Quiz Section for Program Design (I)

Exercise #7

To make the simple game we built in Exercise #5 more fun, we decided to make two changes and add two new game mechanisms for this game.

Changes

1. The first change is that the game will ask the player to enter four action decisions at the beginning of each day, instead of the beginning of each area. Still, if the player enters the decision outside the range, the game will ask the player to enter again, but only for the decisions outside the range. For example, if the player enters "`0 1 2 0`" as the decisions, because the first and the fourth decisions are outside the range, the game will ask the player to re-enter the decision of the first area first, and then ask the player to re-enter the decision of the fourth area.

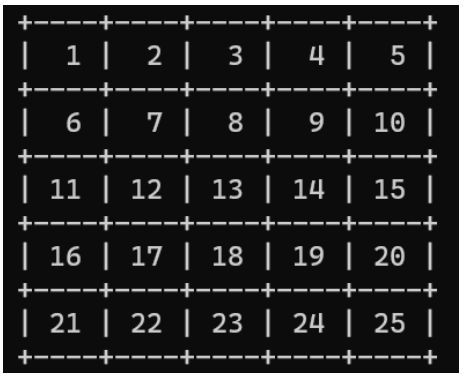
2. The second change is that the game will only show how much money the player earned today first, and then ask the player whether to check the results of each area.

New mechanisms

1. The first mechanism is the "Booster system". The player can get boosters from the lottery, which we will introduce later. There are three types of booster: the speed booster, the price booster, and the area booster. The speed booster doubles the amount of selling hotdogs and the price booster doubles the price of each hotdog. These two boosters are effective for all areas. The area booster allows the player to sell the hotdogs at an extra area (i.e., the player can only sell hotdogs in the fifth area (the extra area) created by the area booster), and it is also affected by the price booster and the speed booster. The player could choose to open or to close the boosters before entering the action decisions. Each booster can be only activated for one day and disappear. If the player has no boosters but chooses to open, the game will close it automatically. The default settings of the boosters are close and the setting of each booster will remain to the next day.

2. The second new mechanism is the "Lottery system". If the player chooses to continue this game after each day, the game will show a $n \times n$ table as a lottery and ask the player whether to choose one cell in the table or to continue the game. The player will get one free choice after each day, and the free choice can be accumulated for the next day. The player can pay for more choices if the player uses up the free choice. The player can continue selecting a new cell until the player has no money or chooses to continue the game. The price for the choice will be $500 in the beginning and increment by 500 for each time, but once the lottery is refreshed, the price will be also refreshed (i.e., the price of the choice will start from $500 again). The lottery will be refreshed when all the cells are chosen, and the size of the table will become

$(n + 2) \times (n + 2)$ after refreshing. The table is represented in a certain pattern. The four corners of each cell are `'+'`; the left and the right margins are `'|'`, and the upper and the under margins are `'-'`. The number of characters in one cell (i.e., the width of the cell) is the digit amount of n^2 plus 2. The center of each cell displays numbers from 1 to n^2 for the player to choose, or `'x'` which means the number was chosen already. The lottery should look like the graph below where n is 5.



There are nine prize types for the lottery. The first type is "money gaining." The player gets $100 \times price\ of\ one\ hotdog$ dollars. The second type is "free choice". The player gets one free choice for the lottery. The third type is "extra choice". The game selects the above cell in the lottery table automatically. If the cell to select is already chosen, the game will show a message and ask the player to choose the next action(i.e., whether to choose one cell in the table or to continue the game). Be aware that the row above the first row will be the last row and the row below the last row is the first row. The fourth to sixth type is similar to the third type, but they will select the cells that are underneath, left and right to the current cell respectively. The seventh to ninth types are "booster gaining". The player can get one speed booster randomly chosen from the seventh (speed booster), the eighth (price booster), and the ninth (area booster) prize type. The prize type in each cell depends on its number. First, reverse the number of a cell, and then take it as an octal number. Second, convert the octal number to a decimal number. Last, module it with 9 and plus 1, and the resulting value is the prize type (e.g., if the resulting value is 1, then the cell contains the first type of prize).

You can check the messages of all situations at the end of this file. We also provide the messages in C code format on eCourse2.

The table below shows the example input and output. The numbers with underscores are the input from players. You can also download the example input and output on Domjudge.

