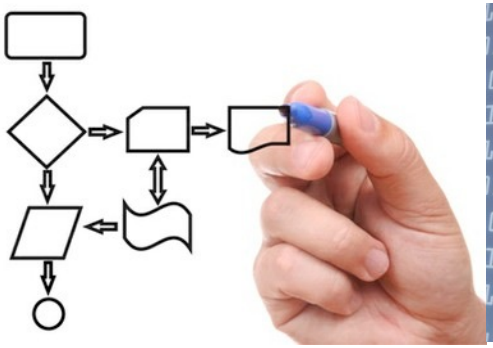
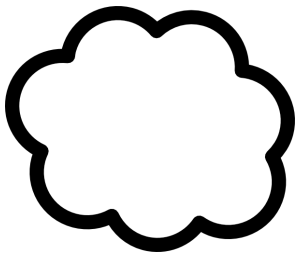
San Jose State University

CMPE 281
Cloud Technologies

Vector Clock Example





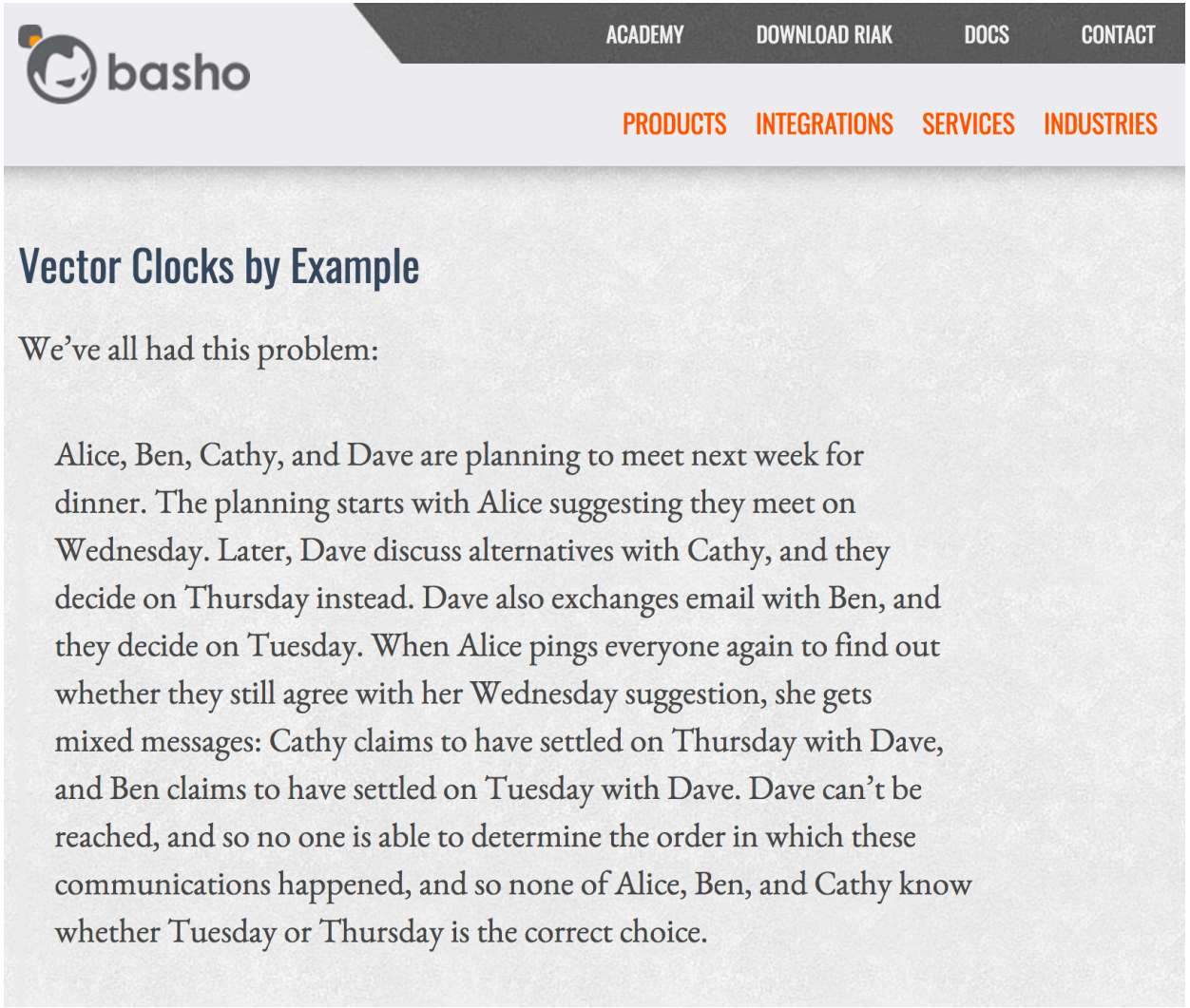
Version Stamps

A field that changes each time data is updated

Examples:

