

Parallel BVH Construction for Real-Time Ray Tracing

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Ray Traced Scene

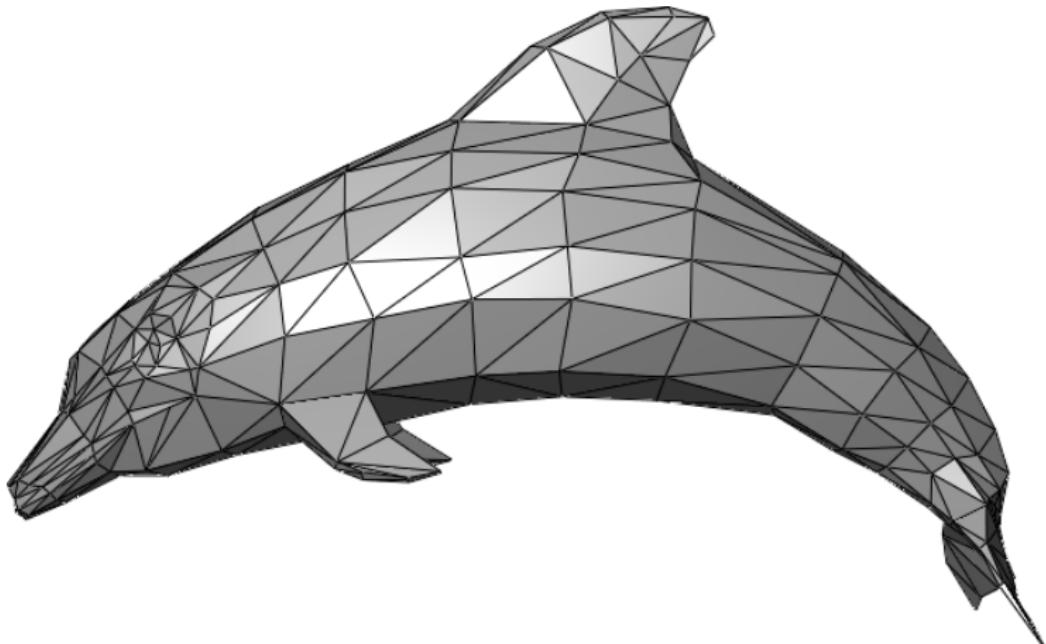


[https://en.wikipedia.org/wiki/Ray_tracing_\(graphics\)](https://en.wikipedia.org/wiki/Ray_tracing_(graphics))

Outline

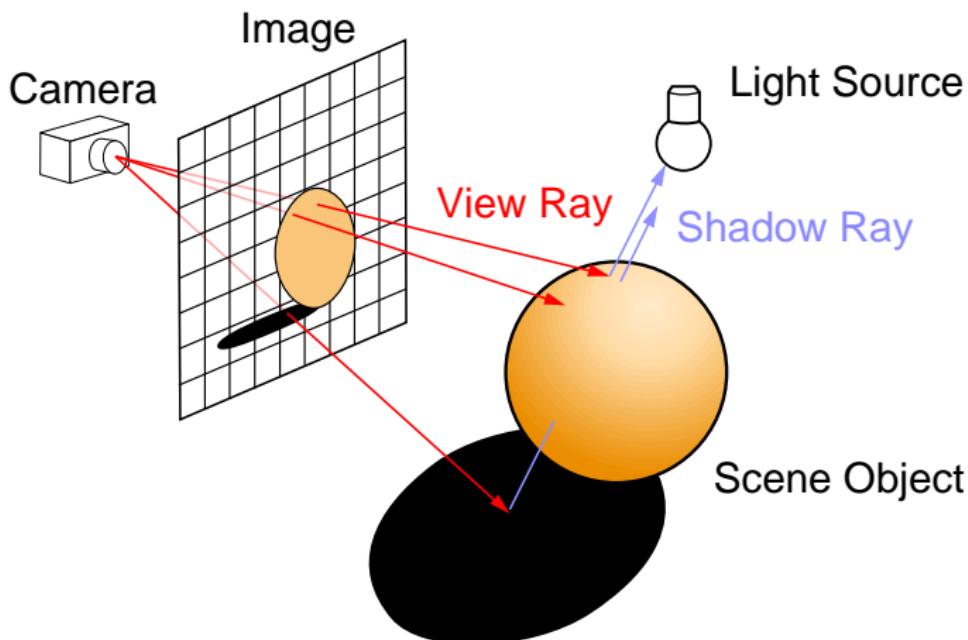
- 1 Ray Tracing Fundamentals
- 2 Grouping Primitives
- 3 Bounding Volume Hierarchy Construction
- 4 Results

Primitives



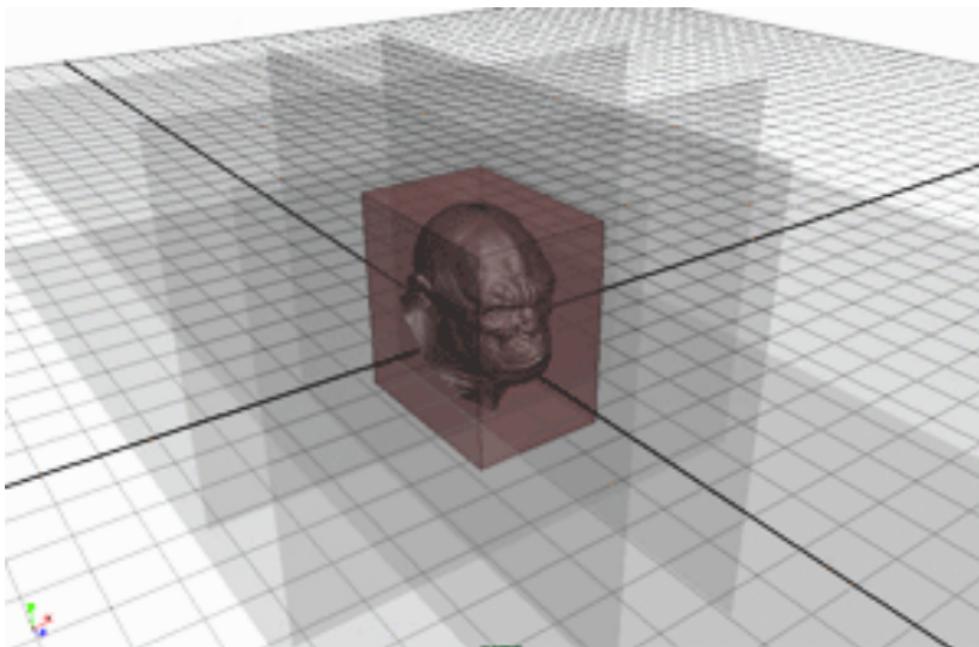
https://en.wikipedia.org/wiki/Triangle_mesh

Ray Tracing

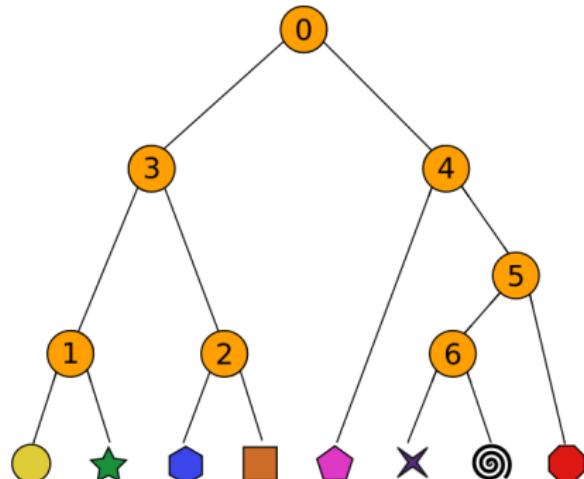
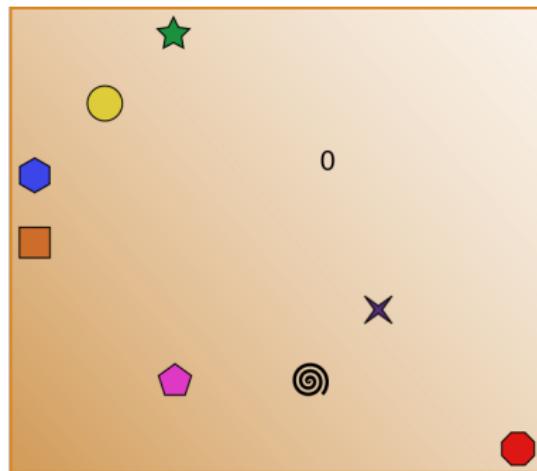


[https://en.wikipedia.org/wiki/Ray_tracing_\(graphics\)](https://en.wikipedia.org/wiki/Ray_tracing_(graphics))

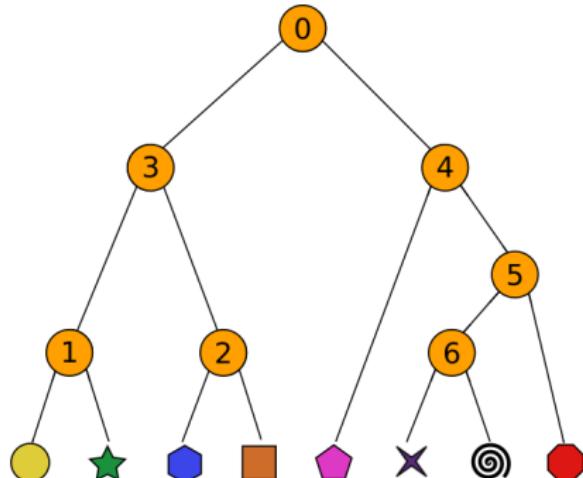
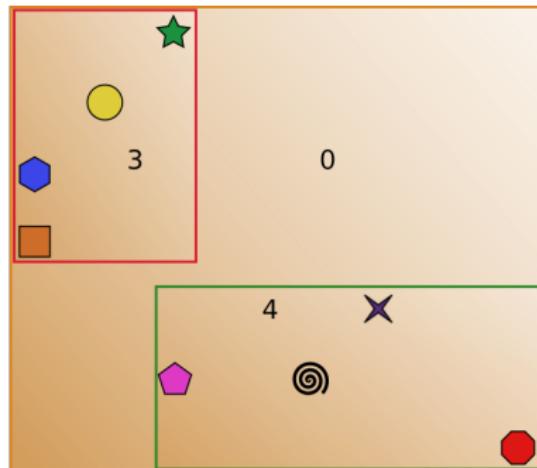
Axis-Aligned Bounding Boxes



