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Information technology — JPSearch —

Part 3: Query format

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Partie 3: Format d'interrogation

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Contents

Page

Foreword

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ISO/IEC 24800-3 was prepared by Joint Technical Committee ISO/IEC JTC 1, *Information technology*, Subcommittee SC 29, *Coding of audio, picture, multimedia and hypermedia information*.

ISO/IEC 24800 consists of the following parts, under the general title *Information technology — JPSearch*:

— *Part 1: System framework and components*

— *Part 2: Registration, identification and management of schema and ontology*

— *Part 3: Query format*

— *Part 4: File format for metadata embedded in image data (JPEG and JPEG 2000)*

The following part is under preparation:

— *Part 5: Data interchange format between image repositories*

Reference software will form the subject of a future Part 6.

Introduction

ISO/IEC 24800 aims to provide a standard for interoperability for still image search and retrieval systems. There are many systems which provide image search and retrieval functionality on computer desktops, on the World Wide Web (i.e., websearch), on imaging devices, and in other consumer and professional applications. Existing systems are implemented in a way that tightly couples many components of the search process. ISO/IEC 24800 provides an abstract framework search architecture that decouples the components of image search and provides a standard interface between these components.

Aligning image search system design to this standard framework facilitates the use and reuse of metadata; the use and reuse of profiles and ontologies to provide a common context for searching; and the provision of a common query language to easily search across multiple repositories with the same search semantics. It allows image repositories to be independent of particular system implementations; and allows users to easily move or upgrade their image management applications or to move to a different device or upgrade to a new computer.

This part of ISO/IEC 24800 contains the tools of the JPEG Query Format (JPQF) as an adaptation for the still images domain of ISO/IEC 15938-12:2008. It addresses the normative aspects of the Query Format and also illustrates some non-normative examples.

Information technology — JPSearch —

Part 3:
Query format

1 Scope

This part of ISO/IEC 24800, also known as “JPSearch Query Format (JPQF)”, provides a standardized interface for image search and retrieval systems in three aspects: Input Query Format, Output Result Format, and Query Management. The Input Query Format provides users/systems with a set of precise input parameters to describe their search criteria in addition to a set of preferred output parameters to depict the return result sets. The Output Result Format provides users/systems with a set of output parameters to describe the aggregated return result sets for user presentation or machine consumption. The Query Management provides a means for selecting services (e.g., MPEG-7 database) or aggregated services (e.g., service provider that administers a set of different services) based on service properties (e.g., supported query format). The goal is to define a query language that provides the industry with a standardized format to accept and respond to user/system specification for image searches.

2 Normative references

The following referenced documents are indispensable the application 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/IEC 15938-12, *Information technology — Multimedia content description interface — Part 12: Query format*

XQuery 1.0 and XPath 2.0 Data Model (XDM). W3C Recommendation, 23 January 2007. http://www.w3.org/TR/xpath-datamodel/

XML Path Language (XPath) 2.0. W3C Recommendation, 23 January 2007. http://www.w3.org/TR/xpath20/

3 Terms, definitions, abbreviated terms and conventions

3.1 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

3.1.1
input query format
interface format going from a requester to one or more responders with two functionalities:

1) provision of a combination of syntax and semantics of the interface, through which the requester assigns search criteria and associated data;

2) provision of syntax and semantics of the interface, through which the requester specifies the format of the result data

NOTE The second functionality of the input query format provides tools by which the requester can express desired output format that should be conformant to the specification of the output result format.

3.1.2
output result format
interface format going from the responder to the requester as a response to the request specified by the input query format

NOTE Output Result Format defines all possible structures of return from responder to the requester. The structure of an actual return is decided by OutputDescription element in Input Query Format.

3.1.3
query management tools
tools to support the functionality required to manage the query transaction between the requesters and the responders

NOTE The query management tools do not include tools that are supported by network protocols. The query management tools are intended to be network agnostic and media agnostic.

3.1.4
multimedia content
coded representation of the information contained in or related to a multimedia resource in a formalized manner suitable for interpretation by human means

3.1.5
content
data and the associated metadata

3.1.6
multimedia resource
URI identifiable portion of raw data of an image in JPEG format, which is associated with a MIME Content-Type

3.1.7
metadata
data expressed as a schema valid XML instance to carry additional information describing a multimedia resource, where the schema defines the information model of the data

3.1.8
evaluation item
EI
unit against which the query condition is tested

NOTE By default, an EI is a multimedia content of the multimedia repository, but other types of EI are also possible: a multimedia content; a segment of a multimedia resource; and an XPath-item related to the multimedia content's metadata XML tree.

3.1.9
segment
spatial, temporal, or spatio-temporal unit of multimedia

EXAMPLE A spatial segment of an image.

