

5) The application may be simply more suitable for multiple child process:

- Application may require pass messages
- " " " " copying memory without changing it.
- " " " " copying the memory state.
- Application may be divided to multiple children.

$$\begin{aligned}
 6) \quad & f(8) = 1 \quad f(6) = 1 + f(8) \\
 & f(4) = 1 + f(6) + f(8) \dots \\
 & f(0) = 1 + f(2) + f(4) + f(6) + f(8) \\
 & f(8) = 1 \quad f(6) = 2 \quad f(4) = 4 \quad f(2) = 8 \\
 & f(0) = 16
 \end{aligned}$$

$$(31+1) \times 2 = \boxed{64}$$

7) $\underset{1}{\text{main}} \quad \underset{2}{x = \text{fork}();} \quad \underset{3}{\text{fork}();} \quad \underset{4}{\text{fork}();}$

$\boxed{4}$

$$8) \quad \frac{1}{0.2 + (0.8)/16} = \boxed{4}$$

9)

P1 P2
 x y x y
 500 75 100 200
 K L

5000, 7000
 100, 260
 1000, 500
 1000, 200
 5000, 7000
 1000, 500
 1000, 7000

10)
 a)

FCFS:

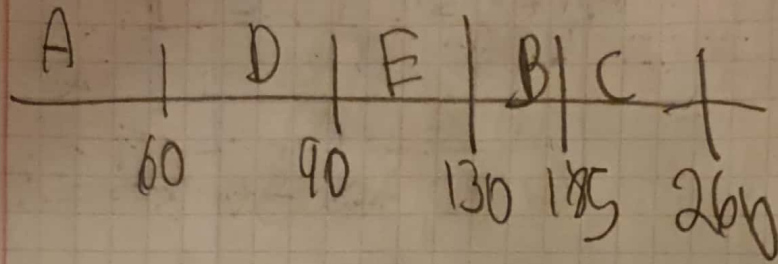
Waiting Time

Finish Time

A	0	60
B	$115 - 15 - 55 = 45$	$60 + 75 = 115$
C	$190 - 100 = 90$	$115 + 75 = 190$
D	$220 - 75 = 145$	$190 + 30 = 220$
E	$260 - 95 = 165$	$220 + 40 = 260$

A	B	C	D	E
0	45	90	145	165
60	115	190	220	260

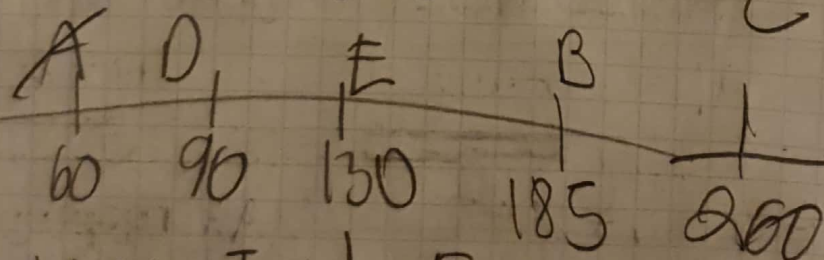
b) SJF:



SJF	Waiting Time	Finish Time
A	0	60
B	$185 - 15 - 55 = 115$	185
C	$260 - 100 = 160$	260
D	$90 - 75 = 15$	90
E	$130 - 95 = 35$	130

c) SRJF:

A 45 C: 35
B 55 B 55



SRJF	Waiting Time	Finish Time
A	0	60
B	115	185
C	160	260
D	15	90
E	35	130

~~A | A | B | A | C | B | A | D | C | E | B | A |~~
 10 20 30 40 50 60 70 80 90 100 110 120
~~| D | C | E | B | A | D | C | E | B | C | F |~~
 120 130 140 150 160 170 180 190 200 210 220 230
~~| B | C |~~
 230 235 240

1) a) FCFS 0 N N+(N-1) N+(N-1)... +1

$$\frac{N(N+1)(2N+1)}{6} - \frac{N(N+1)}{2} = \frac{N(N+1)[(2N+1)/6 - 3/6]}{1}$$

$$N + (N-1) + \dots + 3 + 2 = \text{MAX response time}$$

1 1+2 1+2+3 1+2+...+(N-1)

CamScanner ile tarandı

$$AVG = N(N+1)/2 - (N-1)(2N-1)/6$$

$$\frac{N^2+N}{2} - \frac{2N^2-3N+1}{6}$$

$$\frac{3N^2+3N-2N^2+3N-1}{6}$$

$$\frac{N^2+6N-1}{6} = AVG$$

6, $(N-1)N/2 = \text{Max Response Time}$

c) RR

$N \quad N-1 \quad 3 \quad 2 \quad 1: N-1 \quad 2: N-1+N-2$
 $N: N-1+N-2+\dots+1$

