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DATA604
Assignment 7

Problem 5.6

To model the one hour overlap in shifts, I added three rows to the Inspector work schedule day pattern:

DayPattern1

Work Periods

Start Time	Duration	End Time	Value	Cost Multiplier	Description
12:00 AM	4 hours	4:00 AM	1	1	
5:00 AM	7 hours	12:00 PM	1	1	
1:00 PM	7 hours	8:00 PM	1	1	
9:00 PM	3 hours	12:00 AM	1	1	
4:00 AM	1 hour	5:00 AM	2	2	
12:00 PM	1 hour	1:00 PM	2	2	
8:00 PM	1 hour	9:00 PM	2	2	

I then ran two experiments, one for the original model and one for the updated model. At first, using 30 days and 5 days of warmup, I was getting different results (although the 95% confidence intervals overlapped somewhat), so I extended the experiments to 100 days with 10 days of warmup. After that the results were basically indistinguishable. Since the maximum inspection utilization was 78% in the original model, increasing capacity did not change the results. The only thing it did was to reduce the maximum inspection utilization to 61%.

Original model

Scenario		Replications		Responses		
Name	Status	Required	Completed	TIS	WIP	NumTimes
Scenario 1	Compl...	50	50 of 50	7.84349	78.5125	1.35064

Updated model

Scenario		Replications		Responses		
Name	Status	Required	Completed	TIS	WIP	NumTimes
Scenario 1	Compl...	50	50 of 50	7.98431	79.9022	1.34972

Problem 5.7

Changing the 'definition' of a bad board from simply 8% of all inspected boards to those boards that failed inspection 3 times dramatically reduced the number of bad boards from 2,343.7 to 53.8, on average.

Original model

Average | Minimum | Maximum | Half Width | Scenario

Object Type	Object Name	Data Source	Category	Data Item	Statistic	Scenario1 Average	Minimum	Maximum	Half Width
Sink	BadParts	[DestroyedEntities]	FlowTime	TimeInSystem	Average (Min...	469.5907	358.4348	603.9663	29.6320
					Maximum (Mi...	4,717.4124	754.7400	740.8470	378.1761
					Minimum (Min...	5.6482	5.0477	6.1575	0.0762
					Observations	2,343.7000	261.0000	474.0000	13.8655
		InputBuffer	Throughput	NumberEntered	Total	2,343.7000	261.0000	474.0000	13.8655
				NumberExited	Total	2,343.7000	261.0000	474.0000	13.8655

Updated model

Average | Minimum | Maximum | Half Width | Scenario

Object Type	Object Name	Data Source	Category	Data Item	Statistic	Scenario 1 Average	Minimum	Maximum	Half Width
Sink	BadParts	[DestroyedEntities]	FlowTime	TimeInSystem	Average (Hours)	7.1211	5.6900	8.7476	0.2147
					Maximum (Hours)	18.3785	15.6238	27.1546	0.6244
					Minimum (Hours)	0.5274	0.4432	0.7560	0.0160
					Observations	53.8200	35.0000	70.0000	1.8797
		InputBuffer	Throughput	NumberEntered	Total	53.8200	35.0000	70.0000	1.8797
				NumberExited	Total	53.8200	35.0000	70.0000	1.8797

