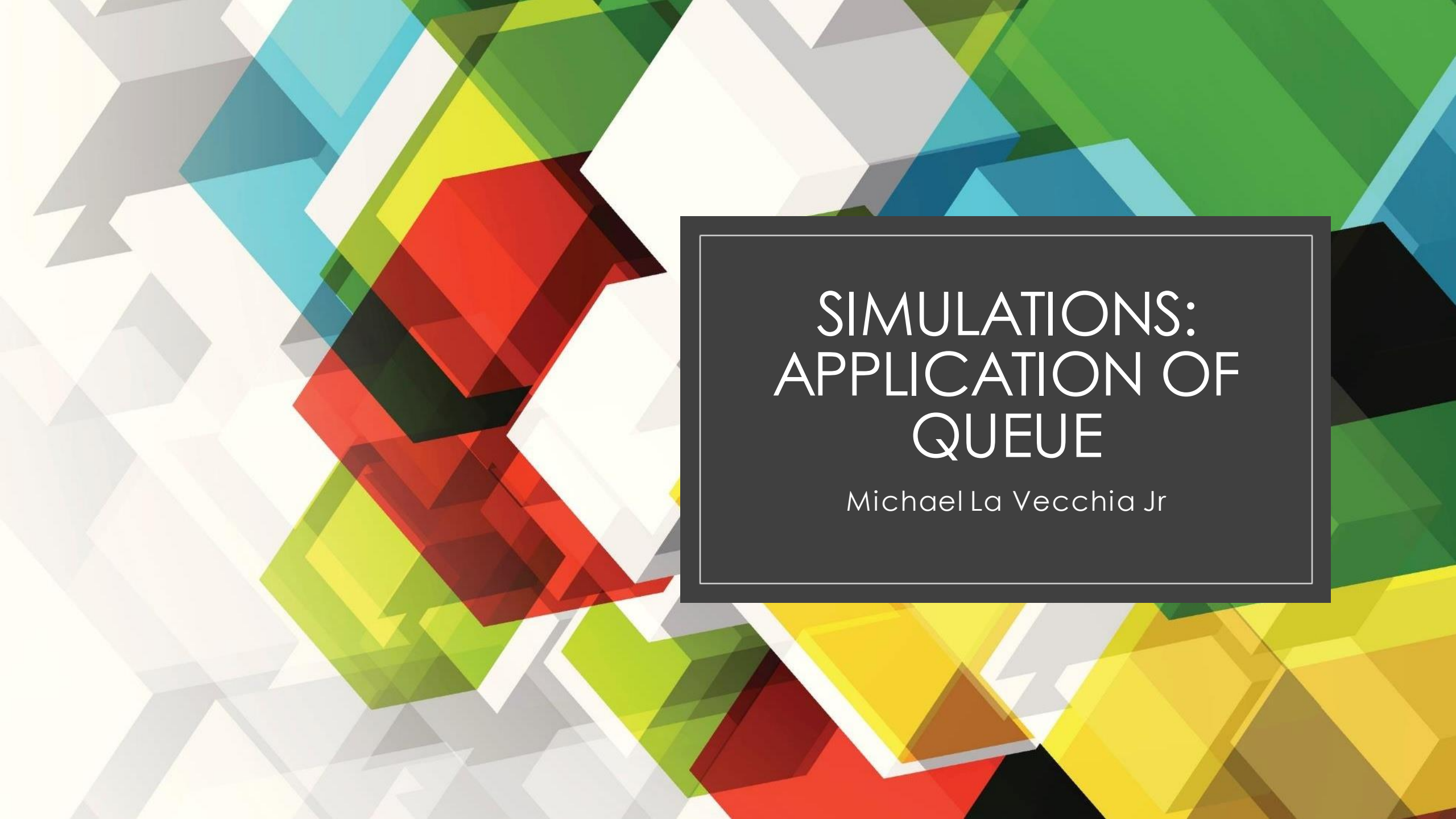

SIMULATIONS: APPLICATION OF QUEUE

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Queue Data Structure

- An ordered list of elements which share similar data types
- Queue follows a FIFO (First in First Out) structure
- Example: A queue of customers waiting to buy a product, where customers are served in the order they arrive
- Hold two pointers at any given time; the front pointer which always points to the first element inserted and the rear pointer which always points to the

Queue Operations

- 1. **enqueue()** - Insertion / adding an element to the queue
- 2. **dequeue()** - Removal / deleting an element from the queue
- 3. **front()**- displays element at the front of the queue
- 4. **isempty()** - to check is the queue is empty

Implementation of Queue

- 2 primary ways for queues to be implemented
  - Array
  - Linked list

Applications of Queue

- Queue is used when we need to manage large groups of data in the order which they became apparent to us. Example:
  - A printer that needs to keep track of which order print requests come in
  - Call center phone systems will often use queues in order to put people on hold based on the order which they called in.
  - Any real time system such as air traffic control systems, networked multimedia systems, command control systems etc.

- Queue has a great real-life application and can also be used for optimization of resources such as time, supplies and labor.

Using a Queue for Simulation

- Scenario: The DMV wants to figure out the perfect amount of employees it needs to hire to run optimally
  - OPTIONS:
    - (A) Try different amount of workers each shift until you find the right number
    - (B) Run a simulation using data of how many customers come in and out daily
  - RESULTS:
    - (A)Costs a business too much money and takes too much valuable time
    - (B) Saves a business money and valuable time by using

Using a Queue for Simulation cont.

- A queue could be used to simulate customer traffic by using data stored by the DMV point of sale system
  - This data will include:
    1. How long they were serviced
    2. How frequently customers cycle out of the DMV
  - The simulation will:
    1. Generate customers on the line via rate of customer frequency based off data
    2. Represent the customers and their respective traits within the queue