SecureCloud

Secure Big Data Processing in Untrusted Clouds

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Secure Cloud

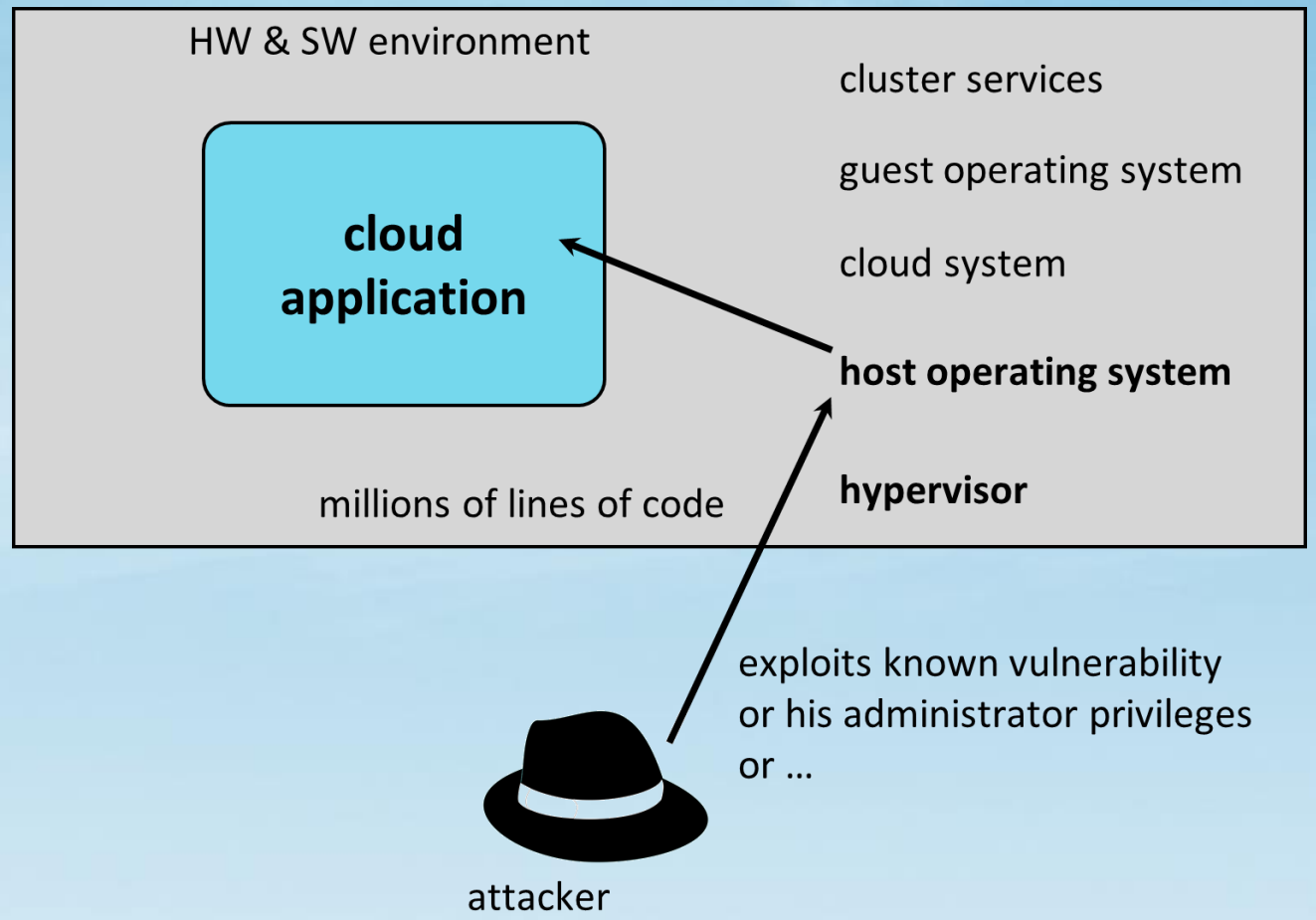
- Main objective
  Improve confidentiality of programs executed in clouds

- Approach
  Evaluate if/how hardware mechanisms in commodity CPUs (esp., Intel SGX) and can be used to protect the confidentiality of programs

