분석 모델링

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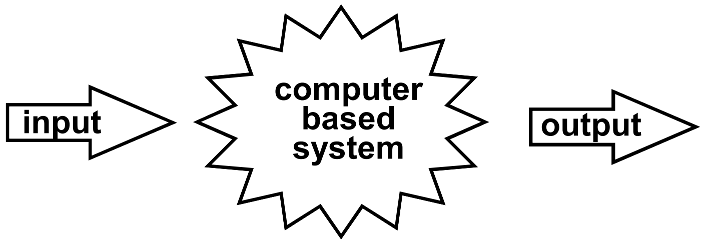
Flow-oriented Modeling

Flow-oriented Models

- **Date flow diagrams**
- **Control-flow diagrams**
- **Processing narratives**

The Flow Model

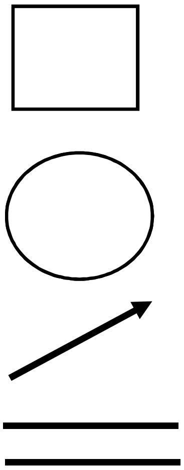
Every computer-based system is an information transform ....



Flow-oriented Model

- The most widely used analysis notations today
- Data Flow Diagram (DFD)
  - Data object: Labeled arrows
  - Transformations: Circles (bubbles)
  - DFD is represented in a hierarchical fashion
  - Level 0 DFD or context diagram represents the system as a whole

Flow Modeling Notation



external entity

process

data flow

data store

External Entity

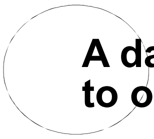
A producer or consumer of data

Examples: a person, a device, a sensor

Another example: computer-based system

Data must always originate somewhere and must always be sent to something

Process

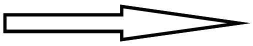


A data transformer (changes input to output)

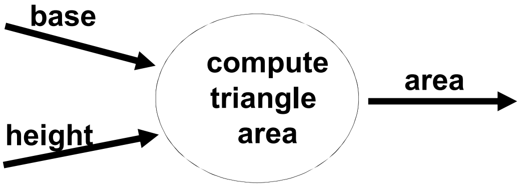
Examples: compute taxes, determine area, format report, display graph

Data must always be processed in some way to achieve system function

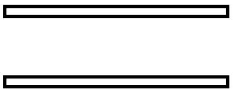
Data Flow



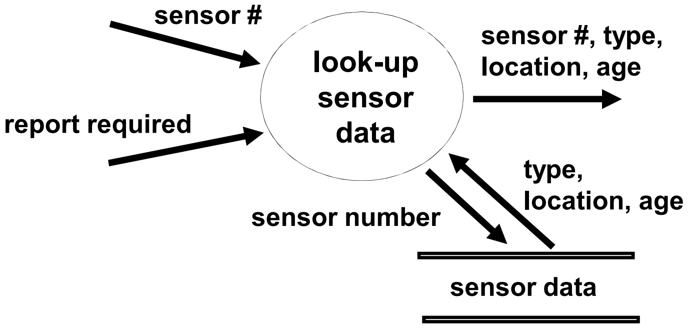
Data flows through a system, beginning as input and be transformed into output.



Data Stores



Data is often stored for later use.



