DO-178c Requirements

Requirements for a simple Snake game translated and adapted from the EPITA paper by Florent Carrez, Alice Goudout and Raphaël Treglia:

[AdaSnake/rapport\_ADA.pdf at main · DarkMiMolle/AdaSnake · GitHub](https://github.com/DarkMiMolle/AdaSnake/blob/main/rapport_ADA.pdf)

# High Level Requirements (HLR)

1. **Win**  
   When the snake fills the entire playground, the game stops and the player wins. The score is displayed.
2. **Loose**When the player looses, the game stops and announces “Game over” together with the score
3. **Terrain display**  
   The borders of the terrain, defining the authorized playground, are displayed correctly.
4. **Food token display**  
   Food tokens are always accessible by the snake.
5. **Snake position**  
   The Snake always stays inside the defined playground
6. **Food tokens consumption**When the snake head reaches a token, this one disappears
7. **Score increase**  
   When the snake head reaches a token, the score increases
8. **Snake size increase**  
   When the snake head reaches a token, the snake length grows by one cell
9. **Keys**  
   When the player uses the arrow keys, the snake moves in the corresponding directions
10. **Body positioning**  
    The positioning of the body of the snake is valid according to standard snake game rules.

# Low Level Requirements (LLR)

* **1.1 Maximum size**  
  The maximum snake length is properly defined.
* **1.2 Game over**  
  When the game ends, the game status is “Game Over”.
* **2.1 Collision**  
  A collision stops the game.
* **3.1 Terrain display**  
  The playground walls are represented by squares
* **4.1 Food token display**  
  The food tokens are displayed at calculated positions
* **4.2 Food token positioning**  
  The position of the food tokens is randomized
* **5.1 Snake display**  
  The snake is properly displayed
* **7.1 Score increase**  
  The score and the length of the snake are increased simultaneously
* **8.1 Snake growth**  
  When a food token is eaton, The length of the array representing the snake’s body is increased by one unit.
* **9.1 Possibility to move around**  
  A keyboard input defines the motion direction towards the next cell.

# Tracking between HLR and LLR

|  |  |
| --- | --- |
| HLR | LLR |
| REQ.1 Win | REQ 1.1 Max size  REQ 1.2 Game over |
| REQ.2 Loose | REQ 2.1 Collision |
| REQ.3 Terrain display | REQ 3.1 Terrain Display |
| REQ.4 Food token display | REQ 4.1 Token display  REQ 4.2 Token position |
| REQ.5 Snake position | REQ 5.1 Snake display |
| REQ.7 Score increase | REQ 7.1 Score increase |
| REQ.8 Snake size increase | REQ 8.1 Snake growth |
| REQ.9 Keys | REQ 9.1 Possibility to move around |

# Testing HLR and LLR

## Testing HLR

* **TC.1.1 Screen filling**  
  The snake can fill the whole playground
* **TC.1.2 Display**  
  The score is displayed when the game is over
* **TC.2.1 Wall collision**  
  A wall collision ends the game
* **TC.2.2 Body self-collision**  
  The snake colliding with its own body ends the game
* **TC.3.1 Terrain**  
  The terrain remains correctly displayed at all time
* **TC.4.1 Food token position**  
  The token position remains inside the playground area
* **TC.5.1 Snake position**  
  All the positions of the snake head shall remain exactly inside the playground area
* **TC.6.1 Food token removal**  
  The symbol representing the food token disappears after the snake head reaches it.
* **TC.6.2 Passing by a previous token position**  
  When the head of the snake reaches again the cell of a previous (eaten) food token, nothing happens: no score increase, no body growth
* **TC.7.1 Score increase**  
  When the snake head reaches a token, the score shall increase by one
* **TC.8.1 Growth**  
  When a token is eaten, N+1 body cells are displayed
* **TC.9.1 Up**  
  the “arrow up” key orders the snake to move up
* **TC.9.2 Down**  
  the “arrow down” key orders the snake to move down
* **TC.9.3 Right**  
  the “arrow right” key orders the snake to move right
* **TC.9.4 Left**  
  the “arrow left” key orders the snake to move left
* **TC.9.5 Pause**  
  the “p” key pauses the game
* **TC.9.6 Exit**  
  the “Esc” key exits the game
* **TC.10.1 Positioning after a move**  
  The N cells of the snake body fill the last N positions of the snake head

## Testing LLR

* **TC.1.1.1 Max size**  
  Verify that the maximum body size is (playground height) x ( playground width)
* **TC.1.2.1 Game over**  
  Verify that game status turns to game over
* **TC.2.1.1 Self collision**  
  Verify that game status turns to game over
* **TC.2.1.2 Wall collision**  
  Verify that game status turns to game over
* **TC.3.1.1 Terrain**  
  Verify that the terrain displays a rectangle of size (playground height) x ( playground width)
* **TC.4.1.1 Matching display with coordinates**

Verify that the display of food tokens matches the food token coordinates

* **TC.4.2.1 Valid coordinates**  
  Verify that food tokens coordinates remain inside the playground
* **TC.5.1.1 Body cells**  
  Verify that the snake size corresponds to (starting size) + (eaten food tokens)
* **TC.5.1.2 Positioning**  
  Verify that the position of each body cell is valid
* **TC.7.1.1 Score**  
  Verify that the score corresponds to the number of extra body cells
* **TC.8.1.1 Growth**  
  Verify that, upon reaching a food token, (previous snake length) + 1 = (current snake length)
* **TC.9.1.1 Moving and Loosing the game**  
  Verify that the next move required by the player is possible before moving the snake

# Tracking between requirements and test cases

## Tracking HLR / Test cases

|  |  |
| --- | --- |
| HLR | Test cases |
| REQ.1 Win | TC.1.1 Screen filling  TC.1.2 Display |
| REQ.2 Loose | TC.2.1 Wall collision  TC.2.2 Body self-collision |
| REQ.3 Terrain display | TC.3.1 Terrain |
| REQ.4 Food token display | TC.4.1 Food token position |
| REQ.5 Snake position | TC.5.1 Snake position |
| REQ.6 Food tokens consumption | TC.6.1 Food token removal  TC.6.2 Passing by a previous token position |
| REQ.7 Score increase | TC.7.1 Score increase |
| REQ.8 Snake size increase | TC.8.1 Growth |
| REQ.9 Keys | TC.9.1 Up  TC.9.2 Down  TC.9.3 Right  TC.9.4 Left  TC.9.5 Pause  TC.9.6 Exit |
| REQ.10 Body positioning | TC.10.1 Positioning after a move |

## Tracking LLR / Test cases

|  |  |
| --- | --- |
| LLR | Test cases |
| REQ.1.1 Maximum size | TC.1.1.1 Max size |
| REQ.1.2 Game over | TC.1.2.1 Game over |
| REQ.2.1 Collision | TC.2.1.1 Self collision  TC.2.1.2 Wall collision |
| REQ.3.1 Terrain display | TC.3.1.1 Terrain |
| REQ.4.1 Food token display | TC.4.1.1 Matching display with coordinates |
| REQ.4.2 Food token positioning | TC.4.2.1 Valid coordinates |
| REQ.5.1 Snake display | TC.5.1.1 Body cells  TC.5.1.2 Positioning |
| REQ.7.1 Score increase | TC.7.1.1 Score |
| REQ.8.1 Snake growth | TC.8.1.1 Growth |
| REQ.9.1 Possibility to move around | TC.9.1.1 Moving and Loosing the game |