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Message from the Chapter Chair

On behalf of the Association for Computing Machinery (ACM) Mid-Southeast Chapter executives, I welcome you to this year's Fall Conference in scenic Gatlinburg, Tennessee. ACM is one of the oldest, largest and most renowned educational and scientific computing society and our chapter is one of the oldest.

The chapter is proud of its rich traditions. The membership is small enough for everyone to know and be known by everyone else (about 100), but diverse enough to accommodate nearly all areas of computing. In keeping with the traditions that make the membership return year after year, the conference offers an opportunity for collegiality, renewal of friendships, and the making new friendships that are likely to last for years. The diversity represented by the chapter's membership will be evidenced by the cross section of presentations in scholarship, pedagogy, roundtable and poolside discussions. There should be something for everyone. Perhaps one of the best parts of the conference is the presentations by our students. We are excited to have these bright young minds join us and to challenge us. Take a minute during the conference to stop and say hello and thank them for their contribution to this conference.

If you have not yet taken the time to join the chapter, please do so. Our dues are very reasonable and help make this wonderful conference possible. Everyone is welcome. There are two membership categories, the professional category at \$10.00 per a year, and student membership at \$5.00 per year; please do join us as we continuously explore and share the joy of learning and teaching Computer Science and Information Technology.

If I have not found you to say hello join me and your colleagues in the hospitality suite. It is a great place to renew the old and make new friendships. Once again, welcome and enjoy the conference and beautiful Gatlinburg.

Kathy Winters, Chair
University of Tennessee–Chattanooga

Chapter Officers

Chair

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Student Paper Competition Judges

Chair

Randy Smith, University of Alabama

Undergraduate

David Frazier, East Tennessee State University

Nancy Smithfield, Austin Peay State University

Glenn Wiggins, Mississippi College

Master's

Greg Kawell, Samford University

Medha Sarkar, Middle Tennessee State University

Melissa Wiggins, Mississippi College

Ph.D.

Srinivasarao Krishnaprasad, Jacksonville State University

Tony Pittarese, East Tennessee State University

Wayne Summers, Columbus State University

Alternates

Donald Sanderson, East Tennessee State University

Session Chairs

Azalea Room

- Session I: Wayne Summers, Columbus State University
Session II: Joyce Crowell, Belmont University
Session III: Medha Sarkar, Middle Tennessee State University
Session IV: Greg Kawell, Samford University

Dogwood I

- Session I: David Frazier, East Tennessee State University
Session II: Nancy Smithfield, Austin Peay State University
Session III: Glenn Wiggins, Mississippi College
Session IV: Otha Britton, University of Tennessee–Martin
Session V: Posters

Dogwood II

- Session I: Ashraful Chowdhury, Georgia Perimeter College
Session II: Richard Detmer, Middle Tennessee State University
Session III: Jim Vandergriff, Austin Peay State University
Session IV: Tony Pittarese, East Tennessee State University
Session V: Ken Adcock, Cleveland State Community College

Highlander Room

- Session I: Julian Boggess, Mississippi State University
Session II: Jim Johnson, Bethel College
Session III: Brenda Parker, Middle Tennessee State University
Session IV: Brian Toone, Samford University

Alternates

- Allan Anderson, Northeast State Technical Community College
Denise Williams, University of Tennessee–Martin
Kathy Winters, University of Tennessee–Chattanooga
-

ACM Mid-Southeast Chapter
2008 Fall Conference
Gatlinburg, Tennessee
Glenstone Lodge

Thursday, November 20, 2008

4:00 – 6:00 p.m.	Registration
6:00 – 7:30 p.m.	Social Meeting, Hospitality Suite
7:30 – 9:00 p.m.	Dinner — Individual Arrangements
9:00 – 12:00 a.m.	Social Gathering, Hospitality Suite

Friday, November 21, 2008

7:30 – 9:00 a.m.	Registration
7:30 – 8:00 a.m.	Morning Coffee Sponsored by Course Technology
8:00 – 8:10 a.m.	Welcome/Announcements — Azalea Room
	Welcome Chapter Chair
	Conference Announcements Conference Chair
	Program Announcements Program Chair
8:10 – 9:00 a.m.	Keynote Address
9:00 – 9:15 a.m.	Coffee Break Sponsored by Course Technology

Session I: 9:15 – 10:35 a.m.**Azalea Room: Doctoral Degree Presentations**

Session Chair: Wayne Summers, Columbus State University

- 9:15 – 9:35 *The Performance of Ontology Creation Tools*, Lauren Biggers, University of Alabama
- 9:35 – 9:55 *Ontology Conceptual Expansion*, Liping Zhou, University of Alabama–Birmingham
- 9:55 – 10:15 *Performance Study of Channel Allocation Algorithm with Tri-communication Model*, Sungbum Hong, Jackson State University
- 10:15 – 10:45 Cancelled

Dogwood I: Undergraduate Presentations

Session Chair: David Frazier, East Tennessee State University

- 9:15 – 9:35 *A Comparison of Metaprogramming Techniques to Support Code Coverage Analysis of Test Cases*, Timothy F Uptain, University of Alabama–Birmingham
- 9:35 – 9:55 Cancelled
- 9:55 – 10:15 Cancelled
- 10:15 – 10:35 *Increasing Retention in Computer Science by Using Alice Techniques*, Tavaris Payton, Talladega College

Dogwood II: Professional Presentations

Session Chair: Ashraful Chowdhury, Georgia Perimeter College

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- 9:15 – 9:35 *Building Mobile Rings: Synergy of Ring-based Peer-to-Peer Systems and Mobile Ad-Hoc Networks*, Wei Ding, Austin Peay State University
- 9:35 – 9:55 *Assembly Language with Visual Studio*, Richard C. Detmer Middle Tennessee State University
- 9:55 – 10:15 *A Survey of Security Issues and Enhancements of SCADA Networks*, Yingbing Yu and Sandip Patel, Austin Peay State University and Morgan State University
- 10:15 –10:35 *Thinking Outside the Text Box, Alternative Approaches to Human Computer Interaction*, Ron Zucker, East Tennessee State University

Highlander Room: Professional Presentations
Session Chair: Julian Mississippi State University

- 9:15 – 9:35 *Minimum Distance Permutations*, Edward L. Bosworth, Columbus State University
- 9:35 – 9:55 *Grass Roots Knowledge Management: A Case Study of KM in a Highly Technical Organization*, Randy K. Smith, The University of Alabama
- 9:55 – 10:15 Cancelled
- 10:15 –10:35 *Data Analysis Methods Using SQL Databases*, B. Wayne Walters, University of Southern Mississippi
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Session II: 10:40 – 12:00 p.m.**Azalea Room: Doctoral Degree Presentations**

Session Chair: Joyce Crowell, Belmont University

- 10:40 – 11:00 *Feature Location by Information Retrieval and Call Graph*, Peng Shao, University of Alabama
- 11:00 – 11:20 *Evaluating Color Harmony's Role in Map Labeling*, Sussan Einakian, University of Alabama–Huntsville
- 11:20 – 11:40 *Visual Summary for Tourist Attractions*, Lin Yang, University of Alabama–Birmingham
- 11:40 – 12:00 *A Client-Server System for Simulating and Visualizing the Random Packing of Polydisperse Spheres*, Bruce Johnson and Robert Lowe, University of Tennessee–Knoxville

Dogwood I: Undergraduate Presentations

Session Chair: Nancy Smithfield, Austin Peay State University

- 10:40 – 11:00 *Robust Speech Synthesis and Understanding for a Robotic Tour Guide*, John Licato, University of South Alabama
- 11:00 – 11:20 *The Virtual Collaborative Student Universe Project*, David Kolb, Columbus State University
- 11:20 – 11:40 *Parallel Adventures With Conway's Game of Life*, Adam Corum, Brian Hawks, Ben Hollomon, and Ryan Hart, University of Tennessee–Martin
- 11:40 – 12:00 Cancelled
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Dogwood II:**Professional Presentations**

Session Chair: Richard Detmer, Middle Tennessee State University

10:40 – 11:00

Does Paired Programming Really Work?, Kathy Winters, University of Tennessee–Chattanooga

11:00 – 11:20

Dependency Injection, Aspect Oriented Programming, and the Spring Framework: The Impact of Ideas in Software, Ken R. Adcock, Jr., United Parcel Service Development

11:20 – 11:40

Combining XML and TXL for Software Visualization, Medha Shukla Sarkar, Middle Tennessee State University

11:40 – 12:00

Comparison of Ethical Theories Mentioned in Computer Ethics Textbooks, Julian Eugene Mississippi State University

Highlander Room:**Professional Presentations**

Session Chair: Jim Johnson, Bethel University

10:40 – 11:00

Using Alice to Introduce the Computer Science Discipline, Brenda Parker, Middle Tennessee State University

11:00 – 11:20

From CS Concept to K12 IT Support, Greg Kawell, Samford University

11:20 – 11:40

Using JavaScript to Support On-Line Content for Multiple Learning Styles, David L. Tarnoff, East Tennessee State University

11:40 – 12:00

The Future of Education—A Case for Ubiquitous, On-demand eLearning, Christopher C. Whitehead, Columbus State University

Lunch**Patio Restaurant 12:00 – 1:00 p.m.**

Session III **1:00 – 2:20 p.m.****Azalea Room:** **Master's Degree Presentations**

Session Chair: Medha Sarkar, Middle Tennessee State University

1:00 – 1:20 *A Fast, Approximate Detector for the W32.Simile Malware*,
Edna Milgo and Yasmine Kandissounon, Columbus
State University

1:20 – 1:40 *An Unsupervised Protein Sequences Clustering Algorithm
Using Functional Domain Information*, Hua Zhong,
University of Alabama–Birmingham

1:40 – 2:00 *Cross Training for a Safer Tomorrow*, Jeff Phillips, East
Tennessee State University

2:00 – 2:20 *Evaluation of STL by McCabe's Cyclomatic Complexity*,
Xiaoyun Jiang, University of Alabama

Dogwood I: **Undergraduate Presentations**

Session Chair: Glenn Wiggins, Mississippi College

1:00 – 1:20 *On the Implementation of a Novel Boundary Representation for
a Triangle Mesh*, Eric Frees, University of Alabama–
Birmingham

1:20 – 1:40 *Navigation Simulation*, Robert M. Rudnick and Jenny L.
Plott, University of South Alabama

1:40 – 2:00 *Autonomous Navigation, Exploration, and Visualization
with the Khepera Robots*, Brian Bodkin and James
Lancaster, Middle Tennessee State University

2:00 – 2:20 *LABVIEW System to Measure Acoustic Impedance*,
Gregory D. McGee, II, Mississippi Valley State
University

Dogwood II:**Professional Presentations**

Session Chair: Jim Vandergriff, Austin Peay State University

1:00 – 1:20

Multi-Core Programming: Challenges and Solutions, Srinivasarao Krishnaprasad, Jacksonville State University

1:20 – 1:40

Investigating the Impact of Ajax on Server Load in a Web 2.0 Application, Brian Toone, Samford University

1:40 – 2:00

ETSU's SAP Initiative, Tony Pittarese, East Tennessee State University

2:00 – 2:20

The Semantic Web: The Next Evolution of the WWW, Christopher C. Whitehead, Columbus State University

Highlander Room:**Professional Presentations**

Session Chair: Brenda Parker, Middle Tennessee State University

1:00 – 1:20

Web-Based Application to Assist with Testing and Grading Computer Programs, Bob Bradley and Otha Britton, University of Tennessee–Martin

1:20 – 1:40

Using Comic Books to Teach Introductory Computer Science Concepts, David Brown, Pellissippi State Technical Community College

1:40 – 2:00

3 Years of Allison Applesauce, Phillip S. Young, Jeremy Ey, and Eric L. Brown, Tennessee Technological University

2:00 – 2:20

You Wonder Why a Student Would Pay \$100 for a Text and Then Not Read It. Getting Students to Read the Text, T. F. Higginbotham, Southeastern Louisiana University

