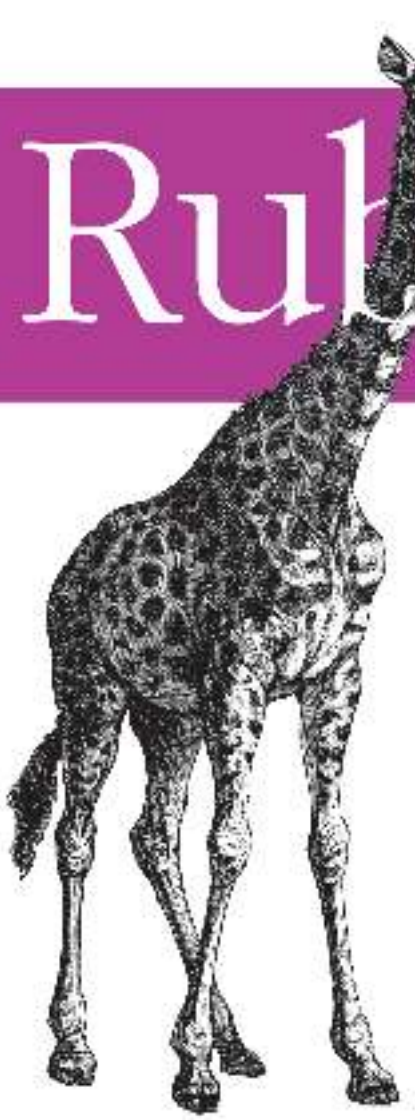
A Quick Guide to Ruby

Ruby

Pocket Reference



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Ruby Pocket Reference

Ruby is an easy language to learn, but in the heat of action, you may forget the name of a method or the correct syntax for a conditional. This handy reference offers brief yet clear explanations of Ruby's core components—from operators to reserved words, from data structures to method syntax—highlighting those key features that you'll likely use every day when coding Ruby.

Organized to help you find what you need quickly, *Ruby Pocket Reference* will not only get you up to speed on how Ruby works, it will also provide you with a handy reference you can use anywhere, anytime.

Inside you'll find essential information on:

- Reserved words, operators, comments, numbers, variables, ranges, and symbols
- Predefined variables, global constants, pseudovariables, and more
- Conditional statements, methods, classes, and modules (mixins)
- Lists of methods from the Object, String, Array, and Hash classes, and the Kernel module
- `sprintf` and time formatting directives
- Interactive Ruby (irb) and RubyGems
- Ruby documentation (RDoc)

If you use Ruby daily and just want the facts—fast—this is the book for you.

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by Michael Fitzgerald

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Ruby Pocket Reference

Ruby is an open source, object-oriented programming language created by Yukihiro "Matz" Matsumoto. First released in Japan in 1995, Ruby has gained worldwide acceptance as an easy-to-learn, powerful, and expressive language, especially since the advent of Ruby on Rails, a web application framework written in Ruby (*http://www.rubyonrails.org*). Ruby's core is written in the C programming language and runs on all major platforms. It is an interpreted rather than compiled language. For more information on Ruby, see *http://www.ruby-lang.org*.

Conventions Used in This Book

The following font conventions are used in this book:

Italic
: Indicates pathnames and filenames (such as program names); Internet addresses, such as domain names and URLs; and emphasized or newly defined terms.

`Constant width`
: Indicates commands and options that should be typed verbatim in a file or in *irb*; or names and keywords in Ruby programs, including method, variable, and class names.

`Constant width italic`
: Indicates user-supplied values.

`Constant width bold`
: Used to draw attention to parts of programs.

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This book is dedicated to John H. Atkinson, Jr. (1934–2007).

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Running Ruby

Test to see whether Ruby is running on your computer by typing the following at a shell or command prompt:

```
ruby --version
```

An affirmative response will look similar to this (this example is for version 1.8.6 running on Mac OS X):

```
ruby 1.8.6 (2007-03-13 patchlevel 0) [powerpc-darwin8.9.0]
```

You can install Ruby on any of the major platforms. For Ruby file archives and installation instructions, see *http://www.ruby-lang.org/en/downloads*.

