Bridge Pattern

Context

- A drawing application dealing with different shapes, such as rectangle, circle, line…

- Different output format, such as screen, printer, XML serializer…

DRAWER

```
class DRAWER

feature

    draw_line (x1, y1, x2, y2: INTEGER) is
        do
            ...
        end

    draw_pixel (x, y: INTEGER) is
        do
            ...
        end

    draw_circle (x, y, r: INTEGER) is
        do
            ...
        end
end
```

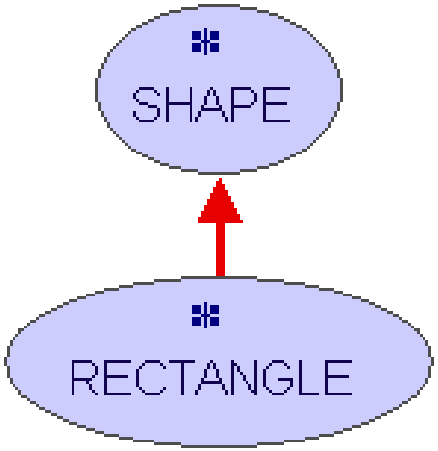
PRINTER

```
class PRINTER

feature

    print_line (x1, y1, x2, y2: INTEGER) is
        do
            ...
        end

    print_pixel (x, y: INTEGER) is
        do
            ...
        end

    print_circle (x, y, r: INTEGER) is
        do
            ...
        end
end
```

SHAPE and RECTANGLE

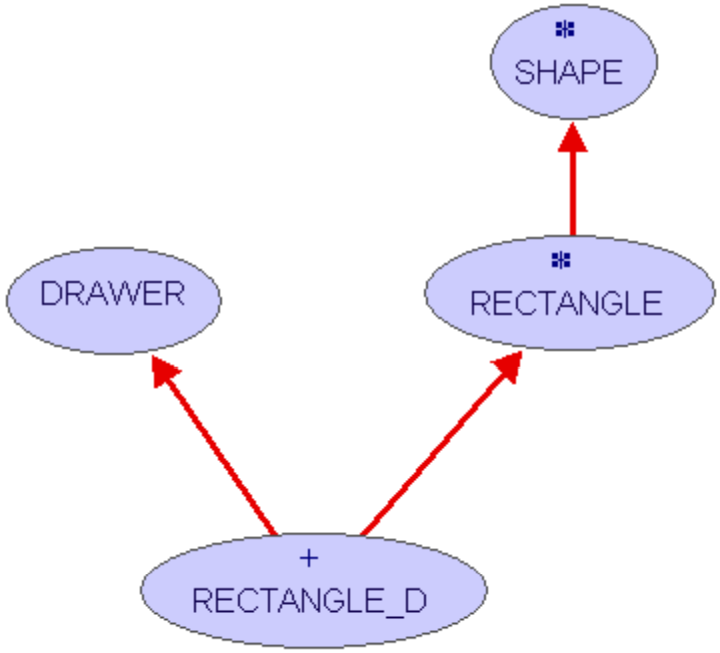
```
deferred class  SHAPE
feature
    draw is
            -- Draw this shape
        deferred
        end
end
```

```
deferred class
    RECTANGLE

inherit
    SHAPE

feature
    x1, x2, y1, y2: INTEGER

end
```



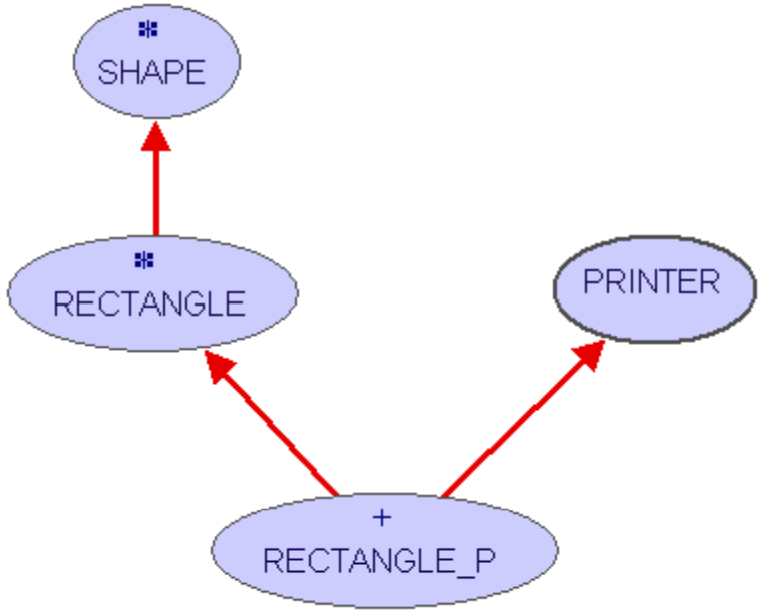
RECTANGLE_D

```
class RECTANGLE_D
inherit
    RECTANGLE
    DRAWER

feature

    draw is
            -- Draw this shape
     do
            draw_line (x1, y1, x2, y1)
            draw_line (x1, y2, x2, y2)
            draw_line (x1, y1, x1, y2)
            draw_line (x2, y1, x2, y2)
     end

end
```

