

Subroutines and Control Abstraction

8.10 Explorations

- 8.58 Research the calling sequence used by SGI compilers when running on the MIPS in 32-bit mode. Compare and contrast to the conventions of Section ©8.2.2. Pay particular attention to the lists of caller- and callee-saves registers, and to the registers used to pass arguments. Speculate as to reasons for the differences.
- 8.59 Research the full range of hardware support for subroutines on the x86, including all variants of `call`. Note that the `leave` instruction is sometimes generated by modern compilers, but others, including `enter`, `pushad`, `popad`, `pushfd`, and `popfd`, usually are not. In addition, the optional argument of `ret` is almost never used, and `push` and `pop` are used sparingly. Discuss the technological trends that have made this machinery obsolete.
- 8.60 As another example of hard-core CISC design, research the subroutine calling conventions of the Digital VAX. Be sure to describe the behavior of the `calls` instruction in detail.
- 8.61 Investigate the concepts of *covariance* and *contravariance* in object-oriented languages. Explain what they have to do with upper and lower bounds (`? extends T` and `? super T`) on Java type parameters.

