WeScheme and the Amazing Technicolor Structures, Part 2

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Colored errors in WeScheme

Purpose statement

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- Students don't understand error message vocabulary [Marceau et al, 2011]

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- Students don't understand error message vocabulary [Marceau et al, 2011]
- We can teach vocabulary through pointing
- Change error messages from flat strings to structures, to use colors for nouns with corresponding highlight on original source

Examples

```
(define (label-near1? label name word)
  (cond [(or (string=? label word word word name)
             (string=? name word word word label)) true]))

(label-near1? name word)
```

Welcome to DrScheme, version 4.2.2 [3m].
Language: Beginning Student; memory limit: 128 megabytes.
label-near1?: this procedure expects 3 arguments, here it is provided 2 arguments

Examples

```
(define (label-near1? label name word)
  (cond [(or (string=? label word word word name)
             (string=? name word word word label)) true]))
```

```
(define (filter-funk a-filter)
  (filter a-filter (filter-brand a-filter) (filter-order a-
filter) (filter-type a-filter) (filter-frequency a-filter)
(filter-ripple a-filter) (filter-band a-filter)))
```

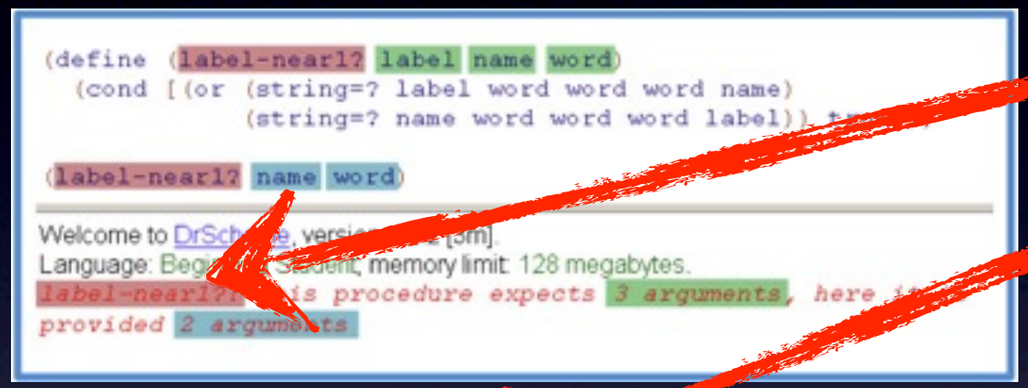
filter: expects only 2 argument, but found 7

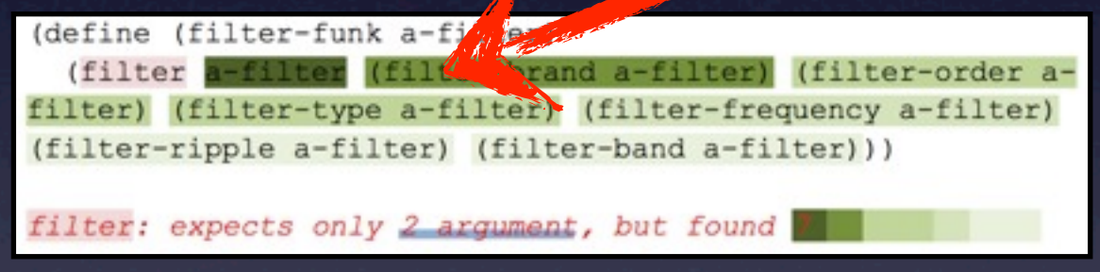
Examples

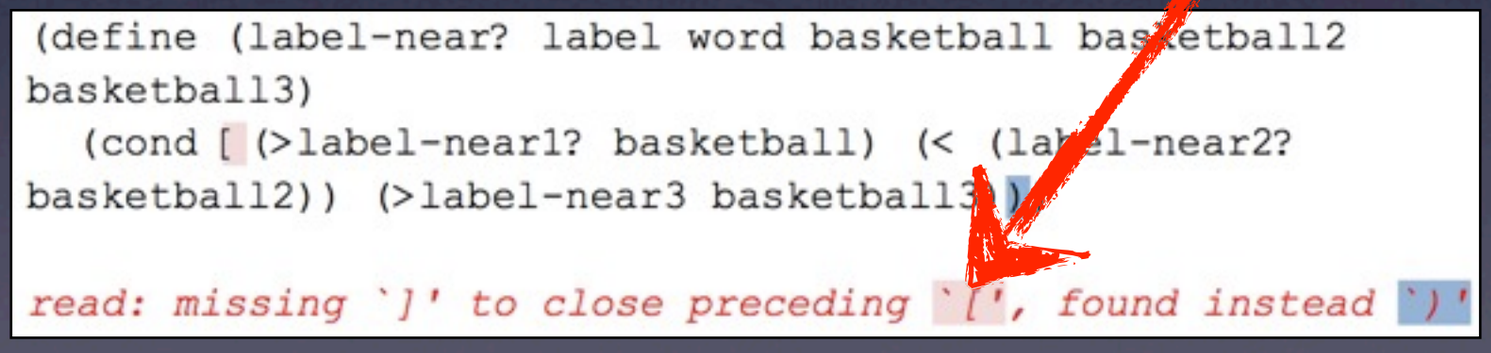
```
(define (label-near1? label name word)
  (cond [(or (string=? label word word word name)
             (string=? name word word word label)) true]))

(label-near1? name word)
```

```
(define (label-near? label word basketball basketball2
basketball3)
  (cond [ (>label-near1? basketball) (< (label-near2?
basketball2)) (>label-near3 basketball3))])

read: missing `]' to close preceding `[', found instead `)
```

Examples







Use color to point between the error message text and the source

Data type definition

An ErrorMessage is a list of:

Data type definition

An ErrorMessage is a list of:

★String

Data type definition

An ErrorMessage is a list of:

★String
★ColoredPart(String text, List<Position> places)

Data type definition

An ErrorMessage is a list of:

★String
★ColoredPart(String text, List<Position> places)
★GradientPart(List<ColoredPart> parts)

Data type definition

An ErrorMessage is a list of:

★String
★ColoredPart(String text, List<Position> places)
★GradientPart(List<ColoredPart> parts)

So all we need to do is change the WeScheme compiler and runtime accordingly

Coding

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Compile-time error messages:

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Compile-time error messages:

(error ‘compiler “...”)

Coding

Compile-time error messages:

(error ‘compiler (list ... (make-ColoredPart ...)))

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Function Application:

Coding

Compile-time error messages:

(error ‘compiler (list ... (make-ColoredPart ...)))

Function Application:

(f x y z)

Coding

Compile-time error messages:

(error ‘compiler (list ... (make-ColoredPart ...)))

Function Application:

(with-continuation-marks ([app-locations ...]) (f x y z))

Demo

TODO/FIXME

- Iterate the design
- Handle higher-order functions
- Most importantly: measure the effect of these interfaces on real people!

Code

- http://github.com/dyoo/WeScheme
- https://github.com/bootstrapworld/wescheme-compiler2012

Some lessons

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- Structures, structures, structures

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- Don’t ever underestimate undergrads trained in HTDP

Some lessons

- Structures, structures, structures
- Don’t ever underestimate undergrads trained in HTDP
- ... but also respect the power of the Olympics to distract those undergrads

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