MODELING - CLASSES

SU:E16:L4

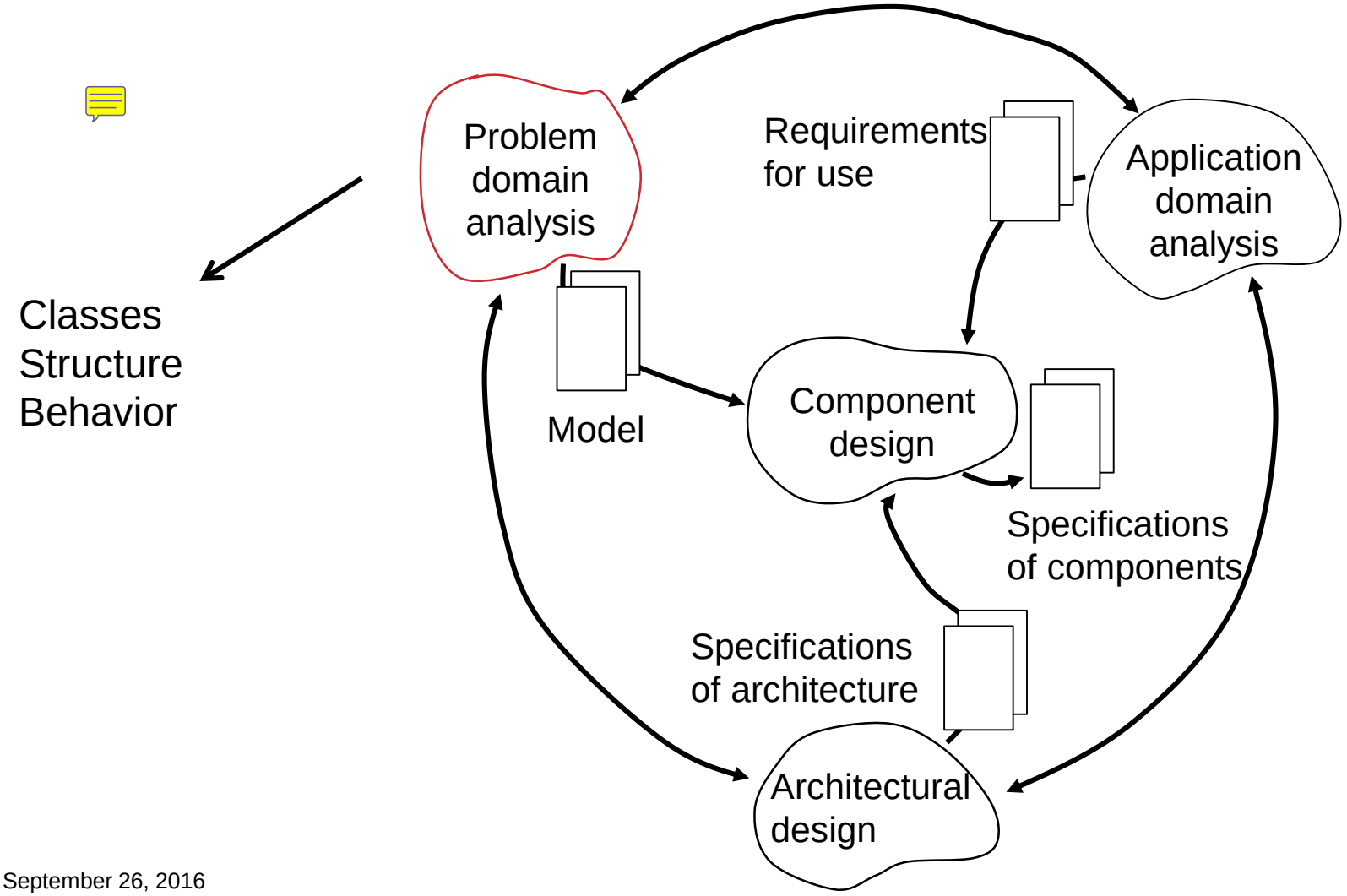
CONTENT

- **Problem domain analysis**
- **The class activity; content and results**

PROBLEM-DOMAIN ANALYSIS

Purpose	• To identify and model a problem domain.
Concepts	• **Problem domain**: That part of a context that is administrated, monitored, or controlled by a system. • **Model:** A description of classes, objects, structures, and behavior in a problem domain.
Principles	• Model the real world as future users will see it. • Get an overview first, then supply details.
Results	• A coherent model of a problem domain

