Computer Programming Ⅰ (COSE101)

Project 2. 2048 Tetris

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Computer Programming Project 2

- Write a program “2048 Tetris”
- What is the program “2048 Tetris” ?

Environment

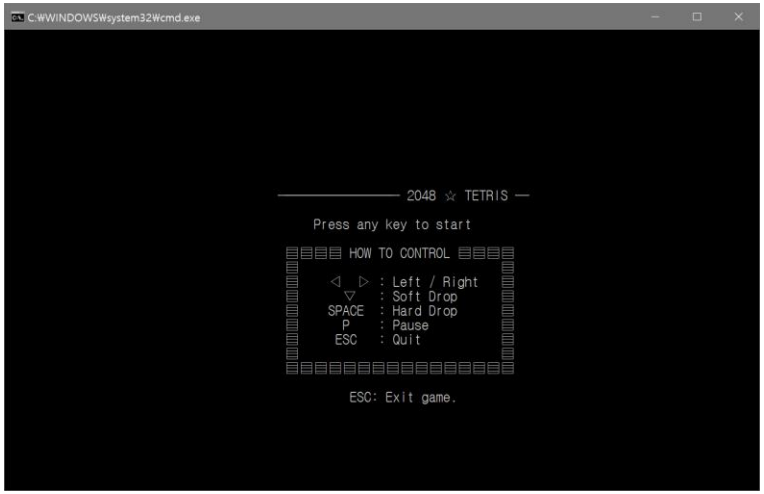
- Windows 10
- Visual Studio 2017
- Programming language: C (C++ will not be allowed.)

2048 Tetris

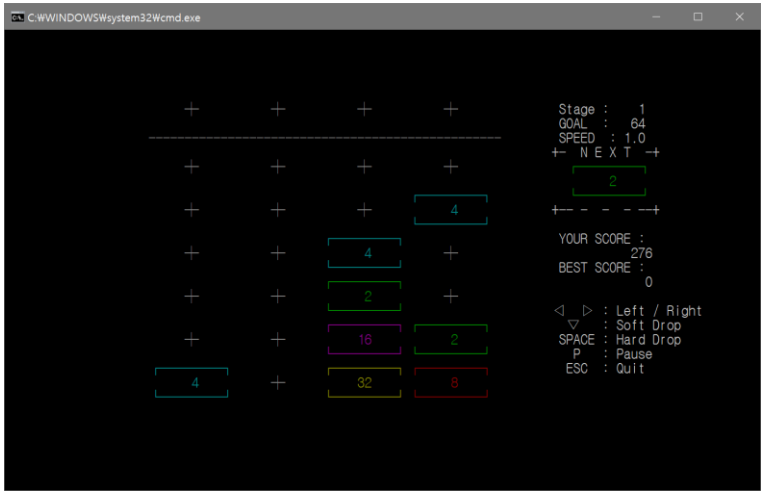
- 2048 Tetris is a block-matching puzzle game.

- Each of blocks has own number.
- Merge 2 blocks with same value to double the number of blocks.
- Goal of each stage is reaching to the certain number.
- Try to reach up ‘2048’ in the final stage.

Game Screenshot



Main menu



Game play screen

New block

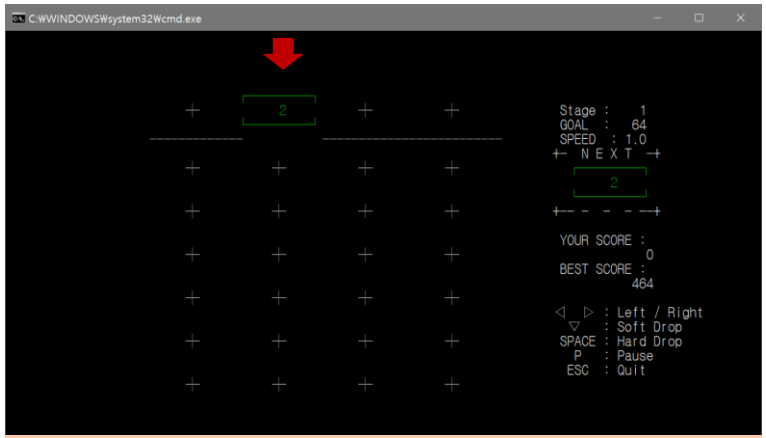
- New block should be created, and starts falling down from **the top of game screen**.
- The horizontal coordinate of the each new blocks should be **random**.
- The new block has **one of the following numbers with the associated probability.**
  - 2 for 50%
  - 4 for 30%
  - 8 for 20%
- If the block cannot fall down anymore, a next block should be created, and starts falling down from the top of the screen.