Example #1

```
Welcome, young boss!
Chop chop, It's dawn.
You have 100 dollars.
You need 15 minutes to make a hotdog.
```

```
The price of a hotdog is $30.
You have 0 speed booster(s), 0 price booster(s), 0 area
booster(s).
Open/Close boosters:
  [1] Speed booster (now close)
  [2] Price booster (now close)
  [3] Area  booster (now close)
  [4] Finish
Enter the number(s): 1
Open/Close boosters:
  [1] Speed booster (now open)
  [2] Price booster (now close)
  [3] Area  booster (now close)
  [4] Finish
Enter the number(s): 1
Open/Close boosters:
  [1] Speed booster (now close)
  [2] Price booster (now close)
  [3] Area  booster (now close)
  [4] Finish
Enter the number(s): 4
Actions you can take for each area:
  [1] Sell the hotdogs
  [2] Improve your cooking speed
      (- $50, - $100, - $200, - $400 for next four upgrades)
  [3] Improve your hotdog flavor
      (- $100, - $200, - $400, - $800 for next four upgrades)
Enter the number(s): 1 1 1 1
Well done, you earn $1440 today.
Which result of the area you want to check?
  [1] Area 1
  [2] Area 2
  [3] Area 3
  [4] Area 4
  [5] Done
Enter the number(s): 3
You make 12 hotdogs here!
You earn $360!
Which result of the area you want to check?
  [1] Area 1
  [2] Area 2
  [3] Area 3
  [4] Area 4
  [5] Done
Enter the number(s): 5
Do you want to continue or exit?
  [1] Continue
  [2] Exit
Enter the number(s): 1
You get one free choice.
+---+---+---+
| 1 | 2 | 3 |
+---+---+---+
| 4 | 5 | 6 |
+---+---+---+
```

```
| 7 | 8 | 9 |
+---+---+---+
You can choose
  [number on cell] to open (- $0)
  [0] to continue the game
Enter the number(s): 9
Fortune, fortune! You get $3000!
+---+---+---+
| 1 | 2 | 3 |
+---+---+---+
| 4 | 5 | 6 |
+---+---+---+
| 7 | 8 | x |
+---+---+---+
You can choose
  [number on cell] to open (- $500)
  [0] to continue the game
Enter the number(s): 0
Chop chop, It's dawn.
You have 6700 dollars.
You need 15 minutes to make a hotdog.
The price of a hotdog is $30.
You have 0 speed booster(s), 0 price booster(s), 0 area
booster(s).
Open/Close boosters:
  [1] Speed booster (now close)
  [2] Price booster (now close)
  [3] Area  booster (now close)
  [4] Finish
Enter the number(s): 4
Actions you can take for each area:
  [1] Sell the hotdogs
  [2] Improve your cooking speed
      (- $50, - $100, - $200, - $400 for next four upgrades)
  [3] Improve your hotdog flavor
      (- $100, - $200, - $400, - $800 for next four upgrades)
Enter the number(s): 1 2 3 4
Invalid input!!!!
Actions you can take at Area 4:
  [1] Sell the hotdogs
  [2] Improve your cooking speed
  [3] Improve your hotdog flavor
Enter the number(s): 2
Well done, you earn $360 today.
Which result of the area you want to check?
  [1] Area 1
  [2] Area 2
  [3] Area 3
  [4] Area 4
  [5] Done
Enter the number(s): 2
You glimpse the secret of wind.
Your hands can move faster now.
Which result of the area you want to check?
  [1] Area 1
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```
  [2] Area 2
  [3] Area 3
  [4] Area 4
  [5] Done
Enter the number(s): 3
You feel the soul of the ingredients.
Your hotdogs are more appetizing now.
Which result of the area you want to check?
  [1] Area 1
  [2] Area 2
  [3] Area 3
  [4] Area 4
  [5] Done
Enter the number(s): 5
Do you want to continue or exit?
  [1] Continue
  [2] Exit
Enter the number(s): 2
We will miss you. Bye!
```

Messages

Situations	*Messages*
Beginning of the game	`Welcome, young boss!`

Beginning of each day	`Chop chop, It's dawn.`
	`You have %d dollars.`
	`You need %d minutes to make a hotdog.`
	`The price of a hotdog is $%d.`
	`You have %d speed booster(s), %d price booster(s), %d area booster(s).`

Choosing booster	`Open/Close boosters:`
	`  [1] Speed booster (now open/close)`
	`  [2] Price booster (now open/close)`
	`  [3] Area  booster (now open/close)`
	`  [4] Finish`
	`Enter the number(s):`

Choosing actions	`Actions you can take for %d areas:`
	`  [1] Sell the hotdogs`
	`  [2] Improve your cooking speed`
	`  (- $%d, - $%d, - $%d, - $%d for next four upgrades)`
	`  [3] Improve your hotdog flavor`
	`  (- $%d, - $%d, - $%d, - $%d for next four upgrades)`
	`Enter the number(s):`

Re-entering for actions	`Actions you can take at Area %d:` `  [1] Sell the hotdogs`

	[2] Improve your cooking speed [3] Improve your hotdog flavor Enter the number(s):
End of actions	Well done, you earn $%d today.
Choosing result of area	Which result of the area you want to check? [1] Area 1 [2] Area 2 [3] Area 3 [4] Area 4 [5] Area 5 [6] Done Enter the number(s):
When the area result is the player doesn't have enough money to upgrade	Can't you tell how poor you are? Go vending your hotdogs instead of thinking about self-improvement!
When the area result is the player cannot make hotdogs faster	Do you want to travel through time? GO WORK!!
When the area result is the player choose to improve cooking speed	You glimpse the secret of wind. Your hands can move faster now.
When the area result is the player choose to improve the taste of hotdogs	You feel the soul of the ingredients. Your hotdogs are more appetizing now.
When the area result is the player vending hotdogs	You make %d hotdogs here! You earn $%d!
Ask the user to decide whether to continue the game	Do you want to continue or exit? [1] Continue [2] Exit Enter the number(s):
Entering the lottery	You get one free choice.
Choosing grid	You can choose [number on cell] to open (- $%d) [0] to continue the game Enter the number(s):
Lack of money for choosing	You have no money!
Choosing prize 1	Fortune, fortune! You get $%d!
Choosing prize 2	You get an extra choice!
Choosing prize 3 ~ 6	Another open on %d!
prize 3 ~ 6 fail to open	Bad Luck :(

Choosing prize 7 ~ 9	`You get a booster!!`
Entering a invalid input	`Invalid input!!!!`
End of game	`We will miss you. Bye!`