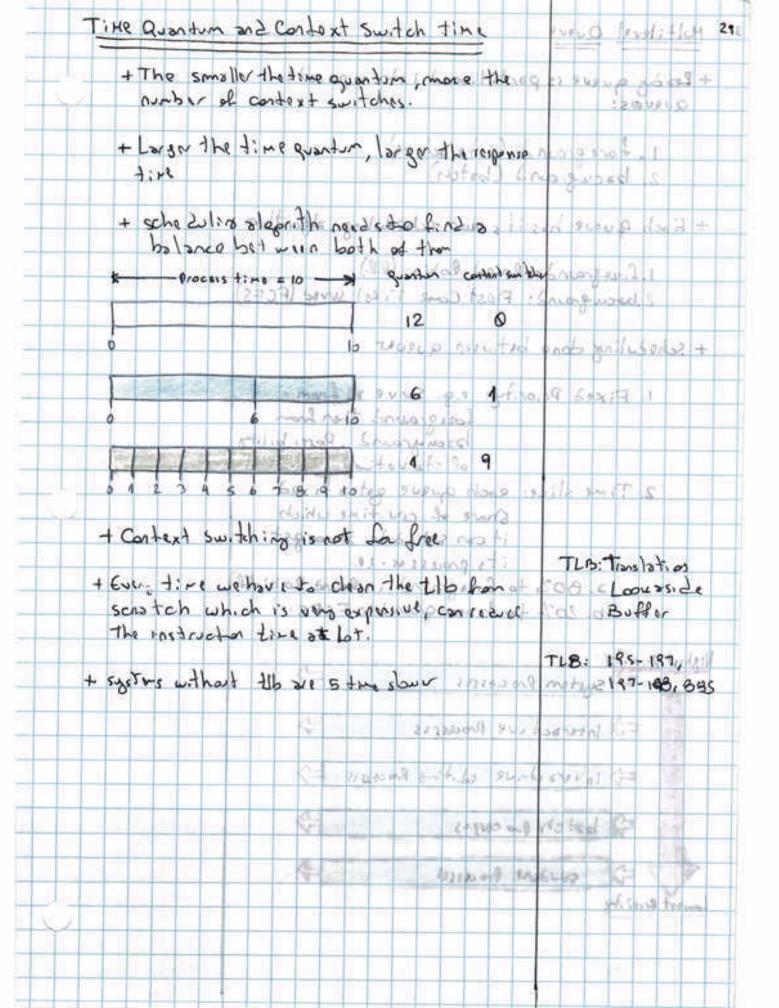
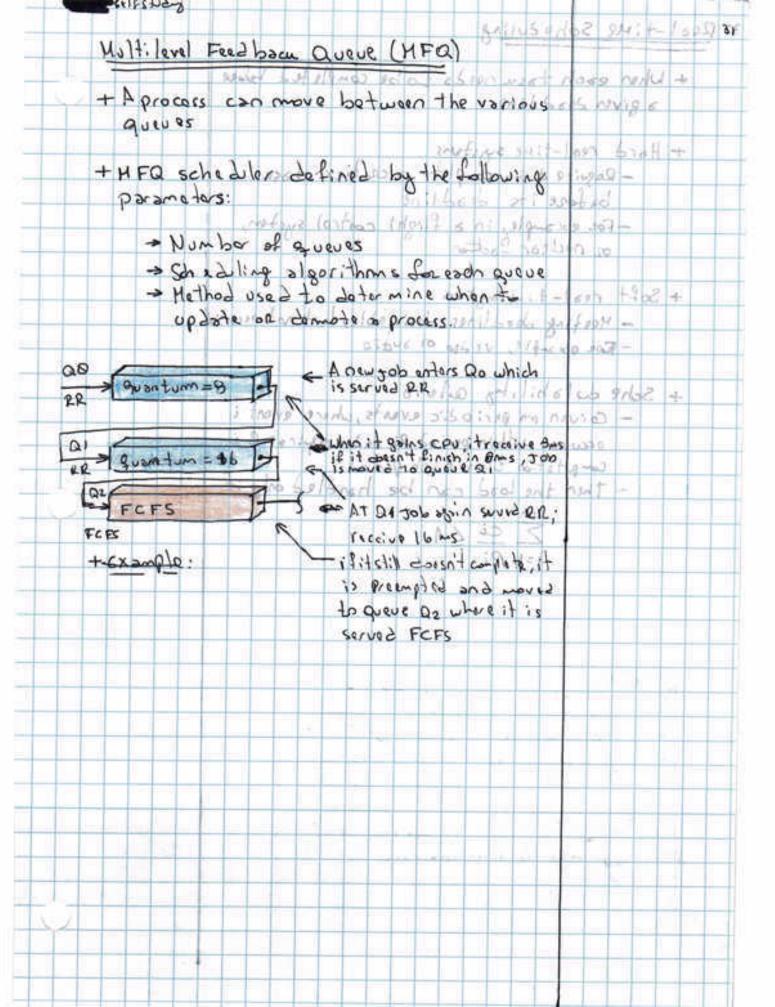


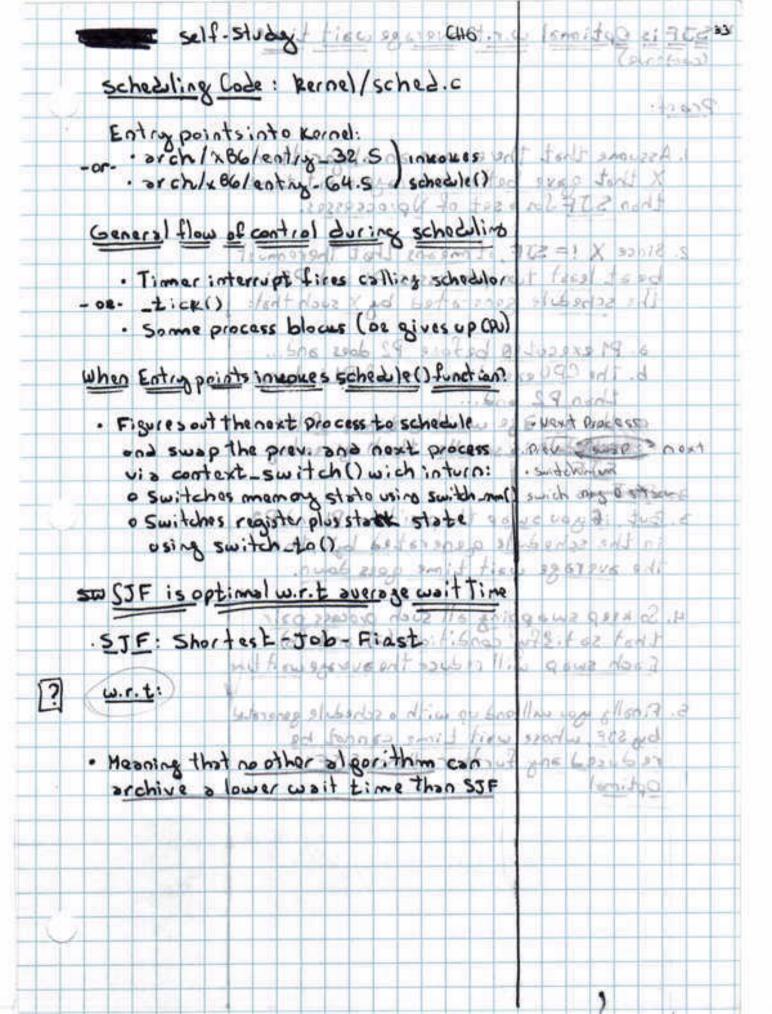
+ Each process get semal) and of CPU time (time quarker) (usually between 10 to 100 ms) + Alter this time has elap sace, the process is present pied and added to the end of the ready quarker is quarker in the ready quarker and the time quantum is quarker such process get 1 of the CPU time in Chances of at most than the units at answ. We process with most than the units at answ. + Du harmer of saccess the trong and the control of	18 Round Robin (RR)	* Carl
+ Each process get some) and of CPU time (time guarders) (usually bedieve a lot of 100 ms) + After this time has elap see, the process is prior peed and a dead to the cird of the ready grander in + I there are a processes in the ready give e and the time granders in the ready give and the time granders in the ready give at time units at east. Is process wait more than (n-1) q time years. + Du harmer of lawyers tipe q small so the much coded switchers - y + The first output would come faster in Rand Robbin 100 ms tycouse some process will run earlier example suggest to have to process sitting in dager we could give the same to have to examp process the process in the code give the same and example process the process in the code give the same and example process the process in the code give the same and example process the process in the code give the same and example process the process in the code give the same and example process the process in the code give the same and example process the process in the code give the same and example process the process in the code give the same and example process the process in the code give the same and example process the process in the code give the same and example give the same and exam	=	+ libata -not-du
the equation) will bottoke to to tooms! + Alter this time has elegated the process is promposed and salid to the end of the readup overes in the ready quare and the live quantum is quarter than by git I of the courting in changs of at most (n-1) quarter units. + De humanes of large as tipe quarter than of the first output would come asolar in hand Robbin to the court of the process will run earlier the first output would come asolar in hand Robbin to the court of the process will run earlier the court of the salid processes sitting in dage. Example Suppose we have to processes sitting in dage. The first output would come asolar in the warrestart the court of the salid is a day precess that the man are the process. The court of the salid is a day processes at the process. The court of the salid is a day precess affecting in dage. The court of the salid is a day precess that the man are the process. The court of the court of the salid is a salid in the salid in	C I consider that assume the account the constant	4 4 4 7 10
+ Alter this time has eleptice. The process is prior pied and addice to the end of the ready queue of the ready queue of the ready queue and the live quantum is q there each process get I of the countine in chance of at mate a time units at ones. In process want more than (n-1) q time units. + De lamance q large as tipo q small as the much control switching to process some process will run earlier the first output would come faster in flound Robin of livesure some process will run earlier Example Suprace we have la processes sitting in days we could give the same the day processes sitting in days fully read as given the day of the day of process the time process through politic is if the run of the westernish very large it will two of large time process gent time PI 53 PI 17 PI 53 PI 18 Para R 28 Para R 29 PI 24 the colleging highly average turn around than STF.	1 1 2 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	1 + 8++
