



# Reactors for Real-Time Systems

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Concurrent and distributed software based on publish-and-subscribe (e.g. ROS) and actors (e.g. Erlang) are sometimes used to realize distributed real-time and robotic systems. Broadly, these mechanisms compose software components that have private state and communicate with each other via message passing. However, the underlying concurrency models have serious flaws. Most important, the message-passing mechanisms are less deterministic than they could be. In this talk, I will describe some simple challenge problems that are common in distributed real-time systems and extremely difficult to solve using either actors or publish-and-subscribe. I will offer an alternative model of computation that we call "reactors" that solves these problems simply and elegantly and that is able to leverage decades of results from the real-time systems community. The reactors model is being implemented in a coordination language called Lingua Franca.

Edward A. Lee has been working on embedded software systems for 40 years, and after detours through Yale, MIT, and Bell Labs, landed at Berkeley, where he is now Professor of the Graduate School in EECS. His research is focused on cyber-physical systems. He is author of leading textbooks on embedded systems and digital communications, and has recently been writing books on philosophical and social implications of technology.

