Analysis 3: Associations, Attributes, Operations, Contracts

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Associations

• Relationships between instances of classes
• Representation of associations in UML
• Finding associations
  – Common associations list
  – “Need to know” associations
  – Avoiding unneeded associations
More on Associations

• Naming associations
  – Role names
  – Navigability

• Multiplicity

• Multiple associations
Attributes

• An attribute is a logical data value of an object
  – Simple attributes (primitive types)
  – Data types

• Complex data types vs. classes

• Avoiding “design creep”
  – Use associations between (instances of) classes, not foreign-object keys
Operations and Contracts

• Pre-conditions
  – Guaranteed by client object (sender of message = caller of operation)

• Post-conditions
  – Guaranteed by server object (receiver of message)

• The stage and curtain analogy
Operations and Contracts 2

• Pre-conditions include conditions on
  – parameters
  – attribute values of receiver (server object)
  – attributes of objects associated with receiver
  – (etc.)

• Post-conditions can include
  – Instance creation or deletion
  – Attribute modification
  – Formation or breaking of associations
An Example Contract

Translator.createSyntaxTree (leftSubtree, operation, rightSubtree)

• Pre-conditions:
  – leftSubtree and rightSubtree are correct syntax trees for source strings in the translation environment
  – operation is a supported source-string operation in the translation environment

• Post-conditions
  – A new syntax tree st has been created
  – st.root = operation
  – leftSubtree is associated with st as its left subtree
  – rightSubtree is associated with st as its right subtree
Design by contract

• Bertrand Meyer (creator of Eiffel)

• Encourages very precise careful specification for operations
  – Object Constraint Language (OCL)

• Useful for complex operations where precision and detail add to developers’ understanding

• Should not be used for every operation