

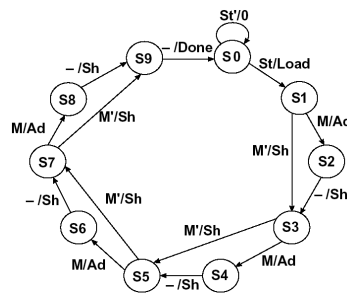
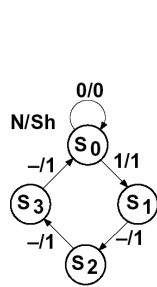
**CPE/EE 422/522**  
**Spring 2004**  
**Chapter 5 - Digital Design**  
**with SM Charts**

**Dr. Rhonda Kay Gaede**



**5.1 State Machine Charts**

¥ State graphs used to describe state machines controlling a digital system



¥ Alternative: use state machine flowchart

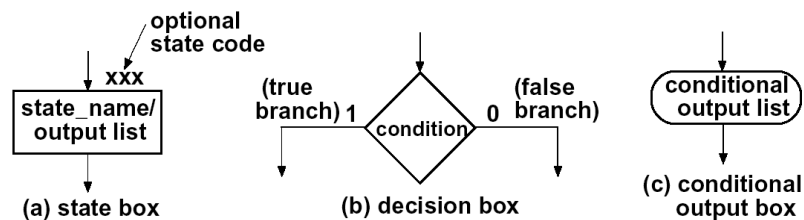
## 5.1 State Machine Charts

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- ¥ SM chart or ASM (*Algorithmic State Machine*) chart
- ¥ Easier to understand the operation of digital system by examination of the SM chart instead of equivalent state graph
- ¥ SM chart leads directly to hardware realization

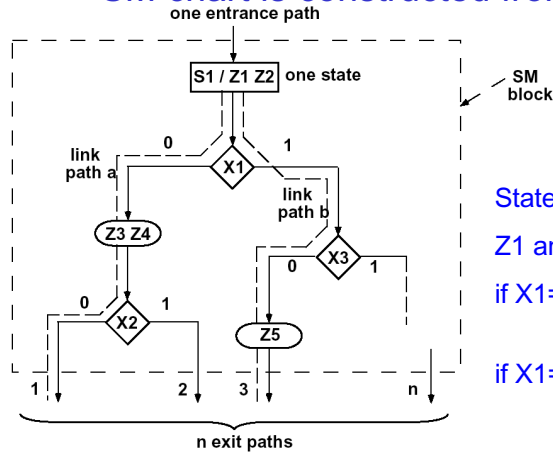
## 5.1 State Machine Charts - Components

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### 5.1 State Machine Charts - SM Blocks

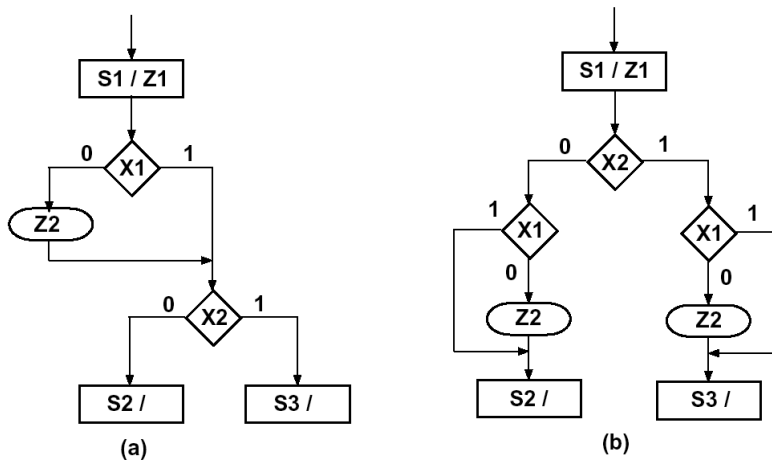
SM chart is constructed from SM blocks



State S1 is entered =>  
 Z1 and Z2 become 1  
 if X1=0  
     Z3 and Z4 become 1  
 if X1=1 and X3=0  
     Z5 become 1

