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Part 4: XML Schema generation

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ISO copyright office
CP 401 • Ch. de Blandonnet 8
CH-1214 Vernier, Geneva
Phone: +41 22 749 01 11
Email: copyright@iso.org
Website: www.iso.org

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Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular, the different approval criteria needed for the different types of ISO document should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

ISO draws attention to the possibility that the implementation of this document may involve the use of (a) patent(s). ISO takes no position concerning the evidence, validity or applicability of any claimed patent rights in respect thereof. As of the date of publication of this document, ISO had not received notice of (a) patent(s) which may be required to implement this document. However, implementers are cautioned that this may not represent the latest information, which may be obtained from the patent database available at www.iso.org/patents. ISO shall not be held responsible for identifying any or all such patent rights.

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For an explanation of the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT), see www.iso.org/iso/foreword.html.

This document was prepared by Technical Committee ISO/TC 68, *Financial services*, Subcommittee SC 9, *Information exchange for financial services*.

This second edition cancels and replaces the first edition (ISO 20022-4:2013), which has been technically revised.

The main changes are as follows:

— Annotation is included to benefit users with meaningful information directly in the schema. Schema are generated into different folders with and without annotation. Annotations include information relevant to each concept such as full unabbreviated name, definition, identification scheme, unit code, base value, meaning when true or false and versioning information.

— Minor versions are supported with the addition of optional attributes to indicate the draft, revision and variation of the MessageDefinition. This metadata benefits users by enabling message writers to include compatibility of content with minor versions in the same namespace as the major version.

— Identification of message content is supported by permitting an optional "id" attribute on compound content. These can be referenced by elements for MessageAssocationEnds, and "ref" attributes on elements for Pointer types. This benefits users by making it simple to reference existing types without additional modelling of an explicit identifier and enables extension by direct reference of content in the same message. The previous edition required explicit modelling of identifiers and references.

— CodeSets with Codes are distinguished from those without Codes used to reference other code lists that are external to the schema.

— If a MessageDefinition has a root element, then a global element and type is generated for it instead of a global element named for the MessageDefinition.

— MessageBuildingBlock is specified separately to MessageElement.

— Text types can indicate the language of the text, which is useful if it differs from the default. An attribute “lang” of type “language” added to generation of Text types, if the language use is specified.

— Boolean and String are generated, and Integer has been removed, to match Metamodel Metaclasses.

— Binary types are generated as base64 by default, or as hexBinary if a preferred text encoding is specified in the model.

— Only user defined classes and data types are transformed. XML Schema datatypes are generated for user-defined DataTypes, but not for the Repository's XML Schema Type Library which has been replaced by ISO/IEC 11404.

— Regrouping and reordering of metaclass and data type clauses and table entries, instead of English collation order.

A list of all parts in the ISO 20022 series can be found on the ISO website.

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

Introduction

The ISO 20022 series defines a scalable, methodical process to ensure consistent descriptions of messages throughout the financial services industry.

The purpose of the ISO 20022 series is to describe precisely and completely the externally observable aspects of financial services messaging in a way that can be verified independently against operational messaging.

The trigger for the creation of the ISO 20022 series was the rapid growth in the scale and sophistication of messaging within financial services during the 1990s using the ISO 15022 series. The financial services industry (hereafter referred to as "the industry") created the first version of the ISO 20022 series as the successor to the ISO 15022 series in response to that trigger. Since the ISO 15022 series, the industry has broadened the scope from securities to the entire industry for the ISO 20022 series.

The ISO 20022 series is based on open technology standards, which historically have evolved more rapidly than the industry itself. Consequently, the ISO 20022 series adopted a model-driven approach where the model of the industry's messaging can evolve separately from the evolution of the messaging technology standards. The period during which the ISO 20022 series has emerged followed the widespread adoption of the internet for business. The eXtensible Mark-up Language (XML) emerged as the de facto standard for document representation on the internet and it became the first syntax for the ISO 20022 series.

