

8-1

```
<?xml version="1.0" encoding="UTF-8"?>
2
<bank>
4
  <accounts>
6    <savings_accounts>
      <savings_account id="a1" interest="0.02">
8        <balance>2500</balance>
      </savings_account>
10    <savings_account id="a2" interest="0.03">
      <balance>15075</balance>
12    </savings_account>
    </savings_accounts>
14
    <checking_accounts>
16    <checking_account id="a3">
      <balance>4025</balance>
18    </checking_account>
    <checking_account id="a4">
20    <balance>-325</balance>
    </checking_account>
22    </checking_accounts>
  </accounts>
24
  <customers>
26    <customer id="c1">
      <name>Ben Richardson</name>
28    <address>Park Drive 2</address>
    </customer>
30    <customer id="c2">
      <name>Angel Steady</name>
32    <address>Lake Sight 15</address>
    </customer>
34    </customers>
36
  <customer_accounts>
    <customer_account c_id="c1" ac_id="a1"/>
38    <customer_account c_id="c1" ac_id="a3"/>
    <customer_account c_id="c2" ac_id="a2"/>
40    <customer_account c_id="c2" ac_id="a4"/>
    </customer_accounts>
42
</bank>
```

<!ELEMENT bank	(accounts, customer, customer_accounts)	>
2		
<!ELEMENT accounts	(savings_accounts, checking_accounts)	>
4		
<!ELEMENT savings_accounts	(savings_account)*	>
<!ELEMENT checking_accounts	(checking_account)*	>
6		
<!ELEMENT customers	(customer)*	>
8		
<!ELEMENT customer_accounts	(customer_account)*	>
10		
<!ELEMENT savings_account	(balance)	>
12	<!-- ATTLIST savings_account	
	id ID #REQUIRED	
	interest CDATA	>
14	<!-- ELEMENT checking_account	
	(balance)	>
<!-- ATTLIST checking_account	id ID #REQUIRED	>
16	<!-- ELEMENT balance	
	(#PCDATA)	>
18	<!-- ELEMENT customer	
	(name, address)	>
<!-- ATTLIST customer	id ID #REQUIRED	>
20	<!-- ELEMENT name	
	(#PCDATA)>	
<!-- ELEMENT address	(#PCDATA)>	
22		
<!-- ELEMENT customer_account	EMPTY	>
24	<!-- ATTLIST customer_account	
	c_id ID #REQUIRED	>
	a_id IDREF #REQUIRED	>

8-3

Ausdruck	Ergebnis
1 count(/descendant::*)	7
2 count(/descendant::*/@attribute::*)	6
3 count(/descendant::argument)	2
4 count(/descendant::class)	1
5 count(/descendant::method)	2
6 count(/descendant::method/@attribute::name)	2
7 count(/descendant::description)	1
8 count(/descendant::return)	1
9 count(/descendant::text())	1
10 count(/descendant::method/child::return)	1
11 count(/descendant::method/child::argument)	2
12 count(/descendant::class/child::*)	3
13 count(/descendant::description/child::*)	0
14 /descendant::class/child::*[1]/self::description	{"This class handles input"}
15 /descendant::*/@attribute::name	{"input", "text", "number"}
16 /descendant::*/@attribute::type	{"string", "int", "string"}
17 /descendant::return/@attribute::type	{int}
18 /descendant::argument/@attribute::type	{"string", "string"}
19 boolean(/descendant::class/@attribute::name)	true
20 boolean(/descendant::return/preceding-sibling::argument)	false

