Cost optimization and online learning: a high level overview

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Outline

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- This class: An introduction through a resource management example.

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  2. Movement from one-of(protein folding) to scalable applications (google maps).

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  - No deadline guarantees (real-time operating systems).
  - Very hard to scale up to large distributed systems.

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  - Scheduling heuristic: Schedule tasks in order recieved, occupying all available cores.

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- Can we benefit from computation on the cloud?

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- Spot pricing - a market system.

The spot market in EC2

Spot Instances

Spot Instances enable you to bid for unused Amazon EC2 capacity. Instances are charged the Spot Price, which is set by Amazon EC2 and fluctuates periodically depending on the supply of and demand for Spot Instance capacity. To use Spot Instances, you place a Spot Instance request, specifying the instance type, the Region desired, the number of Spot Instances you want to run, and the maximum price you are willing to pay per instance hour. To determine how that maximum price compares to past Spot Prices, the Spot Price history is available via the Amazon EC2 API and the AWS Management Console. If your maximum price bid exceeds the current Spot Price, your request is fulfilled and your instances will run until either you choose to terminate them or the Spot Price increases above your maximum price (whichever is sooner).

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- Failures: screen turns off while watching a movie, giving a talk on the computer.
- Underlying problem: predicting when screen will be turned back on (user keystroke).

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- detection of user through microphone, video camera ...

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- Sensor Expert: Don't turn off if detecting user watching screen.

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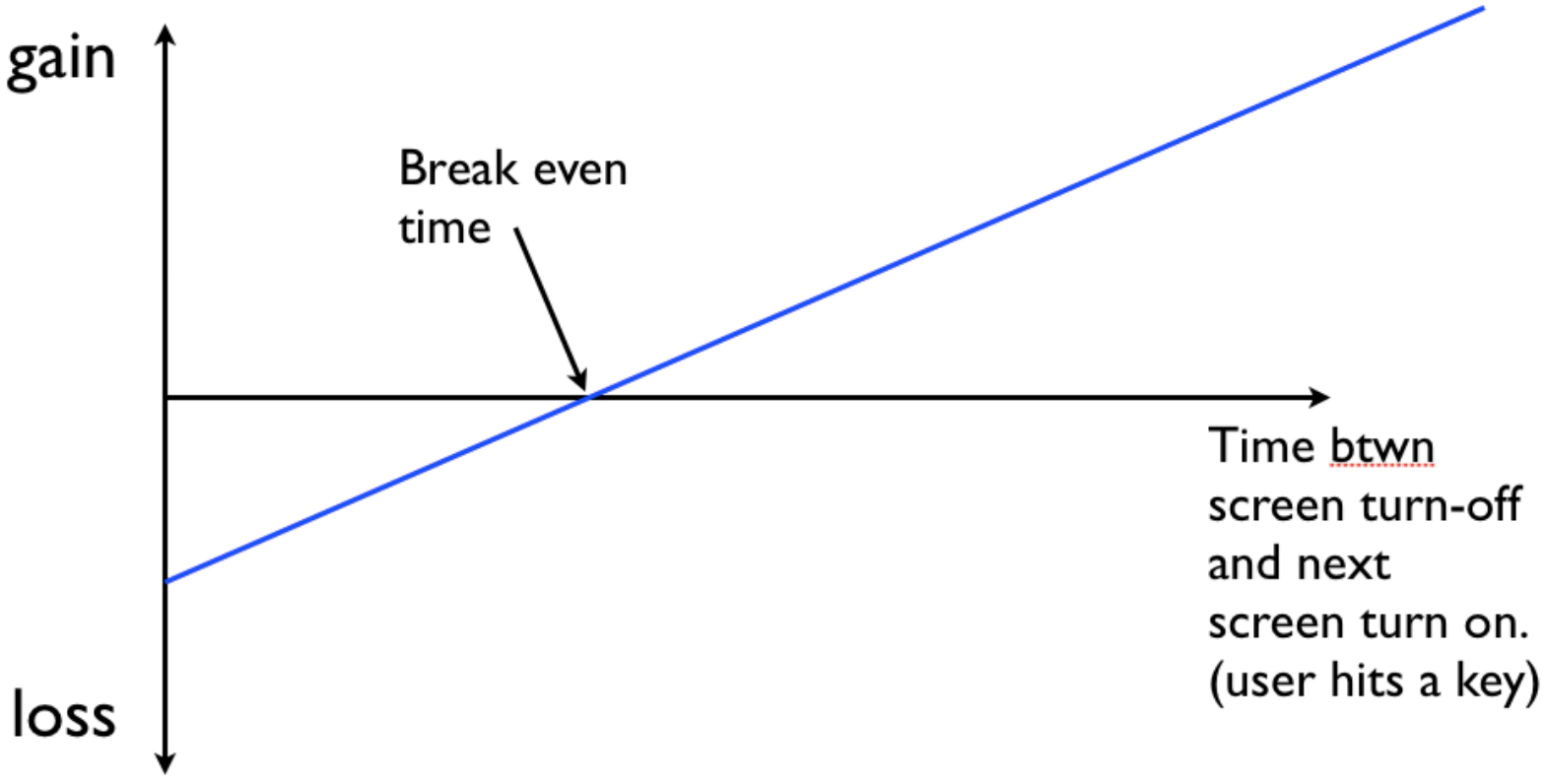
- **Performance measure:** cumulative gain/loss.

