

Thursday 21st November2024

- Rules of Engagement with Orchestra -

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Agenda

- Orchestra Technical Standard
 - Objectives
 - Orchestra in a nutshell
- Orchestra Tools
 - Free tools
 - Open-source tools
- Rules of Engagement with Orchestra Tools
 - Tablature for message design
 - Pandoc for document generation
 - Orchimate for visualization of Orchestra XML files

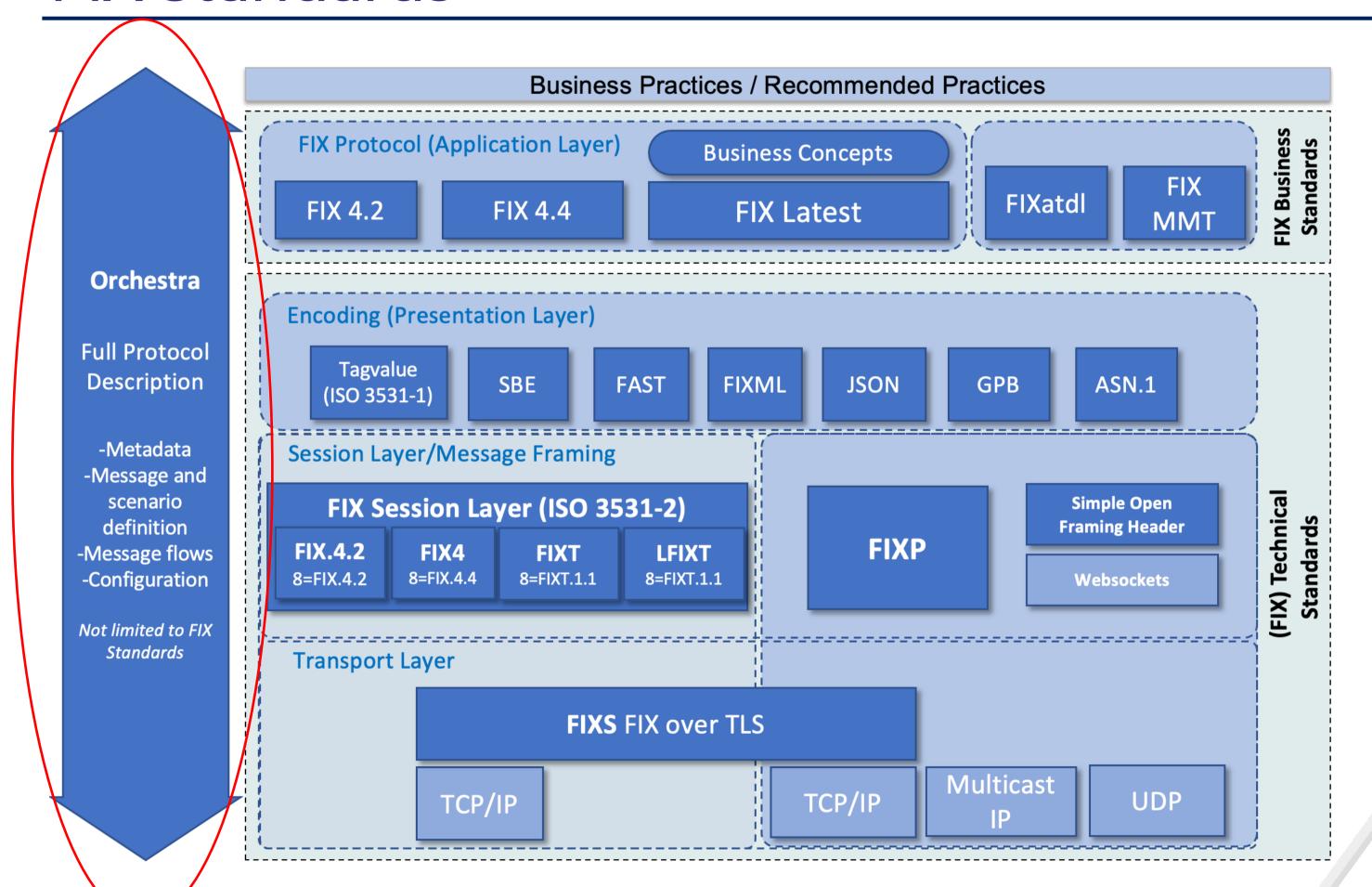








FIX Standards





Objectives for Orchestra

- Machine-readable standard for meta-data describing the content and behavior of an electronic messaging interface.
- Protocol agnostic to be applicable to FIX and non-FIX interfaces.
 - FIX Protocol (across all versions and flavors, including user-defined elements)
 - Regulatory protocols (e.g. US: SEC-CAT, Europe: ESMA/FCA, Asia: SFC-DS-OL)
 - Industry standard protocols (e.g. ISO 20022, FpML)
 - Proprietary protocols (trading venues, clearinghouses, buy/sell-side, vendors)
- Encoding agnostic to separate the business semantics from the wire format (standard/proprietary, ASCII/binary, with/without meta-data).
- Metadata for technical connectivity (counterparties, connections, sessions, versions, encodings, security,...)



Orchestra in a nutshell (application level)

Basic features

- Messages, groups, components, fields, code sets, codes, generic datatypes.
- Nesting of groups/components inside messages, groups, components.
- Simple presence rules (e.g. required, optional, ignored) for elements.
- Unique identification and versioning (a.k.a. pedigree) of all elements.

Advanced features

- Conditional rules defined with expressions (Score DSL).
- Scenarios for most elements to distinguish use cases.
- Workflows to support request/response models or complex negotiations.
- Actors and state machines to define transitions.



Orchestra in a nutshell (connection level)

Basic features

- An <u>interface</u> is a collection of services, protocols, sessions, and the transport exposed by a counterparty.
- A <u>service</u> is an offering of an application (e.g. order entry) and requires the identification of an Orchestra XML file describing the messages etc.
- A <u>protocol</u> relates to a specific layer of the technical stack of the interface, e.g. to the encoding or to the session protocol supported by the interface.
