| | [**Overview**](http://docs.google.com/overview-summary.html) | [**Package**](http://docs.google.com/package-summary.html) | **Class** | [**Use**](http://docs.google.com/class-use/AttributesImpl.html) | [**Tree**](http://docs.google.com/package-tree.html) | [**Deprecated**](http://docs.google.com/deprecated-list.html) | [**Index**](http://docs.google.com/index-files/index-1.html) | [**Help**](http://docs.google.com/help-doc.html) | | --- | --- | --- | --- | --- | --- | --- | --- | | | ***Java™ Platform***  ***Standard Ed. 6*** |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| [**PREV CLASS**](http://docs.google.com/org/xml/sax/helpers/AttributeListImpl.html)   [**NEXT CLASS**](http://docs.google.com/org/xml/sax/helpers/DefaultHandler.html) | [**FRAMES**](http://docs.google.com/index.html?org/xml/sax/helpers/AttributesImpl.html)    [**NO FRAMES**](http://docs.google.com/AttributesImpl.html)     [**All Classes**](http://docs.google.com/allclasses-noframe.html) |
| SUMMARY: NESTED | FIELD | [CONSTR](#3znysh7) | [METHOD](#2et92p0) | DETAIL: FIELD | [CONSTR](#3dy6vkm) | [METHOD](#2s8eyo1) |

## **org.xml.sax.helpers**

Class AttributesImpl

[java.lang.Object](http://docs.google.com/java/lang/Object.html)  
 **org.xml.sax.helpers.AttributesImpl**

**All Implemented Interfaces:** [Attributes](http://docs.google.com/org/xml/sax/Attributes.html) **Direct Known Subclasses:** [Attributes2Impl](http://docs.google.com/org/xml/sax/ext/Attributes2Impl.html)

public class **AttributesImpl**extends [Object](http://docs.google.com/java/lang/Object.html)implements [Attributes](http://docs.google.com/org/xml/sax/Attributes.html)

Default implementation of the Attributes interface.

*This module, both source code and documentation, is in the Public Domain, and comes with* ***NO WARRANTY****.* See <http://www.saxproject.org> for further information.

This class provides a default implementation of the SAX2 [Attributes](http://docs.google.com/org/xml/sax/Attributes.html) interface, with the addition of manipulators so that the list can be modified or reused.

There are two typical uses of this class:

1. to take a persistent snapshot of an Attributes object in a [startElement](http://docs.google.com/org/xml/sax/ContentHandler.html#startElement(java.lang.String,%20java.lang.String,%20java.lang.String,%20org.xml.sax.Attributes)) event; or
2. to construct or modify an Attributes object in a SAX2 driver or filter.

This class replaces the now-deprecated SAX1 [AttributeListImpl](http://docs.google.com/org/xml/sax/helpers/AttributeListImpl.html) class; in addition to supporting the updated Attributes interface rather than the deprecated [AttributeList](http://docs.google.com/org/xml/sax/AttributeList.html) interface, it also includes a much more efficient implementation using a single array rather than a set of Vectors.

**Since:** SAX 2.0

| **Constructor Summary** | |
| --- | --- |
| [**AttributesImpl**](http://docs.google.com/org/xml/sax/helpers/AttributesImpl.html#AttributesImpl())()            Construct a new, empty AttributesImpl object. |
| [**AttributesImpl**](http://docs.google.com/org/xml/sax/helpers/AttributesImpl.html#AttributesImpl(org.xml.sax.Attributes))([Attributes](http://docs.google.com/org/xml/sax/Attributes.html) atts)            Copy an existing Attributes object. |

