Langstons Ant

Sunday, April 2, 2017 6:31 PM

General flow of the program:

1. Start at the menu
   a. Prompt the user:
      i. Size of the board (rows and columns)
      ii. Number of steps to take
   b. Starting position of the ant?
      i. User defined
      ii. If not supplied by the user it needs to be in the middle
         1. Extra credit available for picking a random location for the ant
2. After gathering the information start to move the ant
3. Loop through (based on user input) and move the ant according the to the rules
   a. Turn right if the square is black
   b. Turn left if the square is white
4. Need to consider what happens at the edge?
   a. Send the ant to the other side of the board?
   b. Send him back in the direction that he came from?

Steps for writing the program

- Work on the main/menu first
- Prompt and store the number of rows and columns the user wants
- Validate that the numbers entered are numbers and that they are greater than 0
- If they are valid numbers we can initialize the board
- Create a variable in main for the board using int** pointer
  - Used for creating 2d arrays
- After taking the input call to a function to create the board
- The board should take the arguments of the rows and columns entered by the user
  - The function should then create a new pointer to a 2d array
  - The function should also populate the board to initialize it.
    - For now lets just fill the board with 0's
- Before moving on to the next steps display the board to ensure that everything is being created according to what the user enters
- Need to get input from the user about where to start the ant
  - These can be x and y coordinates
  - Or generated randomly if they decline to choose the starting point
- Once the board has been created an Ant object needs to be created with the position to start as well as a pointer to the board
- The Ant class will need a default constructor to take the x and y variables for a starting position
- The ant is created and placed on the board
- At this point we have a board created in a 2d array and an ant object created and placed on the board
- From we need to start moving the ant based on the rules of the game
- The number of moves will also be determined by the original entry by the player for how many moves to make
- We'll keep looping through with each increment deciding the following:
  - Where to move next
  - What if anything do we need to change on the square
- The above decisions are based on the square that the ant is currently on

Need four classes/groups of functions to complete the project:

1. Main
2. Menu
3. Ant
4. Board

Menu functions

- Checking whether or not it is a number
  - Takes a string as an argument
  - Uses the string to display the message
  - Gets input from the user and validates that it is indeed an int.
  - Returns the int after making sure that it is valid
- Checking whether or not it is a char
  - Takes a string as an argument
  - Uses the string to display the message
  - Gets input from the user and validates that it is a char
  - If it is a char it returns true, if not false

Board functions

- Create the board
  - Pass the x and y limits for the 2d array
  - Fill the board with 0's to initialize
- Display and update the board
  - Loop through to display the board

Ant Class

- Constructor takes the positions and board
- Set the initial positions
  - setX and setY
- Return the positions
  - getX and getY
- Movement
  - Ant will need to know what the color of the current square he is on
  - Move left
    - Update the square before moving
  - Move right
    - Update the square before moving
- May need a function to make sure that our ant is staying within the board
  - maxX and maxY functions to verify