- A <u>session</u> describes the connection with a counterparty (e.g. IP addresses).
- A <u>transport</u> describes the lowest layer of the interface (e.g. TCP, UDP multicast).

Advanced features

- FIXatdl can be supported as the protocol used for the user interface and requires the identification of an FIXatdl XML file describing the GUI.
- A session may have an effective time (start/end time) to support configuration prior to use.
- A session definition may contain security keys (e.g. certificates, private keys) to be used when exchanging messages.



Orchestra Tools



Free Orchestra Tools

FIXimate

- Interactive, browser-based reference for the FIX Protocol Specification, generated from the Orchestra XML file of FIX Latest.
- Playlist*
 - Generates an Orchestra XML file as subset of a reference file in Orchestra XML format (e.g. FIX Latest) loaded into your local browser.
- Log2Orchestra*
 - Generates an Orchestra XML file by using FIX engine logfiles with tag=value encoding and an Orchestra XML reference file as input.
- Orchestra Server* (Esprow)
 - Interactive, browser-based tool to maintain a repository and export to an Orchestra XML file.
- Orchimate (Atomic Wire)
 - Interactive, browser-based tool to upload and display an Orchestra XML file in your local browser.



Orchestra Tools – FIXimate

https://fiximate.fixtrading.org

FIX.Latest_EP292 - English Search lastupdate Find all: Regex match: ^=start, \$=end, .=any char ☐ Match abbreviated name only Message Lookup type: Lookup Component: Name Lookup Field tag: Lookup Field name: Name Lookup Code set: Name About this orchestration **Message Summary** Components Fields Sorted by Tag Number Sorted by Field Name Sorted by Datatype **User Defined Fields Code Sets Datatypes Message Layouts** Session PreTrade Trade SingleGeneralOrderHandling DontKnowTrade ExecutionAck ExecutionReport NewOrderSingle OrderCancelReject OrderCancelReplaceRequest OrderCancelRequest OrderStatusRequest ProgramTrading OrderMassHandling CrossOrders MultilegOrders PostTrade

Infrastructure

NewOrderSingle [type 'D']

<Order>

The new order message type is used by institutions wishing to electronically submit securities and forex orders to a broker for execution.

The New Order message type may also be used by institutions or retail intermediaries wishing to electronically submit Collective Investment Vehicle (CIV) orders to a broker or fund manager for execution.

