

DDG University

Informal Goals

1. Learn new things related to technology.
2. Learn from each other.
3. Foster inter-team building.
4. To become better engineers.

*Search for **DDG University** in Asana.*

Structure and Interpretation of Computer Programs (*SICP*)

by Harold Abelson and Gerald Jay Sussman

3.1 Assignment and Local State

1. *Adding State*
2. *Side Effects*

A Little More Lisp

- set!
- begin

set!

(set! <name> <new-value>)

Assignment, finally...

begin

(begin $\langle \text{exp}_1 \rangle$ $\langle \text{exp}_2 \rangle$... $\langle \text{exp}_n \rangle$)

- Bundle expressions into single statement.
- Evaluates to the final expression.
- Handy in `if` statements.

State

```
(define (make-withdraw balance)
  (lambda (amount)
    (if (>= balance amount)
        (begin (set! balance
                      (- balance amount))
                balance)
        "Insufficient funds")))
```

- The `lambda` is the container.
- `balance` is a local variable.

A Crude Object

```
(define (make-account balance)
  (define (withdraw amount)
    (if (>= balance amount)
        (begin (set! balance
                     (- balance amount))
                balance)
        "Insufficient funds"))
  (define (deposit amount)
    (set! balance (+ balance amount))
    balance)
  (define (dispatch m)
    (cond ((eq? m 'withdraw) withdraw)
          ((eq? m 'deposit) deposit)
          (else (error "Unknown request: MAKE-ACCOUNT" m))))
  dispatch)
```

- `dispatch` (a procedure) is the "object".
- Other variables and functions are in scope when `dispatch` is defined.
- Message passing.

Surprise! You're functional programmers.

...mostly

Side effects...

```
(define (make-simplified-withdraw balance)
  (lambda (amount)
    (set! balance (- balance amount))
    balance))

(define W (make-simplified-withdraw 25))

(W 20)
5

(W 10)
-5
```

- This function is no longer "pure".

Referential transparency

- Given a function and input you will always receive the same output.
- Referentially transparent functions are deterministic.
- Assignment destroys referential transparency.

That's all for section 3.1.

Thanks!