+ Alter this time has elapsed, the process is preme peed and alter the end of the ready quarter + If there are a processes in the ready quare and the time quantum is q that each process get 1 of the counting in Changs of street get 1 of the counting in Changs of street (n-1) q time units. + De la more of garge as tipe q small as the much control switching to preme units. + The first output would come faith in Rand Robin at because some premisual run assist the could give the same in precesses sitting in days we could give the same its only precess the gard the same presents the only politic is if the country precess is the gard of the same precess the only politic is if the country that was same precess the only politic is if the country that is process the only politic is if the country that same process	(Tire of Sugar	Sund Sunda Start
prempted and added to the end of the ready quarter the ready quarter + If there are a processes in the ready quarter and the time quantum is q there each process get 1 is the contine in Charles of at most get in units at ears. It process was more than a time units at ears. It process was more than by (a-1) q time units. + Du harmer q dagge as tipo q small as two much control switcher p small as two much control switcher the first output would come faster in Rand Dobin as because some process will run earlier the first output would come faster in Rand Dobin as because some process will run earlier the first output would come faster in Rand Dobin as because some process will run earlier the first output would come faster in Rand Dobin as because some process will run earlier the first output would come faster in Rand Dobin as because some process will run earlier the first output would come faster in Rand Dobin as because some process will run earlier the first output would come faster in Rand Dobin as because some process will run earlier the first output would come faster in Rand Dobin as because some process will run earlier the first output would come faster in Rand Dobin as because some process will run earlier the first output would come faster in Rand Dobin as because some process will run earlier the first output would come faster in Rand Dobin as because some process will run earlier the first output would come faster in Rand Dobin as because some process will run earlier the first output and the first output as a second of the first output and the first		
the ready graviant the ready quale 1 If there are a processes in the ready quale 2 2 1 If the Contine is q that each process 2 1 If the Contine in Chans at them 2 1 In the Contine in Chans at them 3 1 In the Contine in Chans at them 4 1 In the Contine 4 1 In the Contine 5 1 In the Contine 6 In the Contine 6 1 In th	+ Alter This Time has elap sea, the process is	11 - 10 9 0 1
+ If there are a processes in the ready queve and the tire quantum is q that each process get I at the contine in Changs of it must be get I at the contine in Changs of it must be get I at the contine in Changs of it must be get I at the contine in Changs of it must be get I at the contine in process with more than a the prince of the contine in the more than a prince of the contine in the processes of the pin days to could give the so there is a series presented the many process process of the solution of the contine in the process process of the contine in the processes of the pin above the could give the solution of the contine in the process process of the solution of the contine in the process the contine is given to the transport of the contine in the process the contine is given to the transport of the contine in the process the contine is given to the transport of the contine in the process of the process of the pin the process of the pin the p	prise pied and added to the end of	Carlo dayland &
