

# STATE DIAGRAMS

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# STATE DIAGRAMS

- THE BASIS FOR STATE CHARTS
  - STATE CHARTS ARE “HIGHER-ORDER” STATE DIAGRAMS
- USEFUL FOR MODELING “REACTIVE SYSTEMS”
  - MAINTAIN ONGOING INTERACTION WITH THEIR ENVIRONMENT
  - RATHER THAN PRODUCING SOME FINAL VALUE

# A REACTIVE SYSTEM

DO YOU HAVE ANY THOUGHTS REGARDING THE PARTICLE ACCELERATOR'S TERTIARY F.E.L. GUIDANCE SYSTEM?

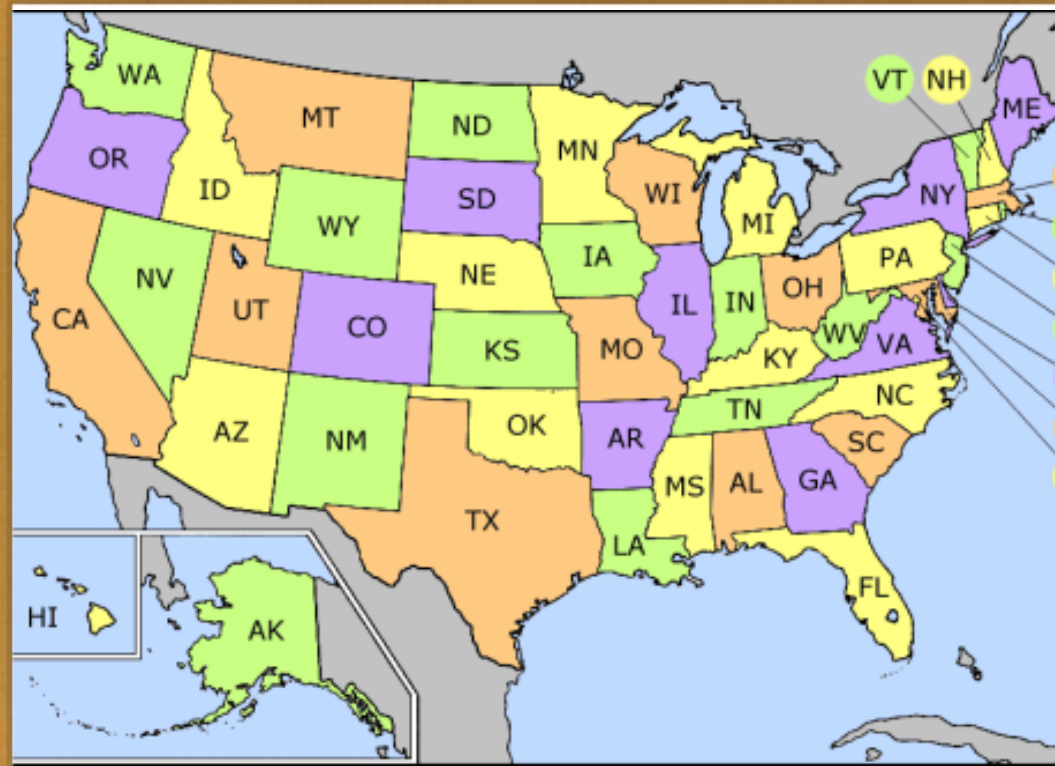
WE CAN'T PUT THE BROKEN PART IN THE MACHINE. IT WOULDN'T SMASH THE RIGHT TINY THINGS TOGETHER. THEN THE MACHINE MIGHT BREAK.

THAT WOULD BE VERY BAD.



I SPENT ALL NIGHT READING SIMPLE.WIKIPEDIA.ORG, AND NOW I CAN'T STOP TALKING LIKE THIS.

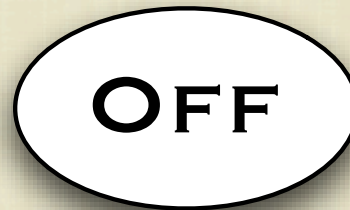
ACTUALLY, I THINK IF ALL HIGHER MATH PROFESSORS HAD TO WRITE FOR THE SIMPLE ENGLISH WIKIPEDIA FOR A YEAR, WE'D BE IN MUCH BETTER SHAPE ACADEMICALLY.



