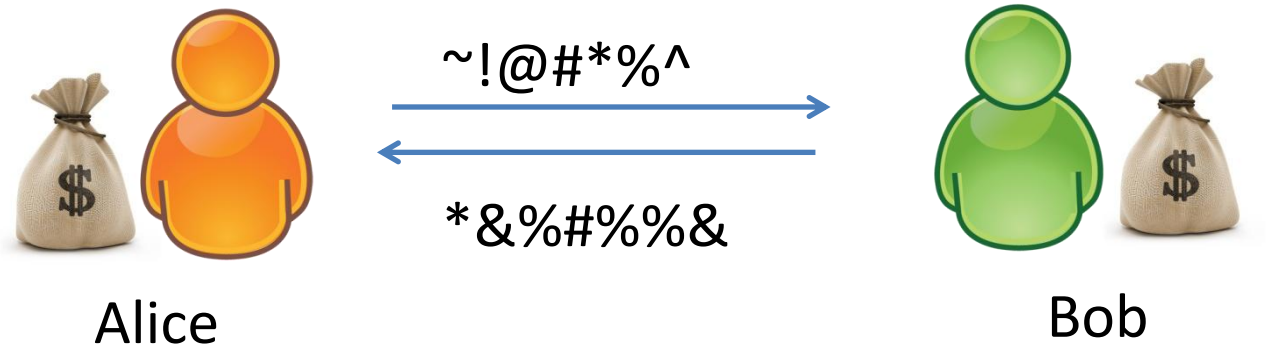
Privacy-Preserving Computing

--Ming Li

What Is Privacy-Preserving Computing?

Millionaires's Problem



How to find out who is richer without revealing their actual wealth?

Privacy-Preserving Computing

Location privacy in location-based services

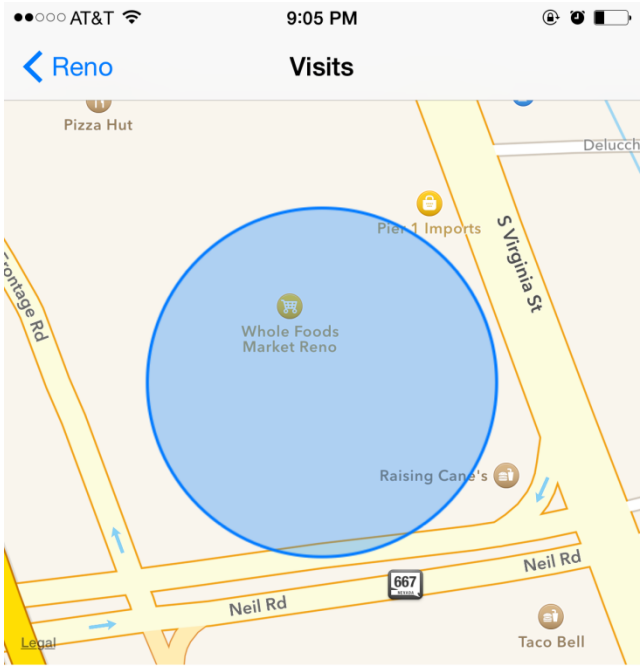
Info privacy in cloud computing systems

Location Privacy in Location-Based Services

What does your smartphone know about your location information?

Then System Services→Frequent Locations→History

Location Privacy in Location-Based Services



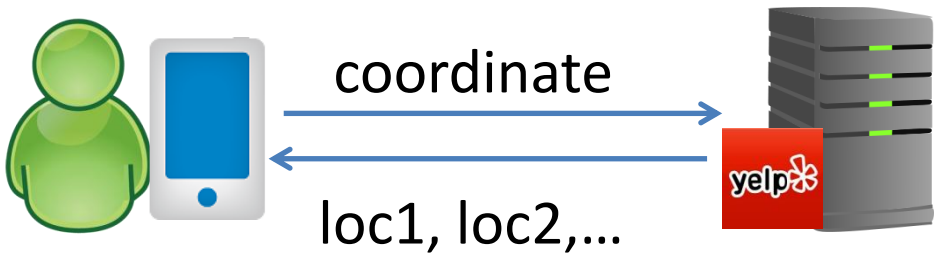
-- Your iphone knows exactly when you were at each location

-- If you are going to somewhere you shouldn't be, switch this feature off!

--Does someone else know this info?

Location Privacy in Location-Based Services

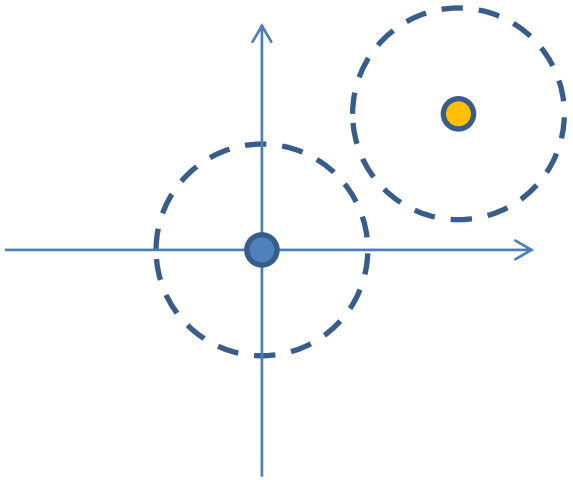
- Does my location privacy known by others?
  - Apple? I hope they will not
  - Other companies? We've already told them the data
    - e.g., Yelp, and other location-based services (LBS)



    - User's location privacy is compromised..

Location Privacy in Location-Based Services

- Object: receive correct POIs while concealing user's location
- One possible approach



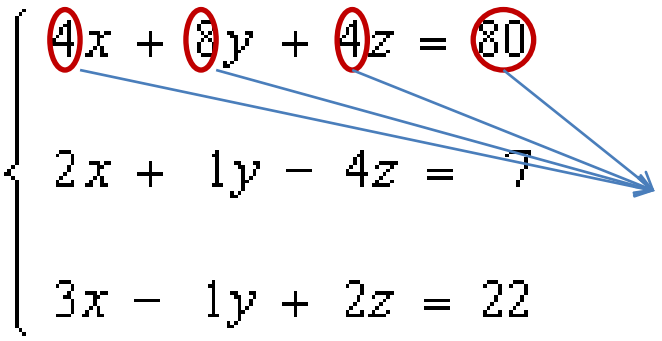
Report a changed location

Information Privacy in Cloud Computing Systems

- Outsource heavy-load computing tasks to remote servers
- Amazon EC2, etc.

Information Privacy in Cloud Computing Systems

- A simple example:



  - How the cloud can solve this equation group correctly without knowing the coefficients?
- More computing problems
  - Average, covariance, LP, NLP, etc.

- Any questions?