Counter	Requires a Single Master to generate unique values.
GUID	Anyone can generate. But values are large and hard to compare.
Hash	Hash of content with a big enough hash key size for global uniqueness.
Timestamp	Nodes have to synchronize clocks.
Vector Stamps	*A vector of version stamps from each node.* *Example: [Node-A: 2, Node-B: 5, Node-C: 10]*

The Actors: Alice, Ben, Cathy, Dave
Goal: Which day to meet for dinner?

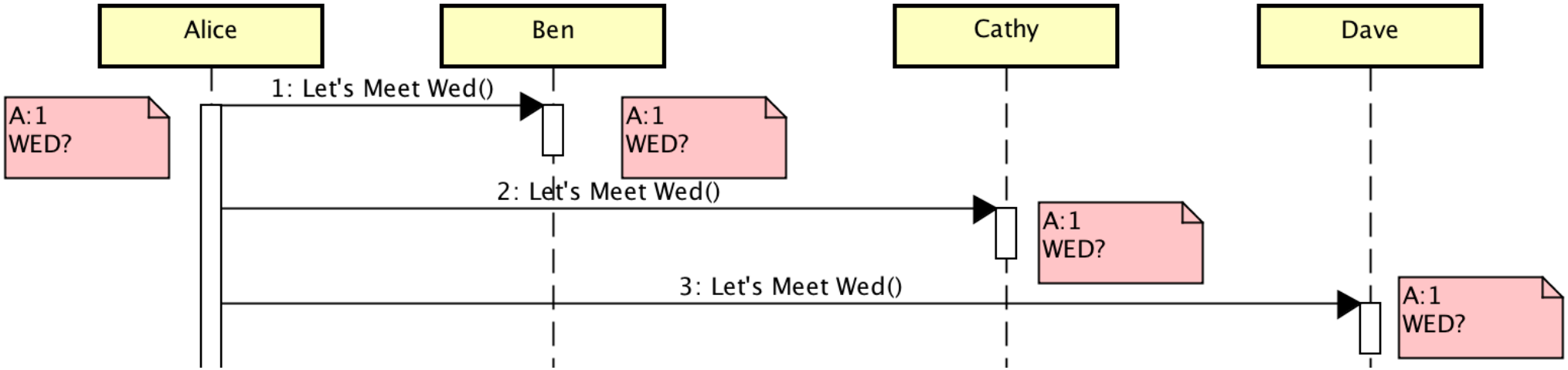


*The story changes, but the end result is always the same: you ask two people for the latest version of a piece of information, and they reply with two different answers, and there's no way to tell which one is **really** the most recent.*

Vector clocks to the rescue, but how? Simple: tag the date choice with a vector clock, and then have each party member update the clock whenever they alter the choice.

