The Ruby Masterclass

Contents:

SECTION 1: Getting Started

- 1. Introduction to Ruby.
- About Dynamically Typed Nature.
- About Interpreted Nature.
- Pure Object Oriented Nature.
- Comparison with C.
- A bit about Ruby vs. Perl vs. Python vs. C++ and their similarities.
- Philosophy.
- introducing ruby-lang.org.
- 2. Installation of the latest version of Ruby on GNU/Linux, Windows and Android:
- Arch / Arch Based systems, Fedora / CentOS / OpenSUSE systems, Debian / Debian based systems.
- Installation of Ruby on Windows based systems with Devkit.
- Running Ruby on Android with Termux.

SECTION 2: Introduction to Standard Output and Interactive Ruby (REPL)

- 1. Printing A simple 'Hello World' to the standard output with `puts` method.
- 2. Introducing the `p` method.
- 3. Introducing the `print` and `printf` and `sprintf` method in short.
- 4. Introduction to basic loops: times and while loop.

SECTION 3: Intro to Open Source Atom Editor

- 1. Customizing the editor.
- 2. Installing atom runner.
- 3. Using Atom runner and atom for convenience.

SECTION 4: Familiarize Yourself with Ruby

- 1. Intro to numbers
- 2. Intro to variables:
 - Intro to = and || = assignment operators.
 - local variables
 - global variables.
- 3. Intro to constants.
- 4. Intro to object methods:
 - the `methods` method.
 - the `class` method.
 - Intro to method chaining.
 - Intro to syntactical sugar / syntactic shorthand.
- 5. Intro to comments:
 - Intro to single line comments.
 - Intro to multi-line comments.
- 6. A brief intro to String objects.

- 7. Intro to the gets method.
- 8. Intro to the tap method on objects.
- 9, Intro to the then method on objects.
- 10. Quiz.

SECTION 5: Basic Arithmetic I

- 1. Intro to Integer class and Float class.
- 2. +, -, *, /, %, ** and other methods of Integer class.
- next`/`succ` methods.
- 4. `odd?`, `even?` methods.
- 5. Integer / Float to String, String to Integer / Float conversion.
- 6. More methods on Float class: truncate, to i, round, next float, ceil, floor, zero?
- 7. The nil? method on objects.
- 8. The object_id methods on objects.
- 9. The is_a?, kind_of and === methods.
- 10. The Spaceship operator (<=>).
- 11. Intro to syntactical sugars / syntactic shorthand.
- 12. Binary, Octal, Hexadecimal literals.
- 13. Quiz: Celsius to Fahrenheit converter.

SECTION 6: Booleans

[We will be using String and Integer / Float class for demonstration.]

- 1. The true, false, and nil objects.
- 2. Equality Operator (==) and Inequality Operator (!=)
- 3. Greater Than Operator (>)
- 4. Lesser Than Operator (<)
- 5. Greater Than Equal (>=)
- 6. Lesser Than Equal (<=)
- 7. Truthiness and falsiness, not and! Operators.
- 8. The Exclusive Or method.
- 9. The respond to? Method.
- 10. Quiz: Guess the outputs!

SECTION 7: Strings I

- 1. Creating strings: ", "", %q(), %Q(), %// syntax.
- 2. String interpolation.
- 3. Escape Characters.
- 4. The * method.
- 5. Using the ==, ===, eql? Methods
- 6. length, size, count methods.
- 7. Using the upcase, downcase, capitalize and swapcase methods.
- 8. The reverse method on a string object.
- 9. String concatenation:
- + and += Operators.
- concat method.
- Shovel operator (<<).

- Efficient practices.
- 10. The empty? Method on a string object.
- 11. Extract character(s) from string using Bracket Syntax [].
- 12. Intro to mutation of string objects.
- 13. The clear and replace methods.
- 14. The slice method with various arguments.
- 15. Introduction to bang methods on string.
- 16. Intro to chomp, chop, strip, Istrip, rstrip and their complementary bang methods.
- 17. Intro to index, rindex methods.
- 18. Intro to squeeze, squeeze! Methods.
- 19. The include? method.
- 20. Quiz: Palindrome in least SLOC.

SECTION 8: Methods I

- 1. Introduction to the def keyword.
- 2. Introduction to the complementary define_method keyword.
- 3. Default Return values.
- 4. Parameters and arguments.
- 5. More on returning booleans.
- 6. Calling a method from another method.
- 7. Challenge: Adding binary numbers in method!
- 8. Challenge: Creating our custom include? Method.

