

Scribble: PLT Documentation Tool

Version 4.2.5

Matthew Flatt
and Eli Barzilay

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Scribble is a collection of tools for creating prose documents—papers, books, library documentation, etc.—in HTML or PDF (via Latex) form. More generally, Scribble helps you write programs that are rich in textual content, whether the content is prose to be typeset or some other form of text to be generated programmatically.

This document itself is written using Scribble. At the time that it was written, its source was available at <http://svn.plt-scheme.org/plt/trunk/collects/scriblings/scribble/> starting with the "scribble.scrbl" file.

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1 Getting Started

No matter what you want to do with Scribble, it's best to start by generating a few simple HTML and/or PDF documents. This chapter steps you through the basics, and it ends in §1.9 "Next Steps" with goal-specific advice on how to continue.

1.1 A First Example

Create a file "mouse.scrbl" with this content:

```
#lang scribble/base

@title{On the Cookie-Eating Habits of Mice}

If you give a mouse a cookie, he's going to ask for a
glass of milk.
```

The first line's `#lang scribble/base` indicates that the file implements a Scribble document. The document starts in "text mode," and the `@` character escapes to operators like `title`, where the curly braces return to text mode for the arguments to the operator. The rest is document content.

Now run the `scribble` command-line program, specifying a mode for the kind of document that you want as output:

- Run

```
scribble -pdf mouse.scrbl
```

to generate PDF as "mouse.pdf". This will work only if you have `pdflatex` installed. If you'd like to see the intermediate Latex, try

```
scribble -latex mouse.scrbl
```

to generate "mouse.tex".

- Run

```
scribble -html mouse.scrbl
```

to generate HTML as "mouse.html". You may notice that the apostrophe in "he's" turned into a curly apostrophe.

- Run

```
scribble -htmls mouse.scrbl
```

to generate HTML as "mouse/index.html". Sub-sections (which we add next) will appear as separate HTML files in the "mouse" directory.

1.2 Multiple Sections

Add more text to "mouse.scrbl" so that it looks like this:

```
#lang scribble/base

@title{On the Cookie-Eating Habits of Mice}

If you give a mouse a cookie, he's going to ask for a
glass of milk.

@section{The Consequences of Milk}

That "squeak" was the mouse asking for milk. Let's
suppose that you give him some in a big glass.

He's a small mouse. The glass is too big--way too
big. So, he'll probably ask you for a straw. You might as
well give it to him.

@section{Not the Last Straw}

For now, to handle the milk moustache, it's enough to give
him a napkin. But it doesn't end there... oh, no.
```

Now, after the first paragraph of the paper, we have two sub-sections, each created by calling `section` to generate a sub-section declaration. The first sub-section has two paragraphs. The second section, as initiated by the result of the second `section` call, has a single paragraph.

Run the `scribble` command(s) from §1.1 "A First Example" again. You may notice the curly double-quotes in the output; in PDF output, the `--` turned into an em-dash. For HTML, it turned into a en-dash with surrounding spaces, which is a typical convention for em-dashes in HTML.

1.3 Splitting the Document Source

As a document grows larger, it's better to split sections into separate source files. The `include-section` operation incorporates a document defined by a ".scrbl" file into a larger document.

To split the example document into multiple files, change "mouse.scrbl" to just


```
#lang scribble/base

@title{On the Cookie-Eating Habits of Mice}

If you give a mouse a cookie, he's going to ask for a
glass of milk.

@include-section["milk.scrbl"]
@include-section["straw.scrbl"]
```

Create "milk.scrbl" and "straw.scrbl" in the same directory as "mouse.scrbl". In "milk.scrbl", put

```
#lang scribble/base

@title{The Consequences of Milk}

That “squeak” was the mouse asking for milk...
```

and in "straw.scrbl", put

```
#lang scribble/base

@title{Not the Last Straw}

For now, to handle the milk moustache, ...
```

Notice that the new files both start with `#lang`, like the original document, and the [sections](#) from the original document become [titles](#) in the new documents. Both "milk.scrbl" and "straw.scrbl" are documents in their own right with their own titles, and they can be individually rendered using `scribble`. Running `scribble` on "mouse.scrbl", meanwhile, incorporates the smaller documents into one document that is the same as before.

1.4 Document Styles

Scribble currently supports only one form of HTML output. You can replace the "scribble.css" file for the generated pages, and that's about it. (We expect to add more styles in the future.)

For Latex-based PDF output, Scribble includes support for multiple page-layout configurations. The "mouse.scrbl" example so far uses the default Latex style. If you plan on submitting the paper to a workshop on programming languages, then—well, you probably

need a different topic. But you can start making the current content look right by changing the first line to

```
#lang scribble/sigplan
```

If you're instead working toward PLT Scheme library documentation, try changing the first line to

```
#lang scribble/manual
```

which produces output with a separate title page, initial content on that page (intended as a brief orientation to the document), and top-level sections turned into chapters that each start on a new page. If you have split the document into multiple files, the first line of the main document file determines the output format.

Using `scribble/sigplan` or `scribble/manual` does not change the rendered HTML for a document—aside from `scribble/manual` adding a version number—but it changes the set of bindings available in the document body. For example, with `scribble/sigplan`, the introductory text can be marked as an abstract:

```
#lang scribble/sigplan

@title{On the Cookie-Eating Habits of Mice}

@abstract{If you give a mouse a cookie, he's going to
          ask for a glass of milk.}

@section{The Consequences of Milk}

....
```

When rendered as HTML, the abstract shows up as an inset paragraph. If you try to use `abstract` with the `scribble/base` or `scribble/manual` language, then you get an error, because `abstract` is not defined.

When a document is implemented across multiple files, changing the language of the main document can set the style for all of the parts, but it does not introduce bindings into the other part files. For example, if you change the language of "mouse.scrbl" to `scribble/sigplan`, then `abstract` becomes available in "mouse.scrbl" but not in "milk.scrbl" or "straw.scrbl". In other words, operator names are lexically scoped.

1.5 More Functions

The `scribble/sigplan` and `scribble/manual` languages are supersets of the `scribble/base` language, which provides a collection of basic operations. Many of the operations are style variations that you can apply to text:

```
He's a @smaller{small mouse}. The glass is too
@larger{big}--@bold{way @larger{too @larger{big}}}. So,
he'll
@italic{probably} ask you for a straw.
```

which renders as

He's a small mouse. The glass is too big—**way too big**. So, he'll *probably* ask you for a straw.

As you would expect, calls to functions like `smaller`, `larger`, and `bold` can be nested in other calls. They can also be nested within calls to `title` or `section`:

```
@section{@italic{Not} the Last Straw}
```

The `centered` operation centers a flow of text:

```
If a mouse eats all your cookies, put up a sign that says
@centered{
  @bold{Cookies Wanted}

  @italic{Chocolate chip preferred!}
}
and see if anyone brings you more.
```

which renders as

If a mouse eats all your cookies, put up a sign that says

Cookies Wanted
Chocolate chip preferred!

and see if anyone brings you more.

The `margin-note` operation is used in a similar way, but the rendered text is moved to the margins.

If you use `margin-note`, then the content shows up over here.

The `itemlist` operation creates a sequence of bulleted text, where the `item` operation groups text to appear in a single bullet. The `itemlist` operation is different from the others that we have seen before, because it only accepts values produced by `item` instead of arbitrary text. This difference is reflected in the use of `[...]` for the arguments to `itemlist` instead of `{...}`:

```
@centered{@bold{Notice to Mice}}

@itemlist[@item{We have cookies for you.}
          @item{If you want to eat a cookie,
                you must bring your own straw.}]
```

which renders as

Notice to Mice

- We have cookies for you.
- If you want to eat a cookie, you must bring your own straw.

1.6 Text Mode vs. Scheme Mode for Arguments

When `[...]` surrounds the arguments of an operation, the argument expressions are in Scheme mode rather than text mode. Even in Scheme mode, `@` can be used to apply operations; once the `@` syntax is enabled through a language like `scribble/base` (as opposed to `scheme`), it behaves the same in both Scheme mode and text mode.

One advantage of using Scheme mode for the arguments to `itemlist` is that we can pass a keyword-tagged optional argument to `itemlist`. In particular, if you want a list with numbers instead of bullets, supply the `'ordered` style to `itemlist` using the `#:style` keyword:

```
@itemlist[#:style 'ordered
          @item{Eat cookie.}
          @item{Drink milk.}
          @item{Wipe mouth.}
          @item{...}]
```

An operation doesn't care whether it's used with `[...]` or `{...}`. Roughly, `{...}` forms an argument that is a string. (Only roughly, though. Newlines or uses of `@` within `{...}` complicate the picture, and we'll get back to that soon.) So,

```
@italic{Yummy!}
```

is equivalent to

```
@italic["Yummy!"]
```

which is equivalent to the Scheme expression

```
(italic "Yummy!")
```

These equivalences explain why Scribble functions are documented in Scheme notation. If you're reading this in HTML format, you can click [italic](#) above to access its documentation. The documentation won't completely make sense, yet, but it will by the end of this chapter.

What if you want to provide arguments in text mode, but you also want to supply other optional arguments? You can use both `[...]` and `{...}` for an operation, as long as the `[...]` is first, and as long as no character separate the closing `]` from the opening `{`. For example, calling `italic` is the same as using `elem` with the `'italic` style:

```
@elem[#:style 'italic]{Yummy!}
```

You can also *omit* both `[...]` and `{...}`. In that case, the Scheme expression after `@` is used directly instead of applied as an operation. For example,

```
1 plus 2 is @(number->string (+ 1 2)).
```

renders as

```
1 plus 2 is 3.
```

The call to `number->string` is needed because a naked number is not valid as document content.

1.7 @ Syntax Basics

The `@` notation provided by Scribble is just another way of writing Scheme expressions. Scribble documents could be constructed using normal Scheme notation, without using `@` at all, but that would be inconvenient for most purposes. The `@` notation makes dealing with textual content much easier.

Whether in text mode or Scheme mode, @ in a document provides an escape to Scheme mode. The basic syntax of @ is

```
@ <cmd> [ <datum>* ] { <text-body> }
```

where all three parts after @ are optional, but at least one must be present. No spaces are allowed between

- @ and <cmd>, [, or {
- <cmd> and [or {; or
-] and }.

A <cmd> or <datum> is normal Scheme notation, while a <text-body> is itself in text mode. A <cmd> obviously must not start with [or {, even though Scheme forms could otherwise start with those characters.

The expansion of just @<cmd> into Scheme code is

```
<cmd>
```

When either [] or { } are used, the expansion is

```
(<cmd> <datum>* <parsed-body>*)
```

where <parsed-body>* is the parse result of the <text-body>. The <parsed-body>* part often turns out to be a sequence of Scheme strings.

In practice, the <cmd> is normally a Scheme identifier that is bound to a procedure or syntactic form. If the procedure or form expects further text to typeset, then {...} supplies the text. If the form expects other data, typically [...] is used to surround Scheme arguments, instead. Even if an operation's argument is a string, if the string is not used as content text (but instead used as, say, a hyperlink label), then the string is typically provided through [...] instead of {...}. Sometimes, both [...] and {...} are used, where the former surround Scheme arguments that precede text to typeset. Finally, if a form is a purely Scheme-level form with not typeset result, such as a require to import more operations, then typically just @ is used.

For example the text-mode stream

```
@(require scriblib/figure)

@section[#:tag "poetry"]{Of Mice and Cookies}
See @secref["milk"].

@section[#:tag "milk"]{@i{Important} Stuff About Milk}
```

```
@figure["straw" @elem{A straw}]{@image["straw.png"]}
```

is equivalent to the Scheme-mode sequence

```
(require scriblib/figure) "\n"
"\n"
(section #:tag "poetry" "Of Mice and Cookies") "\n"
"See " (secref "milk") "." "\n"
"\n"
(section #:tag "milk" (italic "Important") " Milk Supplies") "\n"
(figure "straw" (elem "A straw") (image "straw.png")) "\n"
```

Besides showing how different argument conventions are used for different operations, the above example illustrates how whitespace is preserved in the Scheme form of a text-mode stream—including newlines preserved as their own strings. Notice how the second `section` gets two arguments for its content, since the argument content for `section` in the source stream includes both the use of an operator and additional text. When an operation like `section` or `italic` accepts content to typeset, it normally accepts an arbitrary number of arguments that together form the content.

For more information on the syntax of `@`, see §2 “@ Syntax”. The full syntax includes a few more details, such as brackets like `||{...}|` for text-mode arguments while disabling `@` between the brackets.

1.8 Decoding Sequences

In a document that starts `#lang scribble/base`, the top level is a text-mode stream, just like the `<text-body>` in a `@` form. As illustrated in the previous section, such a top-level sequence corresponds to a mixture of Scheme-mode strings and operation applications. There’s an implicit operation, `decode`, that wraps the whole document to consume this mixture of strings and other values and turn them into a document description.

The `decode` operation implements *flow decoding*, which takes a document stream and breaks it up into sections and paragraphs. Blank lines delimit paragraphs, and the results of operations like `title` and `section` generate “here’s the title” or “a new section starts here” declarations that are recognized by `decode`.

A different but related *content decoding* takes place within a paragraph or section title. Content decoding is responsible for converting `--` to an em-dash or for converting `"` and `'` to suitable curly quotes.

The decoding process for document’s stream is ultimately determined by the `#lang` line that starts the document. The `scribble/base`, `scribble/manual`, and `scribble/sigplan` languages all use the same `decode` operation. The `scribble/text` language, however, acts more like a plain-text preprocessor and it does not perform any such decoding rules.

(For more on `scribble/text`, see §6 “Text Preprocessing”.)

When the flow decoder is used, after it breaks the input stream into paragraphs, it applies content decoding to strings within the paragraph. When content is wrapped with an operation, however, content decoding does not apply automatically. An operation is responsible for calling a content or flow decoder as it sees fit. Most operations call the decoder; for example, `italic`, `bold`, `smaller`, etc., all decode their arguments. Similarly, `title` and `section` decode the given content for the title or section name. The `literal` and `verbatim` operators, however, do not decode the given strings. For example,

More precisely, languages like `scribble/base` apply `decode` only after lifting out all definitions and imports from the document stream.

```
@verbatim{--}
```

renders as

```
--
```

Don’t confuse decoding with the expansion of `@` notation. The source form

```
@verbatim{@(number->string (+ 1 2))}
```

renders as

```
3
```

because the source is equivalent to

```
(verbatim (number->string (+ 1 2)))
```

where `(number->string (+ 1 2))` is evaluated to produce the argument to `verbatim`. The `{...}` style of brackets is often used with `verbatim`, because `{...}` disables `@` notation for arguments. For example,

```
@verbatim|{@(number->string (+ 1 2))}|
```

renders as

```
@(number->string (+ 1 2))
```


1.9 Next Steps

If your immediate goal is to document a PLT Scheme library or write literate programs, skip to §4.1 “Getting Started with Documentation”, and then go back to §2 “@ Syntax” and other chapters.

If you are more interested in producing documents unrelated to PLT Scheme, continue with §2 “@ Syntax” and then §3 “High-Level Scribble API”. Move on to §7 “Low-Level Scribble API” when you need more power.

If you are interested in text preprocessing, continue with §2 “@ Syntax”, but then skip to §6 “Text Preprocessing”.

2 @ Syntax

The Scribble @ notation is designed to be a convenient facility for free-form text in Scheme code, where “@” was chosen as one of the least-used characters in existing Scheme code. An @-expression is simply an S-expression in disguise.

Typically, @ notation is enabled through `scribble/base` or similar languages, but you can also add @ notation to an S-expression-based language using the `at-exp` meta-language. For example,

```
#lang at-exp scheme
(define v '@op{str})
```

is equivalent to

```
#lang scheme
(define v '(op "str"))
```

Using `#lang at-exp scheme` is probably the easiest way to try the examples in this chapter.

2.1 The Scribble Syntax at a Glance

To review §1.7 “@ Syntax Basics”, the concrete syntax of @-forms is roughly

```
@ <cmd> [ <datum>* ] [ { <text-body>* } ]
```

where all three parts after @ are optional, but at least one should be present. (Spaces are not allowed between the three parts.) Roughly, a form matching the above grammar is read as

```
(<cmd> <datum>* <parsed-body>*)
```

where *<parsed-body>* is the translation of each *<text-body>* in the input. Thus, the initial *<cmd>* determines the Scheme code that the input is translated into. The common case is when *<cmd>* is a Scheme identifier, which reads as a plain Scheme form, with datum arguments and/or string arguments.

Here is one example:

```
@foo{blah blah blah} reads as (foo "blah blah blah")
```

The example shows how an input syntax is read as Scheme syntax, not what it evaluates to. If you want to see the translation of an example into S-expression form, add a quote in front of it in a `#lang at-exp scheme` module. For example, running

```
#lang at-exp scheme
```

```
'@foo{blah blah blah}
```

in DrScheme prints the output

```
(foo "blah blah blah")
```

while omitting the quote

```
#lang at-exp scheme
@foo{blah blah blah}
```

triggers a syntax error because `foo` is not bound, and

```
#lang at-exp scheme
(define (foo str) (printf "He wrote ~s.\n" str))
@foo{blah blah blah}
```

prints the output

```
He wrote "blah blah blah".
```

Here are more examples of @-forms:

```
@foo{blah "blah" ('blah'?)} reads as (foo "blah \"blah\" ('blah'?))
@foo[1 2]{3 4} reads as (foo 1 2 "3 4")
@foo[1 2 3 4] reads as (foo 1 2 3 4)
@foo[#:width 2]{blah blah} reads as (foo #:width 2 "blah blah")
@foo{blah blah reads as (foo "blah blah" "\n"
  yada yada} "yada yada")
@foo{ reads as (foo
  blah blah "blah blah" "\n"
  yada yada "yada yada")
}
```

As seen in the last example, multiple lines and the newlines that separate them are parsed to multiple Scheme strings. More generally, a *text-body* is made of text, newlines, and nested @-forms, where the syntax for @-forms is the same whether it's in a *text-body* context as in a Scheme context. A *text-body* that isn't an @-form is converted to a string expression for its *parsed-body*; newlines and following indentations are converted to `"\n"` and all-space string expressions.

```

@foo{bar @baz{3}
  blah}      reads as  (foo "bar " (baz "3") "\n"
                    "blah")

@foo{@b{@u{3} @u{4}}
  blah}      reads as  (foo (b (u 3) " " (u "4")) "\n"
                    "blah")

@C{while (*(p++))
  *p = '\n';} reads as  (C "while (*(p++))" "\n" " "
                    "*p = '\n';")

```

The command part of an @-form is optional as well. In that case, the @ forms is read as a list, which usually counts as a function application, but it also useful when quoted with the usual Scheme quote:

```

@{blah blah} reads as  ("blah blah")

@{blah @[3]} reads as  ("blah " (3))

'@{foo
  bar
  baz} reads as  '("foo" "\n"
                    "bar" "\n"
                    "baz")

```

Finally, we can also drop the datum and text parts, which leaves us with only the command—which is read as is, not within a parenthesized form. This is not useful when reading Scheme code, but it can be used inside a text block to escape a Scheme identifier. A vertical bar (|) can be used to delimit the escaped identifier when needed.

```

@foo          reads as  foo
@{blah @foo blah} reads as ("blah " foo " blah")
@{blah @foo: blah} reads as ("blah " foo: " blah")
@{blah @|foo|: blah} reads as ("blah " foo ": blah")

```

Actually, the command part can be any Scheme expression (that does not start with [, {, or |), which is particularly useful with such escapes since they can be used with any expression.

```

@foo{(+ 1 2) -> @(+ 1 2)!} reads as  (foo "(+ 1 2) -> " (+ 1 2) "!")
@foo{A @"string" escape} reads as  (foo "A string escape")

```

Note that an escaped Scheme string is merged with the surrounding text as a special case. This is useful if you want to use the special characters in your string, but escaping braces are not necessary if they are balanced.

```

@foo{eli@"barzilay.org"} reads as  (foo "eli@barzilay.org")

@foo{A @"{" begins a block} reads as  (foo "A { begins a block")

@C{while (*(p++)) {
  *p = '\n';
}} reads as  (C "while (*(p++)) {" "\n" " "
                    "*p = '\n';" "\n"
                    "}")

```

In some cases, a text contains many literal @s, which can be cumbersome to quote individually. For such case, braces have an alternative syntax: A block of text can begin with a “|{” and terminated accordingly with a “}|”. Furthermore, any nested @ forms must begin with a “|@”.

```
@foo|{bar}@{baz}| reads as (foo "bar}@{baz}")
@foo|{bar|@x{X} baz}| reads as (foo "bar " (x "X") " baz")
@foo|{bar|@x|{@}| baz}| reads as (foo "bar " (x "@") " baz")
```

In cases when even this is not convenient enough, punctuation characters can be added between the | and the braces and the @ in nested forms. (The punctuation is mirrored for parentheses and <>s.) With this extension, Scribble syntax can be used as a “here string” replacement.

```
@foo|-{bar}@|{baz}-| reads as (foo "bar}@|{baz}")
@foo|<<{bar}@|{baz}>>| reads as (foo "bar}@|{baz}")
```

On the flip side of this is, how can an @ sign be used in Scheme code? This is almost never an issue, because Scheme strings and characters are still read the same, and @ is set as a non-terminating reader macro so it can be used in Scheme identifiers anywhere except in the first character of an identifier. When @ must appear as the first character of an identifier, you must quote the identifier just like other non-standard characters in normal S-expression syntax: with a backslash or with vertical bars.

```
(define \@email "foo@bar.com") reads as (define @email "foo@bar.com")
(define |@atchar| #\@) reads as (define @atchar #\@)
```

Note that spaces are not allowed before a | or a {, or they will be part of the following text (or Scheme code). (More on using braces in body texts below.)

```
@foo{bar @baz[2 3] {4 5}} reads as (foo "bar " (baz 2 3) " {4 5}")
```

Finally, remember that the Scribble is just an alternate for S-expressions. Identifiers still get their meaning, as in any Scheme code, through the lexical context in which they appear. Specifically, when the above @-form appears in a Scheme expression context, the lexical environment must provide bindings for foo as a procedure or a macro; it can be defined, required, or bound locally (with let, for example).

```
> (let* ([formatter (lambda (fmt)
  (lambda args (format fmt (apply string-append args))))]
  [bf (formatter "~a*")]
  [it (formatter "/~a/")]
  [ul (formatter "_~a_")]
  [text string-append])
  @text{@it{Note}: @bf{This is @ul{not} a pipe}.})
"/Note/: *This is _not_ a pipe*."
```

2.2 The Command Part

Besides being a Scheme identifier, the $\langle cmd \rangle$ part of an @-form can have Scheme punctuation prefixes, which will end up wrapping the *whole* expression.

```
@' ,@foo{blah}    reads as  ' ,@(foo "blah")
@#' #' #,@foo{blah} reads as  #' #' #,@(foo "blah")
```

When writing Scheme code, this means that `@' ,@foo{blah}` is exactly the same as `'@ ,@foo{blah}` and `' ,@@foo{blah}`, but unlike the latter two, the first construct can appear in body texts with the same meaning, whereas the other two would not work (see below).

After the optional punctuation prefix, the $\langle cmd \rangle$ itself is not limited to identifiers; it can be *any* Scheme expression.

```
@(lambda (x) x){blah} reads as  ((lambda (x) x) "blah")
@'(unquote foo){blah} reads as  '( ,foo "blah")
```

In addition, the command can be omitted altogether, which will omit it from the translation, resulting in an S-expression that usually contains, say, just strings:

```
@{foo bar    reads as  ("foo bar" "\n"
  baz}          "baz")

@' {foo bar  reads as  ' ("foo bar" "\n"
  baz}          "baz")
```

If the command part begins with a `;` (with no newline between the `@` and the `;`), then the construct is a comment. There are two comment forms, one for arbitrary-text and possibly nested comments, and another one for line comments:

```
@;{ <any>* }

@; <anything-else-without-newline>*
```

In the first form, the commented body must still parse correctly; see the description of the body syntax below. In the second form, all text from the `@;` to the end of the line *and* all following spaces (or tabs) are part of the comment (similar to `%` comments in TeX).

```
@foo{bar @; comment reads as  (foo "bar bazblah")
  baz@;
  blah}
```

Tip: if you're editing in a Scheme-aware editor (like DrScheme or Emacs), it is useful to comment out blocks like this:

```
@;{
```

```
...  
;}
```

so the editor does not treat the file as having unbalanced parenthesis.

If only the *<cmd>* part of an @-form is specified, then the result is the command part only, without an extra set of parenthesis. This makes it suitable for Scheme escapes in body texts. (More on this below, in the description of the body part.)

```
@foo{x @y z}      reads as (foo "x " y " z")  
@foo{x @( * y 2) z} reads as (foo "x " (* y 2) " z")  
@{@foo bar}      reads as (foo " bar")
```

Finally, note that there are currently no special rules for using @ in the command itself, which can lead to things like:

```
@@foo{bar}{baz} reads as ((foo "bar") "baz")
```

2.3 The Datum Part

The datum part can contains arbitrary Scheme expressions, which are simply stacked before the body text arguments:

```
@foo[1 (* 2 3)]{bar} reads as (foo 1 (* 2 3) "bar")  
@foo[@bar{...}]{blah} reads as (foo (bar "...") "blah")
```

The body part can still be omitted, which is essentially an alternative syntax for plain (non-textual) S-expressions:

```
@foo[bar] reads as (foo bar)  
@foo{bar @f[x] baz} reads as (foo "bar " (f x) " baz")
```

The datum part can be empty, which makes no difference, except when the body is omitted. It is more common, however, to use an empty body for the same purpose.

```
@foo[] {bar} reads as (foo "bar")  
@foo[] reads as (foo)  
@foo reads as foo  
@foo{} reads as (foo)
```

The most common use of the datum part is for Scheme forms that expect keyword-value arguments that precede the body of text arguments.

```
@foo[:style 'big]{bar} reads as (foo #:style 'big "bar")
```

2.4 The Body Part

The syntax of the body part is intended to be as convenient as possible for free text. It can contain almost any text—the only characters with special meaning is `@` for sub-`@`-forms, and `}` for the end of the text. In addition, a `{` is allowed as part of the text, and it makes the matching `}` be part of the text too—so balanced braces are valid text.

```
@foo{f{o}o}    reads as (foo "f{o}o")
@foo{{{}}{}}  reads as (foo "{{}}{ }")
```

As described above, the text turns to a sequence of string arguments for the resulting form. Spaces at the beginning and end of lines are discarded, and newlines turn to individual `"\n"` strings (i.e., they are not merged with other body parts); see also the information about newlines and indentation below. Spaces are *not* discarded if they appear after the open `{` (before the closing `}`) when there is also text that follows (precedes) it; specifically, they are preserved in a single-line body.

```
@foo{bar}      reads as (foo "bar")
@foo{ bar }    reads as (foo " bar ")
@foo[1]{ bar } reads as (foo 1 " bar ")
```

If `@` appears in a body, then it is interpreted as Scheme code, which means that the `@`-reader is applied recursively, and the resulting syntax appears as part of the S-expression, among other string contents.

```
@foo{a @bar{b} c} reads as (foo "a " (bar "b") " c")
```

If the nested `@` construct has only a command—no body or datum parts—it will not appear in a subform. Given that the command part can be any Scheme expression, this makes `@` a general escape to arbitrary Scheme code.

```
@foo{a @bar c}    reads as (foo "a " bar " c")
@foo{a @(bar 2) c} reads as (foo "a " (bar 2) " c")
```

This is particularly useful with strings, which can be used to include arbitrary text.

```
@foo{A @"}" marks the end} reads as (foo "A } marks the end")
```

Note that the escaped string is (intentionally) merged with the rest of the text. This works for `@` too:

```
@foo{The prefix: @"."} reads as (foo "The prefix: @.")
@foo{@"@x{y}" -> (x "y")}] reads as (foo "@x{y} -> (x \"y\")")
```


2.4.1 Alternative Body Syntax

In addition to the above, there is an alternative syntax for the body, one that specifies a new marker for its end: use `|{` for the opening marker to have the text terminated by a `|}`.

```
@foo|{...}| reads as (foo "...")
@foo|{"}" follows "{"}| reads as (foo "\"}\" follows \"{\\\"")
@foo|{Nesting |{is}| ok}| reads as (foo "Nesting |{is}| ok")
```

This applies to sub-@-forms too—the @ must be prefixed with a `|`:

```
@foo|{Maze
      |@bar{is}
      Life!}| reads as (foo "Maze" "\n"
                       (bar "is") "\n"
                       "Life!")
@t|{In |@i|{sub|@"@s}| too}| reads as (t "In " (i "sub@s") " too")
```

Note that the subform uses its own delimiters, `{...}` or `|{...}|`. This means that you can copy and paste Scribble text with @-forms freely, just prefix the @ if the immediate surrounding text has a prefix.