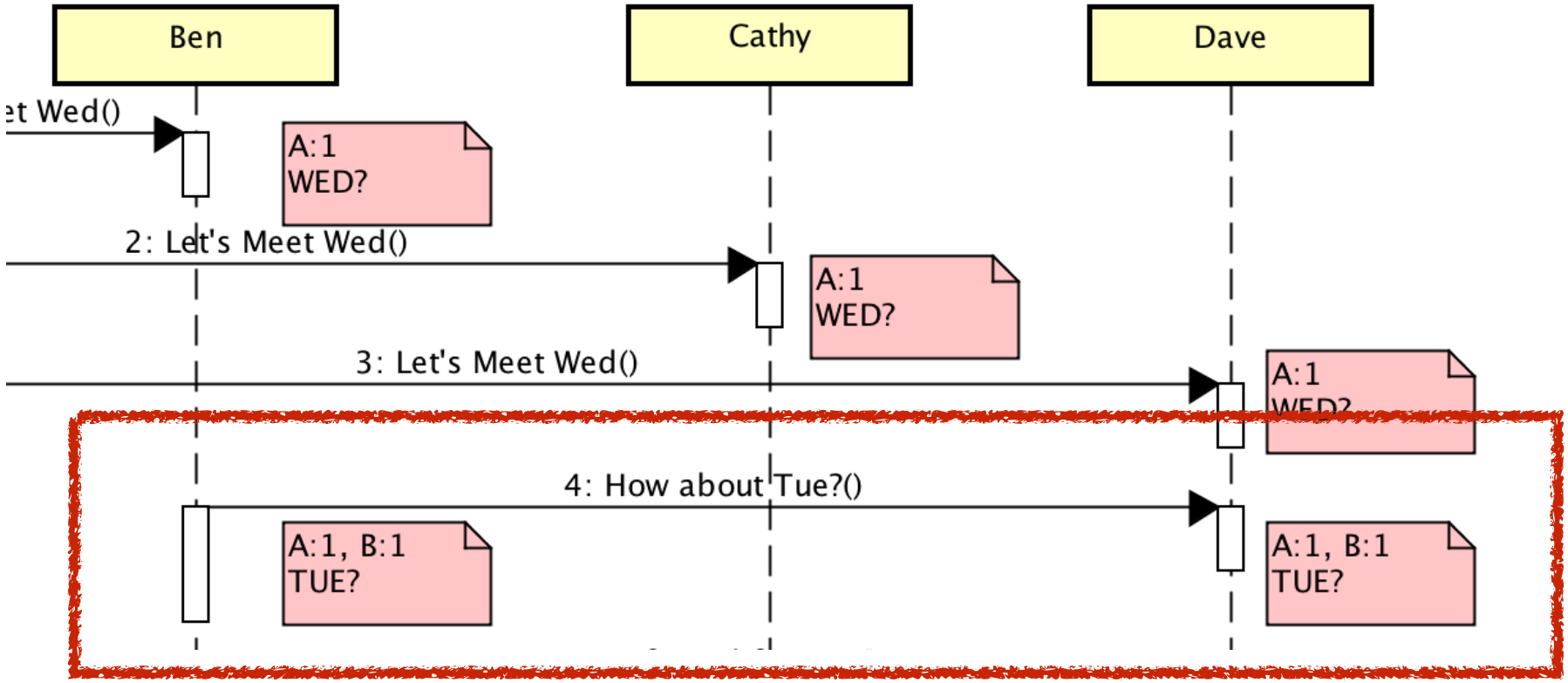
Message 1: Alice asks Ben, Cathy and Dave if "Wednesday" is Okay?

Action: Alice version stamps her message with "A: 1"



