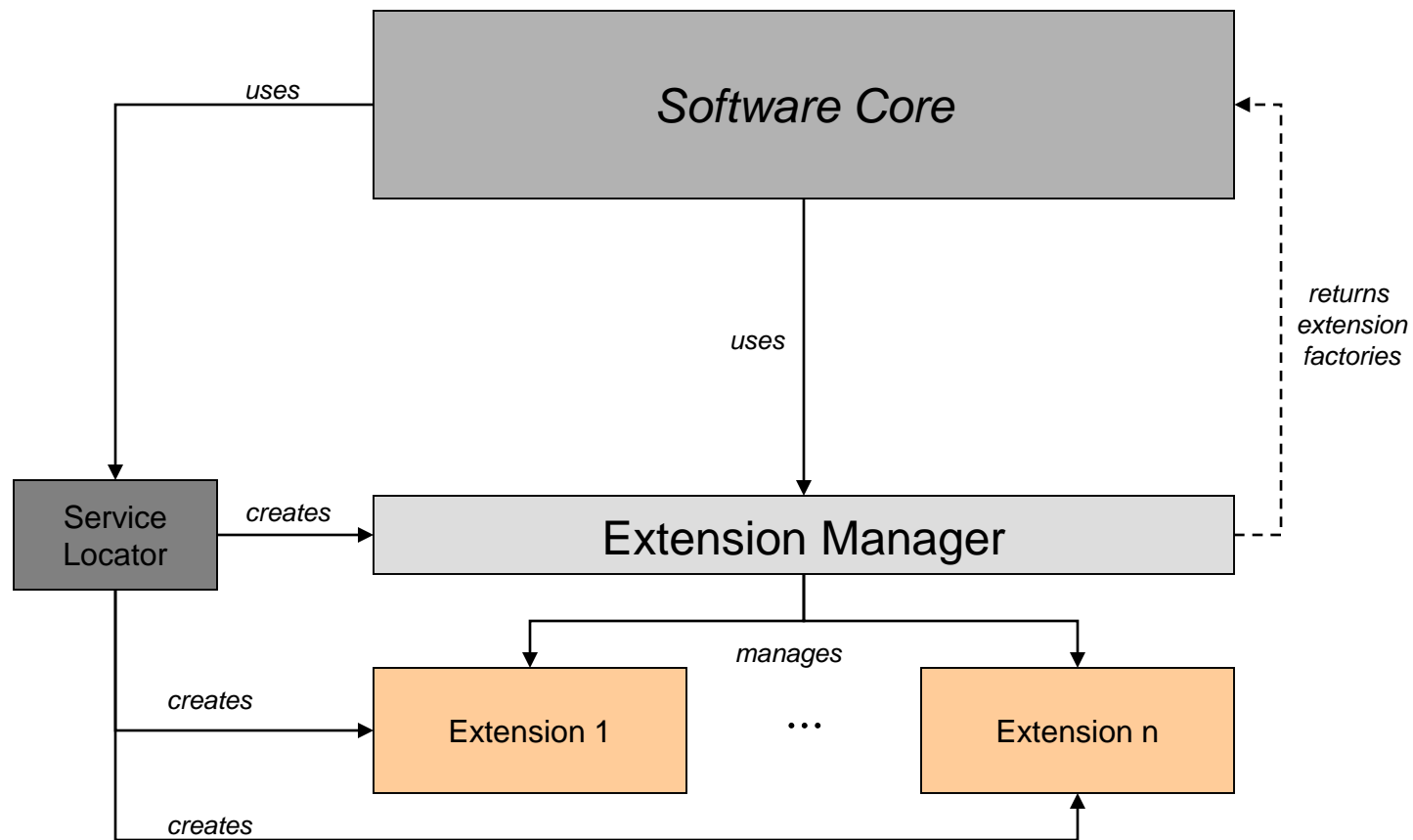
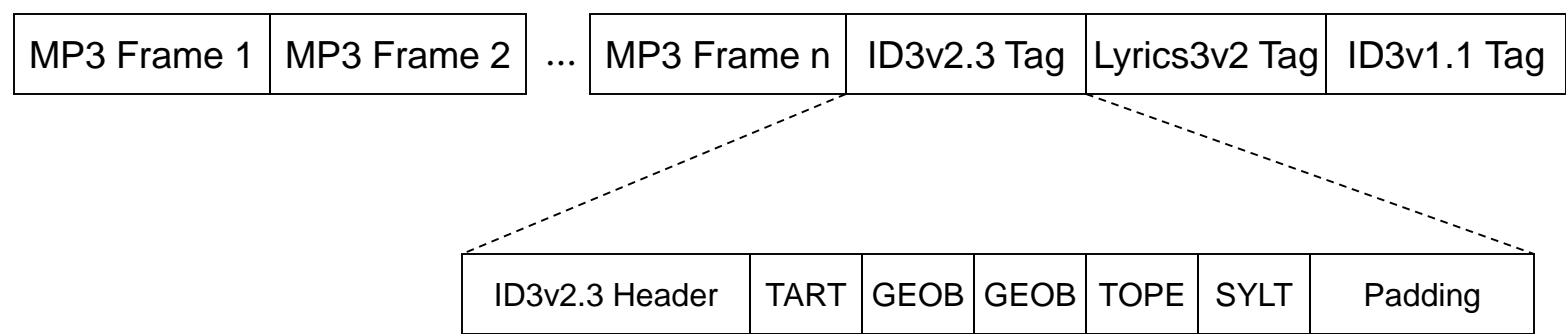


