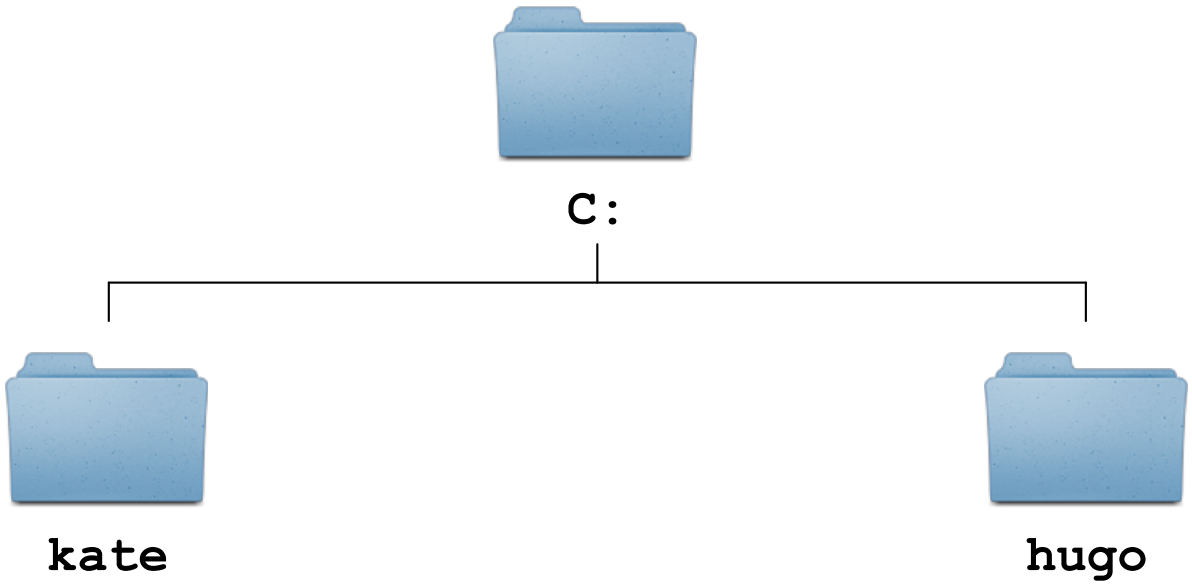
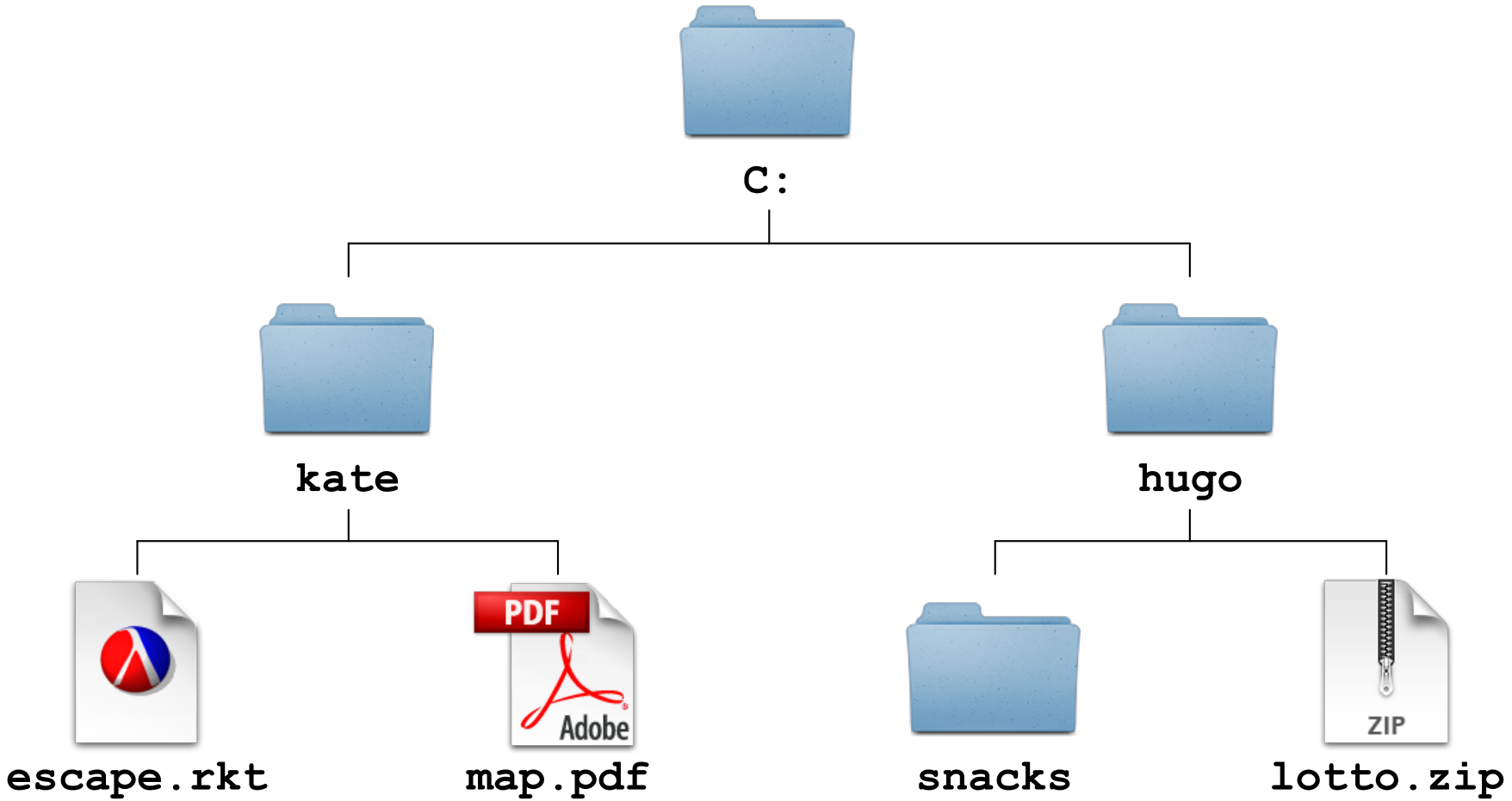
