Concordia University
Department of Computer Science and Software Engineering

Advanced program design with C++
COMP 345-Winter 2020 (Section S)
Project Description

General Information

The project is about writing a C++ computer game that allows the user to play a reasonable version of the *New Haven* game. The *New Haven* is a "tactical" game, the gaming rules are given in [1]. The three assignments will be about the development of different parts of a project. Thus, every assignment will build upon code developed in the previous assignments. You are expected to work in teams of 4 for every assignment. Individual work will be accepted, but will be graded in the same terms as team work.

Problem Statement

New Haven game is a multiplayer board game (2 to 4 players). The developed program will have to be compatible with the rules, components and the play of the game.

The *New Haven* game consists of (i) a Game Board (side A and B), and (ii) the players' Village Game Boards (max 4).

i. The Game Board consists of:
   a) playing area, which is a connected graph map where nodes are squares where each player puts the Harvest Tiles and edges represent adjacency between the harvest tiles.
   b) an area for the available Buildings tokens.
   c) a numbered area for Resource Track.

ii. 4 Player Village Game Boards: each Village Game Board is a map used to build the village.

Each player attempts to build a village in New England that will attract the most colonists by the end of the game. Resources will be gathered and used to attract tradesman and craftsman and better amenities for each village. The village that attracts the largest number of colonists will win.

The Components

⇨ Game Board two sides (A and B)
⇨ 4 Village Game Boards
⇨ 4 Pond Tiles (used only with side B game board)
⇨ *60 Harvest Tildes,* each tile is divided into 4 squares showing 2 or 3 different Resources
⇨ 144 Buildings, 6 Buildings in each of the four colors numbered from 1 to 6. (The opposite side of each building has either a meadow, quarry, forest or wheatfield)
⇨ 4 Player Screens
⇨ 4 Resource Markers

Parts/features of the game

Map: The game consists of (i) one Game Board and (ii) 4 player Village Boards game.

The Game Board is considered as a map, that is a connected graph where each node represents a square for a Harvest Tiles and edges between the nodes represent adjacency between Harvest tiles. During game play, players put their Harvest tiles on the playing area of the Game Board, and the Buildings available as well as Resource Track.

The Village Game board is a 5 by 6 map of circular spaces. The spaces on the Village Game board are marked with numbers to show the cost to play on that space. The figures at the side and bottom show colonists (and therefore score) that will be gained by completing a row or column. Each player owns one Village Game.

Game: the game goes through the following phases:

I. <u>Setup phase</u>
1. The board map (A or B) is loaded.
2. Game of:
   a. four players, the entire playing area will be used.
   b. three players, the light center 5x5 area and the top and bottom green squares will be used.
   c. two players, only the center 5x5 area is used
3. The four Resource markers are placed on the zero space of the Resource Track on the Game Board.
4. Each player takes a Village Board. This board represents the local Village that each player is developing. The spaces are marked with numbers to show the cost to play on that space. The figures at the side and bottom show colonists (and therefore score) that will be gained by completing a row or column.
5. The 60 Harvest Tiles (face hidden to players) are loaded and shuffled thoroughly to form a pool from which to draw.
6. All 144 Buildings are loaded to be drawn randomly.
7. Five Buildings are drawn out and place in the circles at the edge of the board to form the initial face up pool. Each Building is marked with its' cost on the left side and resource needed on the right.
8. Each player takes a Player Screen and draws six Buildings in secret from the pool and two Harvest Tiles from the pool and places all of them behind the screen. Player's Harvest Tiles and Buildings are private and need not be disclosed.
9. Each player is given one Harvest Tile placed face down beside their Village Board as their 'shipment' tile. *This tile is not known until after it has been played.* This tile represents the opportunity that once per game a player may receive 4 of the same resources and temporarily ignore what is actually on the tile.

II. <u>Game playing Overview</u>

- *The player with the smallest student ID number will begin.* Play continues with each player taking a turn clockwise until one space is left unfilled on the board. The game ends when there is only one space left on the board. Each player will take an equal number of turns.

- On each turn the active player begins by selecting one of their Harvest Tiles and placing it onto the Game Board. This play will generate a supply of Resources. The amount of Resources collected is indicated by increasing the Resource Markers on the track beside the Game Board. The active player will then construct Buildings in their Village by using the corresponding Resources. When the active player is finished, each other player in clockwise order will have the option of also using any remaining Resources to construct Buildings in their own Village.

- After everyone has had one chance to build or passes, the active player draws new Buildings based on the final position of the Resource Markers. The Resource Markers are then returned to zero value and the player draws a new Harvest Tile to replace the one just played. The selection of face up Buildings is replenished and the play proceeds with the next player clockwise turn.

III.   Game End:
- The game ends *when there is exactly one open space left on the Game Board*.

- The Scoring is based on how many Colonists each player has attracted to his/her Village. Score points for every row and column that is completely filled with Buildings. The value of each row and column is the number of Colonists shown at the right or bottom. Note: the value of a row or column is doubled if every Building played on that row or column is face up. Buildings leftover behind Player Screens at the end of the game do not score but may be a tie-breaker.

- The player with the highest score is the winner. In the event of a tie, the player with the fewest empty spaces on their board wins. If still tied, then the player with the least buildings leftover wins. If this result is still a tie then it is a shared win between those players.

Main reference on Moodle
1. Game rules.
2. Game components