



PAUL G. ALLEN SCHOOL  
OF COMPUTER SCIENCE & ENGINEERING

# CSE 341

## Section 4

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Spring 2017

# Today's Agenda

- Mutual Recursion
- Module System Example
  - Namespace Organization
  - Preserving Invariants
- Practice with Currying and High Order Functions

# Mutual Recursion

- What if we need function f to call g, and function g to call f?
- This is a common idiom

```
fun earlier x =  
  ...  
  later x  
  ...  
fun later x =  
  ...  
  earlier x  
  ...
```

Unfortunately this  
does not work 😞

# Mutual Recursion Workaround

- We can use higher order functions to get this working
- It works, but there has got to be a better way!

```
fun earlier (f, x) =  
    ...  
    f x  
    ...  
fun later x =  
    ...  
    earlier (later, x)  
    ...
```

# Mutual Recursion with **and**

- SML has a keyword for that
- Works with mutually recursive **datatype** bindings too

```
fun earlier x =  
    ...  
    later x  
    ...  
and later x =  
    ...  
    earlier x  
    ...
```

# Module System

- Good for organizing code, and managing namespaces (useful, relevant)
- Good for maintaining invariants (interesting)

# Currying and High Order Functions

- List.map!
- List.filter!
- List.foldl!
- Emacs unite!