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**1. Compare the array implementation of a queue with the linked list implementation. What are the advantages and disadvantages of each?**

In an linked list implementation of a queue the advantages are that the queue can grow without needing to reallocate memory. Array implementations of a queue however cannot exceed a set size without needing to realloc as the queue grows, which is a disadvantage to the array implementation as reallocation slows the running time of the algorithm. An advantage to the array implementation of a queue is that it is simple to describe how it works. A disadvantage to the linked list implementation is the added memory required to store a pointer to each element of the queue, which is not necessary with an array implementation.

**2. A deque is a queue that also provides functions for making insertions and deletions at both ends of the queue. Which queue representation would be most appropriate for a deque? Justify your answer.**

The most appropriate representation for a deque would be an array implementation. This is due to the fact that an array implementation provides constant time random access across the entire deque, where as a list implementation would require waiting for the list to get from the beginning to the end whenever the user would like to add or remove from the end (which are both key functions of the deque).

**3. Find two examples of simulations that involve a queueing system and describe the requirements of the queue in each simulation.**

One example of a simulation that involves a queueing system is a traffic simulator. The requirements of the queue in this simulator would be to keep track of the order of the cars whenever they reach a point where passing is no longer an option, for example at a red light. In this simulation, the cars are in a first in last out situation which makes a queue a great data structure for the simulation. The queue will need to release cars as the light turns green, stopping them from leaving when the light turns red. Also, the queue will need to receive cars into the queue whenever they pass by the light.

Another example of a simulation that involves a queueing system is a simulation for waiting times to cross a border. The requirements for this queue are releasing people when they have shown an officer at the front of the queue their passports. Also the queue will also have to add people to the end of the queue whenever they want to cross the border. Multiple queues could be used to simulate a border with multiple lanes and officers checking passports. Unique wait times for each queue would simulate officers who checked passports faster, and would allow the simulation to measure how the the traffic moves when crossing.