Model-Based Testing

(DIT848 / DAT260)

Spring 2013

Lecture 9
More on EFSM

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So far…

We have seen

- Testing in general
- EFSM
- Introduction to MBT
- Graph theory techniques for MBT
- Off-line testing (The Qui-Donc example)
- The ModelJUnit library

Today:

- Interactive exercises on EFSM

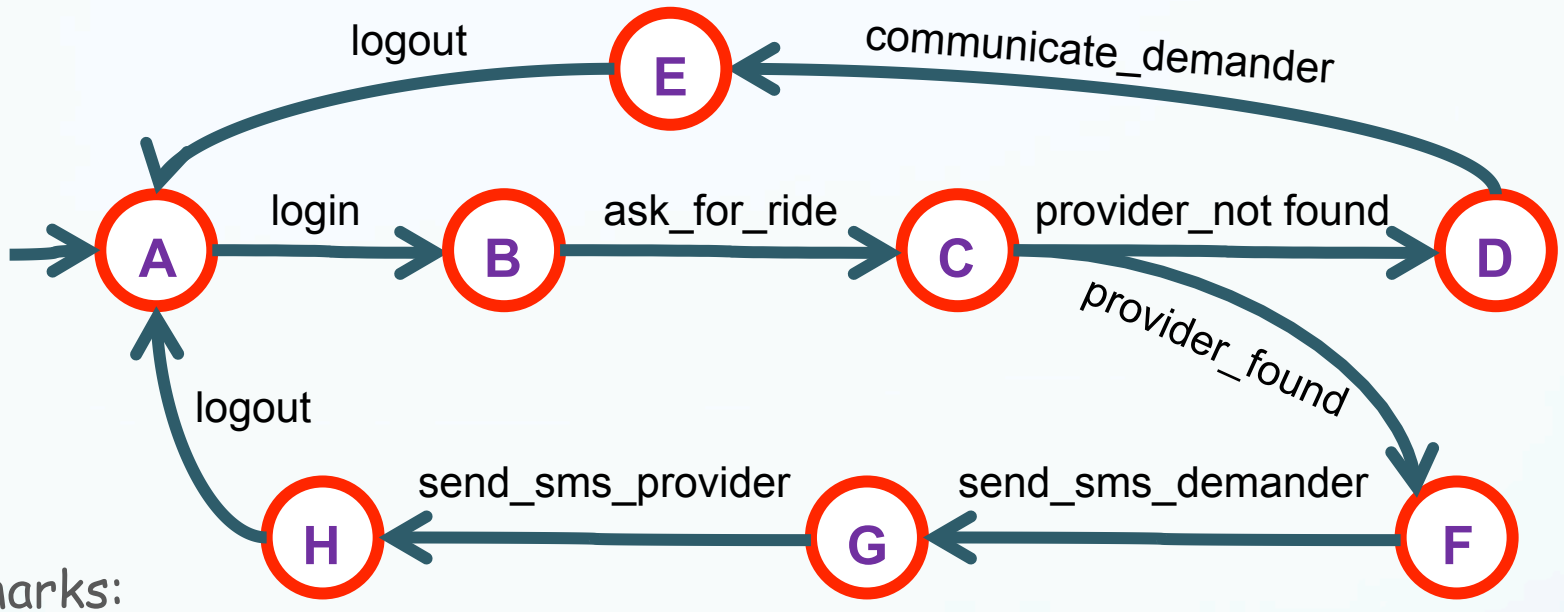
Car sharing ride system (1)

- This task is concerned with part of a car sharing ride system where *demanders* (asking for a ride) log in to a web system asking for a *provider* (having a car and offering places in the car) to share a particular route.

- Your task is to **define a Finite-State Machine (FSM)** for the following specification:
  1. The demander logs into the system;
  2. the demander provides information on the particular route he/she wants and other information useful for the ride;
  3. the system checks whether there is a provider satisfying the demander's request;
  4. if a provider is found then an SMS is sent to both the provider and the demander confirming the ride, and the demander is logged out from the system:
  5. if no provider is found, this is communicated to the demander, who is automatically logged out.

Groups 2-5 persons: 12-15 min

Car sharing ride system (1)
Proposed Solution



Some remarks:

- Many other solutions depending on how much do you abstract
  - A "good" solution should be abstract enough as to capture the informal description (but not too much as to be useless)
- "logout" could be eliminated (as it is automatic)
- No check on whether login is correct or not (not in the specification)
- Implicit loop in state "C" on "look_for_provider"

Car sharing ride system (2)

- Give **2** test cases that **can** be extracted from your FSM, and **2** that **cannot** be extracted from it.

Note: Consider test cases you might want to extract given a "full" specification of the system (consider that the FSM is given as a first step towards a full description of the system)

Groups 2-5 persons: 5 min

Car sharing ride system (2)
Proposed Solution

- Test cases you can extract:
  1. After login if there is provider then the demander gets an sms indicating that.
  2. If no provider exists for that ride then the user is logged out after getting a notification.

