Faculty of Science, Engineering and Technology

Object Oriented Programming

Lecture 1 Scenarios

Overview

This document outlines the scenarios that will be worked through in the lecture.

Instructions

Please read through the scenario prior to the lecture.

During the lecture we will create a conceptual software solution to these scenarios that will help you understand the object oriented approach to software design.

Scenario 1: Blackjack

Blackjack is a card game that involves a dealer and a number of players. The aim of the game is to collect a hand of cards where the total value of the cards adds to 21. Scores lower than 21 are valid, where as those over 21 are considered to be bust.

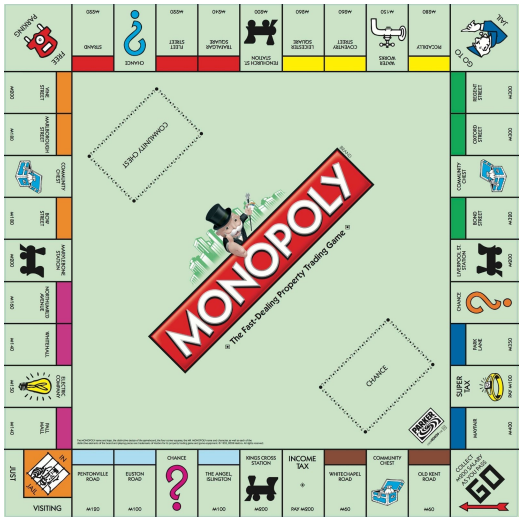
The game involves a standard deck of 52 cards. Each card has a suit (Clubs, Spades, Diamonds, Hearts) and rank (Ace, 2 to 10, Jack, Queen, King). The value of a card is determined by its rank, with cards 2 to 10 having their value, whereas face cards (Jack, Queen, and King) have a value of 10. The Ace card has the value 11, unless the score of the hand is over 21, in which case the Ace is scored as a 1.

Blackjack starts with the dealer dealing each player, and the dealer, two cards. Player cards are dealt face up, whereas the dealer's hand has the first card face down and the second, and subsequent cards, face up. Each player, in turn, is then asked if they want to hit or stand. When they "hit", the player is dealt an additional card. If they have not bust, the player is then asked if they want to hit or stand again. When the player stands, the dealer moves on to the next player.

Once all players have chosen to stand, the Dealer is required to continue to hit until they receive a score of 17 or higher, at which time they must stand.

Player's win when their score is higher than the dealers score. Hands consisting of a face card and an Ace are considered to be a Blackjack, and beat any other score of 21 consisting of additional cards.

Scenario 2: Monoploy



Monopoly is a board game produced by Hasbro that involves multiple players (2 - 6) purchasing and trading properties with the goal of monopolising the market.

The game involved a board, player tokens, chance and community chest cards, money, property deeds, dice, houses and hotels.

The board consists of 40 squares, most of which represent properties, but also include squares that provide access to cards, and four corner squares (Go, Jail, Free Parking, and Go To Jail).

At the start of the game, players are given $1500, and allocated a token that is placed on the Go square. Each player, in turn, rolls two 6 sided dice and moves their token the sum of the values shown. If the token passes (or lands on) the Go square, the player collects $200. The square that the player's token lands on then determines the action the player needs to perform.

- Property square: The player may purchase the square's property deed if it is available from the Bank. Otherwise the player must pay the rent indicated to the owner of the deed.
- Card square: The player must pickup the top card of the tile and perform the indicated action.
- Go To Jail: The player must go to Jail.
- Go: The player collects $200

Players in Jail must roll doubles (the same value on both dice) to move out of Jail.

Players may purchase houses and hotels for property squares that they own the deed of, this increases the price of the rent for that property.

Scenario 3: Robot Control System

A robot consists of a number of a number of devices: sensors, motors, displays, and speakers. The robot receives tasks that it performs using the devices attached to it.

The control system is responsible for reading values from the sensors, making decisions, and powering other devices to generate outputs (movement, video, or audio). To assist with decision making, the Robot's control system maintains a list of strategies. Each strategy has its own rules for how it responds to inputs. For example, a combat robot may have defensive, aggressive, and patrol strategies allowing the robot to adapt its behaviour as required.

When new devices are attached to the Robot, the control system is responsible for querying the device to determine its capabilities. Once the device capabilities are identified it is added the list of devices that the robot is able to use.

The robots contain a map of its surrounds with locations of other entities it has identified. This map is updated periodically as the robot scans its surrounds.

Each task a robot performs may contain a number of sub tasks, and suggested strategies. The Task relates to a target entity, and an objective.

Scenario 4: Workplace Giving

A Workplace Giving system allows employees of subscribing companies to donate part of their before tax pay to various charities. The system provides employees with a portal through which they can view charities, their projects, and make donations to those charities direct from their pay rather than using a credit card or other payment facility.

Charities can add additional projects which outline things the charity is raising money to achieve.

The system also needs to support a number of companies. Each company will have a number of employees as well as a payroll contact. The company's payment schedule is then used to determine when charity payments are made. To facilitate payments, the system will generate a payment advice for the company's payroll contact. This report outlines the amount each employee is asking to pay in donations. The company deducts these payments from the employee's pay, and then pays the Workplace Giving provide the total of all employee donations that pay cycle, and the system then distributes these funds to their respective charities.