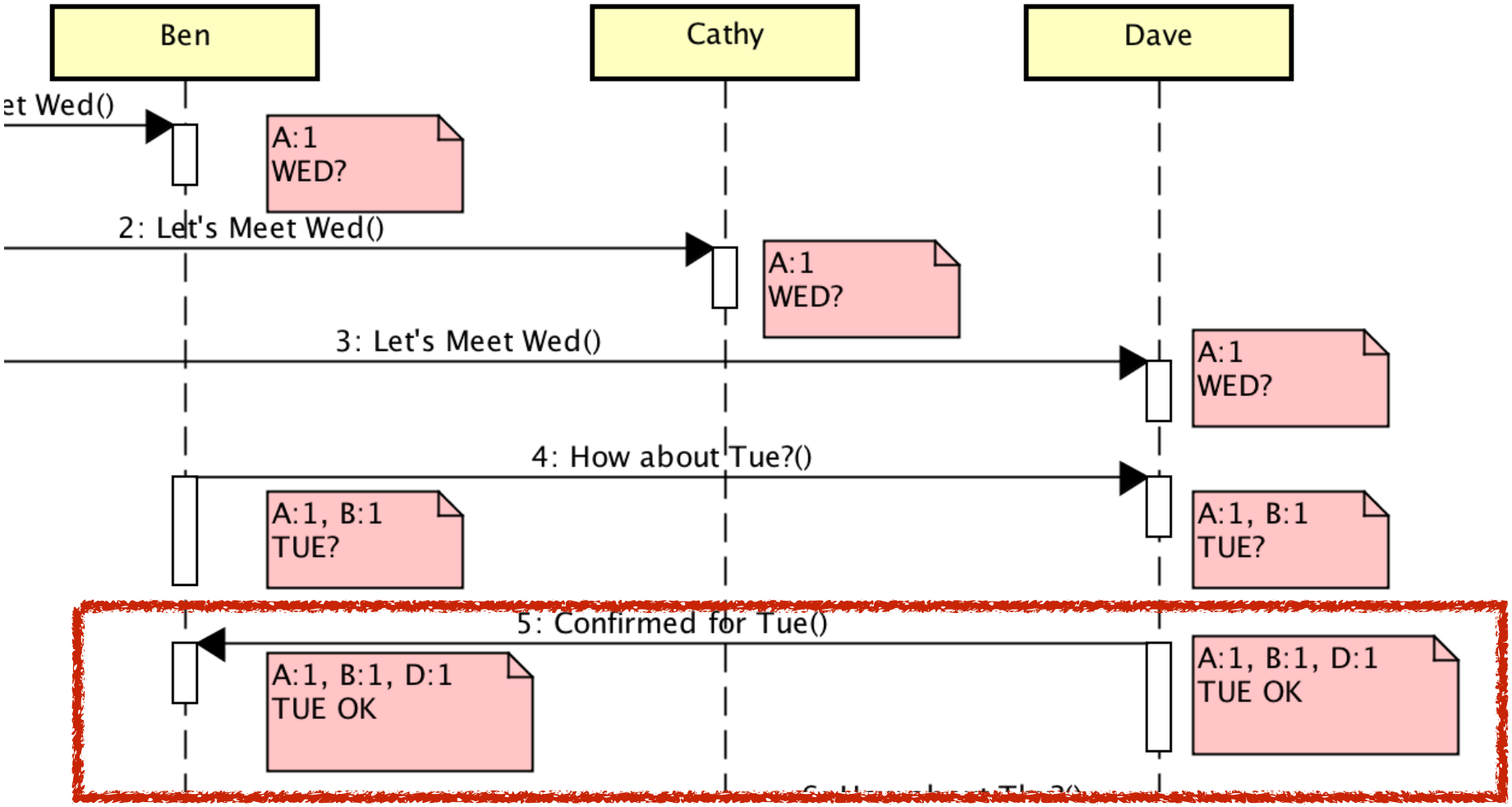
Message 2: Ben asks Dave "How about Tuesday"?

Action: Ben version stamps his message: "A: 1, B: 1" (Leaving Alice's Stamp Alone)



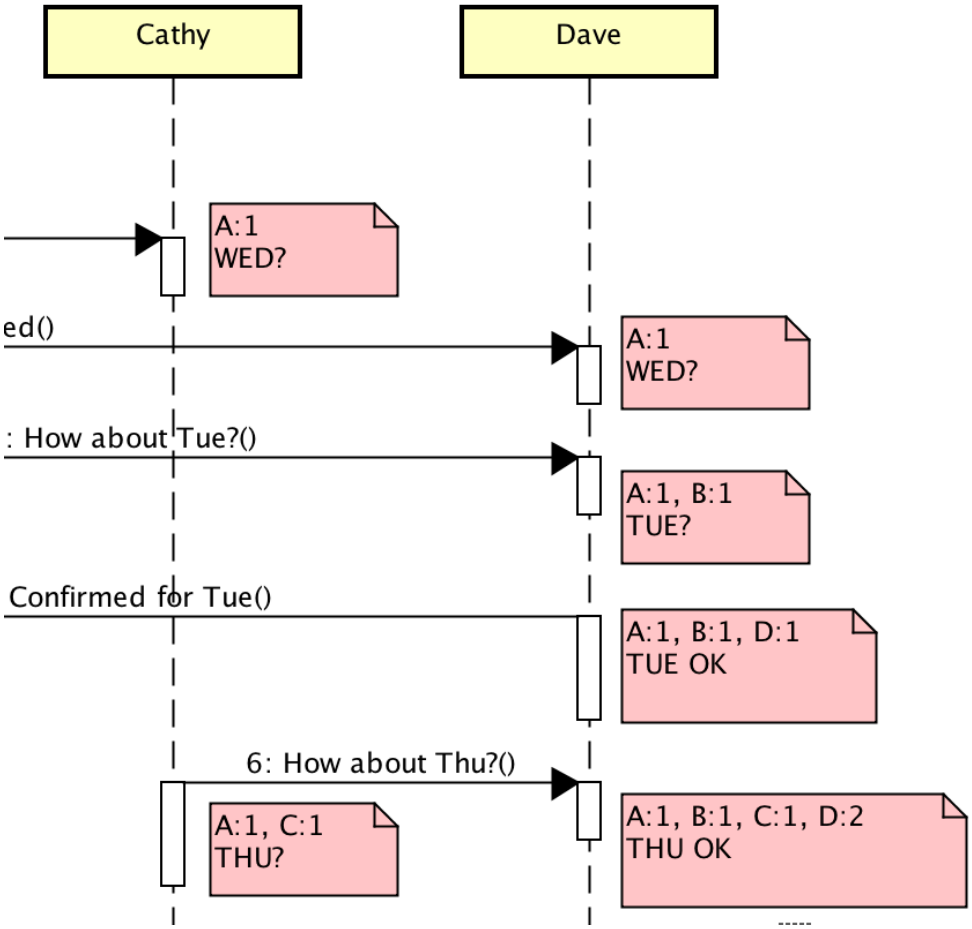
Message 3: Dave replies to Ben "Confirms Tuesday"

