Essentials of Programming Languages Language

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The *Essentials of Programming Languages* language in DrScheme provides a subset of functions and syntactic forms of `mzscheme`—mostly the ones that correspond to `r5rs` forms. See below for a complete list. The language is intended for use with the textbook [EoPL].

```
(require eopl/eopl)
```

The following bindings are re-provided from `mzscheme`:

make-parameter	/	inexact?
parameterize	abs	zero?
print-struct	gcd	positive?
unquote	lcm	negative?
unquote-splicing	exp	odd?
quote	log	even?
quasiquote	sin	quotient
if	cos	remainder
lambda	tan	modulo
letrec	not	floor
define-syntax	eq?	ceiling
delay	make-string	truncate
let	symbol->string	round
let*	string->symbol	numerator
let-syntax	make-rectangular	denominator
letrec-syntax	exact->inexact	asin
and	inexact->exact	acos
or	number->string	atan
cond	string->number	sqrt
case	rationalize	expt
do	output-port?	make-polar
begin	current-input-port	real-part
set!	current-output-port	imag-part

```
#%module-begin      current-error-port     angle
#%app               open-input-file        magnitude
#%datum             open-output-file       input-port?
#%top               close-input-port       read
#%top-interaction   close-output-port      read-char
#%require           with-output-to-file    peek-char
#%provide           transcript-on          eof-object?
#%expression        transcript-off         char-ready?
syntax-rules        flush-output           write
...                 string-length          display
cons                string-ci<=?           newline
car                 string-ci>=?           write-char
cdr                 string-append          load
pair?               string-fill!           string?
map                 string->list           string
for-each            list->string           string-ref
caar                vector-length          string-set!
cadr                vector-fill!           string=?
cdar                vector->list           substring
cddr                list->vector           string-copy
caaar               char-alphabetic?       string-ci=?
caadr               char-numeric?          string<?
cadar               char-whitespace?       string>?
caddr               char-upper-case?       string<=?
cdaar               char-lower-case?       string>=?
cdadr               char->integer          string-ci<?
cddar               integer->char          string-ci>?
cdddr               char-downcase          vector?
caaaar              call-with-output-file  make-vector
caaadr              call-with-input-file   vector
caadar              with-input-from-file   vector-ref
caaddr              apply                  vector-set!
cadaar              symbol?                char?
cadadr              null?                  char=?
caddar              list?                  char<?
cadddr              list                   char>?
cdaaar              length                 char<=?
cdaadr              append                 char>=?
cdadar              reverse                char-ci=?
cdaddr              list-tail              char-ci<?
cddaar              list-ref               char-ci>?
cddadr              memq                   char-ci<=?
cdddar              memv                   char-ci>=?
cddddr              member                 char-upcase
=                   assq                   boolean?
<                   assv                   eqv?
```

>	assoc	equal?
<=	procedure?	force
>=	number?	call-with-values
max	complex?	values
min	real?	dynamic-wind
+	rational?	eval
-	integer?	
*	exact?	

```
(define-datatype id predicate-id
  (variant-id (field-id predicate-expr) ...)
  ...)
```

Defines the datatype *id* and a function *predicate-id* that returns #t for instances of the datatype, and #f for any other value.

Each *variant-id* is defined as a constructor function that creates an instance of the datatype; the constructor takes as many arguments as the variant's *field-id*s, and each argument is checked by applying the function produced by the variant's *predicate-expr*.

In DrScheme v209 and older, when constructor-based printing was used, variant instances were printed with a make- prefix before the variant name. Thus, for compatibility, in addition to *variant-id*, make-variant-id is also defined for each *variant-id* (to the same constructor as *variant-id*).

```
(cases datatype-id expr
  (variant-id (field-id ...) result-expr ...)
  ...)
(cases datatype-id expr
  (variant-id (field-id ...) result-expr ...)
  ...
  (else result-expr ...))
```

Branches on the datatype instance produced by *expr*, which must be an instance of the specified *datatype-id* that is defined with define-datatype.

```
sllgen:make-string-scanner
sllgen:make-string-parser
sllgen:make-stream-parser
sllgen:make-define-datatypes
sllgen:show-define-datatypes
sllgen:list-define-datatypes
```

Defined in the textbook's Appendix B [EoPL]. However, the DrScheme versions are syntac-

tic forms, instead of procedures, and the arguments must be either quoted literal tables or identifiers that are defined (at the top level) to quoted literal tables.

`sllgen:make-rep-loop : procedure?`

Defined in the *EoPL* textbook's Appendix B [EoPL] (and still a function).

`eopl:error : procedure?`

As in the book.

```
(eopl:printf form v ...) → void?
  form : string?
  v : any/c
(eopl:pretty-print v [port]) → void?
  v : any/c
  port : output-port? = (current-output-port)
```

Same as `scheme/base`'s `printf` and `pretty-print`.

```
((list-of pred ...+) x) → boolean?
  pred : (any/c . -> . any)
  x : any/c
(always? x) → boolean?
  x : any/c
(maybe pred) → boolean?
  pred : (any/c . -> . boolean?)
```

As in the book [EoPL].

`empty : empty?`

The empty list.

`(time expr)`

Evaluates *expr*, and prints timing information before returning the result.

`(collect-garbage) → void?`

Performs a garbage collection (useful for repeatable timings).

```
(trace id ...)
(untrace id ...)
```

For debugging: `trace` redefines each *id* at the top level (bound to a procedure) so that it prints arguments on entry and results on exit. The `untrace` form reverses the action of `trace` for the given *id*s.

Tracing a function causes tail-calls in the original function to become non-tail calls.

```
(provide provide-spec ...)
```

Useful only with a module that uses `eopl/eopl` as a language: exports identifiers from the module. See `provide` from `mzscheme` for more information.

```
eopl:error-stop : (-> any/c)
```

Defined only in the top-level namespace (i.e., not in a module); mutate this variable to install an exception-handling thunk. Typically, the handler thunk escapes through a continuation.

The `eopl/eopl` library sets this variable to `#f` in the current namespace when it executes.

```
(install-eopl-exception-handler) → void?
```

Sets an exception handler to one that checks `eopl:error-stop`.

The `eopl/eopl` library calls this function when it executes.

Bibliography

[EoPL] "*Essentials of Programming Languages*, Third Edition," MIT Press, 2008.
`http://www.eopl3.com/`