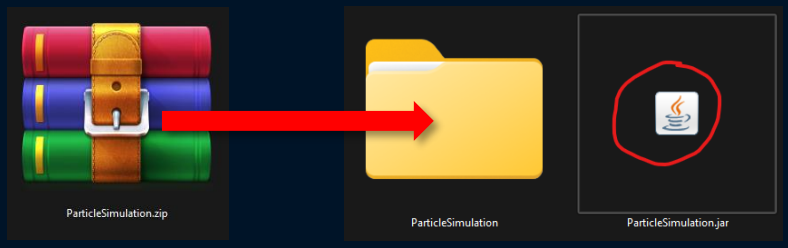
SEPience

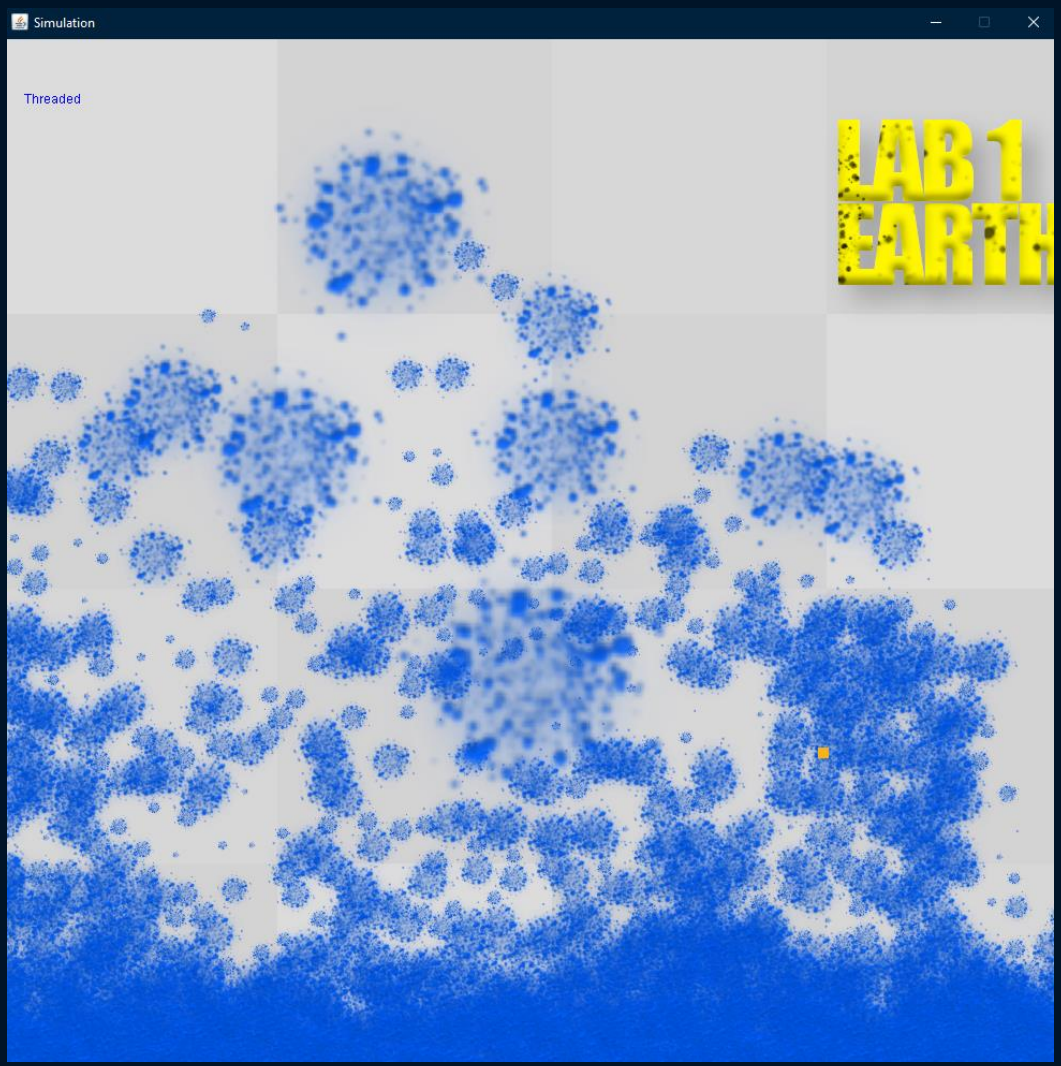
User manual

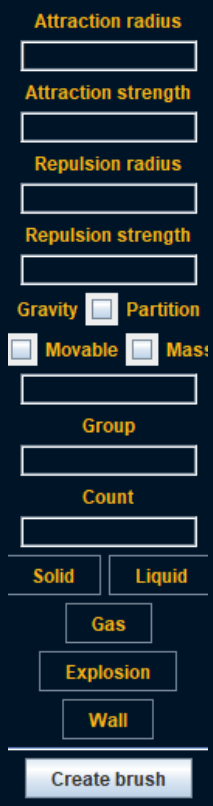
1. Installation

Download the **build.zip** file, then copy it to a directory of your choice and extract it. To execute the program, start the **.jar** file. **Java 8+ is required** in order for the application to run.



