Objects & Inheritance

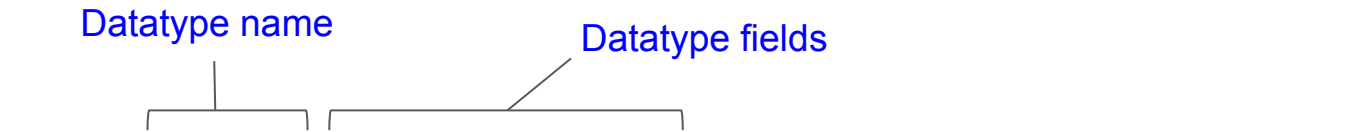
Section 7

Implementing Objects in 401

Ways of implementing objects:

- Use closures as objects
- Use tables as objects

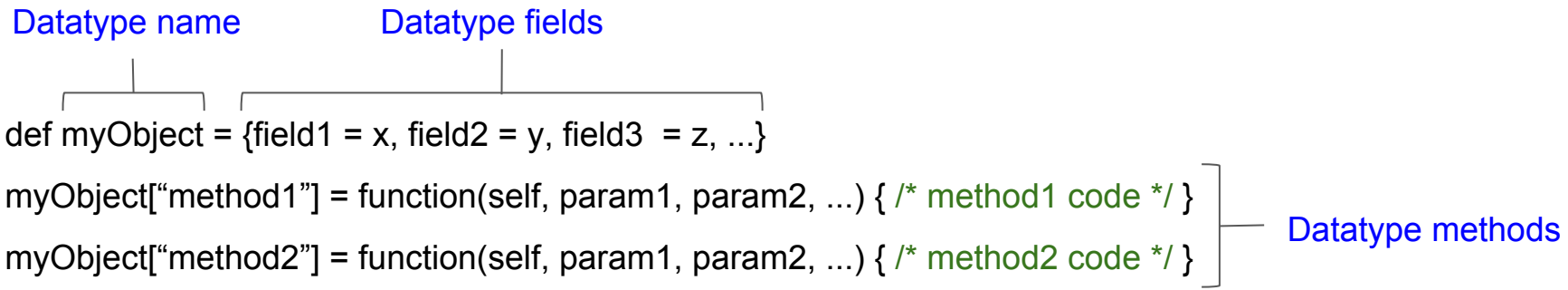
Closures as Objects




```
function myObject (field1, field2, field3 ...) {
        function (methodName, param1, param2) {
                if (methodName == "method1“) {
                        /* method1 code */
                } else if (methodName == "method2“) {
                        /* method1 code */
                } else {
                        error("invalid action")
                }
        }
}
def x = myObject(0,1,2)        // Create instance of data type called x
x(“method1”, 10, “asd”)        // Call method1 on object x
```

Datatype methods

Tables as Objects




```
// Create instance of data type called x and call method 1
def x = { field1 = 5, method1 = myObject[“method1”], method2 = myObject[“method2”] }
x[“method1”](x,a,b,c);
```

We can use de-sugaring to improve syntax. For example:

x:method1(a,b,c) becomes x[“method1”](x,a,b,c)

Exercise 1

a) Use closures to build a custom datatype **Square**. The data structure should have one attribute **length** and two methods **getArea** and **setLength**.

b) Use tables to define the same **Square** datatype.

For this exercise, assume no de-sugaring.

Prototypes

- Prototypes are just like regular objects
- Contain shared methods and attributes
- All objects of the a datatype extend the prototype of that datatype
  - Similar to lexical scoping, objects have a pointer to their prototype
  - When we cannot find a field or method in the object, we search the prototype
  - We keep the prototype pointer in the special **__index** field.