Pedigree Added FIX.2.7

Expand Components | Collapse Components

Field or Component	Field Name	Abbr Name	Req'd	Comments	Pedigree
Component					
Component	StandardHeader	Hdr	Υ	MsgType = D	Added FIX.2.7
11	ClOrdID	ID	Y	Unique identifier of the order as assigned by institution or by the intermediary (CIV term, not a hub/service bureau) with closest association with the investor.	Added FIX.2.7
2422	OrderRequestID	OrdReqID			Added EP188
526	SecondaryClOrdID	ID2			Added FIX.4.3
583	ClOrdLinkID	LnkID			Added FIX.4.3
2829	DuplicateClOrdIDIndicator	DupClOrdIDInd			Added EP253
Component	Parties	Pty		This is party information related to the submitter of the request.	Added FIX.4.3 Updated EP131

Тав	Field Name	Abbr Name		Union Datatype	Description	Pedigree
11		ClOrdID / ID in SingleGeneralOrderHandling	String		Unique identifier for Order as assigned by the buy-side (institution, broker, intermediary etc.) (identified by SenderCompID(49) or OnBehalfOfCompID(115) as appropriate). Uniqueness must be guaranteed within a single trading day. Firms, particularly those which electronically submit multi-day orders, trade globally or throughout market close periods, should ensure uniqueness across days, for example by embedding a date within the ClOrdID(11) field.	Added FIX.2.7 Updated EP282

Used in messages:

[CollateralAssignment][CollateralInquiry][CollateralInquiryAck][CollateralReport][CollateralResponse][Email][ExecutionAck][ExecutionReport][MultilegOrderCancelReplace] [NewOrderMultileg][NewOrderSingle][OrderCancelReject][OrderCancelReplaceRequest][OrderCancelRequest][OrderMassActionReport][OrderMassActionRequest][OrderMassCancelReport] [OrderMassCancelRequest][OrderStatusRequest][QuoteResponse][RegistrationInstructions][RegistrationInstructionsResponse][SettlementInstructions] [TradeCaptureReportRequest]

Used in components

[InstrmtStrkPxGrp][ListOrdGrp][OrdAllocGrp][OrdListStatGrp][OrderAggregationGrp][OrderEntryAckGrp][OrderEntryGrp][SideCrossOrdCxlGrp][SideCrossOrdModGrp][TradeReportOrderDetail]
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Orchestra Tools – Playlist v1.2

FIX Playlist

Creates a subset of an Orchestra file



Input

Source Orchestra file



Drag file to read or

Choose File

FIX Standard

OrchestraFIXLatest.xml

Use Selector File

Clear Input File

Output

Orchestra file to create (*.xml)

myorchestra.xml

Create Orchestra file

User Guide

Terms of Service

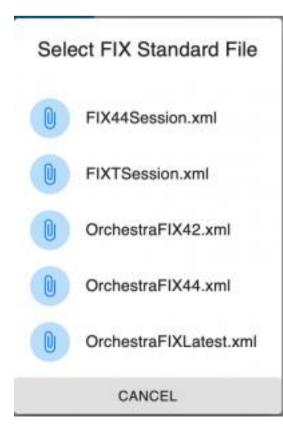
Select Your Content

(All elements sorted alphabetically. Greyed out items are deprecated)

- + MESSAGES
- + GROUPS
- + COMPONENTS
- FIELDS
 - + Tags 1-999
 - + Tags 1000-1999
 - + Tags 2000-2999
 - + Tags 40000-49999
- + CODESETS
- + DATATYPES

https://playlist.fixtrading.org

- NewOrderSingle(35=D) Account(1) - Type String AccountType(581) - Type AccountTypeCodeSet AcctIDSource(660) - Type AcctIDSourceCodeSet AffiliatedFirmsTradeIndicator(2525) - Type Boolean AllocID(70) - Type String AuctionAllocationPct(1804) - Type Percentage AuctionInstruction(1805) - Type AuctionInstructionCodeSet AuctionType(1803) - Type AuctionTypeCodeSet BookingType(775) - Type BookingTypeCodeSet BookingUnit(590) - Type BookingUnitCodeSet CancellationRights(480) - Type CancellationRightsCodeSet CashMargin(544) - Type CashMarginCodeSet ✓ ClOrdID(11) - Type String ClOrdLinkID(583) - Type String ClearingAccountType(1816) - Type ClearingAccountTypeCodeSet ClearingFeeIndicator(635) - Type ClearingFeeIndicatorCodeSet CommissionData - Component CommissionDataGrp - Group ComplianceID(376) - Type String ComplianceText(2404) - Type String ContraOrderOrigination(2882) - Type OrderOriginationCodeSet ContraRoutingArrangmentIndicator(2884) - Type RoutingArrangmentIndicatorCodeSet CopyMsgIndicator(797) - Type Boolean CoveredOrUncovered(203) - Type CoveredOrUncoveredCodeSet ✓ Currency(15) - Type Currency





