Embedded Systems Software Engineering

 Jarosław Kuchta

Use case modeling
Basic concepts

• **use case** – an abstract unit of functionality that system delivers to the user

• **actor** – a role or a coherent set of roles that a human, a hardware device, or even another system plays when interacting with the system
Examples

• **Actors:**
  – Operator
  – Supervisor

• **Use cases**
  – Measures
  – Calibration
  – Operating
Use case kinds

• overview / detailed
  – only generic use cases
  – specific use cases with interactions

• essential / real
  – used in analysis
  – used in design
Use case model

• Generic information
• Actors list (actors class diagram)
• Use case diagram
• Main scenarios (interactions)
Many actors in one use case

Operator → Operation → Supervisor

Player → Game session
Actor hierarchy

- Generic user
- Specific users
  - Operator
  - Supervisor
Use cases relationships

• <<include>>
  – Base use case explicitly incorporates the behavior of another use case at a location specified in the base. The included use case never stands alone, but is only instantiated as part of some larger base that includes it.

• <<extend>>
  – Base use case implicitly incorporates the behavior of another use case at a location specified indirectly by the extending use case. The base use case may stand alone, but under certain conditions, its behavior may be extended by the behavior of another use case.

• generalization-specialization
  – Generalization among use cases is just like generalization among classes. Child use case inherits the behavior and meaning of the parent use case; the child may add to or override the behavior of its parent; and the child may be substituted any place the parent appears
Relationships examples (1)

- Order placement «include» Delivery terms
- Login «extend» Registration

User management

- Account creation
- Account edition
- Password reset
Relationships examples (2)

Admin

User management

Account creation
Account edition
Password reset

Admin

Account creation
Account edition
Password reset
Scenario

- Main event sequence
- Sub-activities
- Exceptional situations
Order placement:

1. Customer authentication
2. Order negotiation
3. Order authorization
Scenario – interaction diagram

1: Login()

2: ok:= Authorization()

3a:[not ok]
Invalid login

4: Get Status()

5: Menu

User

Control Panel

Active Directory

Controller
Use case model usage

• User interface design
• Application logic design
• Testing
Bibliography