# STATE DIAGRAM BASICS

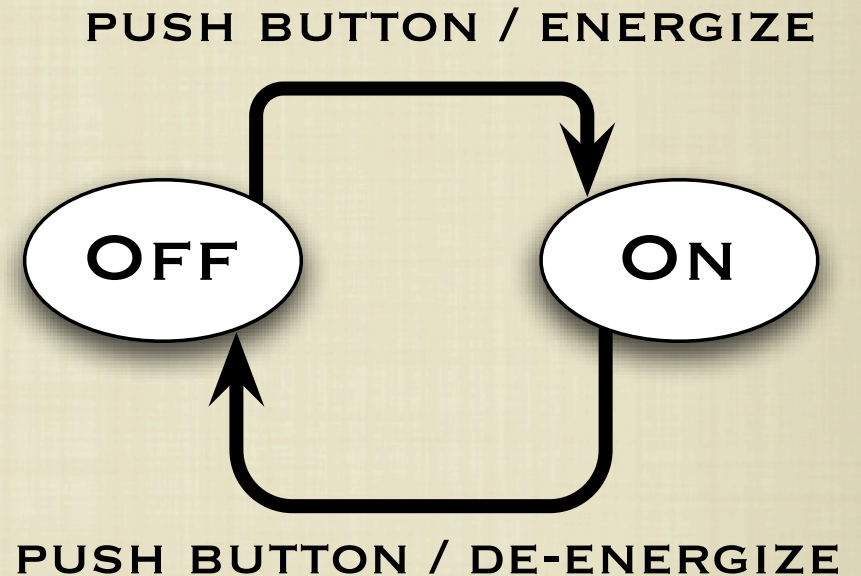
# STATE

■ LABELED OVALS



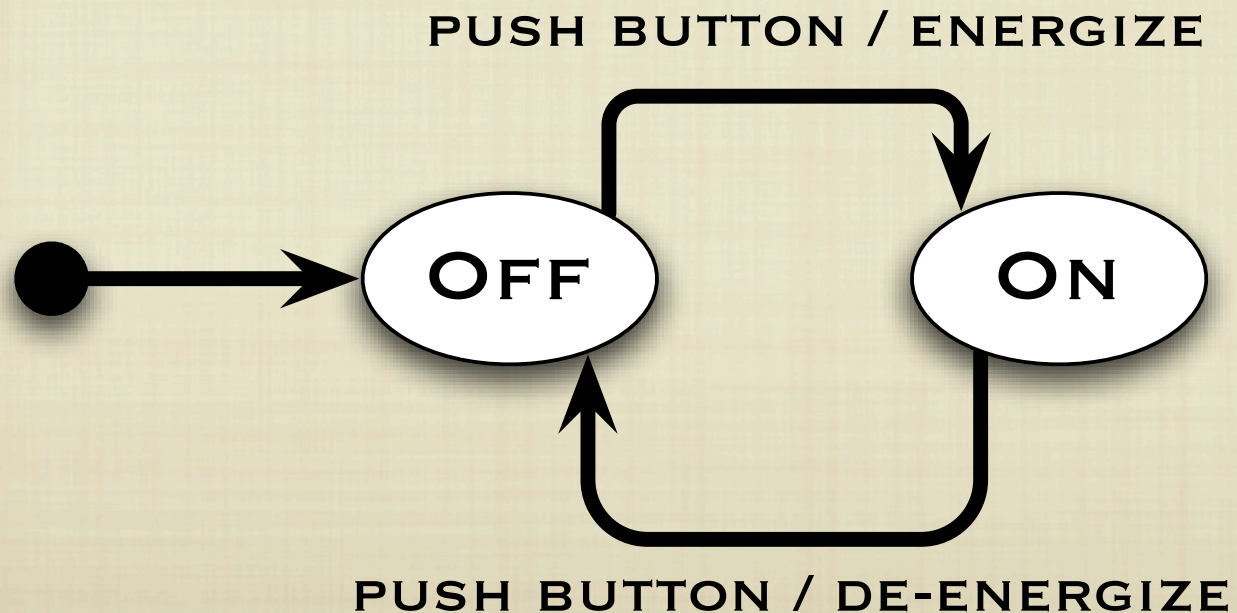
# TRANSITIONS

- LABELED ARROWS
- TRIGGER (INPUT)
- ACTION (OUTPUT)
- WRITTEN:
  - INPUT / OUTPUT



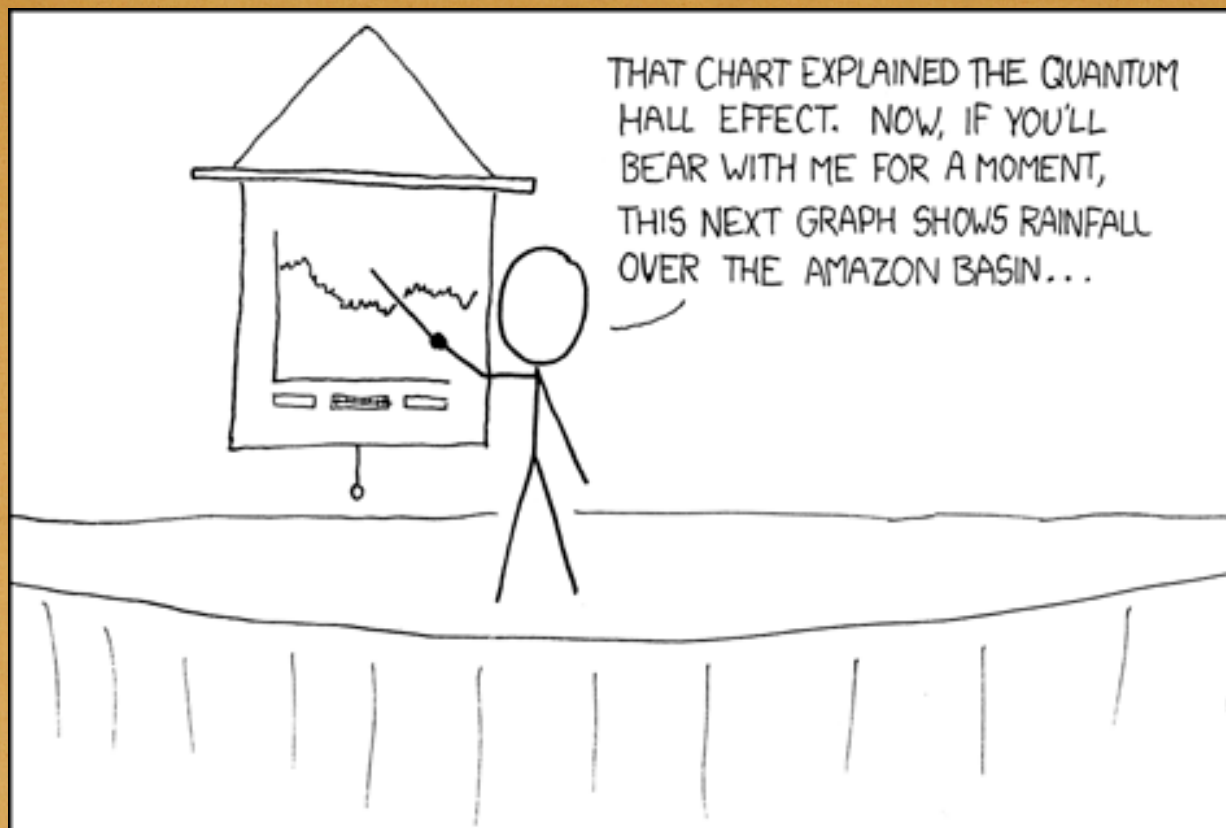
# INITIAL STATE

- INDICATED BY ARROW WITH DOTTED TAIL
- (SOMETIMES NO TAIL)



