

State Machines

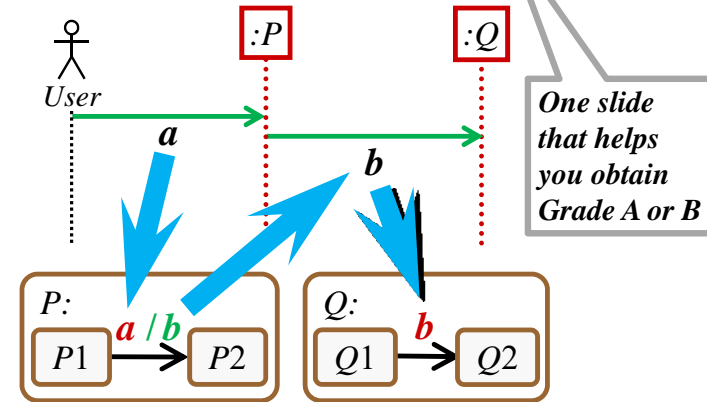
- ◆ Formerly known as state-transition diagrams

A **transition** is

- ◆ a change of **state**
- ◆ caused by an **triggering event**
- ◆ possibly with a **guard condition**
- ◆ may result in an **effect action**

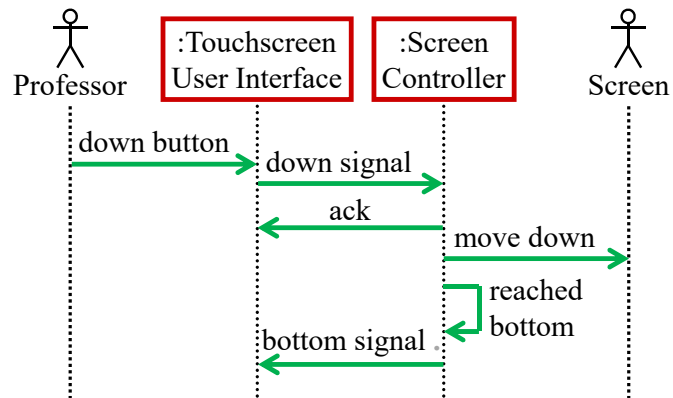
I will use 5 different colours .

Relating Sequence Diagram and State Machines



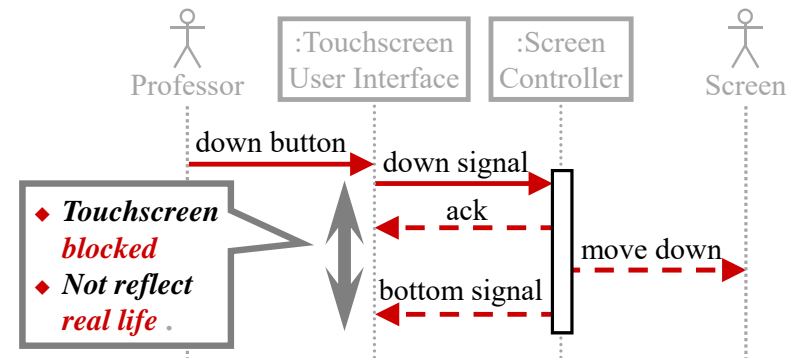
Example 1: Lecture Control System

Sequence Diagram (Draft #1)

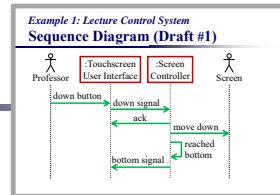
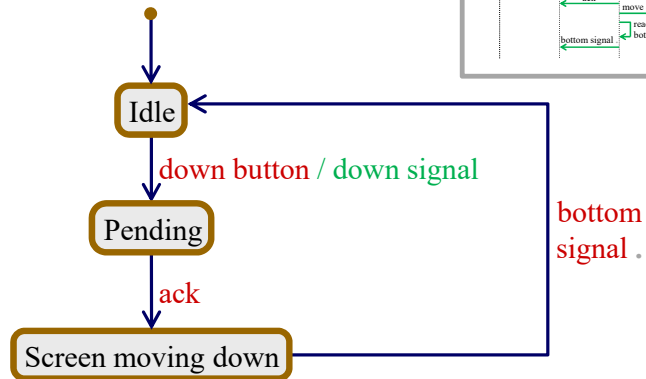


