Cloud Security and Privacy

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07/10/2014
Cloud Services

- Cloud software as a service (SaaS)
- Cloud platform as a service (PaaS)
- Cloud infrastructure as a service (IaaS)
Cloud Services: Benefits

- Benefits:
  - Saving cost
  - Reliable
  - Flexible
  - ......
Cloud Services: Threats

- Threats:
  - Secrecy breakage
    - This might be addressed by traditional cryptographic tools
  - Privacy leakage
    - Privacy – contextual information about user and data
    - For example: data access pattern
Single User Scenario

- Single cloud server to serve a single user
- Threat model:
  - Server may be malicious
- Our research focus:
  - To improve the protocol efficiency in terms of communication bandwidth and server/user storage
Multi User Scenario

- Single cloud server to serve multiple users
  - Different groups of users may have different levels of access privilege to certain services
- Threat model:
  - Server and users may be malicious
  - Server and users may collude
- Our research focus:
  - To provide accountability support
  - To resolve collusion attacks
Intrusions to the Cloud

- **User**: Client Devices
- **SaaS**: User Interface for Applications
- **PaaS**: API
- **IaaS**: Load Balancing, Content Delivery, Compute, Storage, Database
- **Cloud**: Hypervisor
- **Infrastructure**: Traditional attacks, Account compromise, Code injection, Various attacks
Our Strengths at ISU

- **Hardware:**
  - Private cloud testbed available at ECpE and ComS departments, e.g. ISEAGE

- **Software:**
  - Various cloud security and privacy related software and protocols have been developed

- **Team:**
  - Daji Qiao, Associate Professor, ECpE
  - Wensheng Zhang, Associate Professor, ComS
  - Several PhD/MS students