# EXAMPLE

- ELEVATOR WITH STOPS ON THREE FLOORS

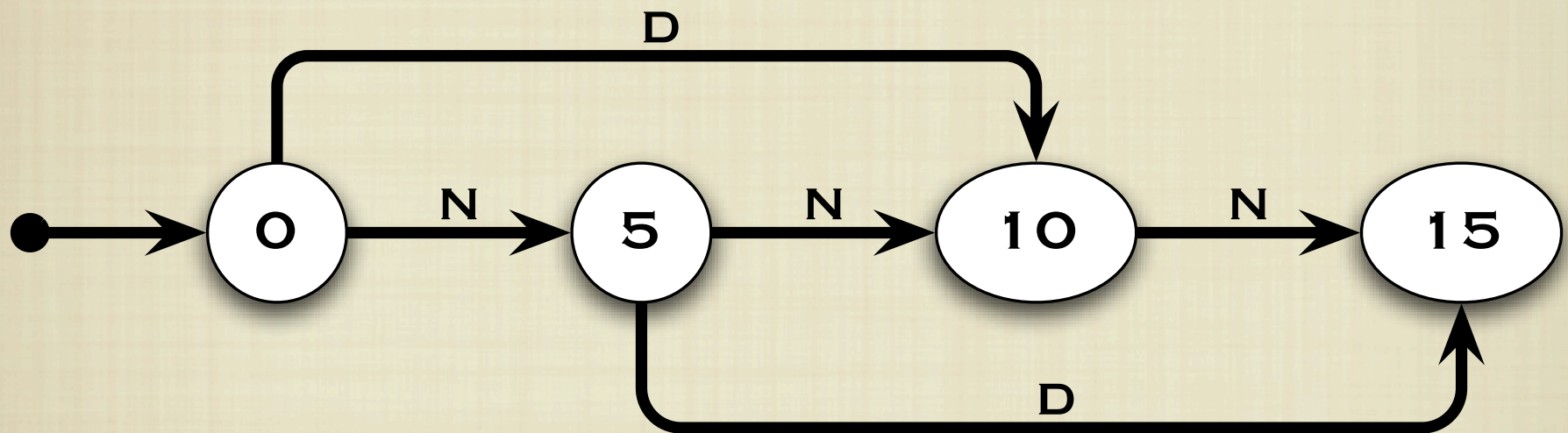


IF YOU KEEP SAYING "BEAR WITH ME FOR A MOMENT",  
PEOPLE TAKE A WHILE TO FIGURE OUT THAT  
YOU'RE JUST SHOWING THEM RANDOM SLIDES.

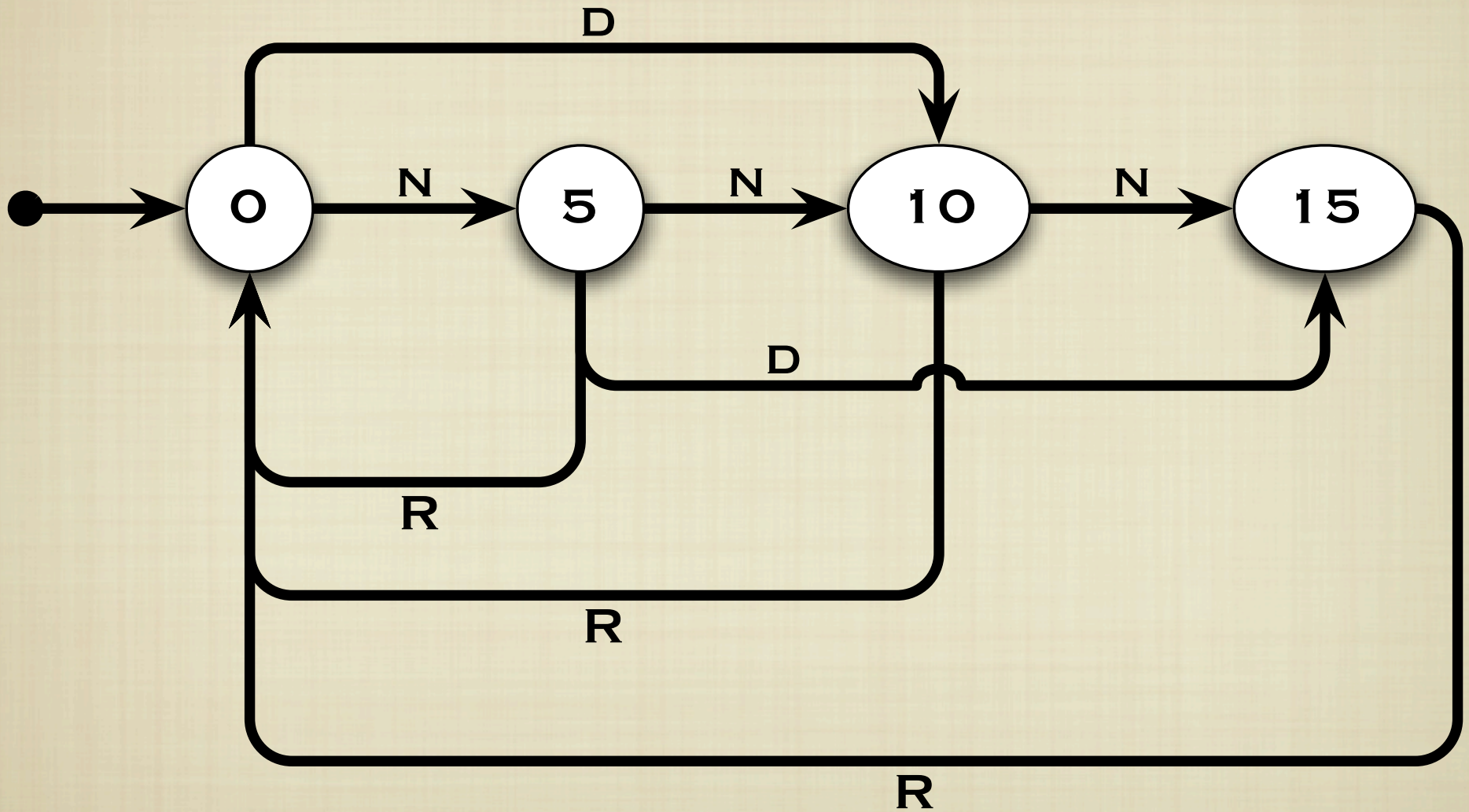
[HTTP://XKCD.COM/365/](http://xkcd.com/365/)