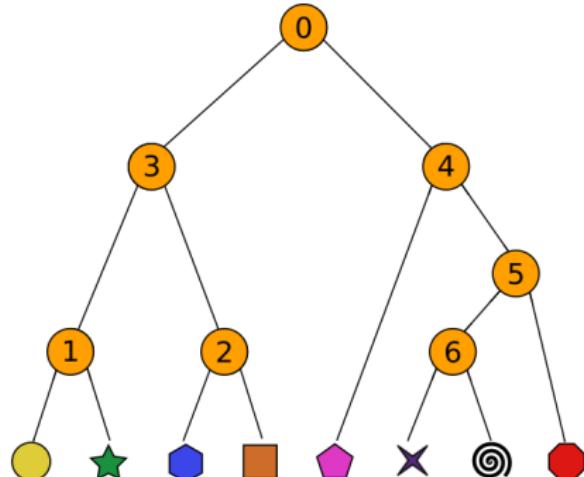
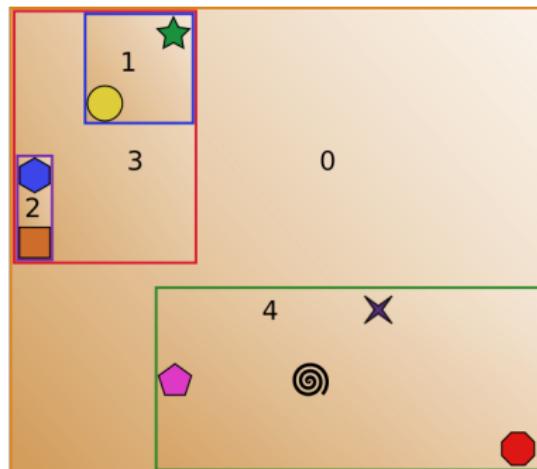
Bounding Volume Hierarchy



