Document Revision History	
30oct2003	Draft#1 Release

FIXML™ Schema for FIX 4.4

Overview of the Schema Version of FIXML 4.4

Initial Draft

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Agenda

- Background
  - Optimizing FIXML Timeline
  - Optimization Approach
- Schema Development
  - Design Objectives
  - FIXML Schema Working Group
- Examples
- Introduction to FIXML Schema
  - Structure and Organization
  - Versioning
  - Usage
  - Customization
- Documentation
- FIXML Schema Distribution Package
- Release Schedule

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Optimizing FIXML Timeline

- June 2002
  - CME approached FPL regarding using FIX for post trades
- July 2002
  - FIA formed the standards working group to drive the effort
  - FIXML was selected because
    - There was not an existing install base of FIX tag=value applications in the listed futures and options back office space
    - There was strong push back from firms to continue using the MQ Series transport instead of using the FIX Session layer
    - Post trade messages (allocation, trade capture, positions) have multiple levels of nesting - ideal for XML
  - CME started their pilot project

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Optimizing FIXML Timeline

- November 2002
  - CME quickly ran into problem that has plagued other FIXML initiatives
    - message size was too large for bandwidth and data storage requirements
    - Trade Capture in FIXML 3200 bytes for example
  - CME developed a transport optimized XML representation
    - Alternatives Examined
      - FIX tag=value
      - Convert from long descriptive element names to tag numbers
      - Convert to attributes
      - Convert to attributes and use abbreviations
    - Chose conversion to attributes using contextual abbreviations
    - Trade Capture was reduced to 850 bytes
    - Message File Size was reduced from 25 MB to 9MB as a result of the optimization for a firm's daily trade file

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Optimizing FIXML Timeline

- December 2002 - January 2003
  - FIA Standards Working Group approached the Global Technical Committee regarding the transport optimized version of FIXML
- February 2003
  - The Global Technical Committee held discussions on the FIXML
    - Goal would be to have one version of FIXML
    - If message size is precluding usage we should consider converting to new version
    - Informally queried about FIXML usage - mostly internal applications
    - Agreed any approach must provide some form of backward compatibility (via XSLT for instance)
  - Agreed to address transport optimization as a part of the FIXML Schema initiative following release of FIX 4.4
- June 2003
  - Development of the FIX repository
  - Release of FIX 4.4 Errata version 20030168
  - Formation of the FIXML Schema Working Group

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Choice

- Eliminate elements that were used as holders for repeating groups
- Convert from elements to attributes where sensible
  - Elements were viewed as analagous to “objects”
  - Attributes were viewed as properties (or attributes) of “objects”
- Use contextual abbreviations
  - Standardized abbreviations using a mechanical dictionary
  - Contextual means - removing prefixes, such as “Trd” from fields on the Trade message for instance
  - Permitted manual overrides to the mechanical abbreviation
- Choices were based upon experience of other organizations that have successfully deployed XML in production messaging applications

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Results

- Goal was not to necessarily have “human readable” XML
- Surprise: optimized version was viewed as more readable
- Message size reduced from ~3200+ bytes to ~850+ bytes per trade record

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Schema Development

The FIXML Schema Working Group was formed in July 2003 and charted to define a transport optimized version of FIXML that was defined by an extensible XML Schema

The Working Group completed their work in December 2003

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Design Objectives for FIXML Messages

- FIXML implementation shall adhere to XML technology standards as specified by the W3C.
- FIXML implementation shall be suitable implementation for use in high volume transaction scenarios. Target applications:
  - Order Routing
  - Trade Reporting and Post Trade Processing
  - Distribution of product (instrument) information
  - Market making for lower volume applications
- FIXML implementation shall minimize bandwidth consumption (reduced message size). The goal is to have FIXML messages be less than 1.5 X the size of an equivalent FIX tag=value message.
- FIXML implementation shall maintain human readability of FIXML message, while still adhering to performance goals.

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Design Objectives for FIXML Messages (cont'd)

- FIXML implementation shall support integration of FpML product specifications within the FIXML message in an equivalent manner to FIX 4.4 tag=value. This integration should use commonly agreed upon, de facto standard XML design patterns.
- FIXML implementation shall support a ready translation to and from FIX tag=value messages.
- FIXML implementation shall provide a cross-reference to ISO 15022 repository for each message, element, and component.
- FIXML implementation shall maintain the extensibility and customization available via the FIX tag=value message format, including:
  - Ability to add custom messages,
  - Ability to add custom fields to messages, component blocks, and repeating groups.
  - FIXML Implementation shall provide full transport level independence.
  - FIXML Implementation shall support version identification.