For even better control, you can add characters in the opening delimiter, between the `|` and the `{`. Characters that are put there (non alphanumeric ASCII characters only, excluding `|` and `@`) should also be used for sub-@-forms, and the end-of-body marker should have these characters in reverse order with paren-like characters (`(`, `[`, `<`) mirrored.

```
@foo|<<<{@x{foo} |@{bar}|.|}>>>| reads as (foo "@x{foo} |@{bar}|.")
@foo|!!{X |!!@b{Y}...}!!| reads as (foo "X " (b "Y") "...")
```

Finally, remember that you can use an expression escape with a Scheme string for confusing situations. This works well when you only need to quote short pieces, and the above works well when you have larger multi-line body texts.

2.4.2 Scheme Expression Escapes

In some cases, you may want to use a Scheme identifier (or a number or a boolean etc.) in a position that touches the following text; in these situations you should surround the escaped Scheme expression by a pair of `|` characters. The text inside the bars is parsed as a Scheme expression.

```
@foo{foo@bar.|} reads as (foo "foo" bar.)
@foo{foo@|bar|.}| reads as (foo "foo" bar ".")
@foo{foo@3.|} reads as (foo "foo" 3.0)
@foo{foo@|3|.}| reads as (foo "foo" 3 ".")
```

This form is a generic Scheme expression escape, there is no body text or datum part when

you use this form.

```
@foo{foo@|(f 1)|{bar}} reads as (foo "foo" (f 1) "{bar}")
@foo{foo@|bar|[1]{baz}} reads as (foo "foo" bar "[1]{baz}")
```

This works for string expressions too, but note that unlike the above, the string is (intentionally) not merged with the rest of the text:

```
@foo{x@"y"z} reads as (foo "xyz")
@foo{x@"|y"|z} reads as (foo "x" "y" "z")
```

Expression escapes also work with *any* number of expressions,

```
@foo{x@|1 (+ 2 3) 4|y} reads as (foo "x" 1 (+ 2 3) 4 "y")
@foo{x@|*
      *|y} reads as (foo "x" *
                    * "y")
```

It seems that `@||` has no purpose—but remember that these escapes are never merged with the surrounding text, which can be useful when you want to control the sub expressions in the form.

```
@foo{Alice@||Bob@|
      |Carol} reads as (foo "Alice" "Bob"
                        "Carol")
```

Note that `@|{...}|` can be parsed as either an escape expression or as the Scheme command part of a `@`-form. The latter is used in this case (since there is little point in Scheme code that uses braces).

```
@|{blah}| reads as ("blah")
```

2.4.3 Comments

As noted above, there are two kinds of Scribble comments: `@;{...}` is a (nestable) comment for a whole body of text (following the same rules for `@`-forms), and `@;...` is a line-comment.

```
@foo{First line@;{there is still a
                  newline here;}
      Second line} reads as (foo "First line"
                               "\n"
                               "Second line")
```

One useful property of line-comments is that they continue to the end of the line *and* all following spaces (or tabs). Using this, you can get further control of the subforms.

```
@foo{A long @;
      single-@;
      string arg.} reads as (foo "A long single-string arg.")
```

Note how this is different from using `@|`s in that strings around it are not merged.

2.4.4 Spaces, Newlines, and Indentation

The Scribble syntax treats spaces and newlines in a special way is meant to be sensible for dealing with text. As mentioned above, spaces at the beginning and end of body lines are discarded, except for spaces between a `{` and text, or between text and a `}`.

```
@foo{bar}    reads as (foo "bar")
@foo{ bar }  reads as (foo " bar ")
@foo{ bar
  baz }      reads as (foo " bar" "\n"
                  "baz ")
```

A single newline that follows an open brace or precedes a closing brace is discarded, unless there are only newlines in the body; other newlines are read as a `"\n"` string

```
@foo{bar
}           reads as (foo "bar")
@foo{
  bar      reads as (foo
                  "bar")
}
@foo{
  bar      reads as (foo
                  "\n"
                  "bar" "\n")
}
@foo{
  bar
  baz      reads as (foo
                  "bar" "\n"
                  "\n"
                  "baz")
}
@foo{
}           reads as (foo "\n")
@foo{
}           reads as (foo "\n"
                  "\n")
```

```
@foo{ bar    reads as (foo " bar" "\n"
  baz }          "baz ")
```

In the parsed S-expression syntax, a single newline string is used for all newlines; you can use `eq?` to identify this line. This can be used to identify newlines in the original *<text-body>*.

```
> (let ([nl (car @' {
              }))]
      (for-each (lambda (x) (display (if (eq? x nl) "\n..." x)))
                @' {foo
                  @,(list "bar" "\n" "baz")
                  blah}))
(newline))
foo
... bar
baz
... blah
```

Spaces at the beginning of body lines do not appear in the resulting S-expressions, but the column of each line is noticed, and all-space indentation strings are added so the result has the same indentation. A indentation string is added to each line according to its distance from the leftmost syntax object (except for empty lines). (Note: if you try these examples on a mzscheme REPL, you should be aware that the reader does not know about the “> ” prompt.)

```
@foo{      reads as (foo
  bar      "bar" "\n"
  baz      "baz" "\n"
  blah     "blah")
}

@foo{      reads as (foo
  begin    "begin" "\n" " "
  x++;     "x++;" "\n"
  end}     "end")

@foo{      reads as (foo " "
  a        "a" "\n" " "
  b        "b" "\n"
  c}       "c")
```

If the first string came from the opening `{` line, it is not prepended with an indentation (but it can affect the leftmost syntax object used for indentation). This makes sense when formatting structured code as well as text (see the last example in the following block).

```

@foo{bar      reads as (foo "bar" "\n" " "
    baz      "baz" "\n"
    bbb}     "bbb")

@foo{ bar    reads as (foo " bar" "\n" " "
    baz      "baz" "\n" " "
    bbb}     "bbb")

@foo{bar     reads as (foo "bar" "\n"
    baz      "baz" "\n"
    bbb}     "bbb")

@foo{ bar    reads as (foo " bar" "\n"
    baz      "baz" "\n"
    bbb}     "bbb")

@foo{ bar    reads as (foo " bar" "\n"
    baz      "baz" "\n" " "
    bbb}     "bbb")

@text{Some @b{bold text}, and
more text.} reads as (text "Some " (b "bold" "\n"
                                "text"), and "\n"
                                "more text.")

```

Note that each @-form is parsed to an S-expression that has its own indentation. This means that Scribble source can be indented like code, but if indentation matters then you may need to apply indentation of the outer item to all lines of the inner one. For example, in

```

@code{
  begin
    i = 1, r = 1
    @bold{while i < n do
      r *= i++
    done}
  end
}

```

a formatter will need to apply the 2-space indentation to the rendering of the **bold** body.

Note that to get a first-line text to be counted as a leftmost line, line and column accounting should be on for the input port (`use-at-readtable` turns them on for the current input port). Without this,

```

@foo{x1
    x2
    x3}

```

will not have 2-space indentations in the parsed S-expression if source accounting is not on, but

```
@foo{x1
      x2
     x3}
```

will (due to the last line). Pay attention to this, as it can be a problem with Scheme code, for example:

```
@code{(define (foo x)
        (+ x 1))}
```

For rare situations where spaces at the beginning (or end) of lines matter, you can begin (or end) a line with a @| |.

```
@foo{           reads as  (foo
  @| | bar @| |    " bar " "\n"
  @| | baz}        " baz")
```

3 High-Level Scribble API

3.1 Base Document Format

```
#lang scribble/base
```

The `scribble/base` language provides functions and forms that can be used from code written either in Scheme or with `@` expressions.

The `scribble/base` name can also be used as a library with `require`, in which case it provides all of the same bindings, but without setting the reader or setting the default rendering format to the PLT Scheme manual format.

Functions provided by this library, such as `title` and `italic`, might be called from Scheme as

```
(title #:tag "how-to"
       "How to Design " (italic "Great") " Programs")
```

They can also be called with `@` notation as

```
@title[#:tag "how-to"]{How to Design @italic{Great} Programs}
```

Although the procedures are mostly design to be used from `@` mode, they are easier to document in Scheme mode (partly because we have `scribble/manual`).

3.1.1 Document Structure

```
(title [#:tag tag
        #:tag-prefix tag-prefix
        #:style style
        #:version vers]
       pre-content ...+) → title-decl?
tag : (or/c false/c string? (listof string?)) = #f
tag-prefix : (or/c false/c string? module-path?) = #f
style : (or/c style? #f string? symbol? (listof symbol?)) = #f
vers : (or/c string? false/c) = #f
pre-content : pre-content?
```

Generates a `title-decl` to be picked up by `decode` or `decode-part`. The decoded `pre-content` (i.e., parsed with `decode-content`) supplies the title content. If `tag` is `#f`, a tag string is generated automatically from the content. The tag string is combined with the symbol `'part` to form the full tag.

The *style* argument can be a style structure, or it can be one of the following: a `#f` that corresponds to a “plain” style, a string that is used as a style name, a symbol that is used as a style property, or a list of symbols to be used as style properties. For information on styles, see [part](#). For example, a style of `'toc` causes sub-sections to be generated as separate pages in multi-page HTML output.

The *tag-prefix* argument is propagated to the generated structure (see §7.3.2 “Tags”). If *tag-prefix* is a module path, it is converted to a string using `module-path-prefix->string`.

The *vers* argument is propagated to the `title-decl` structure. Use `""` as *vers* to suppress version rendering in the output.

The section title is automatically indexed by `decode-part`. For the index key, leading whitespace and a leading “A”, “An”, or “The” (followed by more whitespace) is removed.

```
(section [#:tag tag
         #:tag-prefix tag-prefix
         #:style style]
        pre-content ...+) → part-start?
tag : (or/c false/c string? (listof string?)) = #f
tag-prefix : (or/c false/c string? module-path?) = #f
style : (or/c style? #f string? symbol? (listof symbol?)) = #f
pre-content : pre-content?
```

Like `title`, but generates a `part-start` of depth 0 to be by `decode` or `decode-part`.

```
(subsection [#:tag tag
            #:tag-prefix tag-prefix
            #:style style]
           pre-content ...+) → part-start?
tag : (or/c false/c string? (listof string?)) = #f
tag-prefix : (or/c false/c string? module-path?) = #f
style : (or/c style? #f string? symbol? (listof symbol?)) = #f
pre-content : pre-content?
```

Like `section`, but generates a `part-start` of depth 1.

```
(subsubsection [#:tag tag
               #:tag-prefix tag-prefix
               #:style style]
              pre-content ...+) → part-start?
tag : (or/c false/c string? (listof string?)) = #f
tag-prefix : (or/c false/c string? module-path?) = #f
```



```
style : (or/c style? #f string? symbol? (listof symbol?)) = #f
pre-content : pre-content?
```

Like [section](#), but generates a [part-start](#) of depth 2.

```
(subsubsub*section [#:tag tag
                   #:tag-prefix tag-prefix
                   #:style style]
  pre-content ...+) → paragraph?
tag : (or/c false/c string? (listof string?)) = #f
tag-prefix : (or/c false/c string? module-path?) = #f
style : (or/c style? #f string? symbol? (listof symbol?)) = #f
pre-content : pre-content?
```

Similar to [section](#), but merely generates a paragraph that looks like an unnumbered section heading (for when the nesting gets too deep to include in a table of contents).

```
(include-section module-path)
```

Requires *module-path* and returns its `doc` export (without making any imports visible to the enclosing context). Since this form expands to `require`, it must be used in a module or top-level context.

```
(author auth ...) → block?
auth : content?
```

Generates a [paragraph](#) with style name `'author` to show the author(s) of a document, where each author is represented by content. Normally, this function is used after [title](#) for the beginning of a document. See also [author+email](#).

```
(author+email author
              email
              [#:obfuscate? obfuscate?]) → element?
author : elem
email : string?
obfuscate? : any/c = #f
```

Combines an author name with an e-mail address. If *obfuscate?* is true, then the result obscures the e-mail address slightly to avoid address-harvesting robots.

3.1.2 Blocks

```
(para #:style style pre-content ...) → paragraph?  
  style : (or/c style? string? symbol? #f)  
  pre-content : pre-content?
```

Creates a paragraph containing the decoded *pre-content* (i.e., parsed with `decode-paragraph`).

The *style* argument can be a style, `#f` to indicate a “plain” style, a string that is used as a style name, or a symbol that is used as a style name. (Note that `section` and `para` treat symbols differently as *style* arguments.)

```
(nested #:style style pre-flow ...) → nested-flow?  
  style : (or/c style? string? symbol? #f)  
  pre-flow : pre-flow?
```

Creates a nested flow containing the decoded *pre-flow* (i.e., parsed with `decode-flow`).

The *style* argument is handled the same as `para`. The `'inset` style causes the nested flow to be inset compared to surrounding text.

```
(centered pre-flow ...) → nested-flow?  
  pre-flow : pre-flow?
```

Produces a nested flow whose content is centered.

```
(margin-note pre-content ...) → blockquote?  
  pre-content : pre-content?
```

Produces a nested flow that is typeset in the margin, instead of inlined.

```
(itemlist itm ... [#:style style]) → itemization?  
  itm : item?  
  style : (or/c style? string? symbol? #f) = #f
```

Constructs an `itemization` given a sequence of items constructed by `item`.

The *style* argument is handled the same as `para`. The `'ordered` style numbers items, instead of just using a bullet.

```
(item pre-flow ...) → item?
```

`pre-flow` : `pre-flow?`

Creates an item for use with `itemlist`. The decoded `pre-flow` (i.e., parsed with `decode-flow`) is the item content.

```
(item? v) → boolean?  
  v : any/c
```

Returns `#t` if `v` is an item produced by `item`, `#f` otherwise.

```
(tabular cells [#:style style]) → table?  
  cells : (listof (listof (or/c block? content? 'cont)))  
  style : (or/c style? string? symbol? #f) = #f
```

Creates a table with the given content, which is supplies as a list of rows, where each row has a list of cells. The length of all rows must match.

Use `'cont` as a cell to continue the content of the preceding cell in a row in the space that would otherwise be used for a new cell. A `'cont` must not appear as the first cell in a row.

The `style` argument is handled the same as `para`.

```
(verbatim [#:indent indent] str ...+) → block?  
  indent : exact-nonnegative-integer? = 0  
  str : string?
```

Typesets `strs` in typewriter font with the linebreaks specified by newline characters in `str`. Consecutive spaces in the `strs` are converted to `hspace` to ensure that they are all preserved in the output. Additional space (via `hspace`) as specified by `indent` is added to the beginning of each line.

The `strs` are *not* decoded with `decode-content`, so `(verbatim "--")` renders with three hyphens instead of an em-dash. Beware, however, that `@` for a `verbatim` call performs some processing before delivering arguments to `verbatim`. The `verbatim` form is typically used with `[[{...}]]` or similar brackets to disable `@` notation within the `verbatim` argument, like this:

```
@verbatim|  
  Use @bold{--} like this...  
}|
```

which renders as

```
Use @bold{--} like this...
```

Even with `{...}`, beware that consistent leading whitespace is removed; see §2.4.1 “Alternative Body Syntax” for more information.

See also [literal](#).

3.1.3 Text Styles and Content

```
(elem pre-content ... [#:style style]) → element?  
  pre-content : pre-content?  
  style : (or style? string? symbol? #f) = #f
```

Wraps the decoded `pre-content` as an element with style `style`.

```
(italic pre-content ...) → element?  
  pre-content : pre-content?
```

Like `elem`, but with style `'italic`.

```
(bold pre-content ...) → element?  
  pre-content : pre-content?
```

Like `elem`, but with style `'bold`.

```
(tt pre-content ...) → element?  
  pre-content : pre-content?
```

Like `elem`, but with style `'tt`.

```
(subscript pre-content ...) → element?  
  pre-content : pre-content?
```

Like `elem`, but with style `'subscript`.

```
(superscript pre-content ...) → element?  
  pre-content : pre-content?
```

Like `elem`, but with style `'superscript`.

```
(smaller pre-content ...) → element?  
  pre-content : pre-content?
```

Like `elem`, but with style `'smaller`. When uses of `smaller` are nested, text gets progressively smaller.

```
(larger pre-content ...) → element?  
pre-content : pre-content?
```

Like `elem`, but with style `'larger`. When uses of `larger` are nested, text gets progressively larger.

```
(emph pre-content ...) → element?  
pre-content : pre-content?
```

The same as `italic`.

```
(linebreak) → element?
```

Produces an element that forces a line break.

```
(hspace n) → element?  
n : exact-nonnegative-integer?
```

Produces an element containing `n` spaces and style `'hspace`.

```
(literal str ...+) → element?  
str : string?
```

Produces an element containing literally `str`s with no decoding via `decode-content`.

Beware that `@` for a `literal` call performs some processing before delivering arguments to `literal`. The `literal` form can be used with `||{...}||` or similar brackets to disable `@` notation within the `literal` argument, like this:

```
@literal|{@bold{--}}|
```

which renders as

```
@literal|{@bold{--}}|
```

See also `verbatim`.

```
(image path  
[:scale scale  
#:suffixes suffixes]  
pre-content ...) → element?
```

```

path : (or/c path-string? (cons/c 'collects (listof bytes?)))
scale : real? = 1.0
suffixes : (listof #rx"^[.]") = null
pre-content : pre-content?

```

Creates an image element from the given path. The decoded *pre-content* serves as the alternate text for contexts where the image cannot be displayed.

The path is relative to the current directory, which is set by `setup-plt` and `scribble` to the directory of the main document file. The *path* argument also can be a result of `path->main-collects-relative`.

The strings in *suffixes* are filtered to those supported by given renderer, and then the acceptable suffixes are tried in order. The HTML renderer supports ".png" and ".gif", while the Latex renderer supports ".png", ".pdf", and ".ps" (but ".ps" works only when converting Latex output to DVI, and ".png" and ".pdf" work only for converting Latex output to PDF).

3.1.4 Links

```

(hyperlink url
  pre-content ...
  [#:underline? underline?
   #:style style]) → element?
url : string?
pre-content : pre-content?
underline? : any/c = #t
style : (or/c style? string? symbol? #f)
       = (if underline? #f "plainlink")

```

The decoded *pre-content* is hyperlinked to *url*. If *style* is not supplied, then *underline?* determines how the link is rendered.

```

(url dest) → element?
dest : string?

```

Generates a literal hyperlinked URL.

```

(secref tag
  [#:doc module-path
   #:tag-prefixes prefixes
   #:underline? underline?]) → element?
tag : string?

```

```

module-path : (or/c module-path? false/c) = #f
prefixes : (or/c (listof string?) false/c) = #f
underline? : any/c = #t

```

Inserts the hyperlinked title of the section tagged *tag*, but elements in the title content with the `'aux` style property are omitted in the hyperlink label.

If `#:doc module-path` is provided, the *tag* refers to a tag with a prefix determined by *module-path*. When `setup-plt` renders documentation, it automatically adds a tag prefix to the document based on the source module. Thus, for example, to refer to a section of the PLT Scheme reference, *module-path* would be `'(lib "scribblings/reference/reference.scrbl")`.

The `#:tag-prefixes prefixes` argument similarly supports selecting a particular section as determined by a path of tag prefixes. When a `#:doc` argument is provided, then *prefixes* should trace a path of tag-prefixed subsections to reach the *tag* section. When `#:doc` is not provided, the *prefixes* path is relative to any enclosing section (i.e., the youngest ancestor that produces a match).

If *underline?* is `#f`, then the hyperlink is rendered in HTML without an underline.

```

(seclink tag
  [#:doc module-path
   #:tag-prefixes prefixes
   #:underline? underline?]
  pre-content ...) → element?
tag : string?
module-path : (or/c module-path? false/c) = #f
prefixes : (or/c (listof string?) false/c) = #f
underline? : any/c = #t
pre-content : pre-content?

```

Like `secref`, but the link label is the decoded *pre-content* instead of the target section's name.

```

(other-doc module-path
  [#:underline? underline?]) → element?
module-path : module-path?
underline? : any/c = #t

```

Like `secref` for the document's implicit `"top"` tag. Use this function to refer to a whole manual instead of `secref`, in case a special style in the future is used for manual titles.

```

(elemtag t pre-content ...) → element?
t : (or/c tag? string?)

```

`pre-content` : `pre-content?`

The tag `t` refers to the content form of `pre-content`.

```
(elemref t
  pre-content ...
  [#:underline? underline?]) → element?
t : (or/c tag? string?)
pre-content : pre-content?
underline? : any/c = #t
```

The decoded `pre-content` is hyperlinked to `t`, which is normally defined using `elemtag`.

```
(module-path-prefix->string mod-path) → string?
mod-path : module-path?
```

Converts a module path to a string by resolving it to a path, and using `path->main-collects-relative`.

3.1.5 Indexing

```
(index words pre-content ...) → index-element?
words : (or/c string? (listof string?))
pre-content : pre-content?
```

Creates an index element given a plain-text string—or list of strings for a hierarchy, such as `'("strings" "plain")` for a “plain” entry below a more general “strings” entry. As index keys, the strings are “cleaned” using `clean-up-index-strings`. The strings (without clean-up) also serve as the text to render in the index. The decoded `pre-content` is the text to appear inline as the index target.

Use `index` when an index entry should point to a specific word or phrase within the typeset document (i.e., the `pre-content`). Use `section-index`, instead, to create an index entry that leads to a section, instead of a specific word or phrase within the section.

```
(index* words word-contents pre-content ...) → index-element?
words : (listof string?)
word-contents : (listof list?)
pre-content : pre-content?
```

Like `index`, except that `words` must be a list, and the list of contents render in the index (in parallel to `words`) is supplied as `word-contents`.

```
(as-index pre-content ...) → index-element?  
  pre-content : pre-content?
```

Like `index`, but the word to index is determined by applying `content->string` on the decoded `pre-content`.

```
(section-index word ...) → part-index-decl?  
  word : string?
```

Creates a `part-index-decl` to be associated with the enclosing section by `decode`. The `words` serve as both the keys and as the rendered forms of the keys within the index.

```
(index-section [#:tag tag]) → part?  
  tag : (or/c false/c string?) = "doc-index"
```

Produces a part that shows the index the enclosing document. The optional `tag` argument is used as the index section's tag.

3.1.6 Tables of Contents

```
(table-of-contents) → delayed-block?
```

Returns a delayed flow element that expands to a table of contents for the enclosing section. For Latex output, however, the table of contents currently spans the entire enclosing document.

```
(local-table-of-contents [#:style style]) → delayed-block?  
  style : (or/c symbol? #f) = #f
```

Returns a delayed flow element that may expand to a table of contents for the enclosing section, depending on the output type. For multi-page HTML output, the flow element is a table of contents; for Latex output, the flow element is empty.

The meaning of the `style` argument depends on the output type, but `'immediate-only` normally creates a table of contents that contains only immediate sub-sections of the enclosing section. See also the `'quiet` style of `part` (i.e., in a `part` structure, not supplied as the `style` argument to `local-table-of-contents`), which normally suppresses sub-part entries in a table of contents.

3.2 PLT Scheme Manual Format

The `scribble/manual` language is a major component of Scribble, and it is documented in its own chapter: §4 “Scribbling Documentation”.

3.3 SIGPLAN Paper Format

```
#lang scribble/sigplan
```

The `scribble/sigplan` language is like `scribble/manual`, but configured with Latex style defaults to use the `"sigplanconf.cls"` class file that is included with Scribble.

```
preprint
```

Enables the preprint option. Use `preprint` only on the same line as `#lang`, with only whitespace between `scribble/sigplan` and `preprint`:

```
#lang scribble/sigplan @preprint
```

```
(abstract pre-content ...) → block?  
pre-content : pre-content?
```

Generates a nested flow for a paper abstract.

```
(include-abstract module-path)
```

Similar to `include-section`, but incorporates the document in the specified module as an abstract. The document must have no title or sub-parts.

```
(authorinfo name affiliation email) → block?  
name : pre-content?  
affiliation : pre-content?  
email : pre-content?
```

A replacement for `author` that associates an affiliation and e-mail address with the author name.

```
(conferenceinfo conference location) → block?  
conference : pre-content?  
location : pre-content?
```

```
(copyrightyear content ...) → block?
  content : pre-content?
(copyrightdata content ...) → block?
  content : pre-content?
```

Declares information that is collected into the copyright region of the paper.

```
(category CR-number
  subcategory
  third-level
  [fourth-level]) → block?
  CR-number : pre-content?
  subcategory : pre-content?
  third-level : pre-content?
  fourth-level : (or/c #f pre-content?) = #f
(terms content ...) → block?
  content : pre-content?
(keywords content ...) → block?
  content : pre-content?
```

Typesets category, term, and keyword information for the paper, which is normally placed immediately after an `abstract` form.

3.4 JFP Paper Format

```
#lang scribble/jfp
```

The `scribble/jfp` language is like `scribble/manual`, but configured with Latex style defaults to use the "jfp.cls" class file that is included with Scribble.