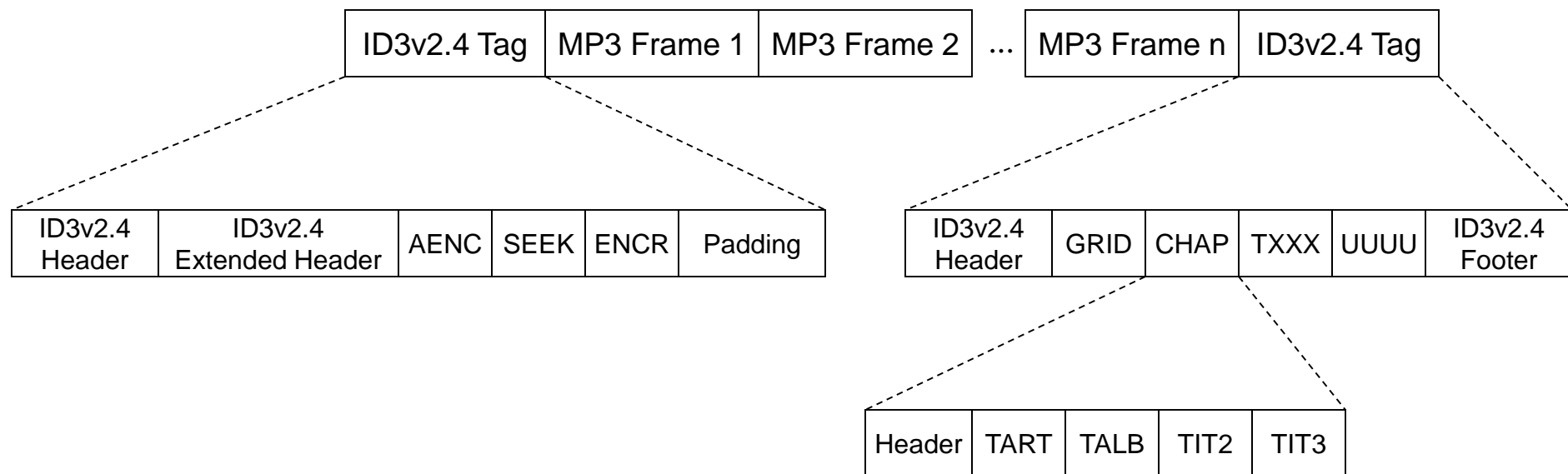
Tag

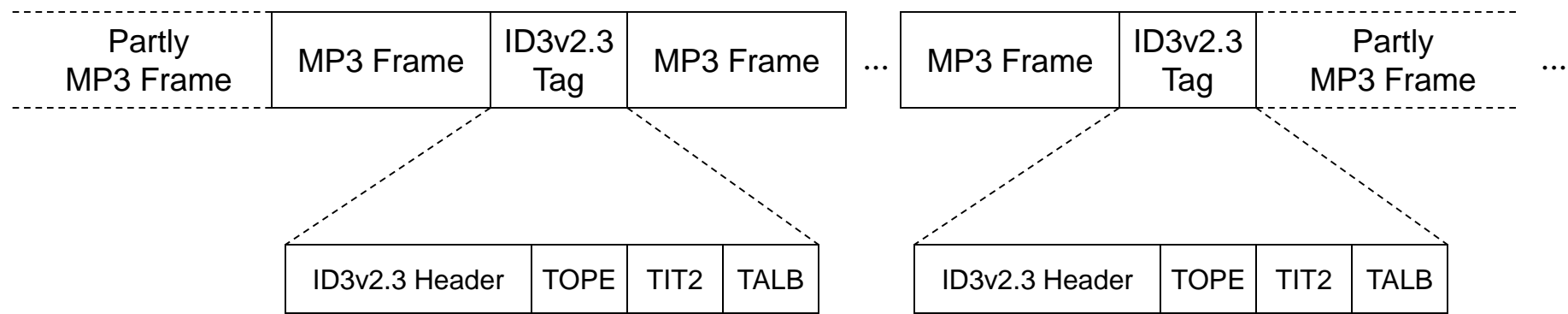
Payload Data

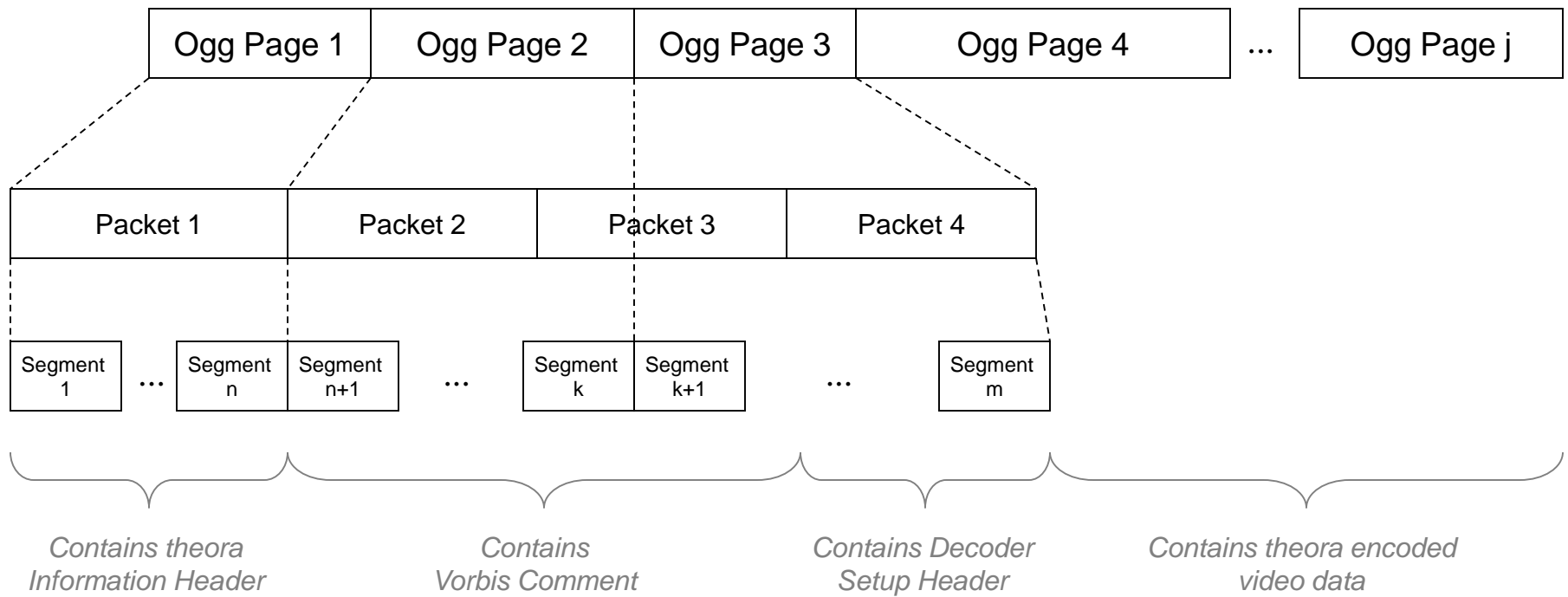


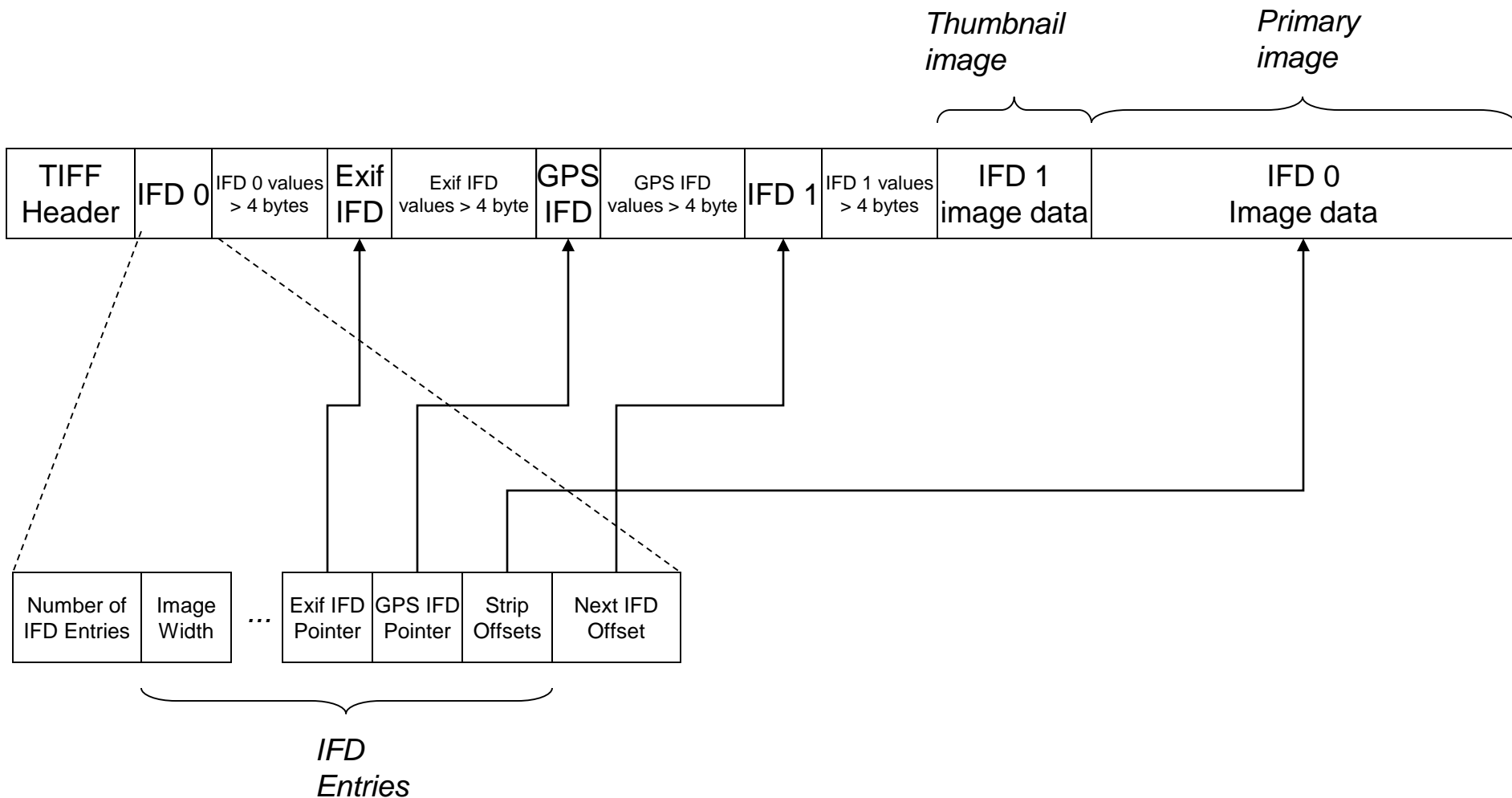


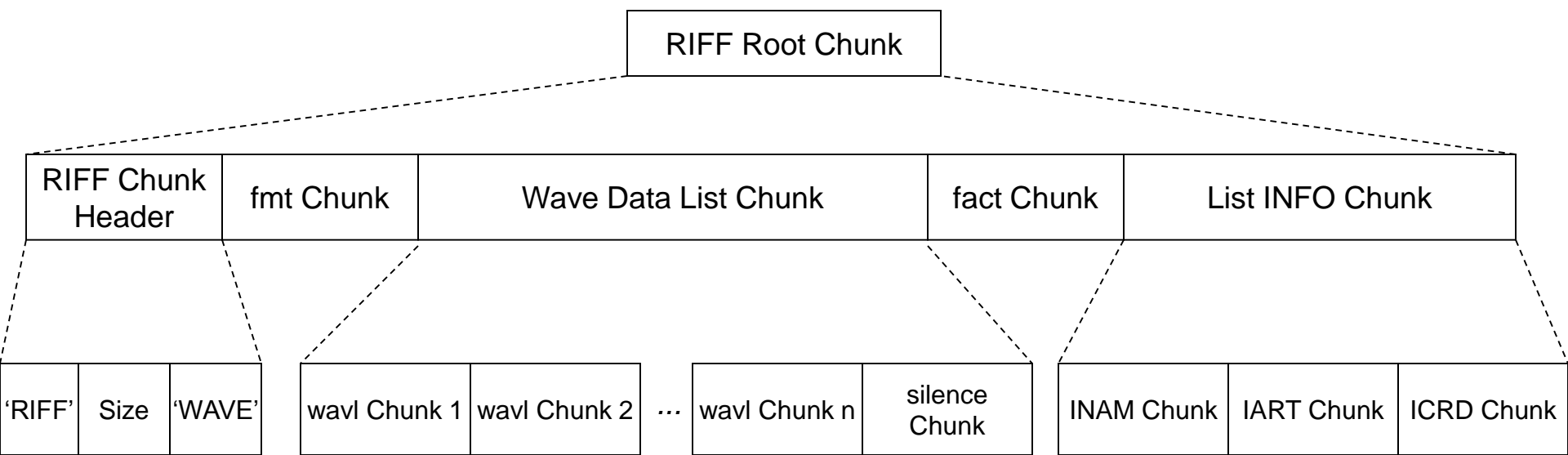


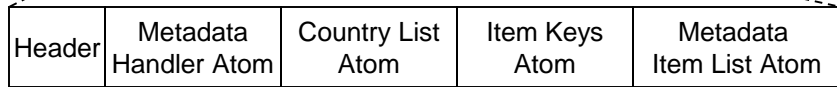
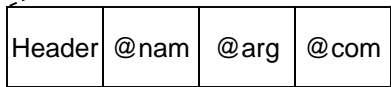
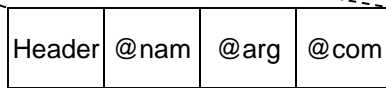
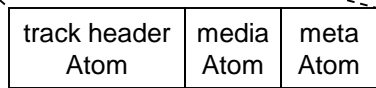
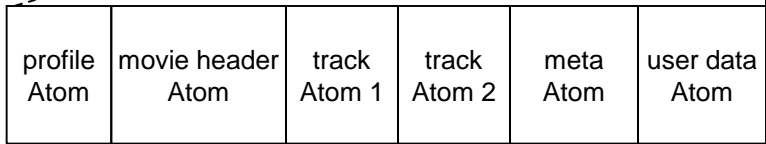
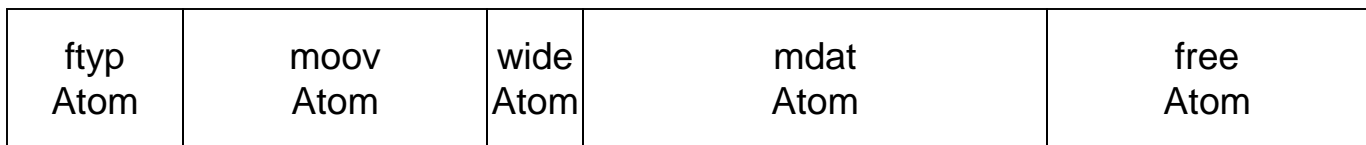












EBML Header	Segment							
	Meta Seek Information	Segment Information	Track	Chapters	Cluster 1	Tags 1	Cluster 2	Tags 2

Tag 1				Tag 2
Targets	Simple Tag 1.1	Simple Tag 1.2	Simple Tag 1.3	

