Attribute-based Authentication

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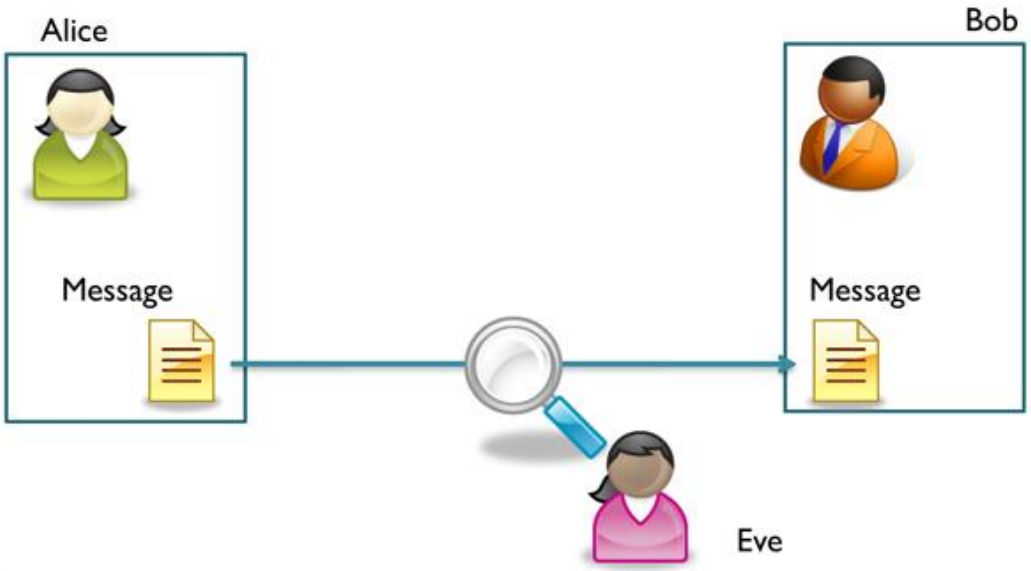
Outline

- Background and motivation
- ABA properties
- ABA workflow
- ABA construction
- ABA applications
- Some open problems
- Conclusions

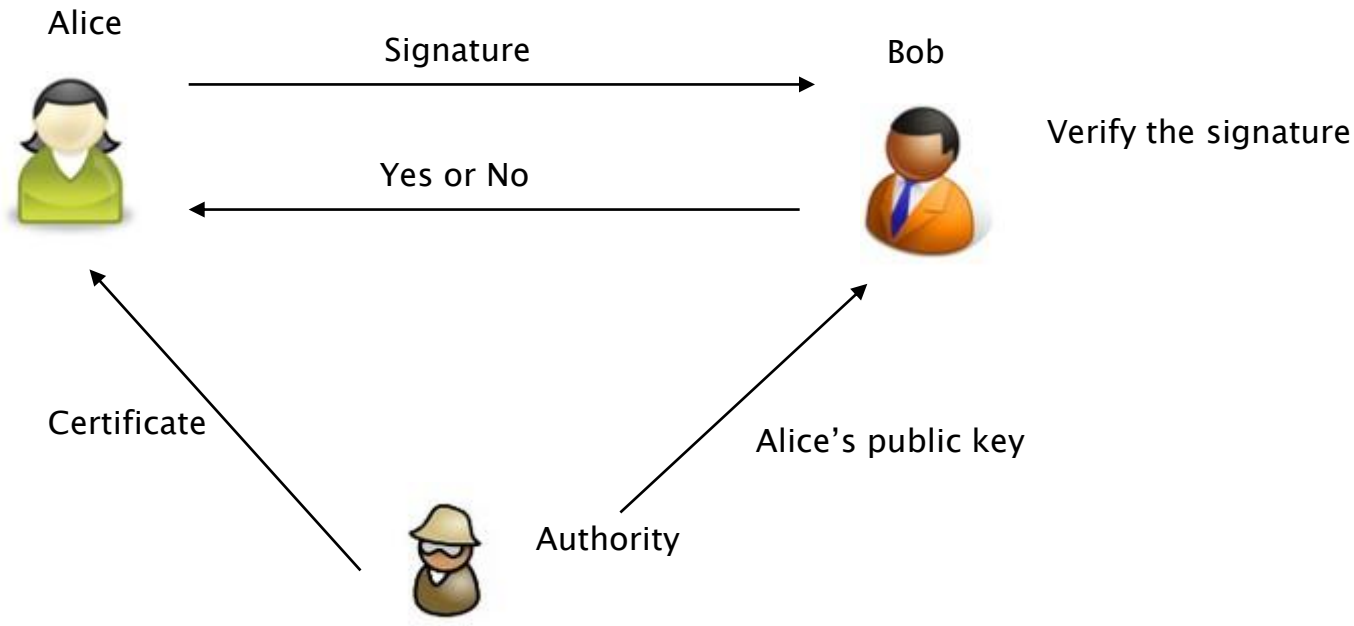
Background and Motivation

- Authentication is very important for Internet communication.



