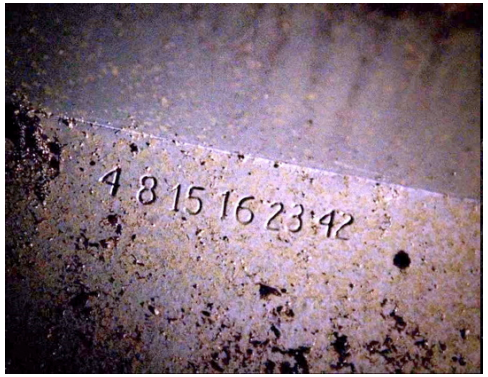
Lost SynchSM Design Problem (Solution)

CS/EE 120B

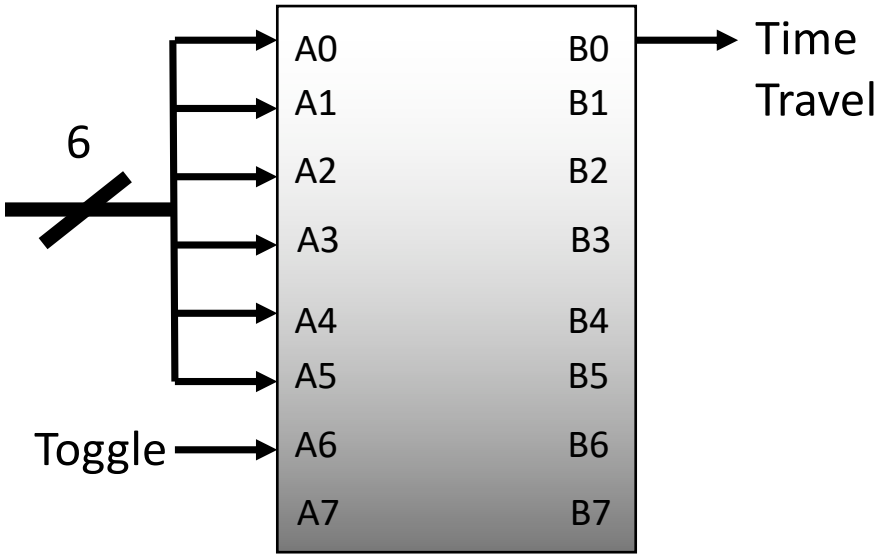
Lost



System Setup

Input
- A5-A0 – Six-bit input
- A6 – Reads A5-A0 when toggled

Output
- B0 – Initiates time-travel



Functionality
- The system starts with a 108 minute countdown
- Inputs A0…A5 are read when the Toggle bit is set (A6 = 1)
  - They are **not** read if when the Toggle bit is not set (A6 = 0)
- The user must input the correct sequence of numbers (4, 8, 15, 16, 23, 42) to reset the countdown
- If the countdown reaches 0, assert B0 to initiate time travel
  - (Get stuck in a state with a self-loop)
- Use a 500ms (0.5 s) period

Quick Math

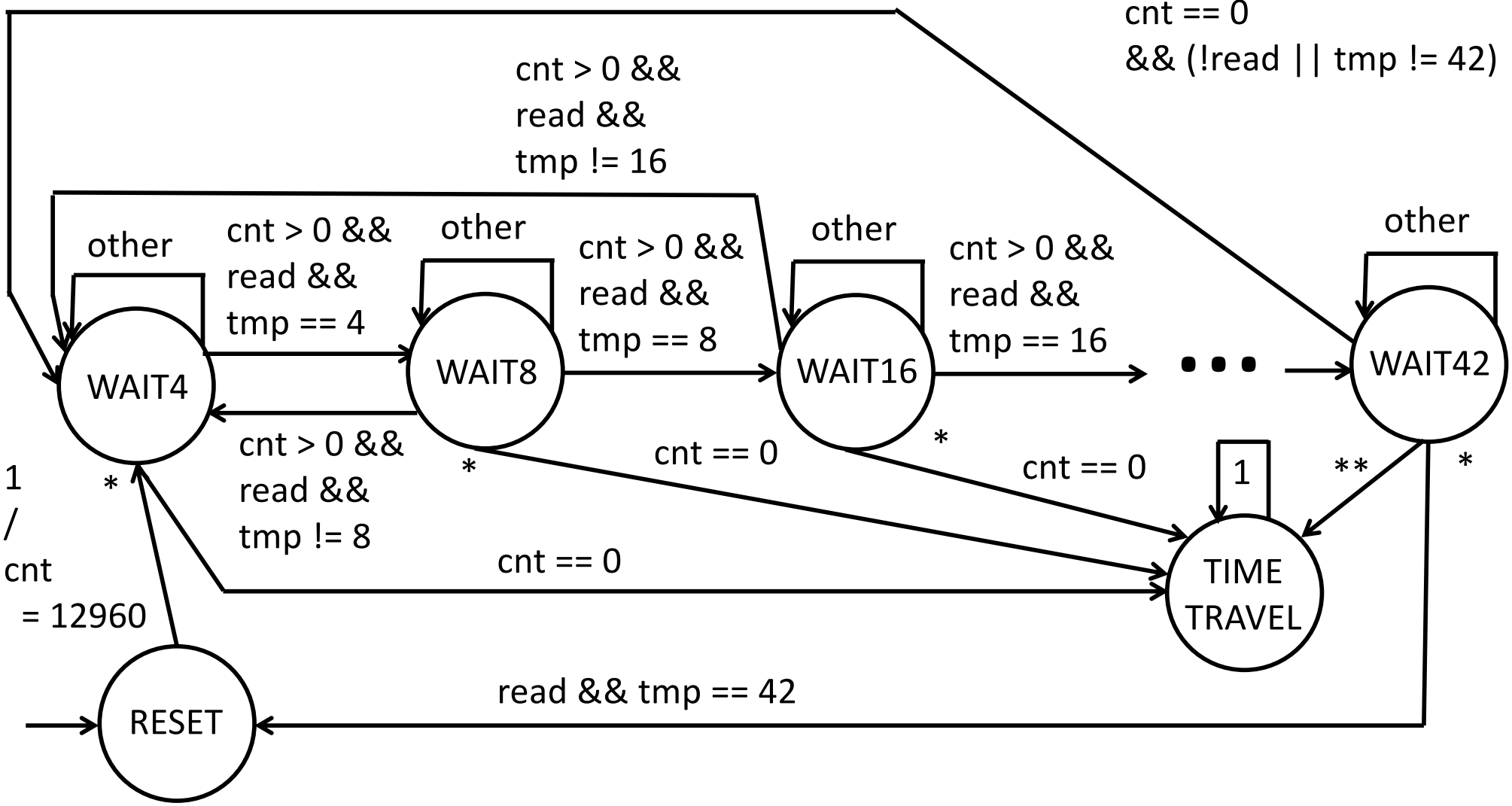
- 108 minutes
- 108 x 60 = 6480 seconds
- 6480 x 2 = 12,960 (1/2-seconds; clock period)
  - Represent this value using a short

