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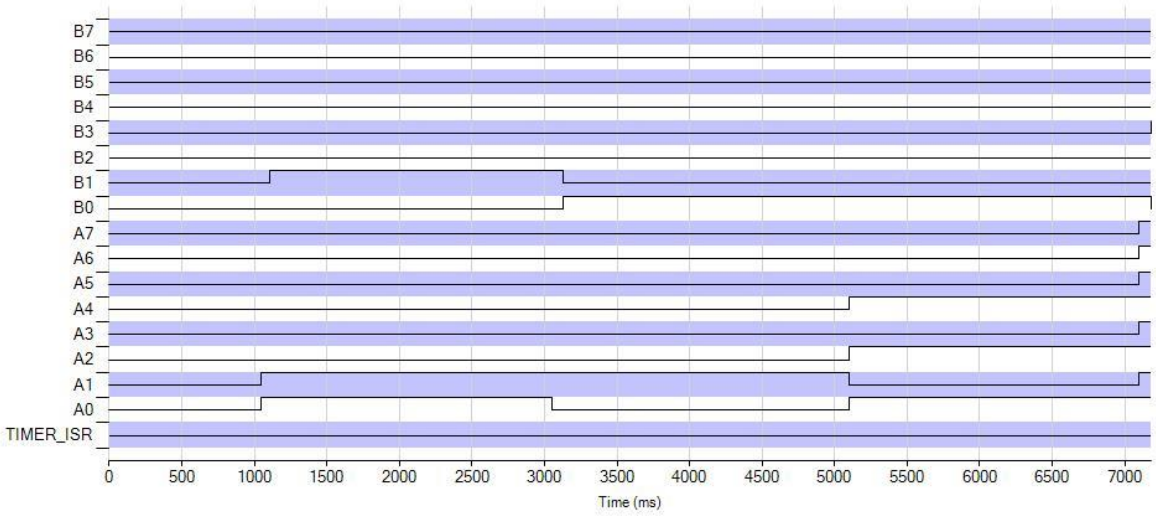
EE120B HW 1

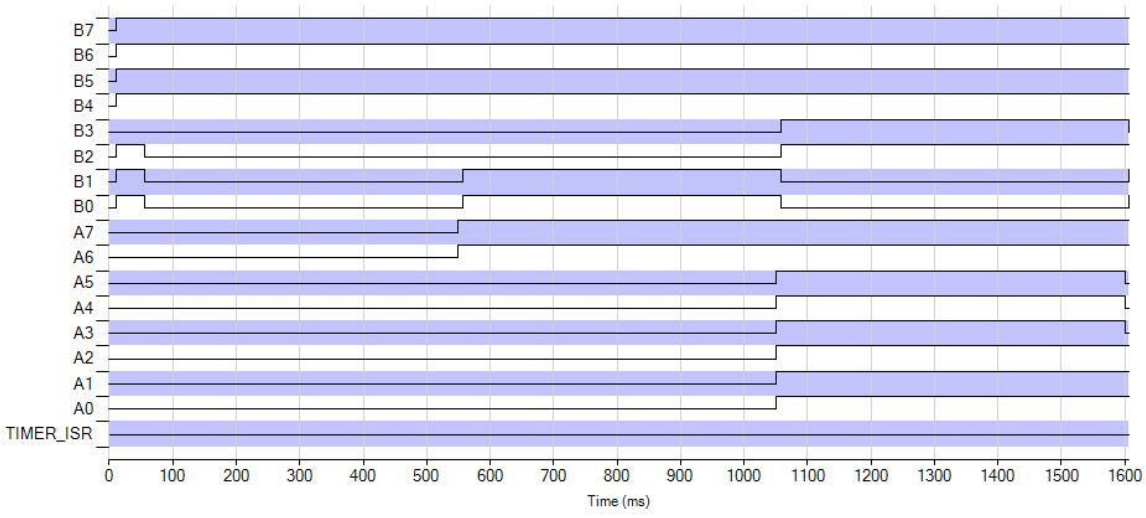
Problem 1

```
#include "rims.h"

void main()
{
   while (1)
   {
      char input = A;
      char count = 0;
      char maxCount = 0;
      char bitMask = 1;
      char i = 0;
      for(; i < 8; i++)
      {
          if((input & bitMask) == bitMask)
          {
              count++;
          }
          else
          {
              if (count > maxCount)
              {
                  maxCount = count;
              }
              count = 0;
          }
          bitMask = bitMask << 1;
      }
      if(count > maxCount)
      {
          maxCount = count;
      }
      B = maxCount;
   }
}
```