Track 1 UID	Track 2 UID	30	TRACK / SONG
-------------	-------------	----	--------------

TITLE	GE-GE	Alle meine Entchen
-------	-------	--------------------

Tag 3		
Simple Tag 2.1	Simple Tag 2.2	Simple Tag 2.3

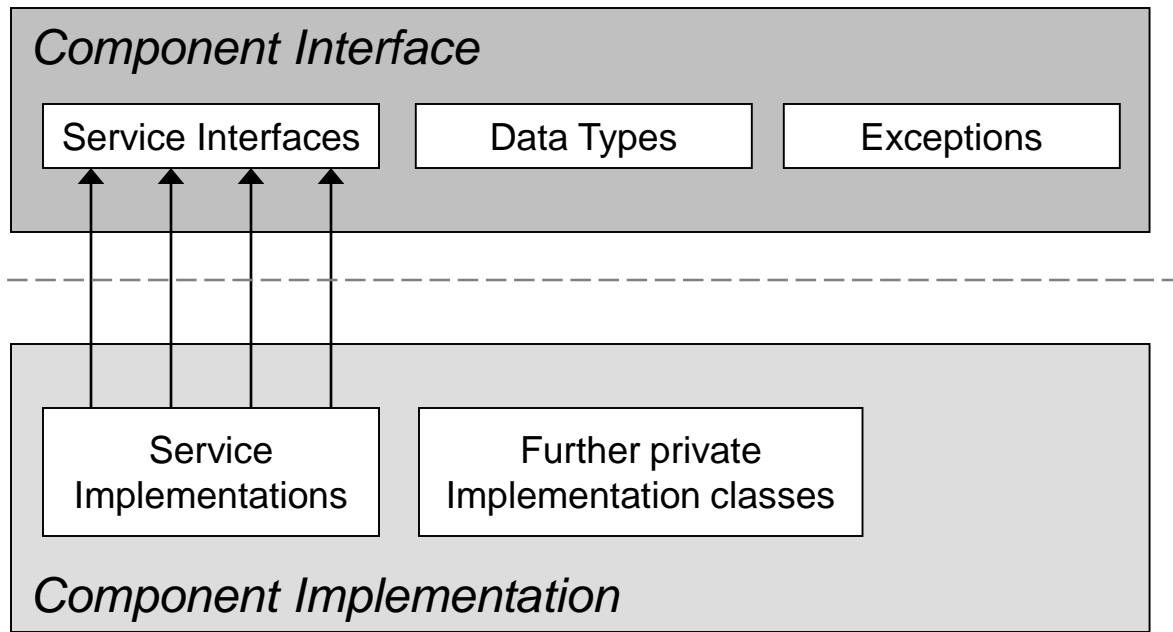
ARTIST	Simple Tag 2.1.1
--------	------------------

TITLE	GE-GE	Volkslieder
-------	-------	-------------

Simple Tag 2.1.1.1	Simple Tag 2.1.1.2
--------------------	--------------------

NAME	GE-GE	Herbert
------	-------	---------

ADDRESS	EN-US	Munich
---------	-------	--------



Application Layer

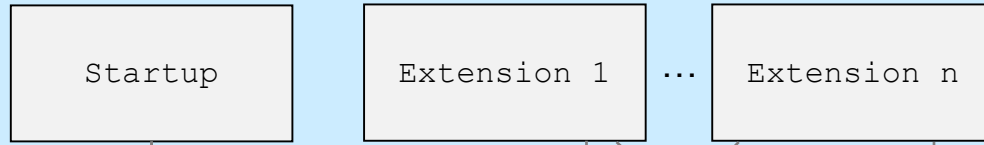
jMeta

Java 9 Virtual Machine (JVM)

