Secure Multi-Party Computation

Lecture 13

Must We Trust eBay?

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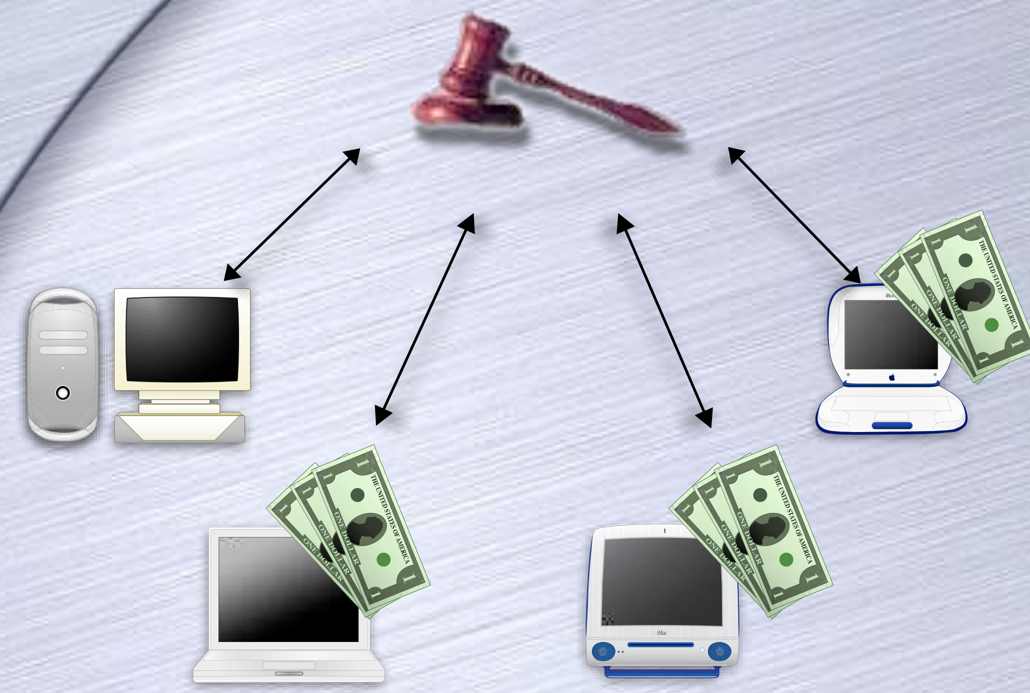

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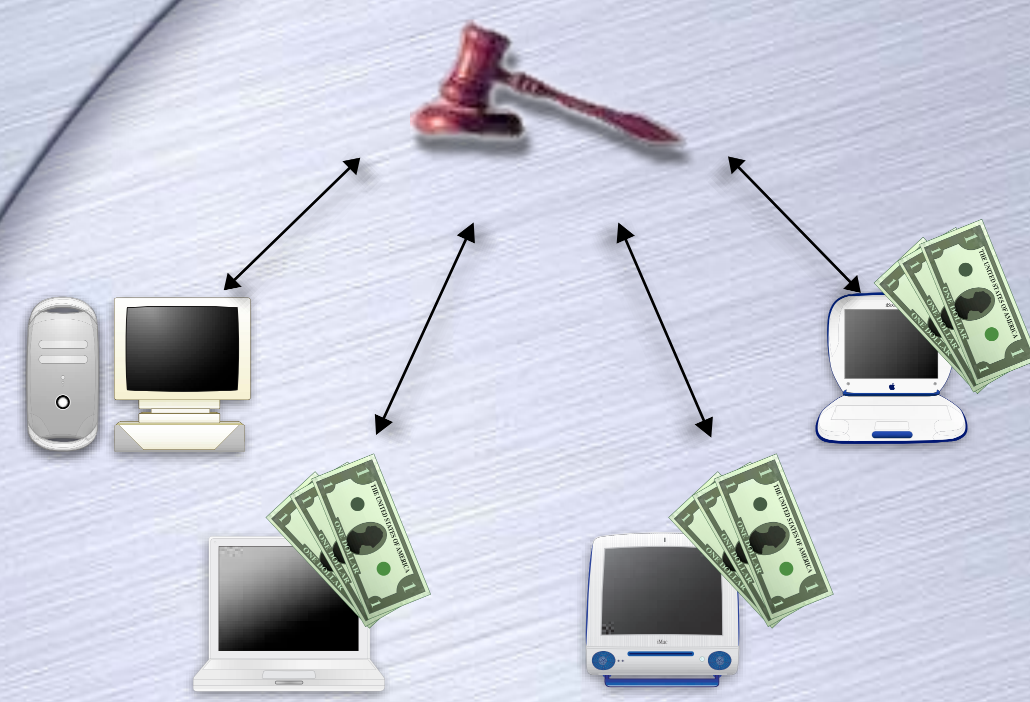

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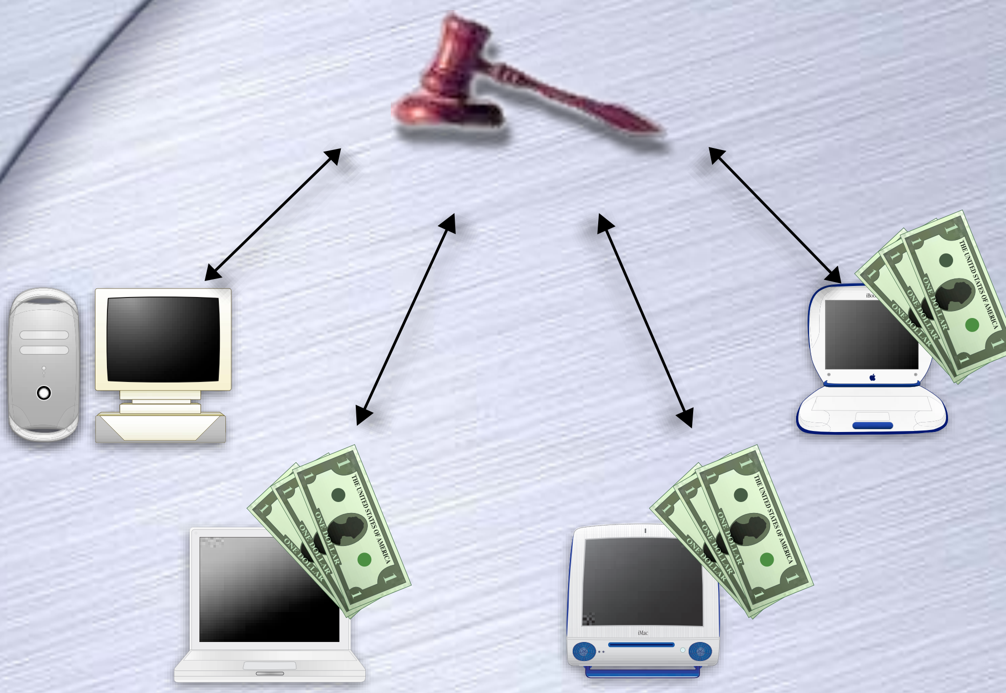
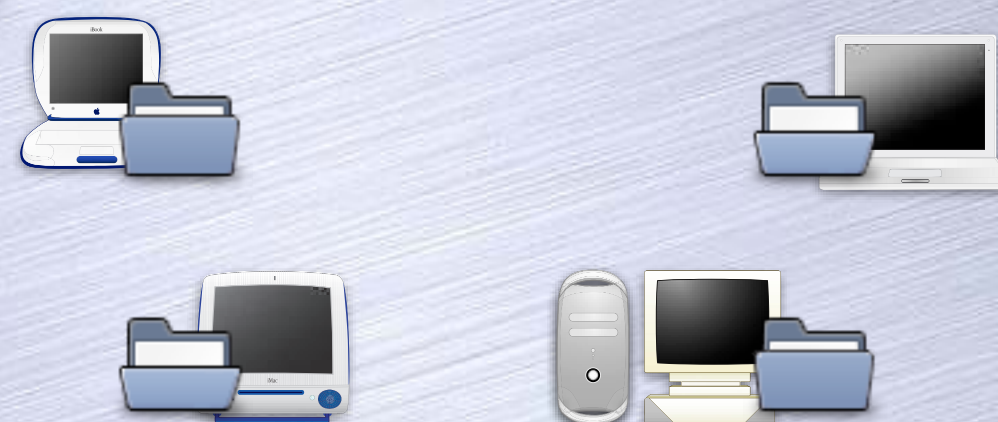


Using data without sharing?



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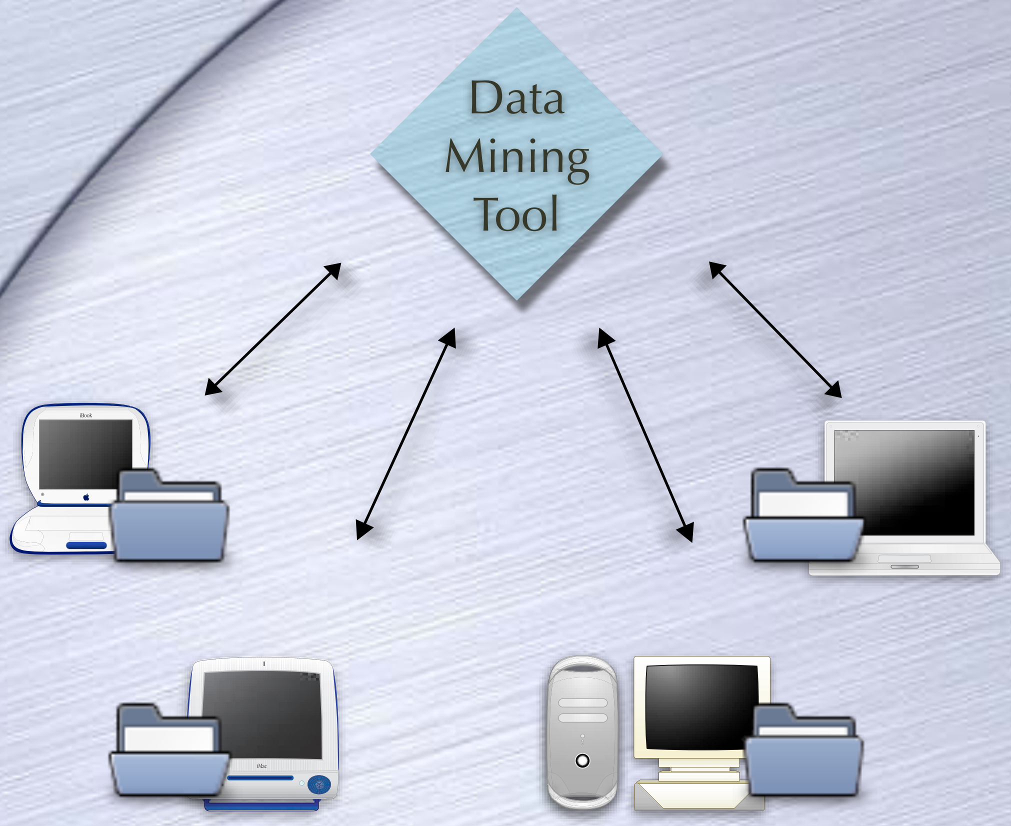
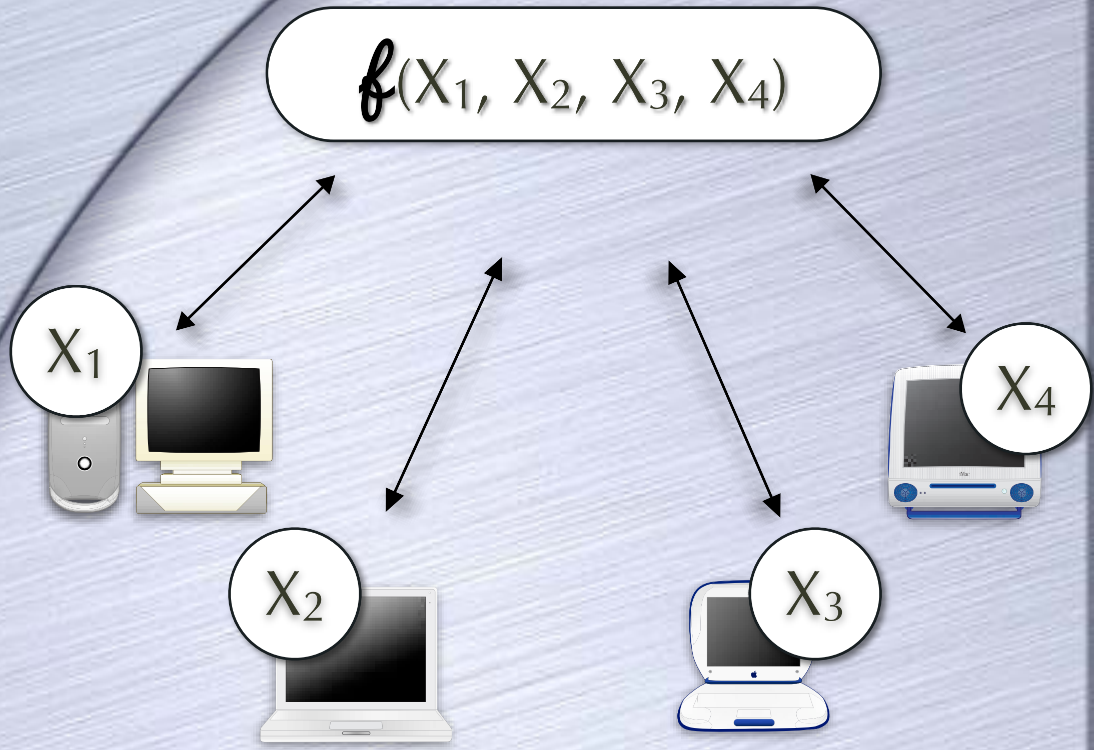
  - But want to data-mine on combined data



Secure Function Evaluation



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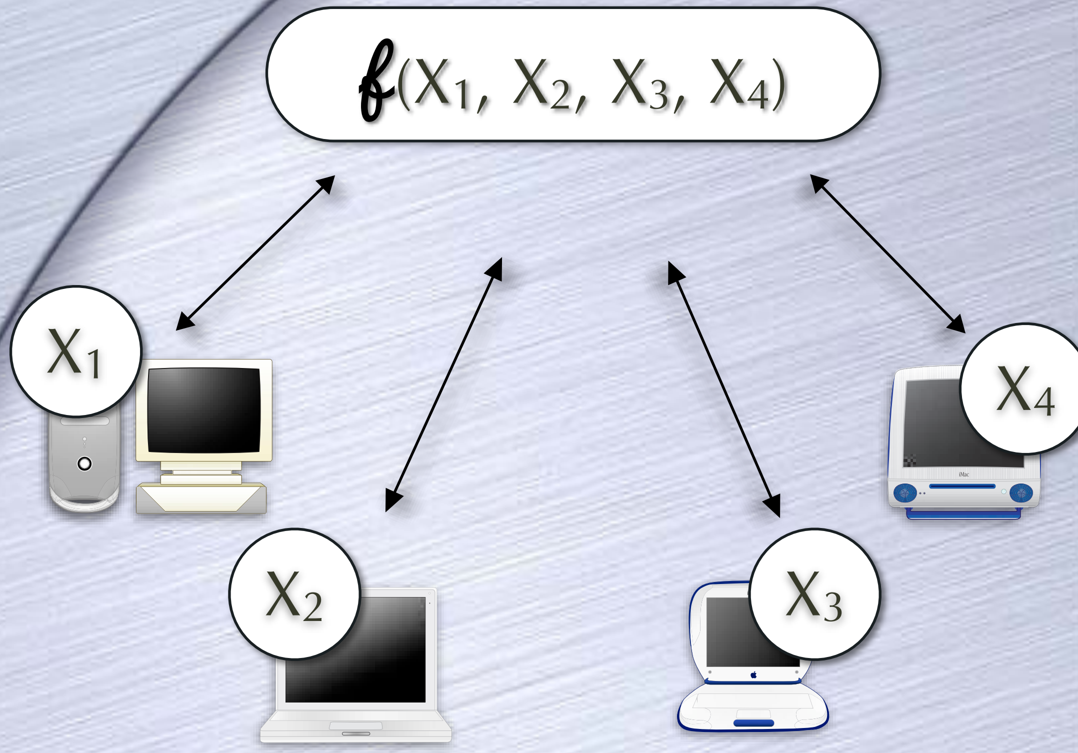

