Functional requirements – what should the application do?

1. Application can read text file containing matrix with any number of rows and columns. Matrix contains non-negative real numbers. Rows are divided by new line, elements in rows by space, comma or semicolon.
2. Application can display „city" in 3D made of „skyscrapers" (simple cuboids) placed on rectangular mesh. Heights of skyscrapers are taken from input text file. Every such skyscraper should be placed in the middle of square. Application should also display "ground" (that is terrain under skyscrapers).

3. Application should allow the user to move in 3D world in a similar way as in classic FPS games (WSAD keys + Mouse). There can be additional keys for moving up and down)

4. There should be a crosshair on the middle of screen.

5. There should be flocks of yellow balls flying between skyscrapers. Those flocks should behave similarly to birds meaning:

    a. Balls should speed up and slow down
    b. Balls should try to keep themselves together in the flock but they shouldn't collide with each other (but occasional collisions are allowed)
    c. Balls should avoid any obstacles (generally skyscrapers)
    d. Balls movement should be similar to natural movement of birds.
    e. There should be more than one flock

6. Pressing left mouse button should result in firing red balls. Red balls should have big initial velocity, and should be able to bounce off the walls. Additionally red balls should have "energy" – big on the beginning. Red balls can accelerate (in any direction) using this "energy" (so finally this "energy" is depleted). The idea is to have this acceleration relatively small. In that case, initial velocity is dominant in the first phase of red ball's flight.

7. If red ball hits yellow ball it consumes it which increases its energy level. Red ball should actively pursue yellow balls in order to consume them. Yellow balls should scatter when attacked by red ball. System should be properly balanced meaning red ball will lose whole its energy after consuming no more than few yellow balls. When red ball loses it's whole energy it becomes a yellow ball an joins nearest flock.

Adding some interesting additional features will be a plus. Creativity is very important in this task (in the matter of interface, "action" and additional features)!

Technical requirements – how should application work and how should it be build?

1. Application should be written in C++ and be compiled in Microsoft Visual Studio. It should run under Windows.

2. Application should work smoothly (at least 30 fps – never below).

3. You should provide source code and binaries. Project should compile and run without requiring any change from us.