

# Project Multitris

Group 23

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## 6. Functional test cases

Below are test cases ordered by the functionality requirement covered. Each test case corresponds to the requirement with the same number in the Requirements Document.

### 6.1.1. Game properties

#### #1 Game pieces

Requirement: There shall be seven different pieces which can be placed. Each piece consists of four parts called bricks.

Input: Controller input

Output: Visible effect; seven different game pieces shown

Step-by-step procedure:

1. Select "Singleplayer" from the main menu.
2. Move the first piece that falls down to the leftmost part of the board.
3. For the next six pieces, verify that each piece is visibly different from the all previous pieces.

#### #2 Boundaries

Requirement: There shall be boundaries that restricts piece movement. Specifically, there is the top, lower and side boundaries. No piece may pass any boundary other than the top one.

Input: Controller input

Output: Visible effect; the piece cannot be moved outside the boundaries

Step-by-step procedure:

1. Select "Sinleplayer" from the main menu.
2. Move the first piece that falls down to the leftmost part of the board and verify that it can go no further.
3. Move the second piece that falls down to the rightmost part of the board and verify that it can go no further.
4. Let the third piece fall to the ground, and verify that it gets fixed to the bottom of the board.

#### #3 Falling pieces

Requirement: Any piece controlled by a player shall move downward with a given speed, that is increased when a piece gets fixated.

Input: Controller input

Output: Visible effect; a piece will have a downward speed that increases as the game progresses

Step-by-step procedure:

1. Select "Singleplayer" from the main menu.
2. Verify that a piece is shown at the top of the board, and that it has a downwards speed.
3. Fixate the first piece to the board.
4. Verify that the speed increases (there may not be noticeable effect after only one piece was fixated, so fixate 10 pieces before measuring the speed again).

#### #4 Score

Requirement: The system shall keep and display a total score that is altered when pieces are fixated or pieces collide.

Input: Controller input

Output: Visible effect; the score meter will increase when a row is removed

Step-by-step procedure:

1. Select "Singleplayer" from the main menu.
2. Fixate pieces so that a complete row is formed.
3. Verify that the score is increased.
4. Enter the main menu, and select "Host game".
5. Start the game and have somebody join it.
6. Launch the game session.
7. Move the two player-controlled pieces together.
8. Keep trying to move the pieces into each other for one second.

9. Verify that the pieces are destroyed and the score decreased.

#### **#5 Get help**

Requirement: The system shall provide a manual for the user. The manual shall describe how to start, stop and play a game session, as well as how to navigate pieces.

Input: Controller input

Output: The game displays the help documentation

Step-by-step procedure:

1. Select "Help" from the main menu.
2. Verify that said points (start, stop, playing a game session, navigating pieces) are included in the help documentation.

#### **#6 Menu system**

Requirement: The system shall allow the user to choose from one of the following options through a menu system: Singleplayer, Host game, Join game, Help, Exit game.

Input: Controller input

Output: Visible effects; different screens are shown depending on user input.

Step-by-step procedure:

1. Select "Host game" from the main menu.
2. Verify that the host game screen is shown.
3. Go back to the main menu.
4. Select "Join game" from the main menu.
5. Verify that the join game screen is shown.
6. Go back to the main menu.
7. Select "Singleplayer" from the main menu.
8. Verify that a game session is started.
9. Go back to the main menu.
10. Select "Help" from the main menu.
11. Verify that the help screen is shown.
12. Go back to the main menu.
13. Select "Exit" from the main menu.
14. Verify that the application was shut down.

### *6.1.2. Game sessions*

#### **#7 Start singleplayer game session**

Requirement: The player shall be able to start a singleplayer game session.

Input: Controller input

Output: A game session is started

Step-by-step procedure:

1. Select "Singleplayer" from the main menu.
2. Verify that a game session starts (the board is shown).

#### **#8 Host multiplayer game**

Requirement: The system shall allow a user to start a game that other users are able to join.

Input: Controller input.

Output: A multiplayer game session is started

Step-by-step procedure:

1. Select "Host game" from the main menu.
2. Enter name and number of players as appropriate. Do not check the "Private game" checkbox.
3. Start the game.
4. Have somebody launch the client, select "Join game" from the main menu, find the game in the game list, and enter it.
5. Verify that the player is shown in the player list.
6. Launch the multiplayer game session.
7. Verify that a multiplayer game session was started.