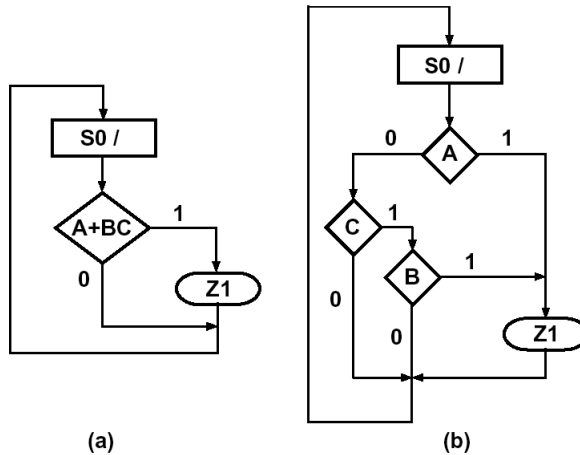
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### 5.1 State Machine Charts - Equivalent SM Blocks

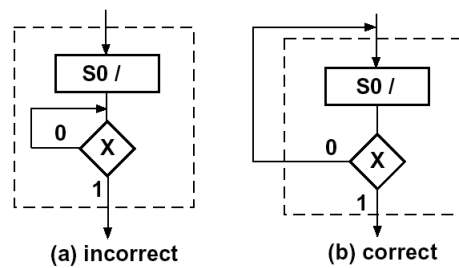


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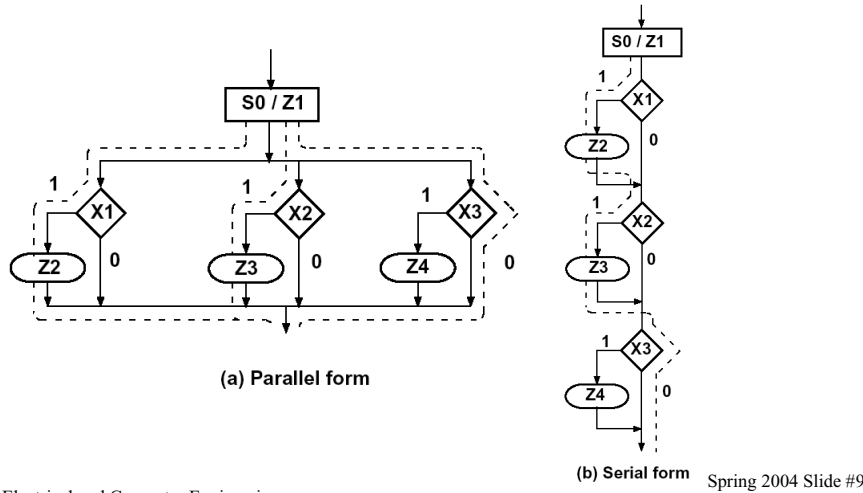
### 5.1 State Machine Charts - Equivalent SM Charts for Combinational Networks



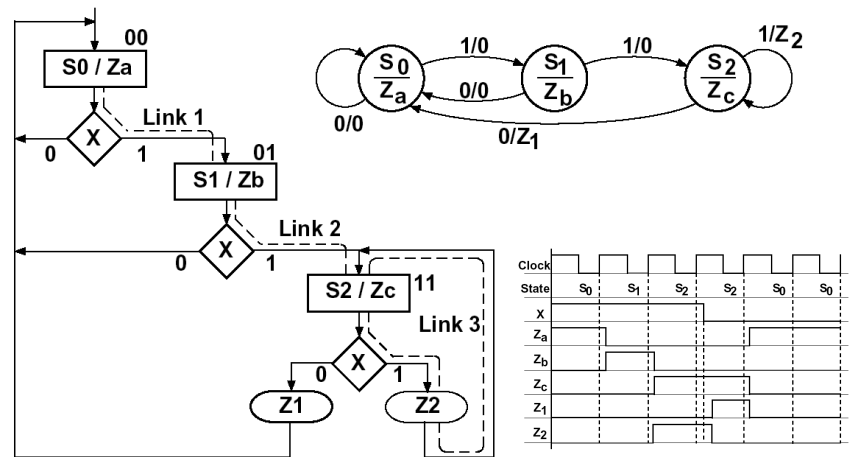
### 5.1 State Machine Charts - Block with Feedback



### 5.1 State Machine Charts - Equivalent SM Blocks



### 5.1 State Machine Charts - Converting a State Graph to an SM Chart



## 5.2 Derivation of SM Charts - SM Chart for Binary Multiplier

