

DO-178c Requirements

Requirements for a simple Snake game translated and adapted from the EPITA paper:

[AdaSnake/rapport_ADA.pdf at main · DarkMiMolle/AdaSnake · GitHub](#)

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 loses, 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 eaten, 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