| **Method Summary** | |
| --- | --- |
| void | [**addAttribute**](http://docs.google.com/org/xml/sax/helpers/AttributesImpl.html#addAttribute(java.lang.String,%20java.lang.String,%20java.lang.String,%20java.lang.String,%20java.lang.String))([String](http://docs.google.com/java/lang/String.html) uri, [String](http://docs.google.com/java/lang/String.html) localName, [String](http://docs.google.com/java/lang/String.html) qName, [String](http://docs.google.com/java/lang/String.html) type, [String](http://docs.google.com/java/lang/String.html) value)            Add an attribute to the end of the list. |
| void | [**clear**](http://docs.google.com/org/xml/sax/helpers/AttributesImpl.html#clear())()            Clear the attribute list for reuse. |
| int | [**getIndex**](http://docs.google.com/org/xml/sax/helpers/AttributesImpl.html#getIndex(java.lang.String))([String](http://docs.google.com/java/lang/String.html) qName)            Look up an attribute's index by qualified (prefixed) name. |
| int | [**getIndex**](http://docs.google.com/org/xml/sax/helpers/AttributesImpl.html#getIndex(java.lang.String,%20java.lang.String))([String](http://docs.google.com/java/lang/String.html) uri, [String](http://docs.google.com/java/lang/String.html) localName)            Look up an attribute's index by Namespace name. |
| int | [**getLength**](http://docs.google.com/org/xml/sax/helpers/AttributesImpl.html#getLength())()            Return the number of attributes in the list. |
| [String](http://docs.google.com/java/lang/String.html) | [**getLocalName**](http://docs.google.com/org/xml/sax/helpers/AttributesImpl.html#getLocalName(int))(int index)            Return an attribute's local name. |
| [String](http://docs.google.com/java/lang/String.html) | [**getQName**](http://docs.google.com/org/xml/sax/helpers/AttributesImpl.html#getQName(int))(int index)            Return an attribute's qualified (prefixed) name. |
| [String](http://docs.google.com/java/lang/String.html) | [**getType**](http://docs.google.com/org/xml/sax/helpers/AttributesImpl.html#getType(int))(int index)            Return an attribute's type by index. |
| [String](http://docs.google.com/java/lang/String.html) | [**getType**](http://docs.google.com/org/xml/sax/helpers/AttributesImpl.html#getType(java.lang.String))([String](http://docs.google.com/java/lang/String.html) qName)            Look up an attribute's type by qualified (prefixed) name. |
| [String](http://docs.google.com/java/lang/String.html) | [**getType**](http://docs.google.com/org/xml/sax/helpers/AttributesImpl.html#getType(java.lang.String,%20java.lang.String))([String](http://docs.google.com/java/lang/String.html) uri, [String](http://docs.google.com/java/lang/String.html) localName)            Look up an attribute's type by Namespace-qualified name. |
| [String](http://docs.google.com/java/lang/String.html) | [**getURI**](http://docs.google.com/org/xml/sax/helpers/AttributesImpl.html#getURI(int))(int index)            Return an attribute's Namespace URI. |
| [String](http://docs.google.com/java/lang/String.html) | [**getValue**](http://docs.google.com/org/xml/sax/helpers/AttributesImpl.html#getValue(int))(int index)            Return an attribute's value by index. |
| [String](http://docs.google.com/java/lang/String.html) | [**getValue**](http://docs.google.com/org/xml/sax/helpers/AttributesImpl.html#getValue(java.lang.String))([String](http://docs.google.com/java/lang/String.html) qName)            Look up an attribute's value by qualified (prefixed) name. |
| [String](http://docs.google.com/java/lang/String.html) | [**getValue**](http://docs.google.com/org/xml/sax/helpers/AttributesImpl.html#getValue(java.lang.String,%20java.lang.String))([String](http://docs.google.com/java/lang/String.html) uri, [String](http://docs.google.com/java/lang/String.html) localName)            Look up an attribute's value by Namespace-qualified name. |
| void | [**removeAttribute**](http://docs.google.com/org/xml/sax/helpers/AttributesImpl.html#removeAttribute(int))(int index)            Remove an attribute from the list. |
| void | [**setAttribute**](http://docs.google.com/org/xml/sax/helpers/AttributesImpl.html#setAttribute(int,%20java.lang.String,%20java.lang.String,%20java.lang.String,%20java.lang.String,%20java.lang.String))(int index, [String](http://docs.google.com/java/lang/String.html) uri, [String](http://docs.google.com/java/lang/String.html) localName, [String](http://docs.google.com/java/lang/String.html) qName, [String](http://docs.google.com/java/lang/String.html) type, [String](http://docs.google.com/java/lang/String.html) value)            Set an attribute in the list. |
| void | [**setAttributes**](http://docs.google.com/org/xml/sax/helpers/AttributesImpl.html#setAttributes(org.xml.sax.Attributes))([Attributes](http://docs.google.com/org/xml/sax/Attributes.html) atts)            Copy an entire Attributes object. |
| void | [**setLocalName**](http://docs.google.com/org/xml/sax/helpers/AttributesImpl.html#setLocalName(int,%20java.lang.String))(int index, [String](http://docs.google.com/java/lang/String.html) localName)            Set the local name of a specific attribute. |
| void | [**setQName**](http://docs.google.com/org/xml/sax/helpers/AttributesImpl.html#setQName(int,%20java.lang.String))(int index, [String](http://docs.google.com/java/lang/String.html) qName)            Set the qualified name of a specific attribute. |
| void | [**setType**](http://docs.google.com/org/xml/sax/helpers/AttributesImpl.html#setType(int,%20java.lang.String))(int index, [String](http://docs.google.com/java/lang/String.html) type)            Set the type of a specific attribute. |
| void | [**setURI**](http://docs.google.com/org/xml/sax/helpers/AttributesImpl.html#setURI(int,%20java.lang.String))(int index, [String](http://docs.google.com/java/lang/String.html) uri)            Set the Namespace URI of a specific attribute. |
| void | [**setValue**](http://docs.google.com/org/xml/sax/helpers/AttributesImpl.html#setValue(int,%20java.lang.String))(int index, [String](http://docs.google.com/java/lang/String.html) value)            Set the value of a specific attribute. |

