

SIT323 Practical Software Development, Trimester 2, 2019

Week 8 – Practical 7

Heuristic Algorithms

Introduction

Last week, during Practical 6, you confirmed whether or not particular allocations were valid. You also attempt to determine an allocation using a heuristic that deletes the largest value first.

This week you will attempt to obtain an allocation using different heuristics.

Task 1

Determine an allocation using the following table of runtime data, a program duration of 30 seconds, and the heuristic that:

- keeps the smallest and largest pair of values per processor (such that the sum of values is not greater than the program duration of 30 seconds); and
- working from the slowest to the fastest processor

| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 |
|---|-----|-----|-----|-----|-----|-----|------|------|------|------|------|------|------|------|------|
| 1 | 1.3 | 2.7 | 5.3 | 5.3 | 8.0 | 9.3 | 12.0 | 12.0 | 14.7 | 16.0 | 18.7 | 20.0 | 28.0 | 28.0 | 30.7 |
| 2 | 1.1 | 2.2 | 4.4 | 4.4 | 6.7 | 7.8 | 10.0 | 10.0 | 12.2 | 13.3 | 15.6 | 16.7 | 23.3 | 23.3 | 25.6 |
| 3 | 0.9 | 1.7 | 3.5 | 3.5 | 5.2 | 6.1 | 7.8 | 7.8 | 9.6 | 10.4 | 12.2 | 13.0 | 18.3 | 18.3 | 20.0 |
| 4 | 0.7 | 1.5 | 3.0 | 3.0 | 4.4 | 5.2 | 6.7 | 6.7 | 8.1 | 8.9 | 10.4 | 11.1 | 15.6 | 15.6 | 17.0 |
| 5 | 0.6 | 1.2 | 2.4 | 2.4 | 3.6 | 4.2 | 5.5 | 5.5 | 6.7 | 7.3 | 8.5 | 9.1 | 12.7 | 12.7 | 13.9 |
| 6 | 0.5 | 1.0 | 2.1 | 2.1 | 3.1 | 3.6 | 4.6 | 4.6 | 5.6 | 6.2 | 7.2 | 7.7 | 10.8 | 10.8 | 11.8 |



Task 2


Determine an allocation using the following table of runtime data, a program duration of 30 seconds, and the heuristic that:

- keeps the smallest and largest pair of values per processor (such that the sum of values is not greater than the program duration of 30 seconds); and
- working from the **fastest to the slowest** processor

| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 |
|---|-----|-----|-----|-----|-----|-----|------|------|------|------|------|------|------|------|------|
| 1 | 1.3 | 2.7 | 5.3 | 5.3 | 8.0 | 9.3 | 12.0 | 12.0 | 14.7 | 16.0 | 18.7 | 20.0 | 28.0 | 28.0 | 30.7 |
| 2 | 1.1 | 2.2 | 4.4 | 4.4 | 6.7 | 7.8 | 10.0 | 10.0 | 12.2 | 13.3 | 15.6 | 16.7 | 23.3 | 23.3 | 25.6 |
| 3 | 0.9 | 1.7 | 3.5 | 3.5 | 5.2 | 6.1 | 7.8 | 7.8 | 9.6 | 10.4 | 12.2 | 13.0 | 18.3 | 18.3 | 20.0 |
| 4 | 0.7 | 1.5 | 3.0 | 3.0 | 4.4 | 5.2 | 6.7 | 6.7 | 8.1 | 8.9 | 10.4 | 11.1 | 15.6 | 15.6 | 17.0 |
| 5 | 0.6 | 1.2 | 2.4 | 2.4 | 3.6 | 4.2 | 5.5 | 5.5 | 6.7 | 7.3 | 8.5 | 9.1 | 12.7 | 12.7 | 13.9 |
| 6 | 0.5 | 1.0 | 2.1 | 2.1 | 3.1 | 3.6 | 4.6 | 4.6 | 5.6 | 6.2 | 7.2 | 7.7 | 10.8 | 10.8 | 11.8 |

Task 3

Determine an allocation using the following table of runtime data, a program duration of 30 seconds, and the heuristic that:

- keeps 3 values per processor, two smallest and the largest (such that the sum of these 3 values is not greater than the program duration of 30 seconds); and
- working from the slowest to fastest processor 

| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 |
|---|-----|-----|-----|-----|-----|-----|------|------|------|------|------|------|------|------|------|
| 1 | 1.3 | 2.7 | 5.3 | 5.3 | 8.0 | 9.3 | 12.0 | 12.0 | 14.7 | 16.0 | 18.7 | 20.0 | 28.0 | 28.0 | 30.7 |
| 2 | 1.1 | 2.2 | 4.4 | 4.4 | 6.7 | 7.8 | 10.0 | 10.0 | 12.2 | 13.3 | 15.6 | 16.7 | 23.3 | 23.3 | 25.6 |
| 3 | 0.9 | 1.7 | 3.5 | 3.5 | 5.2 | 6.1 | 7.8 | 7.8 | 9.6 | 10.4 | 12.2 | 13.0 | 18.3 | 18.3 | 20.0 |
| 4 | 0.7 | 1.5 | 3.0 | 3.0 | 4.4 | 5.2 | 6.7 | 6.7 | 8.1 | 8.9 | 10.4 | 11.1 | 15.6 | 15.6 | 17.0 |
| 5 | 0.6 | 1.2 | 2.4 | 2.4 | 3.6 | 4.2 | 5.5 | 5.5 | 6.7 | 7.3 | 8.5 | 9.1 | 12.7 | 12.7 | 13.9 |
| 6 | 0.5 | 1.0 | 2.1 | 2.1 | 3.1 | 3.6 | 4.6 | 4.6 | 5.6 | 6.2 | 7.2 | 7.7 | 10.8 | 10.8 | 11.8 |

