

Attribute versus Element

Public opinion of what each is used for:

Attributes	Elements
Used for holding meta-data (data about data, eg. ID numbers, information irrelevant to the users)	Used for holding data (information user wants to see)
Can only be defined by a datatype	Can be defined by a datatype, attributes, and structures (this makes them more extensible)
Not expandable for future changes (can only change its datatype)	Can add more attributes, change the datatype or change its structure
Cannot have multiple occurrences	Allows for multiple occurrences
Independent of ordering	Dependent on positional ordering

Customer Information element contains 14 attributes identifying information about the customer

The screenshot displays the XML Spy application window titled "XML Spy - [1_CustomerInformation.xsd *]". The main workspace shows the "CustomerInformation" root element with a comment: "Comment describing your root element". Below this, the "Attributes" tab is active, showing a table of 14 attributes. The table columns are Name, Type, Use, Default, and Fixed. The attributes listed are: AccountId (xs:ID, required), FirstName (xs:string, optional), MiddleName (xs:string, optional), LastName (xs:string, optional), OrganizationName (xs:string, optional), StreetAddress (xs:string, required), City (xs:string, required), County (xs:string, optional), CountyFIPSCode (xs:string, optional), State (xs:string, required), StateFIPSCode (xs:string, optional), Country (xs:string, optional), CountryCode (xs:string, optional), and PhoneNumber (xs:string, required).

Name	Type	Use	Default	Fixed
AccountId	xs:ID	required		
FirstName	xs:string	optional		
MiddleName	xs:string	optional		
LastName	xs:string	optional		
OrganizationName	xs:string	optional		
StreetAddress	xs:string	required		
City	xs:string	required		
County	xs:string	optional		
CountyFIPSCode	xs:string	optional		
State	xs:string	required		
StateFIPSCode	xs:string	optional		
Country	xs:string	optional		
CountryCode	xs:string	optional		
PhoneNumber	xs:string	required		

XML Spy v4.4 U Registered to Chad Juettner (private) ©1998-2002 Altova GmbH & Altova, Inc. Desktop 2:30 PM

- Customer information is split into two components
 - Name information
 - Contact information

XML Spy - [2_CustomerInformation.xsd *]

File Edit Project XML DTD/Schema Schema design XSL Document Editor Convert View Browser Soap Tools Window Help

CustomerInformation
Comment describing your root element

NameInformation
Comment describing your root element

ContactInformation
Comment describing your root element

Attributes | Identity constraints

Name	Type	Use	Default	Fixed
Accountid	xs:ID	required		

11_CustomerInformation.xsd 3_CustomerInformation.xsd 1_CustomerInformation.xsd 2_CustomerInformation.xsd

XML Spy v4.4 U Registered to Chad Juettner (private) ©1998-2002 Altova GmbH & Altova, Inc. NUM

Start Desktop 2:34 PM

Name Information contains information about the customer's name

The screenshot displays the XML Spy interface for the file `2_CustomerInformation.xsd`. The main workspace shows a schema diagram where the `CustomerInformation` element is the root, containing two child elements: `NameInformation` and `ContactInformation`. Both child elements have a comment: "Comment describing your root element".

Below the diagram, the "Attributes" tab is active, showing a table of attributes for the selected element:

Name	Type	Use	Default	Fixed
FirstName	xs:string	optional		
MiddleName	xs:string	optional		
LastName	xs:string	optional		
OrganizationName	xs:string	optional		

The status bar at the bottom indicates the application is XML Spy v4.4 U, registered to Chad Juettner (private), ©1998-2002 Altova GmbH & Altova, Inc. The system tray shows the time as 9:05 AM.

Contact Information contains information about the customer's contact information

The screenshot displays the XML Spy interface for the file `2_CustomerInformation.xsd`. The main workspace shows a schema diagram where the root element `CustomerInformation` (commented as "Comment describing your root element") contains two child elements: `NameInformation` (commented as "Comment describing your root element") and `ContactInformation` (commented as "Comment describing your root element").