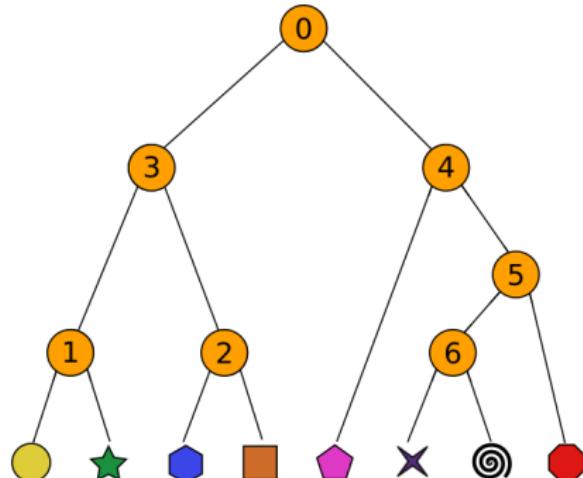
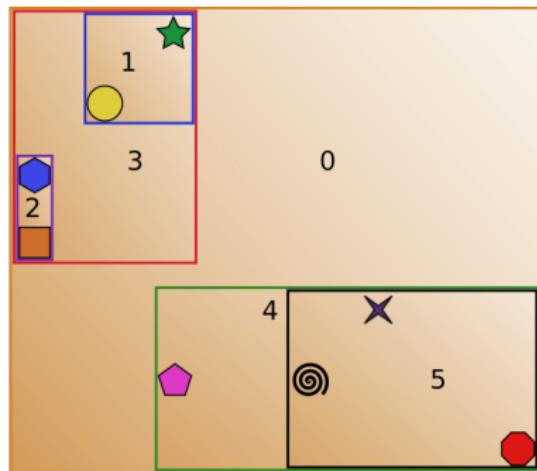
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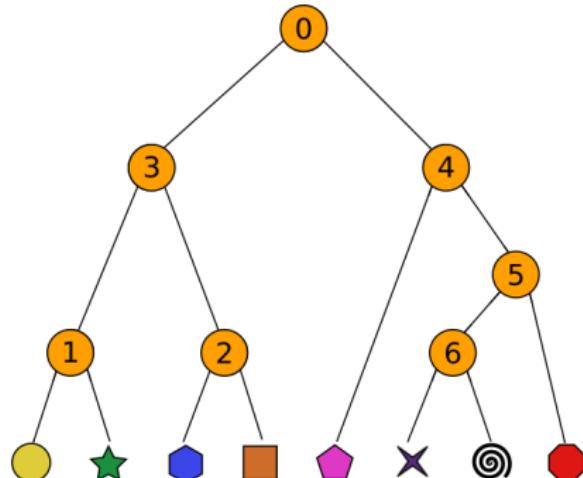
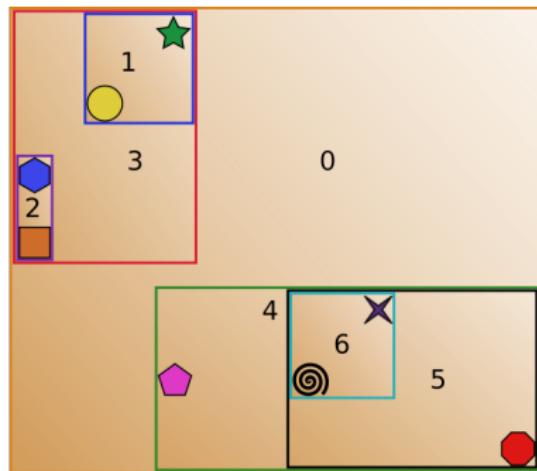
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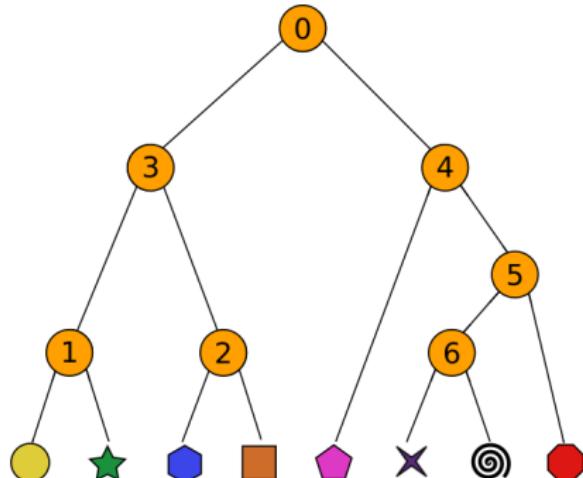
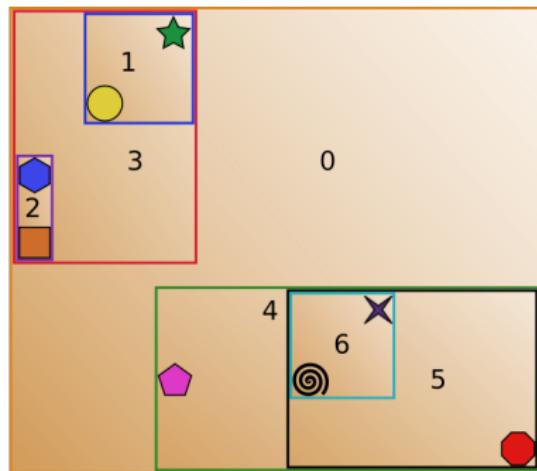
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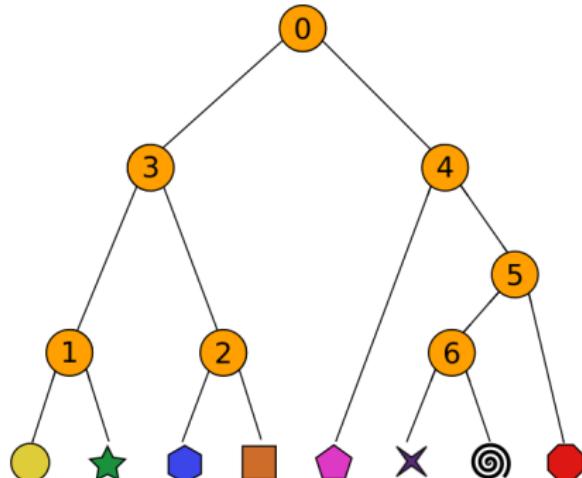
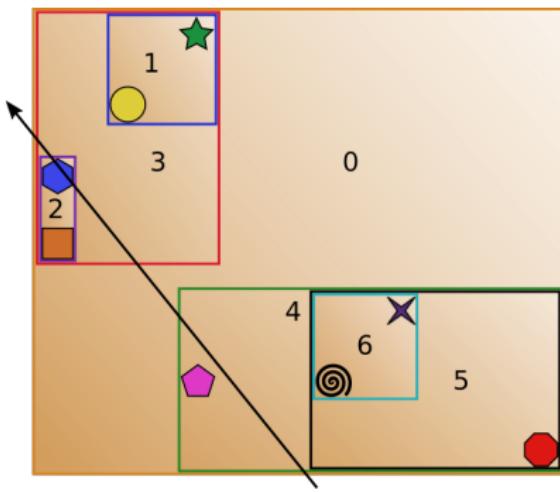
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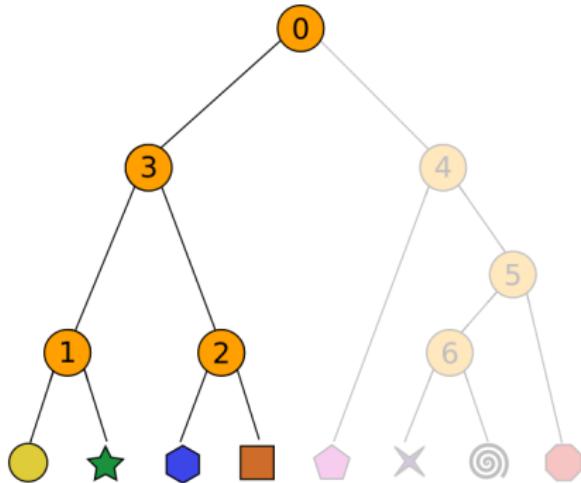
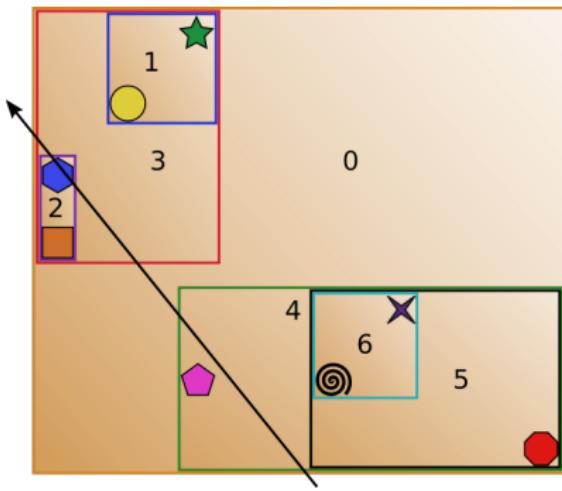
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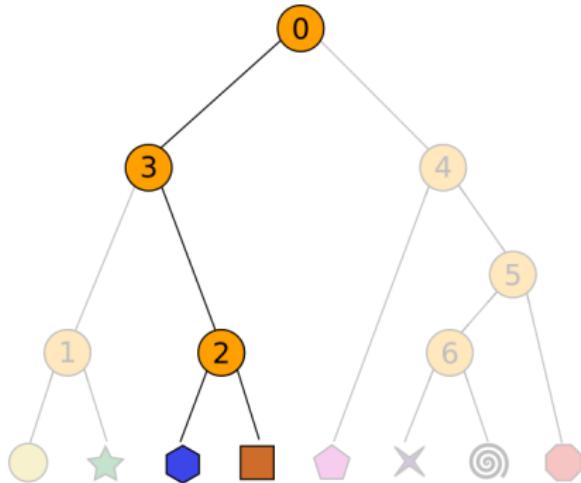
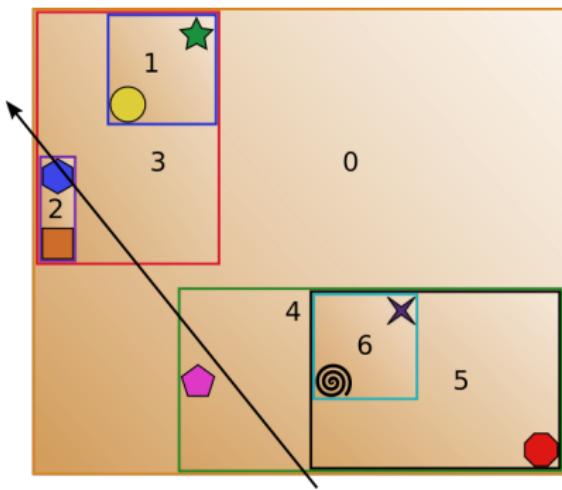
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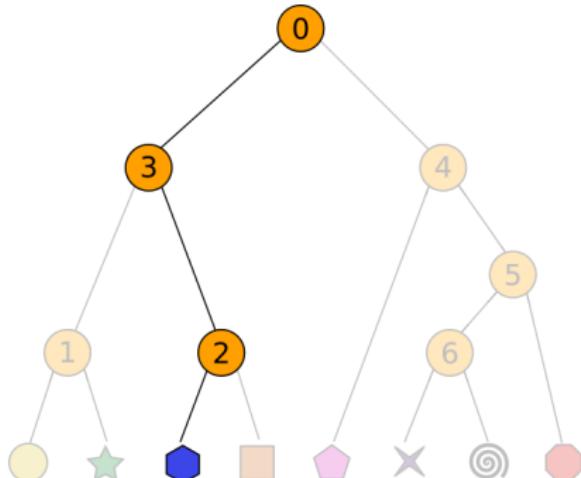
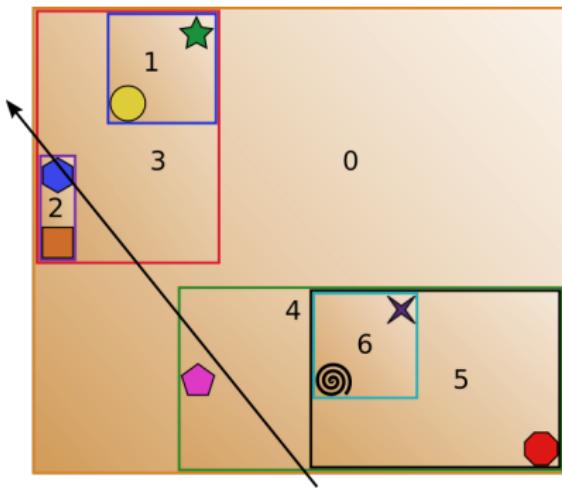
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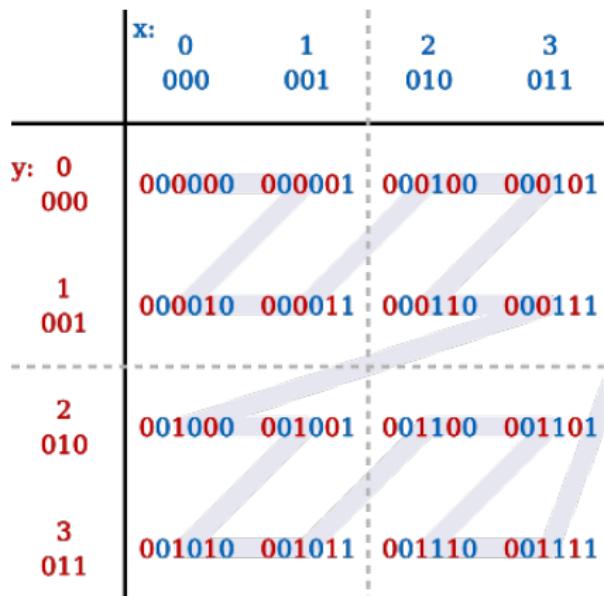
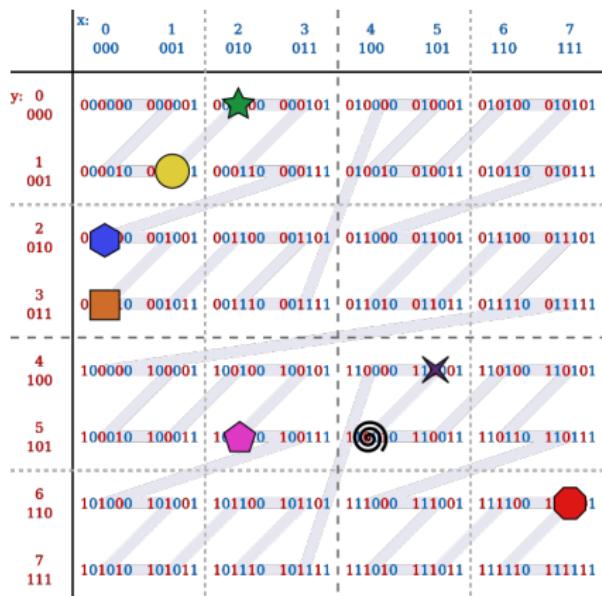
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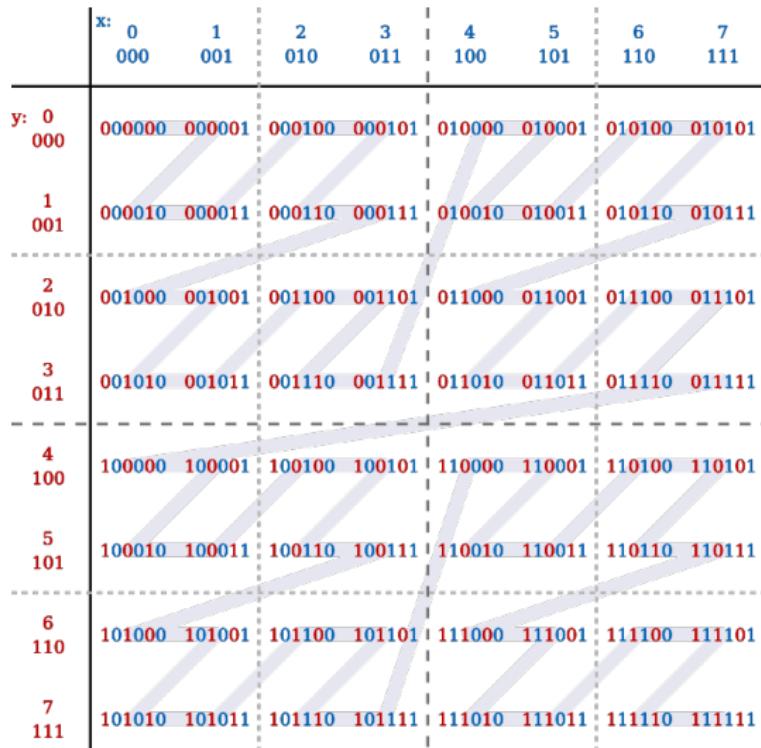
Bounding Volume Hierarchy



