

## Competency Demo #2

### Study Guide

It's been a long time since our last CD at the end of September. During that time, we have discussed a lot of "smallish" topics. These include:

- Object Oriented Programming
  - Class
  - Object
  - Magic Methods/functions
- Abstract Data Types (ADTs)
  - Stack
  - Queue
  - Priority Queue
  - Differences in implementation and how this effects Big-Oh notation (runtime performance)
- AI search
  - BFS – Breadth-first Search
  - DFS – Depth-first Search
  - Why one search would be better than the other depending on the domain

This competency demo is looking at questions that get at a general understanding of these topics. While there may be a few very specific details we would be looking for in questions/answers, most are looking at do you understand the big picture and not, do you understand the nitty-gritty details.

Sample questions could include:

#### Object Oriented Programming

1. What is the purpose of writing/using objects in a programming language?
2. What is the difference between a class and an object?
3. What kind of analogy could you use to explain class vs. object with students?
4. Python has a series of "magic methods." What are these used for? Give an example of one and where/how it is used?
5. Why would programming objects be more difficult without the magic methods?

#### Abstract Data Types

1. What is the main concept of the ABSTRACT Data Type? (emphasis added by me so that you have an understanding of what I am looking for in my answer to this question).
2. When were you using ADTs in the Fundamentals of Programming course without even knowing it at the time?
3. What is a \_\_\_\_\_? Give an example of where a programmer might use one (that isn't from our AI search discussion) [The blank could contain Stack, Queue, or PriorityQueue]

4. One of the functions for a Stack is \_\_\_\_\_. What is the expected Big-Oh notation for this function? Why? [Functions that could go in the blank are push, pop, size, isEmpty]
5. One of the functions for a Queue is \_\_\_\_\_. What is the expected Big-Oh notation for this function? Why? Is your answer implementation dependent? Why? [Functions that could go in the blank are enqueue, dequeue, size, isEmpty]
6. One of the functions for a PriorityQueue is \_\_\_\_\_. What is the expected Big-Oh notation for this function? Why? Is your answer implementation dependent? Why? [Functions that could go in the blank are enqueue, dequeue, size, isEmpty]

#### AI Search

1. Explain the general graph/tree search algorithm used for AI search.
2. The general graph/tree search algorithm can be used to produce several different types of searches. What part(s) of the algorithm are modified to change between searches?
3. Explain how a \_\_\_\_\_ is implemented in the general graph/tree search algorithm. [The blank could contain either Breadth-First Search(BFS) or Depth-First Search (DFS).]
4. Explain how a \_\_\_\_\_ moves through the search space/graph/tree as it searches [Again, the blank could contain either BFS or DFS].
5. When would you use a BFS over a DFS. [Or reverse this].
6. What is the strength of the \_\_\_\_? What is the weakness of the \_\_\_\_? [BFS or DFS in the blank].