S_ij
3   ▷ t_ij, where i = 1, 2 and 1 ≤ j ≤ n − 1, is the switching time from S_ij to S3 − i, j
4   ▷ e_i, where i = 1, 2, is the entry time for assembly line i
5   ▷ x_i, where i = 1, 2, is the exit time for assembly line i
6   ▷ returns the computed values f_ij, f*, l_ij, and l*
7   f_1,1 ← e_1 + a_1,1
8   f_2,1 ← e_2 + a_2,1
9   for j ← 2 to n                          ▷ assembly step j
10      for i ← 1 to 2                      ▷ assembly line i
11          do r ← 3 − i                    ▷ the other assembly line
12             do if f_i,j−1 ≤ f_r,j−1 + t_r,j−1
13                   then f_ij ← a_ij + f_i,j−1
14                        l_ij ← i
15                   else f_ij ← a_ij + f_r,j−1 + t_r,j−1
16                        l_ij ← r
17  if f_1n + x_1 ≤ f_2,n + x_2
18    then f* ← f_1n + x_1
19         l* ← 1
20    else f* ← f_2,n + x_2
21         l* ← 2
22  return  f_ij, f*, l_ij, l*
```

Figure 1: The class version of the FASTEST-WAY algorithm for finding the optimal time f^* of an optimal schedule solving an instance of Assembly-Line Scheduling.

[1] Actually, this is the algorithm that computes the optimal values and the back pointers, not the actual optimal schedule.