SECTION 9: Conditions, Eager Operators and Short-Circuit Operators

- 1. The if keyword with and without then keyword.
- 2. Intro to statement modifiers.
- 3. Reviewing truthiness and falsiness.
- 4. Intro to if, elsif, and nested if conditions.
- 5. The unless keyword.
- 6. The &&, &, and Operators.
- 7. The ||, |, or Operators.
- 8. Parentheses and Precedence.
- 9. The ternary operator.
- 10. The case statement and intro to basic Range objects.
- 11. The case subsumption operator (===).
- 12. Challenge: Grade Calculator in least SLOC.

SECTION 10: Loops and Iterations - I

- 1. Introduction to times loop.
- 2. Introduction to while loop.
- 3. Introduction to until loop.
- 4. Introduction to for loop.

SECTION 11: Challenge FizzBuzz in the least lines of code.

SECTION 12: Range Objects in Detail

1. Intro to Range objects.

- 2. Alphabetical Ranges.
- 3. Numerical Ranges.
- 4. to_a method.
- 5. The .size method.
- 6. min, max, minmax methods.
- 7. min_by, max_by, minmax_by methods.
- 8. The include? method.
- 9. The cover? method.
- 10. The Kernel.rand / rand method.
- 11. The exclude_end? method.
- 12. Quiz: Converting a Range of Hexadecimal numbers to decimal.
- 13. Quiz: Adding a Range of binary numbers!

SECTION 13: Accessing ruby-doc.org, apidock.com for online documentation. Using ri for accessing offline documentation on Linux, Termux, and Windows.

SECTION 14: Accessing Ruby Interpreters Online.

SECTION 15: Array I

- 1. Intro to Arrays
- 2. Creating Array with Bracket Syntax.
- 3. Creating an Array with Array.new
- 4. Using %w() or %w{} or %w[] syntax.
- 5. The size, length, and count methods.
- 6. Accessing Array Items with Bracket Syntax.
- 7. The index method.
- 8. Finding array elements with the find, and select methods.
- 9. the sort method.
- 10. The reverse method.
- 11. The push, append, concat, += and the Shovel Operator (<<).
- 12. The pop, delete, delete_at methods.
- 13. shift and unshift Methods.
- 14. Accessing array elements with fetch method.
- 15. Using the slice method.
- 16. Overwrite values with the bracket syntax.
- 17. The first, and last methods.
- 18. Equality and Inequality Operators.
- 19. The Spaceship (<=>) operator.
- 20. sort method with <=> operators.
- 21. Quiz.

SECTION 16: Array II

- 1. The uniq and uniq! methods.
- 2. The inject / reduce method for one liners!
- 3. The sum method.
- 4. The clone and dup method.
- 5. The flat map method.

- 6. The clear method.
- 7. The permutation and combination methods.
- 8. The select!, reject, reject!, drop, drop_while Methods
- 9. the find, any?, all? Methods.
- 10. Quiz: Make our custom select method.
- 11. The shuffle, shuffle! Methods.
- 12. The sample method.
- 13. The rotate method.
- 14. The empty? Method.
- 15. The cycle method.
- 16. The each_with_object method
- 17. The compact, and compact! Methods.
- 18. Quiz: Make our custom compact! Method.

SECTION 17: Array III

- 1. the each and for loops.
- 2. The map / collect, map! / collect! method for one liners!
- 3. The take method.
- 4. The freeze method.
- 5. Nested arrays and transpose method.
- 6. Array Union and Intersection.
- 7. Quiz: Create our custom transpose method.
- 8. Unpacking one and multidimensional arrays.
- 9. The partition method.
- 10. The group_by method.

SECTION 18: Symbol

- 1. Intro to Symbol objects.
- 2. Usage of Symbols.
- 3. Converting Symbol objects to String objects and vice versa.
- 4. object_id of Symbols.

SECTION 19: Hash

- 1. Intro to Hash Objects.
- 2. Adding Key and Value pairs with Bracket Syntax: Using various Objects as key-value pair.
- 3. The fetch method on a Hash.
- 4. The store method.
- 5. The merge and merge! methods.
- 6. The clear method.
- 7. The length and empty? methods
- 8. The keys and values methods.
- 9. The each method for iteration.
- 10. The flatten method, and conversion of Hash to Array and vice versa.
- 11. Quiz.
- 12. The sort and sort_by methods.
- 13. The default_proc method on a Hash.
- 14. The select and reject method on a Hash.

SECTION 20: Count the occurrence of words in an Array and return a Hash (Enumerable#tally) with as fewer lines of code as possible.

