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# A Halfedge Refinement Rule for Parallel Catmull-Clark Subdivision Supplemental Material: CPU Performance Measurements

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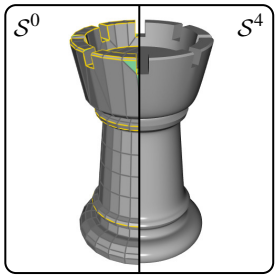
This document provides exhaustive performance measurements of our CPU implementation. The measurements were performed on an AMD Ryzen Threadripper 3960X CPU with 24-cores. We compiled our program with options -march-native and -Os. Our program relies on OpenMP to spawn threads, and we report performance measurements for threads counts 1, 2, 4, 8, 16, and 32. Each number corresponds to the median timing over a set of 50 runs. The goal of this document is to convey the key information that the performances of our method scale linearly with the number of threads from 1 to 16 threads. For 32 threads we observe less significant speed-ups, which is due to the fact that the CPU has 24 cores and obviously becomes less efficient at distributing tasks.

## 1. Rook

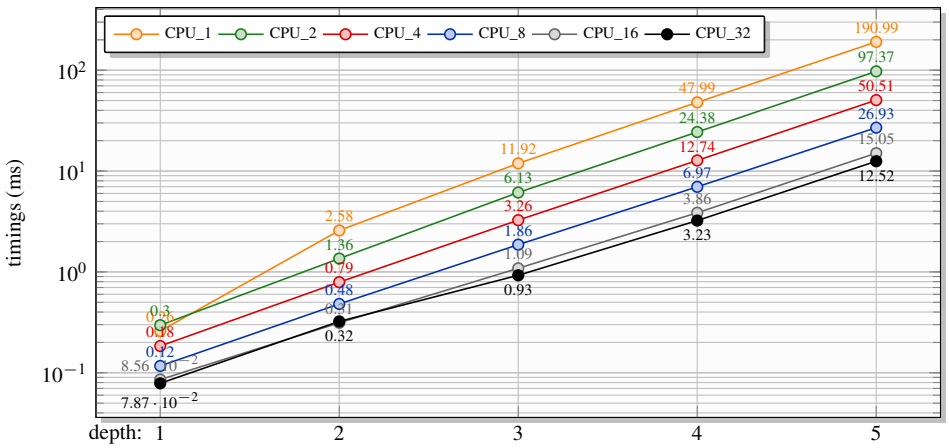
Rook



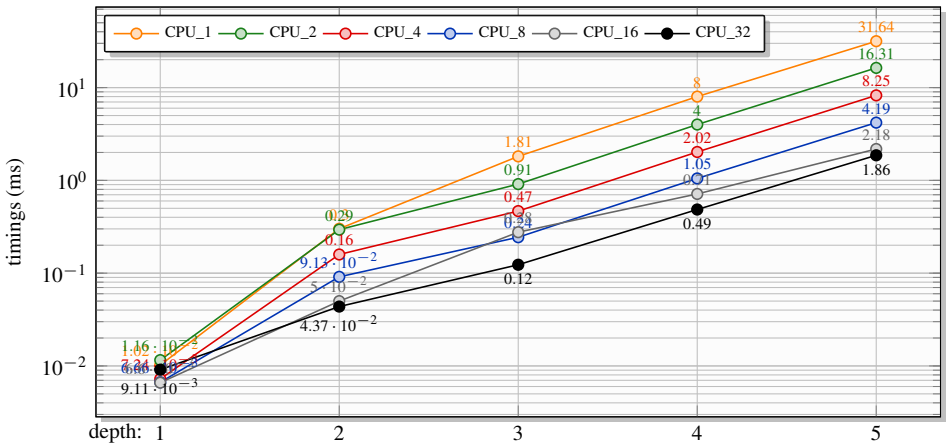

(44 non-quads / 24 boundaries
280 creases)

| | |
|---|---|
| $H_0 = 3,064$ | $H_4 = 784,384$ |
| $F_0 = 777$ | $F_4 = 196,096$ |
| $E_0 = 1,544$ | $E_4 = 392,384$ |
| $V_0 = 768$ | $V_4 = 196,289$ |

