

Wook Shin

Visiting Scholar,
4220 Siebel Center,
201 N Goodwin Ave., Urbana, IL 61801, USA

Phone: +1 217 333-2518
E-mail: wookshin@uiuc.edu

Research Interests Security of { Healthcare system, Web services, Location-based services, Workflow systems, and Embedded operating system }. Trusted Operating Systems, Formal Specification and Verification of Security

Education Mar. 1998 – Feb. 2005 **Gwangju Institute of Science and Technology, Gwangju, Korea**
Ph. D. in Information and Communications (Feb. 2005)
Thesis Title: Extended RBAC for Trusted Operating Systems and Its Coloured Petri Net Model
Master of Engineering in Information and Communications (Mar. 2000)
Thesis Title: Role-Behavior Based Access Control for Mobile Agent Based Workflow Systems

Mar. 1994 – Feb. 1998 **Dongguk University, Seoul, Korea**
B. S. in Computer Engineering (Mar. 1998)

Skills Proficient in Java, C, C++, Python, and others.
Familiar with formal specification and verification tools.
Experienced in embedded systems and web services

Patents **Korean Patent**
1. *Extended-BLP Model Based Access Control System*, Dong-Ik Lee, Jung-Min Kang, Wook Shin, Chun-Gu Park

Awards and Honors ■ **Best paper Award**, Korea Information Processing Society (KIPS) Autumn Conference, 1999
■ Information and Telecommunication National Scholarship by the Ministry of Information and Communication, Korea
■ Gwangju Institute Science and Technology (GIST) scholarship by the Ministry of Science and Technology, Korea

Experience **June 2005 – present Visiting Scholar, Illinois Security Lab., Department of Computer Science, University of Illinois at Urbana-Champaign, USA**

■ **Projects (Involved)**
1. *Assisted Living Project* (<http://lion.cs.uiuc.edu/assistedliving/index.html>), funded by NSF, USA (2005-Present)
Overview: Developing remote health monitoring framework. My role is developing secure communication infrastructure based on open standards.

Feb. 1998 – 2005 Security Research Group, Gwangju Institute of Science and Technology, Korea

■ **Projects (Supervised)**
1. *A study on trusted embedded OS and its formal verification*, funded by Ministry of Information and Communication, Korea (2004)
Overview: A trusted embedded operating system development and the formal verification of the

security configuration of the system.

2. *Formal Methods for Security Verification of Secure OS*, funded by National Security Research Institute, Korea (2003)

Overview: Formal specification and verification method for the correctness test of security configurations. Defines hybrid formal method based on Coloured Petri Net formalisms.

3. *A Secure OS Development*, funded by Ministry of Information and Communication, Korea (2000-2002)

Overview: Development of Trusted Operating System based on monolithic Linux Kernels. The security kernel enforces various access control policies such as MLP, Extended-BLP, RBAC, RBBAC, ML-RBAC. Moreover, the implementation includes audit facilities for MLP, anomaly IDS, and anti-virus mechanisms.

4. *KHF 2002: The 1st K-JIST Hacking Festival*, funded by Gwangju Institute of Science and Technology, Korea (2002)

Overview: KHF is a famous annual domestic hacking contest in Korea. The contest holds in 2 days and more than 200 teams participant to the contest.

5. *A Survey on Intrusions and Vulnerabilities*, funded by Secuve CO, Ltd., Korea (2000)

Overview: To analyze intrusion patterns and develop an intrusion detection system, we collect known intrusion techniques and diagnosis actual codes.

■ **Projects (Involved)**

6. *Joint Forum for Strategic Software Research*, funded by International Information Science Foundation, Japan (2004)

Overview: Studies on the advanced form of Trusted Operating System development. I research on the embedded TOS implementations.

7. *KHF 2003: The 2nd K-JIST Hacking Festival*, funded by Gwangju Institute of Science and Technology, Korea (2003)

Overview: KHF is a hacking contest. I protected the target servers from attacks and made several intentional security flaws.

8. *Hanuri/TFlow 2.0: Workflow Process Tools Development*, funded by Electronics and Telecommunications Research Institute (1999-2000)

Overview: Development of a transactional workflow management system in distributed environment. I wrote RBAC access control architecture and role management application for the system.

9. *A Mobile Agent based Workflow System*, funded by Electronics and Telecommunications Research Institute and Korea Science and Engineering Foundation (1999-2000)

Overview: Development of a workflow system based on the mobile agents. I implemented the agent servers and access control framework for the mobile agent system.

