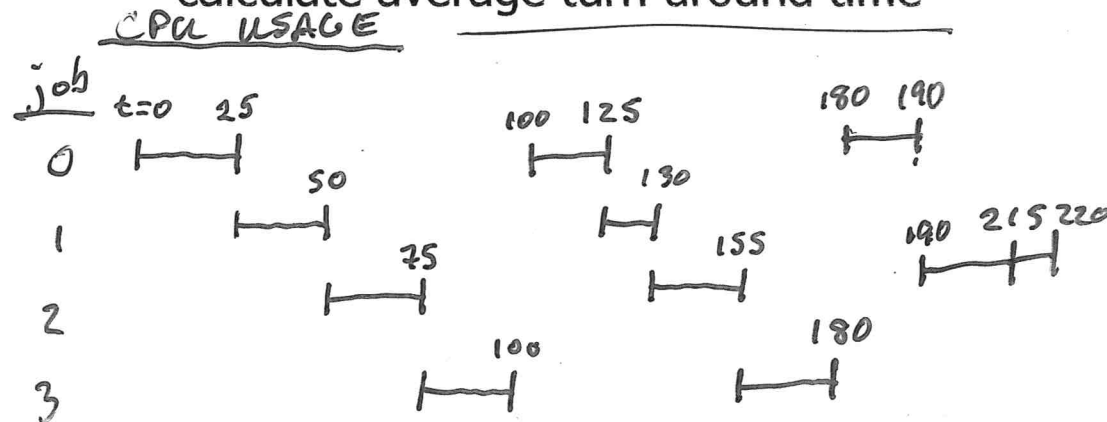


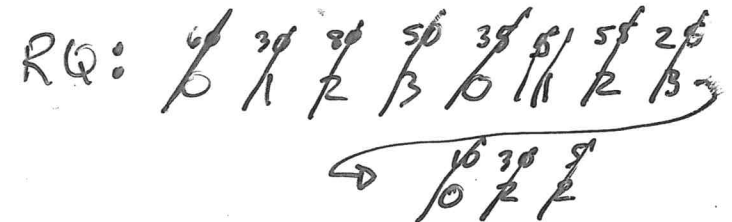
Round Robin Example 1

- time slice = 25, overhead is ignored
- all threads already exist in queue
- 4 threads with service times are $P0=60$, $P1=30$, $P2=80$, $P3=50$
- we want to:

- draw a gantt chart showing cpu usage
- calculate average wait time
- calculate average turn-around time



Front



Start

// time job first changes to Running

Arrival = ϕ // time job was avail to execute (put in READY).

