

A basic layout of Game board is presented in figure below.



Rules of game are listed here.

1. How to Play?

The game starts with Go cell, and each player rolls the six sided dice and moves forward in clock wise direction. Whenever a round is completed and player crosses the Go cell again he will collect 500 PKR from the bank as the salary.

The rules for other cells types in game are listed below.

2. Properties:

- If a player lands on an unowned property, whether residential, commercial, public stations or utility, they can buy the property for its listed purchase price.
- If he declines this purchase offer, the property is auctioned off by the bank to the highest bidder, including the player who declined to buy.
- If the property landed on is already owned, he must pay the owner a given rent for unmortgaged property, the price depends on whether the property is part of a set, upgraded or not.
- Once the player owns an entire group, he can collect double rent for any undeveloped properties within it.
- Upgrade Property:** When a player owns all of the properties in a group and none of them are mortgaged, then he can upgrade them during his turn. Development involves buying houses or hotels from the bank and placing them on the property spaces, and this must be done uniformly across the group.

That is, a second house cannot be built on any property within a group until all of them have one house. Houses, hotels and shops cannot be built on stations or utilities. A player can add only one Wi-Fi, Gas connection, and electricity for each house. The rent of property will be increased according to percentage cost of a development.

The upgrade items and their prices are listed below.

	Item	Price to Buy	Increased Rent
1	House	100 PKR	30%
2	Hotel	4 Houses and 2 Shops	80%
3	Shop	3 Houses or 300 PKR	60%
4	Wi-Fi	30 PKR	10%
5	Gas Connection	50 PKR	20%
6	Electricity	50 PKR	20%

- Houses shops and hotels cannot be built on stations or utilities, the given rent also increases if a player owns more than one of either type.

3. Lists of all properties are given below: Private properties for which rent and cost must be paid to bank or to the owner of property.

ID	Property Name	Purchase Cost PKR	Rent Cost PKR	Group
1	Iqbal Town A	250	60	IQBAL
2	Iqbal Town B	300	70	
3	Iqbal Town C Kareem Block	400	100	
4	Johar Town A	200	80	JOHAR
5	Johar Town B	250	90	
6	Faisal Town A	300	100	FAISAL
7	Faisal Town B	400	130	
8	Faisal Town C	400	130	
9	Model Town A	800	200	MODEL
10	Model Town B	850	250	
11	Model Town C Link Road	2000	500	
12	Gulberg II A	1000	300	GULBERG
13	Gulberg II B	1200	350	
14	Gulberg II C Liberty	2500	600	
15	DHA A	2000	500	DHA
16	DHA B	2000	500	
17	DHA Y Block	2500	1000	
18	Bahria Town A	2500	800	BAHRIA
19	Bahria Town B	3000	900	
20	Bahria Town C	3000	1000	

Properties for which Rent must be paid but cannot be Upgraded or used for Building house and hotel or shop. These properties are in two sets Stations and Utility center.

ID	Property Name	Purchase Cost PKR	Rent Cost PKR	Group
1	Metro Station	2000	200	STATION
2	Bus Station	2000	200	
3	Railway Station	2500	350	
4	Orange Train	2500	350	
5	WASA	4000	400	UTILITY
6	LESCO	5000	450	
7	PTCL	8000	500	
8	SUI	2500	350	

Special unpurchaseable properties for Cards (Community chest and Chance) and unpurchaseable.

Count	Property	Action
1	Go	Collect 500 from Bank on every visit, except for jail.
3	Community Chest	Pick a card from community chest and follow the instructions.
3	Chance	Pick a card from chance and follow the instructions of card.
1	No Go Area /GO To jail	Go to Jail
1	Land Tax	Pay 20% tax on land.
1	Property Tax.	Pay 10% tax on land, 20% tax on houses and 30% on hotels and shops on each visit of this cell
1	Parking	Pay 10 PKR as parking fee when visit.
1	Jail	Players next 2 turns are skipped.

4. Chance/Community Chest: There are total 15 chance and 15 community chest card.

If a player lands on a Chance or Community Chest cell, he will draw the top card from the respective deck and will follow its instructions. This may include collecting or paying money to the bank or another player, or moving to a different space on the board. The list of instructions are given in files chance and community chest. The decks of those card must be shuffled well before start of game.

5. Jail: A player is sent to jail for doing any of the following:

- If he lands on No Go Area cell
- Draws a "Go to Jail" card from Chance or Community Chest

When a player is sent to jail, he moves directly to the Jail and his turn ends. If he pass Go then cannot collect the salary. If a player is in jail, he cannot take a normal turn and must either pay a fine of 400 PKR to be released, or use a Chance or Community Chest "Get out of Jail Free" card. Otherwise his next 2 turns will be skipped.

Players in jail cannot buy properties directly from the bank, due to being unable to move, but can engage all other transactions, such as mortgaging properties, selling properties to other players, selling houses, hotels and shops, collecting rent, and bidding on property auctions.

6. Mortgage:

A player can mortgage properties, even with houses, hotels and shops. The player receives money from the bank for each mortgaged property (half of the purchase price and upgrade price), which must be repaid to bank with 20% interest to un-mortgage. Players cannot collect rent on mortgaged properties but can sell them to other players.

The player buying the mortgaged property must immediately un-mortgage it for the mortgage price plus 20%, or pay the bank just the 20% amount and keep the property mortgaged. If the player chooses the second option, then he must still pay the 20% again if the property is later un-mortgaged.

7. Bankrupt:

- a. A player who cannot pay what they owe is bankrupt and eliminated from the game. If the bankrupt player owes the bank, they must turn all of their assets over to the bank, who then auctions off their properties (if they have any), except buildings.
- b. If the debt is instead to another player, all the assets are instead given to that opponent, except buildings which must be returned to the bank, and the new owner must either pay the bank to un-mortgage any such properties received or pay a fee of 20% of the mortgaged value to the bank if they choose to leave the properties mortgaged. The winner is the last player left after all the others have gone bankrupt.

Other Requirements:

1. **Initial Money:** When the game starts both players will be given same amount of money say 5000 PKR. Whenever a player will buy or sell a property the ownership status must be visible on board. At start all properties, and upgrades will be owned by Bank only.
2. **Player Info:** A list of all mortgaged, upgraded properties and remaining money should be displayed for each player and must be updated too in each turn.
3. **User Interaction:** Your game should be user interactive and should provide proper options to player, which he can use for every move. Like buy a property, pay or collect rent, bidding, mortgage/un-mortgage, buy/sell upgrades etc.
4. **Save and Load:** Add the save and load game functionality so that players can save current game and on start can load previous one or start new.

Part (a)

Design a complete layout of your game including all classes, interaction among objects hierarchical (inheritance), polymorphism, composition, or aggregation on paper. Submit and discuss the Game Draft this Friday in my office from 11:30 am to 3:30 pm. All group members should presence is mandatory.

Part (b)

Implement and submit complete working game.

Graphical user interface is optional. Create neat and clean board on console and write name of objects in cells with proper updates of moves.

HAPPY PROGRAMMING