2000 - 2003 Lecturer, Bitcamp of Bit co. Ltd. (www.bitcamp.co.kr)

- Client/Server system security
- Network Programming
- Java Language

Overview: The Bitcamp and Bit Education Center are the most famous IT education centers in Korea. I gave lectures on security, programming languages, and network to graduate and undergraduate students.

Publications

■ **International Journal**

1. **Wook Shin**, Jeong-Gun Lee, Hong Kook Kim, and Kouichi Sakurai, *Procedural Constraints in the Extended RBAC and the Coloured Petri Net Modeling*, IEICE Transactions on Fundamentals of Electronics, Communications and Computer Science, Special Section on Cryptography and Information Security, Vol.E88-A, No.1, pp. 327-330, Jan. 2005.
2. **Wook Shin**, Jong-Yeol Park, and Dong-Ik Lee, *Extended Role Based Access Control with Procedural Constraints for Trusted Operating Systems*, IEICE Transactions on Information Systems, Vol.E88-D, No.3, pp.619, Mar. 2005.

Overview: We extended previous RBAC scheme for the advanced access control service considering execution sequence of operations. The main benefit of the extension is providing intrusion detection services at the level of access control kernel. The paper 2 introduces the access control and compares it with the other access control models. Next, we proposed a formal model for the extended access control based the Coloured Petri Net formalism. The formal model is discussed in the paper 1.

■ Lecture Notes on Computer Science

3. **Wook Shin**, Dong-Ik Lee, Hyoung-Chun Kim, Jung-Min Kang, and Jin-Seok Lee, *Extended Role Based Access Control and Procedural Restrictions for Secure Operating Systems*, Lecture Notes in Computer Science(LNCS): The International Conf. on Information Security and Cryptology (ICISC2003), Vol. 2971, pp. 184-196, 2004.

Overview: The basic concept and the model of the extended access control are discussed in the paper 3.

■ International Conference

1. Michael J. May, **Wook Shin**, Carl A. Gunter, and Insup Lee, *Securing the Drop-Box Architecture for Assisted Living*, In Formal Methods in Security Engineering (FMSE '06). ACM

Overview: This paper presents security issues in designing Drop-Box architecture for the Assisted Living system, formally specifies communication protocol of the system, and shows implementation results.

2. Qixin Wang, **Wook Shin**, Xue Liu, Zheng Zeng, Cham Oh, Bedoor K. Alshebli, Marco Caccamo, Carl A. Gunter, Elsa L. Gunter, Jennifer Hou, Karrie Karahalios, and Lui Sha, *I-Living: An Open System Architecture for Assisted Living*, In IEEE International Conference on Systems, Man, and Cybernetics (SMC '06), IEEE.

Overview: This paper discusses design issues of the Assisted Living system (I-Living) of UIUC.

3. **Wook Shin** and Dong-Ik Lee, *Extended Role Based Access Control for Secure Operating Systems*, In Asian Pacific International Symposium 2002, pp. 165-172, 2002.
4. JungMin Kang, **Shin Wook**, ChoonGu Park, and DongIk Lee, *Extended BLP Security Model Based on Process Reliability for Secure Linux Kernel*, In Pacific Rim International Symposium on Dependable Computing, Sep. 2001, IEEE.

Overview: The paper 3 discussed separation of abstraction layers of RBAC. The separation reduces errors in security administration. The paper 4 introduces a simple implementation example and performance measurement results of an extended access control method. The paper 5 discusses the extension of BLP model. The E-BLP considering the clearance of processes and their owners separately. It reduces the threats from the Trojan horses attack.

■ Domestic Journal

1. **W. Shin**, D.-I. Lee, S.-H. Yoon, *Role-Behavior Access Control on Mobile Agent System for Workflow Management System*, Journal of Korea Institute of Security and Cryptology, Vol. 10, No 3, pp. 11-27, Sep. 2000.
2. Jongyoul Park, **Wook Shin** and Dong-Ik Lee, *Mobile Codes and Security Problems*, Korea Information Processing Society Magazine, Vol. 7, No. 2, pp. 115-121, 2000.
3. Jung-Min Kang, **Wook Shin**, Chun-Gu Park, Dong-Ik Lee, *E-BLP Security Model for Secure Linux System and Its Implementation*, Journal of Korea Information Processing Society, Vol. 8A, No. 4, pp. 391-398, 2001.