Latex output with `scribble/jfp` uses a main-document version supplied to `title` as the short-form document name (to be used in page headers).

```
(abstract pre-content ...) → block?
  pre-content : pre-content?
```

Generates a nested flow for a paper abstract.

```
(include-abstract module-path)
```

Similar to `include-section`, but incorporates the document in the specified module as an abstract. The document must have no title or sub-parts.

```
(author name ...) → block?  
  name : pre-content?
```

A replacement for `author` from `scribble/base`.

```
((author/short short-name ...) long-name ...) → block?  
  short-name : pre-content?  
  long-name : pre-content?
```

Like `author`, but allows the short-form names (to be used in page headers) to be specified separately from the long-form name.

```
(affiliation place ...) → element?  
  place : pre-content?  
(affiliation-mark mark ...) → element?  
  mark : pre-content?  
(affiliation-sep) → element?
```

Use `affiliation` within `author` or the long-name part of `author/short` to specify affiliations after all authors. If different authors have different affiliations, use `affiliation-mark` with a number after each author, and then use `affiliation-mark` before each different affiliation within a single `affiliation`, using `(affiliation-sep)` to separate affiliations.

4 Scribbling Documentation

The `scribble/manual` language and associated libraries provide extensive support for documenting PLT Scheme libraries. The most significant aspect of support for documentation is the way that source-code bindings are connected to documentation sites through the module namespace—a connection that is facilitated by the fact that Scribble documents are themselves modules that reside in the same namespace. §4.1 “Getting Started with Documentation” provides an introduction to using Scribble for documentation, and the remaining sections document the relevant libraries and APIs in detail.

4.1 Getting Started with Documentation

Although the `scribble` command-line utility generates output from a Scribble document, documentation of PLT Scheme libraries is normally built by `setup-plt`. This chapter emphasizes the `setup-plt` approach, which more automatically supports links across documents.

See §1 “Getting Started” for information on using the `scribble` command-line utility.

4.1.1 Setting Up Library Documentation

To document a collection or PLaneT package:

- Create a file in your collection or planet package with the file extension `".scrbl"`. Beware that the file name you choose will determine the output directory's name. The remainder of these instructions assume that the file is called `"manual.scrbl"`.
- Start `"manual.scrbl"` like this:

```
#lang scribble/manual
```

```
@title{My Library}
```

```
Welcome to my documentation: @scheme[(list 'testing 1 2 3)].
```

The first line starts the file in “text” mode and selects the PLT Scheme manual output format. It also introduces bindings like `title` and `scheme` for writing PLT Scheme documentation.

- Add the following entry to your collect or package's `"info.ss"`:

```
(define scribblings '(("manual.scrbl" ())))
```

The `()` above is a list of options. When your document gets large enough that you want it split into multiple pages, add the `'multi-page` option (omitting the quote, since the whole right-hand side of the definition is already quoted).

If you do not already have an `"info.ss"` module, here's a suitable complete module:

```
#lang setup/infotab
(define scribblings '("manual.scrbl" ()))
```

- Run `setup-plt` to build your documentation. For a collection, optionally supply `-l` followed by the collection name to limit the build process to that collection. For a PLaneT package, optionally supply `-P` followed by the package information to limit the build process to that package.
- The generated documentation is normally `"doc/manual/index.html"` within the collection or PLaneT package directory. If the collection is in PLT Scheme's main `"collects"` directory, however, then the documentation is generated as `"manual/index.html"` in the installation's main `"doc"` directory.

4.1.2 Scheme Typesetting and Hyperlinks

In the document source at the start of this chapter (§4.1.1 “Setting Up Library Documentation”), the Scheme expression `(list 'testing 1 2 3)` is typeset properly, but the `list` identifier is not hyperlinked to the usual definition. To cause `list` to be hyperlinked, add a `require` form like this:

```
@(require (for-label scheme))
```

This `require` with `for-label` declaration introduces a document-time binding for each export of the `scheme` module. When the document is built, the `scheme` form detects the binding for `list`, and so it generates a reference to the specification of `list`. The setup process detects the reference, and it finds the matching specification in the existing documentation, and ultimately directs the hyperlink to that specification.

Hyperlinks based on `for-label` and `scheme` are the preferred mechanism for linking to information outside of a single document. Such links require no information about where and how a binding is documented elsewhere:

```
#lang scribble/manual
@(require (for-label scheme))
```

```
@title{My Library}
```

```
See also @scheme[list].
```

The `scheme` form typesets a Scheme expression for inline text, so it ignores the source formatting of the expression. The `schemeblock` form, in contrast, typesets inset Scheme code, and it preserves the expression's formatting from the document source.

```
#lang scribble/manual
@(require (for-label scheme))
```

```
@title{My Library}
```

Some example Scheme code:

```
@schemeblock[
(define (nobody-understands-me what)
  (list "When I think of all the"
        what
        "I've tried so hard to explain!"))
(nobody-understands-me "glorble snop")
]
```

4.1.3 Section Hyperlinks

A `section` declaration in a document can include a `#:tag` argument that declares a hyperlink-target tag. The `secref` function generates a hyperlink, using the section name as the text of the hyperlink. Use `seclink` to create a hyperlink with text other than the section title.

The following example illustrates section hyperlinks:

```
#lang scribble/manual
@(require (for-label scheme))

@title{My Library}

Welcome to my documentation: @scheme[(list 'testing 1 2 3)].

@table-of-contents[]

@section[#:tag "chickens"]{Philadelphia Chickens}

Dancing tonight!

@section{Reprise}

See @secref{chickens}.
```

Since the page is so short, the hyperlinks in the above example are more effective if you change the "info.ss" file to add the `'multi-file` flag:

```
(define scribblings '(("manual.scrbl" (multi-page))))
```

A section can have a tag prefix that applies to all tags as seen from outside the section. Such a prefix is automatically given to each top-level document as processed by `setup-plt`. Thus, referencing a section tag in a different document requires using a prefix, which is based on the target document's main source file. The following example links to a section in the PLT Scheme reference manual:

```
#lang scribble/manual
@(require (for-label scheme))
@(define ref-src
  '(lib "scribblings/reference/reference.scrbl"))

@title{My Library}

See also @i{@secref[#:doc ref-src]{pairs}}.
```

As mentioned in §4.1.2 “Scheme Typesetting and Hyperlinks”, however, cross-document references based on `(require (for-label ...))` and `scheme` are usually better than cross-document references using `secref`.

4.1.4 Defining Scheme Bindings

Use `defproc` to document a procedure, `deform` to document a syntactic form, `defstruct` to document a structure type, etc. These forms provide consistent formatting of definitions, and they declare hyperlink targets for scheme-based hyperlinks.

To document a `my-helper` procedure that is exported by `"helper.ss"` in the `"my-lib"` collection that contains `"manual.scrbl"`:

- Use `(require (for-label "helper.ss"))` to import the binding information about the bindings of `"helper.ss"` for use when typesetting identifiers. A relative reference `"helper.ss"` works since it is relative to the documentation source.
- Add a `@defmodule[my-lib/helper]` declaration, which specifies the library that is being documented within the section. The `defmodule` form needs an absolute module name `mylib/helper`, instead of a relative reference `"helper.ss"`, since the module path given to `defmodule` appears verbatim in the generated documentation.
- Use `defproc` to document the procedure.

Adding these pieces to `"manual.scrbl"` gives us the following:

```
#lang scribble/manual
@(require (for-label scheme
             "helper.ss"))
```



```

@title{My Library}

@defmodule[my-lib/helper]

@defproc[(my-helper [lst list?])
         (listof
          (not/c (one-of/c 'cow)))]{

  Replaces each @scheme['cow] in @scheme[lst] with
  @scheme['aardvark].}

```

In `defproc`, a contract is specified with each argument to the procedure. In this example, the contract for the `lst` argument is `list?`, which is the contract for a list. After the closing parenthesis that ends the argument sequence, the contract of the result must be given; in this case, `my-helper` guarantees a result that is a list where none of the elements are `'cow`.

Some things to notice in this example and the documentation that it generates:

- The `list?`, `listof`, etc. elements of contracts are hyperlinked to their documentation.
- The result contract is formatted in the generated documentation in the same way as in the source. That is, the source layout of contracts is preserved. (In this case, putting the contract all on one line would be better.)
- In the prose that documents `my-helper`, `lst` is automatically typeset in italic, matching the typesetting in the blue box. The `scheme` form essentially knows that it's used in the scope of a procedure with argument `lst`.
- If you hover the mouse pointer over `my-helper`, a popup reports that it is provided from `my-lib/helper`.
- If you use `my-helper` in any documentation now, as long as that documentation source also has a `(require (for-label ...))` of "helper.ss", then the reference is hyperlinked to the definition above.

See `defproc*`, `defform`, etc. for more information on forms to document Scheme bindings.

4.1.5 Showing Scheme Examples

The `examples` form from `scribble/eval` helps you generate examples in your documentation. **Warning:** the `examples` form is especially likely to change or be replaced.

To use `examples`, the procedures to document must be suitable for use at documentation time; in fact, `examples` uses bindings introduced into the document source by `require`.

Thus, to generate examples using `my-helper` from the previous section, `helper.ss` must be imported both via `require-for-label` and `require`:

```
#lang scribble/manual
@(require scribble/eval      ; <-- added
          "helper.ss"       ; <-- added
          (for-label scheme
            "helper.ss"))

@title{My Library}

@defmodule[my-lib/helper]{The @schememodname[my-lib/helper]
module--now with extra cows!}

@defproc[(my-helper [lst list?])
          (listof (not/c (one-of/c 'cow)))]{

  Replaces each @scheme['cow] in @scheme[lst] with
  @scheme['aardvark].

  @examples[
    (my-helper '())
    (my-helper '(cows such remarkable cows))
  ]}
```

4.1.6 Multi-Page Sections

Setting the `'multi-page` option (see §4.1.3 “Section Hyperlinks”) causes each top-level section of a document to be rendered as a separate HTML page.

To push sub-sections onto separate pages, use the `'toc` style for the enclosing section (as started by `title`, `section`, `subsection`, etc.) and use `local-table-of-contents` to generate hyperlinks to the sub-sections.

Revising `cows.scrbl` from the previous section:

```
#lang scribble/manual

@title[#:style '(toc)]{Cows}

@local-table-of-contents[]

@section[#:tag "singing"]{Singing}
Wherever they go, it's a quite a show.
```

```
@section{Dancing}
See @secref["singing"].
```

To run this example, remember to change "info.ss" to add the 'multi-page style. You may also want to add a call to `table-of-contents` in "manual.scrbl".

The difference between `table-of-contents` and `local-table-of-contents` is that the latter is ignored for Latex output.

When using `local-table-of-contents`, it often makes sense to include introductory text before the call of `local-table-of-contents`. When the introductory text is less important and when when local table of contents is short, putting the introductory text after the call of `local-table-of-contents` may be appropriate.

4.1.7 Style Guide

Prose and Terminology

In the descriptive body of `def form`, `def proc`, etc., do not start with "This ..." Instead, start with a sentence whose implicit subject is the form or value being described. Capitalize the first word. Thus, the description will often start with "Returns" or "Produces." Refer to arguments and sub-forms by name.

Do not use the word "argument" to describe a sub-form in a syntactic form; use the term "sub-form" instead, reserving "argument" for values or expressions in a function call. Refer to libraries and languages as such, rather than as "modules" (even though the form to typeset a library or language name is called `schememodname`). Do not call an identifier (i.e., a syntactic element) a "variable" or a "symbol." Do not use the word "expression" for a form that is a definition or might be a definition; use the word "form," instead. Prefer "function" to "procedure."

Avoid cut-and-paste for descriptive text. If two functions are similar, consider documenting them together with `def together`. To abstract a description, consider using explicit prose abstraction, such as "x is like y, except that ...," instead of abstracting the source and instantiating it multiple times; often, a prose abstraction is clearer to the reader than a hidden abstraction in the document implementation.

Typesetting Code

Use `id` or a name that ends `-id` in `def form` to mean an identifier, not `identifier`, `variable`, `name`, or `symbol`. Similarly, use `expr` or something that ends `-expr` for an expression position within a syntactic form. Use `body` for a form (definition or expression) in an internal-definition position. Do not use `expr` for something that isn't exactly an expression,

`id` for something that isn't exactly an identifier, etc.; instead, use `defform/subs` to define a new non-terminal.

Beware of using `deftogether` to define multiple variants of a syntactic form or procedure, because each `defform` or `defproc` creates a definition point, but each form or procedure should have a single definition point. (Scribble issues a warning when a binding has multiple definition points.) Instead, use `defproc*` or `defform*`.

Pay attention to the difference between identifiers and meta-variables when using `scheme`, especially outside of `defproc` or `defform`. Prefix a meta-variable with `_`; for example,

```
@scheme[(rator-expr rand-expr ...)]
```

would be the wrong way to refer to the grammar of a function call, because it produces `(rator-expr rand-expr ...)`, where `rator-expr` and `rand-expr` are typeset as variables. The correct description is

```
@scheme[(_rator-expr _rand-expr ...)]
```

which produces `(rator-expr rand-expr ...)`, where `rator-expr` and `rand-expr` are typeset as meta-variables. The `defproc`, `defform`, etc. forms greatly reduce this burden in descriptions, since they automatically set up meta-variable typesetting for non-literal identifiers. In `defform`, be sure to include literal identifiers (i.e., those not meant as variables, other than the form name being defined) in a `#:literals` clause.

To typeset an identifier with no particular interpretation—syntax, variable, meta-variable, etc.—use `schemeidfont` (e.g., as in `rand-expr` above). Otherwise, use `litchar`, not merely `schemefont` or `verbatim`, to refer to a specific sequence of characters.

When showing example evaluations, use the REPL-snapshot style:

```
@interaction[
(+ 1 2)
]
```

See also the `scribble/eval` library.

Use four dots, `.....`, in place of omitted code, since `....` means repetition.

Typesetting Prose

Refrain from referring to documentation “above” or “below,” and instead have a hyperlink point to the right place.

In prose, use “and” quotation marks instead of `"`. Use `--` for an em-dash, and do not include spaces on either side, though it will typeset as an en-dash and spaces in HTML output. Use

American style for quotation marks and punctuation at the end of quotation marks (i.e., a sentence-terminating period goes inside the quotation marks). Of course, this rule does not apply for quotation marks that are part of code.

Do not use a citation reference (as created by `cite`) as a noun; use it as an annotation.

Do not start a sentence with a Scheme variable name, since it is normally lowercase. For example, use “The *thing* argument is...” instead of “*thing* is...”

Section Titles

Capitalize all words except articles (“the,” “a,” etc.), prepositions, and conjunctions that are not at the start of the title.

A manual title should normally start with a suitable keyword or key phrase (such as “Scribble” for this manual) that is in boldface. If the key word is primarily an executable name, use `exec` instead of `bold`. Optionally add further descriptive text in the title after a colon, where the text starting with the colon is not in boldface.

4.2 Manual Forms

```
#lang scribble/manual
```

The `scribble/manual` language provides all of `scribble/base` plus many additional functions that are specific to writing PLT Scheme documentation.

The `scribble/manual` name can also be used as a library with `require`, in which case it provides all of the same bindings, but without setting the reader or setting the default rendering format to the PLT Scheme manual format.

With `#lang`, `scribble/manual` associates a `latex-defaults` style property with its `doc` export to select the default PLT Scheme manual style for Latex rendering—unless a style is supplied to `title` that already includes a `latex-defaults` style property.

4.2.1 Typesetting Code

```
(schemeblock datum ...)
```

Typesets the `datum` sequence as a table of Scheme code inset by two spaces. The source locations of the `datums` determine the generated layout. For example,

```
(schemeblock
```

```
(define (loop x)
  (loop (not x)))
```

produces the output

```
(define (loop x)
  (loop (not x)))
```

with the `(loop (not x))` indented under `define`, because that's the way it is indented the use of `schemeblock`.

Furthermore, `define` is typeset as a keyword (bold and black) and as a hyperlink to `define`'s definition in the reference manual, because this document was built using a for-label binding of `define` (in the source) that matches a definition in the reference manual. Similarly, `not` is a hyperlink to its definition in the reference manual.

Use `unsyntax` to escape back to an expression that produces an `element`. For example,

```
(schemeblock
  (+ 1 #,(elem (scheme x) (subscript "2"))))
```

produces

```
(+ 1  $x_2$ )
```

The `unsyntax` form is recognized via `free-identifier=?`, so if you want to typeset code that includes `unsyntax`, you can simply hide the usual binding:

```
(schemeblock
  (let ([unsyntax #f])
    (schemeblock
      #'(+ 1 #,x))))
```

Or use `SCHEMEBLOCK`, whose escape form is `UNSYNTAX` instead of `unsyntax`.

A few other escapes are recognized symbolically:

- `(code:line datum ...)` typesets as the sequence of *datums* (i.e., without the `code:line` wrapper).
- `(code:comment datum)` typesets like *datum*, but colored as a comment and prefixed with a semi-colon. A typical *datum* escapes from Scheme-typesetting mode using `unsyntax` and produces a paragraph using `t`:

```
(code:comment @#,t{this is a comment})
```


(Note that `@#,foo{...}` reads as `#,(foo "...")`.)
- `code:blank` typesets as a blank space.

- `_id` typesets as `id`, but colored as a variable (like `schemevarfont`); this escape applies only if `_id` has no for-label binding and is not specifically colored as a subform non-terminal via `deform`, a variable via `defproc`, etc.

See also `scribble/comment-reader`.

```
(SCHEMEBLOCK datum ...)
```

Like `schemeblock`, but with the expression escape `UNSYNTAX` instead of `unsyntax`.

```
(schemeblock0 datum ...)
```

Like `schemeblock`, but without insetting the code.

```
(SCHEMEBLOCK0 datum ...)
```

Like `SCHEMEBLOCK`, but without insetting the code.

```
(schemeinput datum ...)
```

Like `schemeblock`, but the `datum` are typeset after a prompt representing a REPL.

```
(schememod lang datum ...)
```

Like `schemeblock`, but the `datum` are typeset inside a `#lang`-form module whose language is `lang`. The source location of `lang` (relative to the body `datums`) determines the relative positioning of the `#lang` line in the typeset output.

```
(scheme datum ...)
```

Like `schemeblock`, but typeset on a single line and wrapped with its enclosing paragraph, independent of the formatting of `datum`.

```
(SCHEME datum ...)
```

Like `scheme`, but with the `UNSYNTAX` escape like `schemeblock`.

```
(schemeresult datum ...)
```

Like `scheme`, but typeset as a REPL value (i.e., a single color with no hyperlinks).

```
(schemeid datum ...)
```

Like `scheme`, but typeset as an unbound identifier (i.e., no coloring or hyperlinks).

```
(schememodname datum)  
(schememodname (unsyntax expr))
```

Like `scheme`, but typeset as a module path. If *datum* is an identifier or *expr* produces a symbol, then it is hyperlinked to the module path's definition as created by `defmodule`.

```
(schememodlink datum pre-content-expr ...)
```

Like `schememod`, but separating the module path to link from the content to be linked. The *datum* module path is always linked, even if it is not an identifier.

```
(litchar str ...) → element?  
  str : string?
```

Typesets *str*s as a representation of literal text. Use this when you have to talk about the individual characters in a stream of text, as when documenting a reader extension.

```
(schemefont pre-content ...) → element?  
  pre-content : pre-content?
```

Typesets decoded *pre-content* as uncolored, unhyperlinked Scheme. This procedure is useful for typesetting things like `#lang`, which are not readable by themselves.

```
(schemevalfont pre-content ...) → element?  
  pre-content : pre-content?
```

Like `schemefont`, but colored as a value.

```
(schemeresultfont pre-content ...) → element?  
  pre-content : pre-content?
```

Like `schemefont`, but colored as a REPL result.

```
(schemeidfont pre-content ...) → element?  
  pre-content : pre-content?
```

Like `schemefont`, but colored as an identifier.

```
(schemevarfont pre-content ...) → element?  
  pre-content : pre-content?
```

Like *schemefont*, but colored as a variable (i.e., an argument or sub-form in a procedure being documented).

```
(schemekeywordfont pre-content ...) → element?  
  pre-content : pre-content?
```

Like *schemefont*, but colored as a syntactic form name.

```
(schemeparenfont pre-content ...) → element?  
  pre-content : pre-content?
```

Like *schemefont*, but colored like parentheses.

```
(schememetafont pre-content ...) → element?  
  pre-content : pre-content?
```

Like *schemefont*, but colored as meta-syntax, such as backquote or unquote.

```
(schemeerror pre-content ...) → element?  
  pre-content : pre-content?
```

Like *schemefont*, but colored as error-message text.

```
(schememodfont pre-content ...) → element?  
  pre-content : pre-content?
```

Like *schemefont*, but colored as module name.

```
(schemeoutput pre-content ...) → element?  
  pre-content : pre-content?
```

Like *schemefont*, but colored as output.

```
(procedure pre-content ...) → element?  
  pre-content : pre-content?
```

Typesets decoded *pre-content* as a procedure name in a REPL result (e.g., in typewriter

font with a `#<procedure>` prefix and `>` suffix.).

```
(var datum)
```

Typesets `datum` as an identifier that is an argument or sub-form in a procedure being documented. Normally, the `defproc` and `defform` arrange for `scheme` to format such identifiers automatically in the description of the procedure, but use `var` if that cannot work for some reason.

```
(svar datum)
```

Like `var`, but for subform non-terminals in a form definition.

Typesetting Comments

```
#reader scribble/comment-reader
```

As a reader module, `scribble/comment-reader` reads a single S-expression that contains `;`-based comment lines, and it wraps the comments with `code:comment` for use with forms like `schemeblock`. More precisely, `scribble/comment-reader` extends the current reader to adjust the parsing of `;`.

For example, within a Scribble document that imports `scribble/manual`,

```
@#reader scribble/comment-reader
(schemeblock
  ;; This is not a pipe
  (make-pipe)
)
```

generates

```
; This is not a pipe
(make-pipe)
```

The initial `@` is needed above to shift into S-expression mode, so that `#reader` is recognized as a reader declaration instead of literal text. Also, the example uses `(schemeblock . . .)` instead of `@schemeblock[. . .]` because the `@`-reader would drop comments within the `schemeblock` before giving `scribble/comment-reader` a chance to convert them.

4.2.2 Documenting Modules

```
(defmodule maybe-req id maybe-sources pre-flow ...)
```

```
  maybe-req =  
    | #:require-form expr
```

```
maybe-sources =  
    | #:use-sources (mod-path ...)
```

Produces a sequence of flow elements (encaptured in a `splice`) to start the documentation for a module that can be required using the path `id`. The decoded `pre-flows` introduce the module, but need not include all of the module content.

Besides generating text, this form expands to a use of `declare-exporting` with `id`; the `#:use-sources` clause, if provided, is propagated to `declare-exporting`. Consequently, `defmodule` should be used at most once in a section, though it can be shadowed with `defmodules` in sub-sections.

If a `#:require-form` clause is provided, the given expression produces an element to use instead of `(scheme require)` for the declaration of the module. This is useful to suggest a different way of accessing the module instead of through `require`.

Hyperlinks created by `schememodname` are associated with the enclosing section, rather than the local `id` text.

```
(defmodulelang id maybe-sources pre-flow ...)  
(defmodulelang content-expr #:module-paths (mod-path ...)  
  maybe-sources pre-flow ...)
```

Like `defmodule`, but documents `id` as a module path suitable for use by either `require` or `#lang`. If the module path for `require` is syntactically different from the `#lang` form, use the `#:module-paths` to provide them separately.

```
(defmodulereader id maybe-sources pre-flow ...)
```

Like `defmodule`, but documents `id` as a module path suitable for use with `#reader`.

```
(defmodule* maybe-req (id ...+) maybe-sources pre-flow ...)  
(defmodulelang* (id ...+) maybe-sources pre-flow ...)  
(defmodulelang* (content-expr ...+) #:module-paths (mod-path ...+)  
  maybe-sources pre-flow ...)  
(defmodulereader* (id ...+) maybe-sources pre-flow ...)
```

Like `defmodule`, etc., but introduces multiple module paths instead of just one.

```
(defmodule*/no-declare maybe-req (id ...) pre-flow ...)  
(defmodulelang*/no-declare (id ...) pre-flow ...)  
(defmodulelang*/no-declare (content-expr ...)   
                             #:module-paths (mod-path ...+) pre-flow ...)  
(defmodulereader*/no-declare (id ...) pre-flow ...)
```

Like `defmodule*`, etc., but without expanding to `declare-exporting`. Use this form when you want to provide a more specific list of modules (e.g., to name both a specific module and one that combines several modules) via your own `declare-exporting` declaration.

```
(declare-exporting mod-path ... maybe-sources)
```

```
maybe-sources =  
    | #:use-sources (mod-path ...)
```

Associates the `mod-paths` to all bindings defined within the enclosing section, except as overridden by other `declare-exporting` declarations in nested sub-sections. The list of `mod-paths` is shown, for example, when the user hovers the mouse over one of the bindings defined within the section.

More significantly, the first `mod-path` plus the `#:use-sources mod-paths` determine the binding that is documented by each `defform`, `defproc`, or similar form within the section that contains the `declare-exporting` declaration:

- If no `#:use-sources` clause is supplied, then the documentation applies to the given name as exported by the first `mod-path`.
- If `#:use-sources mod-paths` are supplied, then they are tried in order. The first one to provide an export with the same symbolic name and `free-label-identifier=?` to the given name is used as the documented binding. This binding is assumed to be the same as the identifier as exported by the first `mod-path` in the `declare-exporting` declaration.

The initial `mod-paths` sequence can be empty if `mod-paths` are given with `#:use-sources`. In that case, the rendered documentation never reports an exporting module for identifiers that are documented within the section, but the `mod-paths` in `#:use-sources` provide a binding context for connecting (via hyperlinks) definitions and uses of identifiers.

The `declare-exporting` form should be used no more than once per section, since the declaration applies to the entire section, although overriding `declare-exporting` forms can appear in sub-sections.

4.2.3 Documenting Forms, Functions, Structure Types, and Values

```
(defproc prototype
  result-contract-expr-datum
  pre-flow ...)

prototype = (id arg-spec ...)
            | (prototype arg-spec ...)

arg-spec = (arg-id contract-expr-datum)
            | (arg-id contract-expr-datum default-expr)
            | (keyword arg-id contract-expr-datum)
            | (keyword arg-id contract-expr-datum default-expr)
            | ellipses
            | ellipses+

ellipses = ...

ellipses+ = ...+
```

Produces a sequence of flow elements (encapsulated in a [splice](#)) to document a procedure named *id*. Nesting *prototypes* corresponds to a curried function, as in `define`. The *id* is indexed, and it also registered so that `scheme-typeset` uses of the identifier (with the same for-label binding) are hyperlinked to this documentation.

A `defmodule` or `declare-exporting` form (or one of the variants) in an enclosing section determines the *id* binding that is being defined. The *id* should also have a for-label binding (as introduced by `(require (for-label ...))`) that matches the definition binding; otherwise, the defined *id* will not typeset correctly within the definition.

