

**Figure 12.5**

An XML schema file called *company*.

```
<?xml version="1.0" encoding="UTF-8" ?>
<xsd:schema xmlns:xsd="http://www.w3.org/2001/XMLSchema">
  <xsd:annotation>
    <xsd:documentation xml:lang="en">Company Schema (Element Approach) - Prepared by Babak
      Hojabri</xsd:documentation>
  </xsd:annotation>
  <xsd:element name="company">
    <xsd:complexType>
      <xsd:sequence>
        <xsd:element name="department" type="Department" minOccurs="0" maxOccurs="unbounded" />
        <xsd:element name="employee" type="Employee" minOccurs="0" maxOccurs="unbounded">
          <xsd:unique name="dependentNameUnique">
            <xsd:selector xpath="employeeDependent" />
            <xsd:field xpath="dependentName" />
          </xsd:unique>
        </xsd:element>
        <xsd:element name="project" type="Project" minOccurs="0" maxOccurs="unbounded" />
      </xsd:sequence>
    </xsd:complexType>
    <xsd:unique name="departmentNameUnique">
      <xsd:selector xpath="department" />
      <xsd:field xpath="departmentName" />
    </xsd:unique>
    <xsd:unique name="projectNameUnique">
      <xsd:selector xpath="project" />
      <xsd:field xpath="projectName" />
    </xsd:unique>
    <xsd:key name="projectNumberKey">
      <xsd:selector xpath="project" />
      <xsd:field xpath="projectNumber" />
    </xsd:key>
    <xsd:key name="departmentNumberKey">
      <xsd:selector xpath="department" />
      <xsd:field xpath="departmentNumber" />
    </xsd:key>
    <xsd:key name="employeeSSNKey">
      <xsd:selector xpath="employee" />
      <xsd:field xpath="employeeSSN" />
    </xsd:key>
    <xsd:keyref name="departmentManagerSSNKeyRef" refer="employeeSSNKey">
      <xsd:selector xpath="department" />
      <xsd:field xpath="departmentManagerSSN" />
    </xsd:keyref>
    <xsd:keyref name="employeeDepartmentNumberKeyRef"
      refer="departmentNumberKey">
      <xsd:selector xpath="employee" />

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    <xsd:field xpath="employeeDepartmentNumber" />
  </xsd:keyref>
  <xsd:keyref name="employeeSupervisorSSNKeyRef" refer="employeeSSNKey">
    <xsd:selector xpath="employee" />
    <xsd:field xpath="employeeSupervisorSSN" />
  </xsd:keyref>
  <xsd:keyref name="projectDepartmentNumberKeyRef" refer="departmentNumberKey">
    <xsd:selector xpath="project" />
    <xsd:field xpath="projectDepartmentNumber" />
  </xsd:keyref>
  <xsd:keyref name="projectWorkerSSNKeyRef" refer="employeeSSNKey">
    <xsd:selector xpath="project/projectWorker" />
    <xsd:field xpath="SSN" />
  </xsd:keyref>
  <xsd:keyref name="employeeWorksOnProjectNumberKeyRef"
    refer="projectNumberKey">
    <xsd:selector xpath="employee/employeeWorksOn" />
    <xsd:field xpath="projectNumber" />
  </xsd:keyref>
</xsd:element>
<xsd:complexType name="Department">
  <xsd:sequence>
    <xsd:element name="departmentName" type="xsd:string" />
    <xsd:element name="departmentNumber" type="xsd:string" />
    <xsd:element name="departmentManagerSSN" type="xsd:string" />
    <xsd:element name="departmentManagerStartDate" type="xsd:date" />
    <xsd:element name="departmentLocation" type="xsd:string" minOccurs="0" maxOccurs="unbounded" />
  </xsd:sequence>
</xsd:complexType>
<xsd:complexType name="Employee">
  <xsd:sequence>
    <xsd:element name="employeeName" type="Name" />
    <xsd:element name="employeeSSN" type="xsd:string" />
    <xsd:element name="employeeSex" type="xsd:string" />
    <xsd:element name="employeeSalary" type="xsd:unsignedInt" />
    <xsd:element name="employeeBirthDate" type="xsd:date" />
    <xsd:element name="employeeDepartmentNumber" type="xsd:string" />
    <xsd:element name="employeeSupervisorSSN" type="xsd:string" />
    <xsd:element name="employeeAddress" type="Address" />
    <xsd:element name="employeeWorksOn" type="WorksOn" minOccurs="1" maxOccurs="unbounded" />
    <xsd:element name="employeeDependent" type="Dependent" minOccurs="0" maxOccurs="unbounded" />
  </xsd:sequence>
</xsd:complexType>
<xsd:complexType name="Project">
  <xsd:sequence>
    <xsd:element name="projectName" type="xsd:string" />
    <xsd:element name="projectNumber" type="xsd:string" />
    <xsd:element name="projectLocation" type="xsd:string" />

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(continues)

**Figure 12.5 (continued)**

An XML schema called *company*.

```

        <xsd:element name="projectDepartmentNumber" type="xsd:string" />
        <xsd:element name="projectWorker" type="Worker" minOccurs="1" maxOccurs="unbounded" />
    </xsd:sequence>
</xsd:complexType>
<xsd:complexType name="Dependent">
    <xsd:sequence>
        <xsd:element name="dependentName" type="xsd:string" />
        <xsd:element name="dependentSex" type="xsd:string" />
        <xsd:element name="dependentBirthDate" type="xsd:date" />
        <xsd:element name="dependentRelationship" type="xsd:string" />
    </xsd:sequence>
</xsd:complexType>
<xsd:complexType name="Address">
    <xsd:sequence>
        <xsd:element name="number" type="xsd:string" />
        <xsd:element name="street" type="xsd:string" />
        <xsd:element name="city" type="xsd:string" />
        <xsd:element name="state" type="xsd:string" />
    </xsd:sequence>
</xsd:complexType>
<xsd:complexType name="Name">
    <xsd:sequence>
        <xsd:element name="firstName" type="xsd:string" />
        <xsd:element name="middleName" type="xsd:string" />
        <xsd:element name="lastName" type="xsd:string" />
    </xsd:sequence>
</xsd:complexType>
<xsd:complexType name="Worker">
    <xsd:sequence>
        <xsd:element name="SSN" type="xsd:string" />
        <xsd:element name="hours" type="xsd:float" />
    </xsd:sequence>
</xsd:complexType>
<xsd:complexType name="WorksOn">
    <xsd:sequence>
        <xsd:element name="projectNumber" type="xsd:string" />
        <xsd:element name="hours" type="xsd:float" />
    </xsd:sequence>
</xsd:complexType>
</xsd:schema>

```

1. **Schema descriptions and XML namespaces.** It is necessary to identify the specific set of XML schema language elements (tags) being used by specifying a file stored at a Web site location. The second line in Figure 12.5 specifies