Distributed Systems
600.417
Communication and Knowledge

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Communication and Knowledge
Lecture 12
Common Knowledge

A group has common knowledge of a fact $p$ if they all know $p$, they all know that they all know $p$, they all know that they .... and so on, infinite number of times.

Communication Knowledge and Action

- In many practical systems, common knowledge is not attainable.
- Sometimes, (remember the generals), a lack of common knowledge means inability to act.
- Sometimes, it does not.
The Cheating Husbands Puzzle

• Once upon a time, there was a matriarchal city.
• The women had to pass a logic exam before being allowed to marry.
• The Queen was not required to take that exam, but it was common knowledge that she was truthful.
• The women were obedient to the queen.
• The city was small, so all women heard every shot fired in the city.

Basic Puzzle

Henrietta I:

• All the women gathered at the city square.
• The queen read the following:
  – There are (one or more) unfaithful husbands in the city.
Basic Puzzle (cont.)

– Although none of you knew before this gathering whether your own husband was faithful, each of you knows which of the other husbands are unfaithful.
– I forbid you to discuss it.
– Should you discover that your husband is unfaithful, you must shoot him on the midnight of the day you find out about it.