Each *arg-spec* must have one of the following forms:

```
(arg-id contract-expr-datum)
```

An argument whose contract is specified by *contract-expr-datum* which is typeset via `schemeblock0`.

```
(arg-id contract-expr-datum default-expr)
```

Like the previous case, but with a default value. All arguments with a default value must be grouped together, but they can be in the middle of required arguments.

`(keyword arg-id contract-expr-datum)`

Like the first case, but for a keyword-based argument.

`(keyword arg-id contract-expr-datum default-expr)`

Like the previous case, but with a default value.

...

Any number of the preceding argument. This form is normally used at the end, but keyword-based arguments can sensibly appear afterward. See also the documentation for [append](#) for a use of ... before the last argument.

...+

One or more of the preceding argument (normally at the end, like ...).

The `result-contract-expr-datum` is typeset via `schemeblock0`, and it represents a contract on the procedure's result.

The decoded `pre-flow` documents the procedure. In this description, references to `arg-ids` using `scheme`, `schemeblock`, etc. are typeset as procedure arguments.

The typesetting of all information before the `pre-flows` ignores the source layout, except that the local formatting is preserved for contracts and default-values expressions.

```
(defproc* ([prototype
           result-contract-expr-datum] ...)
          pre-flow ...)
```

Like `defproc`, but for multiple cases with the same `id`.

When an `id` has multiple calling cases, they must be defined with a single `defproc*`, so that a single definition point exists for the `id`. However, multiple distinct `ids` can also be defined by a single `defproc*`, for the case that it's best to document a related group of procedures at once.

```
(defform maybe-id maybe-literals form-datum maybe-contracts
         pre-flow ...)
```

```

    maybe-id =
      | #:id id

    maybe-literals =
      | #:literals (literal-id ...)

    maybe-contracts =
      | #:contracts ([subform-datum contract-expr-datum]
                    ...)

```

Produces a sequence of flow elements (encapsulated in a `splice`) to document a syntactic form named by `id` whose syntax is described by `form-datum`. If no `#:id` is used to specify `id`, then `form-datum` must have the form `(id . datum)`.

The `id` is indexed, and it is also registered so that `scheme-typeset` uses of the identifier (with the same for-label binding) are hyperlinked to this documentation.

The `defmodule` or `declare-exporting` requirements, as well as the binding requirements for `id`, are the same as for `defproc`.

The decoded `pre-flow` documents the form. In this description, a reference to any identifier in `form-datum` via `scheme`, `schemeblock`, etc. is typeset as a sub-form non-terminal. If `#:literals` clause is provided, however, instances of the `literal-ids` are typeset normally (i.e., as determined by the enclosing context).

If a `#:contracts` clause is provided, each `subform-datum` (typically an identifier that serves as a meta-variable in `form-datum`) is shown as producing a value that must satisfy the contract described by `contract-expr-datum`.

The typesetting of `form-datum`, `subform-datum`, and `contract-expr-datum` preserves the source layout, like `schemeblock`.

```

(deform* maybe-id maybe-literals [form-datum ...+] maybe-contracts
  pre-flow ...)

```

Like `deform`, but for multiple forms using the same `id`.

```

(deform/subs maybe-id maybe-literals form-datum
  ([nonterm-id clause-datum ...+] ...)
  maybe-contracts
  pre-flow ...)

```

Like `deform`, but including an auxiliary grammar of non-terminals shown with the `id` form. Each `nonterm-id` is specified as being any of the corresponding `clause-datums`, where the formatting of each `clause-datum` is preserved.

```
(defform*/subs maybe-id maybe-literals [form-datum ...]
  maybe-contracts
  pre-flow ...)
```

Like `defform/subs`, but for multiple forms for *id*.

```
(defform/none maybe-literal form-datum maybe-contracts
  pre-flow ...)
```

Like `defform`, but without registering a definition.

```
(defidform id pre-flow ...)
```

Like `defform`, but with a plain *id* as the form.

```
(specform maybe-literals datum maybe-contracts
  pre-flow ...)
```

Like `defform`, but without indexing or registering a definition, and with indenting on the left for both the specification and the *pre-flows*.

```
(specsubform maybe-literals datum maybe-contracts
  pre-flow ...)
```

Similar to `defform`, but without any specific identifier being defined, and the table and flow are typeset indented. This form is intended for use when refining the syntax of a non-terminal used in a `defform` or other `specsubform`. For example, it is used in the documentation for `defproc` in the itemization of possible shapes for *arg-spec*.

The *pre-flows* list is parsed as a flow that documents the procedure. In this description, a reference to any identifier in *datum* is typeset as a sub-form non-terminal.

```
(specsubform/subs maybe-literals datum
  ([nonterm-id clause-datum ...+] ...)
  maybe-contracts
  pre-flow ...)
```

Like `specsubform`, but with a grammar like `defform/subs`.

```
(specspecsubform maybe-literals datum maybe-contracts
  pre-flow ...)
```


Like `specsubform`, but indented an extra level. Since using `specsubform` within the body of `specsubform` already nests indentation, `specspecsubform` is for extra indentation without nesting a description.

```
(specspecsubform/subs maybe-literals datum
  ([nonterm-id clause-datum ...+] ...)
  maybe-contracts
  pre-flow ...)
```

Like `specspecsubform`, but with a grammar like `defform/subs`.

```
(defparam id arg-id contract-expr-datum pre-flow ...)
```

Like `defproc`, but for a parameter. The `contract-expr-datum` serves as both the result contract on the parameter and the contract on values supplied for the parameter. The `arg-id` refers to the parameter argument in the latter case.

```
(defboolparam id arg-id pre-flow ...)
```

Like `defparam`, but the contract on a parameter argument is `any/c`, and the contract on the parameter result is `boolean?`.

```
(defthing id contract-expr-datum pre-flow ...)
```

Like `defproc`, but for a non-procedure binding.

```
(defstruct struct-name ([field-name contract-expr-datum] ...)
  flag-keywords
  pre-flow ...)

  struct-name = id
                | (id super-id)

flag-keywords =
  | #:mutable
  | #:inspector #f
  | #:mutable #:inspector #f
```

Similar to `defform` or `defproc`, but for a structure definition.

```
(deftogether [def-expr ...] pre-flow ...)
```

Combines the definitions created by the *def-exprs* into a single definition box. Each *def-expr* should produce a definition point via `defproc`, `deform`, etc. Each *def-expr* should have an empty *pre-flow*; the decoded *pre-flow* sequence for the `def` together form documents the collected bindings.

```
(schemegrammar maybe-literals id clause-datum ...+)
```

```
maybe-literals =  
  | #:literals (literal-id ...)
```

Creates a table to define the grammar of *id*. Each identifier mentioned in a *clause-datum* is typeset as a non-terminal, except for the identifiers listed as *literal-ids*, which are typeset as with `scheme`.

```
(schemegrammar* maybe-literals [id clause-datum ...+] ...)
```

Like `schemegrammar`, but for typesetting multiple productions at once, aligned around the `=` and `||`.

```
(defidentifier id  
  [#:form? form?  
   #:index? index?  
   #:show-libs? show-libs?]) → element?  
id : identifier?  
form? : boolean? = #f  
index? : boolean? = #t  
show-libs? : boolean? = #t
```

Typesets *id* as a Scheme identifier, and also establishes the identifier as the definition of a binding in the same way as `defproc`, `deform`, etc. As always, the library that provides the identifier must be declared via `defmodule` or `declare-exporting` for an enclosing section.

If *form?* is a true value, then the identifier is documented as a syntactic form, so that uses of the identifier (normally including *id* itself) are typeset as a syntactic form.

If *index?* is a true value, then the identifier is registered in the index.

If *show-libs?* is a true value, then the identifier's defining module may be exposed in the typeset form (e.g., when viewing HTML and the mouse hovers over the identifier).

4.2.4 Documenting Classes and Interfaces

```
(defclass id super (intf-id ...) pre-flow ...)
```

```
super = super-id  
      | (mixin-id super)
```

Creates documentation for a class *id* that is a subclass of *super* and implements each interface *intf-id*. Each identifier in *super* (except `object%`) and *intf-id* must be documented somewhere via `defclass` or `definterface`.

The decoding of the *pre-flow* sequence should start with general documentation about the class, followed by constructor definition (see `defconstructor`), and then field and method definitions (see `defmethod`). In rendered form, the constructor and method specification are indented to visually group them under the class definition.

```
(defclass/title id super (intf-id ...) pre-flow ...)
```

Like `defclass`, also includes a `title` declaration with the style `'hidden`. In addition, the constructor and methods are not left-indented.

This form is normally used to create a section to be rendered on its own HTML. The `'hidden` style is used because the definition box serves as a title.

```
(definterface id (intf-id ...) pre-flow ...)
```

Like `defclass`, but for an interfaces. Naturally, *pre-flow* should not generate a constructor declaration.

```
(definterface/title id (intf-id ...) pre-flow ...)
```

Like `definterface`, but for single-page rendering as in `defclass/title`.

```
(defmixin id (domain-id ...) (range-id ...) pre-flow ...)
```

Like `defclass`, but for a mixin. Any number of *domain-id* classes and interfaces are specified for the mixin's input requires, and any number of result classes and (more likely) interfaces are specified for the *range-id*. The *domain-ids* supply inherited methods.

```
(defmixin/title id (domain-id ...) (range-id ...) pre-flow ...)
```

Like `defmixin`, but for single-page rendering as in `defclass/title`.

```
(defconstructor (arg-spec ...) pre-flow ...)
```

```
arg-spec = (arg-id contract-expr-datum)
           | (arg-id contract-expr-datum default-expr)
```

Like `defproc`, but for a constructor declaration in the body of `defclass`, so no return contract is specified. Also, the new-style keyword for each `arg-spec` is implicit from the `arg-id`.

```
(defconstructor/make (arg-spec ...) pre-flow ...)
```

Like `defconstructor`, but specifying by-position initialization arguments (for use with `make-object`) instead of by-name arguments (for use with `new`).

```
(defconstructor*/make [(arg-spec ...) ...] pre-flow ...)
```

Like `defconstructor/make`, but with multiple constructor patterns analogous `defproc*`.

```
(defconstructor/auto-super [(arg-spec ...) ...] pre-flow ...)
```

Like `defconstructor`, but the constructor is annotated to indicate that additional initialization arguments are accepted and propagated to the superclass.

```
(defmethod maybe-mode (id arg-spec ...)
  result-contract-expr-datum
  pre-flow ...)
```

```
maybe-mode =
  | #:mode override
  | #:mode override-final
  | #:mode public-final
  | #:mode augment
  | #:mode augment-final
  | #:mode pubment
  | #:mode extend
  | #:mode extend-final
```

Like `defproc`, but for a method within a `defclass` or `definterface` body.

The `maybe-mode` specifies whether the method overrides a method from a superclass, and so on. (For these purposes, use `#:mode override` when refining a method of an implemented interface.) The `extend` mode is like `override`, but the description of the method should

describe only extensions to the superclass implementation.

```
(defmethod* maybe-mode
  ([(id arg-spec ...)
    result-contract-expr-datum] ...)
  pre-flow ...)
```

Like `defproc*`, but for a method within a `defclass` or `definterface` body. The *maybe-mode* specification is as in `defmethod`.

```
(method class/intf-id method-id)
```

Creates a hyperlink to the method named by *method-id* in the class or interface named by *class/intf-id*. The hyperlink names the method, only; see also `xmethod`.

For-label binding information is used with *class/intf-id*, but not *method-id*.

```
(xmethod class/intf-id method-id)
```

Like `method`, but the hyperlink shows both the method name and the containing class/interface.

4.2.5 Documenting Signatures

```
(defsignature id (super-id ...) pre-flow ...)
```

Defines a signature *id* that extends the *super-id* signatures. Any elements defined in decoded *pre-flows*—including forms, procedures, structure types, classes, interfaces, and mixins—are defined as members of the signature instead of direct bindings. These definitions can be referenced through `sigelem` instead of `scheme`.

The decoded *pre-flows* inset under the signature declaration in the typeset output, so no new sections, etc. can be started.

```
(defsignature/splice id (super-id ...) pre-flow ...)
```

Like `defsignature`, but the decoded *pre-flows* are not typeset under the signature declaration, and new sections, etc. can be started in the *pre-flows*.

```
(signature-desc pre-flow ...) → any/c  
pre-flow : pre-flow?
```

Produces an opaque value that `defsignature` recognizes to outdent in the typeset form. This is useful for text describing the signature as a whole to appear right after the signature declaration.

```
(sigelem sig-id id)
```

Typesets the identifier `id` with a hyperlink to its definition as a member of the signature named by `sig-id`.

4.2.6 Various String Forms

```
(aux-elem pre-content ...) → element?  
  pre-content : pre-content?
```

Like `elem`, but adds an `'aux` style property.

```
(defterm pre-content ...) → element?  
  pre-content : pre-content?
```

Typesets the decoded `pre-content` as a defined term (e.g., in italic). Consider using `deftech` instead, though, so that uses of `tech` can hyper-link to the definition.

```
(onscreen pre-content ...) → element?  
  pre-content : pre-content?
```

Typesets the decoded `pre-content` as a string that appears in a GUI, such as the name of a button.

```
(menuitem menu-name item-name) → element?  
  menu-name : string?  
  item-name : string?
```

Typesets the given combination of a GUI's menu and item name.

```
(filepath pre-content ...) → element?  
  pre-content : pre-content?
```

Typesets the decoded `pre-content` as a file name (e.g., in typewriter font and in quotes).

```
(exec pre-content ...) → element?
```

`pre-content : pre-content?`

Typesets the decoded `pre-content` as a command line (e.g., in typewriter font).

`(envvar pre-content ...) → element?`
`pre-content : pre-content?`

Typesets the given decoded `pre-content` as an environment variable (e.g., in typewriter font).

`(Flag pre-content ...) → element?`
`pre-content : pre-content?`

Typesets the given decoded `pre-content` as a flag (e.g., in typewriter font with a leading `=`).

`(DFlag pre-content ...) → element?`
`pre-content : pre-content?`

Typesets the given decoded `pre-content` a long flag (e.g., in typewriter font with two leading `=s`).

`(PFlag pre-content ...) → element?`
`pre-content : pre-content?`

Typesets the given decoded `pre-content` as a `+` flag (e.g., in typewriter font with a leading `+`).

`(DPFlag pre-content ...) → element?`
`pre-content : pre-content?`

Typesets the given decoded `pre-content` a long `+` flag (e.g., in typewriter font with two leading `+`s).

4.2.7 Links

See also §3.1.4 “Links”.

`(schemelink id pre-content ...)`

```
id : identifier?
pre-content : pre-content?
```

An element where the decoded *pre-content* is hyperlinked to the definition of *id*.

```
(link url
  pre-content ...
  [#:underline? underline?
   #:style style]) → element?
url : string?
pre-content : any/c
underline? : any/c = #t
style : (or/c style? string? symbol? #f)
       = (if underline? #f "plainlink")
```

An alias of `hyperlink` for backward compatibility.

```
(other-manual module-path
  [#:underline? underline?]) → element?
module-path : module-path?
underline? : any/c = #t
```

An alias of `other-doc` for backward compatibility.

```
(deftech pre-content ... [#:style? style?]) → element?
pre-content : pre-content?
style? : boolean? = #t
```

Produces an element for the decoded *pre-content*, and also defines a term that can be referenced elsewhere using `tech`.

The `content->string` result of the decoded *pre-content* is used as a key for references, but normalized as follows:

- A trailing “ies” is replaced by “y”.
- A trailing “s” is removed.
- Consecutive hyphens and whitespaces are all replaced by a single space.

These normalization steps help support natural-language references that differ slightly from a defined form. For example, a definition of “bananas” can be referenced with a use of “banana”.

If *style?* is true, then `defterm` is used on *pre-content*.

```
(tech pre-content
  ...
  [#:doc module-path
   #:tag-prefixes prefixes]) → element?
pre-content : pre-content?
module-path : (or/c module-path? false/c) = #f
prefixes : (or/c (listof string?) false/c) = #f
```

Produces an element for the decoded *pre-content*, and hyperlinks it to the definition of the content as established by *deftech*. The content’s string form is normalized in the same way as for *deftech*. The *#:doc* and *#:tag-prefixes* arguments support cross-document and section-specific references, like in *secref*.

With the default style files, the hyperlink created by *tech* is somewhat quieter than most hyperlinks: the underline in HTML output is gray, instead of blue, and the term and underline turn blue only when the mouse is moved over the term.

In some cases, combining both natural-language uses of a term and proper linking can require some creativity, even with the normalization performed on the term. For example, if “bind” is defined, but a sentence uses the term “binding,” the latter can be linked to the former using *@tech{bind}ing*.

```
(techlink pre-content
  ...
  [#:doc module-path
   #:tag-prefixes prefixes]) → element?
pre-content : pre-content?
module-path : (or/c module-path? false/c) = #f
prefixes : (or/c (listof string?) false/c) = #f
```

Like *tech*, but the link is not a quiet. For example, in HTML output, a hyperlink underline appears even when the mouse is not over the link.

4.2.8 Indexing

See also §3.1.5 “Indexing”.

```
(indexed-scheme datum ...)
```

A combination of *scheme* and *as-index*, with the following special cases when a single *datum* is provided:

- If *datum* is a quote form, then the quote is removed from the key (so that it's sorted using its unquoted form).
- If *datum* is a string, then quotes are removed from the key (so that it's sorted using the string content).

```
(idefterm pre-content ...) → element?
  pre-content : pre-content?
```

Combines `as-index` and `defterm`. The content normally should be plural, rather than singular. Consider using `deftech`, instead, which always indexes.

```
(pidefterm pre-content ...) → element?
  pre-content : pre-content?
```

Like `idefterm`, but plural: adds an “s” on the end of the content for the index entry. Consider using `deftech`, instead.

```
(indexed-file pre-content ...) → element?
  pre-content : pre-content?
```

A combination of `file` and `as-index`, but where the sort key for the index item does not include quotes.

```
(indexed-envvar pre-content ...) → element?
  pre-content : pre-content?
```

A combination of `envvar` and `as-index`.

4.2.9 Images

```
(image/plain filename-relative-to-source
  pre-element ...) → element?
  filename-relative-to-source : string?
  pre-element : any/c
```

An alias for `image` for backward compatibility.

4.2.10 Bibliography

See also
`scribiblib/autobib`.

```
(cite key ...) → element?  
  key : string?
```

Links to a bibliography entry, using the `key`s both to indicate the bibliography entry and, in square brackets, as the link text.

```
(bibliography [#:tag tag] entry ...) → part?  
  tag : string? = "doc-bibliography"  
  entry : bib-entry?
```

Creates a bibliography part containing the given entries, each of which is created with `bib-entry`. The entries are typeset in order as given.

```
(bib-entry #:key key  
           #:title title  
           [#:is-book? is-book?  
           #:author author  
           #:location location  
           #:date date  
           #:url url]) → bib-entry?  
key : string?  
title : (or/c false/c pre-content?)  
is-book? : boolean? = #f  
author : (or/c false/c pre-content?) = #f  
location : (or/c false/c pre-content?) = #f  
date : (or/c false/c pre-content?) = #f  
url : (or/c false/c pre-content?) = #f
```

Creates a bibliography entry. The `key` is used to refer to the entry via `cite`. The other arguments are used as elements in the entry:

- `title` is the title of the cited work. It will be surrounded by quotes in typeset form if `is-book?` is `#f`, otherwise it is typeset via `italic`.
- `author` lists the authors. Use names in their usual order (as opposed to “last, first”), and separate multiple names with commas using “and” before the last name (where there are multiple names). The `author` is typeset in the bibliography as given, or it is omitted if given as `#f`.
- `location` names the publication venue, such as a conference name or a journal with volume, number, and pages. The `location` is typeset in the bibliography as given, or it is omitted if given as `#f`.

- *date* is a date, usually just a year (as a string). It is typeset in the bibliography as given, or it is omitted if given as #f.
- *url* is an optional URL. It is typeset in the bibliography using `tt` and hyperlinked, or it is omitted if given as #f.

```
(bib-entry? v) → boolean?
  v : any/c
```

Returns #t if *v* is a bibliography entry created by `bib-entry`, #f otherwise.

4.2.11 Miscellaneous

```
(t pre-content ...) → paragraph?
  pre-content : pre-content?
```

Wraps the decoded *pre-content* as a paragraph.

```
PLaneT : element?
```

"PLaneT" (to help make sure you get the letters in the right case).

```
(hash-lang) → element?
```

Returns an element for #lang that is hyperlinked to an explanation.

```
void-const : element?
```

Returns an element for #<void>.

```
undefined-const : element?
```

Returns an element for #<undefined>.

```
(commandline pre-content ...) → paragraph?
  pre-content : pre-content?
```

Produces an inset command-line example (e.g., in typewriter font).

```
(centerline pre-flow ...) → nested-flow?
```

`pre-flow` : `pre-flow?`

An alias for `centered` for backward compatibility.

`(math pre-content ...)` → `element?`
`pre-content` : `any/c`

The decoded `pre-content` is further transformed:

- Any immediate `'rsquo` is converted to `'prime`.
- Parentheses and sequences of decimal digits in immediate strings are left as-is, but any other immediate string is italicized.
- When `_` appears before a non-empty sequence of numbers and letters, the sequence is typeset as a subscript.
- When `^` appears before a non-empty sequence of numbers and letters, the sequence is typeset as a superscript.

4.2.12 Index-Entry Descriptions

`(require scribble/manual-struct)`

The `scribble/manual-struct` library provides types used to describe index entries created by `scribble/manual` functions. These structure types are provided separate from `scribble/manual` so that `scribble/manual` need not be loaded when deserializing cross-reference information that was generated by a previously rendered document.

`(struct module-path-index-desc ())`

Indicates that the index entry corresponds to a module definition via `defmodule` and `company`.

`(struct exported-index-desc (name from-libs))`
`name` : `symbol?`
`from-libs` : `(listof module-path?)`

Indicates that the index entry corresponds to the definition of an exported binding. The `name` field and `from-libs` list correspond to the documented name of the binding and the primary modules that export the documented name (but this list is not exhaustive, because new modules can re-export the binding).

```
(struct (form-index-desc exported-index-desc) ())
```

Indicates that the index entry corresponds to the definition of a syntactic form via `defform` and `company`.

```
(struct (procedure-index-desc exported-index-desc) ())
```

Indicates that the index entry corresponds to the definition of a procedure binding via `defproc` and `company`.

```
(struct (thing-index-desc exported-index-desc) ())
```

Indicates that the index entry corresponds to the definition of a binding via `defthing` and `company`.

```
(struct (struct-index-desc exported-index-desc) ())
```

Indicates that the index entry corresponds to the definition of a structure type via `defstruct` and `company`.

```
(struct (class-index-desc exported-index-desc) ())
```

Indicates that the index entry corresponds to the definition of a class via `defclass` and `company`.

```
(struct (interface-index-desc exported-index-desc) ())
```

Indicates that the index entry corresponds to the definition of an interface via `definterface` and `company`.

```
(struct (mixin-index-desc exported-index-desc) ())
```

Indicates that the index entry corresponds to the definition of a mixin via `defmixin` and `company`.

```
(struct (method-index-desc exported-index-desc) (method-name  
                                              class-tag))  
  method-name : symbol?  
  class-tag : tag?
```

Indicates that the index entry corresponds to the definition of an method via `defmethod`

and company. The `name` field from `exported-index-desc` names the class or interface that contains the method. The `method-name` field names the method. The `class-tag` field provides a pointer to the start of the documentation for the method's class or interface.

4.3 Scheme

```
(require scribble/scheme)
```

The `scribble/scheme` library provides utilities for typesetting Scheme code. The `scribble/manual` forms provide a higher-level interface.

```
(define-code id typeset-expr)
(define-code id typeset-expr uncode-id)
(define-code id typeset-expr uncode-id d->s-expr)
(define-code id typeset-expr uncode-id d->s-expr stx-prop-expr)
```

Binds `id` to a form similar to `scheme` or `schemeblock` for typesetting code. The form generated by `define-code` handles source-location information, escapes via `unquote`, preservation of binding and property information, and element transformers.

The supplied `typeset-expr` expression should produce a procedure that performs the actual typesetting. This expression is normally `to-element` or `to-paragraph`. The argument supplied to `typeset-expr` is normally a syntax object, but more generally it is the result of applying `d->s-expr`.

The optional `uncode-id` specifies the escape from literal code to be recognized by `id`. The default is `unsyntax`.

The optional `d->s-expr` should produce a procedure that accepts three arguments suitable for `datum->syntax`: a syntax object or `#f`, an arbitrary value, and a vector for a source location. The result should record as much or as little of the argument information as needed by `typeset-expr` to typeset the code. Normally, `d->s-expr` is `datum->syntax`.

The `stx-prop-expr` should produce a procedure for recording a `'paren-shape` property when the source expression uses with `id` has such a property. The default is `syntax-property`.

```
(to-paragraph v) → block?
  v : any/c
```

Typesets an S-expression that is represented by a syntax object, where source-location information in the syntax object controls the generated layout.

Identifiers that have `for-label` bindings are typeset and hyperlinked based on `defi-`

nitions declared elsewhere (via `defproc`, `defform`, etc.). The identifiers `code:line`, `code:comment`, and `code:blank` are handled as in `schemeblock`, as are identifiers that start with `_`.

In addition, the given `v` can contain `var-id`, `shaped-parens`, `just-context`, or `literal-syntax` structures to be typeset specially (see each structure type for details), or it can contain `element` structures that are used directly in the output.

```
((to-paragraph/prefix prefix1
                        prefix
                        suffix)
  v)      → block?

prefix1 : any/c
prefix  : any/c
suffix  : any/c
v       : any/c
```

Like `to-paragraph`, but `prefix1` is prefixed onto the first line, `prefix` is prefix to any subsequent line, and `suffix` is added to the end. The `prefix1`, `prefix`, and `suffix` arguments are used as content, except that if `suffix` is a list of elements, it is added to the end on its own line.

```
(to-element v) → element?
v : any/c
```

Like `to-paragraph`, except that source-location information is mostly ignored, since the result is meant to be inlined into a paragraph.

```
(to-element/no-color v) → element?
v : any/c
```

Like `to-element`, but `for-syntax` bindings are ignored, and the generated text is uncolored. This variant is typically used to typeset results.

```
(struct var-id (sym))
  sym : (or/c symbol? identifier?)
```

When `to-paragraph` and variants encounter a `var-id` structure, it is typeset as `sym` in the variable font, like `schemevarfont`—unless the `var-id` appears under quote or quasiquote, in which case `sym` is typeset as a symbol.

```
(struct shaped-parens (val shape))
  val : any/c
```


shape : char?