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Design Objectives FIXML Schema Documents

- FIXML Schema shall be implemented using the current de facto industry best practices for XML Schema usage
- FIXML Schema shall be implemented in such a way as to fully support the Design Objectives for FIXML Messages (Instance documents)
- FIXML Schema shall support version identification
- FIXML Schema shall provide meta-data sufficient to identify the FIX field name, component type, tag number, ISO 15022 repository cross-reference
- FIXML Schema shall be interoperable and compatible with the FpML schema
- The FIXML Schema shall be based upon and be compatible with the current version of XML schema: http://www.w3.org/2001/XMLSchema

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Prototype Optimization Approach

```
<Fixml>
<TrdCapRpt ReqID="1111111" RptID="1788" Mtch="M" BusDt="2002-11-13" Px="0.35" Qty="20" TrdDt="2002-11-
13" TrdTm="15:22:00" ExecID="049269" PRI="R" AsOf="Y">
            <Inst Exch="XCME" ID="ND" CFI="OCAICS" MatDt="2002-12" StkPx="1500.0”/>
            <UndInst ID="ND" CFI="FXICSX" MatDt="2002-12" />
            <Side Typ="2" TrdTyp="PIT" OrdID="054" OrdTyp="M" OrdCap="4" ClrFee="H" PosEff="O"
CTR="X054">
                        <Pty ID="560" R="4"/>
                        <Pty ID="XCME" R="21"/>
                        <Pty ID="560" R="1"/>
                        <Pty ID="TKY" R="2"/>
                        <Pty R="27" ID="560" Typ="1"/>
                        <Acct ID="17208647"/>
            </Side>
            <Side Typ="1" >
                        <Pty ID="XCME" R="22"/>
                        <Pty ID="824" R="17"/>
                        <Pty ID="HYZ" R="26"/>
            </Side>
            <PosAmt Typ="TVAR" Amt="700.0"/>
            </TrdCapRpt>
</Fixml>
```


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Resulting FIXML 4.4 Schema Message

- To be provided next draft

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FIX 4.4 Work

- Modified the DTD based version of FIXML using the following techniques:
  - Roll up - eliminated extra levels of elements for repeating groups
  - Created standard abbreviation rules
  - Expanded meta data
    - Fullname
    - Category
    - ComponentType
      - Field
      - Message
      - Block
      - BlockRepeating
      - RepeatingGroup
    - Volume
      - Volume within FIX specification

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FIXML Schema Working Group

- Formed to define the FIXML Schema
- Review proposed changes to FIXML for Transport Optimization
- Agree on FIXML (Instance document)
- Work on FIXML Schema Definition
  - Datatype usage
  - Use of types vs. elements
  - Integration with FpML

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FIXML Schema Working Group Plan

- Consider Transport Optimized Approach
  - Attributes vs. Elements
  - Contextual Abbreviations
- Address component blocks built around limitations of FIX tag=value
  - InstrumentLeg, NestedParties, Nested2Parties,UnderlyingInstrument
- Develop XML Schema Design Approach
  - Leverage work already done by ISO/XML and FpML
- Address backward compatibility
- Establish implementation approach and timeline

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FIXML 4.4 Examples

Examples of FIXML Schema Version messages and comparisons to FIX tag=value and previous versions of FIXML are provided

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Example tag=value, FIXML 4.3, FIXML 4.4 Schema