SynchSM Design

Period = 500ms
unsigned short cnt;
unsigned char tmp;
unsigned char read;

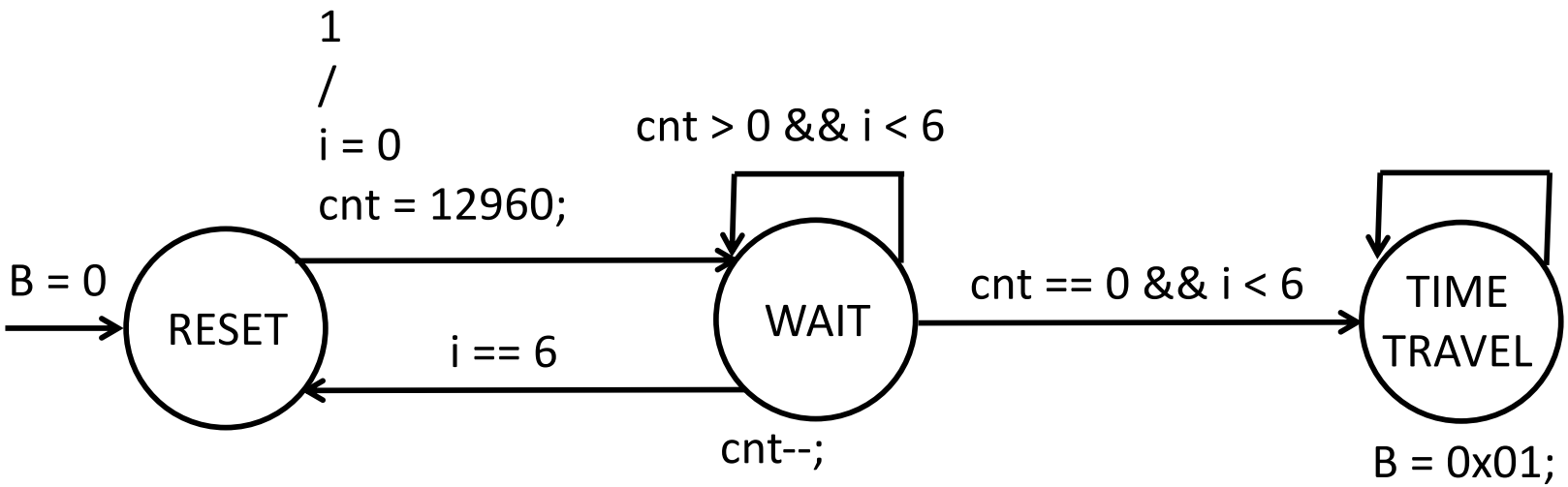
*
cnt--;
read = A & 0x40;
tmp = A & 3F;

**
cnt == 0
&& (!read || tmp != 42)



(Infinitely Simpler) SynchSM Design

Period = 500ms
unsigned short cnt;
unsigned char i;
unsigned char tmp;
const unsigned char value[6] = {4, 8, 15, 16, 23, 42};




```
cnt--;
If( A & 0x40 ) {
        tmp = A & 0x3F;
        if( tmp == value[i])
                i++;
        else
                i = 0;
}
```