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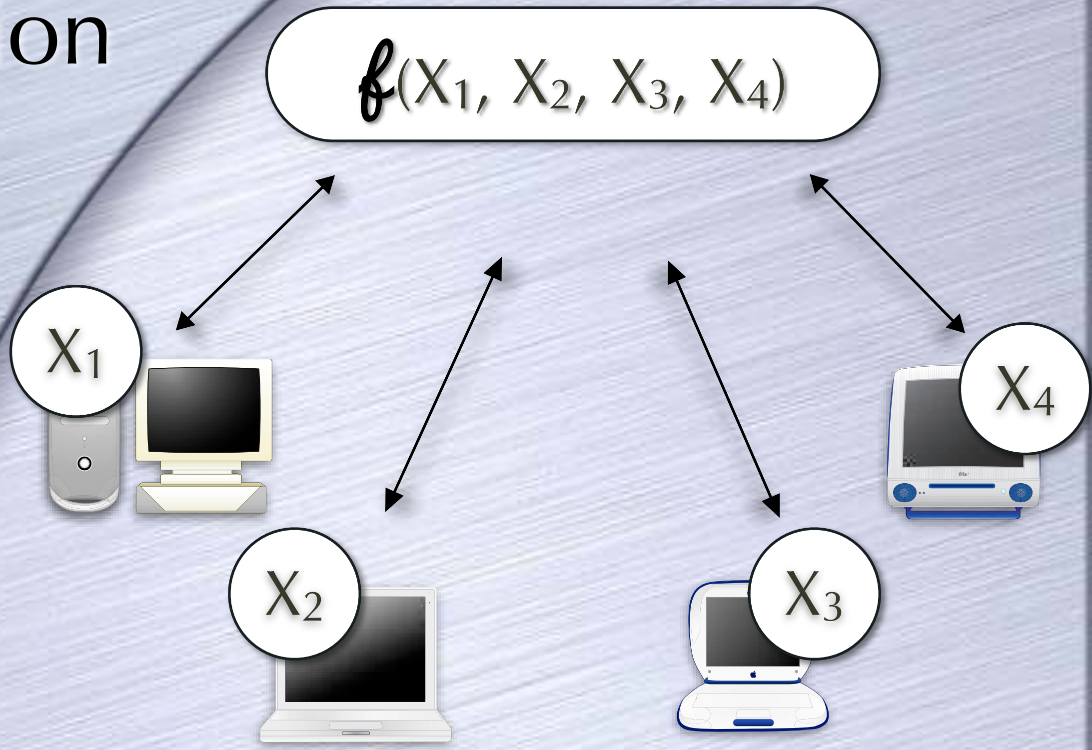

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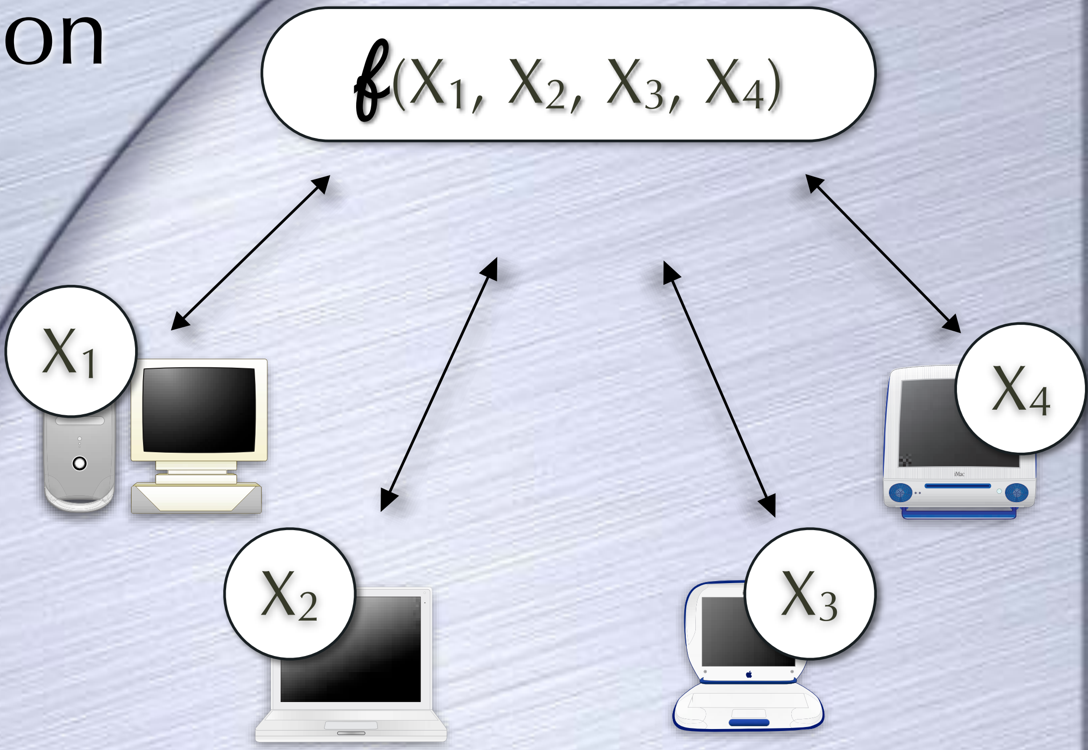

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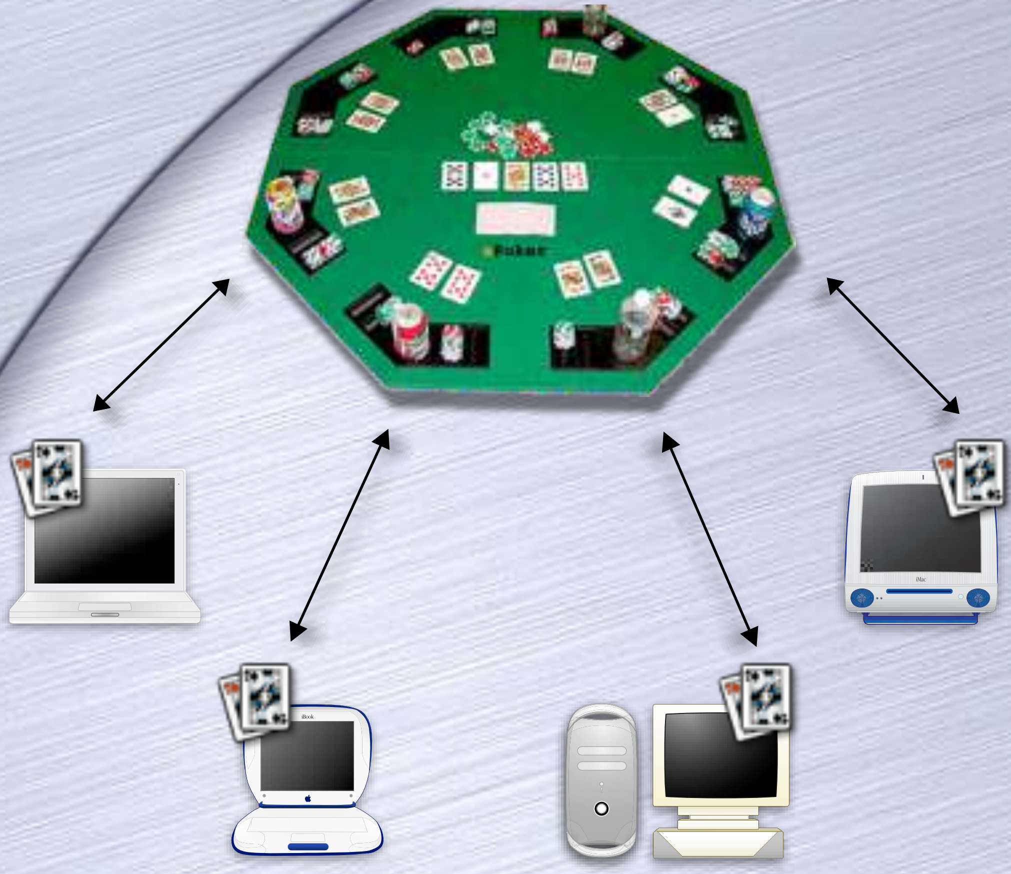

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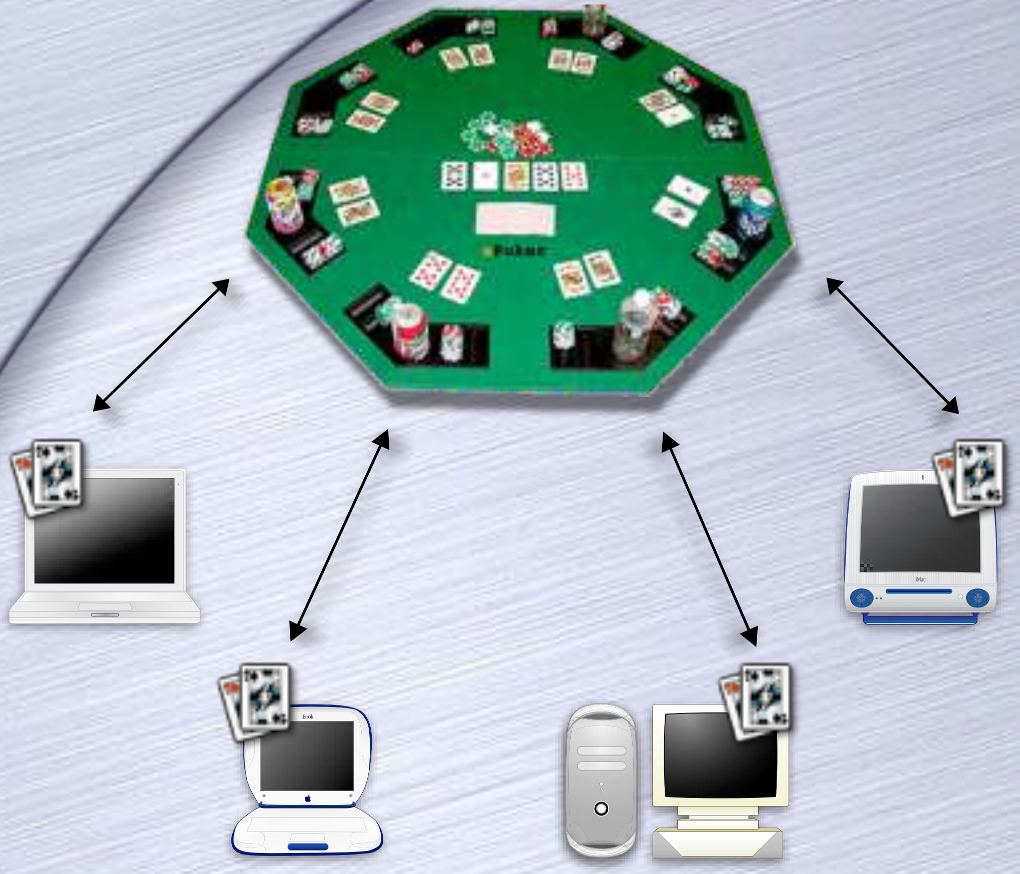

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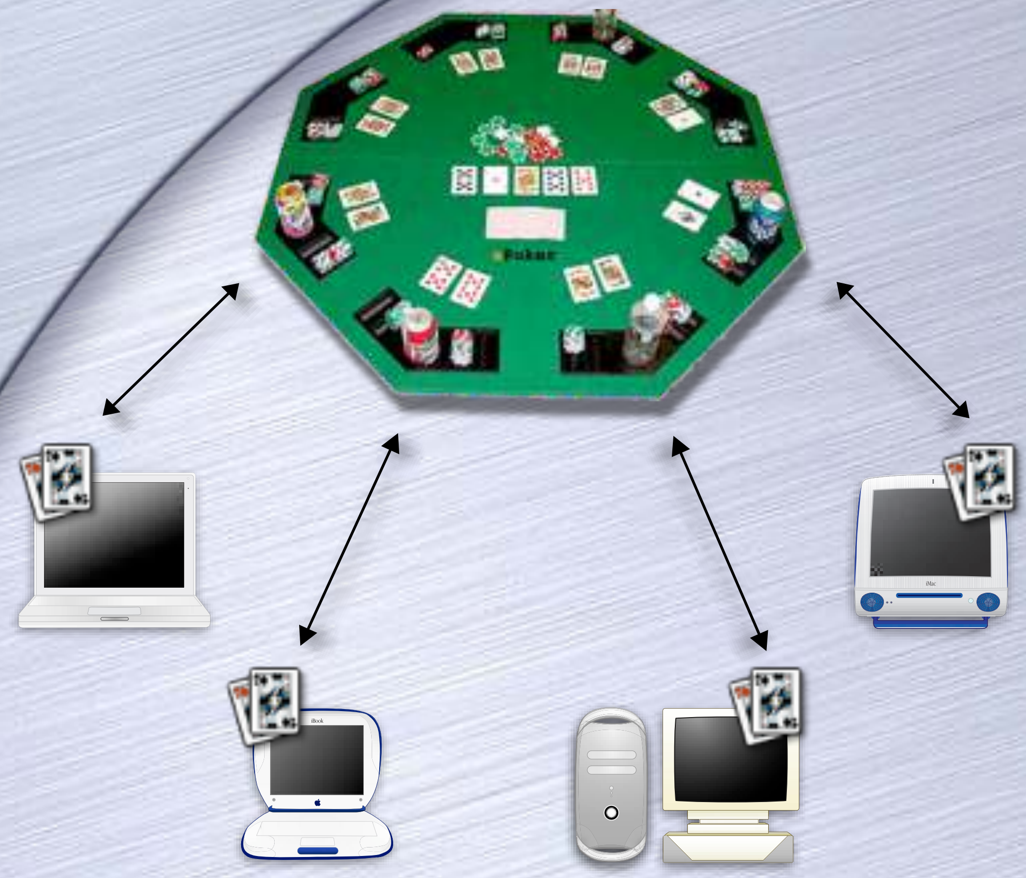

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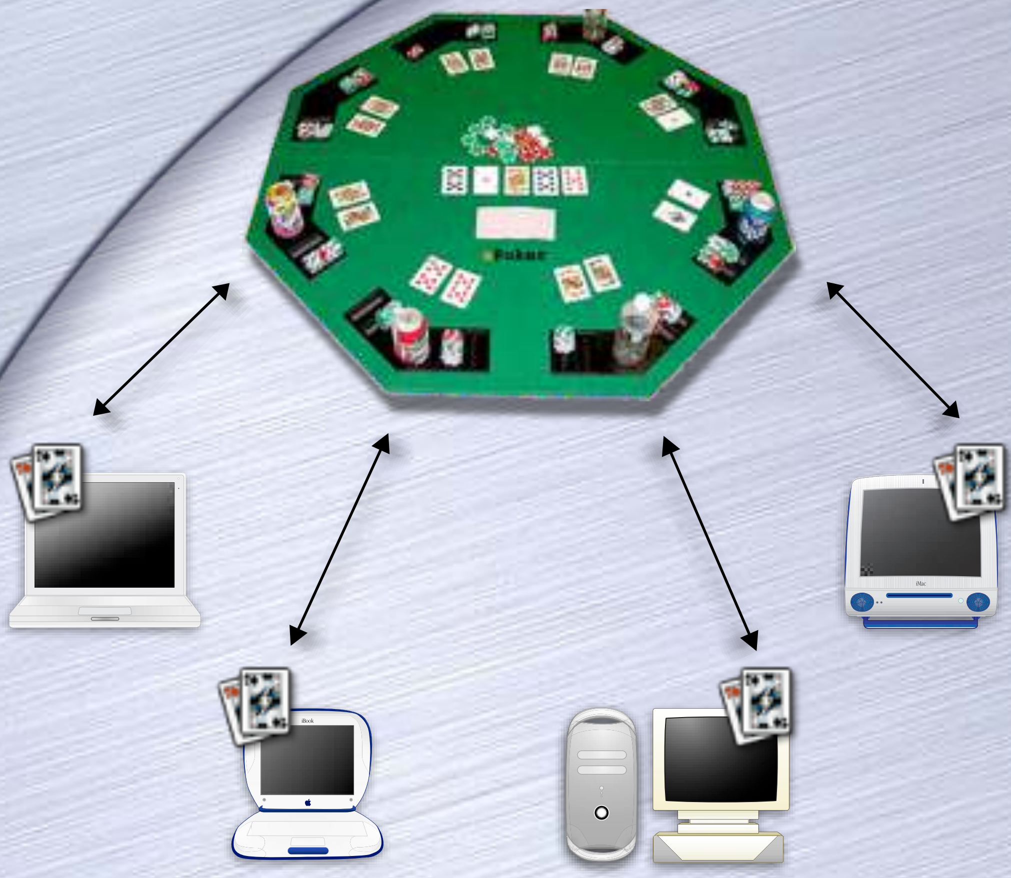

