XML Applications

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A Few Notable XML Applications

- X3D
- XMPP
- DocBook
- OpenDocument
- EPUB
- KML
- OSM XML
- Apache Maven
- FXML

X3D (1)

- X3D is an open standard file format to represent 3D computer graphics: https://www.web3d.org/x3d/what-x3d
- Developed by the Web3D Consortium: https://www.web3d.org/
- The successor of the Virtual Reality Modeling Language (VRML) format.
- Possible applications include: CAD, architecture, 3D printing and scanning, medical visualization, training and simulation, multimedia, entertainment, education, ...
- The current version is 4.0 released in 2023: https://www.web3d.org/standards/version/V4.0
- Also standardized by ISO: https://www.web3d.org/standards
- See also: https://www.web3d.org/x3d-adoption

X3D (2)

- XML schema: https://www.web3d.org/specifications/x3d-4.0.xsd
- File extensions and media types:

Encoding	File Extension	Media Type
XML	`.x3d`	`model/x3d+xml`
Compressed binary	`.x3db`	`model/x3d+fastinfoset`
Classic VRML	`.x3dv`	`model/x3d-vrml`

X3D (3)

Examples (require a 3D viewer):

- https://web3d.org/examples
- Extensible 3D (X3D) Graphics: Basic Examples Archive
- X3DOM Examples
- X_ITE X3D Browser – X3D Examples
- X3D: Extensible 3D Graphics for Web Authors

X3D (4)

Free and open source software:

- Blender (platform: Linux, macOS, Windows; license: GPLv2)
  https://www.blender.org/
- Sunrize (written in: JavaScript; license: MIT License)
  https://create3000.github.io/sunrize/
  https://github.com/create3000/sunrize/
  - X3D editor.

X3D (5)

Free and open source software (continued):

- X3DOM (platform: browser; license: GPLv3/MIT License)
  https://www.x3dom.org/ https://github.com/x3dom/x3dom
  - X3DOM is a JavaScript framework for embedding X3D content in HTML5 documents without requiring additional plugins.
  - Requires a WebGL-enabled browser.
- X_ITE (platform: browser; license: GPLv3)
  https://create3000.github.io/x_ite/
  https://github.com/create3000/x_ite
  - WebGL-based X3D viewer written in JavaScript.

X3D (6)

WebGL:

- A low-level JavaScript API for rendering 3D graphics supported natively by modern web browsers.
- Website: https://www.khronos.org/webgl/ https://github.com/KhronosGroup/WebGL
- Detecting browser support for WebGL: https://get.webgl.org/
- Browser support: https://caniuse.com/webgl

X3D (7)

Humanoid Animation (HAnim):

- A standard based on X3D, developed by the Web3D Consortium and approved by ISO, to represent and animate 3D humanoid characters.
- Examples:
  - HumanoidAnimation (HAnim) X3D Examples Archive (Web3D)
- Free and open source software:
  - Seamless3d (written in: C++; license: MIT License) https://www.seamless3d.com/

XMPP (1)

- Open standard XML-based technology for realtime communication. https://xmpp.org/
- Website: https://xmpp.org/
- Developed by the XMPP Standards Foundation (XSF): https://xmpp.org/about/xmpp-standards-foundation/

XMPP (2)

- Possible applications include:
  - Instant messaging
  - Internet of things (IoT)
  - Online gaming
  - Social networking
  - Real-time communication
- See: https://xmpp.org/uses/

XMPP (3)

Industrial applications:

- EVE Online
- Fortnite
- League of Legends
- WhatsApp
- Zoom

See: https://xmpp.org/uses/gaming/
https://xmpp.org/uses/instant-messaging/

XMPP (4)

- XML schemas: https://xmpp.org/schemas/
- Core specifications:
  - Peter Saint-Andre. Extensible Messaging and Presence Protocol (XMPP). RFC 6120, March 2011.
  - Peter Saint-Andre. Extensible Messaging and Presence Protocol (XMPP): Instant Messaging and Presence. RFC 6121, March 2011.
  - Peter Saint-Andre. Extensible Messaging and Presence Protocol (XMPP): Address Format. RFC 7622, September 2015.

