

Operating Systems Project 1

資工三 張原豪 B06902119

1. 設計

- Scheduler 會被 assign 在第一顆 CPU，其餘 child process 都在第二顆 CPU 上執行。
- FIFO:
 - i. 先進先出的排程模式
 - ii. 先將所有 process 照 ready time 排序
 - iii. 當有 process ready 時，呼叫 fork() 函數並給予一個初始 priority 50
 - iv. 若目前沒有 process 執行，選擇下一個 process 執行並將其 priority 提高到 99，若有則繼續等待
 - v. 持續執行直到所有 process 都執行完畢
- SJF:
 - i. 短執行時間先執行，不中斷執行中的 process
 - ii. 先將所有 process 照 execution time 排序
 - iii. 當有 process ready 時，呼叫 fork() 函數並給予一個初始 priority 50
 - iv. 若目前沒有 process 執行，選擇下一個 process 執行並將其 priority 提高到 99，若有則繼續等待
 - v. 持續執行直到所有 process 都執行完畢
- PSJF:
 - i. 短執行時間先執行，若執行時出現執行時間更短的 process，則中斷原本執行的 process
 - ii. 先將所有 process 照 execution time 排序
 - iii. 當有 process ready 時，呼叫 fork() 函數並給予一個初始 priority 50
 - iv. 若目前沒有 process 執行，選擇下一個未執行完畢的 process 執行並將其 priority 提高到 99
 - v. 若目前有 process 正在執行，但有其他 process 執行時間比當前 process 執行時間還短時，中斷當前 process 的執行（priority 設為 10），並換執行時間最短的 process 執行（priority 設為 99）
 - vi. 持續執行直到所有 process 都執行完畢
- RR
 - i. 每個 process 都可以固定執行一個 time quantum（500 unit time），不管時間內有無執行完畢都會換下一個 process，並持續直到所有 process 執行完。
 - ii. 先將所有 process 照 execution time 排序
 - iii. 當有 process ready 時，呼叫 fork() 函數並給予一個初始 priority 50
 - iv. 若目前沒有 process 執行，從等待列中選擇下一個 process 執行並將其 priority 提高到 99，若有則繼續等待
 - v. 若當前 process 已執行到 time quantum 上限，則將其中斷並把 priority 設為 10，同時將下一個尚未執行完畢且這輪還沒執行過的 process 的 priority 設為 99，讓其執行
 - vi. 持續執行直到所有 process 都執行完畢

2. 環境

- VirtualBox 6.0
- Ubuntu 16.04
- Two CPU
- 核心版本：Linux 4.14.25

3. 比較實際結果與理論結果，並解釋造成差異的原因

- 以下是我認為造成實際結果與理論值有所誤差的原因：
 - i. Scheduler 的計時器並無法調到與 process 的計時器完全同步，因此雖然兩邊都執行相同的迴圈數，但所花費的時間可能會有些微差距。
 - ii. 同理，各 process 執行迴圈的單位時間也都不盡相同，執行同樣的迴圈數並不代表所花時間相同。
 - iii. Scheduler 並非只有進行排程的動作，同時也掌管了 process creation、priority setting 等等的工作。
 - iv. 系統中並非只有 Scheduler 跟 process 在執行，可能在它們的執行過程中系統自動 context switch 到別的工作去了，造成執行時間的誤差。

4. 以下附上各個 test case 的 output 與和理論值比較的結果

- FIFO_1.txt

stdout.txt	dmesg.txt
P1 2125	[Project1] 2125 1587921552.569317774 1587921553.371231689
P2 2126	[Project1] 2126 1587921553.371673039 1587921554.193004520
P4 2128	[Project1] 2127 1587921554.193582254 1587921555.018853223
P3 2127	[Project1] 2128 1587921554.193521407 1587921555.833137489
P5 2129	[Project1] 2129 1587921555.833466745 1587921556.966484262

Theoretical Total Time	3.93962812				
		Name	Start	End	Elapsed Time
		P1	0	0.78792562	0.78792562
		P2	0.78792562	1.57585125	0.78792562
		P3	1.57585125	2.36377687	0.78792562
		P4	2.36377687	3.1517025	0.78792562
		P5	3.1517025	3.93962812	0.78792562
Real Total Time	4.39716649				
		Name	Start	End	Elapsed Time
		P1	0	0.80191398	0.80191398
		P2	0.80235529	1.62368679	0.8213315
		P3	1.62426448	2.44953537	0.82527089