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<xs:schema xmlns:xs="http://www.w3.org/2001/XMLSchema">
  <!-- 1: Bank element and its content model -->
  <xs:element name="bank" type="bank_type">
    <xs:key name="ac_id">
      <!-- elements among which the field attribute must be unique -->
      <xs:selector xpath="accounts/savings_accounts/savings_account |
        accounts/checking_accounts/checking_account"/>
      <!-- field (attribute) whose values must be unique -->
      <xs:field xpath="@id"/>
    </xs:key>
    <xs:key name="c_id">
      <xs:selector xpath="customers/customer"/>
      <xs:field xpath="@id"/>
    </xs:key>
    <xs:keyref name="c_ref" refer="c_id">
      <xs:selector xpath="customer_accounts/customer_account"/>
      <xs:field xpath="@c_id"/>
    </xs:keyref>
    <xs:keyref name="ac_ref" refer="ac_id">
      <xs:selector xpath="customer_accounts/customer_account"/>
      <xs:field xpath="@ac_id"/>
    </xs:keyref>
  </xs:element>
  <xs:complexType name="bank_type">
    <xs:sequence>
      <xs:element name="accounts" type="accounts_type"/>
      <xs:element name="customers" type="customers_type"/>
      <xs:element name="customer_accounts" type="customer_accounts_type"/>
    </xs:sequence>
  </xs:complexType>
  <!-- 2: Customers and their content model -->
  <xs:complexType name="customers_type">
    <xs:sequence>
      <xs:element name="customer" type="customer_type"
        minOccurs="0" maxOccurs="unbounded"/>
    </xs:sequence>
  </xs:complexType>
  <xs:complexType name="customer_type">
    <xs:sequence>
      <xs:element name="name" type="xs:string"/>
      <xs:element name="address" type="xs:string"/>
    </xs:sequence>
    <xs:attribute name="id" type="xs:string" use="required"/>
  </xs:complexType>
  <!-- 3: Accounts and their content model -->
  <xs:complexType name="accounts_type">
    <xs:sequence>
      <xs:element name="savings_accounts" type="savings_accounts_type"/>
      <xs:element name="checking_accounts" type="checking_accounts_type"/>
    </xs:sequence>
  </xs:complexType>

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    <xs:complexType name="savings_accounts_type">
      <xs:sequence>
        <xs:element name="savings_account" type="savings_account_type"
          minOccurs="0" maxOccurs="unbounded"/>
      </xs:sequence>
    </xs:complexType>
    <xs:complexType name="checking_accounts_type">
      <xs:sequence>
        <xs:element name="checking_account" type="checking_account_type"
          minOccurs="0" maxOccurs="unbounded"/>
      </xs:sequence>
    </xs:complexType>
    <!-- 3: Accounts and their content model, continued -->
    <xs:complexType name="basic_account_type">
      <xs:sequence>
        <xs:element name="balance" type="balance_type"/>
      </xs:sequence>
      <xs:attribute name="id" type="xs:string" use="required"/>
    </xs:complexType>
    <xs:simpleType name="balance_type">
      <xs:restriction base="xs:decimal">
        <!-- the balance is greater than -5000 -->
        <xs:minExclusive value="-5000"/>
      </xs:restriction>
    </xs:simpleType>
    <xs:complexType name="savings_account_type">
      <xs:complexContent>
        <xs:extension base="basic_account_type">
          <xs:attribute name="interest" type="xs:decimal" use="required"/>
        </xs:extension>
      </xs:complexContent>
    </xs:complexType>
    <xs:complexType name="checking_account_type">
      <xs:complexContent>
        <xs:extension base="basic_account_type">
        </xs:extension>
      </xs:complexContent>
    </xs:complexType>
    <!-- 4: Relationship between customers and accounts -->
    <xs:complexType name="customer_accounts_type">
      <xs:sequence>
        <xs:element name="customer_account" type="customer_account_type"
          minOccurs="0" maxOccurs="unbounded"/>
      </xs:sequence>
    </xs:complexType>
    <xs:complexType name="customer_account_type">
      <xs:attribute name="c_id" type="xs:string" use="required"/>
      <xs:attribute name="ac_id" type="xs:string" use="required"/>
    </xs:complexType>
  </xs:schema>

```