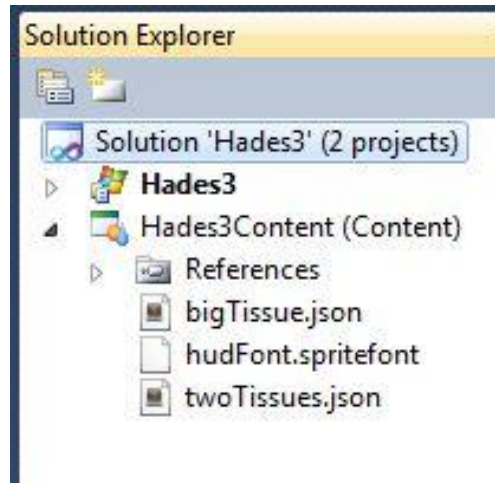


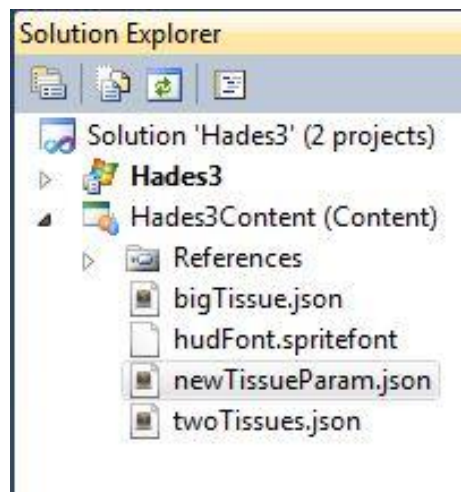
How to use simulation

1. Start Hades3.sln with Visual Studio

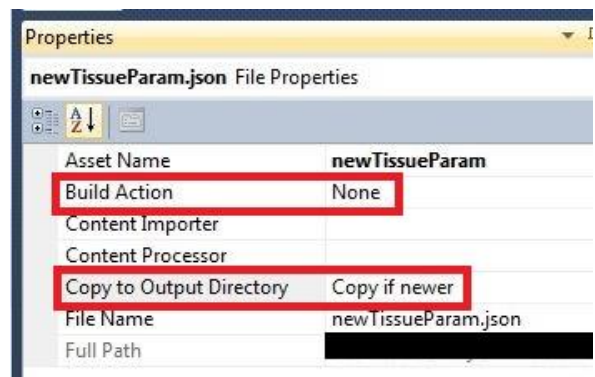
2. Locate the tissue parameters .json files



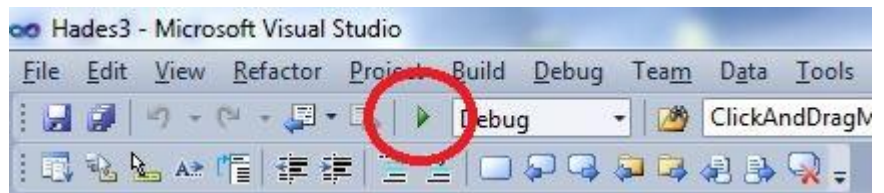
3. Create new tissue parameter to suit your needs