ACTIVITIES IN OOAD



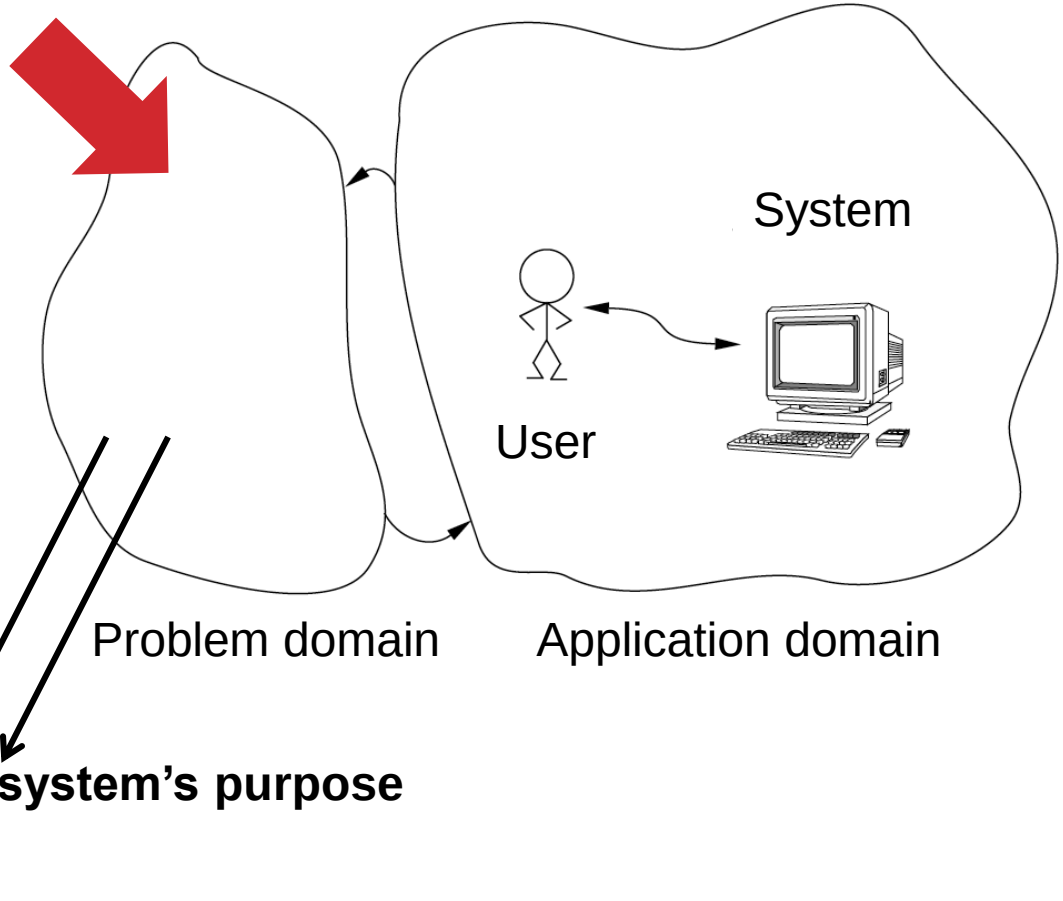
Model: A description of classes, objects, structures, and behavior in a problem domain

