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Programming II - Semestral project
Pacman

Introduction
My project is a take on a classic PAC-MAN game. It is a ZX Spectrum 2D game. The objective of the game is for Pacman (controlled by the player) to eat all dots on the game field, for each dot Pacman collects points. Pacman is chased by 4 ghosts that are trying to stop him. If any ghost catches pacman, he loses one life. When Pacman eats a big dot (there are 4 on the game field) ghosts turn to frightened mode. Their color changes to blue and they move chaotically. While in this mode, Pacman can eat the ghosts, for which he gets points, and reset them to start position. Game ends when either all dots are collected (victory) or all lives are lost (defeat).

User's manual

Controlling pacman
If he is not blocked by a wall, Pacman constantly moves. His direction is controlled by the arrow keys. When you change his direction, he will turn there at the first possibility.

Movement of ghosts
Ghosts have 3 different "personalities" according to which they choose their target. A ghost makes a decision at every step. It takes all the free tiles around it and measures the distance from this tile to its chosen target tile, then chooses the one with the least distance.

All ghosts alternate between 3 modes - Chase, Scatter and Frightened. In Chase, the ghost chooses a target (according to its inside logic) and follows this target. In Scatter, all ghosts move to their assigned home tiles, which are located in the corners of the game field. This gives the player a moment of relief. The duration of Chase and Scatter modes changes with progressing levels.

Frightened mode is turned on by Pacman eating a big dot. In this mode ghost moves randomly, at every step it choses a random tile on the game field and moves to this tile.

Red ghost
Red ghost is the most straight-forward one. It always chooses the tile where Pacman currently stands as its target to chase. It begins outside of the ghosts' home and immediately starts running after Pacman.

Pink ghost

This ghost's starting position is inside the ghosts' home but he finds his way out right after the game starts. When in Chase mode his target is in front of Pacman, 3 tiles in direction of his movement.

Yellow and Blue ghosts

These ghosts wait in their home until a certain amount of dots is eaten - 30 for Yellow and 45 for Blue. In Chase mode they first measure their distance to Pacman. If they are far away, they follow Pacman in the same way as the Red ghost. But when crossing a specified limit (getting too close), they turn away and go to their home tile as in Scatter mode.

Levels

All levels are played on the same game field. The changing factor is the timing of ghosts in different modes. With increasing levels Chase mode lengthens and Scatter and Frightened modes shorten, making it harder for the player not to be killed by the ghosts. Level is repeated until the player succedes, then he moves to the next level. When the player reaches the maximum level, it is repeated so that the player can continue the game.

Technical specification

Framework

Project is built using the MonoGame Framework - Cross-Platform Application. To compile the game for a different operating system the MonoGame Pipeline Tool should be used to prepare the pictures inside the project.

Code decomposition

Project is divided into 4 files.

Game1.cs contains the game loop, which consists of an Update function that controls the game states and a Draw function which draws the game state to the screen. There are other functions that initialize the game and load textures used in graphics.

Program.cs is the main entry point of the project. It creates an instance of the game and runs it.

LevelData.cs contains the LevelData class which loads level data from a file and holds the information about the current level.

Item.cs holds the GamePlan class, which represents the game field and all items on the field.

Decomposition into classes
All items on the game field (Pacman, ghosts) are instances of the Item class, they contain a game plan and information about their position on the field. There are specific classes for different items all derived from the Item class

Pacman class covers all the actions of Pacman - moving, changing direction, eating dots.

There is an abstract class Ghost with an abstract function Chase and other functions that describe the movement and behavior of the ghosts. For each “personality” of the ghosts there is a class derived from Ghost (RedGhost, PinkGhost, BlueGhost, YellowGhost) which implements the Chase function according to its personality. This enables to move all ghosts from different classes with the same function.

Input files
There are 2 input text files in the project - map file and level data file. Map file contains the game field. Format: height and width of the game field on separate lines, then lines representing the game field.

Level data file holds information about timing of the ghosts in each level. Format: first line - number of levels, then 3 lines for each level - first contains chase time in seconds, second scatter time, third frightened time - there should be no empty lines between levels.