Uzochi Dimkpa
Activity Task Graph & Scheduling
ITCS 5145–001
Parallel Computing
Prof. Erik Saule
January 25, 2023

1

- $m = 2, \sum p_i = 38, T_\infty = 20$

$$C_{min}(2) = \frac{\sum p_i}{m} = \frac{38}{2} = \boxed{19},$$

$$C_{max}(2) = \frac{\sum p_i}{m} + T_\infty = \frac{38}{2} + 20 = \frac{38}{2} + 20 = \boxed{39},$$

$$m = 3, \sum p_i = 38, T_\infty = 20$$

$$C_{min}(3) = \frac{\sum p_i}{m} = \frac{38}{3} = \boxed{12\frac{2}{3}},$$

$$C_{max}(3) = \frac{\sum p_i}{m} + T_\infty = \frac{38}{3} + 20 = \frac{38}{3} + 20 = 12\frac{2}{3} + 20 = \boxed{32\frac{2}{3}}$$

Processors	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
$\pi(1)$	A	A	A	C	C	C	C	C	C	C	D	D	D	D	G	G	G	G	G	I			K	K	K
$\pi(2)$	B	B	B	B							E	E	F	H	H	J	J	J	J	J	J			

Processors	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
$\pi(1)$	A	A	A					D	D	D	D	F					I	K	K	K
$\pi(2)$	B	B	B	B				E	E	H	H	J	J	J	J	J	J			
$\pi(3)$	C	C	C	C	C	C	C					G	G	G	G	G				

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- $m = 4, \sum p_i = 56, T_\infty = 10$

$$C_{min}(4) = \frac{\sum p_i}{m} = \frac{56}{4} = \boxed{14},$$

$$C_{max}(4) = \frac{\sum p_i}{m} + T_\infty = \frac{56}{4} + 10 = 14 + 10 = \boxed{24},$$

$$m = 6, \sum p_i = 56, T_\infty = 10$$

$$C_{min}(6) = \frac{\sum p_i}{m} = \frac{56}{6} = \boxed{9\frac{1}{3}},$$

$$C_{max}(6) = \frac{\sum p_i}{m} + T_\infty = \frac{56}{6} + 10 = 9\frac{1}{3} + 10 = \boxed{19\frac{1}{3}}$$

Processors	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
π(1)	M1	M7	N3	N4	N7	P4	P4	P4	P4	P4	T1	C11	T3	C12	C21
π(2)	M2	N1	N5	P1	P1	P1	P1	P1	P5	P5	P5	P5	P5	T2	C22
π(3)	M3	M4	M6	P2	P2	P2	P2	P2	P6	P6	P6	P6	P6		
π(4)	M5	N2	N6	P3	P3	P3	P3	P3	P7	P7	P7	P7	P7		

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Processors	1	2	3	4	5	6	7	8	9	10	11	12	13	14
π(1)	M1	N2	P2	P2	P2	P2	P2	T1	T3	C12				
π(2)	M2	N3	N4	N7	P6	P6	P6	P6	P6	C22				
π(3)	M3	M4	M6	P5	P5	P5	P5	P5	T2					
π(4)	M5	N5	P3	P3	P3	P3	P3	C11						
π(5)	M7	N6	P4	P4	P4	P4	P4							
π(6)	N1	P1	P1	P1	P1	P1	P7	P7	P7	P7	P7	P7	P7	C21

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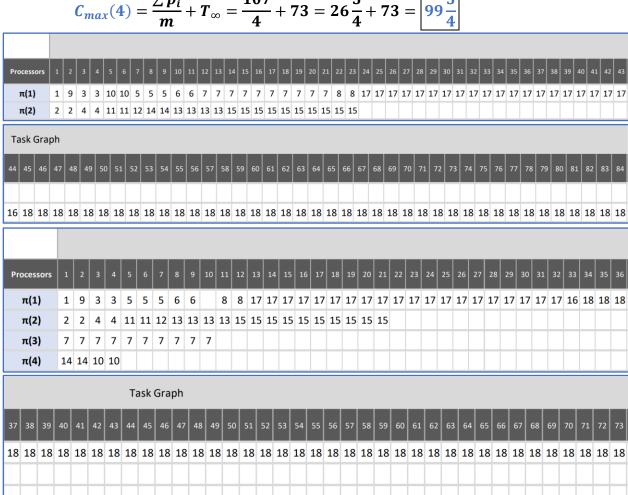January 25, 2023