Block control

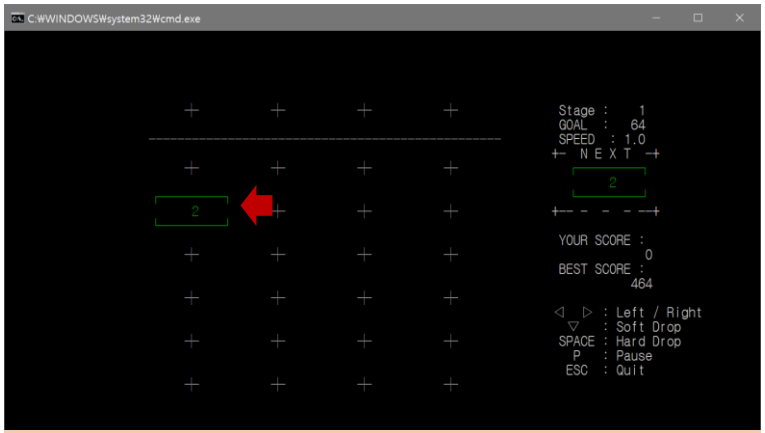
- While the block is falling, the player can move the block to **down, left, or right with each corresponding direction keys from the keyboard**.
  - But cannot move anymore after the block reaches the bottom or other blocks below.

- The player can **‘Hard drop’** the block right away with **‘Space bar’**, to the bottom.