		P4	1.62420368	3.26381969	1.63961601
		P5	3.26414895	4.39716649	1.13301754
Error (Real-Theoretical) Total Time	0.45753837				
		Name	Start	End	Elapsed Time
		P1	0	0.01398835	0.01398835
		P2	0.01442966	0.04783554	0.03340588
		P3	0.04841323	0.0857585	0.03734527
		P4	-0.7395732	0.1121172	0.85169039
		P5	0.11244645	0.45753837	0.34509192

- FIFO_2.txt

stdout.txt	dmesg.txt
P1 2136	[Project1] 2136 1587921556.978636413 1587921686.221915696
P2 2137	[Project1] 2137 1587921686.224317615 1587921694.173039986
P3 2138	[Project1] 2138 1587921694.173321349 1587921695.731344860
P4 2139	[Project1] 2139 1587921695.731649988 1587921697.278512104

Theoretical Total Time	137.099059				
		Name	Start	End	Elapsed Time
		P1	0	126.0681	126.0681
		P2	126.0681	133.947356	7.87925625
		P3	133.947356	135.523207	1.57585125
		P4	135.523207	137.099059	1.57585125
Real Total Time	140.299875				
		Name	Start	End	Elapsed Time
		P1	0	129.243279	129.243279
		P2	129.245681	137.194403	7.94872236
		P3	137.194685	138.752708	1.55802369
		P4	138.753013	140.299875	1.54686213
Error (Real-Theoretical) Total Time	3.20081677				
		Name	Start	End	Elapsed Time
		P1	0	3.17517924	3.17517924
		P2	3.17758107	3.24704719	0.06946611
		P3	3.24732852	3.22950096	-0.0178276
		P4	3.2298059	3.20081677	-0.0289891

- FIFO_3.txt

stdout.txt	dmesg.txt
P1 2158	[Project1] 2158 1587921697.290030106 1587921710.222052937
P2 2159	[Project1] 2159 1587921710.222470609 1587921718.405969676
P3 2160	[Project1] 2160 1587921718.406335816 1587921723.241686257
P4 2161	[Project1] 2161 1587921723.242026793 1587921724.838051264
P5 2162	[Project1] 2162 1587921724.838403140 1587921726.400608694
P6 2163	[Project1] 2163 1587921726.400979846 1587921727.995753382
P7 2164	[Project1] 2164 1587921727.996169046 1587921734.655395352

Theoretical Total Time	36.2445787				
		Name	Start	End	Elapsed Time
		P1	0	12.60681	12.60681
		P2	12.60681	20.4860662	7.87925625
		P3	20.4860662	25.21362	4.72755375
		P4	25.21362	26.7894712	1.57585125
		P5	26.7894712	28.3653225	1.57585125
		P6	28.3653225	29.9411737	1.57585125
		P7	29.9411737	36.2445787	6.303405
Real Total Time	37.3653653				
		Name	Start	End	Elapsed Time
		P1	0	12.932023	12.932023
		P2	12.9324405	21.1159396	8.1834991
		P3	21.1163058	25.9516563	4.83535051
		P4	25.9519968	27.5480213	1.59602451
		P5	27.5483732	29.1105788	1.56220555
		P6	29.1109498	30.7057233	1.59477353
		P7	30.7061391	37.3653653	6.65922618
Error (Real-Theoretical) Total Time	1.12078652				
		Name	Start	End	Elapsed Time
		P1	0	0.32521305	0.32521305
		P2	0.32563052	0.62987337	0.30424285
		P3	0.63023958	0.73803635	0.10779676
		P4	0.73837681	0.75855007	0.02017326
		P5	0.75890198	0.74525628	-0.0136457
		P6	0.74562726	0.76454954	0.01892228
		P7	0.76496534	1.12078652	0.35582118

- FIFO_4.txt

stdout.txt	dmesg.txt
P1 2173	[Project1] 2173 1587921734.666864478 1587921737.793318384
P2 2174	[Project1] 2174 1587921737.793740335 1587921738.585346120
P3 2175	[Project1] 2175 1587921738.585646957 1587921738.889429231
P4 2176	[Project1] 2176 1587921738.889689603 1587921739.694209030