- To be provided next draft

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FIXML 4.4 Schema

Structure and Organization of the FIXML 4.4 Schema Documents

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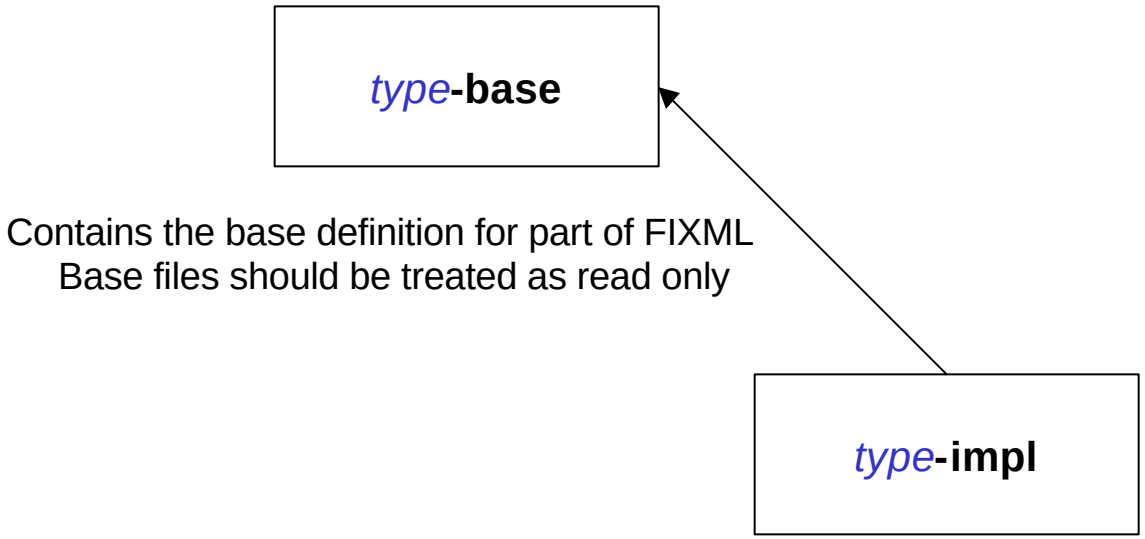
Extensibility Pattern



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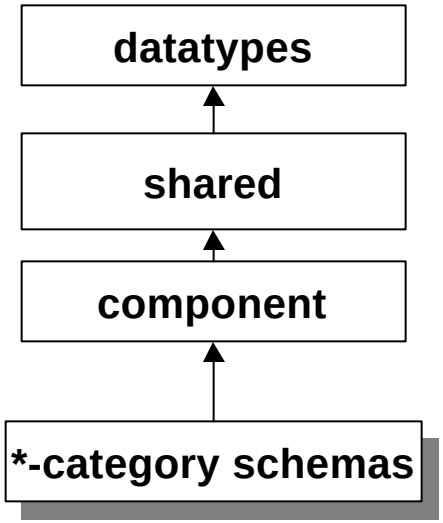
Schema Organization

