Method Properties

Prof. Dr. Dirk Riehle

Friedrich-Alexander University Erlangen-Nürnberg

ADAP C02

Method Properties

- A method property describes a particular property of a method
  - A method may have one property from any one type of method property
  - Different types of method properties should be orthogonal
- A method property comes with its own conventions
  - Naming conventions, for example, specific leading verbs
  - Specific implementation structures
- Like with method types, developers know and use these names

Types of Method Properties

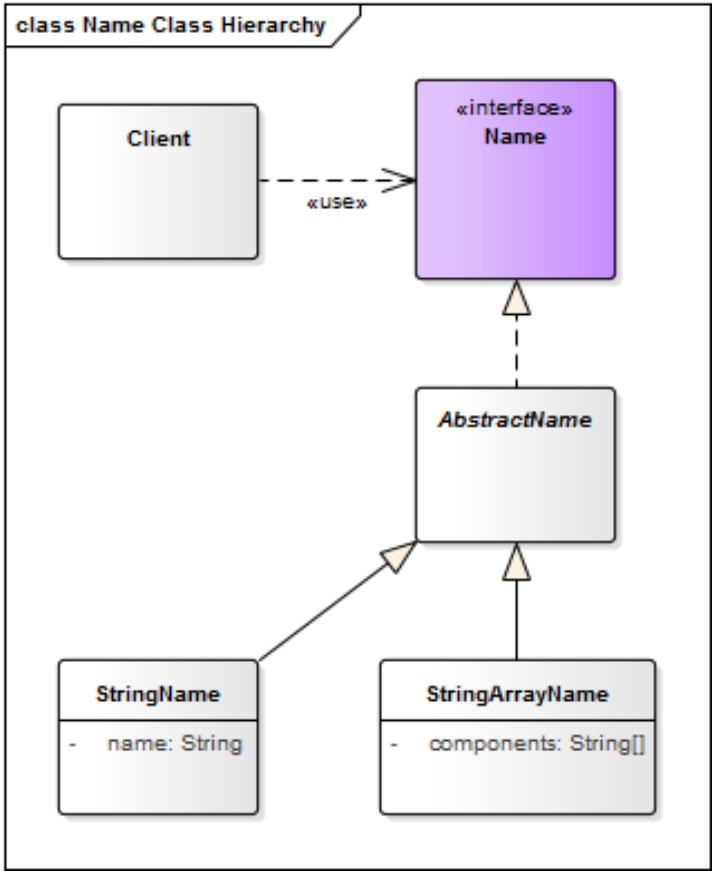
- **Implementation-related**
  - About the internal implementation: { regular, composed, primitive, null }
- **Inheritance-related**
  - About the inheritance interface: { regular, template, hook, abstract }
- **Convenience-related**
  - Making programming easier: { general, constructor, default-value }
- **Meta-level-related**
  - Which meta-level it applies to: { instance, class, meta-class }
- **Visibility-related**
  - Who can see and access: { public, protected, package-protected, private }
- **...**

Types and Values of Method Properties

Implementation	Inheritance	Convenience
regular	regular	general
composed	template	constructor
primitive	primitive	default-value
null	abstract	
...	...	...

A Class Hierarchy for Homogenous Names

- interface Name
  - Captures the Name interface
  - Is client-facing only (no implementation)
- abstract class AbstractName
  - Captures implementation commonalities
  - Defines inheritance interface
- class StringName
  - Represents name in single string
  - Implements inheritance interface
- class StringArrayName
  - Represents name in string array
  - Implements inheritance interface



Composed Method (Implementation)

Definition	A composed method is a method that organizes a task into several subtasks as a linear succession of method calls. Each subtask is represented by another method, primitive or non-primitive.
Also known as	-
JDK example	-
Name example	String AbstractName#getComponent(int) void AbstractName#insert(int, String)
Prefixes	-
Comment	Name was taken from [B97].

Composed Method Examples

```
public String[] asStringArray() {
  int max = getNoComponents();
  String[] sa = new String[max];
  for (int i = 0; i < max; i++) {
    sa[i] = getComponent(i);
  }

  return sa;
}
```

```
protected void doInsert(int index, String component) {
  int newSize = getNoComponents() + 1;
  String[] newComponents = new String[newSize];
  for (int i = 0, j = 0; j < newSize; j++) {
    if (j != index) {
      newComponents[j] = components[i++];
    } else {
      newComponents[j] = component;
    }
  }
  components = newComponents;
}
```

Primitive Method (Implementation)

Definition	A primitive method is a method that carries out one specific task, usually by directly using the fields of the object. It does not rely on any (non-primitive) methods of the class that defines the primitive method.
Also known as	-
JDK example	-
Name example	void AbstractName#assertIsValidIndex(int, int) String AbstractName#doGetComponent(int)
Prefixes	basic, do
Comment	Design by Primitive is a key principle of good class design that uses primitive methods.