Theoretical Total Time	5.042724				
		Name	Start	End	Elapsed Time
		P1	0	3.1517025	3.1517025
		P2	3.1517025	3.93962812	0.78792562
		P3	3.93962812	4.25479837	0.31517025
		P4	4.25479837	5.042724	0.78792562
Real Total Time	5.0273447				
		Name	Start	End	Elapsed Time
		P1	0	3.12645388	3.12645388
		P2	3.12687588	3.91848183	0.79160595
		P3	3.91878247	4.22256494	0.30378246
		P4	4.22282529	5.0273447	0.80451941
Error (Real- Theoretical) Total Time	-0.0153793				
		Name	Start	End	Elapsed Time
		P1	0	-0.0252486	-0.0252486
		P2	-0.0248266	-0.0211463	0.00368032
		P3	-0.0208457	-0.0322334	-0.0113878
		P4	-0.0319731	-0.0153793	0.01659379

- FIFO_5.txt

stdout.txt	dmesg.txt
P1 2183	[Project1] 2183 1587921739.717653984 1587921752.677681848
P2 2184	[Project1] 2184 1587921752.678174353 1587921760.429585820
P3 2185	[Project1] 2185 1587921760.429937054 1587921765.197092504
P4 2186	[Project1] 2186 1587921765.197394736 1587921766.775918168
P5 2187	[Project1] 2187 1587921766.776245411 1587921768.320348408
P6 2188	[Project1] 2188 1587921768.320728564 1587921769.931876470
P7 2189	[Project1] 2189 1587921769.932178901 1587921776.834613105

Theoretical Total Time	36.2445787				
		Name	Start	End	Elapsed Time
		P1	0	12.60681	12.60681
		P2	12.60681	20.4860662	7.87925625
		P3	20.4860662	25.21362	4.72755375
		P4	25.21362	26.7894712	1.57585125
		P5	26.7894712	28.3653225	1.57585125
		P6	28.3653225	29.9411737	1.57585125
		P7	29.9411737	36.2445787	6.303405
Real Total Time	37.1169591				
		Name	Start	End	Elapsed Time
		P1	0	12.9600279	12.9600279
		P2	12.9605203	20.7119319	7.75141168
		P3	20.7122831	25.4794385	4.76715541
		P4	25.4797409	27.0582643	1.5785234
		P5	27.0585914	28.6026945	1.54410315
		P6	28.6030746	30.2142224	1.61114788
		P7	30.214525	37.1169591	6.90243411
Error (Real- Theoretical) Total Time	0.87238035				
		Name	Start	End	Elapsed Time
		P1	0	0.35321794	0.35321794
		P2	0.35371027	0.2258657	-0.1278446
		P3	0.22621689	0.26581855	0.03960166
		P4	0.26612086	0.26879301	0.00267215
		P5	0.26912012	0.23737202	-0.0317481
		P6	0.23775206	0.27304869	0.03529663
		P7	0.27335124	0.87238035	0.59902911

- PSJF_1.txt

stdout.txt	dmesg.txt
P1 2735	[Project1] 2738 1587968728.555775963 1587968733.554399475
P2 2736	[Project1] 2737 1587968726.936044989 1587968740.610258365
P3 2737	[Project1] 2736 1587968725.288986221 1587968750.332692729
P4 2738	[Project1] 2735 1587968723.729932359 1587968765.325692396

Theoretical Total Time	39.3962812				
		Name	Start	End	Elapsed Time
		P1	0	39.3962812	39.3962812
		P2	1.57585125	25.21362	23.6377687
		P3	3.1517025	15.7585125	12.60681
		P4	4.72755375	9.4551075	4.72755375
Real Total Time	41.5957601				
		Name	Start	End	Elapsed Time
		P1	0	41.5957601	41.5957601
		P2	1.5590539	26.6027603	25.0437064
		P3	3.20611262	16.880326	13.6742134
		P4	4.82584357	9.82446718	4.99862361
Error (Real- Theoretical) Total Time	2.19947886				
		Name	Start	End	Elapsed Time
		P1	0	2.19947886	2.19947886
		P2	-0.0167974	1.38914032	1.40593767
		P3	0.05441012	1.12181354	1.06740341
		P4	0.09828982	0.36935968	0.27106986

