DrRacket Tools

Version 6.4

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This manual describes portions of DrRacket's functionality that are exposed via Racket APIs to be used with other editors.

Contents

1 Accessing Check Syntax Programmatically

```
(require drracket/check-syntax)
         package: drracket-tool-lib
```

```
(show-content file-or-stx) → (listof vector?)
  file-or-stx : (or/c path-string?
                      (and/c syntax?
                             (λ (x) (path-string? (syntax-source x)))))
```

This procedure composes the other pieces of this library together in a way that can be used for REPL-style experimentation with the results from Check Syntax, as shown in the example below. The list it returns has one vector for each call that would be made to the object in `current-annotations`. Each vector's first element is a symbol naming a method in `syncheck-annotations<%>` and the other elements of the vector are the arguments passed to the method.

This doesn't work as well for use in a real tool, however, because it doesn't account for the callback procedures present in `syncheck:add-arrow/name-dup/pxpy` and `syncheck:add-id-set` and the resulting vectors are probably less convenient to work with than direct method calls for most uses of this library. Nevertheless, it gives a quick feel for the results that can come back from Check Syntax.

See `annotations-mixin` for some example code to use the other parts of this library.

Note that the paths in the example below have been replaced via `make-paths-be-module-paths` in order to make the results be platform independent.

```
> (define (make-paths-be-module-paths x)
    (let loop ([x x])
      (cond
        [(pair? x) (cons (loop (car x)) (loop (cdr x)))]
        [(vector? x) (for/vector ([x (in-vector x)])
                       (loop x))]
        [(path? x) (path->relative-string/library x)]
        [else x])))

> (let ([example-module
         '(module m racket (λ (x) x))])
    (make-paths-be-module-paths
     (show-content
      (read-syntax
       (build-path (current-directory) "dummy-file.rkt")
       (open-input-string (format "~s" example-module))))))
'(#(syncheck:add-require-open-menu 10 16 "<collects>/racket/main.rkt")
  #(syncheck:add-tail-arrow 17 26)
```

```
  #(syncheck:add-background-color 1 7 "palegreen")
  #(syncheck:add-docs-menu
    1
    7
    module
    "View documentation for module from racket/base, racket"
    "<doc>/reference/module.html"
    (form ('#%kernel module))
    "(form._((quote._~23~25kernel)._module))")
  #(syncheck:add-background-color 20 21 "palegreen")
  #(syncheck:add-docs-menu
    20
    21
    λ
    "View documentation for λ from racket/base, racket"
    "<doc>/reference/lambda.html"
    (form ((lib "racket/private/base.rkt") λ))
    "(form._((lib._racket/private/base..rkt)._~ce~bb))")
  #(syncheck:add-jump-to-definition
    20
    21
    new-λ
    "<collects>/racket/private/kw.rkt"
    ())
  #(syncheck:add-mouse-over-status 20 21 "binding λ imported from
racket")
  #(syncheck:add-arrow/name-dup/pxpy
    10
    16
    0.5
    0.5
    20
    21
    0.5
    0.5
    #t
    0
    #t
    #<procedure:name-dup?>)
  #(syncheck:add-background-color 20 21 "palegreen")
  #(syncheck:add-docs-menu
    20
    21
    λ
    "View documentation for λ from racket/base, racket"
    "<doc>/reference/lambda.html"
```

```
    (form ((lib "racket/private/base.rkt") λ))
    "(form._((lib._racket/private/base..rkt)._~ce~bb))")
  #(syncheck:add-jump-to-definition
    20
    21
    new-λ
    "<collects>/racket/private/kw.rkt"
    ())
  #(syncheck:add-mouse-over-status 20 21 "binding λ imported from
racket")
  #(syncheck:add-arrow/name-dup/pxpy
    10
    16
    0.5
    0.5
    20
    21
    0.5
    0.5
    #t
    0
    #t
    #<procedure:name-dup?>)
  #(syncheck:add-arrow/name-dup/pxpy
    23
    24
    0.5
    0.5
    26
    27
    0.5
    0.5
    #t
    0
    #f
    #<procedure:name-dup?>)
  #(syncheck:add-mouse-over-status 10 16 "1 bound occurrence")
  #(syncheck:add-mouse-over-status 23 24 "1 bound occurrence"))
```

```
                                  (->* (syntax?)
(make-traversal namespace path) →       ((-> any/c void?))
                                       void?)
                                  (-> void?)

  namespace : namespace?
  path : (or/c #f path-string?)
```

This function creates some local state about a traversal of syntax objects and returns two functions. The first one should be called with each of the (fully expanded) syntax objects that make up a program (there will be only one if the program is a module) and then the second one should be called to indicate there are no more.