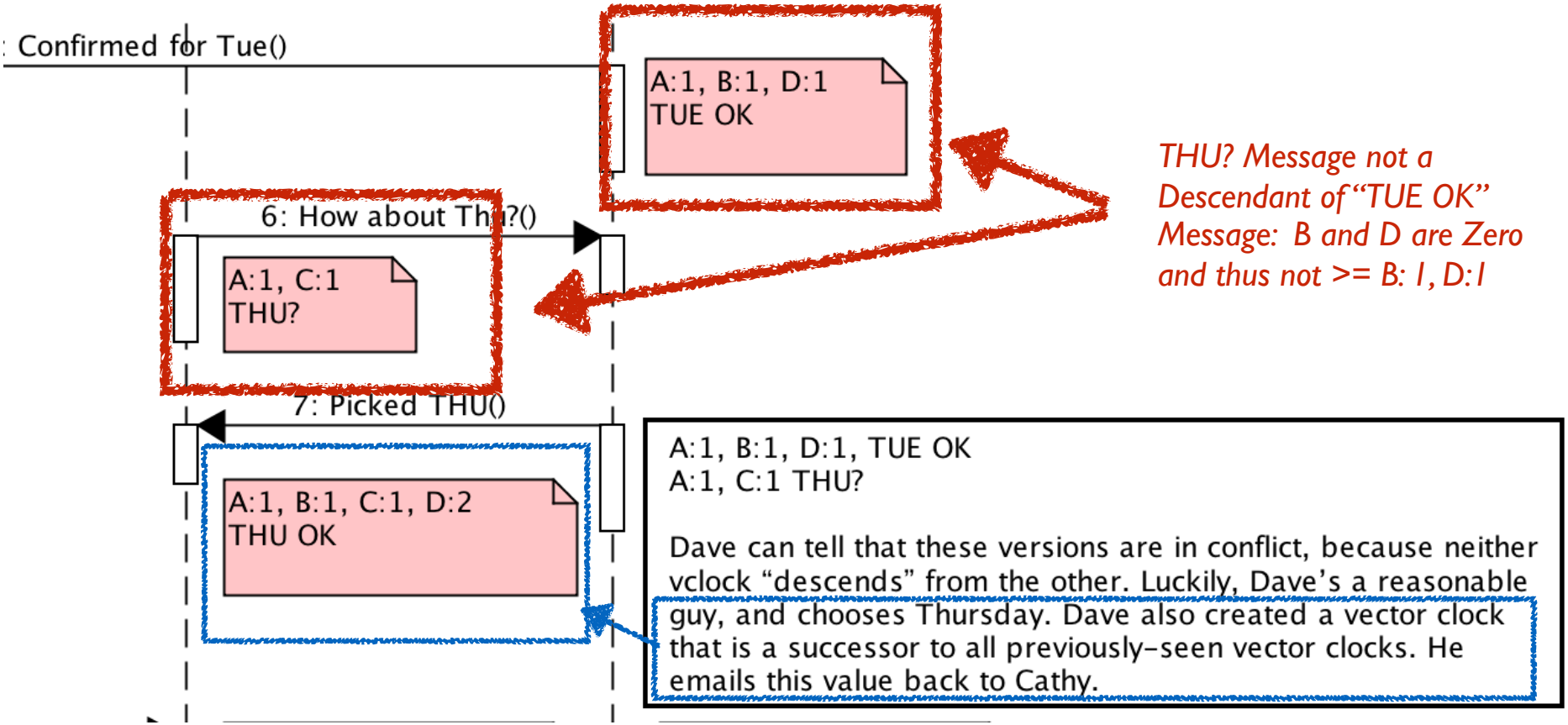
Action: Dave version stamps his message: "A: 1, B: 1, D: 1"



