



User-to-machine authentication

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1 User-machine authentication

- What's the problem?
- General approaches
- Multi-factor authentication



Idea

- A machine provides a service.
- A user wants to authenticate to the machine to use the service.
- How can the machine know the user is the right one?

Example

- The machine is the user's computer.
- The machine is the user's smartphone.
- The machine is the user's smartcard (e.g. VISA, MasterCard).



Idea: Methods for user authentication

- Something you *know*
- Something you *have*
- Something you *are*



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Idea: Methods for user authentication

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Example (Something you know)

- A password (PIN, swipe pattern, *etc.*).
- A cryptographic key (a longer password).



Example (Something you have)

- A physical unclonable function (PUF).
- A hardware token (smartcard, embedded cryptographic key).

Remark

- Where's the border between something you know and something you have?
- Do you know or have a cryptographic key?



Example (Something you have)

- A PUF.
- A hardware token (smartcard, embedded cryptographic key).

Remark

- Where's the border between something you know and something you have?
- Do you know or have a cryptographic key?



Example (Something you are, biometrics)

- Fingerprint
- Iris
- Gait (walking style)
- Handwriting (style, pressure points, *etc.*)
- Ear shape

Definition (Multi-factor authentication)

- Combine two or more methods of authentication: something you know, have or are.



Example (Single-factor authentication)

Identification Username

Authentication Something you know, *i.e.* a password

Example (Two-factor authentication)

Identification Username

Authentication Something you know together with something you have, *e.g.* password and mobile phone



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