Assignment 6: SCOOP type system

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1 Subtyping

1.1 Background

Have a look at the attributes shown in listing 1.

Listing 1: Attributes

```
px: PROCESSOR
py: PROCESSOR

a: separate X
b: separate <px> X
c: separate <py> X
d: X
e: detachable separate X
f: detachable separate <px> X
g: detachable X
```

1.2 Task

Decide whether the following attachments are valid or not. Justify your answer.

1. $a := b$
2. $a := d$
3. $b := a$
4. $b := c$
5. $b := d$
6. $d := a$
7. $d := b$
8. $a := e$
9. $e := a$

2 Valid targets

2.1 Background

Have a look at listing 2.

Listing 2: Enclosing Feature

```
p: PROCESSOR

r (a: detachable separate X; b: separate <p> X; c: separate X)
 local
   d: separate <p> X
   e: separate <c.handler> X
   f: separate X
 do
   ...
 end
```

Imagine that the class *X* has a function *g*: *X* and a procedure *do_something*.

2.2 Task

Decide for each of the following feature calls, whether the calls are valid or not when they appear in feature *r* of listing 2.

1. *c.do_something*
2. *c.g.do_something*
3. *e* := *c*; *e.do_something*
4. *f* := *c*; *f.do_something*
5. *a.do_something*
6. *d* := *b*; *d.do_something*

3 Separate generics or generic separate?

3.1 Background

The interplay between generics and separate types are important to understand, and enforce a good understanding of the type system.

3.2 Task

Consider the differences between:

- **separate** *LIST* [*BOOK*]
- *LIST* [**separate** *BOOK*]

Explain the distinction using the object/processor diagram.

4 Basic library: type combiner

4.1 Background

Consider the classes in listing 3. These classes belong to a basic library implementation.

Listing 3: Basic Library

```
class LIST[G]
  feature
    last: G
        -- Last element.

    put(a_element: G)
        -- Add the element to the list.
      do
        ...
      end
end

class LIBRARY
  feature
    books: LIST[separate BOOK] -- Books.
end
```

4.2 Task

What is the result type of *books.last* from the perspective of the library? What is the type of an actual argument in the call *books.put* (...) from the perspective of the library? Justify your answer.

5 Stack library: type combiner

5.1 Background

Consider the alternative stack based library implementation shown in listing 4.

Listing 4: Stack Library

```
class LIST[G]
  feature
    last: G -- Last element.
end

class STACK[G]
  feature
    top: G -- Top element.
end

class LIBRARY
  feature
    books: LIST[STACK[separate BOOK]] -- Books.
end
```

5.2 Task

What is the result type of *books.last.top* from the perspective of the library? Justify your answer.