

Centipede, the Java project

We will do a version of Centipede, the classic Atari Arcade game. A general description of the game can be found at [https://en.wikipedia.org/wiki/Centipede_\(video_game\)](https://en.wikipedia.org/wiki/Centipede_(video_game)). Videos of playing the game, etc., can be found using <http://imgtfy.com/?q=centipede+arcade+game>. Watch the game videos before reading what is below to have it make sense.

There will be four kinds of items in our game: mushrooms, spiders, the centipede(s), and the player. They have the following interactions:

The player: The player can move up, down, right and left. If it hits the head of a centipede, it loses a life. If the spider hits it, it loses its life. If the player hits a mushroom, nothing happens, and the player can move through a mushroom as if it doesn't exist. The player defends itself by moving, and by shooting. It has unlimited shots. Movement and shooting should be controlled by the mouse, with player movement following mouse movement, and mouse clicks firing shots. When a player dies, its lives are decremented. If there are lives left, the game is restarted with a new centipede and spider in their starting positions.

Centipedes:

Movement: Centipedes should start at the top right. No mushrooms should be placed in the first row so that the centipede can start there. Centipedes move horizontally unless they hit a mushroom or a wall, in which case they move down one level. Each segment of the centipede follows the segment in front of it, i.e., at each time t , a segment s following a segment $s+1$ will occupy the position that segment $s+1$ occupied at time $t-1$. The centipede should not drop below the top-most line of the *player area* (see the section on Mushroom placement)

Actions when hit: When a centipede section is struck twice, it will die, and the centipede will break into two parts. Each part will act as a separate centipede. Ideally, the back segment will travel in a different direction than the front, but this is not necessary. When all centipedes are killed, with a new centipede starting in the top row.

Attacking the player: If any segment of the centipede hits the player, the player dies.

Mushrooms: When the game is initialized, a collection of mushrooms is placed on the board. Mushrooms do not move. When a mushroom is hit three times by the player, it dies. When the centipede hits a mushroom, nothing happens to the mushroom.

Placement: when placing mushrooms, a mushroom should not be placed where the centipede needs to go, e.g.,

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Mo000000000000 Or Mo000000000000
 M                M M
                M
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would be bad mushroom placement. I would suggest placing mushrooms from the top to the bottom. At each location, based on a random number, try and place a mushroom, checking if it will block off mushrooms above it. Mushrooms should not be placed along the wall.

The likelihood of a mushroom being placed should be controlled by a variable read from a file or input to the program at startup. This is to demonstrate that mushroom placement is done algorithmically and not by reading from a file. This implies that initially you can have a file that guides mushroom placement, sparing you from having to work out the mushroom placement algorithm until the rest of the program works. No mushrooms should be placed in the last few rows of the game, where “few” is enough rows for a centipede to move back and forth and have a player in under it. These last few rows – you can pick the exact number, but it should be large enough that the player can be here and the centipede passes over it, are called the *player area*.

When a player dies, all mushrooms that were hit 1 or 2 times are restored to perfect health for the next player.

Spider: The spider moves around erratically. If it hits the player, the play dies. If the player hits the spider with a shot 2 times, the spider dies. When the player dies and has lives left, and a new player is created, a new spider is also created.

Scoring: A score board should be shown somewhere on the screen. It should show the number of lives and the number of points. Points are awarded as follows:

Player hits a centipede segment: 2 point

Player destroys a centipede segment: 5 points

A mushroom is hit: 1 point

A mushroom is destroyed: 5 points

For each mushroom hit but not destroyed, and restored when the player dies: 10 points

Hitting the spider: 100 points

Killing the spider: 600 points

Completely killing off a centipede: 600 points

Grading:

Game terminates normally: 7.5 points

Displaying lives and the score: 7.5 points

Mushrooms 20 points total

- 5 points for placing automatically, 0 points if a pre-defined layout is used

- 5 points for not dying on the first or second hit, but adding to the score

- 5 points for dying on the third hit

- 5 points for restoring

Spider 15 points total

- 5 points for moving

- 5 points for not dying on the first hit, but adding to the score

- 5 points for dying on the second hit, and scoring points

Centipede 25 points total

- 5 points for moving down when hitting a wall

- 5 points for moving down when hitting a mushrooms

- 5 points for moving correctly when a segment is killed

- 5 points for proper scoring when segments are hit

- 5 points for going back and forth and not going down further when it enters the top of the player area.

The player 25 points total

5 points for movement

5 points for shooting

5 points for a sound when shooting.

5 points for dying if hit by the centipede

5 points for dying if hit by the spider