- PSJF_2.txt

stdout.txt	dmesg.txt
P1 2745	[Project1] 2746 1587968767.053619698 1587968768.687819816
P2 2746	[Project1] 2745 1587968765.410608337 1587968771.921065771
P3 2747	[Project1] 2754 1587968773.532697361 1587968776.864135124
P4 2754	[Project1] 2755 1587968776.884820331 1587968778.482900614
P5 2755	[Project1] 2747 1587968771.921389822 1587968783.823301464

Theoretical Total Time	17.3343637				
		Name	Start	End	Elapsed Time
		P1	0	6.303405	6.303405
		P2	1.57585125	3.1517025	1.57585125
		P3	6.303405	17.3343637	11.0309587
		P4	7.87925625	11.0309587	3.1517025
		P5	11.0309587	12.60681	1.57585125
Real Total Time	18.4126933				
		Name	Start	End	Elapsed Time
		P1	0	6.51045752	6.51045752
		P2	1.64301133	3.27721143	1.6342001
		P3	6.51078153	18.4126933	11.9019117
		P4	8.12208915	11.4535267	3.33143759
		P5	11.4742119	13.0722923	1.5980804
Error (Real- Theoretical) Total Time	1.07832952				
		Name	Start	End	Elapsed Time
		P1	0	0.20705252	0.20705252
		P2	0.06716008	0.12550893	0.05834885
		P3	0.20737653	1.07832952	0.87095299
		P4	0.2428329	0.42256799	0.17973509
		P5	0.44325318	0.46548233	0.02222915

- PSJF_3.txt

stdout.txt	dmesg.txt
P1 2762	[Project1] 2763 1587968784.685190789 1587968785.529276619
P2 2763	[Project1] 2764 1587968785.529982962 1587968786.395997460
P3 2764	[Project1] 2765 1587968786.408036008 1587968787.253608199
P4 2765	[Project1] 2762 1587968783.850898950 1587968789.623473410

Theoretical Total Time	5.51547937				
		Name	Start	End	Elapsed Time
		P1	0	5.51547937	5.51547937
		P2	0.78792562	1.57585125	0.78792562
		P3	1.57585125	2.36377687	0.78792562
		P4	2.36377687	3.1517025	0.78792562
Real Total Time	5.77257442				
		Name	Start	End	Elapsed Time
		P1	0	5.77257442	5.77257442
		P2	0.8342917	1.67837763	0.84408593
		P3	1.67908406	2.54509854	0.86601448
		P4	2.55713701	3.40270925	0.84557223
Error (Real- Theoretical) Total Time	0.25709505				
		Name	Start	End	Elapsed Time
		P1	0	0.25709505	0.25709505
		P2	0.04636607	0.10252638	0.05616031
		P3	0.10323281	0.18132167	0.07808886
		P4	0.19336014	0.25100675	0.05764661

- PSJF_4.txt

stdout.txt	dmesg.txt
P2 2772	[Project1] 2774 1587968789.845998768 1587968791.454961623
P3 2774	[Project1] 2772 1587968789.652947485 1587968794.539506469
P1 2773	[Project1] 2775 1587968794.540354389 1587968801.255197397
P4 2775	[Project1] 2773 1587968791.455362413 1587968812.633525153

Theoretical Total Time	22.0619175				
		Name	Start	End	Elapsed Time
		P1	11.0309587	22.0619175	11.0309587
		P2	0	4.72755375	4.72755375
		P3	0.15758512	1.73343637	1.57585125
		P4	4.72755375	11.0309587	6.303405
Real Total Time	22.9805777				
		Name	Start	End	Elapsed Time
		P1	1.80241489	22.9805777	21.1781628
		P2	0	4.88655901	4.88655901
		P3	0.19305134	1.80201411	1.60896277
		P4	4.88740706	11.6022499	6.7148428
Error (Real- Theoretical) Total Time	0.91866021				
		Name	Start	End	Elapsed Time
		P1	-9.2285439	0.91866021	10.1472041
		P2	0	0.15900526	0.15900526
		P3	0.03546621	0.06857774	0.03311152
		P4	0.15985332	0.57129111	0.4114378

- PSJF_5.txt

stdout.txt	dmesg.txt
P1 2789	[Project1] 2789 1587968812.828130103 1587968812.979922826
P2 2790	[Project1] 2791 1587968812.980404023 1587968813.277548875
P3 2791	[Project1] 2790 1587968812.980197189 1587968820.058621792
P4 2792	[Project1] 2792 1587968820.059084026 1587968826.843259085
P5 2793	[Project1] 2793 1587968826.843635466 1587968838.935679069