Break**Poolside 2:20 – 2:35 p.m.****Sponsored by Course Technology****Session IV****2:35 – 3:55 p.m.****Azalea Room:****Master's Degree Presentations**

Session Chair: Greg Kawell, Samford University

2:35 – 2:55

JagBot - A Fully Autonomous Tour Guide Robot, Charles V. Smith III, Michael Skinner, and James Sakalaukus, University of South Alabama

2:55 – 3:15

Using Perl to Statically Analyze C Code, Paul Cleaveland, East Tennessee State University

3:15 – 3:35

The Future is Multi-Touch, Rathy Mohan, Columbus State University

3:35 – 3:55

Extensible Software Requirements, Christopher Kilgore, East Tennessee State University**Dogwood I:****Undergraduate Presentations**

Session Chair: Otha Britton, University of Tennessee–Martin

2:35 – 2:55

IDL-Wave: an Application for the NASA/TIMED Satellite Team, Ameer Armaly and Sean Wilson, Furman University

2:55 – 3:15

Creating Application Shutdown Scripts for the Caterpillar Inc. Server Maintenance Process, DeMarcus Thomas, Mississippi Valley State University

3:15 – 3:35

Computational Solutions of Newton's Laws of Motion, Shawn Bordeaux, Talladega College

3:35 – 3:55

Arithmetic Extension of an Expert System Shell, Brittany Streeter, Talladega College

Dogwood II:**Doctoral Degree/Professional Presentations**

Session Chair: Tony Pittarese, East Tennessee State University

2:35 – 2:55

Cycles in XML Schema and Data Integration, Lila Razavi and Susan V. Vrbsky, University of Alabama

2:55 – 3:15

A Transdisciplinary Approach Towards Clinical Research Evaluation, Varadraj Prabhu Gurupur, University of Alabama–Birmingham

3:15 – 3:35

Matching UML Class Diagrams Across Reverse Engineering Tools, Yan Liang, University of Alabama

3:35 – 3:55

Godel and the Use of Automated Theorem Proving Software, David Frazier, East Tennessee State University (Professional Presentation)

Highlander Room:**Professional Presentations**

Session Chair: Brian Toone, Samford University

2:35 – 2:55

A Curriculum for an Early Database Course to Support IT and CS Majors, Donald Sanderson, East Tennessee State University

2:55 – 3:15

IS Students, Ethics, and Social Responsibility, Vernon L. McGlone and Teresa A. McGlone, University of the Cumberlands and Eastern Kentucky University

3:15 – 3:35

Server Side Programming and Php, Jim Vandergriff, Austin Peay State University

3:35 – 3:55

Behind the Scenes at the Annual Conference of the Mid-Southeast Chapter of the ACM, Jim Clark, University of Tennessee–Martin

Session V: 4:00 – 5:00 p.m.

Dogwood I: Undergraduate Posters/Presentations

4:00 – 4:20 *Intra-Vehicle UWB Channel Measurements*, Asia Walton,
Talladega College

Dogwood II: Professional Presentations

Session Chair: Ken Adcock, Cleveland State
Community College

4:00 – 4:20 *Why Teach Assembly Language?*, Edward L. Bosworth,
Columbus State University

4:20 – 4:40 *PedOGoGE: Pedagogical OpenGL Game Engine*, Jeff
Roach, East Tennessee State University

4:40 – 5:00 *Have Model Will Simulate!*, Rodrigo Obando and Wayne
Summers, Columbus State University

5:00 – 5:30 p.m. Business Meeting, Dogwood II

5:30 – 7:00 p.m. Social Gathering, Hospitality Suite

7:00 – 8:30 p.m. Awards Banquet, Azalea Room
Entertainment: Mike Edwards

9:00 p.m. Social Gathering, Hospitality Suite

Notes



A special “thank you” goes to the The University of Alabama at Birmingham, Edward Bosworth, and Course Technology for lending financial support to this year’s conference, and to students from the University of Tennessee–Martin Student Chapter of ACM for technical support.

Keynote Address

Network Performance for Clusters and Grids

Dr. Martin Swamy

University of Delaware

High performance networks enable cluster and grid computing as viable paradigms. The achievable network performance is critical to the overall performance of the system. Despite increases in the speed of both processors and networks, there is a growing "network performance gap" that limits the ability to perform faster data movement. There are various bottlenecks to achievable network performance and consequently, many potential techniques to improve performance. This talk explores techniques for improving network performance and explores potential evolution of network systems.

About the Speaker

Martin Swany is an Assistant Professor in the Department of Computer and Information Sciences at the University of Delaware. He received his B.A. and M.S. from the University of Tennessee in 1992 and 1998, respectively. He completed his Ph.D. at the University of California, Santa Barbara in 2003 and joined the faculty of the University of Delaware that year. He is a 2004 recipient of the US Department of Energy Early Career Principal Investigator award. Since 2005, Swany has been the Internet2 Faculty Fellow involving work in network metrics and performance enhancing middleware. His research interests include high-performance parallel and distributed computing and networking.

Student Abstracts
Undergraduate Programs

A Comparison of Metaprogramming Techniques to Support Code Coverage Analysis of Test Cases

Timothy F Uptain

Faculty Advisor: Dr. Jeff Gray

University of Alabama–Birmingham

Metaprogramming uses reflection to adapt a program by allowing the interpretation and meaning of a programming language to be altered at compile-time or run-time. Javassist and OpenJava are two metaprogramming environments that can be used to modify an existing Java application. Javassist works directly with the bytecode of a compiled program and generates a modified representation that provides some new capability. OpenJava is a source-to-source translator that parses a program, applies metaobjects that alter the parse tree, and outputs a modified version of the original source code. The methods used by both of these metaprogramming tools are similar, but differ based on their adaptation time (e.g., compile-time or load-time) and type of artifact that is adapted (e.g., source code or byte code). Both of these metaprogramming environments allow the instrumentation of some new feature or requirement into an existing application in an automated manner.

This presentation describes an investigation that uses the metaprogramming capabilities of Javassist and OpenJava to instrument existing code to determine the level of code coverage within a series of test cases. Code coverage analysis is a vital tool to assist in understanding the level of depth in software testing by determining how much of a program's code is executed during a test case. Determining the depth of coverage of a program's code during testing is a valuable asset because it can reveal any untested areas of a program, which might contain potential logic errors hidden in some obscure execution path.

The presentation will offer an introduction to metaprogramming and reflection, describe the different techniques used in Javassist and OpenJava, and demonstrate how code coverage can be instrumented into existing applications using both techniques.

Younger Dryas Impact Study

Cancelled

Using the Intellibrain Robotics Platform for Educational and Research Purposes

Cancelled

Increasing Retention in Computer Science by Using Alice Techniques

Tavaris Payton

Faculty Advisor: Syed Raza

Talladega College

The Higher Education Research Institute found that the number of college freshman interested in computer science as a major of study between 2000 and 2005 dropped by 70% in the US, and the Taulbee Survey found that computer science enrollment at research universities dropped by 50% (Kelleher, Pausch). Students are getting bored with the most popular tools and teachings that are used to acquaint them with programming. The stereotypical characteristics of computer science play a very important role within these statistics. These characteristics include, but are not limited to computer science being boring, hard, geeky, and nerdy. This discourages students with exceptional and prominent math and computer skills. In order to overcome this problem, many different tools are being introduced to show students the brighter side of computer science. One of those tools is Alice. Alice is a graphic program that teaches students programming by using three-dimensional (3D) worlds and characters. Alice has been very successful because it motivates and excites students of different ages. This research involves a 3D world using an interactive environment that enhances the characters' knowledge about computer science.

Robust Speech Synthesis and Understanding for a Robotic Tour Guide

John Licato

Faculty Advisors: Dr. Michael V. Doran and Dr. W. Eugene Simmons

University of South Alabama

Microsoft SAPI (Speech Application Programming Interface) allows for easy access to the speech synthesis and recognition features built into every version of Microsoft's Windows Vista. The library allows for individual words to be recognized, and for grammars to be programmed. These grammars allow for a programmable way to dynamically combine words and phrases and determine appropriate responses; a way to "understand" what was said. In the noisy environment of a college campus, a set of grammars were written with the intention of mounting a laptop and microphone atop a robot that would serve as a tour guide for students. The robot would use GPS and other tools to determine its location, and the speech system would adjust its grammars and preset responses depending on this information. The responses and grammars were designed to allow for multiple variations of questions, taking into account the noisy environment and having the goal of a speech system that would not require user training – so that anyone could simply walk up and start talking to it.

In an effort to create a more dynamic speech interface, we also modified the system so that it would have four grammars active at once: one for grammars specific to the current location, one for the general location, one that was not location-specific and an experimental fourth "dynamic" grammar which would be used for future development. Using this system we were able to create a speech interface with a high rate of recognition, even in a relatively noisy outdoor environment.

The Virtual Collaborative Student Universe Project

David Kolb

Columbus State University

The Virtual Collaborative Student Universe (VCSU) Project is an undertaking to create a 3d virtual world that students can produce content for and instructors can use for class specific content. This paper will cover several of the conceptual ideas the project is seeking to implement in VCSU. These will include audio/visual art galleries for students, custom areas for game programming students, classrooms for instructors and student dorm rooms. Also, it will survey previous uses of virtual worlds for education and the lessons we can draw from them going forward. Finally, these lessons will be applied towards creating a 3d virtual environment fulfilling the project's goals.

Parallel Adventures With Conway's Game of Life

Adam Corum, Brian Hawks, Ben Hollomon,
and Ryan Hart

Faculty Advisor: Bob Bradley

University of Tennessee–Martin

This presentation will focus on our parallel implementations of Conway's Game of Life. We will demonstrate both our GPU and CPU versions. Our GPU version was written using Microsoft's XNA programming library. It is written as a shader and does nearly all of its calculations entirely on the graphic card's GPU. Since even cheap graphics cards have large amounts of on-board RAM and hundreds of parallel processing pipelines, this allows the program to be extremely fast (running thousand's of generations per second) and yet use hardly any CPU resources. We will talk about the advantages of doing calculations on the GPU and also mention the challenges that this method faces. We will also demonstrate our parallel CPU version written using C# 3.0. This version uses the new C# parallel for-loop to allow it to take advantage of multiple CPU cores. We will show how easy it is to use this method and demonstrate what kind of speed up it can offer your programs. Lastly we will demonstrate our standard C++ version that we use as a benchmark for the other programs. And if time allows, we will demonstrate our not parallel, but very portable, iPhone version.

An Interactive Approach to Inspire Females in Computer Science

Cancelled

On the Implementation of a Novel Boundary Representation for a Triangle Mesh

Eric Frees

Faculty Advisor: Dr. John K. Johnstone

University of Alabama–Birmingham

The representation of shape is one of the fundamental issues of computer graphics, and a dominant choice for the computer representation of shape is the polygon mesh. A boundary representation (b-rep) of the mesh is a data structure for storing the vertices, edges, and faces of the mesh so that access to topological relationships, such as a vertex's neighboring edges or a face's neighboring faces, is efficient. A b-rep is crucial to the efficiency of most algorithms that work with a mesh.

We consider a novel boundary representation, called the corner boundary representation, introduced by Ken Joy in 2003. The central element of the corner b-rep is a lath with three pointers: a pointer to a vertex, a pointer to the neighboring lath moving clockwise within the face, and a pointer to the neighboring lath moving clockwise about the vertex. We consider the advantages of the corner b-rep over other b-reps, including the winged edge, half edge, split edge, and quad edge.

This talk is focused on the issues that arise in implementing the corner b-rep. Although open source implementations of other better known b-reps are widely available, we are not aware of any implementations of the corner b-rep. We develop a key algorithm missing from Joy's paper: how to build the corner b-rep of a mesh from a list of its vertices and faces (as in a typical mesh file format).

Navigation Simulation

Robert M. Rudnick and Jenny L. Plott

University of South Alabama

The goal of the overall project is to create a tour guide robot that can give tours of campus to new and incoming students and attract students. This complex task has been divided into smaller tasks. Engineering students are building the physical robot and working on basic movement and the functionality that it will need. A Computer Science student is working closely with the engineering department on the robot's ability to use GPS to determine where it is located and where it will need to go. Two CS students have developed a program that allows the robot to have an interactive dialog with users. The project presented here is a simulation of the robot's ability to follow a path for a tour.

