Advanced Algorithms: Homework 1

Abrie Greeff
B.Sc Hons (Computer Science)
Department of Computer Science
University of Stellenbosch

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1 R-5.3

Skedulering van $T = (1,2),(1,3),(1,4),(2,5),(3,7),(4,9),(5,6),(6,8),(7,9)$

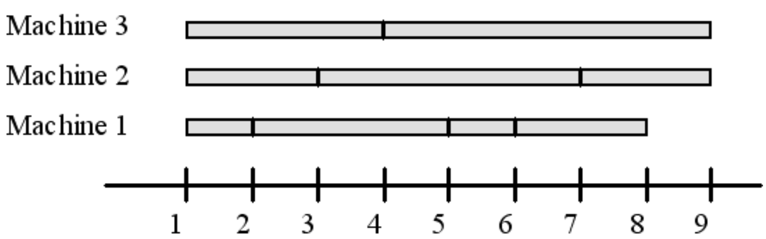

Figure 1: Skedulering van T

2 R-5.4

2.1 (a)

$T(n) = 2T(n/2) + logn$
$a = 2, b = 2$
$n^{log_2 2} = n$
Case 2 met k = 1

$T(n)$ is $O(nlog^2n)$

2.2 (b)

$T(n) = 8T(n/2) + n^2$
$a = 8, b = 2$
$n^{log_2 8} = n^3$
Case 1 met $\epsilon = 1$
$T(n)$ is $\theta(n^3)$

2.3 (c)

$T(n) = 16T(n/2) + (nlogn)^4$
$a = 16, b = 2$
$n^{log_2 16} = n^4$
Case 2 met k = 4
$T(n)$ is $\theta(n^4 log^5 n)$

2.4 (d)

$T(n) = 7T(n/3) + n$
$a = 7, b = 3$
$n^{log_3 7} = n^{1.77124}$
Case 1 met $\epsilon = 0.77124$
$T(n)$ is $\theta(n^{1.77124})$

2.5 (e)

$T(n) = 9T(n/3) + n^3 logn$
$a = 9, b = 3$
$n^{log_3 9} = n^3$
Case 2 met k = 1
$T(n)$ is $\theta(n^3 log^2 n)$

3 R-5.6

Z = XY

$$X = \begin{bmatrix} 3 & 2 \\ 4 & 8 \end{bmatrix} Y = \begin{bmatrix} 1 & 5 \\ 9 & 6 \end{bmatrix}$$

$S_1 = 3(5 - 6) = -3$
$S_2 = (3 + 2)6 = 30$
$S_3 = (4 + 8) = 12$
$S_4 = 8(9 - 1) = 64$
$S_5 = (3 + 8)(1 + 6) = 77$
$S_6 = (2 - 8)(9 + 6) = -90$
$S_7 = (3 - 4)(1 + 5) = -6$

$I = S_5 + S_6 + S_4 - S_2 = 21$
$J = S_1 + S_2 = 27$
$K = S_3 + S_4 = 76$
$L = S_1 - S_7 - S_3 + S_5 = 68$

$$Z = \begin{bmatrix} 21 & 27 \\ 76 & 68 \end{bmatrix}$$

4 R-5.7

$(a + bi)(c + di) = e + fi$
$(ac - bd) + (ad + bc)i = e + fi$

$$\begin{aligned} ac - bd &= e & ad + bd &= f \\ ac - b(c + d) + bc &= e & ad + b(c + d) - bd &= f \\ c(a + b) - b(c + d) &= e & b(c + d) + d(a - b) &= f \end{aligned}$$

Dus om $e + fi$ in slegs drie vermenigvuldig operasies te bereken moet die volgende drie uitgevoer word:

$c(a + b)$
$d(a - b)$
$b(c + d)$

5 R-5.9

Gegee die matrikse: A is 10x5
B is 5x2
C is 2x20
D is 20x12
E is 12x4
F is 4x60

As die greedy method (minste vermenigvuldig operasies) gebruik word om $ABCDEF$ op te los dan word die volgende gekry:

$A \cdot B$
$(A \cdot B) \cdot C$
$((A \cdot B) \cdot C) \cdot (D \cdot E)$
$(((A \cdot B) \cdot C) \cdot (D \cdot E)) \cdot F$
$100 + 400 + 960 + 800 + 2400 = 4660$

Dit sal dus 4660 vermenigvuldig operasies vat om te bereken.

6 P-5.2

6.1 Fractional Knapsack

Om uit te voer tik in *java FraqKnapsack*.

6.2 0-1 Knapsack

Om uit te voer tik in *java Knapsack*.

6.3 Bruteforce 0-1 Knapsack

Om uit te voer tik in *java bruteKnapSack*.