

CMSC 430: Introduction to Compilers

Dodger: Characters

Announcements

- ▶ Assignment 3: Due tomorrow
- ▶ Assignment 4: will be available tomorrow.

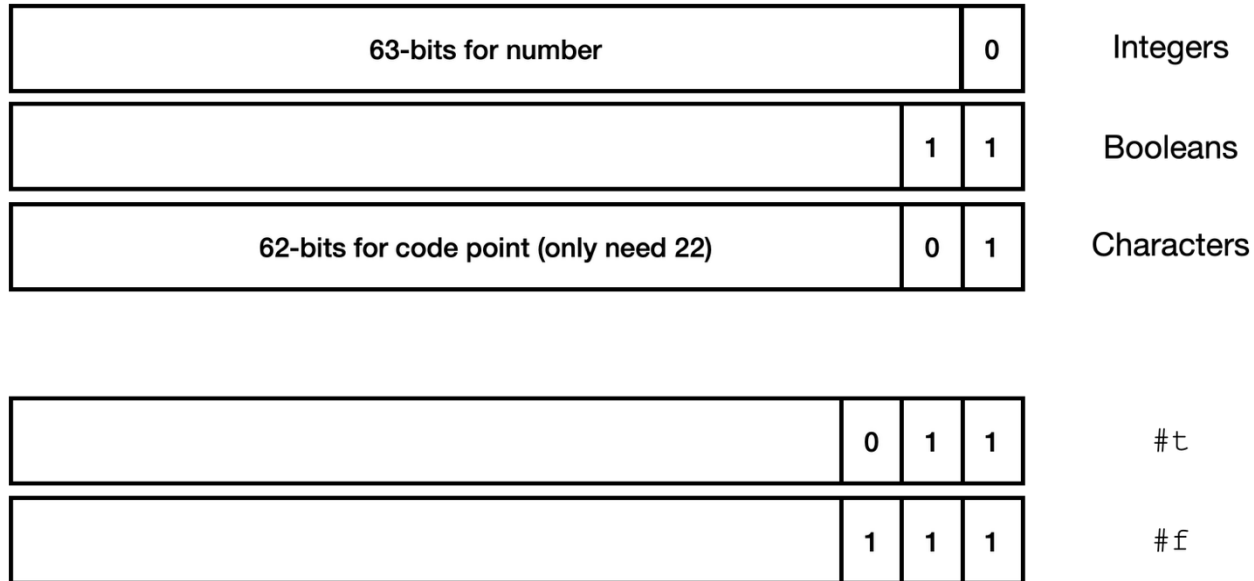
- ▶ Today:
 - Review: C runtime
 - Dodger

Dodger:

- ▶ Dodger adds a new type: `character`
- ▶ It also adds the following operations:
 - `char?` : Any -> Boolean: predicate for recognizing character values
 - `integer->char` : Integer -> Character: converts from integers to characters
 - `char->integer` : Character -> Integer: converts from integers to characters

Encoding values in Dodger

- ▶ Type tag in least significant bits



Representing Values with Bits in Dodger

Values	Bits	Decimal
0	0000	0
1	0010	2
2	0100	4
#t	0011	3
#f	0111	7
#a	1 1000 0101	389
#b	1 1000 1001	393
#z	1 1000 1001	489

$$97 * 4 + 1 = 389$$

Dodger: Parser

```
(define (datum? x)
  (or (exact-integer? x)
      (boolean? x)
      (char? x)))
```

```
(define (op1? x)
  (memq x '(add1 sub1 zero?
            char? integer->char char->integer))))
```

Dodger: Interpreter

```
(define (interp-prim1 op v)
  (match op
    ['add1 (add1 v)]
    ['sub1 (sub1 v)]
    ['zero? (zero? v)]
    ['char? (char? v)]
    ['integer->char (integer->char v)]
    ['char->integer (char->integer v)]))
```

Values -> Integer

```
(define (value->bits v)
  (cond
    [(eq? v #t) #b011]
    [(eq? v #f) #b111]
    [(integer? v)
     (arithmetic-shift v int-shift)]
    [(char? v) (bitwise-ior type-char
     (arithmetic-shift (char->integer v)
     char-shift))]))
```

Dodger Compiler

- ▶ We need implement:
 - char?
 - char->integer
 - integer->char

Dodger: Let's implement it!