2. The brush tool and the eraser tool





The simulation relies heavily on particles, so how do we add the m? Simply select the Brush tool and input your parameters / select a preset:

- *Attraction radius* – the radius of influence of the attraction force
- *Attraction strength* – the strength of the attraction force between the particles
- *Repulsion radius* – the radius of influence of the repulsion force
- *Repulsion strength* – the strength of the repulsion force between the particles
- *Mass* – the mass ("weight") of each particle
- *Group* – the group of the particle.
- *Partition checkbox* – if the particle can be destroyed with the Explosion tool.
- *Gravity checkbox* – if the particle can be affected by gravity.
- *Count* – how many particles using the brush creates at the yellow cursor

The attraction parameters control how strong and how far away the particle is attracted to others, the repulsion parameters – the opposite. Mass also has influence on the effects of these two forces – lighter objects will be affected more than heavier ones.

Group is for visual purposes to separate the particles by color / sprite.

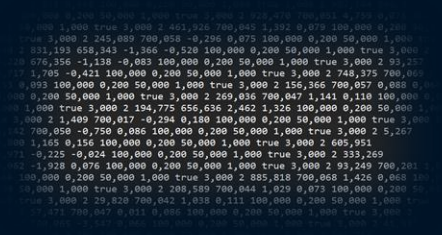
In order to use the **Brush** tool, you have to select it and click on the canvas. The brush will spawn particles that have the same values as the one you just configured in the menu at the location of the yellow cursor. The cursor snaps to a grid of 20x20 pixels, allowing for more precise placement of particles

The configuration step can be skipped entirely by relying on presets. The simulator comes equipped with 5 stock presets – **Solid, Liquid, Gas, Explosion and Wall**. If you want to create custom presets, you can copy one of the preset files (found in **your_directory/ParticleSimulation/config/brushes/preset_X.cfg**) and modify its values using any text editor.

The **Eraser** does the opposite – it deletes the particles that are closest to the yellow cursor. Select the Eraser tool and simply click to remove particles.

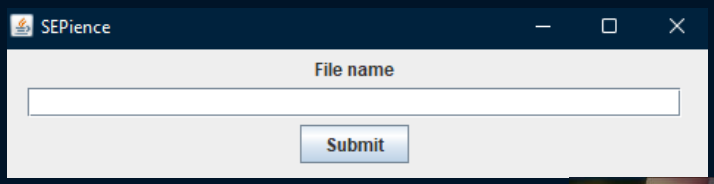
```
preset_title = Wall

attraction_force = 0.1
attraction_radius = 0

repulsion_force = 10
repulsion_radius = 30

mass = 10000

gravity = false
partition = false
movable = false

group = 4
count = 1
```

3. Saving and loading



To save, press the Save button and write a name for your simulation. It'll be automatically saved in **your_folder/ParticleSimulation/data/simulations/simulation_name.pts**. The **.pts** file format stands for *"Particle Time State"*. You can download ones off the internet and put them in your *simulations* folder. Please note, that it saves all the particles, frozen in a single moment of time – new particles, that you add / delete won't appear in the file.

To load a simulation, press the Load button and write the name of the simulation. It's going to be loaded from **your_folder/ParticleSimulation/data/simulations/name.pts.**



4. Labs & themes

Labs are the images that you see in the background. They affect the gravity of the simulation. There are 4 labs by default – *Lab, Moon, Mars, Space*. You can create custom labs by copying the default ones and modifying them. You can find the background configurational files – where you also place your custom ones in the folder specified:

your_folder/ParticleSimulation/config/backgrounds.

However, the background image files are located in a different folder from the configurational files – they're located in

your_folder/ParticleSimulation/assets/backgrounds.

To change the background, press the **Background** button.

You can also change the theme of the application. It consists of 6 themes by default – *Volcanic, Earth, Dark blue, Light, Oceanic, Forest*. Again, you can create your own custom themes by copying and changing values to your liking. To change the theme, you have to write the file name (without the extension) in **your_foler/config/themes/theme.cfg.**

```
theme = dark_blue
```

5. *Miscellaneous tools*

- *Vector tool* – visualizes the velocity of each particle with a small red line.
- *Eye tool* – toggles between particle sprites and small circles.
- *Pressure tool* – displays the pressure at each point in the canvas and the average pressure in the system.
- *Spectrum tool* – visualizes the speed of all particles by coloring them.
- *Skull tool* – toggles multithreading – either 1 or 8 threads that simulate the system. 8 threads – EXPERIMENTAL, but provide better performance.