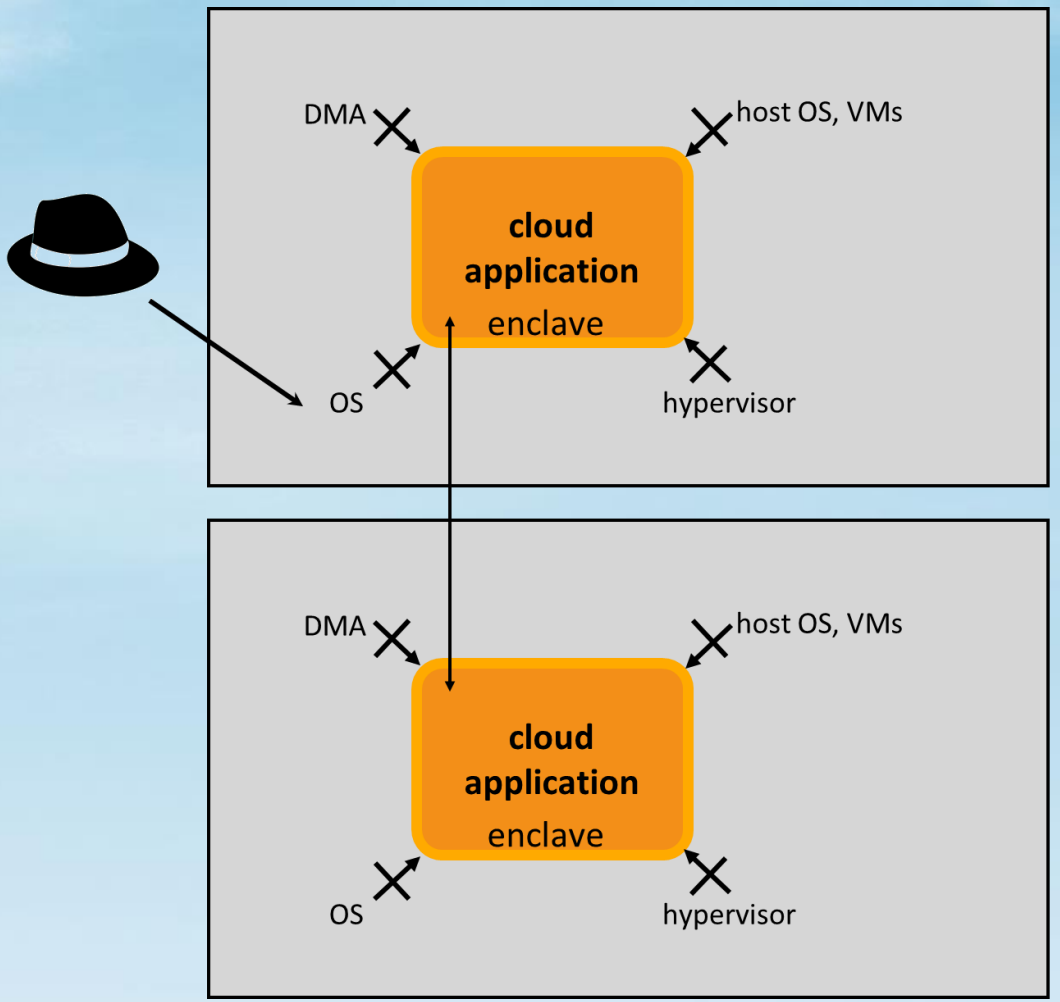
Confidentiality++

- Ensure confidentiality as well as integrity, consistency and availability of applications
- Protect cloud applications against attacks by
  - employees of the cloud provider
  - other tenants / hackers
  - hackers with physical access
- Enable novel applications by removing trust dependency between data providers, application providers and cloud providers

Challenge: lots of software



Protection with enclaves



Objective: All critical application components are protected

Core challenges

- How to protect an application?
- How to minimize the security-induced overhead in big data processing?
- How to ensure application availability?
- How to reconfigure applications if components are unavailable?
- How to ensure the integrity of applications and data?
- How to implement efficient remote attestation to detect unauthorized changes on the application code?
- How to protect cryptographic keys to ensure the confidentiality?