| **Methods inherited from class java.lang.**[**Object**](http://docs.google.com/java/lang/Object.html) |
| --- |
| [clone](http://docs.google.com/java/lang/Object.html#clone()), [equals](http://docs.google.com/java/lang/Object.html#equals(java.lang.Object)), [finalize](http://docs.google.com/java/lang/Object.html#finalize()), [getClass](http://docs.google.com/java/lang/Object.html#getClass()), [hashCode](http://docs.google.com/java/lang/Object.html#hashCode()), [notify](http://docs.google.com/java/lang/Object.html#notify()), [notifyAll](http://docs.google.com/java/lang/Object.html#notifyAll()), [toString](http://docs.google.com/java/lang/Object.html#toString()), [wait](http://docs.google.com/java/lang/Object.html#wait()), [wait](http://docs.google.com/java/lang/Object.html#wait(long)), [wait](http://docs.google.com/java/lang/Object.html#wait(long,%20int)) |

| **Constructor Detail** |
| --- |

### AttributesImpl

public **AttributesImpl**()

Construct a new, empty AttributesImpl object.

### AttributesImpl

public **AttributesImpl**([Attributes](http://docs.google.com/org/xml/sax/Attributes.html) atts)

Copy an existing Attributes object.

This constructor is especially useful inside a [startElement](http://docs.google.com/org/xml/sax/ContentHandler.html#startElement(java.lang.String,%20java.lang.String,%20java.lang.String,%20org.xml.sax.Attributes)) event.

**Parameters:**atts - The existing Attributes object.

| **Method Detail** |
| --- |

### getLength

public int **getLength**()

Return the number of attributes in the list.

**Specified by:**[getLength](http://docs.google.com/org/xml/sax/Attributes.html#getLength()) in interface [Attributes](http://docs.google.com/org/xml/sax/Attributes.html) **Returns:**The number of attributes in the list.**See Also:**[Attributes.getLength()](http://docs.google.com/org/xml/sax/Attributes.html#getLength())

### getURI

public [String](http://docs.google.com/java/lang/String.html) **getURI**(int index)

Return an attribute's Namespace URI.

**Specified by:**[getURI](http://docs.google.com/org/xml/sax/Attributes.html#getURI(int)) in interface [Attributes](http://docs.google.com/org/xml/sax/Attributes.html) **Parameters:**index - The attribute's index (zero-based). **Returns:**The Namespace URI, the empty string if none is available, or null if the index is out of range.**See Also:**[Attributes.getURI(int)](http://docs.google.com/org/xml/sax/Attributes.html#getURI(int))

### getLocalName

public [String](http://docs.google.com/java/lang/String.html) **getLocalName**(int index)

Return an attribute's local name.