Running the Ruby Interpreter

Usage:

```
ruby [switches] [--] [program filename] [arguments]
```

Switches (or command-line options):

`-0[octal]`
: Specify a record separator (`\0` if no argument).

`-a`
: Autosplit mode with `-n` or `-p` (splits `$_` into `$F`).

`-c`
: Check syntax only.

`-Cdirectory`
: `cd` to directory before executing your script or program.

`-d`
: Set debugging flags (set predefined variable `$DEBUG` to `true`).

`-e 'command'`
: Execute one line of script. Several `-e`s allowed. Omit [*program filename*].

`-Fpattern`
: `split( )` pattern for autosplit (`-a`).

`-i[extension]`
: Edit `ARGV` files in place (make backup if extension supplied).

`-Idirectory`
: Specify `$LOAD_PATH` (predefined variable) directory; may be used more than once.

`-Kkcode`
: Specify the character set. See Table 16.

`-l`
: Enable line-ending processing.

`-n`
: Assume '`while gets(); ... end`' loop around your script.

`-p`
: Assume loop like `-n` but print line also like `sed`.

`-rlibrary`
: Require the library before executing your script.

`-s`
: Enable some switch parsing for switches after script name.

`-S`
: Look for the script using `PATH` environment variable.

`-T[level]`
: Turn on tainting checks.

`-v`
: Print version number, then turn on verbose mode (compare `--version`).

`-w`
: Turn warnings on for your script or program.

`-W[level]`
: Set warning level: `0`=silence, `1`=medium, and `2`=verbose (default).

`-x[directory]`
: Strip off text before `#!` shebang line, and optionally `cd` to directory.

`--copyright`
: Print the copyright.

`--version`
: Print the version (compare `-v`).

Using a Shebang Line on Unix/Linux

A shebang line may appear on the first line of a Ruby program (or other program or script). Its job is to help a Unix/Linux system execute the commands in the program or script according to a specified interpreter—Ruby, in our case. (This does not work on Windows.) Here is a program named *hi.rb* with a shebang on the first line:

```
#!/usr/bin/env ruby

puts "Hello, Matz!"
```

Other alternative shebang lines are `#!/usr/bin/ruby` or `#!/usr/local/bin/ruby`. With a shebang in place, you can type the filename (followed by Return or Enter) at a shell prompt without invoking the Ruby interpreter directly:

```
$ hi.rb
```

Associating File Types on Windows

Windows doesn't know or care about shebang (`#!`), but you can achieve a similar effect by creating a file type association with the `assoc` and `ftype` commands on Windows (DOS). To find out whether an association exists for the file extension *.rb*, use the `assoc` command:

```
C:\Ruby Code>assoc .rb
File association not found for extension .rb
```

If it's not found, associate the *.rb* extension with a file type:

```
C:\Ruby Code>assoc .rb=rbFile
```

Then test to see whether the association exists:

```
C:\Ruby Code>assoc .rb
.rb=rbFile
```

Now test to see whether the file type for Ruby exists:

```
C:\Ruby Code>ftype rbfile
File type 'rbfile' not found or no open command associated
with it.
```

If not found, you can create it with a command like this:

```
C:\Ruby Code>ftype rbfile="C:\Program Files\Ruby\bin\
ruby.exe" "%1" %*
```

Be sure to put the correct path to the executable for the Ruby interpreter, followed by the substitution variables. `%1` is a substitution variable for the file you want to run, and `%*` accepts all other parameters that may appear on the command line. Test it:

```
C:\Ruby Code>ftype rbfile
rbfile="C:\Program Files\Ruby\bin\ruby.exe" "%1" %*
```