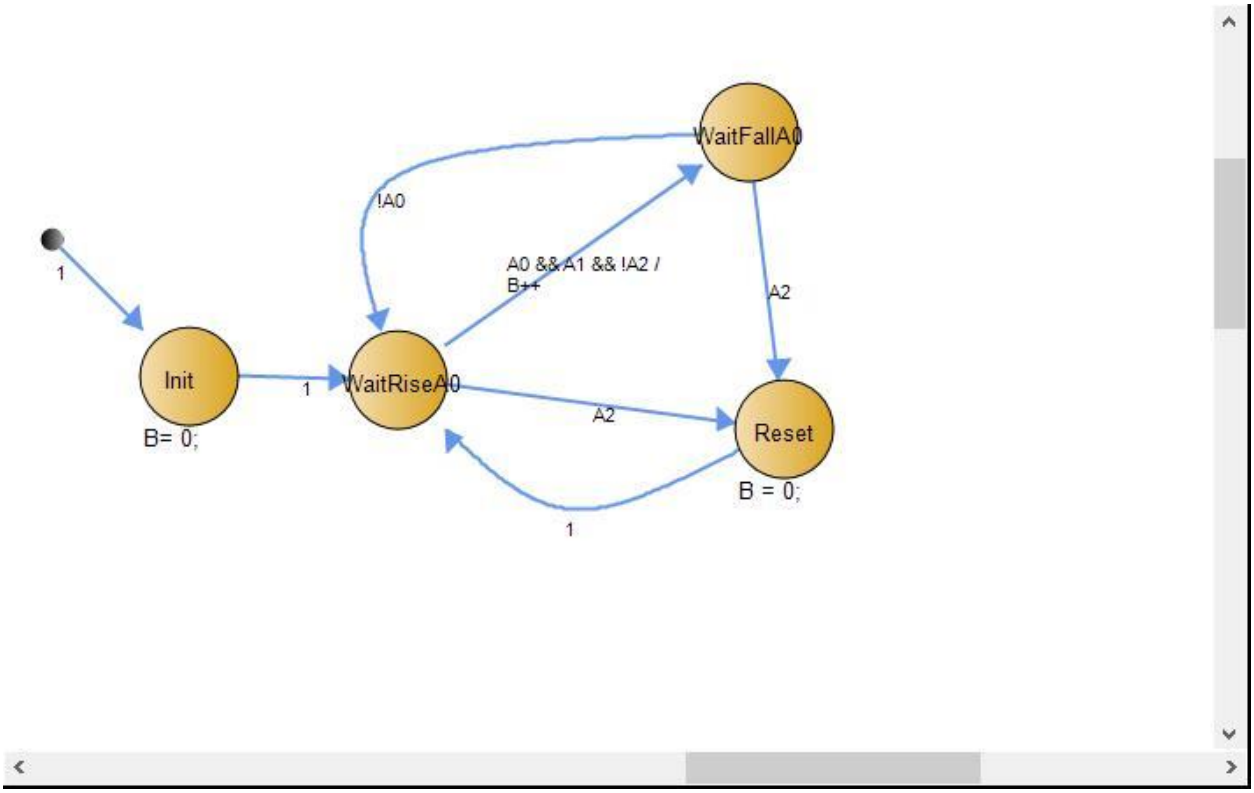


Problem 2

```
#include "rims.h"


void main()
{
    while (1) {

        char sum = 0;
        char A1 = A & 0x03;
        char A2 = (A & (0x03 << 2)) >> 2;
        char A3 = (A & (0x03 << 4)) >> 4;
        char A4 = (A & (0x03 << 6)) >> 6;
        sum = A1 + A2 + A3 + A4;
        B = 0xF0 | sum;
    }
}
```