Loss/gain for single screen turn-off



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- Hedge goal is to track the best performing expert but avoid flukes - good perfomance that is a result of random fluctuations.

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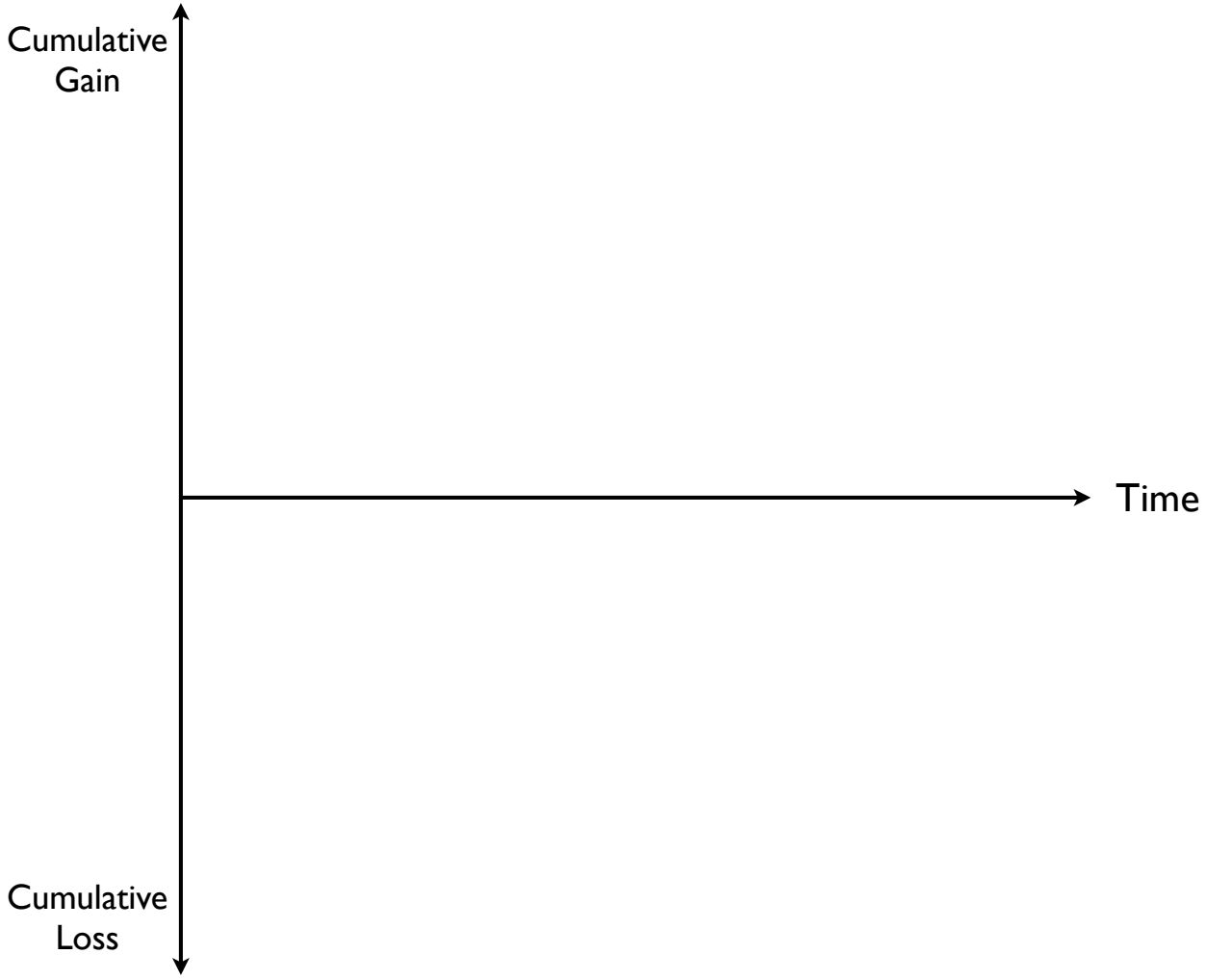