MODEL THE CONTEXT

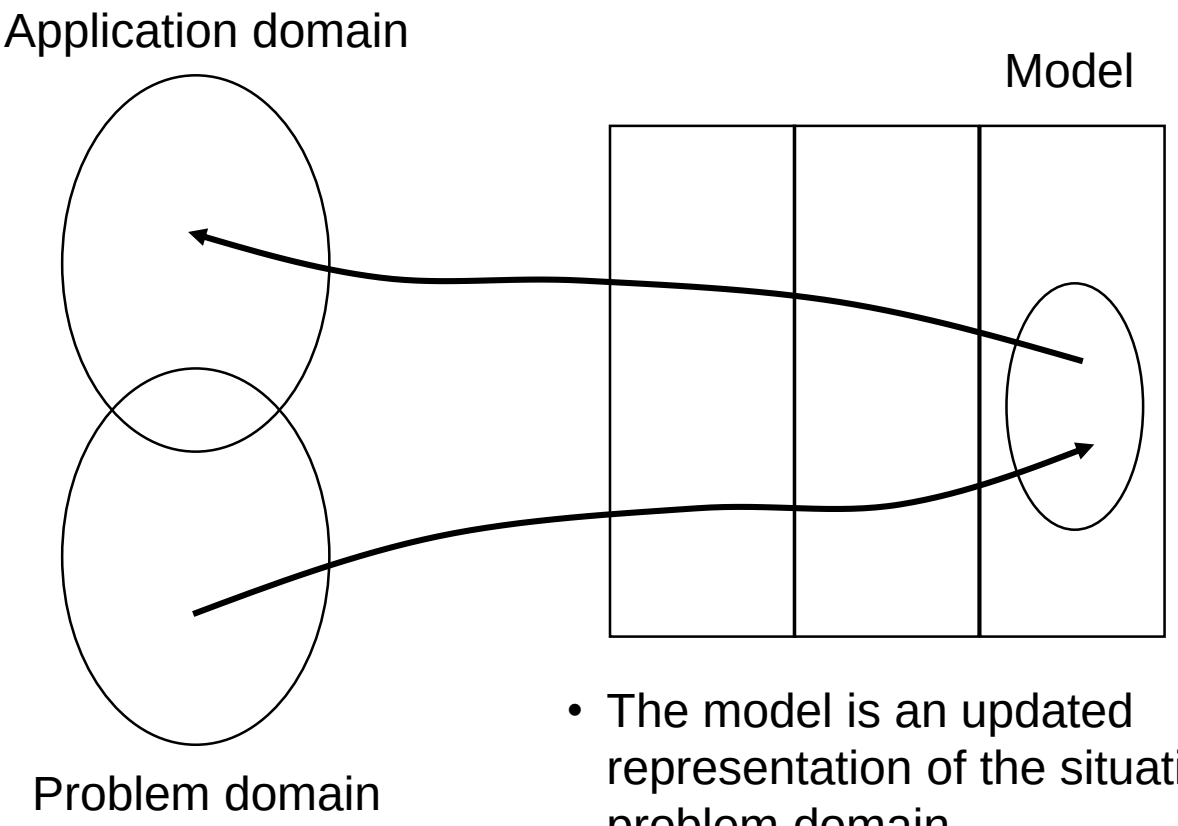
Principle: Model the real world as users will see it

Problem domain:
That part of a context that is administrated, monitored, or controlled by a system.

Application domain:
The organization that administrates, monitors, or controls a problem domain.