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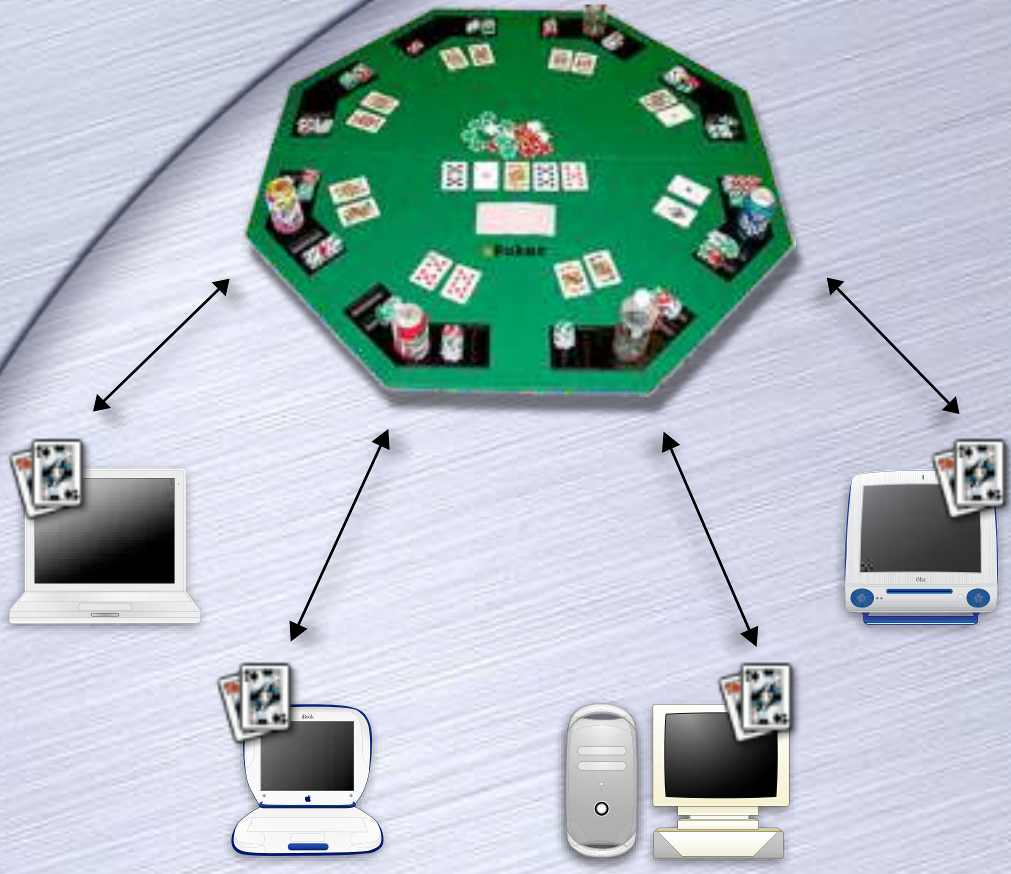

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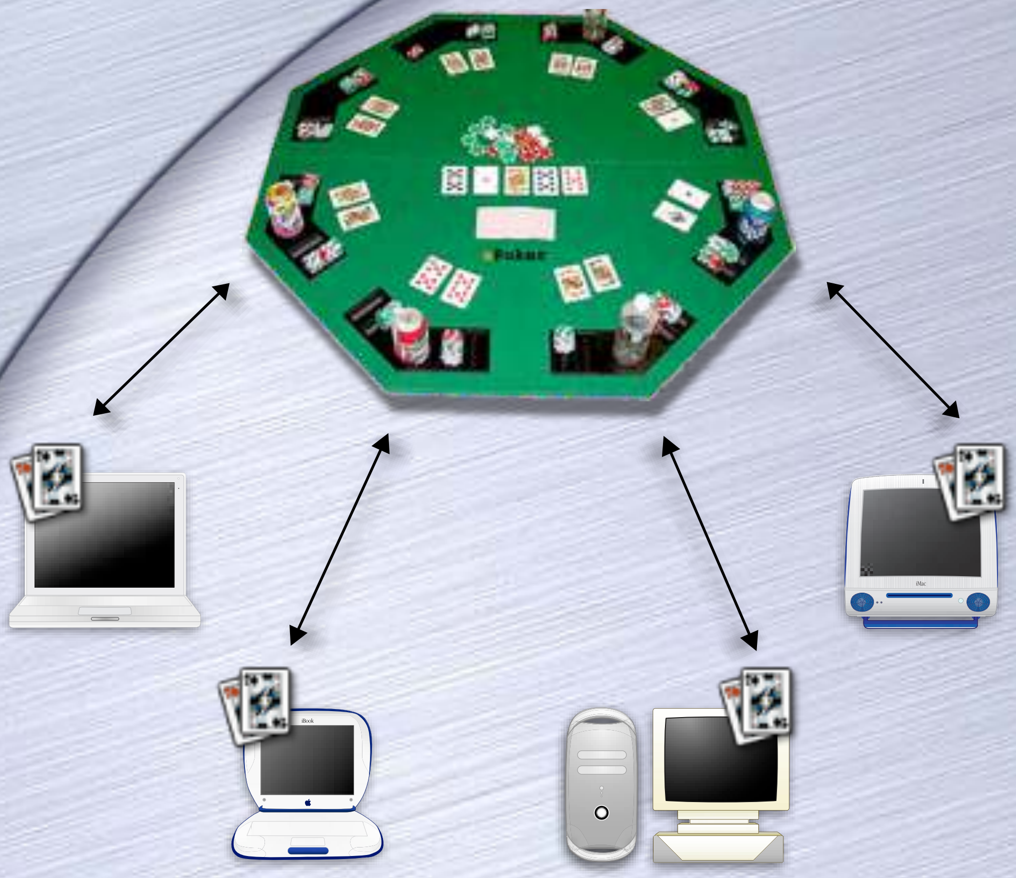

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  - E-commerce
  - Network Games
  - E-voting
  - Secure function evaluation
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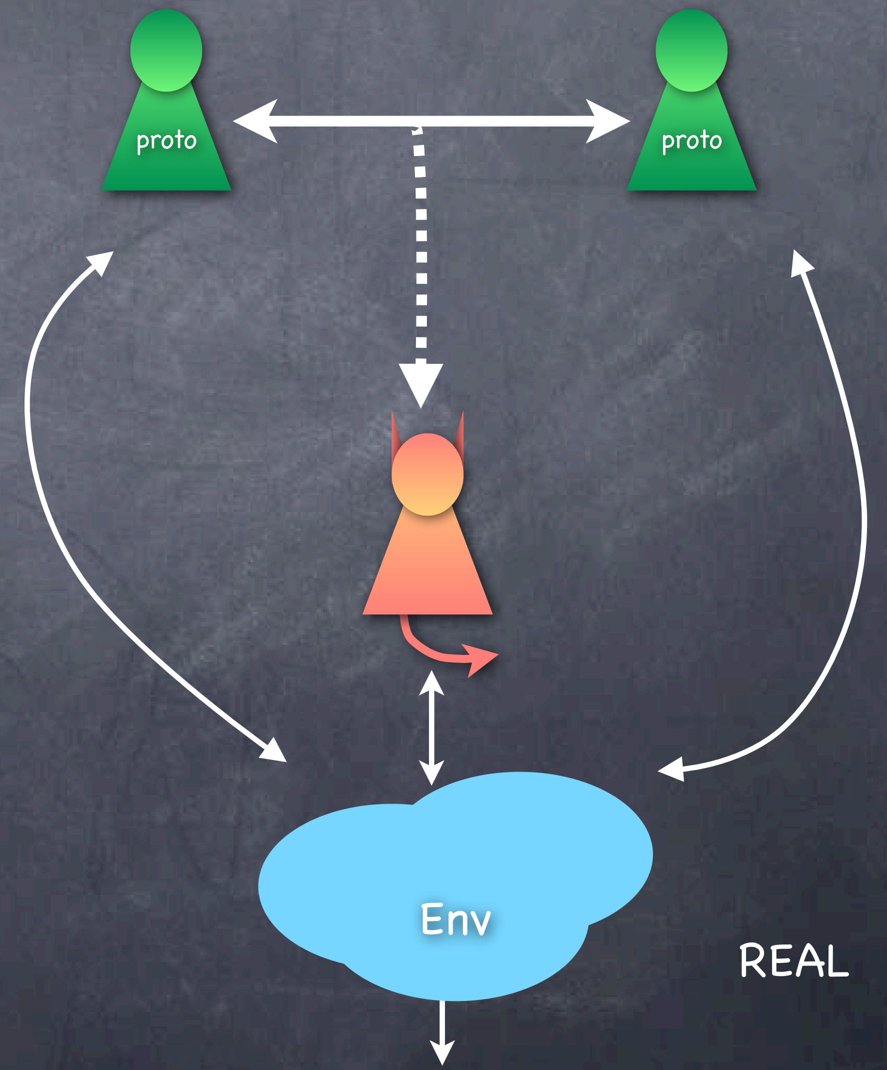
  - And it will not cheat in the computation

SIM-Secure MPC



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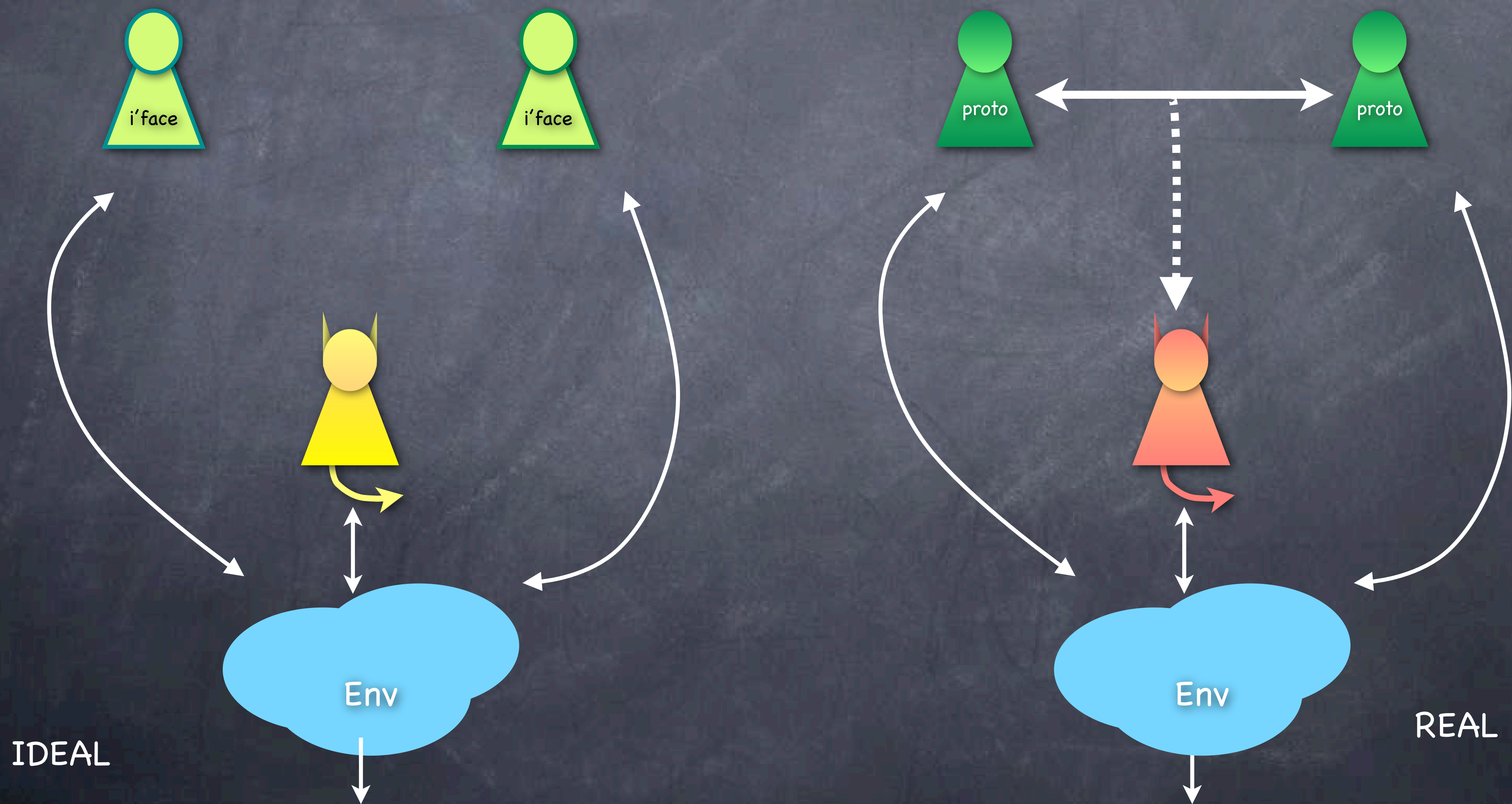

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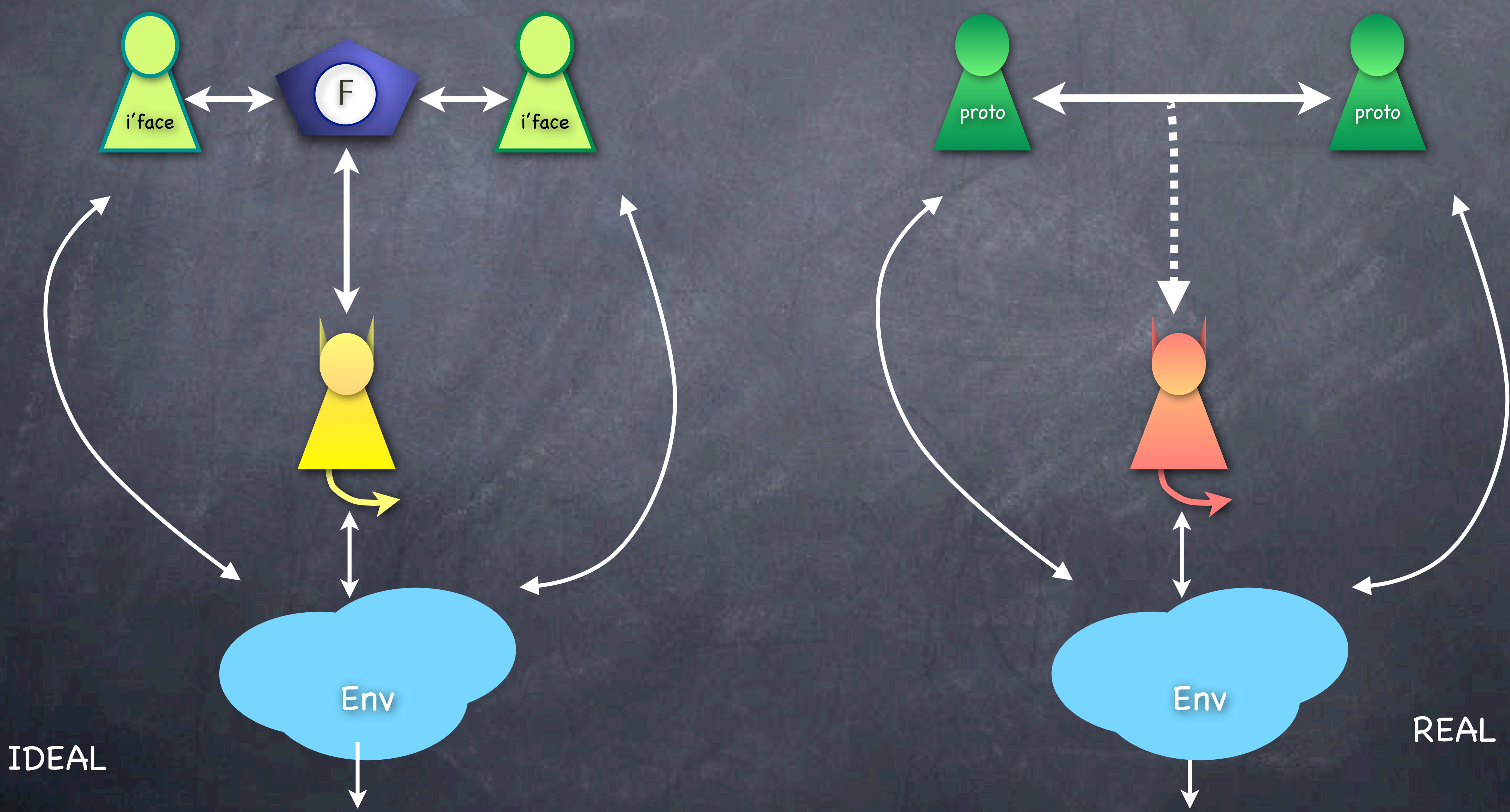

