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COURSE NOTES 14

THE COMPUTER GRAPHICS INTERFACE (CGI)— THE NEXT INTERNATIONAL GRAPHICS STANDARD

Chair
Theodore N. Reed
Los Alamos National Laboratory

Lecturers
Janet S. Chin
Chin Associates
Theodore N. Reed
Los Alamos National Laboratory
Karla Steinbrugge Chauveau
Metheus Corporation

The Computer Graphics Interface (CGI)
The Next International Graphics Standard

Presented at SIGGRAPH '90

Karla Steinbrugge Chauveau
Metheus Corporation
1600 NW Compton Drive
Beaverton, OR 97006-6905

Janet S. Chin
Chin Associates
2980 College Av., Suite 2
Berkeley, CA 94705-2214

Theodore N. Reed, Course Chair
Los Alamos National Laboratory
C-6, Mail Stop B272
Los Alamos, NM 87545

ABSTRACT

The Computer Graphics Interface (CGI) provides a two-dimensional device-independent foundation level standard to which computer graphics devices can be designed and interfaced and upon which other graphics standards, packages, and systems can be implemented. The CGI is expected to become an international graphics standard in 1990.

This course explains the constituency and purpose of the CGI standard. Embedded in this explanation is an overview of the structure of the CGI and its relationship to other graphics standards, including GKS, PHIGS, and CGM. The procedural bindings and data encodings of the CGI are reviewed. A reference model of the CGI showing various configurations in which the CGI can occur is presented. The use of the CGI as a system level interface is described. Particular emphasis is placed on the graphic object pipeline, compound primitives, segments, input functions, and raster functions.

BIOGRAPHIES

Karla S. Chauveau is Vice President of Engineering at Metheus Corporation responsible for all high resolution graphics engineering and product marketing activities. Her background is in graphics software engineering and marketing; her particular area of expertise is computer graphics. Karla has been the Chairperson of the ANSI Accredited Standards Committee (ASC) task group responsible for the CGM and CGI standards since 1985. She has been an active participant in the ISO and ANSI groups responsible for developing the CGI and is the ISO/IEC JTC1/SC24/WG3/CGI Rapporteur.

Janet S. Chin is principal consultant and president of Chin Associates specializing in computer graphics education, product planning, and design. She was the International Representative of the ASC technical committee responsible for computer graphics standards from 1982 through 1988. She was the Vice Chairperson of that committee from 1979 through 1982. She has been an active participant in the ISO and ANSI groups responsible for developing the CGI. Janet has developed and presented a number of seminars and tutorials on GKS, CGI, and computer graphics.

Theodore N. Reed is a staff member at Los Alamos National Laboratory responsible for computer graphics planning and advanced development activities. His background is in software engineering and design with particular emphasis on computer graphics. Ted was Chairperson of the ASC task group responsible for the CGM and CGI standards from their inception in 1979 until 1984. He has continued to be an active participant in the ISO and ANSI groups developing the CGI. Ted also teaches C Programming Language short courses and has worked for the British Home Office in the United Kingdom.

1 INTRODUCTION

2 OVERVIEW OF GRAPHICS STANDARDS

2.1 A Reference Model

A number of computer graphics standards have been proposed to address the needs of application and system programmers in creating, modifying, and manipulating computer-generated pictures. These standards provide bases for development which minimize the effort required to accommodate a variety of needs. One common goal of these standards is to enhance the portability of programs and programmers between installations and environments.

An application programmer's interface (API) standard specifies a set of operations on a variety of graphic objects. An API standard provides for the portability of applications across a wide range of computer hardware, operating systems, programming languages, and graphics devices. A program written to an API standard at one facility in one environment should be easily transferable to another facility in a different environment. Facility dependencies should be the major area requiring modification.

The specific functions supported by an API standard (as with any standard) provide certain capabilities. The application programmer, by identifying the capabilities needed establishes which API is better suited for his/her application.

Figure 2.1 shows two simple operating environments. By using a graphics library or considering the graphics environment as a black box, the application programmer only deals with application data.