# Efficient Point based Global Illumination on Intel MIC Architecture


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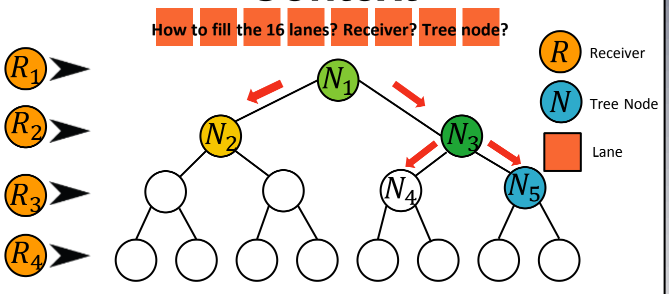
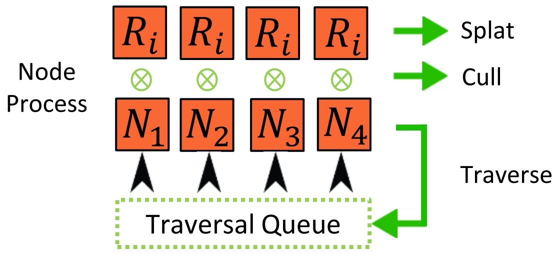
## Context

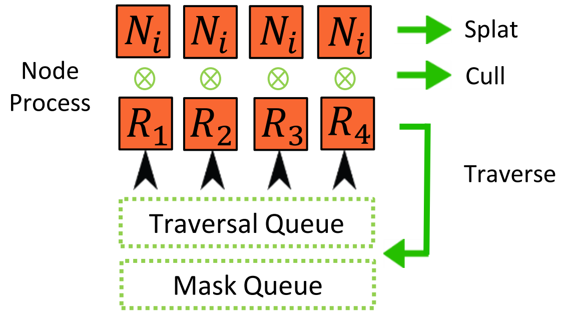



## Method

**Single Vectorization.** Fill 16 SIMD lanes with different tree nodes and then one receiver processes with these tree nodes in parallel.




**Packet Vectorization.** Each lane has its own receiver and microbuffer, and all the lanes share a traversal queue and a mask queue. One node is picked from the traversal queue to fill the 16 lanes.




## Results

Fig.1. Performances (see Tab. 1) are measured on a Intel Xeon Phi Coprocessor 7110P， 61 cores, 1.1GHZ with 8GB memory.

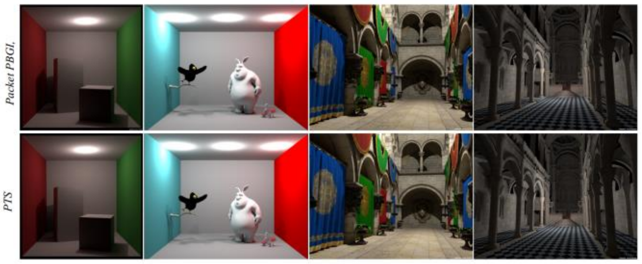
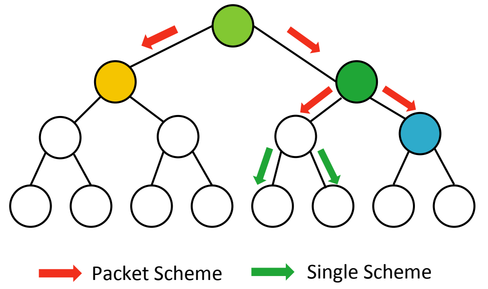



**Figure 1:** *Visual comparison with path tracing.*

| Scenes | pre. | Traversal time | | | |
|---|---|---|---|---|---|
| | (s) | Thread (s) | Single (s) | Packet (s) | Hybrid (s) |
| CBox | 2.95 | 50.90 | 24.19 | 17.61 | 18.19 |
| Bunny | 3.25 | 212.49 | 100.51 | 70.34 | 84.20 |
| Sponza | 4.28 | 266.60 | 122.28 | 90.22 | 86.73 |
| Sibenick | 4.11 | 106.51 | 51.02 | 37.48 | 37.07 |

**Table 1:** *Performance measures.*

**Hybrid Vectorization** Starting from the packet scheme, we trace the count of the active receivers, and when this number is less than a given threshold, we save the traversal state and switch to the single scheme for the last stages of the traversal.

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