- Test cases you cannot extract:
  1. If a provider does exist for the ride, the user may still not get the guarantee of a ride due to overbooking.
  2. Any timing constraints in what concerns how much time to wait for getting a confirmation of a ride.

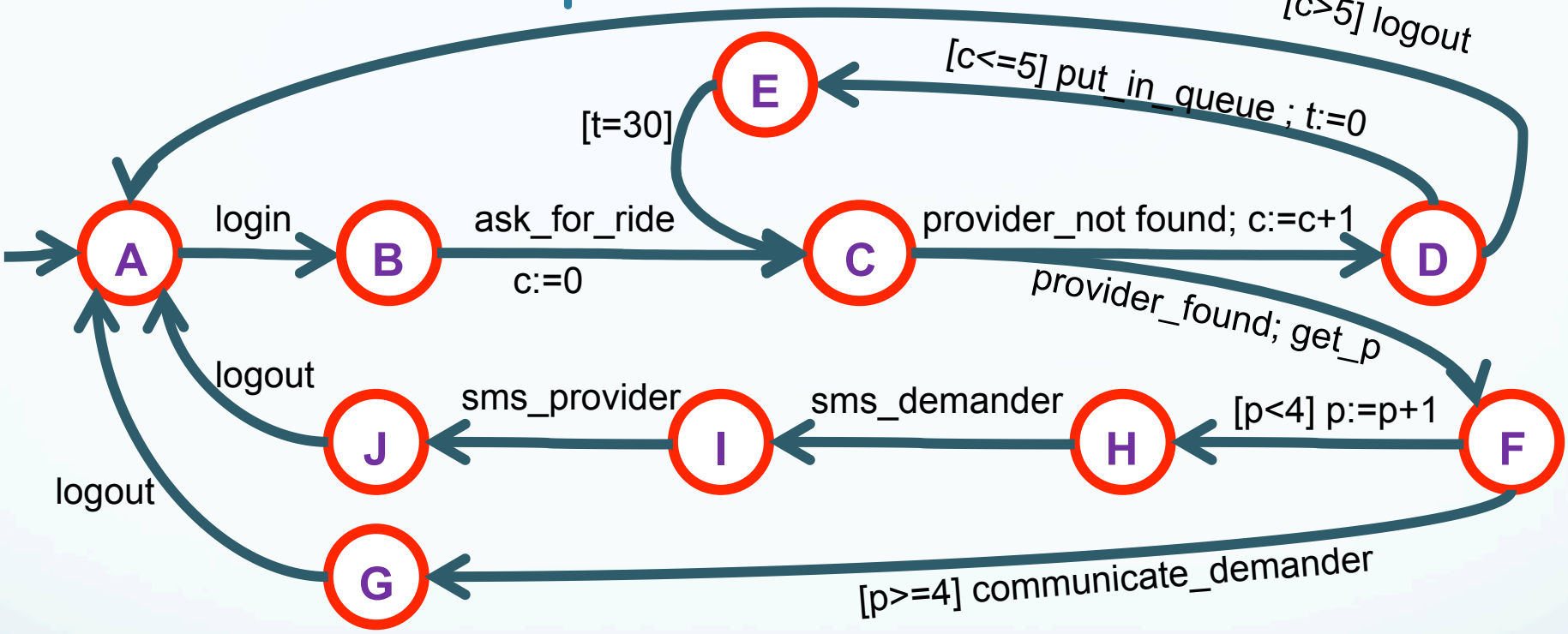
Car sharing ride system (3)

- **Draw an *Extended Finite-State Machine* (EFSM)** for a variation of the system of part (1). The new description of the system is as follows:

1. The demander logs in into the system and asks for a ride as before.
2. If a potential provider is found then it is first checked that the provider can offer the ride, which only happens if there are less than 4 confirmed demanders for that particular provider. If a provider is found but there is no place, then a communication is sent to the demander.
3. If the ride request can be accepted, then an SMS is sent to both provider and demander confirming the ride, a counter counting the number of demanders for that particular provider is increased, and the demander is logged out.
4. If a provider is not found, then the demander is put on a queue for 30 minutes after which the system checks again whether a provider for the requested ride is found; this is repeated at most 5 times, and if finally a provider is not found then the demander is automatically logged out.

Groups 2-5 persons: 15 min

Car sharing ride system (3)
Proposed Solution



Some remarks:

- Brackets ("[.]") are used as a short for "If ... then ..."
- t: timer; c: number of times a demander may request a ride; p: nr of passengers (stored in the DB; get using "get_p")
- Assumption: the timer is automatically incremented (implicit loop in state E)

Vending machine (1)

A programmer wants to develop a simple program to control a vending machine that provides coffee and tea.

This is the specification of how the machine should operate:
"The machine should first allow the insertion of a (machine) coin, and only then allow the customer to select the drink to finally get it".