Finally, add *.rb* to the `PATHEXT` environment variable. See whether it is there already with `set`:

```
C:\Ruby Code>set PATHEXT
PATHEXT=.COM;.EXE;.BAT;.CMD;.VBS;.VBE;.JS;.JSE;.WSF;.WSH;
.tcl
```

If it is not there, add it like this:

```
C:\Ruby Code>set PATHEXT=.rb;%PATHEXT%
```

Then test it again:

```
C:\Ruby Code>set PATHEXT
PATHEXT=.rb;.COM;.EXE;.BAT;.CMD;.VBS;.VBE;.JS;.JSE;.WSF;
.WSH;.tcl
```

All is now in order:

```
C:\Ruby Code>type hi.rb
#!/usr/bin/env ruby

puts "Hello, Matz!"
```

Make sure you are able to execute the file:

```
C:\Ruby Code>cacls hi.rb /g username:f
Are you sure (Y/N)?y
processed file: C:\Ruby Code\hi.rb
```

Run the program by entering the program's file name at the command prompt, with or without the file extension:

```
C:\Ruby Code>hi
Hello, Matz!
```

To preserve these settings, you may add these commands to your *autoexec.bat* file, or set the environment variables by selecting Star → Control Panel → System, clicking on the Advanced tab, and then clicking the Environment Variables button.

Reserved Words

Table 1 lists Ruby's reserved words or keywords.

Table 1. Ruby's reserved words

Reserved word	Description
`BEGIN`	Code, enclosed in { }, to run before the program runs.
`END`	Code, enclosed in { }, to run when the program ends.
`alias`	Creates an alias for an existing method, operator, or global variable.
`and`	Logical operator; same as && except `and` has lower precedence.
`begin`	Begins a code block or group of statements; closes with `end`.
`break`	Terminates a `while` or `until` loop, or a method inside a block.
`case`	Compares an expression with a matching `when` clause; closes with `end`. See `when`.
`class`	Defines a class; closes with `end`.
`def`	Defines a method; closes with `end`.
`defined?`	A special operator that determines whether a variable, method, super method, or block exists.
`do`	Begins a block, and executes code in that block; closes with `end`.
`else`	Executes following code if previous conditional is not true, set with `if`, `elsif`, `unless`, or `case`. See `if`, `elsif`.
`elsif`	Executes following code if previous conditional is not true, set with `if` or `elsif`.
`end`	Ends a code block (group of statements) started with `begin`, `class`, `def`, `do`, `if`, etc.

Table 1. Ruby's reserved words (continued)

Reserved word	Description
`ensure`	Always executes at block termination; use after last rescue.
`false`	Logical or Boolean `false`; instance of `FalseClass`; a pseudovariable. See `true`.
`for`	Begins a `for` loop; used with `in`.
`if`	Executes code block if conditional statement is true. Closes with `end`. Compare `unless`, `until`.
`in`	Used with `for` loop. See `for`.
`module`	Defines a module; closes with `end`.
`next`	Jumps to the point immediately before the evaluation of the loop's conditional. Compare `redo`.
`nil`	Empty, uninitialized, or invalid; always false, but not the same as zero; object of `NilClass`; a pseudovariable.
`not`	Logical operator; same as `!`.
`or`	Logical operator; same as `||` except or has lower precedence.
`redo`	Jumps after a loop's conditional. Compare `next`.
`rescue`	Evaluates an expression after an exception is raised; used before `ensure`.
`retry`	When called outside of `rescue`, repeats a method call; inside `rescue`, jumps to top of block (`begin`).
`return`	Returns a value from a method or block. May be omitted, but method or block always return a value, whether it is explicit or not.
`self`	Current object (receiver invoked by a method); a pseudovariable.
`super`	Calls method of the same name in the superclass. The *superclass* is the parent of this class.
`then`	Separator used with `if`, `unless`, `when`, `case`, and `rescue`. May be omitted, unless conditional is all on one line.
`true`	Logical or Boolean `true`; instance of `TrueClass`; a pseudovariable. See `false`.
`undef`	Makes a method undefined in the current class.
`unless`	Executes code block if conditional statement is false. Compare `if`, `until`.

