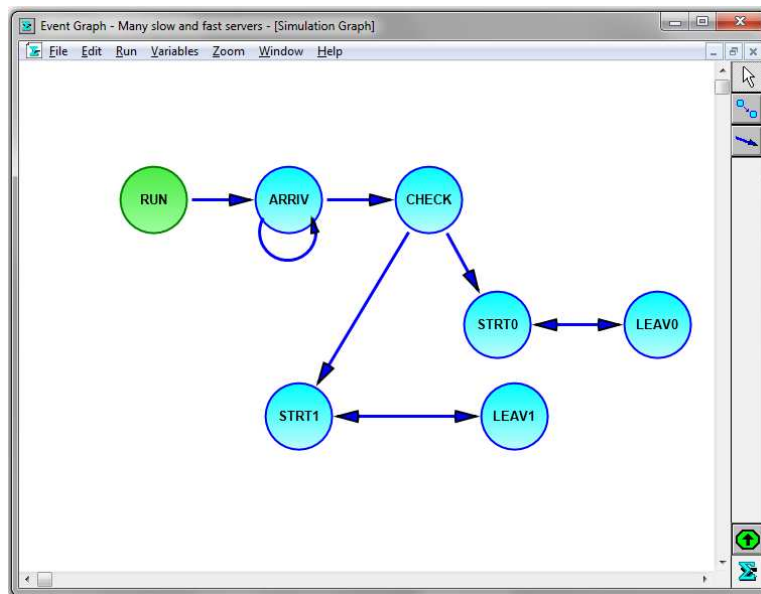


Using SIGMA Run Fast Mode

SIGMA's 'run fast' mode allows you to generate complex models and run them very quickly. This is achieved by compiling your simulation to a separate executable, which then runs outside SIGMA. Having a separate executable means you can quickly run many experiments with different settings at once, or integrate your simulation with Excel or some other external application. In this tutorial we'll explain the key features of the 'run fast' mode.

- 1) Let's start by opening the model 'Many slow and fast servers' under the directory 'Slow and Fast Servers' in the Sigma Models folder. This model has two key inputs, the number of fast servers `SERVER[0]` and the number of slow servers, `SERVER[1]`. Customers arriving prefer to use the fast server, but if there are no fast servers available they use the slow server.



- 2) Now execute this simulation in 'Run Fast' mode by typing `CTRL+F5` or `Run > Fast`. A window will come up asking for an output file name, random number seed, stopping time, event trace and the initial number of fast and slow servers, `SERVER[0]` and `SERVER[1]`. The output file name is where the simulation output will be placed, enter a name like 'output.txt'. Enter a seed of 1, a stopping time of 100, and 1 to trace all the output. Choose 1 of each type of server. The simulation will run and will show some summary statistics.

```

The Next Seed In the Random Input Stream is 16807
SUMMARY STATISTICS
QUEUE:
Time Ave. = 0 Time Sample Var. = 0
Event Ave. = 0.5 Event Sample Var. = 0.25
Minimum = 0
Maximum = 1
SERVER[0]:
Time Ave. = 0 Time Sample Var. = 0
Event Ave. = 0.75 Event Sample Var. = 0.1875
Minimum = 0
Maximum = 1
SERVER[1]:
Time Ave. = 1 Time Sample Var. = 0
Event Ave. = 1 Event Sample Var. = 0
Minimum = 0
Maximum = 1
Output written to, 1
Running the simulation: Many_slow_and_fast_servers.exe
In Path: \Users\Rick Johnston\Documents\Sigma Models\Slow and Fast Servers\
Experiments ended! If runs end early:
1. check fields in *.exp file.
2. check if output file was already open.
Press any key to close.
    
```

- Now let's take a more detailed look at the output file, called the simulation trace. Go to the directory 'Slow and Fast Servers' and double click to open the file we just created called 'output.txt' We entered '1' as the trace option, so SIGMA has output every event that occurred in the simulation, the time of that event, the event name and count of the number of that type of event that has occurred, as well as the state of the entities in the simulation at that time.