# STATE CHARTS

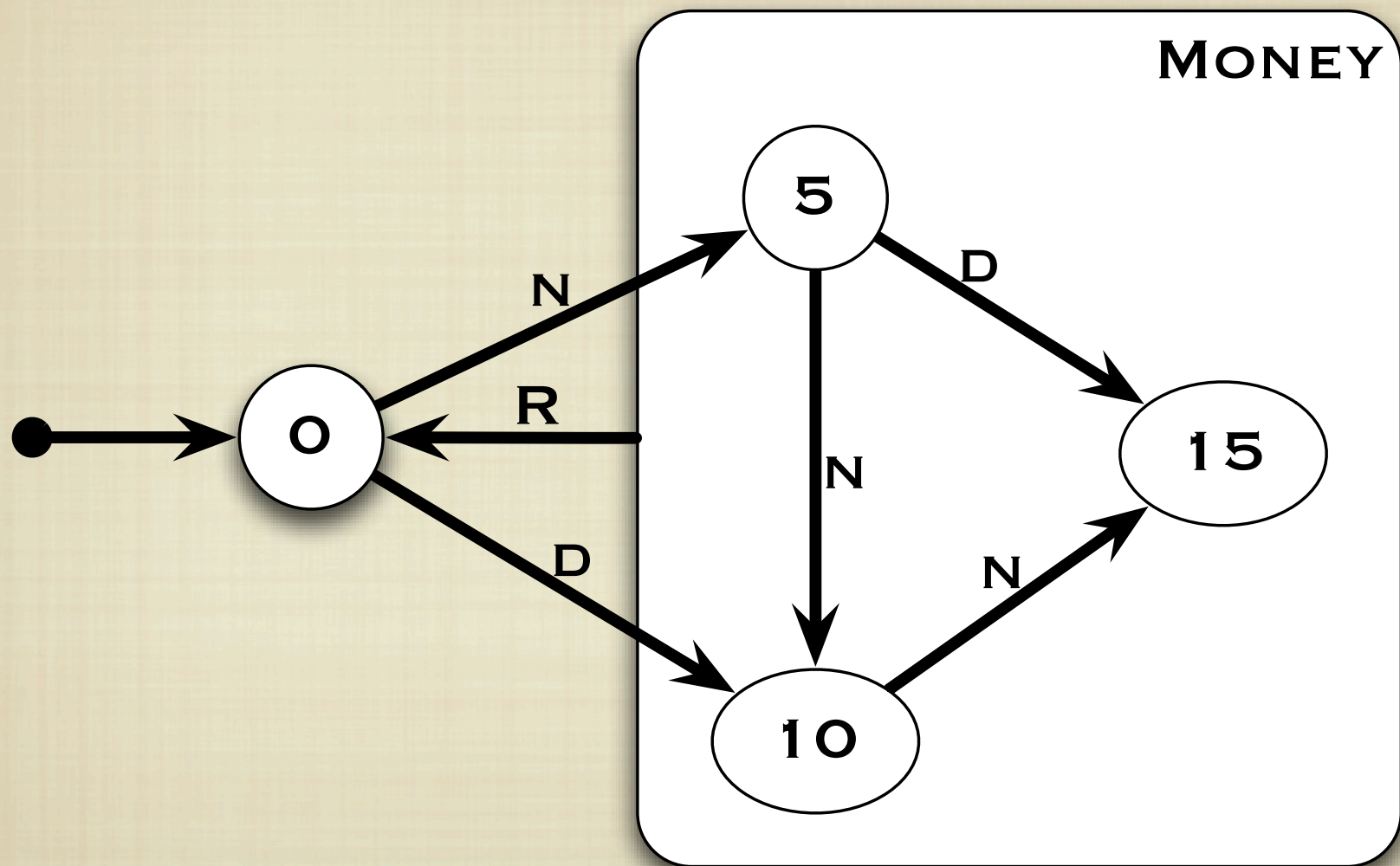
# EXAMPLE



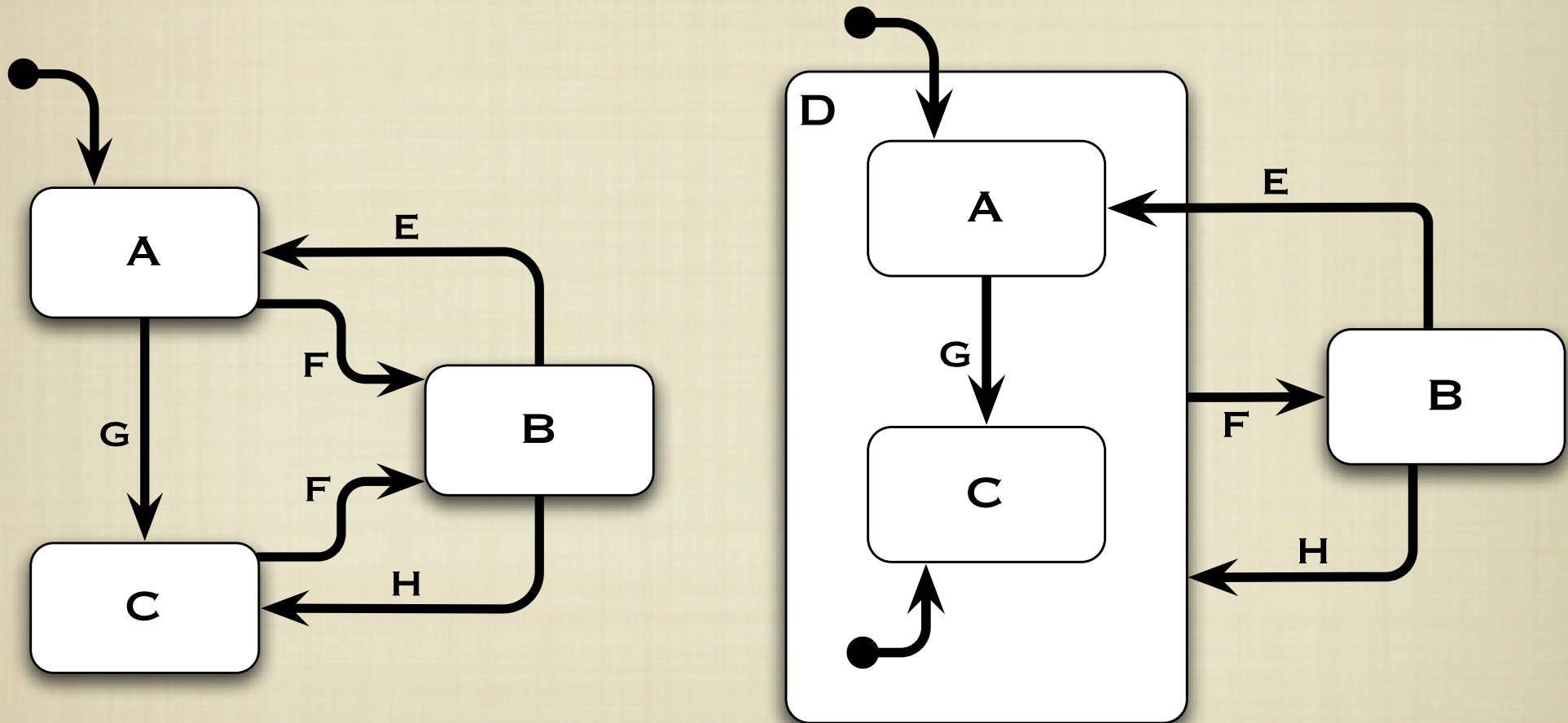
# TOO MANY EDGES!