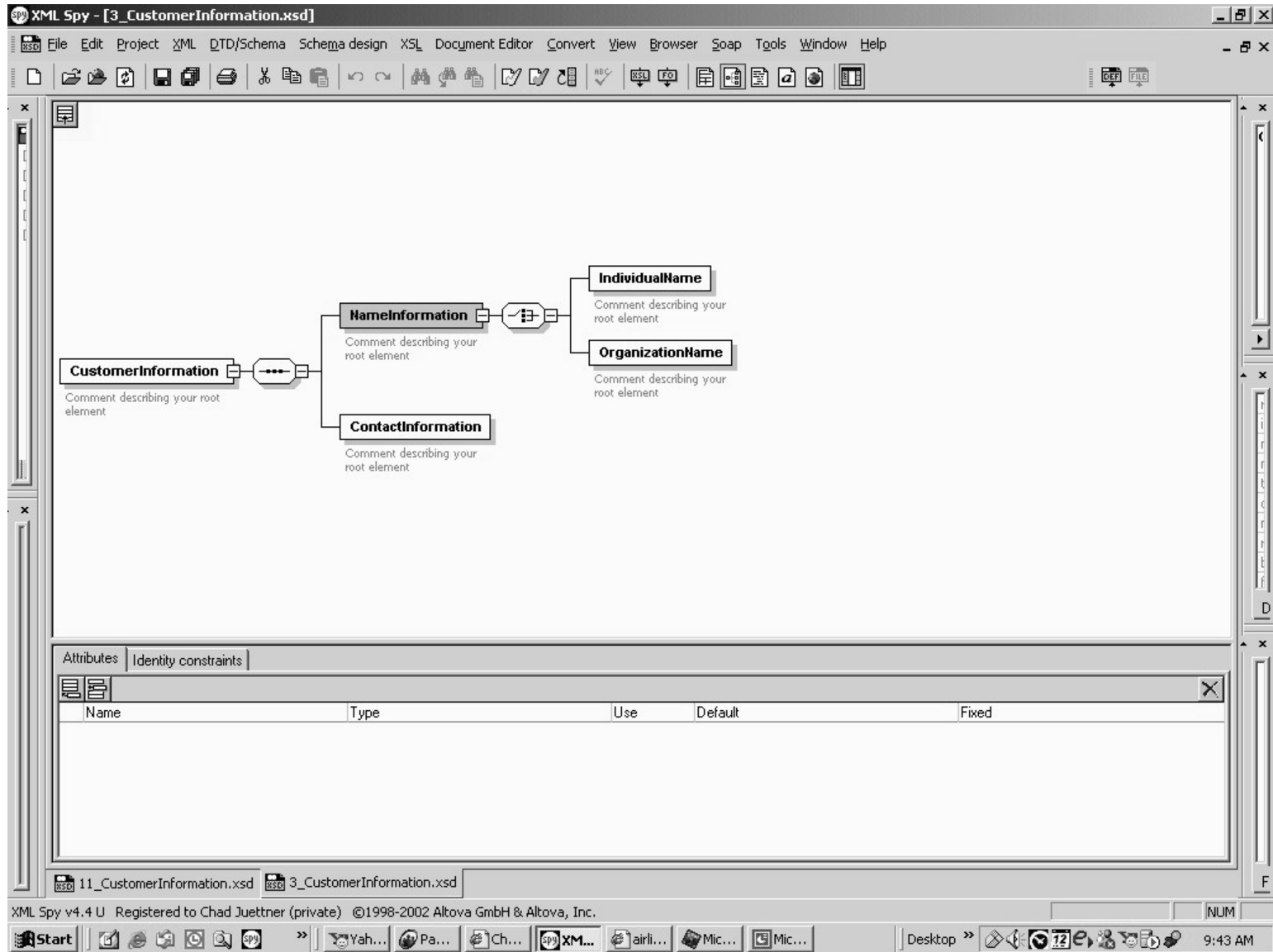
Below the diagram, the "Attributes" tab is active, showing a table of attributes for the selected element:

Name	Type	Use	Default	Fixed
StreetAddress	xs:string	required		
City	xs:string	required		
County	xs:string	optional		
CountyFIPSCode	xs:string	optional		
State	xs:string	required		
StateFIPSCode	xs:string	optional		
Country	xs:string	optional		
CountryCode	xs:string	optional		
PhoneNumber	xs:string	required		

The status bar at the bottom indicates the application is XML Spy v4.4 U, registered to Chad Juettner (private), ©1998-2002 Altova GmbH & Altova, Inc. The system tray shows the time as 9:06 AM.

Name Information is split into two components:

- Individual name
- Organization name



Individual Name contains information for a person.

The screenshot displays the XML Spy interface for the file `3_CustomerInformation.xsd`. The main workspace shows a hierarchical diagram of the XML Schema:

- CustomerInformation**: Comment describing your root element. It contains:
 - NameInformation**: Comment describing your root element. It contains:
 - IndividualName**: Comment describing your root element.
 - OrganizationName**: Comment describing your root element.
 - ContactInformation**: Comment describing your root element.

The 'Attributes' pane at the bottom shows the following table:

Name	Type	Use	Default	Fixed
FirstName	xs:string	required		
MiddleName	xs:string	optional		
LastName	xs:string	required		

The status bar at the bottom indicates the software is XML Spy v4.4 U, registered to Chad Juettner (private), with a copyright notice for 1998-2002 Altova GmbH & Altova, Inc. The system tray shows the date as 12/12 and the time as 9:07 AM.

Organization Name contains information about a company.

The screenshot shows the XML Spy interface with the following components:

- Window Title:** XML Spy - [3_CustomerInformation.xsd *]
- Menu Bar:** File, Edit, Project, XML, DTD/Schema, Schema design, XSL, Document Editor, Convert, View, Browser, Soap, Tools, Window, Help
- Diagram:**
 - CustomerInformation** (Comment describing your root element) contains:
 - NameInformation** (Comment describing your root element) contains:
 - IndividualName** (Comment describing your root element)
 - OrganizationName** (Comment describing your root element) with type `xs:string`
 - ContactInformation** (Comment describing your root element)

- Attributes / Identity constraints:**

Name	Type	Use	Default	Fixed
------	------	-----	---------	-------
- Taskbar:** Start button, system tray with clock (12:49 PM) and a "Take a Feedback Research survey!" notification.

Contact Information needs another street address...

The screenshot shows the XML Spy application window titled "XML Spy - [4_CustomerInformation.xsd *]". The main area displays a diagram of the schema structure. The root element is "CustomerInformation", which contains a "NameInformation" element and a "ContactInformation" element. Both "NameInformation" and "ContactInformation" have a comment: "Comment describing your root element".

Below the diagram, the "Attributes" tab is selected, showing a table of attributes for the "CustomerInformation" element.

Name	Type	Use	Default	Fixed
StreetAddress1	xs:string	required		
StreetAddress2	xs:string	optional		
City	xs:string	required		
County	xs:string	optional		
CountyFIPSCode	xs:string	optional		
State	xs:string	required		
StateFIPSCode	xs:string	optional		
Country	xs:string	optional		
CountryCode	xs:string	optional		
PhoneNumber	xs:string	required		

The status bar at the bottom indicates "XML Spy v4.4 U Registered to Chad Juettner (private) ©1998-2002 Altova GmbH & Altova, Inc." and the system tray shows the time as 9:10 AM.