Problem 5.8

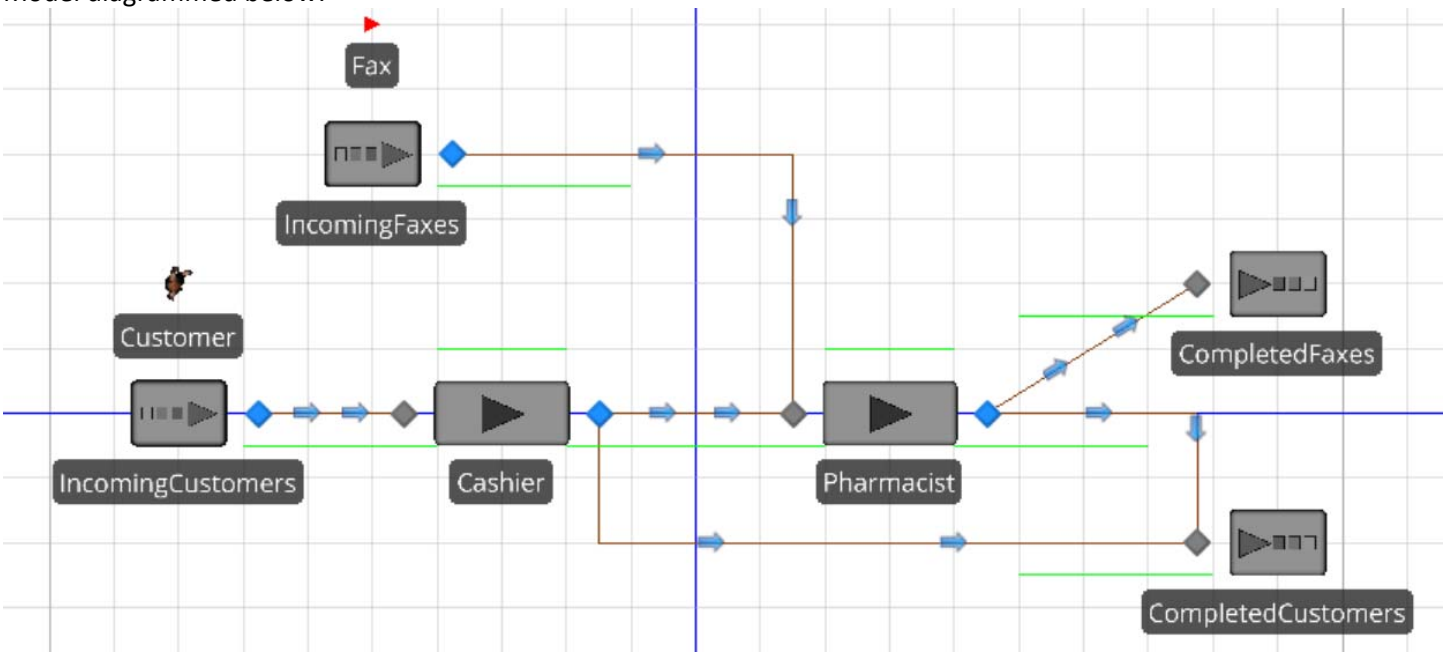
Based on 50 replications of a 110 day experiment with 10 days warmup, the proportion allocated to the fast, medium and slow fine pitch machines were 38%, 34% and 29%, which are consistent with what the book predicted (aside from some rounding error).

Average | Minimum | Maximum | Half Width | Scenario

Object Type	Object Name	Data Source	Category	Data Item	Statistic	Scenario 1 Average	Minimum	Maximum	Half Width
Server	FinepitchFastStation	Processing	Throughput	NumberExited	Total	12,205.9600	011.0000	424.0000	24.0822
	FinepitchMediumStat...	Processing	Throughput	NumberExited	Total	10,911.7000	740.0000	094.0000	19.3111
	FinepitchSlowStation	Processing	Throughput	NumberExited	Total	9,285.5400	114.0000	499.0000	20.5992

