IL 2212 Homework 2 Weikai Zhou

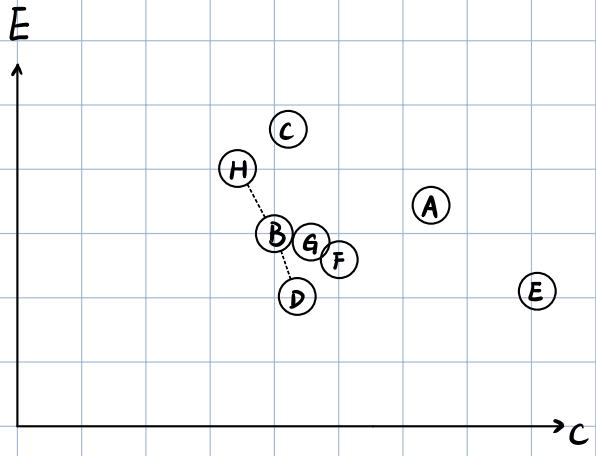
1. (a)

Candidate Solution	$Cost_1$	$Cost_2$
A	25.4	21
B	18.5	16.6
C	18.2	21
D	22.3	15.4
E	26	18.2
F	24.8	18.2
G	21.6	17.4
H	24.8	21.8

Therefore, for low power, we should choose C.

For high performance, we should choose D.

(b)



Therefore, B, D, H are Pareto Points.

(c) Since $E \leq 20$, $P \leq 30$, $C \leq 35$, C, E, H don't satisfy.

For A, it is dominated by B. For F, it is dominated by D.

While for B, D, G, they are not dominated by others.

Therefore, B, D, G are Pareto Points.

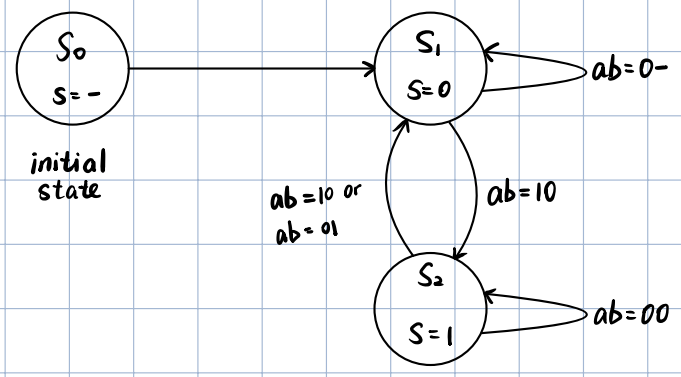
2.(a). We can choose a state variable _init = true → false, which is only true in the initial state.
And state variable pre(s) for the states of the control FSM.

(b). For S_0, we have: _init = true;
pre(s) = nil;
S_0: go to S_1; --s = false; x = nil; y = nil;

For S_1, we have: _init = false;
pre(s) = false;
S_1: if a = true, b = false then
go to S_2; --s = true; x = false; y = false;
else if a = false, b = true then
go to S_1; --s = false; x = true; y = false;
else
go to S_1; --s = false; x = false; y = false;

For S_2, we have: _init = false;
pre(s) = true;
S_2: if a = true, b = false then
go to S_1; --s = false; x = true; y = false;
else if a = false, b = true then
go to S_1; --s = false; x = true; y = true;
else
go to S_2; --s = true; x = false; y = false;

(c).



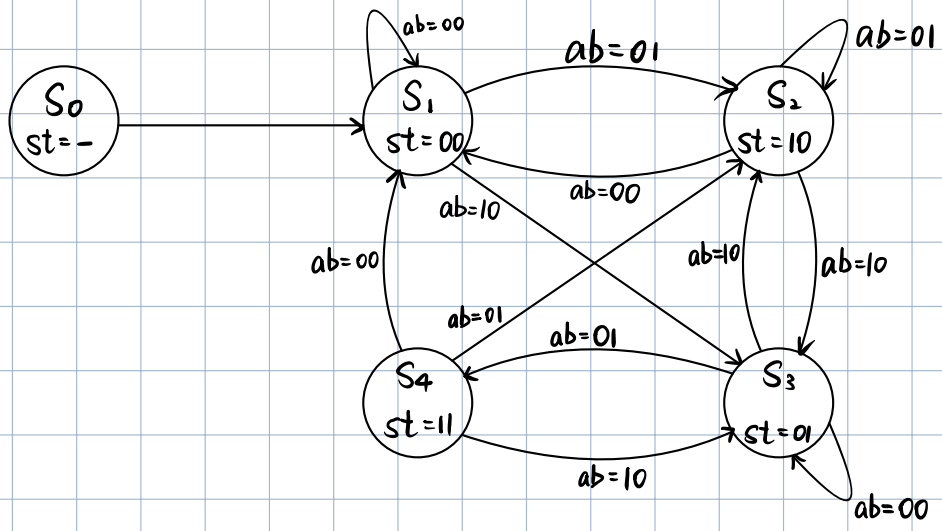
(d). It takes two input a, b and generates two outputs x,y based on the internal state s.

- When pre(s) = false, internal state will not change as long as a = false. b will affect the outputs x,y. When b = true, it will output x = true, y = false. When b is false, it will output x = false, y = false.
- When pre(s) = false, internal state will be changed to true when a = true. b can only be false now. Now it outputs x = true, y = false.

- When pre(s) = true, the internal state will not change as long as a = false, b = false. And it will output x = false, y = false.
- When pre(s) = true, the internal state will change when (a = true, b = false) or (a = false, b = true). For a = true, b = false, it will output x = true, y = false. For a = false, b = true, it will output x = true, y = true.

(e). Please see "Theoretical 2.c" file

(f).



program_1 is a mealy FSM while program_2 is a moore FSM. Mealy machine tends to have less states and both input and state decide the output. For Moore machine, state decides the output, and input decides the state. In fact, a mealy machine can be converted into a moore machine, and vice versa. They are just different representation of logic flow.

3.(a). Please see "sdf.h" file.

(b). Please see "c-bare-metal-skeleton.c" file.

(c). We can arrange different actors on several processors. E.g. AAC on P1 and BD on P2.

We can add "#include <omp.h>" and add "#pragma omp parallel", so that the compiler can do parallel automatically.

The code is like:

```
#pragma omp parallel
{
    A;
    A;
    B;
    C;
    D;
}
```