Primitive Method Examples

```
public String getComponent(int index) {
  assertIsValidIndex(index);
  return doGetComponent(index);
}

protected abstract String doGetComponent(int index);
```

```
protected String doGetComponent(int i) {
  return components[i];
}
```

```
protected String doGetComponent(int i) {
  int startPos = getStartPositionOfComponent(i);
  int endPos = getEndPositionOfComponent(i);
  String maskedComponent = name.substring(startPos, endPos);
  return NameHelper.unmaskString(maskedComponent);
}
```

Template Method (Inheritance)

Definition	A template method is a method that defines an algorithmic skeleton for a task by breaking it into subtasks. Some of the subtasks are deferred to subclasses by means of hook methods.
Also known as	-
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Name example	Name Name#getContextName() String[] Name#asStringArray()
Prefixes	-
Comment	Name was taken from [G+95].

Template Method Examples

```
public String[] asStringArray() {
  int max = getNoComponents();
  String[] result = new String[max];
  for (int i = 0; i < max; i++) {
    result[i] = getComponent(i);
  }
  return result;
}

public abstract int getNoComponents();

public String getComponent(int index) {
  assertIsValidIndex(index);
  return doGetComponent(index);
}

protected abstract String doGetComponent(int index);
```

```
public String[] asStringArray() {
  return Arrays.copyOf(components, components.length);
}
```

Hook Method (Inheritance)

Definition	A hook method is a method that declares a well-defined task and makes it available for overriding through subclasses.
Also known as	-
JDK example	-
Name example	String AbstractName#doGetComponent(int) Name AbstractName#doInsert(int, String)
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Hook Method Examples

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public String[] asStringArray() {
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public abstract int getNoComponents();

public String getComponent(int index) {
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Convenience Method (Convenience)

Definition	A convenience method is a method that simplifies the use of another, more complicated method by providing a simpler signature and by using default arguments where the client supplies no arguments.
Also known as	-
JDK example	String BigInteger::toString() (wraps String BigInteger::toString(int radix))
Name example	String Name#getFirstComponent() String Name#asString()
Prefixes	-
Comment	Name was taken from [H00].

Convenience Method Examples

```
public String getFirstComponent() {
  return getComponent(0);
}

public String asString() {
  return asString(getDelimiterChar());
}
```

Default-Value Method (Convenience)

Definition	A default-value method is a method that returns a single pre-defined value, like a constant, but changeable by subclasses.
Also known as	-
JDK example	-
Name example	public char AbstractName#getDelimiterChar() public char AbstractName#getEscapeChar()
Prefixes	-
Comment	-

Default-Value Method Examples

```
public static final char DEFAULT_DELIMITER_CHAR = '#';

public static final String DEFAULT_DELIMITER_STRING = "#";

public static final char DEFAULT_ESCAPE_CHAR = '\\';

public static final String DEFAULT_ESCAPE_STRING = "\\";
```

```
public char getDelimiterChar() {
  return DEFAULT_DELIMITER_CHAR;
}

public char getEscapeChar() {
  return DEFAULT_ESCAPE_CHAR;
}
```

Making Method Properties Explicit in Code

- Annotate in comments using @MethodProperties list-of-properties

Review / Summary of Session

- General method properties
  - What are method types?
  - What categories of method properties are there?
- Specific method properties
  - What specific method properties are there? How common are they?
  - How are they defined? What naming convention do they follow?
- Interactions of methods
  - How do methods interact? How is this reflected in their properties?

Thank you! Questions?

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- Contributions
  - ...

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It is Friedrich-Alexander University Erlangen-Nürnberg – FAU, in short.

Corporate identity wants us to say “Friedrich-Alexander University”.

