A Project Report

ON

Bank Simulation

BY

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1. ABSTRACT

System Modelling and Simulation is a discipline for developing a level of understanding of the interaction of the parts of a system, and of the system as a whole. The level of understanding which may be developed via this discipline is seldom achievable via any other discipline.

One of the real benefits of modelling and simulation is its ability to accomplish a time and space compression between the interrelationships within a system. This brings into view the results of interactions that would normally escape us because they are not closely related in time and space. Modelling and simulation can provide a way of understanding dynamic complexity!

2. JAAMSIM : AN INTRODUCTION

Simulation is the imitation of the operation of a real-world process or system over time. Simulation software allows you to evaluate, compare and optimize alternative designs, plans and policies. As such, it provides a tool for explaining and defending decisions to various stakeholders.

Because simulation is such a powerful tool to assist in understanding complex systems and to support decision-making, a wide variety of approaches and tools exist. Discrete Event Simulator tools rely on a transaction-flow approach to modelling systems. Models consist of entities, resources, and control elements (elements that determine the states of the entities and resources). Discrete simulators are generally designed for simulating processes in which the material or information that is being simulated can be described as moving in discrete steps or packets. They are not meant to model the movement of continuous material (e.g., water) or represent continuous systems that are represented by differential equations.

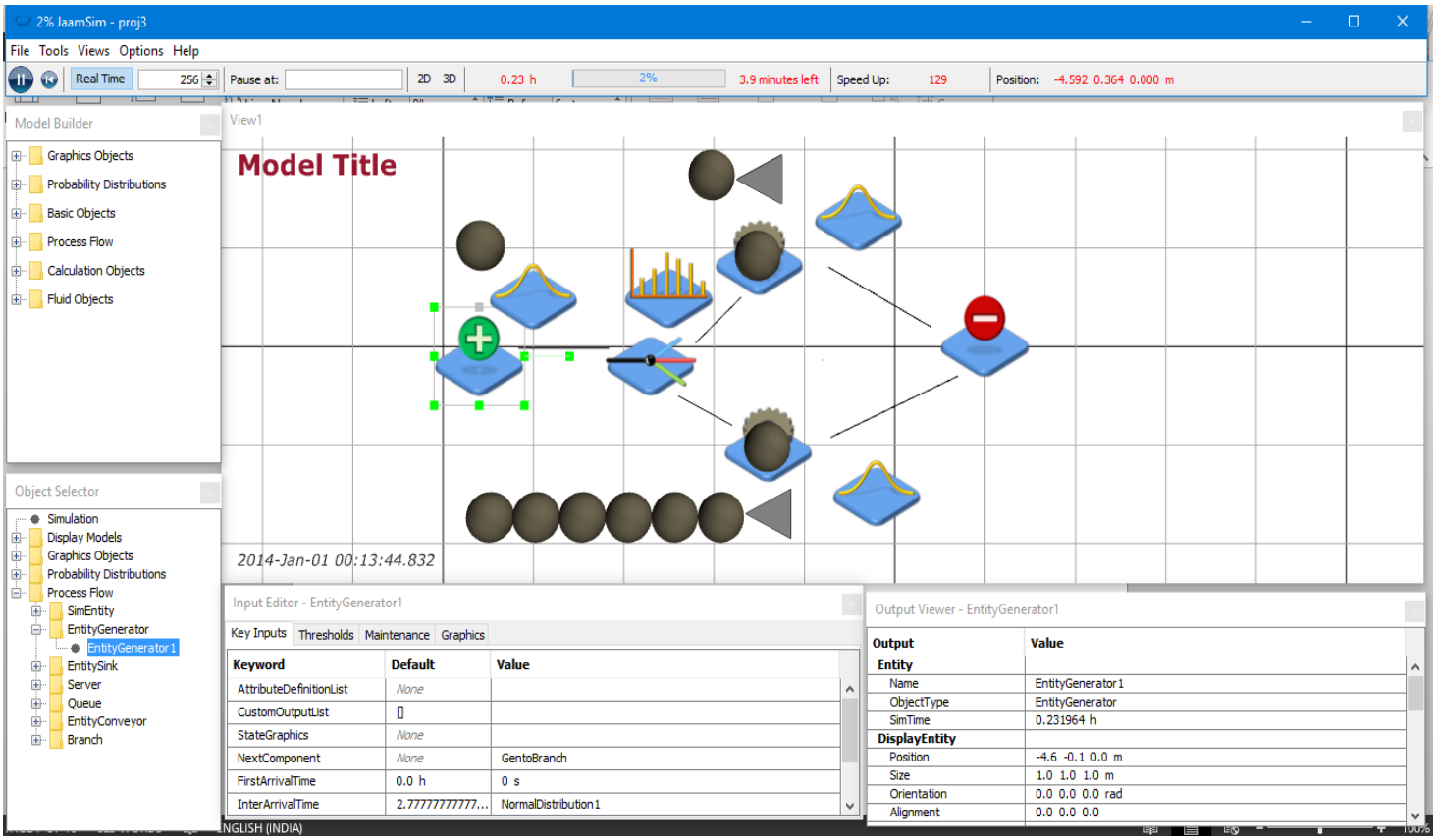
JaamSim (Java Animation Modelling and Simulation) is one such discrete-event simulation software package first developed in 2002 as the foundation for simulation applications.

