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Teaching Programming in the Engineering Tripos

Since 1985, the teaching of programming in Engineering has used Pascal as the primary language. Pascal was chosen because of its qualities as a teaching language eg strict syntax and type checking, good support for structured programming and good data structuring facilities. The core teaching activity consists of first and second year "programming classes" in which students read handouts and work through exercises. In the first year these are supported by 8 introductory lectures on general programming and in the second year, where the emphasis is on numerical methods, by 8 lectures on Numerical Analysis. Surrounding this core, there are a number of teaching activities which rely on it to a greater or lesser degree. These include the 1B IDP, the 1B Information Engineering elective, several of the 3rd year computing projects, several of the 3rd and 4th year lecture courses and project work generally.

There are a number of concerns with the current setup that need to be addressed. These are

a) the 1st year programming classes are not entirely satisfactory. Some students find them much too easy and complete them quickly and without learning anything new. Others have no prior knowledge of Pascal programming but nevertheless manage to avoid learning much by copying from others and 'pumping' the demonstrators.

b) the 2nd year classes suffer similar problems, and whilst the students are somewhat indifferent to the 1st year labs, they are more vigorously critical of the 2nd year labs, especially the Michaelmas term exercises.

c) other courses could also be criticised. The 1B Inf Eng elective involves the design of a network monitor unit. This is actually programmed in C but is presented with some difficulty to the students as though it was programmed in Pascal. The 3rd year Software project needs a data abstraction mechanism but since none is defined for Pascal, it has to use a rather primitive and non-standard HP extension.

d) the choice of Pascal as the primary teaching language may no longer be a good choice. In the last ten years, object oriented programming has moved from being a computer science topic to working practice. During the same period, C and its object oriented derivative C++ have come to dominate a large cross section of industrial applications programming. In contrast, Pascal and its main derivative Ada have waned to near insignificance.

e) it is becoming increasingly difficult to find demonstrators for laboratories who have sufficient competance in Pascal.

f) Matlab is widely used for teaching but is never explicitly taught.

Thus, in summary

+ some of our programming courses are looking very 'tired' and need revision

+ Pascal may be criticised as being 'out of date', lacking industrial relevance, lacking support for object oriented programming and being hard to find experienced demonstrator cover for

+ C++ (and possibly other OOP oriented languages such as Java) may better suit the needs of Engineering students. Also, Matlab deserves more explicit exposure to Engineering students

The Computer Coursework Committee is therefore asked to consider two questions:

1) If we embark on significant revision to the 1st and 2nd year programming courses, should Pascal be replaced?

2) If Pascal is to be replaced, what should it be replaced by?

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