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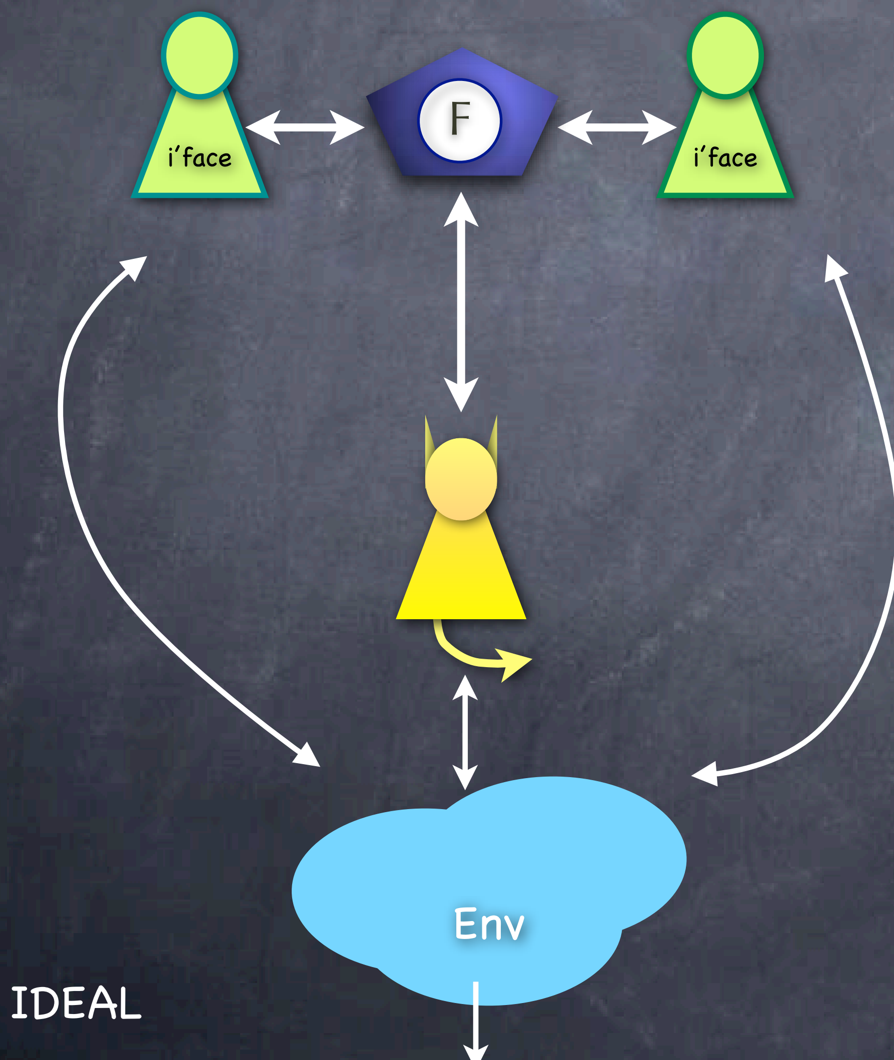

Secure (and correct) if:

∀

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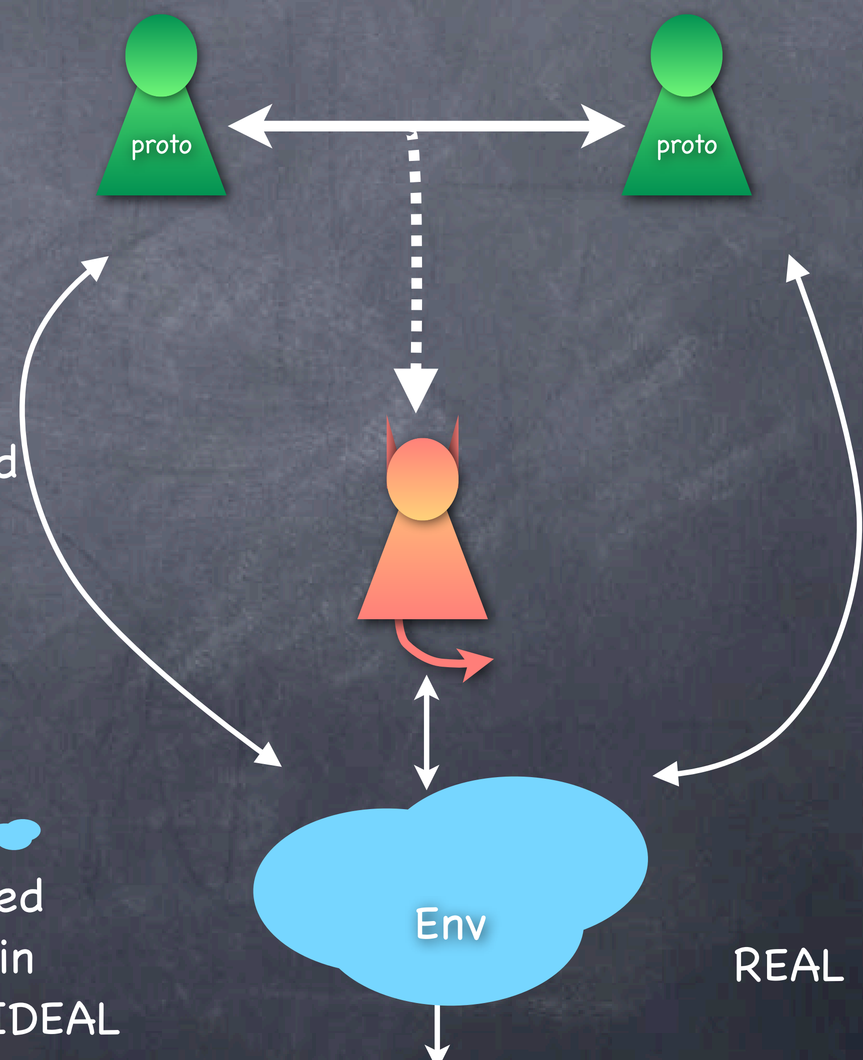

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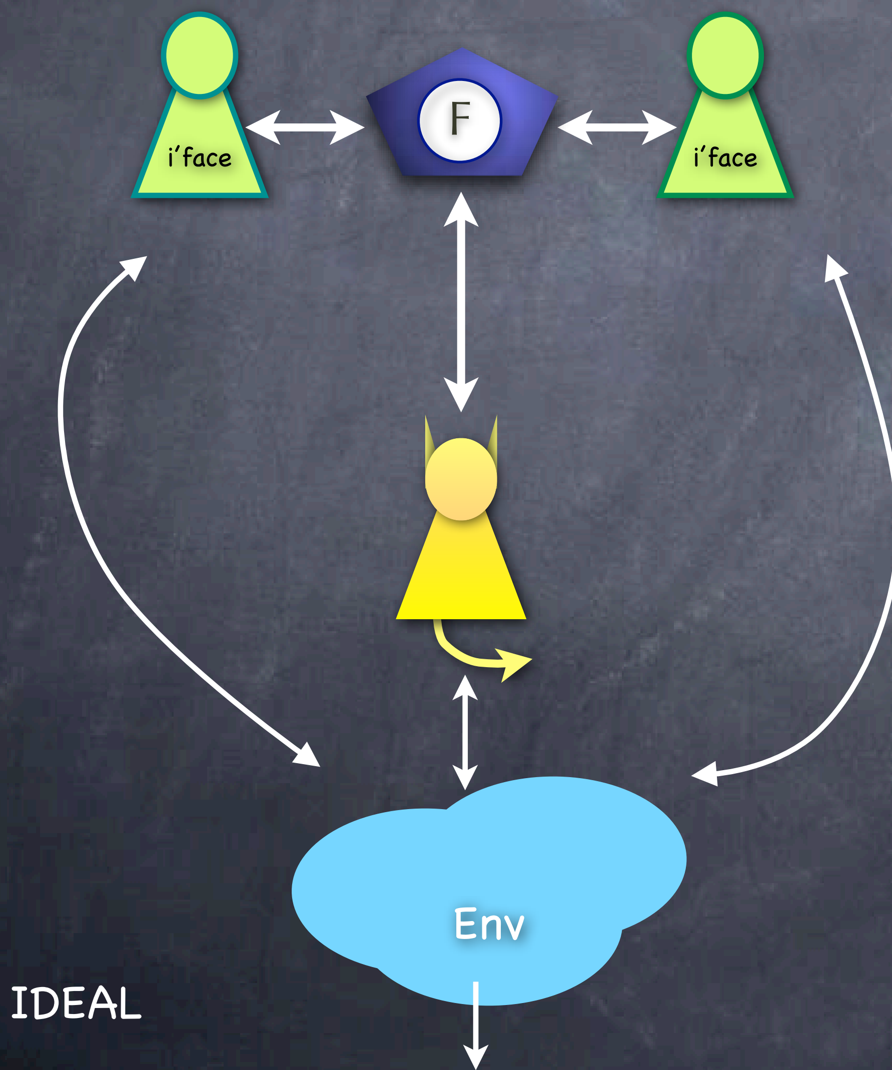

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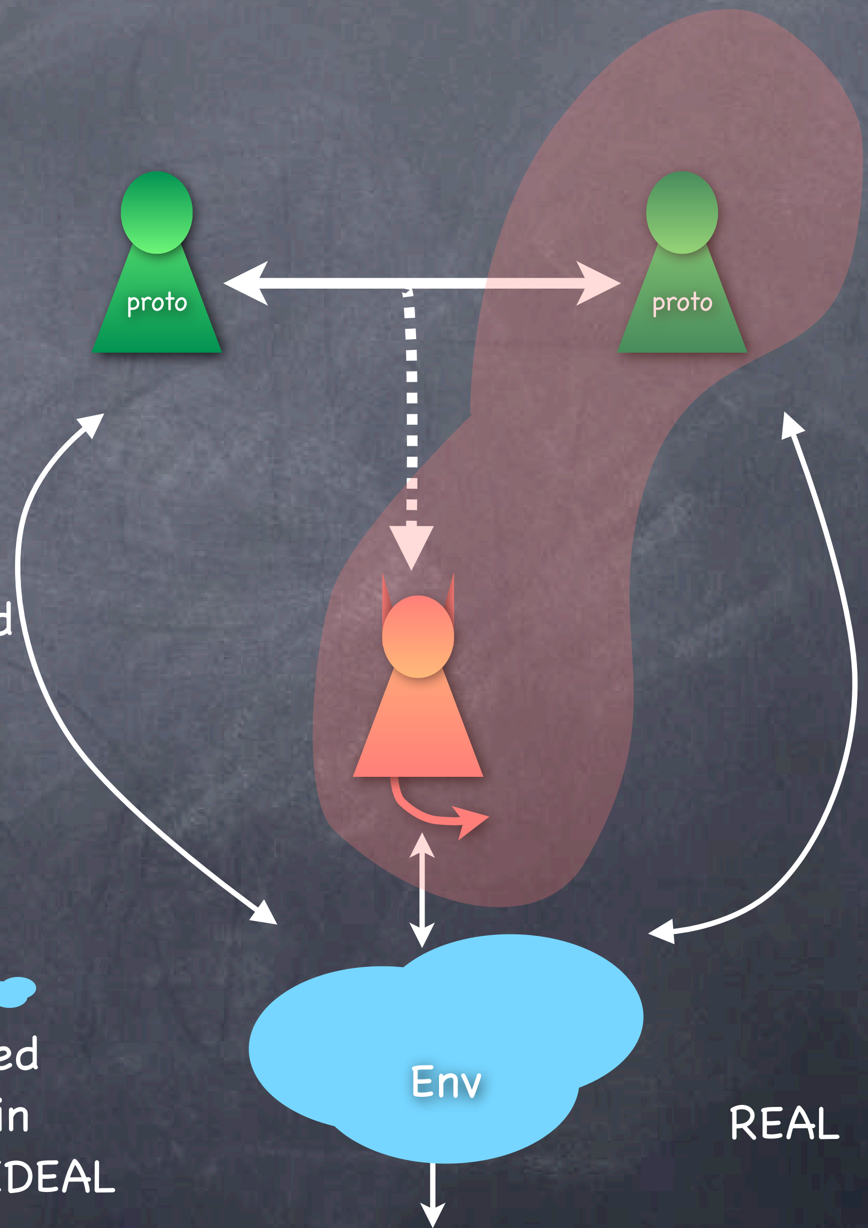

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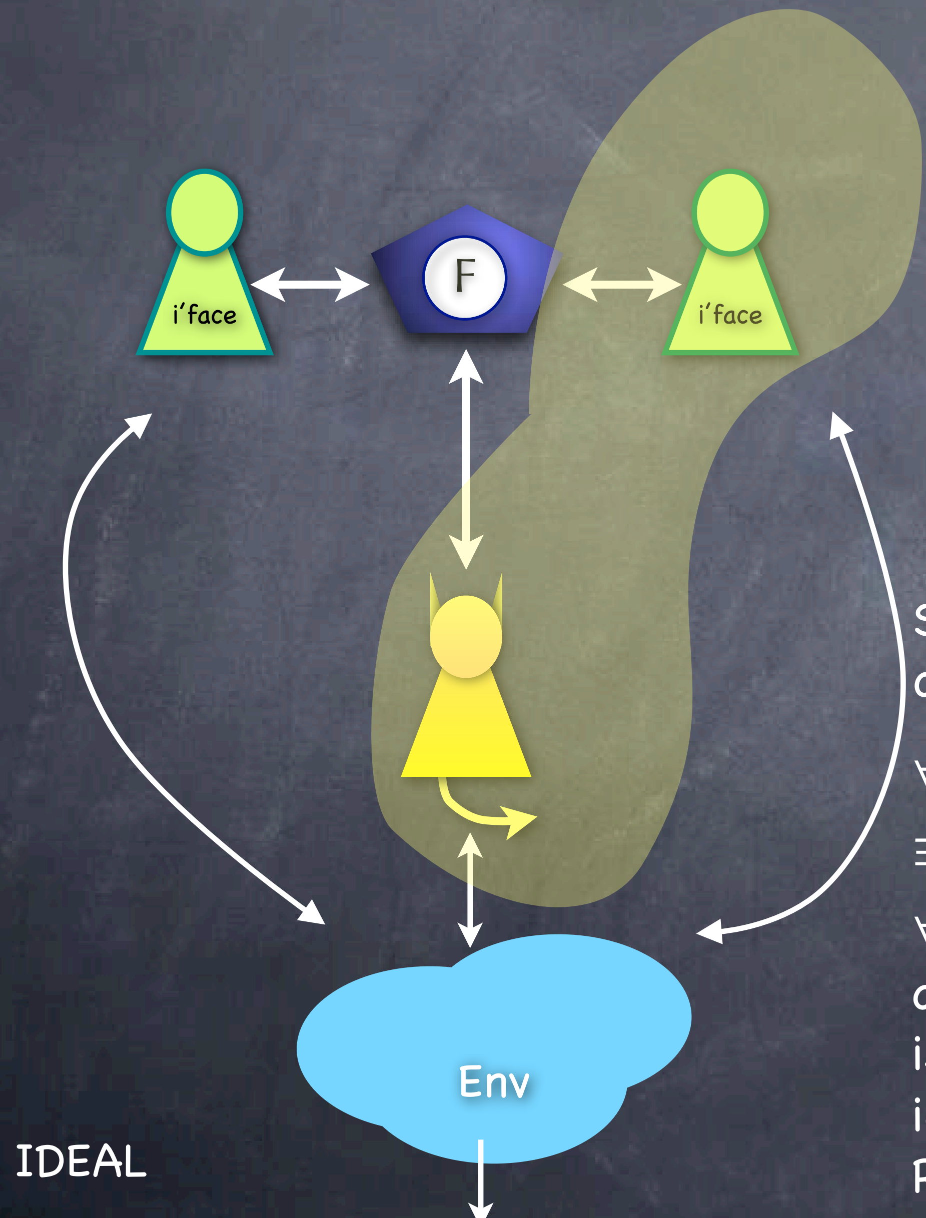

Secure (and correct) if:

$\forall$ [adversary] $\exists$ [simulator] s.t. $\forall$ [environment]