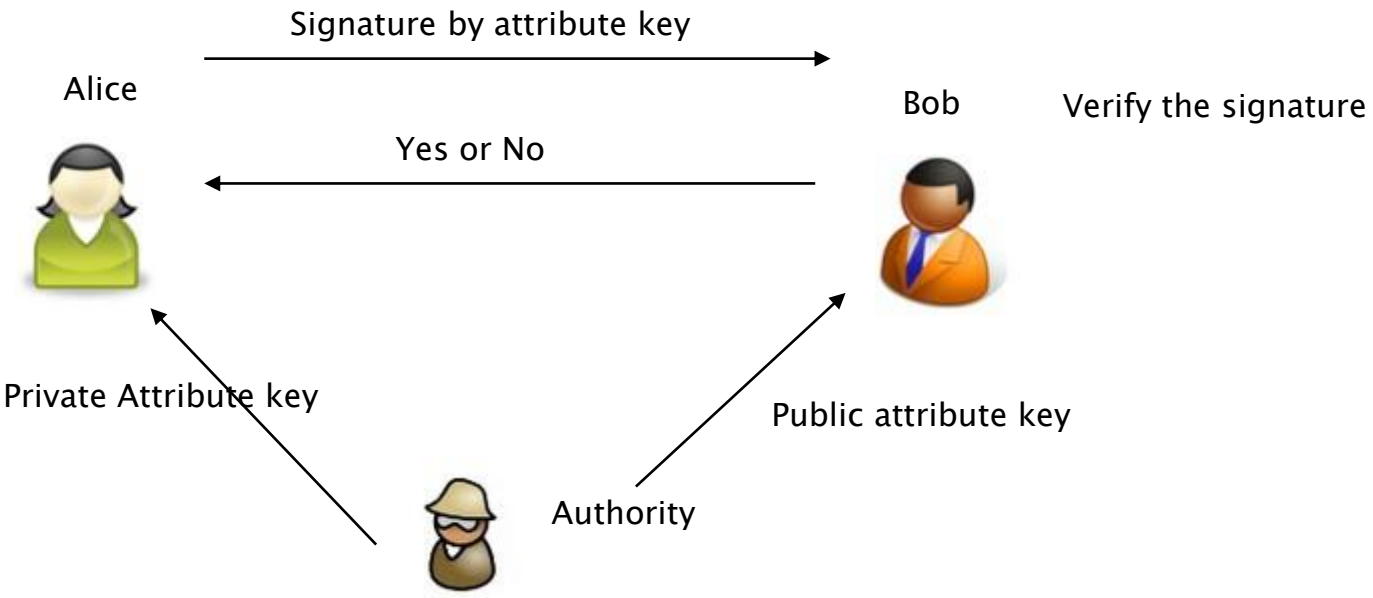
Background and Motivation

- Traditional Public key authentication



Background and Motivation

- ABA
  - Based on users' attributes: age, gender
  - A group of users share the same public attribute key



Background and Motivation

- Advantages of ABA
  - More flexibility: multi-organization cooperation
  - More privacy: anonymity, selective disclosure