# SOLUTION: DEPTH

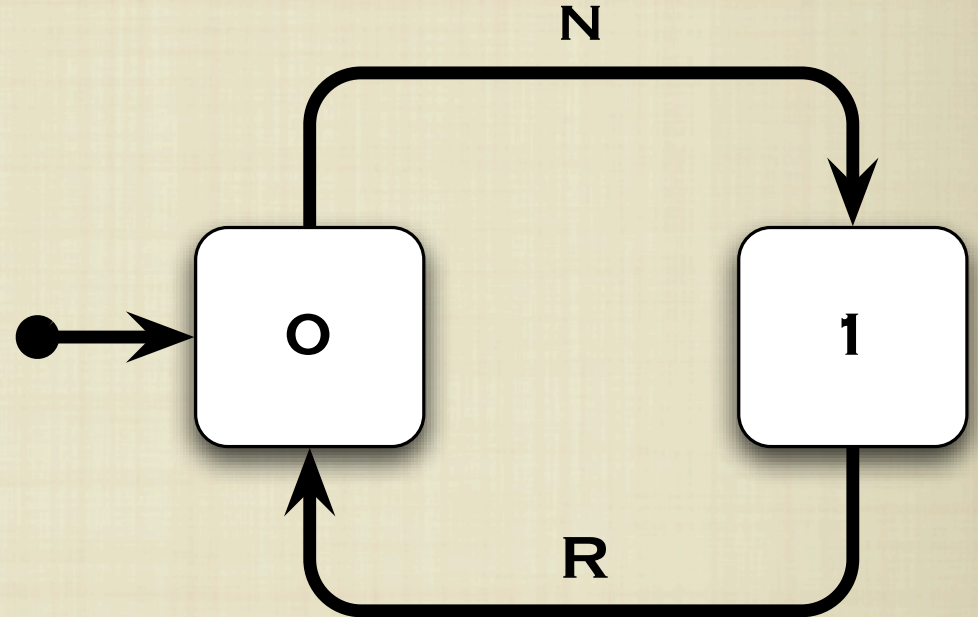


# MORE DEPTH

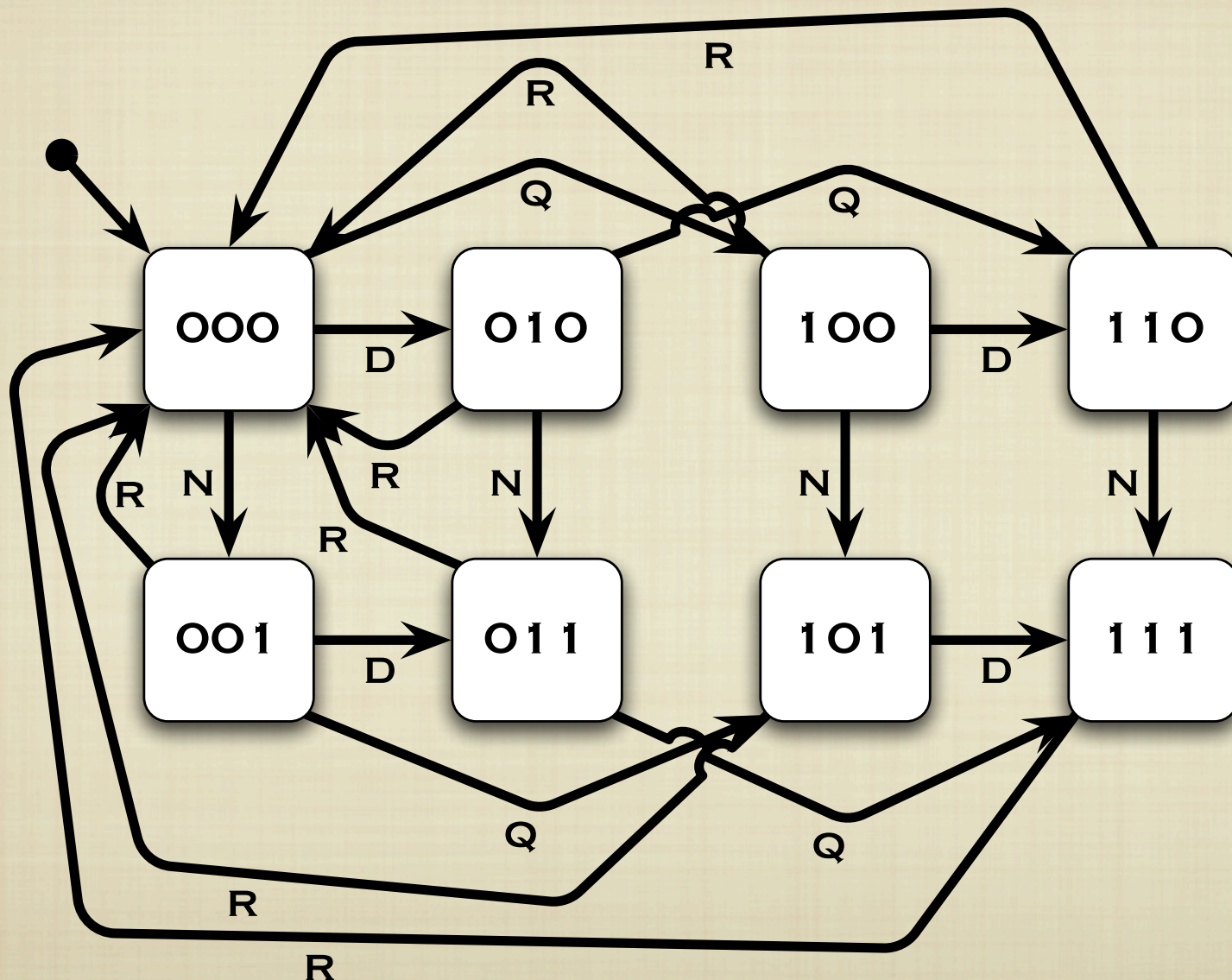