The modelling process is further refined into three levels which, in addition to the messaging technology standard, is why the ISO 20022 series is based on four levels: the scope level, the conceptual level, the logical level and the physical level. This four-level approach is based on the first four levels of the Zachman Framework[14]. The remaining two levels of the Zachman Framework are equivalent to the implementations and the operational levels, respectively.

In ISO 20022-1, the first, second and third levels are described in Unified Modelling Language (UML) because it is widely supported and supports multiple levels of abstraction. The models created in accordance with ISO 20022-1 are technology independent in that they do not require any particular physical expression or implementation. Such models aim to describe all parts of the message exchange. The models form the definition of the protocol between participants exchanging messages. ISO 20022-1 defines a method that describes a process by which these models can be created and maintained by the modellers.

The model and the physical level artefacts are stored in an ISO 20022 Repository (hereafter referred to as "the Repository"). The Repository and physical level artefacts are exposed in a publicly accessible location, such as a website, serviced by a Registration Authority. The name and contact information of the Registration Authority for the ISO 20022 series can be found at www.iso.org/maintenance_agencies.

The Repository is organized into two areas:

— a DataDictionary containing the industry model elements likely to have further or repeated use;

— a BusinessProcessCatalogue that contains models describing specific MessageDefinitions and business processes and physical syntax implementations.

The ISO 20022 series is organized into the following parts:

— ISO 20022-1 describes the metamodel of all the models and the Repository according to ISO/IEC 19502:2005 (MOF).

— ISO 20022-2 covers the UML profile, a grounding of general UML into a specific subset defined for the ISO 20022 series (to be used when UML is selected to define the models).

— ISO 20022-3 describes a modelling method to produce models for the ISO 20022 series.

— This document covers XML schema generation rules to transform a logical level model into a physical level description in the syntaxes.

— ISO 20022-5 covers business concept model interoperability, and logical model alignment and reverse engineering.

— ISO 20022-6 covers message transport characteristics that define the quality of service required by the business process definitions so that they can operate successfully.

— ISO 20022-7 describes the process of managing the registration of models and physical syntax implementations.

— ISO 20022-8 gives ASN.1 syntax generation rules to transform a logical level model into a physical level description in ASN.1.

— ISO 20022-9 describes generic guidelines, which are used to define schema generation rules for any specific syntax.

Financial services — Universal financial industry message scheme —

Part 4: XML Schema generation

1 Scope

This document complements the ISO 20022 Metamodel, as specified in ISO 20022-1, with the XML syntax transformation rules to be applied by the ISO 20022 Registration Authority in order to translate an ISO 20022 compliant MessageDefinition into an XML Schema for the description and validation of XML Messages.

It specifies the transformation rules from the Logical to the Physical level. It is a deterministic transformation, meaning that the resulting XML Schema is completely predictable for a given MessageDefinition. There is neither manual input to the transformation itself nor manual adjustment to the result of the transformation.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 20022-1, *Financial services — Universal financial industry message scheme — Part 1: Metamodel*

RFC 5141, *A Uniform Resource Name (URN) Namespace for the International Organization for Standardization (ISO)*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 20022-1 apply.

ISO and IEC maintain terminology databases for use in standardization at the following addresses:

— ISO Online browsing platform: available at https://www.iso.org/obp

— IEC Electropedia: available at https://www.electropedia.org

4 Background

XML is a standard defined by the World Wide Web Consortium (W3C) that is used for the representation (i.e. the syntax) of standardized ISO 20022 MessageDefinitions. XML leaves a lot of freedom for the exact way it is used in a particular application. Therefore, merely stating that XML is used is not sufficient to guarantee predictability; it is also necessary to explain how it will be used.

This document contains a set of XML design rules. These design rules define how a MessageDefinition is transformed into an ISO 20022 XML Schema, which is used to validate that a message instance, as an XML document, conforms with the structure, data types and constraints of an ISO 20022 MessageDefinition. ISO 20022 XML Schema are annotated with documentation and application information to aide operational staff and software developers to understand messages.