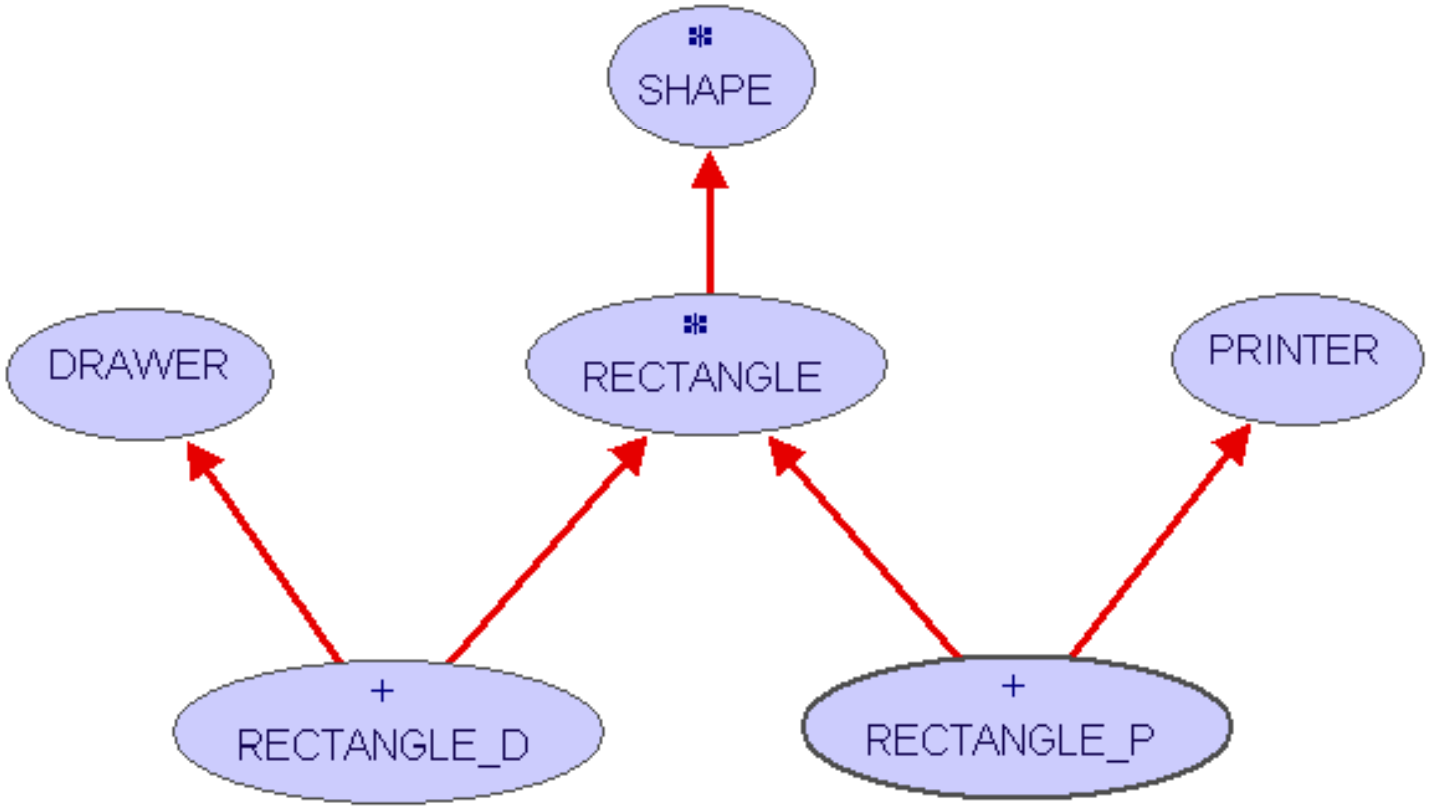


RECTANGLE_P

```
class RECTANGLE_P

inherit
    RECTANGLE
    PRINTER

feature

    draw is
            -- Draw this shape
     do
            print_line (x1, y1, x2, y1)
            print_line (x1, y2, x2, y2)
            print_line (x1, y1, x1, y2)
           print_line (x2, y1, x2, y2)
     end

end
```