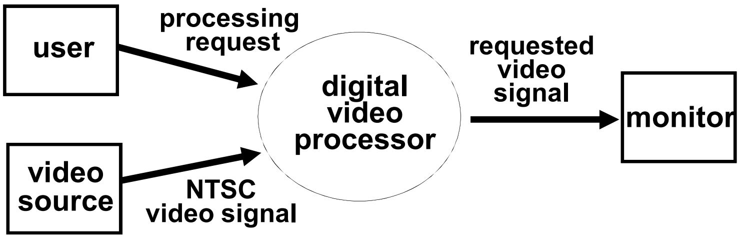
Flow-oriented Model

- Guidelines

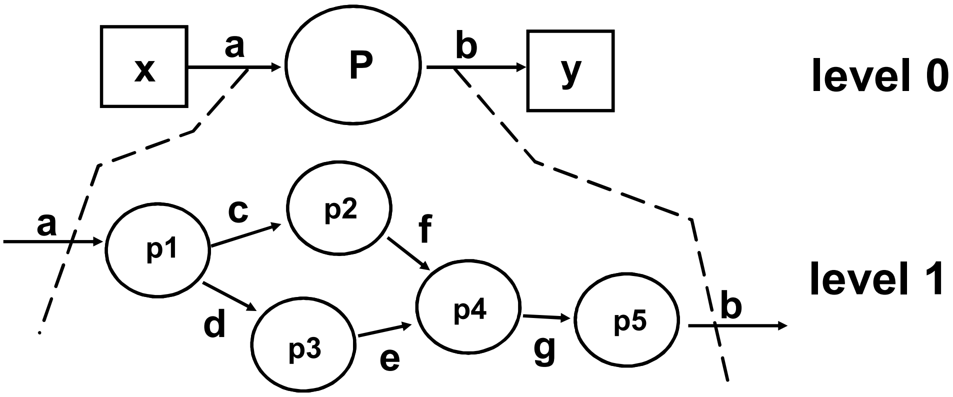
1. The level 0 data flow diagram (context diagram) should depict the software/system as a single bubble
2. Primary input and output should be carefully noted
3. Refinement should begin by isolating candidate processes, data objects, and data stores to be represented at the next level
4. All arrows and bubbles should be labeled with meaningful names
5. Information flow continuity must be maintained from level to level
6. One bubble at a time should be refined

Level 0 DFD

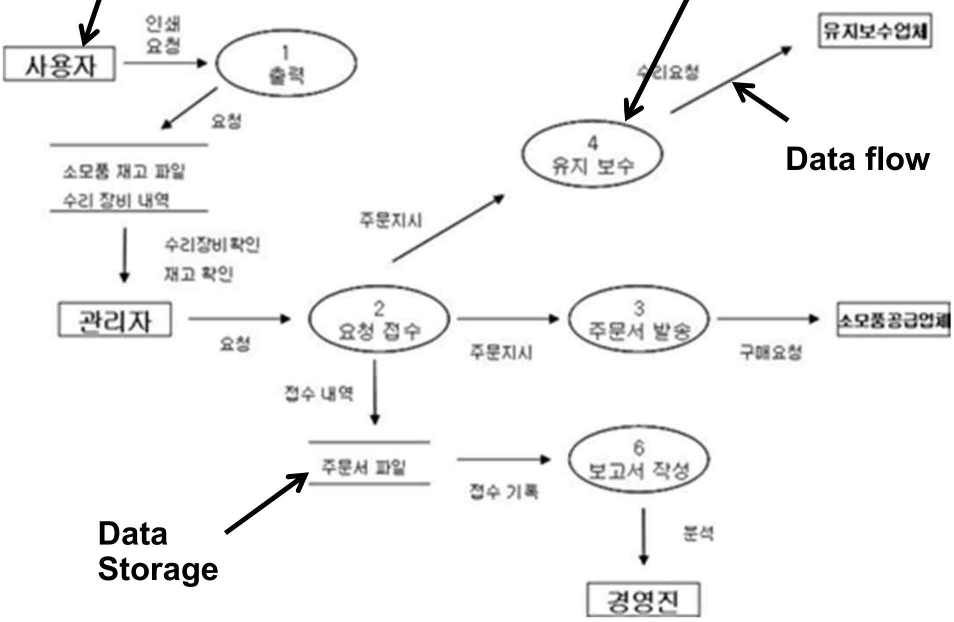
(배경도: Context Diagram)



