

# The Oracle Macrochip: Architecture and Devices

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Workshop on the Interaction between Nanophotonic Devices and Systems

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Recent advances in nanophotonic devices have allowed system designers to rethink the construction of large-scale computing systems. In this talk we discuss a particular system view that employs optics to efficiently transmit data between chips in a large-scale many-chip package. This system vision, called a Macrochip, leverages the advantages of photonic links to create an optimized network between densely aggregated compute and memory sites. We present this system concept and discuss appropriate network architectures for different programming models. We will also discuss our progress on demonstrating the optical links through a series of silicon testchips showing highly energy- and area-efficient transceivers.

**Frankie Liu, Principal Hardware Engineer** – Frankie received his B.S., M.S., and Ph.D. degrees in Electrical Engineering from Stanford University. At Oracle, Frankie designs analog and digital circuits in the VLSI Research Group. Prior to Oracle and Sun Microsystems, he was at Applied Materials, and also True Circuits. His interests include applied physics and mathematics.

**Michael O. McCracken, Senior Software Engineer** – Michael received his M.S. and Ph.D. degrees in Computer Science from The University of California at San Diego. Michael is currently a member of the computer architecture and performance research group in Oracle's Sun Labs. Michael has worked in performance analysis, modeling and simulation of large-scale systems, as well as performance optimization of large scale scientific workloads, collaborating with scientists at the San Diego Supercomputer Center while at UCSD.