

# Final Notes on Authentication

- There are other factors that can be taken into account when conducting authentication. E.g. Alice's location.
- Alice may carry around a cellphone that has a GPS chip inside of it.
- When Alice stands in front of an ATM requesting to withdraw money, Alice's bank could ask her cellphone company's computer system where she currently is.
- If the cellphone company's computer responds with a latitude and longitude that corresponds to the expected location of the ATM, the bank can approve the withdrawal request.

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- However, if Alice's ATM card and PIN were stolen by a bad guy who is trying to withdraw money, then **taking Alice's location** (or specifically, the location of her cell phone) **into account** could help **thwart such a fraudulent withdrawal request**.

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- If Alice's cellphone is still with her, when an attacker attempts to use her card at an ATM, the location of the ATM will not correspond to the location of Alice's cell phone, and the bank will deny the withdrawal request (unless, of course, Alice and her cell phone are being held captive in front of the ATM).
- In this example, it is advantageous for Alice to keep her cellphone and her ATM card in different places; she should not, say, keep both of them in her purse.

# Final Notes on Authentication: Internet

- In all the examples discussed so far, we have talked about people authenticating people or people authenticating themselves to computers.
- In Internet, computers are also interacting with other computers. The **computers may have to authenticate themselves to each other** because all computers cannot be trusted equally.
- There are **many protocols** that can be used to allow computer-to-computer authentication, and these protocols will, in general, support **three types** of authentication: **client authentication, server authentication, and mutual authentication**.

# Final Notes on Authentication: Internet

- *Client authentication* involves the server verifying the client's identity,
- *Server authentication* involves the client verifying the server's identity, and
- *Mutual authentication* involves the client and server verifying each other's identity.
- **TLS/SSL** used in https support client, server, and mutual authentication over the internet.