### **#9 Host private game**

**Requirement:** The user shall be able to host a private network game. This should be the same as hosting a standard network game, except that the game will not show up in the game list for other users. However, the central server should still keep track of the game to allow the desired users to join it by entering its name.

**Input:** Controller input

**Output:** A multiplayer game session is started.

**Step-by-step procedure:**

1. Select "Host game" from the main menu.
2. Enter name and number of players as appropriate. Check the "Private game" checkbox.
3. Start the game.
4. Have somebody launch the client, select "Join game" from the main menu, and input the game name.
5. Verify that the player is shown in the player list.
6. Launch the multiplayer game session.
7. Verify that a multiplayer game session was started.

### **#10 Join multiplayer game**

**Requirement:** The system shall allow users to join previously hosted games.

**Input:** Controller input

**Output:** A multiplayer game was joined.

**Step-by-step procedure:**

1. Have somebody launch the client and host a game with a given name.
2. Select "Join game" from the main menu.
3. Enter the game name.
4. Verify that the player lobby is shown.

Test: Letting another user start a network game session and joining it.

### **#11 Chat with other users**

**Requirement:** The user shall be able to chat with other users when in a game. At any time during a game, a user should be able to send a message that will be displayed to all participating users.

**Input:** Controller input

**Output:** A message is received.

**Step-by-step procedure:**

1. Select "Host game" from the main menu.
2. Enter name and number of players as appropriate. Do not check the "Private game" checkbox.
3. Start the game.
4. Have somebody launch the client, select "Join game" from the main menu, find the game in the game list, and enter it.
5. Launch the multiplayer game session.
6. Press the "Chat" controller key, enter a chat message, and then press the "Chat" controller key again.
7. Verify that the other user receives the message.
8. Have the other user write a message and send it.
9. Verify that you receive a message.

## **6.1.3. Piece movement**

### **#12 Move piece vertically**

**Requirement:** The user shall be able to increase the downward speed of the current piece by a constant factor.

Test: Starting a game session and making sure the piece can be accelerated downwards.

**Input:** Controller input

**Output:** Visible effect; the piece is accelerated downward

**Step-by-step procedure:**

1. Select "Singleplayer" from the main menu.
2. Press the "Down" controller key to accelerate the piece.
3. Verify that the piece's downward speed increases.

### **#13 Move piece horizontally**

**Requirement:** The user shall be able to move the piece horizontally with constant steps.

Input: Controller input

Output: Visible effect; the piece is moved sideways

Step-by-step procedure:

1. Select "Singleplayer" from the main menu.
2. Press the "Left" controller key to move the piece to the left.
3. Verify that the piece is moved to the left.
4. Press the "Right" controller key to move the piece to the right.
5. Verify that the piece is moved to the right.

#### **#14 Rotate piece**

Requirement: The user shall be able to rotate the piece he controls, either clockwise or counter-clockwise.

Input: Controller key

Output: Visible effect; the piece is rotated

Step-by-step procedure:

1. Select "Singleplayer" from the main menu.
2. Press the "Rotate clockwise" controller key to rotate the piece clockwise.
3. Verify that the piece is rotated clockwise.
4. Press the "Rotate counter-clockwise" controller key to rotate the piece counter-clockwise.
5. Verify that the piece is rotated counter-clockwise.

#### **#15 Collide with other player-controlled bricks**

Requirement: Two non-fixed bricks that collide shall either be removed or moved apart. If they are removed, each player shall gain a new piece and a fixed score shall be subtracted from the total score.

Input: Controller input

Output: Visible effect; the pieces are removed or moved apart

Step-by-step procedure:

1. Select "Host game" from the main menu.
2. Enter name and number of players as appropriate. Do not check the "Private game" checkbox.
3. Start the game.
4. Have somebody launch the client, select "Join game" from the main menu, find the game in the game list, and enter it.
5. Launch the multiplayer game session.
6. Move the two player-controlled pieces together.
7. Keep trying to move the pieces into each other for one second.
8. Verify that the pieces are removed.
9. Verify that the score decreases.
10. Verify that each player receives a new piece.
11. Move the new player-controlled pieces together.
12. Move the pieces apart before one second has passed.
13. Verify that the pieces are moved apart.

### *6.1.4. Brick placement*

#### **#16 Piece control**

Requirement: When game session starts the user shall receive a brick to control. After a brick has been fixated the user shall receive a new brick.