# COUNTING COINS

- INSTEAD OF TOTAL, WE WANT TO COUNT COINS
- NICKELS, DIMES, AND QUARTERS
- SIMPLE FOR ONE KIND OF COIN



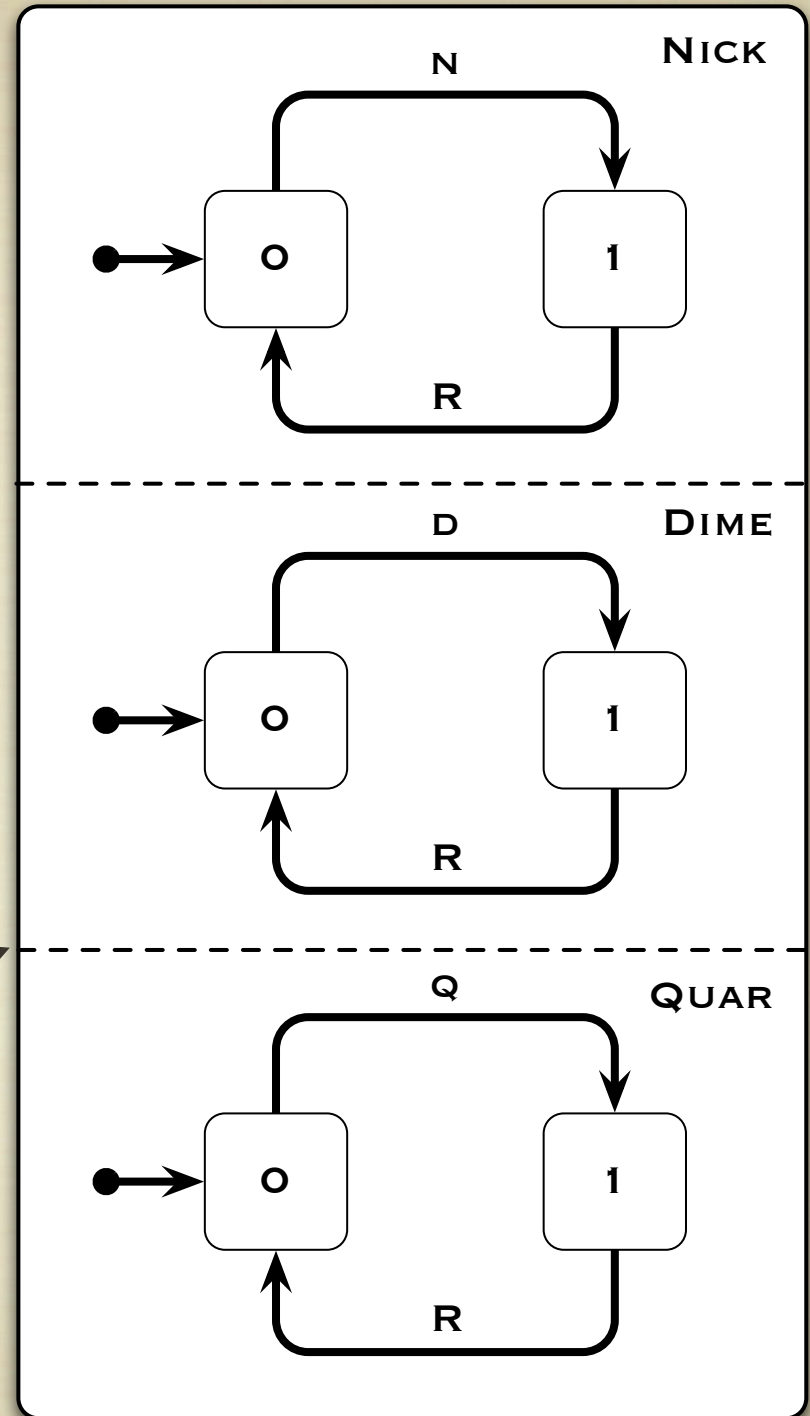