When `to-paragraph` and variants encounter a `shaped-parens` structure, it is typeset like a syntax object that has a `'paren-shape` property with value `shape`.

```
(struct just-context (val context))
  val : any/c
  context : syntax?
```

When `to-paragraph` and variants encounter a `just-context` structure, it is typeset using the source-location information of `val` just the lexical context of `ctx`.

```
(struct literal-syntax (stx))
  stx : any/c
```

When `to-paragraph` and variants encounter a `literal-syntax` structure, it is typeset as the string form of `stx`. This can be used to typeset a syntax-object value in the way that the default printer would represent the value.

```
(element-id-transformer? v) → boolean?
  v : any/c
```

Provided for-syntax; returns `#t` if `v` is an element transformer created by `make-element-id-transformer`, `#f` otherwise.

```
(make-element-id-transformer proc) → element-id-transformer?
  proc : (syntax? . -> . syntax?)
```

Provided for-syntax; creates an *element transformer*. When an identifier has a transformer binding to an element transformer, then forms generated by `define-code` (including `scheme` and `schemeblock`) typeset the identifier by applying the `proc` to the identifier. The result must be an expression whose value, typically an `element`, is passed on to functions like `to-paragraph`.

```
(variable-id? v) → boolean?
  v : any/c
```

Provided for-syntax; returns `#t` if `v` is an element transformer created by `make-variable-id`, `#f` otherwise.

```
(make-variable-id sym) → variable-id?
  sym : (or/c symbol? identifier?)
```

Provided for-syntax; like `make-element-id-transformer` for a transformer that produces *sym* typeset as a variable (like `schemevarfont`)—unless it appears under quote or quasiquote, in which case *sym* is typeset as a symbol.

```
output-color : style?
input-color : style?
input-background-color : style?
no-color : style?
reader-color : style?
result-color : style?
keyword-color : style?
comment-color : style?
paren-color : style?
meta-color : style?
value-color : style?
symbol-color : style?
variable-color : style?
opt-color : style?
error-color : style?
syntax-link-color : style?
value-link-color : style?
module-color : style?
module-link-color : style?
block-color : style?
highlighted-color : style?
```

Styles that are used for coloring Scheme programs, results, and I/O.

4.4 Evaluation and Examples

```
(require scribble/eval)
```

The `scribble/eval` library provides utilities for evaluating code at document-build time and incorporating the results in the document, especially to show example uses of defined procedures and syntax.

```
(interaction datum ...)
(interaction #:eval eval-expr datum ...)
```

Like `schemeinput`, except that the result for each input *datum* is shown on the next line. The result is determined by evaluating the quoted form of the *datum* using the evaluator produced by *eval-expr*, if provided.

The *eval-expr* must produce a sandbox evaluator via `make-evaluator` or `make-module-evaluator` with the `sandbox-output` and `sandbox-error-output` parameters set to `'string`. If `eval` is not provided, an evaluator is created using `make-base-eval`. See also `make-eval-factory`.

Uses of `code:comment` and `code:blank` are stripped from each *datum* before evaluation.

If a *datum* has the form `(eval:alts show-datum eval-datum)`, then *show-datum* is typeset, while *eval-datum* is evaluated.

```
(interaction-eval datum)
(interaction-eval #:eval eval-expr datum)
```

Like `interaction`, evaluates the quoted form of *datum*, but returns the empty string.

```
(interaction-eval-show datum)
(interaction-eval-show #:eval eval-expr datum)
```

Like `interaction-eval`, but produces an element representing the printed form of the evaluation result.

```
(schemeblock+eval datum ...)
(schemeblock+eval #:eval eval-expr datum ...)
```

Combines `schemeblock` and `interaction-eval`.

```
(schememod+eval name datum ...)
(schememod+eval #:eval eval-expr name datum ...)
```

Combines `schememod` and `interaction-eval`.

```
(def+int defn-datum expr-datum ...)
(def+int #:eval eval-expr defn-datum expr-datum ...)
```

Like `interaction`, except the *defn-datum* is typeset as for `schemeblock` (i.e., no prompt) and a line of space is inserted before the *expr-datums*.

```
(defs+int (defn-datum ...) expr-datum ...)
(defs+int #:eval eval-expr (defn-datum ...) expr-datum ...)
```

Like `def+int`, but for multiple leading definitions.

```
(examples datum ...)
(examples #:eval eval-expr datum ...)
```

Like `interaction`, but with an “Examples:” label prefixed.

```
(defexamples datum ...)
(defexamples #:eval eval-expr datum ...)
```

Like `examples`, but each definition using `define` or `define-struct` among the *datums* is typeset without a prompt, and with line of space after it.

```
(make-base-eval) → (any/c . -> . any)
```

Creates an evaluator using `(make-evaluator 'scheme/base)`, setting sandbox parameters to disable limits, set the outputs to `'string`, and not add extra security guards.

```
(make-base-eval-factory mod-paths) → (-> (any/c . -> . any))
  mod-paths : (listof module-path?)
```

Produces a function that is like `make-base-eval`, except that each module in *mod-paths* is attached to the evaluator’s namespace. The modules are loaded and instantiated once (when the returned `make-base-eval`-like function is called the first time) and then attached to each evaluator that is created.

```
(make-eval-factory mod-paths) → (-> (any/c . -> . any))
  mod-paths : (listof module-path?)
```

Like `make-base-eval-factory`, but each module in *mod-paths* is also required into the top-level environment for each generated evaluator.

```
(close-eval eval) → (one-of/c "")
  eval : (any/c . -> . any)
```

Shuts down an evaluator produced by `make-base-eval`. Use `close-eval` when garbage collection cannot otherwise reclaim an evaluator (e.g., because it is defined in a module body).

```
(scribble-eval-handler)
→ ((any/c . -> . any) any/c boolean? . -> . any)
(scribble-eval-handler handler) → void?
  handler : ((any/c . -> . any) any/c boolean? . -> . any)
```

A parameter that serves as a hook for evaluation. The evaluator to use is supplied as the first argument to the parameter's value, and the second argument is the form to evaluate. The last argument is `#t` if exceptions are being captured (to display exception results), `#f` otherwise.

4.5 In-Source Documentation

The `scribble/srcdoc` and `scribble/extract` libraries support writing documentation withing the documentation code along with an export contract, similar to using JavaDoc. With this approach, a single contract specification is used both for the run-time contract and the documentation of an exported binding.

The `scribble/srcdoc` library provides forms for exporting a binding with associated documentation. The `scribble/extract` library is used to pull `scribble/srcdoc`-based documentation into a Scribble document (perhaps for multiple libraries).

Although documentation is written with a library's implementation when using `scribble/srcdoc`, the documentation creates no run-time overhead for the library. Similarly, typesetting the documentation does not require running the library. The two phases (run time versus documentation time) are kept separate in much the same way that the module system keeps expansion-time code separate from run-time code.

For an example use, see the "file" collection's "gif.ss" source file and the corresponding extraction in "scribblings/gif.scrbl". As that example illustrates, prefixing the module declaration with

```
#reader scribble/reader
```

enables the `@-reader`, which is handy for writing documentation expressions.

4.5.1 Source Annotations for Documentation

```
(require scribble/srcdoc)
```

```
(provide/doc spec ...)
```

Like `provide` or `provide/contract`, but each `spec` uses a *documentation transformer* to describe the exported identifier and its contract.

The currently supported documentation transformers are `proc-doc`, `proc-doc/names`, `parameter-doc`, and `thing-doc`.

```
(require/doc require-spec ...)
```

Like `require`, but for bindings that are needed at documentation time (and documentation-expansion time, etc.) instead of run time (and expansion time, etc.). A `require-doc` form has no effect on a normal use of the library; it affects only documentation extraction.

Typically, a library that uses `scribble/srcdoc` includes at least `(require/doc scribble/base scribble/manual)` to get core Scheme forms and basic Scribble functions to use in documentation expressions.

```
(proc-doc/names id contract ((arg-id ...) ((arg-id default-expr) ...)) desc-expr)
(proc-doc/names id case-contract ((arg-id ...) ((arg-id default-expr) ...)) desc-expr)

contract = (-> arg ... result)
          | (->* (mandatory ...) (optional ...) result)

mandatory = contract-expr
           | keyword contract-expr

optional = contract-expr
          | keyword contract-expr

case-contract = (case-> (-> arg ... result) ...)
```

When used in `provide/doc`, exports `id` with the contract described by `contract` or `case-contract`, just like using `provide/contract`.

The `arg-ids` specify the names of arguments, which are not normally written as part of a contract. They are combined with the contract expression to generate the description of the binding in the documentation via `defproc`. The `(arg-id default-expr)` pairs specify the names and default values of the optional arguments.

The `desc-expr` is a documentation-time expression that produces prose to describe the exported binding—that is, the last part of the generated `defproc`, so the description can refer to the `arg-ids` using `scheme`.

The normal requires of the enclosing library are effectively converted into `for-label` requires when generating documentation, so that identifiers in the `contracts` are linked to their corresponding documentation. Similarly, any binding that is available in the run-time phase of the enclosing library can be referenced in documentation prose using the `scheme` form.

```
(proc-doc id contract desc-expr)
```

```

contract = (-> result)
  | (->d (arg ...) () (values [id result] ...))
  | (->d (arg ...) () #:pre-cond expression (values [id result] ...))
  | (->d (arg ...) () [id result])
  | (->d (arg ...) () #:pre-cond expression [id result])
  | (->d (arg ...) () #:rest id rest [id result])

```

Like proc-doc, but supporting contract forms that embed argument names. Only a subset of ->d forms are currently supported.

```
(thing-doc id contract-expr dec-expr)
```

Like proc-doc, but for an export of an arbitrary value.

```
(parameter-doc id (parameter/c contract-expr) arg-id desc-expr)
```

Like proc-doc, but for exporting a parameter.

4.5.2 Extracting Documentation from Source

```
(require scribble/extract)
```

```
(include-extracted module-path)
```

Expands to a sequence of documentation forms extracted from *module-path*, which is expected to be a module that uses `scribble/srcdoc`.

```
(provide-extracted module-path)
```

Similar to `include-extracted`, but the documentation is packaged and exported as `exported`, instead of left inline.

Use this form in combination with `include-previously-extracted` when documentation from a single source is to be split and typeset among multiple documentation locations. The `provide-extracted` form extracts the documentation once, and then `include-previously-extracted` form extracts documentation for specific bindings as needed.

```
(include-previously-extracted module-path regexp)
```

Similar to `include-extracted`, but instead of referring to the source that contains its own documentation, *module-path* refers to a module that uses `provide-extracted`. The `include-previously-extracted` form expands to documentation forms for all identi-

fiers whose string forms match *regexp*.

4.6 BNF Grammars

```
(require scribble/bnf)
```

The `scribble/bnf` library provides utilities for typesetting grammars.

See also `schemegrammar`.

```
(BNF prod ...) → table?  
  prod : (cons element? (listof element?))
```

Typesets a grammar table. Each production starts with an element (typically constructed with `nonterm`) for the non-terminal being defined, and then a list of possibilities (typically constructed with `BNF-seq`, etc.) to show on separate lines.

```
(nonterm pre-content ...) → element?  
  pre-content : any/c
```

Typesets a non-terminal: italic in angle brackets.

```
(BNF-seq elem ...) → element?  
  elem : element?
```

Typesets a sequence.

```
(BNF-group pre-content ...) → element?  
  pre-content : any/c
```

Typesets a group surrounded by curly braces (so the entire group can be repeated, for example).

```
(optional pre-content ...) → element?  
  pre-content : any/c
```

Typesets an optional element: in square brackets.

```
(kleenestar pre-content ...) → element?  
  pre-content : any/c
```


Typesets a 0-or-more repetition.

```
(kleeneplus pre-content ...) → element?  
pre-content : any/c
```

Typesets a 1-or-more repetition.

```
(kleenerange n m pre-content ...) → element?  
n : any/c  
m : any/c  
pre-content : any/c
```

Typesets a *n*-to-*m* repetition. The *n* and *m* arguments are converted to a string using `(format "~a" n)` and `(format "~a" m)`.

```
(BNF-alt elem ...) → element?  
elem : element?
```

Typesets alternatives for a production's right-hand side to appear on a single line. The result is normally used as a single possibility in a production list for [BNF](#).

```
BNF-etc : string?
```

A string to use for omitted productions or content.

4.7 Compatibility Libraries

4.7.1 Compatibility Structures And Processing

```
(require scribble/struct)
```

The `scribble/struct` compatibility library mostly re-exports `scribble/core`, but using some different names (e.g., `blockquote` instead of `nested-flow`).

The following structure types and functions are re-exported directly:

```
collect-info resolve-info tag? block?  
delayed-block collected-info delayed-element  
part-relative-element collect-info-parents  
collect-element render-element generated-tag  
tag-key content->string element->string  
block-width element-width
```

```
info-key? part-collected-info collect-put!  
resolve-get resolve-get/tentative resolve-get/ext?  
resolve-search resolve-get-keys
```

The following structure types are re-exported, but the constructors and some selectors are replaced as documented further below:

```
part paragraph table itemization compound-paragraph  
element toc-element target-element toc-target-element  
page-target-element redirect-target-element link-element  
index-element
```

Several additional compatibility functions and structure types are also exported.

```
(make-part tag-prefix  
          tags  
          title-content  
          style  
          to-collect  
          blocks  
          parts) → part?  
tag-prefix : (or/c false/c string?)  
tags : (listof tag?)  
title-content : (or/c false/c list?)  
style : any/c  
to-collect : list?  
blocks : (listof block?)  
parts : (listof part?)
```

For backward compatibility. Compared to the normal constructor for `part`, parses `style` to convert old formats to the current one. Also, if `title-content` is a list with a single item, the item by itself is stored in the resulting `part`.

```
(part-flow p) → (listof block?)  
p : part?
```

For backward compatibility. An alias for `part-blocks`.

```
(part-title-content p) → list?  
p : part?
```

For backward compatibility. Like the normal selector, but if the result would not be a list, it is coerced to one.

```

(make-versioned-part tag-prefix
                    tags
                    title-content
                    style
                    to-collect
                    blocks
                    parts
                    version) → part?
tag-prefix : (or/c false/c string?)
tags : (listof tag?)
title-content : (or/c false/c list?)
style : any/c
to-collect : list?
blocks : (listof block?)
parts : (listof part?)
version : string?
(versioned-part? v) → boolean?
v : any/c

```

For backward compatibility. Like `make-part`, but adds a the `document-version` style property using the given `version`. The `versioned-part?` predicate recognizes a `part` with a `document-version` property.

```

(make-unnumbered-part tag-prefix
                     tags
                     title-content
                     style
                     to-collect
                     blocks
                     parts) → part?
tag-prefix : (or/c false/c string?)
tags : (listof tag?)
title-content : (or/c false/c list?)
style : any/c
to-collect : list?
blocks : (listof block?)
parts : (listof part?)
(unnumbered-part? v) → boolean?
v : any/c

```

For backward compatibility. Like `make-part`, but adds the `'unnumbered` style property. The `unnumbered-part?` predicate recognizes a `part` with the `'unnumbered` property.

```

(make-paragraph content) → paragraph?

```

```
content : list?
```

For backward compatibility. Compared to the normal constructor for `paragraph`, omits a style argument. Also, if `content` is a list containing a single item, the item by itself is stored in the resulting `paragraph`.

```
(paragraph-content p) → list?  
p : paragraph?
```

For backward compatibility. Like the normal selector, but if the result would not be a list, it is coerced to one.

```
(make-styled-paragraph content style) → paragraph?  
content : list?  
style : any/c  
(styled-paragraph? v) → boolean?  
v : any/c  
(styled-paragraph-style p) → style?  
p : paragraph?
```

For backward compatibility. Compared to the normal constructor for `paragraph`, parses `style` to convert old formats to the current one. The `styled-paragraph?` predicate and `styled-paragraph-style` accessor are aliases for `paragraph?` and `paragraph-style`.

```
(make-omit-table-paragraph content) → paragraph?  
content : list?  
(omit-table-paragraph? v) → boolean?  
v : any/c
```

For backward compatibility. Like `make-paragraph`, but adds the `'omit-table` style property. The `omit-table-paragraph?` predicate checks for a paragraph with the property.

```
(make-table style blocksss) → table?  
style : any/c  
blocksss : (listof (listof (or/c (listof block?) (one-of/c 'cont))))
```

For backward compatibility. Compared to the normal constructor for `table`, the style is converted, and each cell has a list of blocks instead of a single block. If any such list has multiple blocks, they are combined into a `nested-flow`.

```
(table-flowss table)  
→ (listof (listof (or/c (listof block?) (one-of/c 'cont))))  
table : table?
```

For backward compatibility. Like `table-blockss`, but adds a list wrapper to be consistent with `make-table`.

```
(make-itemization blockss) → itemization?  
  blockss : (listof (listof block?))
```

For backward compatibility. Compared to the normal constructor for `itemization`, omits a style argument.

```
(make-styled-itemization style blockss) → itemization?  
  style : any/c  
  blockss : (listof (listof block?))  
(styled-itemization? v) → boolean?  
  v : any/c  
(styled-itemization-style i) → style?  
  i : itemization?
```

For backward compatibility. Compared to the normal constructor for `itemization`, parses `style` to convert old formats to the current one. The `styled-itemization?` predicate is an alias for `itemization?`, and `styled-itemization-style` is an alias for `itemization-style`.

```
(make-blockquote style blocks) → nested-flow?  
  style : any/c  
  blocks : (listof block?)
```

For backward compatibility. Like `make-nested-flow`, but `style` is parsed to the current format.

```
(make-auxiliary-table style blocksss) → table?  
  style : any/c  
  blocksss : (listof (listof (or/c (listof block?) (one-of/c 'cont))))  
(auxiliary-table? v) → boolean?  
  v : any/c
```

For backward compatibility. Like `make-table`, but adds the `'aux` style property. The `auxiliary-table?` predicate recognizes tables with the `'aux` property.

```
(make-compound-paragraph style blocks) → compound-paragraph?  
  style : any/c  
  blocks : (listof block?)
```

For backward compatibility. Compared to the normal constructor for `compound-`

paragraph, parses *style* to convert old formats to the current one.

```
(make-element style content) → element?
  style : any/c
  content : list?
(make-toc-element style content toc-content) → toc-element?
  style : any/c
  content : list?
  toc-content : list?
(make-target-element style content tag) → target-element?
  style : any/c
  content : list?
  tag : tag?
(make-toc-target-element style content tag) → toc-target-element?
  style : any/c
  content : list?
  tag : tag?
(make-page-target-element style content tag)
→ page-target-element?
  style : any/c
  content : list?
  tag : tag?
(make-redirect-target-element style
                             content
                             tag
                             alt-path
                             alt-anchor)
→ redirect-target-element?
  style : any/c
  content : list?
  tag : tag?
  alt-path : path-string?
  alt-anchor : string?
(make-link-element style content tag) → link-element?
  style : any/c
  content : list?
  tag : tag?
```

```

(make-index-element style
                   content
                   tag
                   tag
                   plain-seq
                   entry-seq
                   desc) → index-element?

style : any/c
content : list?
tag : tag?
tag : tag?
plain-seq : (and/c pair? (listof string?))
entry-seq : list?
desc : any/c

```

For backward compatibility. Compared to the normal constructors, parses *style* to convert old formats to the current one.

```

(element? v) → boolean?
v : any/c
(element-content e) → list?
e : element?
(element-style e) → element-style?
e : element?

```

For backward compatibility. A content list is treated as an element by these functions, and the result of `element-content` is always a list.

```

(make-aux-element style content) → element?
style : any/c
content : list?

```

For backward compatibility. Like `make-element`, but adds the 'aux style property.

```

(make-hover-element style content text) → element?
style : any/c
content : list?
text : string?

```

For backward compatibility. Like `make-element`, but adds `hover-property` containing *text* to the element's style.

```
(make-script-element style
                    content
                    type
                    script) → element?

style : any/c
content : list?
type : string?
script : (or/c path-string? (listof string?))
```

For backward compatibility. Like `make-element`, but adds `script-property` containing `type` and `script` to the element's style.

```
(struct with-attributes (style assoc))
  style : any/c
  assoc : (listof (cons/c symbol? string?))
```

For backward compatibility. Used for an `element`'s style to combine a base style with arbitrary HTML attributes. When the `style` field is itself an instance of `with-attributes`, its content is automatically flattened into the enclosing `with-attributes` when it is used (when, e.g., rendering an `element` or `paragraph`).

```
(struct target-url (addr style))
  addr : path-string?
  style : any/c
```

For backward compatibility. Used as a style for an `element`. The `style` at this layer is a style for the hyperlink.

```
(struct image-file (path scale))
  path : (or/c path-string?
              (cons/c 'collects (listof bytes?)))
  scale : real?
```

For backward compatibility. Used as a style for an `element` to inline an image. The `path` field can be a result of `path->main-collects-relative`.

```
(element->string element) → string?
  element : content?
(element->string element renderer p info) → string?
  element : content?
  renderer : any/c
  p : part?
```



```
info : resolve-info?
```

For backward compatibility. An alias for `content->string`.

4.7.2 Compatibility Basic Functions

```
(require scribble/basic)
```

The `scribble/basic` compatibility library mostly just re-exports `scribble/base`.

```
(span-class style-name pre-content ...) → element?  
  style-name : string?  
  pre-content : any/c
```

For backward compatibility. Wraps the decoded `pre-content` as an element with style `style-name`.

```
(itemize itm ... [#:style style]) → itemization?  
  itm : (or/c whitespace? an-item?)  
  style : (or/c style? string? symbol? #f) = #f
```

For backward compatibility. Like `itemlist`, but whitespace strings among the `itms` are ignored.

5 Literate Programming

Programs written using `scribble/lp` are simultaneously two things: a program and a document describing the program.

Programs in `scribble/lp` are viewed in two different ways, either by running the program directly or by including it with `lp-include`. When running the program, all of the chunk expressions are collected and stitched together into a program, and the rest of the module is discarded. When using `lp-include`, the entire contents of the module are preserved and are treated like an ordinary Scribble document, where chunks are typeset in a manner similar to `codeblock`.

For example, consider this program:

```
#lang scribble/lp
```

Literate programs have chunks of code, like this one:

```
@chunk[<f>
      (define (f x)
        <fs-body>)]
```

and this one:

```
@chunk[<fs-body>
      (* x x)]
```

that, when assembled, produce a complete program, in this case:

```
@schemeblock[(define (f x)
              (* x x))]
```

When this file is required in the normal manner, it defines a function `f` that squares its argument, and the documentation is ignored. When it is included with `lp-include`, it looks like this:

Literate programs have chunks of code, like this one:

```
<f> ::=
      (define (f x)
        <fs-body>)
```

and this one:

```
<fs-body> ::=
```

```
( * x x )
```

that, when assembled, produce a complete program, in this case:

```
(define (f x)
  (* x x))
```

5.1 scribble/lp Language

```
#lang scribble/lp
```

The `scribble/lp` language provides core support for literate programming.

```
(chunk id form ...)
```

Introduces a chunk, binding *id* for use in other chunks. Normally, *id* starts with `<` and ends with `>`.

When running a scribble program only the code inside the chunks is run; the rest is ignored.

If *id* is `<*>`, then this chunk is used as the main chunk in the file. If `<*>` is never used, then the first chunk in the file is treated as the main chunk. If some chunk is not referenced from the main chunk (possibly indirectly via other chunks that the main chunk references), then it is not included in the program and thus is not run.

5.2 scribble/lp-include Module

```
(require scribble/lp-include)
```

The `scribble/lp-include` library is normally used within a Scribble document—that is, a module that starts with something like `#lang scribble/base` or `#lang scribble/manual`, instead of `#lang scheme`.

```
(lp-include filename)
```

Includes the source of *filename* as the typeset version of the literate program.

6 Text Preprocessing

```
#lang scribble/text
```

The `scribble/text` language provides everything from `scheme/base` with a few changes that make it suitable as a preprocessor language:

- It uses `read-syntax-inside` to read the body of the module, similar to §7.7 “Document Reader”. This means that by default, all text is read in as Scheme strings; and `@`-forms can be used to use Scheme functions and expression escapes.
- Values of expressions are printed with a custom `output` function. This function displays most values in a similar way to `display`, except that it is more convenient for a preprocessor output.

6.1 Writing Preprocessor Files

The combination of the two features makes text in files in the `scribble/text` language be read as strings, which get printed out when the module is required, for example, when a file is given as an argument to `mzscheme`. (In these examples the left part shows the source input, and the right part the printed result.)

```
#lang scribble/text
Programming languages should
be designed not by piling
feature on top of feature, but
blah blah blah. → Programming languages should
be designed not by piling
feature on top of feature, but
blah blah blah.
```

Using `@`-forms, we can define and use Scheme functions.

```
#lang scribble/text
@(require scheme/list)
@(define Foo "Preprocessing")
@(define (3x . x)
  ;; scheme syntax here
  (add-between (list x x x) " ")) → Preprocessing languages should
be designed not by piling
feature on top of feature, but
blah blah blah.
@Foo languages should
be designed not by piling
feature on top of feature, but
@3x{blah}.
```

As demonstrated in this case, the `output` function simply scans nested list structures recursively, which makes them convenient for function results. In addition, `output` prints most values similarly to `display` — notable exceptions are void and false values which cause no output to appear. This can be used for convenient conditional output.

```

#lang scribble/text
@(define (errors n)
  (list n
        " error"
        (and (not (= n 1)) "s")))
You have @errors[3] in your code,
I fixed @errors[1].

```

→ You have 3 errors in your code,
I fixed 1 error.

Using the scribble @-forms syntax, you can write functions more conveniently too.

```

#lang scribble/text
@(define (errors n)
  ;; note the use of 'unless'
  @list{@n error@unless[(= n 1)]{s}})
You have @errors[3] in your code,
I fixed @errors[1].

```

→ You have 3 errors in your code,
I fixed 1 error.

Following the details of the scribble reader, you may notice that in these examples there are newline strings after each definition, yet they do not show in the output. To make it easier to write definitions, newlines after definitions and indentation spaces before them are ignored.

```

#lang scribble/text

@(define (plural n)
  (unless (= n 1) "s"))

@(define (errors n)
  @list{@n error@plural[n]})

```

→ You have 3 errors in your code,
I fixed 1 error.

```

You have @errors[3] in your code,
  @(define fixed 1)
I fixed @errors[fixed].

```

These end-of-line newline strings are not ignored when they follow other kinds of expressions, which may lead to redundant empty lines in the output.

```

#lang scribble/text
@(define (count n str)
  (for/list ([i (in-range 1 (add1 n))])
    @list{@i @str,@"\n"}))
Start...
@count[3]{Mississippi}
... and I'm done.

```

→ Start...
1 Mississippi,
2 Mississippi,
3 Mississippi,
... and I'm done.

There are several ways to avoid having such empty lines in your output. The simplest way is to arrange for the function call's form to end right before the next line begins, but this is often not too convenient. An alternative is to use a `@;` comment, which makes the scribble reader ignore everything that follows it up to and including the newline. (These methods can be applied to the line that precedes the function call too, but the results are likely to have what looks like erroneous indentation. More about this below.)

```

#lang scribble/text
@(define (count n str)
  (for/list ([i (in-range 1 (+ n 1))])
    @list{@i @str,@"\n"}))
Start...
@count[3]{Mississippi
}... done once.

Start again...
@count[3]{Massachusetts}@;
... and I'm done again.

