



# Parking Lot Model Simulation

Presented by

- Harika
- Rajendra
- Charity
- Timothy
- Vijay

# Abstract

This project describes an animated simulation model that will be used to assess several strategies for improving the Parking Lot C system at Kent State University, Kent Campus. Due to insufficient parking at Lot C it has been a chaos for students rushing for morning classes. We decide on building this simulation in Arena as a project topic.

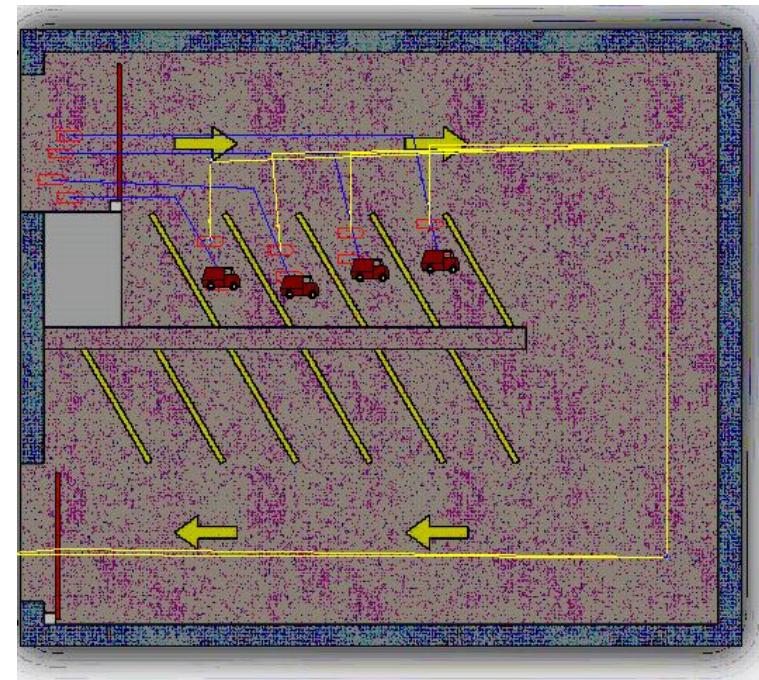
# Purpose Of Study

Focus of this project is on Kent State University Parking Lot C, the lessons learned, and concepts used in this project can also be applied on other Campus Parking Lots as well. We assume that this study will help respective managers for Kent campus better address the problem of scarce parking space on parking lot C during the morning hours. Moreover, we want to analyze and provide recommendations for improvement in lot C, possibly reduce parking space challenges during the early hours of the day.

# Modelling Setup

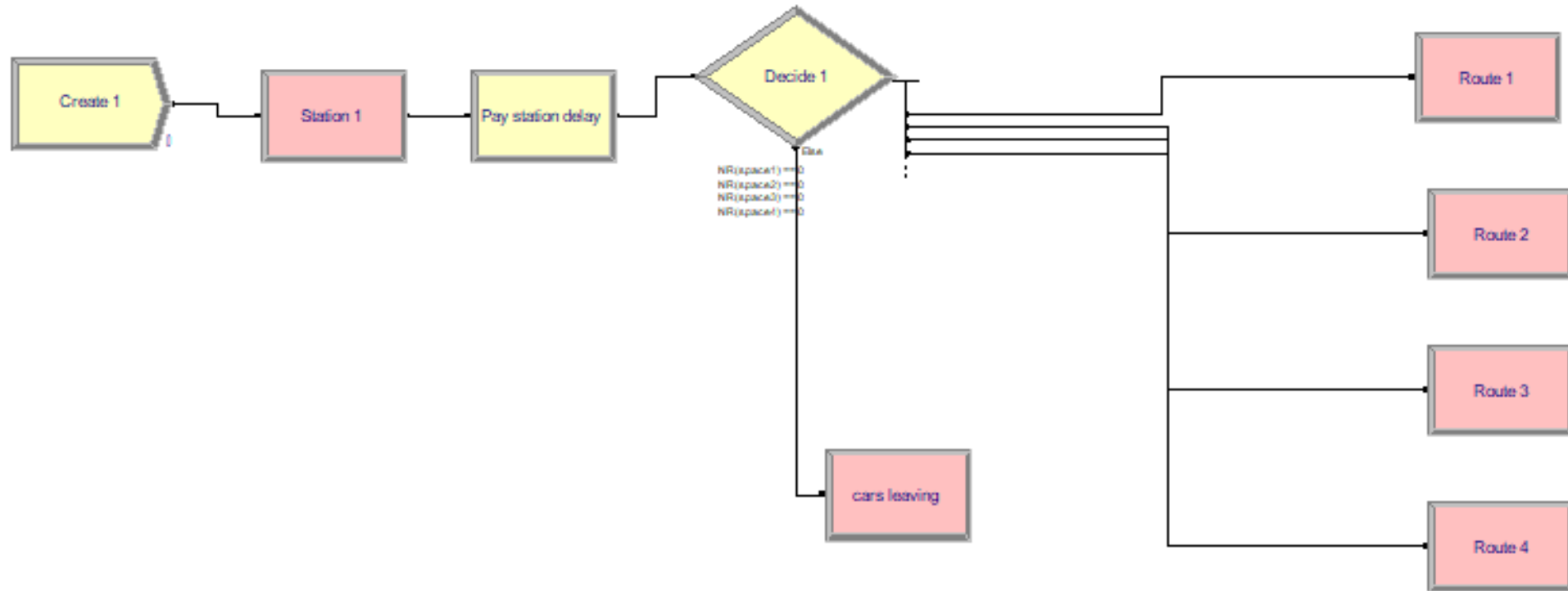
The above animation depicts the Parking C Lot of Kent State University. The details of this model simulation are given below:

- *Entities*: Cars arrive and depart from a 4-stall parking.
- *Resources*: Parking spaces defined by Space 1, Space 2..., etc., where it can accommodate parking.



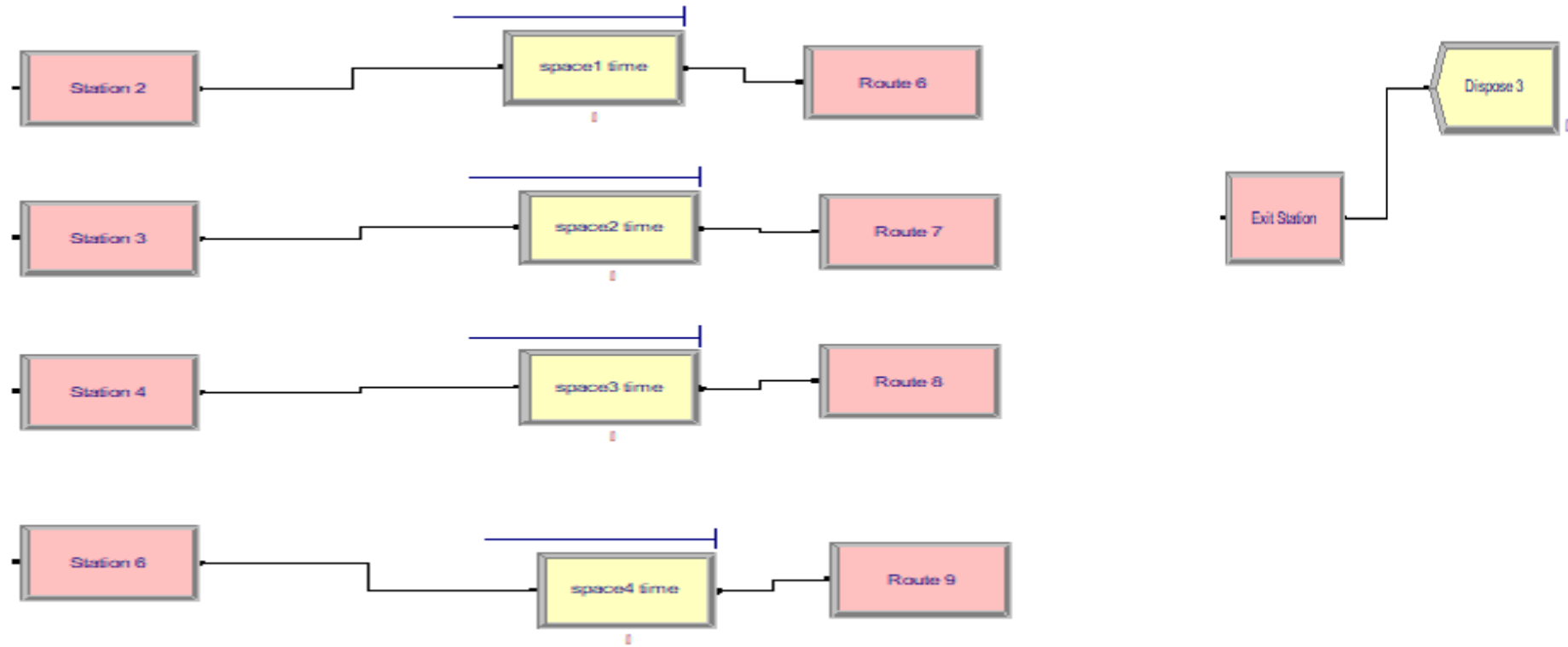
# Model Flow

## Model 1



# Model Flow

## Model 1

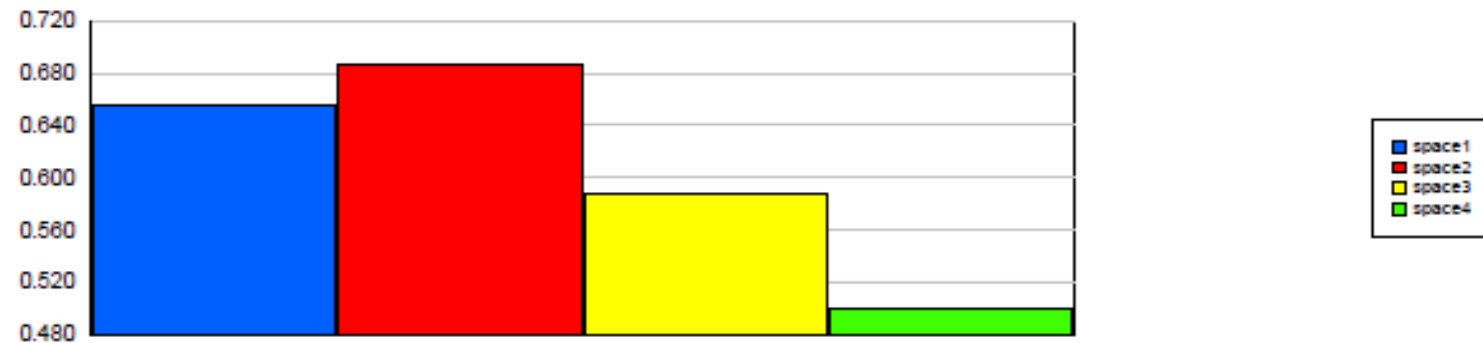


# Model Performance

Number Scheduled	Average	Half Width	Minimum Value	Maximum Value
space1	1.0000	(Insufficient)	1.0000	1.0000
space2	1.0000	(Insufficient)	1.0000	1.0000
space3	1.0000	(Insufficient)	1.0000	1.0000
space4	1.0000	(Insufficient)	1.0000	1.0000

