

# Product Description for Saxon-EE (Enterprise Edition)



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This document lists the features supported by Saxon Enterprise Edition (Saxon-EE), and describes the level of that support.

This document does not form part of any contract unless expressly incorporated.

## Language Support

### 1. XSLT (Transformation Processing)

#### 1.1 XSLT 2.0 (Schema Aware)

Provides a schema-aware XSLT 2.0 processor as defined in section 21 of the XSLT 2.0 Recommendation, which includes all features of the language.

For more details see: [XSLT 2.0 conformance](#).

Relevant W3C Specification: [XSLT 2.0 Recommendation \(23 January 2007\)](#).

#### 1.2 XSLT 3.0 (Schema Aware & Streaming)

A schema-aware XSLT 3.0 processor, which provides almost all features from the XSLT 3.0 specification - including try/catch, evaluate, iterate, accumulators, maps, named modes, content value templates, extended patterns, XPath 3.0 and XPath 3.1 features such as higher-order functions, features that enable streaming (processing of documents that are too large to fit in memory), and an implementation of packages (which allows stylesheet modules to be independently compiled and distributed).

For more details see: [XSLT 3.0 conformance](#).

Relevant W3C Specification: [XSLT 3.0 Candidate Recommendation \(19 November 2015\)](#).

### 2. XPath

#### 2.1 XPath 2.0 (Schema Aware)

Provides all XPath 2.0 features, including those that require schema processing: specifically, any use of source documents with type annotations, and any use of XPath expressions that contain the names of schema components such as element declarations and types, other than the built-in types.

For more details see: [XPath 2.0 conformance](#).

Relevant W3C Specification: [XPath 2.0 Recommendation \(14 December 2010\)](#).

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## 2.2 XPath 3.0 (Schema Aware)

Provides all XPath 3.0 features. This includes features that require schema processing - specifically, any use of source documents with type annotations, and any use of XPath expressions that contain the names of schema components such as element declarations and types, other than the built-in types; and features that require higher-order functions - specifically, the ability to use functions as values, including dynamic function calls, inline functions, partial function application, and specific higher-order functions such as `fn:filter` and `fn:fold-left`. Saxon XPath 3.0 processing also allows selected XPath 3.1 features to be used: the main feature being the implementation of maps.

For more details see: [XPath 3.0 conformance](#).

Relevant W3C Specification: [XPath 3.0 Recommendation \(08 April 2014\)](#).

## 2.3 XPath 3.1 (Schema Aware)

Provides all XPath 3.1 features. This includes features that require schema processing - specifically, any use of source documents with type annotations, and any use of XPath expressions that contain the names of schema components such as element declarations and types, other than the built-in types. It also includes an implementation of maps and arrays, and support for JSON, and features that require higher-order functions - specifically, the ability to use functions as values, including dynamic function calls, inline functions, partial function application, and specific higher-order functions.

For more details see: [XPath 3.1 conformance](#).

Relevant W3C Specification: [XPath 3.1 Candidate Recommendation \(18 December 2014\)](#).

## 3. XQuery

### 3.1 XQuery 1.0 (Schema Aware)

Provides the following features, as defined in section 5 of the XQuery 1.0 specification: Minimal Conformance; Full Axis Feature; Module Feature; Serialization Feature; Schema Import Feature; and Schema Validation Feature. (That is, all optional features except the Static Typing feature.)

For more details see: [XQuery 1.0 conformance](#).

Relevant W3C Specification: [XQuery 1.0 Recommendation \(14 December 2010\)](#).

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## 3.2 XQuery 3.0 (Schema Aware)

Provides the following features, as defined in section 5 of the XQuery 3.0 specification: Minimal Conformance (including try/catch and "group-by"); Module Feature; Serialization Feature; Higher-Order Function Feature; Schema Aware Feature; and Typed Data Feature. (That is, all optional features except the Static Typing Feature.)

For more details see: [XQuery 3.0 conformance](#).

Relevant W3C Specification: [XQuery 3.0 Recommendation \(08 April 2014\)](#).

## 3.3 XQuery 3.1 (Schema Aware)

Provides the following features, as defined in section 5 of the XQuery 3.1 specification: Minimal Conformance (including try/catch and "group-by"); Module Feature; Serialization Feature; Higher-Order Function Feature; Schema Aware Feature; and Typed Data Feature. (That is, all optional features except the Static Typing Feature and `fn:put()` Feature.)

For more details see: [XQuery 3.1 conformance](#).

Relevant W3C Specification: [XQuery 3.1 Candidate Recommendation \(18 December 2014\)](#).

## 3.4 XQuery Update 1.0

Saxon provides all the features defined in the XQuery Update 1.0 specification. The implementation allows XQuery Update 1.0 syntax to be mixed with XQuery 3.0 or 3.1 syntax.

For more details see: [XQuery Update 1.0 conformance](#).

Relevant W3C Specification: [XQuery Update 1.0 Recommendation \(17 March 2011\)](#).

## 4. XSD (XML Schema Validation)

### 4.1 XML Schema 1.0

Saxon includes a complete implementation of XML Schema 1.0. This provides the ability to process XSD 1.0 schema documents and use them to validate instance documents. Note that Saxon does not expose the full PSVI, as required by the conformance rules in the XSD 1.0 Recommendation.

For more details see: [XML Schema 1.0 conformance](#).

Relevant W3C Specification: [XML Schema 1.0 Recommendation \(28 October 2004\)](#).

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## 4.2 XML Schema 1.1

Saxon includes a complete implementation of XML Schema 1.1. This provides the ability to process schema documents that use the new features of XSD 1.1, and use them to validate instance documents. More specifically, in the language of section 2.4 of the specification, it is a General-Purpose Web-Aware Validator.