Table 1. Ruby's reserved words (continued)

Reserved word	Description
`until`	Executes code block while conditional statement is `false`. Compare `if`, `unless`.
`when`	Starts a clause (one or more) under `case`.
`while`	Executes code while the conditional statement is true.
`yield`	Executes the block passed to a method.
`__FILE__`	Name of current source file; a pseudovariable.
`__LINE__`	Number of current line in the current source file; a pseudovariable.

Operators

Table 2 lists all of Ruby's operators in descending order of precedence. Operators that are implemented as methods may be overridden and are indicated in the Method column.

Table 2. Ruby's operators

Operator	Description	Method
`::`	Scope resolution	
`[] []=`	Reference, set	✓
`**`	Raise to power (exponentiation)	✓
`+ - ! ~`	Positive (unary), negative (unary), logical negation, complement	✓ (not `!`)
`* / %`	Multiplication, division, modulo (remainder)	✓
`+ -`	Addition, subtraction	✓
`<< >>`	Shift left, shift right	✓
`&`	Bitwise *and*	✓
`| ^`	Bitwise *or*, bitwise exclusive *or*	✓
`> >= < <=`	Greater than, greater than or equal to, less than, less than or equal to	✓
`<=> == === != =~ !~`	Equality comparison (spaceship, equality, equality, not equal to, match, not match	✓ (not `!=` or `!~`)

Table 2. Ruby's operators (continued)

Operator	Description	Method
&&	Logical *and*	
||	Logical *or*	
.. ...	Range inclusive, range exclusive	✓ (not ...)
? :	Ternary	
= += -= *= /= %= **= <<= >>= &= |= ^= &&= ||=	Assignment, abbreviated assignment	
not	Logical negation	
and or	Logical composition	
defined?	Special operator (no precedence)	

Comments

A comment hides a line, part of a line, or several lines from the Ruby interpreter. You can use the hash character (#) at the beginning of a line:

```
# I am a comment. Just ignore me.
```

Or, a comment may be on the same line after a statement or expression:

```
name = "Floydene" # ain't that a name to beat all
```

You can make a comment run over several lines, like this:

```
# This is a comment.
# This is a comment, too.
# This is a comment, too.
# I said that already.
```

Here is another form. This block comment conceals several lines from the interpreter with =begin/=end:

```
=begin
This is a comment.
This is a comment, too.
This is a comment, too.
I said that already.
=end
```

A block can comment out one line or as many lines as you want.

Numbers

Numbers are not primitives; each number is an object, an instance of one of Ruby's numeric classes. `Numeric` is Ruby's base class for numbers. The numeric class `Fixnum` is used for integers, fixed-length numbers with bit lengths of the native machine word, minus 1. The `Float` class is for floating-point numbers, which use the native architecture's double-precision floating-point representation internally. The `Bignum` class is used to hold integers larger than `Fixnum` can hold. `Bignum`s are created automatically if any operation or assignment yields a result too large for `Fixnum`. The only limitation on the size integer `Bignum` can represent is the available memory in the operating system:

```
2411       # integer, of class Fixnum
2_411      # integer, of class Fixnum, underscore ignored
241.1      # float, of class Float
3.7e4      # scientific notation, of class Float
3E4        # scientific notation, of class Float
3E-4       # scientific notation, with sign before
             exponent
0444       # octal, of class Fixnum
0xfff      # hexadecimal, of class Fixnum
0b1101     # binary, of class Fixnum
4567832704 # integer, of class Bignum
```

Figure 1 shows a hierarchy of Ruby's math classes.

Variables

A *variable* is an identifier that is assigned to an object, and that object may hold a value. The type of the value is assigned at runtime. Ruby variables are not declared nor statically typed. Ruby uses *duck typing*, a kind of dynamic typing. If a value behaves or acts like a certain type, such as an integer, Ruby gives it a context, and it is treated in that context.

