# SYSTEM SIMULATION PROJECT ON SUBWAY TICKET QUERY SYSTEM

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# EXECUTIVE SUMMARY

- This ppt presents a detailed study of the rail metro ticket queuing system at metro station using various simulation methods

- The study aimed to optimize the queuing system for purchasing tickets, which aimed to reduce waiting times and enhance passenger experience the first example highlighted the challenges faced by passengers due to queuing therefore, which resulted in long wait times and possible ticket cancellations Passengers can go to the station and choose their queue

- These improvements are expected to improve the overall efficiency of the ticketing process, reduce wait times, and improve customer satisfaction The findings of this study provide valuable insights for Subway to improve its queuing process and improve service delivery

# Objective

- The objective of the simulation observation is to optimize the queuing device for ticket purchases at a Subway. The current system experiences long queues, resulting in passenger dissatisfaction and potential ticket cancellations. The aim is to improve the queuing system by reducing waiting times and enhancing overall efficiency to enhance the passenger experience.

- By utilizing discrete event simulation in Arena software, the study aims to recommend and analyze alternative scenarios that can optimize the queuing system. The simulation results will provide valuable insights into potential improvements and assist in decision-making to streamline the ticketing system. The findings will guide the implementation of the most effective solution for enhancing the queuing process at the Subway.

# Overview

The ppt focuses on designing efficient ticket queuing systems on subways, considering the entire passenger experience from entry to exit at the ticket counter. The study aims to address challenges such as long queues, passenger frustration, and potential ticket cancellations.

By utilizing Arena software to simulate different scenarios, the analysis aims to optimize the queuing process and propose improvements. The objective is to enhance passenger satisfaction, prevent queuing congestion, and improve overall efficiency in the subway, providing valuable insights for improving the ticketing system.

# Scope

- The scope of this study encompasses the queuing gadget for ticket purchases at a Subway

- The study specializes in addressing the demanding situations posed by long queues, which could result in passenger dissatisfaction and ability price ticket cancellations

- The findings will guide choice-making and offer suggestions for streamlining the ticketing manner to keep away from long queues and beautify passenger delight on the Subway

# Initial Model Setup(Model 1)

Set up :

Resources

                Ticket Issuer 1

                Ticket Issuer 2

Stations & Route Logic     Enter station

                Exit station to platform

                Ticket Counter station

                Queue line.

                Queue Station

Schedules        Arrival schedule -

         Ticket Issuer

Expressions      Slow arrival

         Busy arrival

         order time

         pay time

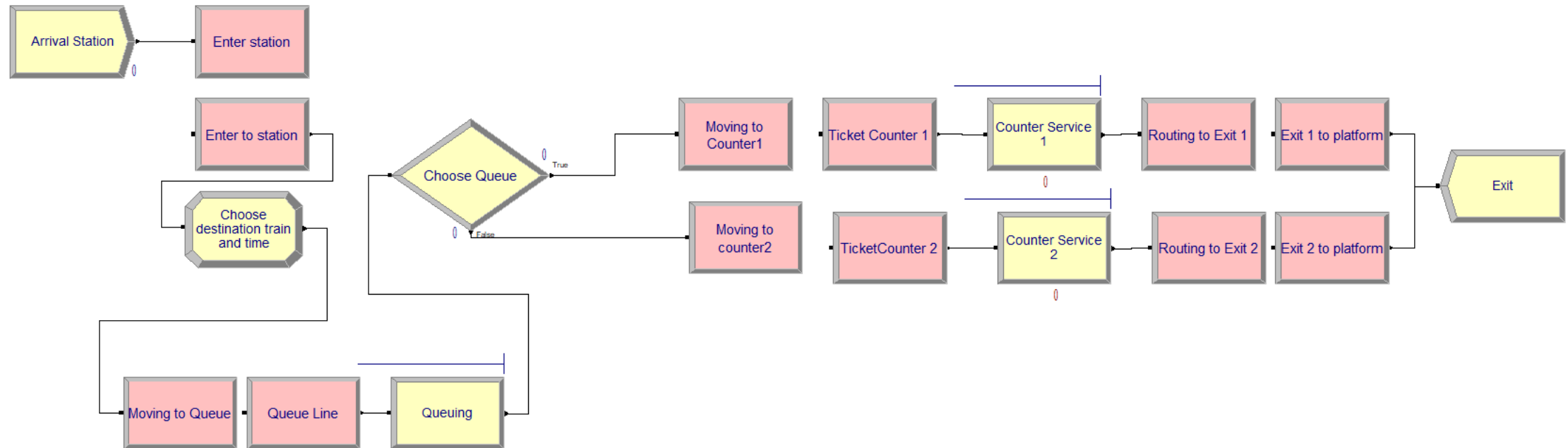Sets            Customer type.