The optional argument to the first function is ignored. It is left there for historical reasons. In the past it was called for each sequence of binding identifiers encountered in `define-values`, `define-syntaxes`, and `define-values-for-syntax`.

During the dynamic extent of the call to the two result functions, the value of the `current-annotations` parameter is consulted and various methods are invoked in the corresponding object (if any), to indicate what has been found in the syntax object. These methods will only be called if the syntax objects have source locations.

```
(current-annotations)
 → (or/c #f (is-a?/c syncheck-annotations<%>))
(current-annotations ca) → void?
  ca : (or/c #f (is-a?/c syncheck-annotations<%>))
```

The methods of the value of this parameter are invoked by the functions returned from `make-traversal`.

```
(current-max-to-send-at-once)
 → (or/c +inf.0 (and/c exact-integer? (>=/c 2)))
(current-max-to-send-at-once m) → void?
  m : (or/c +inf.0 (and/c exact-integer? (>=/c 2)))
```

No longer used.

```
syncheck-annotations<%> : interface?
```

Classes implementing this interface are accceptors of information about a traversal of syntax objects. See `make-traversal`.

Do not implement this interface directly, as it is liable to change without warning. Instead, use the `annotations-mixin` and override the methods you're interested in. The `annotations-mixin` will keep in sync with this interface, providing methods that ignore their arguments.

```
(send a-syncheck-annotations syncheck:find-source-
object stx)
 → (or/c #f (not/c #f))
  stx : syntax?
```

This should return `#f` if the source of this syntax object is uninteresting for annotations (if, for example, the only interesting annotations are those in the

original file and this is a syntax object introduced by a macro and thus has a source location from some other file).

Otherwise, it should return some (non-`#f`) value that will then be passed to one of the other methods below as a *source-obj* argument.

```
(send a-syncheck-annotations syncheck:add-background-color
 source-obj
 start
 end
 color)
→ void?
 source-obj : (not/c #f)
 start : exact-nonnegative-integer?
 end : exact-nonnegative-integer?
 color : string?
```

Called to indicate that the color *color* should be drawn on the background of the given range in the editor, when the mouse moves over it. This method is typically called in conjuction with some other method that provides some other annotation on the source.

```
(send a-syncheck-annotations syncheck:add-require-open-menu
 source-obj
 start
 end
 file)
→ void?
 source-obj : (not/c #f)
 start : exact-nonnegative-integer?
 end : exact-nonnegative-integer?
 file : path-string?
```

Called to indicate that there is a `require` at the location from *start* to *end*, and that it corresponds to *file*. Check Syntax adds a popup menu.

```
(send a-syncheck-annotations syncheck:add-docs-menu
 source-obj
 start
 end
 id
 label
 path
 tag)
→ void?
 source-obj : (not/c #f)
 start : exact-nonnegative-integer?
```

```
 end : exact-nonnegative-integer?
 id : symbol?
 label : any/c
 path : any/c
 tag : any/c
```

Called to indicate that there is something that has documentation between the range *start* and *end*. The documented identifier's name is given by *id* and the docs are found in the html file *path* at the html tag *tag*. The *label* argument describes the binding for use in the menu item (although it may be longer than 200 characters).

```
(send a-syncheck-annotations syncheck:add-id-set
 all-ids
 new-name-interferes?)
→ void?
 all-ids : (listof (list/c (not/c #f)
                           exact-nonnegative-integer?
                           exact-nonnegative-integer?))
 new-name-interferes? : (-> symbol boolean?)
```

This method is no longer called by Check Syntax. It is here for backwards compatibility only. The information it provided must now be synthesized from the information supplied to syncheck:add-arrow/name-dup/pxpy.

```
(send a-syncheck-annotations syncheck:add-arrow
 start-source-obj
 start-left
 start-right
 end-source-obj
 end-left
 end-right
 actual?
 phase-level)
→ void?
 start-source-obj : (not/c #f)
 start-left : exact-nonnegative-integer?
 start-right : exact-nonnegative-integer?
 end-source-obj : (not/c #f)
 end-left : exact-nonnegative-integer?
 end-right : exact-nonnegative-integer?
 actual? : boolean?
 phase-level : (or/c exact-nonnegative-integer? #f)
```

This function is not called directly anymore by Check Syntax. Instead syncheck:add-arrow/name-dup/pxpy is.

