

**SIGGRAPH 1991**  
**18th International Conference**  
**On Computer Graphics and**  
**Interactive Techniques**

**Las Vegas Convention Center**  
**28 July - 2 August**

## **COURSE NOTES**

## **C15**

**PHIGS PLUS PROPOSED**  
**EXTENSION TO PHIGS**  
**GRAPHICS STANDARD**

***Chair***

**Edy Henderson**  
**Sun Microsystems, Inc**

***Lecturers***

**Henn Gouraud**  
**Digital Equipment Corporation**  
**Griff Hamlin**  
**McDonnell Douglas**  
**Eileen McGinnis**  
**Sun Microsystems, Inc**  
**Mike Stapleton**  
**System Simulation Ltd**  
**Spencer Thomas**  
**University of Michigan**

## **Abstract of Course**

Attendees will have the opportunity to study concepts of the soon-to-be-standardized ISO extensions to PHIGS, known as PHIGS PLUS, which defines advanced rendering where PHIGS left off. PHIGS PLUS includes advanced geometries for surface modeling including NURBs (Non-Uniform Rational B-Splines) and advanced 3D rendering for shading, lighting, and depth cueing, applying 3D graphics standards to fields like MCAD and molecular modeling. These industries are quickly moving over to PHIGS PLUS. Here is an opportunity to understand where the next phase of graphics standards is going, and why. The course presentation will include "live" demonstrations using real-time PHIGS PLUS graphics running on local workstations with displays projected for viewing by the class.

This course presents PHIGS PLUS, the proposed extensions to the PHIGS graphics standard. The course will examine the history and current status of the PHIGS PLUS standardization process. The student will gain understanding of the rapid move within industry to adopt implementations of the PHIGS PLUS concepts. The lecturers will give a technical examination of PHIGS PLUS architecture and functionality. The course will also include what is NOT in PHIGS PLUS and why. The course concludes with insights from an application's point of view showing how and when it is appropriate to use PHIGS PLUS.

The course will be presented using a mix of live demos from PHIGS Workstations projected on a large screen, and 2 screens for projection of 35mm slides: one for course content, one for examples or rendered PHIGS 3D images.

PHIGS PLUS is the ANSI/ISO proposed extension to the PHIGS standard and is supported by multiple vendors as the API for providing advanced rendering and advanced primitive geometries within the PHIGS environment. This course covers the evolution, architecture, and algorithms of PHIGS PLUS. The course explores the impact that the use of PHIGS PLUS might have on an application environment and investigates considerations that should be made by application and graphics-system implementors.

## Lecturer Biographies

### **Henri Gouraud, Paris Research Laboratory, Digital Equipment Corp**

Henri Gouraud is a member of the Research Staff of Digital's Paris Research Laboratory, and its Operations Manager. He was previously one of the founders of a small software company, Tangram, and prior to that consultant at Tecs1, a subsidiary of Compagnie Générale d'Électricité. He obtained his PhD in 1971 from the University of Utah where he developed what is known as "Gouraud shading". He obtained his engineer's degree from Ecole Centrale in Paris.

### **Griff Hamlin, McDonnell Douglas,**

Griff has been using PHIGS PLUS in an MCAD application at McDonnell Douglas for the past 3 years. Griff has 16 years of experience in computer graphics and graphics standards. While at Stellar Computer, Griff implemented PHIGS PLUS extensions to Stellar's PHIGS implementation, and participated on the committee to draft the original PHIGS PLUS document. Griff received a Ph D in Computer Science from U of North Carolina, 1975.

### **Edy Henderson, Sun Microsystems, Inc.**

Edy Henderson chaired the first Siggraph Course on PHIGS PLUS at Siggraph '90. Edy joined Sun's Graphics Standards Department in January 1988, where she is the Engineering Project Manager of SunPHIGS, Sun Microsystems' product implementation of PHIGS and PHIGS PLUS. Edy has been involved in computer graphics for 13 years in the areas of ECAD, MCAD, scientific applications and graphics standards. She holds a BS in Mathematics from the University of Redlands.

### **Eileen McGinnis, Sun Microsystems, Inc**

Eileen has been actively involved in the development of graphics interfaces since 1978, and currently serves as the head of the US delegation developing PHIGS PLUS within ISO. She has been with Sun Microsystems for 4 years where she has been in charge of the development of the Graphics API's. At Sun she is currently developing an architectural framework for the integration of graphics and other media. Eileen holds an MS in Computer Science and Mathematics from Stanford.

### **Mike Stapleton, System Simulation Ltd ,**

Mike is a Principle in System Simulation, A UK company specializing in multi-media systems design. Mike is the Chair of the British Standards Institute Panel of Graphics APIs including PHIGS and PHIGS PLUS. Mike holds degrees in Physics and Computer Science.

### **Spencer Thomas, University of Michigan, Dept. of Computer Science,**

Spencer Thomas is an assistant professor in the EECS Department at the University of Michigan. He was previously on the faculty at University of

Utah In 1988, Spencer headed a team that produced a demonstration implementation of PEX (the PHIGS extension to X) for SIGGRAPH '88 Spencer Thomas received his Ph.D. in B-spline based modeling from the department of Computer Science at the University of Utah in 1984

## Schedule

- **8:30 - 9:00 – Introduction / Henderson**  
Goals of the Course  
PHIGS PLUS Functionality Overview
- **9:00 - 10:00 – History & Status, Concepts & Architecture / McGinnis**  
PHIGS PLUS History and Goals  
Current Status of PHIGS PLUS  
Relationship/Interaction with other Graphics Standards
- **10:00 - 10:15 - Break**
- **10:15 - 11:45 – Advanced Primitives / Thomas, Stapleton**  
Geometric Output Primitives (NURBS, etc.)  
Surface Modelling
- **11:45 - 1:15 – Lunch**
- **1:15 - 2:45 – PHIGS PLUS Advanced Rendering / Gouraud, Stapleton**  
Colour Models  
Lighting, Shading, Depth Cueing  
Data Mapping  
API calls to invoke the algorithms
- **2:45 - 3:00 – Break**
- **3:00 - 4:00 – Application Programmer's Considerations / Hamlin**  
General Application Considerations for PHIGS PLUS  
Performance Hints for Writing PHIGS PLUS Applications
- **4:00 - 5:00 – Q & A / Panel of Speakers**

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