Making Street Address an element allows an unlimited number of street addresses

The screenshot displays the XML Spy interface for the file `5_CustomerInformation.xsd`. The main workspace shows a graphical representation of the XML Schema. The root element is `CustomerInformation`, which contains two child elements: `NameInformation` and `ContactInformation`. The `ContactInformation` element contains a `StreetAddress` element. The `StreetAddress` element is defined with the type `xs:string` and a cardinality of `1..∞`, indicating that it can occur one or more times. Comments describe each element as 'Comment describing your root element'.

Below the diagram, the 'Attributes' tab is active, showing a table of attributes for the selected `StreetAddress` element.

Name	Type	Use	Default	Fixed
City	xs:string	required		
County	xs:string	optional		
CountyFIPSCode	xs:string	optional		
State	xs:string	required		
StateFIPSCode	xs:string	optional		
Country	xs:string	optional		
CountryCode	xs:string	optional		
PhoneNumber	xs:string	required		

The status bar at the bottom of the window shows the version of XML Spy (v4.4 U), the developer (Chad Juettner), and the copyright information (©1998-2002 Altova GmbH & Altova, Inc.). The system tray at the very bottom shows the Start button, taskbar icons for Yahoo, Pam, Chea, XML, airlin, and Micro, and the system clock showing 9:11 AM on 12/12.

Another field for a phone number is requested:

The screenshot shows the XML Spy interface for the file `6_CustomerInformation.xsd`. The main window displays a schema diagram with the following structure:

- CustomerInformation** (Comment describing your root element) is the root element, containing two child elements: **NameInformation** and **ContactInformation**.
- NameInformation** (Comment describing your root element) is a child of **CustomerInformation**.
- ContactInformation** (Comment describing your root element) is a child of **CustomerInformation** and contains one child element: **StreetAddress**.
- StreetAddress** (Comment describing your root element) has a type of `xs:string` and a cardinality of `1..∞`.

Below the diagram, the 'Attributes' tab is active, showing a table of attributes for the selected element:

Name	Type	Use	Default	Fixed
City	xs:string	required		
County	xs:string	optional		
CountyFIPSCode	xs:string	optional		
State	xs:string	required		
StateFIPSCode	xs:string	optional		
Country	xs:string	optional		
CountryCode	xs:string	optional		
OfficePhoneNumber	xs:string	optional		
CellPhoneNumber	xs:string	optional		

The status bar at the bottom indicates the application is XML Spy v4.4 U, registered to Chad Juettner (private), ©1998-2002 Altova GmbH & Altova, Inc. The system tray shows the time as 9:12 AM.

Another request for a phone number...

The screenshot displays the XML Spy application window for a schema named `7_CustomerInformation.xsd`. The main area shows a diagram of the `CustomerInformation` root element. It is composed of a sequence of `NameInformation` and `ContactInformation` elements. The `ContactInformation` element contains a `StreetAddress` element, which is of type `xs:string` and has a cardinality of `1..∞`. Comments describe each element as 'Comment describing your root element'.

Below the diagram is a table showing the attributes of the `CustomerInformation` element. The table has columns for Name, Type, Use, Default, and Fixed.

Name	Type	Use	Default	Fixed
City	xs:string	required		
County	xs:string	optional		
CountyFIPSCode	xs:string	optional		
State	xs:string	required		
StateFIPSCode	xs:string	optional		
Country	xs:string	optional		
CountryCode	xs:string	optional		
OfficePhoneNumber	xs:string	optional		
CellPhoneNumber	xs:string	optional		
OtherNumberType	xs:string	optional		
OtherNumber	xs:string	optional		

The application title bar reads 'XML Spy - [7_CustomerInformation.xsd *]'. The status bar at the bottom shows 'XML Spy v4.4 U Registered to Chad Juettner (private) ©1998-2002 Altova GmbH & Altova, Inc.' and the system tray shows the time as 9:13 AM.

Adding a Communication Information element allows unlimited numbers (phone, cell, pager, fax, email, etc.)