Operating System

Physical Storage Medium

High-Level API

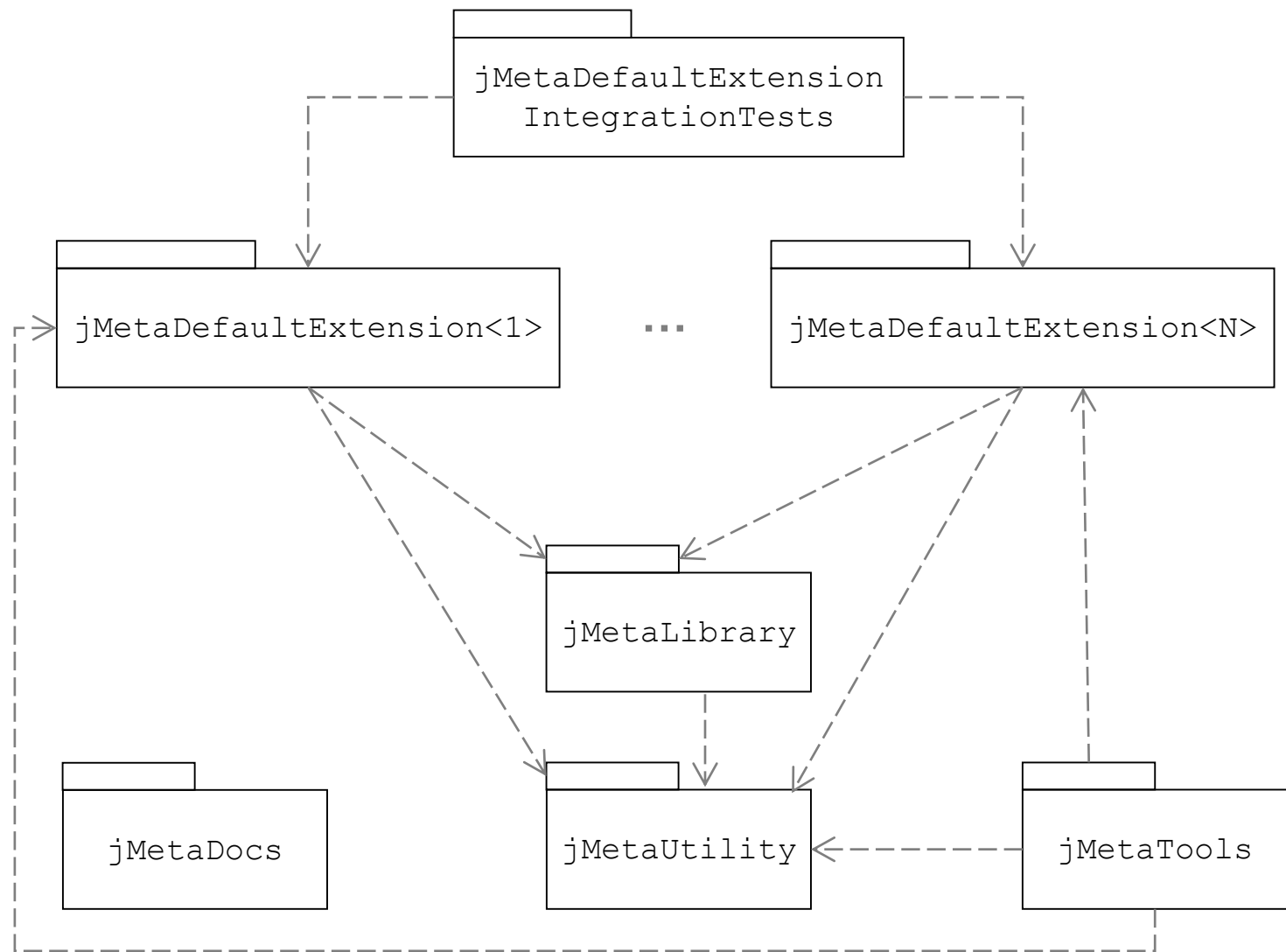


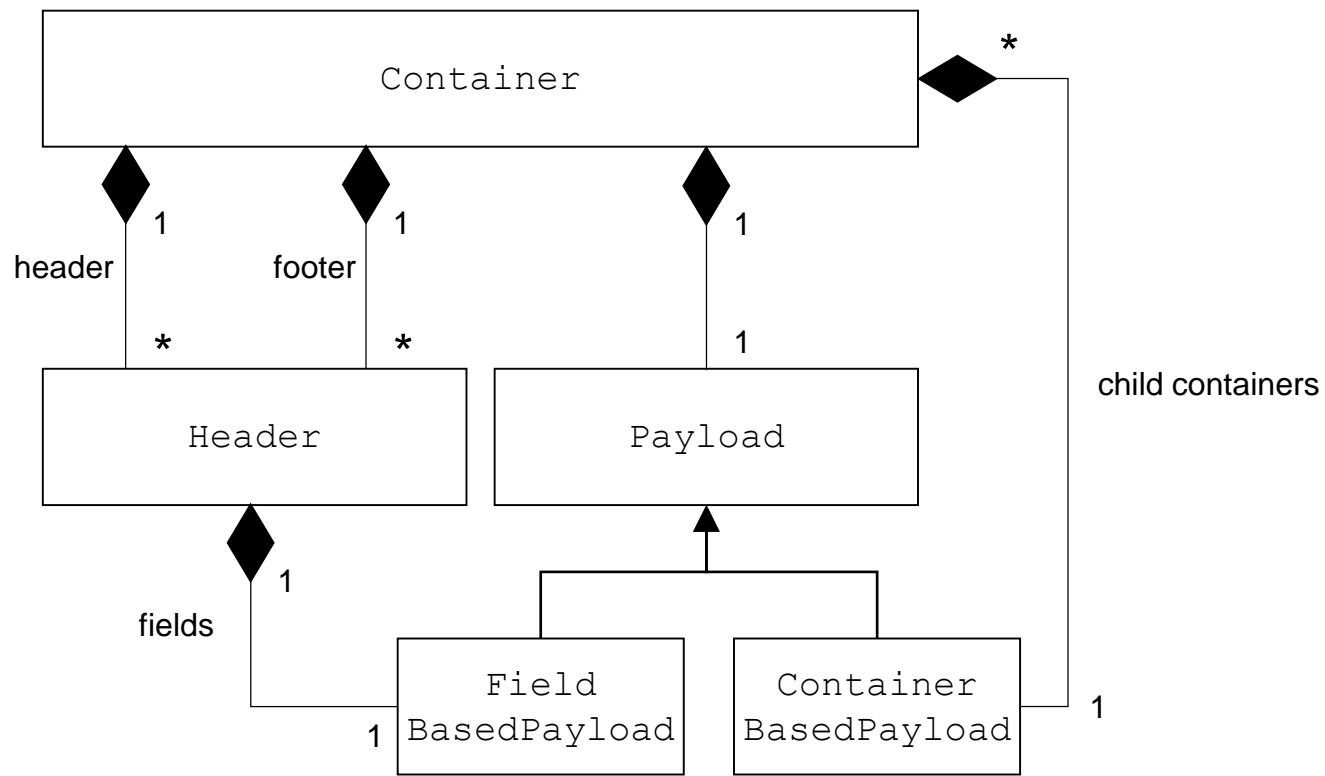
Low-Level API



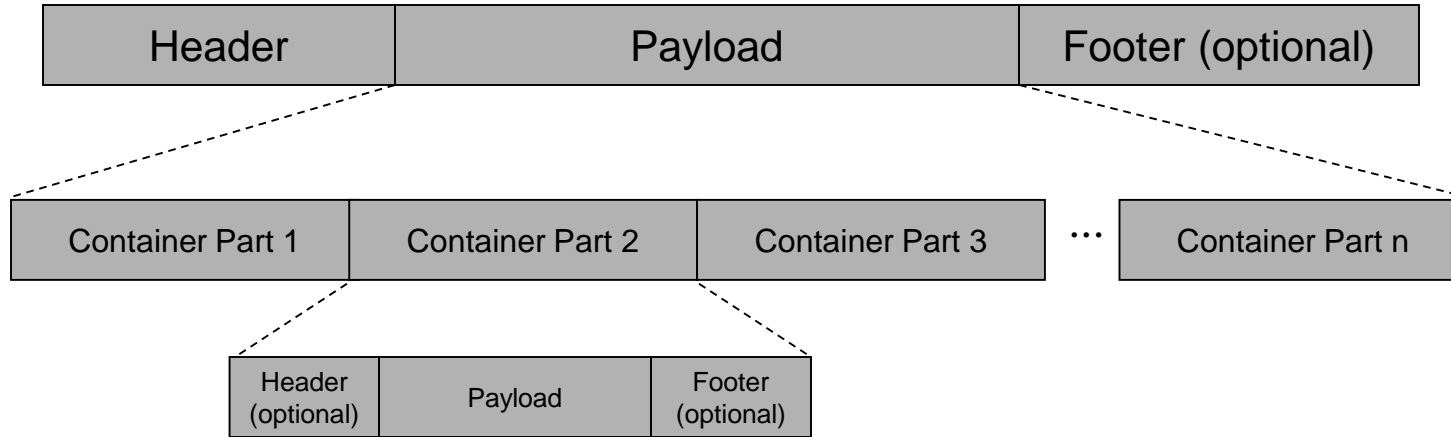
Technical Base



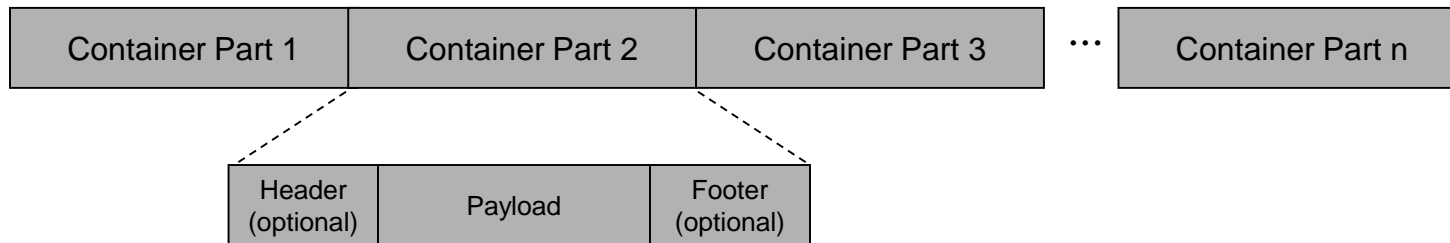




Parent Container