Overall hierarchy



Things change…

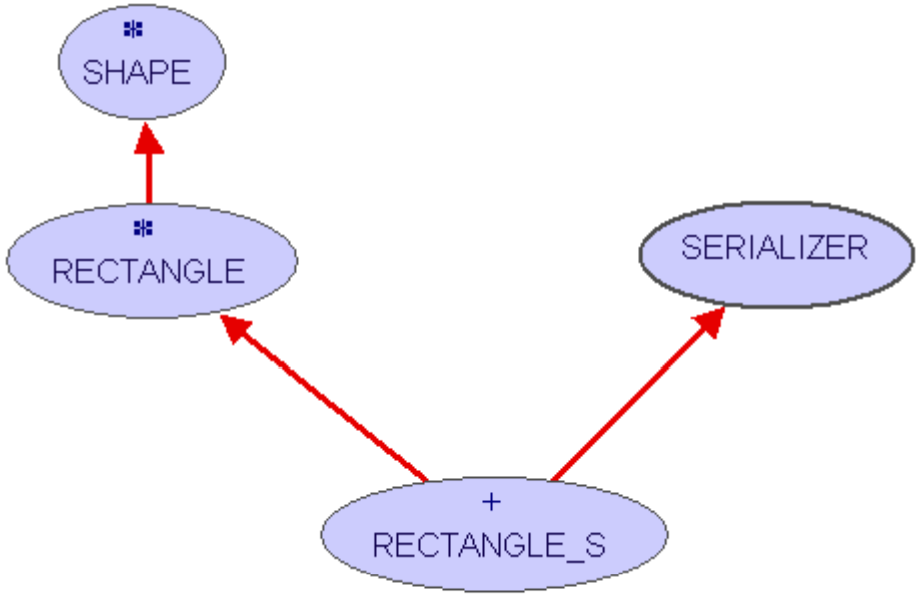
What if new output format needs to be supported?

For example, a XML serializer as output.

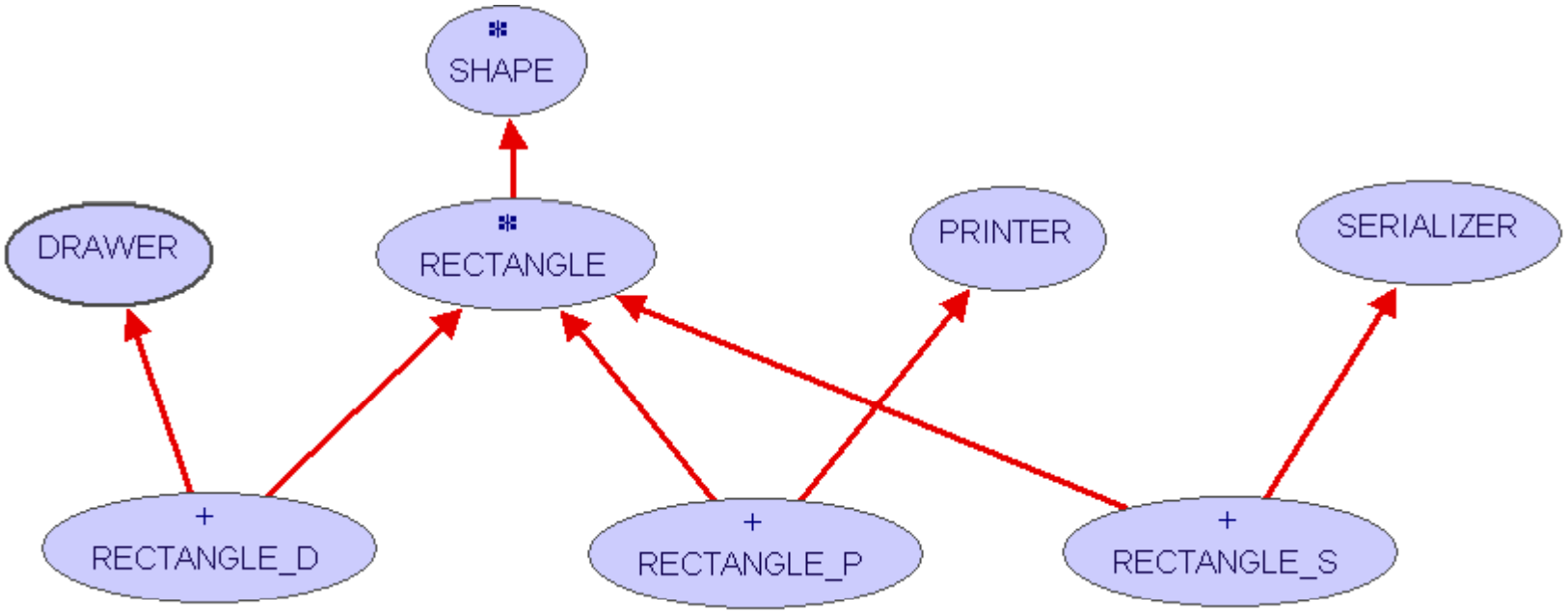
SERIALIZER

```
class
   XML_WRITER

feature

   serialize_line (x1, y1, x2, y2: INTEGER) is
      do
         ...
      end

   serialize_pixel (x, y: INTEGER) is
      do
         ...
      end
   serialize_circle (x, y, r: INTEGER) is
      do
         ...
      end

end
```

```
class
   RECTANGLE_S

inherit
   RECTANGLE

   SERIALIZER

feature

    draw is
          -- Draw this shape
     do
       serialize_line (x1, y1, x2, y1)
       serialize_line (x1, y2, x2, y2)
       serialize_line (x1, y1, x1, y2)
       serialize_line (x2, y1, x2, y2)
     end


end
```



