

Project II  
Survey of Selected Programming Languages

Hui Chen

Released on March 16, 2016  
Lastly revised on March 16, 2016  
Revision: 191:f68683169e4f

Copyright© 2016. Hui Chen <[huichen@ieee.org](mailto:huichen@ieee.org)> Permission is granted to copy, distribute and/or modify this document under the terms of the GNU Free Documentation License, Version 1.3 or any later version published by the Free Software Foundation. A copy of the license can be found at <http://www.gnu.org/licenses/fdl.html>.

## Contents

### 1 Description

From your past courses, your programming experience, and this course, you have learned and are to learn many programming languages. You should have developed at least two perspectives of programming languages, an imperative style as in Java or C++, and a functional style as in SML. In addition, you should have experienced different programming language syntaxes, different semantics, different idioms, and different programming language tools.

In the 2nd project in the course, while you continue to learning SML, you are exploring two new programming language, Racket and Ruby. You shall compare and contrast features across the three languages, SML, Racket, and Ruby and the programming language you have been mostly programming in, either Java or C++.

The project outcome consists of two major items,

- a written survey of selected programming languages,
- and non-trivial example programs in selected programming languages,

which are discussed as the following two sections.

## 2 Survey of Selected Programming Languages

As the minimum requirement in your survey, you shall explore the following areas of the programming languages, and compare and contrast the areas with the languages using examples written in the programming languages.

- How do you declare variables?
- What are basic data types (integers, floating points, Booleans, etc.)?
- What are basic data structures (lists, tuples, arrays, etc.)?
- How do you define functions/methods and how to you call them?
- When utilizing functions and methods what mechanisms does the language provide for passing data into the function and returning data from the function?
- Are functions “first-class” in the language? If not, does the language provide any mechanism by which you can mimic that behavior?

Note that you must follow the additional requirements below when you prepare your survey report.

- You shall document your survey in a *written report in no less than 4 pages*. The report *must be in* either ACM SIG Proceedings Templates<sup>1</sup> or IEEE Manuscript Templates for Conference Proceedings<sup>2</sup>.
- In your report, you must use code snippets to demonstrate your points, preferably the code snippets from the example programs described in next section.

## 3 Example Programs

You are to implement a non-trivial program satisfying the same set of requirements in two different programming languages, one of which must be one of SML, Racket, and Ruby, and the other of which must be either Java or C++.

Upon approval of the instructor, you can propose a problem of your own to implement the example programs as long as the perceived complexity of the problem for which you are to implement the example programs is similar to the problem below.

The program will allow the user to play blackjack against the computer that serves as the dealer. In the game of Blackjack, players are dealt cards and try to get a hand of cards that scores as close to 21 as possible without going over. Cards are scored as their face values except that Jack, Queen, and King are 10 and Ace is either 1 or 11. Aces are scored as 11 or 1 based on what is better for the player. If counting an ace as 11 keeps the player under 21, it will count as 11, otherwise, it will count as 1. For example, if the player has the cards Queen, Ace, and 9, then their score will be  $10 + 1 + 9 = 20$ .

---

<sup>1</sup>You may find it at <https://www.acm.org/publications/proceedings-template>

<sup>2</sup>You may find it at [http://www.ieee.org/conferences\\_events/conferences/publishing/templates.html](http://www.ieee.org/conferences_events/conferences/publishing/templates.html)

## PROJECT II: SELECTED PROGRAMMING LANGUAGES

---

Your program should start with giving the user who is a player in the game two random cards. The program should then ask whether the user wants to hit, i.e., to receive a new card or to stay, i.e., not to receive a new card. We call this a “step” in this document. The program should repeat the step, i.e., keep asking the user if the user wants to hit or to stay until the user either chooses to stay or gets a score over 21. At each step, the program should display their cards, i.e., the numbers and suits of the cards.

Finally, the program should then print out the numerical score. If the score is 21, you should print “Blackjack!”, if the score is over 21, you should print “Bust!”.

You do not need to provide a way for the user to play multiple games. Nor do you need to support multiple concurrent players to play the game.

When you write the programs, you should consider that you will use them as the “example” programs in your survey.

## 4 Submission

The submission deadline is *April 25, 2016*.

Include the following items in your submission,

- A written report that summarizes the survey of the 4 programming languages in no less than 4 pages and
- and a public code repository containing the code of the example programs of the project.

## 5 Acknowledgment

This project is adopted from a class project written by [Dr. David Walter](#) for the same courses in prior semesters with revision.