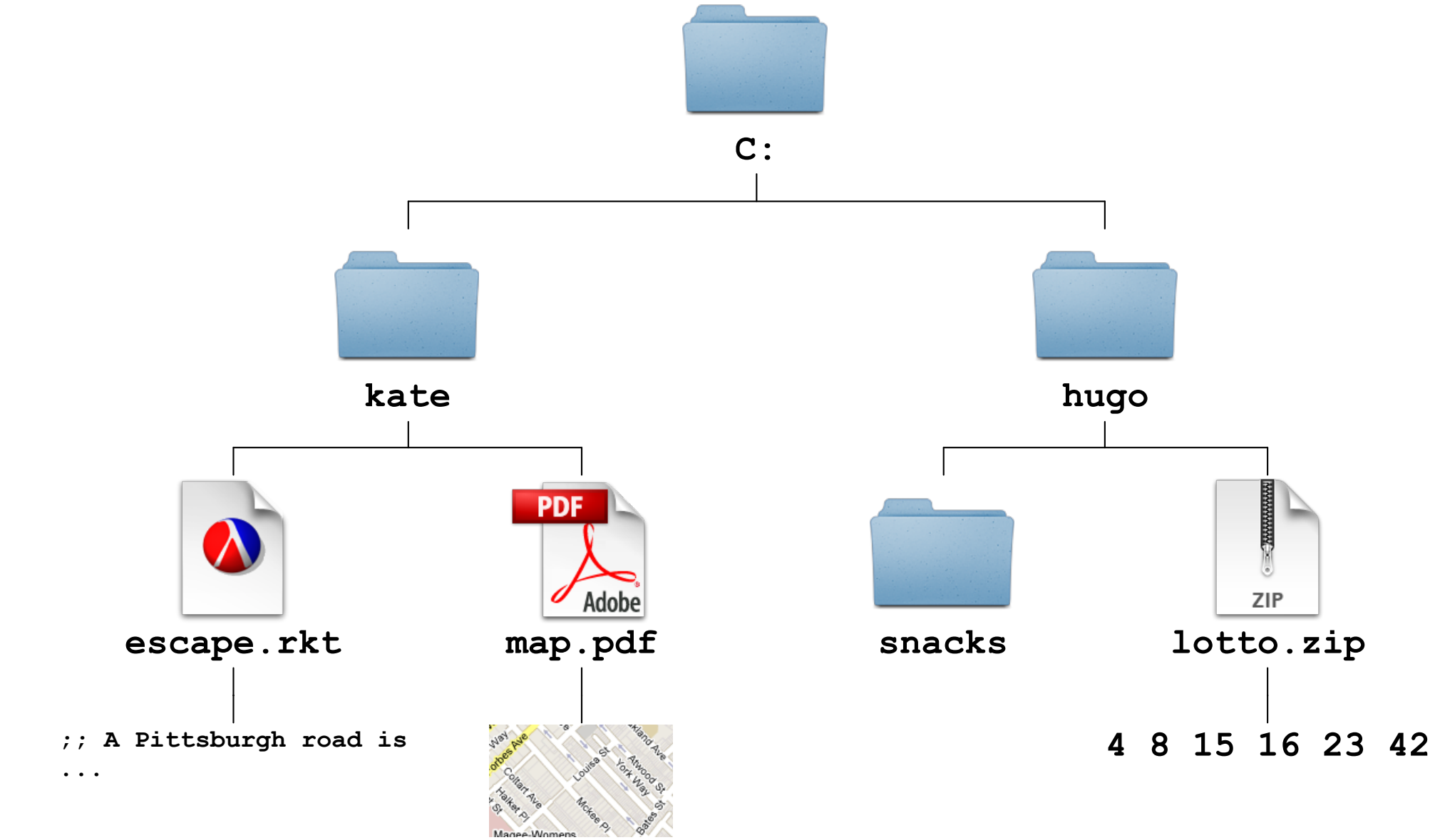
C:


C:
kate
hugo


C:
kate
hugo
PDF
Adobe
ZIP
escape.rkt
map.pdf
snacks
lotto.zip


C:
kate
hugo
PDF
Adobe
ZIP
escape.rkt
map.pdf
snacks
lotto.zip
;; A Pittsburgh road is
...
4 8 15 16 23 42

Iterative Refinement

Iterative Refinement

- Start simple

Iterative Refinement

- Start simple
- When the problem needs more:
  - expand your data definition
  - adjust your functions

Iterative Refinement

```
; find : directory string -> boolean
```

Iterative Refinement

```
; find : directory string -> boolean
```

A directory has

- a name
- files and other directories

A file has

- a name

Initial Data Definitions

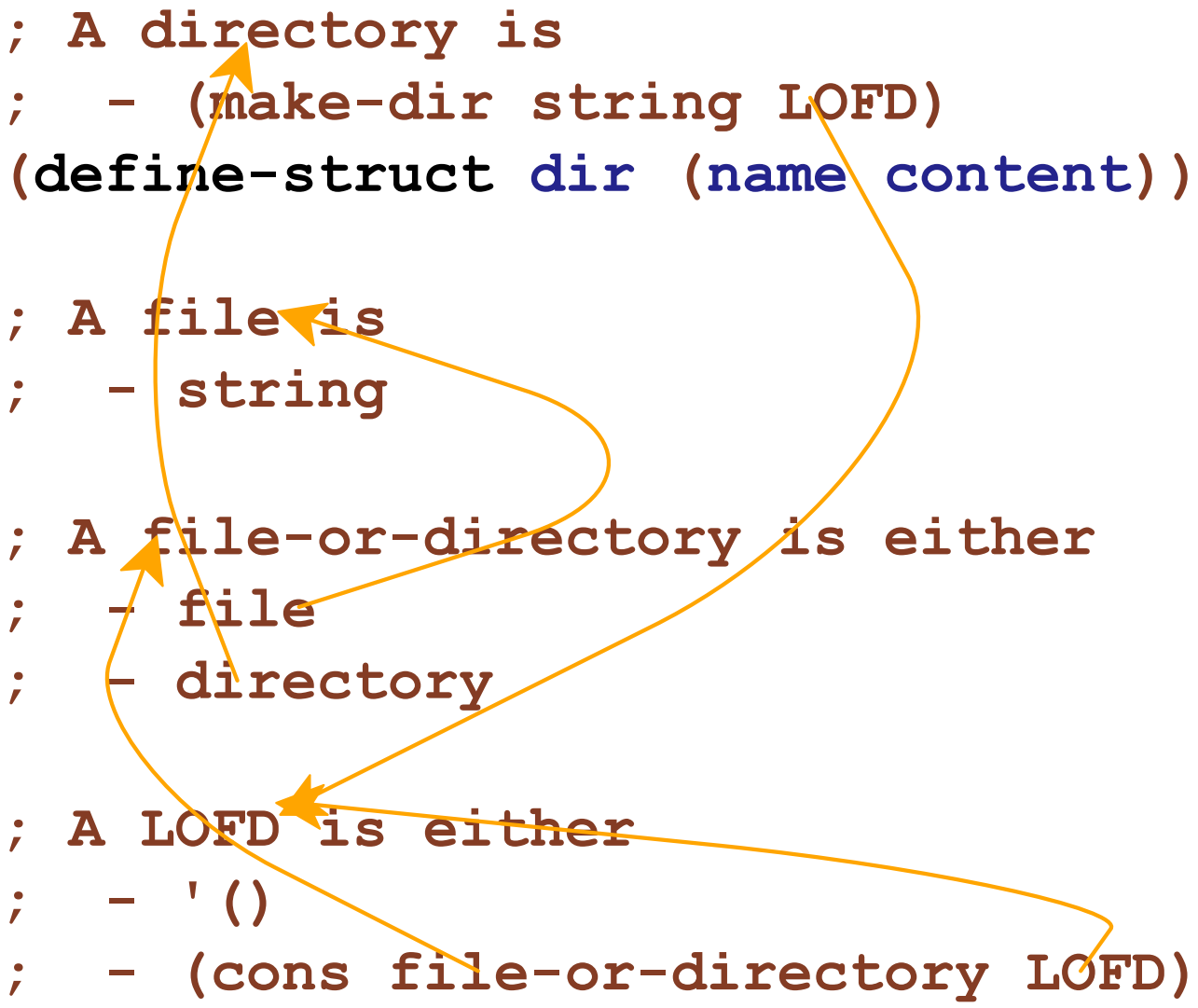
```
; A directory is
;  - (make-dir string LOFD)
(define-struct dir (name content))

; A file is
;  - string

; A file-or-directory is either
;  - file
;  - directory

; A LOFD is either
;  - '()
;  - (cons file-or-directory LOFD)
```

Initial Data Definitions



```
; A directory is
;   - (make-dir string LOFD)
(define-struct dir (name content))

; A file is
;   - string

; A file-or-directory is either
;   - file
;   - directory

; A LOFD is either
;   - '()
;   - (cons file-or-directory LOFD)
```

Initial Implementation

```
; find : directory string -> bool
(define (find dir n)
  ... (dir-name dir)
  ... (lofd-find (dir-content dir) n) ...)

; file-find : file string -> bool
(define (file-find file n)
  ... file ...)

