OS project 1

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Design

main

Processing the input, and stroe.
I use a pointer array to store the data, each data is a stucture
composed{
name, pid, ready_time, exec_time.
}, and check the type of schedule

schdule

這裡分成四種排程方法，FIFO, RR, SJF, PSJF。
而這隻程式就是負責管理當前應該要分配給那一個工作用的，（依據不同type），
每回合我先

FIFO

FIFO的作法很單純，在最一開始我先做一個sort。所以它會依照ready time排序
如果當前有人在做，那就讓它繼續做，如果沒有的話，我就去跑一個迴圈，去看後面最近的有誰需要（理論上是下一個）

RR

RR的作法比較麻煩一點，我用陣列做一個queue，接著每次一直從queue當中去抓東西，依序做最多一個time slice(500)，如果時間到但還沒做完，就push進queue。這可以保證它至多等待n-1個時間就會換到它。

SJF

當空閒時，我就會去找目前已經ready（但還沒做的人），從當中找一個exec時間最短的人來做，一直到它做完為止。

PSJF

跟SJF的最大差異是，PSJF可以被打斷，也就是它考慮的是每一個時刻"當前"的最短工作，所以我每一個time都去看已經ready的人，然後找最小execution time，（execution time會存還剩餘的工作量）。

fork children

如果一個工作已經ready了，我就會去fork一個child，並先把它的priority設最低，如果真的輪到它工作時，我才真正去把它放上child CPU(cpu 1)，這時他的execution time才會開始減少。

processer

在這裡負責管理優先序跟child，如果一個工作被放上child CPU，我就會去call gettime這個system call，然後開始跑他的迴圈，結束夠會在call一次gettime，這兩個時間就是start time and end time.

Kernel version

The Linux version I use is
Ubuntu 16.04

And the Kernel version is
Linux project1 4.14.25 #5 SMP Wed Apr 29 11:44:05 CST 2020 x8664 x8664 x8664 GNU/Linux

成果比較

實際結果與理論結果

以下是我的程式執行結果和理論結果的比較表格

children的執行時間通常都會大於expect。

UNIT_TIME	0.001553

- FIFO_1.txt

name	start	end	exec time	my start	my end	my exec	error rate
P1	0	500	500	0.00	515.87	515.87	3.17%
P2	500	1000	500	516.02	1020.78	504.76	0.95%
P3	1000	1500	500	1020.95	1523.76	502.81	0.56%
P4	1500	2000	500	1524.11	2024.02	499.91	0.02%
P5	2000	2500	500	2024.16	2516.55	492.38	1.52%

()

- FIFO_2.txt

name	start	end	exec time	my start	my end	my exec	erro rate
P1	0	80000	80000	0.00	84270.60	84270.60	5.3
P2	80000	85000	5000	84270.84	89455.15	5184.31	3.6
P3	85000	86000	1000	89455.34	90501.68	1046.34	4.6
P4	86000	87000	1000	90502.24	91479.32	977.09	2.2

()

- FIFO_3.txt

name	start	end	exec time	my start	my end	my exec	error rate
P1	0	8000	8000	0.00	8468.33	8468.33	5.85%
P2	8000	13000	5000	8468.50	13881.32	5412.81	8.26%
P3	13000	16000	3000	13881.49	17119.23	3237.75	7.92%
P4	16000	17000	1000	17119.39	18192.83	1073.44	7.34%
P5	17000	18000	1000	18193.04	19241.50	1048.46	4.85%
P6	18000	19000	1000	19241.71	20258.78	1017.08	1.71%
P7	19000	23000	4000	20259.14	23992.51	3733.37	6.67%

()

- FIFO_4.txt

name	start	end	exec time	my start	my end	my exec	error rate
P1	0	2000	2000	0.00	1922.89	1922.89	3.86%
P2	2000	2500	500	1923.21	2434.59	511.38	2.28%
P3	2500	2700	200	2434.76	2641.91	207.14	3.57%
P4	2700	3200	500	2642.04	3143.70	501.66	0.33%

()

