Syllable-based compression for XML

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Motivatoin

- XML
  - Simple text format for structured text documents
  - Data exchange standard
  - Hight redundancy

Compression Methods for XML

- Character-based
  - XMill
  - XMLPPM
  - XGrind, ...
- Word-based ?
- Syllable-based ?

Syllable-based compression

- LZWL
  - Dictionary-based method
  - Syllable-based version of LZW
- HufSyl
  - Statistical method
  - Adaptive Huffman coding
  - Inspired by HuffWord

Syllable-based compression

- Syllable-based compression is suitable for languages with rich morphology (Czech)
- Syllable-based compression is suitable for small or middle-sized files

Syllable-based compression of XML

- Majority of XML documents are small or middle-sized
- Many text-like XML documents
  - news in RSS format
  - documentations or books in DocBook format

Syllable-based compression

and XML?

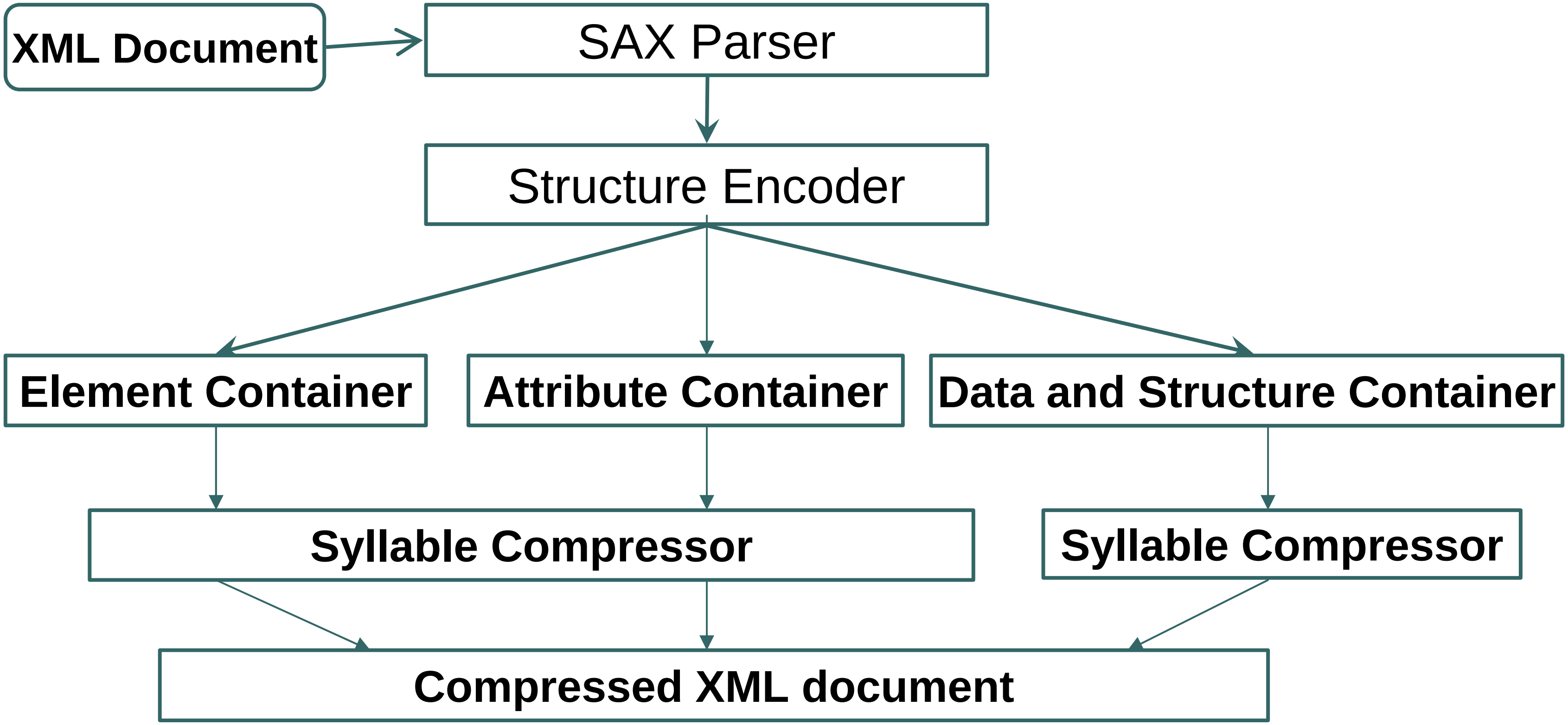
XMLSyl

Idea

- Syllable-based compressor
  - XML tokens are divided to many syllables
- XMLSyl
  - XML tokens are treated as single syllables