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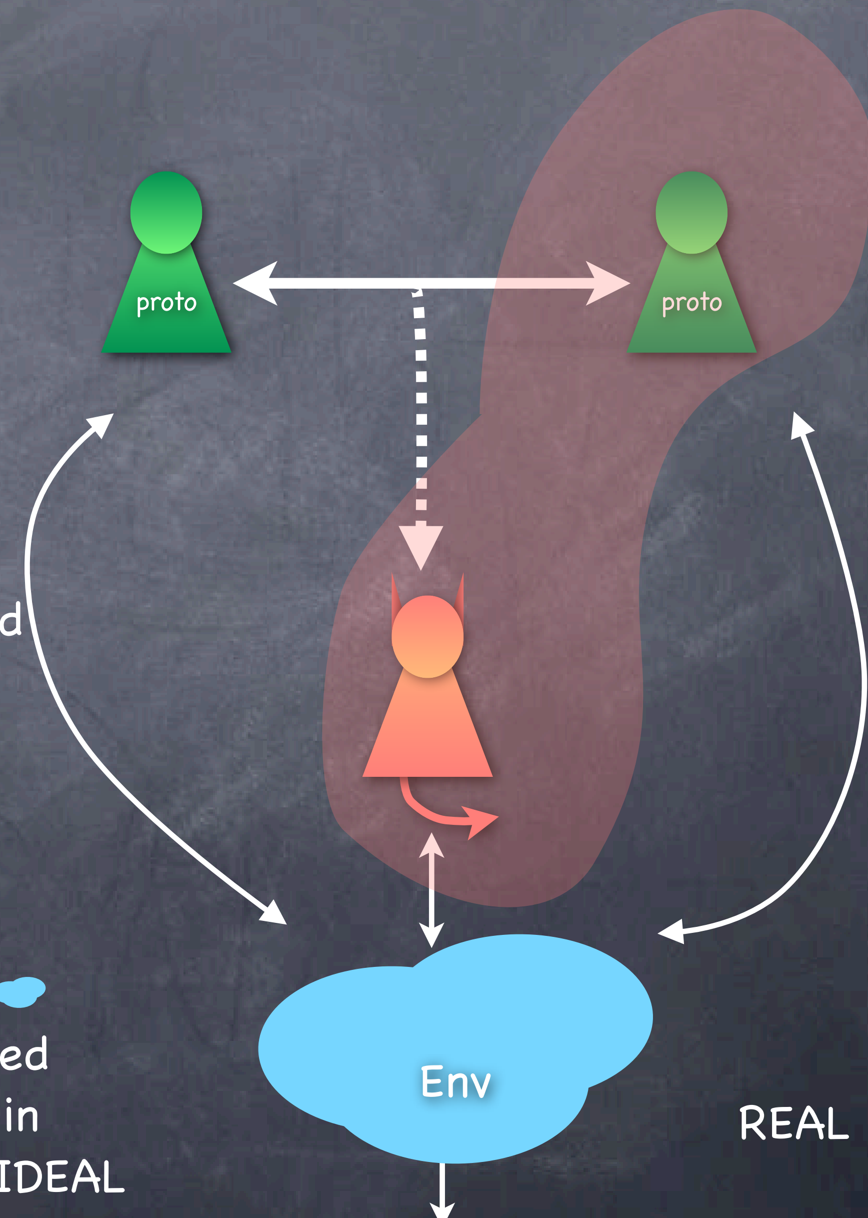

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  - Because IDEAL trusted entity would allow neither

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  - e.g. 2-party SFE for OR, with output going to only one party (trivial against active adversary; impossible without computational assumptions against passive adversary)

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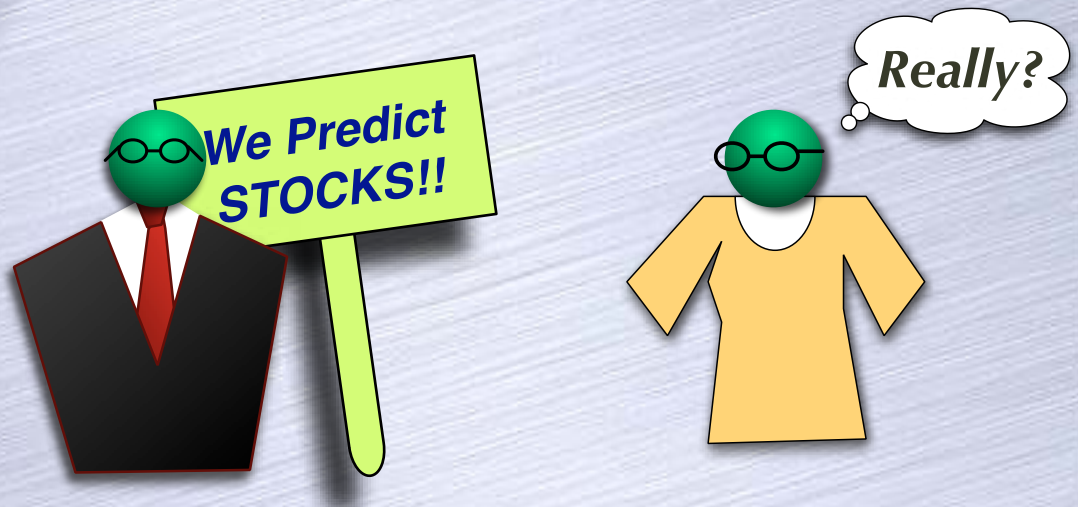

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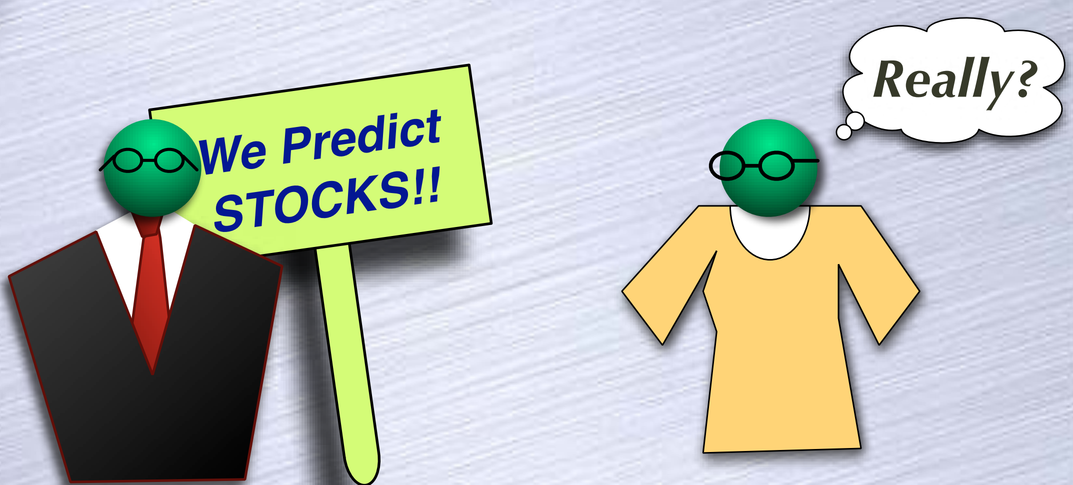

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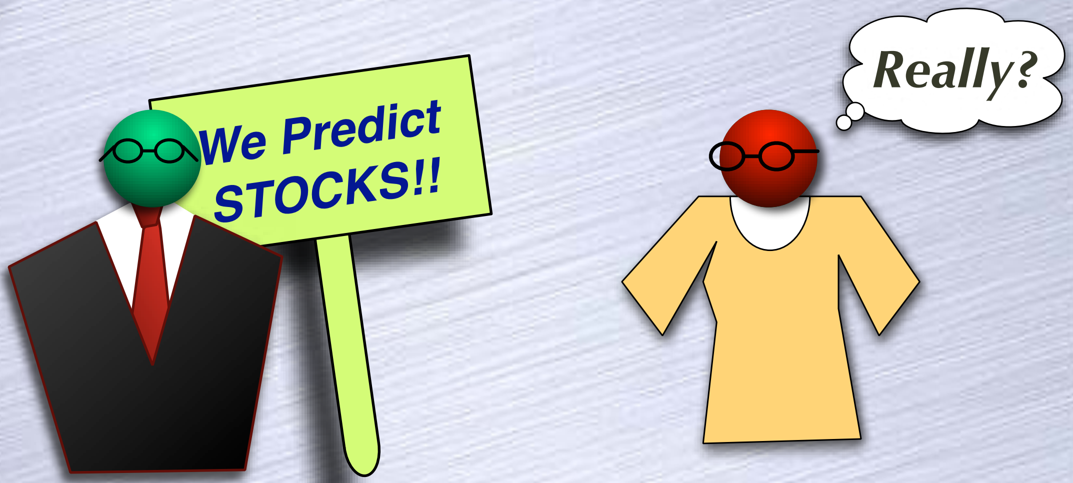

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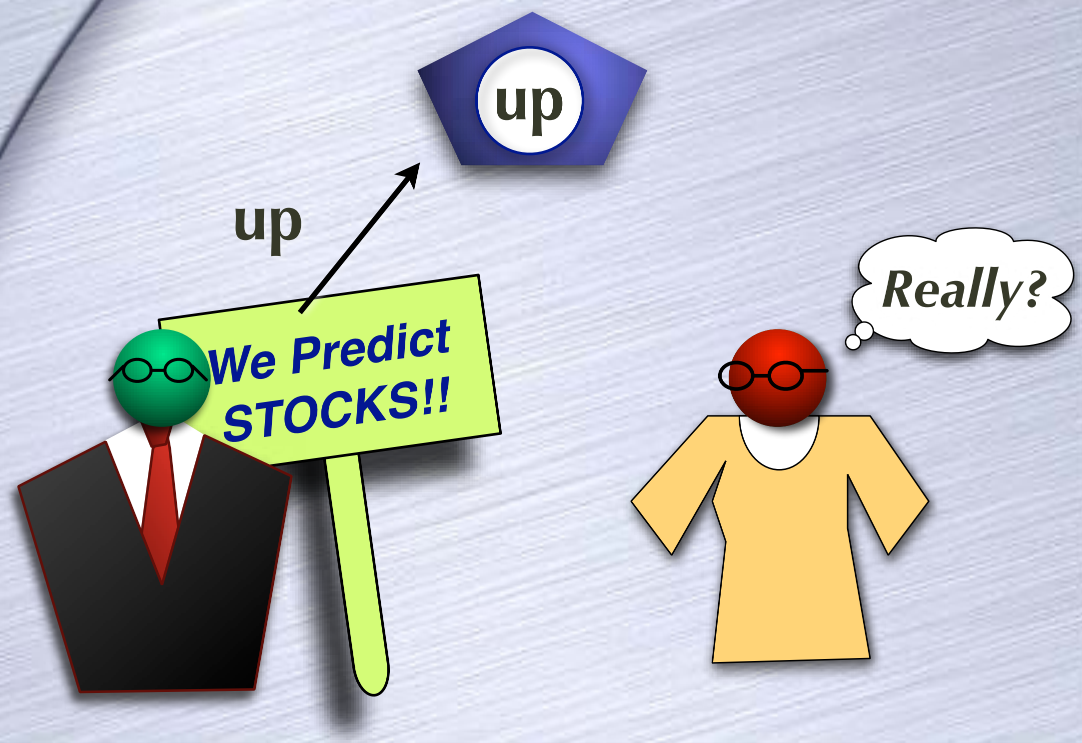

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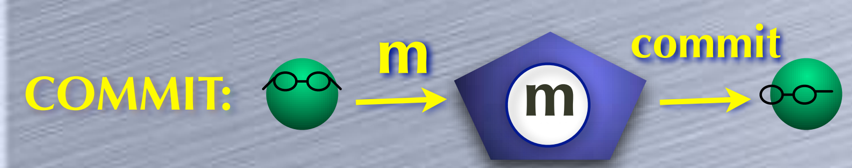

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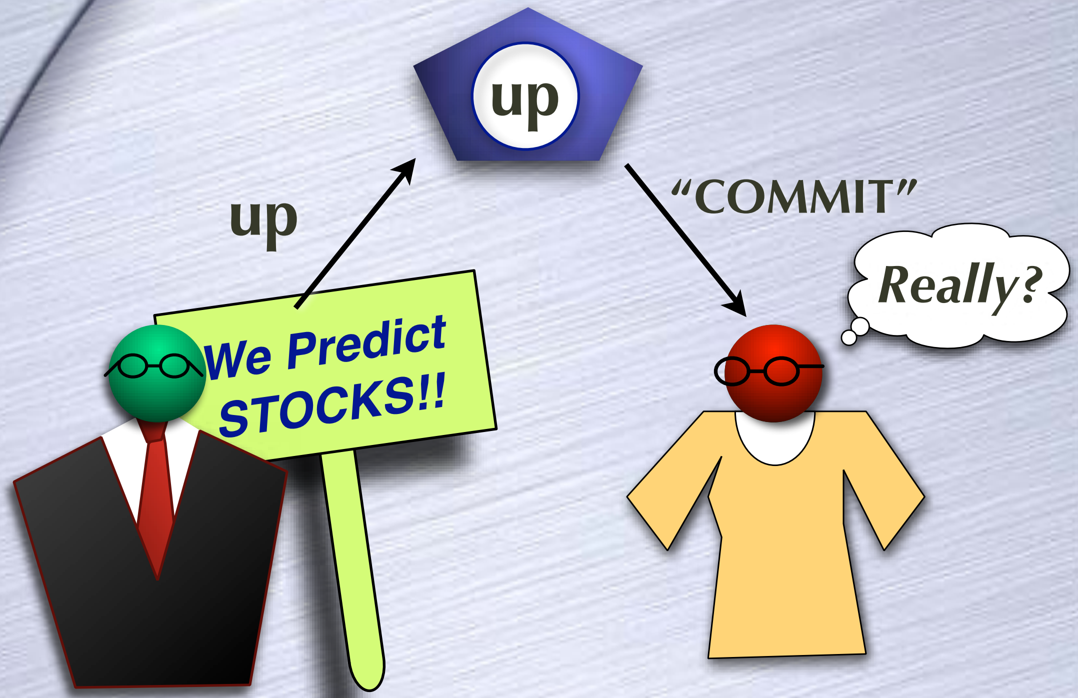

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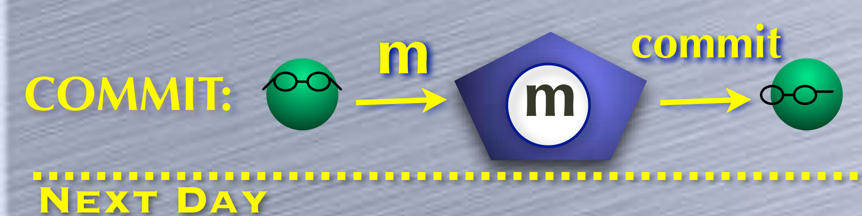

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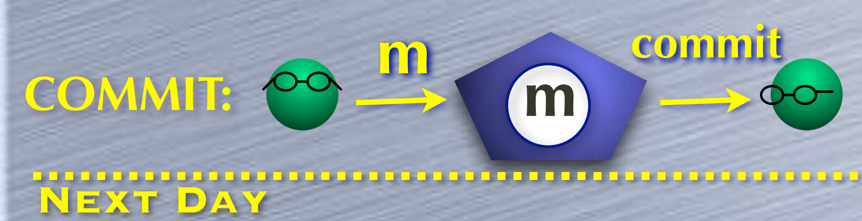

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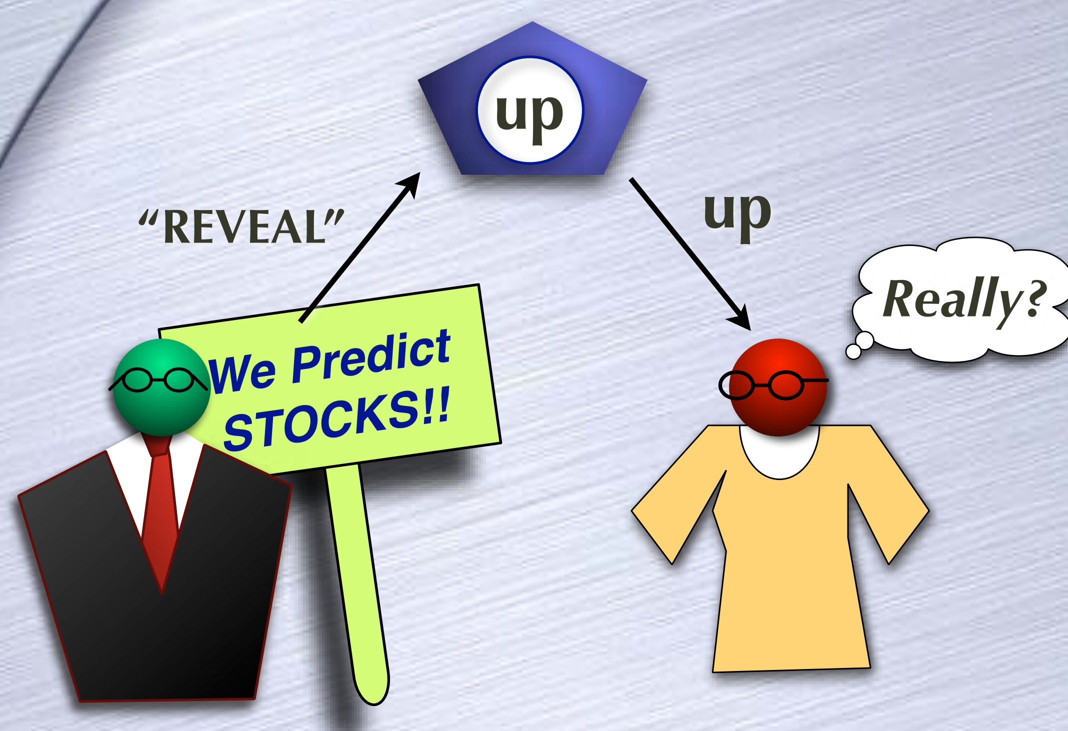