Defines FIXML Datatypes

Defines FIXML Fields and enumerations

Defines FIXML root elements and component blocks

Defines FIXML message within a message category



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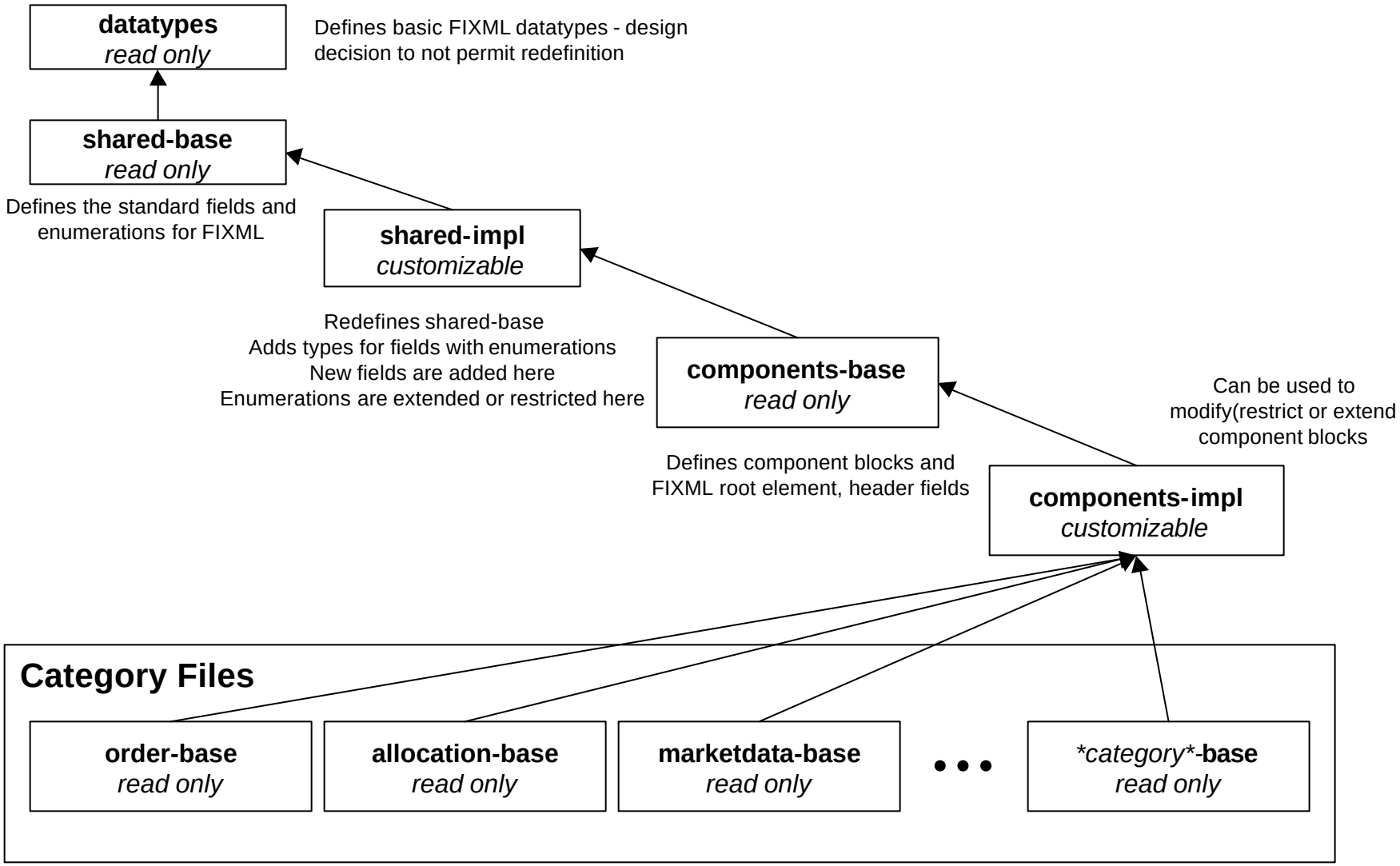
Each Message Category has its own file



Schema File Naming Conventions

fixml-*Type*-{base | impl}-*FixMajorVersion*-*FixMinorVersion*.xsd

Type is one of

datatypes
shared
components
category -where category is one of the FIX message categories, such as *confirmation*, *listorder*, *order*, *settlement*, etc.

FixMajorVersion is the FIX Major Version number, such as “4”

FixMinorVersion is the FIX Minor Version number, such as “4”