Time	Event	Count	QUEUE	SERVER[0]	SERVER[1]
0.000	RUN	1	0	1	1
0.000	ARRIV	1	1	1	1
0.000	CHECK	1	1	1	1
0.000	STRTO	1	0	0	1
3.000	LEAVO	1	0	1	1
23.516	ARRIV	2	1	1	1
23.516	CHECK	2	1	1	1
23.516	STRTO	2	0	0	1
26.516	LEAVO	2	0	1	1
27.573	ARRIV	3	1	1	1
27.573	CHECK	3	1	1	1
27.573	STRTO	3	0	0	1
28.133	ARRIV	4	1	0	1
28.133	CHECK	4	1	0	1
28.133	STRTO	1	0	0	0
29.692	ARRIV	5	1	0	0
29.692	CHECK	5	1	0	0
30.573	LEAVO	3	1	1	0
30.573	STRTO	4	0	0	0
30.952	ARRIV	6	1	0	0
30.952	CHECK	6	1	0	0
33.133	LEAV1	1	1	0	1
33.133	STRTO	2	0	0	0
33.573	LEAVO	4	0	1	0
33.989	ARRIV	7	1	1	0
33.989	CHECK	7	1	1	0
33.989	STRTO	5	0	0	0

- Now let's open this output in Excel, and we can filter by the 'Event' column to just see the type of events 'LEAV1' corresponding to jobs leaving the slower server. Compare them to the number of events 'LEAVO' corresponding to jobs leaving the faster server. Since customers prefer the faster server, there will be fewer 'LEAV1' events than 'LEAVO' events.

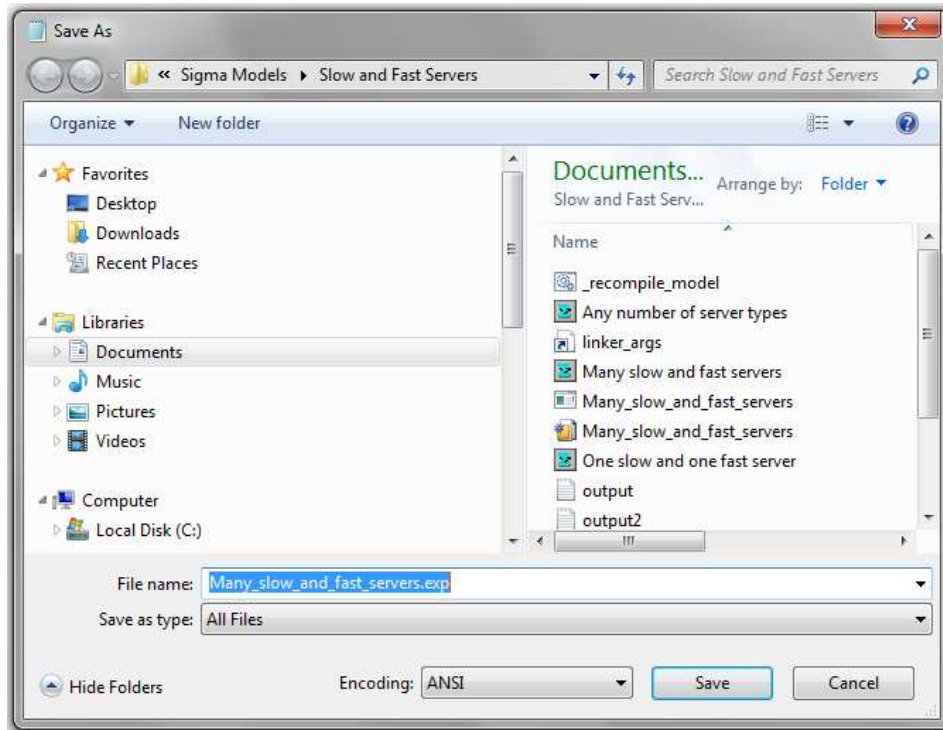
	A	B	C	D	E	F	G	H	I	J
1	Time	Event	Count	Q	SER	SE	ER[1]			
23	33.133	LEAV1	1	1	0	1				
30	38.133	LEAV1	2	0	1	1				
49	45.877	LEAV1	3	4	0	1				
55	50.877	LEAV1	4	1	0	1				
62	55.877	LEAV1	5	0	1	1				
74	64.241	LEAV1	6	0	1	1				
82	76.689	LEAV1	7	0	1	1				
103	83.847	LEAV1	8	3	0	1				
111	88.847	LEAV1	9	3	0	1				
125	93.847	LEAV1	10	4	0	1				
133	98.847	LEAV1	11	2	0	1				
151										
152										
153										

- 5) The 'run fast' mode also allows you to perform a batch of experiments at the same time using an experiment file. The experiment file stores the settings we manually entered in step 3 of this tutorial. Open a new text file and enter the values below.