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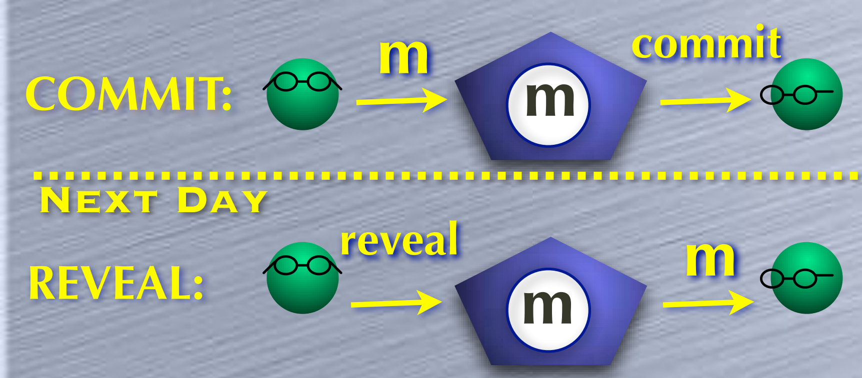

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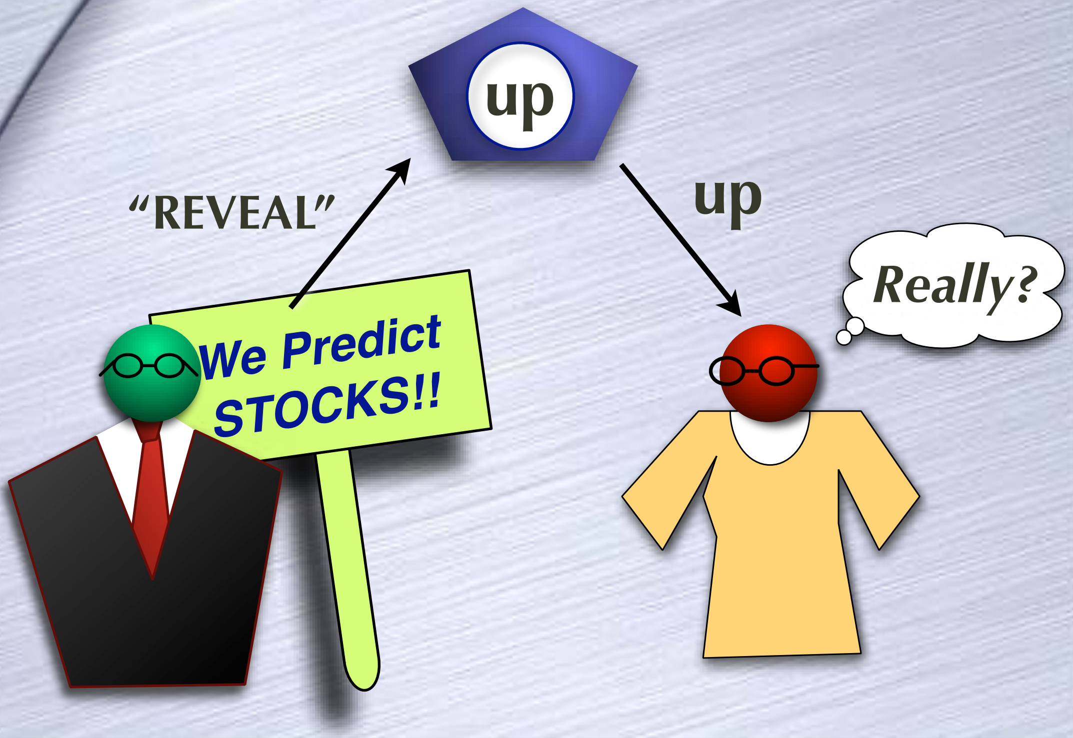

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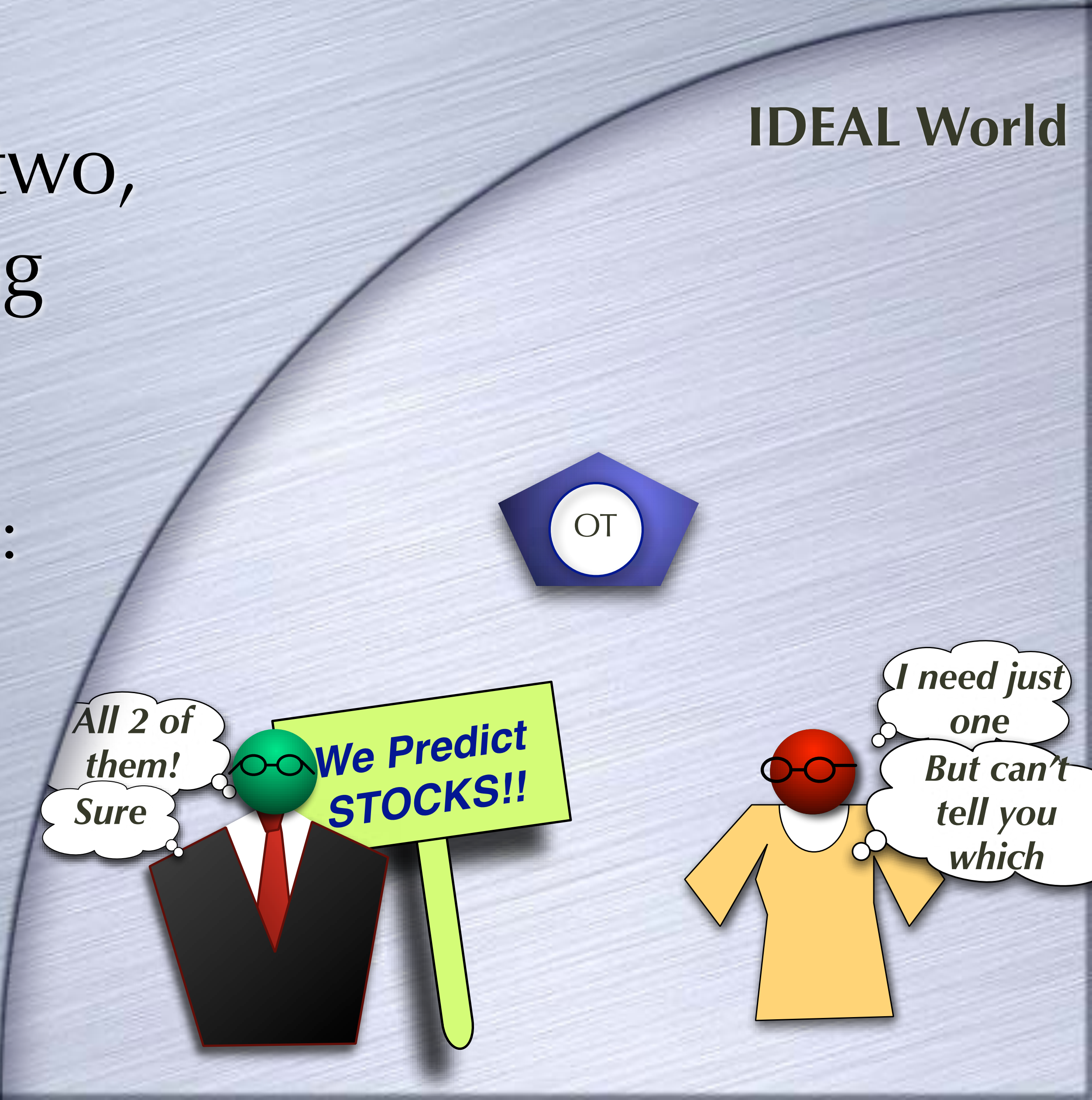

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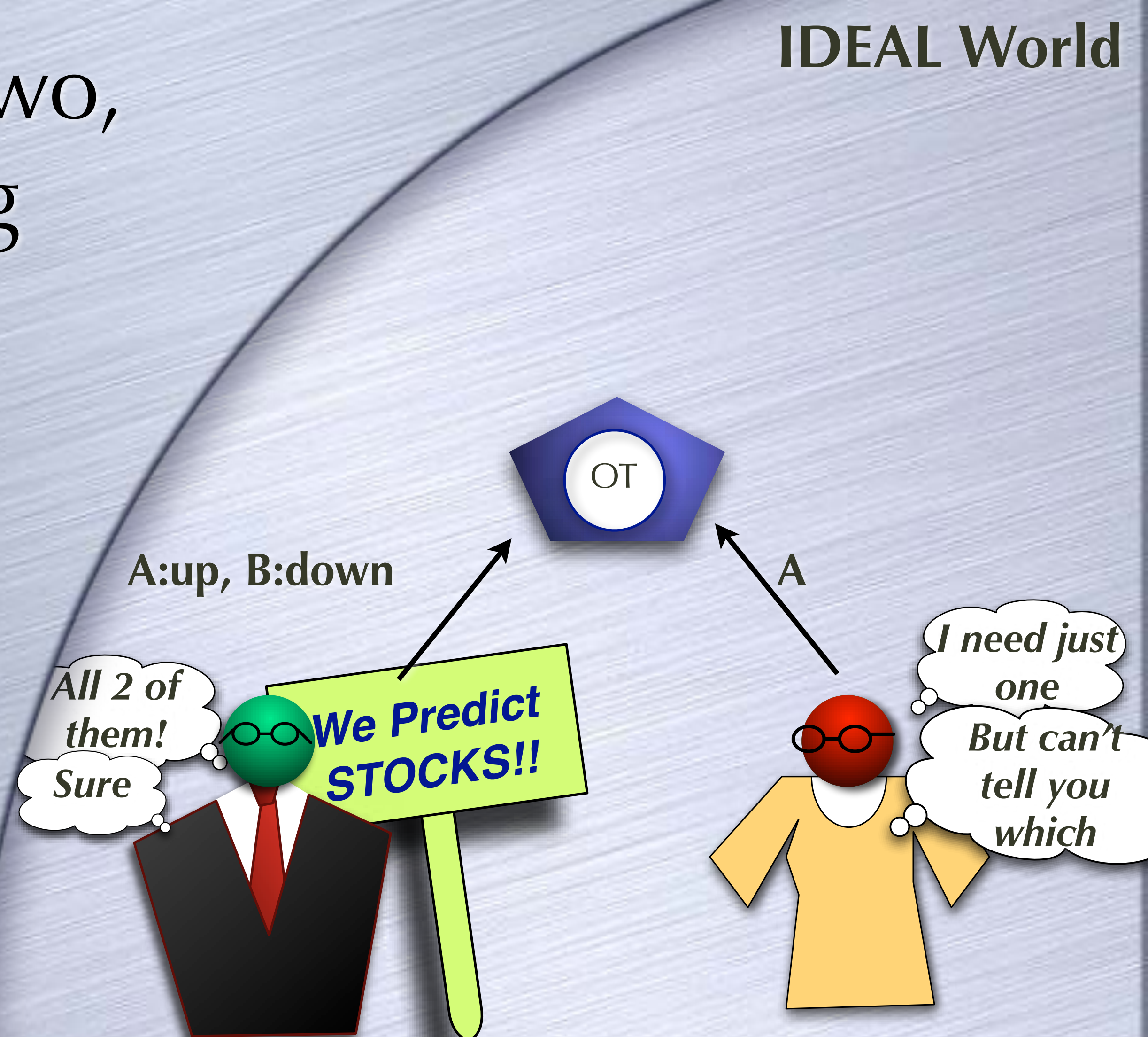

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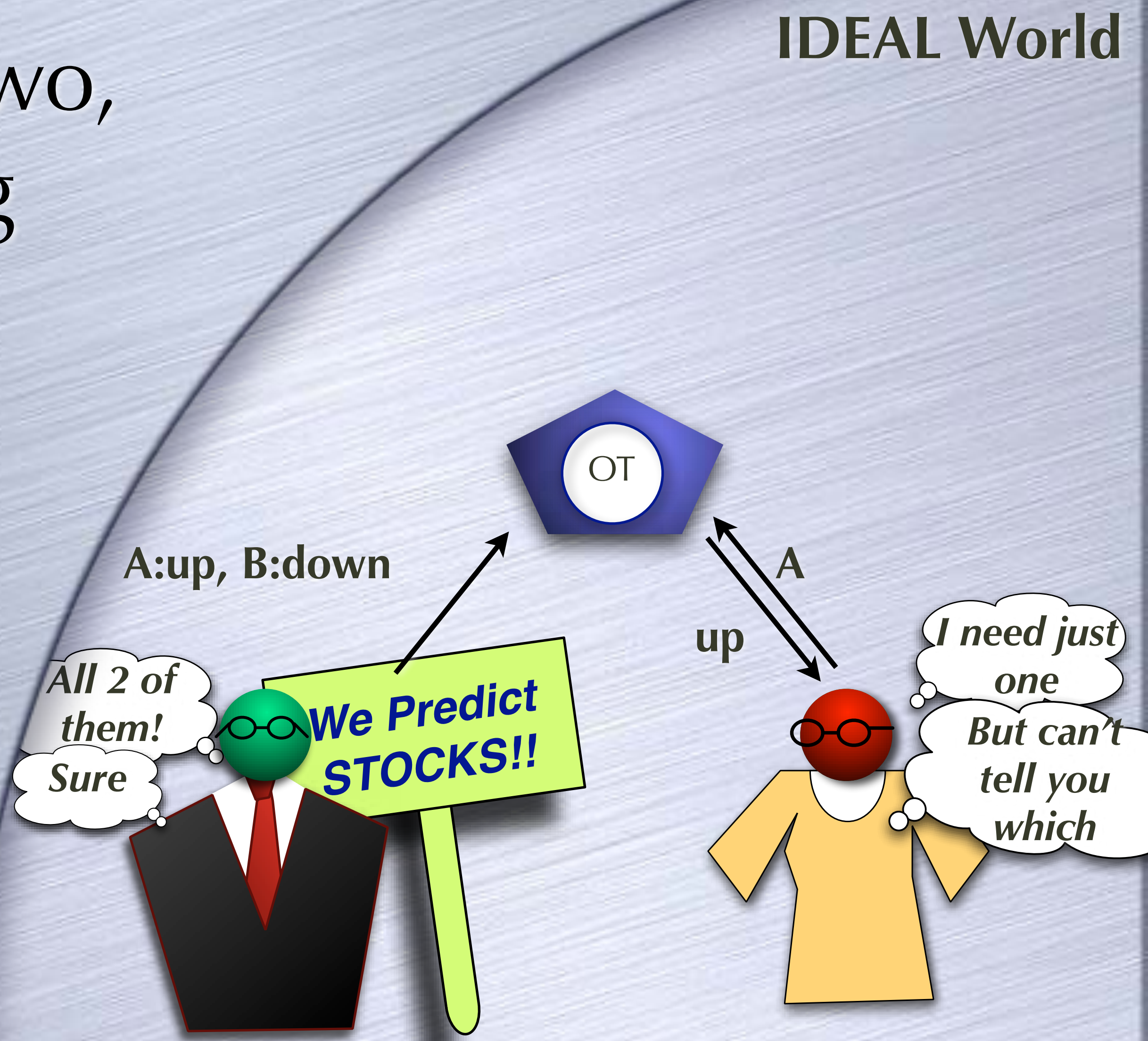

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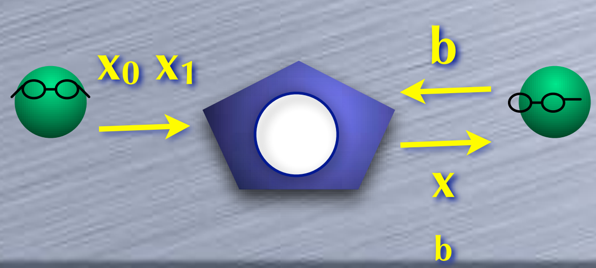
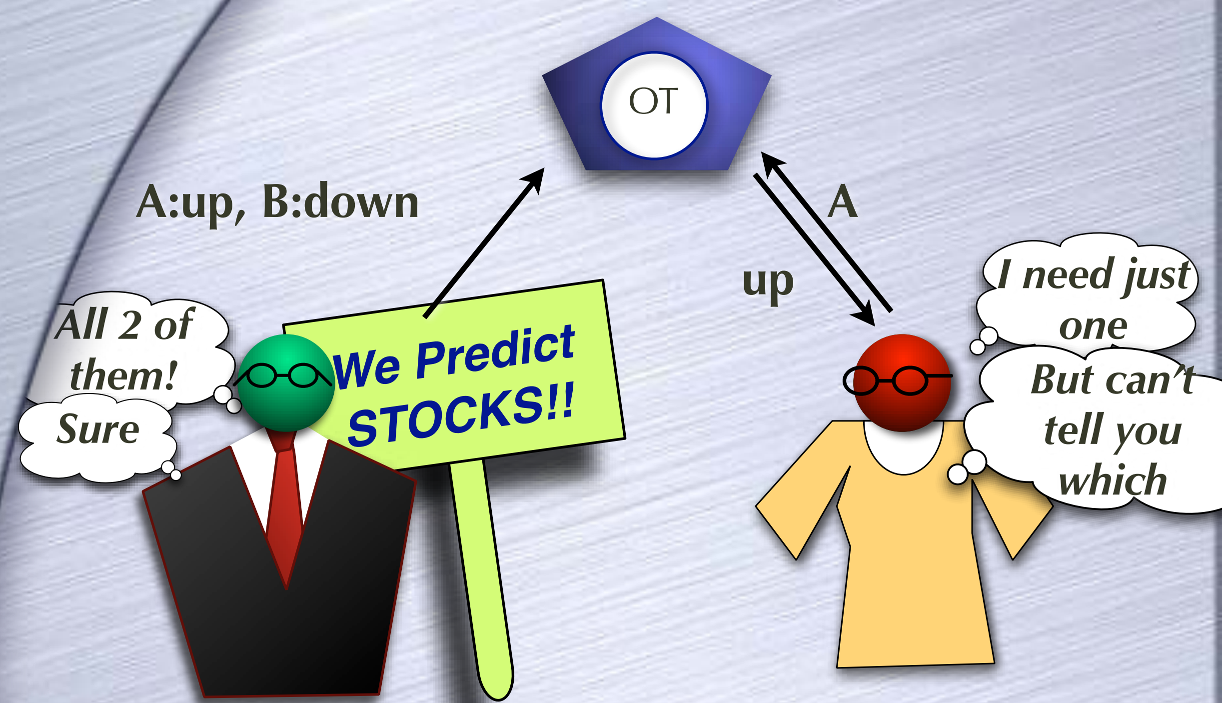