Overall hierarchy now



Things change…

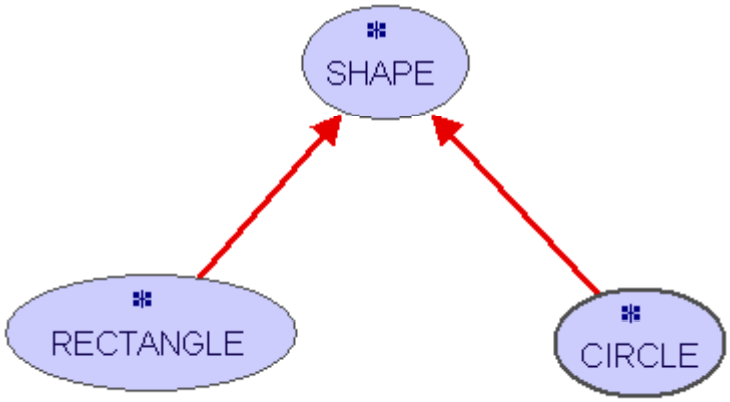
What if we need to support new kind of shape?

For example, circle.

We need to add a CIRCLE class, and for every supported output format, we need to add a descendant class of CIRCLE.

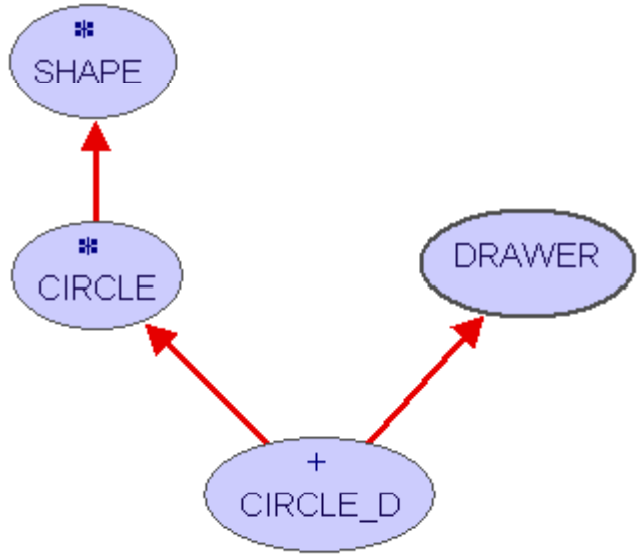
CIRCLE

```
deferred class
    CIRCLE

inherit
    SHAPE

feature
    x, y, r: INTEGER

end
```

