Performance

Performance: General notes on visualiser performance.

Generally, the visualiser performs well on machines with (currently defined - 2020) average computing capabilities. Machines using integrated graphics cards tend to struggle with allowing the user to manipulate large crystals in real-time. To alleviate these issues, users can switch to displaying objects as points (CTRL + SHIFT + P, or by selecting points in the "Drawing" drop-down menu) while they conduct their desired changes. Once the crystal is placed in the required position, repeating this keyboard shortcut or reselecting the menu option will switch the visualiser back to its original drawing mode where the user can record an image. Dedicated graphics cards with 1-2 GB of graphics memory are capable of real-time manipulation of average sized simulation files (e.g. an 18 MB file or 400,000 tiles using an NVIDIA GeForce 940MX laptop graphics card).

Read in times in the new, general visualiser are slightly longer than previous iterations of the program, primarily due to creating display lists dynamically upon read in, rather than having them stored already within the program. This change was necessary to achieve the goal of the project and still gives manageable read in times (approximately 2 seconds on the aforementioned graphics card and 18 MB file).

Performance increases were gained by adopting the new "list of lists" approach outlined in the modes of operation manual section. Previously, the program would redraw each cage individually after translation and rotation operations, leading to repeated pauses when manipulating structures. By adding the additional step of saving all repeated cages as a large display list composed of thousands of smaller lists, the speed during crystal manipulation remains consistent, although this has contributed to the slower read in times. The visualiser was also switched from being a 32-bit program to a 64-bit program, which allows a larger amount of memory to be allocated to the program but limits the visualiser to only functioning on 64-bit machines. A 32-bit version of the program is still available, although this has a lower limit on movie size. The current version of the visualiser (v1.69 – May 2020) can now be distributed as a single executable ".exe" file with no need for the user to install Visual Studio to run the program. From this version onwards, Visual Studio will only be required for debugging or editing the visualiser source code.