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**\* Project Report Template  
\* Project 3 (Map Routing), ECE368**  
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**\*Explain your overall approach to the problem and a short  
\*general summary of your solution and code.**  
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**Implementation:**Min Heap, data-structure that would be used to store each vertex of the map.

The following approach could be adopted in order to successfully implement the algorithm:

**Steps:**

1. Create an array that would store the vertices stored from the (first input file) map.
2. Build an adjacency list using the data from the map.
3. Check the number of queries by reading the query file.
4. We check the queries until we hit the end of file. It is done one by one.
5. Address of each vertex is stored in a different array.
6. We then build a min heap with all the vertices of the map.
7. We swap the first and the visited node in min heap and do down heap traversal.
8. Perform up-heap traversal after each element in the adjacency list of the elements swapped in updated.
9. We loop through this entire process until we encounter the heap to be empty or if the destination element has been marked by us.
10. Move on to the next query and do the same process for it as well.

**Output:**

Using the above steps for implementation, we can print the shortest path from the source vertex to destination vertex along with its distance.

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**\*Known bugs / limitations of your program / assumptions made.**  
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While compiling, it is requested to include ‘-lm’ flag due to inclusion of the in-built math   
library.   
Compilation command: **gcc -g -Werror -Wall -lm <filename.c> -o <filename  
where filename is : shortestpath.c**  
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**\*List whatever help (if any) that you received.**  
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Referred to Wikipedia in-order to understand the algorithm.   
Used geeks for geeks and code academy for the pseudo-code on using the algorithm  
and making use of the min heap in the implementation.

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**\*Describe any serious problems you encountered.** \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*/  
No major problem encountered as such.

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**\*List any other comments/feedback here (e.g., whether you  
\*enjoyed doing the exercise, it was too easy/tough, etc.).**  
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Overall, I feel this project was hard. It did require a lot of thinking. I had to first read about the algorithm and other algorithms that were associated or like Dijkstra’s  
algorithm. Therefore, I found the project challenging. To conclude, I enjoyed the course and new things that I learnt throughout the semester. Moreover, I learnt how useful the heap could be by applying it in this project