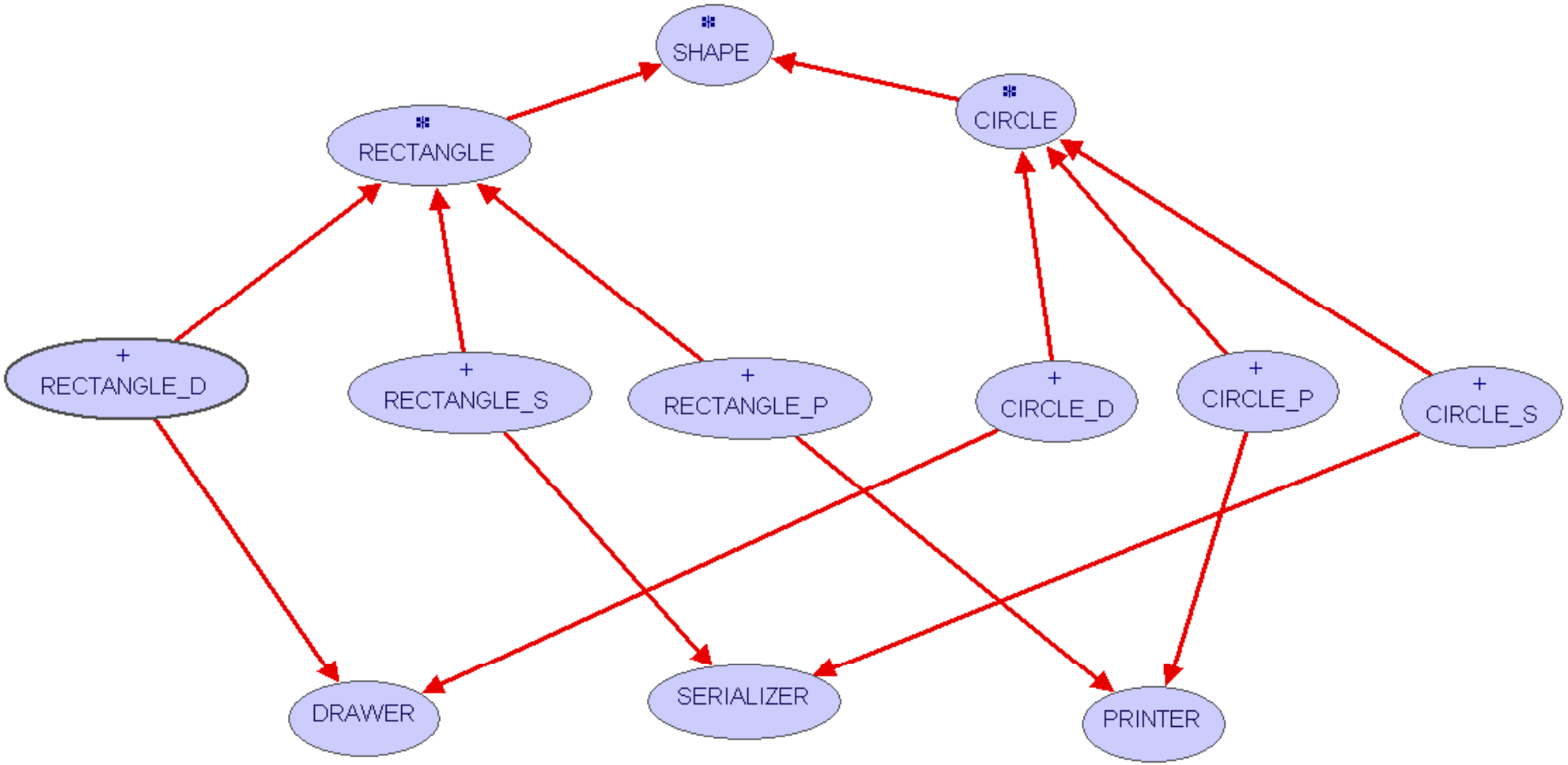


CIRCLE_D, CIRCLE_P, CIRCLE_S

```
class
    CIRCLE_D

inherit
    CIRCLE

    DRAWER

feature

    draw is
            -- Draw this shape
        do
            draw_circle (x, y, r)
        end

end
```



