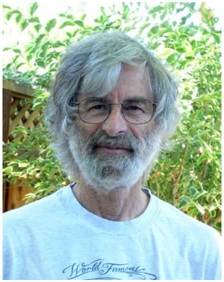
Brief history of Lamport's works



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brief description of **One-way Function**

- A one way function $\boldsymbol{f}$ is a function that is **easy to compute** but whose **inverse is difficult to compute**:

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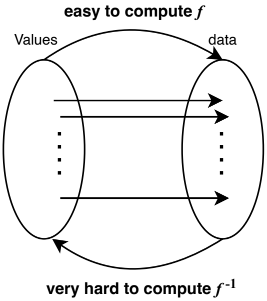

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brief description of **One-way Authentication**

Definition (Digital signature)

A digital signature created by **sender P** for **document m** is a data item $\sigma_p(m)$ that is when received together with **m**, one can determine (e.g. in a court of law) that **P** generated document **m**.

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Hence A tool for determining **validity** of something sent.[3]

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brief description of **One-way Authentication**

Definition (One way authentication)

It must be **easy for anyone** to recognize the signature as **authentic** but **impossible** for anyone other than the signer to produce it![4]

[1]Diffie, W. (1976)" *New Directions in Cryptography*"

A practical Example of a **One-way function** in **one-way authentication**
Login Problem

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- and its inverse has 10^{30} more instructions (or computations), which practically makes it **noninvertible**
- for example, finding square root of x_0 given in $f(x) = x^2$ is much harder than computing x^2 at x_0.

brief description of **One-way Authentication** *Cont'd*

- However, determining exactly what the one-way function should be is originally solved by **Lamport**
  which further lead to the publication of the paper: " *Constructing Digital Signatures from a One Way Function*"

brief description of **One-way Authentication** *Cont'd*

- But how this solution relates to the ecosystem of **public keys** is out of the scope of the presentation and discussed in the paper: *"New Directions in Cryptography"* by Whitfield Diffie (1976)

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- **Paxos algorithm**: an algorithm used in distributed systems for reaching consensus, used in distributed storage systems

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Definition (Partial ordering)

Partial ordering relation is an ordering relation in which not all members of the set need to be comparable!

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But where is the "Byzantine generals" problem in the list?