For more details see: [XML Schema 1.1 conformance](#).

Relevant W3C Specification: [XML Schema 1.1 Recommendation \(05 April 2012\)](#).

## Performance Features

### 5. Binary XML

Saxon's PTree format is a serialized binary representation of Saxon's internal tree format. It occupies around the same amount of disk space as the original XML, but is faster to serialize and faster to reparse.

For more details see: [The PTree file format](#).

### 6. Byte code generation

Allows code generation for XSLT, XQuery, and XPath. Available for both Java and .NET platforms, typically giving a 25% performance boost (at the cost of increased compile time).

For more details see: [Compiling a Stylesheet](#).

### 7. Document projection

This feature performs static analysis of a query and uses this to filter a document during loading, so that the only parts held in memory are those parts needed to answer the query. For simple queries on large documents this can give substantial memory savings.

For more details see: [Document projection](#).

### 8. Export stylesheet packages

XSLT 3.0 packaging allows stylesheet modules to be independently compiled and distributed, and provides much more "software engineering" control over public and private interfaces, and the like. The ability to save packages in compiled form gives much faster loading of frequently used stylesheets.

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For more details see: [Compiling a Stylesheet](#).

## 9. Import stylesheet packages

Allows the importing of stylesheet packages in compiled form. Possible with all editions, provided the package only uses features available in that edition.

For more details see: [Compiling a Stylesheet](#).

## 10. Multi-threading

Takes advantage of multi-core CPUs by providing automatic parallel execution of the `collection()` function and the `xsl:result-document` instruction; plus an extension attribute (`saxon:threads`) to allow multi-threaded execution of `xsl:for-each` instructions under the control of the stylesheet author.

## 11. Optimizer (Advanced)

The Advanced optimizer provides the wide range of static and dynamic optimizations featured in the Basic optimizer - including full pipelining of list operations, lazy evaluation of variables, elimination of redundant sorting operations, etc. - and additionally provides join optimization and inlining of variables and functions, where appropriate.

## 12. Reading W3C schemas and DTDs

The W3C web server now routinely rejects requests for commonly-referenced files such as the DTD for XHTML, causing parsing failures. In response to this, Saxon now includes copies of these documents within the issued JAR file, and recognizes requests for these documents, satisfying the request using the local copy.

## 13. Streaming

Allows large documents to be processed without holding the whole document in memory. Provides the streaming features of the XSLT 3.0 specification, plus Saxon extensions to allow limited streaming in XQuery.

For more details see: [Streaming of Large Documents](#).

## Extensibility

## 14. EXSLT and EXPath extension functions

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A selection of EXSLT and EXPath extension functions are provided (in the modules Common, Dates and Times, Math, Random, and Sets; and Archive, Binary, and File, respectively), as listed in the documentation.

For more details see: [EXSLT extensions](#), [EXPath extensions](#).

## 15. Extensibility using custom classes

Ability to write extension functions (for use in XSLT, XQuery, or XPath) by implementing a Saxon-defined interface and registering the implementation with the Saxon Configuration.

For more details see: [Extensibility](#).

## 16. Extensibility using reflexion

Ability to access existing Java or .NET methods dynamically and invoke them as extension functions by means of dynamic loading and reflexion.

For more details see: [Extensibility](#).

## 17. Saxon extension functions (Advanced)

Extension functions, as listed in the documentation, in the Saxon namespace. The Advanced level includes those that depend on streaming or schema-awareness. Many Saxon extension functions have over the years become superseded by facilities in the W3C standards or in EXPath libraries, but some such as the ability to access the line number of an element remain available only through this library.

For more details see: [Saxon extension functions](#).

## 18. SQL extension

XSLT extension instructions providing access to SQL databases. Available on the Java platform only (not .NET).

For more details see: [Saxon SQL extension](#).

## 19. XSLT element extensibility

Ability to implement XSLT extension instructions by implementing a Saxon-defined interface and registering the implementation with the Saxon Configuration.

For more details see: [Writing XSLT extension instructions](#).

## Localization

### 20. Localization (Advanced)

All the interfaces for developers are in English, but there is some localization support in transformation to enable dates and numbers to be formatted and collations performed in other languages (so end-user output can be localized, but developer output cannot). The Advanced level includes number and date formatting for a variety of languages, as well as support for the Unicode Collation Algorithm using features from the [ICU - International Components for Unicode](#). The Advanced level also includes APIs which allow support for additional languages to be developed.

For more details see: [Unicode collation](#), [Localizing numbers and dates](#).

## Interfaces and APIs

### 21. JAXP API

Implementations of the standard JAXP interfaces for XSLT transformation, XPath evaluation, and XML Schema validation. Applies to the Java platform only.

For more details see: [JAXP API conformance](#).

### 22. S9API API

Saxon's native interface for processing XSLT, XQuery, XPath, and XML Schema. Available in slightly different forms on the Java and .NET platforms.

### 23. Support for DOM

Ability to use a DOM (Document Object Model) for the input and output of transformations and queries. On the .NET platform this includes the System.XML DOM classes.

For more details see: [Object models](#).

### 24. Support for JDOM, JDOM2, AXIOM, DOM4J, and XOM

Ability to use a JDOM, JDOM2, AXIOM, DOM4J, and XOM for the input or output of transformations and queries. Applies to the Java platform only. Note that the code for these interfaces is open source and can be compiled to work with Saxon-HE, but it does not come packaged with the Saxon-HE download.

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For more details see: [Object models](#).

### 25. XQJ API

Implementations of the standard XQJ interfaces for XQuery processing. Applies to the Java platform only. Note that the XQJ interfaces have been removed from the standard download of Saxon-HE because the Oracle specification license is not open source, but they are available on request.

For more details see: [XQJ API conformance](#).