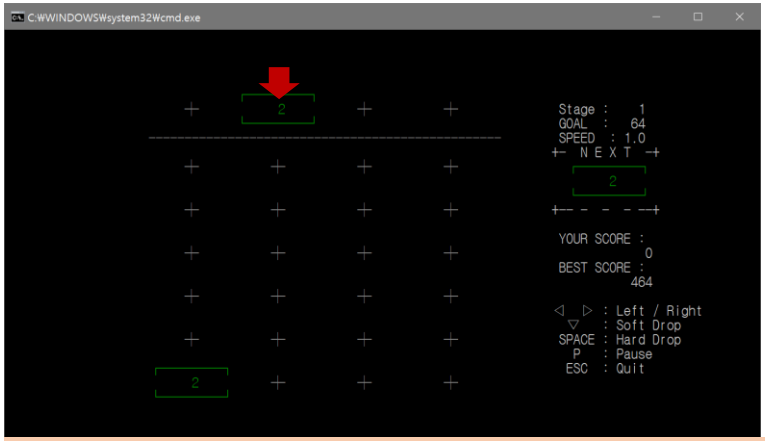
Game Screenshot

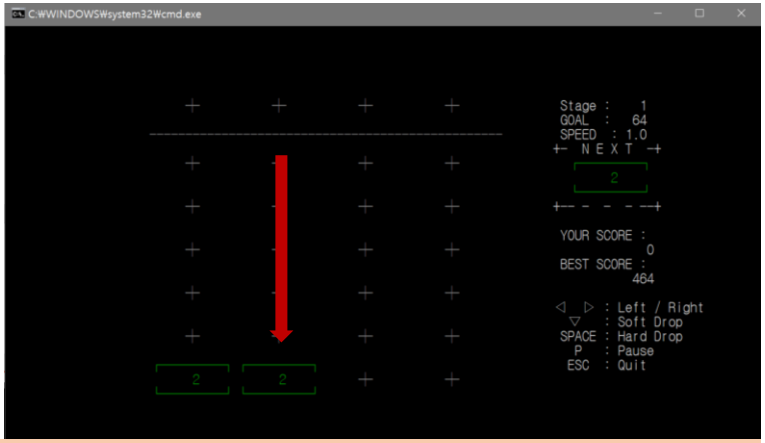


New Block is created
from top of game screen



The player can move
the block to down, left, or right



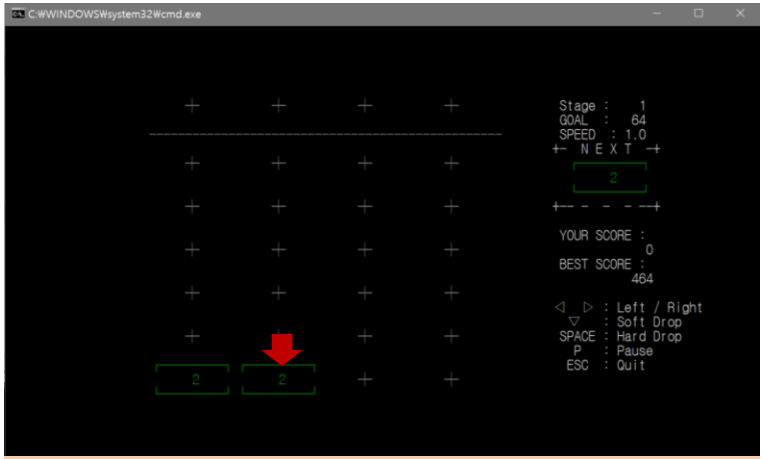


The player can Hard drop the block

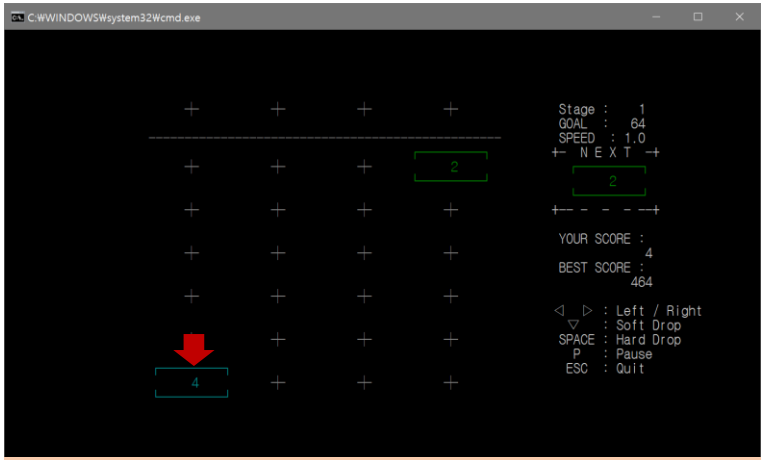
Merging blocks

- When the falling block reached the bottom or other blocks below, find out if any of surrounding blocks can be merged.
  - Two adjacent (either vertical or horizontal) blocks can be merged if they have the same values.
  - Only two blocks can be merged at once.
  - If multiple adjacent blocks have the same values, vertical merging has higher priority than horizontal merging.
  - For the horizontal merging, if both the left and right blocks have the same values, left-side merging has higher priority.
  - In either case, the previously existing block is doubled, and the current block is deleted.
- Merging must be happened in a row.
  - The merged block must check surrounding blocks if there are any other blocks that can be merged again with it.

Game Screenshot



If two adjacent blocks have same value,



It can be merged.

Stages

- The game has 10 stages with different goal number and block speed.

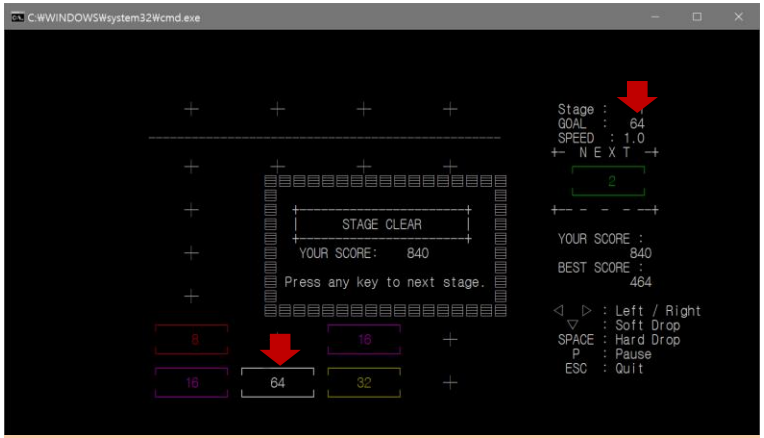
Stage	Goal number	Block speed
1	64	1 (Initial speed)
2	128	1.3 times of initial speed.
3	128	1.5 times of initial speed.
4	256	1.7 times of initial speed.
5	256	2 times of initial speed.
6	512	2.5 times of initial speed.
7	512	3 times of initial speed.
8	1024	4 times of initial speed.
9	1024	5 times of initial speed.
10	2048	7 times of initial speed.

