**Market To-go/Quick Zone Simulation**

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CS1538: Intro to Simulation

We decided to model the Market To-go/Quick Zone dinning service located in the base of the Towers complex. We simulated the real life environment by personally collecting observable data and implementing the system in the Java programming language. The actual location was interesting to us for multiple reasons. First, the central location on campus provides access to a service that the average student or faculty member has used during their time at the University of Pittsburgh. Next, the two types of services at the location provide a challenge in modeling the actual system and improving it while keeping the assumptions we make valid in relation to the real world environment. The location in particular contains the Quick Zone convince store and the take-out order Market To-go. Customers that are finished with either service locations bottleneck at the cashiers that service both locations. Finally, the Market To-Go/Quick Zone location provides a subject that follows the distributions—Poisson, Exponential, Normal—and Queuing models that we focused on for our class. The main problem that we are trying to solve by implementing the simulation of Market To-go/Quick Zone location is to increase server efficiency. Server efficiency is defined as improving server utilization with a minimum of servers without drastically increasing wait times in the queues. The main way we solved this problem was by experimenting with different configurations of servers placed throughout the location depending on the time of day. Our results of the experiments indicate that by XXXXXXXXXXXXXXXXXXXXX. The following report will go into details of the approach, experiments, and our final results.

The Market To-Go/ Quick Zone location has various different variables that contribute to the system itself. Until recently, Market To-Go used to have its own location that was located across the room from Quick Zone. The University expanded the main dining area, Market, to accommodate the influx of new Pitt students which in turn moved the original Market To-Go location. Market To-Go currently resides in the location that used to belong to Taco Bell. Market To-Go is now attached to the Quick Zone with its customers entering from that area. First, customers arrive by entering the doors that are located at the Quick Zone entrance. They then have the choice to continue shopping in the Quick Zone area or they can head over to the Market To-Go area. In the real life system they have the option to buy items from both locations while our simulation simplifies this option which we will discuss later in the report. The Quick Zone area contains many items that you would find in the average convenience store. These items include frozen goods, candy bars, soda, energy drinks, toothpaste, paper towels and various other items that the average Pitt student might need while enrolled. Along with these items, Quick Zone offers stations that provide salad selection and/or sushi selection. The main service area acts as a queueing model with an infinite server capacity as each customer serves themselves. Market To-Go has different a different setup entirely. There are different stations with premade food items and a take-out order area. The premade food items include onion rings, sandwiches and various other premade items. The take-out order area is the main focus for the Market To-Go portion of our simulation. The order area is serviced by one employee in the current real environment. A queue forms up at this point with one customer being serviced at a time. The customer has the option of picking two sides and one main item. The sides are usually consistent on a day to day basis with mac-and-cheese, mashed potatoes, or corn being examples. The main entrée varies throughout the week. Some examples would be a chicken breast or meatloaf. Once the customers are finished in either the Market To-Go area or the Quick Zone area, they proceed to the checkout location that is located at the entrance of Quick Zone. The checkout location has space for four active cashiers (servers) with queues forming at their relative location. The real life environment system usually only has two of the checkout locations open at a time. The customers form queues at each checkout location with the customer choosing the queue with the least amount of customers in it.

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