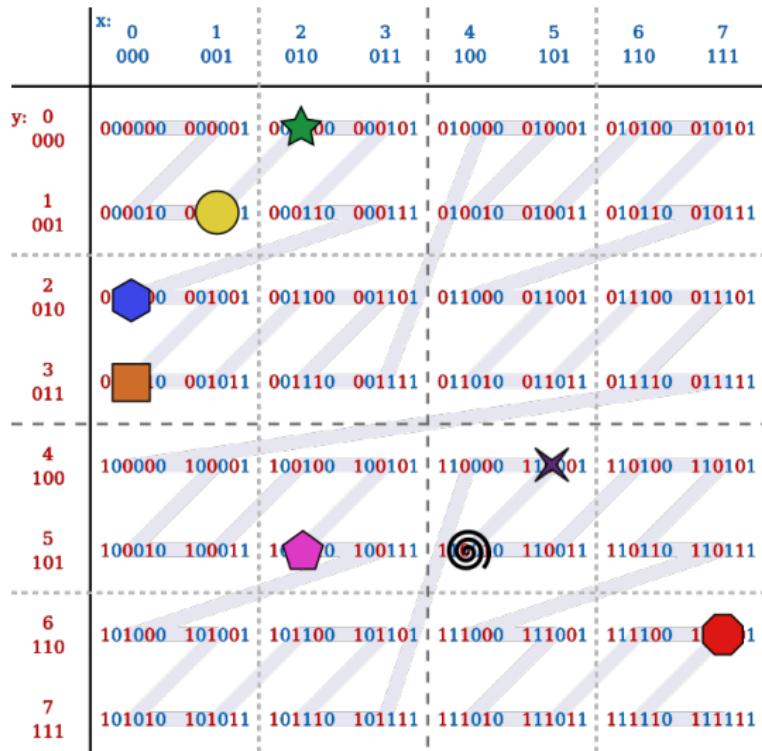
Morton Codes



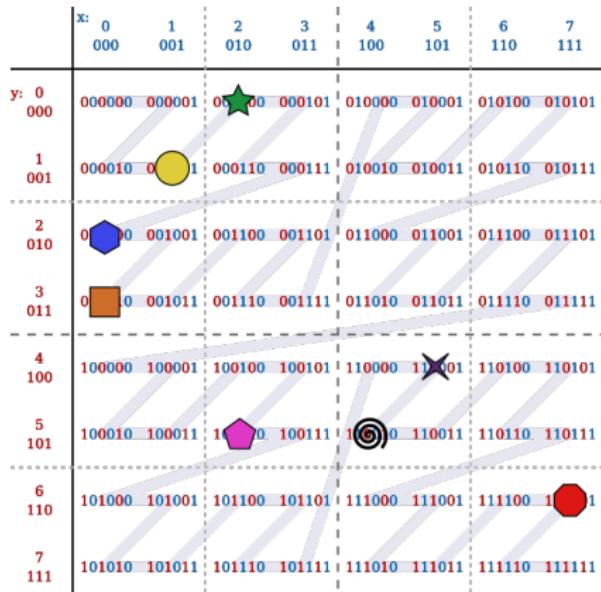
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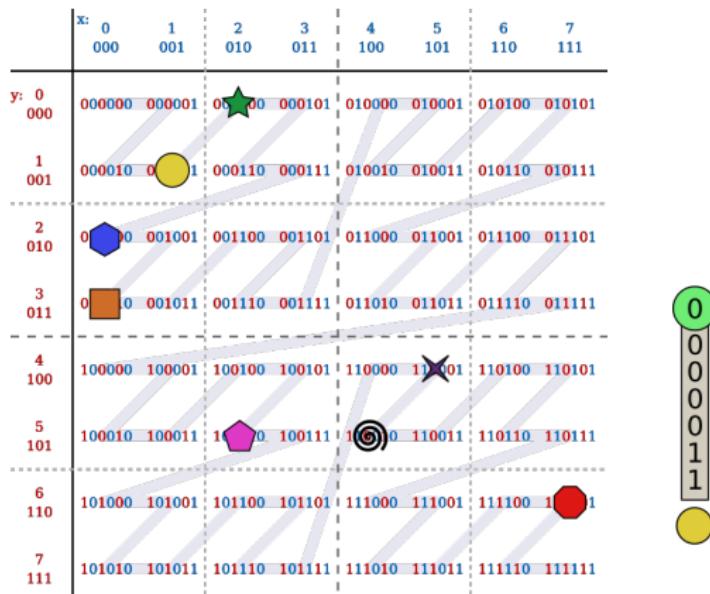
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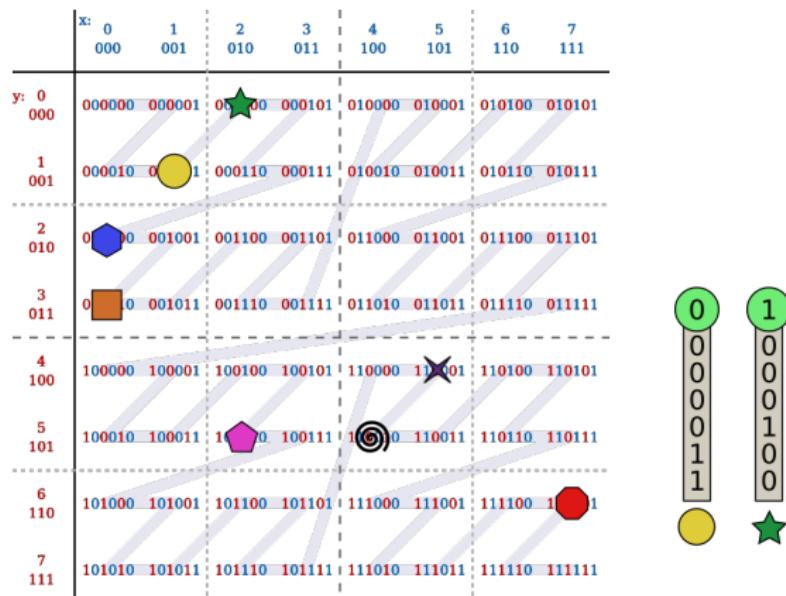
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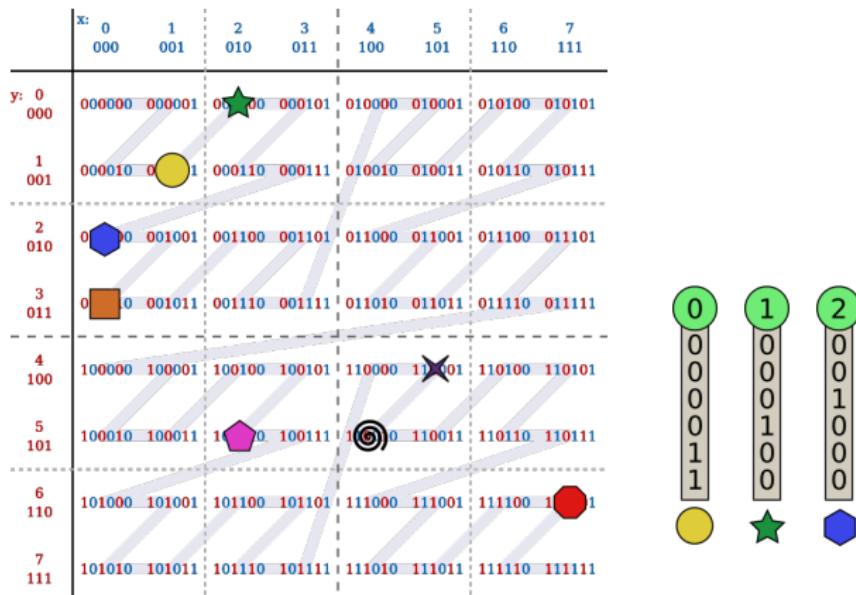
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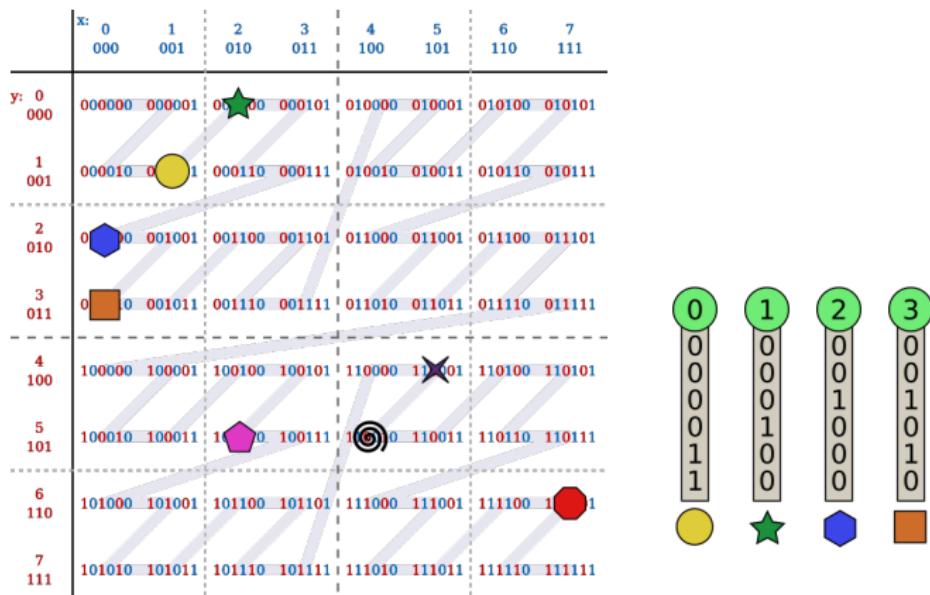
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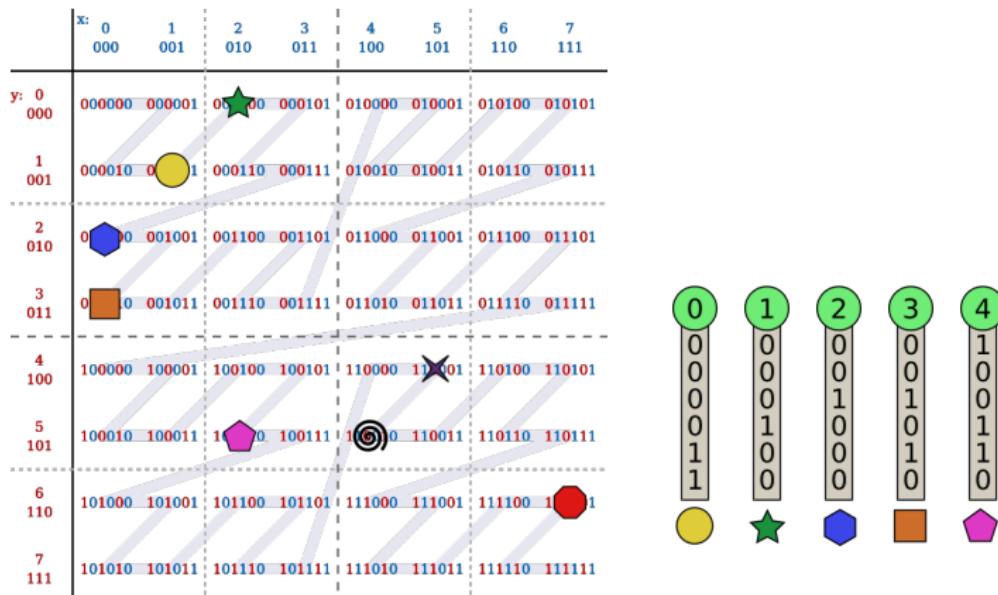
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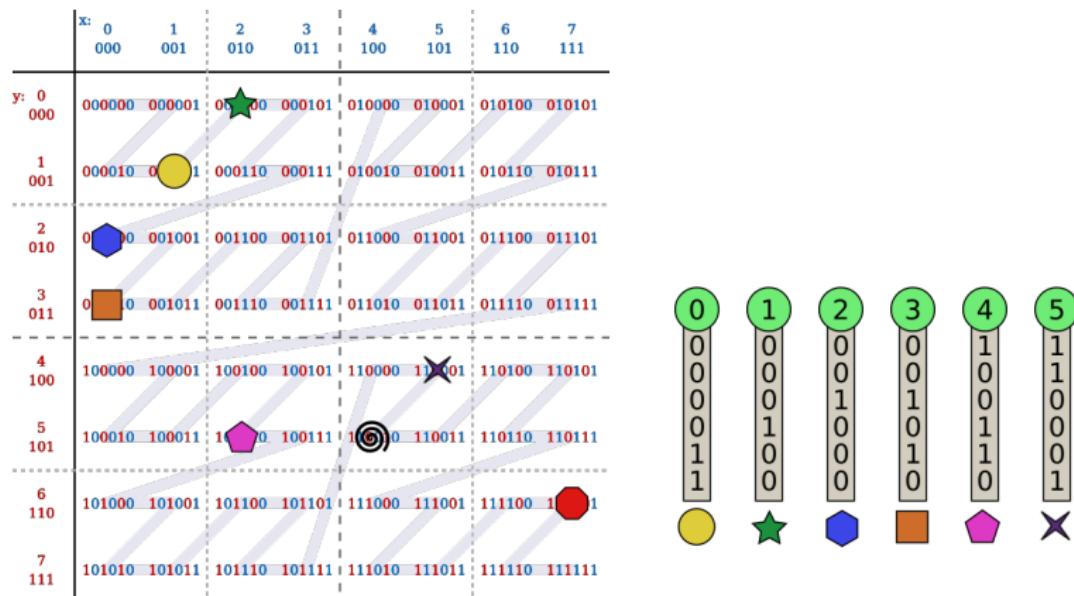
