The Properties of Hash Algorithms

1. **Determinism**
   - the output of a hash function doesn't change between executions if it runs on the same input.
2. **Hash Uniqueness**
   - any two different inputs always have different hashes.
3. **One-Way Function**
   - it’s computationally infeasible to determine the original message from its hash value.
4. **Fixed length**
   - Hash functions always produce a fixed length output regardless of size of the input.
5. **Avalanche effect**
   - Changing one bit in the input should create an avalanche effect and results in an entirely different hash.

The Properties of Hash Algorithms

A good cryptographic hash function must also provide:

- Compression: the length of the output should be small enough
- Efficiency: the output hash should be computed easily
- Collision and preimage resistance: they should be secure enough