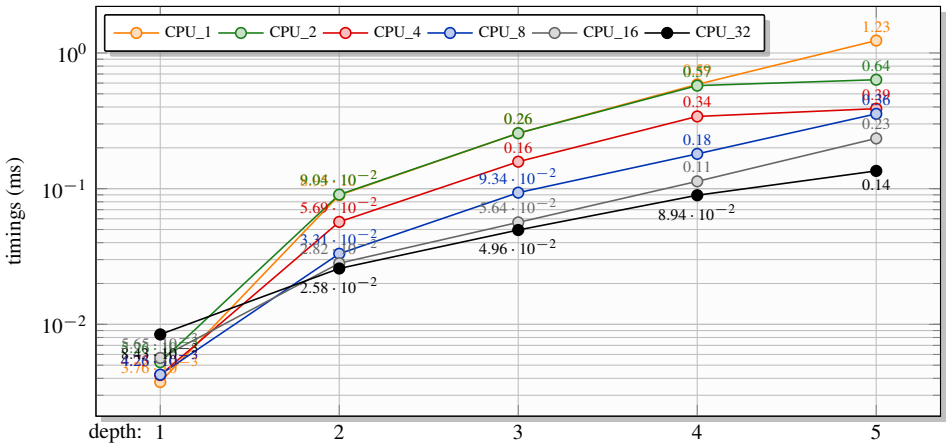
Vertex-Point Refinement




Halfedge Refinement

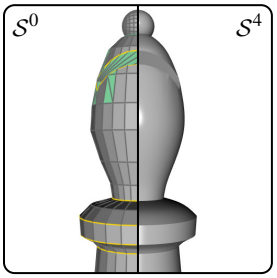



Crease Refinement



## 2. Bishop

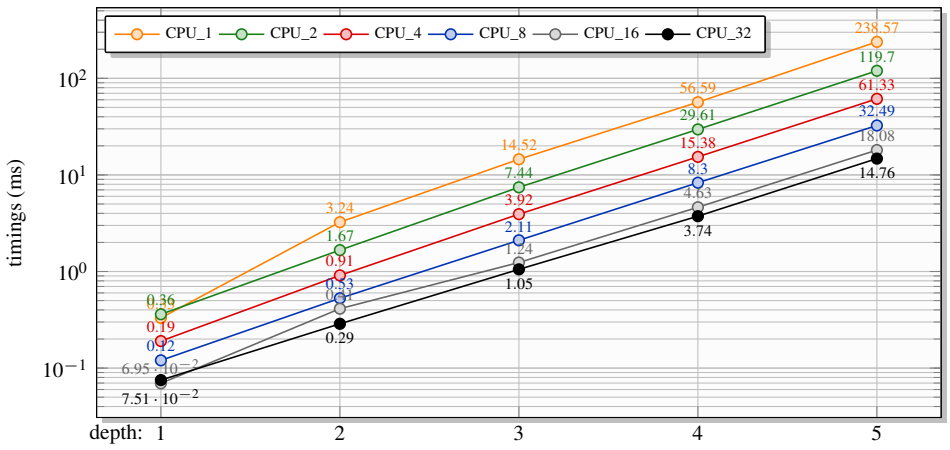
Bishop



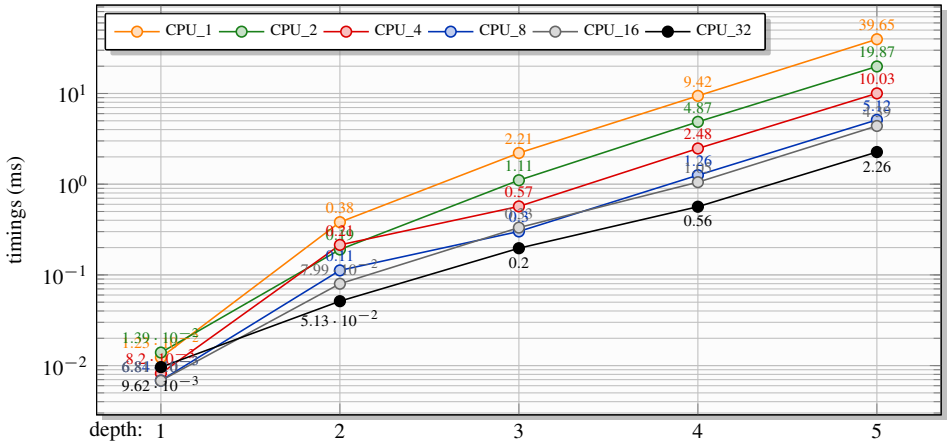

(132 non-quads / 24 boundaries
224 creases)

