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Big Data - Security with Privacy

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CERIAS®

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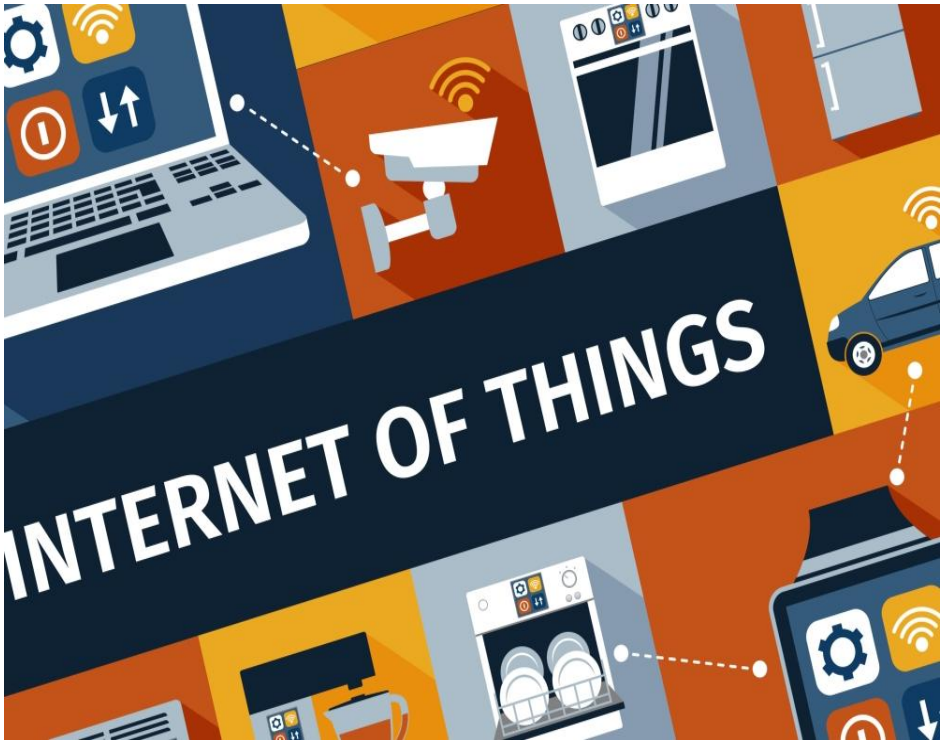
IoT – Big Data Data from EveryWhere and from EveryThing

Today we have technologies for

- Acquiring and sensing data
- Transmitting data
- Storing, managing and aggregating data data
- Performing analytics on data



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Use of Data for Security

- *Cyber Security*
  - Security information and event management (SIEM)
  - Authentication (biometrics, federated digital identity management, continuous data authentication)
  - Access control (e.g. attribute-based, location-based and context-based access control)
  - Insider threat (anomaly detection) and user monitoring
- *Homeland Protection*
  - Identification of links and relationships among individuals in social networks
  - Prediction of attacks
  - Management of emergence and disasters
- *Healthcare*
  - Monitoring and prevention of disease spreading
  - Evidence-based healthcare

Privacy Risks

- *Exchange and integration of data across multiple sources*
  - Data becomes available to multiple parties
  - Re-identification of anonymized user data becomes easier
- *Security tasks such as authentication and access control may require detailed information about users*
  - For example, location-based access control requires information about user location and may lead to collecting data about user mobility
  - Continuous authentication requires collecting information such as typing speed, browsing habits, mouse movements

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Can security and privacy be reconciled?

And if so which are the methods and techniques that make this reconciliation possible?

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Research Agenda

- For which domains security with privacy is critical?
- Which are the policy issues related to the use of data for security?
  - Ethical use of data
  - Ownership of data – *perhaps we need to move from the notion of data owner to that of data stakeholder*
- Is control by users something which is possible in all domains?
- Which research advances are needed to make it possible to reconcile security with privacy? On small devices?
  - Efficient techniques for performing computations on encrypted data
  - Privacy-preserving data mining techniques
  - ***Privacy-aware software engineering***
- How do we balance "personal privacy" with "collective security"?
  - *Could a risk-based approach to this problem work?*

Partially based on results of the NSF Workshop on Big Data Security and Privacy, Dallas, TX, Sept. 16th-17th, 2014, http://csi.utdallas.edu/events/NSF/NSF%20papers%202014.htm

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Research Agenda (con't)

- Privacy techniques for small devices:
  - *How to prevent devices from collecting data depending on contexts and situations?*
- Access control for big data – techniques for:
  - Automatically merging, and evolving large number of heterogeneous access control policies
  - Automatic authorization administration
  - Enforcing access control policies on heterogeneous multimedia data
- Privacy-preserving data correlation techniques
  - *Techniques to control what is extracted from multiple correlated datasets and to check that what is extracted can be shared and/or used*
- Approaches for data services monetization
  - If data is considered as a good to be sold, are there regulations concerning contracts for buying/selling data?
  - Can these contracts include privacy clauses be incorporated requiring for example that users to whom this data pertains to have been notified?
- Privacy implications on data quality

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Thank You!

- *Questions?*
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