e tire units of cors. Is process with more than by (n-1) & time waits. + Pu lumances of lacked the two man content switchers gently to two man content switchers + The first output would come factor in Rand Robin of the laces so some process will run earlier the course some process will run earlier except suppose we have 10 processes at they in days. the could give the so there they were short present and the time to every process they in days. present is given to the time to give the orth process the only politic is if the curbon of powers is your large it will two or large the first some in the state of the curbon of powers. Example (The wonton = 20) Process part time Pt 53 Pt 53 Pt 13 24 Pt 13 68 Pu 24 The curbon of the state	The ready queuno	130
e tire units of moss. We process with most than by (n-1) of time waits. + De humanes of large to tipo a factor in Rand Robin to the time to the most contest switching to the factor in Rand Robin to the factor of the factor o	+ 1111 aggregate to the roads a sure	the Guess hard
e tire units of more. We process with more than by (a-1) & time waits. + Du humanes of lacked the time and suitable of a small so two men content suitable of the time to men content suitable of the time to mand Robin of the lacked of the time to mand Robin of the lacked of the content of the time of the content of the	2 the 1 2 a 1 to 2 to	CS PARTIES CHEMONE
e tire units of more. We process with more than by (a-1) & time waits. + Du humanes of lacked the time and suitable of a small so two men content suitable of the time to men content suitable of the time to mand Robin of the lacked of the time to mand Robin of the lacked of the content of the time of the content of the	and the time grantom is a charge of the	2
+ De la more of sage => + 170	Set The Cho Time In Chones	has s days
+ De la morce s q longe so tipo a final suithing of a small so the much condent suithing of the true of the suithing of the species will run earlier the superior of the sure of the were short and the were short and the were short and the direct of agreements of the could give the said the direct of agree the process of the said agree the process of the said agree the species of the said agree the species of the could give the direct to array process the species of agree to agree the species of the could give the direct to array process of powers as the said agree to agree the species of the could give the direct to array process of powers as the said agree to agree the species of the could give the direct to array process of powers as the said agree to agree the s	a tire muits of pass. he brocers mail worse	b b
# The first output would come faster in Rand Robin & because some precess will run as live # the same have be processed in Rand Robin & all the complex supported by the same have be processed in Rand Robin & all the complex of the complex of the same state of the complex of the complex of the same is given to the time is given to the time is given to the complex of process to the complex of the complex of process is given to the time is given to the complex of process is given to the time is given to the complex of process is given to the complex of process is given the complex of process is given to the complex of the com	(0-1) & EINE GOISS.	