| | |
|---|---|
| $H_0 = 3,740$ | $H_4 = 957,440$ |
| $F_0 = 968$ | $F_4 = 239,360$ |
| $E_0 = 1,882$ | $E_4 = 478,912$ |
| $V_0 = 917$ | $V_4 = 239,555$ |

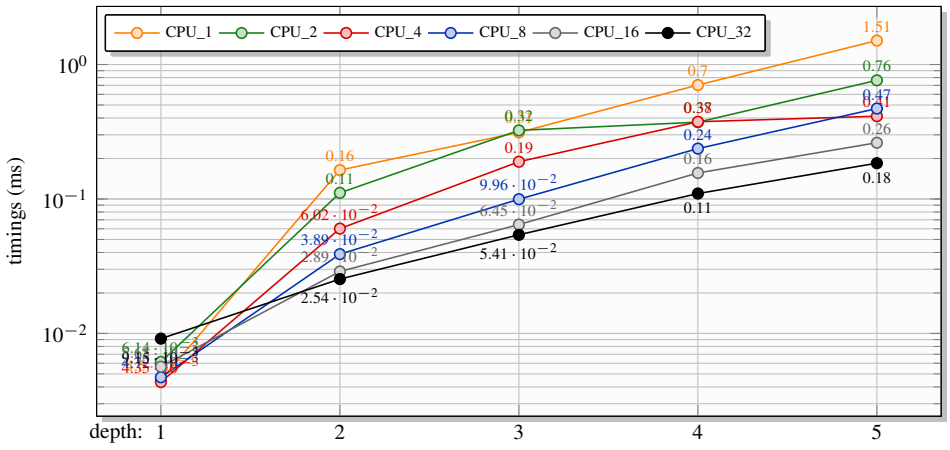
Vertex-Point Refinement




Halfedge Refinement

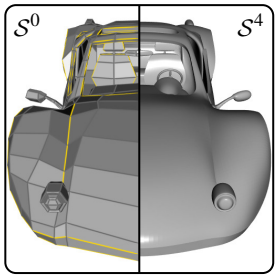



Crease Refinement



## 3. Car

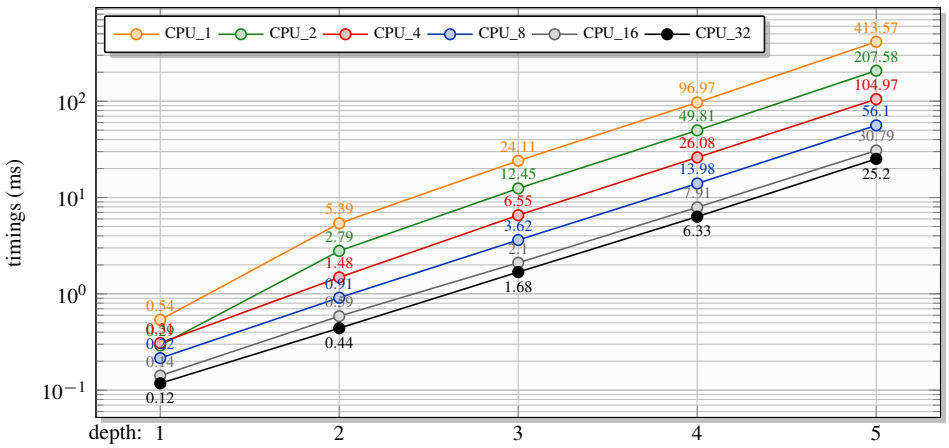
Car



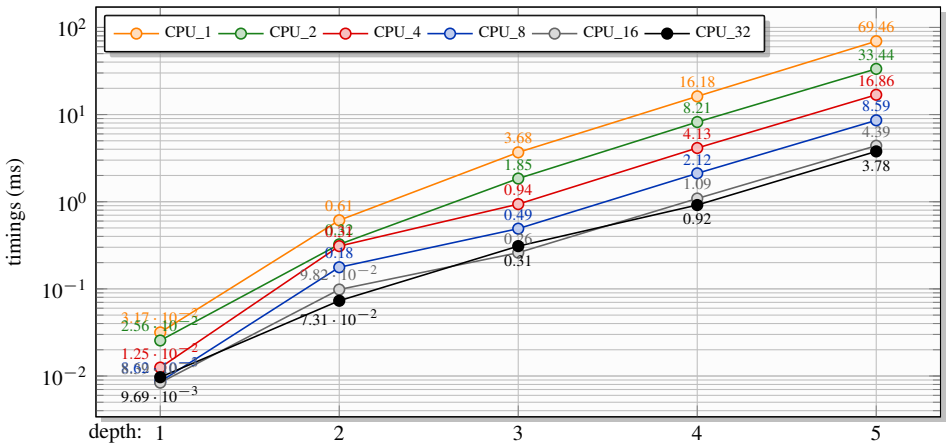

(all-quads / 60 boundaries
314 creases)

| | |
|---|---|
| $H_0 = 6,300$ | $H_4 = 1,612,800$ |
| $F_0 = 1,575$ | $F_4 = 403,200$ |
| $E_0 = 3,180$ | $E_4 = 806,880$ |
| $V_0 = 1,642$ | $V_4 = 403,717$ |