Overall hierarchy



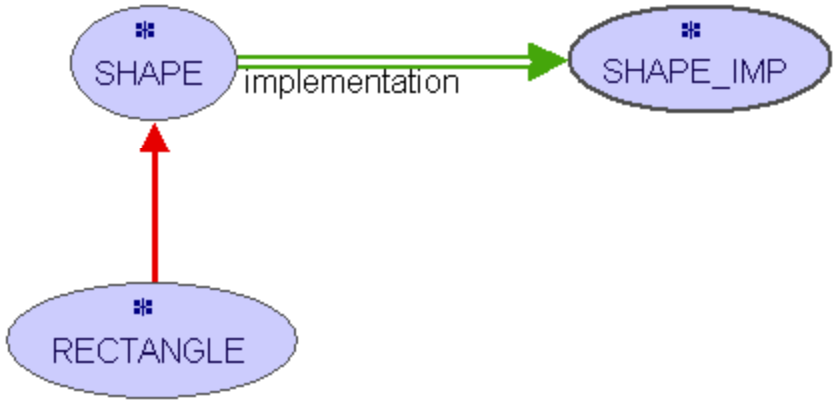
SHAPE and SHAPE_IMP (Two ends of a bridge)

```
deferred class
    SHAPE

feature
    implementation: SHAPE_IMP
        -- Implementation

feature

    draw is
            -- Draw this shape
     deferred
       end

end
```

```
deferred class
    SHAPE_IMP

feature
    draw_line (x1, y1, x2, y2: INTEGER) is
       deferred
       end

    draw_pixel (x, y: INTEGER) is
       deferred
       end

    draw_circle (x, y, r: INTEGER) is
       deferred
       end

end
```

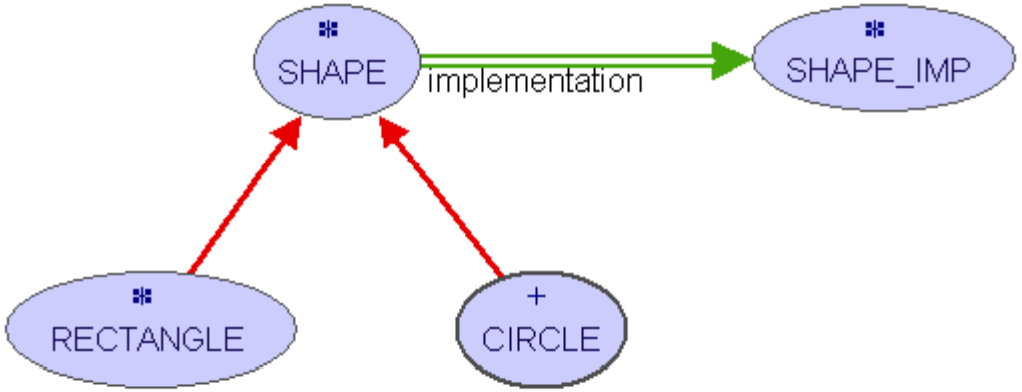
RECTANGLE

```
class RECTANGLE
inherit SHAPE

feature
    x1, x2, y1, y2: INTEGER

feature

    draw is
            -- Draw this shape
     do
         implementation.draw_line (x1, y1, x2, y1)
         implementation.draw_line (x1, y2, x2, y2)
         implementation.draw_line (x1, y1, x1, y2)
        implementation.draw_line (x2, y1, x2, y2)
     end

end
```



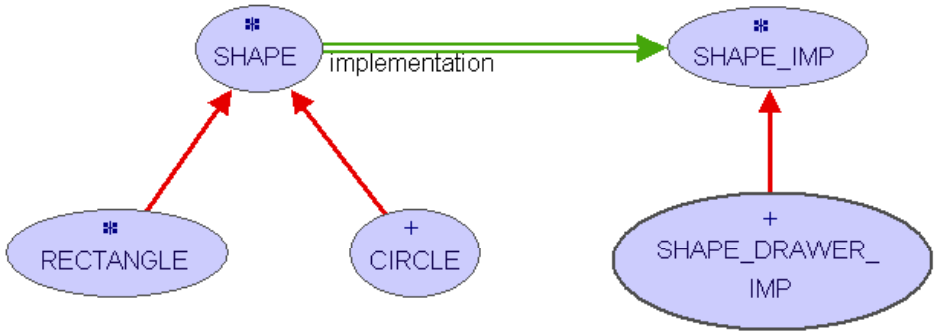
CIRCLE

```
class
    CIRCLE

inherit
    SHAPE

feature
    x, y, r: INTEGER

feature

    draw is
            -- Draw this shape
     do
            implementation.draw_circle (x, y, r)
     end

end
```