3

- $m = 2, \sum p_i = 107, T_\infty = 73$

$$C_{min}(2) = \frac{\sum p_i}{m} = \frac{107}{2} = \boxed{53\frac{1}{2}},$$

$$C_{max}(2) = \frac{\sum p_i}{m} + T_\infty = \frac{107}{2} + 73 = 53\frac{1}{2} + 73 = \boxed{126\frac{1}{2}},$$

$$m = 4, \sum p_i = 107, T_\infty = 73$$

$$C_{min}(4) = \frac{\sum p_i}{m} = \frac{107}{4} = \boxed{26\frac{3}{4}},$$

$$C_{max}(4) = \frac{\sum p_i}{m} + T_\infty = \frac{107}{4} + 73 = 26\frac{3}{4} + 73 = \boxed{99\frac{3}{4}}$$

Processors	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43
π(1)	1	9	3	3	10	10	5	5	5	6	6	7	7	7	7	7	7	7	7	7	7	8	8	17	17	17	17	17	17	17	17	17	17	17	17	17	17	17	17	17	17	17	17
π(2)	2	2	4	4	11	11	12	14	14	13	13	13	13	15	15	15	15	15	15	15	15	15	15																				

Task Graph																																									
44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84
16	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18

Processors	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36
π(1)	1	9	3	3	5	5	5	6	6		8	8	17	17	17	17	17	17	17	17	17	17	17	17	17	17	17	17	17	17	17	17	16	18	18	18
π(2)	2	2	4	4	11	11	12	13	13	13	13	15	15	15	15	15	15	15	15	15	15															
π(3)	7	7	7	7	7	7	7	7	7	7	7																									
π(4)	14	14	10	10																																

															Task Graph																						
37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73
18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18

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4

- $m = 3, \sum p_i = 9, T_\infty = 3$

$$C_{min}(3) = \frac{\sum p_i}{m} = \frac{9}{3} = \boxed{3},$$

$$C_{max}(3) = \frac{\sum p_i}{m} + T_\infty = \frac{9}{3} + 3 = 3 + 3 = \boxed{6},$$

$$m = 4, \sum p_i = 9, T_\infty = 3$$

$$C_{min}(4) = \frac{\sum p_i}{m} = \frac{9}{4} = \boxed{4\frac{1}{2}},$$

$$C_{max}(4) = \frac{\sum p_i}{m} + T_\infty = \frac{9}{4} + 3 = 4\frac{1}{2} + 3 = \boxed{7\frac{1}{2}}$$

Processors	1	2	3
π(1)	G	G	G
π(2)	A	C	E
π(3)	B	D	F

Processors	1	2	3
π(1)	G	G	G
π(2)	A	D	
π(3)	B	E	
π(4)	C	F	

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- $m = 3, \sum p_i = 33, T_\infty = 6$

$$C_{min}(3) = \frac{\sum p_i}{m} = \frac{33}{3} = \boxed{11},$$

$$C_{max}(3) = \frac{\sum p_i}{m} + T_\infty = \frac{33}{3} + 6 = 11 + 6 = \boxed{17},$$

$$m = 4, \sum p_i = 9, T_\infty = 6$$

$$C_{min}(4) = \frac{\sum p_i}{m} = \frac{33}{4} = \boxed{8\frac{1}{4}}, 0$$

$$C_{max}(4) = \frac{\sum p_i}{m} + T_\infty = \frac{33}{4} + 6 = 8\frac{1}{4} + 6 = \boxed{14\frac{1}{4}}$$

Processors	1	2	3	4	5	6	7	8	9	10	11	12
π(1)	D	D	D	D	D	G	G	G	G	G	G	
π(2)	B	B	B	B	E	E	E	E	E	A	A	A
π(3)	C	C	C	C	F	F	F	F	F	F		

Processors	1	2	3	4	5	6	7	8	9
π(1)	G	G	G	G	G	G	A	A	A
π(2)	F	F	F	F	F	F			
π(3)	E	E	E	E	E	C	C	C	C
π(4)	D	D	D	D	D	B	B	B	B