BSI Standards Publication

Information technology — Object oriented BioAPI

Part 1: Architecture

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National foreword

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Part 1: Architecture

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Partie 1: Architecture

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Foreword

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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 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).

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For an explanation on the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the WTO principles in the Technical Barriers to Trade (TBT) see the following URL: Foreword - Supplementary information

The committee responsible for this document is ISO/IEC JTC 1, *Information technology*, SC 37, *Biometrics*.

ISO/IEC 30106 consists of the following parts, under the general title *Information technology — BioAPI for object oriented programming languages*:

— *Part 1: Architecture*

— *Part 2: Java implementation*

— *Part 3: C# implementation*

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Introduction

The existing versions of BioAPI (ANSI version-INCITS 358 and ISO/IEC 19784-1) specify an application programming interface expressed in the C language. The use of a portable language like C ensures the BioAPI is accessible across multiple computing platforms and application domains. BioAPI is an appropriate fit for applications written in C and is adequate for applications written in C++.

Unfortunately, a function-based language like C does not map easily to the object oriented domain where this issue may be answered with an object oriented (OO) version of BioAPI. As noted, the function-based nature of a C API does not map easily to the object oriented paradigm (i.e. languages such as C# and Java). In particular, the use of a C API from within an object oriented application is unnatural and requires programming constructs which introduce complexity to the development of an application. Development of a OO version of BioAPI aims to increase the productivity of software practitioners who who wish to use the BioAPI whilst remaining in the object oriented domain.

A standard object oriented version of BioAPI allows, in case of Java, BSPs that are intended for loading into a Java-based application server to perform verification and/or identification operations. In those application servers, use of the OO BioAPI is more natural when developing a framework and BSPs than the C version of BioAPI.

Another area in which a standard OO version of BioAPI would be useful is that of small computing devices based on an object oriented language (OOL), where (as on the large application servers mentioned above) an OO BioAPI framework and OO BSPs would fit better than their C counterparts.

This part of ISO/IEC 30106 is expected to have the following impact:

— enable creation of BioAPI applications by developers more comfortable with Object Oriented Languages;

— create a market of standard OO BSP components which target OO environments such as Java application servers, Java applets, small Java devices, .NET servers, .NET applications, web services;

— increase the level of adoption of BioAPI by decreasing the barrier of entry for OO developers. This includes providing access to C based BSPs (as if they were OO BSPs) through special versions of the BioAPI framework, bridging a standard OO BioAPI framework to a standard C BioAPI framework.

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Information technology — Object oriented BioAPI —

Part 1: Architecture

1 Scope

This part of ISO/IEC 30106 specifies an architecture for a set of interfaces which define the OO BioAPI. Components defined in this part of ISO/IEC 30106 include a framework, Biometric Service Providers (BSPs), Biometric Function Providers (BFPs) and a component registry.

NOTE Each of these components have an equivalent component specified in ISO/IEC 19784-1 as the OO BioAPI is intended to be an OO interpretation of this part of ISO/IEC 30106.

For this reason, this part of ISO/IEC 30106 is conceptually equivalent to ISO/IEC 19784-1. Concepts present in this part of ISO/IEC 30106 (for example, BioAPI_Unit and component registry) have the same meaning as in ISO/IEC 19784-1. While the conceptual equivalence of this part of ISO/IEC 30106 will be maintained with ISO/IEC 19784-1, there are differences in the parameters passed between functions and the sequence of function calls. These differences exist to take advantage of the features provided by Object Oriented Programming Languages.

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO/IEC 2382-37, *Information technology — Vocabulary — Part 37: Biometrics*

ISO/IEC 19784-1:2006, *Information technology — Biometric Application Programming Interface — Part 1: BioAPI Specification*

ISO/IEC 19785-1:2015, *Information technology — Common Biometric Exchange Formats Framework — Part 1: Data Element Specification*

A1 ISO/IEC 19785, *Information technology — Common Biometric Exchange Formats Framework (CBEFF) — Part 3: Patron format specifications* A1

3 Terms and definitions

For the purposes of this document, the terms and definitions in ISO 2382-37, ISO/IEC 19784-1, and ISO/IEC 19785 (all parts) apply.

4 Symbols and abbreviated terms

For the purposes of this document, the symbols and abbreviated terms defined in ISO/IEC 19784-1, ISO/IEC 19785 (all parts) and the following apply.

