CS 5984: Object-Oriented Systems and Languages
Spring 2008
Syllabus

Meeting Times: Monday, 4:00-6:45pm

Meeting Place: Burrus Hall 123A

Instructor: Dr. Eli Tilevich
213 Knowledge Works II, 540-231-3475
tilevich AT cs.vt.edu
Office Hours: TBA

Description: Object-oriented (OO) systems has been one of the most dynamic research areas in recent years. Beyond encapsulation, inheritance, and polymorphism, research in OO systems is a confluence of various topics in systems, programming languages, compilers, and software engineering. Specifically, research in OO systems has engendered several exciting recent developments in areas including: programming languages (e.g., genericity, reflection, meta-programming, bytecode engineering, virtual dispatch, garbage collection, just-in-time-compilation), middleware (e.g., distributed-object systems), concurrency (e.g., Java memory model), and others. Several novel programming paradigms such as aspect-oriented programming (AOP) stem from research in object-oriented technologies. Therefore, knowledge in OO systems is essential for anyone involved in development of next generation technologies.

This course will provide students with a background in OO technologies by covering both standard research literature and providing hands-on experience with specific technologies. In addition, the course will introduce students to research opportunities in current state-of-the-art OO systems. Additional topics covered will be determined by the individual interests of the class’s participants.

Prerequisites: Because this is a graduate course, prerequisites are not strictly enforced. However, you should have knowledge of programming languages equivalent to an undergraduate PL survey course and fluency in at least one OO language.

Evaluation: term (research) paper (70%)
midterm exam (10%)
research paper presentation (10%)
handson exercises (10%)

Other Resources:
Listserv: TBA
Web Page: TBA
Course Outline:
The course will cover an extensive sample of work from the Object-Oriented Systems and Languages literature such as can be found in the proceeding of the OOPSLA, ECOOP, GPCE, and AOSD conferences. Specific areas to be covered include:

Design Patterns—a critical view and analysis (not tutorial)
Component-based designs: layered design, mixin, mixin layers
Aspect-Oriented Programming, Subject-Oriented Programming, Adaptive Programming
OO Type Systems: parameterization mechanisms for Java, virtual types, module systems
Language Extensibility: meta-object protocols, reflection
Implementation issues: efficient dynamic dispatch, multiple inheritance and object layout, garbage collection for Java
OO Distributed Systems: OO middleware, distributed object systems
Software tools: code generation, code transformation, bytecode engineering

Reading Material:
There is no textbook for this course. Papers from the literature will be used. The reading list, below, offers a sampling of selected papers and books. The list is not complete (does not include very recent papers) but it is meant to give you a taste of the material we will study.

Reading List:


T.J. Biggerstaff, “The Library Scaling Problem and the Limits of Concrete Component Reuse”, 3rd Int. Conf. on Softw. Reuse (ICSR ‘94).


E. Gamma, R. Helm, R. Johnson, and J. Vlissides, *Design Patterns: Elements of Reusable Object-Oriented Software*. Addison-Wesley, 1994.


Dr. Eli Tilevich CS 5984: Object-Oriented Systems & Languages