Objectives

- Substantially improve the state-of-the-art in cloud dependability
- Seamlessly integrate new features into standard cloud infrastructure (e.g., OpenStack)
- Validate and demonstrate in applications for critical infrastructures (e.g., Smart Grids)
- Widely promote and disseminate the outcomes

SecureCloud contributions

- Security and Safety
  - Identify and propose patterns for cloud-based big data applications that are aware of quality-of-service, privacy, and security
  - Address the problem of data privacy by using cutting-edge technology to store data with different levels of protection and in multiple locations
- Accessibility
  - Design and implement services that manage secure containers in an open-source middleware
- Latency
  - Develop a validation system for demonstration and evaluation of cloud-based services applied to the smart grid

Consortium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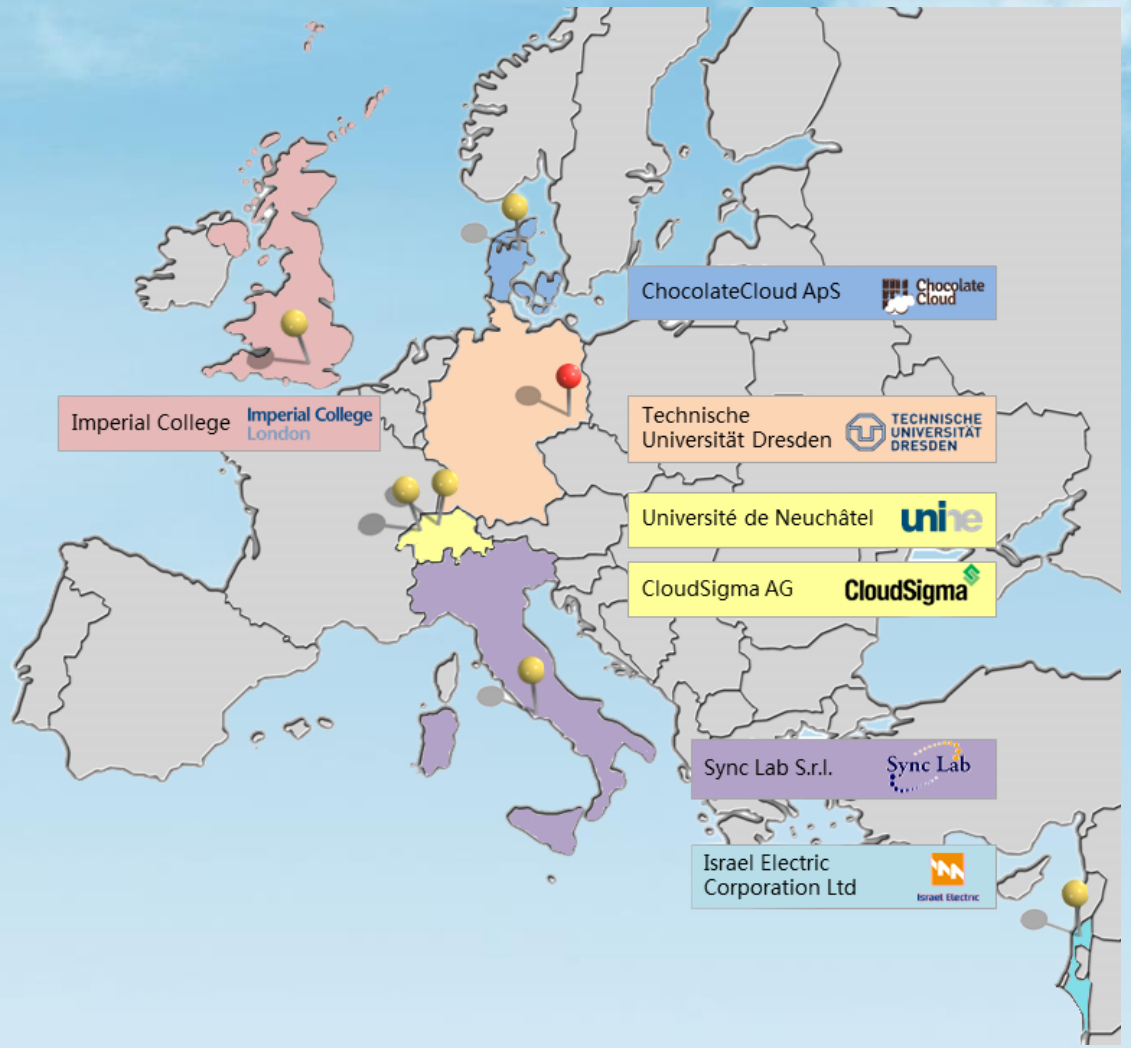
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