# CROSS-PRODUCT EXPLOSION!



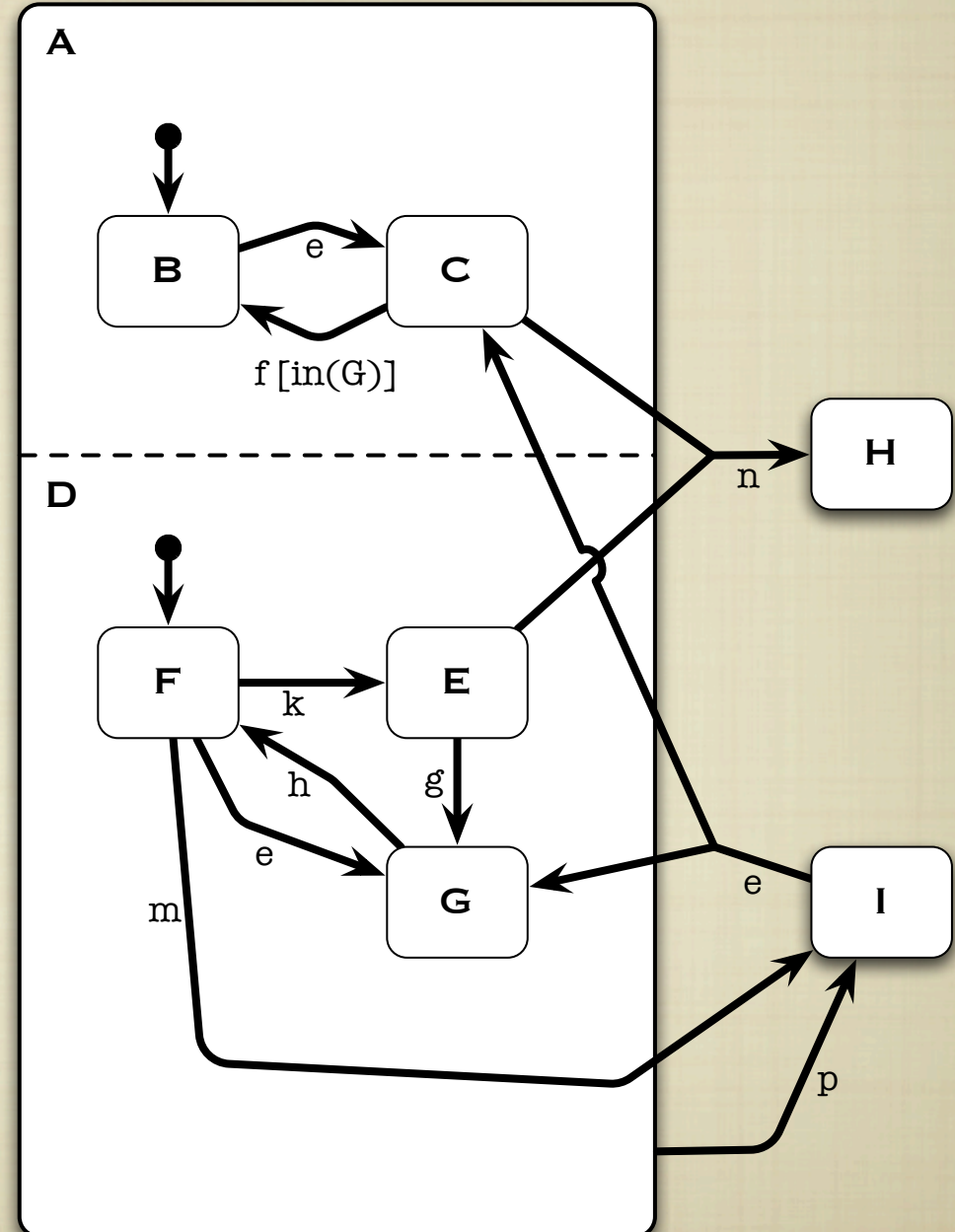
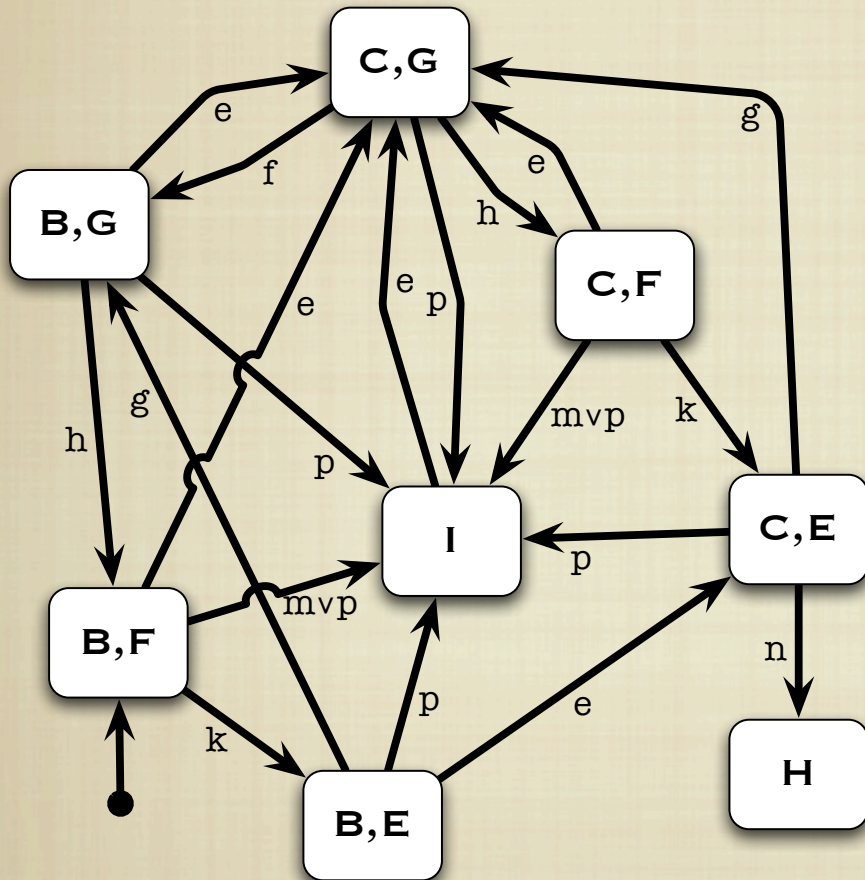
# SOLUTION