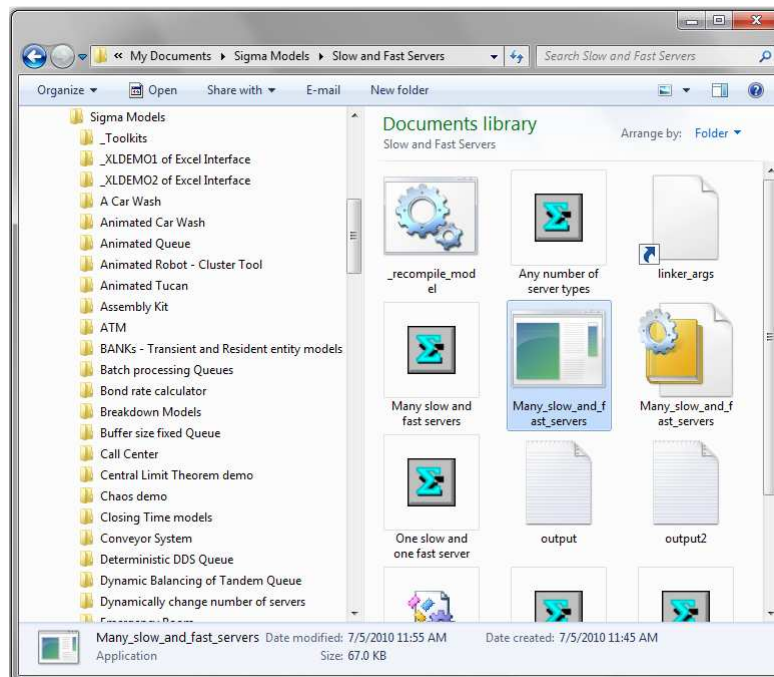
```

Many_slow_and_fast_servers - Notepad
File Edit Format View Help
run1.xls y 1 100 1 1 1
run2.xls y 2 100 1 1 1
    
```

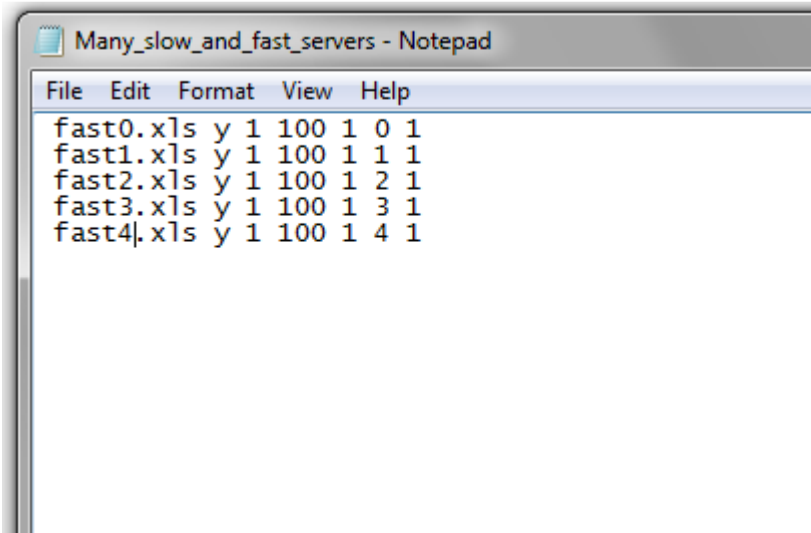
- 6) You'll note that there are two lines, so we will run two simulations to the output files 'run1.xls' and 'run2.xls'. The only difference between these simulations is the random seed, which is 1 for run 1 and 2 for run 2. Save this file in the same directory with the file name 'Many_slow_and_fast_servers.exp'.



- 7) Now run the simulation executable again, by double clicking on many_slow_and_fast_servers.exe. Note that this time, the application doesn't ask for input settings before it runs the simulation, since this information is stored in the experiment file we saved earlier.



- 8) Finally, let's do 5 experiments where we change the number of fast servers from 0 to 4. Edit the experiment file with notepad, and change the number of servers in experiments. We're also going to put the outputs in a different location, 'fast0.xls' through 'fast4.xls' to avoid over-writing our other outputs. This time we use the same random seed of 1 so we can compare the outputs.



Run the many_slow_and_fast_servers executable again.

- 9) There should now be 5 files in the directory, which you can double click to open and compare in Excel.