The simulated routes will be useful when the actual robot begins to move as a "you are here" visualization of the path. In the process of this work it was decided that the robot would need to visit the CIS compound, the Administration building, the Mitchell Center, the Bookstore/Student Center area, and the Engineering compound. We plotted paths and important points for the robot to move through or stop at on maps of the necessary parts of campus. Along each path a variety of points were defined: location points, waypoints, speaking points, and decision points. When the robot reaches one of these points the appropriate actions would take place. A graphical simulation has been implemented in C#. The focus of the simulation was the underlying data structure. We created a linked list of points that could be traversed in either direction, with each decision point having a list of points to which it is directly connected. To handle the different types of points, inheritance from a basic point class was used to create classes for the necessary types.

Autonomous Navigation, Exploration, and Visualization with the Khepera Robots

Brian Bodkin and James Lancaster

Faculty Advisor: Dr. Cen Li

Middle Tennessee State University

The Khepera robot is a miniature robot equipped with infrared distance and light sensors and encoders. Khepera robots have been used in various experimental settings for research. In particular, it has been an ideal test bed for evolutionary algorithms and algorithms for collective robot behavior generation. Khepera has also been used for testing AI navigation algorithms in educational settings. There, the focus has been on reactive navigation, and on semi-autonomous, serial controlled navigation.

This research work explored the capabilities of Khepera as a fully autonomous robot for navigation and exploration. The research team first investigated the sensing capabilities of the robot for navigation purposes. Based on the experimental results, an appropriate model mimicking a typical office floor layout was constructed. A hybrid architecture was adopted for programming the robot. The hybrid architecture consists of a high level, deliberative planning layer that is separated from a lower level, reactive behavior execution layer. In the planning layer, the D* Lite search algorithm was adapted to find the shortest path between a starting and a destination location. An internal map corresponding the environment is constructed and used in the planning stage. In the behavior execution layer, separate routines were developed that carries out the navigation defined for pre-specified behaviors. The shortest path computed from the planning layer are passed to the executed by one instruction at a time. Each instruction is executed by following a behavior until a terminating state is detected.

Robot exploration function is activated when discrepancies between the map and the environment, such as unexpected blockage or disappearing wall along the navigation path, are detected. This information is fed back to the planning stage where the map is updated to incorporate the new information, the shortest path is recomputed/updated, and the navigation resumes.

A separate visualization module was built to monitor the progress of the navigation and exploration. The tool parses serial commands from the robot and displays the up to date internal map structure, the computed/recomputed optimal path, and the current position of the robot in real time. The visualization tool, with the added ability to write the program to the robot in one button click, greatly reduced the time spent debugging the internal map and behaviors of the robot. This visualization module is undergoing further development beyond the scope of this research project.

LABVIEW System to Measure Acoustic Impedance

Gregory D. McGee, II

Mississippi Valley State University

Acoustic impedance, defined as the ratio of acoustic pressure to the acoustics particle velocity, describes the reflection and transmission of sound at an absorptive material. This is needed to design the lining in a duct or on the wall or ceiling of a room. The goal of the work was to develop a system using the two microphone measurement technique to measure the impedance of materials. Literature was reviewed to identify the equations to calculate impedance from the two microphone signals and to establish criteria to design the measurement system. LABVIEW, a program widely used in industries and research environments, was the programming environment for the measurement system. The LABVIEW program was developed and tested for correctly implementing the equations and the system design criteria were used to develop a tool for future design of a measurement system. Further work is needed to verify the impedance values that are measured.

IDL-Wave: an Application for the NASA/TIMED Satellite Team

Ameer Armaly and Sean Wilson

Furman University

In response to a request from the NASA/TIMED satellite team, we have developed a simulation/visualization application to study the global propagation of gravity waves in the Earth's atmosphere. Features of this global circulation model include earth reflection of gravity waves, ducting of these waves due to temperature inversions in the stratosphere and thermosphere and the capability of synthesizing responses to user defined arbitrary source geometries and time dependences by linear superposition using a stored bank of transfer functions. The transfer functions are height integrated Green's functions for the earth's atmosphere. Following the specification provided by the NASA/TIMED team, the application has been developed using ITT's IDL programming language. IDL offers several advantages for implementation of this application including: vector array manipulation, object-oriented encapsulation, sophisticated debugging and testing capabilities, seamless GUI development, very advanced interactive 3D graphics display and seamless output of all graphics to encapsulated postscript files. IDL also interfaces well with Java and this capability allowed the rapid development of an initial prototype IDL application by calling on several Java packages that had been previously developed for a related model. We will discuss the design of the final application and show examples of the capabilities of the full IDL application, IDL-Wave, that has been delivered to the NASA/TIMED satellite team and which is also being provided to the NASA/AIM satellite team. We will also discuss some of the interesting and difficult debugging that was performed to ensure double precision accuracy of the IDL results. The model is presently being used to analyze data from both of these NASA missions.

Creating Application Shutdown Scripts for the Caterpillar Inc. Server Maintenance Process

DeMarcus Thomas

Mississippi Valley State University

This project was created in an effort to develop a methodology to generate an automated process of application shutdown at Caterpillar Inc. These processes would be used to improve total shutdown times for server maintenance, reduce personnel required to manually work on servers during change windows, and to initiate their course of action to decrease the separation of Information Technology groups within Caterpillar Inc. For this to be accomplished, application groups were consulted to provide requirements on how their applications could be shutdown and those requirements were implemented in shell scripts. A shell script would provide an efficient means of server maintenance and reduce the chance of human error during work on mission critical server systems.

Computational Solutions of Newton's Laws of Motion

Shawn Bordeaux

Faculty Advisor: Dr. Anthony Skjellum

Talladega College

The purpose of this project was to create a computer program that could be used by high school students as a homework checker for physics problems involving Newton's Laws of Motion. This proposed project has created a program for Newton's second law that generates given data by the student and displays the answer on the screen. This program is very simply worked and can be used as a valuable study tool.

Arithmetic Extension of an Expert System Shell

Brittany Streeter

Faculty Advisors: Dr. Kevin Reilly and Mr. Leonard J. Jowers

Talladega College

In order to extend the Expert System Shell, the Simulation Language (SLX) has to become more portable. The system needed to be able to execute along with other applications and be transferable to multi- databases without errors or crashes. This wasn't possible due to the substantial amount of memory the program utilized. The simulation language was given arithmetic from a program written in SLX. The purpose of this was to extend its environment while making the language more user-friendly. Adding arithmetic lead to decreasing very important components called the Decision Table and gave ways to better teach software engineering, Expert System Shells (ESS), and the Simulation Language (SLX) to others in a way that can be comprehended easily. Using the code re-use technique of inventing a type conversion method was shown to be an effective way of versioning software and even databases. The improved Expert System Shell has given new lights to teaching styles and has already proven to be successful in future experiments.

Intra-Vehicle UWB Channel Measurements

Asia Walton

Faculty Advisor: Dr. Jia Li (Oakland University)

Talladega College

Clustering phenomenon exists in the Ultra-Wideband (UWB) impulse responses. Although it is feasible to manually identify clusters via visual inspection, this task becomes very difficult and time consuming when a large amount of data needs to be processed. Furthermore, visual inspection highly depends on the person who performs the cluster identification task, which may cause inconsistent or unrepeatable results. In this paper, we propose an automatic procedure to identify clusters in UWB impulse responses. The algorithm takes both the amplitude and time delay into account when finding the clusters. The algorithm performs well. If the threshold is set correctly, there will not be any error.

Student Abstracts
Master's Degree Programs

A Fast, Approximate Detector for the W32.Simile Malware

Edna Milgo and Yasmine Kandissounon

Faculty Advisor: Mohamed Chouchane

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W32.Simile is one of the most advanced metamorphic malicious programs (or malware) ever seen in the wild; it uses a sophisticated set of source-to-source program transformations to evade detection by anti-virus scanners. These transformations include code substitution, garbage insertion, and code reordering. Metamorphic malicious programs such as W32.Simile have for a long time been some of the main concerns of anti-virus researchers: these programs considerably challenge time and space resources needed to detect them by continually changing their appearance or behavior, which forces anti-virus analysts to devise and implement a new method for detecting each of a possibly vast number of newly-produced variants.

We present a fast, approximate approach for detecting variants of W32.Simile. Detection is based on the quickly-computable instruction frequency vectors of the variants. The evolution of the instruction frequency vectors of the variants is modeled as a Markov chain. First, the transition probabilities of the chain are learned from an input training sample. Then, the transition matrix of the chain is constructed. Next, a classifier is built which uses the transition matrix and its successive powers to detect the variants. Experimental results are finally presented which show that the classifier satisfactorily and efficiently discriminates variants of W32.Simile from other programs. This classifier may be used as a decision support procedure for an anti-virus scanner to determine whether potentially time-consuming analyses on a suspect program are called for.

An Unsupervised Protein Sequences Clustering Algorithm Using Functional Domain Information

Hua Zhong

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In this paper, we present an unsupervised novel approach for protein sequences clustering by incorporating the functional domain information into the clustering process. In the proposed framework, the domain boundaries predicated by ProDom database are used to provide a better measurement in calculating the sequence similarity. In addition, we use an unsupervised clustering algorithm as the kernel which includes a hierarchical clustering in the first phase to pre-cluster the protein sequences, and a partitioning clustering in the second phase to refine the clustering results. More specifically, we perform the agglomerative hierarchical clustering on protein sequences in the first phase to obtain the initial clustering results for the subsequent portioning clustering, and then, a profile Hidden Markove Model (HMM) is built for each cluster to represent the centroid of a cluster. In the second phase, the HMMs based k-means clustering is then performed to refine the cluster results as protein families. The experimental results show our model is effective and efficient in clustering protein families.

Cross Training for a Safer Tomorrow

Jeff Phillips

East Tennessee State University

As Computer Scientists, we can program the best of games. We discuss the OSI model and we know about an SRS document. How many would know what amendment protects the reading of e-mails? What if you are working on a computer and found child porn, would you be in violation of the Fourth Amendment?

This presentation will show there is a growing need for cross training in the Computer Science and Criminal Justice Majors. The Criminal Justice majors would probably not understand things such as bit stream copy, file slack or hidden partitions. Forensic courses have been taught throughout the academic world for years. Forensic Anthropology, Document Examination, and Ballistic Examination are just a few.

Law enforcement has typically been behind in technology while the computer scientists have been in the forefront. It is time for these two fields to unite and learn from each other. In order for this to work effectively we must introduce these sciences together on common ground through a Computer Forensic course.

“Angie”, a minor, meets a Johnson City man online and he sends her a webcam. They begin innocent chats and then it turns to him instructing this young girl on how to perform sexual acts for him. The man records them with a video camera and stores them on his hard drive. In all he has over 65 videos and countless images. He thought he deleted them all before law enforcement seized his computer. Thanks to computer forensics these videos were recovered and he has pled guilty of Producing Child Pornography and Interstate Solicitation of a Minor.

We need this cross training more than ever before. We have knowledgeable people in both areas; now is the time to unite for a better and safer tomorrow.

Evaluation of STL by McCabe's Cyclomatic Complexity

Xiaoyun Jiang

University of Alabama

Unlike C language, C++ gains the benefit of using the Standard Template Library (STL). Through STL, constructs like maps, iterators, and standard strings become available. While C++ can still use an array of char type values to represent strings, the language also has the option of the standard string, which not only contains the string's value, but can operate on it as well. Although not part of the original language, STL has become part of the ANSI standard for C++ implementations. Software complexity is traditionally a direct indicator of software quality and software maintenance cost. The greater the complexity the more fault prone the software and the higher the maintenance cost. Much effort has gone into identifying techniques and metrics to 'measure' the complexity of software and software modules. This paper uses McCabe's Cyclomatic Complexity as a tool, the goal is to find the relationship between project files that use STL and the ones which use STL. There are two computational tools used in the paper: RSM and CCCC. The CC evaluation data got from experiments shows the benefit of C++ STL, and complexity relationship between STL and non-STL code files.