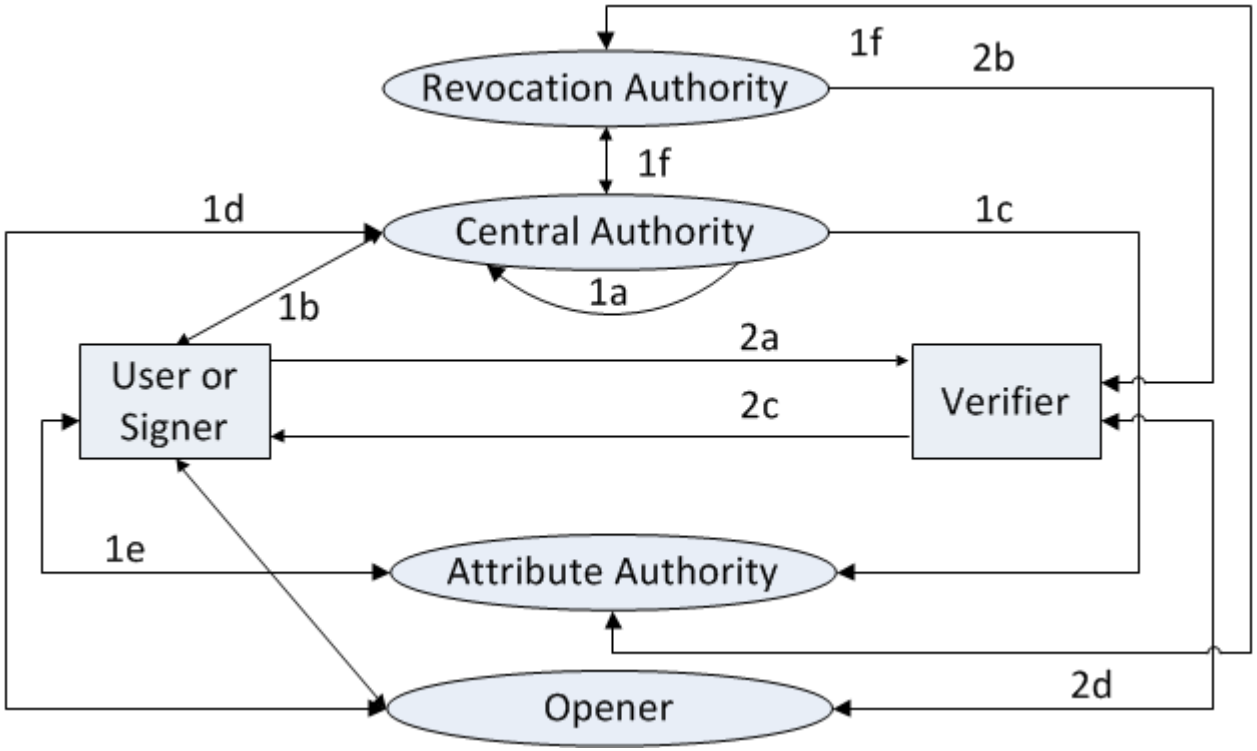
ABA Properties

- Anonymity
- Unforgeability
- Unlinkability
- Coalition resistance
- Traceability

ABA Workflow

- Authorities: divided by functions
  - Central authority: generate basic parameters, users' keys
  - Attribute authority: generate private/public key pairs, users' private attribute keys
  - Revocation authority: revoke users or their attribute keys
  - Opener: reveal the signer's identity given a signature

