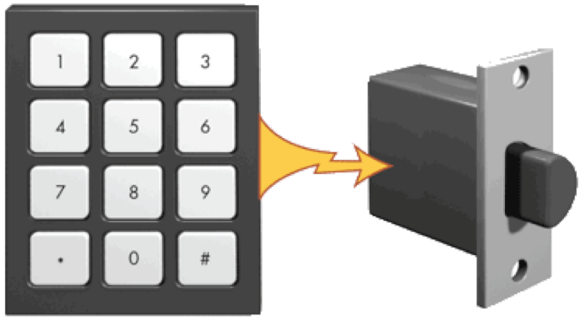
DevTitans

Wokwi: Máquinas de Estados Finitos

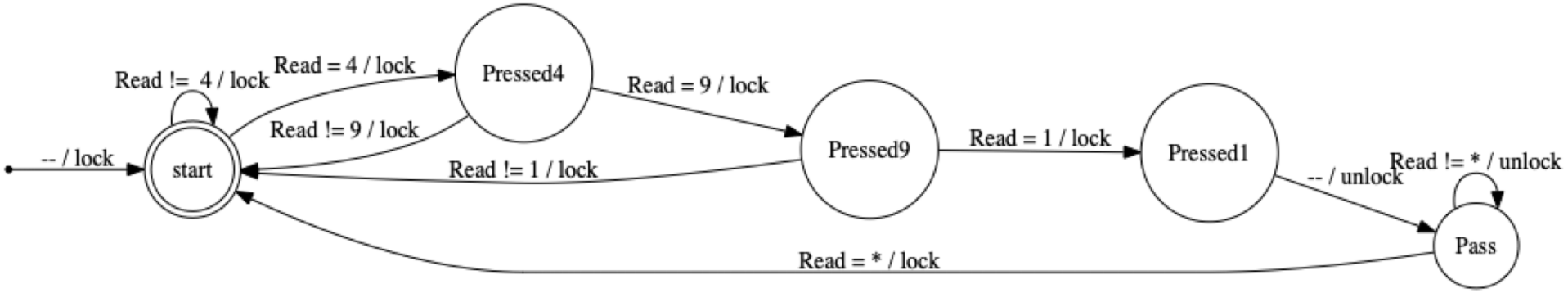
Introdução

- Técnica de **codificação** a partir de uma Máquina de Estados Finitos (Mealy) usando **switch/case**