Orchestra Tools – Log2Orchestra

https://log2orchestra.fixtrading.org

FIX Log to Orchestra

Creates an Orchestra file from one or more FIX message logs (tag-value encoding)

Input Configuration file for scenarios FIX message log files Reference Orchestra file (optional) Drag file to read or Drag file to read or Drag file to read or Choose File **Choose Files Choose File** FIX Standard **Clear Input Files** Output Orchestra file to create (*.xml) myorchestra.xml Append only (removes no scenarios) **Create Orchestra file** Help **Terms of Service**



Orchestra Tools – Orchestra Server

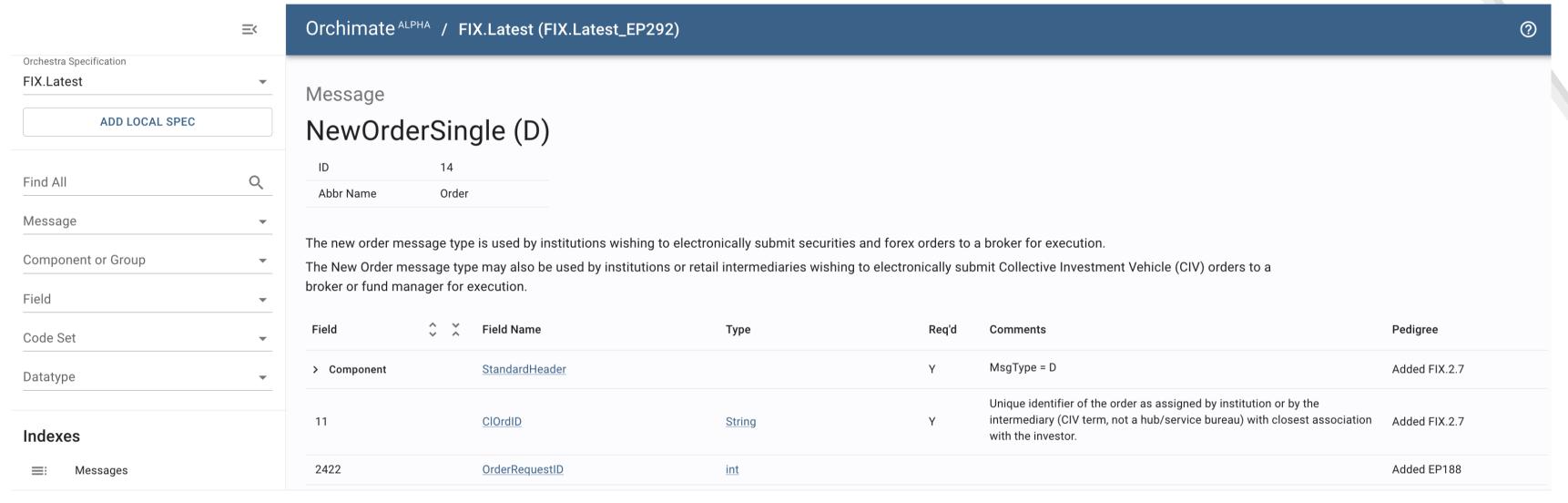
https://orchestra.sbox.esprow.com

< > No	lewOrderSingle [D] (base)		① View Details			
+ Add Element + Bulk Add Elements				Components Groups Fields Code Sets =		
	Name	/ Id ▼	Scenario	Presence T	Documentation	
• • •	+ StandardHeader	1024	base	required	MsgType = D	
• •	CIOrdID	11	base	required	Unique identifier of the order as assigned by institution or by the intermediary (
• •	ExDestination	100	base	optional		
• • •	— Instrument	1003	base	required	Insert here the set of "Instrument" (symbology) fields defined in "Common Com	
	Symbol	55	base	optional	Common, "human understood" representation of the security. SecurityID value c	
	SecurityID	48	base	optional	Takes precedence in identifying security to counterparty over SecurityAltID bloc	
	SecurityIDSource V	22	base	optional	Conditionally required when SecurityID(48) is specified.	
	ISINNumber 4	22004			ISIN	
• •	OrderQtyData	1011	base	required		
	OrderQty	38	base	optional	One of CashOrderQty, OrderQty, or (for CIV only) OrderPercent is required. Not	
• •	OrdType ∨	40	base	required		
	Market 1	40001			Market	
	Limit 2	40002			Limit	
· · · · · · · · · · · · · · · · · · ·	Price	44	base	optional	Required for limit OrdTypes. For F/X orders, should be the "all-in" rate (spot rate	
· · · · · ·	+ StandardTrailer	1025	base	required		



