CS 220

Problem Set 3

Due: 30 March 2018, 11:59 PM

General Instructions

- If you have consulted references (books, journal articles, online materials, other people), cite them as footnotes to the specific item where you used the resource/s as reference.
- Save your answer sheet as a PDF file. The answer sheet can be made using any word processing program (although preferably, one should use LaTeXto make it if as a practice towards writing technical articles).
- Submission of the problem set answers should be done via e-mail. Attach the PDF file, and write as the subject header of the e-mail: [CS 220] < *Last Name, First Name* > − Problem Set 3. For example, [CS 220] Kapayapaan, Reynaldo - Problem Set 3. Send your answers to jcyap@dcs.upd.edu.ph.
- **You should receive a confirmation e-mail from me stating receipt of your deliverable within 24 hours upon your submission of the problem set**. If you have not received any, forward your previous submission using the same subject header once more.
- If you have any questions regarding an item (EXCEPT the answer and solution) in the problem set, do not hesitate to e-mail me to ask them.

Questions

NOTE: Each item is worth 1 point, for a maximum score of 5 points.

1. Look deeper into λ-calculus (http://www.inf.fu-berlin.de/lehre/WS03/alpi/lambda.pdf would be a good place to start).
   (a) Provide comments based on the following PL property:
      i. Data types
      ii. Syntax Design
      iii. Expressivity
   (b) How would you design a type checking system for λ-calculus?
   (c) How would you handle parameter passing in this case?
2. Look into 1 functional PL apart from (dialects of) LISP and Haskell. Give details as to their efficiency in terms of compilation/interpretation and program execution.
3. Read about Prolog's `cut` pruning mechanism in Chapter 8.1.9 and Gödel's `bar commit`.
   - Discuss how each of the mechanisms performs pruning in the backtrack search tree.
   - List down similarities and differences of the pruning mechanisms.
4. Mercury is considered *the* fastest declarative programming language in the world by many fronts[1]. Research on the language and find out the reasons/evidences behind the claim.
5. Discuss which between functional and declarative programming paradigms has an advantage *for each of the programming language properties discussed prior in class.*

[1] https://www.mercurylang.org/about/motivation.html