CS 220

Problem Set 1

Due: 16 February 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 1. For example, [CS 220] Kapayapaan, Reynaldo - Problem Set 1. 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 8 points.

1. Are pointers primitive or structured types? Justify your answer.

2. Look into power loops and continuations as mentioned in Chapter 2 of R.A. Finkel's book. List and discuss at least 2 advantages and 2 disadvantages of implementing each structure into a programming language.

3. What were the considerations in the conceptualization of the name and macro parameter passing mode?

4. Look into the runtime store organization of the C and Python programming languages. In particular, describe how the mechanisms for code, global variables, call stack and activation records, and memory heaps (together with memory allocation and deallocation) were implemented in each of the aforementioned PL's specifications.

5. Write the grammar of the following PL constructs in BNF[1]:

    (a) A Java class definition header statement
    (b) A Java method call statement

6. Provide operational and denotational semantics definition for the C `do-while` statement.

7. Provide pairings of the characteristics of programming languages in the listed criteria for evaluation that you think are trade-offs of each other (e.g. syntax design-expressivity). For each pairing, give a brief explanation why improving the aspect of one characteristic would be detrimental in observing the other.

8. Give at least 2 characteristics of programming languages outside of the listed criteria that you think would be of importance when evaluating PLs. Give a brief explanation (i.e., around 2-3 sentences) why it would be important to look into the characteristics you have listed in evaluation of languages.

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[1]This item is based on an item from the Chapter 3 Problem Set of the 10th edition of R.W. Sebesta's book.