Especificação do problema

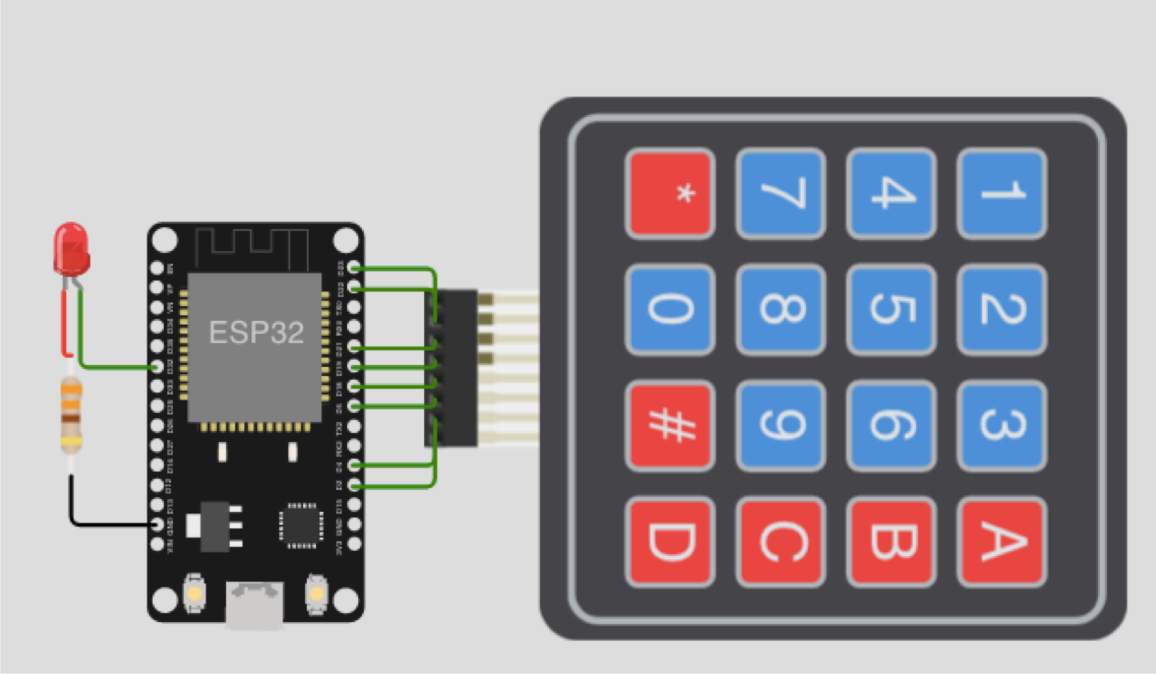


4-9-1 destrava a fechadura



Circuito

Construa o circuito abaixo



R1 (23)
R2 (22)
R3 (21)
R4 (19)
C1 (18)
C2 (5)
C3 (4)
C4 (2)
LED (32)

Código inicial (1)

```
#include <Keypad.h>
const int ledPin = 32;
byte rows[] = { 23, 22, 21, 19 };
byte columns[] = { 18, 5, 4, 2 };
const byte numRows = 4;
const byte numCols = 4;

char keys[numRows][numCols] = {
    {'1','2','3','A'},
    {'4','5','6','B'},
    {'7','8','9','C'},
    {'*','0','#','D'}
};
```

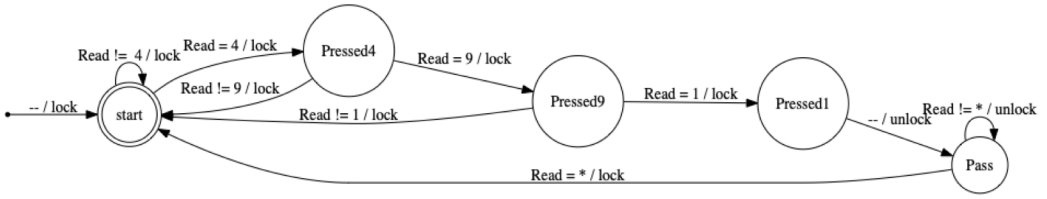
Código inicial (2)

```
Keypad myKeypad = Keypad(makeKeymap(keys), rows,
columns, numRows, numCols);


char key;


const int start = 1;
const int Pressed4 = 2;
const int Pressed9 = 3;
const int Pressed1 = 4;
const int Pass = 5;
```

Código inicial (3)

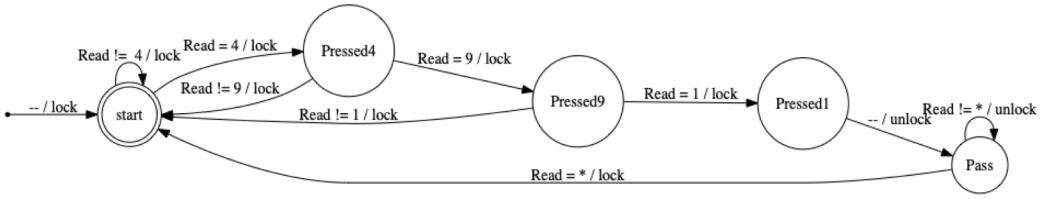
```
int state = start;


void setup()
{
    pinMode (ledPin, OUTPUT);
    digitalWrite(ledPin, LOW);
    Serial.begin(9600);
    Serial.println("lock");
}
```

