

COURSE FOR SPRING 2011

Both intelligence and law enforcement agencies have uncovered evidence of penetrations of government and commercial organizations resulting in loss of highly sensitive national defense and business information. The result is a massive demand for security experts who can find the flaws, analyze attacks, and secure the systems. Any software developer should know something about security or his work will not be able to withstand attacks.

This course exposes the required concepts when dealing with distributed systems and points the directions for further specialization. We use security patterns and UML models to describe designs. The course is updated yearly to reflect the latest advances in this topic. Its orientation is strongly practical with emphasis on current advances.

This course will be taught by Dr. Ed Fernandez. Dr. Fernandez developed the course, is the author of three books on security and a world-recognized expert on software systems and software security (he has been working with the National Institute of Informatics in Tokyo, Japan by invitation of the Japanese Government to work on software security). His biography is attached at the end.

CIS6375 Distributed Systems Security

Prereqs: CIS6370/ COP6855 (Comp. data security) or CNT4403 (Intro. to data security), some knowledge of UML.

Catalog description: Most practical information systems are distributed systems. This comes from the need to provide access to corporate information to distributed employees and customers and to adapt to application needs. This course considers the security issues of such systems together with possible solutions. We consider as reference context Internet-based systems. We use UML and patterns to describe architectures. We discuss new advances such as web services, cloud computing, and wireless systems and their effect on security. We present a methodology to build secure systems. We assume you are acquainted with basic aspects of security (a set of notes provides necessary background).

Textbooks: Class notes.

References: E.B.Fernandez, E.Gudes, and M. Olivier, *The design of secure systems*, book under contract with Addison-Wesley. (Draft version will be in Blackboard)

E.B.Fernandez, “*Security patterns in practice: Building secure architectures using software patterns*”, under contract with J. Wiley. To appear in the Wiley Series on Software Design Patterns. (Draft version in Blackboard0)

Instructor: Dr. Eduardo B.Fernandez, Professor of Computer Science and Engineering
<http://www.cse.fau.edu/~ed>

Goals: An in-depth review of current topics on the security of distributed systems, including standards and architectures. Use of patterns to model precisely system architectures. A basic objective is to provide a perspective on how all these systems fit together. Another objective is to understand their structure and implementation so they can be used to build complex systems. .

Topics :

1. Motivation and overview.
2. Security patterns. Misuse patterns. Other types of patterns. Overview of UML.
3. Methodologies for secure distributed applications
- 4 Distributed architectures. Units (Broker, Client/Server/Dispatcher) Agents. P2P. Middleware. SOA. Clouds.
5. SOA and Web services: architectures, attacks, and standards. Web services patterns. Identity. Misuse patterns.
6. Security in cloud computing. Threats and defenses.
7. Communication networks. Architectural layers. Remote authentication. Firewalls. VPNs
8. Wireless systems. Security standards. Wireless web services. Ad hoc networks security. RFID and sensors.
9. Cyber-physical systems. Smart grid.
- 10 Complex distributed applications. Securing medical, financial, and transportation systems.

Grading: Project (70 %) (selected from a set of topics provided by the instructor or the student (with instructor's agreement)). Assignments (3). (30%).

Dr. Eduardo B. Fernandez (Eduardo Fernandez-Buglioni) is a professor in the Department of Computer Science and Engineering at Florida Atlantic University in Boca Raton, Florida. He has published numerous papers on authorization models, object-oriented analysis and design, and security patterns. He has written four books on these subjects, the most recent being a book on security patterns. He has lectured all over the world at both academic and industrial meetings. He has created and taught several graduate and undergraduate courses and industrial tutorials. His current interests include security patterns and web services security and fault tolerance. He holds a MS degree in Electrical Engineering from Purdue University and a Ph.D. in Computer Science from UCLA. He is a Senior Member of the IEEE, and a Member of ACM. He is an active consultant for industry, including assignments with IBM, Allied Signal, Motorola, Lucent, and others. More details can be found at <http://www.cse.fau.edu/~ed>