IDEAL World



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    - Gives a protocol using access to f', to securely realize f Exercise

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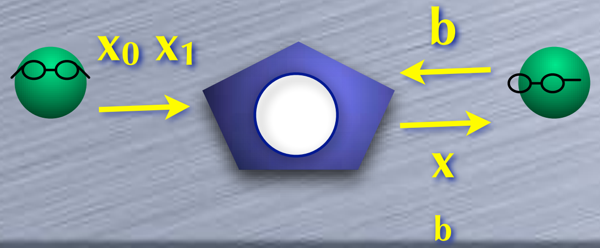
(passive receiver corruption)



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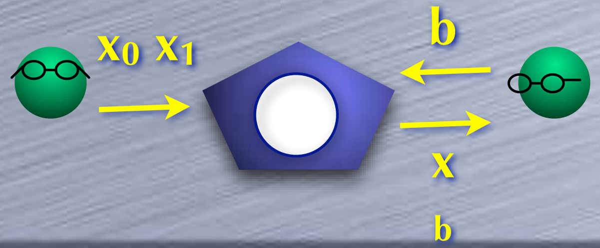

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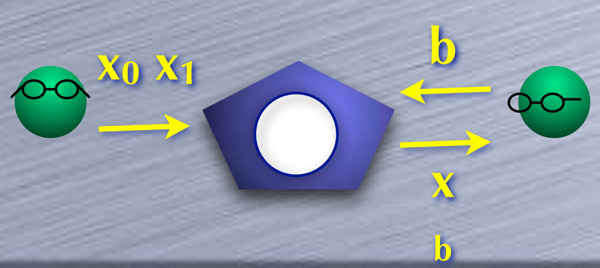

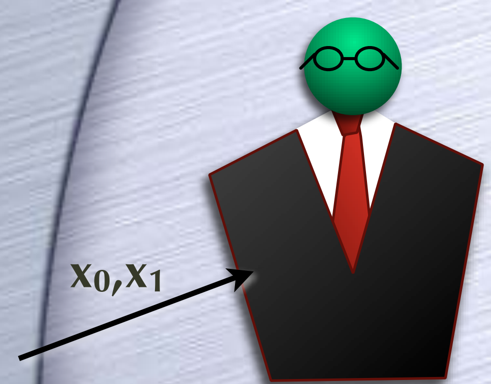

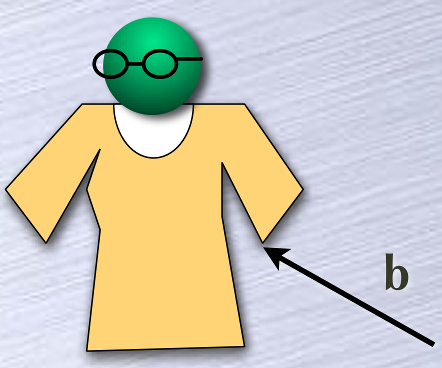

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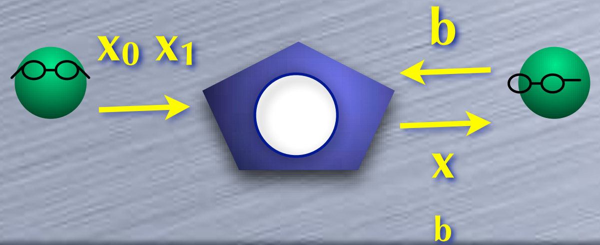

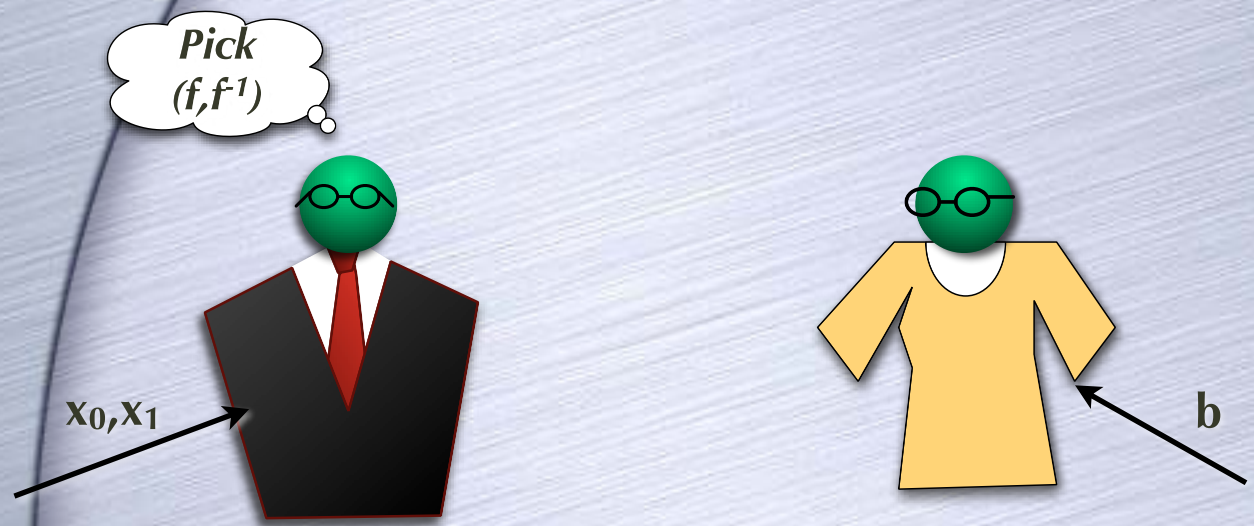

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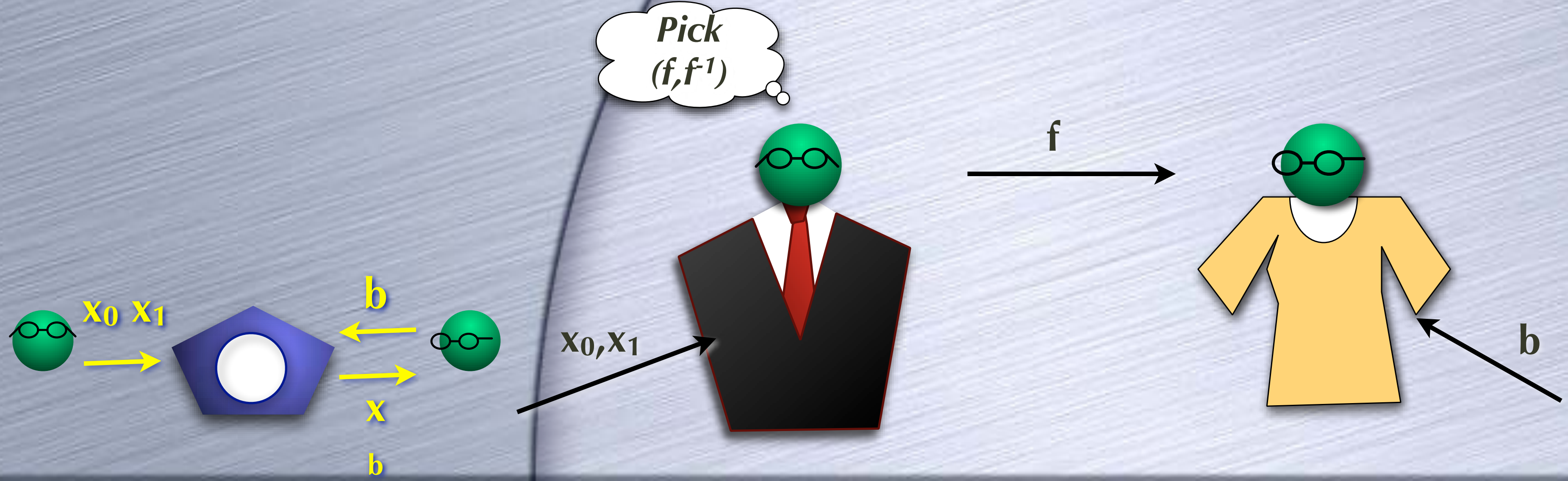

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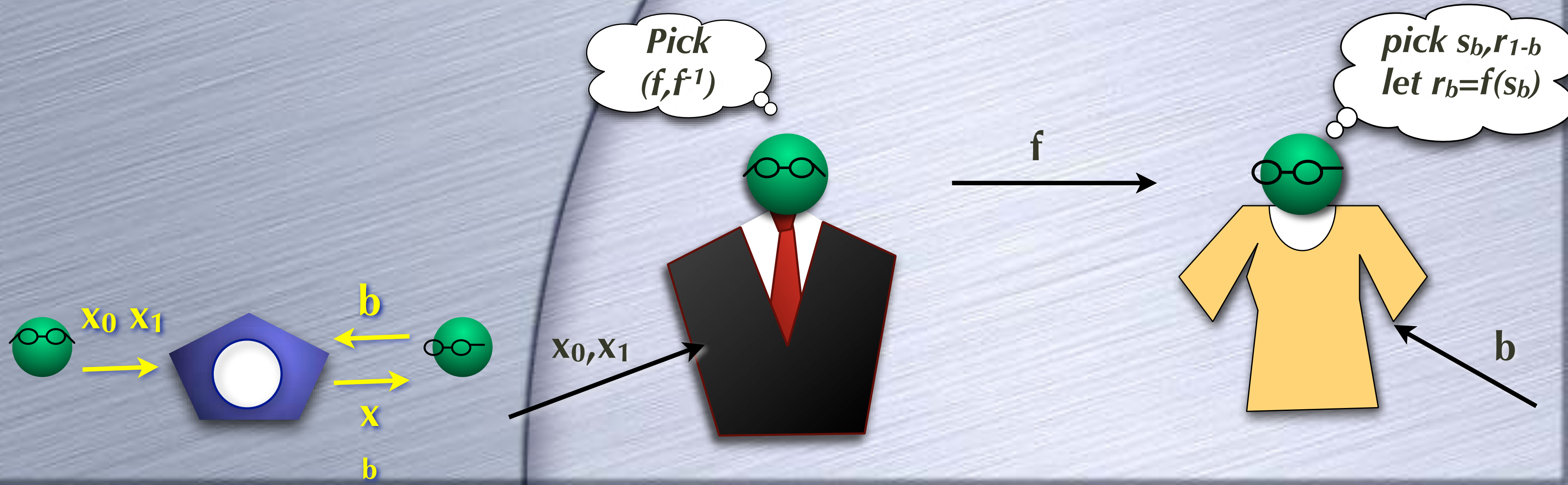

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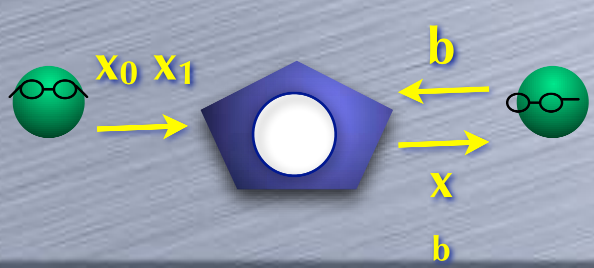

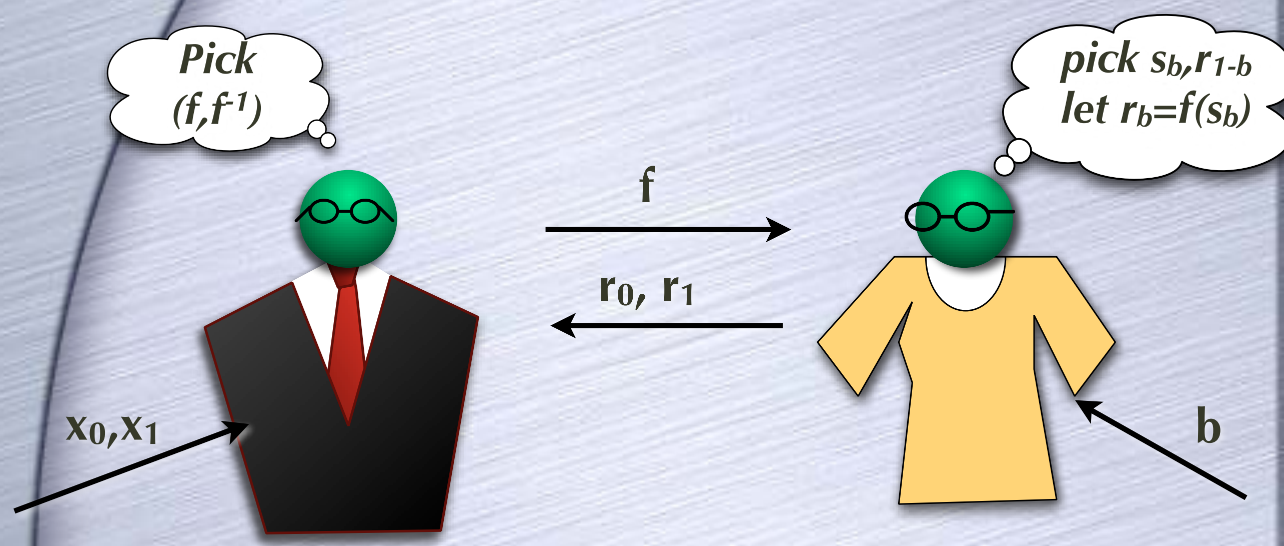

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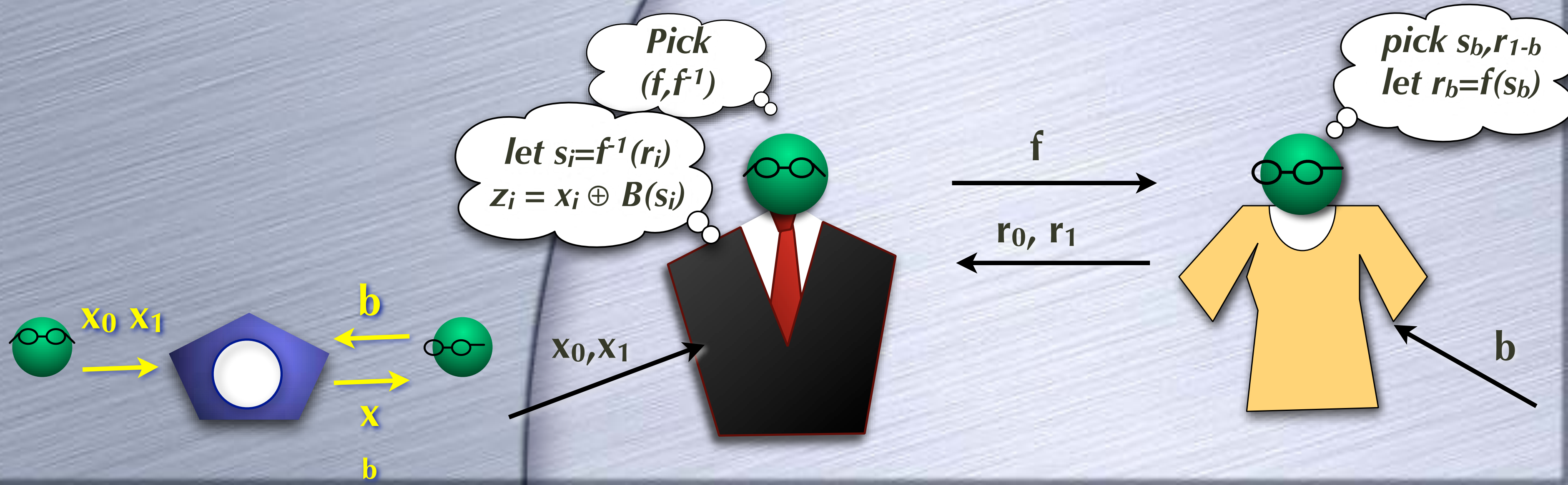