API	Application Programming Interface
BDB	Biometric Data Block

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BFP	Biometric (OO) Function Provider
BIR	Biometric Information Record
BSP	Biometric Service Provider
CBEFF	Common Biometric Exchange Formats Framework
FMR	False Match Rate
FPI	Function Provider Interface
GUI	Graphical User Interface
ID	Identity/Identification/Identifier
MOC	Match on Card
OOBioAPI	Object Oriented BioAPI
PID	Product ID
SB	Security Block
	NOTE This term and abbreviation is imported from ISO/IEC 19785-1.
SBH	Standard Biometric Header
	NOTE This term and abbreviation is imported from ISO/IEC 19785-1.
SPI	Service Provider Interface
UUID	Universally Unique Identifier

5 Conformance

Those products that claim conformance with any of the parts in the ISO/IEC 30106 series, shall comply with the requirements stated in Annex A.

6 Object Oriented BioAPI CBEFF Patron Formats

Object Oriented BioAPI is able to use biometric data coded as Self-Identifying BIRs, either Simple BIRs or Complex BIRs, following the structure and definition of CBEFF (i.e. ISO/IEC 19785). In particular, Object Oriented BioAPI shall use the following CBEFF Patron Formats:

— For Simple BIRs the patron format to be used is the one called "Self-identifying Tag-oriented Simple BIR", registered as Patron Format Owner 257 and Patron Format Type 12, and described in ISO/IEC 19785-3.

— For Complex BIRs the patron format to be used is the one called "Self-identifying Tag-oriented Complex BIR", registered as Patron Format Owner 257 and Patron Format Type 13, and described in ISO/IEC 19785-3.

The particular tagged format (e.g. TLV, XML or JSON) to be used will be determined by the application and/or platform used.

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7 BioAPI CBEFF Patron Formats

7.1 General

Object Oriented BioAPI is able to use biometric data coded as Self-Identifying BIRs, either Simple BIRs or Complex BIRs, following the structure and definition of CBEFF (i.e. ISO/IEC 19785). Therefore, this Clause describes both, the Simple BIR and the Complex BIR data structures in binary format.

This patron format may be expanded by using other type of coded, such as a Self-Identifying TLV coding, as long as they are defined in the latest revision of ISO/IEC 19785-3.

7.2 Simple BIR

The data elements of a Simple BIR are provided in the following table. It is stated which elements from those described in ISO/IEC 19785 are mandatory or not.

Table 2 — CBEFF data elements of the patron format for a Simple BIR

CBEFF data element name	**Field name**	**Length and optionality**[a]	**Abstract values and Encodings**[b]
The following fields shall occur at most once			
CBEFF_BIR_self_id_owner	**BirSelfIdOwner**	**2, mandatory**	**1..65535 (for SC37 30106-x Simple: 257)**
CBEFF_BIR_self_id_type	**BirSelfIdType**	**2, mandatory**	**1..65535 (for SC37 30106-x Simple: 9)**
not a standard CBEFF data element	**BIRLength**	**4, mandatory**	**The complete length in bytes of the whole BIR, including header and SB (if applicable)**
CBEFF_version	cbeffVersion	1, mandatory	Major '3' and Minor '0': 0x000030
CBEFF_patron_header_version	patronHeaderVersion	1, mandatory	1
CBEFF_BDB_format_owner	bdbFormatOwner	2, mandatory	0..65535
CBEFF_BDB_format_type	bdbFormatType	2, mandatory	0..65535
CBEFF_BDB_encryption_options	bdbEncryption	1; mandatory	NO ENCRYPTION: 0 ENCRYPTION: 1
CBEFF_BIR_integrity_options	birIntegrity	1, mandatory	NO INTEGRITY: 0 INTEGRITY: 1
CBEFF_subheader_count	**numChildren**	**1, mandatory**	**0**