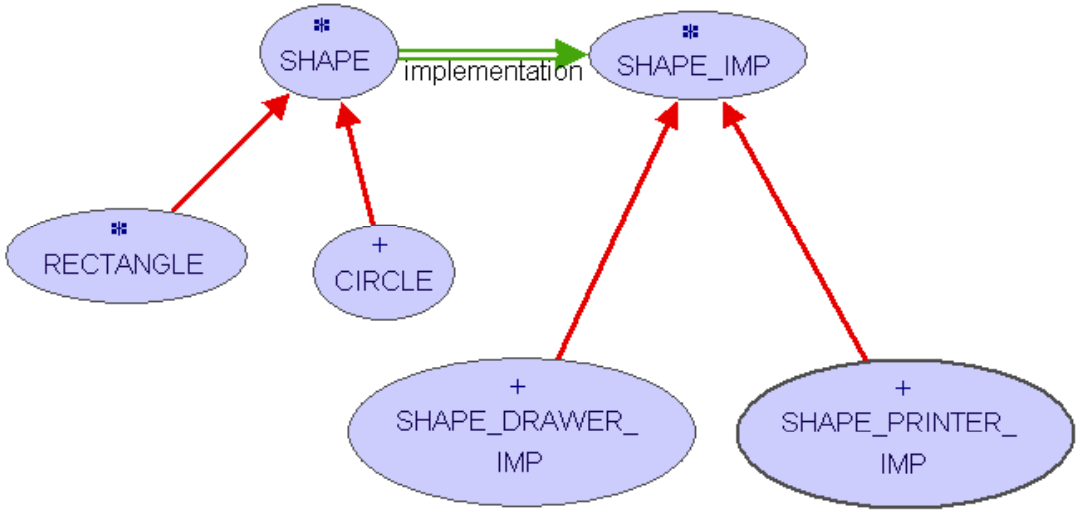
SHAPE_DRAWER_IMP

```
class SHAPE_DRAWER_IMP
inherit SHAPE_IMP

feature
    drawer: DRAWER

feature
    draw_line (x1, y1, x2, y2: INTEGER) is
        do
            drawer.draw_line (x1, y1, x2, y2)
     end

    draw_pixel (x, y: INTEGER) is
        do
            drawer.draw_pixel (x, y)
       end

    draw_circle (x, y, r: INTEGER) is
        do
            drawer.draw_circle (x, y, r)
     end

end
```