         Customer picture

Attributes       Process time

Variables        Walk time

# Overview of Model 1



Subway Ticket Query System

# Model1 Results

- Based on the results, it is obtained that the average queue time of simulation is 0.131 minutes with an average number of 1.71 people per minute. Service time at counter 1 is 0.07 minutes with an average number of 0.048 per minute. The service time at counter 2 is 0.08 minutes with an average amount of 0.057 per minute.

## Entity

### Other

#### Number Out

| | Value |
|---|---|
| Entity 1 | 0.00 |
| Passenger | 6533.00 |
| Ticket Issuer 1 | 0.00 |
| Ticket Issuer 2 | 0.00 |

#### WIP

| | Average | Half Width | Minimum Value | Maximum Value |
|---|---|---|---|---|
| Entity 1 | 0.00 | (Insufficient) | 0.00 | 0.00 |
| Passenger | 3.8365 | 0.381697246 | 0.00 | 37.0000 |
| Ticket Issuer 1 | 0.00 | (Insufficient) | 0.00 | 0.00 |
| Ticket Issuer 2 | 0.00 | (Insufficient) | 0.00 | 0.00 |

## Queue

### Time

#### Waiting Time

| | Average | Half Width | Minimum Value | Maximum Value |
|---|---|---|---|---|
| Counter Service 1.Queue | 0.00739760 | 0.001846266 | 0.00 | 0.1826 |
| Counter Service 2.Queue | 0.00889669 | (Correlated) | 0.00 | 0.1640 |
| Queuing.Queue | 0.1311 | 0.019229681 | 0.00 | 1.1690 |

### Other

#### Number Waiting

| | Average | Half Width | Minimum Value | Maximum Value |
|---|---|---|---|---|
| Counter Service 1.Queue | 0.04846908 | 0.012826600 | 0.00 | 4.0000 |
| Counter Service 2.Queue | 0.05795301 | 0.010306739 | 0.00 | 4.0000 |
| Queuing.Queue | 1.7123 | 0.300916104 | 0.00 | 31.0000 |

## Alternate Model Setup (Model 2)
In addition to the initial model, an alternative queuing system solution
is proposed to reduce queue lengths for passengers at the Subway

Set up :

Resources

Ticket Issuer 1

Ticket Issuer 2

Stations & Route Logic          Enter station

Exit station to platform

Ticket Counter station

Queue line.