- FIFO_5.txt

name	start	end	exec time	my start	my end	my exec	error rate
P1	0	8000	8000	0.00	8211.28	8211.28	2.64%
P2	8000	13000	5000	8211.80	13314.07	5102.27	2.05%
P3	13000	16000	3000	13314.27	16469.26	3154.99	5.17%
P4	16000	17000	1000	16469.44	17571.15	1101.72	10.17
P5	17000	18000	1000	17571.29	18660.14	1088.84	8.88%
P6	18000	19000	1000	18660.44	19744.90	1084.46	8.45%
P7	19000	23000	4000	19745.13	23778.35	4033.21	0.83%

()

- PSJF_1.txt

name	start	end	exec time	my start	my end	my exec	error rate
P4	3000	6000	3000	308.59	3589.19	3280.60	9.35%
P3	2000	10000	8000	209.06	8489.69	8280.63	3.51%
P2	1000	16000	15000	110.55	15388.50	15277.95	1.85%
P1	0	25000	25000	0.00	25221.71	25221.71	0.89%

()

- PSJF_2.txt

name	start	end	exec time	my start	my end	my exec	error rate
P2	1000	2000	1000	111.09	1073.11	962.03	3.80%
P1	0	4000	4000	0.00	4030.41	4030.41	0.76%
P4	5000	7000	2000	4141.52	6228.54	2087.02	4.35%
P5	7000	8000	1000	6230.29	7285.94	1055.66	5.57%
P3	4000	11000	7000	4030.57	11028.81	6998.24	0.03%

()

- PSJF_3.txt

name	start	end	exec time	my start	my end	my exec	error rate
P2	500	1000	500	61.35	574.44	513.10	2.62%
P3	1000	1500	500	576.53	1095.30	518.77	3.75%
P4	1500	2000	500	1096.93	1582.46	485.53	2.89%
P1	0	3500	3500	0.00	3470.06	3470.06	0.86%

()

- PSJF_4.txt

name	start	end	exec time	my start	my end	my exec	error rate
P3	100	1100	1000	14.16	1111.48	1097.32	9.73%
P2	0	3000	3000	0.00	3301.25	3301.25	10.04%
P4	3000	7000	4000	3302.45	7625.04	4322.59	8.06%
P1	7000	14000	7000	7625.23	14506.15	6880.92	1.70%

()

- PSJF_5.txt

name	start	end	exec time	my start	my end	my exec	error rate
P1	100	200	100	0.00	104.40	104.40	4.40%
P3	200	400	200	104.71	314.02	209.31	4.65%
P2	400	4400	4000	314.34	4528.15	4213.81	5.35%
P4	4400	8400	4000	4528.32	8637.81	4109.49	2.74%
P5	8400	15400	7000	8637.94	15855.65	7217.71	3.11%

()

- RR_1.txt

name	start	end	exec time	my start	my end	my exec	error rate
P1	0	500	500	0.00	538.51	538.51	7.70%
P2	500	1000	500	538.77	1102.12	563.35	12.67%
P3	1000	1500	500	1102.76	1599.06	496.30	0.74%
P4	1500	2000	500	1599.25	2134.99	535.74	7.15%
P5	2000	2500	500	2135.12	2678.27	543.15	8.63%

()

- RR_2.txt

name	start	end	exec time	my start	my end	my exec	error rate
P1	600	8100	7500	0.00	4423.27	4423.27	41.02%
P2	1100	9600	8500	58.89	9082.07	9023.18	6.16%

()

- RR_3.txt

name	start	end	exec time	my start	my end	my exec	error rate
P3	4200	18200	14000	330.17	4508.44	4178.27	70.16%
P1	1200	19700	18500	0.00	9108.15	9108.15	50.77%
P2	2700	20200	17500	170.61	12565.48	12394.87	29.17%
P6	8200	28200	20000	762.83	17928.03	17165.21	14.17%
P5	6700	30200	23500	600.67	23555.05	22954.38	2.32%
P4	6200	31200	25000	546.39	29721.75	29175.36	16.70%

()

- RR_4.txt

name	start	end	exec time	my start	my end	my exec	error rate
P4	1500	5500	4000	178.81	1422.20	1243.39	68.92%
P5	2000	6000	4000	253.20	2420.05	2166.85	45.83%
P6	2500	6500	4000	287.25	3411.07	3123.82	21.90%
P3	1000	14500	13500	119.44	6905.35	6785.91	49.73%
P7	3500	18500	15000	376.81	10769.84	10393.04	30.71%
P2	500	20000	19500	59.73	15208.33	15148.60	22.31%
P1	0	23000	23000	0.00	22503.35	22503.35	2.16%