Overview: The paper 1 discusses layered access control framework for large distributed systems. The paper 2 explains security problems in mobile code technology. I wrote the part of the paper mentioning about attacks from mobile codes and host protection technique. The paper 3 introduces the concept of extended BLP model and its implementation on Linux kernel.

■ Domestic Conference

– **Japanese Domestic**

1. **Wook Shin**, Dong-Ik Lee, Hyoung-Chun Kim, Jung-Min Kang, and Jin-Seok Lee, *Extended Role Based Access Control and Procedural Restrictions for Secure Operating Systems*, Proc. of Computer Security Symposium 2003(CSS 2003), pp. 247-252, 2003.
2. **Wook Shin**, Hong Kook Kim, Kouichi Sakurai, *An Implementation of Extended-Role Based Access Control on an Embedded System*, Proc. of Computer Security Symposium 2004, pp. 667-671, 2004.
3. Hyung Chan Kim, **Wook Shin**, R. S. Ramakrishna, Kouichi Sakurai, *Conflicts of Role Based Access Control in Multi-domain Security*, In Proc. of 2004 Symposium on Cryptography and Information Security (SCIS 2004), pp. 481-486, 2004.

Overview: The paper 1 introduces the concept of E-RBAC and its procedural constraints. The procedural constraints model the execution sequences of operations. The concept of E-RBAC is simply implemented in an embedded environment. The implementation is introduced in the Paper 2. The paper 3 presents about the security problems when 2 different role hierarchies conflict in distributed environment.

– **Korean Domestic**

1. **Wook Shin** and Dong-Ik Lee, *Security considerations on mobile agent-based workflow systems*, Proc. of KIPS Spring Conference 99, Vol. 6, No. 1, pp. 1137-1140, 1999.
2. **Wook Shin** and Dong-Ik Lee, *The Role-Behavior Based Access Control*, Proc. of KIPS Autumn Conference, Vol. 6, No. 2, pp. 57-63, 1999. (Best paper)
3. **Wook Shin** and Dong-Ik Lee, *Security Property Testing Rules in Role-Behavior Based Access Control*, Workshop on Information Security and Cryptography 2000, pp. 219-232, 2000.
4. **W. Shin**, J.-M. Kang, C.-G. Park, D.-I. Lee, *Extended Multi-Level/Role Behavior Based Access Controls on Linux Operating Systems*, Proc. of KISS Spring Conference, pp. 772-774, 2001.
5. **Shin Wook**, Park Chun-Goo, Kang Jung-Min, Lee Dong-Ik, Jung Seung-Woog, *Multi Level-Role Behavior Based Access Control(ML-RBBAC) for Secure Operating Systems*, Proc. of KIPS Autumn Conference, Vol. 8, No. 2, pp. 1005-1008, 2001.
6. **Wook Shin** and Dong-Ik Lee, *ML/RBBAC(Multi-Level/Role-Behavior Based Access Control)*, Proc. of Conference on Information Security and Cryptology 2001, Vol. 11, No. 1, pp. 396-400, 2001.
7. **Wook Shin**, Dong-Ik Lee, Hyoung-Chun Kim, Jung-Min Kang, Jin-Seok Lee, *Extended Role Based Access Control for Trusted Operating Systems*, Proc. of KIPS Autumn Conference, 10, 29, pp. 1981-1984, 2003.
8. **Shin Wook**, Kim Hyung-Chan, Lee Dong-Ik, *Extended Role Based Access Control with Procedural Constraints*, Proc. of the 13th Joint Conference on Communications and Informations, No. III-F-2, pp. III-F-2.1~4, 2003.
9. **Wook Shin**, Dong-Ik Lee, Hyoung-Chun Kim, Jung-Min Kang, and Jin-Seok Lee, *The Continuous Access Control with RBAC*, Proc. of KISS Autumn Conference, Vol. 30-2, No. 51, pp. 742-744, 2003.
10. **Wook Shin**, Hong Kook Kim, Jung-Min Kang and In-Sook Jang, *The Extended RBAC Model using Coloured Petri Net*, Proc. of the 21th KIPS Spring Conference, vol. 11, no. 1, pp. 1099-1102, 2004.