Example 1: Lecture Control System

(For Students Who Like Synchronous Version)

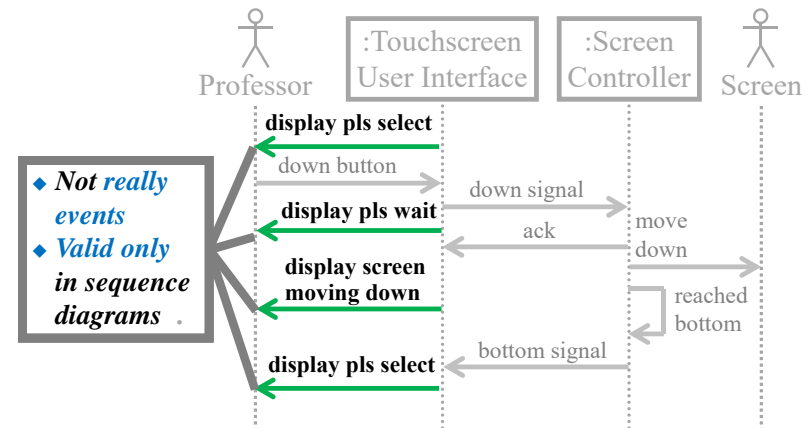


Touchscreen User Interface State Machine (Draft #1)

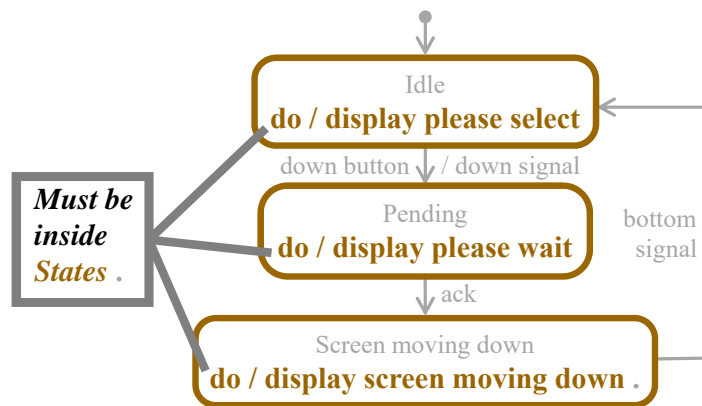


5

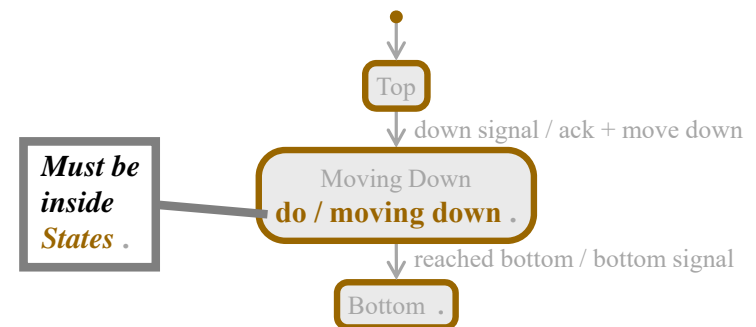
Example 1: Lecture Control System Sequence Diagram (Draft #2): Displays



Touchscreen User Interface State Machine (Draft #2): Displays



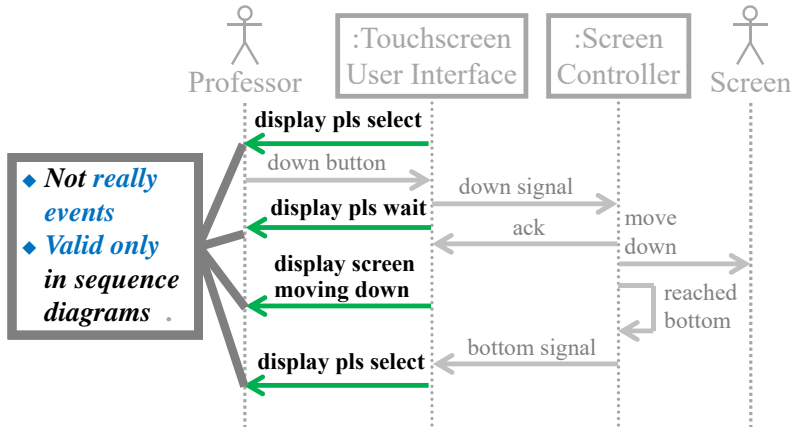
Screen Controller State Machine (Draft #2): Continuous Activity



