

California State University, Channel Islands (CSUCI) Department of Computer Science

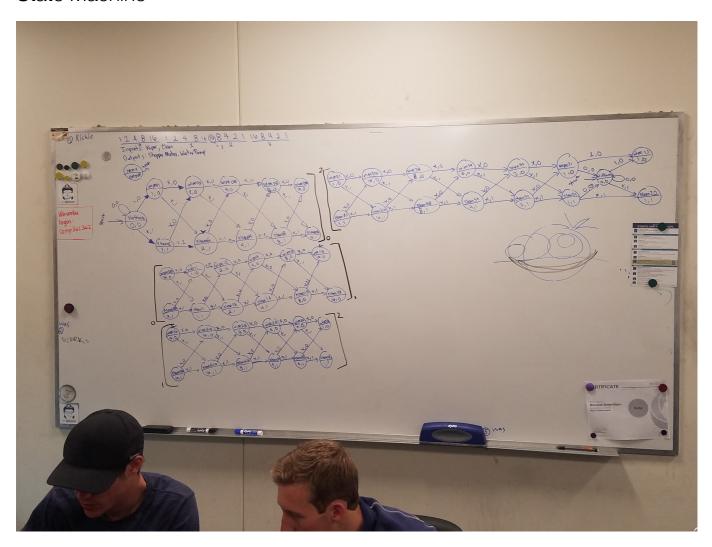
COMP-462: Embedded Systems Fall 2019

Assignment Nu	mber: 4
Student Name:	Brian "Keith" Skinner
Student Major:	Computer Science

Assignment4Code.md 10/22/2019

Assignment 4

State Machine



State Machine Code

List of States

```
enum StateIndex
{
    NOTHING,

    W001, W002, W004, W008, W016,
    W101, W102, W104, W108, W116,
    W216, W208, W204, W202, W201,
    W316, W308, W304, W302, W301,

    C001, C002, C004, C008, C016,
    C101, C102, C104, C108, C116,
    C216, C208, C204, C202, C201,
    C316, C308, C304, C302, C301,
```

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```
NUM_STATES
};
```

State Structure

```
typedef struct state_tag {
    uint32_t wipe;
    uint32_t clean;
    uint32_t next[4];
} State;
```

List of I/O Transitions

```
State STATES[NUM_STATES] =
{
    // NOTHING
   { 0, 0, { NOTHING, C001, W001, C001 } },
    // W0XX
    { 1, 0, { W002, C002, W002, C002 } },
    { 2, 0, { W004, C004, W004, C004 } },
   { 4, 0, { W008, C008, W008, C008 } },
    { 8, 0, { W016, C016, W016, C016 } },
   { 16, 0, { W101, C101, W101, C101 } },
    // W1XX
   { 1, 0, { W102, C102, W102, C102 } },
   { 2, 0, { W104, C104, W104, C104 } },
   { 4, 0, { W108, C108, W108, C108 } },
    { 8, 0, { W116, C116, W116, C116 } },
   { 16, 0, { W216, C216, W216, C216 } },
    // W2XX
    { 16, 0, { W208, C208, W208, C208 } },
    { 8, 0, { W204, C204, W204, C204 } },
    { 4, 0, { W202, C202, W202, C202 } },
    { 2, 0, { W201, C201, W201, C201 } },
    { 1, 0, { W316, C316, W316, C316 } },
    // W3XX
    { 16, 0, { W308, C308, W308, C308 } },
   { 8, 0, { W304, C304, W304, C304 } },
    { 4, 0, { W302, C302, W302, C302 } },
    { 2, 0, { W301, C301, W301, C301 } },
    { 1, 0, { NOTHING, C001, W001, C001 } },
    // C0XX
    { 1, 1, { W002, C002, W002, C002 } },
    { 2, 1, { W004, C004, W004, C004 } },
```

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```
{ 4, 1, { W008, C008, W008, C008 } },
    { 8, 1, { W016, C016, W016, C016 } },
    { 16, 1, { W101, C101, W101, C101 } },
    // C1XX
    { 1, 1, { W102, C102, W102, C102 } },
        1, { W104, C104, W104, C104 } },
    { 4, 1, { W108, C108, W108, C108 } },
    { 8, 1, { W116, C116, W116, C116 } },
   { 16, 1, { W216, C216, W216, C216 } },
   // C2XX
   { 16, 1, { W208, C208, W208, C208 } },
   { 8, 1, { W204, C204, W204, C204 } },
   { 4, 1, { W202, C202, W202, C202 } },
   { 2, 1, { W201, C201, W201, C201 } },
    { 1, 1, { W316, C316, W316, C316 } },
   // C3XX
    { 16, 1, { W308, C308, W308, C308 } },
    { 8, 1, { W304, C304, W304, C304 } },
        1, { W302, C302, W302, C302 } },
   { 2, 1, { W301, C301, W301, C301 } },
   { 1, 1, { NOTHING, C001, W001, C001 } }
};
```

State Loop

```
while(1) {
    // output
    GPIO_PORTE_DATA_R = state.wipe + (state.clean << 5);
    // wait
    SysTick_Wait10ms(5);
    // input
    uint32_t input = GPIO_PORTA_DATA_R;
    // next
    input >>= 4;
    input &= 3;
    state = STATES[state.next[input]];
}
```