This method is invoked by the default implementation of *syncheck:add-arrow/name-dup* in annotations-mixin.

```
(send a-syncheck-annotations syncheck:add-arrow/name-dup
 start-source-obj
 start-left
 start-right
 end-source-obj
 end-left
 end-right
 actual?
 phase-level
 require-arrow?
 name-dup?)
→ void?
 start-source-obj : (not/c #f)
 start-left : exact-nonnegative-integer?
 start-right : exact-nonnegative-integer?
 end-source-obj : (not/c #f)
 end-left : exact-nonnegative-integer?
 end-right : exact-nonnegative-integer?
 actual? : boolean?
 phase-level : (or/c exact-nonnegative-integer? #f)
 require-arrow? : boolean?
 name-dup? : (-> string? boolean?)
```

This function is not called directly anymore by Check Syntax. Instead syncheck:add-arrow/name-dup/pxpy is.

The default implementation of syncheck:add-arrow/name-dup/pxpy discards the *start-px start-py end-px end-py* arguments and calls this method.

```
(send a-syncheck-annotations syncheck:add-arrow/name-dup/pxpy
 start-source-obj
 start-left
 start-right
 start-px
 start-py
 end-source-obj
 end-left
 end-right
 end-px
 end-py
 actual?
 phase-level
 require-arrow?
 name-dup?)
```

```
→ void?
 start-source-obj : (not/c #f)
 start-left : exact-nonnegative-integer?
 start-right : exact-nonnegative-integer?
 start-px : (real-in 0 1)
 start-py : (real-in 0 1)
 end-source-obj : (not/c #f)
 end-left : exact-nonnegative-integer?
 end-right : exact-nonnegative-integer?
 end-px : (real-in 0 1)
 end-py : (real-in 0 1)
 actual? : boolean?
 phase-level : (or/c exact-nonnegative-integer? #f)
 require-arrow? : boolean?
 name-dup? : (-> string? boolean?)
```

Called to indicate that there should be an arrow between the locations described by the first ten arguments. The *start-px* and *start-py* indicate how far along the diagonal between the upper-left coordinate of the editor position *start-left* and the bottom-right of the editor position *start-right* to draw the foot of the arrow. The *end-px* and *end-py* indicate the same things for the head of the arrow.

The *phase-level* argument indicates the phase of the binding and the *actual?* argument indicates if the binding is a real one, or a predicted one from a syntax template (predicted bindings are drawn with question marks in Check Syntax).

The *require-arrow?* argument indicates if this arrow points from an imported identifier to its corresponding `require`.

The *name-dup?* predicate returns `#t` in case that this variable (either the start or end), when replaced with the given string, would shadow some other binding (or otherwise interfere with the binding structure of the program at the time the program was expanded).

```
(send a-syncheck-annotations syncheck:add-tail-arrow
 from-source-obj
 from-pos
 to-source-obj
 to-pos)
→ void?
 from-source-obj : (not/c #f)
 from-pos : exact-nonnegative-integer?
 to-source-obj : (not/c #f)
 to-pos : exact-nonnegative-integer?
```

Called to indicate that there are two expressions, beginning at *from-pos* and *to-pos* that are in tail position with respect to each other.

```
(send a-syncheck-annotations syncheck:add-mouse-over-status
 source-obj
 pos-left
 pos-right
 str)
→ void?
 source-obj : (not/c #f)
 pos-left : exact-nonnegative-integer?
 pos-right : exact-nonnegative-integer?
 str : string?
```

Called to indicate that the message in *str* should be shown when the mouse passes over the given position.

```
(send a-syncheck-annotations syncheck:add-jump-to-definition
 source-obj
 start
 end
 id
 filename
 submods)
→ void?
 source-obj : (not/c #f)
 start : exact-nonnegative-integer?
 end : exact-nonnegative-integer?
 id : any/c
 filename : path-string?
 submods : (listof symbol?)
```

Called to indicate that there is some identifier at the given location (named *id*) that is defined in the *submods* of the file *filename* (where an empty list in *submods* means that the identifier is defined at the top-level module).

```
(send a-syncheck-annotations syncheck:add-definition-target
 source-obj
 start
 finish
 style-name)
→ void?
 source-obj : (not/c #f)
 start : exact-nonnegative-integer?
 finish : exact-nonnegative-integer?
 style-name : any/c
```

```
(send a-syncheck-annotations syncheck:color-range source-obj
                                                  start
                                                  finish
                                                  style-name
                                                  mode)
 → void?
  source-obj : (not/c #f)
  start : exact-nonnegative-integer?
  finish : exact-nonnegative-integer?
  style-name : any/c
  mode : any/c
```