-w
# The first output would come faster in Rand Robin & because some press will run as live # thereof he press will run as live Except: Suppose we have to processes at they in Dayso. wo could give the said the other were about the process of faster is given to the time is given the said the time is given to the time is giv		1
+ The first output would come do to in Road Robin & hecouse Some pocesswill run earlier + the first output would come do to Road Robin & he he he had processes at they in Dayso. Example: Suppose the have 10 processes at they in Dayso. We could give the sac there they were share they were share they were share they were share they were the true of her were they were they were they process they had the true of her who had they were they were they are they were they were they are they	+ Dulmances of large => FIFO	3/1 - 03
+ The first output would come forth in Rand Pohin To a light by course some processially run as light + the male series we have le processes afting in Dayso. Example suprae we have le processes afting in Dayso. We could give the sac three they were short Spoin an fix the dene to every processes they are by It large of squar so the time of agust to gath process + the only polator os if the number of posmers is very large it will tone to large time Example (The wonton = 20) Rosers Bourd time P1 53 9/42 P2 80 8 83 P0 81 83 P3 P2 17 0 20 37 57 77 97 117 121 124 124 124 122 P3 68 P4 24 + the cally, highy average turn around than STF,	g small - Do Two much Consider South	
the super we have to processes sitting in 2000. Example: Suppose we have to processes sitting in 2000. We could give the said to a very process of the gard process is given all the time of grown of the form process the only poloter os if the number of powers is very large it will tand a large to the process Best time PT 53 PE 17 0 20 37 57 77 97 117 121 134 154 162 P3 68 P4 24 The colly, highly average turn around than STE,		1 23 0
the third policy of the comber of powers is through policy of the comber of powers is through policy of the comber of powers is very large it will two to boy the Example (The worth = 20) Process Board time P2 17 0 20 37 57 77 97 17 121 154 164 162 P3 68 P4 24 The cally, highly average three around than STE,	+ The first output would come to seve in Hound &	omin Se
Example: Suppose the have lo processes sitting in 2000. We could give the sac ten or then were colored Spails an fix the time to every proceed to the party process process the theory pobler is if the number of pooress is very large it will tand or boy time Example (Time wantum = 20) Process point time P1 53 P1 12 P2 P2 P2 P2 P3 P3 P2 17 0 20 37 57 77 97 17 121 D21 D21 D21 D21 D21 P3 68 P4 24 The color, higher average time around then STF	lacause some process will run earlier	THEO OF A ON ST
Example: Suppose the have 10 processes sitting in 2000. We could give the sac time of her were extent 250110 an fix the fire to every proceed to the process Process He theoring poblar is if the number of poorners to the only poblar is if the number of poorners to your large it will tand or large that Example (True wantum = 20) Process point time P1 53 P1 12 P2 P2 P2 P2 P3 P3 P2 17 0 20 37 57 77 97 17 121 124 124 124 124 124 The colly, highly average than around than STF	* * * * * * * * * * * * * * * * * * *	= farretz (m/doQ)+1
we could give the so there of the werestart 250111 on fix the time to every preceded the och presents is given to the time it your to each process the only poblem is if the number of powers is very large it will tame to born time Example (True wontum = 20) Process Bourd time PI 53 PI 12 PA	conduction the bare la properties siften in de	230.