The Data Flow Hierarchy



DFD 예제



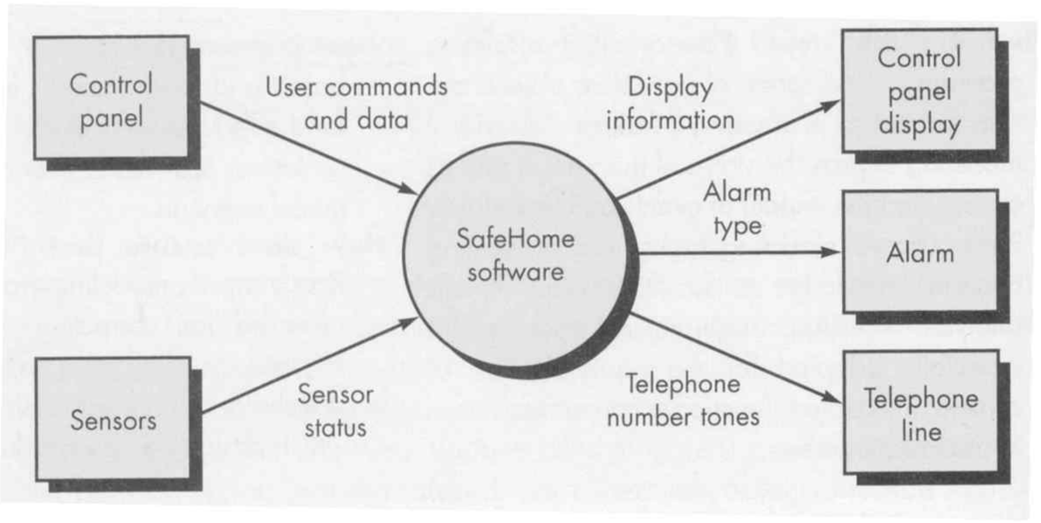
External Entity

Process /Transform /Bubble

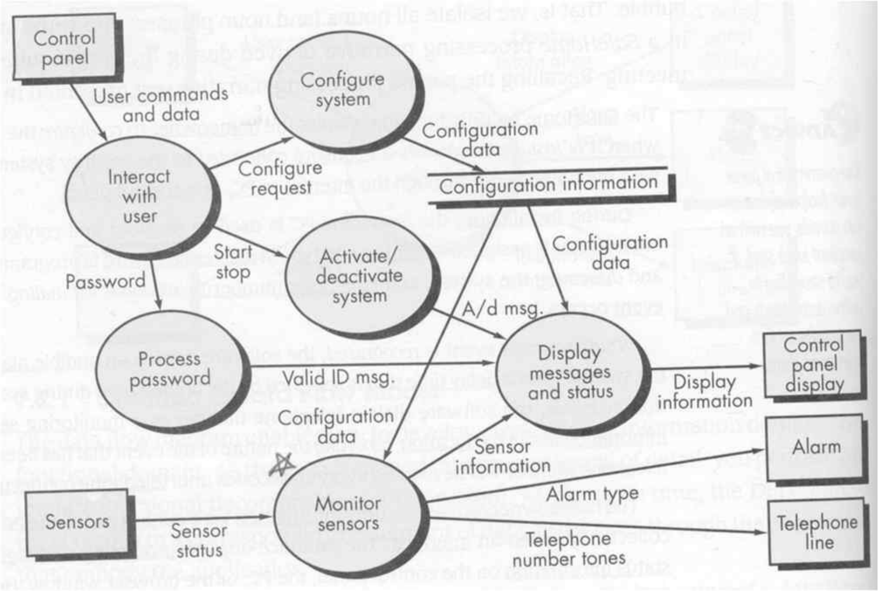
Data flow

Data Storage

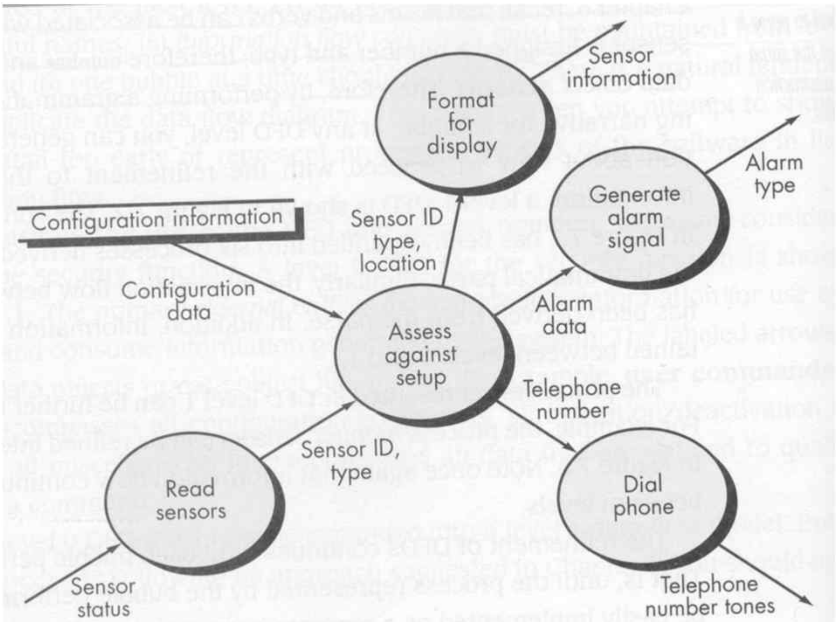
Flow-oriented Model



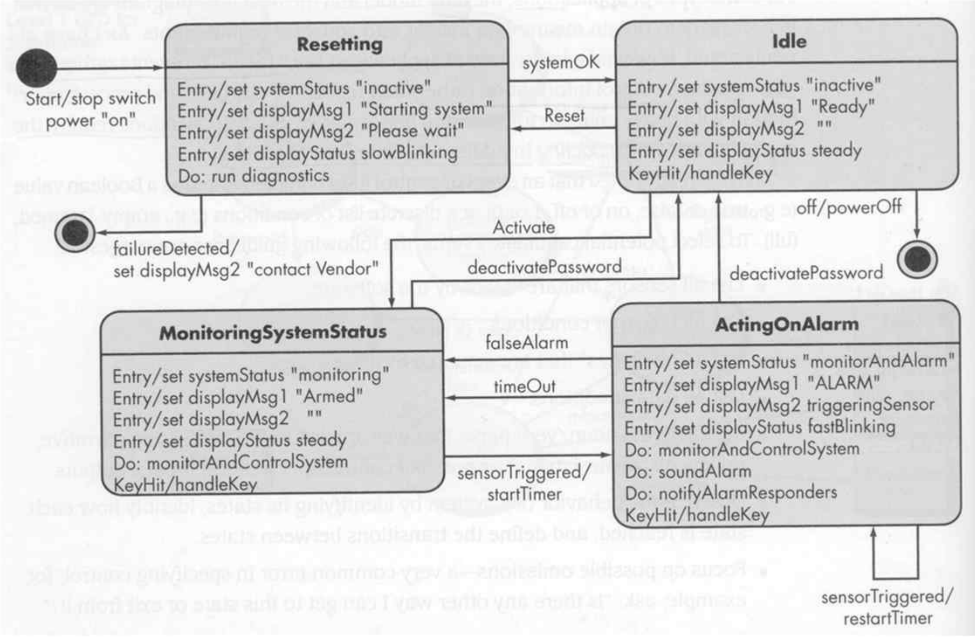
Flow-oriented Model



Flow-oriented Model



Flow-oriented Model


Resetting
Entry/set systemStatus "inactive"
Entry/set displayMsg1 "Starting system"
Entry/set displayMsg2 "Please wait"
Entry/set displayStatus slowBlinking
Do: run diagnostics
Start/stop switch power "on"
systemOK
Reset
Idle
Entry/set systemStatus "inactive"
