

# Reasoning About Knowledge: A Tutorial

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**Abstract:** In this tutorial talk, we will first review the standard possible-worlds definition of knowledge. We then give a method of modelling interactive systems as sets of *runs*, where a run is a complete description of what happens in the system over time. This approach is applicable to modelling a wide range of phenomena, including distributed protocols, games, and conversations. We show how to interpret knowledge in a distributed system and use this approach to analyze the *coordinated attack* problem. All the material in this talk is taken from [HF85, HM84] and the overview paper [Hal87].

## References

- [Hal87] J. Y. Halpern, Using reasoning about knowledge to analyze distributed systems, *Annual Review of Computer Science, Vol. 2*, Annual Reviews Inc., 1987, pp. 37–68.
- [HF85] J. Y. Halpern and R. Fagin, A formal model of knowledge, action, and communication in distributed systems: preliminary report, *Proc. 4th ACM Symp. on Principles of Distributed Computing*, 1985, pp. 224–236.
- [HM84] J. Y. Halpern and Y. Moses, Knowledge and common knowledge in a distributed environment, *Proc. 3rd ACM Symp. on Principles of Distributed Computing*, 1984, pp. 50–61. A revised version appears as *IBM Research Report RJ 4421*, Aug., 1987.