DOCTORAL THESIS

Query authentication in data outsourcing and integration services

Chen, Qian

Date of Award:
2015

Abstract

Owing to the explosive growth of data driven by e-commerce, social media, and mobile apps, data outsourcing and integration have become two popular Internet services. These services involve one or more data owners (DOs), many requesting clients, and a service provider (SP). The DOs outsource/synchronize their data to the SP, and the SP will provide query services to the requesting clients on behalf of DOs. However, as a third-party server, the SP might alter (leave out or forge) the outsourced/integrated data and query results, intentionally or not. To address this trustworthy issue, the SP is expected to deliver their services in an authenticatable manner, so that the correctness of the service results can be verified by the clients. Unfortunately, existing work on query authentication cannot preserve the privacy of the data being queried. Furthermore, almost all previous studies assume only a single data source/owner, while data integration services usually combine data from multiple sources. In this dissertation, we take the first step to study the authentication of location-based queries with confidentiality and investigate authenticated online data integration services. Cost models, security analysis, and experimental results consistently show the effectiveness and robustness of our proposed schemes under various system settings and query workloads.

Keywords: Query Authentication, Privacy Preservation, Location-based Services, Data Integrity, Data Integration

Acknowledgements

I would like to express my special appreciation and thanks to my supervisor, Prof. Jianliang Xu, for his expertise on inspiring guidance and constructive suggestions in my studies and research works in these years. He has brought me into this challenging research area and shared insightful experiences with me. I would also like to thank my co-supervisors, Dr. Haibo Hu and Dr. Byron Choi, for their great patience in guiding me shaping good research topics, and improving skills of presentation and paper writing. Without their supervision and constant help, this dissertation would not have been possible.

I would like to thank my colleagues for their direct and indirect help. In particular, I should mention Mr. Zhe Fan, Mr. Yafei Li, Mr. Lei Chen, Mr. Peipei Yi, Mr. Jingjing Chen, Mr. Cheng Xu, Dr. Yun Peng, Dr. Xin Lin, Dr. Rui Chen, Dr. Qijun Zhu, Dr. Dingming Wu, Mr. Shen Gao, Mr. Jintian Deng, Mr. Ziwei Yang, Dr. Qilong Han, Mr. Xiaojing Xie, Ms. Shenshen Peng, Mr. Zhuo Chen among many others.

Finally, I take this special occasion to thank my father Guoliang Chen and my mother Yunxian Wu for raising me and supporting me for so many years. I also wish to thank my wife Chengcheng Dai for her love, kindness and understanding. Without them, I would never go so far.

Table of Contents

List of Figures