CSc 841: Computer Performance Evaluation

Dr. Jozo Dujmović

HOMEWORK: Exponential queuing models

Hin lok Chan

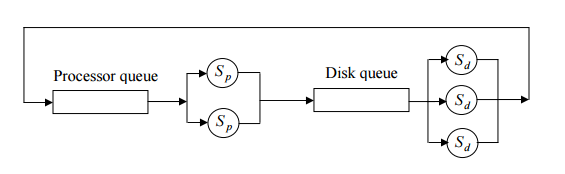
Fall 16, 12/7/16

1.a

U

^

2^



U

2Uu

3Uu

3Uu

^

2^

2^

Processer idol

^ = 1/Sp, U=1/Sd

1-U = p4+1/2p3

p0 2^=p1U, p1 = 2qp0, q = ^/u = 2

p1 2^=p22U, p2=qp1 =2q^2p0

p2 2^=p33U, p3=2/3qp2 = 4/3q^3p0

P3 ^=p44U, p4=1/4qp3 = 1/3q^4p0

P0+p1+p2+p3+p4 =1

P0 ( 1+2Q+2Q^2+4/3q^3+1/3q^4) = 1

P0 = 1/1+2Q+2Q^2+4/3q^3+1/3q^4

P4 = q^4/3(1+2Q+2Q^2+4/3q^3+1/3q^4)

P3 = 2q^3/3(1+2Q+2Q^2+4/3q^3+1/3q^4)

U = 1-p4-1/2p3 = 1-q^4+2Q^3/3(1+2Q+2Q^2+4/3q^3+1/3q^4)

U = 3(1+2Q+2Q^2+4/3q^3+1/3q^4) - q^4+2q^3/3(1+2q+2q^2+4/3q^3+1/3q^4)

= 3+6q+6q^2+4q^3+q^4 –q^4-2q^3 /3(1+2q+2q^2+4/3q^3+1/3q^4)

= 3+6q+6q^2+2q^3/3(1+2q+2q^2+4/3q^3+1/3q^4) = 3+12+24+16/3(1+4+8+32/3+16/3) =55/87 = 0.63

b) s= 10min, z=20min

R = n of program \*S /n of cpu \*U –Z = 4\*10/2\* 0.63 -20 = 40/1.26 -20 = 31.7 – 20 = 11.74min

C

U

2Uu

3Uu

3Uu

^

^

^

^

^ = 1/Sp, U=1/Sd

1-U = p4

p0 ^=p1U, p1 = qp0, q = ^/u = 2

p1 ^=p22U, p2=1/2qp1 =1/2q^2p0

p2 ^=p33U, p3=1/3qp2 = 1/6q^3p0

P3 ^=p44U, p4=1/4qp3 = 1/24q^4p0

P0+p1+p2+p3+p4 =1

P0 ( 1+q+1/2q^2+1/6q^3+1/24q^4) = 1

P0 = 1/( 1+q+1/2q^2+1/6q^3+1/24q^4)

P4 = q4/24( 1+q+1/2q^2+1/6q^3+1/24q^4)

1-U = p4, u = 1-p4 = 24( 1+q+1/2q^2+1/6q^3+1/24q^4)-q4/24( 1+q+1/2q^2+1/6q^3+1/24q^4)

= 24+24q+12q^2+4q^3/24( 1+q+1/2q^2+1/6q^3+1/24q^4)

=24+48+48+32/24(1+2+2+8/6+16/24) = 152/168 = 0.90

R = 4\*10/.90 – 20 = 44-20 = 22min

2a

^

2^

3^

4^4^

5^

6^

2Uu

2Uu

U

2Uu

2Uu

2Uu

^ = 1/Sp, U=1/Sd

1-U = P0 + 1/2p1

p0 6^=p1U, p1 = 6qp0, q = ^/u = 4

p1 5^=p22U, p2=5/2qp1 =15q^2p0

p2 4^=p32U, p3=2qp2 = 30q^3p0

p33^=p42U, p4=3/2qp3=45/2q^4p0

p42^=p52U, p5= 1qp4=45/2q^5p0

p5^=p62U, p6=1/2qp5=45/4q^6p0

P0+p1+p2+p3+p4+p5+p6 =1

P0 (1+6q+15q^2+30q^3+45/2q^4+45/2q^5+45/4q^6) =1

P0 = 1/(1+6q+15q^2+30q^3+45/2q^4+45/2q^5+45/4q^6)

