In practice, there is one packet switch at each site and the addressing scheme assigns a unique number to each packet switch. Thus, the first part of an address identifies a packet switch and the second part identifies a specific computer attached to the switch. For example, Figure 18.4 shows two-part hierarchical addresses assigned to computers connected to a pair of packet switches.

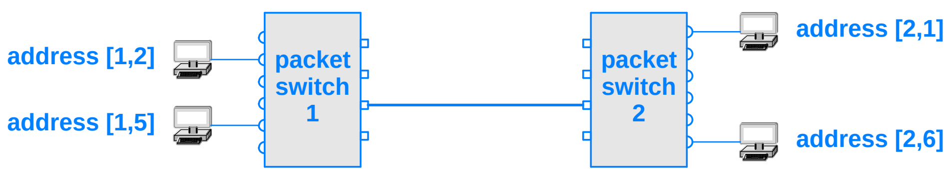

Figure 18.4 Example of an address hierarchy where each address identifies a packet switch and a computer attached to the switch.

The figure shows each address as a pair of decimal integers. For example, a computer connected to port *6* on packet switch *2* is assigned address *[2,6]*. Although we think of the address as a pair of integers, an address is represented as a single binary value, with initial bits of the binary value used to represent a packet switch number and the remaining bits used to identify a computer. In Part IV of the text, we will see that the Internet uses the same scheme: each Internet address consists of a binary number where a prefix of the bits identifies a specific network in the Internet and the remainder of the bits identify a computer attached to the network.

18.7 Next-Hop Forwarding

The importance of hierarchical addressing becomes clear when one considers packet processing. When a packet arrives, a packet switch must choose an outgoing path over which to forward the packet. If a packet is destined for a local computer (i.e., a computer attached to the same switch), the switch sends the packet directly to the destination computer. Otherwise, the packet must be forwarded over one of the connections that leads to another switch. Software in the packet switch uses the destination address in the packet to make the decision. The software extracts the packet switch number from the address. If the extracted value is identical to the packet switch's own ID, the packet is intended for a computer on the local packet switch. Otherwise, the packet is intended for a computer on another packet switch. Algorithm 18.1 explains the computation.

The important idea is that a packet switch does not need to keep complete information about how to reach all possible computers, nor does a switch need to compute the entire route a packet will follow through the network. Instead, a switch bases forward-