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// Coda-C subclass examples

#include <coda-c.h> // shapes.c 08/20/2026
#include <math.h>

structShape_ { Charcolor; };
#define class Shape
CodaClassZerosC();// 1. ABSTRACTION: blueprint for all shapes
CodaClass(Shape,structShape_,Root);
    property0$(Char,color);// 2. ENCAPSULATION: Private data
    typedef double OSig$(calculate_area);// Abstract method: required in subclasses
    typedef double OSig$(calculate_perimeter);// defines function type and signature key
#undef class // Shape

    structCircle_ { doubleradius; };
#define class Circle
CodaClassZerosC();// 3. INHERITANCE: Circle inherits from Shape
CodaClass(Circle,structCircle_,Shape);
    getter$(double,radius,_radius);// double Circle_radius(Circle self) { return _radius; }
    method$(double,calculate_area) { return M_PI * _radius * _radius; }
    method$(double,calculate_perimeter) { return (2.0* M_PI * _radius); }

classCircle_new(Charcolor,doubleradius) {
    class self=new0(class);
    Shape_set_color((Obj)self,color);
    _radius=radius;// where #define _ self->
    return(self);
}
#undef class // Circle

    structRectangle_ { doublewidth,height; };
#define class Rectangle
CodaClassZerosC();
CodaClass(Rectangle,structRectangle_,Shape);
    method$(double,calculate_area) { return _width * _height; }
    method$(double,calculate_perimeter) { return 2.0 * (_width + _height); }

classRectangle_new(Charcolor,doublewidth,doubleheight) {
    class self=new0(class);
    Shape_set_color((Obj)self,color);
    _width=width;_height=height;
    return(self);
}
#undef class // Rectangle

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// 4. POLYMORPHISM (Usage Example)
void print_shape_details(Obj shape) { // This function accepts any subclass of Shape.
    printf("--- %12.12s  Details  Color:%-8.8s  ", kind0(shape), Shape_color(shape));
    printf("Area: %3.2f  ", obj_(calculate_area, shape));
    printf("Perimeter: %3.2f  ---\n", obj_(calculate_perimeter, shape));
}

int main() {
    Circle my_circle = Circle_new(Obj("Blue"), 5.0);
    Obj my_rectangle = Rectangle_new(Obj("Green"), 4.0, 6.0);

    print_shape_details(my_circle);
    print_shape_details(my_rectangle);
}

/* OUTPUT:
---      Circle  Details  Color:Blue      Area: 78.54Perimeter:31.42---
---      Rectangle  Details  Color:Green      Area: 24.00Perimeter:20.00---
*/
```