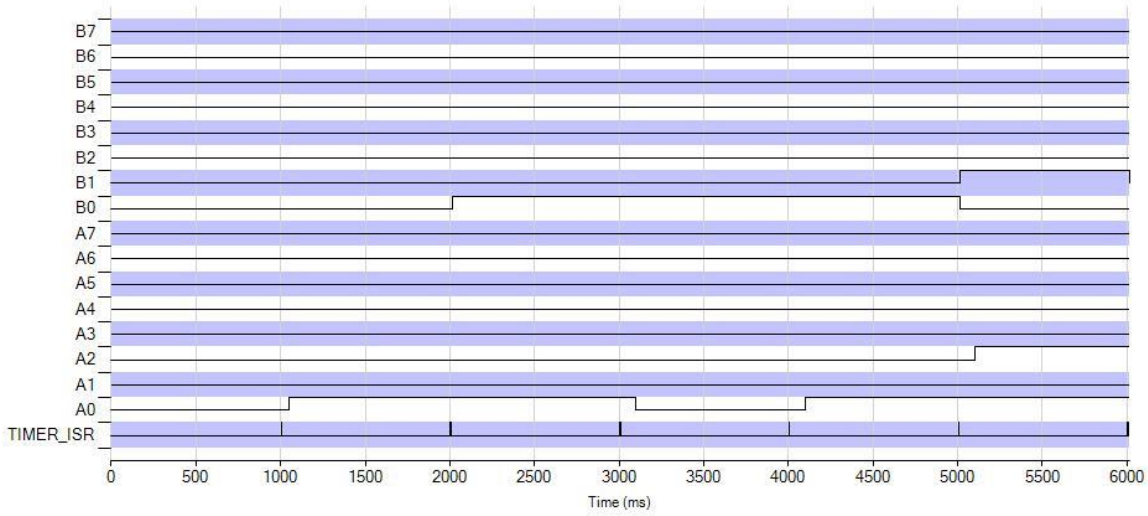


Problem 3

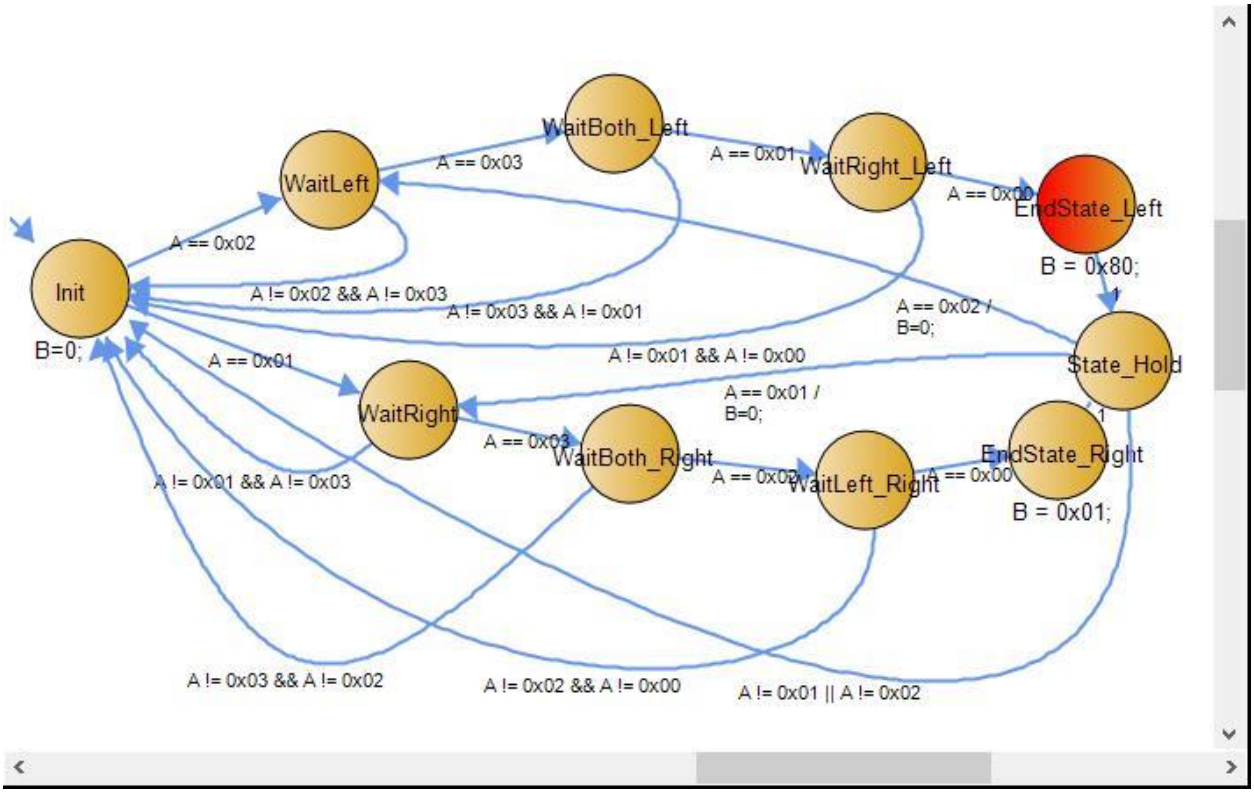



```
#include "rims.h"


enum SM1_States { SM1_Init, SM1_WaitRiseA0, SM1_WaitFallA0, SM1_Reset }
SM1_State;

TickFct_State_machine_1() {
   switch(SM1_State) { // Transitions
      case -1:
         SM1_State = SM1_Init;
         break;
         case SM1_Init:
         if (1) {
            SM1_State = SM1_WaitRiseA0;
         }
         break;
      case SM1_WaitRiseA0:
         if (A0 && A1 && !A2) {
            SM1_State = SM1_WaitFallA0;
            B++;
         }
         else if (A2) {
            SM1_State = SM1_Reset;
         }
         break;
      case SM1_WaitFallA0:
         if (A2) {
```

```
            SM1_State = SM1_Reset;
         }
         else if (!A0) {
            SM1_State = SM1_WaitRiseA0;
         }
         break;
      case SM1_Reset:
         if (1) {
            SM1_State = SM1_WaitRiseA0;
         }
         break;
      default:
         SM1_State = SM1_Init;
   } // Transitions

   switch(SM1_State) { // State actions
      case SM1_Init:
         B= 0;
         break;
      case SM1_WaitRiseA0:
         break;
      case SM1_WaitFallA0:
         break;
      case SM1_Reset:
         B = 0;
         break;
      default: // ADD default behaviour below
      break;
   } // State actions

}

int main() {

   SM1_State = -1; // Initial state
   B = 0; // Init outputs

   while(1) {
      TickFct_State_machine_1();
   } // while (1)
   return 0;
} // Main
```



