**Spike:** Spike 25

**Title:** Measuring Performance & Optimizations

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**Goals / deliverables:**

The goal is to measure the performance of various collisions-checking methods provided. And then create a report that presents a comparison of the different collision detection approaches.

Besides this report, what else was created?

* C++ code sample (downloaded from class’s GitHub)
* Short report with the “report must include” part of the instructions titled “Task 25 Answer report”.
* Text file with all the created data called “results.txt”

**Technologies, Tools, and Resources used:**

* Visual Studio Community 2022
* SDL version 2.30.8
* Notepad
* Microsoft Word

**Tasks undertaken:**

* Download and install Visual Studio
* Download and instal SDL
* Download and open sample code provided in the class’s GitHub.
* Compile code and obtain data.
* Analyse data and answer report questions on a different word document. (I’ll also answer the questions at the end of the sike report just in case).
* Try to find a way to modify the code to make it the most optimal.

**What we found out:**

After compiling the code, I got results from 35 to 50 boxes using all 5 test methods. Results that I analysed and summarized in a table.

I also try analysing the code to find a way to improve it but wasn’t able to. Leaving the code as it is.

**“Report must include” answers (I also include them on another word doc.):**

1. A description of each collision test (method) approach (and the differences between them).
   1. **Test A1:** Basic bounding box collision detection.
   2. **Test A2:** Optimized Bounding box check.
   3. **Test B:** Spatial partitioning box method. Divides the space into smaller regions and only checks collisions within the same region.
   4. **Test C:** Quadtree-phase partitioning method. Divides the space and perform check on relevant nodes.
   5. **Test D:** Broad-phase and narrow-phase. Broad-phase pass eliminates boxes that are far apart. Narrow-phase check for closer pairs.
2. The method you used to collect your data and your reasons for choosing it.
   1. I collected the data by running each test for a time frame of 10 seconds to capture the number of collision checks performed. Choosing this method allowed for a direct comparison of efficiency between methods.
   2. The main reason to do it this way is because of the simplicity and ability to generate comparable results across tests.
3. The raw data you collect to support your results.

