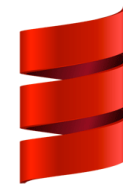


CS 360

Programming Languages

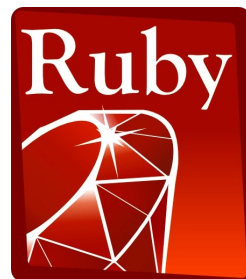
Day 12 – Lexical Scope II



Scala



Swift



Closures

A **closure** is a data structure used to implement first-class functions.

- A closure has **two parts**:
 - The **code**
 - The **environment** that was current when the function was ***defined***.
- **Key idea of lexical scoping:**

When a function f is called, f 's code is evaluated in the environment that was stored alongside that code when the closure was created.

 - (The environment is first extended with extra bindings for the values of f 's arguments.)

Comparison of Java and Racket

```
(define x 5)
(define (add1 x) (+ x 1))
(define y (add1 7))
```

```
int add1(int x) {
    return x + 1;
}

int main() {
    int x = 5;
    int y = add1(x);
    return 0;
}
```

```
(define (make-adder y)
  (lambda (x) (+ x y)))
```

```
(define add3 (make-adder 3))
(define add4 (make-adder 4))
```

```
(define z (add3 10))
(define w (add4 20))
```