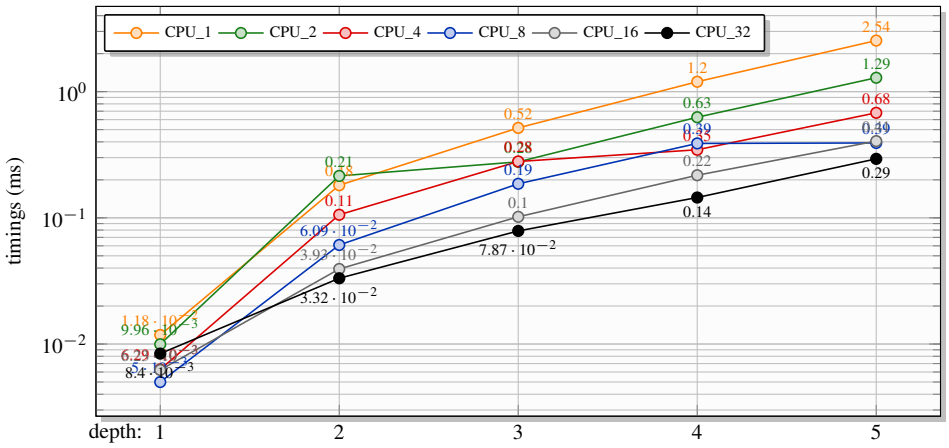
Vertex-Point Refinement




Halfedge Refinement

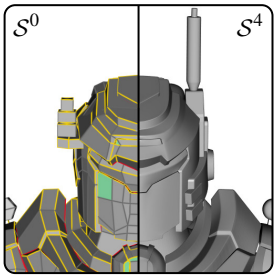



Crease Refinement



## 4. ArmorGuy

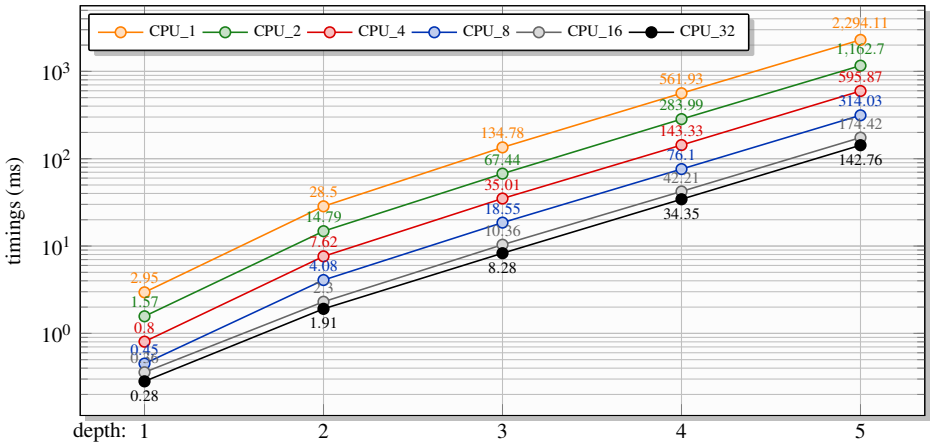
ArmorGuy



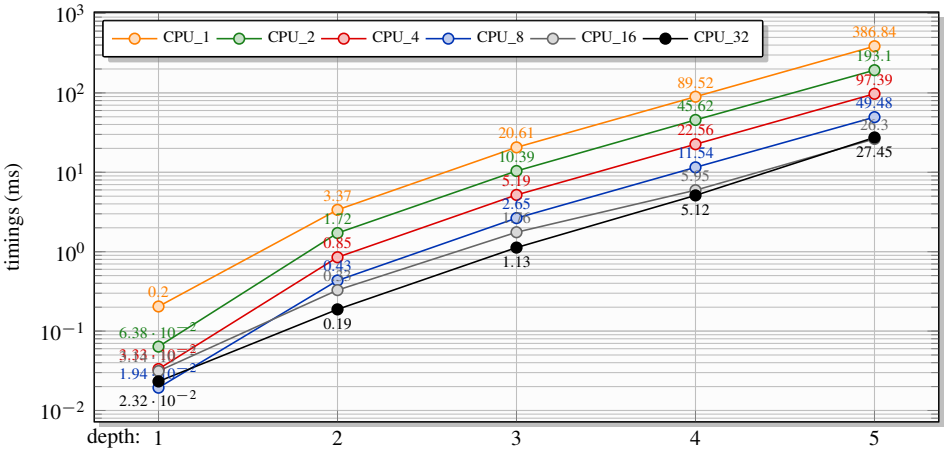

(300 non-quads / 2,034 boundaries
7,101 creases)

$H_0 = 34,388$ $H_4 = 8,803,328$
$F_0 = 8,639$ $F_4 = 2,200,832$
$E_0 = 18,211$ $E_4 = 4,417,936$
$V_0 = 10,022$ $V_4 = 2,217,554$