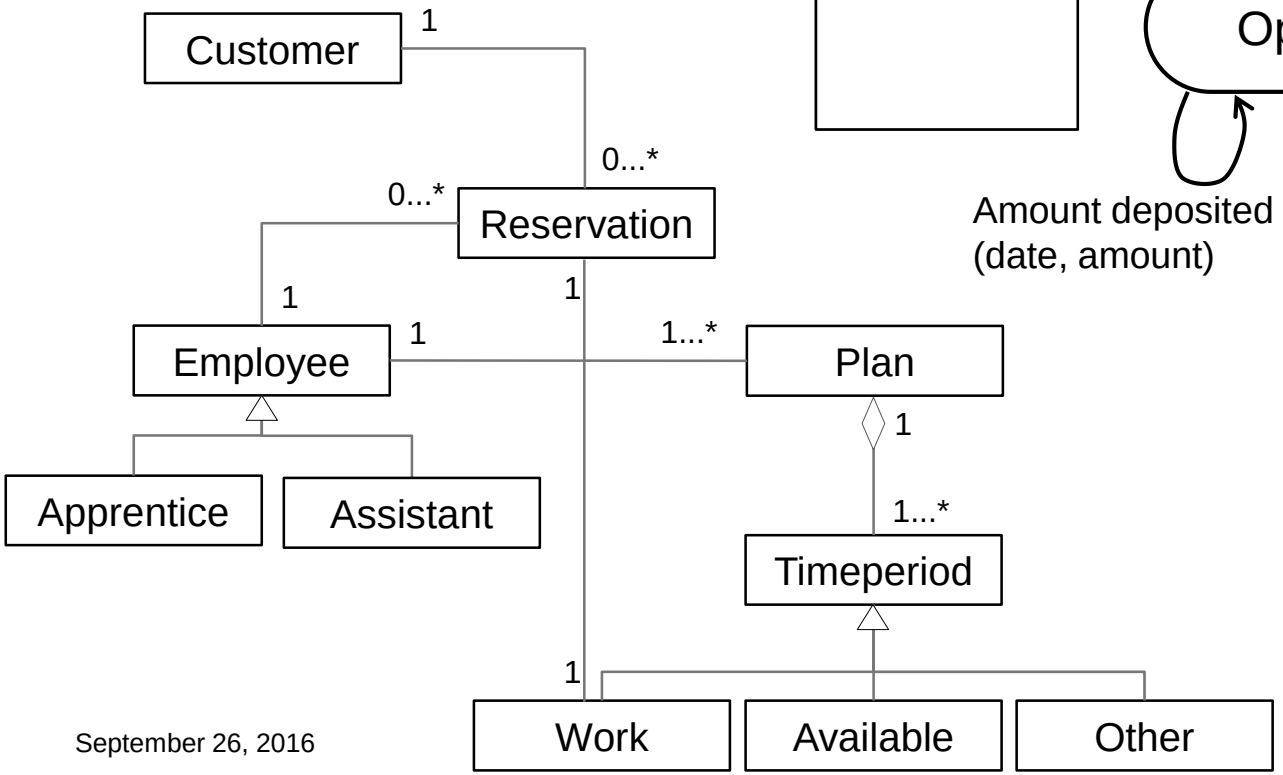


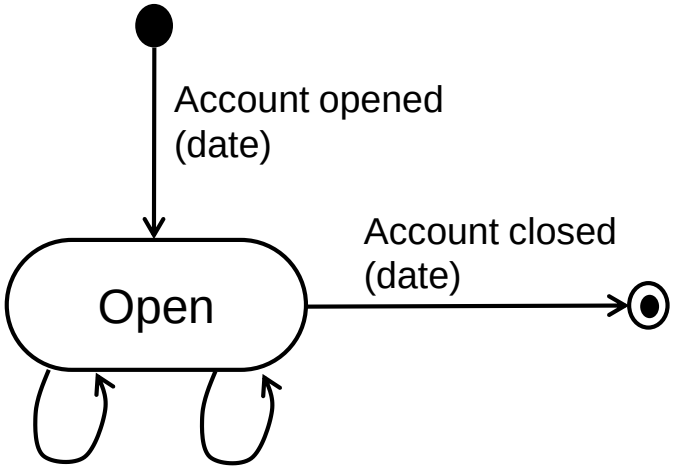
THE MODEL OF THE PROBLEM DOMAIN



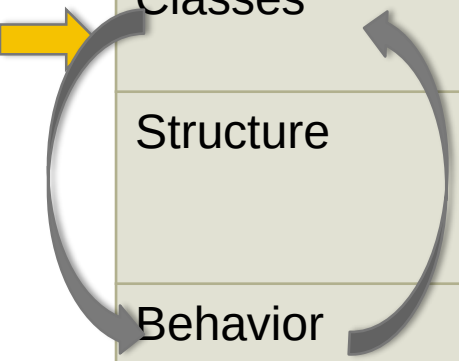
- The model is an updated representation of the situation in the problem domain.
- The model gives the user information about the problem domain.