XMLSyl

Architecture



XMLSyl

Example

XML doc:

```
<book>
  <title lang="en">XML</title>
</book>
```

SAX events:

```
startElement(“book”)
startElement(“title”,(“lang”,”en”))
characters(“XML”)
endElement(“title”)
endElement(“book”)
```

XMLSyl

Example – Encoding process

SAX events:

startElement(“book”)

startElement(“title ,(“lang”,”en”))
characters(“XML”)
endElement(“title”)
endElement(“book”)

Element Container

book	**E0**
title	**E1**

Attribute Container

lang	**A0**

Data and Structure Container

E0 **E1** **A0** en **END_ATT**
CHAR XML **END_CHAR** **END_TAG** **END_TAG**

XMLSyl

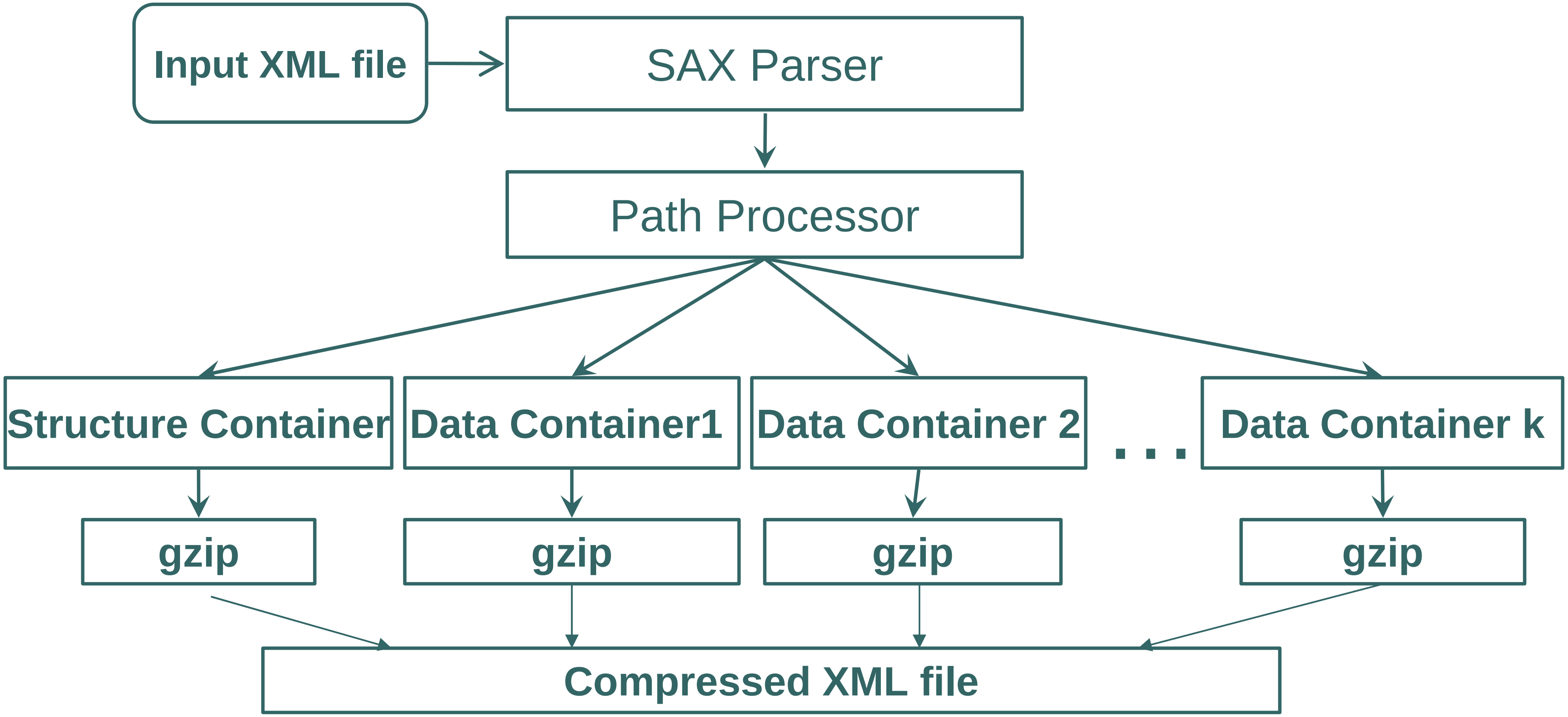
Implementation details

- SAX parser – EXPAT
- Syllable Compressor – LZWL and HufSyl
- Encoding was inspired by existing XML compression methods
  - XMLPPM, XGrind, XPress, XMill

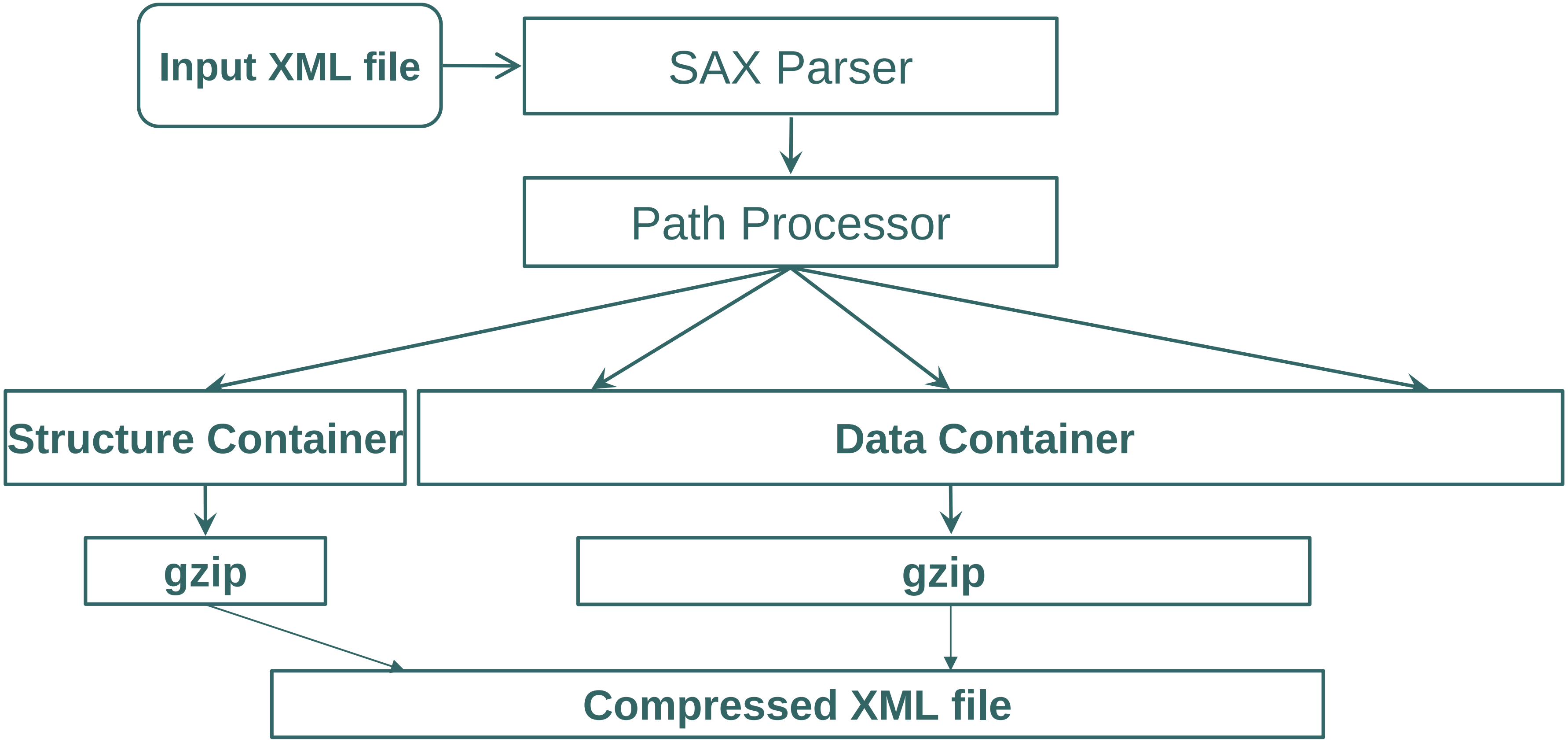
XMillSyl

- Based on XMill
- Main principles of XMill
  - Separating structure from data
  - Grouping Data values with related meaning