JagBot - A Fully Autonomous Tour Guide Robot

Charles V. Smith III, Michael Skinner, and
James Sakalaukus

Faculty Advisors: Dr. Michael V. Doran, Dr W. Eugene Simmons and
Dr. Thomas G. Thomas, Jr

University of South Alabama

JagBot is a complex GPS and sensor aided autonomous robot which when completed will be able to perform the functions of a tour guide on a college campus. With the use of standard multi-sensory navigation (infrared sensors, sonar, image, tactile) JagBot can greatly improve “awareness” of environmental features. JagBot can communicate with voice recognition software to interact with human beings in a dynamic environment. The true challenges will lie in the human interaction and acceptance as the robot is tested on a university campus. Visual and audio cues will allow for a context driven acknowledgment of the local area and human interaction. Part of JagBot’s awareness will be the ability to avoid obstacles and recognize the current location of the tour. The JagBot project is a practical design and application of a number of computer science and electrical engineering skills. This project thoroughly examines a number of principles related to network communication, timing, real-time operation, multi-processing, and hardware / software interfacing.

The authors have focused on the construction and navigation of JagBot. Along with GPS there will be available sensors for sidewalk detection, obstacle avoidance, and navigation. Sonar sensors are typically used in mobile robotics for the purpose of obstacle avoidance and navigation, thus JagBot will have six of these sensors that will register within a range of approximately fourteen feet. Mid-range infrared sensors are also effective for obstacle avoidance. The infrared sensors on JagBot register about six feet and the robot will have six of these as well. A digital compass will determine direction and tactile bumper switches will be used in case the robot runs into obstacles. The accuracy and context dependent consideration of these sensors will lead to a more accurate and effective determination of acceptable locality.

Using Perl to Statically Analyze C Code

Paul Cleaveland

East Tennessee State University

Vulnerable code is not intentionally written, but it is written. Methods have been used to locate vulnerable code since software engineering first began, but vulnerabilities still finds its way into the final product. The problem with identifying vulnerable code is that vulnerabilities are not always obvious. Searching for potential vulnerabilities is a much easier task to perform. Static analysis examines code that could potentially be vulnerable. By using static analysis, programmers can find potentially vulnerable code to determine whether or not the code is indeed vulnerable.

Problems that static analysis can be used to detect include vulnerable function calls, functions that have not been properly formed (such as print statements being called without using modifiers) and input that has not been sanitized. Regular expressions are necessary and play a vital role in locating blocks of code that incorporate the aforementioned vulnerabilities. By using a language, such as Perl, that has a powerful regular expression engine; static analysis can be used to quickly find code that could be vulnerable.

Perl's regular expression engine is fast and powerful. So far, Perl has not been used to create a program that performs static analysis on C source code. I plan to show how Perl can be used to write a static analysis program that searches for potential vulnerabilities to give programmers the opportunity to change any code that they feel is vulnerable or would like to rewrite to be safe.

The Future is Multi-Touch

Rathy Mohan

Columbus State University

Multitouch, which denotes a set of interaction techniques, has been a dream of computing visionaries. Multi-touch-sensing was designed to allow nontechnies to do masterful things while allowing power users to be even more accomplished. A multi-touch screen is a human-computer interface that allows the user to interact with two or more contact points simultaneously. This allows single or multiple users to simultaneously carry out multiple tasks or more efficiently conduct complex operations. Multitouch is by far the most advanced form of touch technology and, although not new, it but has only recently begun to emerge beyond research labs and product prototypes.

The development of this technology is rapidly evolving from the computer mouse control to the single plasma screen touch capabilities to multiple touch and gesture recognition engines which will interpret any patterns we make with our fingertips or hands. Multitouch will live up to its name in the field of technology giving a greater level of precision and efficiency to our computer interaction as we glide into a new world of computing technology. Multitouch is not limited to be used in monitors or LCD displays and is limited only by the boundaries of our imagination. It is an extraordinary piece of technology that will bring us closer to the future of human computer interaction.

Multitouch is what the world has been waiting for in terms of HCI (Human Computer Interface) to make the computers more accessible and intuitive for everyone.

Extensible Software Requirements

Christopher Kilgore

Faculty Advisor: Jeff Roach

East Tennessee State University

A software application development project requires many elements to succeed. One of those elements is a clearly defined software requirements specification (SRS) document. An SRS is a complete description of the system and how the system will behave. So, if the SRS is missing, incomplete or inaccurate, the project may fail.

In some projects, requirements are volatile and so the SRS has to be frequently updated. Frequent updates to an SRS document may result in confusing and missing requirements. This threatens the integrity and usefulness of the SRS document. It is prudent, therefore, to keep the SRS up-to-date and accurate.

In the summer and fall of 2008, East Tennessee State University (ETSU) commissioned the computer science department to complete a graduate capstone project called the Faculty Teaching Credentials System (FTCS). The FTCS presents information about faculty members, what courses they teach, and how they are qualified to teach those courses. Success of this system is important, as the information will help ETSU's accreditation process. The FTCS project had many constraints, of which, limited working time and volatile requirements were the top two. These two constraints resulted in the SRS document being updated frequently, which increased the risk of requirements being incomplete, missing, or inaccurate. This constant updating threatens the integrity of the project.

This presentation will discuss possible alternatives to keeping an SRS document up-to-date in an environment where the requirements are constantly changing and evolving. The FTCS will be used as a basis to explore what has been done before and explain why there is no perfect solution to this issue.

Student Abstracts
Doctoral Degree Programs

The Performance of Ontology Creation Tools

Lauren Biggers

University of Alabama

An ontology is an explicit specification of a conceptualization. Ontologies are increasingly utilized in computer science, but can be difficult to create by hand. Tools, such as OntoGen, have been developed to aid in ontology creation.

OntoGen, developed at the Jozef Stefan Institute, is an ontology editor that intends to reduce the time spent and complexity involved with creating an ontology. We are curious about how OntoGen's output compares to what a human would manually construct. We tested this tool against an already categorized document set. The set contains documents that belong to only a single category and documents that belong to multiple categories. At this time, tests have only been performed on the singly categorized documents. The intent of the project was to compare the groupings produced by OntoGen to the human categorization. This comparison can help developers determine how well the tool performs a human task. Through analysis of the results, we can theorize how to improve the tool's performance by using different similarity metrics or enhancing current functionalities.

The user selects the type of categorization OntoGen will utilize: k-means clustering, latent semantic indexing, keyword categorization, or a mixture. For singly categorized documents, k-means clustering and LSI perform similarly at approximately 23% of the documents being categorized correctly. Keyword categorization performed slightly better at approximately 29% of the documents being categorized correctly.

We believe improvement does not necessarily lie in the tool, but on the underlying techniques utilized by the tool. If keyword categorization were replaced by a technique that could take context and semantics into account, then we believe the ontology might be closer to what a human would produce. The tool might also benefit from the use of some fuzzy clustering techniques, because some documents might fit into more than one category.

Ontology Conceptual Expansion

Liping Zhou

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A semantics-based method is proposed to extract concepts from a large corpus of text documents and expand the concepts of the known Ontology based on the semantic relations between two terms. The proposed method explores how to identify the candidate concepts, and how to give suggestions to knowledge engineers on where the concepts should be inserted in a given Ontology. The effectiveness of this approach is demonstrated by experiments on a Traditional Chinese Medicine (TCM) text corpus

The proposed method has several advantages: 1) it is based on semantic statistics instead of term frequencies. 2) It uses Universal Networking Language (UNL) expressions to formalize the structure of text, hence structuralize the Ontology representation. 3) It categorizes the relationships among concepts and assigns them different weights based on semantics. 4) We put forward two different approaches for calculating similarities among concepts. One approach is the calculation of similarities based on UNL network, while in the other method the similarity is calculated according to a conceptual semantic matrix. 5) Candidate concept selection and insertion is converted to a quadratic optimization problem that can be easily solved.

In brief, we proposed a new approach of Ontology conceptual expansion based on the statistics of semantic information, which is different from term-frequency based approaches. TCM Ontology is used to verify the proposed algorithm. In the experiments, most of the candidate concepts obtained for specialized concepts (lower level concepts) are considered to be relevant by domain experts. It is also worth mentioning that the proposed approach is domain-independent and can be applied to many other fields. This research can be extended in future for the application of Ontology in automatic medical diagnosis.

Performance Study of Channel Allocation Algorithm with Tri-communication Model

Sungbum Hong

Jackson State University

The radio is a valuable resource for the wireless/mobile communication system. The large bandwidth available technically is divided into many narrow bandwidths called channels. Each channel group is allocated to a specific wireless communication type such as local wireless network, wireless telecommunication systems, wireless networks for police and wireless networks for home appliances.

We have studied the channel allocation problem for wireless mobile networks. Much research work for the channel allocation problem of wireless/mobile communication systems has been done. The results of the work can be categorized into two major types: (i) the fixed channel assignment (FCA) model, where every cell has its own channel; (ii) the dynamic channel assignment (DCA) model, based on requests, channels are dynamically allocated; and (iii) the hybrid model that combine FCA and DCA.

In this paper, we present an efficient algorithm using a novel triangle communication model to synchronize processes effectively in searching for free channels for wireless mobile communication systems. For fair evaluation, we introduced a novel metric, which is called Accumulated Failure Locality (AFL). The triangle communication model improves message complexity, response time and accumulated failure locality (AFL) of the algorithm. Each cell in a sub-cluster can effectively collect channel information of the first tier of co-channel cells through the triangle communication model. The performance of the communication model is verified in terms of message complexity and response time. With AFL, we examine our algorithm and produce a vector of AFL value.

We discuss the algorithm and prove its correctness and also show that the algorithm requires at most $O(N_{sc})$ message complexity where N_{sc} is the number of cells in a sub-cluster. This is compared to the algorithms [Bou02] which require $O(N_g)^2$ where N_g is the number of groups into which the channels is divided.

Cancelled



Feature Location by Information Retrieval and Call Graph

Peng Shao

University of Alabama

Feature Location is the process to identify pieces of source code corresponding to a specific feature, where a feature is defined as a function in software. Feature location is a significant process and can be used for different purposes during the development of software, such as requirement tracing, impact analysis, program comprehension and different maintenance tasks. In this paper, we provide a new technique, with the combination of Lexical Information and Structural Information. For gathering Lexical Information we use Information Retrieval (IR) Model, and use Call Graph for collecting structural information. In our technique, IR Model can search in the source code, assign each method a relative score, and return a ranked list of methods based on a Query, which represents a feature. Then, we draw Call Graph for each method returned from the list by IR Model, and check whether a method's Call Graph's nodes exist in the ranked list, and assign an additional score to the nodes. Finally we will rank the list again by considering additional scores. By running different experiments and evaluating the results, we believe that the combination technique can improve the accuracy of IR Model and thus improve the effectiveness of feature location as compared to IR Model used independently.

Evaluating Color Harmony's Role in Map Labeling

Sussan Einakian

Advisor: Dr. Tim Newman

University of Alabama–Huntsville

Map labeling is one of the concerns in geographic information systems. Two of the key aspects that map labeling must consider are the location and color of the label on the map. Our focus in this paper is a user study that examines the impact of color of the text on maps. We investigate if harmonic or non-harmonic colors are best for the text. Harmonic colors are defined as a set of colors that come together in a way that pleases the human visual perception. Color and color harmony play a major role in art, design, visualization, and many other areas. Color and color harmony have extended the method of color harmonization to volume visualization [1][2] and data visualization [3]. Color harmony in art and design help designer and artist harmonize part of image with background and add text to the poster and image. [4] There are different types of tools that can determine a small set of colors that are harmonic. We used the Color Wheel Expert to find harmonic and non-harmonic colors. For the investigation of harmony, we used four different types of map of Alabama with different background colors and different detail information. Three maps are based on three fundamental harmonic color types (the i type, T type, and X type) based on the hue color wheel. The other map has non-harmonic colors as the background. The experiment used combinations of harmonic and non-harmonic color texts added to these maps. In it, viewers were asked to read the texts and their time to see the written texts on the map were recorded. We also asked each of them which text is most obvious and which is most pleasant, in their own perspective. The study group involved 30 people who are not color blind.

