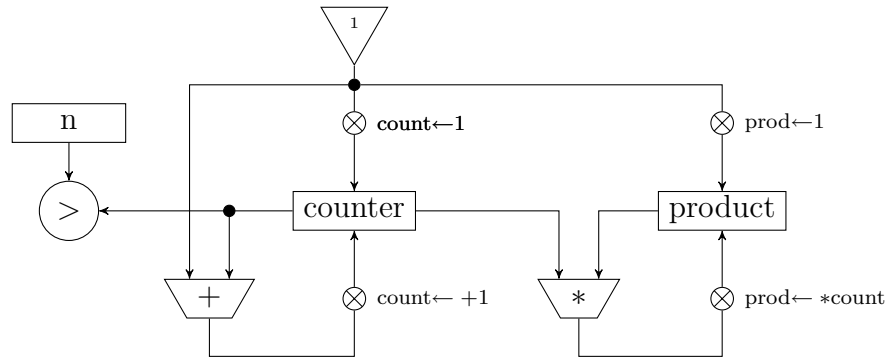Here's the data path of a register machine computing factorials.

And here's the corresponding controller diagrams