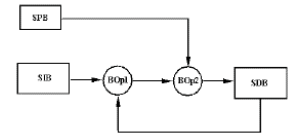


Course Announcement

MAT 201B Programming with Media Data (Winter, 2009)

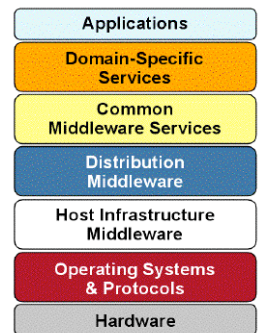
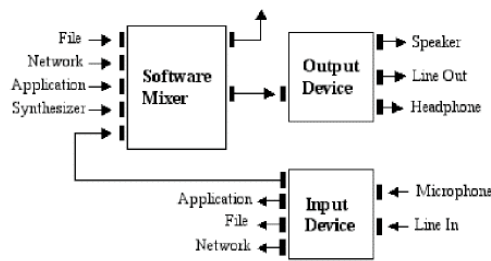
Overview

MAT 201B is a hands-on graduate-level software development course dedicated to media-rich applications and tools. The course reader consists of a mix of computer science and software engineering theory, and praxis-oriented how-to programming tutorials on media data processing and modern software development. The lecturers will concentrate on the concrete skills required for development of multimedia applications and tools in mainstream programming languages using the standard off-the-shelf software development libraries. In the practical part, students work on several platforms (Linux/UNIX, MS-Windows, and Macintosh OSX), and develop programs for multimedia tasks such as file I/O, data streaming and playback, content creation/editing, format conversion, and data analysis.



Outline

- 1: Software development: languages and tools
- 2: Application organization and I/O models
- 3: Software engineering: objects, methodology
- 4: Computing with sound and music data
- 5: Computing with still and dynamic images
- 6: Programming GUIs and interactive software
- 7: Distributed systems and network programming
- 8: Control protocols and sensor input
- 9: Application domain frameworks



Prerequisites

Students are expected to be functionally proficient in C, C++, or Java, to understand data structures and algorithms, and to be able to use a development environment such as VisualStudio, Xcode, or Eclipse. Grading will be on the basis of in-class participation, quizzes, and programming projects.

Course Materials

A reader and presentation slides for this course will be available at the UCSB book store; the course web site includes many links as well as down-loadable example software.

Instructor

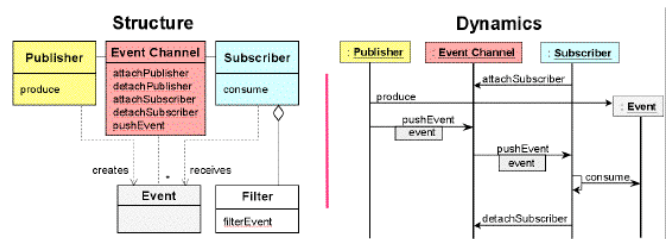
Stephen T. Pope (stephen@mat.ucsb.edu)

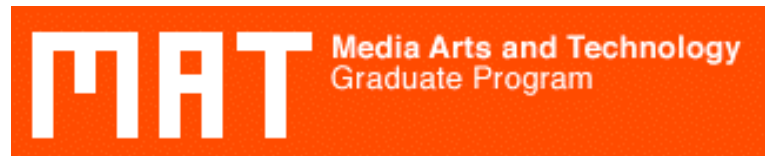
Meeting Time and Place

Tuesday/Thursday 9:00 - 11:00 AM
CREATE class room, Music 2215
First meeting: January 6, 2009

Course Web Site

Includes detailed outline and reader table of contents
See <http://www.create.ucsb.edu/201B>





MAT 201B: Computing with Media Data

UCSB Winter Quarter 2009

Instructor: Stephen Travis Pope, stp@mat.ucsb.edu
Teaching Asst:
URL: <http://create.ucsb.edu/201B>

Format: 2 lectures and 1 lab/discussion per week (all required)

Materials: Readings book and presentation slides
(both at the UCSB book store)

Topics: Computing with Media Data

- 1: Software development: languages and tools
- 2: Application organization and I/O models
- 3: Software engineering: objects, methodology
- 4: Computing with sound and music data
- 5: Computing with still and dynamic images
- 6: Programming GUIs and interactive software
- 7: Distributed systems and network programming
- 8: Control protocols and sensor input
- 9: Application domain frameworks, review

MAT 201B Reader Contents

Topic 1. Software Development

Programming Languages

- OSData.com Programming Languages Overview (www)
- Programming Languages: A Collection of Home Pages (www)
- Survey of Object-Oriented Programming Languages. Chris Hostetter (www)
- Web Programming Languages (www)
- Scriptometer: Measuring the ease of Script-Oriented-Programming Languages (www)
- An Overview of Language Implementation. Terence Parr (www)

Software Development Tools

- Requirements for an Experimental Programming Environment. L. P. Deutsch & E. A. Taft. Xerox PARC, 1980.
- GNU C Compiler (gcc) Manual Page
- What's New in Eclipse 3.1. Ed Burnette. *Java Developer's Journal*, 6/2005
- Review of JTest 7.0. Venkant. *Java Developer's Journal*, 6/2005
- Concurrent Version System (CVS) Overview (www)