The screenshot shows XML Spy displaying the schema for `CustomerInformation.xsd`. The diagram illustrates the following structure:

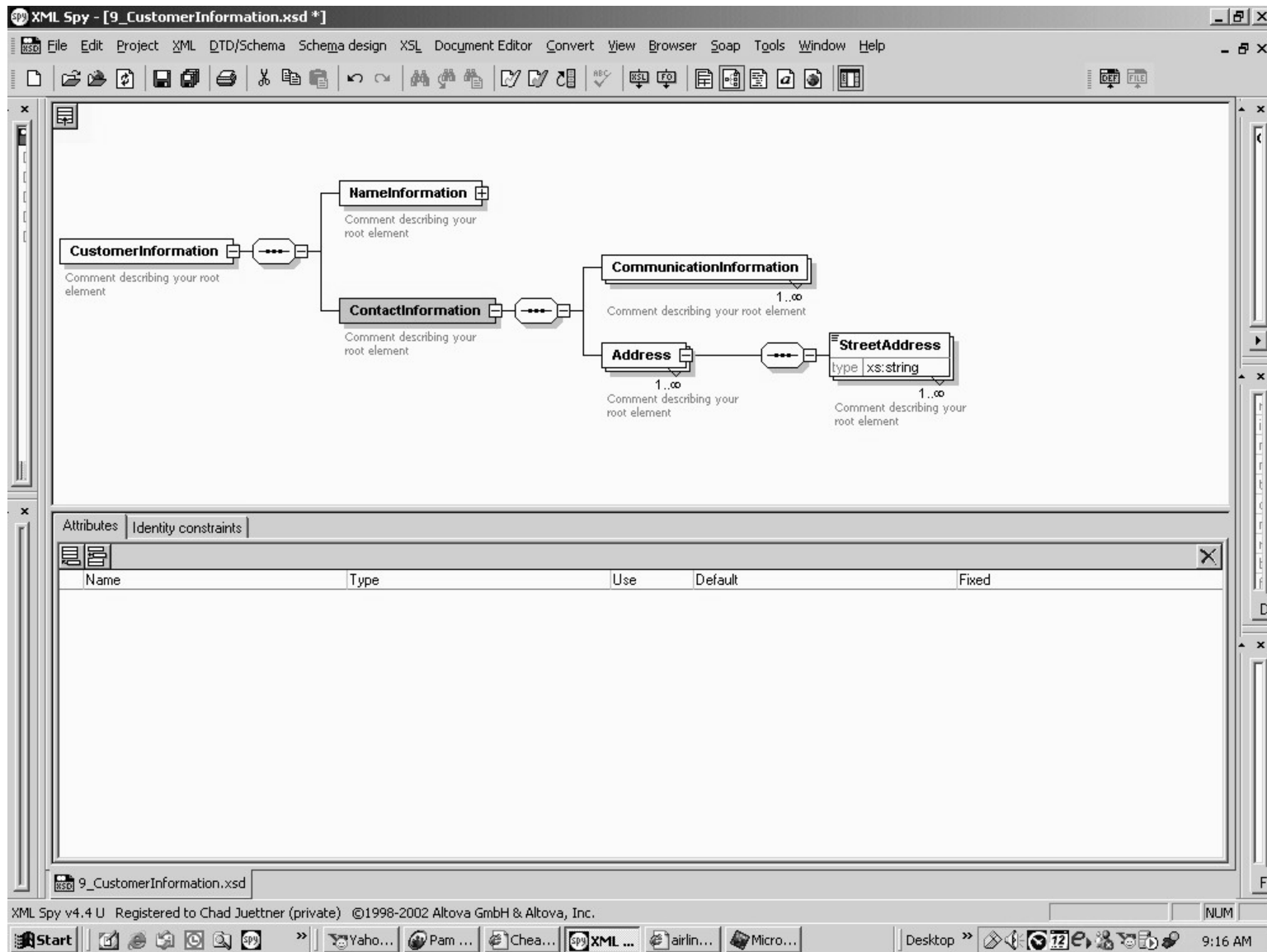
- CustomerInformation** (root element): Contains `NameInformation` and `ContactInformation`.
- NameInformation**: Contains a comment "Comment describing your root element".
- ContactInformation**: Contains `StreetAddress` and `CommunicationInformation`.
- StreetAddress**: Type `xs:string`, cardinality `1..∞`, contains a comment "Comment describing your root element".
- CommunicationInformation**: Cardinality `1..∞`, contains a comment "Comment describing your root element".