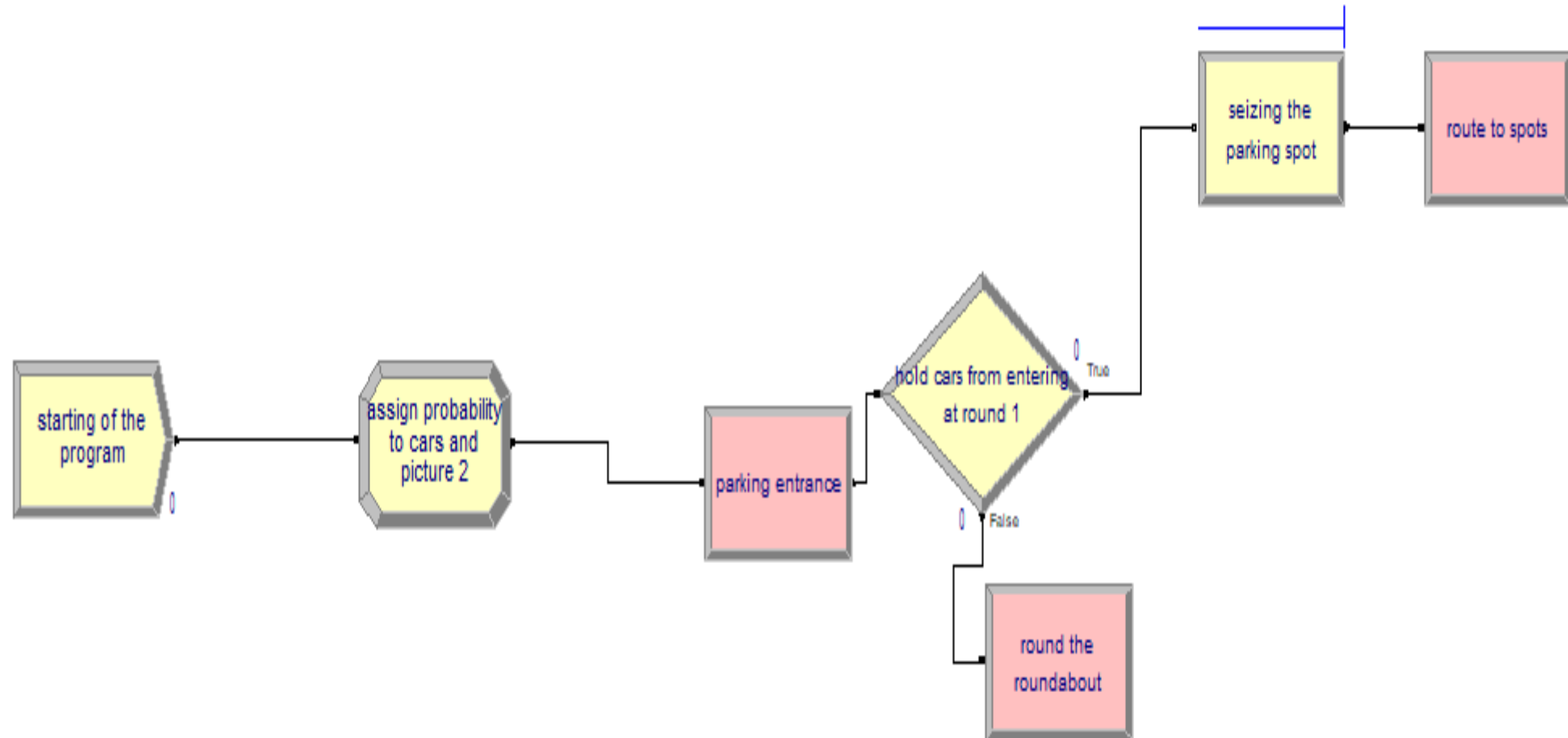
  

Scheduled Utilization	Value
space1	0.6563
space2	0.6875
space3	0.5875
space4	0.5000