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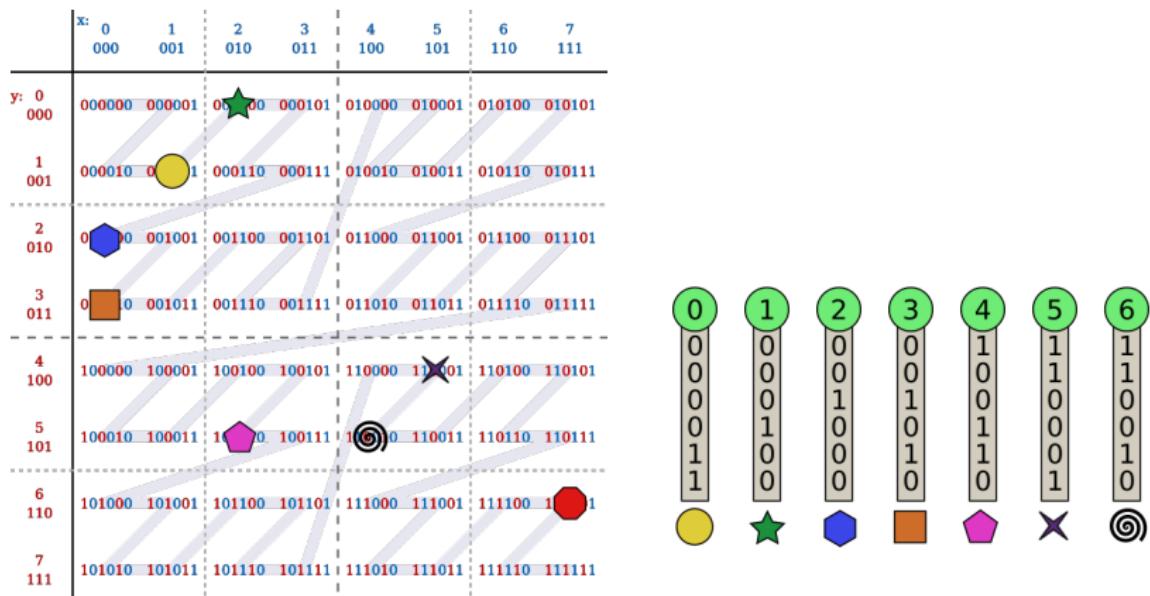
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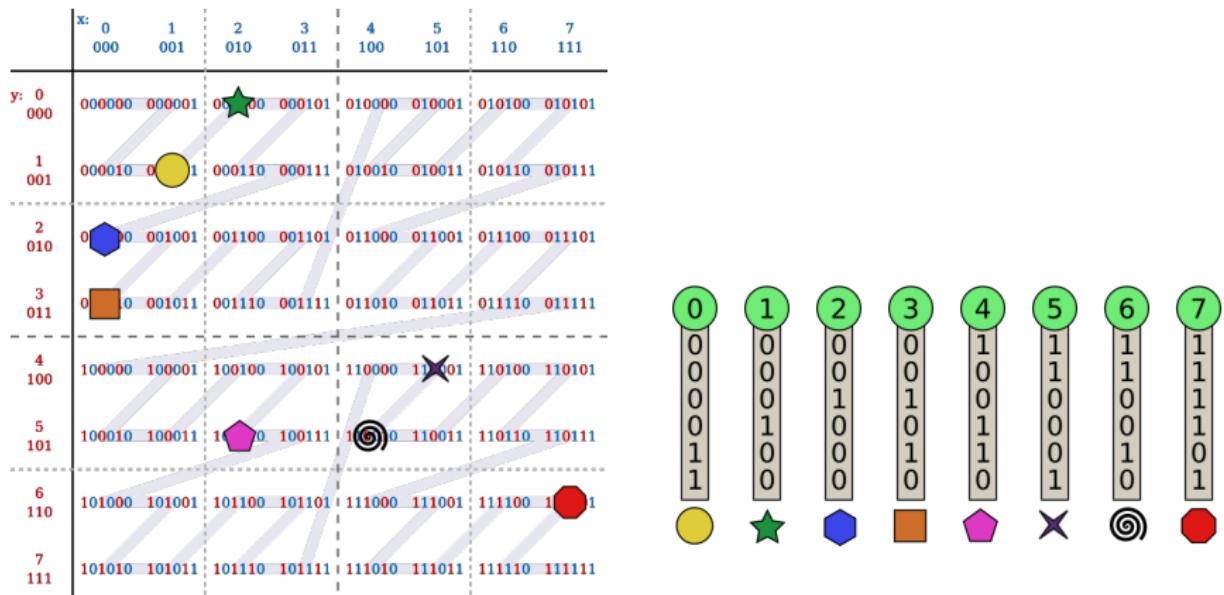
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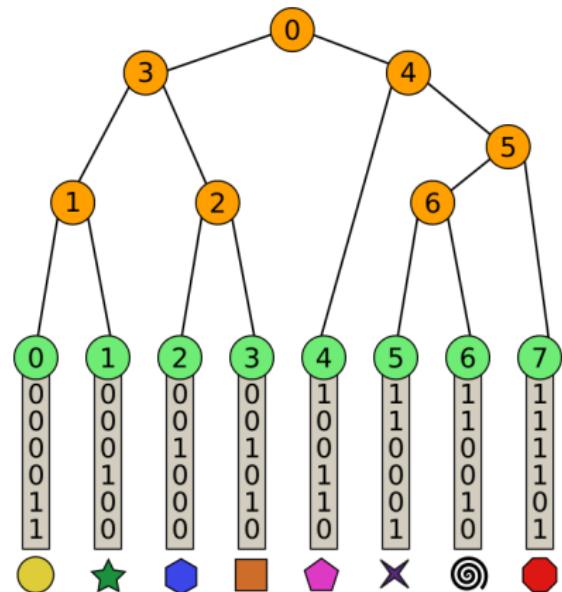
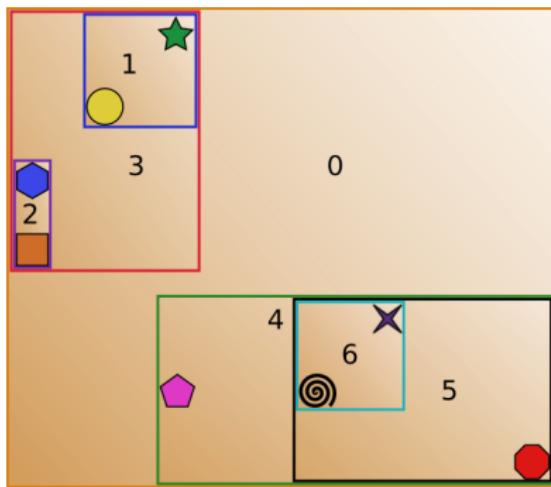
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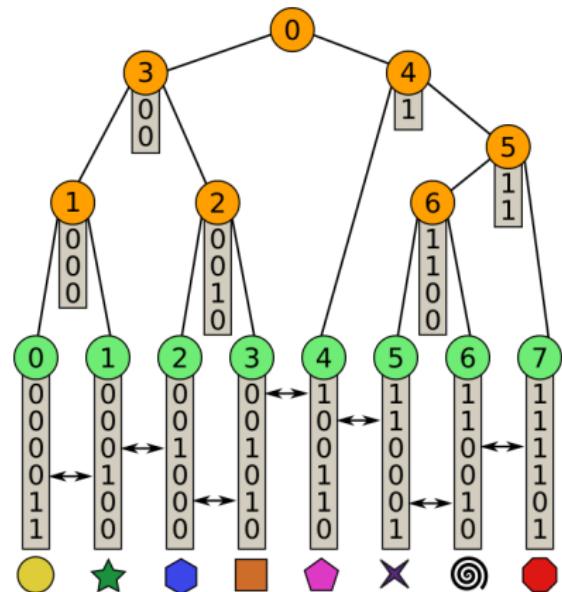
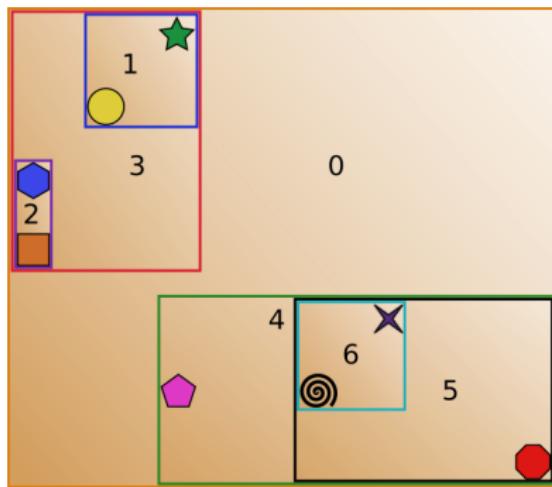
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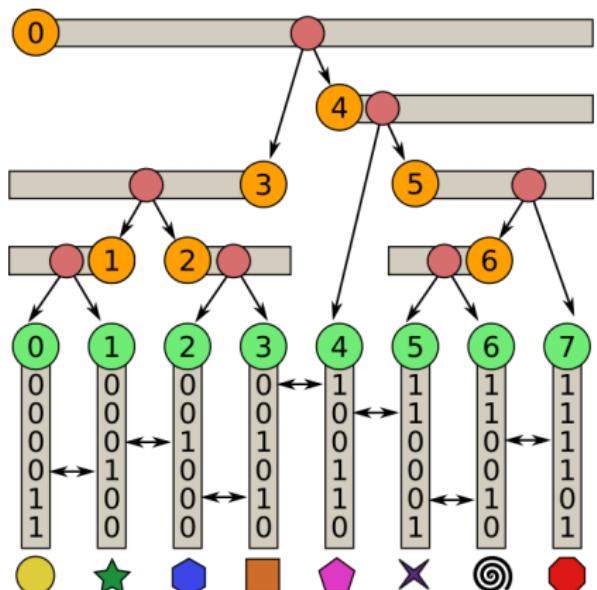
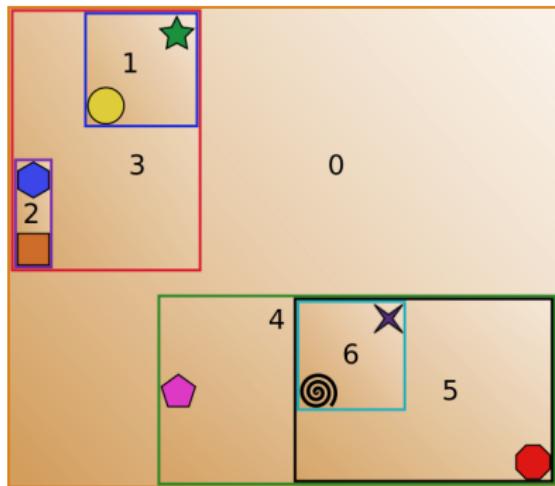
Goal