The "Attributes" table for the selected element is as follows:

Name	Type	Use	Default	Fixed
City	xs:string	required		
County	xs:string	optional		
CountyFIPSCode	xs:string	optional		
State	xs:string	required		
StateFIPSCode	xs:string	optional		
Country	xs:string	optional		
CountryCode	xs:string	optional		

XML Spy v4.4 U Registered to Chad Juettner (private) ©1998-2002 Altova GmbH & Altova, Inc. 8_CustomerInformation.xsd

Adding an Address element allows unlimited types of addresses



Address (an element) has an attribute (Type) to identify the type of address (mailing, physical, billing, etc.)

The screenshot displays the XML Spy interface for the file `9_CustomerInformation.xsd`. The main window shows a hierarchical schema diagram. The root element is `CustomerInformation`, which contains two child elements: `NameInformation` and `ContactInformation`. `ContactInformation` contains two child elements: `CommunicationInformation` and `Address`. `Address` contains one child element: `StreetAddress`. Each element has a comment describing its role as a root element. Multiplicities are shown as `1..∞` for `CommunicationInformation`, `Address`, and `StreetAddress`. The `StreetAddress` element has an attribute `type` of type `xs:string`.

Below the diagram, the 'Attributes' tab is active, showing a table of attributes for the selected element:

Name	Type	Use	Default	Fixed
Type	xs:string	required		
City	xs:string	required		
County	xs:string	optional		
CountyFIPSCode	xs:string	optional		
State	xs:string	required		
StateFIPSCode	xs:string	optional		
Country	xs:string	optional		
CountryCode	xs:string	optional		

The taskbar at the bottom shows the Windows XP environment with the Start button, taskbar icons for Yahoo, Pam, Chea, XML, airlin, and Micro, and the system tray showing the date and time as 9:16 AM.

Attributes on the Address element are now represented using elements

The screenshot displays the XML Spy interface for the file `10_CustomerInformation.xsd`. The main workspace shows a schema diagram with the following structure:

- CustomerInformation** (1..∞)
 - NameInformation** (1..∞)
 - ContactInformation** (1..∞)
 - CommunicationInformation** (1..∞)
 - Address** (1..∞)
 - StreetAddress** (1..∞)
 - City** (1..∞)
 - County** (1..∞)
 - State** (1..∞)
 - ZipCode** (1..∞)
 - Country** (1..∞)

Each element is represented by a box containing its name, a comment, and its cardinality. The **Address** element box also includes a 'derivedBy' attribute with the value 'extension'. The bottom of the window features a table with the following data:

Name	Type	Use	Default	Fixed
Type	xs:string	required		

The status bar at the bottom indicates the application is XML Spy v4.4 U, registered to Chad Juettner (private), with a copyright notice for 1998-2002 Altova GmbH & Altova, Inc. The system tray shows the time as 9:17 AM.