$$(N-1)N(2N-1)/6 - 1 + (N-1)N/2$$

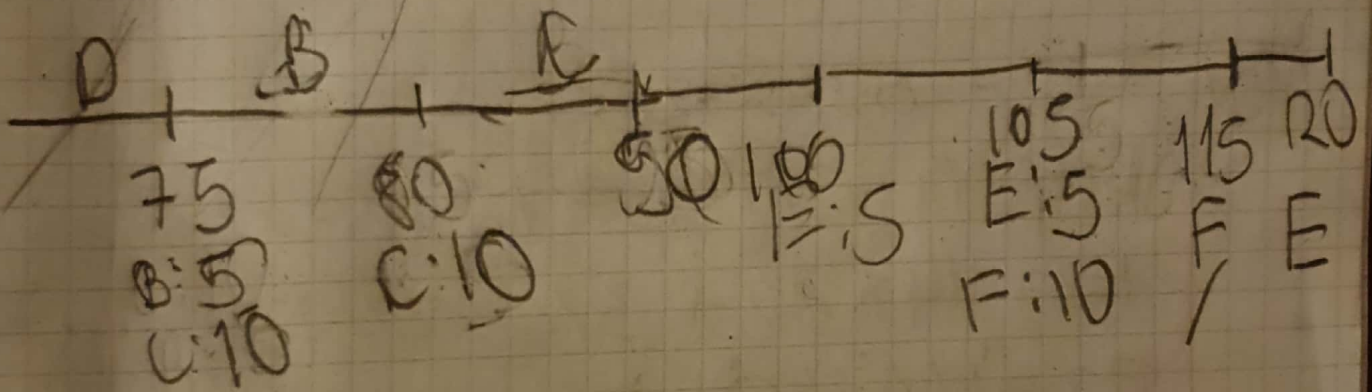
$$\frac{(N-1)(2N-1)}{6} - \frac{1}{N} + \frac{(N-1)N}{2}$$

$$\frac{2N^2-3N+1}{6} + \frac{3N-3}{6} - \frac{1}{N}$$

$$\frac{2N^2-2}{6} - \frac{1}{N} = \frac{2N^3-2N-6}{6N} = \text{AVG Time}$$

$N-1: \text{max response time}$

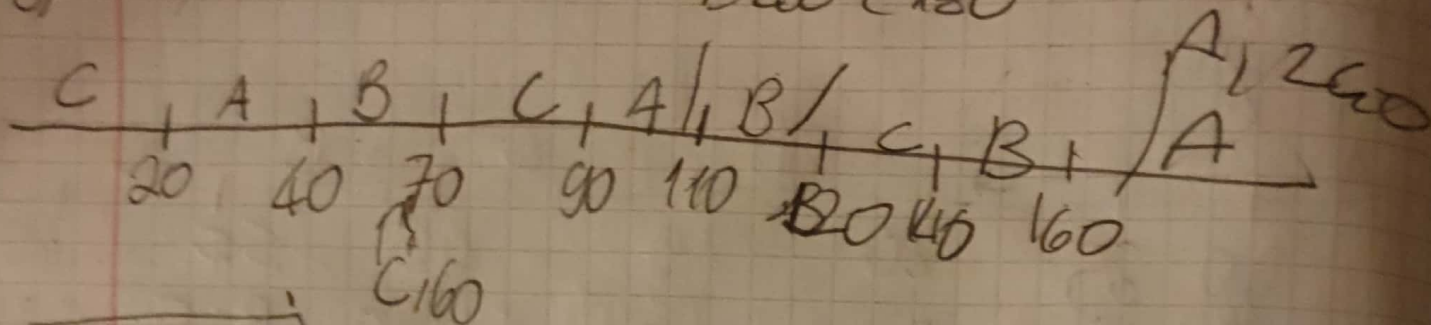
~~A~~
 A — B B C B C
 20 25 30 35 45 55 60
 A B:25 B:20 C:25 C:15 B:5 C:10
 C:25 B:15 B:15 C:15 B:5
 D:15



CamScanner ile tarandı

13)

B 260 C 180



A: 180
B: 160
C: 140

14) $E_0 = 20, T_0 = 30$

$$E_1 = 30/4 + 3/4 \times 20 = 7.5 + 15 = 22.5$$

$$E_2 = 1/4 \times 20 + 3/4 \times 22.5 = 21.875$$

$$E_3 = 1/4 \times 40 + 3/4 \times 21.875 = 26.40625$$

15) int count = x;

condition Ci

void wait()

{ wait(mutex);

count--;

if (count < 0)

{ C.wait();

signal(mutex);

}

void signal()

{ wait(mutex);

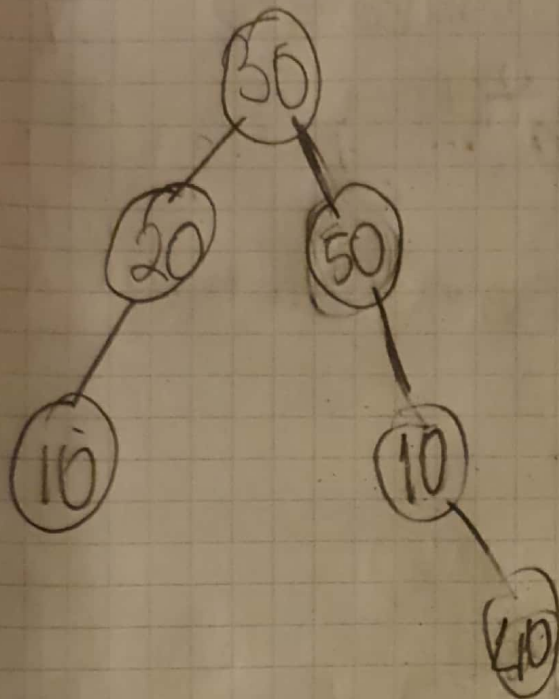
count++;

signal(C);

signal(mutex);

}

16) Just create, pre conditions



40, 10, 50, 10, 20, 30

40, 10, 10, 50, 20, 30

40, 10, 20, 10, 50, 30

40, 10, 10, 20, 50, 30

10, 20, 40, 10, 50, 30

10, 40, 20, 10, 50, 30

10, 40, 10, 20, 50, 30

10, 40, 10, 50, 20, 30

17)

semaphore $ag = 1$
semaphore $makeC[3] = \{0\}$

maker()

do {

wait(make[index]);

signal(ag);

makeCigarette();

} while (TRUE);

giver()

do {

wait(ag);

index = chooseASmoker();

signal(make[index]);

} while (TRUE);