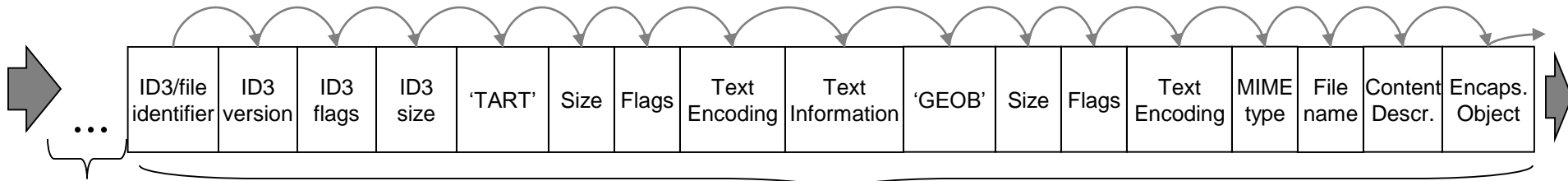
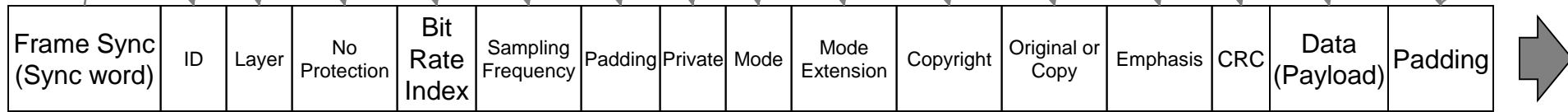


Top-Level Container Parts



MP3 Frame 1

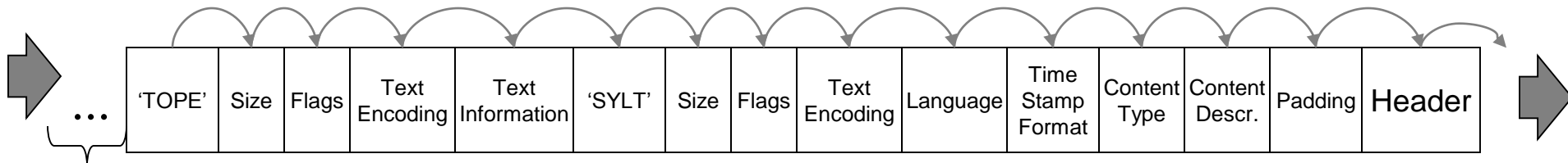
hasNext() + next()



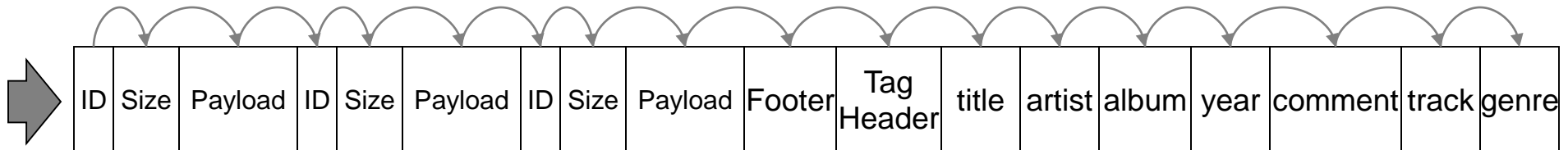
Other MP3 frames
(same block sequence)

ID3v2.3 Tag

Lyrics3v2 Tag
(first part)

