Digital Signature Using Hash Functions

A hash function acts like a **digital fingerprint** for a document. The function ensures that the hash code is varied enough for any given document. But how does digital signing work with this process?

Steps:

- 1. **Compute the hash**: Calculate (y = H(x)) for a document (x). This creates a unique "fingerprint" of the document.
- 2. **Encrypt the hash**: Use the **private key** to encrypt the hash \(y \).
- 3. **Attach the result**: The encrypted hash is attached to the document as the **signature**.

Consequences

- The signed document remains readable.
- The signature can be stored separately from the document, for example, at a notary or in a database.

During **network communication**, the following data is transmitted:

- 1. The original document.
- 2. The **hash of the document**, encrypted with the sender's private key.
- 3. The sender's **public key**.

How to Verify the Integrity of the Signature

- 1. Calculate the hash of the received document.
- 2. **Decrypt the encrypted hash** using the sender's public key.
- 3. Compare the two hash codes. If they match, the document's integrity is intact.

This process ensures that the document has not been tampered with and that the signature is valid.

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