Overview: The paper 1 introduces the security problems in mobile agent technology and the possible dangerous situations when the mobile agents are used for workflow executions. The paper 2 argues the problem of mixed abstraction of RBAC, proposes the separation of the abstraction in RBAC, and introduces the benefits of the separation. The model of the separated access control and several security checking rules are introduced in the paper 3. The paper 4-6 discuss the hybrid access control technique of mandatory access controls and role-based access controls. The paper 7-9 present the extended role based access control considering execution sequences, and the formal model of the extension is suggested in the paper 10.

11. JungMin Kang, **Shin Wook**, ChoonGu Park, and DongIk Lee, *Extended BLP Security Model based on Process Reliability and Architecture Design*, Proc. of KISS Spring

Conference, pp. 802-804, 2001.

12. Jung-Min Kang, **Wook Shin**, Chun-Gu Park, Donk-Ik Lee and Kyung-Ho Lee, *Security Level Decision Problem in MLP-based Secure OS*, Proc. of KIPS Autumn Conference, Vol. 8, No. 2, pp.943-946, 2001.
13. C.-G. Park, **W. Shin**, J.-M. Kang, D.-I. Lee, *The Design of a Log Manager for Mandatory Access Control Mechanism of Secure Operating System*, Proc. of KISS Spring Conference, pp. 805-807, 2001.
14. Chun-Goo Park, **Shin Wook**, Jung-Min Kang, and Dong-Ik Lee, *A Study on Access Control Mechanism for Secure Downgrading of Objects in the MLS System*, Proc. of KISS Autumn Conference, pp. 790-792, 2002.
15. Chun-Goo Park, **Shin Wook**, Jung-Min Kang, and Dong-Ik Lee, *A Design and Implementation of Access Control Mechanism for Secure Downgrading of Objects*, Proc. of CISC(Conference on Information Security and Cryptology), Vol. 11, No. 1, 281-286, 2001.
16. Ki-Woong Ko, **Wook Shin**, Dong-Ik Lee, *Intrusion Detection based on Intrusion Prediction DB using System Call Sequences*, Proc. of KISS Autumn Conference, Vol. 9, No. 1, pp. 927-930, 2002.
17. Hyung-Chan Kim, **Wook Shin**, Dong-Ik Lee, *Security Problems on Ubiquitous Computing Frameworks*, Proc. of KIPS Spring Conference, Vol. 9, No. 1, pp. 895-898, 2002.
18. Hyung Chan Kim, **Wook Shin**, Dong Ik Lee, *Role-Based Access Control Model for Cooperative Work*, Proc. of KISS Spring Conference, Vol. 30, No. 1, 236-238, 2003.
19. Hyung Chan Kim, **Wook Shin**, Dong Ik Lee, *Role-Based Access Control Model for Domains under Exclusive Authorities*, Proc. of the 13th Joint Conference on Communications and Informations, No. III-F-2, III-F1.1-4, 2003.

Overview: The papers 11-12 discuss the extended BLP. The E-BLP enables to implement the concept of Bell-LaPadula Model more safely. The security levels of processes are evaluated separately from the human users. All of execution images in a computer system can be replaced with dangerous codes. The main idea of E-BLP started from the fact. The paper 13-15 introduces the security issues when the security labels of entities are changed. The problems from the changes of the configuration can be solved relying on audit data. The paper 16 presents the hybrid intrusion detection technique of anomaly detection and misuse detection. The paper 17 refers the security problems in ubiquitous environments. The paper 18-19 introduces the conflict problem of role hierarchies when each hierarchies are managed by different administrator. The solution of the problem is making a role interface between different security domains.

- Talks and ETC.
- The 2nd Midwest Security Workshop, UIUC, USA: Securing Drop-box Architecture for Assisted Living System, September 2006.
 - The 11th Network Security Workshop Korea (NETSEC-KR) 2005, Seoul, Korea: Trusted Embedded Operating Systems, April 2005, Host: Dae-Ho Kim and Hong-Seop Lee
 - Kyushu University, Fukuoka, Japan: *The Extended Role Based Access Controls*, July 2004, Host: Prof. Kouichi Sakurai
 - Markany, Inc., Seoul, Korea: *Trusted Operatinng Systems*, October 2003, Host: Prof. John Choi (CEO of Markany, Inc.)
 - National Security Research Institute, Daejeon, Korea: *Security Models*, March 2003, Host: Dr. Joong-Gil Park
 - National Security Research Institute, Daejeon, Korea: *Hacking Techniques*, February 2003, Host: Dr. Joong-Gil Park