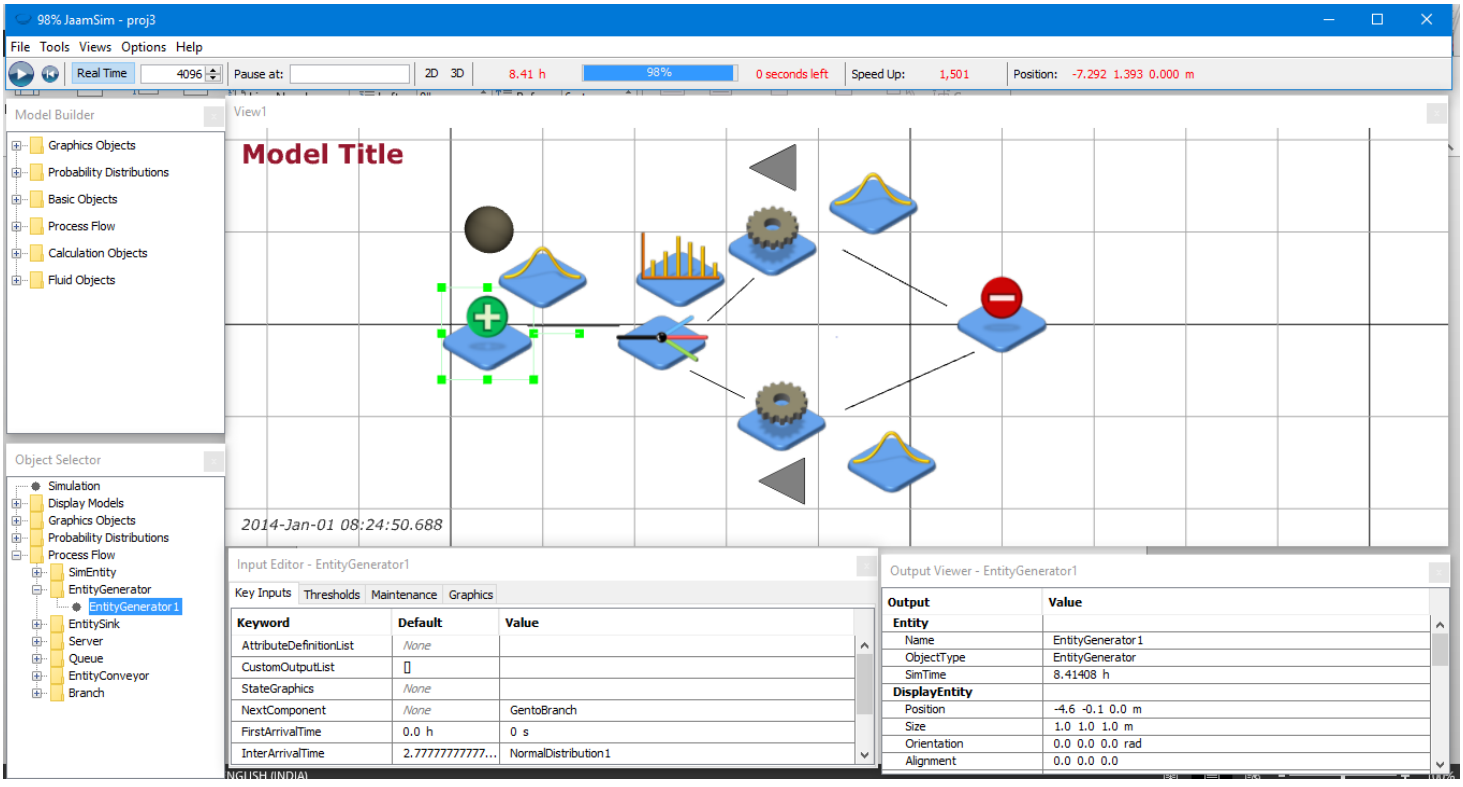
JaamSim includes a drag and drop graphical user interface, 3D animation, and a full set of built-in objects for model building. It is object oriented, extremely fast, and scalable to the largest of applications. Windows, Linux, and OSX are all supported.