Theoretical Total Time	24.1105241				
		Name	Start	End	Elapsed Time
		P1	0	0.15758512	0.15758512
		P2	0.47275537	6.77616037	6.303405
		P3	0.15758512	0.47275537	0.31517025
		P4	6.77616037	13.0795654	6.303405
		P5	13.0795654	24.1105241	11.0309587
Real Total Time	26.107549				
		Name	Start	End	Elapsed Time
		P1	0	0.15179276	0.15179276
		P2	0.15206718	7.23049188	7.07842469
		P3	0.15227413	0.44941878	0.29714465
		P4	7.23095393	14.0151291	6.78417516
		P5	14.0155056	26.107549	12.0920434
Error (Real- Theoretical) Total Time	1.99702483				
		Name	Start	End	Elapsed Time
		P1	0	-0.0057924	-0.0057924
		P2	-0.3206882	0.4543315	0.77501969
		P3	-0.005311	-0.0233366	-0.0180256
		P4	0.45479356	0.93556372	0.48077016
		P5	0.93594018	1.99702483	1.06108465

- RR_1.txt

stdout.txt	dmesg.txt
P1 2423	[Project1] 2423 1587921887.614933598 1587921888.382009902
P2 2424	[Project1] 2424 1587921888.382317759 1587921889.153571104
P3 2425	[Project1] 2425 1587921889.154019665 1587921889.985820568
P4 2426	[Project1] 2426 1587921889.986102896 1587921890.801232844
P5 2427	[Project1] 2427 1587921890.801491278 1587921891.600769779

Theoretical Total Time	3.93962812				
		Name	Start	End	Elapsed Time
		P1	0	0.78792562	0.78792562
		P2	0.78792562	1.57585125	0.78792562
		P3	1.57585125	2.36377687	0.78792562
		P4	2.36377687	3.1517025	0.78792562
		P5	3.1517025	3.93962812	0.78792562
Real Total Time	3.98583627				
		Name	Start	End	Elapsed Time
		P1	0	0.76707649	0.76707649
		P2	0.76738429	1.53863764	0.77125335
		P3	1.5390861	2.37088704	0.83180094
		P4	2.37116933	3.18629932	0.81513
		P5	3.18655777	3.98583627	0.7992785
Error (Real- Theoretical) Total Time	0.04620814				
		Name	Start	End	Elapsed Time
		P1	0	-0.0208491	-0.0208491
		P2	-0.0205413	-0.0372136	-0.0166723
		P3	-0.0367651	0.00711017	0.04387531
		P4	0.00739245	0.03459682	0.02720437
		P5	0.03485527	0.04620814	0.01135287

- RR_2.txt

stdout.txt	dmesg.txt
P1 2459	[Project1] 2459 1587921892.525628206 1587921904.581338679
P2 2460	[Project1] 2460 1587921893.271401967 1587921907.148229660

Theoretical Total Time	14.1826612				
		Name	Start	End	Elapsed Time
		P1	0	11.8188844	11.8188844
		P2	0.78792562	14.1826612	13.3947356
Real Total Time	14.6226015				
		Name	Start	End	Elapsed Time
		P1	0	12.0557106	12.0557106
		P2	0.74577379	14.6226015	13.8768277
Error (Real- Theoretical) Total Time	0.43994026				
		Name	Start	End	Elapsed Time
		P1	0	0.23682618	0.23682618
		P2	-0.0421518	0.43994026	0.48209209

- RR_3.txt

stdout.txt	dmesg.txt
P1 2467	[Project1] 2469 1587921913.667308187 1587921935.572705697
P2 2468	[Project1] 2467 1587921908.953324395 1587921938.807835377
P3 2469	[Project1] 2468 1587921911.259762564 1587921939.716770624
P4 2470	[Project1] 2472 1587921918.303282335 1587921951.537571540
P5 2471	[Project1] 2471 1587921917.514674451 1587921954.854849663
P6 2472	[Project1] 2470 1587921916.772895690 1587921956.471828234