8

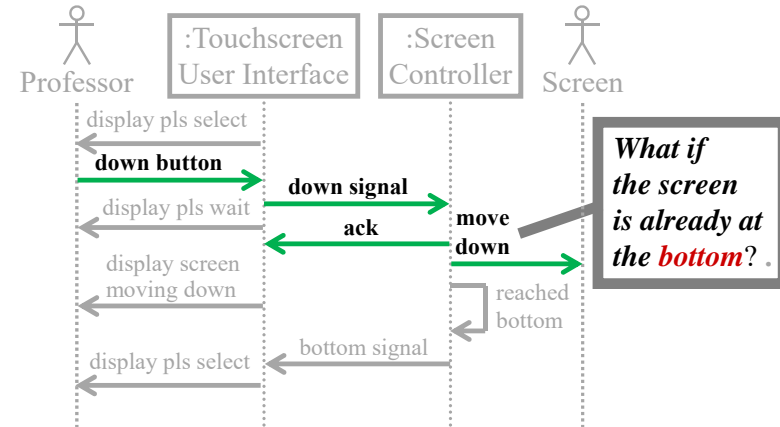
Example 1: Lecture Control System

Sequence Diagram (Draft #2): Displays



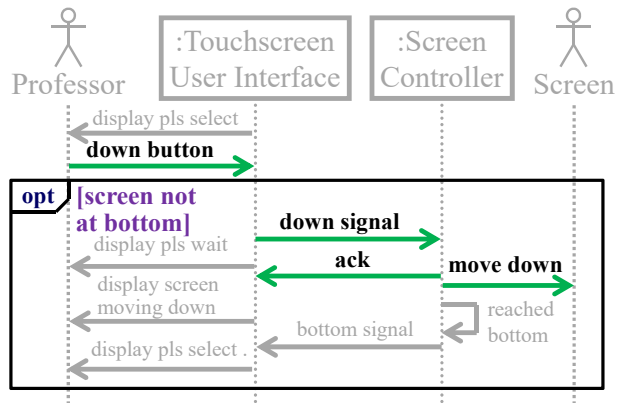
Lecture Control System

Sequence Diagram (Draft #2) Revisit



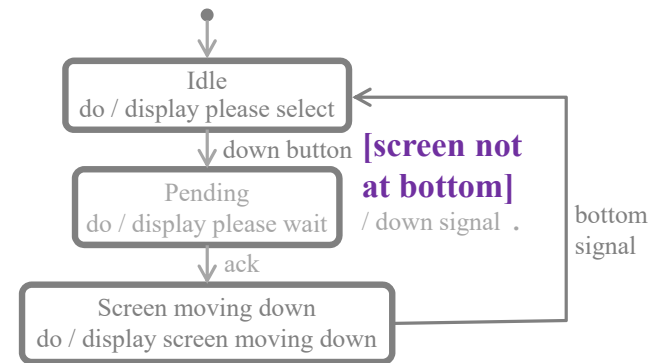
Lecture Control System

Sequence Diagram (Draft #3)



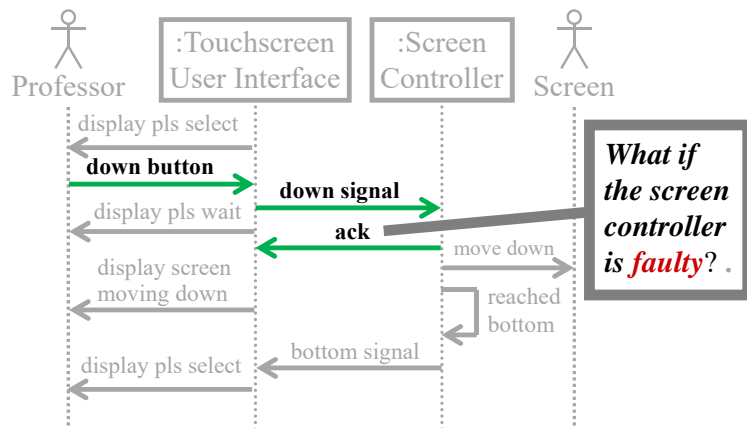
Screen Controller

State Machine (Draft #3)