**Specified by:**[getLocalName](http://docs.google.com/org/xml/sax/Attributes.html#getLocalName(int)) in interface [Attributes](http://docs.google.com/org/xml/sax/Attributes.html) **Parameters:**index - The attribute's index (zero-based). **Returns:**The attribute's local name, the empty string if none is available, or null if the index if out of range.**See Also:**[Attributes.getLocalName(int)](http://docs.google.com/org/xml/sax/Attributes.html#getLocalName(int))

### getQName

public [String](http://docs.google.com/java/lang/String.html) **getQName**(int index)

Return an attribute's qualified (prefixed) name.

**Specified by:**[getQName](http://docs.google.com/org/xml/sax/Attributes.html#getQName(int)) in interface [Attributes](http://docs.google.com/org/xml/sax/Attributes.html) **Parameters:**index - The attribute's index (zero-based). **Returns:**The attribute's qualified name, the empty string if none is available, or null if the index is out of bounds.**See Also:**[Attributes.getQName(int)](http://docs.google.com/org/xml/sax/Attributes.html#getQName(int))

### getType

public [String](http://docs.google.com/java/lang/String.html) **getType**(int index)

Return an attribute's type by index.

**Specified by:**[getType](http://docs.google.com/org/xml/sax/Attributes.html#getType(int)) in interface [Attributes](http://docs.google.com/org/xml/sax/Attributes.html) **Parameters:**index - The attribute's index (zero-based). **Returns:**The attribute's type, "CDATA" if the type is unknown, or null if the index is out of bounds.**See Also:**[Attributes.getType(int)](http://docs.google.com/org/xml/sax/Attributes.html#getType(int))

### getValue

public [String](http://docs.google.com/java/lang/String.html) **getValue**(int index)

Return an attribute's value by index.

**Specified by:**[getValue](http://docs.google.com/org/xml/sax/Attributes.html#getValue(int)) in interface [Attributes](http://docs.google.com/org/xml/sax/Attributes.html) **Parameters:**index - The attribute's index (zero-based). **Returns:**The attribute's value or null if the index is out of bounds.**See Also:**[Attributes.getValue(int)](http://docs.google.com/org/xml/sax/Attributes.html#getValue(int))

### getIndex

public int **getIndex**([String](http://docs.google.com/java/lang/String.html) uri,  
 [String](http://docs.google.com/java/lang/String.html) localName)

Look up an attribute's index by Namespace name.

In many cases, it will be more efficient to look up the name once and use the index query methods rather than using the name query methods repeatedly.

**Specified by:**[getIndex](http://docs.google.com/org/xml/sax/Attributes.html#getIndex(java.lang.String,%20java.lang.String)) in interface [Attributes](http://docs.google.com/org/xml/sax/Attributes.html) **Parameters:**uri - The attribute's Namespace URI, or the empty string if none is available.localName - The attribute's local name. **Returns:**The attribute's index, or -1 if none matches.**See Also:**[Attributes.getIndex(java.lang.String,java.lang.String)](http://docs.google.com/org/xml/sax/Attributes.html#getIndex(java.lang.String,%20java.lang.String))

### getIndex

public int **getIndex**([String](http://docs.google.com/java/lang/String.html) qName)

Look up an attribute's index by qualified (prefixed) name.

**Specified by:**[getIndex](http://docs.google.com/org/xml/sax/Attributes.html#getIndex(java.lang.String)) in interface [Attributes](http://docs.google.com/org/xml/sax/Attributes.html) **Parameters:**qName - The qualified name. **Returns:**The attribute's index, or -1 if none matches.**See Also:**[Attributes.getIndex(java.lang.String)](http://docs.google.com/org/xml/sax/Attributes.html#getIndex(java.lang.String))

### getType

public [String](http://docs.google.com/java/lang/String.html) **getType**([String](http://docs.google.com/java/lang/String.html) uri,  
 [String](http://docs.google.com/java/lang/String.html) localName)

Look up an attribute's type by Namespace-qualified name.

**Specified by:**[getType](http://docs.google.com/org/xml/sax/Attributes.html#getType(java.lang.String,%20java.lang.String)) in interface [Attributes](http://docs.google.com/org/xml/sax/Attributes.html) **Parameters:**uri - The Namespace URI, or the empty string for a name with no explicit Namespace URI.localName - The local name. **Returns:**The attribute's type, or null if there is no matching attribute.**See Also:**[Attributes.getType(java.lang.String,java.lang.String)](http://docs.google.com/org/xml/sax/Attributes.html#getType(java.lang.String,%20java.lang.String))

### getType

public [String](http://docs.google.com/java/lang/String.html) **getType**([String](http://docs.google.com/java/lang/String.html) qName)

Look up an attribute's type by qualified (prefixed) name.