process throng pobler is if the number of pourrors very large it will tand to born tool Example (Time wantum = 20) Process Board time P1 53 P1 P2 P2 P2 P3 P4 P5 P3 P3 P2 17 0 20 37 57 77 97 17 121 134 154 162 P3 68 P4 24 throughly, highly average form around than STF,	is all and the confidence of their war colored	
	The sole that are to over ancest of the	NIBA (restulation)
+ the only pobler , s, f the number of powers is very large it will tand & lary three Example (Time workin = 20) Process Bourd time PT 53 PH B PS PH PL PS PS PS P2 17 0 20 37 57 77 97 117 121 134 154 162 P3 68 P4 24 + type cally, h, ghy average than around than SJF,	So in the the trace of any to a	ch
+ the only pobler is if the number of powers is very large it will tand a large tire Example (Time wantum = 20) Process Boust time PI 53 PI 83 PI 81 PI PI 83 PI 81 PI 17 0 20 37 57 77 97 117 121 134 154 162 P3 68 P4 24 + type cally, highly avaing a turn around than STE		
+ theory pobler is if the number of powers is very large it will tame a large tird Example (Time quantum = 20) Process Board time PI 53 Pu B Ps Pu B Ps Pu B Ps Ps PI 53 Ps PI 53 Ps PI 24 + type cally, highly average turn around then SJE,	the second secon	
Example (Time wonton = 20) Process Bout time P1 53 P1 P2 P3 P4 P1 P3 P4 P1 P3 P3 P2 17 0 20 37 57 77 97 117 121 134 154 162 P3 68 P4 24 + 1 > 11, colly, h, ghy average Lord around than SJF,	1 H 1 - 1 - 2 P +1 0 0 - 2 - C	
Example (True wantum = 20) Process Best 1:48 PI 53 PI PS PS PU PL PS PS PI 17 0 20 37 57 77 97 117 121 134 154 162 P3 68 P4 24 T 1, 11, colly, h, ghy average turn around than SJF,	+ 1x (0) 12 1 2 1 2 1 2 1 2 1 2 1 2 1 2 1 2 1 2	4
Process Bourd +1348 P1 53 P1 P2 P2 P2 P2 P2 P2 P2 P3 P3 P2 17 0 20 37 57 77 97 117 121 134 154 162 P3 68 P4 24 + 1 > 10 cally, h, ghy average from around than SJE,	Ach 12 Pr 12 MILL LOW	
Process Bourd +1: HR PI 53 PI B PS PU B PS PU B PS PS P2 17 0 20 37 57 77 97 117 121 134 154 162 P3 68 P4 24 + type cally, he gay ava a go two avount than 5 J. F.	Example (Time wontom = 20)	
P1 53 P1 P2 P3 P4 P1 P3 P4 P1 P5 P3 P2 17 0 20 37 57 77 97 117 121 134 154 162 P3 68 P4 24 + type cally, highly availage than around than 5 J. F.	AND AND DESCRIPTION OF THE PARTY OF THE PART	
P2 117 0 20 37 57 77 97 117 121 134 154 162 P3 68 P4 24 + type cally, highly availage than around than SJE,		
P3 68 P4 24 + typesly, higher are ago than around than SJE,	17 0 20 ST ST TT ST 117 121 THE 164 162	