Switch/Case



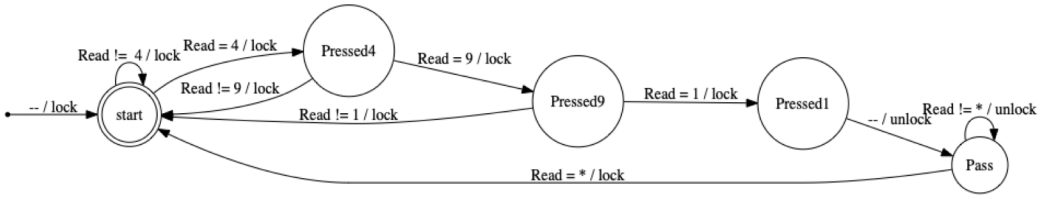

```
void loop {
  key = myKeypad.getKey();
  switch (state) {
    case start:
      if ((key != NO_KEY) && (key == '4')) {
         Serial.println (key);
         Serial.println ("next state=Pressed4");
         state = Pressed4;
      }
      else {
        digitalWrite (ledPin, LOW);
        state = start;
      }
      break;
```

Switch/Case



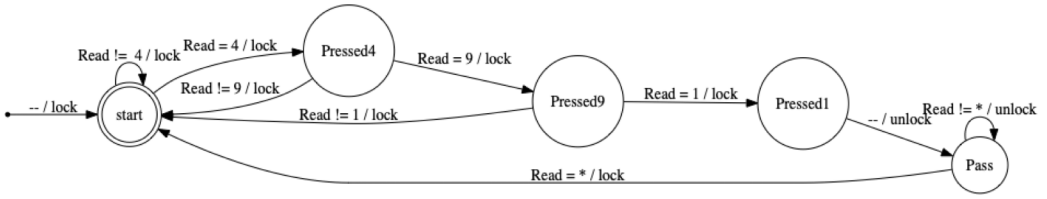

```
case Pressed4:
    if (key != NO_KEY) {
        Serial.println (key);
        if (key == '9') {
            Serial.println ("next state=Pressed9");
            state = Pressed9;
        }
        else {
            digitalWrite (ledPin, LOW);
            state = start;
        }
    }
    break;
```

Switch/Case



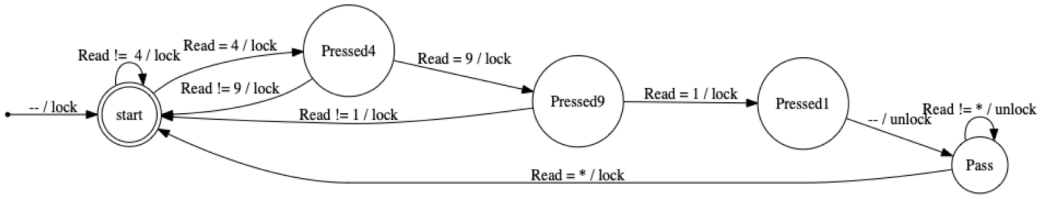

```
case Pressed9:
      if (key != NO_KEY) {
          Serial.println (key);
          if (key == '1') {
              Serial.println ("next state=Pressed1");
              state = Pressed1;
          }
          else {
              digitalWrite (ledPin, LOW);
              state = start;
          }
      }
      break;
```