Stages

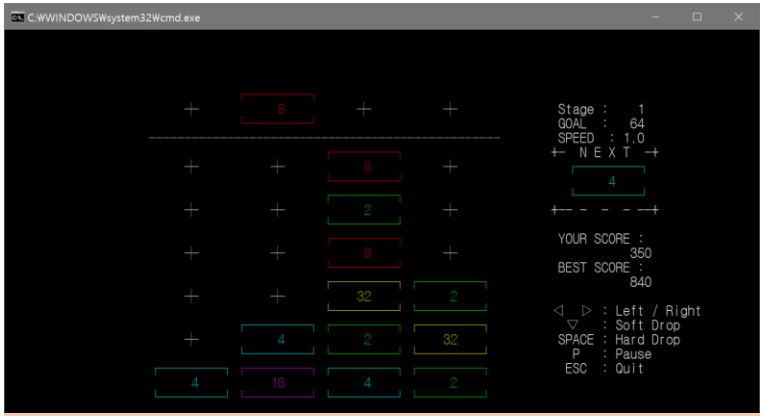
- Player wins the stage when having a block with goal number.
- Player wins the game when cleared all stages.

- Player loses game when blocks reach up to the top of the game screen.

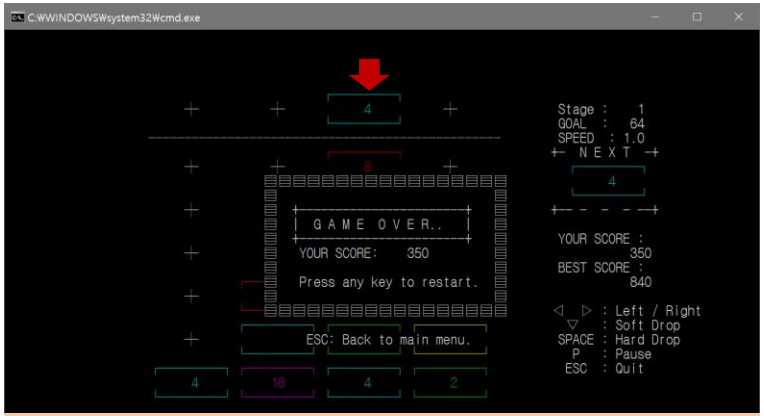
Game Screenshot



Player wins the stage when having a block with goal number.



When block reach up to the top



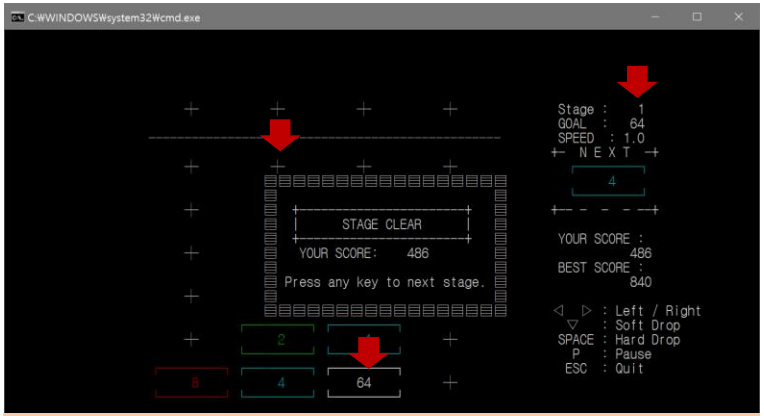
Player loses the game

Stages

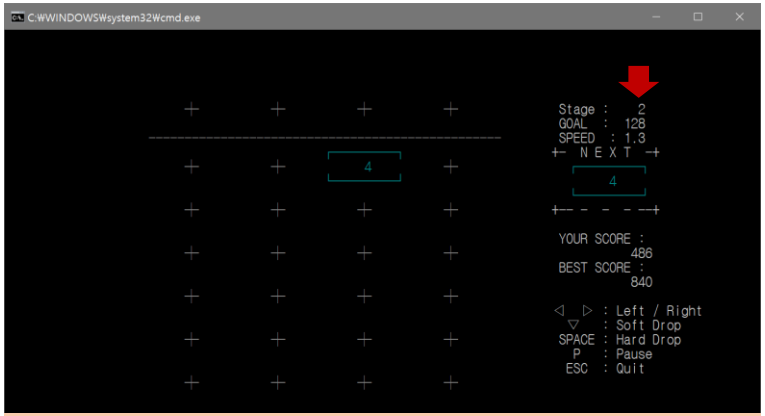
- The player must complete the previous stage to move to the next stage.