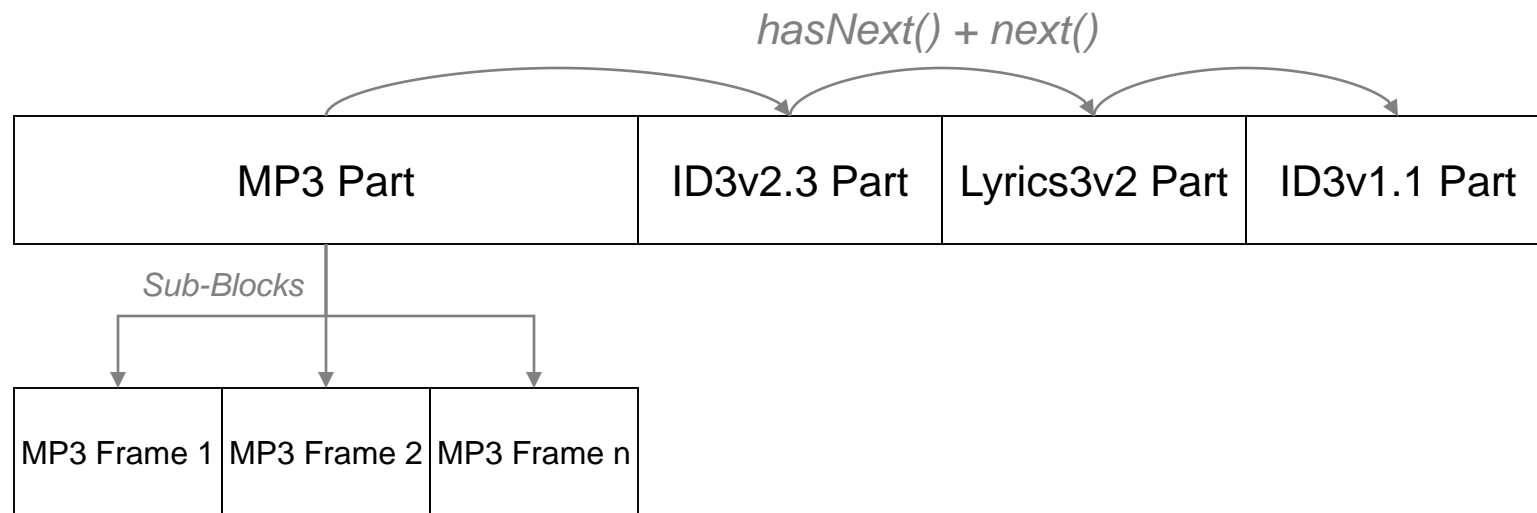


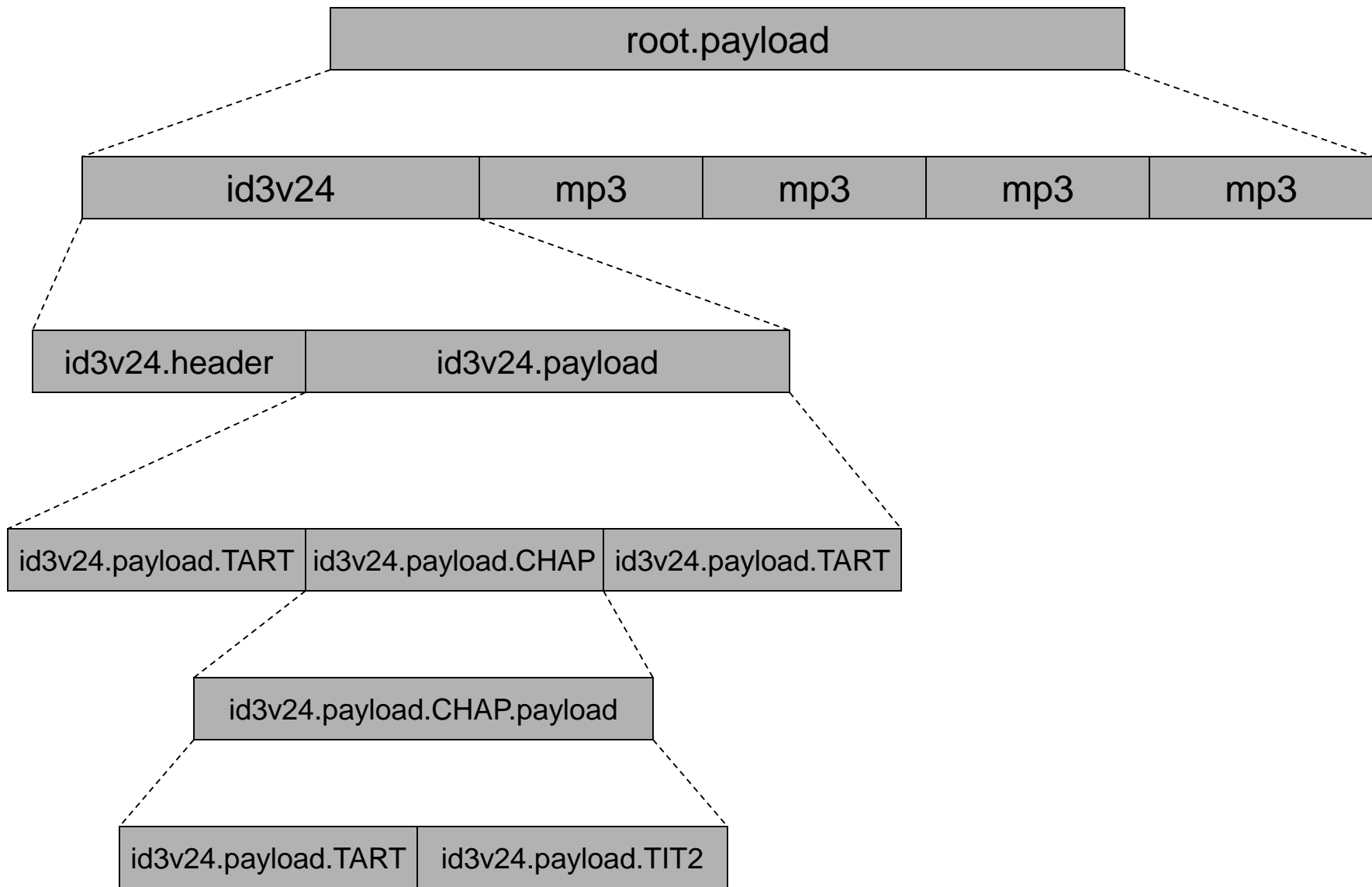
Second GEOB
frame identical

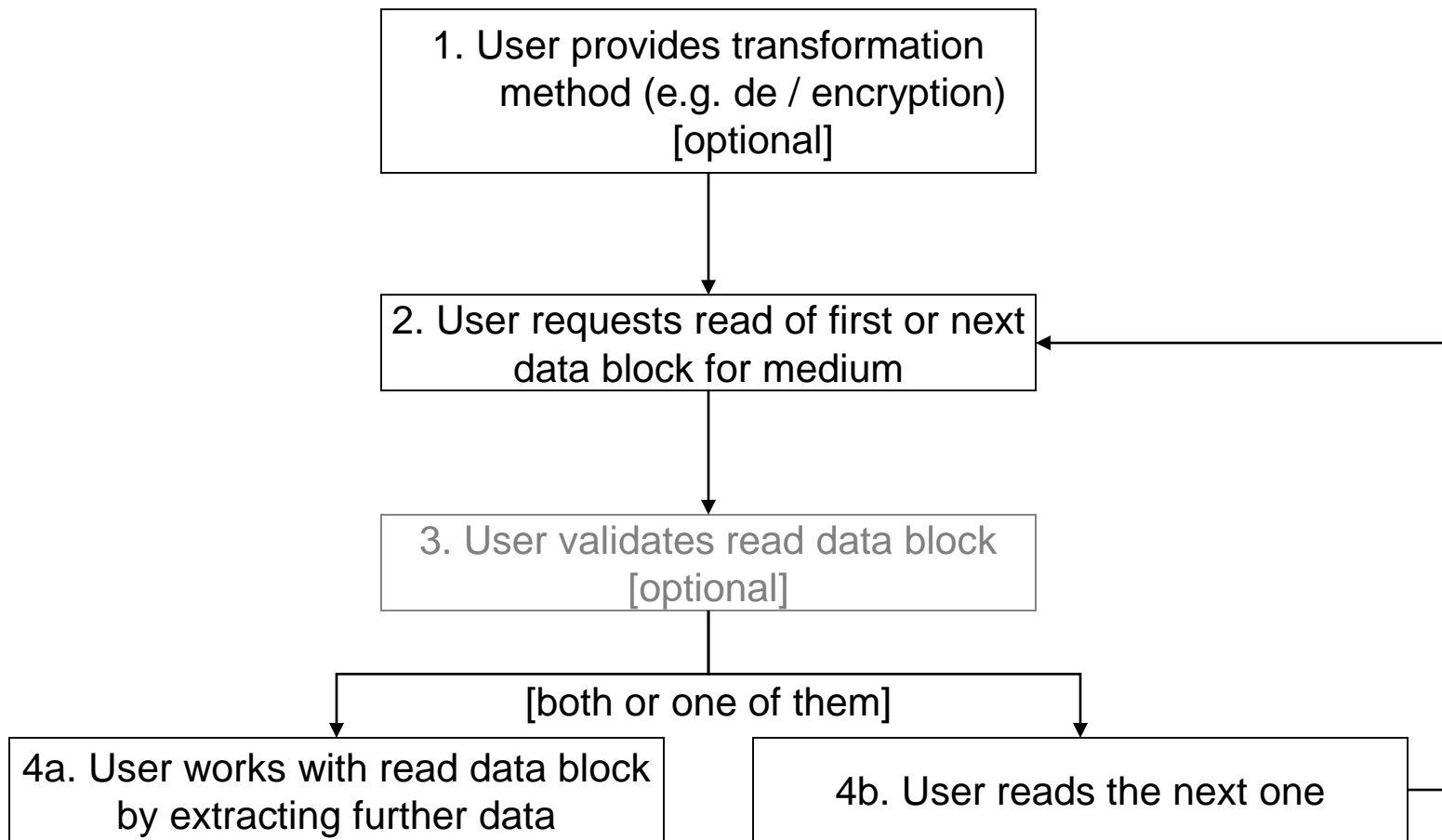


Lyrics3v2 Tag
(second part)