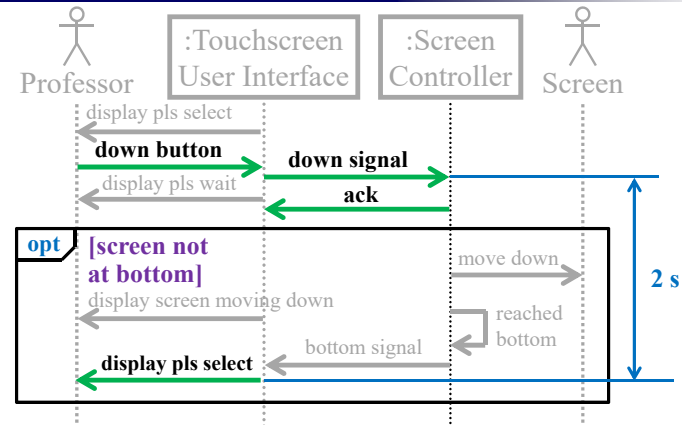
Lecture Control System

Sequence Diagram (Draft #2) Revisit 2



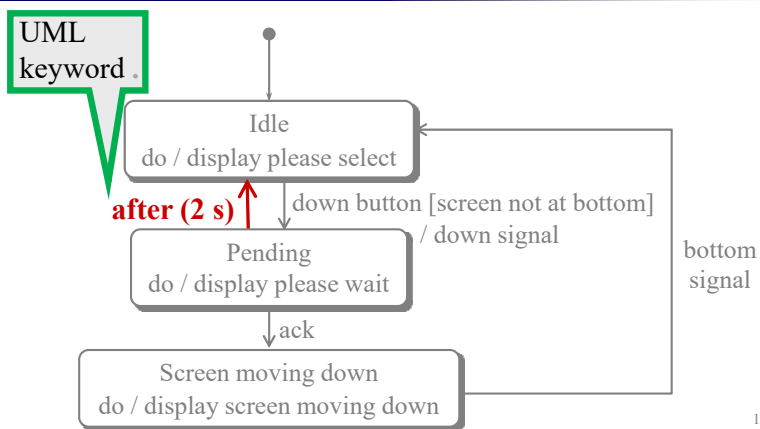
Lecture Control System

Sequence Diagram (Draft #4)



Touchscreen User Interface

State Machine (Draft #4)