$$wait_i = start_i - arrival$$

<u>job</u>	<u>start</u>	<u>arrival</u>	$wait_i$
0	0	- 0	= 0

1	25	- 0	= 25
---	----	-----	------

2	50	- 0	= 50
---	----	-----	------

3	75	- 0	= 75
---	----	-----	------

$$avg\ wait = \frac{150}{4} = 37.5.$$

$$T_{ndi} = finish - arrival.$$

0	190	- 0	= 190
---	-----	-----	-------

1	130	- 0	= 130
---	-----	-----	-------

2	220	- 0	= 220
---	-----	-----	-------

3	180	- 0	= 180
---	-----	-----	-------

$$avg\ T_{nd} = \frac{720}{4} = \underline{\underline{180}}$$

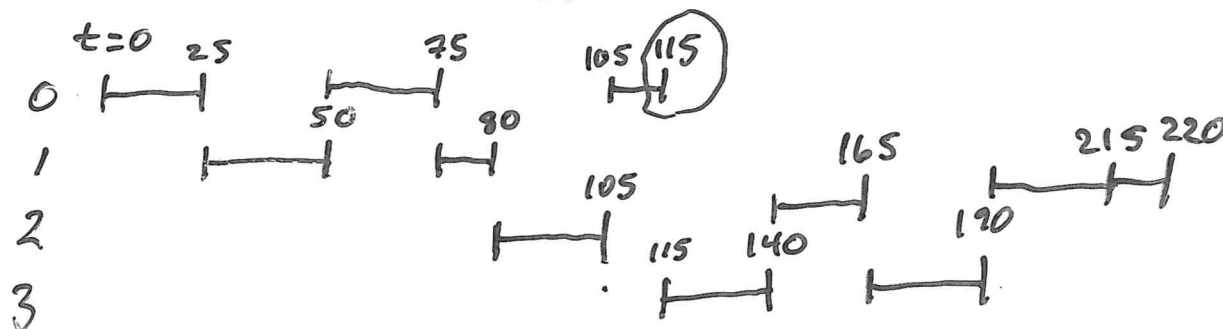
Round Robin Example 2

- same time slice and processes as example 1
- add variable arrival times, as follows:

$$\underline{TS = 25}$$

i	t(p _{ij})	Arrival
0	60	0
1	30	10
2	80	60
3	50	100

RQ: ~~60~~ ~~30~~ ~~35~~ ~~5~~ ~~10~~ ~~10~~ ~~50~~ ~~55~~ ~~25~~ ~~30~~ ~~5~~

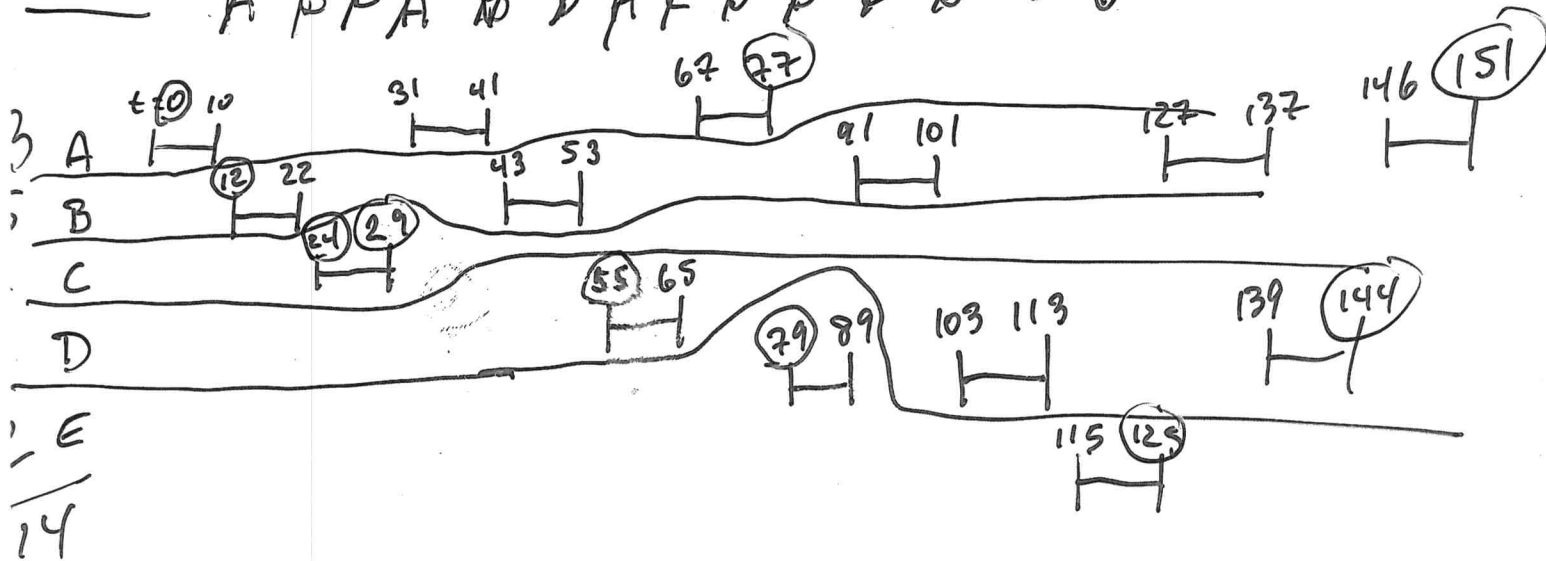


~~AVG. WAIT~~ AVG. TURN

Comp 4735

JOB	FINISH	ARRIVAL	
0	115	0	= 115
1	80	10	= 70
2	220	60	= 160
3	190	100	= 90

Req: 30 45 9 20 35 25 10 20 25 15 10 15 0 0
 A B C A B D A E B D E B D B



$$wait_i = start_i - arrive_i = wait_i$$

0	-	0	=	0
12	-	5	=	7
24	-	5	=	19
55	-	30	=	25
79	-	50	=	29

$$Avg\ wait = 80/5 = 16$$

TRMD

finish - arrive

77	-	0	=	77	*
151	-	5	=	146	
29	-	5	=	24	
144	-	30	=	114	
125	-	50	=	75	

$$Avg\ TRMD = \frac{Sum(*)}{5} = 87.2$$

Multi-level Example 1

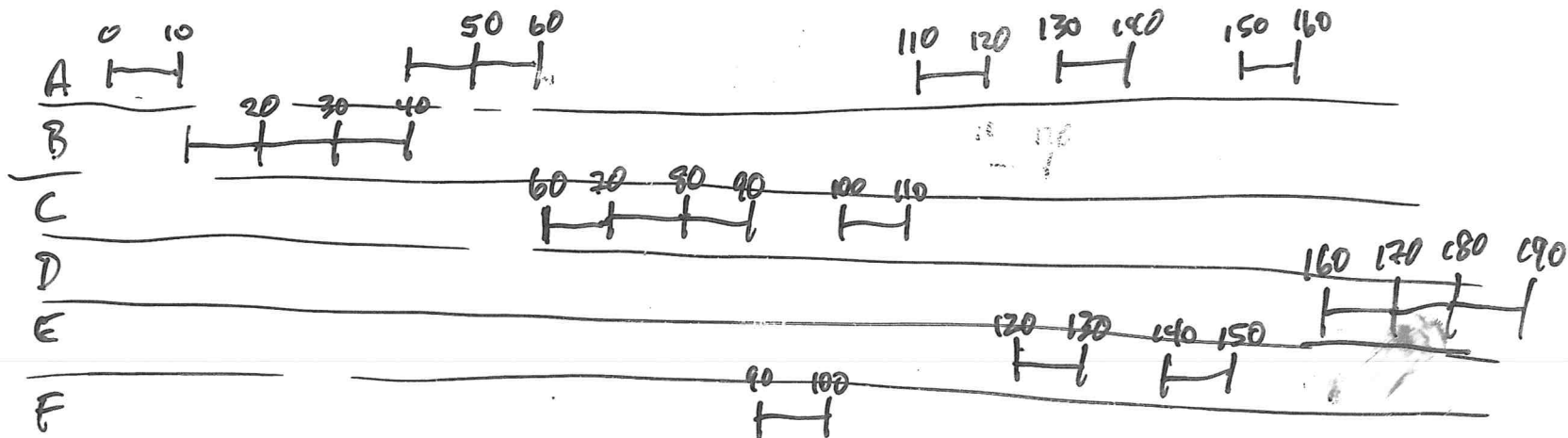
- assume you have a multi-level queue with ~~4~~ levels
- the *BSD scheduling model* is used
- assume the *time quantum* is 10, and ignore overhead

	i	t(p _{ij})	Arrival	Priority
A	0	60	0	3
B	1	30	10	2
C	2	40	60	1
D	3	30	75	4
E	4	20	85	3
F	5	10	90	1

RQ: 1
2
3
4

Handwritten notes for Round Robin (RQ) scheduling:

- Level 1: A (0-10), B (10-20), C (20-30), D (30-40), E (40-50), F (50-60)
- Level 2: A (60-70), B (70-80), C (80-90), D (90-100), E (100-110), F (110-120)
- Level 3: A (120-130), B (130-140), C (140-150), D (150-160), E (160-170), F (170-180)
- Level 4: A (180-190), B (190-200), C (200-210), D (210-220), E (220-230), F (230-240)



WAIT

A	0	-	0	= 0
B	10	-	10	= 0
C	60	-	60	= 0
D	160	-	75	= 85 85
E	120	-	85	= 35
F	90	-	90	= 0