Design Document

Runtime Analysis of every Method Used:

<In Progress>

Algorithm Chosen: Adjacency Matrix is chosen as the algorithm implementation strategy as the lookup needs to be done fast and assign weights for each edge.

**Adjacency Matrix**

* Uses O(n^2) memory
* It is fast to look up and check for presence or absence of a specific edge  
  between any two nodes O(1)
* It is slow to iterate over all edges
* It is slow to add/delete a node; a complex operation O(n^2)
* It is fast to add a new edge O(1)

Alternative Approach:

**Adjacency List**

* Memory usage depends more on the number of edges (and less on the number of nodes),  
  which might save a lot of memory if the adjacency matrix is sparse
* Finding the presence or absence of specific edge between any two nodes  
  is slightly slower than with the matrix O(k); where k is the number of neighbors nodes
* It is fast to iterate over all edges because you can access any node neighbors directly
* It is fast to add/delete a node; easier than the matrix representation
* It fast to add a new edge O(1)