ABA Workflow



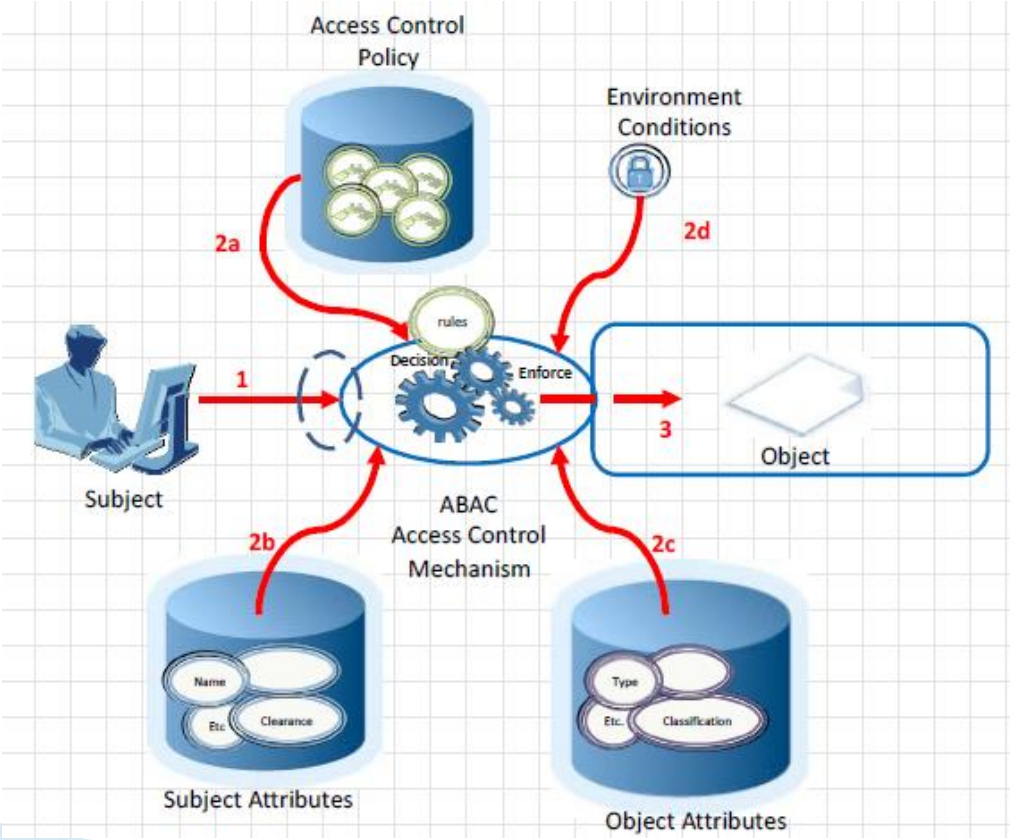
ABA Construction

- Examples: based on group signatures, ring signatures
  - Group signature: traceability
  - Ring signature: no traceability
- Reference:
  - [1] D. D. Khader, “Attribute-based authentication scheme,” Ph.D. dissertation, University of Bath, 2009.
  - [2] Huihui Yang, Vladimir Oleshchuk, “A Dynamic Attribute-based Authentication Scheme”, to appear.
  - …

ABA Applications

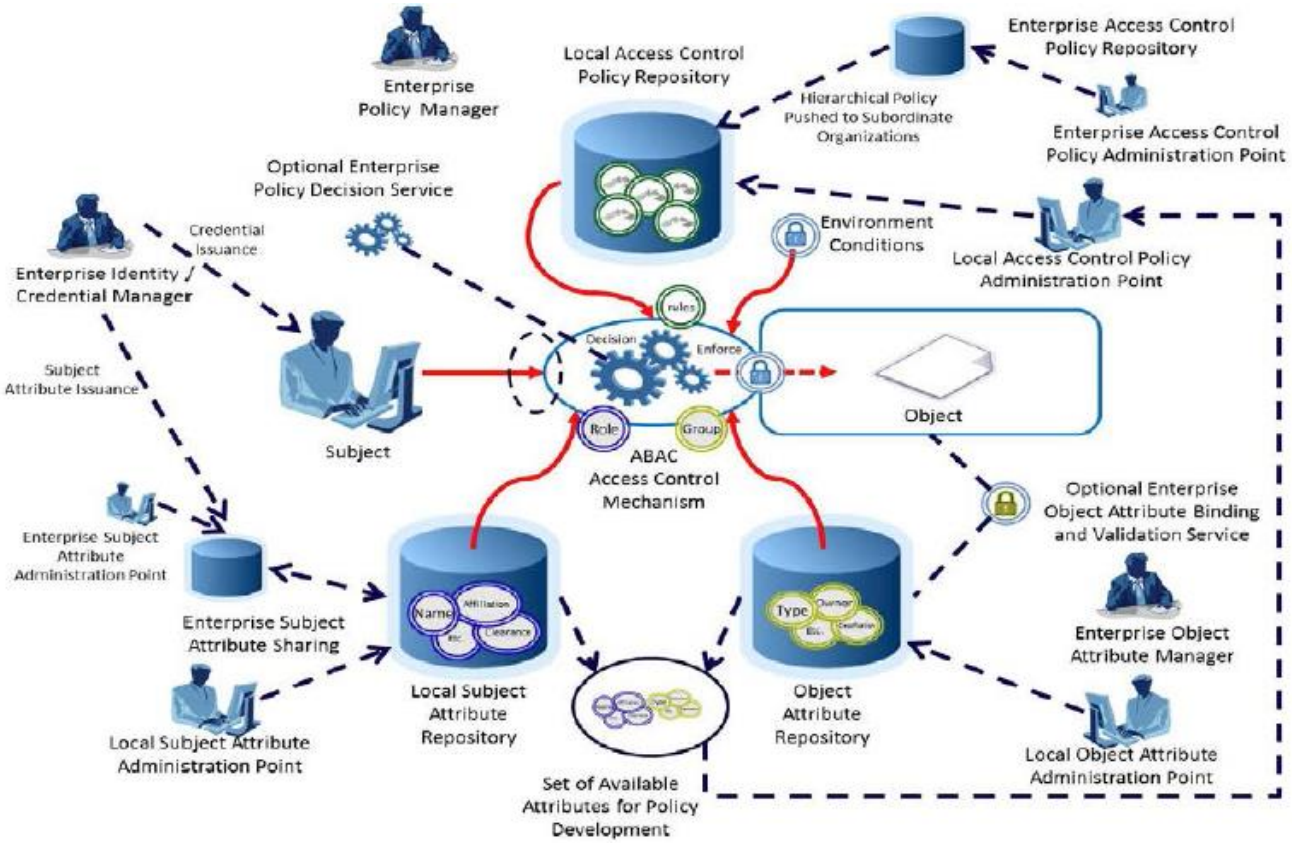
- Part of attribute-based access control (ABAC)

