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Senior Project

Requirements

Definitions:

Sequential computing: running a program on 1 computer and not explicitly trying to use threads.

Parallel computing: running a program on 1 computer and explicitly use threads to break up the computation among multiple processors.

Cluster computing: like parallel computing but splitting the process between multiple computers as well as processors.

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| ID | Functional Requirement | Demonstration | Success |
| 1 | The system shall show the time it takes to construct an image of sizes 500x500, 500x1000, 1000x1000 pixels for each of the following sub requirements. | Show all sub shall requirement’s results in a time matrix displaying times in milliseconds. | Each sub shall requirement is fulfilled. |
| 1.1 | The system shall display the time for 1 computer running on 1 processor for images of sizes 500x500, 500x1000, 1000x1000 pixels | Display times in the time matrix | Times are displayed in the matrix |
| 1.2 | The system shall display the time for 1 computer running on 2 processors for images of sizes 500x500, 500x1000, 1000x1000 pixels | Display times in the time matrix | Times are displayed in the matrix |
| 1.3 | The system shall display the time for 1 computer running on 4 processors for images of sizes 500x500, 500x1000, 1000x1000 pixels | Display times in the time matrix | Times are displayed in the matrix |
| 1.4 | The system shall display the time for 2 computers running on 1 processors each for images of sizes 500x500, 500x1000, 1000x1000 pixels | Display times in the time matrix | Times are displayed in the matrix |
| 1.5 | The system shall display the time for 2 computers running on 2 processors each for images of sizes 500x500, 500x1000, 1000x1000 pixels | Display times in the time matrix | Times are displayed in the matrix |
| 1.6 | The system shall display the time for 2 computers running on 4 processors each for images of sizes 500x500, 500x1000, 1000x1000 pixels | Display times in the time matrix | Times are displayed in the matrix |
| 1.7 | The system shall display the time for 4 computers running on 4 processors each for images of sizes 500x500, 500x1000, 1000x1000 pixels | Display times in the time matrix | Times are displayed in the matrix |
| 1.8 | Images produced for the time test shall all look the same for each size category. | Show images side by side for all 500x500, 500x1000, 1000x1000 pixels. | The images in each category look like each other. (eg a.. 500x500 pixels images look the same. |
| 2.1 | The system shall show that running on more processors is faster than running on 1 processor on one computer | Times in time matrix show that time for req 1.1 are the longest running times | Times in time matrix show that time for req 1.1 are the longest running times |
| 2.2 | The system shall show that the more processors you use the faster the program runs for the 1000x1000 image. | Compare times in time matrix. Time matrix will show total number of processors for each computer set. | Times in the time matrix show that time for req 1.7 is the fastest and 1.1 is the slowest. Any time compared to another time with less processors shall be larger. (i.e. 1 computer 2 processors will be slower than 2 computers 2 processors each (4 processors total) |
| 3 | Ray Tracing Engine – The system shall be able to produce an image and fulfill all sub shall requirements | The system produces an image and completion of all 2.x sub shall requirements | The system produces an image and completion of all 3.x sub shall requirements |
| 3.1 | The system shall be able to display spheres | They system produces an image that contains 2 or more spheres | The image contains 2 or more sphere |
| 3.2 | The system shall be able to display boxes in images | The system produces an image that contains 2 or more boxes | The image contains 2 or more boxes |
| 3.3 | The system will be able to display shading | The shapes in the have shading | The shapes in the have shading |
| 3.4 | The system shall be able to display shapes with reflective properties | Draw shapes that reflect one another | The shapes reflect one another. |
| 3.5 | The system shall be able to have shadows for objects | Display a scene where a sphere is on top of a box and is casting a shadow on to the box. | There is a shadow casted by the sphere onto the box. |
| 3.6 | The ray tracing engine shall take sufficient amount of time that times displayed in req 1 are meaningful | Times in req 1 are displayed | Req 1.1 for 500x500 runs for 4\* seconds (4000 ms) on one of the machines in the Linux lab. (the fastest time on the slowest column) |
| 4 | Images shall be saved as a .png file | See file after program is run when the image directory is empty. Open image. | Image file exists and displays correctly. |

\*shortest theoretical time would be .25 seconds and total estimated maximum system running time would be 4.2 minutes. Estimated minimum estimated running time 1.25 minutes.