4. Edit Properties of the newly created file to
Build Action: None
Copy to Output Directory: Copy of newer

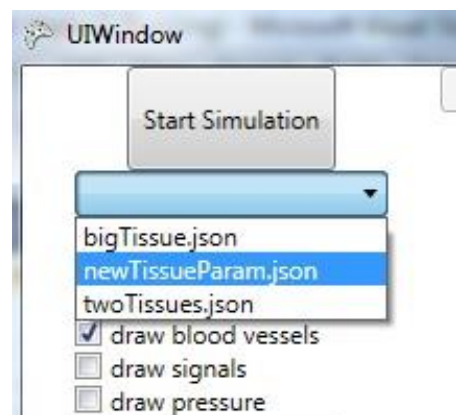


5. Launch the program either from Visual Studio by pressing F5 or the green arrow

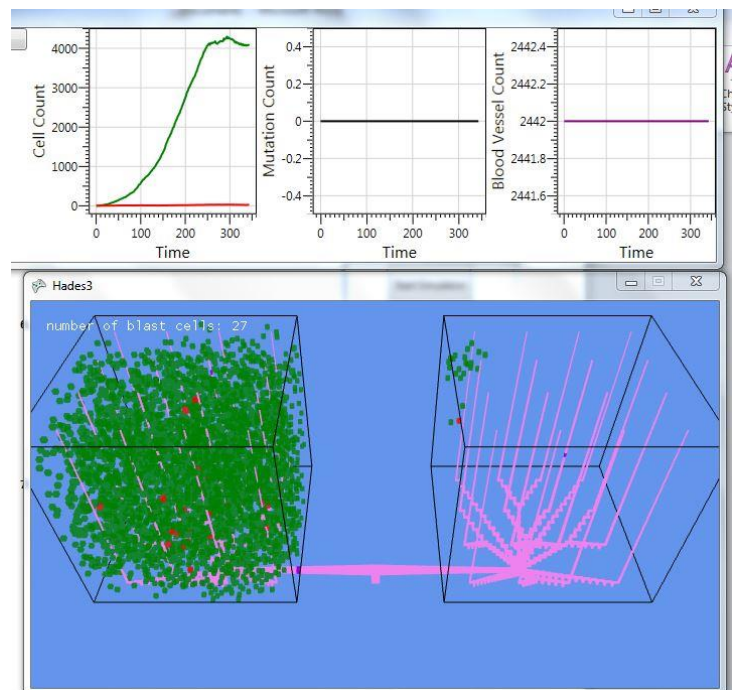


or by launching it from the Hades3.exe located in
\\CancerSimulation\\Hades3\\Hades3\\bin\\x86\\Debug

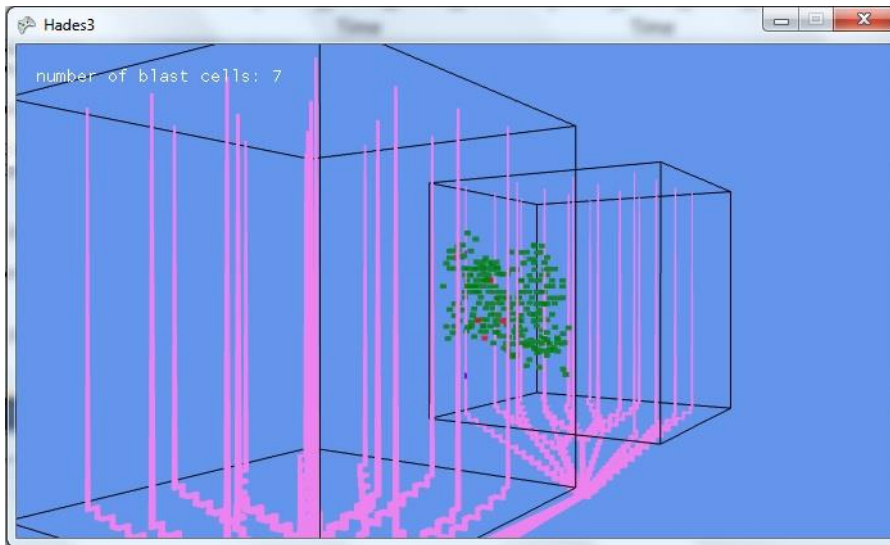
6. Select the desired parameter file from the drop-down menu and press Start Simulation button