**Specified by:**[getType](http://docs.google.com/org/xml/sax/Attributes.html#getType(java.lang.String)) in interface [Attributes](http://docs.google.com/org/xml/sax/Attributes.html) **Parameters:**qName - The qualified name. **Returns:**The attribute's type, or null if there is no matching attribute.**See Also:**[Attributes.getType(java.lang.String)](http://docs.google.com/org/xml/sax/Attributes.html#getType(java.lang.String))

### getValue

public [String](http://docs.google.com/java/lang/String.html) **getValue**([String](http://docs.google.com/java/lang/String.html) uri,  
 [String](http://docs.google.com/java/lang/String.html) localName)

Look up an attribute's value by Namespace-qualified name.

**Specified by:**[getValue](http://docs.google.com/org/xml/sax/Attributes.html#getValue(java.lang.String,%20java.lang.String)) in interface [Attributes](http://docs.google.com/org/xml/sax/Attributes.html) **Parameters:**uri - The Namespace URI, or the empty string for a name with no explicit Namespace URI.localName - The local name. **Returns:**The attribute's value, or null if there is no matching attribute.**See Also:**[Attributes.getValue(java.lang.String,java.lang.String)](http://docs.google.com/org/xml/sax/Attributes.html#getValue(java.lang.String,%20java.lang.String))

### getValue

public [String](http://docs.google.com/java/lang/String.html) **getValue**([String](http://docs.google.com/java/lang/String.html) qName)

Look up an attribute's value by qualified (prefixed) name.

**Specified by:**[getValue](http://docs.google.com/org/xml/sax/Attributes.html#getValue(java.lang.String)) in interface [Attributes](http://docs.google.com/org/xml/sax/Attributes.html) **Parameters:**qName - The qualified name. **Returns:**The attribute's value, or null if there is no matching attribute.**See Also:**[Attributes.getValue(java.lang.String)](http://docs.google.com/org/xml/sax/Attributes.html#getValue(java.lang.String))

### clear

public void **clear**()

Clear the attribute list for reuse.

Note that little memory is freed by this call: the current array is kept so it can be reused.

### setAttributes

public void **setAttributes**([Attributes](http://docs.google.com/org/xml/sax/Attributes.html) atts)

Copy an entire Attributes object.

It may be more efficient to reuse an existing object rather than constantly allocating new ones.

**Parameters:**atts - The attributes to copy.

### addAttribute

public void **addAttribute**([String](http://docs.google.com/java/lang/String.html) uri,  
 [String](http://docs.google.com/java/lang/String.html) localName,  
 [String](http://docs.google.com/java/lang/String.html) qName,  
 [String](http://docs.google.com/java/lang/String.html) type,  
 [String](http://docs.google.com/java/lang/String.html) value)

Add an attribute to the end of the list.

For the sake of speed, this method does no checking to see if the attribute is already in the list: that is the responsibility of the application.

**Parameters:**uri - The Namespace URI, or the empty string if none is available or Namespace processing is not being performed.localName - The local name, or the empty string if Namespace processing is not being performed.qName - The qualified (prefixed) name, or the empty string if qualified names are not available.type - The attribute type as a string.value - The attribute value.

### setAttribute

public void **setAttribute**(int index,  
 [String](http://docs.google.com/java/lang/String.html) uri,  
 [String](http://docs.google.com/java/lang/String.html) localName,  
 [String](http://docs.google.com/java/lang/String.html) qName,  
 [String](http://docs.google.com/java/lang/String.html) type,  
 [String](http://docs.google.com/java/lang/String.html) value)

Set an attribute in the list.

For the sake of speed, this method does no checking for name conflicts or well-formedness: such checks are the responsibility of the application.

**Parameters:**index - The index of the attribute (zero-based).uri - The Namespace URI, or the empty string if none is available or Namespace processing is not being performed.localName - The local name, or the empty string if Namespace processing is not being performed.qName - The qualified name, or the empty string if qualified names are not available.type - The attribute type as a string.value - The attribute value. **Throws:** [ArrayIndexOutOfBoundsException](http://docs.google.com/java/lang/ArrayIndexOutOfBoundsException.html) - When the supplied index does not point to an attribute in the list.