SECTION 21: Methods II

- 1. Splat Arguments.
- 2. Intro to Blocks.
- 3. The yield keyword.
- 4, Additional arguments in a method with a block.
- 5. Calling blocks with .call(), [], .[](), .===(), and .() methods, and &:method syntax.
- 6. The block_given? method.
- 7. {} vs. do end block.
- 8. aliasing methods the alias keyword.
- 9. The method() method:
 - calling methods with .call method.
 - knowing the owner of a method.
 - Using the arity method.
- 10. Using the instance_method method

SECTION: 22: Procs and Lambdas

- 1. Intro to Procs.
- 2. Quiz.
- 3. Intro to lambdas.
- 4. Lambda vs. Proc.
- 5. The arity method.

SECTION 23: Loops and Iterations II

- 1. while loop.
- 2. until loop.
- 3. for loop.
- 4. each loop.
- 5. times loop.
- 6. step loop.
- 7. upto loop.
- 8. downto loop.
- 9. loop loop.
- 10. Intro to redo, break, next keywords...
- 11. Revising map / inject loop for one-liners.
- 12. Quiz: Creating our own loops.

SECTION 24: Time Object

- 1. Introduction to Time class.
- 2. Instance methods of time objects.
- 3. Adding and subtracting a Time object from another Time object.
- 4. Different formats of time with strftime (string from time)
- 5. The monday?, tuesday?, wednesday?, etc. methods.
- 6. The String Parse Time, Time gem, and its methods.

- 7. Using the Date gem.
- 8. Challenge 1: Time converter.
- 9. Challenge 2:

SECTION 25: Introduction to File IO

- 1. Introduction to Reading text files with File and IO classes.
- 2. Writing to a text file:
- The open method and its arguments from File class.
- Using the write method from File class.
- 3. Reading Linux's /dev/urandom for a custom random generator.
- 4. Using the zero? method from File class.
- 5. Using the exists? method from File class.
- 6. Using readable?, writable?, executable? methods from File class.
- 7. Intro to blockdev?, chardev?, symlink? methods.
- 8. Loading gems into Ruby:
 - The load method.
 - The require relative method.
 - The require method.
 - The Kernel#require method.
- 9. Introduction to the standard library.
- 10. Using the prime gem from the standard library.
- 11. Quiz: Creating an Eratosthenes Generator!
- 12. The gem command.
- 13. Intro to www.rubygems.org

SECTION 26: String II: Regular Expressions (Regexp)

- 1. The include? method.
- 2. The start with? end with? methods.
- 3. Intro to rubular.com.
- 4. The scan method.
- 5. The sub, and gsub methods.
- 6. Class Regexp.
- 7. Challenge: Creating a camelize method.

SECTION 27. STRINGS III

- 1. Intro to the split method.
- 2. Intro to the chars method.
- 3. Intro to the join method.
- 4. Intro to the each char method.
- 5. Intro to the each line method.
- 6. Intro to various here documents.
- 7. The bytesize method.
- 8. The ord and chr methods.
- 9. The pack and unpack methods.
- 10. Challenge: Our custom chars method.

SECTION 28: Using the Internet

- 1. Using the net/http standard library gem.
- 2. Using the open-uri standard library gem.
- 3. Downloading images and music with Ruby.

SECTION 29: Cryptography - String IV

- 1. Using the crypt method for cryptography.
- 2. Breaking Linux encryption by brute force.
- 3. Using Permutation to generate passwords.
- 4. Using the digest gem from the standard library.
- 5. Using the openssl gem from the standard library.
- 6. The Kernel.eval / binding.eval() methods.
- 7. Have I been pawned?

SECTION 30: Generating Random passwords after confirming if they have been leaked or not.

SECTION 31: Classes I

- 1. Intro to classes.
- 2. The class method on every object.
- 3. The superclass and ancestors method.
- 4. The methods method.
- 5. The singleton_methods method.
- 6. Creating a class.
- 7. Review of object_id and the equal? methods.
- 8. Instance methods.
- 9. Getters.
- 10. Setters.
- 11. Shortcuts to getters and setters:
 - attr reader.
 - attr_writer.
 - attr_accessor.
- 13. Adding parameters to instance other methods.
- 14. Intro to self keyword and singleton methods.
- 15. Quiz.

SECTION 32: Modules and Mixins

- 1. Intro to Modules.
- 2. Intro to the Math module.
- 3. Intro to the Scope Resolution Operator (::).
- 4. Inheriting classes.
- 5. Intro to Mixins.
- 6. The include keyword.
- 7. The prepend keyword.
- 8. The extend keyword.
- 9. Intro to the Enumerable module.
- 10. Quiz.