Task 4

Determine an allocation using the following table of runtime data, a program duration of 30 seconds, and the heuristic that:

- keeps 3 values per processor, two smallest and the largest (such that the sum of these 3 values is not greater than the program duration of 30 seconds); and
- working from the **fastest to the slowest** processor

| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 |
|---|-----|-----|-----|-----|-----|-----|------|------|------|------|------|------|------|------|------|
| 1 | 1.3 | 2.7 | 5.3 | 5.3 | 8.0 | 9.3 | 12.0 | 12.0 | 14.7 | 16.0 | 18.7 | 20.0 | 28.0 | 28.0 | 30.7 |
| 2 | 1.1 | 2.2 | 4.4 | 4.4 | 6.7 | 7.8 | 10.0 | 10.0 | 12.2 | 13.3 | 15.6 | 16.7 | 23.3 | 23.3 | 25.6 |
| 3 | 0.9 | 1.7 | 3.5 | 3.5 | 5.2 | 6.1 | 7.8 | 7.8 | 9.6 | 10.4 | 12.2 | 13.0 | 18.3 | 18.3 | 20.0 |
| 4 | 0.7 | 1.5 | 3.0 | 3.0 | 4.4 | 5.2 | 6.7 | 6.7 | 8.1 | 8.9 | 10.4 | 11.1 | 15.6 | 15.6 | 17.0 |
| 5 | 0.6 | 1.2 | 2.4 | 2.4 | 3.6 | 4.2 | 5.5 | 5.5 | 6.7 | 7.3 | 8.5 | 9.1 | 12.7 | 12.7 | 13.9 |
| 6 | 0.5 | 1.0 | 2.1 | 2.1 | 3.1 | 3.6 | 4.6 | 4.6 | 5.6 | 6.2 | 7.2 | 7.7 | 10.8 | 10.8 | 11.8 |



Task 5

Determine an allocation using the following table of runtime data, a program duration of 30 seconds, and the heuristic that:

- keeps many values per processor, several smallest and the largest (such that the sum of these values is not greater than the program duration of 30 seconds); and
- working from the slowest to fastest processor

| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 |
|---|-----|-----|-----|-----|-----|-----|------|------|------|------|------|------|------|------|------|
| 1 | 1.3 | 2.7 | 5.3 | 5.3 | 8.0 | 9.3 | 12.0 | 12.0 | 14.7 | 16.0 | 18.7 | 20.0 | 28.0 | 28.0 | 30.7 |
| 2 | 1.1 | 2.2 | 4.4 | 4.4 | 6.7 | 7.8 | 10.0 | 10.0 | 12.2 | 13.3 | 15.6 | 16.7 | 23.3 | 23.3 | 25.6 |
| 3 | 0.9 | 1.7 | 3.5 | 3.5 | 5.2 | 6.1 | 7.8 | 7.8 | 9.6 | 10.4 | 12.2 | 13.0 | 18.3 | 18.3 | 20.0 |
| 4 | 0.7 | 1.5 | 3.0 | 3.0 | 4.4 | 5.2 | 6.7 | 6.7 | 8.1 | 8.9 | 10.4 | 11.1 | 15.6 | 15.6 | 17.0 |
| 5 | 0.6 | 1.2 | 2.4 | 2.4 | 3.6 | 4.2 | 5.5 | 5.5 | 6.7 | 7.3 | 8.5 | 9.1 | 12.7 | 12.7 | 13.9 |
| 6 | 0.5 | 1.0 | 2.1 | 2.1 | 3.1 | 3.6 | 4.6 | 4.6 | 5.6 | 6.2 | 7.2 | 7.7 | 10.8 | 10.8 | 11.8 |

Task 6

Determine an allocation using the following table of runtime data, a program duration of 30 seconds, and the heuristic that:

- keeps many values per processor, several smallest and the largest (such that the sum of these values is not greater than the program duration of 30 seconds); and
- working from the **fastest to the slowest** processor

| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 |
|---|-----|-----|-----|-----|-----|-----|------|------|------|------|------|------|------|------|------|
| 1 | 1.3 | 2.7 | 5.3 | 5.3 | 8.0 | 9.3 | 12.0 | 12.0 | 14.7 | 16.0 | 18.7 | 20.0 | 28.0 | 28.0 | 30.7 |
| 2 | 1.1 | 2.2 | 4.4 | 4.4 | 6.7 | 7.8 | 10.0 | 10.0 | 12.2 | 13.3 | 15.6 | 16.7 | 23.3 | 23.3 | 25.6 |
| 3 | 0.9 | 1.7 | 3.5 | 3.5 | 5.2 | 6.1 | 7.8 | 7.8 | 9.6 | 10.4 | 12.2 | 13.0 | 18.3 | 18.3 | 20.0 |
| 4 | 0.7 | 1.5 | 3.0 | 3.0 | 4.4 | 5.2 | 6.7 | 6.7 | 8.1 | 8.9 | 10.4 | 11.1 | 15.6 | 15.6 | 17.0 |
| 5 | 0.6 | 1.2 | 2.4 | 2.4 | 3.6 | 4.2 | 5.5 | 5.5 | 6.7 | 7.3 | 8.5 | 9.1 | 12.7 | 12.7 | 13.9 |
| 6 | 0.5 | 1.0 | 2.1 | 2.1 | 3.1 | 3.6 | 4.6 | 4.6 | 5.6 | 6.2 | 7.2 | 7.7 | 10.8 | 10.8 | 11.8 |