P1 = 6q/(1+6q+15q^2+30q^3+45/2q^4+45/2q^5+45/4q^6)

1-U = 1+3q/(1+6q+15q^2+30q^3+45/2q^4+45/2q^5+45/4q^6)

U = 1-1+3q/(1+6q+15q^2+30q^3+45/2q^4+45/2q^5+45/4q^6)

= 1+6q+15q^2+30q^3+45/2q^4+45/2q^5+45/4q^6-1-3q/

(1+6q+15q^2+30q^3+45/2q^4+45/2q^5+45/4q^6)

=3q+15q^2+30q^3+45/2q^4+45/2q^5+45/4q^6/(1+6q+15q^2+30q^3+45/2q^4+45/2q^5+45/4q^6)

= 12+240+1920+5670+23040+46080/1+24+240+1920+5670+23040+46080 = 76962/76975 = 0.99

R = n of ws \*S /n of cpu \*U –Z = 6\*2 /2 – 8 = 2sec( servers time)

b)

^ = 1/Sp, U=1/Sd

1-U = P0

p0 6^=p1U, p1 = 6qp0, q = ^/u = 8

p1 5^=p2U, p2=5qp1 =30q^2p0

p2 4^=p3U, p3=4qp2 = 120q^3p0

p33^=p4U, p4=3qp3=360q^4p0

p42^=p5U, p5= 2qp4=720q^5p0

p5^=p6U, p6=qp5=720q^6p0

P0+p1+p2+p3+p4+p5+p6 =1

P0(1+6q+30q^2+120q^3+360q^4+720q^5+720q^6) = 1

P0= 1/(1+6q+30q^2+120q^3+360q^4+720q^5+720q^6)

1-u = p0, U = 1-po

= 6q+30q^2+120q^3+360q^4+720q^5+720q^6/(1+6q+30q^2+120q^3+360q^4+720q^5+720q^6)

=48+1920+61440+1474560+23592960+188742680/(1+48+1920+61440+1474560+23592960+188742680) = 1

R = 6\*1/1 -8 = 2s ( servers time)

#include <ctime>

#include <cstdlib>

#include <iostream>

#include <cmath>

#include <fstream>

using namespace std;

int main()

{

int s = 2, z = 8;

int m = 2;

int num;

for( int i = 0; i <= 30; i++)

{

cout << i<<" ";

if((i\*s)/m -z > s) num=(i\*s)/m -z;

else num = s;

cout << num<<endl;

}

}

0 2

1 2

2 2

3 2

4 2

5 2

6 2

7 2

8 2

9 2

10 2

11 3

12 4

13 5

14 6

15 7

16 8

17 9

18 10

19 11

20 12

21 13

22 14

23 15

24 16

25 17

26 18

27 19

28 20

29 21

30 22

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Process exited with return value 0

Press any key to continue . . .

With 2 cpu

0 1

1 1

2 1

3 1

4 1

5 1

6 1

7 1

8 1

9 1

10 2

11 3

12 4

13 5

14 6

15 7

16 8

17 9

18 10

19 11

20 12

21 13

22 14

23 15

24 16

25 17

26 18

27 19

28 20

29 21

30 22

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Process exited with return value 0

Press any key to continue . . .

One cpu with double time

b) both curves looks like the same, but the response time of curve two shows that the second system use only half server time before n = 9.

So b is better.

C n\* = n of cpu (z+s/s) = 1(8+1/1) = 8, which same as the graph , and the response time for n=30 is 22s, with is 3n\* and 22 time of serve time.