
Module 3b: Compound Data

CPSC 110

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Module 3b: Compound Data

- Be able to identify domain information that should be represented as compound data.
- Be able to read and write define-struct definitions.
- Be able to design functions that consume and/or produce compound data.
- Be able to design world programs that use compound world state.

Notes

- **define-struct**: defines four general definitions
 - Definitions:
 - * the **struct** itself
 - * **constructor**: `make-<struct-name>`
 - * **selector(s)**: `<struct-name>-<field-name>`
 - A unique selector is created for each field name
 - * **predicate**: `<struct-name>?`
 - `(define <struct-name> (x y))`
 - * `x` and `y` have given this `struct` two field names
 - Define a `<struct-name>` struct using:
 - * `(define S1 (<struct-name> x y))`
 - * `x` and `y` set values for the field names

Data definition example:

```
1 (@HtDD Movie)
2 (define-struct movie (title budget year))
3 ;; Movie is (make-movie String Natural Natural)
4 ;; interp. metadata for a movie
5 ;;           title is the movie's title
6 ;;           budget is the movie's production budget
7 ;;           year is the year the movie was released
8 (define M-TITANTIC (make-movie "Titanic" 2000000000 1997))
9 (define M-ELEMENT (make-movie "The Fifth Element" 900000000 1997))
10 (define M-AVATAR (make-movie "Avatar" 2370000000 2009))
11 (define M-AVENGERS (make-movie "The Avengers" 2200000000 2012))
12
13 (@add-template-rules compound)
14 (define (fn-for-movie m)
15   (... (movie-title m)      ; String
16         (movie-budget m)    ; Natural
```

```
17      (movie-year m))) ; Natural
```

and a function implementing `Movie`:

```
1  (@HtDF budget?)
2  (@signature Movie -> Boolean)
3  ;; produce true if movie's budget is < 100 000 000 (USD)
4  (check-expect (budget? M-TITANTIC) false)
5  (check-expect (budget? M-ELEMENT) true)
6  (check-expect (budget? (make-movie "Moonrise Kingdom"
7                                     160000000
8                                     2012))
9                true)
10
11  ;(define (budget? m) false) ; stub
12
13  (@template Movie)
14  (define (budget? m)
15    (< (movie-budget m)
16      100000000))
```

Terminology