

2019 Tennessee Tech College of Engineering New Faculty Research Seminar Series

Data Protection in Transit and at Rest with Leakage Detection

**Presented by Denis Ulybyshev, Assistant Professor, Computer
Science Department**

Abstract: In service-oriented architecture, services can communicate and share data among themselves. I present a solution that allows detecting several types of data leakages made by authorized insiders to unauthorized parties. My solution provides role-based and attribute-based access control for data so that each service can access only those data subsets for which the service is authorized; considering a context and service attributes such as the security level of the web browser and trust level of service. My approach provides data protection in transit and at rest for both centralized and peer-to-peer service architectures. The methodology ensures confidentiality and integrity of data, including data stored in untrusted cloud. In addition to protecting data against malicious or curious cloud, or database administrators, the capability of running a search through encrypted data, using SQL queries and building analytics over encrypted data is supported. I implemented this methodology for two use cases: (1) Hospital Information System with secure storage and exchange of Electronic Health Records; (2) Vehicle-to-Everything communication system with secure data exchange. My approach is applicable for content distribution systems, document management systems, online shopping, and for other use cases when role-based and attribute-based access control is needed for data. To help with investigating data leakage incidents in service-oriented architecture, integrity of provenance data needs to be guaranteed. For that purpose, I am integrating my solution with IBM Hyperledger Fabric blockchain network, so that every data access, transfer or update is recorded in a public blockchain ledger, is non-repudiable and can be verified at any time in the future.

About the Speaker: I am an Assistant Professor in the Department of Computer Science. I received my PhD from Purdue University in 2019 and my Master's degree from Bauman Moscow State Technical University in 2004. In 2004-2012 I worked as a Software Engineer for companies, including Samsung Electronics and Schneider Electric.

**Tuesday, Oct. 8 2019, 4:30 to 5:30 p.m.
Prescott Hall, Room 225**

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