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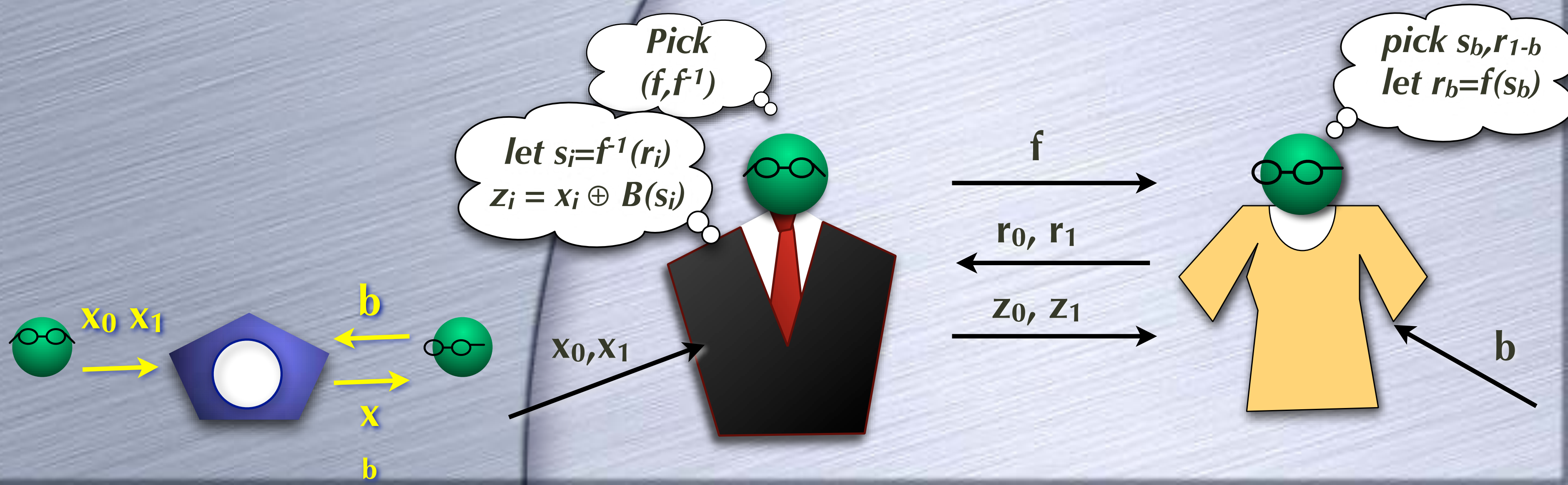

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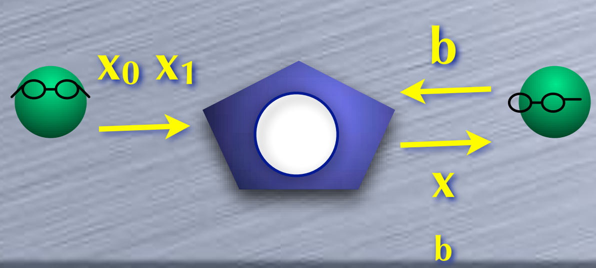

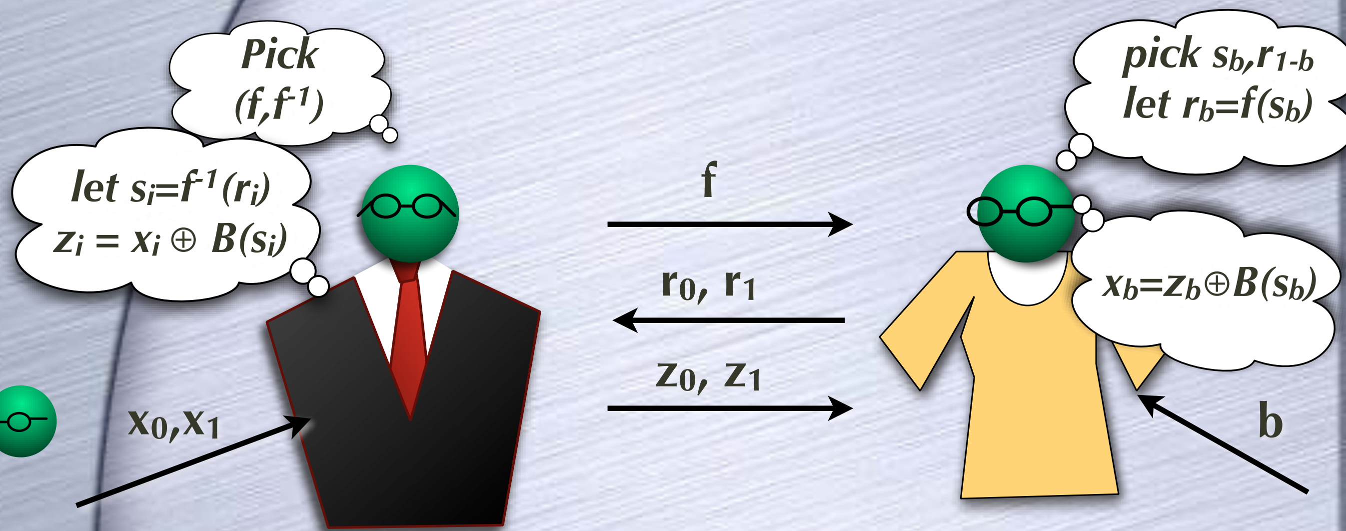

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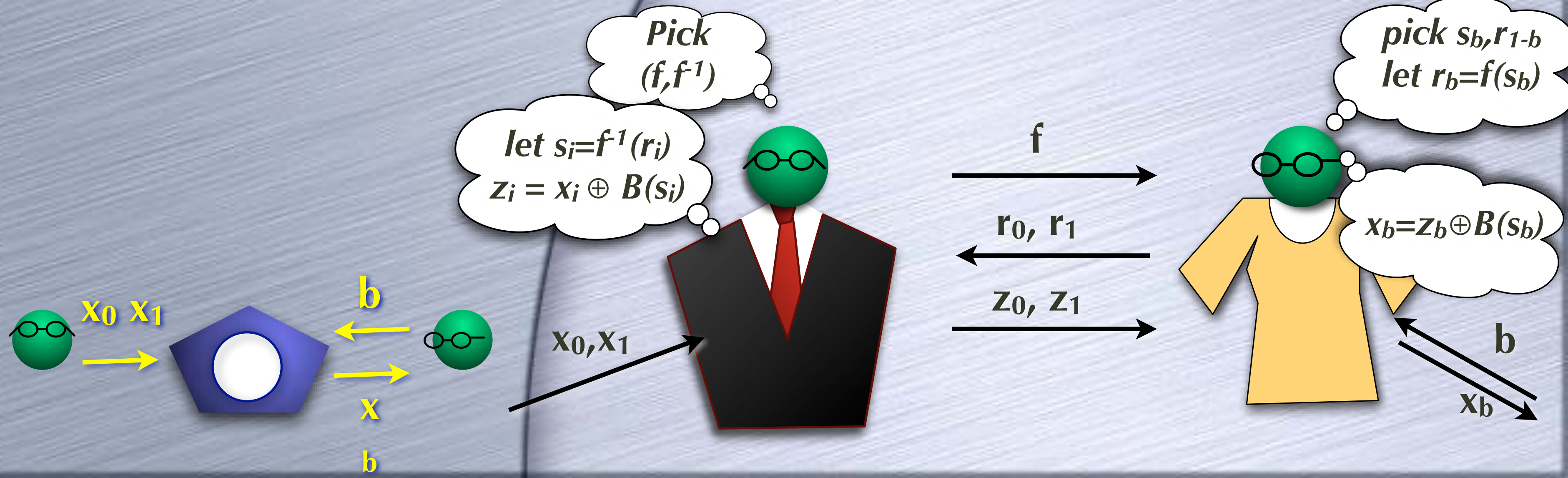

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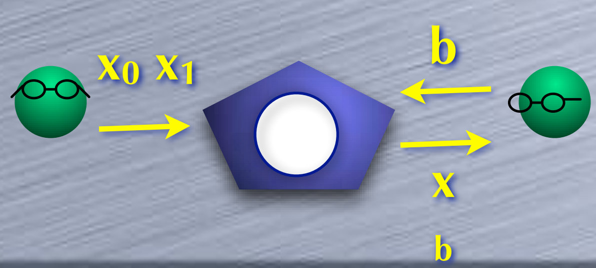

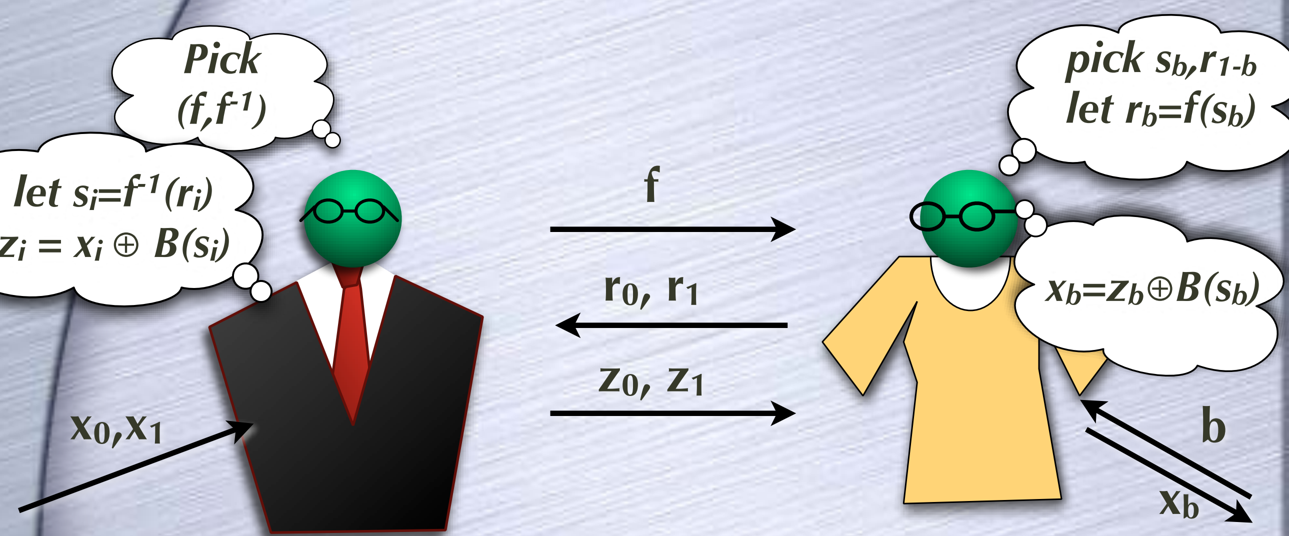

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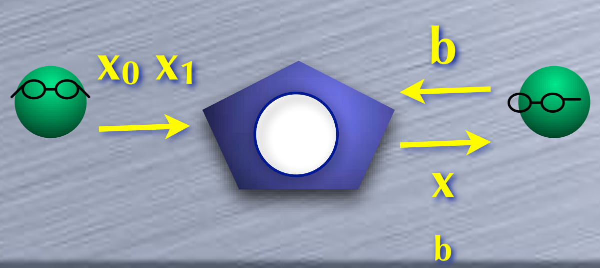

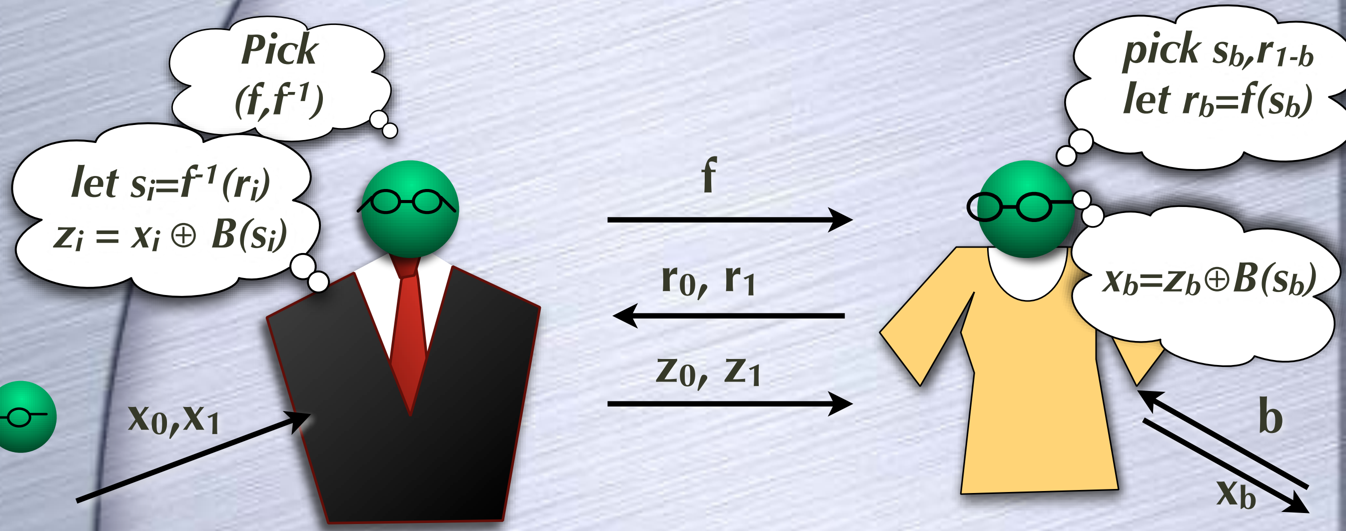

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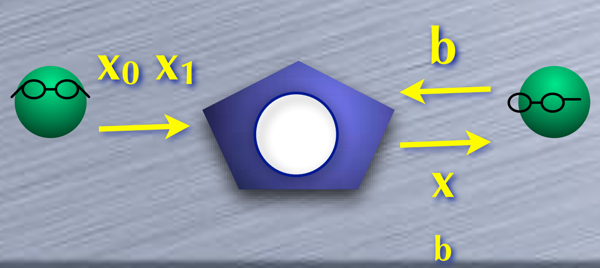

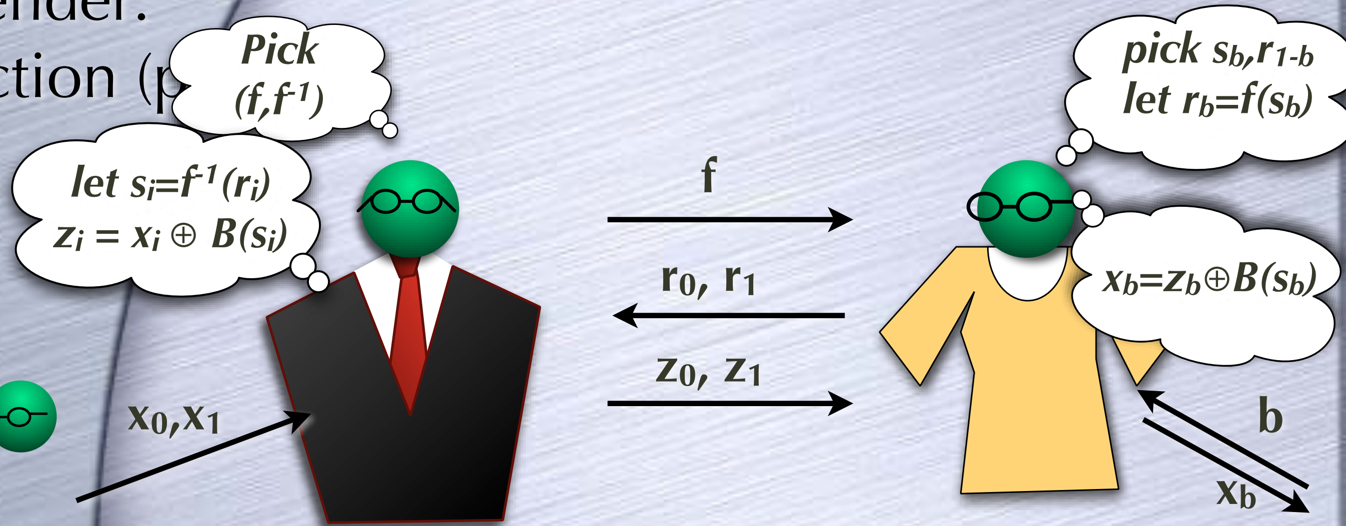

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- Coming up: SFE protocols for passive security. Zero-Knowledge proofs. Issues of composition. Universal Composition.