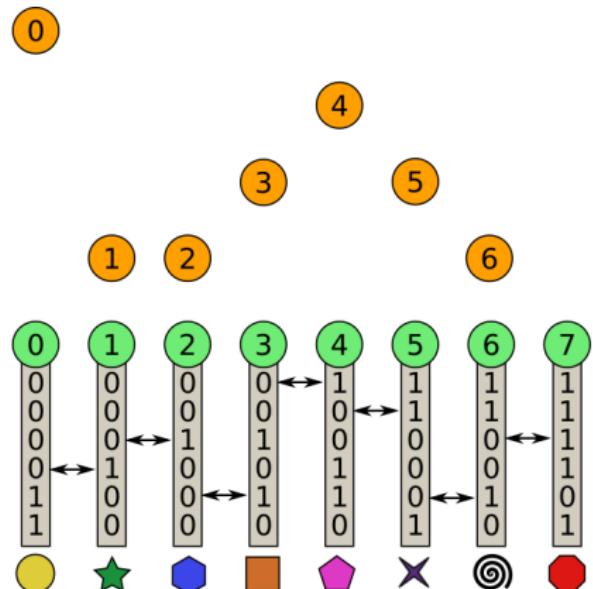
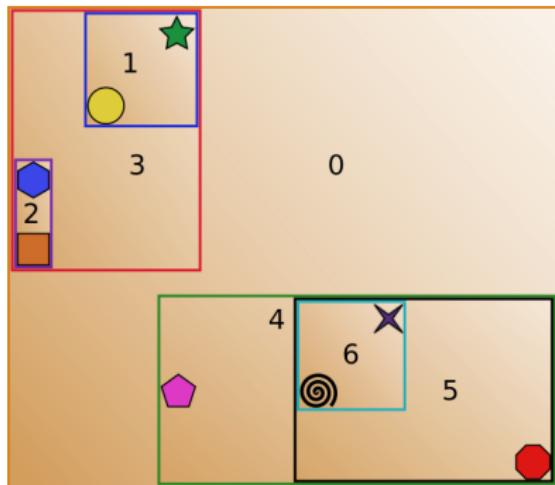
Binary Radix Tree



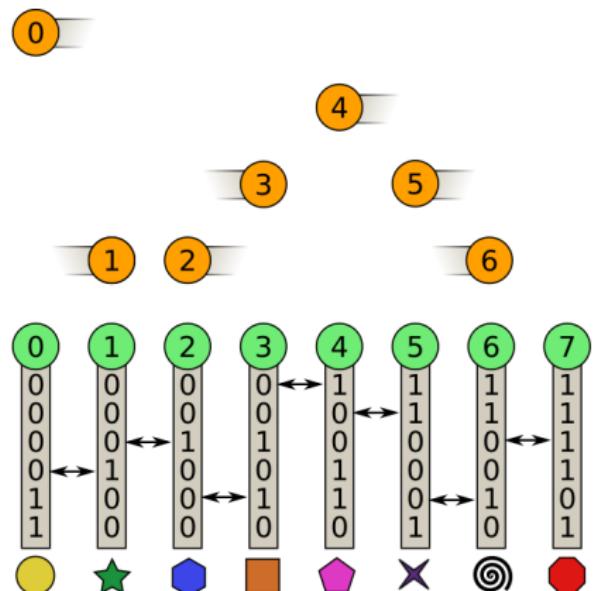
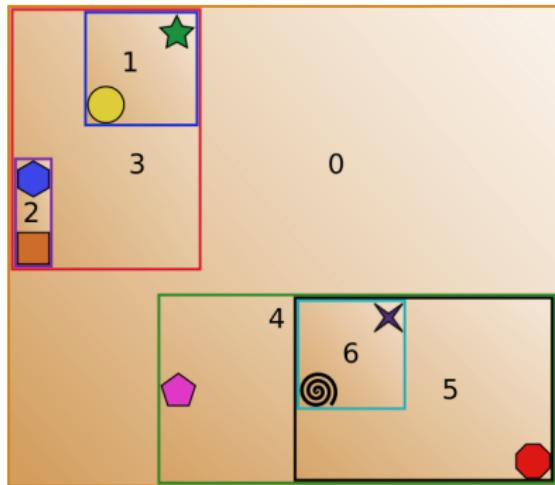
Internal Node Array



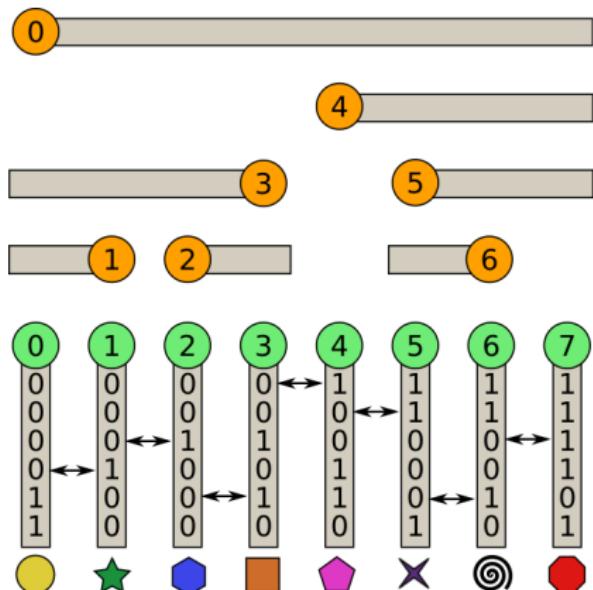
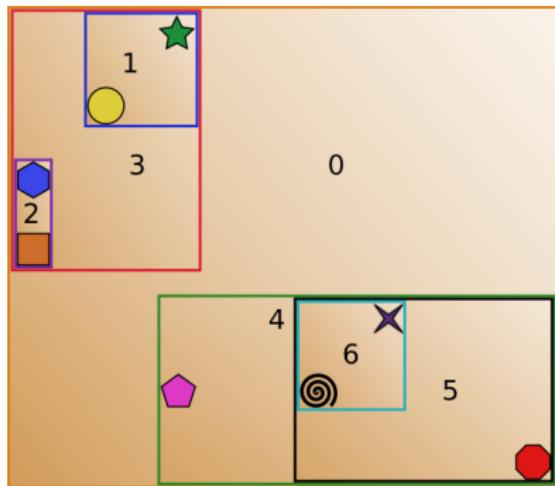
Internal Nodes