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CBEFF data element name	Field name	Length and optionality[a]	Abstract values and Encodings[b]
not a standard CBEFF data element	fieldPresence	4, mandatory	A 32-bit field containing one bit for each optional field in the patron format. The bit value '1' means that the corresponding field is present in the BIR instance. Bit position (0=least significant, 31=least significant) and corresponding optional field (those not defined yet shall be set to '0'): 0. bdbBiometricType 1. bdbBiometricSubtype 2. bdbCaptureDeviceOwner and Type 3. bdbFeatureExtractionAlgOwner and Type 4. bdbComparisonAlgOwner and Type 5. bdbCompressionAlgOwner and Type 6. bdbPADTechniqueOwner and Type 7. bdbChallengeResponse 8. bdbCreationDate 9. bdbIndex 10. bdbProcessedLevel 11. bdbProductOwner and Type 12. bdbPurpose 13. bdbQuality 14. bdbOwner and Type 15. bdbValidityPeriod 16. birCreationDate 17. birCreator 18. birIndex 19. birPayload 20. birPointer 21. birValidityPeriod 22. sbFormatOwner and Type
CBEFF_BDB_biometric_type	bdbBiometricType	4	*This encoding is a 4 octet bitmap. NO VALUE AVAILABLE is encoded as all 0 bits. If MULTIPLE BIOMETRIC TYPES is set, other bits may also be set to enumerate the types contained in the BDB.* NO VALUE AVAILABLE: X'00 00 00' MULTIPLE BIOMETRIC TYPES: X'00 00 01' FACE: X'00 00 02' VOICE: X'00 00 04' FINGER: X'00 00 08' IRIS: X'00 00 10' RETINA: X'00 00 20' HAND GEOMETRY: X'00 00 40' SIGNATURE OR SIGN: X'00 00 80' KEYSTROKE: X'00 01 00' LIP MOVEMENT: X'00 02 00' GAIT: X'00 10 00' VEIN: X'00 20 00' DNA: X'00 40 00' EAR: X'00 80 00' FOOT: X'01 00 00' SCENT: X'02 00 00'

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CBEFF data element name	Field name	Length and optionality[a]	Abstract values and Encodings[b]
CBEFF_BDB_biometric_subtype	bdbBiometricSubtype	1	*This encoding is a 1 octet bitmap. Combinations of abstract values are permitted (by ORing the encodings for those values) when the abstract value encoded in CBEFF_BDB_biometric_type represents a biometric technology that can create a BDB where multiple subtypes are supported.* NO VALUE AVAILABLE: b'0000 0000' LEFT: b'0000 0001' RIGHT: b'0000 0010' LEFT THUMB: b'0000 0101' LEFT INDEX FINGER: b'0000 1001' LEFT MIDDLE FINGER: b'0001 0001' LEFT RING FINGER: b'0010 0001' LEFT LITTLE FINGER: b'0100 0001' RIGHT THUMB: b'0000 0110' RIGHT INDEX FINGER: b'0000 1010' RIGHT MIDDLE FINGER: b'0001 0010' RIGHT RING FINGER: b'0010 0010' RIGHT LITTLE FINGER: b'0100 0010' LEFT PALM: b'1000 0101' LEFT BACK OF HAND: b'1000 1001' LEFT WRIST: b'1001 0001' RIGHT PALM: b'1000 0110' RIGHT BACK OF HAND: b'1000 1010' RIGHT WRIST: b'1001 0010'
CBEFF_BDB_capture_device_owner	bdbCaptureDeviceOwner	2	0..65535, being 0 – NO VALUE AVAILABLE
CBEFF_BDB_capture_device_type	bdbCaptureDeviceType	2	0..65535, being 0 – NO VALUE AVAILABLE
CBEFF_BDB_feature_extraction_algorithm_owner	bdbFeatureExtractionAlgOwner	2	0..65535, being 0 – NO VALUE AVAILABLE
CBEFF_BDB_feature_extraction_algorithm_type	bdbFeatureExtractionAlgType	2	0..65535, being 0 – NO VALUE AVAILABLE
CBEFF_BDB_comparison_algorithm_owner	bdbComparisonAlgOwner	2	0..65535, being 0 – NO VALUE AVAILABLE
CBEFF_BDB_comparison_algorithm_type	bdbComparisonAlgType	2	0..65535, being 0 – NO VALUE AVAILABLE
CBEFF_BDB_compression_algorithm_owner	bdbCompressionAlgOwner	2	0..65535, being 0 – NO VALUE AVAILABLE
CBEFF_BDB_compression_algorithm_type	bdbCompressionAlgType	2	0..65535, being 0 – NO VALUE AVAILABLE
CBEFF_BDB_PAD_technique_owner	bdbPADTechniqueOwner	2	0..65535, being 0 – NO VALUE AVAILABLE
CBEFF_BDB_PAD_technique_type	bdbPADTechniqueType	2	0..65535, being 0 – NO VALUE AVAILABLE
CBEFF_BDB_challenge_response	bdbChallengeResponse	2 + 0..65535	Variable-length octet string, preceded by a 16-bit integer field containing the length (octets).