Example File Names

Shared base file for FIX Version 4.4: fixml-shared-base-4-4.xsd

Order Category base file for FIX Version 4.4: fixml-order-base-4-4.xsd

Component implementation file for FIX Version 4.4: fixml-components-impl-4-4.xsd

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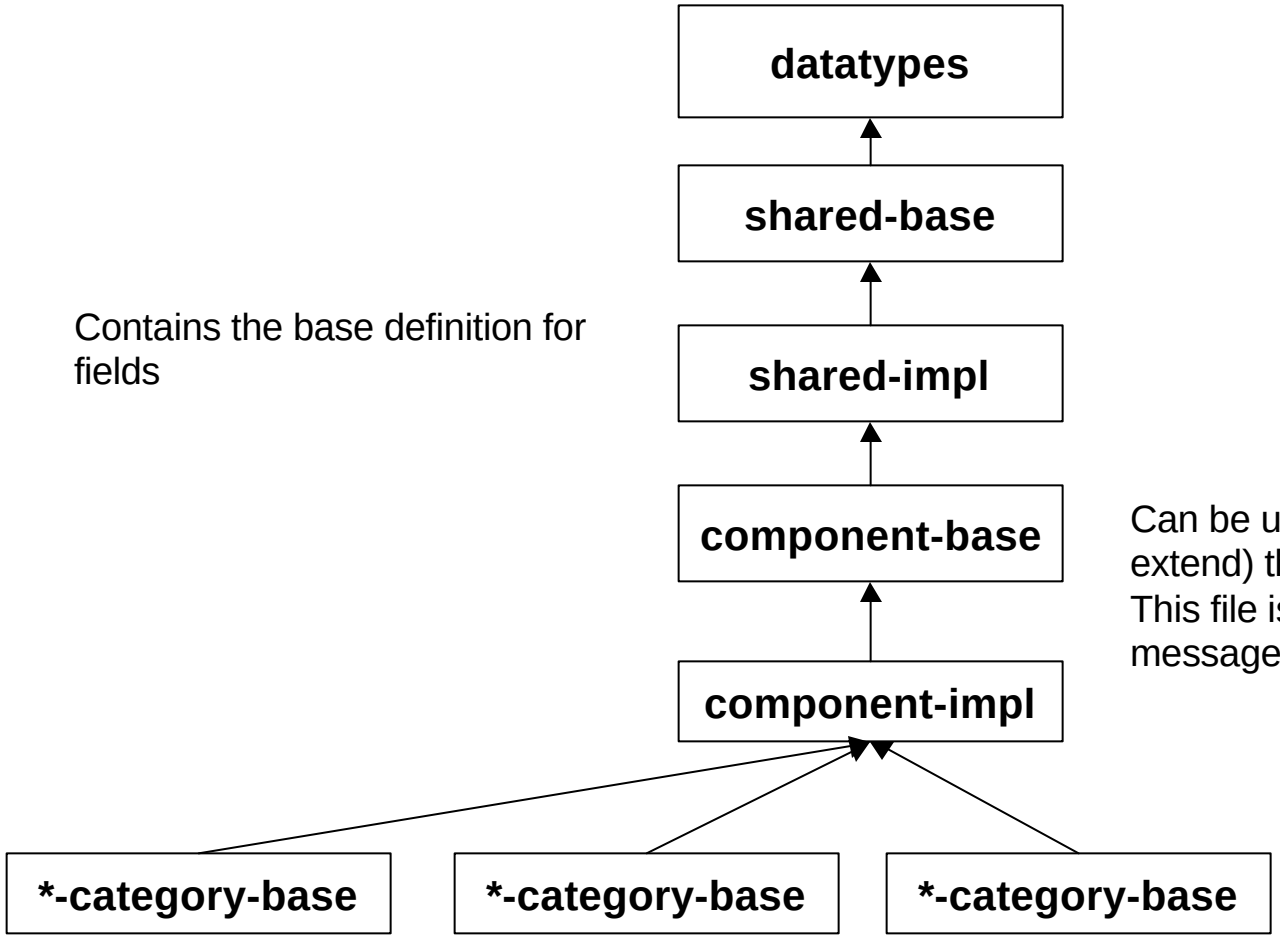
Schema File Hierarchy



Contains the base definition for fields

Can be used to modify (restrict or extend) the base definition
This file is referenced by the message schema files

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File Structure

- main
  - pretrade
    - indication
    - newsevents
    - quotation
    - marketdata
    - securitystatus
  - trade
    - singleorder
    - crossorder
    - multilegorder
    - listorder
  - posttrade
    - allocation
    - collateral
    - confirmation
    - positions
    - settlement
    - tradecapture
    - registration
  - other
  - shared

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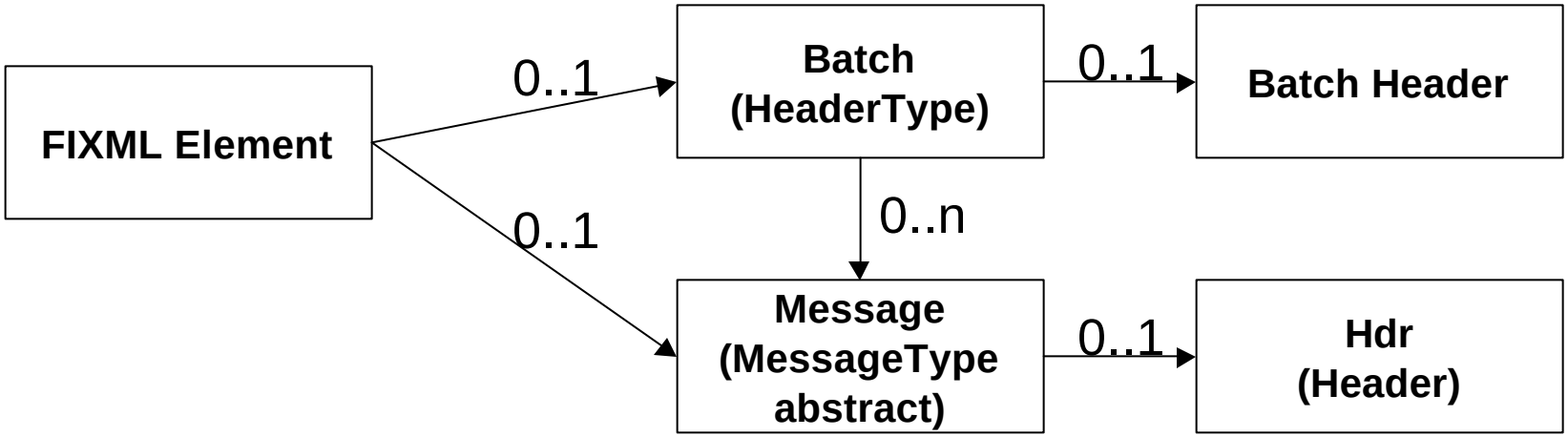
FIXML Document Structure