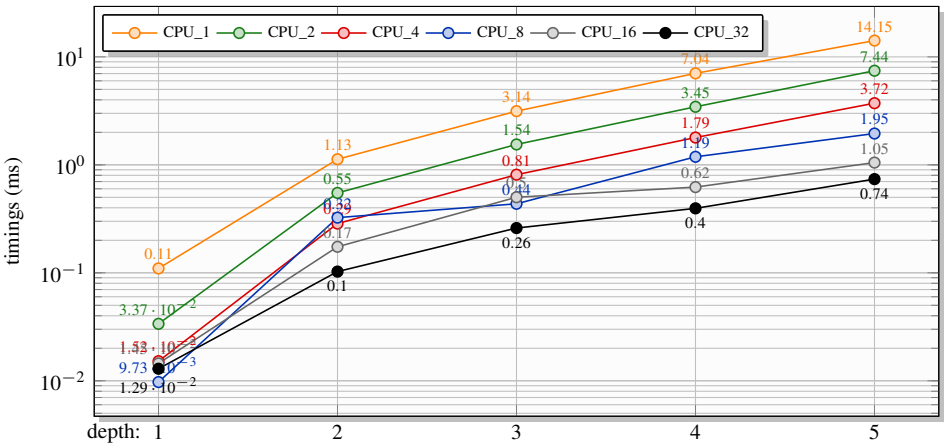
Vertex-Point Refinement




Halfedge Refinement

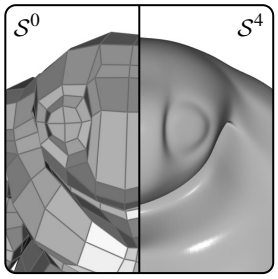



Crease Refinement



## 5. Bigguy

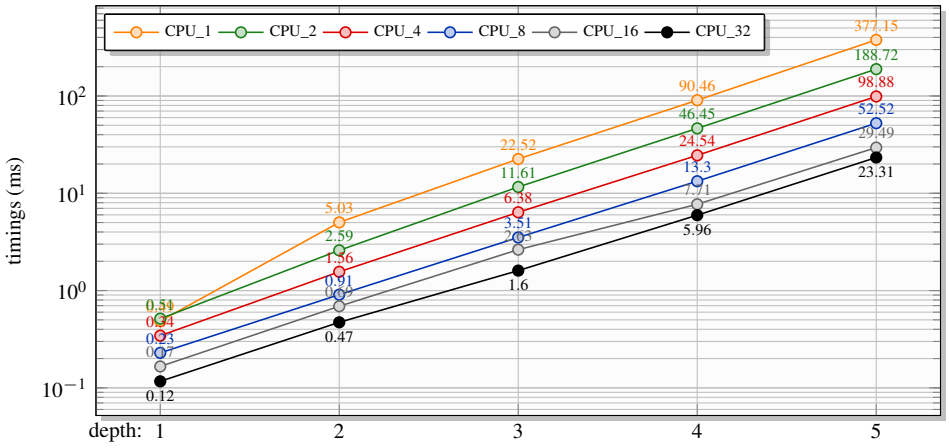
Bigguy



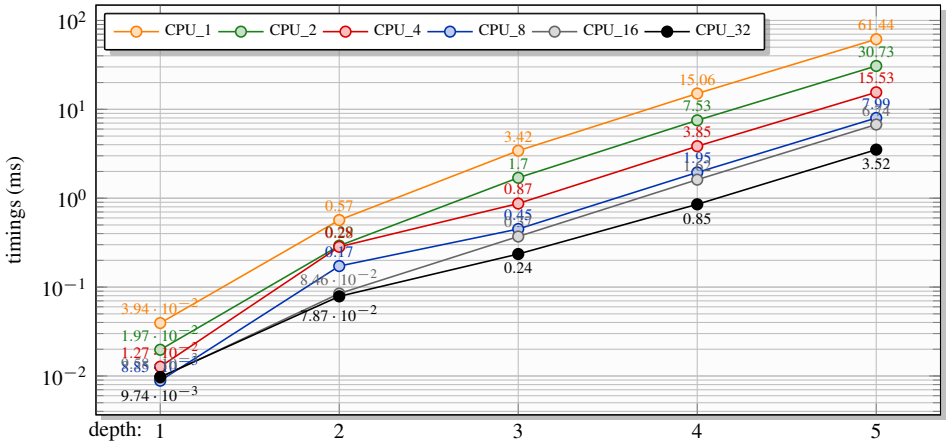

(all-quads / no boundaries)

| | |
|---|---|
| $H_0 = 5,800$ | $H_4 = 1,484,800$ |
| $F_0 = 1,450$ | $F_4 = 371,200$ |
| $E_0 = 2,900$ | $E_4 = 742,400$ |
| $V_0 = 1,452$ | $V_4 = 371,202$ |

