PART II

GENERAL INFORMATION

The purpose of this part is to develop an understanding of the issues relating to designing and implementing a programming language. Chapter 4 is a project to implement a very simple language.

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PROJECT

4.1 CLASS

4.1.1 Week 1

The first class day is spent with the usual administrative tasks. The deliverable for the first day is to get personal information from the students and perform what I call "expectation management." Unless your students have significant experience with problem-based learning and other active learning pedagogies, it is important to explain the process. One exercise that you might consider is some form of "ice-breaker" exercise; there are many suggestions on the World Wide Web.

Time and time management are an important aspect of the course. Our counseling center has prepared one-hour lectures on studying issues, including time management. The chapter on PDSP has forms and information, but how to actually develop time plans is best explained by instructors with experience.

The first exercise for the course is the introduction to the specification, Chapter 2. I read the students into the project by telling them that the role I play is that of a liaison with the language development group; I am not here to make decisions or dictate solutions. My job is to guide. There are two deliverables for the first week: (1) a small suite of test programs and (2) the beginnings of the lexicon of compiling.

For active-learning techniques to work, the students must be actively engaged. My experience is that this is doubly threatening to students: (1) they lose their anonymity and (2) they come under active scrutiny during discussion. This second point is the more difficult because in any discussion there are questions and answers that are tossed around. This is called the Socratic method or the Moore method. My experience is that students feel if you ask a follow-up question, then their original answer was wrong. You will have to constantly remind them that the Socratic method is an approach that requires each participant to ask questions and to also answer them.

It is helpful to get the students thinking about the technical vocabulary and the relationships among words. I have found mind-mapping exercises to be helpful.

4.1.2 Week 2

The second week is taken up with understanding how humans process and understand language. Even though SOL is a "formal language," it is a language first and we must develop a vocabulary for describing features of language. This vocabulary is traditionally part of the philosophy of language: linguistics. The key issue is that the students must begin to separate syntax, semantics, and pragmatics and develop formal understanding of the deeper issues.

The deliverable for week two should be the global design of the system. Among the resource texts, one can find a single diagram that shows the components of a compiler and the gross processing. An example is in Pratt and Zelkowitz (1995), Figure 3.2, page 80. At the end of the week, each component should have gross processing requirements developed and data structures named.

4.2 MIND MAPS

4.2.1 The Exercise

Mind maps are the result of free word association. Mind mapping is a graphical technique for exploring the relationships among words. The procedure is simple.

Take a piece of paper (11 × 17 computer paper is excellent). Turn the paper long-side down (landscape mode). Write the word that you want to map in the center. Now, as rapidly as you can, write all the words you can think of that the subject word reminds you of. It doesn't matter what the relationship is—all you care is that the subject word reminds you of the new word. Now, the new word may remind you of another word...go ahead, follow that path. At some point, the original subject word will come back into view, so to speak. Start a new leg using that word.

Continue this process as long as it seems fruitful. After doing this exercise a few times, you will learn when you're done. As untechnical as it sounds, you will run out of new ideas—that point will be obvious to you.

Mind mapping is a "brainstorming" technique.

4.2.2   Why It Works

That this exercise is fruitful is taken as evidence for how human memory functions. Psychologists believe that concepts are related in memory in a network fashion. This means there are many different connections between concepts. When we try to remember something, we search our memory along all the connections that exist among related words. The human brain is quite slow when compared to the modern computer. Nonetheless, this search method can go on without conscious control; this is why you may suddenly remember something long after you gave up consciously searching for the connections.