Single Message Usage

```
<FIXML>
    <OrderSingle>
       <Hdr/>
     </OrdSingle>
</FIXML>
```

Batch Message Usage

```
<FIXML>
   <Batch>
      <Hdr/>
      <OrdSingle>
        <Hdr/>
      </OrdSingle>
      <OrdSingle>
         <Hdr/>
      </OrdSingle>
    </Batch>
</FIXML>
```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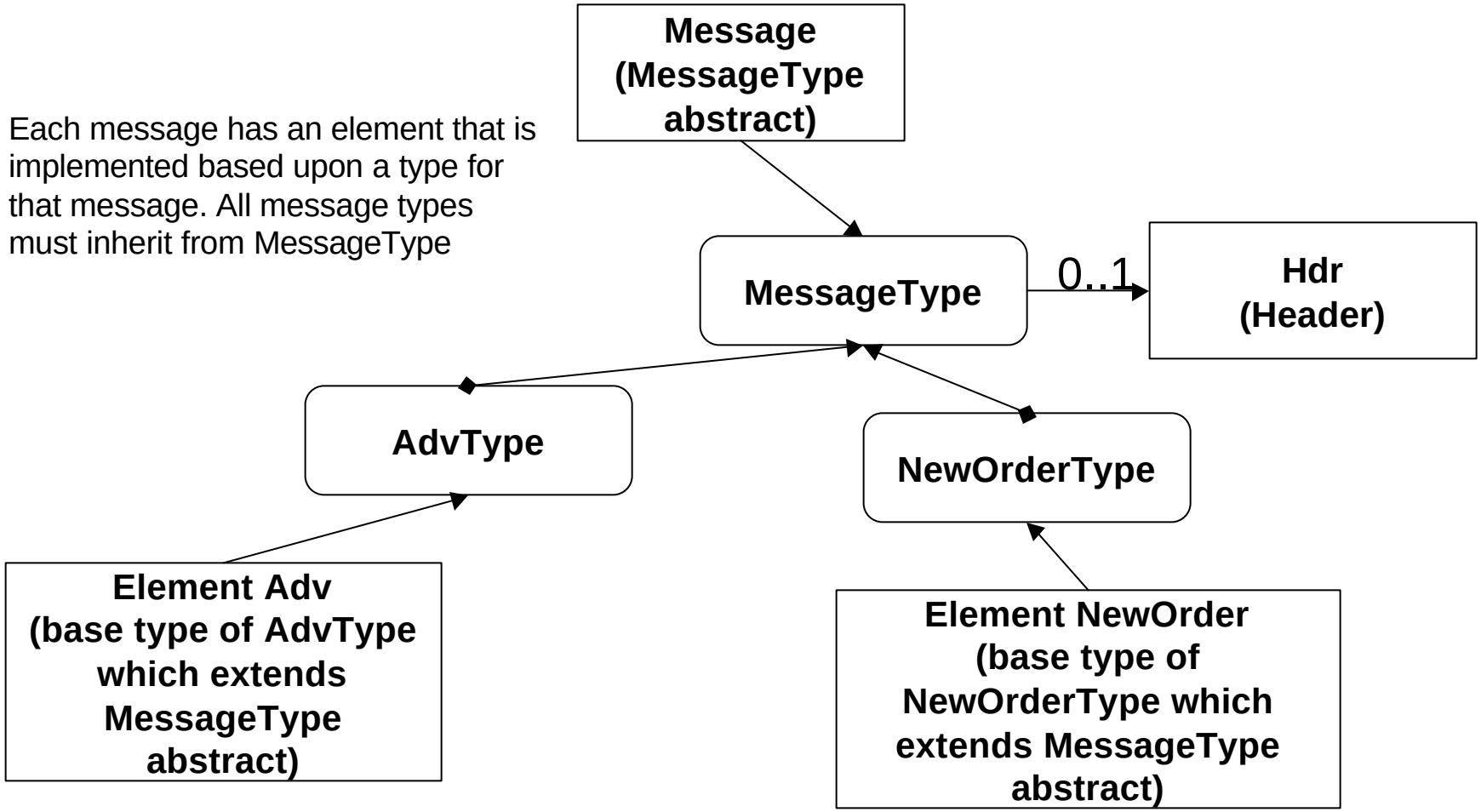
FIXML Message Structure