-- New Test: Test A1Loops: 146173

Time (ms): 10000

Loops/Second: 14617.3

Num boxes: 35

-- New Test: Test A2Loops: 292393

Time (ms): 10000

Loops/Second: 29239.3

Num boxes: 35

-- New Test: Test BLoops: 685235

Time (ms): 10000

Loops/Second: 68523.5

Num boxes: 35

-- New Test: Test CLoops: 1770847

Time (ms): 10000

Loops/Second: 177085

Num boxes: 35

-- New Test: Test DLoops: 2301217

Time (ms): 10000

Loops/Second: 230122

Num boxes: 35

-- New Test: Test A1Loops: 134727

Time (ms): 10000

Loops/Second: 13472.7

Num boxes: 36

-- New Test: Test A2Loops: 283374

Time (ms): 10000

Loops/Second: 28337.4

Num boxes: 36

-- New Test: Test BLoops: 656888

Time (ms): 10000

Loops/Second: 65688.8

Num boxes: 36

-- New Test: Test CLoops: 1678899

Time (ms): 10000

Loops/Second: 167890

Num boxes: 36

-- New Test: Test DLoops: 2184423

Time (ms): 10000

Loops/Second: 218442

Num boxes: 36

-- New Test: Test A1Loops: 133459

Time (ms): 10000

Loops/Second: 13345.9

Num boxes: 37

-- New Test: Test A2Loops: 277275

Time (ms): 10000

Loops/Second: 27727.5

Num boxes: 37

-- New Test: Test BLoops: 629384

Time (ms): 10000

Loops/Second: 62938.4

Num boxes: 37

-- New Test: Test CLoops: 1622678

Time (ms): 10000

Loops/Second: 162268

Num boxes: 37

-- New Test: Test DLoops: 2084386

Time (ms): 10000

Loops/Second: 208439

Num boxes: 37

-- New Test: Test A1Loops: 125158

Time (ms): 10000

Loops/Second: 12515.8

Num boxes: 38

-- New Test: Test A2Loops: 262784

Time (ms): 10000

Loops/Second: 26278.4

Num boxes: 38

-- New Test: Test BLoops: 594280

Time (ms): 10000

Loops/Second: 59428

Num boxes: 38

-- New Test: Test CLoops: 1552028

Time (ms): 10000

Loops/Second: 155203

Num boxes: 38

-- New Test: Test DLoops: 1969859

Time (ms): 10000

Loops/Second: 196986

Num boxes: 38

-- New Test: Test A1Loops: 119520

Time (ms): 10000

Loops/Second: 11952

Num boxes: 39

-- New Test: Test A2Loops: 247248

Time (ms): 10000

Loops/Second: 24724.8

Num boxes: 39

-- New Test: Test BLoops: 561585

Time (ms): 10000

Loops/Second: 56158.5

Num boxes: 39

-- New Test: Test CLoops: 1480351

Time (ms): 10000

Loops/Second: 148035

Num boxes: 39

-- New Test: Test DLoops: 1886684

Time (ms): 10000

Loops/Second: 188668

Num boxes: 39

-- New Test: Test A1Loops: 120878

Time (ms): 10000

Loops/Second: 12087.8

Num boxes: 40

-- New Test: Test A2Loops: 246477

Time (ms): 10000

Loops/Second: 24647.7

Num boxes: 40

-- New Test: Test BLoops: 554112

Time (ms): 10000

Loops/Second: 55411.2

Num boxes: 40

-- New Test: Test CLoops: 1477873

Time (ms): 10000

Loops/Second: 147787

Num boxes: 40

-- New Test: Test DLoops: 1881600

Time (ms): 10000

Loops/Second: 188160

Num boxes: 40

-- New Test: Test A1Loops: 113262

Time (ms): 10000

Loops/Second: 11326.2

Num boxes: 41

-- New Test: Test A2Loops: 232220

Time (ms): 10000

Loops/Second: 23222

Num boxes: 41

-- New Test: Test BLoops: 526472

Time (ms): 10000

Loops/Second: 52647.2

Num boxes: 41

-- New Test: Test CLoops: 1403522

Time (ms): 10000

Loops/Second: 140352

Num boxes: 41

-- New Test: Test DLoops: 1753394

Time (ms): 10000

Loops/Second: 175339

Num boxes: 41

-- New Test: Test A1Loops: 110039

Time (ms): 10000

Loops/Second: 11003.9

Num boxes: 42

-- New Test: Test A2Loops: 224252

Time (ms): 10000

Loops/Second: 22425.2

Num boxes: 42

-- New Test: Test BLoops: 494289

Time (ms): 10000

Loops/Second: 49428.9

Num boxes: 42

-- New Test: Test CLoops: 1351662

Time (ms): 10000

Loops/Second: 135166

Num boxes: 42

-- New Test: Test DLoops: 1718887

Time (ms): 10000

Loops/Second: 171889

Num boxes: 42

-- New Test: Test A1Loops: 104991

Time (ms): 10000

Loops/Second: 10499.1

Num boxes: 43

-- New Test: Test A2Loops: 213894

Time (ms): 10000

Loops/Second: 21389.4

Num boxes: 43

-- New Test: Test BLoops: 480015

Time (ms): 10000

Loops/Second: 48001.5

Num boxes: 43

-- New Test: Test CLoops: 1298330

Time (ms): 10000

Loops/Second: 129833

Num boxes: 43

-- New Test: Test DLoops: 1578812

Time (ms): 10000

Loops/Second: 157881

Num boxes: 43

-- New Test: Test A1Loops: 98721

Time (ms): 10000

Loops/Second: 9872.1

Num boxes: 44