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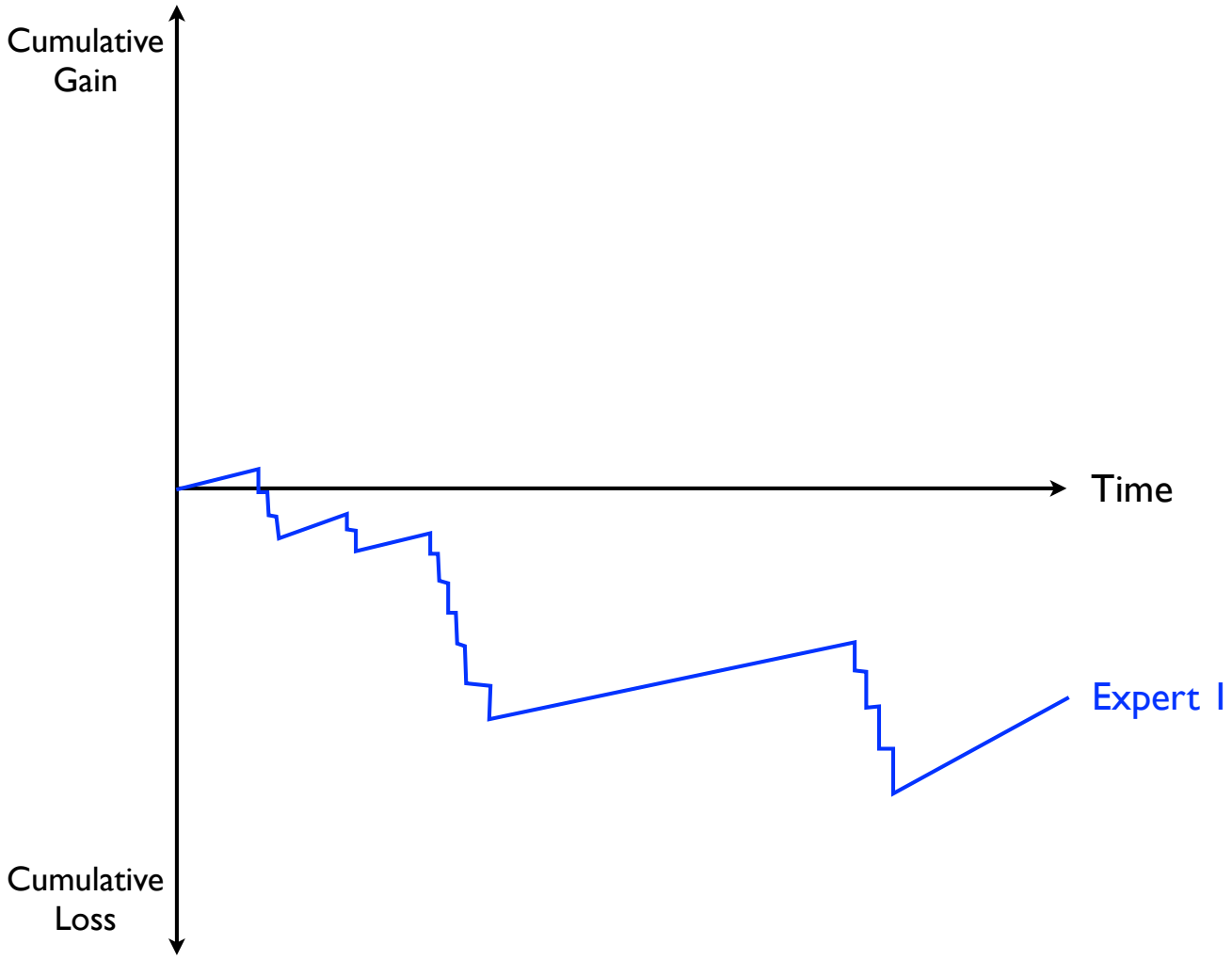

