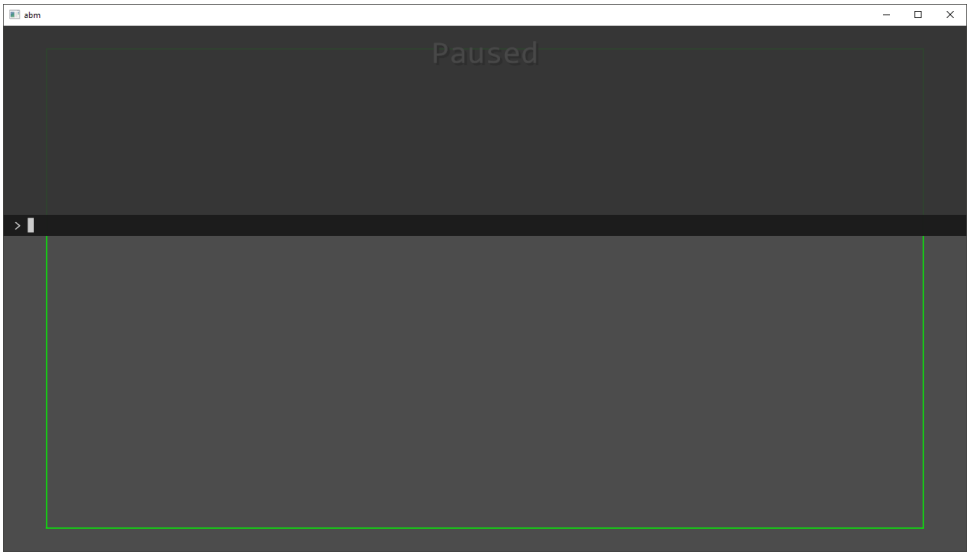
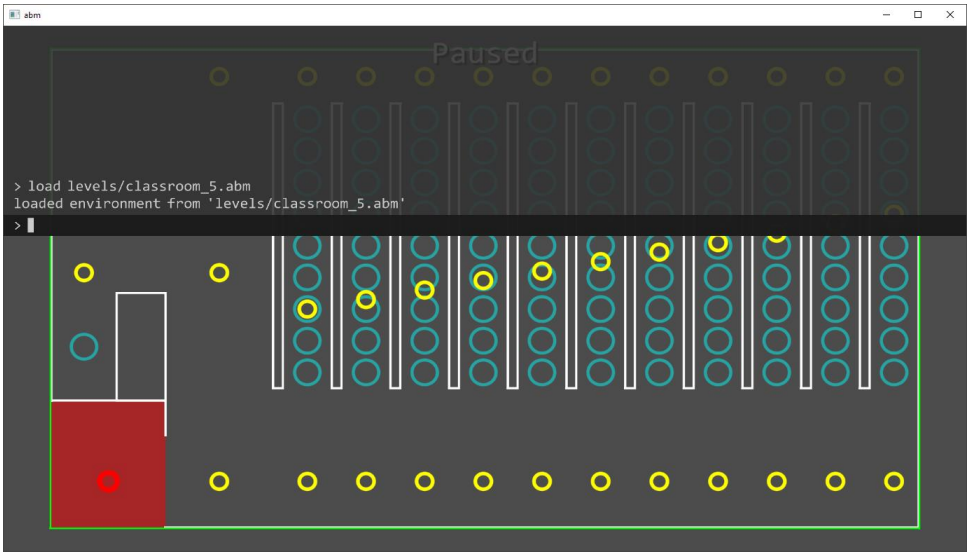
- Run the executable (**abm.exe**) from command line or by double click. An empty simulation window should open:

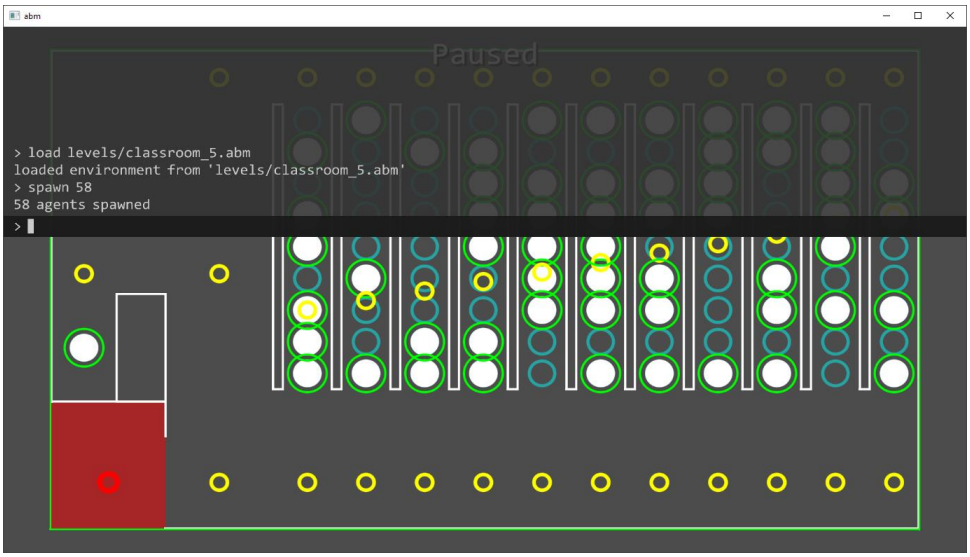
- Press **control + o** to open the console:



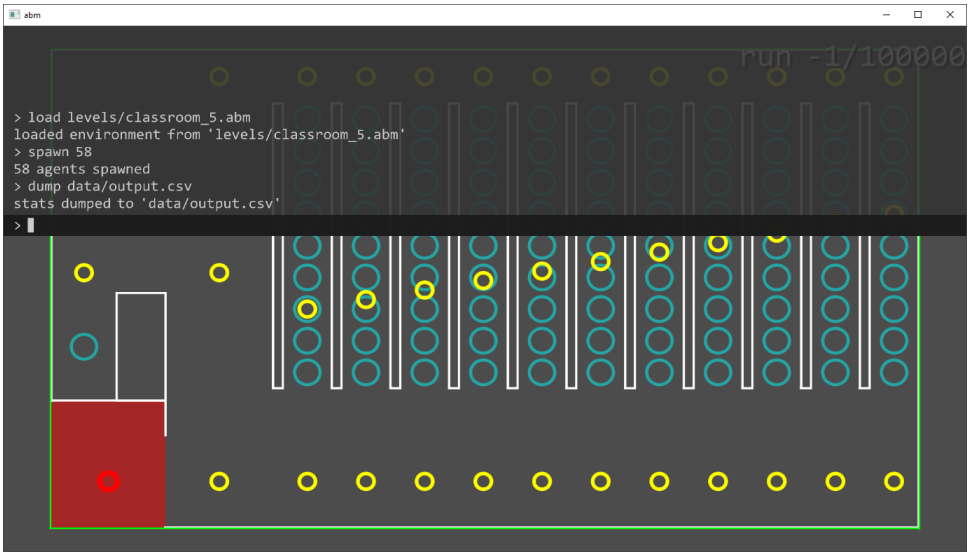
- To load the simulation environment, use the **load** command. We created several environments which can be found in the **levels** directory:



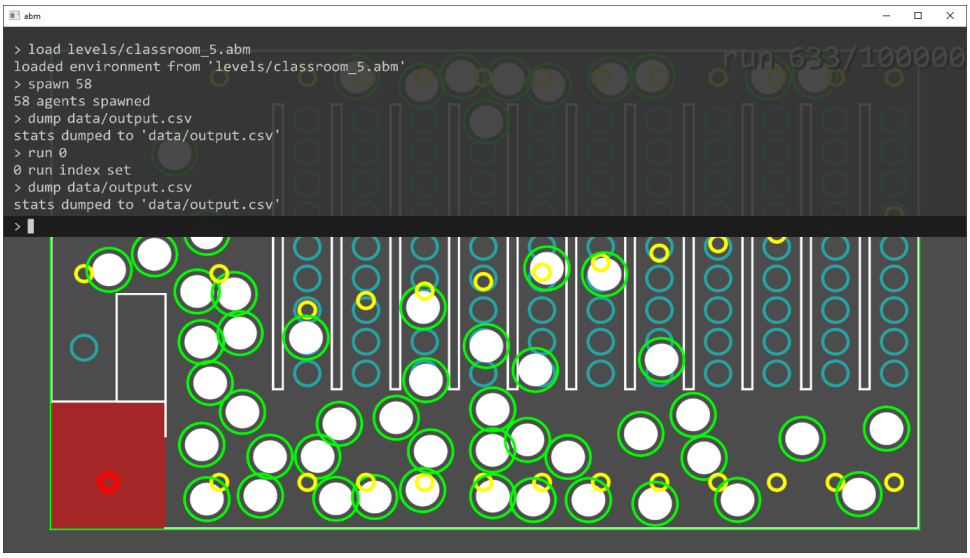
- Cyan circles mark the possible agent positions. To create *n* randomly placed agents, run the **spawn *n*** command:



- Press **control + o** or run the **close** command to close the console. Press **space** to unpause the simulation. The agents will go towards the red point using the yellow ones to build their path. The simulation is executed in real time by default. To toggle the simulated time execution, press **control + i**. In this mode the program runs 50 simulation steps and updates the visualization once. The vertical synchronization gets disabled and the program is executed without waiting for the screen refresh. Once the simulation is over (all the agents left the simulation area or reached one of the targets), you can output the run parameters using the **dump** command. Output contains agent parameters, number of the agents, and the total evacuation time which are stored in a default csv format.

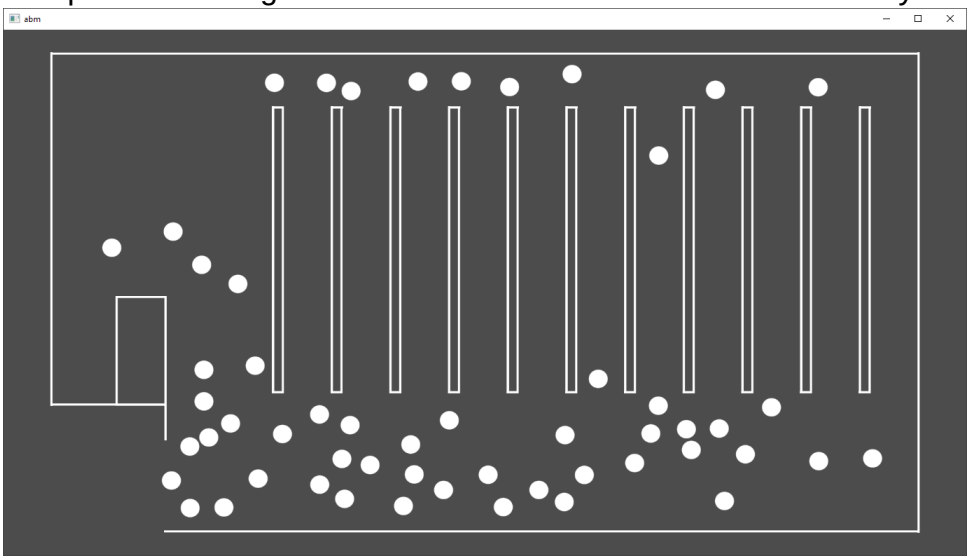


- Currently we do not provide a way to specify the simulation parameters from outside of the program. Instead, the program generates a 100000 random run specifications on launch. To switch to the *n*-th one of these, use the **run *n*** command. After one of the specified runs is selected, the program iterates through all of them until none is left. During the execution, the console remains accessible, and the data can be output at any moment. In addition, when executing the run specifications, the data gets saved automatically to **default_output.csv** after *all* the runs are finished.