# Model Flow

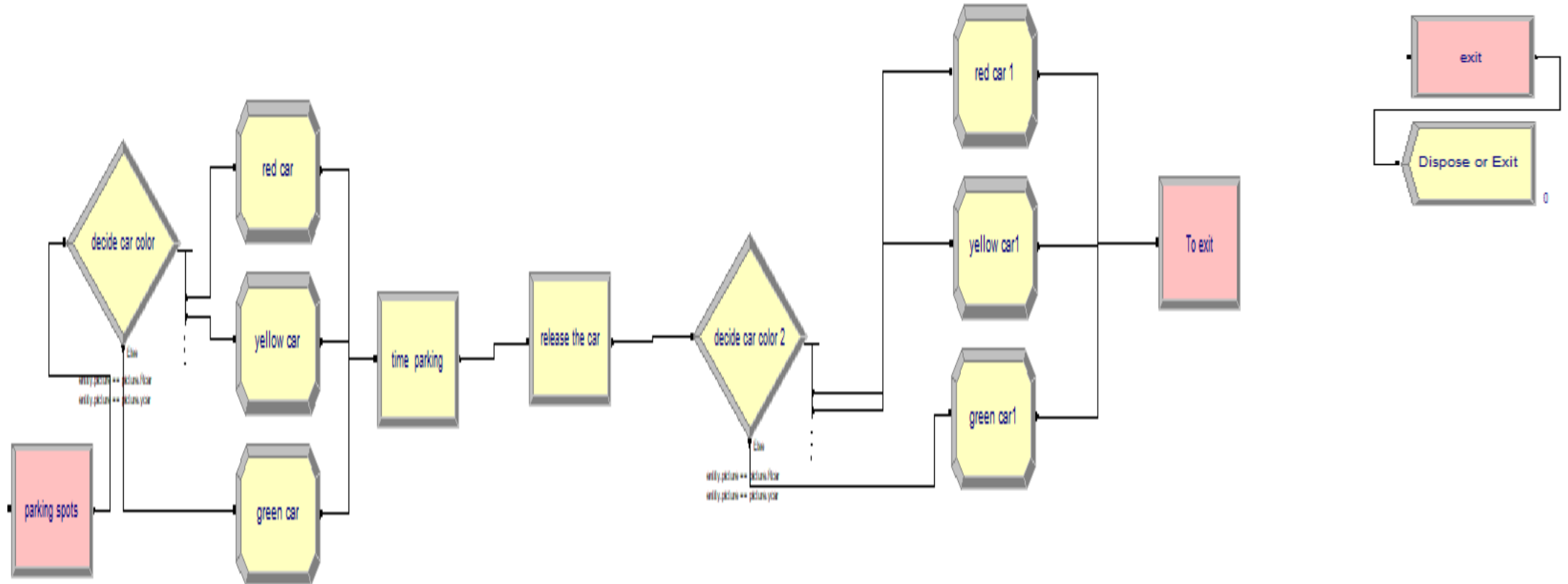
## Model 2





# Model Flow

## Model 2

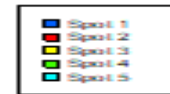
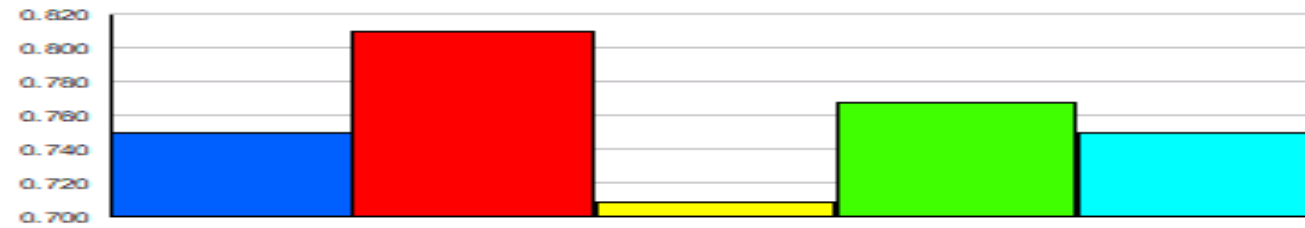


# Model Performance

## Usage

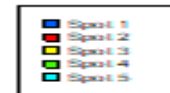
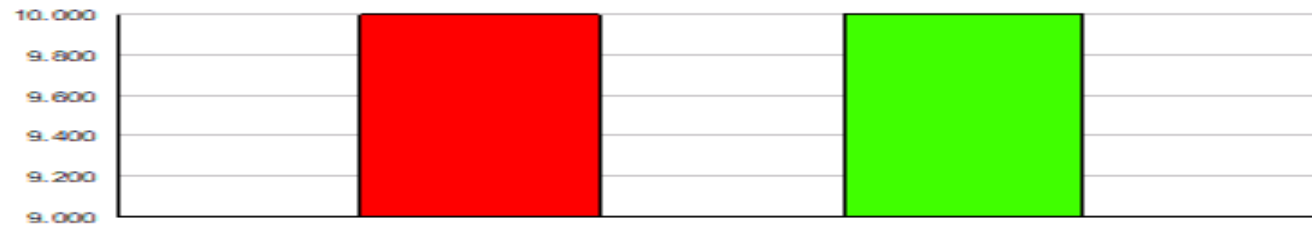
### Scheduled Utilization

	Value
Spot 1	0.7499
Spot 2	0.8104
Spot 3	0.7080
Spot 4	0.7673
Spot 5	0.7500



### Total Number Seized

	Value
Spot 1	9.0000
Spot 2	10.0000
Spot 3	9.0000
Spot 4	10.0000
Spot 5	9.0000



# Assumptions

- Model1 Assumptions

The route delays are 5 minutes to each respective space.

We also assumed constant type car space times.

Run setup time is for 8 hours.

- Model2 Assumptions

Parking time for each car is constant type with 35 minutes.

Distribution for create module is Norm (10,1) distribution with max arrival value is 100.

## Conclusion

The two models simulate the operation of car parking system. Two scenarios were considered one with four parking spaces and another one with 5 parking spaces with different color cars and set module. For the first scenario, total 45 cars are out, average utilization is 65% and second scenario it is 43 cars are out, average utilization is 75%. Using this project as prototype we can also analyze using parking meters and expanding the parking spaces near to real world scenarios.

# References

- Textbook: Simulation with Arena by Kelton, Sadowski, Zupick.
- Professor Wu Lecture Notes.
- Arena Simulation. 2020. Arena Simulation. [ONLINE] Available at: <https://www.arenasimulation.com/support>. [Accessed 30 April 2020].
- learn.kent.edu. 2020. No page title. [ONLINE] Available at: [https://learn.kent.edu/webapps/blackboard/content/listContent.jsp?course\\_id=282215\\_1&content\\_id=10899580\\_1](https://learn.kent.edu/webapps/blackboard/content/listContent.jsp?course_id=282215_1&content_id=10899580_1). [Accessed 30 April 2020].
- Simulation Model of Parking Spaces Through the Example of the Belgorod Agglomeration - ScienceDirect. 2020. Simulation Model of Parking Spaces Through the Example of the Belgorod Agglomeration - ScienceDirect. [ONLINE] Available at: <https://www.sciencedirect.com/science/article/pii/S2352146517300194>. [Accessed 30 April 2020].