Problem 4




```
#include "rims.h"

enum SM_States { SM_Init, SM_WaitLeft, SM_WaitRight, SM_WaitBoth_Right,
SM_WaitBoth_Left, SM_WaitRight_Left, SM_WaitLeft_Right, SM_EndState_Left,
SM_EndState_Right, SM_State_Hold } SM_State;

TickFct_State_machine_1() {
   switch(SM_State) { // Transitions
      case -1:
```

```
            SM_State = SM_Init;
            break;
            case SM_Init:
            if (A == 0x02) {
               SM_State = SM_WaitLeft;
            }
            else if (A == 0x01) {
               SM_State = SM_WaitRight;
            }
            break;
         case SM_WaitLeft:
            if (A == 0x03) {
               SM_State = SM_WaitBoth_Left;
            }
            else if (A != 0x02 && A != 0x03) {
               SM_State = SM_Init;
            }
            break;
         case SM_WaitRight:
            if (A == 0x03) {
               SM_State = SM_WaitBoth_Right;
            }
            else if (A != 0x01 && A != 0x03) {
               SM_State = SM_Init;
            }
            break;
         case SM_WaitBoth_Right:
            if (A == 0x02) {
               SM_State = SM_WaitLeft_Right;
            }
            else if ( A != 0x03 && A != 0x02) {
               SM_State = SM_Init;
            }
            break;
         case SM_WaitBoth_Left:
            if (A == 0x01) {
               SM_State = SM_WaitRight_Left;
            }
            else if (A != 0x03 && A != 0x01) {
               SM_State = SM_Init;
            }
            break;
         case SM_WaitRight_Left:
            if (A == 0x00) {
               SM_State = SM_EndState_Left;
            }
            else if (A != 0x01 && A != 0x00) {
               SM_State = SM_Init;
            }
            break;
         case SM_WaitLeft_Right:
            if (A == 0x00) {
               SM_State = SM_EndState_Right;
            }
            else if (A != 0x02 && A != 0x00) {
               SM_State = SM_Init;
            }
```

```
         break;
      case SM_EndState_Left:
         if (0) {
            SM_State = SM_Init;
         }
         else if (1) {
            SM_State = SM_State_Hold;
         }
         break;
      case SM_EndState_Right:
         if (0) {
            SM_State = SM_Init;
         }
         else if (1) {
            SM_State = SM_State_Hold;
         }
         break;
      case SM_State_Hold:
         if (A == 0x01) {
            SM_State = SM_WaitRight;
         }
         else if (A == 0x02) {
            SM_State = SM_WaitLeft;
         }
         else if (A != 0x01 || A != 0x02) {
            SM_State = SM_Init;
         }
         break;
      default:
         SM_State = SM_Init;
   } // Transitions

   switch(SM_State) { // State actions
      case SM_Init:
         B=0;
         break;
      case SM_WaitLeft:
         break;
      case SM_WaitRight:
         break;
      case SM_WaitBoth_Right:
         break;
      case SM_WaitBoth_Left:
         break;
      case SM_WaitRight_Left:
         break;
      case SM_WaitLeft_Right:
         break;
      case SM_EndState_Left:
         B = 0x80;
         break;
      case SM_EndState_Right:
         B = 0x01;
         break;
      case SM_State_Hold:
         break;
      default: // ADD default behaviour below
```

```
      break;
   } // State actions

}

int main() {

   SM_State = -1; // Initial state
   B = 0; // Init outputs

   while(1) {
      TickFct_State_machine_1();
   } // while (1)
} // Main
```