Delivering reputation information in centralized systems

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Reputation background 1/2

- Many definitions for reputation, all meaning more or less
  - the consistency of actions, and
  - the perception of trustworthiness
- A reputation system
  - collects, distributes, and aggregates data about agents' past behavior (the input)
  - produces reputation estimates about agents (the output)
  - can be seen as a ”soft” security mechanism

Reputation background 2/2

- Reputation systems in use at present
  - eBay
  - Slashdot
  - Amazon.com

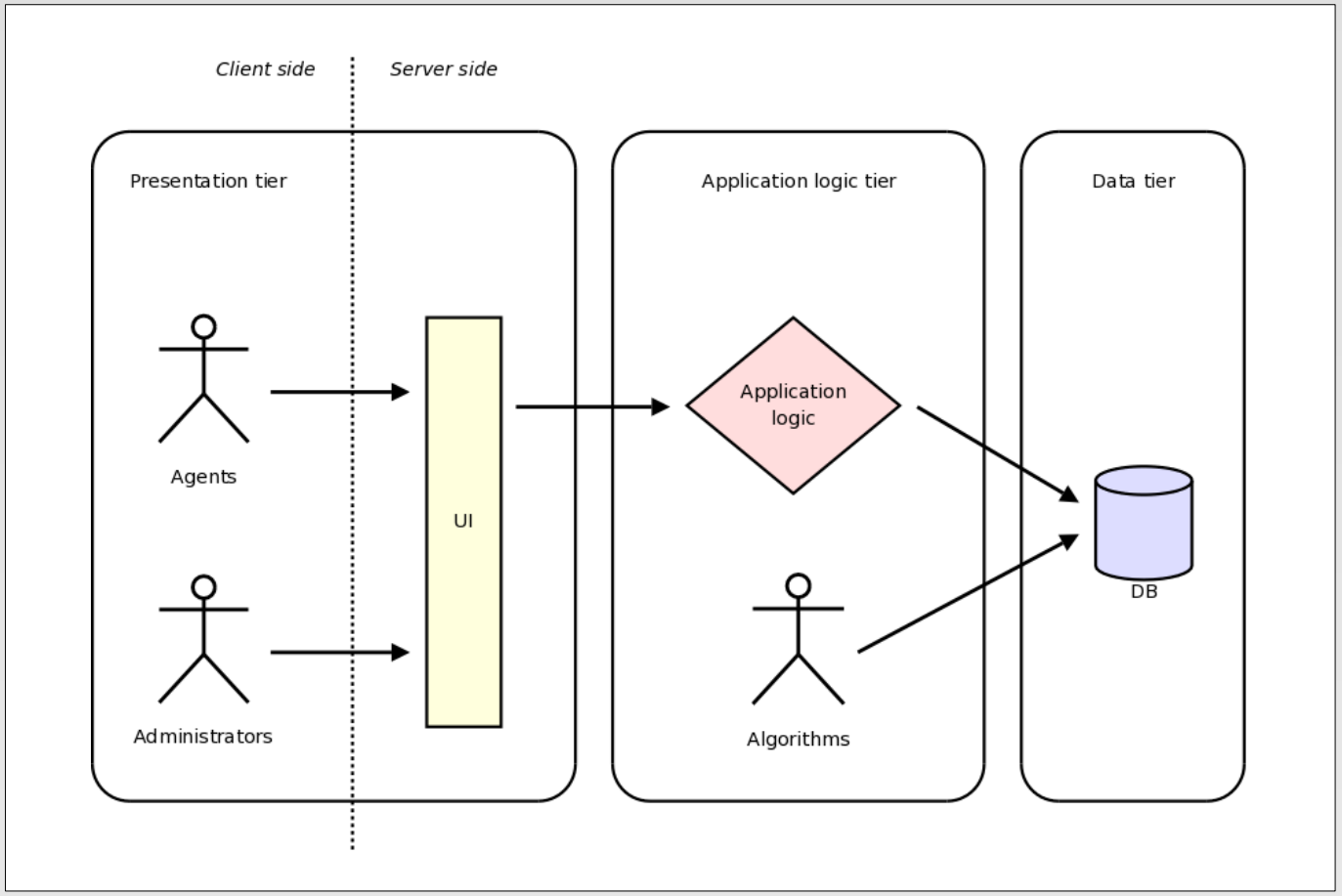
Thesis objective

- There are few general-purpose reputation frameworks
  - many theoretical or application-specific models
- Develop a reputation framework that
  - is widely applicable by
  - offering solutions to the certain parts of the problem of implementing a full reputation system,
  - while leaving the other parts to be implemented by the system designer
- Implement a working reputation system using the framework

The reputation framework 1/2

- The most important goals are
  - simplicity,
  - flexibility, and
  - expandability
- The most important design decisions are
  - centralized, three-tiered, architecture, and
  - reputation algorithms run independently as special users of the database

The reputation framework 2/2



Application for web services 1/2

- Problem
  - Existing web services would like to identify harmful and provoking users
    - The ideal scenario: a common user population, where the user identification scheme is shared between the services
- Solution
  - Employ the framework as a common background service

Application for web services 2/2

- Interface the reputation system with HTTP
  - Atom Publishing Protocol
    - RESTful
      - scales well (cacheability and statelessness)
      - uniform interface (GET, POST, PUT, and DELETE)
  - Database entries are represented as Atom entries (single entry) or feeds (multiple entries) with XHTML contents
  - Example: get all the feedbacks for a society: GET to <http://service-address/feedbacks/?society=example>

An implementation

- Implement the framework for web services
- Guideline: use existing open source software
- Server-side
  - Ruby on Rails
    - for the user interface and application logic
    - plugin: BackgrounDRb (for the reputation algorithms)
  - MySQL (for the database)
- Client-side
  - An HTTP client written with Ruby
  - Common library for parsing and creating resource representations, which the server uses as well

Evaluation 1/2

- A functional validation of the implementation
  - Setup two societies and the members for them; the members rate each other; the server computes the reputation scores for the societies (different algorithms for each society); change feeback ratings
  - Proof of concept: the framework can be realized and the system works

Evaluation 2/2

- Comparison to other reputation frameworks
  - Rein's reference model
    - conceptual, general-purpose
    - for reputation system designers
  - Pythia
    - a reputation system for authentication purposes
  - Our framework places itself in between
    - general-purpose, but not suitable for all
    - centralized: relies heavily on the database

Application for SIP user agents

- A theoretical study
- Upon INVITE request from Bob to Alice
  - Alice's home SIP proxy inserts "P-Reputation" header field about Bob
  - Alice can use this information to decide whether to accept the call or not
- Returning a feedback rating about Bob is problematic
  - SIP is a protocol for managing sessions, not a generic data transfer protocol

Future research

- The performance of the framework
- Interoperability between different reputation algorithms
  - utilize reputation information from other societies
- Configurable policy rules for societies
- The requirements and motivation for using reputation systems with SIP user agents

Thank you

Questions?