+ tymosly, higher average turn around than SJE,	La La La La Maria	A 4 10 0
+ true colly, higher average turn around than SJE,		
+ tymosty, higher average turn around than SJF, but better response time		
but better response time	A A U La also average I as a count the CAR	
DOI DEMO (CSPONSC DIME	1 2 1 2 1 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2	
	bot bene response time	



Multilevel Queve ant datas to also 3 for aday Queve
+ Ready queve is partitioned into separate of the
Queves:
1 Loce erand which existing the total of the set
1. Fore ground (horter)
2. bacugrand (interactive)
+ Each queve has it sown scheduling algorithm
1. Coregraind: Round Robin (RR) 2. bacu ground: First Come First Surved (FCFS)
1 foregraind: Raine comm (CC EC)
2. bacu ground: Fiass Cont Fiass street
+ schooling done between queves
1. Fixed Priority: e.g. Save all from
Caroling the from
foreground then from brenground. Poss, bility
Pol staveta
2. Time slice: each queve get & fixed
Share of coutine which
it can schedule amongst it was to the
3. Boto to Consgraine in Roune Robinsel
b. 20% to become ground in FCFS
7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7
Highest Provide at
Highest With System Processes
To Interactive Processes
Ed la lars chaus addition Roccours Ed
5) boden pocasses
TEX SANDENT BUCKERS IT
Lawart Briai Ary
Lawrit Hilliam



200	0.	- 1	4	: 14	0	٠,	L 0	Δ.	120			T					F						K		- 1			
34	150	101	-7	1 1	_	36	No		=	O	(1)	0	IN)	941	01.1	0	-11	60	6	į.		22		14	1		
		a	Lil	100		- 01	. 4			200	١,		0	28	co	mo	1.4	47	4	la	R					1	4	
	Н	5955	-	811	100	20	3	1	~0	V	9,4	F	0.00		10	4	9.10			4		224	0.00	10	4	-	-	-
			a	Bu																		3	24	-	9	4	-	-
		+	н.			20	1-+	ine	5	20	·	5												4	-	-	+	-
_	П	1	11.	ord -	Ra	eui r	0	4		0	-pl	076		c	217	CX	1	10	L	u	1	13		ΣĒ	14	d-	+	+
Ī			П		1	1	00	3.4	-	مل	2	111	90								13	16.	1	36	9	-	+	+
ī	F	П	П	00	For	. 0	××	ام	20	10	à	91	ngh	1	con	Arc) 5	inc	1 en	,				_		4	4	+
Ī	Е		ō		co)	m	do	00	2	ck	0		0		2	Picis	U	U	ra .	0	1.	16	4	q-	\Box	4	-	+
	Т						- 1		1/4	200	0.2		07.1		000	17.3	200		-64	ми	4	40	1111	-		4	-	+
	Т	+	Sc	8+ -	r	69	-	1 2	0 8	40	tes	. 3	n:		16	J.	-	- 4	92	-	0.00	1-1	4 .	-	+	-	+	+
				_	Мо	140	M	de	62	lin	121	له د	esi	00	b)e	11	tu	100	4.6	150	331	Q	5-	-	-	+	+	+
	Г			-	For	. 0	× 2×	410	,	11	200	0	1 8	19:	٥				Ц					-				-
																A	-		1				100		1		0.0	
		+	S	chs	5 6	اد	16	lic	· to	5	ai	lv	id	500	944	33	000	2	20		(dz	, (Oy	(2)	SE U	10		9.9	+
		-5400		-	6	iv	20	m	De	1	0 2	C	CV	N	15	whi	10	61	QV)									+
