

Research Directions

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Research Overview

- Cluster Computing Software*
- HCI for Handheld/Wireless Devices
- XML Processing, Data Binding, Transformation
- Triveni*
- Extreme Programming
- Advanced Topics Software Reuse*

Applications to AOSD

- Not all of our research relates to AOSD
- Those marked with asterisk (*) have potential for AOSD
 - An extra slide is presented for topics where AOP/AOSD may be applied
- We welcome opportunities to collaborate with Ph.D. students!

Cluster Computing

- CN Software (in Java) to allow networks of computers to function as a single compute resource.
- Individual cluster nodes have different capabilities
 - problem: some nodes do I/O, some don't; tasks want to be oblivious to the details
 - solution: AOP allows every task to do I/O and do transparent redirection to nodes that can do I/O
- UML-based framework for Task Composition and Coordination

Clustering and AOSD?

- Where can AOSD help cluster computing codes?
 - logging
 - performance monitoring
 - distributed debugging
 - task scheduling and policies
 - security
- Most of these problems can be addressed more coherently with AOP methodology.

HCI/Language Teaching

- Using Handheld/Wireless technology for education
- Use to enhance teaching of both CS and non-CS courses
- Current application: Teaching Arabic and Asiatic languages (joint project with UC Berkeley)
 - learning to write/speak considered difficult
 - access to experts considered helpful
 - built-in assessment to shorten learning curve

XML Research

- Goal is to make XML processing more straightforward and natural in OO languages, e.g. Java and Python.
- Projects
 - Language-independent IR for transporting XML in parsed form.
 - OO Data Binding and Patterns for going to/from XML
 - Persisting XML
 - Intuitive and Efficient Transformation & RPC

Triveni Framework

- Framework for advanced concurrent programming
- Separation of aspects of software components:
 - state-based behavior (object)
 - event-based behavior (communication, control)
 - autonomous behavior (threads)
- Application domains: interactive (GUI-based), server-side, middleware/distributed, embedded systems

Triveni and AOSD

- How can Triveni support AOSD?
 - Already provides separation of basic aspects within a component
 - Further research needed on
 - expressing cross-cutting aspects
 - relationship between aspects and event-oriented programming

Applying Extreme Programming (XP)

- Pair programming
- Automated unit testing
- Distributed version control
- Documentation (“literate programming”)

Advanced Techniques for Software Reuse

- Further research required in
 - Relationship between aspects and patterns
 - Aspect granularity
 - Aspect composition
 - Dynamic vs. static aspects
 - Using formal methods to address these issues

Project Pages

- Clustering and CN
<http://content.cs.luc.edu/cpdc>
- HCI Work
<http://cluster.cs.luc.edu/~wirelesslab>
- XML Project
<http://gkt-www.cs.luc.edu/research/xir>
- Triveni
<http://www.cs.luc.edu/triveni>