()

- RR_5.txt

name	start	end	exec time	my start	my end	my exec	error rate
P4	1500	5500	4000	179.49	1555.26	1375.77	65.61%
P5	2000	6000	4000	249.10	2539.84	2290.74	42.73%
P6	3000	7000	4000	364.91	3601.01	3236.09	19.10%
P3	1000	14500	13500	130.59	7002.82	6872.23	49.09%
P7	3500	18500	15000	413.85	10919.17	10505.32	29.96%
P2	500	20000	19500	74.13	15255.21	15181.08	22.15%
P1	0	23000	23000	0.00	22702.95	22702.95	1.29%

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- SJF_1.txt

name	start	end	exec time	my start	my end	my exec	error rate
P2	0	2000	2000	0.00	1951.69	1951.69	2.42%
P3	2000	3000	1000	1952.18	2952.47	1000.29	0.03%
P4	3000	7000	4000	2952.70	7039.40	4086.71	2.17%
P1	7000	14000	7000	7039.53	13981.01	6941.49	0.84%

()

- SJF_2.txt

name	start	end	exec time	my start	my end	my exec	error rate
P1	100	200	100	0.00	118.80	118.80	18.80%
P3	200	400	200	119.13	338.03	218.90	9.45%
P2	400	4400	4000	338.24	4649.74	4311.50	7.79%
P4	4400	8400	4000	4649.90	8942.88	4292.98	7.32%
P5	8400	15400	7000	8943.09	15972.57	7029.47	0.42%

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- SJF_3.txt

name	start	end	exec time	my start	my end	my exec	error rate
P1	100	3100	3000	0.00	3209.97	3209.97	7.00%
P4	3100	3110	10	3210.25	3220.80	10.55	5.46%
P5	3110	3120	10	3221.03	3231.70	10.67	6.69%
P6	3120	7120	4000	3231.86	7480.81	4248.95	6.22%
P7	7120	11120	4000	7481.07	11748.12	4267.05	6.68%
P2	11120	16120	5000	11748.40	17160.15	5411.75	8.23%
P3	16120	23120	7000	17160.28	24767.28	7607.00	8.67%
P8	23120	32120	9000	24767.62	33917.37	9149.74	1.66%

()

- SJF_4.txt

name	start	end	exec time	my start	my end	my exec	error rate
P1	0	3000	3000	0.00	3087.76	3087.76	2.93%
P2	3000	4000	1000	3087.97	4130.27	1042.30	4.23%
P3	4000	8000	4000	4130.40	8302.61	4172.21	4.31%
P5	8000	9000	1000	8303.02	9300.90	997.87	0.21%
P4	9000	11000	2000	9301.07	11331.83	2030.76	1.54%

()

- SJF_5.txt

name	start	end	exec time	my start	my end	my exec	error rate
P1	0	2000	2000	0.00	2140.80	2140.80	7.04%
P2	2000	2500	500	2141.24	2689.96	548.72	9.74%
P3	2500	3000	500	2690.47	3220.00	529.53	5.91%
P4	3000	3500	500	3220.25	3734.41	514.16	2.83%

()

- TIME_MEASUREMENT.txt

name	start	end	exec time	my start	my end	my exec	error rate
P0	0	500	500	0.00	511.53	511.53	2.31%
P1	1000	1500	500	561.14	1064.98	503.84	0.77%
P2	2000	2500	500	1117.02	1635.44	518.41	3.68%
P3	3000	3500	500	1689.10	2170.55	481.45	3.71%
P4	4000	4500	500	2219.61	2719.69	500.07	0.01%
P5	5000	5500	500	2768.65	3266.83	498.18	0.36%
P6	6000	6500	500	3314.45	3806.16	491.71	1.66%
P7	7000	7500	500	3854.65	4377.46	522.81	4.56%
P8	8000	8500	500	4429.97	4933.90	503.93	0.79%
P9	9000	9500	500	4981.80	5449.86	468.06	6.39%

()
9.863345497517475