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| |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | |  | | | | | | | TSP Design Document | | | | | | |  | | |  |  | | | | Status: | Draft | | | | Version: | 0.1 | | | | Date: | **15 Nov 2018** | | | | Project ID |  | | | | | |
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# Document Purpose

This document provides the Detail Design for TSP solutionfor HPSE assessement. The purpose of this document is to capture the implementation and data flow required to satisfy the project requirements.

* TSP will converge the shortest possible route that visits each city and return to the origin city, provided list of cities and distance between each pair of cities

# Scope & Out of Scope

# Scope

* The scope of project is to implement the Travel Sales Person algorithm using dynamic programming.

# Requirement Reference

|  |  |
| --- | --- |
| **Requirements** | |
| **Profile creation** | |
| US001 | Travel Sales Person algorithm using dynamic programming |

# Assumptions and Dependencies



# Assumptions

* The list of cities and distance between each pair of cities
  + - It should be in matrix format
    - Should have more than 2 cities

# Benefits of TaaS

* Shortest possible route that visits each city and return to the origin city

# Design

The Held Karp algorithm:

There are 2 possible cases in each iteration:

A) A base case where we already know the answer. (Stopping condition)

B) Decreasing the number of considered vertices and calling our algorithm again. (Recursion)

Explanation of every case:

A) If the list of vertices is empty, return the distance between starting point and vertex.

B) If the list of vertices is not empty, lets decrease our problem space:

1) Consider each vertex in vertices as a starting point ("initial")

2) As "initial" is the starting point, we have to remove it from the list of vertices

3) Calculate the cost of visiting "initial" (costCurrentNode) + cost of visiting the rest from it ("costChildren")

4) Return the minimum result from step 3

# References

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# Definitions

The following words, acronyms and abbreviations are referred to in this document.

| Term | Definition |
| --- | --- |
| TSP | Travelling Sales Person Algorithm |

# DOCUMENT CONTROL SHEET

The purpose of this section is to capture all changes made to the content of document.

Contact for Enquiries and Proposed Changes

If you have any questions regarding this document or would like to suggest an improvement, contact:

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Revision History

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| --- | --- | --- | --- |
| Version No | Version Date | Nature of Change | Author of Change |
| 0.1 | 15/11/18 | Initial Draft | Neethu George |

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