3.1.10
XPath-item
node from the multimedia content's metadata XML tree or an atomic value

NOTE Details about the different types of nodes and atomic values can be found in the W3C Recommendation on XQuery 1.0 and XPath 2.0 Data Model. An XPath-item of a multimedia content's metadata may or may not be related to a multimedia content's segment. Also, a multimedia content or a multimedia content's segment may or may not be related to XML metadata. Within JPQF queries, XPath can be used to select a sequence of multimedia content's segments and/or metadata XPath-items. According to the W3C Recommendation on XQuery 1.0 and XPath 2.0 Data Model, a sequence is an ordered collection of zero or more XPath-items.

3.2 Abbreviated terms

MPEG-7 ISO/IEC 15938

JPQF JPEG Query Format (ISO/IEC 24800-3)

URI Uniform Resource Identifier (IETF Standard is RFC 2396)

URL Uniform Resource Locator (IETF Standard is RFC 2396)

XML Extensible Markup Language (W3C, http://www.w3.org/XML/)

3.3 Conventions

The Syntax defined in this part of ISO/IEC 24800 assumes the following Schema Wrapper.

```
<schema xmlns:jpqf="urn:jpeg:jpqf:schema:2008"
xmlns="http://www.w3.org/2001/XMLSchema"
xmlns:mpqf="urn:mpeg:mpqf:schema:2008"
targetNamespace="urn:jpeg:jpqf:schema:2008" elementFormDefault="qualified"
attributeFormDefault="unqualified">
<import namespace="urn:mpeg:mpqf:schema:2008" schemaLocation="mpqf.xsd"/>
```


4 Structure and data model

4.1 Structure

As shown in Figure 1, JPSearch architecture is conceptually divided into four layers, which are User Layer, Query Layer, Management Layer and Content Layer. The interfaces marked with rounded pink boxes are within the scope of this part of ISO/IEC 24800. Data flow between each layer is defined as Input Query and Output Result. Where the nature of the data flow is requesting information, it is defined as Input Query and when the nature of the data flow is returning data upon a request, it is defined as Output Query. This part of ISO/IEC 24800 defines the format for input queries and output results which are used not only between the user layer and the query layer, but also between all other layers, as defined in the architecture, so that each layer of the JPSearch system can be implemented and maintained in a distributed way. This part of ISO/IEC 24800 also defines the messages for querying and providing information regarding the service description, service discovery and selection. The tools specifically serving these purposes are called Management tools.

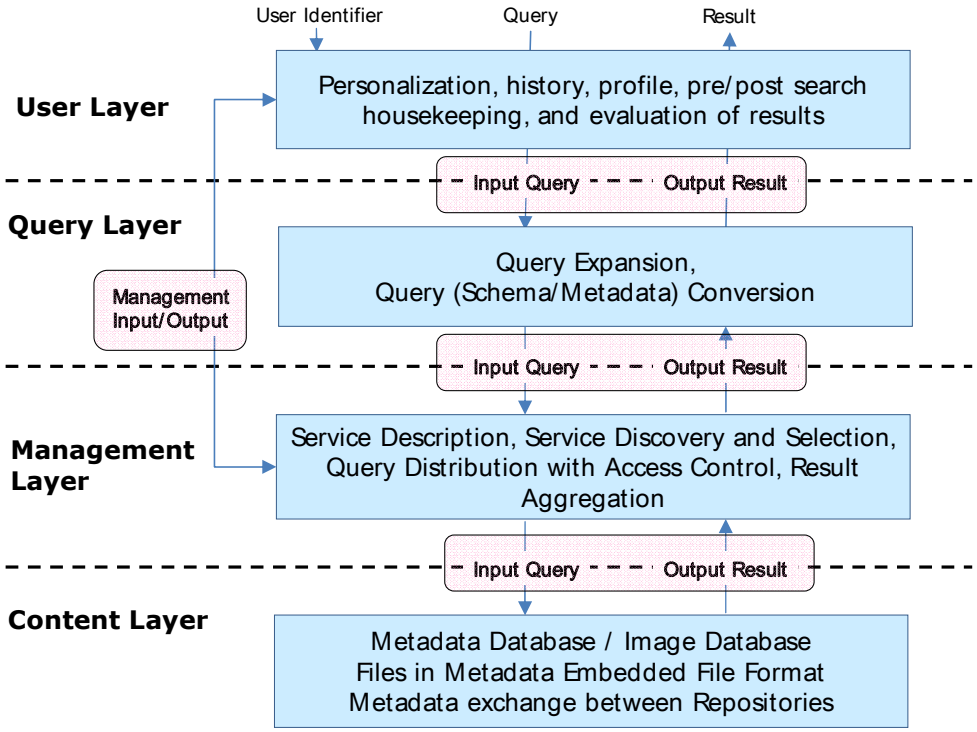

Figure 1 — JPSearch architecture and scope of this part of ISO/IEC 24800

The JPEG Query Fomat is defined as the complex type of element named JPEGQuery. The JPEGQuery contains a choice of InputQuery, FetchResult, OutputResult, and Management elements. This simplified structure of the JPEGQuery element is depicted in Figure 2.