3. PROBLEM STATEMENT

Customers arrive at a nationalized bank at the rate of one every 60 ± 40 seconds. 60% of the customers perform money transactions and the remaining 40% do other things such as getting the draft, updating passbooks, etc., which require 3 ± 1 and 4 ± 1 minutes, respectively. There are separate counters for both the activities. Simulate the system for 200 arrivals.

4. SCREENSHOTS





5. OUTPUT

Simulation	Present Time and Date	April 15, 2017 10:03	-
Simulation	Initialization Duration	0.0	h
Simulation	Run Duration	8.5	h
Simulation	Present Simulation Time	8.5	h

*** Branch ***

Branch1	StateTimes[None]	8.5	h
Branch1	NumberAdded	200.0	-
Branch1	NumberProcessed	200.0	-

*** EntityConveyor ***

BranchtoServ1	StateTimes[Idle]	8.5	h
BranchtoServ1	Availability	1.0	-
BranchtoServ1	NumberAdded	67.0	-
BranchtoServ1	NumberProcessed	67.0	-
BranchtoServ2	StateTimes[Idle]	8.5	h
BranchtoServ2	Availability	1.0	-
BranchtoServ2	NumberAdded	133.0	-
BranchtoServ2	NumberProcessed	133.0	-
GentoBranch	StateTimes[Idle]	8.5	h
GentoBranch	Availability	1.0	-
GentoBranch	NumberAdded	200.0	-
GentoBranch	NumberProcessed	200.0	-
Ser1vtoSink	StateTimes[Idle]	8.5	h
Ser1vtoSink	Availability	1.0	-
Ser1vtoSink	NumberAdded	67.0	-
Ser1vtoSink	NumberProcessed	67.0	-
Serv2toSink	StateTimes[Idle]	8.5	h
Serv2toSink	Availability	1.0	-
Serv2toSink	NumberAdded	133.0	-
Serv2toSink	NumberProcessed	133.0	-

*** EntityGenerator ***

EntityGenerator1	StateTimes[Breakdown]	0.0	h
EntityGenerator1	StateTimes[Idle]	5.094633078055555	h
EntityGenerator1	StateTimes[Working]	3.4053669219444442	h
EntityGenerator1	Utilisation	0.4006314025816993	-
EntityGenerator1	Commitment	0.4006314025816994	-
EntityGenerator1	Availability	1.0	-
EntityGenerator1	Reliability	1.0	-

EntityGenerator1	NumberAdded	200.0	-
EntityGenerator1	NumberProcessed	200.0	-

*** EntitySink ***

EntitySink1	StateTimes[None]	8.5	h
EntitySink1	NumberAdded	200.0	-
EntitySink1	NumberProcessed	200.0	-