-- New Test: Test A2Loops: 197480

Time (ms): 10000

Loops/Second: 19748

Num boxes: 44

-- New Test: Test BLoops: 449968

Time (ms): 10000

Loops/Second: 44996.8

Num boxes: 44

-- New Test: Test CLoops: 1214330

Time (ms): 10000

Loops/Second: 121433

Num boxes: 44

-- New Test: Test DLoops: 1531342

Time (ms): 10000

Loops/Second: 153134

Num boxes: 44

-- New Test: Test A1Loops: 91179

Time (ms): 10000

Loops/Second: 9117.9

Num boxes: 45

-- New Test: Test A2Loops: 190236

Time (ms): 10000

Loops/Second: 19023.6

Num boxes: 45

-- New Test: Test BLoops: 437413

Time (ms): 10000

Loops/Second: 43741.3

Num boxes: 45

-- New Test: Test CLoops: 1187163

Time (ms): 10000

Loops/Second: 118716

Num boxes: 45

-- New Test: Test DLoops: 1488300

Time (ms): 10000

Loops/Second: 148830

Num boxes: 45

-- New Test: Test A1Loops: 91974

Time (ms): 10000

Loops/Second: 9197.4

Num boxes: 46

-- New Test: Test A2Loops: 186236

Time (ms): 10000

Loops/Second: 18623.6

Num boxes: 46

-- New Test: Test BLoops: 403184

Time (ms): 10000

Loops/Second: 40318.4

Num boxes: 46

-- New Test: Test CLoops: 1139465

Time (ms): 10000

Loops/Second: 113947

Num boxes: 46

-- New Test: Test DLoops: 1445225

Time (ms): 10000

Loops/Second: 144523

Num boxes: 46

-- New Test: Test A1Loops: 87930

Time (ms): 10000

Loops/Second: 8793

Num boxes: 47

-- New Test: Test A2Loops: 179018

Time (ms): 10000

Loops/Second: 17901.8

Num boxes: 47

-- New Test: Test BLoops: 402672

Time (ms): 10000

Loops/Second: 40267.2

Num boxes: 47

-- New Test: Test CLoops: 1078397

Time (ms): 10000

Loops/Second: 107840

Num boxes: 47

-- New Test: Test DLoops: 1370077

Time (ms): 10000

Loops/Second: 137008

Num boxes: 47

-- New Test: Test A1Loops: 83712

Time (ms): 10000

Loops/Second: 8371.2

Num boxes: 48

-- New Test: Test A2Loops: 171654

Time (ms): 10000

Loops/Second: 17165.4

Num boxes: 48

-- New Test: Test BLoops: 383665

Time (ms): 10000

Loops/Second: 38366.5

Num boxes: 48

-- New Test: Test CLoops: 1052793

Time (ms): 10000

Loops/Second: 105279

Num boxes: 48

-- New Test: Test DLoops: 1332423

Time (ms): 10000

Loops/Second: 133242

Num boxes: 48

-- New Test: Test A1Loops: 77970

Time (ms): 10000

Loops/Second: 7797

Num boxes: 49

-- New Test: Test A2Loops: 164762

Time (ms): 10000

Loops/Second: 16476.2

Num boxes: 49

-- New Test: Test BLoops: 362840

Time (ms): 10000

Loops/Second: 36284

Num boxes: 49

-- New Test: Test CLoops: 972342

Time (ms): 10000

Loops/Second: 97234.2

Num boxes: 49

-- New Test: Test DLoops: 1268093

Time (ms): 10000

Loops/Second: 126809

Num boxes: 49

-- New Test: Test A1Loops: 77078

Time (ms): 10000

Loops/Second: 7707.8

Num boxes: 50

-- New Test: Test A2Loops: 155439

Time (ms): 10000

Loops/Second: 15543.9

Num boxes: 50

-- New Test: Test BLoops: 349705

Time (ms): 10000

Loops/Second: 34970.5

Num boxes: 50

-- New Test: Test CLoops: 960218

Time (ms): 10000

Loops/Second: 96021.8

Num boxes: 50

-- New Test: Test DLoops: 1225456

Time (ms): 10000

Loops/Second: 122546

Num boxes: 50

1. A summary table of the results.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Num Boxes** | **Test A1 (Loops/sec)** | **Test A2 (Loops/sec)** | **Test B (Loops/sec)** | **Test C (Loops/sec)** | **Test D (Loops/sec)** |
| 35 | 14617.3 | 29239.3 | 68523.5 | 177085 | 230122 |
| 36 | 13472.7 | 28337.4 | 65688.8 | 167890 | 218442 |
| 37 | 13345.9 | 27727.5 | 62938.4 | 162268 | 208439 |
| 38 | 12515.8 | 26278.4 | 59428 | 155203 | 196986 |
| 39 | 11952 | 24724.8 | 56158.5 | 148035 | 188668 |
| 40 | 12087.8 | 24647.7 | 55411.2 | 147787 | 188160 |
| 41 | 11326.2 | 23222 | 52647.2 | 140352 | 175339 |
| 42 | 11003.9 | 22425.2 | 49428.9 | 135166 | 171889 |
| 43 | 10499.1 | 21389.4 | 48001.5 | 129833 | 157881 |
| 44 | 9872.1 | 19748 | 44996.8 | 121433 | 153134 |
| 45 | 9117.9 | 19023.6 | 43741.3 | 118716 | 148830 |
| 46 | 9197.4 | 18623.6 | 40318.4 | 113947 | 144523 |
| 47 | 8793 | 17901.8 | 40267.2 | 107840 | 137008 |
| 48 | 8371.2 | 17165.4 | 38366.5 | 105279 | 133242 |
| 49 | 7797 | 16476.2 | 36284 | 97234.2 | 126809 |
| 50 | 7707.8 | 15543.9 | 34970.5 | 96021.8 | 122546 |