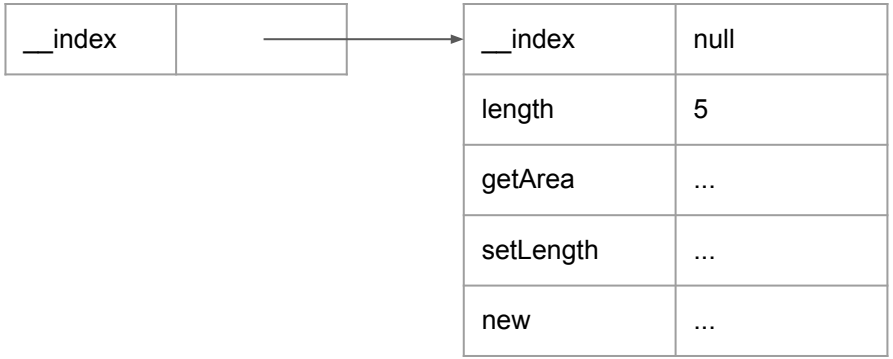
Square example

```
/* Create the prototype object */
def Square = {length = 5}
Square[“getArea”] = function(self) { length * length }
Square[“setLength”] = function(self, newLength) { self.length = newLength }
Square[“new”] = function(self) {
        def o = {}
        o.__index = self
        o
}
/* Create instance of datatype */
def x = Square[“new”](Square)
```

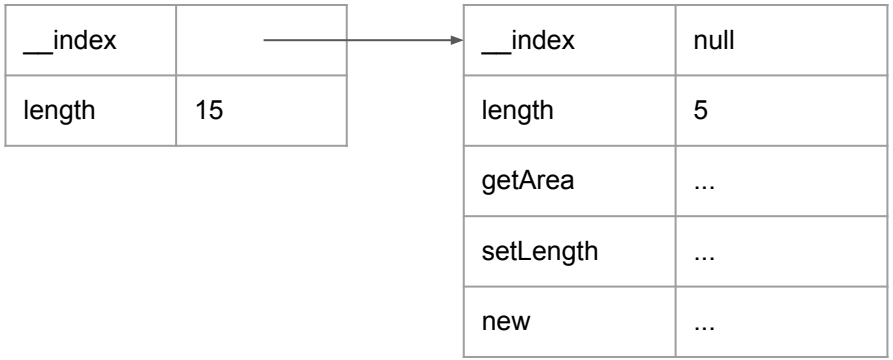
or with desugaring it simply becomes: `def x = Square:new()`

How __index is used.

⇒ def x = Square:new()

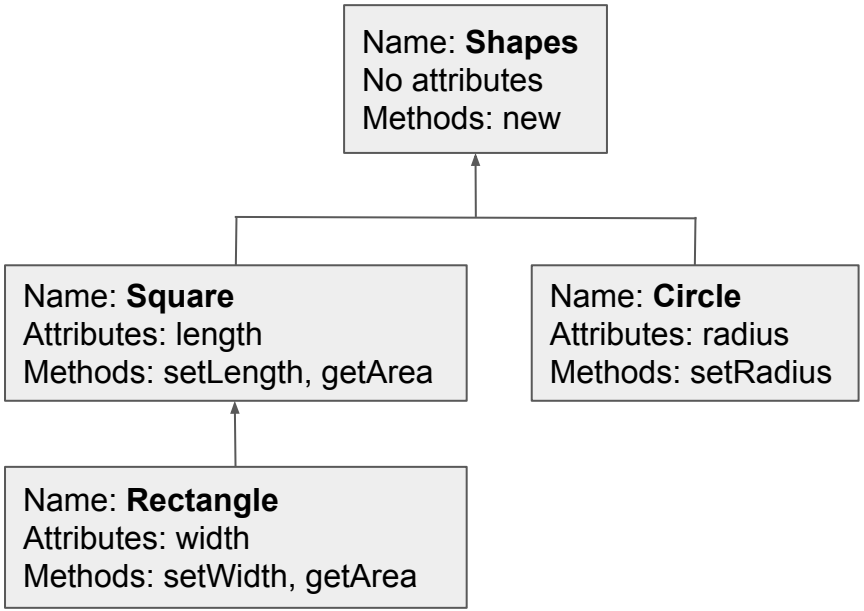


⇒ x.length = x.length + 10



Exercise 2

Using tables and prototypes, define the following datatypes and create one instance of each type. You may assume desugaring.



Fin.