```

```

Start...
1 Mississippi,
2 Mississippi,
3 Mississippi,
... done once.

Start again...
1 Massachusetts,
2 Massachusetts,
3 Massachusetts,
... and I'm done again.

```

A better approach is to generate newlines only when needed.

```

#lang scribble/text
@(require scheme/list)
@(define (counts n str)
  (add-between
    (for/list ([i (in-range 1 (+ n 1))]) →
      @list{@i @str,})
    "\n"))
Start...
@counts[3]{Mississippi}
... and I'm done.

```

```

Start...
1 Mississippi,
2 Mississippi,
3 Mississippi,
... and I'm done.

```

In fact, this is common enough that the `scribble/text` language provides a convenient facility: `add-newlines` is a function that is similar to `add-between` using a newline string as the default separator, except that false and void values are filtered out before doing so.

```

#lang scribble/text
@(define (count n str)
  (add-newlines
    (for/list ([i (in-range 1 (+ n 1))]) →
      @list{@i @str,}))
Start...
@count[3]{Mississippi}
... and I'm done.

```

```

Start...
1 Mississippi,
2 Mississippi,
3 Mississippi,
... and I'm done.

```

```

#lang scribble/text
@(define (count n str)
  (add-newlines
    (for/list ([i (in-range 1 (+ n 1))])
      @(and (even? i) @list{@i @str,})))) →
Start...
@count[6]{Mississippi}
... and I'm done.

```

The separator can be set to any value.

```

#lang scribble/text
@(define (count n str)
  (add-newlines #:sep ",\n"
    (for/list ([i (in-range 1 (+ n 1))])
      @list{@i @str}))) →
Start...
@count[3]{Mississippi}.
... and I'm done.

```

6.2 Defining Functions and More

(Note: most of the tips in this section are applicable to any code that uses the Scribble @-form syntax.)

Because the Scribble reader is uniform, you can use it in place of any expression where it is more convenient. (By convention, we use a plain S-expression syntax when we want a Scheme expression escape, and an @-form for expressions that render as text, which, in the `scribble/text` language, is any value-producing expression.) For example, you can use an @-form for a function that you define.

```

#lang scribble/text
@(define @bold[text] @list{*@|text|*}) → An important note.
An @bold{important} note.

```

This is not commonly done, since most functions that operate with text will need to accept a variable number of arguments. In fact, this leads to a common problem: what if we want to write a function that consumes a number of “text arguments” rather than a single “rest-like” body? The common solution for this is to provide the separate text arguments in the S-expression part of an @-form.

```

#lang scribble/text
@(define (choose 1st 2nd)
  @list{Either @1st, or @|2nd|@"."} → Either you're with us, or against us.
@(define who "us")
@choose[@list{you're with @who}
        @list{against @who}]

```

You can even use @-forms with a Scheme quote or quasiquote as the “head” part to make it shorter, or use a macro to get grouping of sub-parts without dealing with quotes.

```

#lang scribble/text
@(define (choose 1st 2nd)
  @list{Either @1st, or @|2nd|@"."})
@(define who "us")
@choose[@list{you're with @who}
        @list{against @who}]
@list{Shopping list:
      * apples
      * oranges
      * 6 bananas}
@list{Shopping list:
      @compare[@{apples}
                @{oranges}
                @{@(* 2 3) bananas}]}

```

Yet another solution is to look at the text values and split the input arguments based on a specific token. Using match can make it convenient — you can even specify the patterns with @-forms.

```

#lang scribble/text
@(require scheme/match)
@(define (features . text)
  (match text
    [ @list{ @|1st| @...
            --
            @|2nd| @... }
      @list{ >> Pros <<
            @1st;
            >> Cons <<
            @|2nd|. } ]))
@features{fast,
          reliable
          --
          expensive,
          ugly}

```

In particular, it is often convenient to split the input by lines, identified by delimiting “\n” strings. Since this can be useful, a `split-lines` function is provided.


```

#lang scribble/text
@(require scheme/list)
@(define (features . text)
  (add-between (split-lines text) → red, fast, reliable.
               ", "))
@features{red
          fast
          reliable}.

```

Finally, the Scribble reader accepts *any* expression as the head part of an @-form — even an @ form. This makes it possible to get a number of text bodies by defining a curried function, where each step accepts any number of arguments. This, however, means that the number of body expressions must be fixed.

```

#lang scribble/text
@(define ((choose . 1st) . 2nd)
  @list{Either you're @1st, or @|2nd|.}) → Either you're with me, or against me.
@(define who "me")
@@choose{with @who}{against @who}

```

6.3 Using Printouts

Because the preprocessor language simply displays each toplevel value as the file is run, it is possible to print text directly as part of the output.

```

#lang scribble/text
First                               First
@display{Second} → Second
Third                               Third

```

Taking this further, it is possible to write functions that output some text *instead* of returning values that represent the text.

```

#lang scribble/text
@(define (count n)                               Start...
  (for ([i (in-range 1 (+ n 1))])                1 Mississippi,
        (printf "~a Mississippi,\n" i))) →      2 Mississippi,
Start...                                         3 Mississippi,
@count[3]@; avoid an empty line                ... and I'm done.
... and I'm done.

```

This can be used to produce a lot of output text, even infinite.

```

#lang scribble/text
@(define (count n)
  (printf "~a Mississippi,\n" n)
  (count (add1 n)))
Start...
@count[1]
this line is never printed!

```

Start...
1 Mississippi,
2 Mississippi,
3 Mississippi,
4 Mississippi,
5 Mississippi,
...

However, you should be careful not to mix returning values with printouts, as the results are rarely desirable.

```

#lang scribble/text
@list{1 @display{two} 3} → two1 3

```

Note that you don't need side-effects if you want infinite output. The `output` function iterates `thunks` and (composable) promises, so you can create a loop that is delayed in either form.

```

#lang scribble/text
@(define (count n)
  (cons @list{@n Mississippi,@"\n"}
        (lambda ()
          (count (add1 n)))))
Start...
@count[1]
this line is never printed!

```

Start...
1 Mississippi,
2 Mississippi,
3 Mississippi,
4 Mississippi,
5 Mississippi,
...

6.4 Indentation in Preprocessed output

An issue that can be very important in many preprocessor applications is the indentation of the output. This can be crucial in some cases, if you're generating code for an indentation-sensitive language (e.g., Haskell, Python, or C preprocessor directives). To get a better understanding of how the pieces interact, you may want to review how the Scribble reader section, but also remember that you can use quoted forms to see how some form is read.

```

#lang scribble/text
@(format "~s" ' @list{
  a → (list "a" "\n" " " "b" "\n" "c")
  b
  c})

```

The Scribble reader ignores indentation spaces in its body. This is an intentional feature, since you usually do not want an expression to depend on its position in the source. But the question is how *can* we render some output text with proper indentation. The `output` function achieves that by assigning a special meaning to lists: when a newline is part of a list's contents, it causes the following text to appear with indentation that corresponds to the

column position at the beginning of the list. In most cases, this makes the output appear “as intended” when lists are used for nested pieces of text — either from a literal `list` expression, or an expression that evaluates to a list, or when a list is passed on as a value; either as a toplevel expression, or as a nested value; either appearing after spaces, or after other output.

```

#lang scribble/text
foo @list{1          →   foo 1
      2            →     2
      3}           →     3

#lang scribble/text
@(define (block . text)   begin
  @list{begin           first
        @text           second
        end})           begin
@block{first           →   third
      second           →   fourth
      @block{           end
        third           last
        fourth}        end
      last}

#lang scribble/text
@(define (enumerate . items)
  (add-newlines #:sep ";\\n"
    (for/list ([i (in-naturals 1)]
              [item (in-list items)])
      @list{@i|. @item})))
  →
  Todo: 1. Install PLT Scheme;
        2. Hack, hack, hack;
        3. Profit.
  Todo: @enumerate[@list{Install PLT Scheme}
                  @list{Hack, hack, hack}
                  @list{Profit}].

```

There are, however, cases when you need more refined control over the output. The `scribble/text` provides a few functions for such cases. The `splice` function is used to group together a number of values but avoid introducing a new indentation context.

```

#lang scribble/text
@(define (block . text)
  @splice{
    blah(@text);
  })
start
@splice{foo();
  loop:}
@list{if (something) @block{one,
  two}}
end

```

→

```

start
foo();
loop:
if (something) {
  blah(one,
    two);
}
end

```

The `disable-prefix` function disables all indentation printouts in its contents, including the indentation before the body of the `disable-prefix` value itself. It is useful, for example, to print out CPP directives.

```

#lang scribble/text
@(define ((IFF00 . var) . expr1) . expr2)
  (define (array e1 e2)
    @list{[@e1,
      @e2]})
  @list{var @var;
    @disable-prefix{#ifdef F00}
    @var = @array[expr1 expr2];
    @disable-prefix{#else}
    @var = @array[expr2 expr1];
    @disable-prefix{#endif}})
function blah(something, something_else) {
  @disable-prefix{#include "stuff.inc"}
  @@IFF00{i}{something}{something_else}
}

```

→

```

function blah(something, something_else) {
#include "stuff.inc"
var i;
#ifdef F00
i = [something,
something_else];
#else
i = [something_else,
something];
#endif
}

```

If there are values after a `disable-prefix` value on the same line, they will get indented to the goal column (unless the output is already beyond it).

```

#lang scribble/text
@(define (thunk name . body)
  @list{function @name() {
    @body
  }})
@(define (ifdef cond then else)
  @list{@disable-prefix{#}ifdef @cond
    @then
    @disable-prefix{#}else
    @else
    @disable-prefix{#}endif})

@thunk['do_stuff]{
  init();
  @ifdef["HAS_BLAH"
    @list{var x = blah();}
    @thunk['blah]{
      @ifdef["BLEHOS"
        @list{@disable-prefix{#}@;
          include <bleh.h>
          bleh();}
        @list{error("no bleh");}]
      }
    more_stuff();
  }
}

```

→

```

function do_stuff() {
  init();
  # ifdef HAS_BLAH
    var x = blah();
  # else
    function blah() {
      #   ifdef BLEHOS
        #     include <bleh.h>
        bleh();
      #   else
        error("no bleh");
      #   endif
    }
  # endif
  more_stuff();
}

```

There are cases where each line should be prefixed with some string other than a plain indentation. The `add-prefix` function causes its contents to be printed using some given string prefix for every line. The prefix gets accumulated to an existing indentation, and indentation in the contents gets added to the prefix.

```

#lang scribble/text
@(define (comment . body)
  @add-prefix["// "]{@body})
@comment{add : int int -> string}
char *foo(int x, int y) {
  @comment{
    skeleton:
    allocate a string
    print the expression into it
    @comment{...more work...}
  }
  char *buf = malloc(@comment{FIXME!
                        This is bad}
                    100);
}

```

→

```

// add : int int -> string
char *foo(int x, int y) {
  // skeleton:
  // allocate a string
  // print the expression into it
  // // ...more work...
  char *buf = malloc(// FIXME!
                    // This is bad
                    100);
}

```

When combining `add-prefix` and `disable-prefix` there is an additional value that can be useful: `flush`. This is a value that causes `output` to print the current indentation and prefix. This makes it possible to get the “ignored as a prefix” property of `disable-prefix` but only for a nested prefix.

```

#lang scribble/text
@(define (comment . text)
  (list flush
    @add-prefix[" *"]{
      @disable-prefix{/*} @text */}))
function foo(x) {
  @comment{blah
    more blah
    yet more blah}
  if (x < 0) {
    @comment{even more
      blah here
      @comment{even
        nested}}
    do_stuff();
  }
}

```

→

```

function foo(x) {
  /* blah
   * more blah
   * yet more blah */
  if (x < 0) {
    /* even more
     * blah here
     * /* even
     * * nested */ */
    do_stuff();
  }
}

```

6.5 Using External Files

Using additional files that contain code for your preprocessing is trivial: the preprocessor source is still source code in a module, so you can require additional files with utility functions.

```

#lang scribble/text
@(require "itemize.ss")
Todo:
@itemize[@list{Hack some}
         @list{Sleep some}
         @list{Hack some
               more}]
itemize.ss: #lang scheme
            (provide itemize)
            (define (itemize . items)
              (add-between (map (lambda (item)
                                (list "*" " item))
                              items)
                           "\n"))
→ Todo:
   * Hack some
   * Sleep some
   * Hack some
   more

```

Note that the `at-exp` language can often be useful here, since such files need to deal with texts. Using it, it is easy to include a lot of textual content.

```

#lang scribble/text
@(require "stuff.ss")
Todo:
@itemize[@list{Hack some}
         @list{Sleep some}
         @list{Hack some
               more}]
stuff.ss: @summary
          #lang at-exp scheme/base
          (require scheme/list)
          (provide (all-defined-out))
          (define (itemize . items)
            (add-between (map (lambda (item)
                              @list{* @item})
                            items)
                         "\n"))
          (define summary
            @list{If that's not enough,
                  I don't know what is.})
→ Todo:
   * Hack some
   * Sleep some
   * Hack some
   more
   If that's not enough,
   I don't know what is.

```

Of course, the extreme side of this will be to put all of your content in a plain Scheme module, using `@-` forms for convenience. However, there is no need to use the preprocessor language in this case; instead, you can `(require scribble/text)`, which will get all of the bindings that are available in the `scribble/text` language. Using `output`, switching from a preprocessed files to a Scheme file is very easy — choosing one or the other depends on whether it is more convenient to write a text file with occasional Scheme expressions or the other way.

```

#lang at-exp scheme/base
(require scribble/text scheme/list)
(define (itemize . items)
  (add-between (map (lambda (item)
                    @list{* @item})
                  items)
              "\n"))
(define summary
  @list{If that's not enough,
        I don't know what is.}) →
(output
 @list{
   Todo:
   @itemize[@list{Hack some}
            @list{Sleep some}
            @list{Hack some
                  more}]
   @summary
 })

```

Todo:
 * Hack some
 * Sleep some
 * Hack some
 more
 If that's not enough,
 I don't know what is.

However, you might run into a case where it is desirable to include a mostly-text file from a preprocessor file. It might be because you prefer to split the source text to several files, or because you need to preprocess a file without even a `#lang` header (for example, an HTML template file that is the result of an external editor). For these cases, the `scribble/text` language provides an `include` form that includes a file in the preprocessor syntax (where the default parsing mode is text).


```

#lang scribble/text
@(require scheme/list)
@(define (itemize . items)
  (list
   "<ul>"
   (add-between
    (map (lambda (item)
         @list{<li>@|item|</li>})
        items)
    "\n")
   "</ul>"))
@(define title "Todo")
@(define summary
  @list{If that's not enough,
       I don't know what is.})
@include["template.html"]

```

template.html:

```

<html>
<head><title>@|title|</title></head>
<body>
  <h1>@|title|</h1>
  @itemize[@list{Hack some}
           @list{Sleep some}
           @list{Hack some
                 more}]
  <p><i>@|summary|</i></p>
</body>
</html>

```

```

→
<html>
<head><title>Todo</title></head>
<body>
  <h1>Todo</h1>
  <ul><li>Hack some</li>
    <li>Sleep some</li>
    <li>Hack some
        more</li></ul>
  <p><i>If that's not enough,
    I don't know what is.</i></p>
</body>
</html>

```

(Using `require` with a text file in the `scribble/text` language will not work as intended: using the preprocessor language means that the text is displayed when the module is invoked, so the required file's contents will be printed before any of the requiring module's text does. If you find yourself in such a situation, it is better to switch to a Scheme-with-@-expressions file as shown above.)

7 Low-Level Scribble API

7.1 Scribble Layers

Scribble is made of independently usable parts. For example, the Scribble reader can be used in any situation that requires lots of free-form text. You can also skip Scribble's special reader support, and instead use the document-generation structure directly.

7.1.1 Typical Composition

A Scribble document normally starts

```
#lang scribble/manual
```

but it could also start

```
#lang scribble/base
```

or

```
#lang scribble/doc
```

The last one introduces the smallest number of typesetting bindings in the document body. Using `scribble/base` after `#lang` is the same as using `scribble/doc` plus `(require scribble/base)`, and using `scribble/manual` after `#lang` is the same as using `scribble/doc` plus `(require scribble/manual)`.

Besides making the file a module, each of the `#lang` declarations selects the Scribble reader (instead of the usual Scheme reader), and it starts the body of the file in “text” mode. The reader layer mostly leaves text alone, but `@` forms escape to S-expression mode.

A module written as

```
#lang scribble/doc
@(require scribble/manual)

@(define to-be "To Be")

@title{@|to-be| or Not @|to-be|}

@bold{That} is the question.
Whether 'tis nobler...
```

reads as

```

(module <name> scribble/doc
  (require scribble/manual)
  "\n"
  (define to-be "To Be") "\n"
  "\n"
  (title to-be " or Not " to-be) "\n"
  "\n"
  (bold "That") " is the question." "\n"
  "Whether 'tis nobler..." "\n")

```

As shown in this example, the read result is a module whose content mingles text and definitions. The `scribble/doc` language lifts definitions, requires, and provides to the beginning of the module, while everything else is collected into a document bound to the provided identifier `doc`. That is, the module is transformed to something like this:

```

(module <name> scheme/base
  (require scribble/decode
            scribble/manual)
  (define to-be "To Be")
  (define doc
    (decode
      "\n" "\n" "\n"
      (title to-be " or Not " to-be) "\n"
      "\n"
      (bold "That") " is the question." "\n"
      "Whether 'tis nobler..." "\n"))
  (provide doc))

```

The `decode` function produces a `part` structure instance that represents the document. To build the `part` instance, it inspects its arguments to find a `title-decl` value created by `title` to name the part, `part-start` values created by `section` to designate sub-parts, etc.

A `part` is the input to a rendering back-end, such as the HTML renderer. All renderers recognize a fixed structure hierarchy: the content of a part is a *flow*, which is a sequence of *flow elements*, such as paragraphs and tables; a table, in turn, consists of a list of list of flows; a paragraph is a list of *elements*, which can be instances of the `element` structure type, plain strings, or certain special symbols.

The value bound to `doc` in the example above is something like

```

(make-part ....
  (list "To Be" " or Not " "To Be") ; title
  ....
  (make-flow
    (list
      (make-paragraph

```

```

      (list (make-element 'bold (list "That"))
            " is the question." "\n"
            "Whether " 'rsquo "tis nobler..."))))
    ....)

```

Notice that the `'` in the input's `'tis` has turned into `'rsquo` (rendered as a curly apostrophe). The conversion to use `'rsquo` was performed by `decode` via `decode-flow` via `decode-paragraph` via `decode-content` via `decode-string`.

In contrast, `(make-element 'bold (list "That"))` was produced by the `bold` function. The `decode` operation is a function, not a syntactic form, and so `bold` has control over its argument before `decode` sees the result. Also, decoding traverses only immediate string arguments.

As it turns out, `bold` also decodes its argument, because the `bold` function is implemented as

```

(define (bold . strs)
  (make-element 'bold (decode-content strs)))

```

The `verbatim` function, however, does not decode its content, and instead typesets its text arguments directly.

A document module can construct elements directly using `make-element`, but normally functions like `bold` and `verbatim` are used to construct them. In particular, the `scribble/manual` library provides many functions and forms to typeset elements and flow elements.

The `part` structure hierarchy includes built-in element types for setting hyperlink targets and references. Again, this machinery is normally packaged into higher-level functions and forms, such as `secref`, `defproc`, and `scheme`.

7.1.2 Layer Roadmap

Working roughly from the bottom up, the Scribble layers are:

- `scribble/reader`: A reader that extends the syntax of Scheme with `@`-forms for conveniently embedding a mixin of text and escapes. See §2 “@ Syntax”.
- `scribble/core`: A set of document datatypes and utilities that define the basic layout and processing of a document. For example, the `part` datatype is defined in this layer. See §7.3 “Structures And Processing”.
- `scribble/base-renderer` with `scribble/html-renderer`, `scribble/latex-renderer`, or `scribble/text-renderer`: A base renderer and mixins that generate

documents in various formats from instances of the `scribble/struct` datatypes. See §7.4 “Renderer”.

- `scribble/decode`: Processes a stream of text, section-start markers, etc. to produce instances of the `scribble/core` datatypes. See §7.5 “Decoding Text”.
- `scribble/doclang`: A language to be used for the initial import of a module; processes the module top level through `scribble/decode`, and otherwise provides all of `scheme/base`. See §7.6 “Document Language”.
- `scribble/doc`: A language that combines `scribble/reader` with `scribble/doclang`. See §7.7 “Document Reader”.
- `scribble/base`: A library of basic document operators—such as `title`, `section`, and `secref`—for use with `scribble/decode` and a renderer. This library name also can be used as a language, where it combines `scribble/doc` with the exports of `scribble/base`. See §3.1 “Base Document Format”.
- `scribble/scheme`: A library of functions for typesetting Scheme code. See §4.3 “Scheme”. These functions are not normally used directly, but instead used through `scribble/manual`.
- `scribble/manual`: A library of functions for writing PLT Scheme documentation; re-exports `scribble/base`. Also, the `scribble/manual-struct` library provides types for index-entry descriptions created by functions in `scribble/manual`. See §4.2 “Manual Forms”.
- `scribble/eval`: A library of functions for evaluating code at document-build time, especially for showing examples. See §4.4 “Evaluation and Examples”.
- `scribble/bnf`: A library of support functions for writing grammars. See §4.6 “BNF Grammars”.
- `scribble/xref`: A library of support functions for using cross-reference information, typically after a document is rendered (e.g., to search). See §7.8 “Cross-Reference Utilities”.
- `scribble/text`: A language that uses `scribble/reader` preprocessing text files.

The `scribble` command-line utility generates output with a specified renderer. More specifically, the executable installs a renderer, loads the modules specified on the command line, extracts the `doc` export of each module (which must be an instance of `part`), and renders each—potentially with links that span documents.

7.2 @ Reader Internals

7.2.1 Using the @ Reader

You can use the reader via Scheme's `#reader` form:

```
#reader scribble/reader @foo{This is free-form text!}
```

or use the `at-exp` meta-language as described in §7.2.3 “Adding @-expressions to a Language”.

Note that the Scribble reader reads @-forms as S-expressions. This means that it is up to you to give meanings for these expressions in the usual way: use Scheme functions, define your functions, or require functions. For example, typing the above into `mzscheme` is likely going to produce a “reference to undefined identifier” error, unless `foo` is defined. You can use `string-append` instead, or you can define `foo` as a function (with variable arity).

A common use of the Scribble @-reader is when using Scribble as a documentation system for producing manuals. In this case, the manual text is likely to start with

```
#lang scribble/doc
```

which installs the @ reader starting in “text mode,” wraps the file content afterward into a Scheme module where many useful Scheme and documentation related functions are available, and parses the body into a document using `scribble/decode`. See §7.7 “Document Reader” for more information.

Another way to use the reader is to use the `use-at-readtable` function to switch the current readtable to a readtable that parses @-forms. You can do this in a single command line:

```
mzscheme -ile scribble/reader "(use-at-readtable)"
```

7.2.2 Syntax Properties

The Scribble reader attaches properties to syntax objects. These properties might be useful in some rare situations.

Forms that Scribble reads are marked with a `'scribble` property, and a value of a list of three elements: the first is `'form`, the second is the number of items that were read from the datum part, and the third is the number of items in the body part (strings, sub-forms, and escapes). In both cases, a `0` means an empty datum/body part, and `#f` means that the corresponding part was omitted. If the form has neither parts, the property is not attached to the result. This property can be used to give different meanings to expressions from the datum and the body parts, for example, implicitly quoted keywords:

```

(define-syntax (foo stx)
  (let ([p (syntax-property stx 'scribble)])
    (printf ">>> ~s\n" (syntax->datum stx))
    (syntax-case stx ()
      [(_ x ...)
       (and (pair? p) (eq? (car p) 'form) (even? (cadr p)))
       (let loop ([n (/ (cadr p) 2)]
                  [as '()]
                  [xs (syntax->list #'(x ...))])
         (if (zero? n)
             (with-syntax ([attrs (reverse as)]
                           [(x ...) xs])
               #'(list 'foo 'attrs x ...))
             (loop (sub1 n)
                   (cons (with-syntax ([key (car xs)]
                                       [val (cadr xs)])
                               #'(key ,val))
                         as)
                     (cddr xs)))))))]))

```

```

> @foo[x 1 y (* 2 3)]{blah}
>>> (foo x 1 y (* 2 3) "blah")
(foo ((x 1) (y 6)) "blah")

```

In addition, the Scribble parser uses syntax properties to mark syntax items that are not physically in the original source — indentation spaces and newlines. Both of these will have a `'scribble` property; an indentation string of spaces will have `'indentation` as the value of the property, and a newline will have a `'(newline S)` value where `S` is the original newline string including spaces that precede and follow it (which includes the indentation for the following item). This can be used to implement a verbatim environment: drop indentation strings, and use the original source strings instead of the single-newline string. Here is an example of this.

```

(define-syntax (verb stx)
  (syntax-case stx ()
    [(_ cmd item ...)
     #'(cmd
        #,@(let loop ([items (syntax->list #'(item ...))])
              (if (null? items)
                  '()
                  (let* ([fst (car items)]
                        [prop (syntax-property fst 'scribble)]
                        [rst (loop (cdr items))])
                    (cond [(eq? prop 'indentation) rst]
                          [(not (and (pair? prop)
                                       (eq? (car prop) 'newline)))
                           ]))))))]

```

```

                                (cons fst rst)]
                                [else (cons (datum->syntax-object
                                                fst (cadr prop) fst)
                                                rst]]))]]))]]))
> @verb[string-append]{
    foo
    bar
  }
"foo\n bar"

```

7.2.3 Adding @-expressions to a Language

```
#lang at-exp
```

The `at-exp` language installs `@-reader` support in the readtable, and then chains to the reader of another language that is specified immediate after `at-exp`.

For example, `#lang at-exp scheme/base` adds `@-reader` support to `scheme/base`, so that

```
#lang at-exp scheme/base

(define (greet who) @string-append{Hello, @|who|.})
(greet "friend")

```

reports `"Hello, friend."`.