- Each time the player moves on to next stages, **corresponding values of goal number and block speed need to be reset with cleaned game screen**.

Game Screenshot



Complete the stage

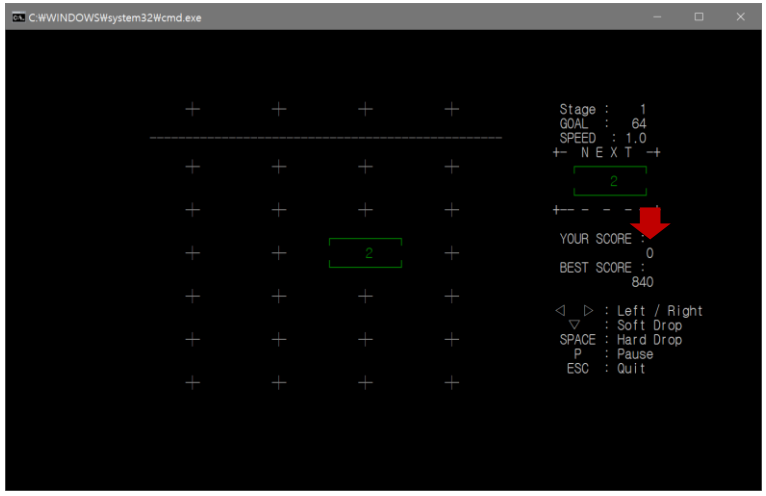


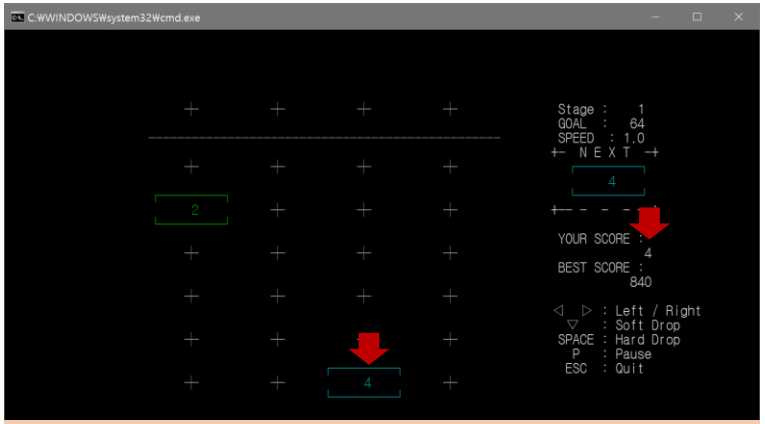
For moving to the next stage.

Score

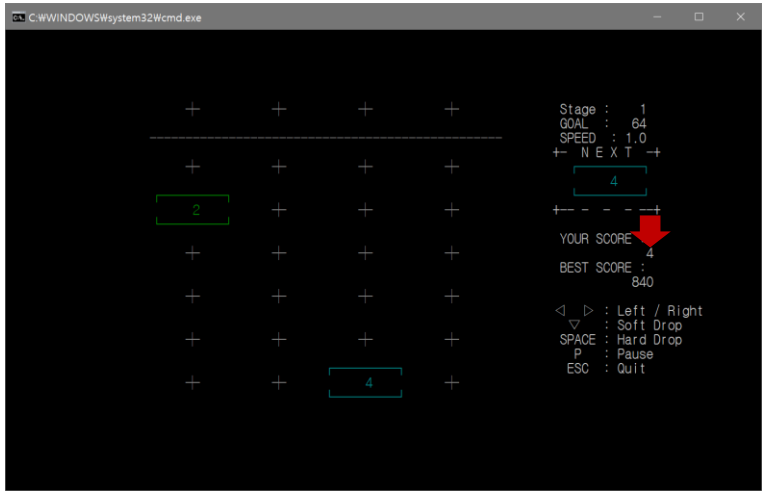
- In addition to the stage, there is **a scoring system**.
  - Each time the blocks are merged, player gets the same points as the number of the merged block.
  - When **‘Hard drop’** the block, player gets 10 points as a bonus score.
- Score will be accumulated after the player clears each stage.
  - The score is reset when the game ends.
- The highest score is displayed until the program ends.