[1] L.Wang and K.Mueller Harmonic Colormaps for Volume Visualization

[2] L.Wang, J.Giesen, K.McDonnell Color Design for Illustrative Visualization

[3] G.Healey Choosing Effective Colors for Data Visualization

[4] D.Cohen, O.Sorkine, R.Gal, T.Leyvand, Y.Xu Color Harmonization

Visual Summary for Tourist Attractions

Lin Yang

University of Alabama–Birmingham

With fast developments in digital and internet technologies, online photo collections have become truly gigantic. Photo sharing site Flickr now hosts more than 2 billion photographs, a large portion of which are contributed by tourists. A keyword search for a popular tourism site often returns hundreds of thousands of photographs. A more efficient tool for navigation is necessary to help users to explore online photo collections.

We present an algorithm for selecting representative views for a tourist attraction. Upon input of a huge photo collection for a tourism site, our algorithm extracts scenes that have been photographed most frequently. These scenes are most likely to convey the essence of the tourist attraction. Since a number of photographs exist for a particular scene, our algorithm also seeks the one with the highest visual quality. The output of our algorithm is a small set of high quality photographs, each of which shows a representative view of the tourism site.

Our algorithm is fully automatic and relies only on photographs (no metadata is required). We use visual features to encode the scene structure of each photograph, and compute a ranking of the photo collection in terms of frequent scene structures (representativeness). A vision-based algorithm for visual quality assessment is also applied to each photograph, which provides another ranking of the photo collection in terms of visual quality. Having combined the two rankings, our algorithm uses adaptive non-maximal suppression to extract a single photograph for each representative view. We show experimental results on multiple tourist attractions, and compare our results with other state-of-the-art scene summarization algorithms.

A Client-Server System for Simulating and Visualizing the Random Packing of Polydisperse Spheres

Bruce Johnson and Robert Lowe

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The random packing of particles is important to understand the properties of geological materials, especially unconsolidated sediments that are typically difficult to sample without destroying their structure. Computer simulation algorithms are now widely used to simulate the packing of granular materials but are computationally intensive - typically $O(n^3)$ - exercises that are especially complicated when simulating the packing of materials with different size and density distributions. The objective of this project was to develop a polydisperse packing algorithm for scalable execution on multiple processor (i.e., parallel) computers. We present VirtualSoil, a client-server numerical computation package written in C++ that utilizes a portable OpenGL-based graphical user interface and particle visualization system for the client and the Message Passing Interface (MPI library) based parallel computation for the server. The packing algorithm is based on a Monte Carlo simulation in which all the grains simultaneously settle in a concentrated suspension. Input data requirements include the particle size intervals and number of particles in each interval whereas the data output is a final spatial distribution of a packed bed.

Cycles in XML Schema and Data Integration

Lila Razavi and Susan V. Vrbsky

University of Alabama

The existence of large amounts of data on the web demands the integration of XML data from different sources. Much research has been done recently on XML schema integration to coordinate different XML resources and to obtain better querying results. XML integration has been studied from two different approaches. The first approach builds an XML tree based on the comparison and integration between two XML schemas similar to the ER diagrams of RDBMS. The second approach builds an XML tree based on the comparison and integration of the XML schemas and also the data itself. Considering the data as well as XML schemas when building the trees provides additional detail for the integration of two XML sources. However, one issue typically not addressed when creating these XML trees is the existence of cycles and how to represent this data in the tree without missing critical data relationships. Xtron [1] proposes handling cycles in the tree by repeating the nodes twice for a cycle, which may increase the difficulty when integrating a complex system. QMatch [2] uses path-based matching of two XML schema trees and replaces the repeated matching structure of the tree by a single node, making comparisons easier but increasing the complexity of finding paths in the queries. Another possible approach is to include a labeling scheme for indicating cycles and integration. In our research, we propose to merge aspects from these approaches to create a new model that better addresses cycles in the data for the integration of XML resources.

[1] J.-K. Min, C.-H. Lee and C.-W. Chung, "XTRON: An XML data management system using relational databases," *Information and Software Technology*, 50(5): 462-479 (2008).

[2] N. Tansalarak, K. T. Claypool, "QMatch – Using paths to match XML schemas," *Data and Knowledge Engineering*, 60(2): 260-282 (2007).

A Transdisciplinary Approach Towards Clinical Research Evaluation

Varadraj Prabhu Gurupur

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The present day scenario of clinical research evaluation of any disease or disorder involves the participation of an individual who is either prone to the disease or could be a potential candidate to develop the disease or disorder. The clinician carries out investigation on various physiological, psychological, and demographic attributes of the clinical study participant. In the present scenario of clinical research evaluation the conclusions derived from observations is mainly based on the reliability of the conclusions drawn by the clinicians. This situation engenders a great need for building a transdisciplinary approach towards solving this problem of clinical research evaluation involving a set of technologies and methodologies that have been tested and used for engineering applications.

The process of clinical study of a particular disease or disorder could be further enhanced by using various methodologies and technologies such as Semantic Services, Semantic Web Technology, and Information Theory available to the scientific community. We are proposing a paradigm shift from a research based on evaluation, experience, and knowledge of the clinicians to that of a decision support system. This decision support system will be built using Abstract Software Design Framework (ASDF), a newly proposed framework for building distributed software systems. This approach involves usage of concept map tools, Wiki engines, and XML parsing techniques to build the required decision support system. This system will help the clinicians to respond more rapidly to observations made on clinical research trials and accelerate the process of clinical research on various diseases and disorders.

Matching UML Class Diagrams Across Reverse Engineering Tools

Yan Liang

University of Alabama

Software evolution compels developers to take much effort to understand the design of existing software systems. Reverse engineering tools can extract facts such as class diagrams from source code so that human effort on program comprehension can be greatly reduced. Choosing suitable and appropriate tools is itself a difficult process. To address this problem, an evaluation should be carried out across different candidate tools. Many metrics and benchmarks have been proposed to measure the accuracy of reengineering tools. Ignored by most evaluation experiments and approaches is the understanding of differences and similarities of the output artifacts produced by the tools. Currently, this comparison process is implemented manually in most tool evaluations, which is time-consuming, unscalable and error-prone.

In this research, we focus on examining the content of the class diagrams output by two reverse engineering tools. We propose an automatic approach to find matching class pairs across two class diagrams which refer to the same class in the source code input. First, the output of each tool is transformed into a unified schema which covers all possible features of a class. Next, based on the schema, we build a class matching model that can be used to find equal classes across two class diagrams derived from different tools for the same input program. We also present how to implement this class matching model to identify equivalent classes derived by different tools. This approach is different from typical record matching approaches. These typical approaches utilize fuzzy string comparison algorithms where domain knowledge is critical and the approaches typically ignore missing data. Our class matching model emphasizes the ability of handling missing features of classes and proposes a reasonable and simplified string comparison algorithm according to the nature of the C++ programming language.

Professional Abstracts



Building Mobile Rings: Synergy of Ring-based Peer-to-Peer Systems and Mobile Ad-Hoc Networks

Wei Ding

Austin Peay State University

In the past decade, commercial success of peer-to-peer (P2P) systems has triggered active research on synergy of P2P systems and mobile ad hoc networks (MANETs). This talk proposes a novel Mobile Ring Ad-hoc Networks (MRAN) protocol to solve the mobility disturbance problem of mobile P2P rings over MANETs. MRAN is a decentralized, message passing based, ring construction protocol. Simulation results show that MRAN works well under mobility disturbance. This research is a follow-up of our previous research on static ring construction protocol RAN.

Opposite to centralized client/server model, a decentralized network has no central node, which is usually an expensive bottleneck and point of failure. Decentralized model puts ordinary users on the driver's seat, gives them much more control, and stimulates their enthusiasm in active participation. As seen in eBay, Wikipedia, and YouTube, ordinary users' participation is pivotal to the vigor of a networking system. It is predicted to ultimately replace the client/server model in the long run.

P2P systems and MANETs are leading technologies in decentralized networking. In terms of decentralization, they are almost homogeneous. However, in terms of real world application, they are poles apart. P2P systems are accountable for biggest share of Internet traffic, while MANETs are still in the laboratory. The interesting phenomenon has sparked considerable research effort to transplant successful approaches in P2P systems into MANETs. While most research in the synergy focuses on routing, the network initialization problem remains indispensable. The most pivotal part in initialization is topology construction in P2P node ID space. And the most important topology is ring.

Previous approaches followed the rule of thumb of node joining and the idea of replacing IP with networking layer of MANETs, which add unnecessary restrictions to the synergy. Our scheme has avoided both of obstacles.

Assembly Language with Visual Studio

Richard C. Detmer

Middle Tennessee State University

Assembly language programming is often used in computer science curriculums to introduce computer architecture. Assembly language programming also reinforces high-level language concepts. Implementing a conditional or an iterative structure at the machine level contributes to the knowledge of the semantics of the structure. Converting a signed integer from its internal 2's-complement form to its ASCII representation helps the student appreciate how much work is being done by output functions in a high level language. Calling a procedure shows the student how parameters are actually passed. The 80x86 processor family is a good platform for assembly language instruction since many institutions have computers with these CPUs.

Microsoft's Visual Studio is readily available to educational institutions through the MSDN Academic Alliance. It provides a robust environment for teaching assembly language and 80x86 computer architecture, both with 32-bit and with 64-bit CPUs. A user can edit, assemble and execute assembly language programs in the Visual Studio 2008 environment, using the IDE that may already be familiar from other languages. One can use the debugger to "see" registers and memory inside the computer. A student can do Windows input/output from assembly language programs employing macros that she or he can easily use early in a course. The underlying input/output procedures are transparent to the student, but can later become objects of study in their own right. One can link assembly language driver programs to assembly language procedures, assembly language drivers to C (or other high-level language) functions, and C drivers to assembly language procedures. 32-bit and 64-bit 80x86 environments have minor differences such as operand size, and major differences such as parameter passing conventions (stack-based for 32-bit and register-based for 64-bit) and floating point practices (using the floating point unit for 32-bit and XMM registers for 64-bit).

A Survey of Security Issues and Enhancements of SCADA Networks

Yingbing Yu and Sandip Patel

Austin Peay State University and Morgan State University

Supervisory Control and Data Acquisition (SCADA) systems are used extensively to monitor and control process throughout the utility industries such as oil, gas, power, water/waste water, and transportation industries. SCADA depends on many networks to support communications between its components, including microwave, PSTN, satellite, frame relay, wireless networks, private fiber networks, and the Internet over TCP/IP in recent years. As part of national critical infrastructure, they have a crucial role in the health and economic well-being of the Nation and require protection from a variety of serious threats especially considering the possible terrorist activities. Unfortunately, the SCADA technology was initially designed to maximize functionality and performance with little attention to security. As a result, performance, reliability, flexibility and safety of distributed control/SCADA systems are robust, while the security of these systems is often weak. This has caused an urgent need to upgrade existing systems to withstand unauthorized intrusions potentially leading to terrorist attacks. Though managerial and administrative solutions have been always suggested, scientific research in low-level technical details ensuring or enhancing SCADA security is more critical to prevent from cyber attacks.

This paper provides a survey of the current state of security issues and enhancements of SCADA networks and its communication protocols especially the DNP3 (Distributed Network Protocol Version 3). We will discuss the reasons for rising concerns over the security of these systems, analyze the fundamental vulnerabilities and a variety of tangible attack scenarios from malicious intruders, and put forth recommended security solutions from the industry and the research. We further investigate effective methods to enhance its security by analyzing DNP3 protocols, a de facto industry standard protocol for implementing the SCADA communications. DNP3 is an open and public protocol and plays a crucial role in SCADA systems considering the widely utilization in industries.