Vertex-Point Refinement

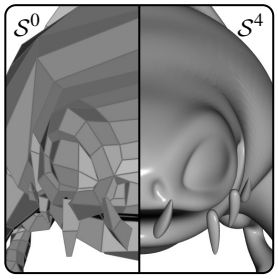



Halfedge Refinement



## 6. Monsterfrog

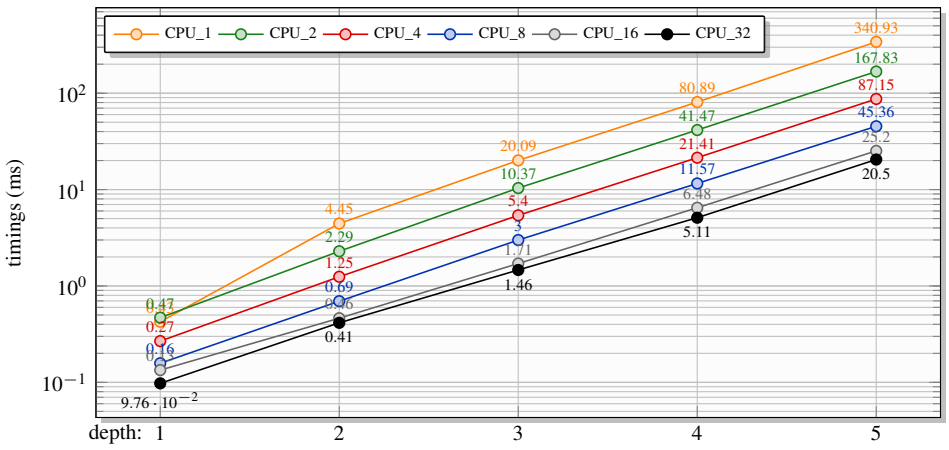
Monsterfrog



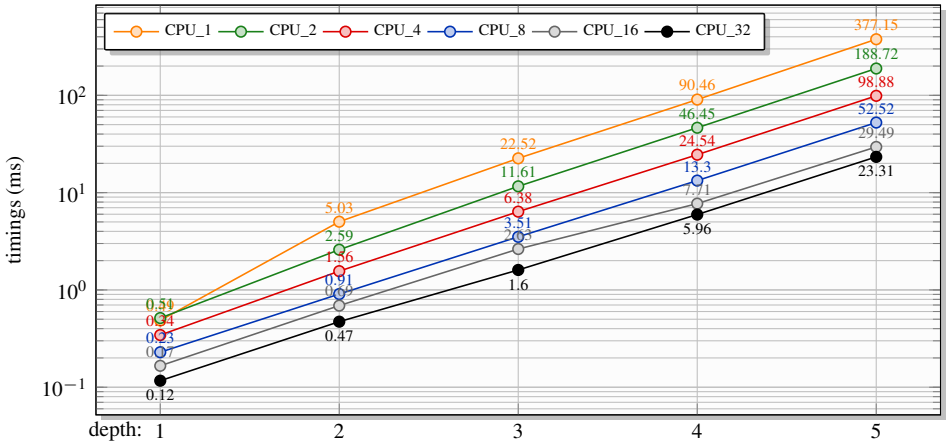

(all-quads / no boundaries)

| | |
|---|---|
| $H_0 = 5,168$ | $H_4 = 1,323,008$ |
| $F_0 = 1,292$ | $F_4 = 330,752$ |
| $E_0 = 2,584$ | $E_4 = 661,504$ |
| $V_0 = 1,308$ | $V_4 = 330,768$ |