Queue Station

Schedules          Arrival schedule -

Ticket Issuer

Expressions          Slow arrival

Busy arrival

order time

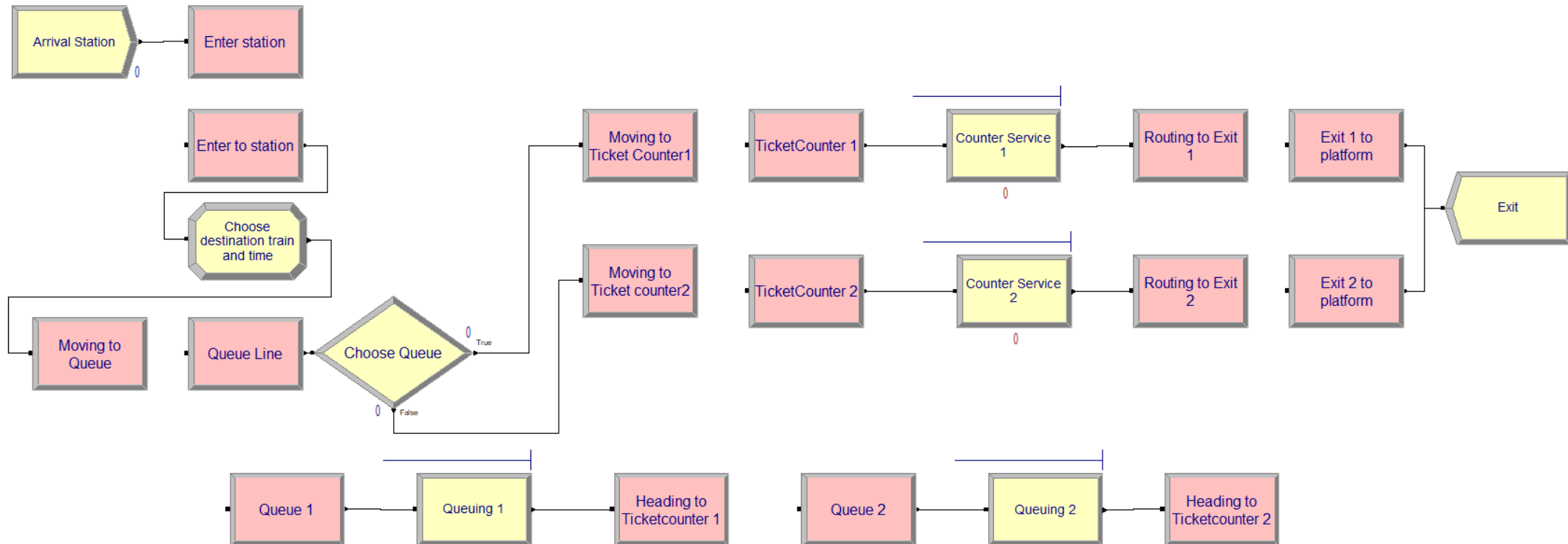pay time

Sets          Customer type.

Customer picture

Attributes          Process time

Variables          Walk time

# Overview of Model 2

# Model2 Results

- Based on the results, it is obtained that the average queue time of simulation in Queues 1 and 2 are 0.025 and 0.025 minutes with an average number of 0.12 and 0.13 people per minute. Service time at counter 1 is 0.006 minutes with an average number of 0.031 per minute. The service time at counter 2 is 0.009 minutes with an average amount of 0.047 per minute.

## Entity

### Other

#### Number Out

| | Value |
|---|---|
| Entity 1 | 0.00 |
| Passenger | 5006.00 |
| Ticket Issuer 1 | 0.00 |
| Ticket Issuer 2 | 0.00 |

#### WIP

| | Average | Half Width | Minimum Value | Maximum Value |
|---|---|---|---|---|
| Entity 1 | 0.00 | (Insufficient) | 0.00 | 0.00 |
| Passenger | 2.2429 | 0.117348364 | 0.00 | 17.0000 |
| Ticket Issuer 1 | 0.00 | (Insufficient) | 0.00 | 0.00 |
| Ticket Issuer 2 | 0.00 | (Insufficient) | 0.00 | 0.00 |

## Queue

### Time

#### Waiting Time

| | Average | Half Width | Minimum Value | Maximum Value |
|---|---|---|---|---|
| Counter Service 1.Queue | 0.00647709 | 0.001497526 | 0.00 | 0.1635 |
| Counter Service 2.Queue | 0.00933562 | 0.002747064 | 0.00 | 0.2082 |
| Queuing 1.Queue | 0.02529612 | 0.002519836 | 0.00 | 0.2890 |
| Queuing 2.Queue | 0.02553802 | 0.002822033 | 0.00 | 0.2804 |

### Other

#### Number Waiting

| | Average | Half Width | Minimum Value | Maximum Value |
|---|---|---|---|---|
| Counter Service 1.Queue | 0.03178956 | 0.006247168 | 0.00 | 3.0000 |
| Counter Service 2.Queue | 0.04764903 | 0.012730607 | 0.00 | 5.0000 |
| Queuing 1.Queue | 0.1242 | 0.015020413 | 0.00 | 6.0000 |
| Queuing 2.Queue | 0.1303 | 0.017138073 | 0.00 | 6.0000 |

# Insights and Conclusion

- The simulation results of the railway metro ticket queuing system of Subway provide valuable insights for optimizing the queuing system for ticketing

- The original prototype identified existing challenges, such as long waiting times due to queue queues, which resulted in dissatisfied passengers and possible ticket cancellations, but the new prototype showed a marked improvement by way of it is used to select passengers to be selected over the queue

- Simulation results provide strong evidence that the inclusion of queuing routes effectively reduces queue length and improves scheduling efficiency by adopting this solution, stations can better manage passenger flows, for improve service, and reduce customer dissatisfaction caused by long queues Queue systems

# References

- https://ieeexplore.ieee.org/document/5768318

- https://www.youtube.com/watch?v=M5XKBRdIKCE

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# Thank You