Architecture of XMill

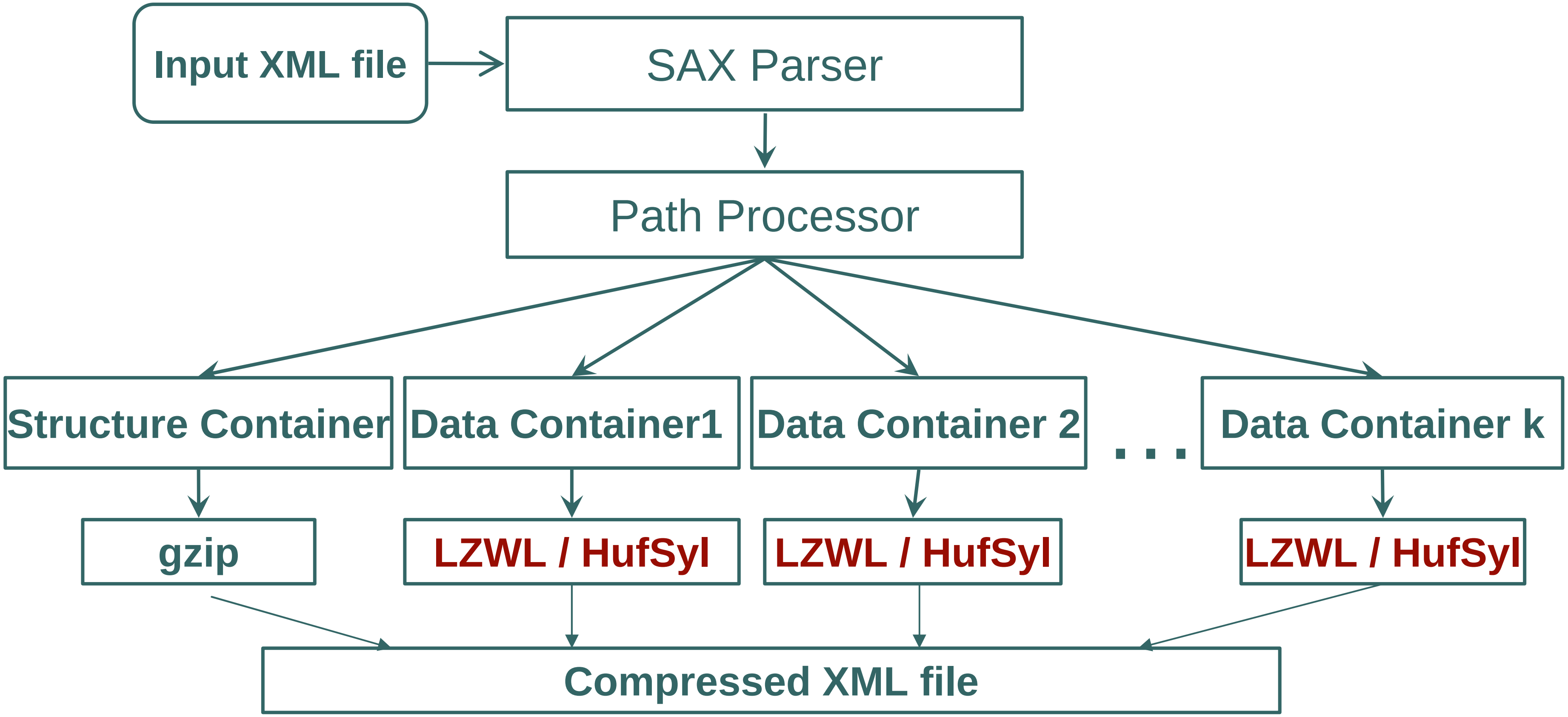


XMill – one container



XMillSyl

Architecture


Input XML file

SAX Parser

Path Processor

Structure Container

Data Container1

Data Container 2

. . .

