# Secure Outsourcing of Computation

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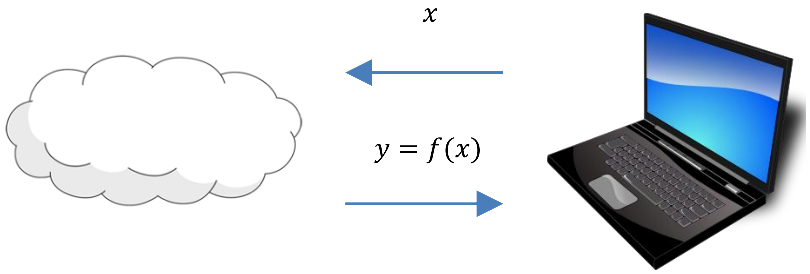
# Outsourcing Computation

**Motivation:** allow a computationally weak client to outsource its computation to an untrusted server.



$x$

$y = f(x)$

Main security concerns:

1. **Correctness:** $y = f(x)$?
2. **Privacy:** cloud learns our secret data $x$.

# Doubly Efficient Interactive Proofs

[GKR08]

Double efficiency requirement:

1. The verifier should be super efficient.
2. The prover should be relatively efficient.

Also want to minimize the interaction.

# Some Results

- Linear-time constant-round verification for $TISP(\mathrm{poly}(n), n^{\epsilon})$ with statistical soundness (together with Omer Reingold and Guy Rothblum).

- Linear-time 1-round verification for P with **computational** soundness, under cryptographic assumptions (together with Ran Raz and Yael Kalai).

- Study of **sub-linear** time verification (joint works with Oded Goldreich, Tom Gur and Yael Kalai).