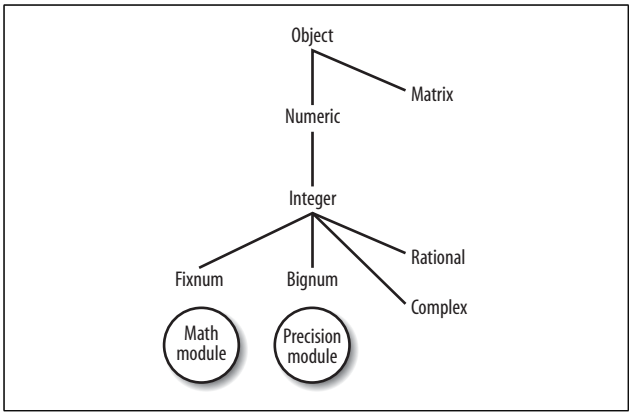

Figure 1. Hierarchy of Ruby math classes

Duck typing comes from the concept that if it walks like a duck, quacks like a duck, flies like a duck, and swims like a duck (or integer or float, etc.), then it is probably a duck. If a variable is able to act like an integer, for example, then it is legal to use it in that context.

Local Variables

A l*ocal variable* has a local scope or context. For example, if a variable is defined inside of a method or a loop, its scope is within the method or loop where it was defined. Local variable names must start with a lowercase letter or with an underscore character (_), such as `alpha` or `_beta`, and cannot be prefixed with a special character (as in `@`, `@@`, or `$`).

Instance Variables

An *instance variable* belongs to a particular instance of a class (hence the name) and can only be accessed from outside that instance via an accessor (or helper) method. Instance variables are always prefixed with a single at sign (`@`), as in `@hello`. See the upcoming section "Classes."

Class Variables

A *class variable* is shared among all instances of a class. Only one copy of a class variable exists for a given class. In Ruby, it is prefixed by two at signs (`@@`), such as `@@times`. You have to initialize (declare a value for) a class variable before you use it. See the upcoming section "Classes."

Global Variables

Global variables are available globally to a program, inside any structure. Their scope is the whole program. They are prefixed by a dollar sign (`$`), such as `$amount`. Matz's opinion on global variables is, and I quote, "They are ugly, so don't use them." I would take his advice. You can use a singleton instead. See the upcoming section "Singletons."

Constants

Constant variable names must begin with a capital letter (`Matz`), and by convention are frequently all capitals (`MATZ`). This makes make them easy to spot. As their name suggests, constants are not expected to change their value after their initial assignment. Because Ruby is a flexible language, there are a couple of notable exceptions to this. First, you can reassign a constant in Ruby, though Ruby will generate a warning if you do, and it's not a good idea. Second, and more importantly, since constants refer to objects, the contents of the object *to which the constant refers* may change without Ruby generating a warning. Thus, Ruby constants are called *mutable*, because, although the constant is only expected to refer to a single object throughout the program, what's contained in that object may vary.

Parallel Assignment of Variables

With parallel assignment, you can assign several values to several variables in a single expression. A list of variables, separated by commas, can be placed to the left of the equals

sign, with the list of values to assign them (in order) on the right. Here is an example:

```
x, y, z = 100, 200, 500
```

You can also assign values of different types:

```
a, b, c = "cash", 1.99, 100
```

Symbols

Ruby has a special object called a *symbol*. Symbols are like placeholders for identifiers and strings; they are always prefixed by a colon (`:`), such as `:en` and `:logos`. Most importantly, *only one copy* of the symbol is held in a single memory address, as long as the program is running. You don't directly create a symbol by assigning a value to one. You create a symbol by calling the `to_sym` or `intern` methods on a string, or by assigning a symbol to a symbol:

```
name = "Brianna"
name.to_sym # => :Brianna
:Brianna.id2name # => "Brianna"
name == :Brianna.id2name # => true
```

Predefined Variables

Table 3 lists all of Ruby's predefined variables.