SECTION: 33: Classes II

- 1. Public methods.
- 2. Private methods.
- 3. Protected methods.
- 4. Instance methods and instance variables.
- 5. Using setter and getter in depth.
- 6. Using Struct.
- 7. Revising methods aliasing.
- 8. Unbound Method.
- 9. Quiz.

SECTION 34: Monkey Patching: Classes III

- 1. Introduction to monkey patching.
- 2. Using Monkey patching
- 3. Custom class with monkey patching.
- 4. Using the instance_method, bind, and call methods.
- 5. Other ways to create methods, and call methods.
- 6. Using the send, and method keywords.
- 7. instance eval method.
- 8. Challenge: Defining prev and prev! methods on String class.

SECTION 35: Introduction to Error Handling

- 1. Intro to the begin, rescue, else, ensure keywords.
- 2. Intro to BEGIN, END, exit, exit!, abort, at_exit.
- 3. Intro to the retry keyword.

SECTION 36: Introduction to Refinements

- 1. Intro to the refine keyword.
- 2. Intro to the using keyword with a refined class.
- 3. Refining Array, String and a class.

SECTION 37: Challenge: Enhancing our password generator.

SECTION 38: Challenge: Anagrams from a 100K words open dictionary file.

SECTION 39: Reading and Writing Documentation

- 1. Intro to class method documentation.
- 2. Installation of rdoc.
- 3. Using rdoc to generate own HTML documentation.

SECTION 40: Introduction to benchmarking

- 1. Use the benchmark gem from the standard library.
- 2. Performance comparison between loops.
- 3. Performance comparison: String Concatenation: +=, concat, and << methods.
- 4. Performance comparison: Array concatenation: +, concat, push, append, <<, unshift methods.
- 5. Performance comparison: Array pop, delete_at, shift, methods.
- 6. Benchmarking 3 Array uniq sorts (no algorithm).

- 7. Benchmarking bubblesort, mergesort, and ruby's quicksort.
- 8. Benchmarking method call, lambda call, proc call, stabby lambda call.
- 9. Intro to ObjectSpace.

SECTION 41. Introducing my 'patched-irb' for Students' Convenience.

SECTION 42: Executing Shell commands

- 1. Using back-ticks (``).
- 2. Using %x() or $%x\{\}$ or %x[] syntax.
- 3. Calling the system method.
- 4. Using the open3 gem from the standard library.
- 5. Intro to the shell gem from the standard library.

SECTION 43: Standard Input, Standard Output, Standard Error and ANSI Escape sequences

- 1. Colourize your strings!
- 2. Gradient RGB colours on strings.
- 3. Blinking / underlining texts and many more.
- 4. Replicating the `clear` command with ANSI Escape Sequence!
- 5. Looking at STDIN, STDOUT, STDERR classes.
- 6. Looking at 50 ways to print "Hello World" to the standard output!
- 7. Looking at the Warning module.
- 8. Kernel.warn() vs. Warning.warn().
- 9. Looking at the SimpleDelegator class and patching \$stdout object.
- 10. Intro to 'io/console' gem from the standard library:
- Determining the terminal size.
- Getting single characters from the user with STDIN.getch
- 11. Quiz: Creating a colourful output on a user input with gradient RGB colours.

SECTION 44: Introduction to 2D Game Development

- 1. Intro to Ruby2D.
- 2. Installation of Ruby2D Not a Standard Library Gem.
- 3. Intro to creating Square, Circle, Rectangle, Triangle, Line, Quads Using gradient RGB colours.
- 4. Intro to Images by Using copyleft images.
- 5. Using loops to create thousands of Ruby2D objects and animating them in lesser than 15 lines of code.
- 6. Intro to Fonts (using downloaded open source fonts for our project from the internet)
- 7. Intro to Sound and Music (using copyleft music for our project from the internet)
- 8. Monkey Patching Ruby2D.

SECTION 45: Bonus Challenge: Developing a Colour::Clock.

SECTION 46: Bonus Challenge: Developing a Snake Game in Lesser than 150 LOC!

SECTION 47: Magic Comments.

SECTION 48: A short intro to Various Ruby Interpreters and Performance Comparison [Demonstration Only]

1. A brief intro to RVM.

- 2. Using multiple Ruby Versions with RVM in short.
- 3. Intro to MRuby, Rubinius and Jruby in short.

SECTION 49: Accessing the Course Resources from GitHub

- 1. Intro to GitHub Web.
- 2. Downloading all the resources as a zip file.
- 3. A sample Ruby code to download the course resources recursively to your local storage.

SECTION 50: Conclusion and Congratulation.