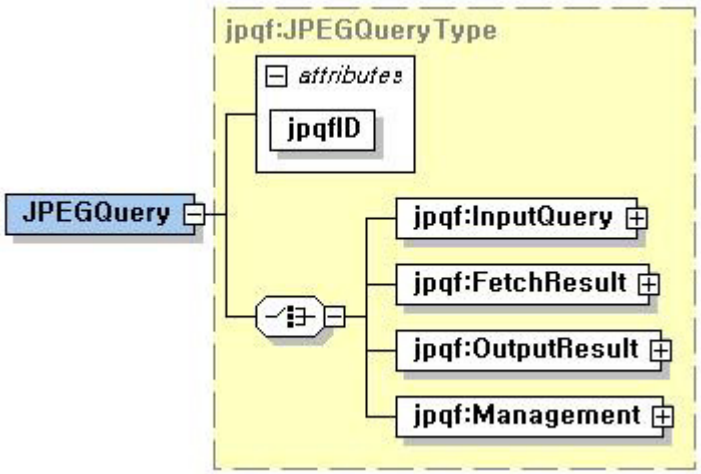

Figure 2 — Schema overview of the uppermost elements of the JPEG Query Format

Table 1 explains these four elements in more detail:

Table 1 — Top-Level JPEGQuery elements

`InputQuery`	The `InputQuery` element provides a container for describing a query request. Such a request can consist of a query condition and/or the output description which specifies the structure and content of the output result format and/or some declaration parts.
`FetchResult`	The `FetchResult` element is also part of the Input Query Format. It allows the user to request the results of a previous query issued using e.g., the asynchronous mode.
`OutputResult`	The `OutputResult` element describes the Output Result Format. It provides a container for output result returned from servers or returned from lower layers of the JPSearch architecture. It may contain not only query results but also any messages such as errors, exceptions or comments.
`Management`	A set of tools for the query management defined for the JPEG Query Format including service discovery, querying service capability, and service capability description. The structure defined for the `Management` element provides a container for Management Input Tools or the Management Output Tools.

Note that the `Input` and the `FetchResult` elements belong to the Input Query Format, which provides a container for describing a query request (e.g., the query condition and/or the output description which specifies the structure and content of the output result format).

The `Management` element of the JPEG Query Format represents the Query Management Tools of the Query Format as defined in ISO/IEC 15938-12:2008. It describes a set of tools for the query management including service discovery, querying service capability, and service capability description. Similar to the query tools (Input Query Format and Output Result Format), the management part distinguishes the tools for the request (Input Management Type) and the response (Output Management Type). Table 2 depicts the containing elements in more detail.

Table 2 — Elements in Query Management Tools

`Input`	The `Input` element, which is defined for the management tools, is intended to be sent from a requester to one or more responders.
`Output`	The `Output` element, which is defined for the management tools, is intended to be sent from a responder to one requester.

4.2 Data model

Processing and evaluation of a JPFQ query is executed against one or more multimedia repositories. Note, all introduced terms used within this Subclause are explained in 3.1.

JPQF assumes the same data model defined in 1.3 of ISO/IEC 15938-12:2008. For details of the data model, refer to 1.3 of ISO/IEC 15938-12:2008.

5 Root Element

5.1 Introduction

The `JPEGQuery` element serves as the root element of the JPEG Query Format. The root element shall be used as the topmost element in all messages transmitted. This applies on the one side to the input query format and the output result format of a query request/response as well as on the other side to the query management of the input/output.

5.2 Syntax

```
<element name="JPEGQuery" type="jpqf:JPEGQueryType"/>

<complexType name="JPEGQueryType">
  <choice>
     <element name="InputQuery" type="jpqf:InputQueryType"/>
     <element name="FetchResult">
        <complexType>
           <attribute name="queryID" type="anyURI"/>
           <attribute name="retrievePageNum" type="positiveInteger"/>
        </complexType>
     </element>
     <element name="OutputResult" type="mpqf:OutputQueryType"/>
     <element name="Management">
        <complexType>
           <choice>
              <element name="Input" type="jpqf:InputManagementType"/>
              <element name="Output" type="jpqf:OutputManagementType"/>
           </choice>
        </complexType>
     </element>
  </choice>
  <attribute name="jpqfID" type="anyURI" use="required"/>
</complexType>
```