

domain classes that might be involved. For example, there would need to be information about a traveler attending a resort for a particular week. The traveler would be assigned to a room along with roommates but might also be connected to other friends. There might be different interests or hobbies a traveler can associate with in the hopes of connecting to others. The resort has many locations where a traveler might be hanging out at any given time, and a traveler can note

## On the Spot Courier Services

On the Spot courier services grew and changed over the years. At first, Bill received requests for package pickups on his mobile phone, recorded that information in a log, and would then drive around to retrieve all the packages later in the day. However, he soon discovered that with another driver, it was difficult to coordinate pickups between the two of them from his van. It was not long before he reorganized his business and turned the warehouse employee into a driver. Then, he stayed in the warehouse himself, and his two employees made all the pickups and deliveries. This worked well because he could control and coordinate

*(continued on page 117)*

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*(continued from page 116)*

the pickups and deliveries better. It was also easier for him to receive pickup requests working at a desk rather than trying to do it while driving a delivery van.

As he thought about how his business was growing and the services he provided to his customers, Bill began to itemize the kinds of information he would need to maintain.

Of course, he needed to maintain information about his customers. Some of his customers were businesses; some were individuals. He needed to have basic address and contact information for every customer. Also, for his corporate customers, he needed to identify a primary contact person. It was mostly his corporate customers who wanted to receive monthly statements listing all their shipments during the month and the total cost. Bill needed to distinguish which customers paid cash and which wanted monthly statements. In fact, for those that paid monthly, he needed to keep a running account of such things as when they were last billed, when they paid, and any outstanding balances. Finally, when payments were received, either for individual shipments or from monthly invoices, he needed to record information about the payment: type of payment, date, and amount. Although this was not a

Once the packages were retrieved, each package needed to be uniquely identified. Bill needed to know when it was picked up and which delivery person picked it up. Other important information was the "deliver to" entity name and the address. He also needed to identify the type of delivery. Some packages were high priority, requiring same-day delivery. Others were overnight. Of course, the weight and cost were recorded so the customer could either pay or have it added to the monthly invoice.

In the courier and delivery business, one of the most important information requirements is the date and time stamp. For each package, it is important to know when it was picked up, when it arrived at the warehouse, when it went back out on the delivery run, and when it was delivered. When possible, it is also important to have names associated with each of these events.

1. Using the noun technique, read through this case and identify all the nouns that may be important for this system. You may also find it helpful to read back through the case descriptions in the previous chapters.

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Next, he started thinking about his packages and shipments. At the time that a request for a pickup came in, he needed to keep track of it as some type of delivery request or delivery order. At that point in time, Bill mostly needed to know who the customer was, where the pickup location was, and what date and time the package(s) would be ready for pickup. He also recorded the date and time that he received the order. A delivery order was considered "open" until the delivery van arrived at the pickup location and the packages were all retrieved. At that point, the delivery order was satisfied.

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2. Once you have identified all the nouns, identify which are classes and which are attributes of these primary classes. Begin constructing a class diagram based on the classes and attributes you have identified.
3. Now that you have identified the classes, determine what the relationships should be among the classes. Add multiplicity constraints, being especially cognizant of zero-to-many versus one-to-many differences.
4. Finalize the class diagram, including all your classes, attributes, primary keys, relationships, and multiplicity constraints.