; fod-find : file-or-directory string -> bool
(define (fod-find fod n)
  (cond
   [(string? fod) ... (file-find fod n) ...]
   [(dir? fod) ... (find fod n) ...]))

; lofd-find : lofd string -> bool
(define (lofd-find lofd n)
  (cond
   [(empty? lofd) ...]
   [(cons? lofd)
    ... (fod-find (first lofd) n)
    ... (lofd-find (rest lofd) n) ...]))
```

New Problem

Compute how much space is used on the disk:

```
; du : directory -> number
```

Revised Data Definitions

```
; A directory is
;   - (make-dir string LOFD)
(define-struct dir (name content))

; A file is
;   - (make-file string number)
(define-struct file (name size))

; A file-or-directory is either
;   - file
;   - directory

; A LOFD is either
;   - '()
;   - (cons file-or-directory LOFD)
```

Revised Implementation

```
; find : directory string -> bool
(define (find dir n)
  ... (dir-name dir)
  ... (lofd-find (dir-content dir) n) ...)

; file-find : file string -> bool
(define (file-find file n)
  ... (file-name file)
  ... (file-size file) ...)

; fod-find : file-or-directory string -> bool
(define (fod-find fod n)
  (cond
   [(file? fod) ... (file-find fod n) ...]
   [(dir? fod) ... (find fod n) ...]))

; lofd-find : lofd string -> bool
(define (lofd-find lofd n)
  (cond
   [(empty? lofd) ...]
   [(cons? lofd)
    ... (fod-find (first lofd) n)
    ... (lofd-find (rest lofd) n) ...]))
```