Orchestra Tools - Orchimate

https://orchimate.org



Field



Unique identifier for Order as assigned by the buy-side (institution, broker, intermediary etc.) (identified by SenderCompID(49) or OnBehalfOfCompID(115) as appropriate). Uniqueness must be guaranteed within a single trading day. Firms, particularly those which electronically submit multi-day orders, trade globally or throughout market close periods, should ensure uniqueness across days, for example by embedding a date within the ClOrdID(11) field.

Used in components: <u>TradeReportOrderDetail</u>

Used in groups: InstrmtStrkPxGrp, ListOrdGrp, OrdAllocGrp, OrdListStatGrp, OrderAggregationGrp, OrderEntryAckGrp, OrderEntryGrp, SideCrossOrdCxlGrp, SideCrossOrdModGrp

Used in messages: CollateralAssignment, CollateralInquiry, CollateralInquiry, CollateralInquiry, CollateralReport, CollateralReport, MultilegOrderCancelReplace, NewOrderMultileg, NewOrderSingle, OrderCancelReject, OrderCancelReplaceRequest, CollateralResponse, Email, ExecutionAck, ExecutionAck,



X

FIX Open-Source Orchestra Tools

- Tablature (.../tablature)
 - Simple authoring solution for Orchestra XML files (repository and interfaces).
 - Converts markdown document to an Orchestra XML file (optionally using a reference file in Orchestra XML format, e.g. FIX Latest) and vice versa.
- XML Diff/Merge (.../xml-diff-merge)
 - XML Diff compares two Orchestra XML files and generates a third file that represents their differences in IETF RFC 5261 format.
 - XML Merge takes a base Orchestra XML file and a difference file in IETF RFC 5261 format and merges the two to produce an updated Orchestra XML file
- Orchestra2QuickFIX (.../fix-orchestra-quickfix)
 - Converts an Orchestra Repository XML file to a QuickFIX dictionary.
- Orchestra2Avro (.../fix-orchestra-avro)
 - Utilities for the integration of Orchestra XML files and Apache Avro.



FIX Open-Source Tools – Orchestra Utilities

- Repository Validator
 - Validates that an XML file conforms to the Orchestra Repository schema.
- Interfaces Validator
 - Validates that an XML file conforms to the Orchestra Interfaces schema.
- Repository Compressor
 - Creates extracts from an Orchestra XML file by section or category.
- Unified2Orchestra
 - Populates an Orchestra XML file from a Unified Repository 2010 Edition file.
- Orchestra2Doc
 - Generates documentation for an Orchestra XML file that can be viewed in any web browser.



Rules of Engagement with Orchestra Tools





Rules of Engagement (application level)

Task

- Design a FIX Latest compliant interface with an order entry message and a response confirming a) the successful addition to the order book and b) the partial or full execution of the order.
- The order needs to support ticker symbols and ISINs for the security.
- Order attributes are type (market or limit), side, price, quantity, target venue and an optional custom fields "MyUDF1" (string) and "MyUDF2" (enums) for additional information.

Approach

- Use spreadsheet to define your messages.
- Write Tablature markdown file with FIX Latest as reference file.
 - 1. Define standard elements of messages (NewOrderSingle(35=D), ExecutionReport(35=8))
 - 2. Define standard elements of components (Instrument, OrdQtyData)
 - 3. Define standard subsets for code sets (SecurityIDSource(22), OrdType(40), Side(54), ExecType(150), OrdStatus(39), MsgType(34), BeginString(8))
 - 4. Add your RoE text, define your custom fields and add them to messages, components
- Convert markdown to Orchestra XML with Tablature (machine-readable RoE)
- Convert markdown to PDF document with Pandoc (human-readable RoE)



