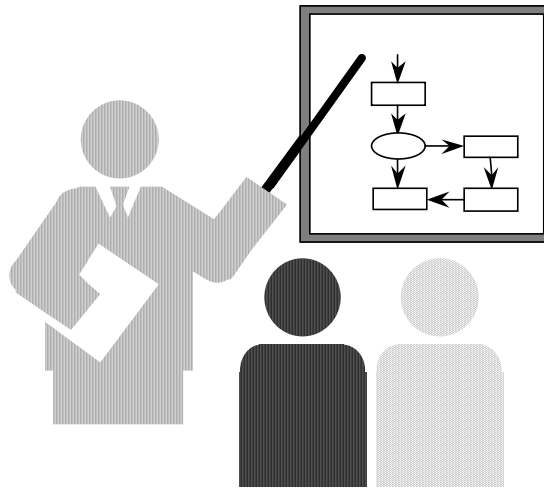


TTT Project

Requirements Document / Use Case Analysis



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Team Members:

Name	ID	Email Address
Shen Li	27913907	shenli2015@yahoo.com
Isha Mehta	27376030	ishakmehta04@gmail.com
Zhihao li	27252331	lizhihao1109@gmail.com
Akjil Kumar	27711794	reddyakhil24@gmail.com
Chenyang Li	27588801	tomli8chenyangli@gmail.com
Xiangshiyu Li	27320841	lixiangshiyu@gmail.com
Meng Yao	26847005	yaomenghncn@gmail.com
Singh Mehare	40012584	birdevinder1705@gmail.com
Golnoush Lotfi	26753906	golnoush.lotfi@gmail.com

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1. Domain Model

1.1 Domain Model Description

Domain model is a conceptual model that shows important objects and concepts in the business. It represents both the key concepts and the vocabulary of the problem domain. A domain model shows the relationships between the concepts in the problem domain and identifies the attributes of that concept. A domain model does not reflect the methods. It encapsulates the methods to hide the details. Thus a domain model consists of concepts, attributes and the association between those concepts.

The domain model of figure below depicts our initial understanding of what conceptual classes are likely to be necessary, to build the Tic-Tac-Toe game. Some of the main conceptual classes of our system are explained below:

TTT game* is the main conceptual class for our system. TTT game can be played by a **Player**. A player can choose the **Game level** from Beginner, Intermediate and Advanced. A player can be Human or Computer. A human player can view the **Score Board** which generates the **Game Result** that will declare whether a player is a winner, loser or there is a tie. This Game Result will generate a **Gift** that will be given to the player upon winning the game. A player can also exit the game anytime he/she wants.

A player is also allowed to choose the **Marker Type** from 'X' or 'O'. This marker type is represented by the **Marker** placed by the player. A player can place 3, 4 or 5 marks in a game, to complete the game or win the game. A player is assigned the time limit by the **Timer** which limits the time in which the player can place a mark on the board. This timer is displayed on the board.

TTT game includes a board which is composed of 9 **Unit of grids**, that is the squares, on which a player is allowed to place a mark. TTT game also has a button to show the game **Instruction**. While a game is being played, TTT game will play the background **music** for its players for some additional entertainment.

1.2 Important attributes of the conceptual classes

Important attributes of the given domain model includes:

- name- Name of the player
- play_turn-Which player turn it is
- X/O- Marker type of that player ('X' or 'O')

³
*Note: All the conceptual classes are made bold and all the association names are underlined for the readers to relate it with the diagram.

- state- A boolean value representing the State of grid to indicate whether the grid is empty or filled
- win/tie/lose- Game result whether it is a tie, win or a loose.
- time limit- This is the limit on the player's ability to make the move.
- toatl_time_of_a_game- Total time of the game.

1.3 Important multiplicities between the conceptual classes

Some of the important multiplicities between conceptual classes are:

- A player can mark on the board 3 times (winning condition in first try), 4 times or 5 times (if a tie).
- One board has 9 units of grid
- One game result will generate 0 (if lost) or 1 (if winning) gift
- There can be 1 (in case of human vs computer player game) or 2 (in case of human vs human player game) players in a game with 1 board.
- Only the first player is allowed to choose the game level.
- Similarly only first player is allowed to select the marker type.
- A player will be given 0(if lost) or 1(if won) gift.

```

classDiagram
    class Human {
        name
    }
    class Computer {
    }
    class Player {
        name
        play_turn: boolean
    }
    class Gift {
    }
    class ScoreBoard {
    }
    class GameResult {
        winner
        tie
        loser
    }
    class TTTgame {
    }
    class Board {
        size
    }
    class Marker {
    }
    class GameLevel {
    }
    class Timer {
        time_limit
        total_time_of_a_game
    }
    class UnitOfGrid {
        state: boolean
    }

    Human "*" -- "1" ScoreBoard : view
    Human --|> Player
    Computer --|> Player
    Player "1" -- "0..1" Gift : choose
    Player "1" -- "1" GameLevel : choose
    Player "1" -- "1" Marker : choose
    Player "1" -- "1" TTTgame : play and exit
    Player "1" -- "1" Timer : has time limit
    Player "1" -- "1" Board : has time limit
    Player "1" -- "1" UnitOfGrid : occupies
    Gift "0..1" -- "1" GameResult : generates
    ScoreBoard "1" -- "1" GameResult : generates
    TTTgame "1" -- "1" GameResult : generates
    TTTgame "1" -- "1" Board : includes
    TTTgame "1" -- "1" Marker : place
    TTTgame "1" -- "1" Timer : reset
    TTTgame "1" -- "1" UnitOfGrid : has time limit
    Marker "2" -- "1" GameLevel : is represented with
    Marker "1" -- "1" UnitOfGrid : occupies
    GameLevel "1" -- "1" UnitOfGrid : occupies
    
```

The diagram illustrates the structure of a Tic Tac Toe game system. It features several classes and their relationships:

- Human** and **Computer** are subclasses of **Player**, both having a `name` attribute.
- Player** has attributes `name` and `play_turn: boolean`. It is associated with **Gift** (1 to 0..1), **Game Level** (1 to 1), **Marker** (1 to 1), **TTT game** (1 to 1), **Timer** (1 to 1), **Board** (1 to 1), and **Unit of grid** (1 to 1).
- Gift** is associated with **Game Result** (0..1 to 1) via a `generates` relationship.
- Score Board** is associated with **Game Result** (1 to 1) via a `generates` relationship.
- Game Result** has attributes `winner`, `tie`, and `loser`. It is associated with **TTT game** (1 to 1) via a `generates` relationship.
- TTT game** is associated with **Board** (1 to 1) via an `includes` relationship, with **Board** having a `size` attribute.
- TTT game** is associated with **Marker** (1 to 1) via a `place` relationship.
- TTT game** is associated with **Timer** (1 to 1) via a `reset` relationship.
- TTT game** is associated with **Unit of grid** (1 to 1) via a `has time limit` relationship.
- Marker** is associated with **Game Level** (2 to 1) via a `is represented with` relationship.
- Marker** is associated with **Unit of grid** (1 to 1) via an `occupies` relationship.
- Game Level** is associated with **Unit of grid** (1 to 1) via an `occupies` relationship.