APIs and Libraries

- Introduction to the Standard Template Library (www)
- Boost Libraries and Documentation (www)
- OpenDirectory C++ Class Library List (www)

Programming Techniques for Multimedia

- Clear, Efficient Audio Signal Processing in ANSI C, Adrian Freed (www)
- Music Programming with the new Features of Standard C++, Adrian Freed and Amar Chaudhary (www)
- Writing Portable Programs (Princeton CS 217)

Topic 2: Application Organization

Software Architecture

- The Classical OS Model in UNIX (Duke Systems and Architecture)
- UNIX Network Programming: 6.2: I/O Models. W. Richard Stevens, Bill Fenner, Andrew M. Rudoff. Addison/Wesley Publishers

Multi-threaded Programming

- Getting Started with POSIX Threads. Tom Wagner and Don Towsley. UMass
- YoLinux Tutorial: POSIX Thread Libraries (www)

Databases

SQL: Chapter 2: Files, Databases and Database Management Systems (www)

SQL: Chapter 3: Relational Databases

SQL: Chapter 4: SQL Data Manipulation Language

SQL: Chapter 5: SQL Data Definition Language

Topic 3: OO Software Engineering

Errors and Exception Handling

C++.com Tutorial: 5.3: Exception Handling (www)

COP 2334 Lecture Notes: C++ Exception Handling (www)

Software Engineering and O-O Technology

Object-Oriented System Development: Chapter 2: Introduction to Analysis (www)

Object-Oriented System Development: Chapter 12: The Analysis Process

Object-Oriented System Development: Chapter 26: From Design to Implementation

Object-Oriented System Development: Appendix: Notation

MKS Integrity Suite 2005 Review. M. Sayko. *Java Developer's Journal*, 6/2005

O-O Design Patterns

Patterns and Software: Essential Concepts and Terminology, Brad Appleton

Software Patterns Lecture Slides (X. Amatriain)

The Design Patterns Java Companion. James W. Cooper. Addison-Wesley.

Java Tutorial: How do These Concepts Translate into Code? (www)

Testing

Eclipse Tutorial: Using JUnit in Eclipse. Christopher Batty. (www)

[Advanced UNIX Programming course (www)]

[C++ libraries: <http://www.thefreecountry.com/sourcecode/cpp.shtml>]

Topic 4: Digital Audio

PortAudio Tutorial, P. Burke. (www)

RTAudio Tutorial, G. Scavone. (www)

JACK Tutorial (www)

MAT 240A Notes

“A Child's Garden of Sound File Systems” Pope and Van Rossum. CMJ 19:1

Topic 5: Computer Graphics

"Graphics File Formats." D. Meyer.

"Overview of OpenGL." B. Lipchak.

Common Image File Formats (www)

Image Formats. Joe Burns. (www)

Compression, Encoding and Graphics Files: A Practical Tutorial (slides). Rich Holowczak

Parsing and Writing QuickTime Files in Java. Chris Adamson (www)

Star Trek Technology for Java 3D (SysCon)

[File formats -- <http://desktoppub.about.com/od/graphicformats>, <http://graphicssoft.about.com/od/aboutgraphics/a/bitmapvector.htm>]

Topic 6: Applications and GUIs

QT 3.3 Whitepaper. Trolltech.

Eclipse Tutorial: Basic SWT Widgets. Shantha Ramachandran. (www)

Topic 7: Distributed Applications and Networking

Internet: "The Big Picture." Russ Haynal. (www)

Network Layers (www)

TCP/IP Networking Protocols (www)

Beej's Guide to Network Programming. Brian Hall.

Remote Method Invocation: Java RMI and Web Services. A. Konstantinou.

Topic 8: Control and Sensor I/O

PortMIDI Header file

OpenSoundControl Paper

Web References

Topic 9: Domain-specific Application Frameworks

AlloSphere ICMC 2007 Paper

Siren 7.5 ICMC 2007 Paper

Web References

MAT 201B Code Archive

- Hello World examples
- APIs for media
- C, C++, Java
- Basic media types
- (2007 Students)

▶	2004_students	65.1 MB
▶	2005_Students	18 MB
▶	BasicCarbonApp	175.2 KB
▼	DrawScheduler	12.6 KB
	DrawScheduler.class	2.7 KB
	DrawScheduler.java	2.2 KB
	score copy.dat	824 bytes
	score.dat	816 bytes
▶	File_Formats	108.2 KB
▶	gamedesigndoc	180 KB
▶	Helix	42.9 MB
▼	HelloWorld	5.9 MB
	HelloWorldInC	73.3 KB
	HelloWorldInC++	56.9 KB
	HelloWorldWithABug	75.1 KB
	HelloWorldWithGUI	5.7 MB
	HelloWorld.c	455 bytes
	README	3.3 KB
▶	java2d	389.1 KB
▶	java3d11-examples	2.6 MB
▶	JavaAudioSamples	761.2 KB
▶	javashout	45.9 KB
▶	midi_sched	55.9 KB
▶	midi_test	277.2 KB
▼	PerfCode	7 MB
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	ras_file_info.c	7.1 KB
	slk.ras	125.3 KB
	slk.sun	25.2 KB
	Venice.ras	6.8 MB
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	lsf.java	3.4 KB
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	snd_player.c	3.5 KB
	snd_player2.c	4.7 KB