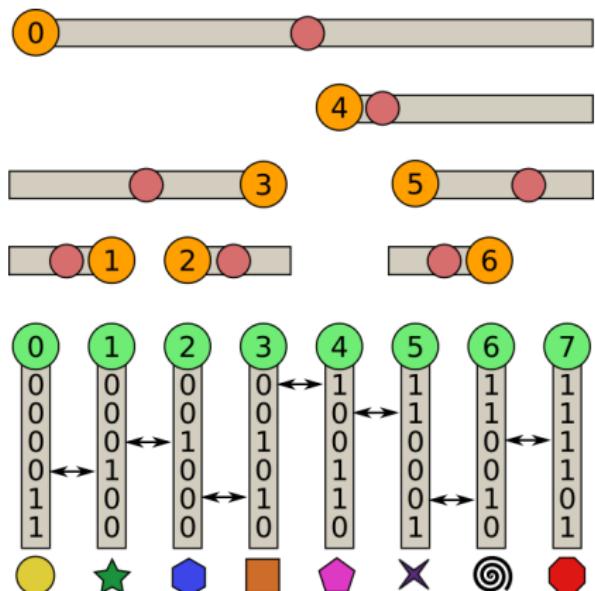
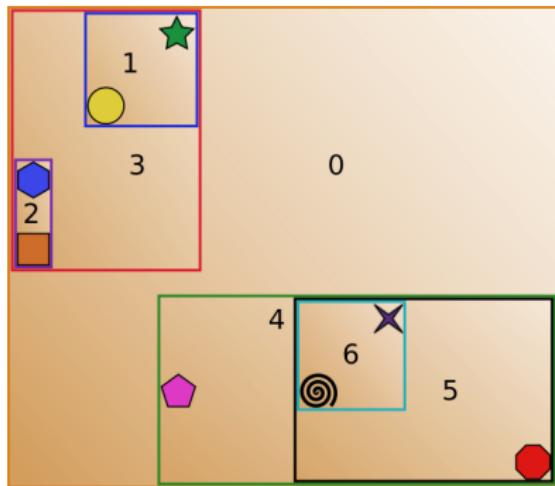
Determine Range Direction



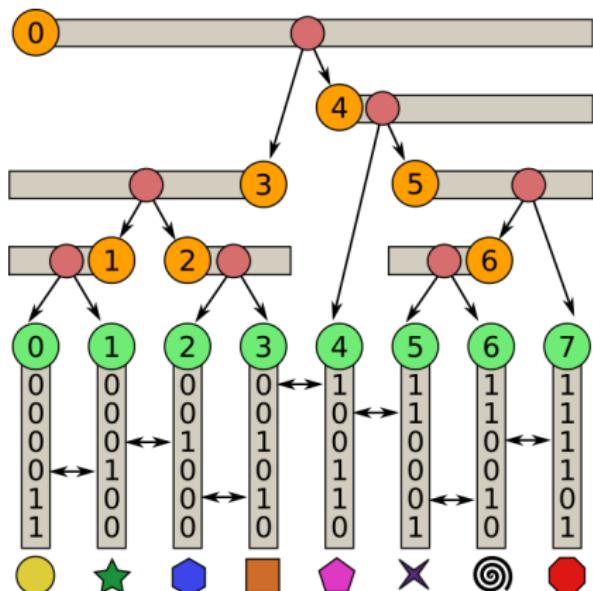
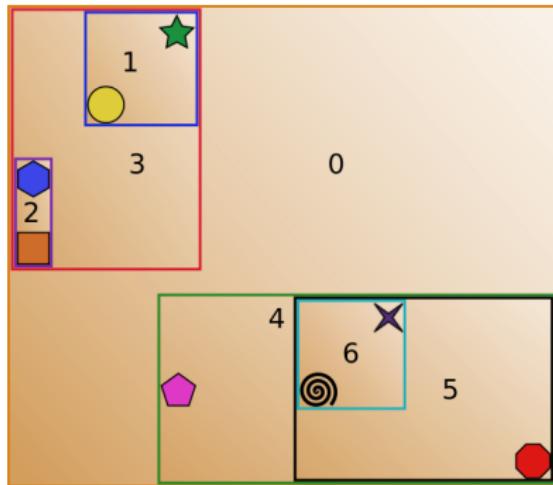
Determine Full Range



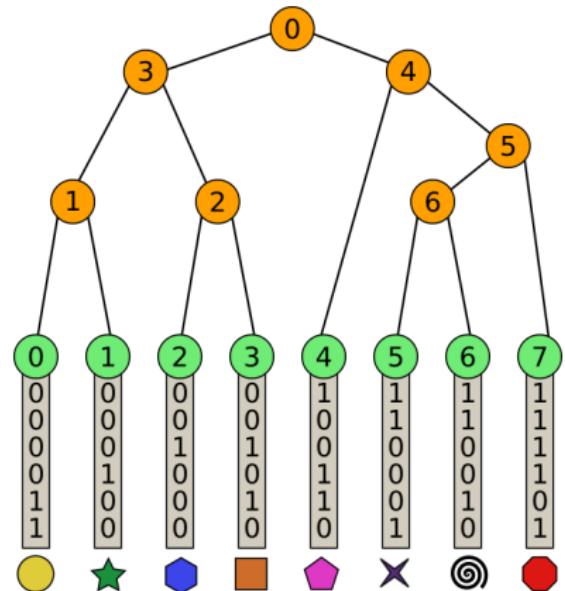
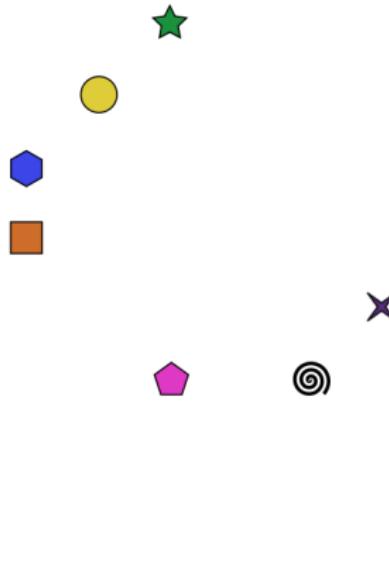
Determine Split Location



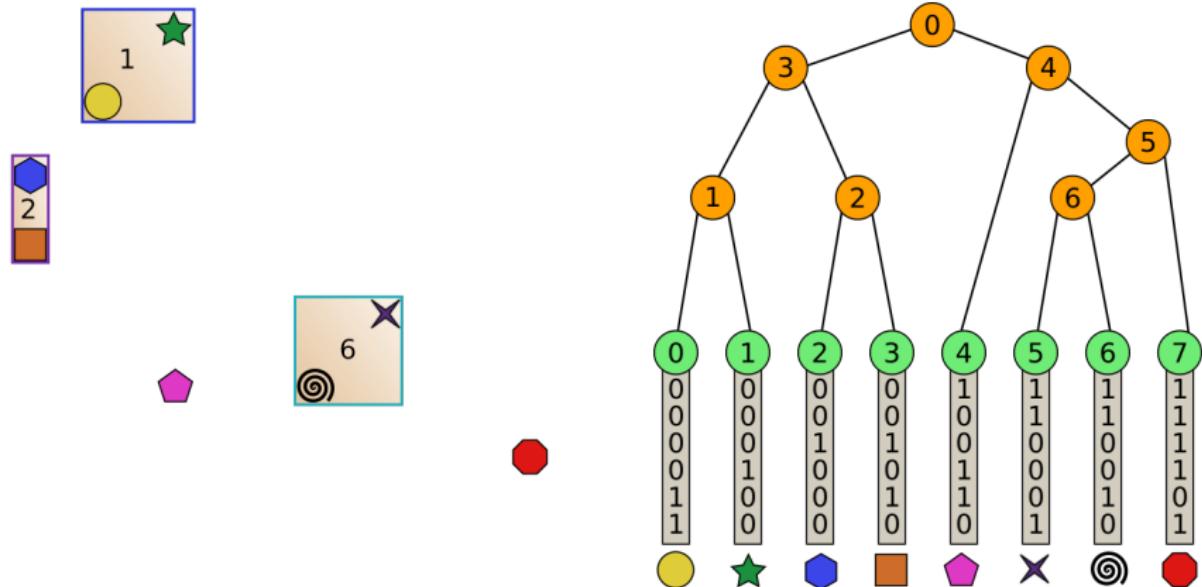
Determine Children



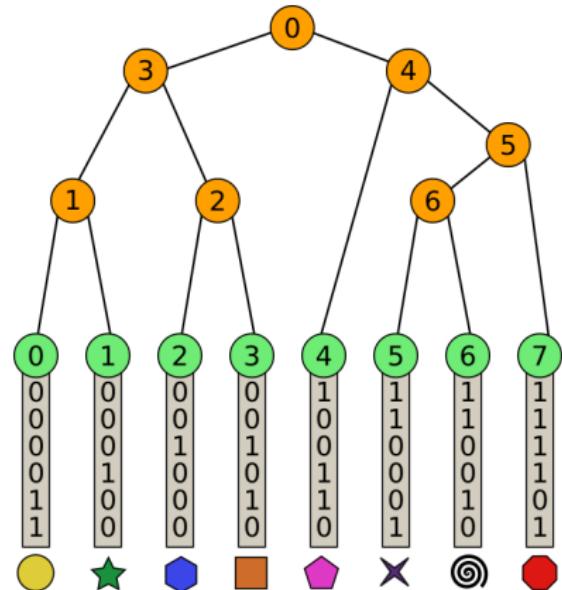
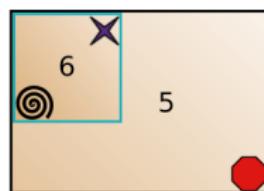
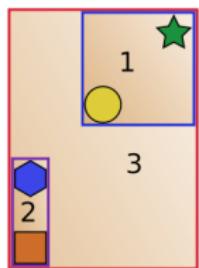
Fitting Boxes