Theoretical Total Time	47.2755375				
		Name	Start	End	Elapsed Time
		P1	0	29.1532481	29.1532481
		P2	2.36377687	29.9411737	27.5773969
		P3	4.72755375	26.7894712	22.0619175
		P4	7.87925625	47.2755375	39.3962812
		P5	8.66718187	45.6996862	37.0325044
		P6	11.0309587	42.5479837	31.517025
Real Total Time	47.5185039				
		Name	Start	End	Elapsed Time
		P1	0	29.854511	29.854511
		P2	2.30643821	30.7634463	28.4570081
		P3	4.71398377	26.6193814	21.9053977
		P4	7.81957126	47.5185039	39.6989326
		P5	8.56135011	45.9015253	37.3401752
		P6	9.34995794	42.5842471	33.2342892
Error (Real-Theoretical) Total Time	0.24296641				
		Name	Start	End	Elapsed Time
		P1	0	0.7012629	0.7012629
		P2	-0.0573387	0.82227259	0.87961125
		P3	-0.01357	-0.1700898	-0.1565198
		P4	-0.059685	0.24296641	0.30265141
		P5	-0.1058318	0.20183902	0.30767078
		P6	-1.6810008	0.03626337	1.71726418

- RR_4.txt

stdout.txt	dmesg.txt
P1 2481	[Project1] 2484 1587921959.669166589 1587921965.283214987
P2 2482	[Project1] 2485 1587921960.418671251 1587921966.100324255
P3 2483	[Project1] 2486 1587921961.313600462 1587921966.981421049
P4 2484	[Project1] 2483 1587921958.852704181 1587921979.677774228
P5 2485	[Project1] 2487 1587921966.981674069 1587921987.526693028
P6 2486	[Project1] 2482 1587921957.238571861 1587921989.181136324
P7 2487	[Project1] 2481 1587921956.486615176 1587921993.573943414

Theoretical Total Time	36.2445787				
		Name	Start	End	Elapsed Time
		P1	0	36.2445787	36.2445787
		P2	0.78792562	31.517025	30.7290994
		P3	1.57585125	22.8498431	21.2739919
		P4	2.36377687	8.66718187	6.303405
		P5	3.1517025	9.4551075	6.303405
		P6	3.93962812	10.2430331	6.303405
		P7	5.51547937	29.1532481	23.6377687
Real Total Time	37.0873282				
		Name	Start	End	Elapsed Time
		P1	0	37.0873282	37.0873282
		P2	0.7519567	32.6945212	31.9425645
		P3	2.36608911	23.191159	20.8250699
		P4	3.18255138	8.79659986	5.61404848
		P5	3.93205619	9.61370897	5.68165278
		P6	4.82698536	10.4948058	5.66782045
		P7	10.4950588	31.0400779	20.5450191
Error (Real- Theoretical) Total Time	0.84274945				
		Name	Start	End	Elapsed Time
		P1	0	0.84274945	0.84274945
		P2	-0.0359689	1.17749619	1.21346512
		P3	0.79023786	0.34131589	-0.448922
		P4	0.81877451	0.12941799	-0.6893565
		P5	0.78035369	0.15860147	-0.6217522
		P6	0.88735723	0.25177269	-0.6355845
		P7	4.9795794	1.88682981	-3.0927496

- RR_5.txt

stdout.txt	dmesg.txt
P1 2494	[Project1] 2497 1587921996.817779131 1587922002.395014852
P2 2495	[Project1] 2498 1587921997.747203020 1587922003.230390823
P3 2496	[Project1] 2499 1587921998.488845142 1587922004.175621761
P4 2497	[Project1] 2496 1587921995.995827177 1587922016.910284808
P5 2498	[Project1] 2500 1587922003.230552187 1587922024.877941894
P6 2499	[Project1] 2495 1587921994.394788069 1587922026.594219986
P7 2500	[Project1] 2494 1587921993.598594705 1587922031.027193216

