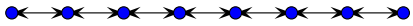
CS403: Programming Languages

Notes on Lists



A useful list function is one that concatenates two lists into a single list. Often, this function is called *append*. Consider these recurrence relations for *append*:

```
append list a to list b:          place the head of list a onto the
                                  append of the tail of list a
                                  and the list b

append the empty list to list  b:  list b
```

These relations can be directly translated into Scheme:

```
(define (append a b)
    (if (not a)
        b
        (cons (car a) (append (cdr a) b))
        )
    )
```

Once append is in place, we can use it to write reverse:

```
(define (reverse a)
    (if a
        (append (reverse (cdr a)) (list (car a)))
        nil
        )
    )
```

Note that the variable *nil* is often used to represent the empty cons object/list. Surprisingly, the iterative form of reverse is simpler (in that it only uses *cons*).

```
(define (reverse a)
    (define (_reverse supply result)
        (if (supply)
            (_reverse (cdr supply) (cons (car supply) result)))
            result
            )
        )
    (_reverse a ())
    )
```

Why can we get away with using *cons* in this case?