XMPP (5)

XMPP Extension Protocol (XEP):

- Extensions to XMPP developed by the XSF.
- The list of published XEPs: https://xmpp.org/extensions/
- See also: https://xmpp.org/about/standards-process/

XMPP (6)

Free and open source software:

- Servers:
  - ejabberd Community Edition (platform: Linux, macOS; license: GPLv2) https://www.ejabberd.im/ https://github.com/processone/ejabberd
  - OpenFire (platform: Linux, macOS, Windows; license: Apache License 2.0) https://github.com/igniterealtime/Openfire
- Clients:
  - converse.js (platform: browser; license: Mozilla Public License 2.0) https://conversejs.org/ https://github.com/conversejs/converse.js
  - Mozilla Thunderbird (platform: Linux, macOS, Windows; license: Mozilla Public License 2.0) https://www.thunderbird.net/
  - Pidgin (platform: Linux, maxOS, Windows; licenc: GPLv2) http://www.pidgin.im/

XMPP (7)

Free and open source software:

- Libraries:
  - Smack (platform: Android, Java; license: Apache License 2.0)
    https://github.com/igniterealtime/Smack
  - xmpp.js (platform: JavaScript; license: ISC License)
    https://github.com/xmppjs/xmpp.js

See: https://xmpp.org/software/

DocBook (1)

- Open standard XML format for writing technical documentation.
- Originally, it was developed for writing hardware and software documentation, but is also suitable for other uses.
- Widely used in the industry.
- Stylesheets and other tools are used to transform DocBook XML documents to other formats (e.g., EPUB, HTML, man pages, PDF).
- Website: https://docbook.org/ https://docbook.sourceforge.net/

DocBook (2)

- Developed by the OASIS DocBook Technical Committee.
- The current version is 5.1:
  - DocBook Version 5.1 (OASIS Standard) (November 22, 2016)
- The format is defined in terms of a RELAX NG schema.
  - Schema: https://docbook.org/xml/5.1/rng/
- Version 5.2 is currently under development.
- Documentation: *DocBook 5.1: The Definitive Guide* https://tdg.docbook.org/tdg/5.1/

DocBook (3)

- Industrial applications (writing documentation):
  - GNOME https://www.gnome.org/ https://wiki.gnome.org/DocumentationProject/
  - KDE https://www.kde.org/ https://l10n.kde.org/docs/
  - PHP https://php.net/ http://doc.php.net/phd.php
  - PostgreSQL https://www.postgresql.org/
  - *The Linux Documentation Project* https://tldp.org/
- See also: https://github.com/docbook/wiki/wiki/WhoUsesDocBook

DocBook (4)

- Free and open source software:
  - *DAPS – DocBook Authoring and Publishing Suite* (platform: Linux; license: GPLv2) https://opensuse.github.io/daps/ https://github.com/openSUSE/daps
  - Pandoc (platform: Linux, macOS, Windows; license: GPLv2) https://pandoc.org/ https://github.com/jgm/pandoc

OpenDocument (1)

- Open standard XML format for office applications.
- Developed by the OASIS OpenDocument Technical Committee: https://www.oasis-open.org/committees/office/
- The current version is 1.3:
  - Open Document Format for Office Applications (OpenDocument) Version 1.3 (27 April 2021)
- Supports several types of documents, including text documents, spreadsheets, and presentations.
- Version 1.2 is also published as an ISO standard: ISO/IEC 263001:2015, ISO/IEC 26300-2:2015, ISO/IEC 26300-3:2015.

OpenDocument (2)

- File extension:
  - `.odt` (text document)
  - `.odp` (presentation)
  - `.ods` (spreadsheet)
  - `.odg` (drawing)
  - ...
- Media type: `application/vnd.oasis.opendocument.*`

OpenDocument (3)

- A mandatory standard for NATO members.
  - See: NATO Interoperability Standards and Profiles (NISP)
- See also: OpenDocument adoption (Wikipedia)
- The rival standard by Microsoft: Office Open XML
  - ECMA-376: Office Open XML File Formats
  - ISO/IEC 29500:2016

OpenDocument (4)

- Free and open source software:
  - Apache OpenOffice (license: *Apache License v2*)
    https://www.openoffice.org/
  - LibreOffice (license: *Mozilla Public License 2.0*)
    https://www.libreoffice.org/
  - ONLYOFFICE Desktop Editors (platform: Linux, macOS, Windows; license: AGPLv3) https://www.onlyoffice.com/desktop.aspx
    https://github.com/ONLYOFFICE/DesktopEditors
- Services:
  - Google Docs
  - Microsoft 365

EPUB (1)

- Open standard format for distributing digital publications and documents that is widely used for e-books.
- Originally, it was developed by the International Digital Publishing Forum (IDPF): http://idpf.org/
- In 2017, IDP has been merged with W3C.
  - See: W3C Welcomes IDPF as Organizations Officially Combine to Develop Roadmap for Future of Publishing. 31 January 2017.
- Within the W3C, the EPUB 3 Working Group develops EPUB: https://www.w3.org/publishing/groups/epub-wg/

EPUB (2)

- The current version is 3.3 (25 May 2025): https://www.w3.org/TR/epub-33/
- File extension: `.epub`
- Media type: `application/epub+zip`

EPUB (3)

- Based on the use of existing web standards (HTML5, CSS, SVG).
- Related resources that comprise an EPUB document are packaged into a single ZIP file.
- Package document: an XML document that contains metadata, the list of resources comprising the document, and the default reading order.
  - File extension: `.opf`
- Schemas: https://github.com/w3c/epubcheck/tree/main/src/main/resources/com/adobe/epubcheck/schema/30