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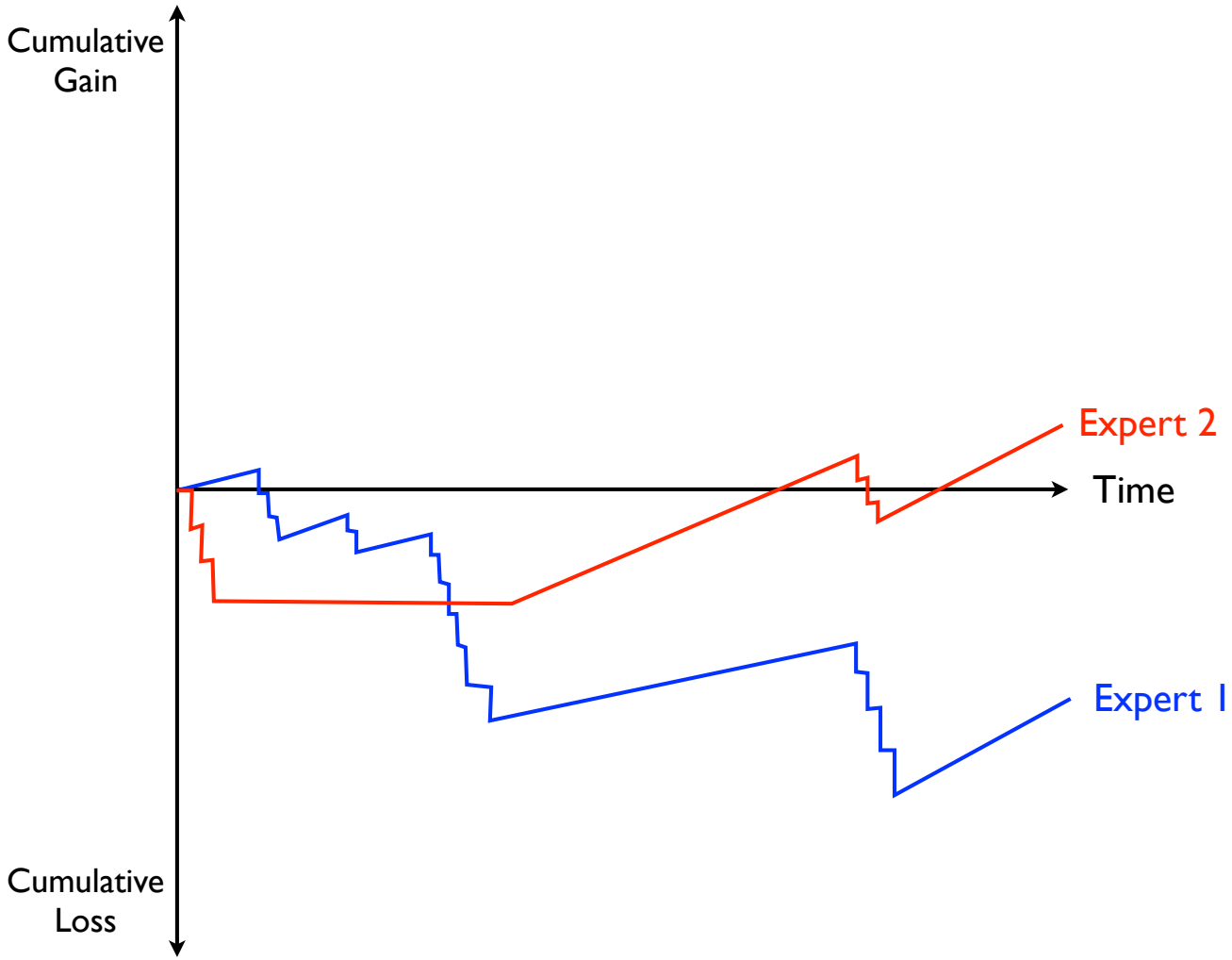