Entry/set displayMsg1 "Ready"
Entry/set displayMsg2 ""
Entry/set displayStatus steady
KeyHit/handleKey
off/powerOff
failureDetected/ set displayMsg2 "contact Vendor"
Activate
deactivatePassword
deactivatePassword
MonitoringSystemStatus
Entry/set systemStatus "monitoring"
Entry/set displayMsg1 "Armed"
Entry/set displayMsg2 ""
Entry/set displayStatus steady
Do: monitorAndControlSystem
KeyHit/handleKey
falseAlarm
timeOut
sensorTriggered/ startTimer
ActingOnAlarm
Entry/set systemStatus "monitorAndAlarm"
Entry/set displayMsg1 "ALARM"
Entry/set displayMsg2 triggeringSensor
Entry/set displayStatus fastBlinking
Do: monitorAndControlSystem
Do: soundAlarm
Do: notifyAlarmResponders
KeyHit/handleKey
sensorTriggered/ restartTimer

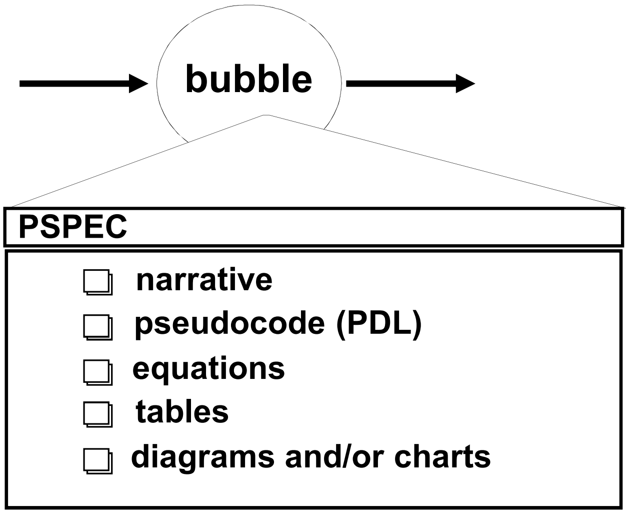
Flow-oriented Model

- The process specification (PSPEC)

  ➔ Describe all flow model processes that appear at the final level of refinement

  - Narrative text
  - Program design language (PDL)
  - Mathematical equations
  - Tables
  - Diagrams
  - Chart

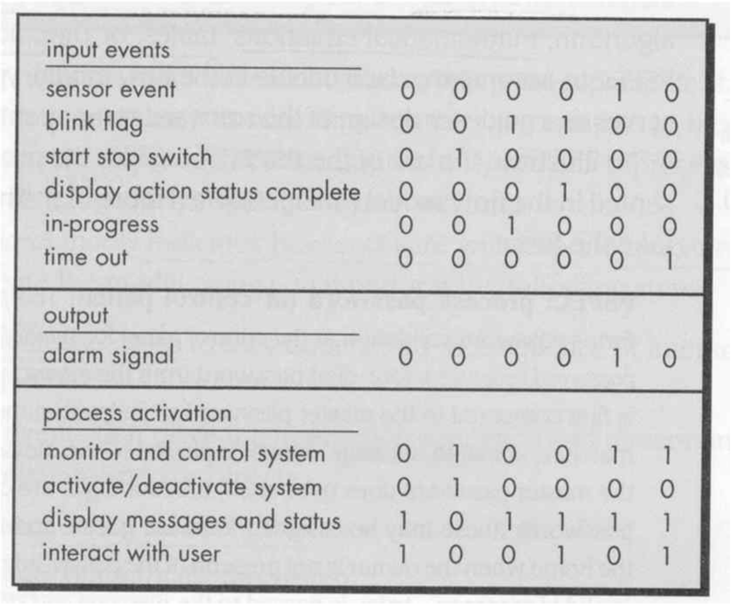
Process Specification (PSPEC)



PSPEC

- □ narrative
- □ pseudocode (PDL)
- □ equations
- □ tables
- □ diagrams and/or charts

