Poznan University of Technology
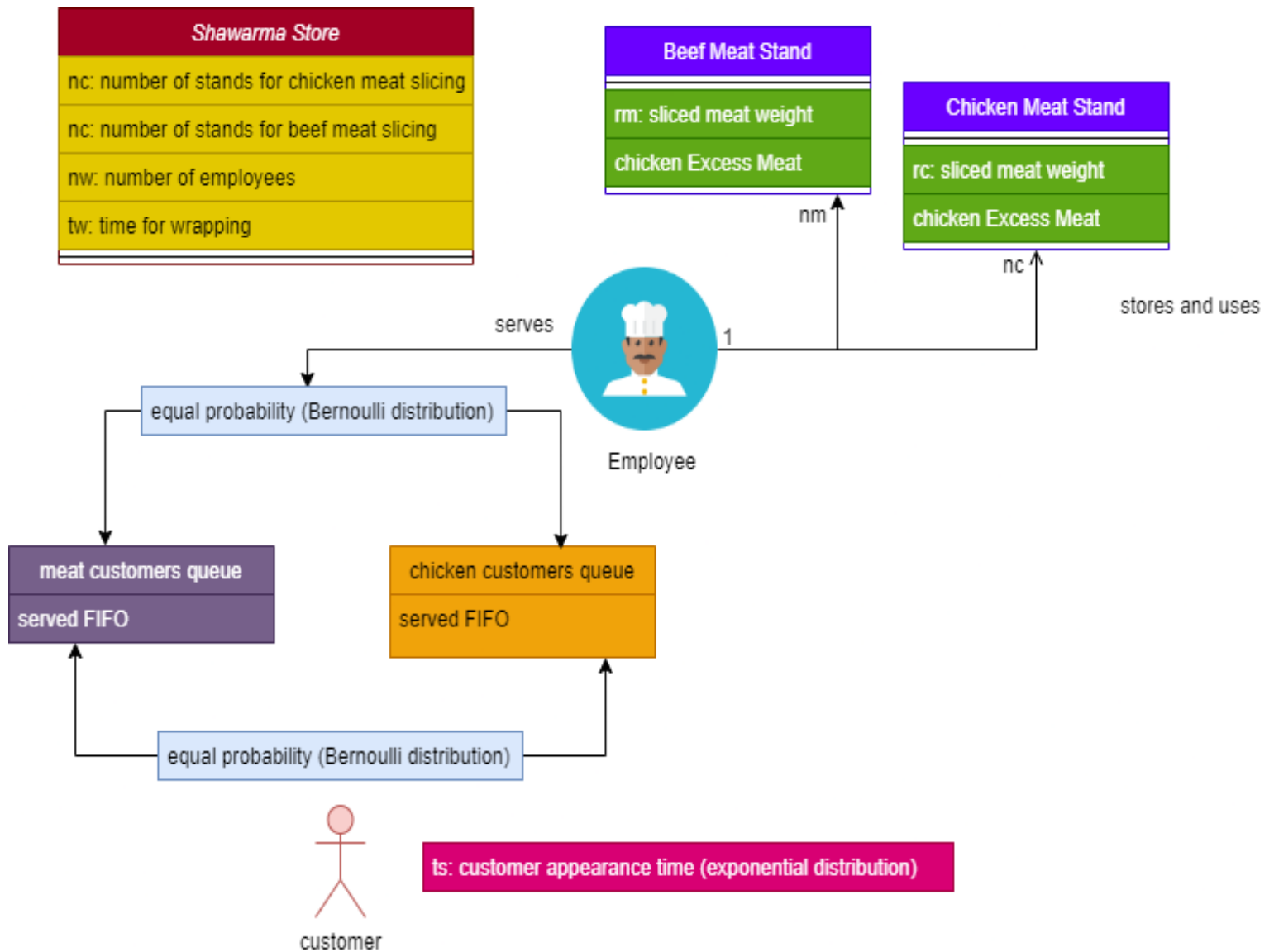## Faculty of Computing and Telecommunications

Simulation Techniques
Project

Task 1

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1. Simulation Model Scheme

Shawarma Store

- nc: number of stands for chicken meat slicing
- nc: number of stands for beef meat slicing
- nw: number of employees
- tw: time for wrapping

Beef Meat Stand

- rm: sliced meat weight
- chicken Excess Meat

Chicken Meat Stand

- rc: sliced meat weight
- chicken Excess Meat

stores and uses

nm

nc

serves

1

Employee

equal probability (Bernoulli distribution)

meat customers queue

served FIFO

chicken customers queue

served FIFO

equal probability (Bernoulli distribution)

customer

ts: customer appearance time (exponential distribution)

2. Objects Description

Object	Class name	Attributes | types	Description
Shawarma Store	ShawarmaStore	numberOfChickenStands int numberOfBeefStands int numberOfEmployees int wrappingTime int averageWaitingTime int averageStorageTime int averageFreeTime int	Instance to introduce input parameters and create the initial state of the simulation and store output parameters
Customer	Customer	customerId int arrival_time int serviced_time int	Instance to manage the customers attributes
Employee	Employee	employeeId int isFree bool freeTime int	Instance to manage the employees attributes
MeatStand	MeatStand	meatStandId int slicedMeatQuantity int isChicken bool currentQuantity int storageTime int	Instance to manage the meat stands attributes

3. Event Description

- **Time Events**
  - Meat Slicing (each T)
  - Customer appearance (each ts: exponential distribution)
  - Free Employee (start service+tw: wrapping time)
- **Conditional Events**
  - Begin of Service (if customer queue is not empty)
  - Employee Serving choice (to serve either chicken or meat queue)
  - Enough meat on the queue to make a wrap
  - Begin of Meat Slicing
  - Checking the Meat queue (Excess Meat) before slicing.

4. Processes Description

- **Customer Process**
  - Start: Customer arrives
  - waits until: Customer starts service
  - End: Customer completion
- **Meat Slicing Process**
  - Start: Each period T.
  - waits if storedMeatQuantity==max (N)
  - End: End of Simulation

- **Block Diagram**

Start

Initialize the model

clock == Simulation duration

No → **Select First Event on the EventList**

Yes → **Stop**

Meat Slicing

Schedule next meat slicing Event to the Event List clock+T

is it BeefStand?

No → **BeefMeatQueue is free?**

Yes → **Add rc (normal distribution) to MeatQueue**

No → **Delete First Event of type slicing meat**

Yes → **BeefMeatQueue is free?**

Yes → **Add rm (normal distribution) to BeefMeatQueue**

No → **Delete First Event of type slicing meat**

customer appearance

Schedule next Event to the Event list clock+ts

Determine which order the customer wants (Bernoulli distribution)

BeefQueue is Free

Yes → **Add to BeefQueue**

No → **Chickenqueue is free**

No → **Customer Rejected**

Yes → **Add to Chickenqueue**

Delete First Event of type customer appearance

Free Employee

ChickenQeue or MeatQueue empty

Serve a customer from the non-empty queue

Random Selection of queue Based on Bernoulli distribution

Chicken or Beef queue

Enough meat for a wrap

No

Yes → **Delete First customer from quue**

Schedule Event of Free Employee to the Event List clock+ tw

Delete First Event of type Free Employee

Not Enough Meat