

Homework 10

Due Sunday, 11 May (NO EXCEPTIONS)

Handout 23
CSCI 334: Spring, 2008
24 April

Reading

1. Mitchell, Chapter 13.

Problems

1. (150 points) C# Language Report

This question gives you experience in applying the ideas you have learned in cs334 to a new language.

Partners You may (but are not required to) work with another student on this homework. Please send me email telling me who you will work with if you plan to have a partner (or if you would like help finding one).

If you do work with another student, submit only one copy of the report. Although different parts of the report may be originally written by different people, you are both responsible for reading through and editing the entire document, and for making sure that it feels like a complete and coherent whole.

Scenario You are consulting for a small software company that is considering switching to the C# programming language. Their programmers are currently spending all of their time getting a release out the door, and thus do not have much time to think about new programming languages. You have been hired to look into C#; the hope is that by reading your report their programmers (who already know C++ and Java) can review this new language more quickly.

Since your contract is short-term, the company has requested that you concentrate on the following specific issues:

- C#, like Java, has a type system that is supposed to ensure safety. What sorts of types does C# provide? (You do not need to list every single type available to the programmer; types that are very closely related (e.g., all object types, all integer types, etc.) can be treated as a group.)
- How are these types related by subtyping?
- What kinds of parameter passing does C# support?
- What kinds of genericity does C# support?
- What are the rules for overloading? Specifically, under what conditions can two methods with the same name coexist in the same class? Given specific arguments, how does the system choose which of the available methods is the right one (or decide that none is right)?
- In C++, methods cannot be overridden in subclasses unless they were explicitly declared virtual when defined. In contrast, all methods in Java can be overridden in subclasses unless explicitly declared final. How do inheritance and overriding work in C#?
- C# includes other constructs called properties, delegates, and events. What are they, what are they good for, and how do they compare to constructs in other languages? (Delegates, in particular, seem to act a little like function values, but are they they more like code pointers, closures, or something else entirely?)

- Various features changed or were added in versions 2.0 and 3.0. How important are these changes? (A discussion of every small detail is not necessary— just explain the most significant and their importance.)
- What one other aspect of C# is (in your opinion) most important for the company’s programmers to be aware of?

Fortunately, their programmers have all taken a college course in programming languages, and so you can and should use ideas and vocabulary discussed in cs334.

Requirements Your report should:

- Address all the requested issues.
- Have clear, accurate, and complete answers.
- Use appropriate vocabulary.
- Provide a bibliography of resources consulted.
- Provide example code and/or comparisons with other languages, if doing so would improve clarity.
- Be relatively self-contained (e.g., the report should not assume the reader saw the problem statement or has previous knowledge of C#).
- Have no spelling or grammatical errors.
- Be typed and legible.
- Be your own work (i.e., do not copy text or example code verbatim from other sources, etc.).

Please turn in a **paper copy** of your report no later than the due date.

Resources You may use any reliable general resources on C#, as long as they are documented in your bibliography. A number of C# books covering the language features in varying degrees of detail are available for you to use in the Unix Lab. *These books must stay in the lab.* There is also plenty of very detailed information available online (e.g., from Microsoft directly at <http://msdn.microsoft.com/>— just web search for “C# Language”). I suggest that you look at tutorial-style descriptions of the features of interest as well as the C# Language Specification for some of the specifics.