Switch/Case



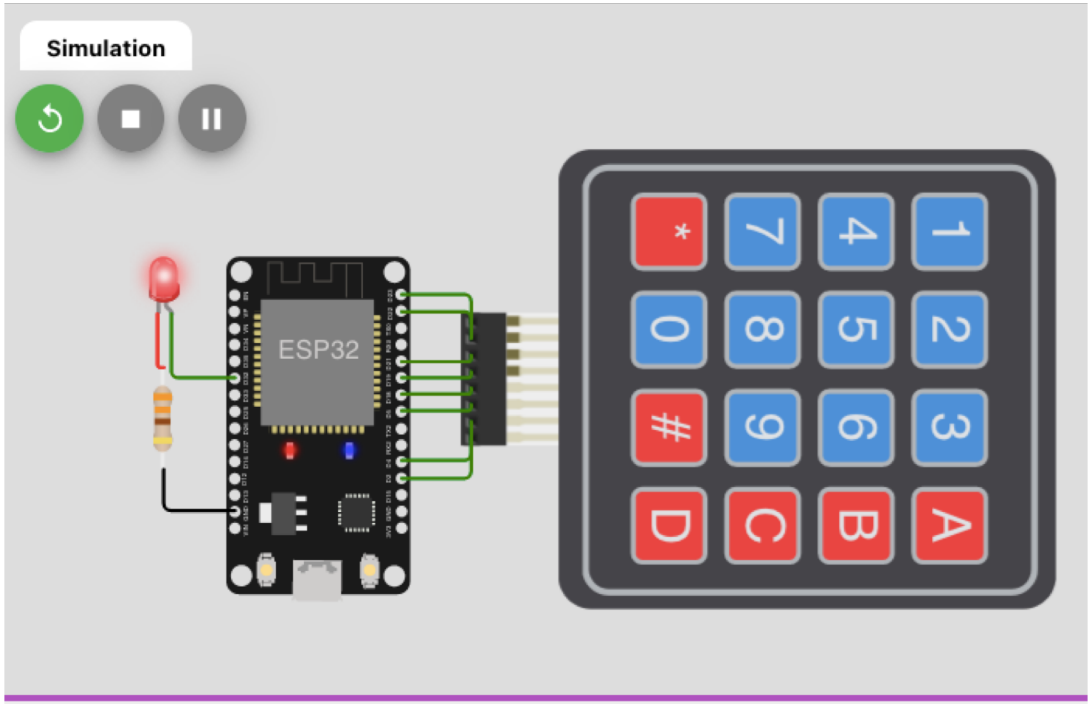

```
case Pressed1:
    digitalWrite (ledPin, HIGH);
    state = Pass;
    Serial.println ("next state=Pass");
    Serial.println("unlock");
    break;
```

Switch/Case



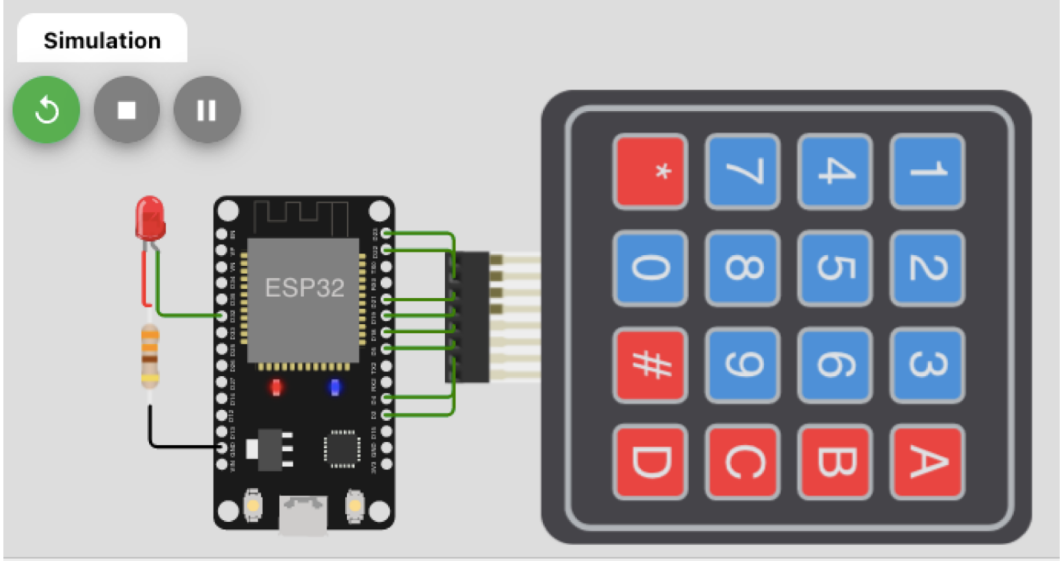

```
    case Pass:
      if ((key != NO_KEY) && (key == '*')) {
        Serial.println (key);
        Serial.println ("next state=start");
        state = start;
        Serial.println("lock");
        digitalWrite (ledPin, LOW);
      }
      break;
  } // switch
} // loop
```

Simulação




```
lock
4
next state=Pressed4
9
next state=Pressed9
1
next state=Pressed1
next state=Pass
unlock
```

Simulação




```
lock
4
next state=Pressed4
9
next state=Pressed9
1
next state=Pressed1
next state=Pass
unlock
state=Pass
*
next state=start
lock
```