OUTCOME OF THE PROBLEM-DOMAIN ANALYSIS





ACTIVITIES IN PROBLEM-DOMAIN ANALYSIS



Activity	Content	Concepts
Classes	Which objects and events are part of the problem-domain?	Class, object, and event
Structure	How are classes and objects conceptually ties together?	Generalization, aggregation, association, and cluster
Behavior	Which dynamic properties do the objects have?	Event trace, behavioral pattern, and attribute

Principle: First get an overview, then supply details

PEER ASSIGNMENT

You are developing a system for a hospital

1. **Sketch two alternative system definitions**

- **FACTOR**
  - Functionality
  - Application domain
  - Conditions
  - Technology
  - Objects
  - Responsibility

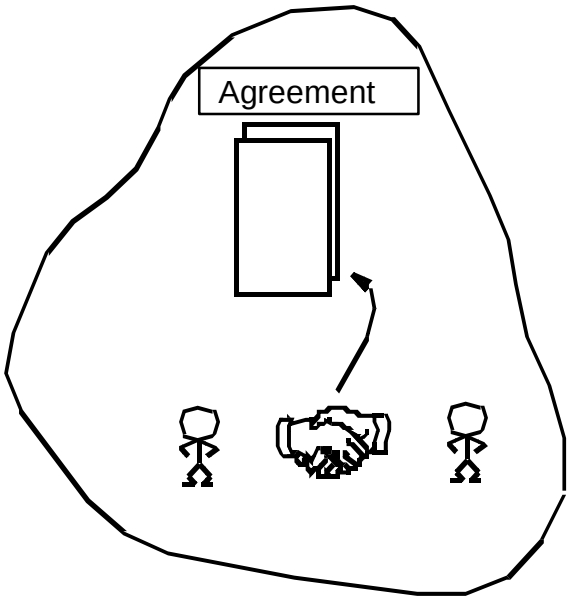
CLASSES

Purpose	• To select the elements of a problem-domain model.
Concepts	• Object: An entity with identity, state and behavior • Class: A description of a collection of objects haring structure behavioral pattern, and attributes. • Events: An instantaneous incident involving one or more objects.
Principles	• Classify objects in the problem domain • Characterize objects through their events • Have an open mind, but select critically
Results	• An event table with classes and related events.

CLASSIFY OBJECTS AND EVENTS

Three class activity principles:

1. Classify objects in the problem-domain
2. Characterize objects though their events
3. Have an open mind, but select critically



Customer
Assistant
Agreement description
…
Agreement made
Agreement resigned
…

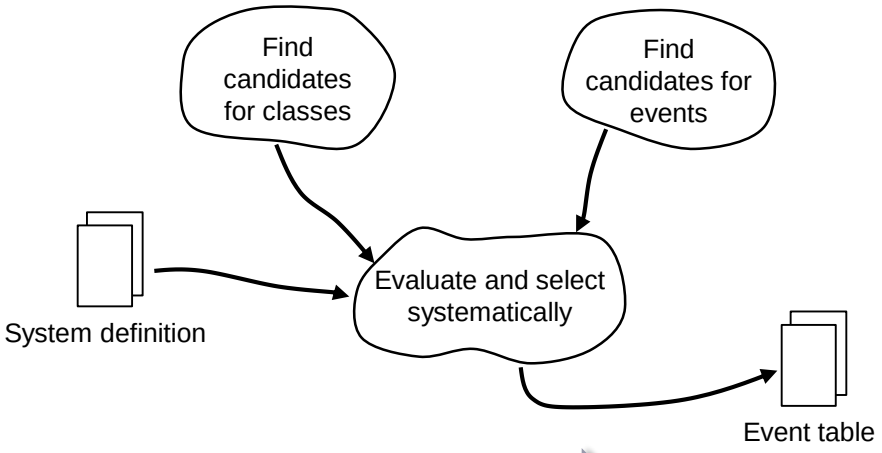
Abstraction
Classification
Selection

OUTCOME OF ‘CLASSES’

Example: hair salon

	Classes				
Events	Customer	Assistant	Apprentice	Appointment	Plan
reserved	X	X		X	X
cancelled	X	X		X	
treated	X			X	
employed		X	X		
resigned		X	X		
graduated			X		
agreed		X	X		X

ACTIVITIES IN ‘CLASSES’



Find candidates for classes

- Candidates for classes
- Items
- Persons
- Organizations
- Places
- Concepts
- Descriptions
- Resources
- Systems

Find candidates for events

- Candidates for events
- Work
- Transport
- Use
- Life cycle
- Carrier
- Monitoring
- Planning