Thinking Outside the Text Box, Alternative Approaches to Human Computer Interaction

Ron Zucker

East Tennessee State University

With the introduction of Interactive Development Environments (IDE's), programmers are able to quickly develop powerful Graphical User Interfaces (GUI's) for their projects. Just as in the saying "if the only tool you have is a hammer, everything looks like a nail", the ease of developing GUI forms using available widgets encourages programmers to stick to the given widgets in the IDE's palette. This presentation will attempt to show the evolution of the GUI from the use of standard widgets to more graphical and natural ways of interfacing with systems to provide a more intuitive and easier interface for the end user.

Minimum Distance Permutations

Edward L. Bosworth

Columbus State University

We consider some permutations that arise naturally from interconnecting computers on a common backplane, such as is found on a linear blade enclosure. We minimize two measures: 1. The maximum distance between any 2 computers. 2. The average distance between any two computers.

Consider a blade enclosure with N slots, numbered from 1 through N . The position of a computer in such a server might be denoted by an integer J in the range $1 \dots N$. The distance between any two computers is equivalent to the absolute value of the difference of their slot numbers. We consider a special case, in which the computers are arranged in a ring topology. By definition, computer J can communicate with computer $(J + 1)$, and computer N with computer 1.

We investigate the allocation of computers to slots in the backplane. Each possible allocation can be represented by a permutation of the integers in the set $[1, N]$. One obvious allocation corresponds to the identity permutation; put computer J into slot J .

For J in 1 to $(N - 1)$, the distance from computer J to computer $(J + 1)$ is 1. The distance from computer N to computer 1 is $(N - 1)$.

The maximum distance between any two computers is $(N - 1)$. The average distance is $2 \cdot (N - 1) / N$. The average is acceptable, but the maximum distance is too big.

We present a construction of a permutation with an identical average distance, but with a maximum distance of 2. We then give a proof that for more than 2 computers, the maximum distance must be at least 2, and end with a consideration of permutations that minimize the average distance while keeping the maximum distance $1 \leq 2$.

Grass Roots Knowledge Management: A Case Study of KM in a Highly Technical Organization

Randy K. Smith

The University of Alabama

Knowledge and knowledge management are key resources for an organization's success, and successful Knowledge Management (KM) is a crucial part of organizational strategies for enhancing competitiveness and performance. An effective knowledge management system enables organizations to be more dynamic, innovative, and competitive in today's rapidly changing environment. In the space industry, aerospace companies and federal agencies alike are challenged by the longevity of space missions, the complexity of technical solutions, and the potential loss of knowledge due to retiring experts. NASA has been at the center of these knowledge management endeavors. The space agency has recently reinvented its knowledge process with advanced knowledge capturing and data access technologies. NASA's KM strategy focuses on three areas: 1) sustainable knowledge across long missions and changing generations; 2) helping people find, organize, and share the knowledge that has been created; and 3) increasing collaboration among knowledge workers and facilitating knowledge creation and sharing. Following in the footsteps of the NASA KM team, the Marshall Space Flight Center (MSFC) Propulsion Systems Department (PSD) has conducted a KM initiative since October 2005 to enhance systematic knowledge use within the department for better engineering decision-making. The PSD KM team has piloted a system to evaluate current use of knowledge within the department and introduce new systems to enhance the knowledge capture and dissemination process. The PSD pilot seeks to - improve knowledge access across the organization, - increase the PSD's responsiveness to anomalies, and - prevent knowledge attrition.

This case study first developed a strategic plan for the pilot defining requirements. Secondly, the KM team designed a pilot architecture to meet those requirements. Finally, the pilot was developed and evaluated with its success based on predetermined measures. This case study examines the lessons learned, both technical and social, from this maturing knowledge management project.

Digital Medical Image Indexing Using Attributed Relational Graph and Rectangular Tree

Cancelled

Data Analysis Methods Using SQL Databases

B. Wayne Walters

University of Southern Mississippi

Relational database courses typically focus on data modeling, database design and efficiencies in processing. These are appropriate topics in Computer Science curricula as set forth by the Association for Computing Machinery (ACM). At the University of Southern Mississippi, in our Information Technology program, in the School of Computing, we have expanded offerings in relational database to include an emphasis on SQL commands and data analysis techniques.

By utilizing SQL functions found in Microsoft SQLServer and Microsoft EXCEL more knowledge can be gleaned from stored data. The results of queries can provide data that can quickly be inserted into pivot table (i.e., crosstab operations) and charting for interactive analysis and presentation. The frequent limitation of interactive analysis of database data can also be overcome by using n-dimensional cube structures such as those found in Microsoft OLAP offering. These techniques allow for good ad hoc viewing of data results.

These OLAP Cubes essentially allows data to be returned in cubes (ie, pivot table) for rotational

Does Paired Programming Really Work?

Kathy Winters

University of Tennessee–Chattanooga

Paired programming is a technique used extensively in extreme programming. All code is created by two people working together at a single computer. One serves as the driver and is responsible for the logic of the program. The other person is considered the navigator and is responsible for the syntax of the program. The theory is that pair programming increases software quality. I became intrigued with the idea of using this technique in CS One and CS Two courses to increase retention by leveling the playing field for all incoming students. When students enter our first course, they come from different backgrounds. These students' experience ranges from barely knowing how to turn on a computer to being experienced programmers. For approximately six semesters, I have used the paired programming technique in my introductory CS one course. When using this technique several questions must be addressed. Do students learn at the same rate? Do students learn to program on their own? What do you do about the student who relies on others for their share of the work? How do you go about making pairing assignments? This presentation will discuss lessons learned from my experience. It will also explore the advantages and disadvantage of its use. Finally, this presentation will address the question of should it be used and will I continue to do it.

Dependency Injection, Aspect Oriented Programming, and the Spring Framework: The Impact of Ideas in Software

Ken R. Adcock, Jr.

United Parcel Service Development

An amazing element of technology is how one person and an idea can change the way things are done. There is no better example than what is now known as the Spring framework. The Spring framework originated from source code published in a book written by Rod Johnson entitled *Expert One-on-One J2EE Design and Development* (Wrox, 2003). Rod Johnson wrote the book to describe his experiences and problems he encountered developing enterprise-level commercial Java applications.

The eventual response from the development community was tremendous. In fact, Spring is now regarded by many as the de facto standard for enterprise Java development. Not surprisingly, Spring has also become a key skill-set for Java developers. Furthermore, the Spring-approach had and continues to have very significant spillover effects on other development platforms. As one of the flagship frameworks used in industry, Spring has not only provided inspiration resulting in the increasing prevalence and usage of frameworks, it has focused the attention of developers on how to better architect and develop applications.

The significance of Spring cannot be fully appreciated without examining the problems addressed by its two core components: Dependency Injection (DI) and Aspect Oriented Programming (AOP). DI and AOP are concepts designed to address two shortcomings inherent in object oriented programming. DI addresses how to manage the complexity associated with the dependencies of objects on one another whereas AOP addresses how to manage so called cross-cutting concerns that apply across most if not all the objects in an application.

This presentation will examine the Spring framework and the two core components of DI and AOP and why they are important. However, the goal of this presentation is to address something more fundamental: Ideas matter and good execution on those ideas matter even more. Finally, this presentation will demonstrate why the Spring framework is an example of how hard work, creativity, and great execution applied to known problems can have a very significant impact.

Combining XML and TXL for Software Visualization

Medha Shukla Sarkar

Middle Tennessee State University

The dilemma of software engineering is to document software with sufficient details to be able to maintain it; but without having to worry about maintaining the large amount of resulting documentation in turn. The answer to this in can be found with software visualization. Software visualization is an important tool in software engineering to help understand the organization, algorithm and processes in software programs.

Visual software representation can be much more efficient in representing detailed information compared to text representation. This work is motivated by the above idea to develop tools and enable dynamic visualization of source code through techniques that can be used in various software maintenance scenarios where existing documentation or the amount of details available in the existing documentation is inadequate.

The approach to dynamic software visualization taken here is to use eXtended Markup Language i.e. XML platform and existing XML visualization tools for final visualization of existing source code. For this, the existing source code is first needed to be converted to a well formed XML document. A rule based source to source transformation language TXL (Tree Transformation Language) is used to convert a correct source code file into the XML document that validates against a predefined XML schema. Finally this XML representation of the source code is visualized in freely available XML visualization software called *SHriMP*, which graphically represents the language constructs and modules within the given source code. We show this approach using simple functionalities of C language, however, this tool can be expanded to cover all features of ANSI C grammar and extended to other languages for detailed dynamic visualization for various programming platforms.

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Comparison of Ethical Theories Mentioned in Computer Ethics Textbooks

Julian Eugene Boggess

Mississippi State University

Goal: The purpose of this study was to determine which ethical theories are discussed in a selection of Computer Ethics textbooks, and the extent to which each theory is mentioned, particularly in comparison to the other theories.

Methodology: The methodology of this study was to examine the table of contents and the index of each textbook. For the table of contents data, the TOC was examined for the name of each major ethical theory and/or its associated philosopher. A descriptive phrase associated with the ethical theory, such as “Duty-based” for Deontology, was also accepted. If the name was listed in the TOC, the number of pages listed for that topic was recorded. For the index data, the TOC was checked to determine the number of pages referenced for each of the 5 major ethical theories, and/or the names of the philosophers associated with the theories. For each name found in the index, the number of pages referenced were counted and recorded. Duplicate page listings in a particular category were eliminated.

	Deontology (Duty) (Kant)	Utilitarianism (Consequence) (Bentham, Mill)	Rights (Contract) (Locke, Hobbes)	Social (Contract) (Rousseau)	Virtue (Character) (Aristotle)
% coverage	0.25	0.37	0.11	0.09	0.18

For the TOC entries, the theories are ranked as follows:

	Deontology (Duty) (Kant)	Utilitarianism (Consequence) (Bentham, Mill)	Rights (Contract) (Locke, Hobbes)	Social (Contract) (Rousseau)	Virtue (Character) (Aristotle)
% coverage	0.41	0.39	0.20	0.0	0.0

- (1) Overall, Utilitarianism seems to be the most frequently-discussed ethical theory in this sampling of the Computer Ethics literature, followed by Deontology.
- (2) Generally, a relatively small number of pages seems to be devoted to a discussion of the major philosophical theories of ethics.
- (3) Virtue Ethics gets relatively short shrift compared to the other major ethical theories.

Using Alice to Introduce the Computer Science Discipline

Brenda Parker

Middle Tennessee State University

In order for Tennessee and area states to meet the rising technological demands of the future, educators must prepare the next generation of students to enter the technological literate workforce. A major part of that workforce according to Marc Prensky's article "Programming: The New Literacy"¹ will involve knowing how to program to some degree. Statistics indicate that if students (especially girls) are not won over to certain disciplines by the 8th grade they are lost. Therefore, it appears that introducing middle school teachers and students to programming can help prepare students for the future and also result in helping students understand what programming is all about and introduce the computer science discipline. The Alice program is a fun and easy way to introduce students to the programming world. To help in this effort, Middle Tennessee State University recently held an Alice workshop for area middle school science and math teachers. Details of the planning and the delivery of the workshop will be presented along with the survey results of the participants.

¹ <http://www.edutopia.org/programming-the-new-literacy>

From CS Concept to K12 IT Support

Greg Kawell

Samford University

For years now, K-12 school districts have been flooded with government funds designated to fill classrooms with the latest technology. Not only are classrooms now filled with desktop computers, but there are lcd projectors, SMART boards, classroom response systems, web conferencing rooms, and many other of the “latest” technologies.

Unfortunately, after the ribbon-cutting ceremonies and photo ops with the government officials, the day-to-day use and maintenance of the technology begins to take its toll on the teachers. Desktop computers become infected with adware and viruses, SMART boards begin to act stupid, response systems no longer respond, and the web conference never leaves the building. Many small school districts are given the funds for the technology, but are not given any monies to hire and train a sufficient IT department. Soon all the technology is dumped to the back of the room and left.