*** Queue ***

Queue1	StateTimes[None]	8.5	h
Queue1	NumberAdded	67.0	-
Queue1	NumberProcessed	67.0	-
Queue1	QueueLengthAverage	0.723787598137255	-
Queue1	QueueLengthStandardDeviation	1.3749369390667177	-
Queue1	QueueLengthMinimum	0.0	-
Queue1	QueueLengthMaximum	6.0	-
Queue1	QueueLengthTimes[0]	6.0577069025000005	h
Queue1	QueueLengthTimes[1]	0.7219913775000002	h
Queue1	QueueLengthTimes[2]	0.7849846319444439	h
Queue1	QueueLengthTimes[3]	0.27069779166666674	h
Queue1	QueueLengthTimes[4]	0.3162716208333333	h
Queue1	QueueLengthTimes[5]	0.30703196888888873	h
Queue1	QueueLengthTimes[6]	0.04131570666666701	h
Queue1	AverageQueueTime	0.09182379976368162	h

Queue2	StateTimes[None]	8.5	h
Queue2	NumberAdded	133.0	-
Queue2	NumberProcessed	133.0	-
Queue2	QueueLengthAverage	38.313020383431386	-
Queue2	QueueLengthStandardDeviation	23.638399510256967	-
Queue2	QueueLengthMinimum	0.0	-
Queue2	QueueLengthMaximum	79.0	-
Queue2	QueueLengthTimes[0]	0.3238539599999999	h
Queue2	QueueLengthTimes[1]	0.08069824444444525	h
Queue2	QueueLengthTimes[2]	0.08322963583333323	h
Queue2	QueueLengthTimes[3]	0.08223172388888873	h
Queue2	QueueLengthTimes[4]	0.08021600055555562	h
Queue2	QueueLengthTimes[5]	0.1325612594444444	h
Queue2	QueueLengthTimes[6]	0.08908785777777799	h
Queue2	QueueLengthTimes[7]	0.12747687805555497	h
Queue2	QueueLengthTimes[8]	0.19260809861111125	h

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Queue2	QueueLengthTimes[69]	0.13840726249999938	h
Queue2	QueueLengthTimes[70]	0.12449559972222182	h

Queue2	QueueLengthTimes[71]	0.13035548500000055	h
Queue2	QueueLengthTimes[72]	0.10025609611111172	h
Queue2	QueueLengthTimes[73]	0.09354211055555525	h
Queue2	QueueLengthTimes[74]	0.10256863444444408	h
Queue2	QueueLengthTimes[75]	0.11237767611111091	h
Queue2	QueueLengthTimes[76]	0.09604333750000074	h
Queue2	QueueLengthTimes[77]	0.07925132305555507	h
Queue2	QueueLengthTimes[78]	0.08471424277777816	h
Queue2	QueueLengthTimes[79]	0.005851048888888625	h
Queue2	AverageQueueTime	2.4485764906704266	h
Queue2	NumberReneged	0.0	-

*** Server ***

Server1	StateTimes[Idle]	5.175090980833333	h
Server1	StateTimes[Working]	3.3249090191666664	h
Server1	Utilisation	0.3911657669607843	-
Server1	Commitment	0.3911657669607843	-
Server1	Availability	1.0	-
Server1	Reliability	1.0	-
Server1	NumberAdded	67.0	-
Server1	NumberProcessed	67.0	-

Server2	StateTimes[Idle]	0.1902805413888889	h
Server2	StateTimes[Stopped]	0.0	h
Server2	StateTimes[Working]	8.309719458611111	h
Server2	Utilisation	0.9776140539542483	-
Server2	Commitment	0.9776140539542484	-
Server2	Availability	1.0	-
Server2	Reliability	1.0	-
Server2	NumberAdded	133.0	-
Server2	NumberProcessed	133.0	-

*** SimEntity ***

SimEntity1	StateTimes[None]	8.5	h

7. CONCLUSION

Currently, there are separate counters for both the activities. But if both the counters would available for both the Activity the average wait would be reduced and system will be efficient.

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