EPUB (4)

Free and open source software:

- calibre (platform: Linux, macOS, Windows; license: GPLv3)
  https://calibre-ebook.com/ https://github.com/kovidgoyal/calibre
  - Conversion and collection management tool.
- Koodo Reader (platform: Linux, macOS, Windows; license: AGPLv3)
  https://www.koodoreader.com/
  https://github.com/koodo-reader/koodo-reader
- Okular (platform: Linux, macOS, Windows; license: GPLv2)
  https://okular.kde.org/
- Sigil (platform: Linux, macOS, Windows; license: GPLv3)
  https://sigil-ebook.com/ https://github.com/Sigil-Ebook/Sigil
  - EPUB editor.

KML (1)

- Open standard XML format for representing geographical data for visualization purposes.
- Originally, it was developed for Google Earth.
- Developed by the Open Geospatial Consortium (OGC): https://www.ogc.org/
- The current version is 2.3 (August 4, 2015): https://www.ogc.org/standards/kml/
- XML schemas: http://schemas.opengis.net/kml/
- File extension: `.kml`, `.kmz`
- Media type: `application/vnd.google-earth.kml+xml`, `application/vnd.google-earth.kmz`

KML (2)

Examples:

- NASA Earthdata – Active Fire Data
- National Weather Service – Hurricane Threats and Impacts
  - Example: https://tgftp.nws.noaa.gov/data/hurricane_products/hti/TornadoThreat.kml
- Unesco – World Heritage List
  - Example: https://whc.unesco.org/en/list/kmz
- USGS Earthquake Hazards Program – Real-time Notifications, Feeds, and Web Services – Google Earth KML

KML (3)

- Software and services:
  - Bing Maps
  - Google Earth
  - Google Maps
  - NASA World Wind https://worldwind.arc.nasa.gov/ https://github.com/NASAWorldWind/
- Further information:
  - https://developers.google.com/kml/
    - KML Tutorial
    - KML FAQ

OSM XML (1)

- OpenStreetMap (OSM) is a collaborative community project to create a freely editable map of the world that is freely available for use.
- Website: https://www.openstreetmap.org/
- Further information: OpenStreetMap Wiki
- OSM uses an XML format (i.e., OSM XML) for exporting map data.
  - See: https://wiki.openstreetmap.org/wiki/OSM_XML

OSM XML (2)

- All OSM data in one file: https://planet.openstreetmap.org/
- Map data is available in smaller chunks, e.g., by country.
  - OpenStreetMap Wiki – Downloading data
  - Geofabrik – OpenStreetMap Data Extracts
  - BBBike https://download.bbbike.org/osm/bbbike/ https://extract.bbbike.org/

Apache Maven (1)

- Software project management and build tool widely used in the industry.
  - Website: https://maven.apache.org/
  - Written in Java.
  - Free and open source software distributed under the Apache License v2.
- Used mainly for Java projects, but can be also used for other programming languages, such as Kotlin and Scala.
- Project Object Model (POM):
  - An XML document (`pom.xml`) that contains a declarative description of the project.
  - Contains metadata and configuration settings.
  - Further information: Apache Maven – POM Reference
  - XML schema: http://maven.apache.org/xsd/maven-4.0.0.xsd

Apache Maven (2)

IDE support:

- Eclipse IDE https://www.eclipse.org/m2e/
- IntelliJ IDEA
  https://www.jetbrains.com/help/idea/maven-support.html
- NetBeans IDE
  https://netbeans.apache.org/tutorial/main/tutorials/nbm-maven-quickstart/

FXML (1)

- JavaFX:
  - Platform for developing rich client applications that operate consistently on diverse systems based on Java SE.
  - Was introduced in Java SE 7 Update 6 as part of the JDK/JRE.
  - Starting with JDK 11, JavaFX will be removed from the JDK, OpenJFX is intended to replace it.
    - See: Donald Smith. The Future of JavaFX and Other Java Client Roadmap Updates. March 7, 2018.
- FXML: XML format for defining the structure of user interfaces of JavaFX applications.
  - Provides means to separate the user interface from the business logic.
  - The program do not have to be recompiled when the user interface changes.

FXML (2)

Free and open source software:

- OpenJFX (platform: Java; license: GPLv2 + Classpath Exception)
  https://openjfx.io/ https://openjdk.org/projects/openjfx/
  https://wiki.openjdk.org/display/OpenJFX/Main
- Gluon Scene Builder (platform: Java; license: New BSD License)
  https://gluonhq.com/products/scene-builder/
  https://github.com/gluonhq/scenebuilder
  - Supported IDEs: NetBeans IDE, Eclipse IDE, IntelliJ IDEA

Further XML-based formats

See: List of XML markup languages (Wikipedia)