# DESIGN

Main

# Initialize Scanner input

# Output: “Enter the number of cities: ”

# Initialize int numberOfCities <- input

# Output: “Enter the coordinates of the cities: “

# Initialize double 2d array cityLocation as [numberOfCities][2]

# Initialize double 2d array cityDistance as [numberOfCities][numberOfCities]

# For loop: 0 to numberOfCities

# cityLocation[counter][0] <- input

# cityLocation[counter][1] <- input

# For loop counter1: 0 to numberOfCities

# For loop counter2: 0 to numberOfCities

#### NOTE: This is an application of Pythagorean theorem (). Given 2 points, to find the line segment between them, take the square root of the quantity (point1x - point2x)2 + (point1y - point2y)2

# cityDistance[counter1][counter2] = √((cityLocation[counter1][0] – cityLocation[counter1][1])2 + (cityLocation[counter2][0] – cityLocation[counter2][1])2)

# Initialize centralCity <- findCentralCity(cityDistance)

### findCentralCity ###

# Initialize double array totalDistance with size equal to the length of cityDistance

# Initialize double minDistance <- 0

# Initialize int centralCity <- 0

# for loop counter1: 0 to len(cityDistance)

# for loop counter2: 0 to len(cityDistance)

# totalDistance[counter1] <- totalDistance[counter1] + cityDistance[counter1][counter2]

# minDistance <- totalDistance[0]

# for loop: counter from 0 to len(totalDistance)

# if totalDistance[counter] < minDistance

# minDistance <- totalDistance[counter]

# centralCity <- counter

# return centralCity

# Initialize double centralCityX <- cityLocation[centralCity][0]

# Initialize double centralCityY <- cityLocation[centralCity][1]

# Initialize double totalDistance <- 0

# for loop: double distance as each element of cityDistance[centralCity]

# totalDistance <- totalDistance + distance

# Output: “The central city is at “ + centralCityX + “,” + centralCityY

# Output: “The total distance to all other cities is “ + totalDistance

Design

A screenshot of a computer screen

Description automatically generated

# TEST PLAN

|  |  |  |
| --- | --- | --- |
| Test # | Input | Expected Output |
| 1 | Enter the number of cities: 5  Enter the coordinates of the cities: 2.5 5 5.1 3 1 9 5.4 54 5.5 2.1 | The central city is at (2.5, 5.0)  The total distance to all other cities is 60.81 |
| 2 | Enter the number of cities: 3  Enter the coordinates of the cities: 30 22 11 3.14 1 9 | The central city is at (11.0, 3.14)  The total distance to all other cities is 38.36 |
| 3 | Enter the number of cities: 9  Enter the coordinates of the cities: 2.5 5 5.1 3 1 9 5.4 54 5.5 2.1 30 22 11 3.14 99 99 65 33 | The central city is at (5.1, 3.0)  The total distance to all other cities is 301.04 |

# SCREEN SHOTS

1

A screen shot of a computer code

Description automatically generated

2

A screen shot of a computer screen

Description automatically generated

3