Called to indicate that the given location should be colored according to the style *style-name* when in *mode*. The mode either indicates regular check syntax or is used indicate blame for potential contract violations (and still experimental).

```
(send a-syncheck-annotations syncheck:add-rename-menu
 id
 all-ids
 new-name-interferes?)
→ void?
 id : symbol?
 all-ids : (listof (list/c (not/c #f)
                           exact-nonnegative-integer?
                           exact-nonnegative-integer?))
 new-name-interferes? : (-> symbol boolean?)
```

This method is listed only for backwards compatibility. It is not called by Check Syntax anymore.

```
annotations-mixin : (class? . -> . class?)
  result implements: syncheck-annotations<%>
```

Supplies all of the methods in `syncheck-annotations<%>` with default behavior. Be sure to use this mixin to future-proof your code and then override the methods you're interested in.

By default:

- The `syncheck:find-source-object` method ignores its arguments and returns `#f`;
- the `syncheck:add-arrow/name-dup` method drops the *require-arrow?* and *name-dup?* arguments and calls `syncheck:add-arrow`; and
- the `syncheck:add-arrow/name-dup/pxpy` method drops the *from-px*, *from-py*, *to-px*, and *to-py* arguments and calls `syncheck:add-arrow/name-dup`; and

- all of the other methods ignore their arguments and return `(void)`.

Here is an example showing how use this library to extract all of the arrows that Check Syntax would draw from various expressions. One subtle point: arrows are only included when the corresponding identifiers are `syntax-original?`; the code below manages this by copying the properties from an identifier that is `syntax-original?` in the call to `datum->syntax`.

```
> (define arrows-collector%
    (class (annotations-mixin object%)
      (super-new)
      (define/override (syncheck:find-source-object stx)
        stx)
      (define/override (syncheck:add-arrow/name-dup/pxpy
                        start-source-obj start-left start-
right start-px start-py
                        end-source-obj end-left end-right end-
px end-py
                        actual? phase-level require-arrow? name-
dup?)
        (set! arrows
              (cons (list start-source-obj end-source-obj)
                    arrows)))
      (define arrows '())
      (define/public (get-collected-arrows) arrows)))

> (define (arrows form)
    (define base-namespace (make-base-namespace))
    (define-values (add-syntax done)
      (make-traversal base-namespace #f))
    (define collector (new arrows-collector%))
    (parameterize ([current-annotations collector]
                   [current-namespace base-namespace])
      (add-syntax (expand form))
      (done))
    (send collector get-collected-arrows))

> (define (make-id name pos orig?)
    (datum->syntax
     #f
     name
     (list #f #f #f pos (string-length (symbol->string name)))
     (and orig? #'is-orig)))

> (arrows `(λ (,(make-id 'x 1 #t)) ,(make-id 'x 2 #t)))
'((#<syntax::1 x> #<syntax::2 x>))
```

```
> (arrows `(λ (x) x))
'()
> (arrows `(λ (,(make-id 'x 1 #f)) ,(make-id 'x 2 #t)))
'()
> (arrows `(λ (,(make-id 'x 1 #t)) x))
'()
```

syncheck:find-source-object

Bound to an identifier created with define-local-member-name that is used in syncheck-annotations<%>.

syncheck:add-background-color

Bound to an identifier created with define-local-member-name that is used in syncheck-annotations<%>.

syncheck:add-require-open-menu

Bound to an identifier created with define-local-member-name that is used in syncheck-annotations<%>.

syncheck:add-docs-menu

Bound to an identifier created with define-local-member-name that is used in syncheck-annotations<%>.

syncheck:add-rename-menu

Bound to an identifier created with define-local-member-name that is used in syncheck-annotations<%>.

syncheck:add-arrow

Bound to an identifier created with define-local-member-name that is used in syncheck-annotations<%>.

`syncheck:add-arrow/name-dup`

Bound to an identifier created with `define-local-member-name` that is used in `syncheck-annotations<%>`.

`syncheck:add-arrow/name-dup/pxpy`

Bound to an identifier created with `define-local-member-name` that is used in `syncheck-annotations<%>`.

`syncheck:add-tail-arrow`

Bound to an identifier created with `define-local-member-name` that is used in `syncheck-annotations<%>`.

`syncheck:add-mouse-over-status`

Bound to an identifier created with `define-local-member-name` that is used in `syncheck-annotations<%>`.

`syncheck:add-jump-to-definition`

Bound to an identifier created with `define-local-member-name` that is used in `syncheck-annotations<%>`.

`syncheck:add-id-set`

Bound to an identifier created with `define-local-member-name` that is used in `syncheck-annotations<%>`.

