

ITEC451
Activity 16-3 - Solutions

Let $x_i = 1$ if server i is included in the initial set.

$x_i = 0$ otherwise

Then appropriate IP is

$$\max z = 3x_1 + 2x_2 + 2x_3 + x_4 + 3x_5 + 3x_6 + x_7$$

$$\text{s.t. } x_1 + x_3 + x_5 + x_7 \geq 4 \text{ (service 1)}$$

$$x_3 + x_4 + x_5 + x_6 + x_7 \geq 2 \text{ (service 2)}$$

$$x_2 + x_4 + x_6 \geq 1 \text{ (service 3)}$$

$$x_1 + x_2 + x_3 + x_4 + x_5 + x_6 + x_7 = 5 \text{ (five servers in the initial set)}$$

$$3x_1 + 2x_2 + 2x_3 + x_4 + 3x_5 + 3x_6 + 3x_7 \geq 10 \text{ (CPU power)}$$

$$3x_1 + x_2 + 3x_3 + 3x_4 + 3x_5 + x_6 + 2x_7 \geq 10 \text{ (Memory)}$$

$$x_1 + 3x_2 + 2x_3 + 3x_4 + 3x_5 + 2x_6 + 2x_7 \geq 10 \text{ (Number of users)}$$

$$x_6 + x_3 \leq 1$$

$$-x_4 - x_5 + 2 \leq 2y \quad (\text{If } x_2 > 0 \text{ then } x_4 + x_5 \geq 2)$$

$$x_2 \leq 2(1-y)$$

$$x_2 + x_3 \geq 1$$

$x_1, x_2, \dots, x_7, y$ are all 0-1 variables