The programmer made a first model according to the specification above, getting the Finite State Machine (FSM) depicted in the figure on the right.

- Is the FSM depicted in the picture above correct according to the specification? If not, explain what is wrong and modify the model so that it conforms to the specification

Groups 2-5 persons: 5-7 min

Vending machine (1)
Proposed Solution

- NO! It is not correct

  Solution: invert all the arrows

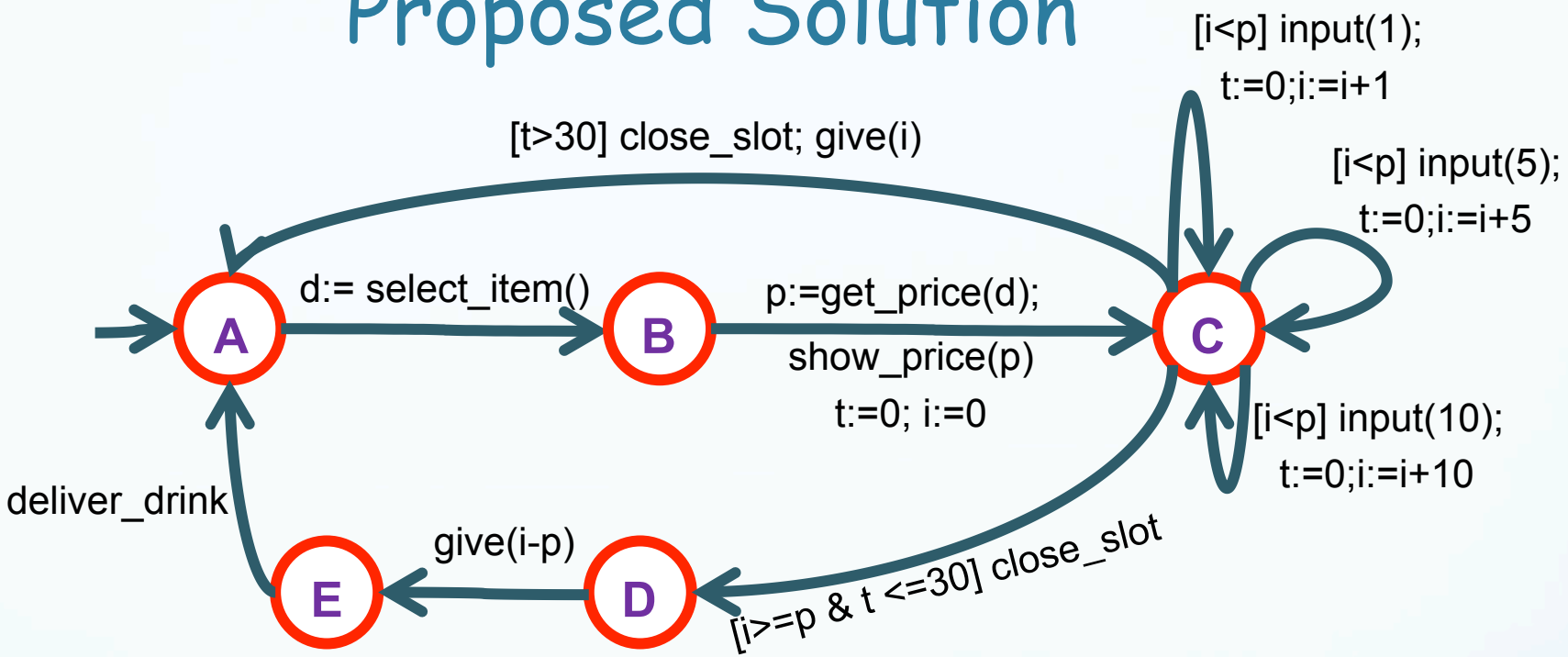
Vending machine (2)

Give an **Extended Finite State Machine (EFSM)** that models a vending machine offering 45 different items. Each item has a defined cost. The vending machine operates as follows.

1. First the client must select one of the items, a display then shows the value for that item.
2. The customer is then required to input Swedish coins (1, 5 or 10 SEK) to cover at least the cost of that item.
3. The slot accepting coins is closed (not accepting more coins) as soon as the inserted money is equal or higher than the cost of the selected item.
4. The machine gives change (if applicable) and delivers the item.
5. If the customer takes more than 30 seconds to input coins to cover the cost, the slot accepting coins is closed and it gives all the coins inserted so far by the customer.

Groups 2-5 persons: 15 min

Vending machine (2)
Proposed Solution



Some remarks:

- The way actions are written as "methods" is intentional
  - To see another way to write them
- You might (also) want to distinguish between "internal" actions (done by the machine) and "external" (interactions from the user)

Reminder

- Next week there will only be consultation meeting for assignments
  - No lecture!

- Mon Apr 29: Assignment session (9:00-12:00)
- Wed May 1st: **no lecture**