7.2.4 Interface

```
(require scribble/reader)
```

The `scribble/reader` module provides direct Scribble reader functionality for advanced needs.

```
(read [in]) → any
  in : input-port? = (current-input-port)
```

```
(read-syntax [source-name in]) → (or/c syntax? eof-object?)
  source-name : any/c = (object-name in)
  in : input-port? = (current-input-port)
```


These procedures implement the Scribble reader. They do so by constructing a reader table based on the current one, and using that for reading.

```
(read-inside [in]) → any
  in : input-port? = (current-input-port)
```

```
(read-syntax-inside [source-name in]) → (or/c syntax? eof-object?)
  source-name : any/c = (object-name in)
  in : input-port? = (current-input-port)
```

These `-inside` variants parse as if starting inside a `@{...}`, and they return a (syntactic) list. Useful for implementing languages that are textual by default (see "docreader.ss" for example).

```
(make-at-readtable [#:readtable readtable
                  #:command-char command-char
                  #:datum-readtable datum-readtable
                  #:syntax-post-processor syntax-post-proc])
→ readtable?
  readtable : readtable? = (current-readtable)
  command-char : character? = #\@
  datum-readtable : (or/c readtable? boolean?
                        (readtable? . -> . readtable?))
                  = #t
  syntax-post-proc : (syntax? . -> . syntax?) = values
```

Constructs an `@-readtable`. The keyword arguments can customize the resulting reader in several ways:

- `readtable` — a readtable to base the `@-readtable` on.
- `command-char` — the character used for `@-forms`.
- `datum-readtable` — determines the readtable used for reading the datum part. A `#t` value uses the `@-readtable`, otherwise it can be a readtable, or a readtable-to-readtable function that will construct one from the `@-readtable`. The idea is that you may want to have completely different uses for the datum part, for example, introducing a convenient `key=val` syntax for attributes.
- `syntax-post-proc` — function that is applied on each resulting syntax value after it has been parsed (but before it is wrapped quoting punctuations). You can use this to further control uses of `@-forms`, for example, making the command be the head of a list:

```
(use-at-readtable
```

```
#:syntax-post-processor
(lambda (stx)
  (syntax-case stx ()
    [(cmd rest ...) #'(list 'cmd rest ...)]
    [else (error "@ forms must have a body")]))))
```

```
(make-at-reader #:syntax? syntax?
 #:inside? inside? ...) → procedure?

syntax? : #t
inside? : #f
```

Constructs a variant of a `@-readtable`. The arguments are the same as in `make-at-readtable`, with two more that determine the kind of reader function that will be created: `syntax?` chooses between a `read-` or `read-syntax`-like function, and `inside?` chooses a plain reader or an `-inside` variant.

The resulting function has a different contract and action based on these inputs. The expected inputs are as in `read` or `read-syntax` depending on `syntax?`; the function will read a single expression or, if `inside?` is true, the whole input; it will return a syntactic list of expressions rather than a single one in this case.

Note that `syntax?` defaults to `#t`, as this is the more expected common case when you're dealing with concrete-syntax reading.

Note that if `syntax?` is true, the `read`-like function is constructed by simply converting a syntax result back into a datum.

```
(use-at-readtable ...) → void?
```

Passes all arguments to `make-at-readtable`, and installs the resulting readtable using `current-readtable`. It also enables line counting for the current input-port via `port-count-lines!`.

This is mostly useful for playing with the Scribble syntax on the REPL.

7.3 Structures And Processing

```
(require scribble/core)
```

A document is represented as a part, as described in §7.3.1 “Parts”. This representation is intended to be independent of its eventual rendering, and it is intended to be immutable; rendering extensions and specific data in a document can collude arbitrarily, however.

A document is processed in three passes. The first pass is the *collect pass*, which globally

collects information in the document, such as targets for hyperlinking. The second pass is the *resolve pass*, which matches hyperlink references with targets and expands delayed elements (where the expansion should not contribute new hyperlink targets). The final pass is the *render pass*, which generates the resulting document. None of the passes mutate the document, but instead collect information in side `collect-info` and `resolve-info` tables.

7.3.1 Parts

A *part* is an instance of `part`; among other things, it has a title content, an initial flow, and a list of subsection parts. There is no difference between a part and a full document; a particular source module just as easily defines a subsection (incorporated via `include-section`) as a document.

A *flow* is a list of blocks.

A *block* is either a table, an itemization, a nested flow, a paragraph, a compound paragraph, or a delayed block.

- A *table* is an instance of `table`; it has a list of list of blocks corresponding to table cells.
- A *itemization* is an instance of `itemization`; it has a list of flows.
- A *nested flow* is an instance of `nested-flow`; it has a flow that is typeset as sub-flow.
- A *paragraph* is an instance of `paragraph`; it has a content:
 - An *content* can be a string, one of a few symbols, an instance of `element` (possibly `link-element`, etc.), a `multiarg-element`, a part-relative element, a delayed element, or a list of content.
 - * A string is included in the result document verbatim, except for space, and unless the content’s enclosing style is `'hspace`. In a style other than `'hspace`, consecutive spaces in the output may be collapsed together or replaced with a line break. In the style `'hspace`, all text is converted to uncollapsible spaces that cannot be broken across lines.
 - * A symbol content is either `'mdash`, `'ndash`, `'ldquo`, `'lsquo`, `'rsquo`, `'larr`, `'rarr`, or `'prime`; it is rendered as the corresponding HTML entity (even for Latex output).
 - * An instance of `element` has a content plus a style. The style’s interpretation depends on the renderer, but it can be one of a few special symbols (such as `'bold`) that are recognized by all renderers.
 - * An instance of `link-element` has a tag for the target of the link.
 - * An instance of `target-element` has a tag to be referenced by `link-elements`. An instance of the subtype `toc-target-element` is treated

like a kind of section label, to be shown in the “on this page” table for HTML output.

- * An instance of `index-element` has a tag (as a target), a list of strings for the keywords (for sorting and search), and a list of contents to appear in the end-of-document index.
 - * An instance of `image-element` incorporates an image from a file into the rendered document.
 - * An instance of `multiarg-element` combines a style with a list of content, where the style corresponds to a rendered command that takes multiple arguments.
 - * An instance of `collect-element` has a procedure that is called in the collect pass of document processing to record information used by later passes.
 - * A *part-relative element* is an instance of `part-relative-element`, which has a procedure that is called in the collect pass of document processing to obtain *content*. When the part-relative element’s procedure is called, collected information is not yet available, but information about the enclosing parts is available.
 - * A *delayed element* is an instance of `delayed-element`, which has a procedure that is called in the resolve pass of document processing to obtain *content*.
 - * An instance of `render-element` has a procedure that is called in the render pass of document processing.
- A *compound paragraph* is an instance of `compound-paragraph`; like `blockquote`, it has list of blocks, but the blocks are typeset as a single paragraph (e.g., no indentation after the first block) instead of inset.
 - A *delayed block* is an instance of `delayed-block`, which has a procedure that is called in the resolve pass of document processing to obtain a *block*.

7.3.2 Tags

A *tag* is a list containing a symbol and either a string, a `generated-tag` instance, or an arbitrary list. The symbol effectively identifies the type of the tag, such as `'part` for a tag that links to a part, or `'def` for a Scheme function definition. The symbol also effectively determines the interpretation of the second half of the tag.

A part can have a *tag prefix*, which is effectively added onto the second item within each tag whose first item is `'part` or `'tech`. The prefix is added to a string value by creating a list containing the prefix and string, and it is added to a list value using `cons`; a prefix is not added to a `generated-tag` instance. The prefix is used for reference outside the part, including the use of tags in the part’s `tags` field. Typically, a document’s main part has a tag prefix that applies to the whole document; references to sections and defined terms within the document from other documents must include the prefix, while references within the

same document omit the prefix. Part prefixes can be used within a document as well, to help disambiguate references within the document.

Some procedures accept a “tag” that is just the string part of the full tag, where the symbol part is supplied automatically. For example, `section` and `secreref` both accept a string “tag”, where `'part` is implicit.

7.3.3 Styles

A *style* combines a style name with a list of style properties in a `style` structure. A *style name* is either a string, symbol, or `#f`. A *style property* can be anything, including a symbol or a structure such as `color-property`.

A style has a single style name, because the name typically corresponds to a configurable instruction to a renderer. For example, with Latex output, a string style name corresponds to a Latex command or environment. For more information on how string style names interact with configuration of a renderer, see §7.9 “Extending and Configuring Scribble Output”. Symbolic style names, meanwhile, provide a simple layer of abstraction between the renderer and documents for widely supported style; for example, the `'italic` style name is supported by all renderers.

Style properties within a style compose with style names and other properties. Again, symbols are often used for properties that are directly supported by renderers. For example, `'unnumbered` style property for a part renders the part without a section number. Many properties are renderer-specific, such as a `hover-property` structure that associates text with an element to be shown in an HTML display when the mouse hovers over the text.

7.3.4 Collected and Resolved Information

The collect pass, resolve pass, and render pass processing steps all produce information that is specific to a rendering mode. Concretely, the operations are all represented as methods on a `render%` object.

The result of the `collect` method is a `collect-info` instance. This result is provided back as an argument to the `resolve` method, which produces a `resolve-info` value that encapsulates the results from both iterations. The `resolve-info` value is provided back to the `resolve` method for final rendering.

Optionally, before the `resolve` method is called, serialized information from other documents can be folded into the `collect-info` instance via the `deserialize-info` method. Other methods provide serialized information out of the collected and resolved records.

During the collect pass, the procedure associated with a `collect-element` instance can register information with `collect-put!`.

During the resolve pass, collected information for a part can be extracted with `part-collected-info`, which includes a part's number and its parent part (or `#f`). More generally, the `resolve-get` method looks up information previously collected. This resolve-time information is normally obtained by the procedure associated with a delayed block or delayed element.

The `resolve-get` information accepts both a `part` and a `resolve-info` argument. The `part` argument enables searching for information in each enclosing part before sibling parts.

7.3.5 Structure Reference

```
(struct part (tag-prefix
             tags
             title-content
             style
             to-collect
             blocks
             parts))
tag-prefix : (or/c false/c string?)
tags : (listof tag?)
title-content : (or/c false/c list?)
style : style?
to-collect : list?
blocks : (listof block?)
parts : (listof part?)
```

The `tag-prefix` field determines the optional tag prefix for the part.

The `tags` indicates a list of tags that each link to the section.

The `title-content` field holds the part's title, if any.

For the `style` field, the currently recognized symbolic style names are as follows:

- `'index` — The part represents an index.

The recognized style properties are as follows:

- `'unnumbered` — A section number is computed for an unnumbered section during the collect pass, but the number is not rendered.
- `'toc` — Sub-parts of the part are rendered on separate pages for multi-page HTML mode.

- `'non-toc` — Initial sub-parts of the part are *not* rendered on separate pages for multi-page HTML mode; this style applies only to the main part.
- `'reveal` — Shows sub-parts when this part is displayed in a table-of-contents panel in HTML output (which normally shows only the top-level sections).
- `'hidden` — The part title is not shown in rendered HTML output.
- `'quiet` — In HTML output and most other output modes, hides entries for sub-parts of this part in a `table-of-contents` or `local-table-of-contents` listing except when those sub-parts are top-level entries in the listing.
- `'no-toc` — As a style for the main part of a document, causes the HTML output to not include a margin box for the main table of contents; the “on this page” box that contains `toc-element` and `toc-target-element` links (and that only includes an “on this page” label for multi-page documents) takes on the location and color of the main table of contents, instead.
- `document-version` structure — A version number for this part and its sub-parts (except as overridden). When it is not "" may be used when rendering a document; at a minimum, a non-"" version is rendered when it is attached to a part representing the whole document. The default version for a document is (`version`).
- `body-id` structure — Generated HTML uses the given string `id` attribute of the body tag; this style can be set separately for parts that start different HTML pages, otherwise it is effectively inherited by sub-parts; the default is `"scribble-plt-scheme.org"`, but `setup-plt` installs `"doc-plt-scheme.org"` as the `id` for any document that it builds.

The `to-collect` field contains content that is inspected during the collect pass, but ignored in later passes (i.e., it doesn't directly contribute to the output).

The `blocks` field contains the part's initial flow (before sub-parts).

The `parts` field contains sub-parts.

```
(struct paragraph (style content))
  style : style?
  content : content?
```

A paragraph has a style and a content.

For the `style` field, a string style name corresponds to a CSS class for HTML output or a macro for Latex output (see §7.9.1 “Implementing Styles”). The following symbolic style names are recognized:

- `'author` — Typeset as the author of a document. Such paragraphs normally should appear only in the initial flow of a `part` for a document, where they are treated specially by the Latex renderer by moving the author information to the title.

The currently recognized style properties are as follows:

- `'omitable` — When a table cell contains a single `omitable-paragraph`, then when rendering to HTML, no `p` tag wraps the cell content.
- `'div` — Generates `<div>` HTML output instead of `<p>`.
- `attributes` structure — Provides additional HTML attributes for the `<p>` or `<div>` tag.
- `body-id` structure — For HTML, uses the given string as an `id` attribute of the `<p>` or `<div>` tag.
- `'never-indent`s — For Latex and compound paragraphs; see `compound-paragraph`.

```
(struct table (style blockss))
  style : style?
  blockss : (listof (listof (or/c block? (one-of/c 'cont))))
```

A table has, roughly, a list of list of blocks. A cell in the table can span multiple columns by using `'cont` instead of a block in the following columns (i.e., for all but the first in a set of cells that contain a single block).

Within `style`, a string style name corresponds to a CSS class for HTML output or an environment for Latex output (see §7.9.1 “Implementing Styles”). The following symbolic style names are also recognized:

- `'boxed` — Renders as a definition.
- `'centered` — Centers HTML output horizontally.

The following style properties are currently recognized:

- `table-columns` structure — Provides column-specific styles, but only if a `table-cells` structure is not included as a style property.
- `table-cells` structure — Provides cell-specific styles.
- `attributes` structure — Provides additional HTML attributes for the `<table>` tag.

- `body-id` structure — For HTML, uses the given string as an `id` attribute of the `<table>` tag.
- `'aux` — For HTML, include the table in the table-of-contents display for the enclosing part.
- `'never-indent`s — For Latex and compound paragraphs; see `compound-paragraph`.

For Latex output, a paragraph as a cell value is not automatically line-wrapped, unless a vertical alignment is specified for the cell through a `table-cells` or `table-columns` style property. To get a line-wrapped paragraph, use a `compound-paragraph` or use an element with a string style and define a corresponding Latex macro in terms of `parbox`. For Latex output of blocks in the flow that are `nested-flows`, `itemizations`, `compound-paragraphs`, or `delayed-blocks`, the block is wrapped with `minipage` using `linewidth` divided by the column count as the width.

```
(struct itemization (style blockss))
  style : style?
  blockss : (listof (listof block?))
```

A itemization has a style and a list of flows.

In `style`, a string style name corresponds to a CSS class for HTML output or a macro for Latex output (see §7.9.1 “Implementing Styles”). In addition, the following symbolic style names are recognized:

- `'compact` — Reduces space between items.
- `'ordered` — Generates `` HTML output instead of `` or an Latex enumeration instead of an itemization.

The following style properties are currently recognized:

- `attributes` structure — Provides additional HTML attributes for the `` or `` tag.
- `body-id` structure — For HTML, uses the given string as an `id` attribute of the `` or `` tag.
- `'never-indent`s — For Latex and compound paragraphs; see `compound-paragraph`.

```
(struct nested-flow (style paragraphs))
```

```
style : any/c
paragraphs : (listof block?)
```

A nested flow has a style and a flow.

In `style`, the "style name" is normally a string that corresponds to a CSS class for HTML blockquote output or a Latex environment (see §7.9.1 “Implementing Styles”). The following symbolic style names are recognized:

- `'inset` — Insets the nested flow relative to surrounding text.

The following style properties are currently recognized:

- `'command` — For Latex output, a string style name is used as a command name instead of an environment name.
- `attributes` structure — Provides additional HTML attributes for the `<blockquote>` tag.
- `body-id` structure — For HTML, uses the given string as an id attribute of the `<blockquote>` tag.
- `'never-indent`s — For Latex and compound paragraphs; see `compound-paragraph`.

```
(struct compound-paragraph (style blocks))
  style : style?
  blocks : (listof block?)
```

A compound paragraph has a style and a list of blocks.

For HTML, a `paragraph` block in `blocks` is rendered without a `<p>` tag, unless the paragraph has a style with a non-`#f` style name. For Latex, each block in `blocks` is rendered with a preceding `\noindent`, unless the block has the `'never-indent`s property (checking recursively in a `nested-flow` or `compound-paragraph` if the `nested-flow` or `compound-paragraph` itself has no `'never-indent`s property).

The `style` field of a compound paragraph is normally a string that corresponds to a CSS class for HTML output or Latex environment for Latex output (see §7.9.1 “Implementing Styles”). The following style properties are currently recognized:

- `'command` — For Latex output, a string style name is used as a command name instead of an environment name.
- `attributes` structure — Provides additional HTML attributes for the `<p>` tag.

- `body-id` structure — For HTML, uses the given string as an `id` attribute of the `<p>` tag.
- `'never-indent`s — For Latex within another compound paragraph; see above.

```
(struct delayed-block (resolve))
  resolve : (any/c part? resolve-info? . -> . block?)
```

The `resolve` procedure is called during the resolve pass to obtain a normal block. The first argument to `resolve` is the renderer.

```
(struct element (style content))
  style : element-style?
  content : content?
```

Styled content within an enclosing paragraph or other content.

The `style` field can be a `style` structure, but it can also be just a style name.

In `style`, a string style name corresponds to a CSS class for HTML output and a macro name for Latex output (see §7.9.1 “Implementing Styles”). The following symbolic style names are recognized:

- `'tt`, `'italic`, `'bold`, `'sf`, `'url`, `'subscript`, `'superscript`, `'smaller`, `'larger` — Basic styles recognized by all renders.
- `'hspace` — Renders its `content` as monospace blanks.
- `'newline` — Renders a line break independent of the `content`.

The following style properties are currently recognized:

- `target-url` structure — Generates a hyperlink.
- `url-anchor` structure — For HTML, inserts a hyperlink target before `content`.
- `color-property` structure — Applies a color to the text of `content`.
- `background-color-property` structure — Applies a color to the background of `content`.
- `attributes` structure — Provides additional HTML attributes for a `` tag.
- `hover-property` structure — For HTML, adds a text label to the content to be shown when the mouse hovers over it.

- `script-property` structure — For HTML, supplies a script alternative to `content`.
- `body-id` structure — For HTML uses the given string as an id attribute of the span tag.
- `'aux` — Intended for use in titles, where the auxiliary part of the title can be omitted in hyperlinks. See, for example, `secref`.
- `'tt-chars` — For Latex output, when the style name is a string, render the element's content with escapes suitable for Latex `tt` mode.
- `'exact-chars` — For Latex output, when the style name is a string, render the elements content exactly (without escapes).

```
(struct (image-element element) (path suffixes scale))
  path : (or/c path-string?
          (cons/c 'collects (listof bytes?)))
  suffixes : (listof #rx"^[.]")
  scale : real?
```

Used as a style for an `element` to inline an image. The `path` field can be a result of `path->main-collects-relative`.

For each string in `suffixes`, if the rendered works with the corresponding suffix, the suffix is added to `path` and used if the resulting path refers to a file that exists. The order in `suffixes` determines the order in which suffixes are tried. The HTML renderer supports `".png"` and `".gif"`, while the Latex renderer supports `".png"`, `".pdf"`, and `".ps"` (but rendering Latex output to PDF will not work with `".ps"` files, while rendering to Latex DVI output works only with `".ps"` files). If `suffixes` is empty or if none of the suffixes lead to files that exist, `path` is used as-is.

The `scale` field scales the image in its rendered form.

```
(struct (target-element element) (tag))
  tag : tag?
```

Declares the content as a hyperlink target for `tag`.

```
(struct (toc-target-element target-element) ())
```

Like `target-element`, the content is also a kind of section label to be shown in the “on this page” table for HTML output.

```
(struct (page-target-element target-element) ())
```

Like `target-element`, but a link to the element goes to the top of the containing page.

```
(struct (redirect-target-element target-element) (alt-path
                                                alt-anchor))
  alt-path : path-string?
  alt-anchor : string?
```

Like `target-element`, but a link to the element is redirected to the given URL.

```
(struct (toc-element element) (toc-content))
  toc-content : content?
```

Similar to `toc-target-element`, but with specific content for the “on this page” table specified in the `toc-content` field.

```
(struct (link-element element) (tag))
  tag : tag?
```

Hyperlinks the content to `tag`.

When `tag` is a part tag and the content of the element is `null`, then the hyperlink uses the target part’s number and/or title as the content. In that case, if the section number is preceded by a word, the word starts in uppercase if the element’s style includes a `'uppercase` property.

```
(struct (index-element element) (tag plain-seq entry-seq desc))
  tag : tag?
  plain-seq : (and/c pair? (listof string?))
  entry-seq : (listof content?)
  desc : any/c
```

The `plain-seq` specifies the keys for sorting, where the first string is the main key, the second is a sub-key, etc. For example, an “night” portion of an index might have sub-entries for “night, things that go bump in” and “night, defender of the”. The former would be represented by `plain-seq '("night" "things that go bump in")`, and the latter by `'("night" "defender of the")`. Naturally, single-string `plain-seq` lists are the common case, and at least one word is required, but there is no limit to the word-list length. The strings in `plain-seq` must not contain a newline character.

The `entry-seq` list must have the same length as `plain-seq`. It provides the form of each key to render in the final document.

The `desc` field provides additional information about the index entry as supplied by the entry creator. For example, a reference to a procedure binding can be recognized when `desc` is

an instance of `procedure-index-desc`. See `scribble/manual-struct` for other typical types of `desc` values.

See also `index`.

```
(struct multiarg-element (style content))
  style : element-style?
  content : (listof content?)
```

Like `element` with a list for content, except that for Latex output, if the style name in `style` is a string, then it corresponds to a Latex command that accepts as many arguments (each in curly braces) as elements of `content`.

```
(struct delayed-element (resolve sizer plain))
  resolve : (any/c part? resolve-info? . -> . list?)
  sizer : (-> any/c)
  plain : (-> any/c)
```

The `render` procedure's arguments are the same as for `delayed-block`, but the result is content. Unlike `delayed-block`, the result of the `render` procedure's argument is remembered on the first call for re-use for a particular resolve pass.

The `sizer` field is a procedure that produces a substitute content for the delayed element for the purposes of determining the delayed element's width (see `element-width`).

The `plain` field is a procedure that produces a substitute content when needed before the collect pass, such as when `element->string` is used before the collect pass.

```
(struct part-relative-element (resolve sizer plain))
  resolve : (collect-info? . -> . list?)
  sizer : (-> any/c)
  plain : (-> any/c)
```

Similar to `delayed-block`, but the replacement content is obtained in the collect pass by calling the function in the `resolve` field.

The `resolve` function can call `collect-info-parents` to obtain a list of parts that enclose the element, starting with the nearest enclosing section. Functions like `part-collected-info` and `collected-info-number` can extract information like the part number.

```
(struct (collect-element element) (collect))
  collect : (collect-info . -> . any)
```

Like `element`, but the `collect` procedure is called during the collect pass. The `collect`

procedure normally calls `collect-put!`.

Unlike `delayed-element` or `part-relative-element`, the element remains intact (i.e., it is not replaced) by either the collect pass or resolve pass.

```
(struct (render-element element) (render))
  render : (any/c part? resolve-info? . -> . any)
```

Like `delayed-element`, but the `render` procedure is called during the render pass.

If a `render-element` instance is serialized (such as when saving collected info), it is reduced to a `element` instance.

```
(struct collected-info (number parent info))
  number : (listof (or/c false/c integer?))
  parent : (or/c false/c part?)
  info : any/c
```

Computed for each part by the collect pass.

```
(struct target-url (addr))
  addr : path-string?
```

Used as a style property for an `element`. A path is allowed for `addr`, but a string is interpreted as a URL rather than a file path.

```
(struct document-version (text))
  text : (or/c string? false/c)
```

Used as a style property for a `path` to indicate a version number.

```
(struct color-property (color))
  color : (or/c string? (list/c byte? byte? byte?))
```

Used as a style property for an `element` to set its color. Recognized string names for `color` depend on the renderer, but at the recognized set includes at least "white", "black", "red", "green", "blue", "cyan", "magenta", and "yellow". When `color` is a list of bytes, the values are used as RGB levels.

```
(struct background-color-property (color))
  color : (or/c string? (list/c byte? byte? byte?))
```

Like `color-property`, but sets the background color.

```
(struct table-cells (styleless))
  styleless : (listof (listof style?))
```

Used as a style property for a `table` to set its cells' styles.

If a cell style has a string name, it is used as an HTML class for the `<td>` tag or as a Latex command name.

The following symbols are recognized as cell-style properties:

- `'left` — Left-align the cell content.
- `'right` — Right-align the cell content top baselines.
- `'center` — Center the cell content horizontally.
- `'top` — Top-align the cell content.
- `'baseline` — Align the cell content top baselines.
- `'bottom` — bottom-align the cell content.
- `'vcenter` — Center the cell content vertically.

In addition, for HTML output, `attributes` structures as style properties can add arbitrary attributes to a cell's `<td>` tag.

```
(struct table-columns (styles))
  styles : (listof style?)
```

Like `table-cells`, but the `styles` list is duplicated for each row in the table. This style property is used only when a `table-cells` is not present in a style's list of properties.

```
(block? v) → boolean?
  v : any/c
```

Returns `#t` if `v` is a `paragraph`, `table`, `itemization`, `nested-flow`, or `delayed-block`, `#f` otherwise.

```
(content? v) → boolean?
  v : any/c
```

Returns `#t` if `v` is a string, symbol, `element`, `multiarg-element`, `delayed-element`, `part-relative-element`, or list of content, `#f` otherwise.

```
(struct style (name properties))
  name : (or/c string? symbol? #f)
  properties : list?
```

Represents a style.

```
plain : style?
```

A style (`make-style #f null`).

```
(element-style? v) → boolean?
  v : any/c
```

Returns `#t` if `v` is a string, symbol, `#f`, or `style` structure.

```
(tag? v) → boolean?
  v : any/c
```

Returns `#t` if `v` is acceptable as a link tag, which is a list containing a symbol and either a string, a `generated-tag` instance, or a list (of arbitrary values).

```
(struct generated-tag ())
```

A placeholder for a tag to be generated during the collect pass. Use `tag-key` to convert a tag containing a `generated-tag` instance to one containing a string.

```
(content->string content) → string?
  content : content?
(content->string content renderer p info) → string?
  content : content?
  renderer : any/c
  p : part?
  info : resolve-info?
```

Converts content to a single string (essentially rendering the content as “plain text”).

If `p` and `info` arguments are not supplied, then a pre-“collect” substitute is obtained for delayed elements. Otherwise, the two arguments are used to force the delayed element (if it has not been forced already).

```
(content-width c) → exact-nonnegative-integer?
```

```
c : content?
```

Returns the width in characters of the given content.

```
(block-width e) → exact-nonnegative-integer?  
e : block?
```

Returns the width in characters of the given block.

```
(struct collect-info (ht  
                    ext-ht  
                    parts  
                    tags  
                    gen-prefix  
                    relatives  
                    parents))  
  
ht : any/c  
ext-ht : any/c  
parts : any/c  
tags : any/c  
gen-prefix : any/c  
relatives : any/c  
parents : (listof part?)
```

Encapsulates information accumulated (or being accumulated) from the collect pass. The fields are exposed, but not currently intended for external use, except that `collect-info-parents` is intended for external use.

```
(struct resolve-info (ci delays undef))  
ci : any/c  
delays : any/c  
undef : any/c
```

Encapsulates information accumulated (or being accumulated) from the resolve pass. The fields are exposed, but not currently intended for external use.

```
(info-key? v) → boolean?  
v : any/c
```

Returns `#t` if `v` is an *info key*: a list of at least two elements whose first element is a symbol. The result is `#f` otherwise.