`syncheck:color-range`

Bound to an identifier created with `define-local-member-name` that is used in `syncheck-annotations<%>`.

2 Module Browser

```
(require drracket/module-browser)
```
package: drracket-tool-lib

```
(module-browser path) → void?
  path : path-string?
```

Opens a window containing the module browser for *path*.

3 Module Path Selection

DrRacket provides two APIs for prompting the user to select a module path. One that uses the `racket/gui` library with a dialog box and one, lower-level, for use with another UI that provides just the information needed for completions.

3.1 GUI Module Path Selection

```
(require drracket/get-module-path)
```
package: drracket-tool-lib

```
(get-module-path-from-user
 [#:init init
  #:pref pref
  #:dir? dir?]
  #:current-directory current-directory)
→ (if dir?
      (or/c (listof path?) #f)
      (or/c path? #f))
 init : string? = ""
 pref : (or/c symbol? #f) = #f
 dir? : boolean? = #f
 current-directory : (or/c path-string? #f)
```

Opens a dialog box that facilitates choosing a path in the file system accessible via a module.

The user types a partial require path into the dialog and is shown completions of the require path and which paths they correspond to. (The initial content of the field where the user types is *init*.) Selecting one of the completions causes this function to return with the path of the selected one. If the *dir?* argument is `#t`, then the require path might not be complete, in which case the result is a list of directory paths corresponding to the directories where the partial require paths points. If the result is `#f`, then the user canceled the dialog.

The dialog also has an optional field where the path to some different racket binary than the one currently running. If that is filled in, then the dialog shows completions corresponding to how `require` would behave in that other racket binary. When that text field is edited, the *pref* is used with `preferences:set` and `preferences:get` to record its value so it persists across calls to `get-module-path-from-user`.

3.2 Module Path Selection Completion Computation

```
(require drracket/find-module-path-completions)
```

```
(find-module-path-completions dir)
 → (-> string? (listof (list/c string? path?)))
  dir : path-string?
```

This is the completion computing function for get-module-path-from-user.

The *dir* argument specifies a directory for relative require paths.

The result is a function that closes over some local state that is used to cache information to speed up repeated queries. (This cache should not be used across interactions with the user as it captures details about the current file system's directory and file layout.)

The result function's argument is the string the user has typed and the the result function's result is a new set of completions. Each element of the list corresponds to a completion. The string? portion of each element is the complete require and the path? portion is the path it matches in the filesystem. The get-module-path-from-user function shows the strings to the user and uses the paths to decide how to handle "return" keystrokes (and clicking on the "OK" button). If the path is a directory, then a "return" keystroke with descend into that directory (replacing the place where the user typed with the string portion of that element). If the path is not a directory, then return closes the dialog and returns the path.

Use path->relative-string/library to turn the paths into strings to show the user as potential completions.

```
(find-module-path-completions/explicit-cache
  str
  dir
  #:pkg-dirs-cache pkg-dirs-cache
 [#:alternate-racket alternate-racket])
→ (listof (list/c string? path?))
 str : string?
 dir : path-string?
 pkg-dirs-cache : (box/c (or/c #f pkg-dirs-info/c))
 alternate-racket : (or/c #f
                          path-string?
                          (list/c
                           current-library-collection-links-info/c
                           current-library-collection-paths-info/c
                           pkg-dirs-info/c))
                  = #f
```

This is a version of find-module-path-completions that explicates the *pkg-dirs-cache* argument and supports using a different racket binary (as discussed in get-module-path-from-user).

The *pkg-dirs-cache* argument should initially be (box #f); it is filled in with the cached information and then the filled in box can be used on subsequent calls.

Use alternate-racket-clcl/clcp to get the values for the *alternate-racket* argument in the case that an alternate racket is used. Pass #f for the current racket.

```
(alternate-racket-clcl/clcp alternate-racket
                            pkg-dirs-cache)
 → current-library-collection-links-info/c
   current-library-collection-paths-info/c
   pkg-dirs-info/c
  alternate-racket : path-string?
  pkg-dirs-cache : (box/c (or/c #f pkg-dirs-info/c))
```

Computes the information needed for completions by calling out to the external racket binary *alternate-racket*. Use the same *pkg-dirs-cache* argument as with find-module-path-completions/explicit-cache.

```
current-library-collection-links-info/c : contract?
```

A contract specifying what information used by this library relevant to the current library links.

```
current-library-collection-paths-info/c : contract?
```

A contract specifying what information used by this library relevant to the current library collections.

```
pkg-dirs-info/c : contract?
```

A contract specifying what information used by this library relevant to the pkg directories.