

# *Essentials of Programming Languages* Language

Version 4.1

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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`:

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

#!/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
caaaadr	call-with-input-file	vector
caaaar	with-input-from-file	vector-ref
caaaadr	apply	vector-set!
caaaar	symbol?	char?
caaaadr	null?	char=?
caaaar	list?	char<?
caaaadr	list	char>?
caaaar	length	char<=?
caaaadr	append	char>=?
caaaar	reverse	char-ci=?
caaaadr	list-tail	char-ci<?
caaaar	list-ref	char-ci>?
caaaadr	memq	char-ci<=?
caaaar	memv	char-ci>=?
caaaadr	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-ids*, 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 `ids`.

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/>