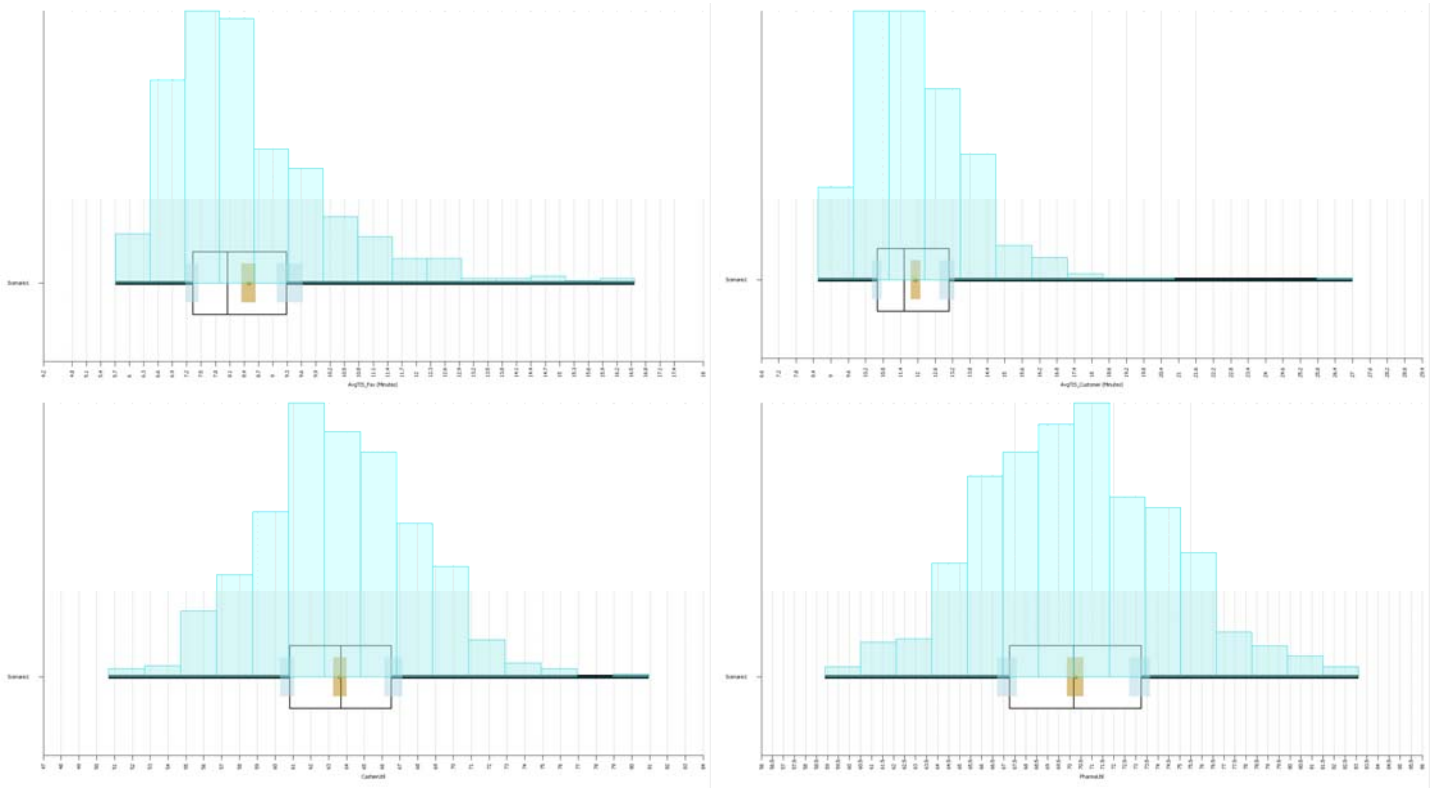
Problem 5.9

Model diagrammed below:



Experiment results:

	Scenario		Replications		Responses			
	Name	Status	Required	Completed	AvgTIS_Fax...	AvgTIS_Customer...	CashierUtil	PharmaUtil
1	Scenario 1	Compl...	500	500 of 500	8.49638	11.9203	63.6351	70.2554



I wanted to see what if anything would happen if pharmacists prioritized physical customers over faxes:

- Pharmacist prioritizes physical customers over faxes using entity priority and server ranking rule
- Separate sinks for physical customers and faxes (using Entity.Is.[EntityName]) routing logic

It appears that having pharmacists prioritize physical customers over faxes results in statistically significant fewer minutes in system for customers on average.

	Scenario		Replications		Responses			
	Name	Status	Required	Completed	AvgTIS_Fax...	AvgTIS_Customer...	CashierUtil	PharmaUtil
▶	Scenario 1	Compl...	500	500 of 500	10.4345	10.5618	63.6351	70.2554