- ORTHOGONALITY
- STATES IN PARALLEL
- COMMON EVENTS ARE SIMULTANEOUS

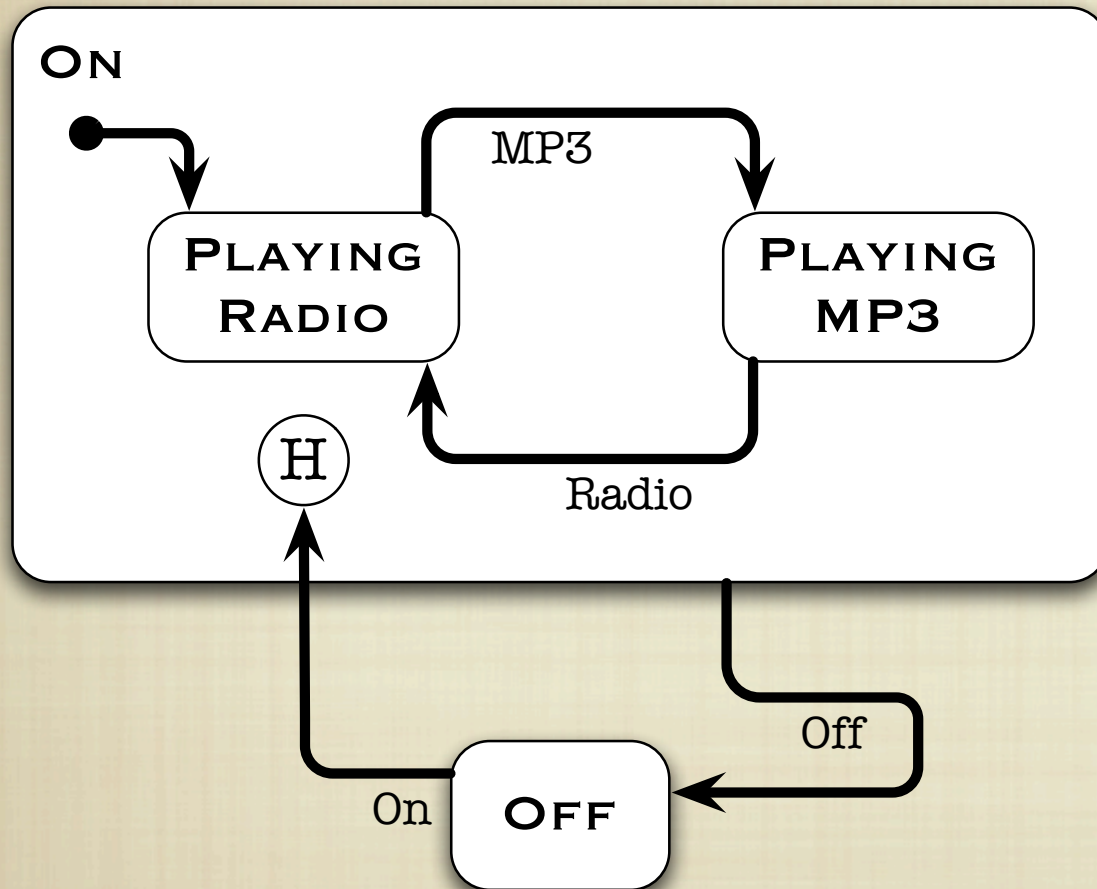
DOTTED LINES  
SEPARATE  
ORTHOGONAL  
SUBSTATES



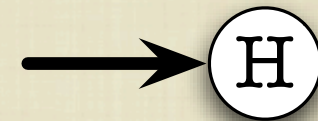
# MORE ORTHOGONALITY



# HISTORY



- CAN DENOTE RE-ENTERING LAST SUB-STATE



- AN ALTERNATIVE TO DEFAULT INITIAL STATE