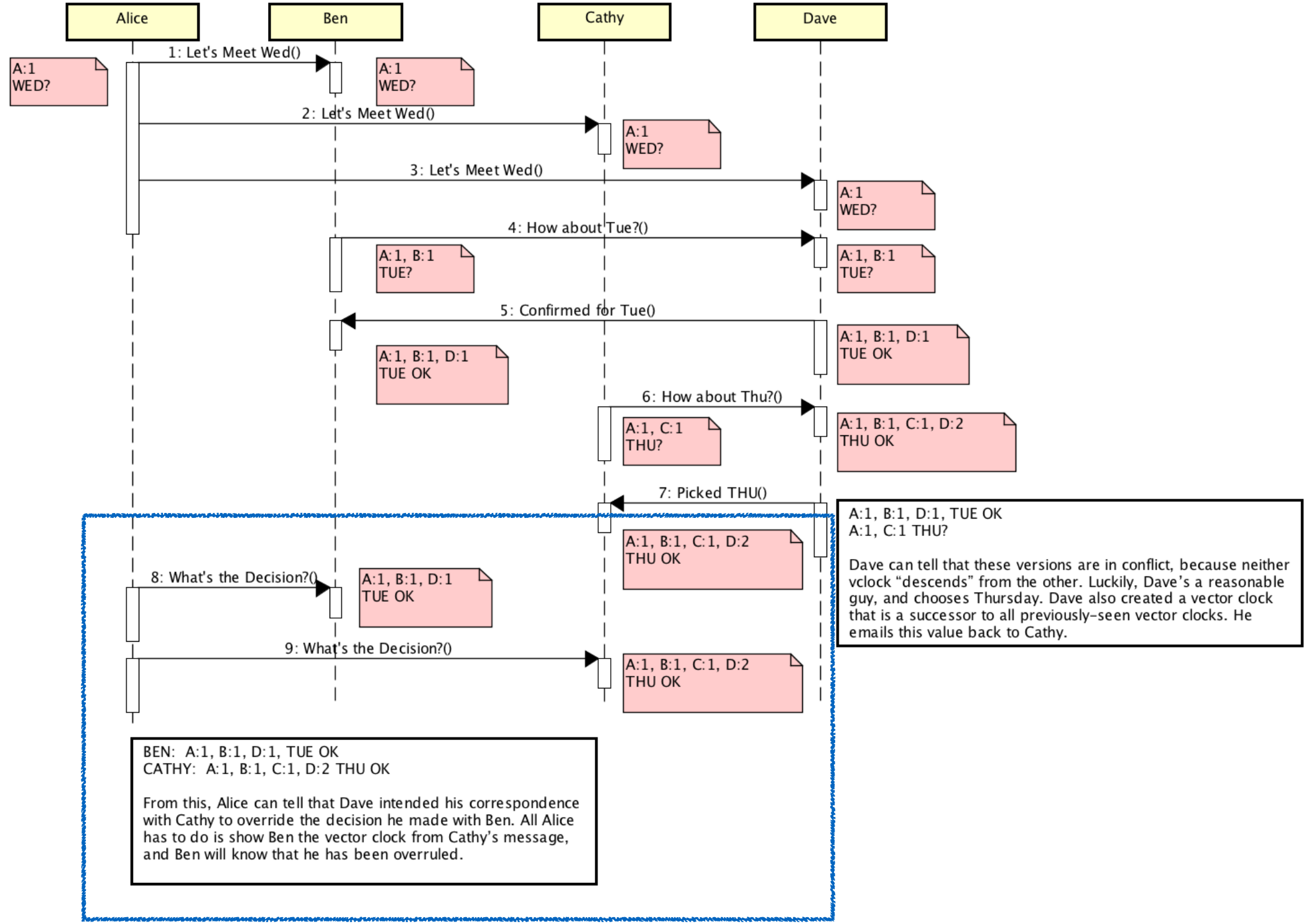
Message 4: Cathy asks Ben "Thursday?"