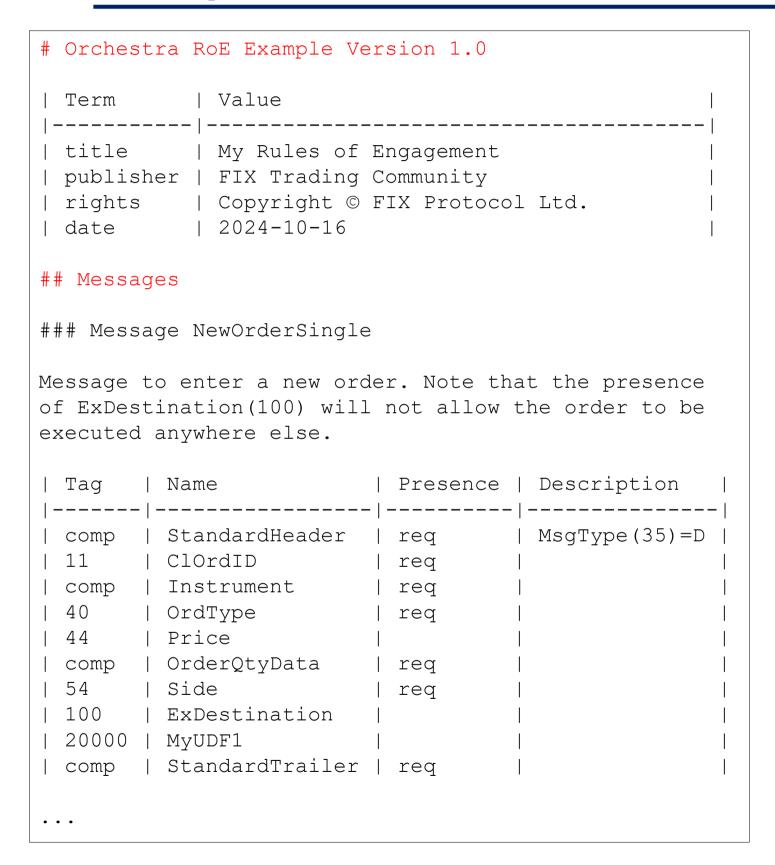
Step 1: Define messages in spreadsheet

Message	Component	Field	Value(s)
NewOrderSingle(35=D)		BeginString(8)	FIXT.1.1
		ClOrdID(11)	
	Instrument	Symbol(55)	
	Instrument	SecurityID(48)	
	Instrument	SecurityIDSource(22)	4=ISIN
		OrdType(40)	1=Market
			2=Limit
		Price(44)	
	OrderQtyData	OrderQty(38)	
		Side(54)	1=Buy
			2=Sell
		ExDestination(100)	
		MyUDF1(20000)	

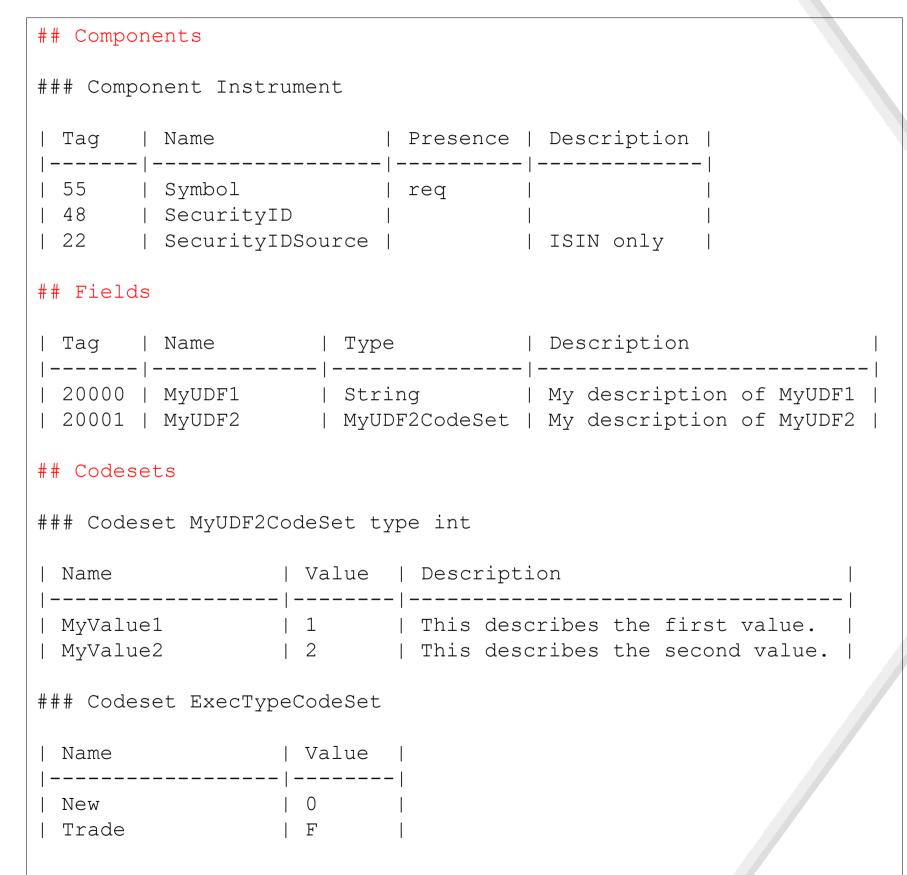
Message	Component	Field	Value(s)
ExecutionReport(35=8)		BeginString(8)	FIXT.1.1
		ClOrdID(11)	
		OrderID(37)	
	Instrument	Symbol(55)	
	Instrument	SecurityID(48)	
	Instrument	SecurityIDSource(22)	4=ISIN
		OrdType(40)	1=Market 2=Limit
		Price(44)	
	OrderQtyData	OrderQty(38)	
		Side(54)	1=Buy 2=Sell
		ExDestination(100)	
		ExecID(17)	
		ExecType(150)	0=New F=Trade
		OrdStatus(39)	0=New 1=Partially Filled 2=Filled
		LeavesQty(151)	
		CumQty(14)	
		LastQty(32)	
		LastPx(31)	
		MyUDF1(20000)	
		MyUDF2(20001)	1=MyValue1 2=MyValue2