Each message has an element that is implemented based upon a type for that message. All message types must inherit from MessageType



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```
<xs:simpleType name="AvgPx_t">
    <xs:annotation>
      <xs:documentation xml:lang="en">
      Calculated average price of all fills on this order
      For Fixed Income trades AvgPx is always expressed as percent of par
regardless of the PriceType  423  of LastPx  3
AvgPx will contain an average of percent of par values  see LastParPx  669
for issues traded in Yield  Spread or Discount
      </xs:documentation>
      <xs:appinfo xmlns:x="http://www.fixprotocol.org/fixml/metadata.xsd">
          <xs:Xref Protocol="FIX" name="AvgPx" tag="6" datatype="Price"
ComponentType="Field"/>
          <xs:Xref Protocol="ISO_15022_XML"/>
      </xs:appinfo>
    </xs:annotation>
    <xs:restriction base="Price"/>
</xs:simpleType>
```


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```
            <xs:simpleType name="CommType_enum_t">
                        <xs:annotation>
                                    <xs:documentation xml:lang="en">Commission type Valid values:  =
per unit  implying shares  par  currency  etc   2 = percentage 3 = absolute  total monetary amount  4
=   for CIV buy orders  percentage waived   cash discount 5 =   for CIV buy orders  percentage waived
enhanced units 6 = points per bond or or contract   Supply ContractMultiplier  23  in the  Instrument
component block if the object security is denominated in a size other than the industry default   000
par for bonds
                        </xs:documentation>
                                    <xs:appinfo
xmlns:x="http://www.fixprotocol.org/fixml/metadata.xsd">
                                                <xs:Xref Protocol="FIX" name="CommType" tag="13"
datatype="char" ComponentType="Field"/>
                                                <xs:Xref Protocol="ISO_15022_XML"/>
                                    </xs:appinfo>
                                    <xs:appinfo
xmlns:x="http://www.fixprotocol.org/fixml/metadata.xsd">
                                                <x:EnumDoc value="1" desc="PerShare"/>
                                                <x:EnumDoc value="2" desc="Percent"/>
                                                <x:EnumDoc value="3" desc="Absolute"/>
                                                <x:EnumDoc value="4" desc="PctWaivedCshDisc"/>
                                                <x:EnumDoc value="5" desc="PctWaivedEnUnits"/>
                                                <x:EnumDoc value="6" desc="PerBond"/>
                                    </xs:appinfo>
                        </xs:annotation>
                        <xs:restriction base="xs:string">
                                    <xs:enumeration value="1"/>
                                    <xs:enumeration value="2"/>
                                    <xs:enumeration value="3"/>
                                    <xs:enumeration value="4"/>
                                    <xs:enumeration value="5"/>
                                    <xs:enumeration value="6"/>
                        </xs:restriction>
            </xs:simpleType>
```


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Versioning

- Explicit versioning in file name
  - Unlike other uses of XML - we felt that the version should be explicitly identified
- Attributes on <FIXML> element

V FIX Protocol Version “4.4”

r FIX Protocol Version release date “20030618”

S FIXML Schema release date “20031121”

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Documentation

- Guide
- This Presentation
- Schema documents
- Examples

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Distribution Packages

- Schema Zip file (.xsd files and documentation)
- Examples Zip file (Draft#2)

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Release Schedule

- October 30
  - Draft #1
  - Last day to submit comments for consideration for inclusion in next draft is set for November 14th
- November 20
  - Draft #2
  - Last day to submit comments for consideration is set for November 20th
- December 1
  - Final Release of FIXML 4.4 Schema Version

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