PARALLEL PROCESSING AND ADVANCED ARCHITECTURES IN COMPUTER GRAPHICS

COURSE # 16

CHAIR:

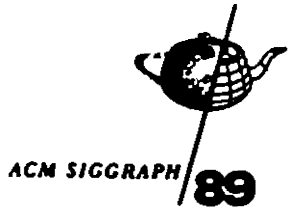
Scott Whitman
Ohio State University

SPEAKERS:

Frank Crow
Xerox Palto Alto Research Center

Henry Fuchs
University of North Carolina

Nader Gharachorloo
IBM T.J. Watson Research Center



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Parallel Processing and Advanced Architectures in Computer Graphics

Scott Whitman
(slim@cis.ohio-state.edu)

Course Chair

This course has been inspired by a growing interest from the parallel processing and computer graphics communities on research combining these technologies. The recent availability of commercial parallel processors has opened up the domain for testing of new parallel graphics display algorithms. In addition, VLSI technology in recent years has made it possible for us to build high quality graphics workstations. All of these circumstances have brought us to the development of a new generation of research methods which can effectively exploit existing and future technology for high performance computer graphics.

The speakers in this course are presently involved in research which will further this effort. The lectures will provide a glimpse into the state of the art work in this area. In addition, we have provided course notes which serve as a reference guide to the research the speakers will discuss. The notes contain papers which are all very up to date developments in the subject area. We hope you find them useful.

Topics

I. Introduction/Scott Whitman

A. Course Overview

B. Fast Parallel Solutions to Image Generation Problem

1. Hardware
2. Software

C. Characteristics of Hardware/Software Solutions

1. Advantages/Disadvantages to each
2. Application Areas relevant to each solution

II. Parallel Processing for High-End Graphics/Frank Crow

A. Need for Speed

1. Applications for Teraflops
2. Current Reality
3. Current Architectural Solutions - from PC's to Massively Parallel Computers
4. Parallel Algorithms for Graphics
5. Impact of Programming Ease

B. Granularity in Parallel Approaches to Image Synthesis

1. Course Grain to Fine Grain solutions

C. Parallelizing the Rendering Pipeline

1. Data Input to Pixel Shading

III. Graphics Display Algorithms for Parallel Processors/Scott Whitman

A. Constraints on Displaying Images in Parallel

B. Potential Parallelism in Image Synthesis Techniques

C. Issues in Developing a Software Parallel Graphics Algorithm

D. Example Software Parallel Solutions

1. Past Methods
2. Mapping of Algorithm to Architecture
3. Criteria for Evaluating Algorithms
4. Current and Future Research

IV. Introduction to Rasterization Problem/Henry Fuchs

A. Front End Calculations

B. Back End Pixel Calculations

C. Frame Buffer, Z-Buffer, Gouraud Shading

D. History of Research Proposals

Schedule

	TIME
I. Introduction (Speaker - Scott Whitman)	8:30-8:45
II. Parallel Processing for High-End Graphics (Speaker - Frank Crow)	8:45-9:45
BREAK	9:45-10:00
III. Graphics Display Algorithms for Parallel Processors (Speaker - Scott Whitman)	10:00-11:20
IV. Introduction to Rasterization (Speaker - Henry Fuchs)	11:20-12:00
LUNCH	12:00-1:30
V. Scanline Based Architectures and Performance Techniques (Speaker - Nader Gharachorloo)	1:30-3:00
BREAK	3:00-3:15
VI. Architecture of the Pixel Planes 5 System (Speaker - Henry Fuchs)	3:15-4:00
VII. Future Directions and Trends in Parallel Graphics (Speaker - Frank Crow)	4:00-4:30
VIII. Discussion on Future of High Performance Graphics Systems (ALL)	4:30-5:00

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