In this talk, I will present some data on this problem and then talk about how our computer science department has begun an involvement with the Perry County School District (PCSD) in Alabama. For the past three years, I have been working to develop a long-term relationship with the PCSD by integrating innovative ideas into my course requirements and also by conducting all-day work projects. PCSD is seventy miles from the Samford campus, yet, despite this distance, we have helped to repair and set up over 300 computers, design a database, and helped to investigate ways to implement new technologies.

The hope of this research is to see if two objectives can be met. First, I hope to give university students an opportunity to reach beyond tests and homework and actually apply the concepts they are learning in the classroom. Having to work in an environment with budgets, deadlines, and politics can help the student be better prepared to move into the world which awaits them after graduation. The second objective is to help the K-12 schools get the technology help they so desperately need. This technological assistance provides an environment that allows the teacher to develop confidence in the “latest” technology and to use it more effectively.

Using JavaScript to Support On-Line Content for Multiple Learning Styles

David L. Tarnoff

East Tennessee State University

Instructors interested in on-line course content know that there are plenty of tools for developing and presenting content. There are Podcasts, web cams, desktop capture applications, and plain old HTML with its images and text. There are also plenty of resources such as on-line textbooks, Java-based simulations, and on-line video. The problem is delivering usable, worthwhile content to students who have a variety of learning styles and backgrounds. This presentation discusses the experiences the author has had since first using on-line content in a microprocessor design laboratory in 1997 and the issues he is currently facing with delivering mixed-media content without the aid of a content management system. It addresses the importance of client-side applications such as JavaScript toward creating manageable on-line course content. The benefits and drawbacks of different tools will also be addressed along with methods for integrating them.

The Future of Education – A Case for Ubiquitous, On-demand eLearning

Christopher C. Whitehead

Columbus State University

In the past few years, the world of higher education has changed significantly due to the increased use of the Web as a supplement to or a substitute for the traditional classroom. Commonly referred to as online learning, this new model has now been implemented in one form or another by nearly every higher education institution in the U.S. This presentation discusses the next phase in the evolution of higher education—continuous elearning. In this next phase, online learning is no longer bound to the time and space requirements of today’s traditional and online models. Instead, learning is characterized by personalized, on demand learning that makes efficient and effective use of advanced multimedia and simulation technologies such as virtual worlds. The impact this next phase will have on traditional higher education is also discussed.

Multi-Core Programming: Challenges and Solutions

Srinivasarao Krishnaprasad

Jacksonville State University

To achieve higher performance using concurrency at lower heat dissipation, vendors now offer multi-core processors wherein multiple processing cores are included on the same die. Unfortunately, adding more cores will not automatically speedup an application. To exploit the multiple cores, the application has to be coded as multithreaded program so that individual threads can be run concurrently on separate cores. Multithreaded programming requires skilled programmers as it involves complicated issues of synchronization and communication. Also, thread-level programming is currently supported in different ways in different languages and operating system platforms. Use of these low-level threading capabilities has made application development challenging and difficult. Moreover, a lack of standards in multithreading technology has led to productivity and portability issues. But, multi-core processors are here to stay and indeed proliferate. Hence, there is an urgent need for a simpler and standard approach to develop concurrent applications that run on current multi-cores and also that scale well to future multi-core processors.

A small development team at Axon7 has introduced a tool named Jibu which is a library to facilitate multi-core programming on C++, Java, .NET, and Delphi platforms. Jibu provides a high-level abstraction for parallel and concurrent programming in a platform independent fashion. In this talk we present the motivation for developing tools for multi-core programming leading to basics of Jibu. We will illustrate very simple examples contrasting traditional code with Jibu's code to highlight the latter's advantages. These high-level constructs effectively allow programmers to develop efficient and portable applications quickly and reliably.

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Investigating the Impact of Ajax on Server Load in a Web 2.0 Application

Brian Toone

Samford University

Web 2.0 applications are characterized by frequent accesses to large datasets which continue to grow as users contribute significantly to the content of the website. One of the enabling technologies that allows Web 2.0 applications to provide rich user experiences while accessing large quantities of data is Ajax (Asynchronous Javascript and XML). Ajax provides websites with the ability to access server resources without refreshing the client web page. Google Maps and Facebook are example Web 2.0 applications that utilize Ajax to provide users with seamless access to data and services that would not be possible in the traditional HTTP request response cycle.

The additional capabilities provided by Ajax do not come for free. If used without consideration of the impact on server performance, the asynchronous requests initiated by the web browser in response to user actions can quickly overwhelm computational and network resources on the web server. For example, a web application that responds to “mousemove” events by sending a new Ajax request to the web server for each mousemove event can send hundreds of individual requests in only a few seconds. Each request consumes web server resources and prevents this type of code from scaling to large number of simultaneous users.

In this presentation we discuss the results of our investigation on the impact of Ajax requests on the web server hosting a Web 2.0 application that allows users to create and share topographic maps [1]. We demonstrate our experimental setup including the tools used for monitoring network and CPU usage. Finally, we provide suggestions on web application design to minimize the impact of Ajax requests on web server performance.

[1] <http://www.topocreator.com>

ETSU's SAP Initiative

Tony Pittarese

East Tennessee State University

SAP is the world's largest business software company. Over 100,000 companies worldwide run SAP software to support business operations. SAP development jobs tend to be very good jobs, and there is currently a significant shortage of employees in this segment. (Estimates indicate a deficit in the U.S. of 30,000 - 40,000 SAP knowledgeable developers.)

To address this shortage, SAP created the SAP University Alliances program. This program allows universities access to SAP software and supporting resources without the high cost and need for an extensive hardware infrastructure that normally accompanies an SAP installation. ETSU is one of only 2 Tennessee universities currently participating.

The "SAP Initiative" at ETSU has been influenced by regional businesses that use SAP software and are in need of developers. They have provided the necessary funds for supporting Alliances membership, as well as providing experienced SAP developers to serve as curriculum consultants. The success of this ETSU initiative will directly help them in their employee recruitment and training efforts.

In this presentation a brief overview of the University Alliances program will be presented, as well as a synopsis of the information from SAP Initiative partners. A case study of SAP deployment in one new class will be presented. This class, Enterprise Information Systems: Fundamentals of Business IT--offered totally as a student elective--is fully enrolled this Fall and students had to be turned away.

ERPsim, an award winning real-time business simulation that runs within theSAP environment, has been used with great success in presenting business concepts to computer science (and related fields) students, and showing the application of those business concepts in a real-world enterprise-class information system. An overview of ERPsim will be presented, as well as information about how it has been incorporated into coursework and the overall results.

The Semantic Web: The Next Evolution of the WWW

Christopher C. Whitehead

Columbus State University

In 2001, Tim Berners-Lee, James Hendler, and Ora Lassila wrote, "The Semantic Web will bring structure to the meaningful content of Web pages, creating an environment where software agents roaming from page to page can readily carry out sophisticated tasks for users." In 2003, Michael Daconta, Kevin Smith, and Leo Obrst wrote, the Semantic Web is "an extended web of machine-readable information and automated services that amplify the Web far beyond current capabilities." The purpose of this presentation is to provide an overview of what the Semantic Web is, its background, its major components, why it is needed, its possible uses, and how it can be implemented. This presentation also includes practical examples of current implementations and uses of the Semantic Web.

Web-Based Application to Assist with Testing and Grading Computer Programs

Bob Bradley and Otha Britton

University of Tennessee–Martin

For several years the computer science instructors on our campus have used the course management system Blackboard and have asked their programming students to submit their programs on Blackboard using the “assignment” feature. This has worked well, but grading the assignments involves many steps for the instructors. First the instructor must make up a folder on the faculty member’s computer for each assignment. Then the instructor must download the zip file from Blackboard, saving it in the appropriate folder. If the program involves multiple files, the additional identifying labels that Blackboard puts on the filename must be removed. Finally, the program can be compiled and run as many times as necessary to test it properly. Students get no feedback until after the grading process is complete. In order to make this grading process much easier for the instructor, as well as providing students feedback even prior to their submitting their programs, the authors have developed and are using a web-based application that includes applications for compiling and testing programs. The students can use a standard integrated development environment to enter, debug and test their programs. They then go to the “labgrader” program, copy in their program, compile it, and run it through test cases that are already included on the system. The data entry is provided automatically by the system, and the output is checked for accuracy. Students are told that the test succeeded, or are told exactly why it did not, so that they are able to correct the error before submitting it for grading. The instructors then use the same application to grade the programs, while also checking visually for appropriate comments, indentation and the like.

Using Comic Books to Teach Introductory Computer Science Concepts

David Brown

Pellissippi State Technical Community College

Many of us have fond memories of younger versions of ourselves following the exploits of our favorite comic book heroes, heroines and villains. Comic books have long been a part of popular culture and with the popularity of blockbuster movies based on comics, they are arguably more popular than ever. Comic books utilize a rich grammar that includes visual and textual information that can be used to teach concepts that require abstract model building on the part of students. Dr. David Brown describes his experience in utilizing comic books at Pellissippi State Technical Community College to teach introductory computer concepts.

3 Years of Allison Applesauce

Phillip S. Young, Jeremy Ey, and Eric L. Brown

Tennessee Technological University

Some academic and research computing environments might be tempted to move beyond traditional UNIX/Linux environments for the apparent ease of Mac OS X. Even the most adventurous developer has at times wished for technology which "Just Works" requiring only that one "check the box." Justin Stinson and current authors, Jeremy Ey and Eric L. Brown, previously presented information about the Department of Computer Science at Tennessee Tech's efforts at the 2006 ACM Midsoutheast Conference [1]. This retrospective will present some of the challenges faced during our 3 years of trial and implementation to replace Linux as the primary *nix platform.

As noted in the previous work, there are many advantages to the Mac OS X environment; however, there have also been a fair number of challenges along the way. Not unlike other operating system environments, solving these challenges often required trading one set of problems for another. Additionally, the somewhat unique release cycle for operating systems and operating system updates present additional challenges to Mac OS X administration.

This constant exchanging of one problem for another has at times felt like a never ending episode of *The Perils of Penelope Pitstop* [2]. In the interest of uniqueness, and the abatement of the ire of copyright lawyers, we present our dear, sweet Allison Applesauce and her challenges of dealing with one problem leading directly into another. It is in this spirit of comical disasters that the problems, solutions, and lessons learned will be presented complete with Southern accent.

[1] Ey, Jeremy, Stinson, Justin and Brown, Eric 2006 OS X as a Unix Environment. Proceedings of the Mid-Southeast Chapter of the ACM 2006 Fall Conference

[2] Hanna-Barbera 1969 *The Perils of Penelope Pitstop*

You Wonder Why a Student Would Pay \$100 for a Text and Then Not Read It. Getting Students to Read the Text

T. F. Higginbotham

Southeastern Louisiana University

The first time that I tried this I wrote 592 multiple choice questions for “Introduction to Java Programming” Fifth Edition, Y. Daniel Liang, chapters 5 - 16. Each question was taken directly (this was the key) from the text using the exact words from the text or the overhead slides.

Since this was an online course, class time was not being overburdened as there was no class time; everything was online.

The rules were as follows: (1) There were 10 tests, all released the first day of class, and a final, which was available for four days. (2) Each test had 20 questions, 2 points each, randomly selected from a large pool. The final had 50 questions, 4 points each. (3) A test could be taken as many times as desired, but the last grade was the only one that counted. A test, once started, had to be completed. And (4) Students were told they could tell another student on which page an answer could be found. Since each student had a unique test, this was of little value. I even set up a discussion board for each test and program.

Very little cheating appears to have taken place. In fact, I think less than usual; students are not going to semi-memorize the text and give it away, especially since the questions kept changing.

The students read the text and their grades really went up. The majority of students took each test about 1.5 times. My Student Opinion of Teaching went up, and later when I provided other members of the Faculty, so did theirs.

The method works!