For a list that is an info tag, the interpretation of the second element of the list is effectively determined by the leading symbol, which classifies the key. However, a `#f` value as the

second element has an extra meaning: collected information mapped by such info keys is not propagated out of the part where it is collected; that is, the information is available within the part and its sub-parts, but not in ancestor or sibling parts.

Note that every tag is an info key.

```
(collect-put! ci key val) → void?  
  ci : collect-info?  
  key : info-key?  
  val : any/c
```

Registers information in *ci*. This procedure should be called only during the collect pass.

```
(resolve-get p ri key) → any/c  
  p : (or/c part? false/c)  
  ri : resolve-info?  
  key : info-key?
```

Extract information during the resolve pass or render pass for *p* from *ri*, where the information was previously registered during the collect pass. See also §7.3.4 “Collected and Resolved Information”.

The result is `#f` if the no value for the given key is found. Furthermore, the search failure is recorded for potential consistency reporting, such as when `setup-plt` is used to build documentation.

```
(resolve-get/ext? p ri key) → any/c boolean?  
  p : (or/c part? false/c)  
  ri : resolve-info?  
  key : info-key?
```

Like `render-get`, but returns a second value to indicate whether the resulting information originated from an external source (i.e., a different document).

```
(resolve-search dep-key p ri key) → void?  
  dep-key : any/c  
  p : (or/c part? false/c)  
  ri : resolve-info?  
  key : info-key?
```

Like `resolve-get`, but a shared *dep-key* groups multiple searches as a single request for the purposes of consistency reporting and dependency tracking. That is, a single success for the same *dep-key* means that all of the failed attempts for the same *dep-key* have been satisfied. However, for dependency checking, such as when using `setup-plt` to re-

build documentation, all attempts are recorded (in case external changes mean that an earlier attempt would succeed next time).

```
(resolve-get/tentative p ri key) → any/c
  p : (or/c part? false/c)
  ri : resolve-info?
  key : info-key?
```

Like `resolve-search`, but without dependency tracking. For multi-document settings where dependencies are normally tracked, such as when using `setup-plt` to build documentation, this function is suitable for use only for information within a single document.

```
(resolve-get-keys p ri pred) → list?
  p : (or/c part? false/c)
  ri : resolve-info?
  pred : (info-key? . -> . any/c)
```

Applies `pred` to each key mapped for `p` in `ri`, returning a list of all keys for which `pred` returns a true value.

```
(part-collected-info p ri) → collected-info?
  p : part?
  ri : resolve-info?
```

Returns the information collected for `p` as recorded within `ri`.

```
(tag-key t ri) → tag?
  t : tag?
  ri : resolve-info?
```

Converts a `generated-tag` value with `t` to a string.

7.3.6 HTML Style Properties

```
(require scribble/html-properties)
```

The `scribble/html-properties` library provides datatypes used as style properties for HTML rendering.

```
(struct attributes (assoc))
  assoc : (listof (cons/c symbol? string?))
```

Used as a style property to add arbitrary attributes to an HTML tag.

```
(struct url-anchor (name))
  name : string?
```

Used as a style property with `element` to insert an anchor before the element.

```
(struct hover-property (text))
  text : string?
```

Used as a style property with `element` to add text that is shown when the mouse hovers over the element.

```
(struct script-property (type script))
  type : string?
  script : (or/c path-string? (listof string?))
```

Used as a style property with `element` to supply a script alternative to the element content.

```
(struct css-addition (path))
  path : (or/c path-string?
           (cons/c 'collects (listof bytes?)))
```

Used as a style property to supply a CSS file to be referenced in the generated HTML. This property can be attached to any style, and all additions are collected to the top of the generated HTML page.

The path field can be a result of `path->main-collects-relative`.

```
(struct body-id (value))
  value : string?
```

Used as a style property to associate an id attribute with an HTML tag.

```
(struct html-defaults (prefix style extra-files))
  prefix : (or/c bytes? path-string?
            (cons/c 'collects (listof bytes?)))
  style : (or/c bytes? path-string?
           (cons/c 'collects (listof bytes?)))
  extra-files : (listof (or/c path-string?
                             (cons/c 'collects (listof bytes?))))
```

Like `latex-defaults`, but use for the scribble command-line tool's `-html` and `-htmls`

modes.

7.3.7 Latex Style Properties

```
(require scribble/latex-properties)
```

The `scribble/latex-properties` library provides datatypes used as style properties for Latex rendering.

```
(struct tex-addition (path))  
  path : (or/c path-string?  
          (cons/c 'collects (listof bytes?)))
```

Used as a style property to supply a ".tex" file to be included in the generated Latex. This property can be attached to any style, and all additions are collected to the top of the generated Latex file.

The `path` field can be a result of `path->main-collects-relative`.

```
(struct latex-defaults (prefix style extra-files))  
  prefix : (or/c bytes? path-string?  
            (cons/c 'collects (listof bytes?)))  
  style : (or/c bytes? path-string?  
           (cons/c 'collects (listof bytes?)))  
  extra-files : (listof (or/c path-string?  
                           (cons/c 'collects (listof bytes?))))
```

Used as a style property on the main `part` of a document to set a default prefix file, style file, and extra files (see §7.9.2 “Configuring Output”). The defaults are used by the `scribble` command-line tool for `and -latex` or `-pdf` mode if none are supplied via `-prefix` and `-style` (where `extra-files` are used only when `prefix` is used). A byte-string value is used directly like file content, and a path can be a result of `path->main-collects-relative`.

Languages (used with `#lang`) like `scribble/manual` and `scribble/sigplan` add this property to a document to specify appropriate files for Latex rendering.

```
(struct latex-auto-extra-files (paths))  
  paths : (listof (or/c path-string?  
                     (cons/c 'collects (listof bytes?))))
```

Used as a style property for the main `part` of a document to supply extra files needed to build the document via the `scribble` command-line tool (for `-latex` and `-pdf` mode).

Languages (used with #lang) like `scribble/sigplan` add this property to a document to specify appropriate extra files.

7.4 Renderer

A renderer is an object that provides two main methods: `collect` and `render`. The first method is called to collect global information about the document, including information that spans multiple documents rendered together; the collection pass tends to be format-independent, and it usually implemented completely by the base renderer. The latter method generates the actual output, which is naturally specific to a particular format.

7.4.1 Base Renderer

```
(require scribble/base-render)
```

The `scribble/base-render` module provides `render%`, which implements the core of a renderer. This rendering class must be refined with a mixin from `scribble/text-render`, `scribble/html-render`, or `scribble/latex-render`.

The mixin structure is meant to support document-specific extensions to the renderers. For example, the `scribble` command-line tool might, in the future, extract rendering mixins from a document module (in addition to the document proper).

See the "`base-render.ss`" source for more information about the methods of the renderer. Documents built with higher layers, such as `scribble/manual`, generally do not call the render object's methods directly.

```
render% : class?  
  superclass: object%
```

Represents a renderer.

```
(new render%  
  [dest-dir dest-dir]  
  [[refer-to-existing-files refer-to-existing-files]  
  [root-path root-path]])  
→ (is-a?/c render%)  
dest-dir : path-string?  
refer-to-existing-files : any/c = #f  
root-path : (or/c path-string? false/c) = #f
```

Creates a renderer whose output will go to `dest-dir`. For example, `dest-dir`

could name the directory containing the output Latex file, the HTML file for a single-file output, or the output sub-directory for multi-file HTML output.

If *root-path* is not *#f*, it is normally the same as *dest-dir* or a parent of *dest-dir*. It causes cross-reference information to record destination files relative to *root-path*; when cross-reference information is serialized, it can be deserialized via *deserialize-info* with a different root path (indicating that the destination files have moved).

```
(send a-render collect srcs dests) → collect-info?  
srcs : (listof part?)  
dests : (listof path-string?)
```

Performs the collect pass. See *render* for information on the *dests* argument.

```
(send a-render resolve srcs dests ci) → resolve-info?  
srcs : (listof part?)  
dests : (listof path-string?)  
ci : collect-info?
```

Performs the resolve pass. See *render* for information on the *dests* argument.

```
(send a-render render srcs dests ri) → void?  
srcs : (listof part?)  
dests : (listof path-string?)  
ri : resolve-info?
```

Produces the final output.

The *dests* provide names of files for Latex or single-file HTML output, or names of sub-directories for multi-file HTML output. If the *dests* are relative, they're relative to the current directory; normally, they should indicate a path within the *dest-dir* supplied on initialization of the *render%* object.

```
(send a-render serialize-info ri) → any/c  
ri : resolve-info?
```

Serializes the collected info in *ri*.

```
(send a-render deserialize-info v  
                                ci  
                                [#:root root-path]) → void?
```

```
v : any/c  
ci : collect-info?  
root-path : (or/c path-string? false/c) = #f
```

Adds the deserialized form of *v* to *ci*.

If *root-path* is not *#f*, then file paths that are recorded in *ci* as relative to an instantiation-supplied *root-path* are deserialized as relative instead to the given *root-path*.

7.4.2 Text Renderer

```
(require scribble/text-render)
```

```
render-mixin : (class? . -> . class?)  
  argument extends/implements: render%
```

Specializes a `render%` class for generating plain text.

7.4.3 HTML Renderer

```
(require scribble/html-render)
```

```
render-mixin : (class? . -> . class?)  
  argument extends/implements: render%
```

Specializes a `render%` class for generating HTML output.

```
(send a-render set-external-tag-path url) → void?  
  url : string?
```

Configures the renderer to redirect links to external via `url`, adding a tag query element to the end of the URL that contains the Base64-encoded, `printed`, serialized original tag (in the sense of `link-element`) for the link.

```
render-multi-mixin : (class? . -> . class?)  
  argument extends/implements: render%
```

Further specializes a rendering class produced by `render-mixin` for generating multiple HTML files.

7.4.4 Latex Renderer

```
(require scribble/latex-render)
```

```
render-mixin : (class? . -> . class?)  
  argument extends/implements: render%
```

Specializes a `render%` class for generating Latex input.

7.5 Decoding Text

```
(require scribble/decode)
```

The `scribble/decode` library helps you write document content in a natural way—more like plain text, except for `@` escapes. Roughly, it processes a stream of strings to produces instances of the `scribble/struct` datatypes (see §4.7.1 “Compatibility Structures And Processing”).

At the flow level, decoding recognizes a blank line as a paragraph separator. Blocks and paragraphs without blank lines in between are collected into a compound paragraph.

At the content level, decoding makes just a few special text conversions:

- `--`: converted to `'mdash`, which the HTML render outputs as an en-dash surrounded by space (so don't put spaces around `--` in a document)
- `=`: converted to `'ndash`
- `“`: converted to `'ldquo`, which is fancy open quotes: “
- `”`: converted to `'rdquo`, which is fancy closing quotes: ”
- `’`: converted to `'rsquo`, which is a fancy apostrophe: ’

Some functions *decode* a sequence of *pre-flow* or *pre-content* arguments using `decode-flow` or `decode-content`, respectively. For example, the `bold` function accepts any number of *pre-content* arguments, so that in

```
@bold{“apple”}
```

the `“apple”` argument is decoded to use fancy quotes, and then it is bolded.

```
(pre-content? v) → boolean?  
  v : any/c
```

Returns `#t` if `v` is a *pre-content* value: a string or other non-list content, or a `splice` containing a list of pre-content values; otherwise returns `#f`.

Pre-content is decoded into content by functions like `decode-content` and `decode-paragraph`.

```
(pre-flow? v) → boolean?  
  v : any/c
```

Returns `#t` if `v` is a *pre-flow* value: a string or other non-list content, a block, `#<void>`, or a `splice` containing a list of pre-flow values; otherwise returns `#f`.

Pre-flow is decoded into a flow (i.e., a list of blocks) by functions like `decode-flow`.

```
(pre-part? v) → boolean?  
  v : any/c
```

Returns `#t` if `v` is a *pre-part* value: a string or other non-list content, a block, a `part`, a `title-decl`, a `part-start`, a `part-index-decl`, a `part-collect-decl`, a `part-tag-decl`, `#<void>`, or a `splice` containing a list of pre-part values; otherwise returns `#f`.

A pre-part sequences is decoded into a `part` by functions like `decode` and `decode-part`.

```
(decode lst) → part?  
  lst : (listof pre-part?)
```

Decodes a document, producing a part. In `lst`, instances of `splice` are inlined into the list. An instance of `title-decl` supplies the title for the part, plus tag, style and version information. Instances of `part-index-decl` (that precede any sub-part) add index entries that point to the section. Instances of `part-collect-decl` add elements to the part that are used only during the collect pass. Instances of `part-tag-decl` add hyperlink tags to the section title. Instances of `part-start` at level 0 trigger sub-part parsing. Instances of `section` trigger are used as-is as subsections, and instances of `paragraph` and other flow-element datatypes are used as-is in the enclosing flow.

```
(decode-part lst tags title depth) → part?  
  lst : (listof pre-part?)  
  tags : (listof string?)  
  title : (or/c #f list?)  
  depth : exact-nonnegative-integer?
```

Like `decode`, but given a list of tag string for the part, a title (if `#f`, then a `title-decl` instance is used if found), and a depth for `part-starts` to trigger sub-part parsing.

```
(decode-flow lst) → flow?  
  lst : (listof pre-flow?)
```

Decodes a flow. A sequence of two or more newlines separated only by whitespace counts is parsed as a paragraph separator. In *lst*, instances of `splice` are inlined into the list. Instances of `paragraph` and other flow-element datatypes are used as-is in the enclosing flow.

```
(decode-compound-paragraph lst) → block?  
  lst : (listof pre-flow?)
```

Decodes a compound paragraph. If the compound paragraph contains a single block, the block is returned without a `compound-paragraph` wrapper.

```
(decode-paragraph lst) → paragraph?  
  lst : (listof pre-content?)
```

Decodes a paragraph.

```
(decode-content lst) → list?  
  lst : (listof pre-content?)
```

Decodes content.

```
(decode-elements lst) → list?  
  lst : (listof pre-content?)
```

An alias for `decode-content`.

```
(decode-string s) → (listof content?)  
  s : string?
```

Decodes a single string to produce content.

```
(whitespace? s) → boolean?  
  s : string?
```

Returns `#t` if *s* contains only whitespace, `#f` otherwise.

```
(struct title-decl (tag-prefix tags version style content))  
  tag-prefix : (or/c #f string?)
```

```
tags : (listof string?)
version : (or/c string? #f)
style : any/c
content : content?
```

See [decode](#) and [decode-part](#). The `tag-prefix` and `style` fields are propagated to the resulting `part`.

```
(struct part-start (depth tag-prefix tags style title))
  depth : integer?
  tag-prefix : (or/c #f string?)
  tags : (listof string?)
  style : any/c
  title : content?
```

Like [title-decl](#), but for a sub-part. See [decode](#) and [decode-part](#).

```
(struct part-index-decl (plain-seq entry-seq))
  plain-seq : (listof string?)
  entry-seq : list?
```

See [decode](#). The two fields are as for [index-element](#).

```
(struct part-collect-decl (element))
  element : element?
```

See [decode](#).

```
(struct part-tag-decl (tag))
  tag : tag?
```

See [decode](#).

```
(struct splice (run))
  run : list?
```

See [decode](#), [decode-part](#), and [decode-flow](#).

```
(clean-up-index-string str) → string?
  str : string?
```

Trims leading and trailing whitespace, and converts non-empty sequences of whitespace to a single space character.

7.6 Document Language

```
#lang scribble/doclang
```

The `scribble/doclang` language provides everything from `scheme/base`, except that it replaces the `#!/module-begin` form.

The `scribble/doclang` `#!/module-begin` essentially packages the body of the module into a call to `decode`, binds the result to `doc`, and exports `doc`.

Any module-level form other than an expression (e.g., a `require` or `define`) remains at the top level, and the `doc` binding is put at the end of the module. As usual, a module-top-level `begin` slices into the module top level.

7.7 Document Reader

```
#lang scribble/doc
```

The `scribble/doc` language is the same as `scribble/doclang`, except that `read-syntax-inside` is used to read the body of the module. In other words, the module body starts in Scribble “text” mode instead of S-expression mode.

7.8 Cross-Reference Utilities

```
(require scribble/xref)
```

The `scribble/xref` library provides utilities for querying cross-reference information that was collected from a document build.

```
(xref? v) → boolean?  
v : any/c
```

Returns `#t` if `v` is a cross-reference record created by `load-xref`, `#f` otherwise.

```
(load-xref sources  
  [#:render% using-render%  
   #:root root-path]) → xref?  
sources : (listof (-> any/c))  
using-render% : (subclass?/c render%) = (render-mixin render%)  
root-path : (or/c path-string? false/c) = #f
```

Creates a cross-reference record given a list of functions that each produce a serialized information obtained from `serialize-info` in `render%`. If a `sources` element produces `#f`, its result is ignored.

Since the format of serialized information is specific to a rendering class, the optional `using-render%` argument accepts the relevant class. It default to HTML rendering.

If `root-path` is not `#f`, then file paths that are serialized as relative to an instantiation-supplied `root-path` are deserialized as relative instead to the given `root-path`.

Use `load-collections-xref` from `setup/xref` to get all cross-reference information for installed documentation.

```
(xref-binding->definition-tag xref
                             binding
                             mode) → (or/c tag? false/c)

xref : xref?
binding : (or/c identifier?
           (list/c (or/c module-path?
                    module-path-index?)
                  symbol?)
           (listof module-path-index?
                   symbol?
                   module-path-index?
                   symbol?
                   (one-of/c 0 1)
                   (or/c exact-integer? false/c)
                   (or/c exact-integer? false/c)))
mode : (or/c exact-integer? false/c)
```

Locates a tag in `xref` that documents a module export. The binding is specified in one of several ways, as described below; all possibilities encode an exporting module and a symbolic name. The name must be exported from the specified module. Documentation is found either for the specified module or, if the exported name is re-exported from other other module, for the other module (transitively).

The `mode` argument specifies the relevant phase level for the binding. The `binding` is specified in one of four ways:

- If `binding` is an identifier, then `identifier-binding` is used with `mode` to determine the binding.
- If `binding` is a two-element list, then the first element provides the exporting module and the second the exported name. The `mode` argument is effectively ignored.
- If `binding` is a seven-element list, then it corresponds to a result from `identifier-binding` using `mode`.

- If *binding* is a five-element list, then the first element is as for the two-element-list case, and the remain elements are as in the last four elements of the seven-element case.

If a documentation point exists in *xref*, a tag is returned, which might be used with [xref-tag->path+anchor](#) or embedded in a document rendered via [xref-render](#). If no definition point is found in *xref*, the result is `#f`.

```
(xref-tag->path+anchor xref
                        tag
                        [#:render% using-render%])
→ (or/c false/c path?)
   (or/c false/c string?)
   xref : xref?
   tag  : tag?
   using-render% : (subclass?/c render%) = (render-mixin render%)
```

Returns a path and anchor string designated by the key *tag* according the cross-reference *xref*. The first result is `#f` if no mapping is found for the given tag. The second result is `#f` if the first result is `#f`, and it can also be `#f` if the tag refers to a page rather than a specific point in a page.

The optional *using-render%* argument is as for [load-xref](#).

```
(xref-tag->index-entry xref tag) → (or/c false/c entry?)
   xref : xref?
   tag  : tag?
```

Extract an `entry` structure that provides addition information about the definition (of any) referenced by *tag*. This function can be composed with [xref-binding->definition-tag](#) to obtain information about a binding, such as the library that exports the binding and its original name.

```
(xref-render xref
             doc
             dest
             [#:render% using-render%
              #:refer-to-existing-files? use-existing?])
→ (or/c void? any/c)
   xref : xref?
   doc  : part?
   dest : (or/c path-string? false/c)
   using-render% : (subclass?/c render%) = (render-mixin render%)
   use-existing? : any/c = (not dest)
```


Renders *doc* using the cross-reference info in *xref* to the destination *dest*. For example, *doc* might be a generated document of search results using link tags described in *xref*.

If *dest* is *#f*, no file is written, and the result is an X-expression for the rendered page. Otherwise, the file *dest* is written and the result is *#<void>*.

The optional *using-renderer%* argument is as for *load-xref*. It determines the kind of output that is generated.

If *use-existing?* is true, then files referenced during rendering (such as image files) are referenced from their existing locations, instead of copying to the directory of *dest*.

```
(xref-transfer-info renderer ci xref) → void?  
  renderer : (is-a?/c renderer%)  
  ci : collect-info?  
  xref : xref?
```

Transfers cross-reference information to *ci*, which is the initially collected information from *renderer*.

```
(xref-index xref) → (listof entry?)  
  xref : xref?
```

Converts indexing information *xref* into a list of *entry* structures.

```
(struct entry (words content tag desc))  
  words : (and/c (listof string?) cons?)  
  content : list?  
  tag : tag?  
  desc : any/c
```

Represents a single entry in a Scribble document index.

The *words* list corresponds to *index-element-plain-seq*. The *content* list corresponds to *index-element-entry-seq*. The *desc* value corresponds to *index-element-desc*. The *tag* is the destination for the index link into the main document.

7.9 Extending and Configuring Scribble Output

Sometimes, Scribble's primitives and built-in styles are insufficient to produce the output that you need. The cases in which you need to extend or configure Scribble fall into two groups:

- You may need to drop into the back-end “language” of CSS or Latex to create a specific output effect. For this kind of extension, you will mostly likely attach a `css-addition` or `tex-addition` style property to style, where the addition implements the style name. This kind of extension is described in §7.9.1 “Implementing Styles”.
- You may need to produce a document whose page layout is different from the PLT Scheme documentation style. For that kind of configuration, you can run the `scribble` command-line tool and supply flags like `-prefix` or `++style`, or you can associate a `html-defaults` or `latex-defaults` style property to the main document’s style. This kind of configuration is described in §7.9.2 “Configuring Output”.

7.9.1 Implementing Styles

When a string is used as a style in an `element`, a `multiarg-element`, `paragraph`, `table`, `itemization`, `nested-flow`, or `compound-paragraph`, it corresponds to a CSS class for HTML output or a Latex macro/environment for Latex output. In Latex output, the string is used as a command name for a `paragraph` and an environment name for a `table`, `itemization`, `nested-flow`, or `compound-paragraph`; the if style has a `'command` style property for a `nested-flow` or `compound-paragraph`, then the style name is used as a command instead of an environment. In addition, for an itemization, the style string is suffixed with `"Item"` and used as a CSS class or Latex macro name to use for the itemization’s items (in place of `item` in the case of Latex).

To add a mapping from your own style name to a CSS configuration, add a `css-addition` structure instance to a style’s style property list. To map a style name to a Latex macro or environment, add a `tex-addition` structure instance. A `css-addition` or `tex-addition` is normally associated with the style whose name is implemented by the addition, but it can also be added to the style for an enclosing part.

Scribble includes a number of predefined styles that are used by the exports of `scribble/base`. You can use them or redefine them. The styles are specified by `"scribble.css"` and `"scribble.tex"` in the `"scribble"` collection.

The styles used by `scribble/manual` are implemented by `"scheme.css"` and `"scheme.tex"` in the `"scribble"` collection. Other libraries, such as `scrib-lib/autobib`, similarly implement styles through files that are associated by `css-addition` and `tex-addition` style properties.

To avoid collisions with future additions to Scribble, start your style name with an uppercase letter that is not `S`. An uppercase letter helps to avoid collisions with macros defined by Latex packages, and future styles needed by `scribble/base` and `scribble/manual` will start with `S`.

For example, a Scribble document

```
#lang scribble/manual
```

```

@(\require scribble/core
   scribble/html-properties
   scribble/latex-properties)

(define inbox-style
  (make-style "InBox"
    (list (make-css-addition "inbox.css")
          (make-tex-addition "inbox.tex"))))

@title{Quantum Pet}

Do not open: @elem[#:style inbox-style]{Cat}

```

combined with an "inbox.css" that contains

```

.inbox {
  padding: 0.2em;
  border: 1px solid #000000;
}

```

and an "inbox.tex" that contains

```

\newcommand{\InBox}[1]{\fbox{#1}}

```

generates

```

Quantum Pet
Do not open: Cat

```

7.9.2 Configuring Output

The implementation of styles used by libraries depends to some degree on separately configurable parameters, and configuration is also possible by replacing style implementations. Latex output is more configurable in the former way, since a document class determines a set of page-layout and font properties that are used by other commands. The style-replacement kind of configuration corresponds to re-defining Latex macros or overriding CSS class attributes. When `setup-plt` builds PDF documentation, it uses both kinds of configuration to produce a standard layout for PLT Scheme manuals; that is, it selects a particular page layout, and it replaces some `scheme/base` styles.

Two kinds of files implement the two kinds of configuration:

- A *prefix file* determines the DOCTYPE line for HTML output or the documentclass configuration (and perhaps some addition package uses or other configurations) for Latex output.

The default prefix files are "scribble-prefix.html" and "scribble-prefix.tex" in the "scribble" collection.

- A *style file* refines the implementation of styles nused in the document—typically just the “built-in” styles used by `scribble/base`.

The default style files, "scribble-style.css" and "scribble-style.tex" in the "scribble" collection, change no style implementations.

For a given configuration of output, typically a particular prefix file works with a particular style file. Some prefix or style files may be more reusable. For now, reading the default files is the best way to understand how they interact. A prefix and/or style file may also require extra accompanying files; for example, a prefix file for Latex mode may require a corresponding Latex class file. The default prefix and style files require no extra files.

When rendering a document through the `scribble` command-line tool, use flags to select a prefix file, style file, and additional accompanying files:

- Select the prefix file using the `-prefix` flag. (Selecting the prefix file also cancels the default list of accompanying files, if any.)
- Replace the style file using the `-style` flag. Add additional style definitions and re-definitions using the `++style` flag.
- Add additional accompanying files with `-extra`.

When using the `scribble` command-line utility, a document can declare its default style, prefix, and extra files through a `html-defaults` and/or `latex-defaults` style property. In particular, when using the `scribble` command-line tool to generate Latex or PDF a document whose main part is implemented with `#lang scribble/manual`, the result has the standard PLT Scheme manual configuration, because `scribble/manual` associates a `latex-defaults` style property with the exported document. The `scribble/sigplan` language similarly associates a default configuration with an exported document. As libraries imported with `require`, however, `scribble/manual` and `scribble/sigplan` simply implement new styles in a composable way.

Whether or not a document has a default prefix- and style-file configuration through a style property, the defaults can be overridden using `scribble` command-line flags. Furthermore, languages like `scribble/manual` and `scribble/sigplan` add a `html-defaults` and/or `latex-defaults` style property to a main-document part only if it does not already have such a property added through the `#:style` argument of `title`.

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