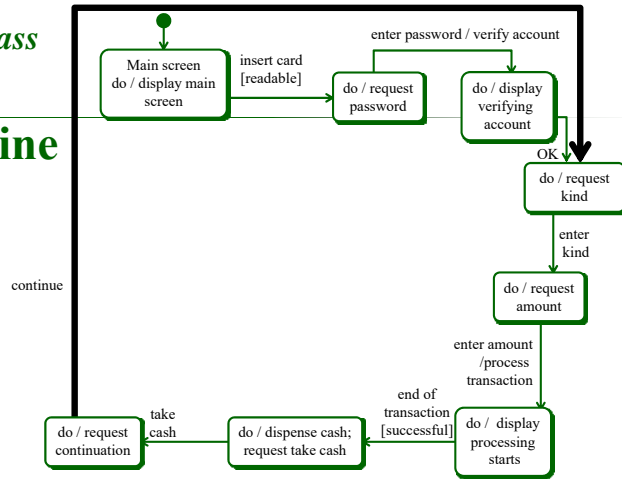


Example 4: e-Banking System

Sequence Diagram

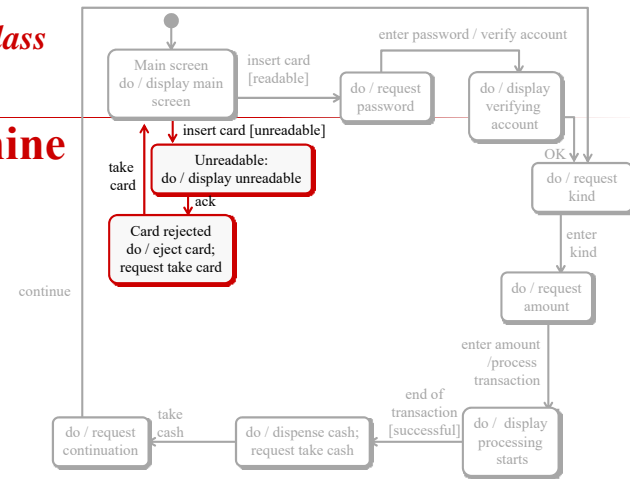


ATM Class State Machine



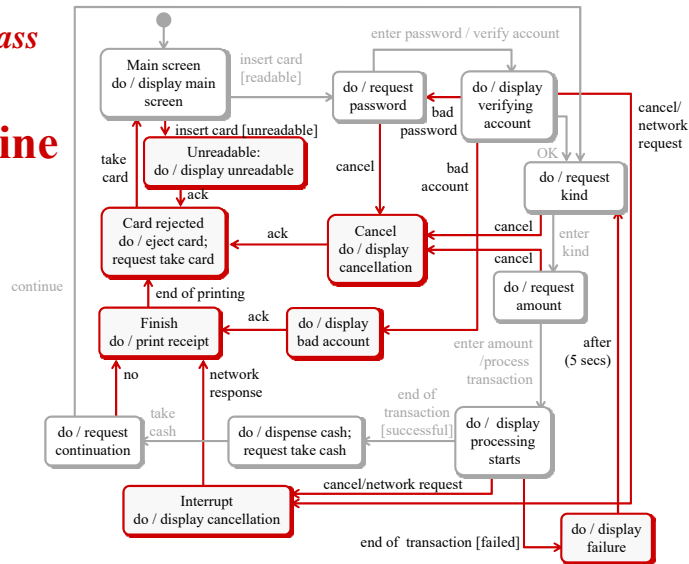
17

ATM Class State Machine

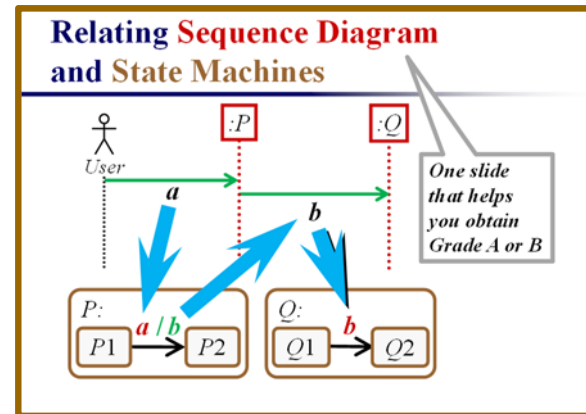


18

ATM Class State Machine

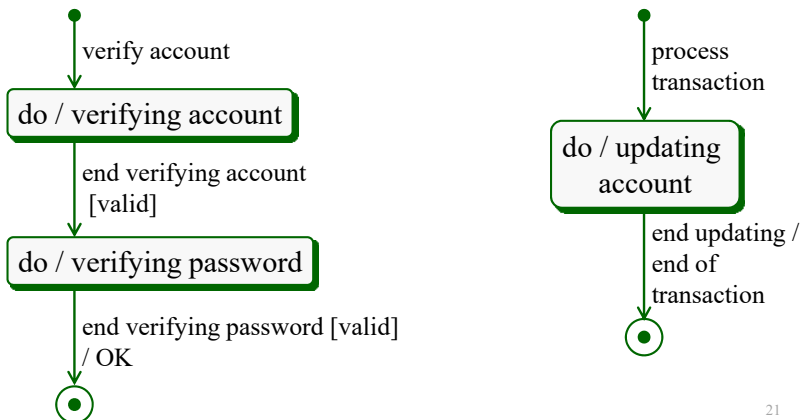


Recall



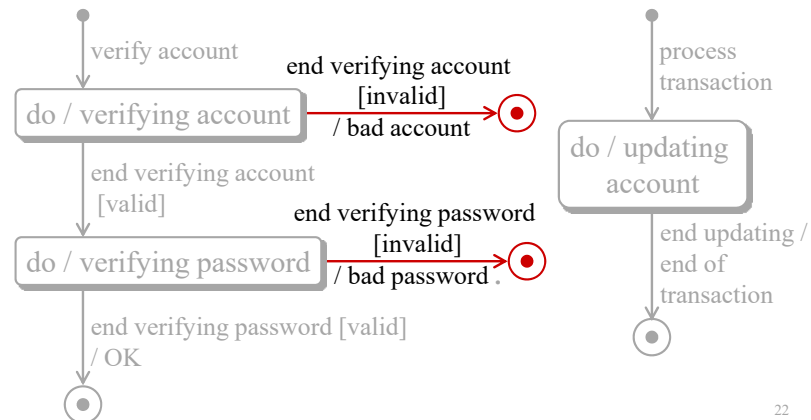
20

Bank Class State Machine



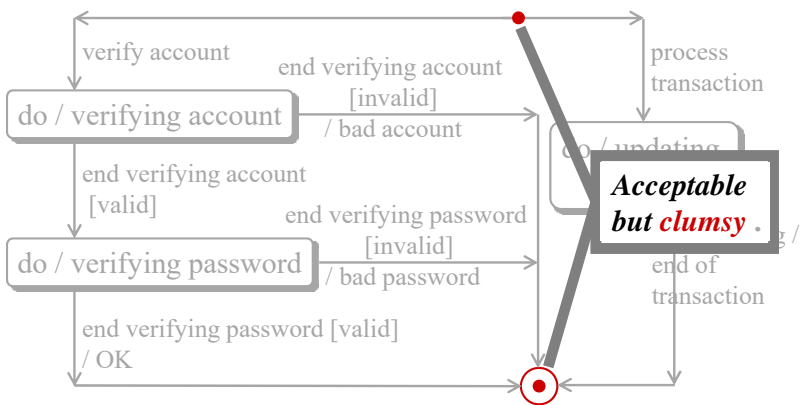
21

Bank Class State Machine



22

Bank Class State Machine



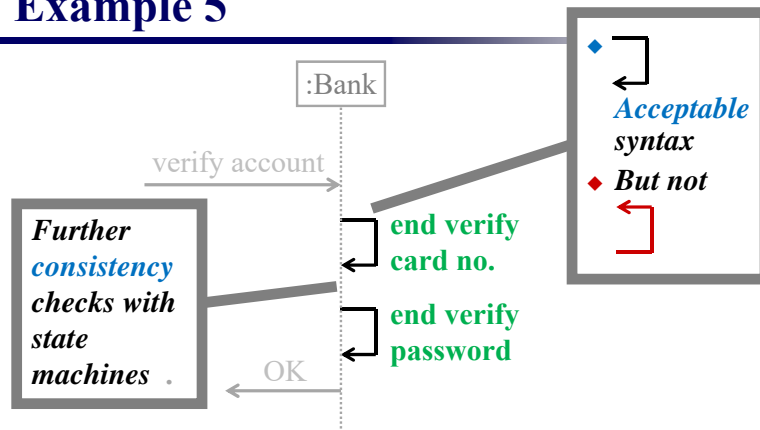
Matching Events Between Objects

Check completeness and consistency

- ◆ A sender and a receiver for each event
- ◆ Predecessors or successors for every state
- ◆ Consistencies of corresponding events between *sequence diagrams* and *state machines*
- ◆ Consistencies of corresponding events between different *state machines*
- ◆ Potential synchronization errors, especially when an input occurs at an awkward time .

24

Matching Events Between Objects Example 5

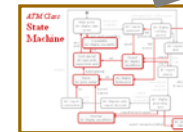
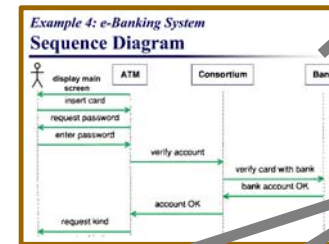


Further consistency checks with state machines .

end verify card no.
end verify password

25

Matching Events Between Objects Example 6



How many objects?

Hence, how many state machines?

How many state machines here?

State machine for Consortium class is *missing*.