ABA + Authorization → ABAC



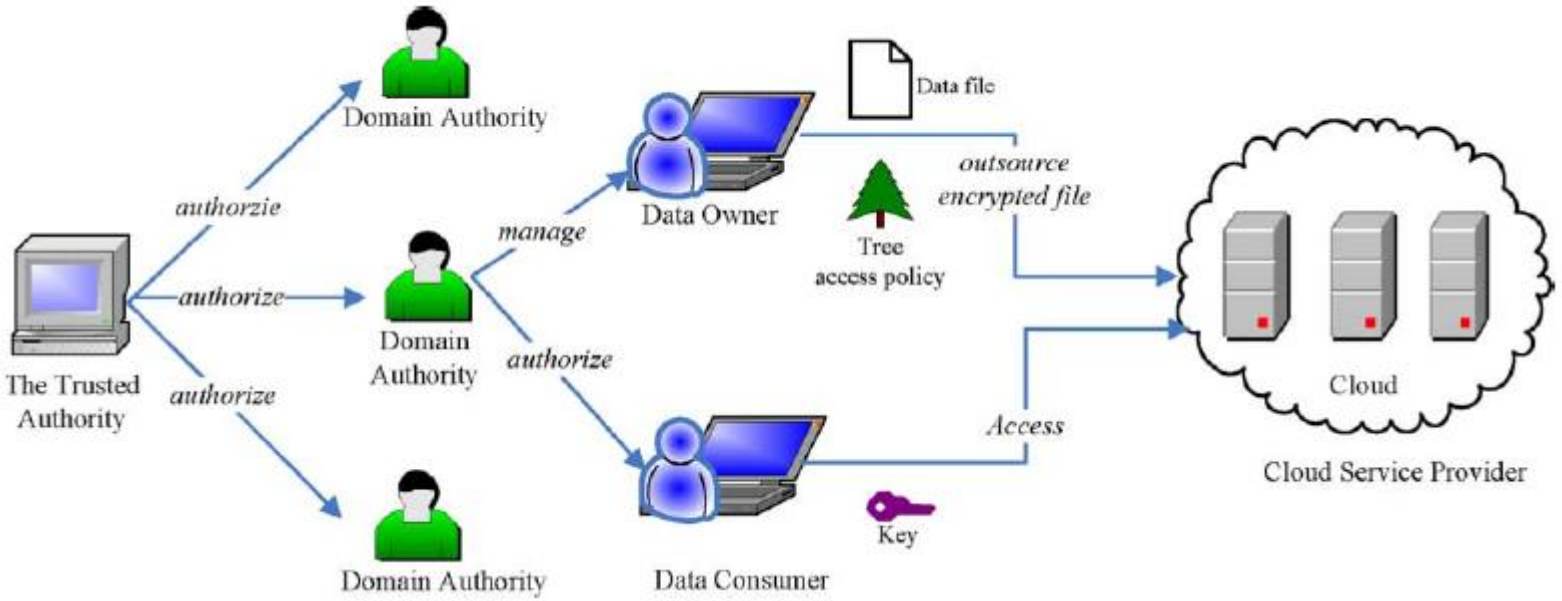
ABA Applications

- Multi-organization cooperation



ABA Applications

- Data outsourcing and cloud computing



Open Problems

- ABA schemes are usually very complicated.
  - Complicated algorithms, lots of computations
  - Gap between theory and application
- Revocation
  - User-based
  - Attribute-based

Conclusions

- ABA introduction
- Workflow
- Construction
- Applications
- Open problems

THANK YOU!