7. Observe tissue growth

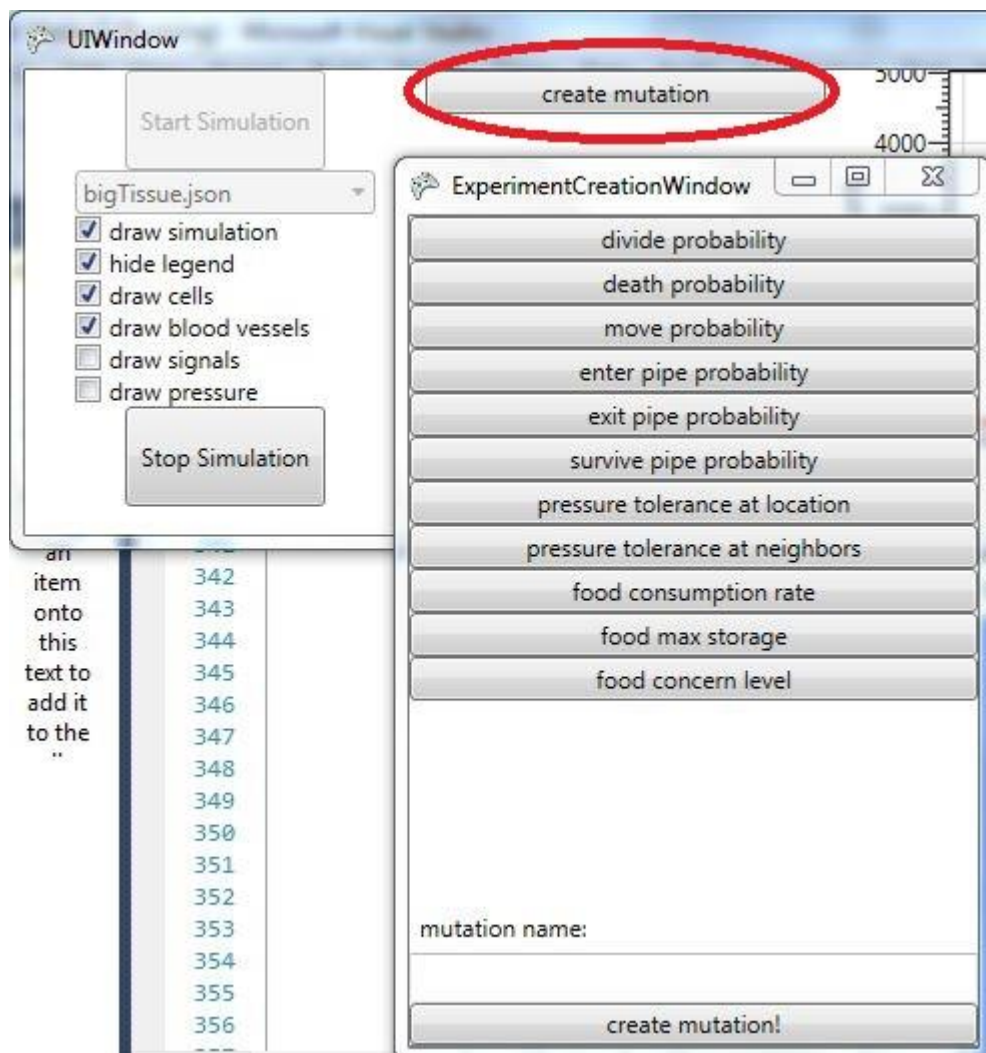


8. Use Spacebar to pause simulation and move the camera with WASD or arrow keys and mouse.



```
SimulationCore.cs X
Hades3.SimulationCore toggleMovement()
334 #region processKeyPresses
335
336 private void processInput()
337 {
338     prevKeyboardState = currentKeyboardState;
339     currentKeyboardState = Keyboard.GetState();
340
341     if (KeyJustPressed(Keys.Space))
342     {
343         togglePause();
344         toggleMovement();
345     }
346
347     else if (KeyJustPressed(Keys.PageUp))
348     {
349         SelectionDistance++;
350     }
351
352     else if (KeyJustPressed(Keys.PageDown))
353     {
354         SelectionDistance--;
355     }
356
357     else if (KeyJustPressed(Keys.G))
358     {
359         interferenceQueue.Enqueue(new ToggleAllowPleaseDieSignal());
360     }
361 }
362
```

9. Open mutation window



10. Select the desired mutations and values.

The screenshot shows the 'ExperimentCreationWindow' dialog box. It contains a list of parameters to be configured for a simulation. The parameters are: divide probability, death probability, move probability, enter pipe probability, exit pipe probability, survive pipe probability, pressure tolerance at location, pressure tolerance at neighbors, food consumption rate, food max storage, and food concern level. Below the list, there are three sliders: 'pressure tolerance at location' set to 248, 'pressure tolerance at neighbors' set to 171, and 'division prob' set to 0.607692307692308. There is a text field for 'mutation name' containing the text 'cancer!'. At the bottom, there is a 'create mutation!' button.

11. Upon pressing the *create mutation* button, a new button with the specified name will appear on the main UI.

The screenshot shows the 'UIWindow' of the simulation. It features a 'Start Simulation' button, a dropdown menu currently showing 'bigTissue.json', a list of checkboxes for simulation options (draw simulation, hide legend, draw cells, draw blood vessels, draw signals, draw pressure), and a 'Stop Simulation' button. On the right side, there is a 'create mutation' button. Below this button, a new button labeled 'cancer!' has appeared, which is circled in red to highlight its presence.

At this point you can either create additional mutations or close the Mutation Creation Window

- 12.** Now press the mutation button on the UI to select the mutation, move the camera so that a cell is highlighted in yellow and press “M” to apply the mutation to the cell.



- 13.** Observe the cancer grow!