County is now an element with its FIPSCode as an attribute

The screenshot displays the XML Spy interface for the file `10_CustomerInformation.xsd`. The main workspace shows a schema diagram with the following structure:

- CustomerInformation** (type: xs:string, derivedBy: extension) contains:
 - NameInformation** (type: xs:string, derivedBy: extension)
 - ContactInformation** (type: xs:string, derivedBy: extension) contains:
 - CommunicationInformation** (type: xs:string, derivedBy: extension)
 - Address** (type: xs:string, derivedBy: extension) contains:
 - StreetAddress** (type: xs:string, derivedBy: extension)
 - City** (type: xs:string, derivedBy: extension)
 - County** (type: xs:string, derivedBy: extension) - **Selected**
 - State** (type: xs:string, derivedBy: extension)
 - ZipCode** (type: xs:string, derivedBy: extension)
 - Country** (type: xs:string, derivedBy: extension)

The 'Attributes' pane at the bottom shows the following table:

Name	Type	Use	Default	Fixed
FIPSCode	xs:string	optional		

The status bar at the bottom indicates the application is XML Spy v4.4 U, registered to Chad Juettner (private), with a copyright notice for 1998-2002 Altova GmbH & Altova, Inc. The system tray shows the time as 9:17 AM.

State is now an element with its FIPSCode as an attribute

The screenshot displays the XML Spy interface for the schema file 10_CustomerInformation.xsd. The main workspace shows a tree diagram of the schema elements:

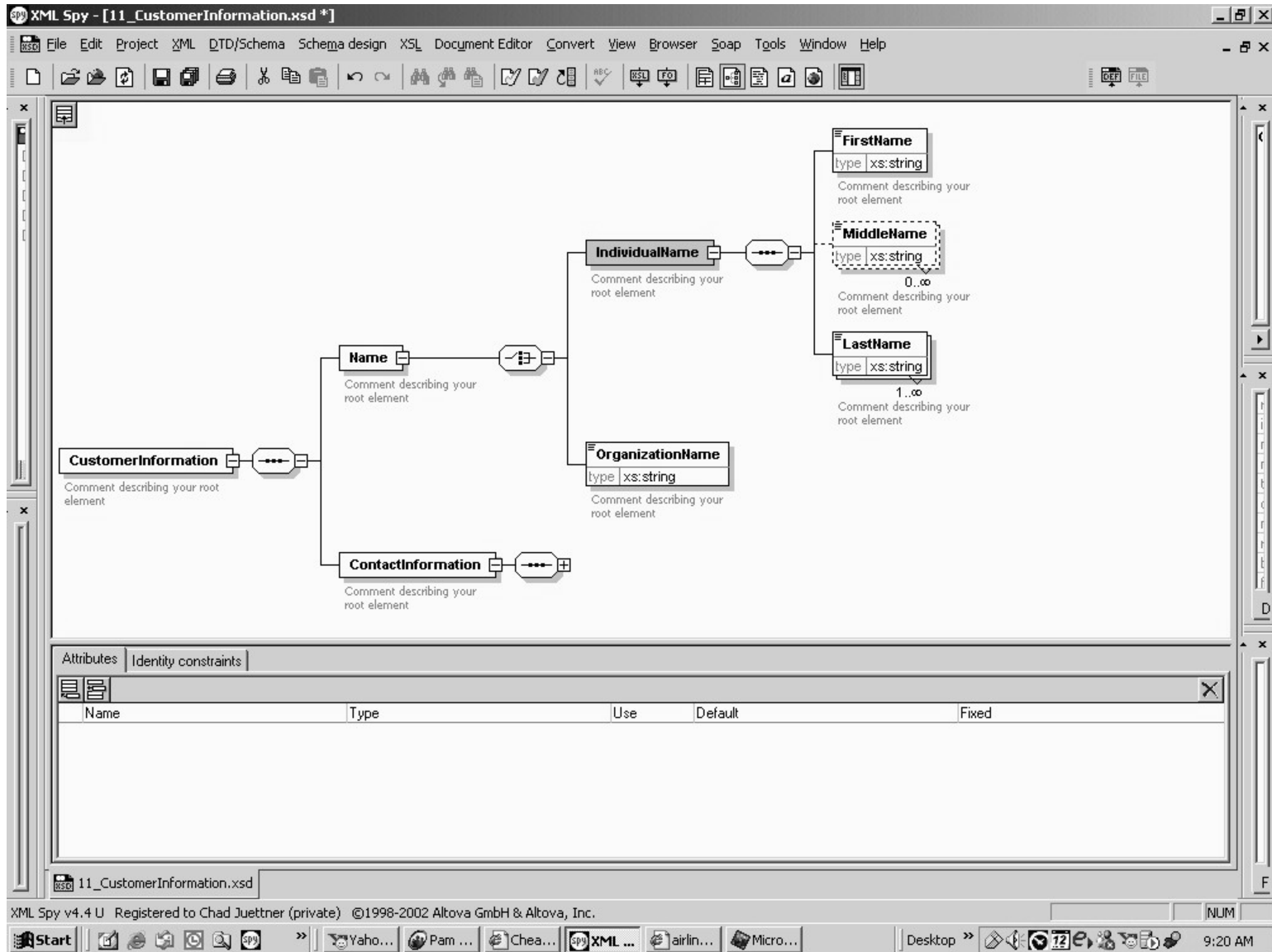
- CustomerInformation** (root element):
 - NameInformation** (1..∞): Comment describing your root element.
 - ContactInformation** (1..∞): Comment describing your root element.
 - CommunicationInformation** (1..∞): Comment describing your root element.
 - Address** (1..∞): Comment describing your root element.
 - StreetAddress** (1..∞): type xs:string, Comment describing your root element.
 - City**: type xs:string.
 - County**: type xs:string, derivedBy extension.
 - State**: type xs:string, derivedBy extension. (Selected)
 - ZipCode**: type xs:string.
 - Country**: type xs:string, derivedBy extension.