Step 2: Use Tablature markdown



The complete markdown file only has 150 lines.





Step 3: Convert markdown to Orchestra XML

```
<?xml version="1.0" encoding="UTF-8" standalone="yes"?>
    <fixr:repository xmlns:dc="http://purl.org/dc/elements/1.1/"
         xmlns:dcterms="http://purl.org/dc/terms/"
         xmlns:fixr="http://fixprotocol.io/2020/orchestra/repository"
         name="Orchestra RoE Example Version 1.0" version="1.0">
         <fixr:metadata>
             <dcterms:title>My Rules of Engagement</dcterms:title>
             <dcterms:publisher>FIX Trading Community</dcterms:publisher>
             <dcterms:rights>Copyright © FIX Protocol Ltd.</dcterms:rights>
10
             <dcterms:date>2024-10-16</dcterms:date>
11
         </fixr:metadata>
12 >
         <fixr:datatypes>=
114 >
         <fixr:codeSets>=
187 >
         <fixr:fields>=
         <fixr:components>=
380 >
         <fixr:groups/>
410
         <fixr:messages>==
     </fixr:repository>
483
```

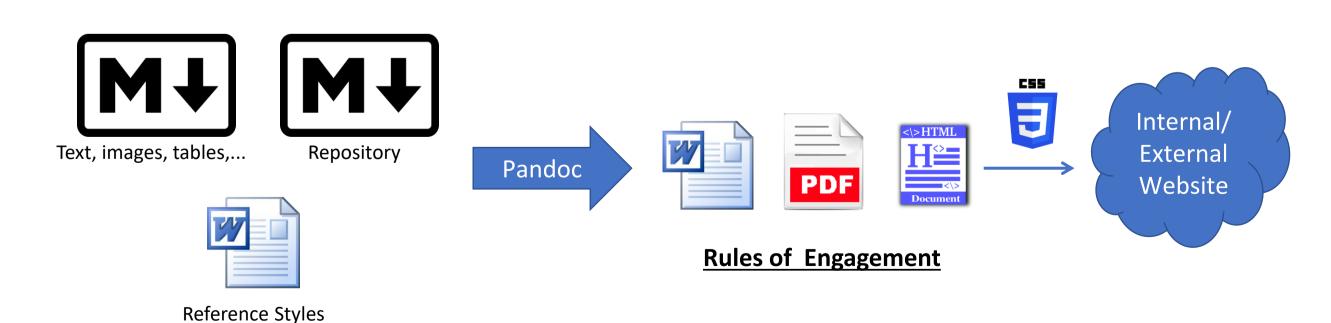
- Standard field definitions and datatypes are automatically retrieved from the FIX Latest reference file.
- Messages, groups, components, and code sets are only subsets of FIX Latest if they are contained in the markdown file.
- Messages, groups, components, fields, and code sets are completely absent if they are not used in the markdown file.
- User-defined fields and code sets need to be fully defined in the markdown file, not in the reference file.