Theoretical Total Time	36.2445787				
		Name	Start	End	Elapsed Time
		P1	0	36.2445787	36.2445787
		P2	0.78792562	31.517025	30.7290994
		P3	1.57585125	22.8498431	21.2739919
		P4	2.36377687	8.66718187	6.303405
		P5	3.1517025	9.4551075	6.303405
		P6	4.72755375	11.0309587	6.303405
		P7	5.51547937	29.1532481	23.6377687
Real Total Time	37.4285986				
		Name	Start	End	Elapsed Time
		P1	0	37.4285986	37.4285986
		P2	0.79619336	32.9956253	32.1994319
		P3	2.39723253	23.3116901	20.9144576
		P4	3.2191844	8.7964201	5.5772357
		P5	4.14860845	9.63179612	5.48318768
		P6	4.89025044	10.5770271	5.68677664
		P7	9.63195753	31.2793472	21.6473897
Error (Real-Theoretical) Total Time	1.1840199				
		Name	Start	End	Elapsed Time
		P1	0	1.1840199	1.1840199
		P2	0.00826774	1.47860026	1.47033253
		P3	0.82138128	0.46184697	-0.3595343
		P4	0.85540752	0.12923822	-0.7261693
		P5	0.99690595	0.17668862	-0.8202173
		P6	0.1626967	-0.4539317	-0.6166284
		P7	4.11647816	2.12609906	-1.9903791

- SJF_1.txt

stdout.txt	dmesg.txt
P2 2509	[Project1] 2509 1587922031.039988928 1587922034.220228161
P3 2511	[Project1] 2511 1587922034.221887608 1587922035.819392704
P1 2510	[Project1] 2512 1587922035.819805146 1587922042.220161311
P4 2512	[Project1] 2510 1587922035.819753576 1587922053.467687623

Theoretical Total Time	22.0619175				
		Name	Start	End	Elapsed Time
		P1	11.0309587	22.0619175	11.0309587
		P2	0	3.1517025	3.1517025
		P3	3.1517025	4.72755375	1.57585125
		P4	4.72755375	11.0309587	6.303405
Real Total Time	22.4276986				
		Name	Start	End	Elapsed Time
		P1	4.77976465	22.4276986	17.647934
		P2	0	3.1802392	3.1802392
		P3	3.18189859	4.77940369	1.59750509
		P4	4.77981615	11.1801722	6.40035605
Error (Real- Theoretical) Total Time	0.36578112				
		Name	Start	End	Elapsed Time
		P1	-6.2511941	0.36578112	6.61697521
		P2	0	0.0285367	0.0285367
		P3	0.03019609	0.05184994	0.02165384
		P4	0.0522624	0.14921346	0.09695106

- SJF_2.txt

stdout.txt	dmesg.txt
P1 2519	[Project1] 2519 1587922053.641900687 1587922053.803584253
P2 2520	[Project1] 2521 1587922053.804021837 1587922054.112192016
P3 2521	[Project1] 2520 1587922053.803850512 1587922060.549535923
P4 2522	[Project1] 2522 1587922060.549961110 1587922066.954725132
P5 2523	[Project1] 2523 1587922066.955031042 1587922079.211026399

Theoretical Total Time	24.1105241				
		Name	Start	End	Elapsed Time
		P1	0	0.15758512	0.15758512
		P2	0.47275537	6.77616037	6.303405
		P3	0.15758512	0.47275537	0.31517025
		P4	6.77616037	13.0795654	6.303405
		P5	13.0795654	24.1105241	11.0309587
Real Total Time	25.5691257				
		Name	Start	End	Elapsed Time
		P1	0	0.16168356	0.16168356
		P2	0.16194963	6.90763521	6.74568558
		P3	0.16212106	0.47029114	0.30817008
		P4	6.90806031	13.3128242	6.40476394
		P5	13.3131304	25.5691257	12.2559953
Error (Real- Theoretical) Total Time	1.45860153				
		Name	Start	End	Elapsed Time
		P1	0	0.00409843	0.00409843
		P2	-0.3108057	0.13147484	0.44228058
		P3	0.00453593	-0.0024642	-0.0070002
		P4	0.13189994	0.23325888	0.10135894
		P5	0.23356501	1.45860153	1.22503653

- SJF_3.txt

stdout.txt	dmesg.txt
P1 2533	[Project1] 2533 1587922079.409019215 1587922084.451450768
P2 2534	[Project1] 2536 1587922084.452083887 1587922084.467683772
P4 2536	[Project1] 2534 1587922084.467983865 1587922092.331262259
P3 2535	[Project1] 2537 1587922092.331679271 1587922092.347525224
P5 2537	[Project1] 2538 1587922092.347986446 1587922098.740977301
P6 2538	[Project1] 2539 1587922098.741389851 1587922105.221419400
P7 2539	[Project1] 2535 1587922092.331630657 1587922117.038478330
P8 2540	[Project1] 2540 1587922117.044211980 1587922131.599283925

