A Note on Firing Squad Synchronization Algorithms

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The famous firing squad synchronization problem(FSSP for short) is stated as follows: Given an array of n identical cellular automata, including a "general" at the left end which is activated at time t = 0, we want to design the automata so that at some future time all the cells will simultaneously and for the first time enter a special "firing" state. Since the birth of FSSP proposed by J. Myhill in about 1957, a lot of synchronization algorithms have been developed. It has been known that Goto was the first-in-the-world designer who developed time-optimum synchronization algorithm, which was reported at Harvard University course note. Since his result was not published as a paper, it has not been circulated widely. The course note was referenced and quoted by several classical papers on FSSP. Last year we had a cellular meeting at Dagstuhl and there I found some researchers who were interested in Goto's FSSP algorithm. Communicating with Prof. Goto, He indicated just one existing figure showing his algorithm with a very small explanation expressed in 173 Japanese characters and asked me to introduce the algorithm. In this talk we reconstruct Goto's time-optimum FSSP algorithm based on one figure. The talk includes some algorithmic strategies like guessing a riddle.