

PRESENTATION OUTLINE: Build and Travel KD-Tree with CUDA

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1 Introduction

- Definition of KD-Tree
- Picture of KD-tree

2 Introduction

- Pros and Cons of KD-Tree

3 Introduction

- With KD-Tree we can do...

4 Introduction

- Particular application of KD-Tree–ray tracing
- What is ray tracing
- Why is KD-Tree helpful in ray tracing

5 Introduction

- KD-Tree compare to other partition method
- OcTree
- BVH

6 Serial KD-Tree build algorithm

- Overall algorithm introduction

7 Serial KD-Tree build algorithm

- Split strategy
- Mid split
- Surface Area Heuristic(SAH)

8 Serial KD-Tree build algorithm

- Large Node Stages

9 Serial KD-Tree build algorithm

- Small Node Stages

10 Serial KD-Tree build algorithm

- Data structure of KD-Tree
- SoA array of tree structure

11 Parallel KD-Tree build algorithm

- Analysis of serial code
- Corresponding CUDA code

12 Parallel KD-Tree build algorithm

- Time consuming of serial and parallel KD-Tree build algorithm
- Performance analysis

13 KD-Tree travel algorithm

- Question:Can we do tree travel in parallel?

14 KD-Tree travel algorithm

- Stack based tree travel

15 KD-Tree travel algorithm

- Time of finding intersections without KD-Tree
- Time of finding intersections with KD-Tree
- Time of finding intersections with KD-Tree on CUDA

16 KD-Tree travel algorithm

- Overall performance and acceleration ratio analysis

17 Conclusion

- KD-Tree is powerful on CUDA
- Remaining issues