Vertex-Point Refinement

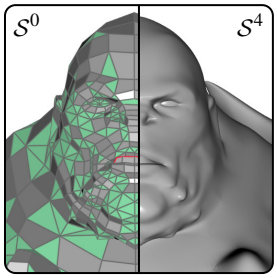



Vertex-Point Refinement



## 7. Imrod

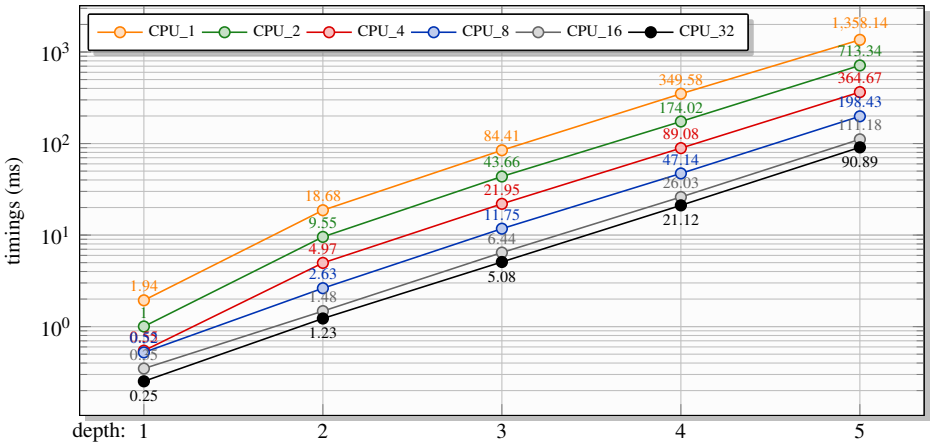
Imrod



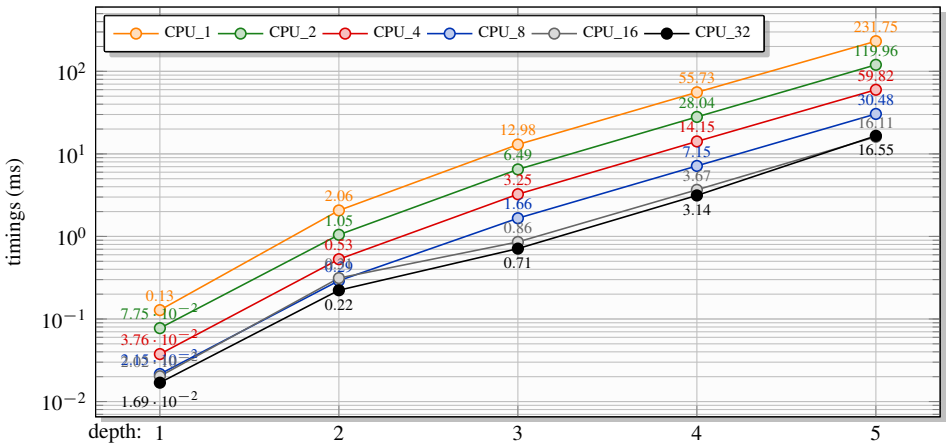

(3,479 non-quads / 223 boundaries)

| | |
|---|---|
| $H_0 = 21,399$ | $H_4 = 5,478,144$ |
| $F_0 = 6,202$ | $F_4 = 1,369,536$ |
| $E_0 = 10,811$ | $E_4 = 2,740,856$ |
| $V_0 = 4,630$ | $V_4 = 1,371,341$ |