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CBEFF data element name	Field name	Length and optionality[a]	Abstract values and Encodings[b]
CBEFF_BDB_creation_date	bdbCreationDate	7	The string shall represent a date (or date and a time of the day). Format is: 2 bytes for the year 1 byte for the month 1 byte for the day 1 byte for the hour 1 byte for the minute 1 byte for the second All set to 0, or not present, means NO VALUE AVAILABLE
CBEFF_BDB_index	bdbIndex	2 + 0..65535	Variable-length octet string, preceded by a 16-bit integer field containing the length (octets). Shall not appear in any BIR in which numChildren is not x'00'.
CBEFF_BDB_processed_level	bdbProcessedLevel	1	RAW: 1 INTERMEDIATE: 2 PROCESSED: 3
CBEFF_BDB_product_owner	bdbProductOwner	2	Company that owns the BSP creating the BIR 0..65535, being 0 – NO VALUE AVAILABLE
CBEFF_BDB_product_type	bdbProductType	2	0..65535, being 0 – NO VALUE AVAILABLE
CBEFF_BDB_purpose	bdbPurpose	1	VERIFY: 1 IDENTIFY: 2 ENROLL: 3 ENROLL FOR VERIFICATION ONLY: 4 ENROLL FOR IDENTIFICATION ONLY: 5 AUDIT: 6
CBEFF_BDB_quality	bdbQuality	1	QUALITY NOT SUPPORTED BY BDB CREATOR: 255 QUALITY SUPPORTED BY BDB CREATOR BUT NOT SET: 254 INTEGER VALUE: 0 – 100
CBEFF_BDB_quality_algorithm_owner	bdbOwner	2	0..65535, being 0 – NO VALUE AVAILABLE
CBEFF_BDB_quality_algorithm_type	bdbType	2	0..65535, being 0 – NO VALUE AVAILABLE
CBEFF_BDB_validity_period	bdbValidityPeriod	14	The string shall represent an interval of two dates (or date and time of the day). Both dates are coded in 7 bytes, as the bdbCreationDate.

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CBEFF data element name	**Field name**	**Length and optionality**[a]	**Abstract values and Encodings**[b]
CBEFF_BIR_creation_date	birCreationDate	7	The string shall represent a date (or date and a time of the day). Format is: 2 bytes for the year 1 byte for the month 1 byte for the day 1 byte for the hour 1 byte for the minute 1 byte for the second All set to 0, or not present, means NO VALUE AVAILABLE
CBEFF_BIR_creator	birCreator	2 + 0..65535	Variable-length ISO/IEC 10646 character string, encoded in UTF-8, and preceded by a 16-bit integer field containing the length of the UTF-8 encoding (octets).
CBEFF_BIR_index	birIndex	2 + 0..65535	Variable-length octet string, preceded by a 16-bit integer field containing the length (octets). Shall not inherit its value from any other level BIR.
CBEFF_BIR_payload	birPayload	2 + 0..65535	Variable-length octet string, preceded by a 16-bit integer field containing the length (octets). Shall not inherit its value from any other level BIR.
CBEFF_BIR_pointer	birPointer	2 + 0..65535	Variable-length octet string, preceded by a 16-bit integer field containing the length (octets). Provide the pointer (path or registry ID) to the following BIR to be addressed in a multibir schema.
CBEFF_BIR_validity_period	birValidityPeriod	14	The string shall represent an interval of two dates (or date and time of the day). Both dates are coded in 7 bytes, as the bdbCreationDate.
CBEFF_SB_format_owner	sbFormatOwner	2 , **conditional**	1..65535
CBEFF_SB_format_type	sbFormatType	2 , **conditional**	1..65535
BDB	bdb	4 + 0..4294967295	Variable-length octet string, preceded by a 32-bit integer field containing the length (octets). If this field is present in a BIR instance (as indicated in bit 19 of the field *fieldPresence*), then no child BIRs shall be included (*numChildren* shall have the value 0). Otherwise, at least one child BIR shall be included (*numChildren* shall have a value greater than 0). NOTE - The content and encoding of the BDB are not specified by CBEFF nor by this patron format specification.
SB	sb	4 + 0..4294967295, **conditional**	Variable-length octet string, preceded by a 32-bit integer field containing the length (octets).

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