Theoretical Total Time	50.458757				
		Name	Start	End	Elapsed Time
		P1	0	4.72755375	4.72755375
		P2	17.3658808	25.245137	7.87925625
		P3	25.245137	36.2760958	11.0309587
		P4	4.72755375	4.74331226	0.01575851
		P5	4.74331226	4.75907077	0.01575851
		P6	4.75907077	11.0624758	6.303405
		P7	11.0624758	17.3658808	6.303405
		P8	36.2760958	50.458757	14.1826612
Real Total Time	52.1902647				
		Name	Start	End	Elapsed Time
		P1	0	5.04243159	5.04243159
		P2	5.05896473	12.9222431	7.86327839
		P3	12.9226115	37.6294591	24.7068477
		P4	5.04306459	5.05866456	0.01559997
		P5	12.9226601	12.9385059	0.01584578
		P6	12.9389672	19.3319581	6.39299083
		P7	19.3323705	25.8124001	6.48002958
		P8	37.6351926	52.1902647	14.5550721
Error (Real- Theoretical) Total Time	1.73150769				
		Name	Start	End	Elapsed Time
		P1	0	0.31487784	0.31487784
		P2	-12.306916	-12.322894	-0.0159779
		P3	-12.322526	1.35336337	13.6758889
		P4	0.31551085	0.3153523	-0.0001585
		P5	8.17934785	8.17943511	8.73E-05
		P6	8.17989645	8.26948228	0.08958583

		P7	8.26989475	8.44651933	0.17662458
		P8	1.35909686	1.73150769	0.37241082

- SJF_4.txt

stdout.txt	dmesg.txt
P1 2549	[Project1] 2549 1587922139.056907813 1587922144.110459204
P2 2550	[Project1] 2550 1587922144.110794311 1587922145.748043330
P3 2551	[Project1] 2551 1587922145.748329690 1587922152.372304130
P5 2553	[Project1] 2553 1587922152.372937190 1587922154.004955778
P4 2552	[Project1] 2552 1587922154.005388393 1587922157.256267959

Theoretical Total Time	17.3343637				
		Name	Start	End	Elapsed Time
		P1	0	4.72755375	4.72755375
		P2	4.72755375	6.303405	1.57585125
		P3	6.303405	12.60681	6.303405
		P4	14.1826612	17.3343637	3.1517025
		P5	12.60681	14.1826612	1.57585125
Real Total Time	18.1993601				
		Name	Start	End	Elapsed Time
		P1	0	5.0535512	5.0535512
		P2	5.05388641	6.69113541	1.63724899
		P3	6.69142175	13.3153963	6.62397456
		P4	14.9484806	18.1993601	3.25087953
		P5	13.3160293	14.9480479	1.63201857
Error (Real- Theoretical) Total Time	0.86499639				
		Name	Start	End	Elapsed Time
		P1	0	0.32599745	0.32599745
		P2	0.32633266	0.38773041	0.06139774
		P3	0.38801675	0.70858631	0.32056956
		P4	0.76581936	0.86499639	0.09917703
		P5	0.70921931	0.76538663	0.05616732

- SJF_5.txt

stdout.txt	dmesg.txt
P1 2560	[Project1] 2560 1587922157.271570056 1587922160.463202912
P2 2561	[Project1] 2561 1587922160.463576392 1587922161.333811739
P3 2562	[Project1] 2562 1587922161.334137547 1587922162.116886435
P4 2563	[Project1] 2563 1587922162.117244100 1587922162.956752513

Theoretical Total Time	5.51547937				
		Name	Start	End	Elapsed Time
		P1	0	3.1517025	3.1517025
		P2	3.1517025	3.93962812	0.78792562
		P3	3.93962812	4.72755375	0.78792562
		P4	4.72755375	5.51547937	0.78792562
Real Total Time	5.68518257				
		Name	Start	End	Elapsed Time
		P1	0	3.19163299	3.19163299
		P2	3.19200635	4.06224179	0.87023544
		P3	4.06256747	4.84531641	0.78274894
		P4	4.84567404	5.68518257	0.83950853
Error (Real- Theoretical) Total Time	0.1697032				
		Name	Start	End	Elapsed Time
		P1	0	0.03993049	0.03993049
		P2	0.04030385	0.12261367	0.08230982
		P3	0.12293935	0.11776266	-0.0051767
		P4	0.11812029	0.1697032	0.05158291