Vertex-Point Refinement

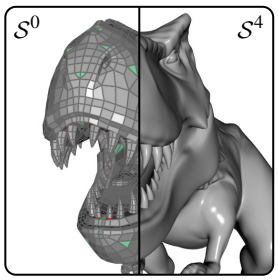



Halfedge Refinement



## 8. T-Rex

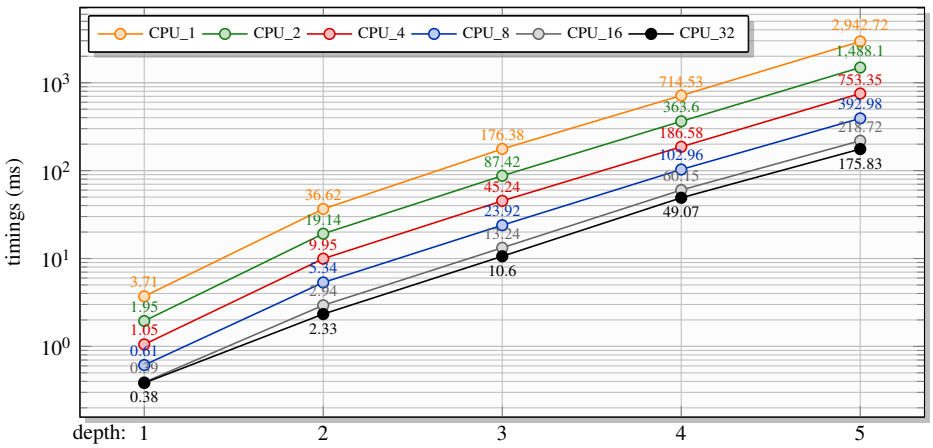
T-Rex




(468 non-quads / 594 boundaries)

| | |
|---|---|
| $H_0 = 45,224$ | $H_4 = 11,577,344$ |
| $F_0 = 11,422$ | $F_4 = 2,894,336$ |
| $E_0 = 22,909$ | $E_4 = 5,793,424$ |
| $V_0 = 11,539$ | $V_4 = 2,899,140$ |

Vertex-Point Refinement




Halfedge Refinement