Evaluate and select systematically

- General criteria for evaluation
- Criteria for evaluation of classes
- Criteria for evaluation of events
- Event – class relationships

FIND CLASSES

- **Generate a candidate list**
  - Make a list of all potentially relevant classes
- **Consider many sources**
  - Your own perception of the problem domain
  - Existing descriptions (rich pictures, the system definition, etc.)
  - Collaborate with prospective users
- **The names for the candidate classes must be**
  - Simple and readable,
  - Originate in the problem domain, and
  - Describe a single instance

EXAMPLE: HAIR SALON (CH. 20)

A system for use in a hair salon in the daily work of managing customers and appointments, as well as earlier treatments of regular customers. The system should also be used by the salon owner for planning employees' work schedules. The system should be a reliable and fast tool in the daily work and should also be a common medium for work schedules (appointments). The system, is based on a single, small (and cheap) PC or Macintosh with a large graphics screen (17"), capable of showing detailed work schedules. The development process should be conducted in close cooperation with the salon employees.

- F: Support for work planning and appointments.
- A: Managing customers, their treatments, and appointments, and planning employees' work schedules.
- C: Developed in close cooperation with employees.
- T: Smaller PC or Macintosh with large graphics screen.
- O: Customers, employees, appointments, and work schedules.
- R: Tool for reliable administration and a common mediator in the salon.

EXAMPLE: CANDIDATES FOR CLASSES

- Plan
- Customer database
- Appointment book
- Cash register
- Appointment
- Treatment performed
- Desired vacation
- Work schedule
- Boss, assistant, receptionist (Assistant)
- Apprentice
- Customer
- Chair
- Salon

GROUP DISCUSSION

You are developing a system for a hospital

1. Create two alternative system definitions
2. **Choose one system definition**
3. **Find candidates for classes**

- **FACTOR**
  - Functionality
  - Application domain
  - Conditions
  - Technology
  - Objects
  - Responsibility

FIND EVENTS

- **Generate a candidate list**
  - Make a list of all potentially relevant events
- **Consider many sources**
  - Your own perception of the problem domain
  - Existing descriptions
- **Eliminate verbs related to the way users carry our their job**
  - These belong to the application domain
- **The names for event candidates**
  - Must be simple and readable
  - Originate in the problem domain, and
  - Indicate a single event.

EXAMPLE: CANDIDATES FOR EVENTS

- reserved
- cancelled
- customer arrived
- treated
- payment received
- employed
- resigned
- graduated
- agreed
- material used
- item sold
- item purchased
- customer picked up
- arrived workplace
- leave workplace

GROUP DISCUSSION

You are developing a system for a hospital

1. Create two alternative system definitions
2. Choose one system definition
3. Find candidates for classes
4. **Find candidates for events**

- **FACTOR**
  - Functionality
  - Application domain
  - Conditions
  - Technology
  - Objects
  - Responsibility

EVALUATE AND SELECT SYSTEMATICALLY

General evaluation criteria

- Is the class or event within the system definition?
- Is the class or event relevant for the problem-domain model?

Evaluation criteria for classes

- Can you identify objects from the class?
- Does the class contain unique information?
- Does the class include multiple objects?
- Does the class have a suitable and manageable number of events?

Evaluation criteria for events

- Is the event instantaneous?
- Is the event atomic?
- Can the event be identified when it occurs?

EVALUATION: CLASSES

- Plan +
- Customer database -
- Appointment book -
- Cash register -
- Appointment +
- Treatment performed -
- Desired vacation -
- Work schedule -
- Boss, assistant, receptionist + (Assistant)
- Apprentice +
- Customer +
- Chair -
- Salon -

EVALUATION: EVENTS

- reserved +
- cancelled +
- customer arrived -
- treated +
- payment received -
- employed +
- resigned +
- graduated +
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- material used -
- item sold -
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- customer picked up -
- arrived workplace -
- leave workplace -

GROUP DISCUSSION

You are developing a system for a hospital

1. Create two alternative system definitions
2. Choose one
3. Find candidates for classes
4. Find candidates for events
5. **Evaluate candidates for classes and events**
6. **Make the event table**

- **FACTOR**
  - Functionality
  - Application domain
  - Conditions
  - Technology
  - Objects
  - Responsibility