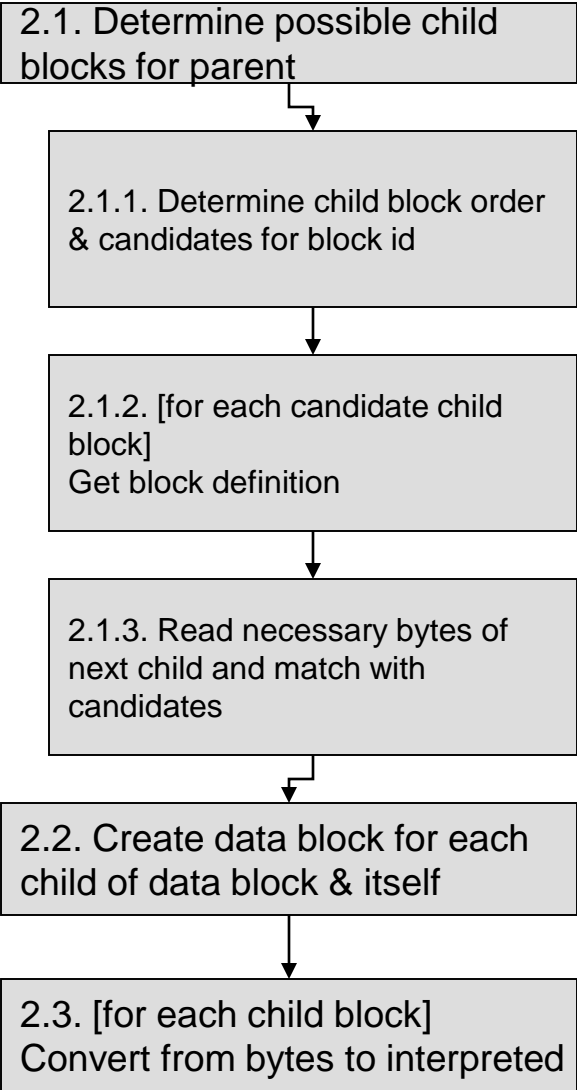
ID3v1.1 Tag





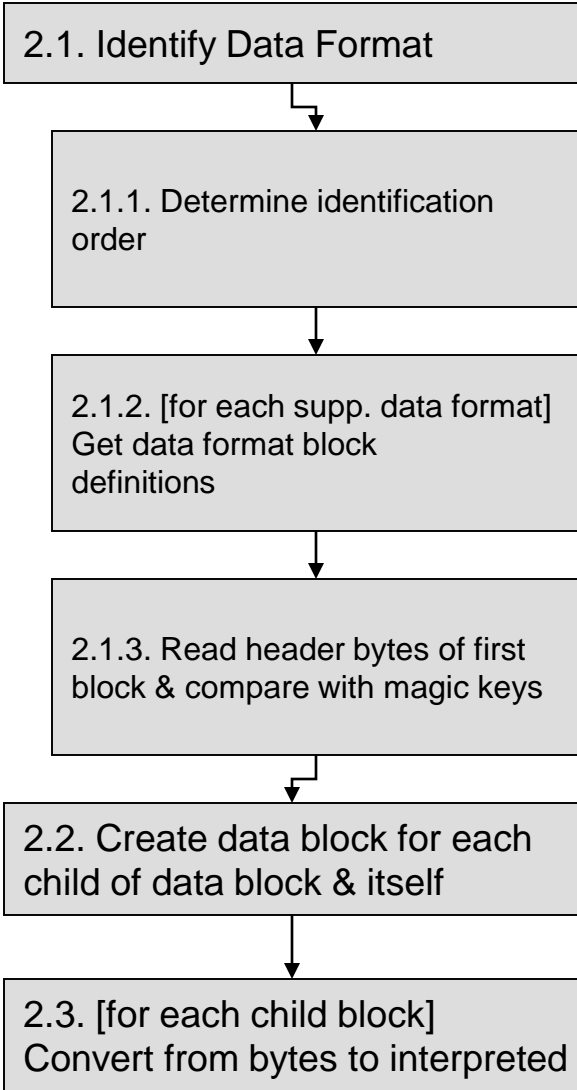


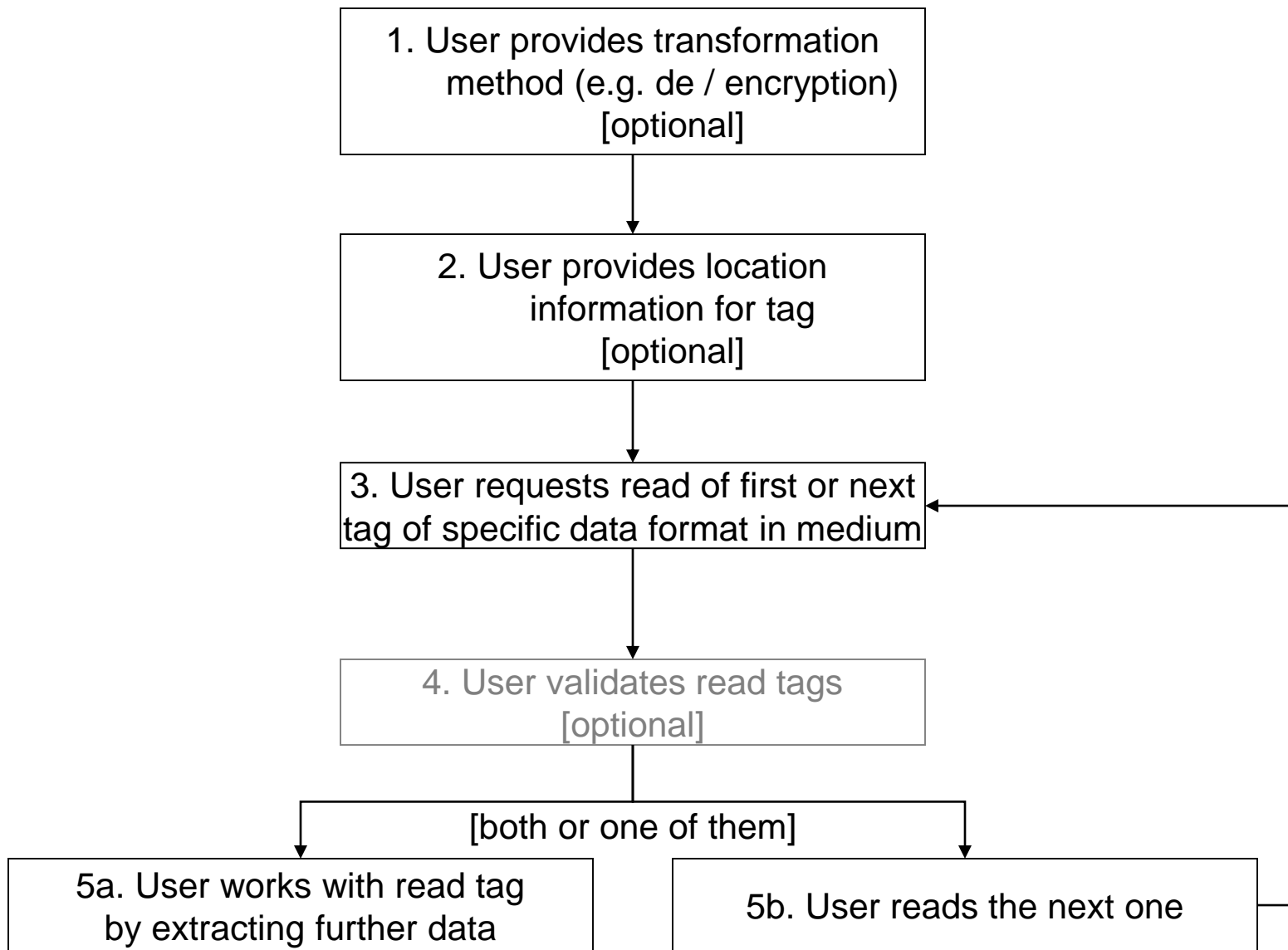
Known parent block / data format



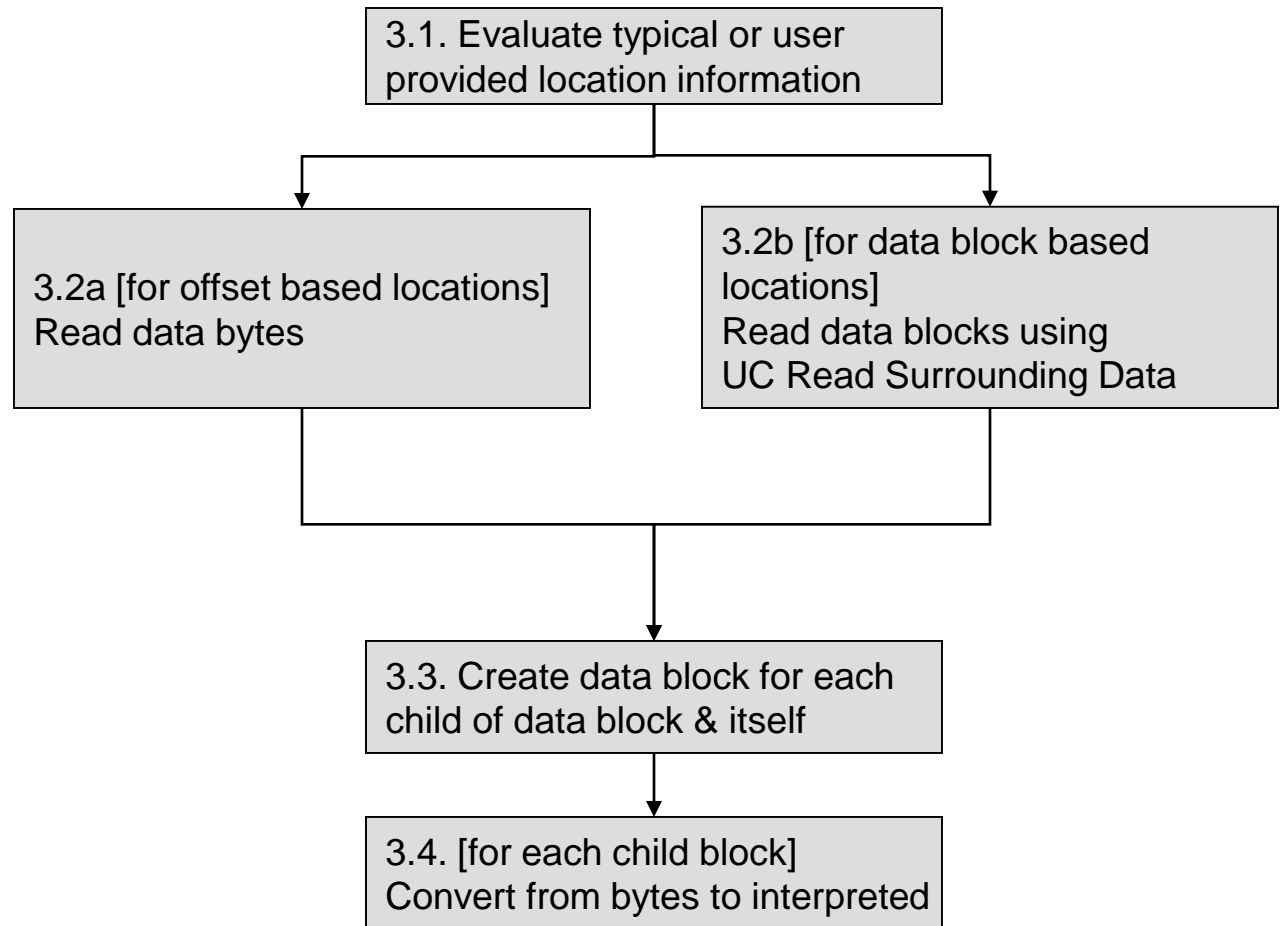
2. User requests read of first or next data block for medium