A Curriculum for an Early Database Course to Support IT and CS Majors

Donald Sanderson

East Tennessee State University

Following a curriculum analysis it was found that many second and third year courses were using basic database technologies, with each course repeating basic material from the others. It was decided to move the database course from a junior-senior level to a freshman-sophomore level to reduce the overlap. This presentation will cover the rationale for the move, and its impact on both the CS and IT curricula. In addition, the current syllabus for the course will be presented along with the rationale for topic selections. Finally a few pedagogical techniques that have been effective in presenting abstract concepts such as system/object level privilege pairings to a student with limited experience in the discipline will be discussed.

IS Students, Ethics, and Social Responsibility

Vernon L. McGlone and Teresa A. McGlone

University of the Cumberland and Eastern Kentucky University

Ethical scandals and other negative publicity in the business world in recent years has resulted in increased attention to ethics education across various business disciplines, including Information Systems (IS). While most educators agree that ethical issues deserve a place in the business and IS curriculum, there is considerable disagreement about the effectiveness of current educational methods. Some research shows that ethics education makes a major difference in the ethical attitudes of students, while other studies conclude that it has little or no impact on students' ethical behavior.

A related issue for debate is the most appropriate means of integrating ethical issues in the classroom. There are many approaches of teaching business and IS ethics, but no general agreement as to which works best. For example, should ethics be taught as a separate course or can it be integrated within existing courses? If the latter approach is preferred, how much time should be devoted to the topic? Current research provides no consensus answers to these questions, so a further examination of alternative educational means is needed.

In this presentation, we report on a project involving a series of ethics-related events not tied to specific courses. As part of the project, we examine students' ethical awareness and sense of social responsibility, using a preliminary survey on involvement with volunteer organizations and attitudes toward volunteering. In our analysis, we follow previous research in examining the impact of demographics on student attitude. We find there are differences based on gender, age, and major field of study, with IS majors less likely to engage in socially responsible behavior, but more likely to have positive ethical attitudes. These results echo some previous research findings and contradict others.

Server Side Programming and Php

Jim Vandergriff

Austin Peay State University

Program chairs of conferences need applications so that abstracts of papers can be submitted and reviewed for conference consideration. I am currently the program chair of the Southeastern Section of the MAA. I needed a web application with system requirements that included:

- To have abstracts submitted as text as well as uploadable files in approved formats.
- To handle 200 papers broken down in eight categories.
- To send confirmation acceptance e-mails as well as notification of presenters' time slots.
- To allow real-time viewing of current submissions
- To have an online conference survey form for an after conference survey

I decided to use Apache server software, php server-side programming language, and mysql database. The objective of this talk is to go through some of the trials and tribulations of installing, programming, and testing such a system. The final project application will be presented including some of the code that makes php a powerful server-side programming language. I will also discuss some of the drawbacks of php and possible future projects.

Behind the Scenes at the Annual Conference of the Mid-Southeast Chapter of the ACM

Jim Clark

University of Tennessee–Martin

What proportion of presentation abstracts are submitted on the last weekend before the deadline? How many are submitted on the very last day? When does planning for the conference begin? Is there ever a time when one wonders “What if they planned a conference and no one came?” What do you do when the conference hotel calls and says “So far your group has reserved only one room?” Why is pre-registration so critical? How are deadlines established? These and other issues regarding the planning of the annual conference of the Mid-Southeast Chapter of the ACM will be addressed in this presentation.

Why Teach Assembly Language?

Edward L. Bosworth

Columbus State University

This paper is based on the author's experience in teaching ASM, the assembly language for the IBM Enterprise Series of Computers. These computers, originally called "Mainframes", include such important machines as the System/360, System/370, the z900, and the z9.

The paper begins with a quick survey of reasons to study assembly language, organized by the decade in which these reasons would have been valid.

The paper continues with the reasons that Columbus State University has chosen to retain a course in assembly language and, in particular, why the IBM Enterprise assembler, ASM. A few of the reasons for a course in assembly language are:

1. The course focuses the student's attention on the functional structure of a stored program computer. .
 2. The course integrates well with, and supports, our introductory course in Computer Architecture.
 3. The course highlights the run-time services provided by a typical higher level language. As an examples, we discuss explicit bounds checking on array accesses, and the use of a stack to support recursive subroutines.
 4. Although few of our students will be expected to write or modify assembly language programs, the course provides significant insights into the structures of other languages. One of our students stated that he had not understood some of the design choices in the COBOL language until he took the course in assembly language.
 5. There seems to be some growth in the use of large timesharing computer systems, especially Massively Parallel Processors. Our course gives the student considerable experience in timesharing access to a large Enterprise server.
 6. A few local companies use IBM Enterprise servers and appreciate our teaching the assembly language for that machine.
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PedOGGoGE : Pedagogical OpenGL Game Engine

Jeff Roach

East Tennessee State University

Teaching in the field of Computer Science is an ever increasing challenge. Concepts such as object-orientation, abstraction, encapsulation, and polymorphism are notoriously difficult to teach. These concepts are not only abstract –the students find them boring and irrelevant. The challenge therefore, is to find interesting ways to deliver these topics. The advent of video gaming has presented one such interesting way.

PedOGGoGE is a play on the word pedagogy –the art or science of teaching– and is an acronym meaning Pedagogical OpenGL Game Engine. The PedOGGoGE framework is designed as a tool to teach students the fundamentals of building a 3D game engine from the ground up. Since the framework utilizes all the concepts mentioned earlier, students should realize the relevance of each concept, thereby increasing the students' interest and retention of the concepts.

The framework is an object-oriented one. It utilizes the concept of abstraction to provide interfaces for varying types of technologies such as the operating system and the graphics application programming interface (API). The current version of the engine targets the Windows operating system with an OpenGL graphics backend and is written in C++. Polymorphism and encapsulation are utilized to create virtual 3D objects and worlds with a game.

The presentation will describe the PedOGGoGE framework and how each concept is realized and implemented. There will also be a demonstration of the engine in action.

Have Model Will Simulate!

Rodrigo Obando and Wayne Summers

Columbus State University

Modeling and Simulation (M&S) has been part of many disciplines. Modeling of entities and simulation of their interaction have been used to study complex processes for which a closed form equation is not known. For some years, the discipline of Modeling and Simulation has been emerging on its own, without being attached to a discipline or field of study. We explore our serendipitous encounter with this phenomenon as we track our progress into creating, initially, a track within our Graduate Program in Computer Science.

DoD (Department of Defense) contractors in our area started to see the need to have specialists in M&S due to the emergence of the use of these techniques in the development and deployment of their products and services. A grant opportunity was provided by Georgia's Intellectual Capital Partnership Program (ICAPP). The original grant provided funds to create the first course in the track of M&S. We recently received a second grant to expand this course into a graduate certificate program in M&S. The synergy of the military (Ft. Benning), the university and the community has provided not only the beginning of a track but that of a vision to carry us into the 21st Century.

Gödel and the Use of Automated Theorem Proving Software

David Frazier

East Tennessee State University

One of areas of Artificial Intelligence that is being used in practical applications is in the area of automated theorem provers. This class of software takes as its input a series of base theorems, derived by hand from mathematics. The user can then feed the theorem prover a series of unproven lemmas to be proved or disproved. Different Theorem provers employ different strategies to accomplish this, with more or less success depending on the kind of problems that they are fed.

It would be nice to imagine that someday a super automated theorem prover might be developed that would allow users to quickly determine valid from invalid lemmas. Unfortunately, Gödel's incompleteness theorem becomes a limiting factor. There will always be statements that we know to be true, but that cannot be proven to be true.

This presentation will focus on some of these Gödel statements that I have discovered during the last year with my work on the RESOLVE verifying compiler project. I will also discuss the strategies of dealing with these statements as well as how useful a program we can hope for.

Conference at a Glance



	Azalea Room	Dogwood I
7:30 AM	Morning Coffee–Poolside	Morning Coffee–Poolside
8:00 AM	Welcome and Keynote Address	
9:00 AM	Coffee Break–Poolside	Coffee Break–Poolside
	Session I–PhD	Session I–Undergraduate
	Chair: Wayne Summers	Chair: David Frazier
9:15 AM	Lauren Biggers (50)	Timothy Uptain (22)
9:35 AM	Liping Zhou (51)	
9:55 AM	Sungburn Hong (52)	
10:15 AM		Tavaris Payton (25)
	Session II–PhD	Session II–Undergraduate
	Chair: Joyce Crowell	Chair: Nancy Smithfield
10:40 AM	Peng Shao (54)	John Licato (26)
11:00 AM	Sussan Einakian (55)	David Kolb (27)
11:20 AM	Lin Yang (56)	Corum, Hawks, Hollomon, Hart (28)
11:40 AM	Johnson, Lowe (57)	
12:00 PM	Lunch–Patio Restaurant	Lunch–Patio Restaurant
	Session III–Masters	Session III–Undergraduate
	Chair: Medha Sarkar	Chair: Glenn Wiggins
1:00 PM	Milgo, Kandissounon (40)	Eric Frees (30)
1:20 PM	Hua Zhong (41)	Rudnick, Plott (31)
1:40 PM	Jeff Phillips (42)	Bodkin, Lancaster (32)
2:00 PM	Xiaoyun Jiang (43)	Gregory McGhee (33)
2:20 PM	Break–Poolside	Break–Poolside
	Session IV–Masters	Session IV–Undergraduate
	Chair: Greg Kawell	Chair: Otha Britton
2:35 PM	Smith, Skinner, Sakalaukus (44)	Armaly, Wilson (34)
2:55 PM	Paul Cleaveland (45)	DeMarcus Thomas (35)
3:15 PM	Rathy Mohan (46)	Shawn Bordeaux (36)
3:35 PM	Christopher Kilgore (47)	Brittany Streeter (37)
		Session V–Posters
4:00 PM		Asia Walton (38)
4:20 PM		
4:40 PM		
5:00 PM	Business Meeting–Dogwood II	
7:00 PM	Awards Banquet–Azalea Room	

	Dogwood II	Highlander Room
7:30 AM	Morning Coffee–Poolside	Morning Coffee–Poolside
9:00 AM	Coffee Break–Poolside	Coffee Break–Poolside
	Session I–Professional	Session I–Professional
	Chair: Ashraful Choudhury	Chair: Julian Boggess
9:15 AM	Wei Ding (62)	Edward Bosworth (66)
9:35 AM	Richard Detmer (63)	Randy Smith (67)
9:55 AM	Yu, Patel (64)	
10:15 AM	Ron Zucker (65)	B. Wayne Walters (69)
	Session II–Professional	Session II–Professional
	Chair: Richard Detmer	Chair: Jim Johnson
10:40 AM	Kathy Winters (70)	Brenda Parker (74)
11:00 AM	Ken Adcock, Jr. (71)	Greg Kawell (75)
11:20 AM	Medha Sarkar (72)	David Tarnoff (76)
11:40 AM	Julian Boggess (73)	Christopher Whitehead (77)
12:00 PM	Lunch–Patio Restaurant	Lunch–Patio Restaurant
	Session III–Professional	Session III–Professional
	Chair: Jim Vandergriff	Chair: Brenda Parker
1:00 PM	Srinivasarao Krishnaprasad (78)	Bradley, Britton (82)
1:20 PM	Brian Toone (79)	David Brown (83)
1:40 PM	Tony Pittarese (80)	Young, Ey, Brown (84)
2:00 PM	Christopher Whitehead (81)	T.F. Higgenbotham (85)
2:20 PM	Break–Poolside	Break–Poolside
	Session IV–PhD/Professional	Session IV–Professional
	Chair: Tony Pittarese	Chair: Brian Toone
2:35 PM	Razavi, Vrbsky (58)	Donald Sanderson (86)
2:55 PM	Varadraj Gurupur (59)	Vernon & Teresa McGlone (87)
3:15 PM	Yan Liang (60)	Jim Vandergriff (88)
3:35 PM	David Frazier (93) (Prof.)	Jim Clark (89)
	Session V–Professional	Session V–Professional
	Chair: Ken Adcock	
4:00 PM	Edward Bosworth (90)	
4:20 PM	Jeff Roach (91)	
4:40 PM	Obando, Summers (92)	
5:00 PM	Business Meeting–Dogwood II	
7:00 PM	Awards Banquet–Azalea Room	

Notes