Table 3. Predefined variables

Predefined variable	Description
`$!`	The exception information message containing the last exception raised. `raise` sets this variable. Access with `=>` in a `rescue` clause.
`$@`	The stack backtrace of the last exception, retrievable via `Exception#backtrace`.
`$&`	The string matched by the last successful pattern match in this scope, or `nil` if the last pattern match failed. Same as `m[0]` where `m` is a `MatchData` object. Read only. Local.

Table 3. Predefined variables (continued)

Predefined variable	Description
`$``	String preceding whatever was matched by the last successful pattern match in the current scope, or `nil` if the last pattern match failed. Same as `m.pre_match` where `m` is a `MatchData` object. Read only. Local.
`$'`	String following whatever was matched by the last successful pattern match in the current scope, or `nil` if the last pattern match failed. Same as `m.post_match` where `m` is a `MatchData` object. Read only. Local.
`$+`	Last bracket matched by the last successful search pattern, or `nil` if the last pattern match failed. Useful if you don't know which of a set of alternative patterns matched. Read only. Local.
`$1, $2...`	Subpattern from the corresponding set of parentheses in the last successful pattern matched, not counting patterns matched in nested blocks that have been exited already, or `nil` if the last pattern match failed. Same as `m[n]` where `m` is a `MatchData` object. Read only. Local.
`$~`	Information about the last match in the current scope. `Regex#match` returns the last match information. Setting this variable affects match variables like `$&`, `$+`, `$1`, `$2`, etc. The *n*th subexpression can be retrieved by `$~[nth]`. Local.
`$=`	Case-insensitive flag; `nil` by default.
`$/`	Input record separator, newline by default. Works like awk's RS variable. If it is set to `nil`, a whole file will be read at once. `gets`, `readline`, etc. take the input record separator as an optional argument.
`$\`	Output record separator for print and `IO#write`; `nil` by default.
`$,`	Output field separator between arguments; also the default separator for `Array#join`, which allows you to indicate a separator explicitly.
`$;`	The default separator for `String#split`; `nil` by default.
`$.`	The current input line number of the last file that was read. Same as `ARGF.lineno`.

Table 3. Predefined variables (continued)

Predefined variable	Description
`$<`	The virtual concatenation file of the files given by command-line arguments, or standard input (in case no argument file is supplied). `$<.`*`filename`* returns the current filename. Synonym for `ARGF`.
`$>`	Default output for print, `printf`, `$stdout` by default. Synonym for `$defout`.
`$_`	Last input line of string by `gets` or `readline` in the current scope; set to `nil` if `gets` or `readline` meets EOF. Local.
`$0`	Name of the current Ruby program being executed.
`$*`	Command-line arguments given for the script. The options for the Ruby interpreter are already removed.
`$$`	Process number (`process.pid`) of the Ruby program being executed.
`$?`	Exit status of the last executed process.
`$:`	Synonym for `$LOAD_PATH`.
`$"`	Array containing the module names loaded by `require`. Used for prevent `require` from loading modules twice.
`$DEBUG`	True if `-d` or `--debug` switch is set.
`$defout`	Default output for `print`, `printf`; `$stdout` by default. Synonym for `$>`.
`$F`	Receives output from `split` when `-a` specified. Set if `-a` is set along with `-p` and `-n`.
`$FILENAME`	Name of the file currently being read from `ARGF`. Same as `ARGF.`*`filename`* or `$<.`*`filename`*.
`$LOAD_PATH`	Synonym for `$:`.
`$SAFE`	Security level: *0* No checks on externally supplied (tainted) date. Default. *1* Potentially dangerous operations using tainted data are forbidden. *2* Potentially dangerous operations performed on processes and files are forbidden. *3* All newly created objects are considered tainted. *4* Modification of global data is forbidden.