IBM

Cable Layout System – LAYOUT

Minor Project

INTRODUCTION

The purpose of this document is to define scope and requirements of a Cable Layout System - LAYOUT for a leading Telephone Company that is expanding its operations rapidly. To meet the growth demand, laying telephone cables becomes a major challenge as it involves deciding optimal paths where cables can be laid from a large number of choices of paths available. These paths are nothing but all possible interconnections between "distribution boxes" installed at various locations in an area. The decision is often made on the basis of cost of laying cable on a path. The cost varies due to distance or depth at which a cable is placed.

The proposed system will provide a simple and effective way to select the optimum cable laying paths for every new area.

This document is the primary input to the development team to architect a solution for this project.

System Users
The operations team of the telephone company will primarily use the LAYOUT system.

Assumptions
1. The data pertaining to each possible path, along with cost and time details will be uploaded using a CSV file.

2. To simplify further, it is assumed that there is only one single cost assigned to each path by the operations team by taking in to account various applicable costs associated with factors such as length of cable required or digging depth.

REQUIREMENTS

LAYOUT will determine the most optimum path between all "distribution boxes" in an area to minimize the cost, while ensuring that there exists a path to reach every distribution box in that area.

Basic System Operation
The following set of operations outline as to how the telephone company's team will determine the optimum path.

1. User will be able to create a new area and upload the details of all possible paths in that area along with cost details in CSV format.

2. On successful upload, the list of uploaded path for the given area will be displayed. At this stage, user can click on "Find Optimal Paths" to determine the optimum path. This will be displayed in the form of list of pairs of distribution boxes that are directly connected with each other.

3. User will also be able to edit & save the cost data to perform a what-if analysis to determine corresponding change in paths.

4. The data for each area analyzed will be saved and will remain available for the future reference.

Path Data Input

The LAYOUT software will receive the input in a CSV whose format will be as follows:

Location 1	Location 2	Cost
Sector 51 Block A	Sector 51 Block B	10
Sector 51 Block B	Sector 51 Block C	37
Sector 51 Block C	Sector 51 Block D	96
Sector 51 Block D	Sector 51 Block A	15
Sector 51 Block A	Sector 51 Block C	75
Sector 51 Block B	Sector 51 Block D	51

Each row has the cost data for one pair of location that can be interconnected. The cost figures are relative figures between 0 and 100. The operation team computes these figures by taking in to account various applicable costs for each possible path.

The above data illustrates the example for a sample area, called sector 51 that has four locations identified at A, B, C and D blocks. This area can be visualized as:
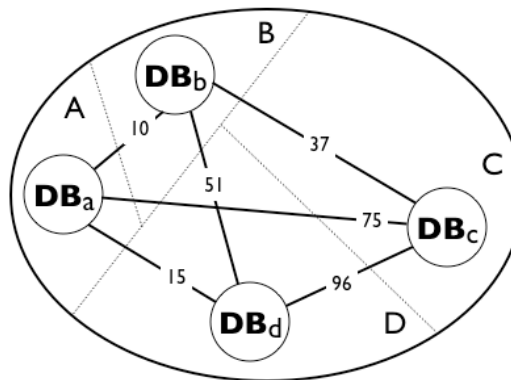
Each block is separated by a dotted line. The distribution box for location as shown as DL_{block}. The cost is shown on each path between distribution boxes. Note, this is a simplified symbolic view; in real life paths are drawn & analyzed on the actual map of the area.

DEVELOPMENT ENVIRONMENT

LAYOUT will be developed as a web application using Java/JSP and DB2 database. Eclipse will be used as the IDE for the same.