Bachelor/Master Thesis

Verifying Location through Blockchain and IoT Architectures

Context

Many use-cases build upon geographic information of its users to deliver certain services. Location-based advertising is one example, where users can obtain certain rewards for checking into particular locations. Such systems can create an incentive for users to cheat their positions [1]. Beyond location based services, many other traditional business processes like travel-expense reports or insurance claims also rely on accurate location information to approve the payment of large sums. In such contexts, it is especially important that the locations reported by users are truthful and verifiable.

State of the Art & Problem

Verifying a user's presence in a privacy-preserving and secured manner is a significant challenge. Depending on the use-case, different requirements in range, accuracy and user privacy can play a role in the design. Several location-proving architectures have been proposed to answer the above mentioned issue. Centralized solutions that rely on trusted location authorities have been suggested [2], as well as fully decentralized solutions that use blockchain technology to provide peer-to-peer location proofs [3].

Thesis Topic & Goal

To what extent do existing verification approaches meet the specific requirements of different use-cases? How do these requirements influence architectural decisions, e.g. when is a decentralized solution more desirable than a centralized solution? How could blockchain-based verification be designed for a particular use-case, in a way that is trustworthy and reliable?

Skills:

Distributed systems, IoT systems, Blockchain technologies

[1] He, W. et al. "Location Cheating: A Security Challenge to Location-Based Social Network Services." In *ICDCS 2011*: 740-749.
[2] Luo, W., and U. Hengartner. "Veriplace: a privacy-aware location proof architecture." In *SIGSPATIAL 2010*: 23-32.
[3] Brambilla, G. et al. "Using Blockchain for Peer-to-Peer Proof-of-Location." arXiv preprint: 1607.00174 (2016).

Contact:
Maria Borges, Jonathan Heiß
mb@ise.tu-berlin.de
jh@ise.tu-berlin.de

Our Mission:
Our lectures cover fundamental methods and techniques in the areas of service computing, cloud computing, and enterprise computing. We like to engage students in hands-on building of distributed information systems and to take an interdisciplinary approach to evaluating such systems. Through a close mentoring of students, especially in our seminars, we aim to introduce students to our ongoing research and to excite them to do future studies and research with us.

ISEngineering
Wirtschaftsinformatik –
Information Systems Engineering