Flow-oriented Model



input events						
sensor event	0	0	0	0	1	0
blink flag	0	0	1	1	0	0
start stop switch	0	1	0	0	0	0
display action status complete	0	0	0	1	0	0
in-progress	0	0	1	0	0	0
time out	0	0	0	0	0	1
output						
alarm signal	0	0	0	0	1	0
process activation						
monitor and control system	0	1	0	0	1	1
activate/deactivate system	0	1	0	0	0	0
display messages and status	1	0	1	1	1	1
interact with user	1	0	0	1	0	1

Flow-oriented Model

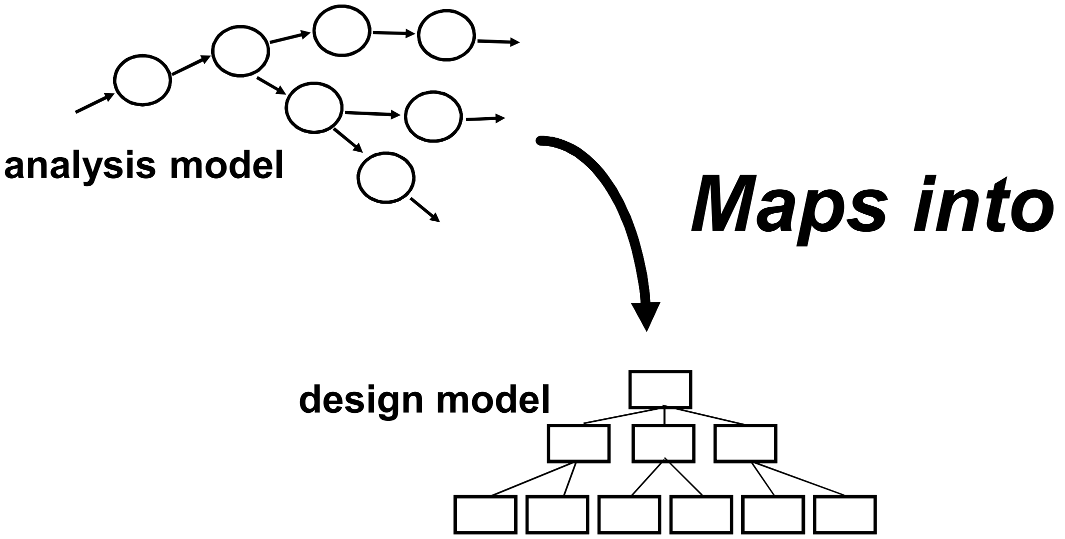
- Creating a control flow model
  - Driven by events rather than data
  - Produce control information
  - Such applications require the use of control flow modeling in addition to data flow modeling

Flow-oriented Model

- The control specification
  - Represents the behavior of the system
  - CSPEC contains a state diagram that is a sequential specification of behavior

(* CSPEC: Control Specification)

DFDs: A Look Ahead



analysis model

Maps into

design model

Behavioral Modeling

Behavioral Models

- **State diagrams**
- **Sequence diagrams**

Behavioral Modeling

- The behavioral model indicates how software will respond to external events or stimuli.

  1. Evaluate all use-cases
  2. Identify events that drive the interaction sequence and understand how these events relate to specific objects.
  3. A sequence for each use-case.
  4. A state diagram for the system.
  5. Review

Behavioral Modeling

- Identifying Events with the Use-Case

  - Safehome example: security function

    The homeowner used the keypad to key in a four-digit password. The password is compared with the valid password stored in the system. If the password is incorrect, the control panel will beep once and reset itself for additional input. If the password is correct, the control panel awaits further action