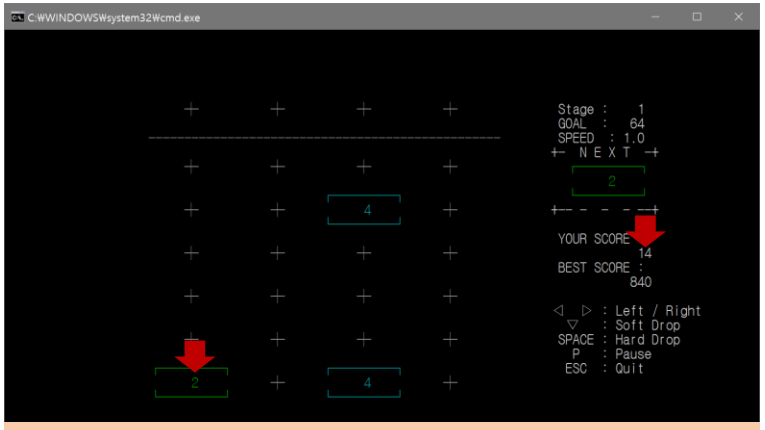
Game Screenshot





The score is increased by corresponding number to the merged block.





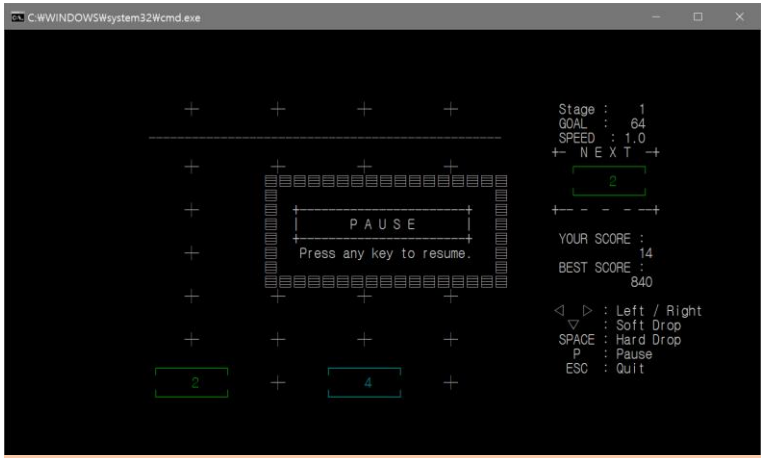
When Hard drop the block,
10 points are increased.

Function key

- Player can ‘Pause’ game with pressing ‘p’ key from keyboard and resume by pressing ‘p’ again.
- Player can go back to ‘Main menu’ by pressing ‘Esc’ key from keyboard while playing game.
- Player can ‘Exit game’ by pressing ‘Esc’ key from keyboard in the main menu.

Game Sreentshot

Player can go back to “Main menu” by pressing ‘Esc’



Player can pause by pressing ‘p’

Note

- Use given sample code to complete your project.
  - You can add or modify the specified area in the given sample code as you want.

- You may watch provided 2 demo videos from the link below for your further understanding.

  Demo videos: https://bit.ly/2LqX5NM

- Exceptions need to be well handled including invalid inputs.

Submission Format

- Submit a file “Student ID_prj2.zip”
  - Source File “Student ID_prj2.c”
  - Several Screenshots “screenshot #”
    - Game screens
    - Result screens of function keys
    - The first stage clear screen

- BlackBoard (kulms.korea.ac.kr)

Submission Due Date

- Dead line: 23:59, June 14, 2018
- Please try to submit little bit earlier than dead line against possible errors from the blackboard.
- No cheating is allowed.
- If any cheating (e.g., sharing the code) is found, all students involved in the cheating will get 0 point without exception.