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Assignment 2

**Part 1a)**

T = 30 minutes \* 60 = 1800 seconds

M = 30

C0 = CCPU = 1600

Cfast = 32000

Cslow = 12000

BCPU = 1080

Bfast = 400

Bslow = 600

Vk =

VCPU =

Vfast =

Vslow =

Sk =

SCPU =

Sfast =

Sslow =

Dk = Vk \* Sk

DCPU = 0.675 \* 1 = 0.675

Dfast = 20 \* 0.0125 = 0.25

Dslow = 7.5 \* 0.05 = 0.375

**Part 1b)**

Dsum = 0.675 + 0.25 + 0.375 = 1.3

Dmax = 0.675

z = 12

ABA bound formulas:

**m = 5**

**m = 10**

**m = 20**

**m = 40**

**Part 2b)**

*Modification 1: move all files to fast disk*

DCPU = 0.675

Dslow = 0

Sfast = 0.0125

Vfast =

Dfast = 0.0125 \* 27.5 = 0.344

Dsum = 0.344 + 0 + 0.675 = 1.019

Dmax = 0.675

**m = 5**

4

**m = 10**

**m = 20**

**m = 40**

*Modification 2: Replace the slow disk with a second fast disk*

DCPU= 0.675

Dfast = 0.25

x = 150

Sfast2 =

Dfast2 = 0.094

Dsum = 0.675 + 0.25 + 0.094 = 1.019

Dmax = 0.0675

**m = 5**

4

**m = 10**

**m = 20**

**m = 40**

*Modification 3: Increase the CPU by 50% (with the original disks)*

Dfast = 0.25

Dslow = 0.375

SCPU =

DCPU = 0.45 \* 1 = 0.45

Dsum = 0.25 + 0.375 + 0.45 = 1.075

Dmax = 0.45

**m = 5**

2

**m = 10**

**m = 20**

**m = 40**

*Modification four: Increase the CPU speed by 50% and balance the disk load across two fast disks*

DCPU 0.45

Vfast1 = = = 13.75

Vfast2 = = = 13.75

Dfast1 = 13.75 \* 0.0125 = 0.172

Dfast2 = 13.75 \* 0.0125 = 0.172

Dsum = 0.45 + 0.172 + 0.172 = 0.794

Dmax = 0.45

**m = 5**

**m = 10**

**m = 20**

**m = 40**

**Part 2b)**

*Modifcation 1:*

Dsum = 1.019

m = max[29.63, 1.019]

m = 29.63

*Modification 3:*

m = max[44.44, 1.019]

m = 44.44

**Part 2c)**

Dmax = 0.55

Since Dfast and Dslow are lower than 0.55, 0.55 must be DCPU

DCPU = SCPU \* VCPU

0.55 = SCPU \* 1

SCPU = 0.55

% speedup =

**Part 2d)**

Dmax = 0.3375

Dslow and DCPU are greater than 0.3375. Both need to be sped up.

Dslow = Sslow \* Vslow

0.3375 = Sslow \* 7.5

Sslow = 0.045

% speedupslow =

DCPU = SCPU \* VCPU

0.375 = SCPU \* 1

SCPU = 0.375

% speedupCPU =

**Part 3a)**

Dsum = 12

Dmax = 5

**m = 5**

**m = 10**

**m = 20**

**m = 40**

**Part 3b)**

BJB Bounds Formulas:

**m = 5**

(5 + 3 – 1) \* Davg (5 + 3 – 1) \* Dmax

7 \* 4 7 \* 5

28 35

**m = 10**

(10 + 3 – 1) \* Davg (10 + 3 – 1) \* Dmax

12 \* 4 12 \* 5

48 60

**m = 20**

(20 + 3 – 1) \* Davg (20 + 3 – 1) \* Dmax

22 \* 4 22 \* 5

88 110

**m = 40**

(40 + 3 – 1) \* Davg (40 + 3 – 1) \* Dmax

42 \* 4 42 \* 5

168 210