					0	cu	05	w	th:	'n	por	00	P	0 9	50	10	0	f e	s C	Ċ					_	-	6	+
					r.		100	1	= 1	2	6	4.0	his	142	0	7.1	-		S	- 6	4	2	10	200	2	-	4	+
				-	1	hen	+	he	los	7	c	30	b	2	ha	νş	10	50	nhy	if						457		+
							1	an	47.14	M.	200	M ==	000	\$34	1.5			- 2	4		_		3	[2]	31-1		-1	+
			L					2	9	·	4	1	1 4	559	213			1					1		20	24	-	+
			L				4	151	P	6	Tra	16	6	1	1:2	7		-	Н	4	-	4	27.5	On Si	×2	4		
			L	L			S	LA	_	60	6	91	San.	27	1						H	H		H			-	+
								1.6	1:	10	N.	06	3	100	100	1		H			H	H	-					1
		1	╙	L						H	-	15	7	50	132	-	H	H			-	-	H					-
ļ		Ш			ш	╙						H		H	-		-				H	-	H		Н			
L	4	4		H							-	H		H	-		H	H	Н		H							
L				1	-	-	L	H			-	H	Н	H	-	Н		H		H	-							\top
				1			L	H				H	Н	H	₽			H	H				-		Н			1
				-		-	L						-			+												
			1		-	-		-					-			H	-											
ļ			+		-	-	-				-	-	H		-		-											
		-	+	-	H	-	-				-	+	H		+			H		-			1	T				
	-	1	-	-	-	H	H	-		H			H		H		-		-	-				H				
					-	-	H				-	+			H	H	+	+		-						П		
		4		-	-	-	H	-			-	-		-	+	F	+	+			H		-	T			7	
				1	+	+	H	-	-		-	H		H	+	-		-		-	H			H				-
				1		-	-	+	-		-	+			-	H		-	H			-						
					-	-	-		-	-		+	-		+	+	H	+	H	-		H			H			
L						1	1				-	+			-			-	-									



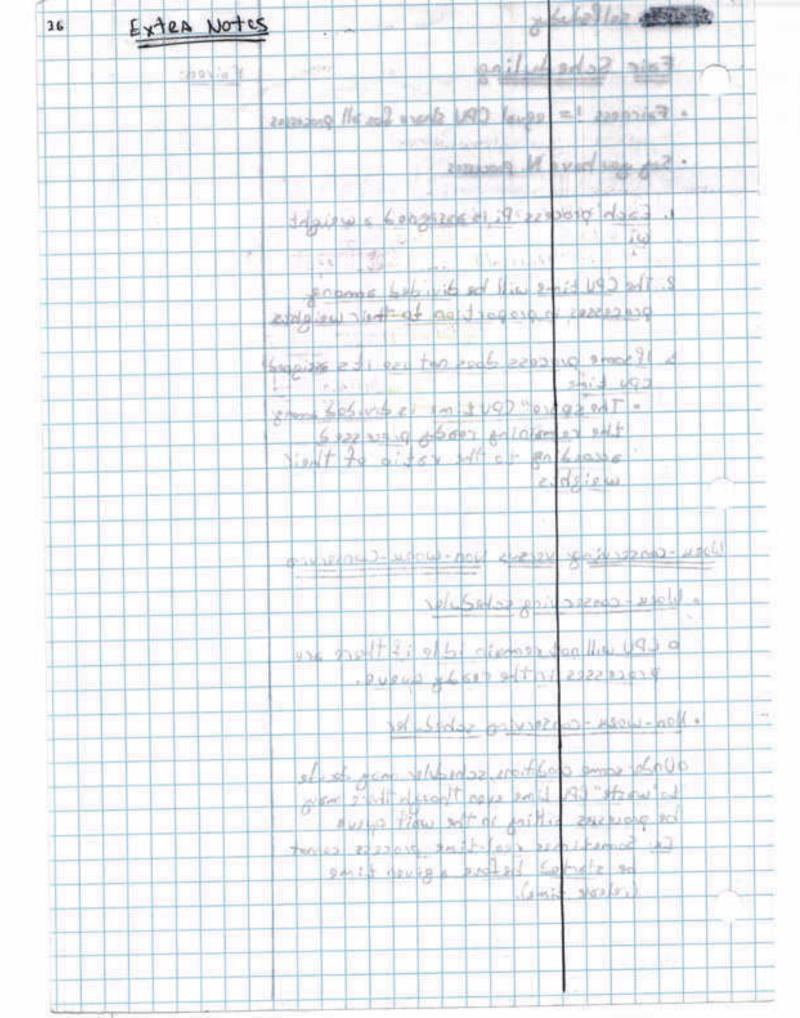
SJF is Optim	al w.r.t ave	icu spers	+ Lime	2 7/20	
(contine)					
	3.4	00/22/100	128 : 36	27801	lehorist
Proof:				0.0	
		- Ace	son aka	etalog	unto 3
. A	4 + 1	1000	4.4		4%
1. Assume the	of the ma	2 90 010	TILIMAN	30.12	1904
X That 83	ve better a	151296 m	or Lime	LSE MACH	
than SJF	Son a set of	Notocess	505.	- 6	
	0-1450N	2 201346	lastons	la wolf	(418080)
2. Since X !=	SJF, it mez	ons that	heremus	+	
be at leas	+ two process	ses Pt an	& Pain	gini he	ne iT ·
the sched	ule generat	ed by X s	sch that:	(14)	110-
	740.000	Vie 29) 2	usold asa	2005 900	002.
> D4 ava	cutes before	P2 Jose	۲۸۶	3.7	
0. F1 exe	Ocasemtion t	D. D. D.		4	the section
		I MC 10 + CIF I	12 100 20	1010	1.03
2han	P2 202	V V V V V V V V V V V V V V V V V V V	0-11-	14-6	
c. The a	tions so every	o time	SKILKS BUT	ect that	910244
schod	elema ziste	Than gi	Are Dal	41 350	\$ 600
SJF	in into	i raise (10	Latime_	Deptho	2 KiV
3 BUT is	Dage of ins	more ofat	2 Poplar	o portof	ms a
3. But , if 40	v swap thes	position P	Vanz P2	742806A	m2 o
in the scl	redute a ene	rated by	Odhes	100 100	120
11000000	ge wait tim	2 0005 5	2W O.	1	
Ine avera	DE 1931/ 1911	- 0	H. 4 (4)	too.	1 7 C2 suz
	N N				
H. So Keep SI	lle griggen	Soen produ	1 11	+ trond	322
that sat	. Sfy condit.	ans rel an	1 (0)		
Each swa	ه سازا روط	e The aver	age want to	7	
