

Real-time Interaction via Haptics Real-time Interaction by Sense of Touching (Haptics)

Steer simulation in real-time | Feel invisible phenomena via touching | 3D space | Real-time Input && output



Silk Road: Distributed Collaborative Simulation Framework



Three QUADS: An Interconnection Network for Interactive Simulations

Low Diameter of 2 | Fault tolerance and path diversity | Embeddability of topologies | Medium-scale

Simultaneous and interactive execution of simulation and visualization



Node assignment to switches in Three Quads (64 nodes case)



Diameter = 2 | Fault-tolerance | Path diversity

"Three" stands for

The existence of <u>three</u> independent sub-networks. SW-X, SW-Y, and SW-Z

"Quads" stands for

The coverage of each GbE is a nodes inside a rectangular area in one of the X-Y,Y-Z, or Z-X planes.





Sensable Simulation System (with GPUs)



- Any two nodes can communicate with each other in 2 hops.
- High cost performance (Against expensive switch)

Table 5	Elapsed	Time for Matrix	Transpose[s]
Network Config	uration	Three Quads	Enterprise Switch
Half Duple	ex	19.2	13.2
Full Duple	ex	11.8	10.4

Table 2 Element Time for Matrix Transmoster[1]



Execution time of each node on Three Quads with HD program



Execution time of each node on Three Quads with FD program