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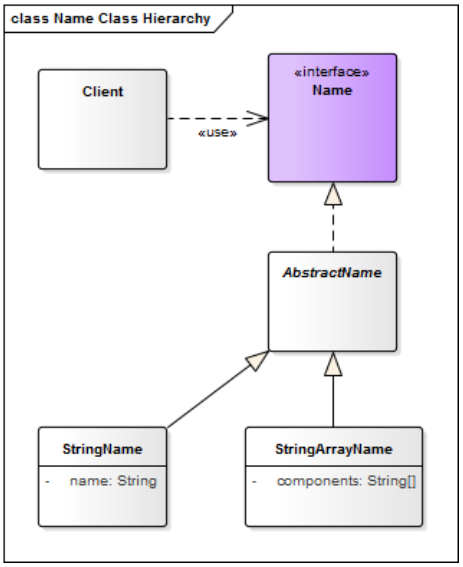

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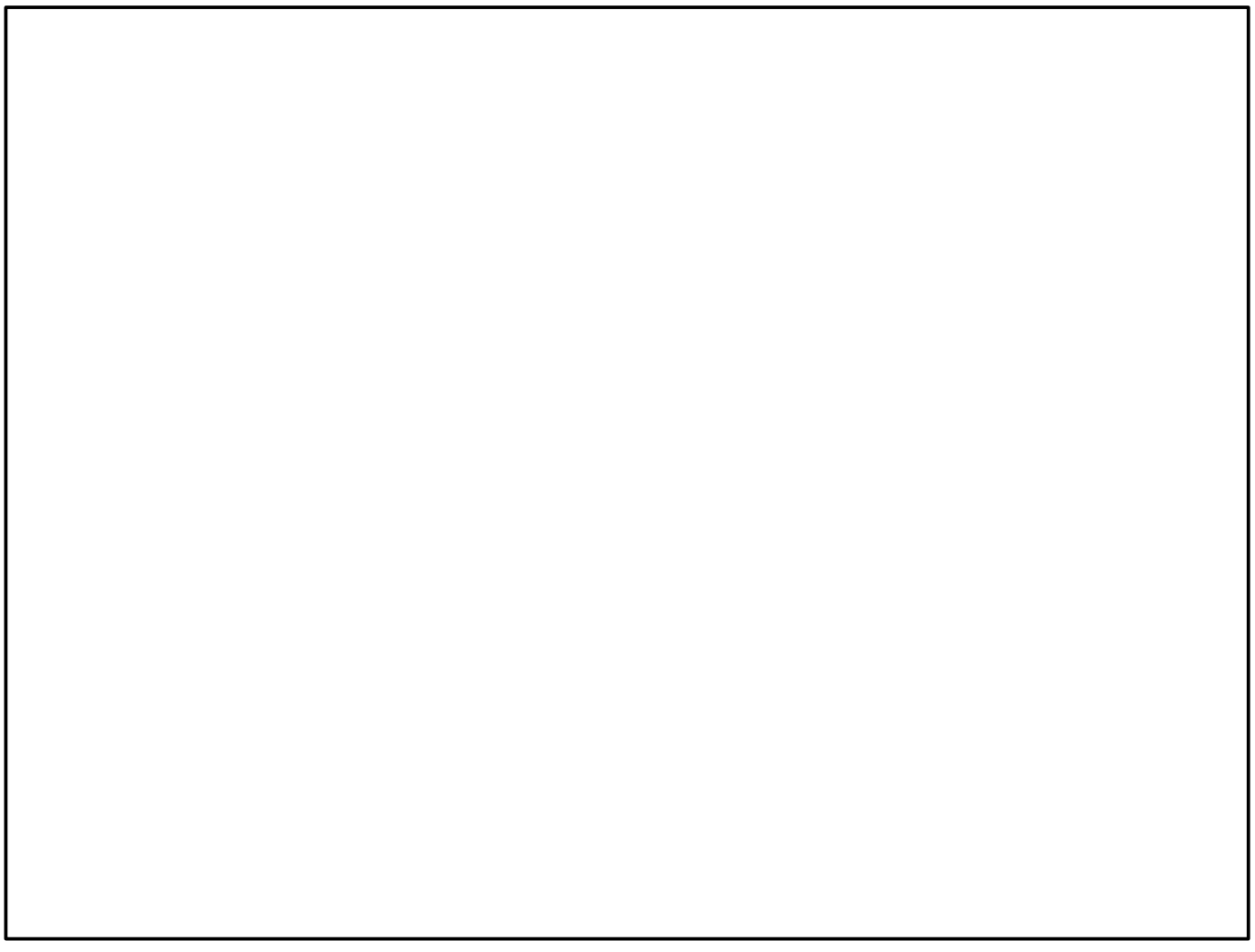

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