Action: Cathy version stamps her message: "A: 1, C: 1"





Dave can tell that these versions are in conflict, because neither vclock "descends" from the other. ***In order for vclock B to be considered a descendant of vclock A, each marker in vclock A must have a corresponding marker in B that has a revision number greater than or equal to the marker in vclock A****. Markers not contained in a vclock can be considered to have revision number zero*



http://basho.com/posts/technical/why-vector-clocks-are-easy/ http://basho.com/posts/technical/why-vector-clocks-are-hard/

Source of Example

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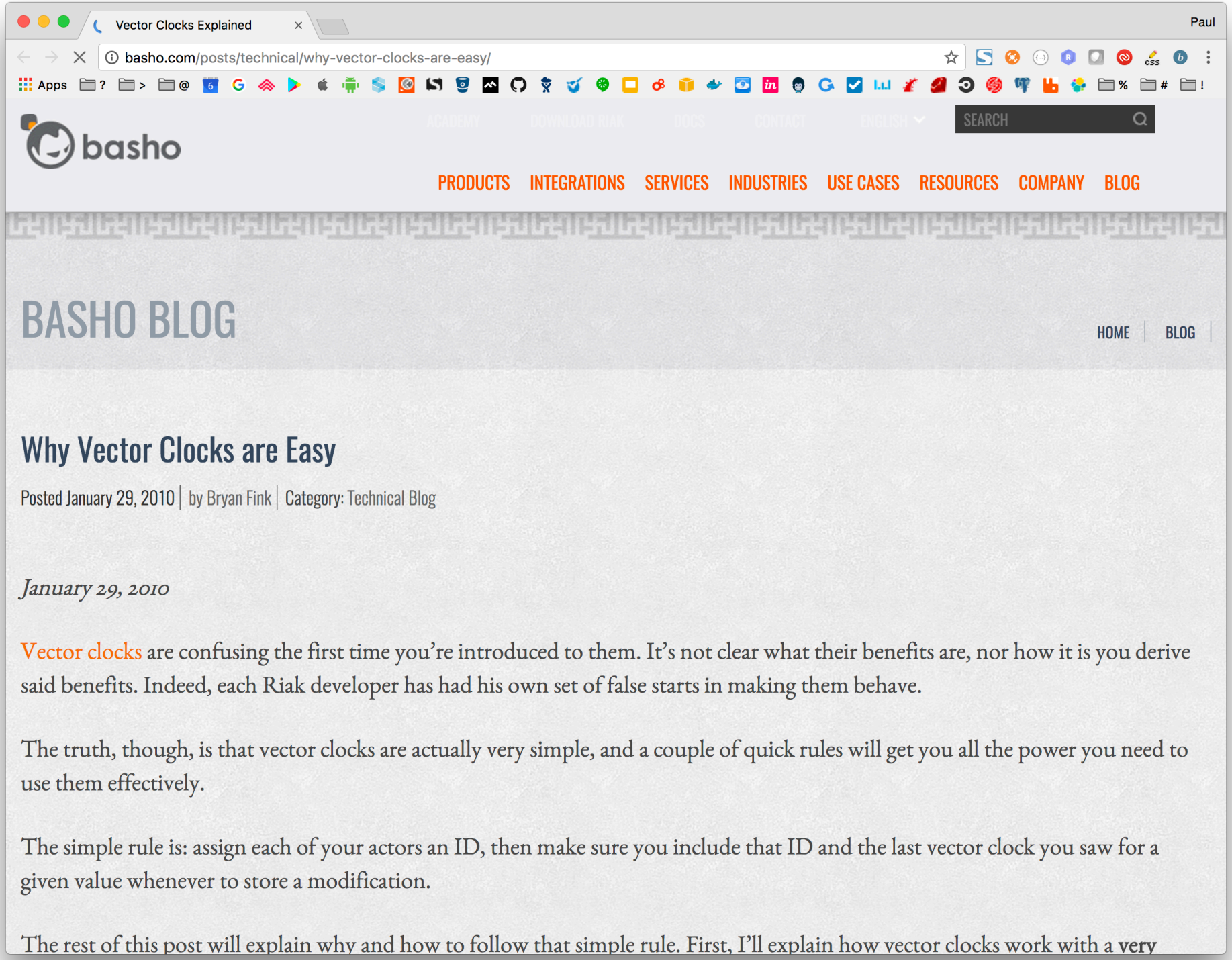

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