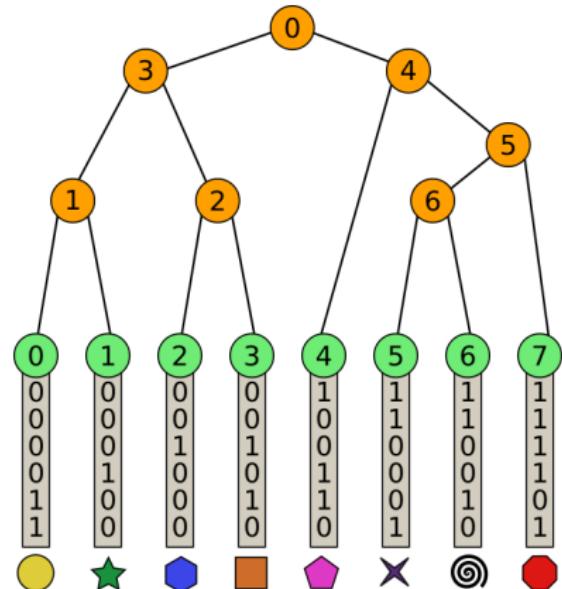
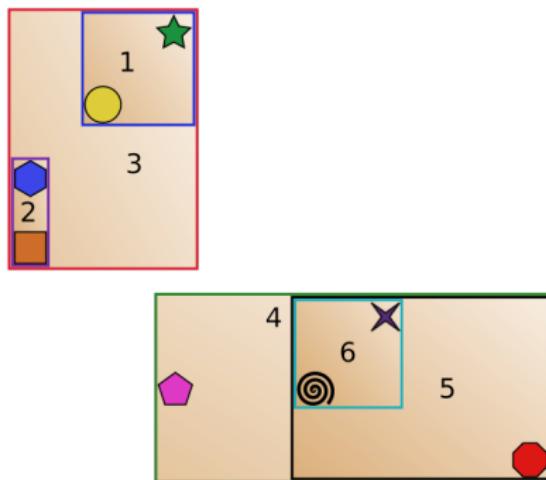
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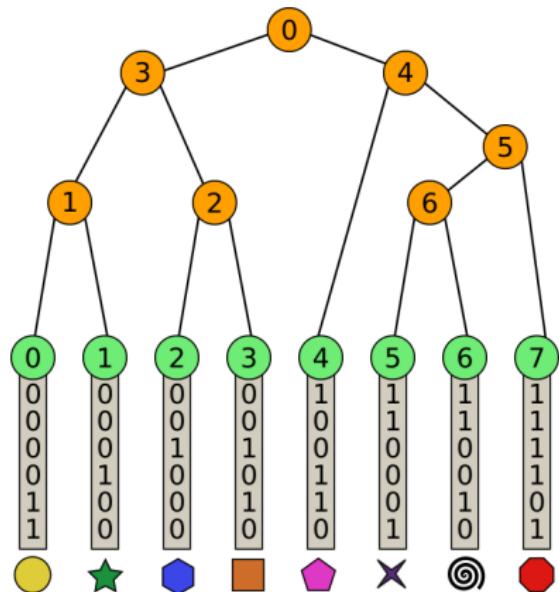
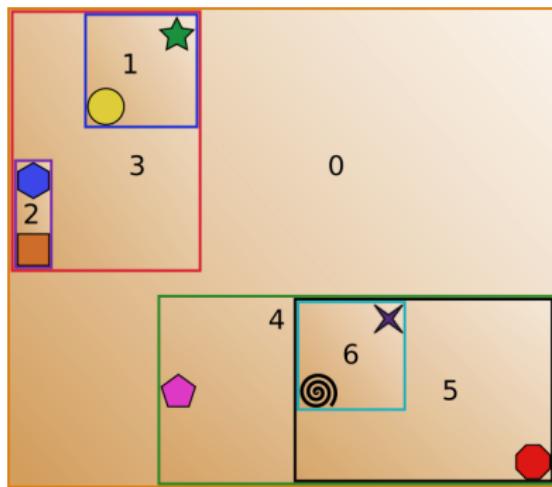
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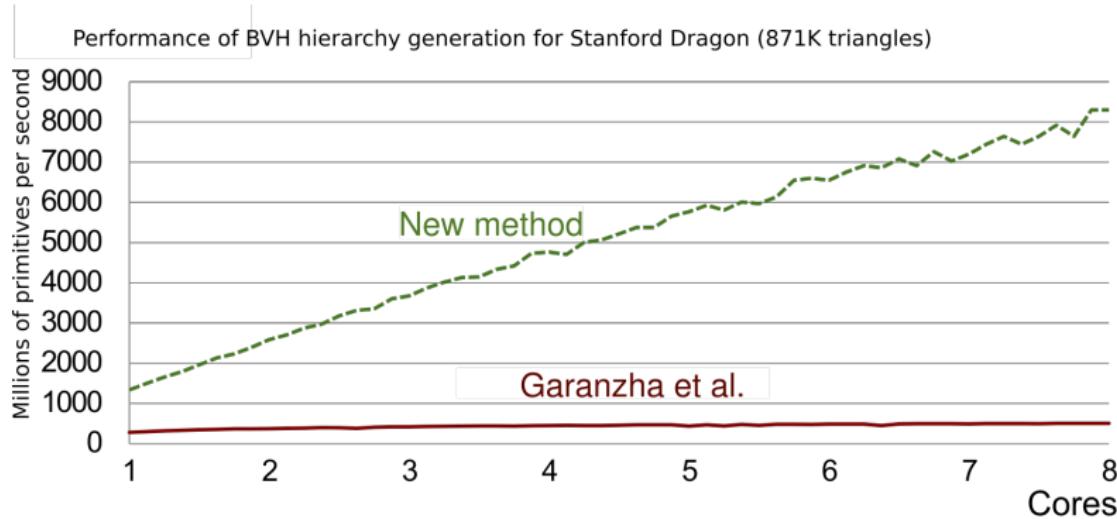
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Fitting Boxes

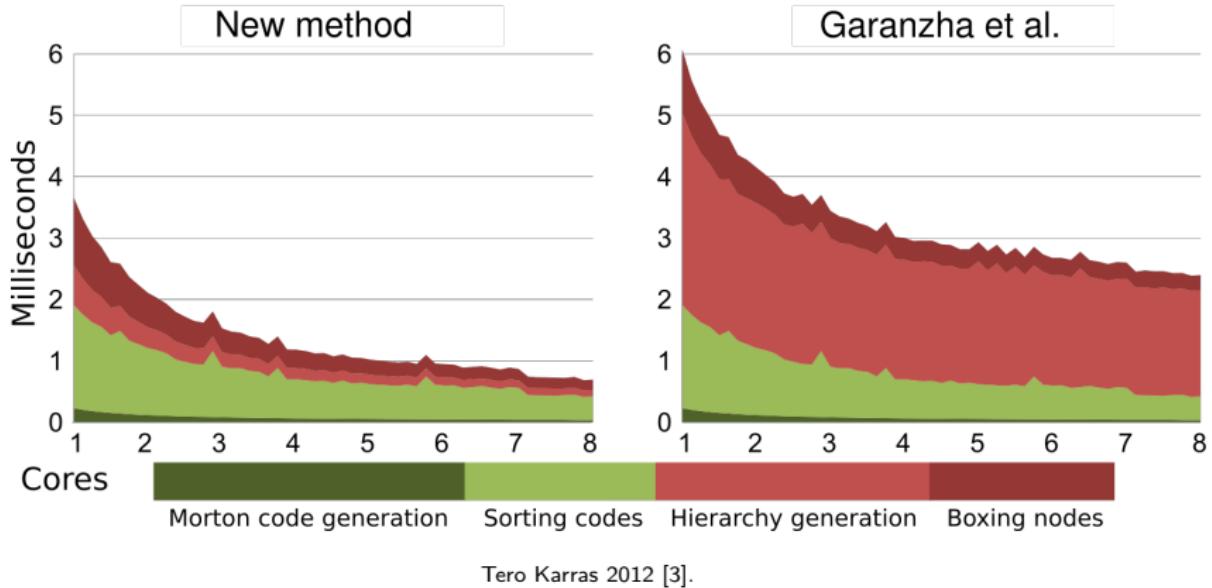


Results



Tero Karras 2012 [3].

Results



Questions?



Bibliography

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DOI=<http://dx.doi.org.ezproxy.morris.umn.edu/10.1145/2018323.2018333>
- ② Christian Gribble, Jeremy Fisher, Daniel Eby, Ed Quigley, and Gideon Ludwig. 2012. Ray tracing visualization toolkit. In Proceedings of the ACM SIGGRAPH Symposium on Interactive 3D Graphics and Games (I3D '12), Stephen N. Spencer (Ed.). ACM, New York, NY, USA, 71-78.
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- ⑥ Turner Whitted. 1980. An improved illumination model for shaded display. Commun. ACM 23, 6 (June 1980), 343-349. DOI=<http://dx.doi.org/10.1145/358876.358882>