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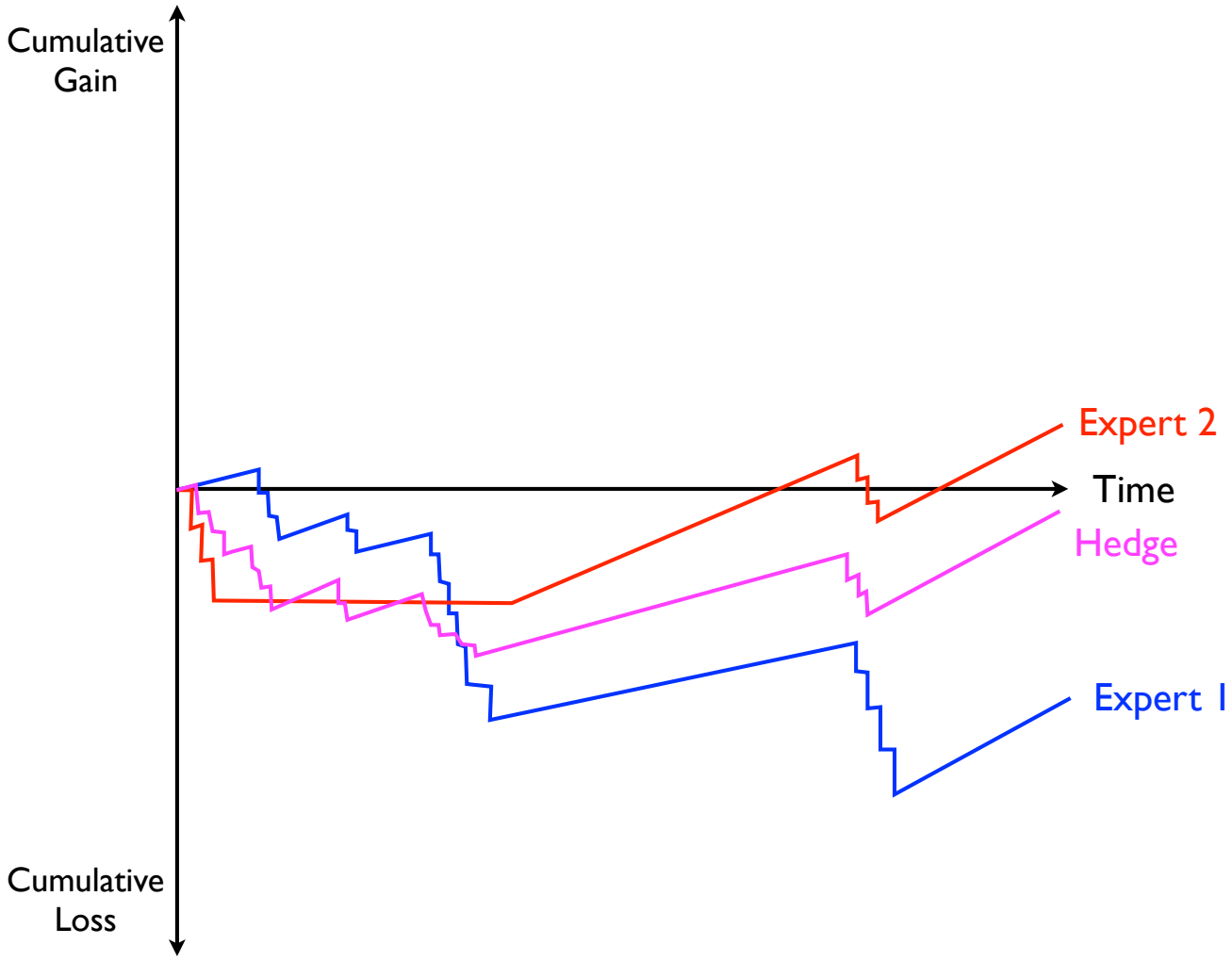

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