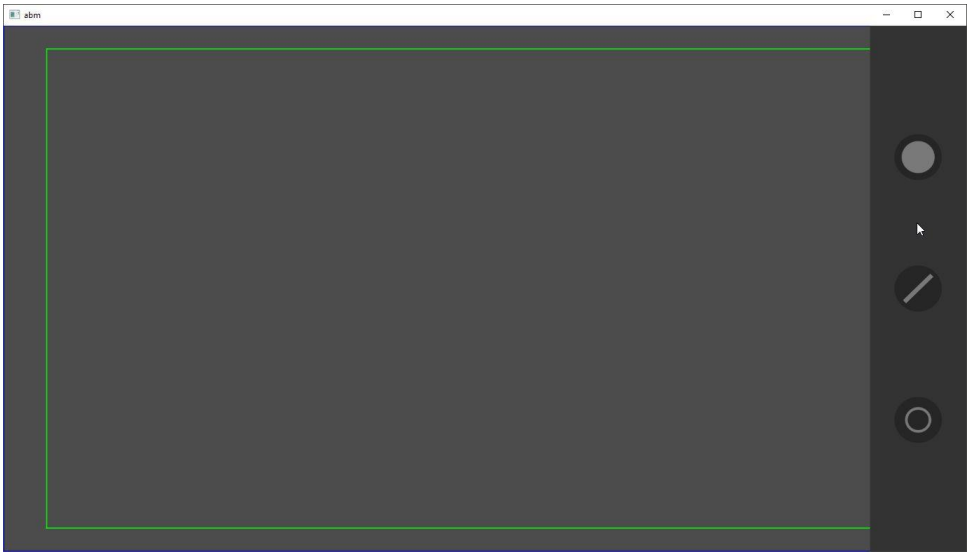


Note: given that the sim parameters are randomized, the simulation will not be showing visually reasonable results most of the time during the execution. It happens because the model is quite sensitive to some of the agent parameters, for instance, the *relaxation_time* parameter affects the speed at which the agents are capable of changing their velocity, and when it's large, the agents can barely control themselves and just bounce around because of agent-to-agent and agent-to-environment interactions.

- Additionally, you can press **w** during the simulation to disable all the unnecessary drawing:

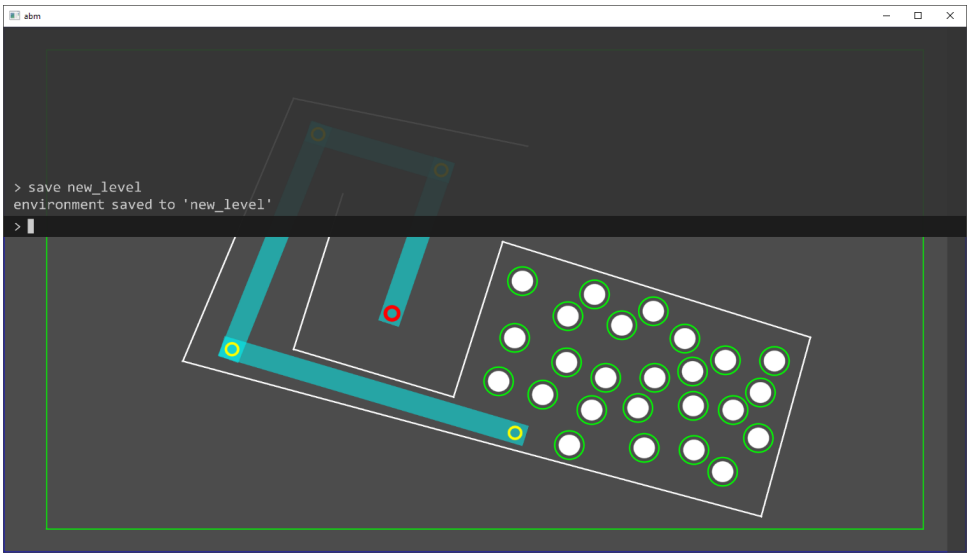


- To reload the last environment and remove the agents, enter the **reload** command. To load an empty simulation, enter the **load_default** command. If you want to build your own environments, there's a simple environment editor. To toggle it on or off, you should press **e**. A small interactive panel will appear on the right side of the window. To interact with it, hover your mouse cursor over it.



- It has three buttons:
  1. Click this button to enter the agent placement mode. When the agent placement mode is enabled, you can place agents by pressing the **left mouse button** inside the simulation area. Hold **shift** to snap to the grid.
  2. Click this button to enter the obstacle placement mode. When the obstacle placement mode is enabled, you can place obstacles by pressing the **left mouse button** inside the simulation area. Line obstacles are automatically chained together. To interrupt the current line, press the **right mouse button**. Hold **shift** to snap to the grid.
  3. Without the waypoints in the simulation region, agents have no aim. Click the third button to enter the waypoint placement mode. When the waypoint placement mode is enabled, you can place waypoints by pressing the **left mouse button** inside the simulation area. By default the *intermediate* waypoints are getting placed. To place a *target* waypoint, hold control and press the **left mouse button**.
     Note: when in the waypoint placement mode, **left mouse button** click on a waypoint allows to change the current shortest path from this waypoint to the *current selected target*.
- When no mode is active (to toggle the active mode off, press the corresponding button again) you can specify the *current selected agent* to visualize their waypoint selection process and the *current selected target* to visualize the paths leading to it (and to have the ability to change them when in the waypoint placement mode) by clicking them with the **left mouse button**.

- If you want to save the environment you created, you can save it by entering the **save** command:



Note: you can see the paths leading to the *current selected target* are being visualized on the screenshot.
Note: editor doesn't have the full supported functionality (positions for random agent placement, obstacles having different shapes, and target areas are currently *not* supported by the editor).