15-440: Distributed Systems
Problem Solving Assignment 1
School of Computer Science
Carnegie Mellon University, Qatar
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Due date: Sep 22, 2011

1. Applet is a widely used example of mobile code. The user running a browser selects a link to an applet whose code is stored on a web server; the code is downloaded to the browser and runs there. What are the advantages and disadvantages of running a downloaded code locally? Would restricting the exposure of a downloaded code avoid all the disadvantages? Which technique you think would help protecting against mobile code?

2. A server program written in one language (e.g., C++) provides the implementation of a BLOB object that is intended to be accessed by clients that may be written in a different language (e.g., Java). The client and server computers may have different hardware, but all of them are attached to the Internet. Considering this scenario, answer the following:

   o Describe the problems due to each of the five aspects of heterogeneity that need to be solved to make it possible for a client object to invoke a method on the server object.

   o An open distributed system allows the BLOB object to be added and accessed by a variety of client programs. To what extent the needs of openness differ from those of heterogeneity?

3. Read the paper "Lampson's design guidelines"[i], and critique it. Please refer to the section "A note on how to read/critique a research paper" on course webpage (under Assignments link) before reading the paper.

4. This question is regarding a classical paper: "Saltzer's end-to-end argument"[ii]. Provide a concrete example of the dilemma offered by Saltzer's end-to-end argument in the context of the provision of middleware support for distributed applications (you may want to focus on one aspect of providing dependable distributed systems, for example related to fault tolerance or security).

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[i] Lampson's design guidelines : http://dl.acm.org/citation.cfm?id=806614

[ii] Saltzer's end-to-end argument: http://web.mit.edu/Saltzer/www/publications/endtoend/endtoend.pdf