The complete Orchestra XML file for FIX Latest has 163,813 lines as of EP292!



Step 4: Convert markdown to PDF document

- Create separate markdown file(s) for chapters preceding or following the chapter defining the repository, i.e. your markdown file used to create an Orchestra XML file.
- Create a Pandoc (https://www.pandoc.org, open source) reference style document in Microsoft Word to define layout of your Rules of Engagement document. You only need to create it once and can then use it for all of your specifications.
- Create a YAML file to define the content of your title page.
- Generate your Rules of Engagement document (docx/pdf) from your markdown file(s) with Pandoc using the reference style document.
- Optionally, generate an online version of your Rules of Engagement (html) for your website using your standard CSS file for the look-and-feel.





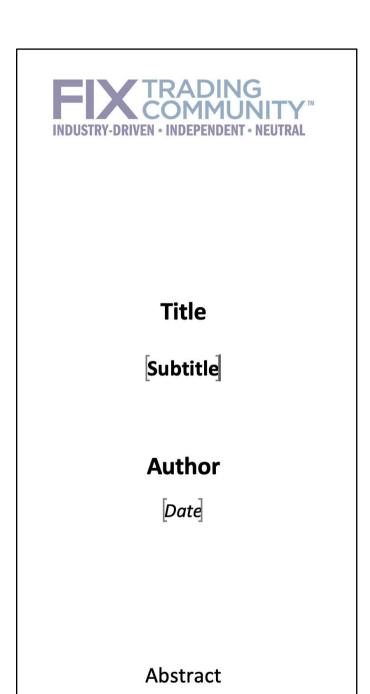
Pandoc Reference Style Document

1.1.1 Heading 3

Text of Heading 3

1.1.1.1 Heading 4

Text of Heading 4



Sample title page

Company – My Application Version 1.0	October 2024
OC Heading	
	
Heading 1	3
1.1 Heading 2	3
1.1.1 Heading 3	3
1.1.1.1 Heading 4	3
	Company – My Application Version 1.0 C Heading Heading 1

Sample layout for page header and table of contents

Title of Table Col 1 Col 2 Col 3 Col 4 Row 1 Row 2 Text of Heading 2 Text of Heading 2

Table caption
Image Caption

```
title: "My Company Name"
subtitle: "My Application Name"
author:
- "Rules of Engagement"
- "Version 1.0"
date: "October 16, 2024"
abstract: "Simulation Version"
---
```

Sample YAML file

Sample layout for chapter headings, tables, and captions



Rules of Engagement Document



My Company Name

My Application Name

Rules of Engagement

Version 1.0

October 16, 2024

Simulation Version

My Company – My Application Version 1.0 October 2024 **Table of Contents** 1 Orchestra RoE Example Version 1.0..... Component Instrument Component OrderQtyData......4 Component StandardHeader......4 1.3 Fields.. Codeset ExecTypeCodeSet......5 Codeset MyUDF2CodeSet type int.......5 Codeset MsgTypeCodeSet5 Codeset OrdStatusCodeSet.......5 Codeset SecurityIDSourceCodeSet Codeset SideCodeSet

1.1 Messages

1.1.1 Message NewOrderSingle

Message to enter a new order. Note that the presence of ExDestination(100) will not allow the order to be executed anywhere else.

Tag	Name	Presence	Description
comp	StandardHeader	req	MsgType(35)=D
11	ClOrdID	req	
comp	Instrument	req	
40	OrdType	req	
44	Price		
comp	OrderQtyData	req	
54	Side	req	
100	ExDestination		
20000	MyUDF1		
comp	StandardTrailer	req	

Table of contents

Message definition with UDFs

1.3 Fields

Tag	Name	Туре	Description
20000	MyUDF1	String	My description of MyUDF1
20001	MyUDF2	MyUDF2CodeSet	My description of MyUDF2

Value Description Name MyValue1 This describes the first value. MyValue2 2 This describes the second value.

1.4.3 Codeset MyUDF2CodeSet type int

Custom field definitions

Custom code set definition



Title page

Rules of Engagement Visualization