				V	13.1.6
5. Finally you	a gu bas Ilm	th o sched	ule general	-62	
L cas . I	bara with the	- 0 CX000	ha		
reduced	any further	Honce 57	Fishlos	o feet	* Mosnins
Optimal	778.00		1840 124	VO 6 8	VINTONE
200					

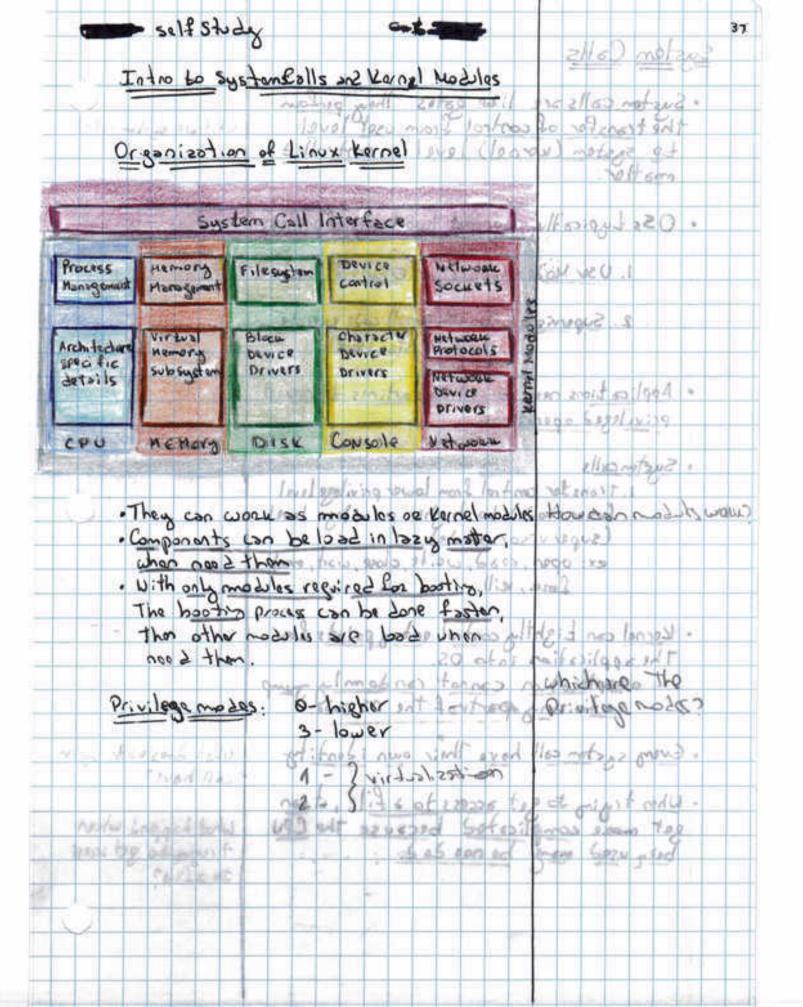
selfstudy

- · Fairness != equal CPU share for all processes
- · Say you have N. Processes
 - 1. Each process Pi is assigned a weight
 - 2. The CPU time will be divided among processes in proportion to their weights
- 3. If some process does not use its assigned cpu time
 - . The space" CPU time is divided among the remaining ready processed according to the ratio of their weights

Work-conserving versus Non-Work-Conservino

- · Work conserving schedular
 - o CPU will not remain idle if there are Processes inthe ready gueve.
- · Non-woek-conserving scheduler
 - ounder some conditions, scheduler may decide to "woste" CPV time even though there may be processes sitting in the wait queue Ex: Sometimes real-time process connot be started before a given time (release time).





	O Service Silver - Transaction
System Calls	And about the
2075 304 000 000 000	
· System calls are line astes. They person the transfer of control from user level	0.1
the transfer of control from user level	who tere system cakes
to system (word) level in controlled	An mortagines D
mother.	
	0.7.7.
. Oss Expicatly support two levels of privile	a: which are the levels of
	The state of the s
1. Use Mode: Application exacts at this	evel Os esperat
2. Supervisse kade: OS(vernel) code execute	
at this level	April American Street Court
a this test	The second second
a Navi I a Navi I a la la casa	d a second
· Applications need to call OS routines to reque	
privileged operations	See Manager
· Suction calls	1
1. Transfor control from lower privilege level	Ir.
Euser model to higher prividege love	CLEAN ON SOUTH
(supervisor mode) sol of See se	ha at Anagona)
ex: open, read, weite, close, want, exec	chil Swap hora
Some, will, or tred and Garleger	el bonglis Hill
netzet en en en et	iong chage ent
· Kernel can Eightly control entry points for	do- with real
7)	NEVE 5 550
into and part of the os code.	
and all the ox case	245 m 2481 v 19
-8 -8	
· Every system call have Their own identity	what does each syden
	Cored Mas
and a second of the Acon	
· must did a de secretado a atricio	U what toppend when
et more complicated because the CP	The Name of State of
pein used many be not do d	tryingto get seed
	10 2 1 (e)