### removeAttribute

public void **removeAttribute**(int index)

Remove an attribute from the list.

**Parameters:**index - The index of the attribute (zero-based). **Throws:** [ArrayIndexOutOfBoundsException](http://docs.google.com/java/lang/ArrayIndexOutOfBoundsException.html) - When the supplied index does not point to an attribute in the list.

### setURI

public void **setURI**(int index,  
 [String](http://docs.google.com/java/lang/String.html) uri)

Set the Namespace URI of a specific attribute.

**Parameters:**index - The index of the attribute (zero-based).uri - The attribute's Namespace URI, or the empty string for none. **Throws:** [ArrayIndexOutOfBoundsException](http://docs.google.com/java/lang/ArrayIndexOutOfBoundsException.html) - When the supplied index does not point to an attribute in the list.

### setLocalName

public void **setLocalName**(int index,  
 [String](http://docs.google.com/java/lang/String.html) localName)

Set the local name of a specific attribute.

**Parameters:**index - The index of the attribute (zero-based).localName - The attribute's local name, or the empty string for none. **Throws:** [ArrayIndexOutOfBoundsException](http://docs.google.com/java/lang/ArrayIndexOutOfBoundsException.html) - When the supplied index does not point to an attribute in the list.

### setQName

public void **setQName**(int index,  
 [String](http://docs.google.com/java/lang/String.html) qName)

Set the qualified name of a specific attribute.

**Parameters:**index - The index of the attribute (zero-based).qName - The attribute's qualified name, or the empty string for none. **Throws:** [ArrayIndexOutOfBoundsException](http://docs.google.com/java/lang/ArrayIndexOutOfBoundsException.html) - When the supplied index does not point to an attribute in the list.

### setType

public void **setType**(int index,  
 [String](http://docs.google.com/java/lang/String.html) type)

Set the type of a specific attribute.

**Parameters:**index - The index of the attribute (zero-based).type - The attribute's type. **Throws:** [ArrayIndexOutOfBoundsException](http://docs.google.com/java/lang/ArrayIndexOutOfBoundsException.html) - When the supplied index does not point to an attribute in the list.

### setValue

public void **setValue**(int index,  
 [String](http://docs.google.com/java/lang/String.html) value)

Set the value of a specific attribute.

**Parameters:**index - The index of the attribute (zero-based).value - The attribute's value. **Throws:** [ArrayIndexOutOfBoundsException](http://docs.google.com/java/lang/ArrayIndexOutOfBoundsException.html) - When the supplied index does not point to an attribute in the list.

| | [**Overview**](http://docs.google.com/overview-summary.html) | [**Package**](http://docs.google.com/package-summary.html) | **Class** | [**Use**](http://docs.google.com/class-use/AttributesImpl.html) | [**Tree**](http://docs.google.com/package-tree.html) | [**Deprecated**](http://docs.google.com/deprecated-list.html) | [**Index**](http://docs.google.com/index-files/index-1.html) | [**Help**](http://docs.google.com/help-doc.html) | | --- | --- | --- | --- | --- | --- | --- | --- | | | ***Java™ Platform***  ***Standard Ed. 6*** |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| [**PREV CLASS**](http://docs.google.com/org/xml/sax/helpers/AttributeListImpl.html)   [**NEXT CLASS**](http://docs.google.com/org/xml/sax/helpers/DefaultHandler.html) | [**FRAMES**](http://docs.google.com/index.html?org/xml/sax/helpers/AttributesImpl.html)    [**NO FRAMES**](http://docs.google.com/AttributesImpl.html)     [**All Classes**](http://docs.google.com/allclasses-noframe.html) |
| SUMMARY: NESTED | FIELD | [CONSTR](#3znysh7) | [METHOD](#2et92p0) | DETAIL: FIELD | [CONSTR](#3dy6vkm) | [METHOD](#2s8eyo1) |

[Submit a bug or feature](http://bugs.sun.com/services/bugreport/index.jsp)

For further API reference and developer documentation, see [Java SE Developer Documentation](http://docs.google.com/webnotes/devdocs-vs-specs.html). That documentation contains more detailed, developer-targeted descriptions, with conceptual overviews, definitions of terms, workarounds, and working code examples.

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