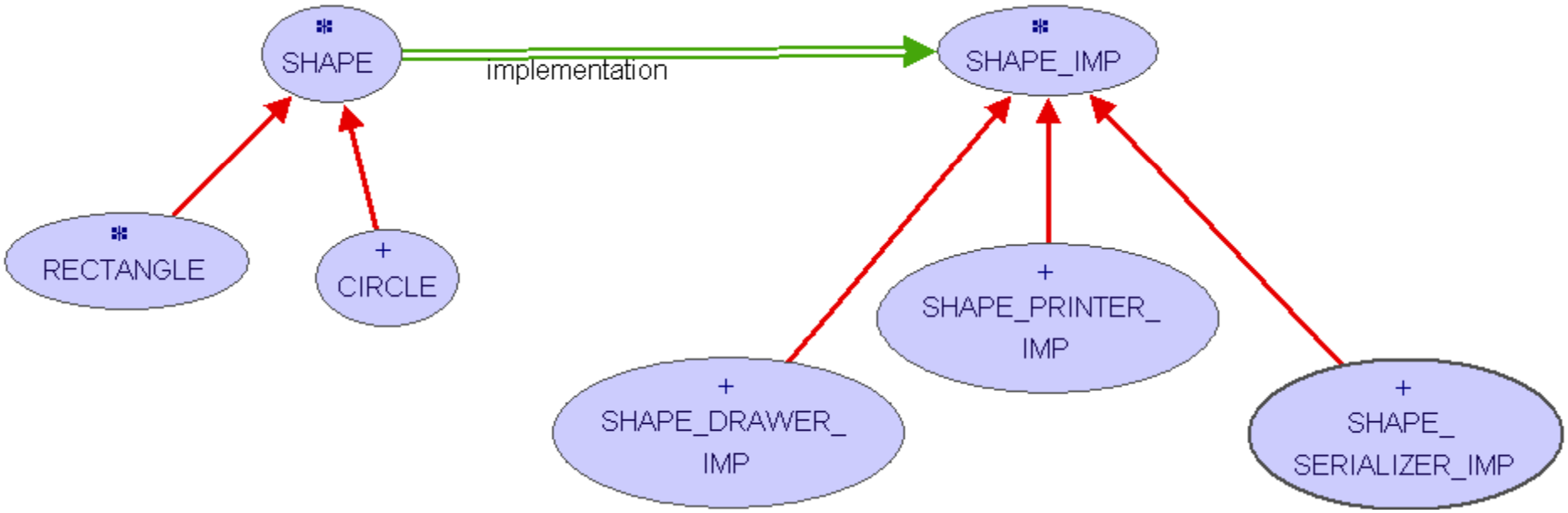


SHAPE_PRINTER_IMP

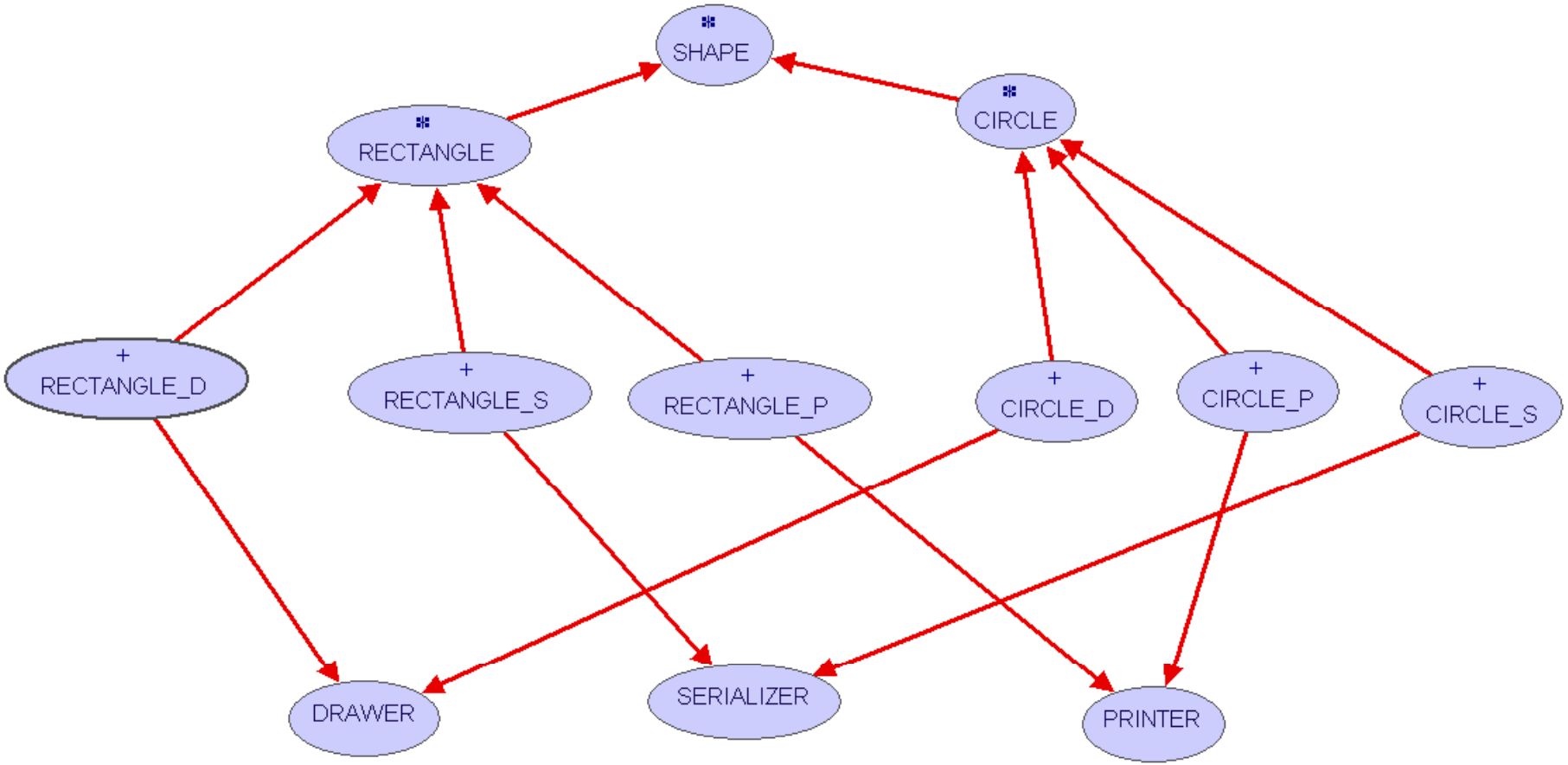
```
class SHAPE_PRINTER_IMP

inherit SHAPE_IMP

feature
    printer: PRINTER

feature
    draw_line (x1, y1, x2, y2: INTEGER) is
        do
            printer.print_line (x1, y1, x2, y2)
     end

    draw_pixel (x, y: INTEGER) is
        do
            printer.print_pixel (x, y)
       end

    draw_circle (x, y, r: INTEGER) is
        do
            printer.print_circle (x, y, r)
     end

end
```



Overall hierarchy



Compared to the hierarchy before



Things change…