

## 2023 Digital IC Design Homework 2

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### Functional Simulation Result

**Score**

**100**

```

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---- Simulation finish, ALL PASS, Score = 100 ----
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** Note: $finish      : C:/Graduate School/IC_DESIGN/HW2/tb.v(139)
    Time: 96400 ns  Iteration: 1  Instance: /testfixture
  
```

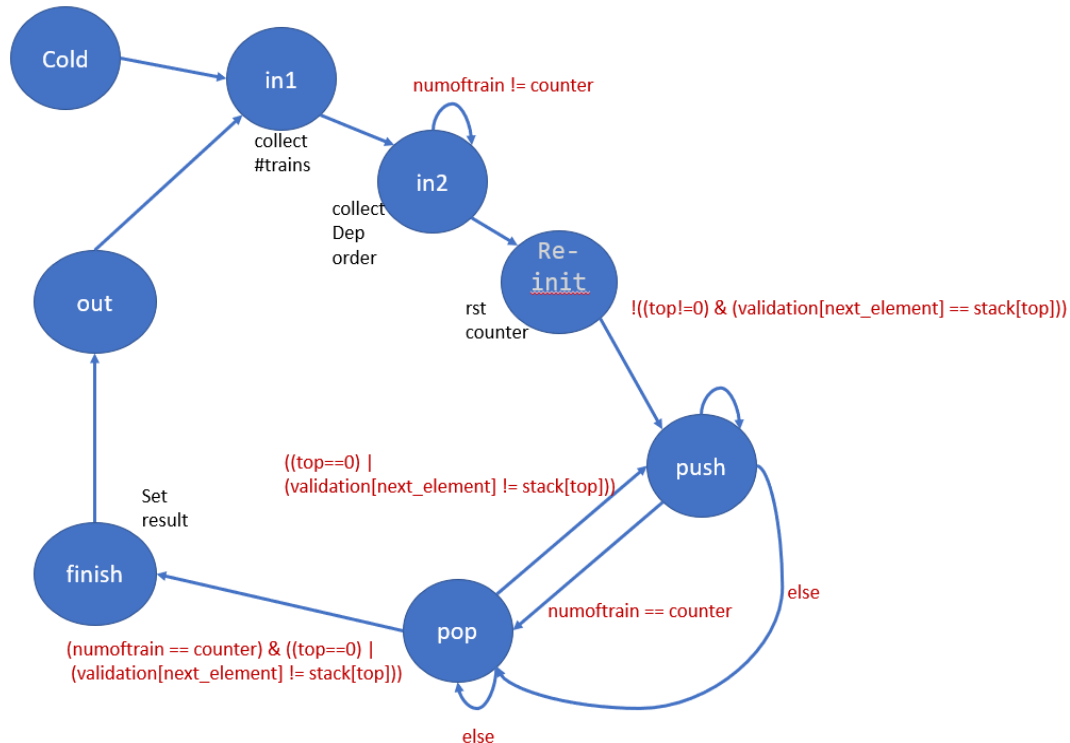
### Description of your design

#### Register

```

reg [2:0] state, next_state;
reg [3:0] numoftrain;
reg [3:0] validation[0:15];
reg [3:0] stack[0:15];
reg [3:0] counter; // for inputing data and stack push operations
reg [3:0] top; // top == 0 means empty , and stack[0] is always empty
reg [3:0] next_element;
  
```

#### Finite State Machine



## State Operations

```
cold;;  
in1:  
    numoftrain = data;  
in2: begin  
    validation[counter] = data;  
    counter = counter + 1;  
end  
reinit:  
    counter = 0;  
push: begin  
    top = top + 1;  
    counter = counter + 1;  
    stack[top] = counter;  
end
```

```
pop: begin
    next_element = next_element + 1;
    top = top - 1;
end
finish: begin
    if(top == 0)
        result = 1'd1;
    else
        result = 1'd0;
    valid = 1'd1;
end
```

```
out:begin
    for(i=0;i<16;i=i+1)
        validation[i] <= 4'b0;
    for(i=0;i<16;i=i+1)
        stack[i] <= 4'b0;
    i = 0;
    counter = 0;
    top = 0;
    next_element = 0;
    result = 1'd0;
    valid = 1'd0;
end
default;;
```