Data Container k

gzip

LZWL / HufSyl

LZWL / HufSyl

LZWL / HufSyl

Compressed XML file

Syllable-based compression of XML

Experimental results

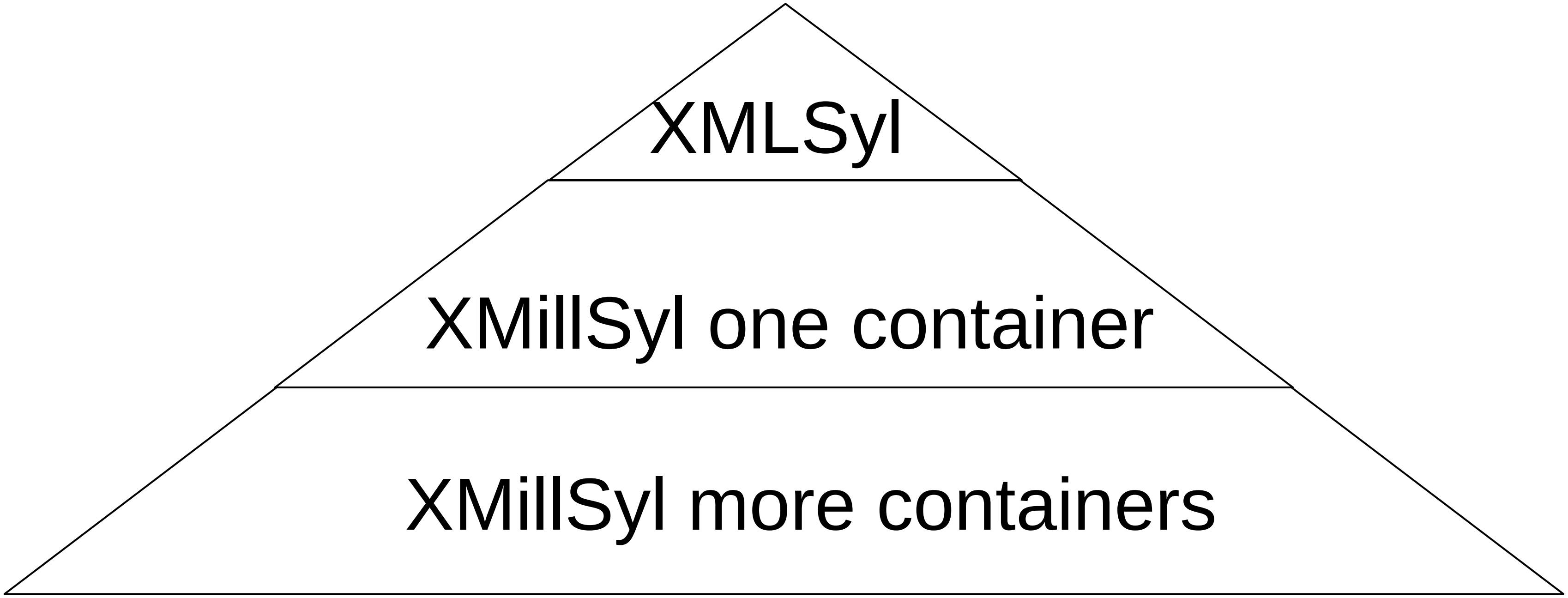
XMLSyl & XMillSyl vs. LZWL & HufSyl

- Non-textual XML data
  - 50-60% better
- Textual XML data
  - 10-20% better

Syllable-based compression of XML

Experimental results

Text-like XML documents



XMLSyl

XMillSyl one container

XMillSyl more containers

Syllable-based compression of XML
Experimental results

Text-like XML documents

XMLSyl

- XMLHuf is suitable for small-sized files
- XMLzwl is suitable for large-sized files

XMLSyl vs. XMill

- On average 10-15% worse than XMill
- On some documents the same performance or better

Conclusion

- New syllable-based compression methods of XML
  - XMLSyl (versions: XMLzwl, XMLhuf)
  - XMillSyl (versions: XMillzwl, XMillhuf)
- One of our method outperforms XMill on some documents

Conclusion

- Future work
  - extract and utilize the information in the DTD section
  - create a special syllable dictionary for elements and attributes
  - compress HTML data