Input: Controller input

Output: Visible effect; a piece is shown at the top of the board

Step-by-step procedure:

1. Select "Singleplayer" from the main menu.
2. Verify that a piece is shown.
3. Press the "Drop" controller key to fixate the piece.
4. Verify that the piece was fixated.
5. Verify that a new piece is shown.

#### **#17 Fixate piece**

Requirement: When the vertical movement is obstructed by a fixated piece or the lower boundary, the piece shall stop moving and be taken out of player control.

Input: Controller input

Output: A piece stops moving and is no longer controlled by the player

Step-by-step procedure:

1. Select "Singleplayer" from the main menu.
2. Press the "Drop" controller key to fixate the piece.
3. Verify that the piece is no longer moving.
4. Press the "Left" controller key to try moving the fixated piece left.
5. Verify that the piece was not moved.
6. Verify that the new piece was moved instead.

#### **#18 Remove row**

Requirement: Complete brick rows reaching between the two side boundaries shall be removed and points shall be added to the total score.

Input: Controller input

Output: Visible effect; the completed remove is removed and all bricks above the removed row are moved downwards.

Step-by-step procedure:

1. Select "Singleplayer" from the main menu.
2. Move pieces so that a complete row is formed.
3. Verify that the row is removed.
4. Verify that the score is increased.
5. Verify that all bricks above the removed row are moved downwards.

#### **#19 Finishing a game session**

Requirement: When a piece gets fixated above the top boundary, the game session shall be terminated and the total score presented to the user. In a multiplayer game session, all participating players shall be presented with the total score.

Input: Controller input

Output: Visible effect; the game over screen is shown

Step-by-step procedure:

1. Select "Host game" from the main menu.
2. Enter name and number of players as appropriate. Do not check the "Private game" checkbox.
3. Start the game.
4. Have somebody launch the client, select "Join game" from the main menu, find the game in the game list, and enter it.
5. Launch the multiplayer game session.
6. Press the "Drop" controller key to fixate each piece shown until a piece gets fixated above the top boundary.
7. Verify that the game session is terminated.
8. Verify that the total score is shown to both participating players.

### *6.1.5. Powerups*

#### **#20 Obtain powerup**

Requirement: The user shall be able to obtain powerups contained in completed rows.

Input: Controller input

Output: Visible effect; the obtained powerup is shown in the powerup list

Step-by-step procedure:

1. Select "Singleplayer" from the main menu.
2. Move pieces so that a complete row is formed, with at least one brick still on the board. One brick will then be changed into a powerup brick.
3. Move pieces so that the row containing the powerup is completed.
4. Verify that the powerup is shown in the powerup list.

#### **#21 Create powerup**

Requirement: When a row is removed, a random brick on the game board shall be replaced with a powerup brick. If there are no bricks on the game board, nothing happens.

Input: Controller input

Output: Visible effect; one brick is changed into a powerup.

Step-by-step procedure:

1. Select “Singleplayer” from the main menu.
2. Move pieces so that a complete row is formed, with at least one brick still on the board.
3. Verify that one brick is changed into a powerup brick.

## #22 Use powerup

Requirement: At any time during a game session, the player shall be able to activate a powerup that he has obtained. This will affect gameplay or the game board. A list of powerups with corresponding effects is given in Table 1.

Input: Controller input

Output: Visible effect, as described in table 1 below.

Step-by-step procedure:

1. Select “Singleplayer” from the main menu.
2. Move pieces so that a complete row is formed, with at least one brick still on the board. One brick will then be changed into a powerup brick.
3. Move pieces so that the row containing the powerup is completed. This powerup will be shown in the powerup list.
4. Press the corresponding “Use powerup” controller key to use the powerup.
5. Verify that the powerup affects the game according to Table 1.

*Table 1.*

<b>Powerup</b>	<b>Effect</b>
Clear row	Removes all bricks in the bottom row from the game board.
Clear partial row	Removes all bricks in a given part of the bottom row from the game board.
Clear field	Removes all bricks on the game board.
Mirror flip	Allows the player to flip pieces horizontally.
Gravity	Pulls all bricks on the board as far down as possible, which removes any gaps.
No gravity	Removes gravity for the current piece, removing its falling speed.
Foresight	Shows upcoming pieces to the player.