The bottom panel shows the attributes of the selected **State** element:

Name	Type	Use	Default	Fixed
FIPSCode	xs:string	optional		

The status bar at the bottom indicates the application is XML Spy v4.4 U, registered to Chad Juettner (private), ©1998-2002 Altova GmbH & Altova, Inc. The system tray shows the time as 9:18 AM.

Attributes on the Individual element are now represented using elements for flexibility in allowing more than one



Communication Information's Type and Value attributes are now elements which can be changed at anytime to allow multiple of each

The screenshot displays the XML Spy interface for the file `11_CustomerInformation.xsd`. The main workspace shows a hierarchical XML Schema diagram:

- CustomerInformation** (root element, 1..∞)
 - Name** (1..∞)
 - ContactInformation** (1..∞)
 - CommunicationInformation** (1..∞)
 - Type** (1..∞)
 - Value** (1..∞)
 - Address** (1..∞)

The 'Attributes' panel at the bottom is currently empty, showing only the column headers: Name, Type, Use, Default, and Fixed.

Started with this...

The screenshot shows the XML Spy v4.4 U interface. The main window displays the schema definition for the `CustomerInformation` root element. The schema is defined as follows:

```
<root>  
  <element name="CustomerInformation" type="CustomerInformation"/>  
</root>  
  
<complexType base="xsd:string" name="CustomerInformation"/>
```

The `CustomerInformation` complex type is defined with the following attributes:

Name	Type	Use	Default	Fixed
AccountId	xs:ID	required		
FirstName	xs:string	optional		
MiddleName	xs:string	optional		
LastName	xs:string	optional		
OrganizationName	xs:string	optional		
StreetAddress	xs:string	required		
City	xs:string	required		
County	xs:string	optional		
CountyFIPSCode	xs:string	optional		
State	xs:string	required		
StateFIPSCode	xs:string	optional		
Country	xs:string	optional		
CountryCode	xs:string	optional		
PhoneNumber	xs:string	required		

The interface also shows the `CustomerInformation` root element in the main editor area, with a comment describing the root element. The status bar at the bottom indicates the software is registered to Chad Juettner (private) and shows the system clock at 2:30 PM.

Ended with this.