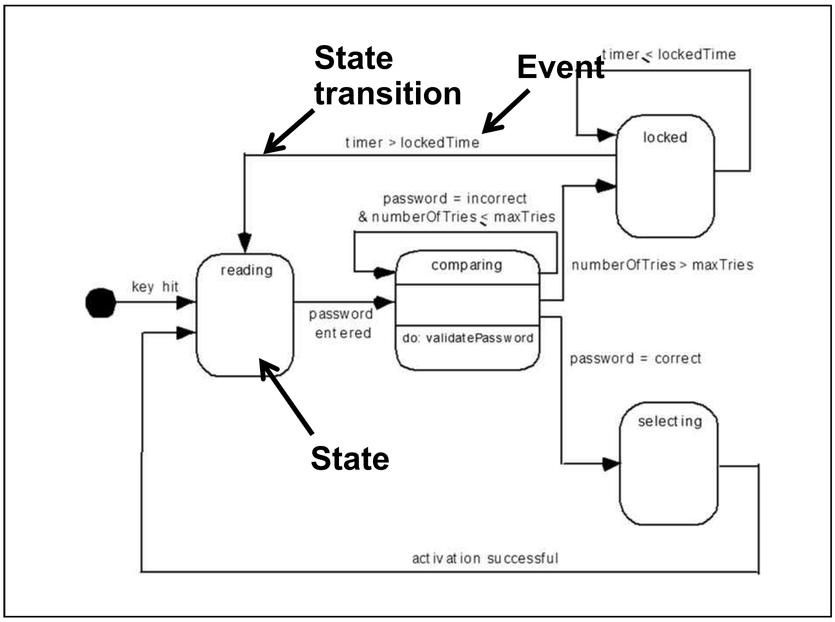
Creating a Behavioral Model

- State diagrams for analysis classes
  - UML state diagram that represents active states for each class and the events that cause changes between these active states

The States of a System

- State — a set of observable circumstances that characterizes the behavior of a system at a given time
- State transition — the movement from one state to another
- Event — an occurrence that causes the system to exhibit some predictable form of behavior
- Action — process that occurs as a consequence of making a transition

State Diagram for the ControlPanel Class



Creating a Behavioral Model

- Sequence diagrams
  - Indicates how events cause transitions from object to object
  - The sequence diagram is s shorthand version of the use-case
  - Each of arrows represents an event and indicates how the event channels behavior between Safehome object
  - Time is measured vertically and the narrow vertical rectangles represent time spent in processing an activity
  - States may be shown along a vertical timeline

Sequence Diagram

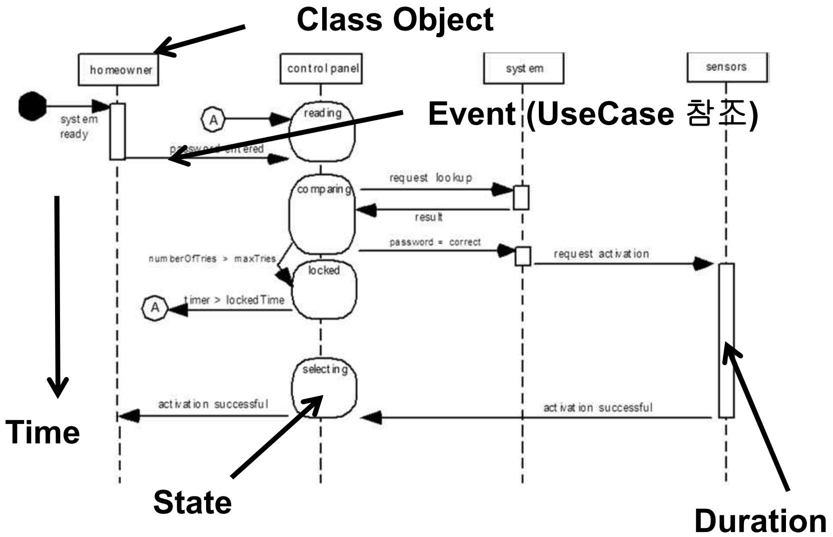


Figure 8.27 Sequence diagram (partial) for *SafeHome* security function

과제

- 이전 프로젝트 관리 과제에 대해 다섯 가지 분석 모델링을 적용하여 각각의 **diagram**을 그리고 간략히 설명하시오.