No parent block / data format

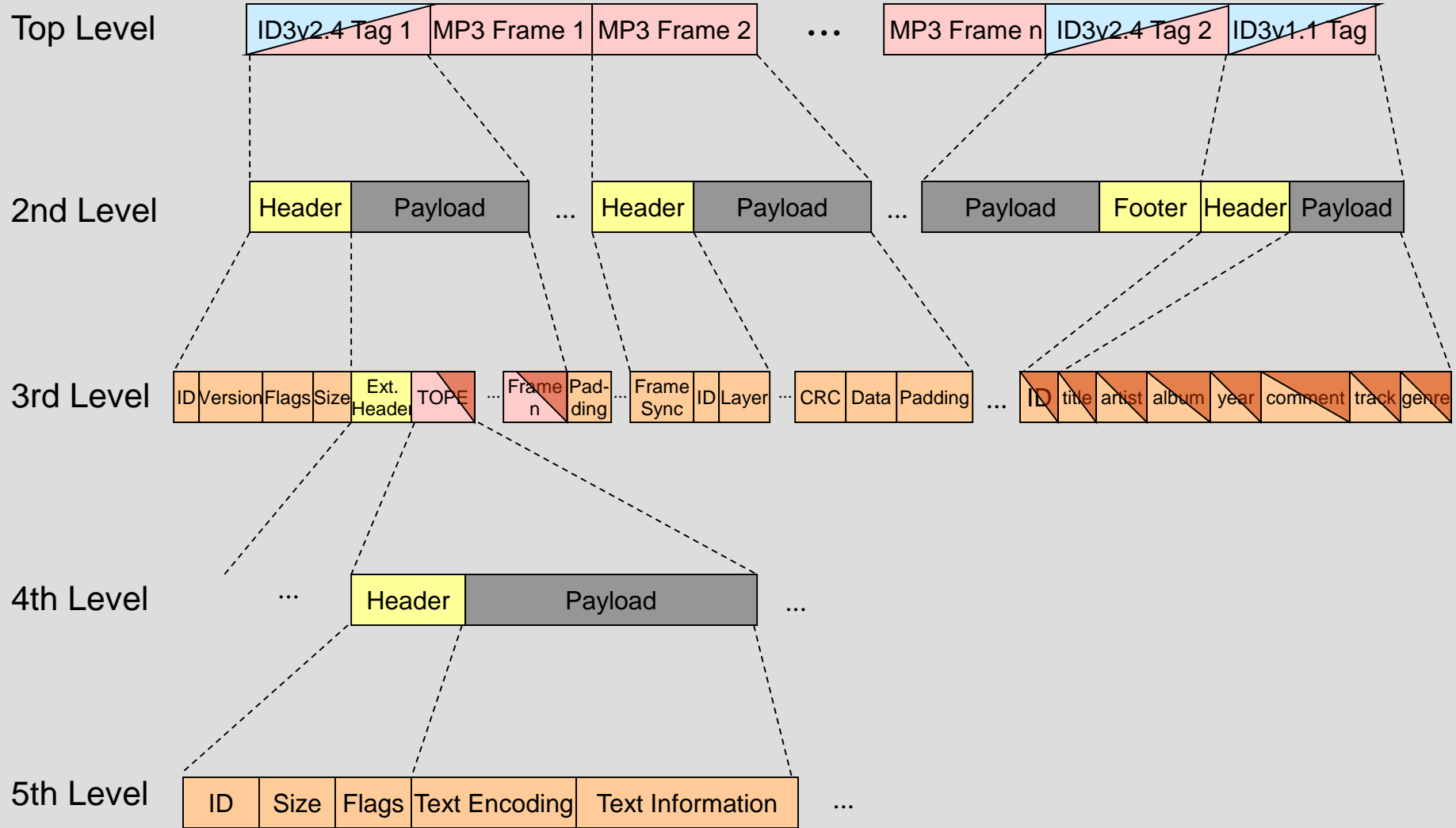




3. User requests read
of first or next tag of
specific data format
in medium

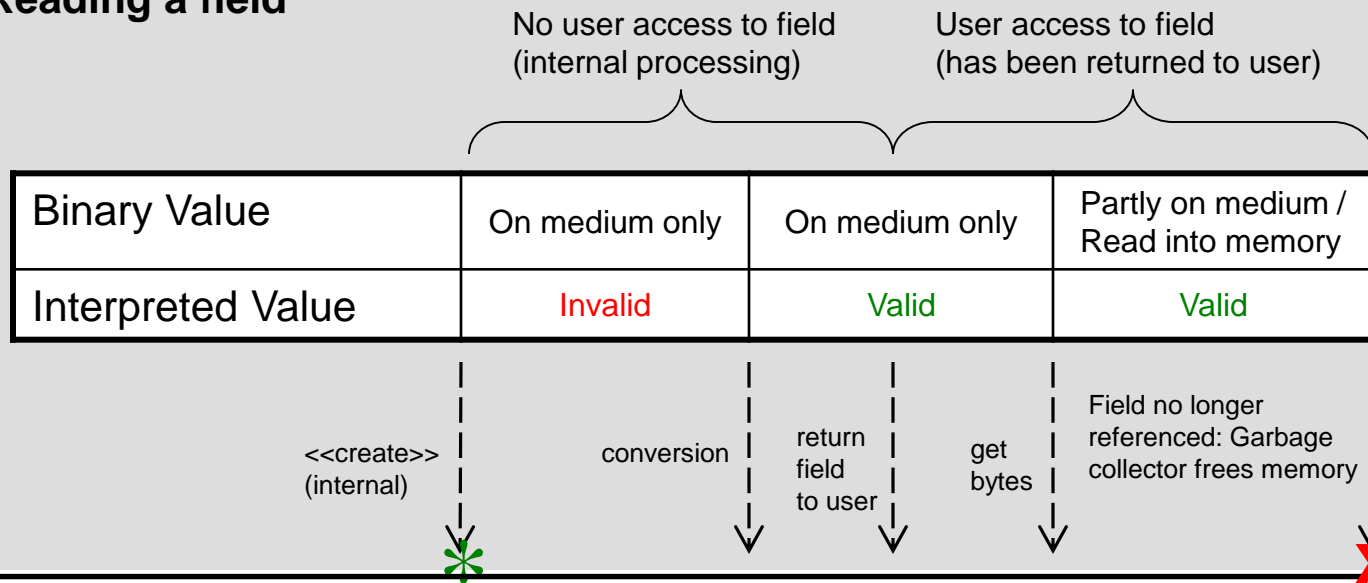


Medium

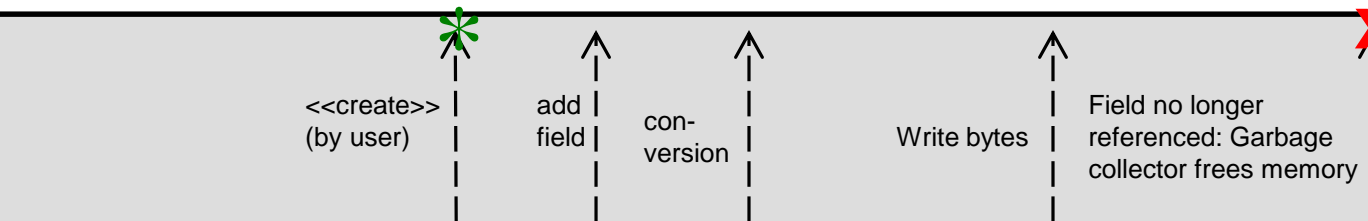


- Container
- Tag (special Container)
- Attribute (special Container)
- Header/Footer
- Payload
- Field

Reading a field



Time



Binary Value	Invalid	In memory only	On medium
Interpreted Value	Valid	Valid	Valid

Internal processing

Writing a field

User access to field (user has created it)

Reading a large field

No user access to field
(internal processing)

User access to field
(has been returned to user)

Binary Value	On medium only	Partly on medium / Read into memory
Interpreted Value	Invalid	Valid

<<create>>
(internal)

return
field
to user

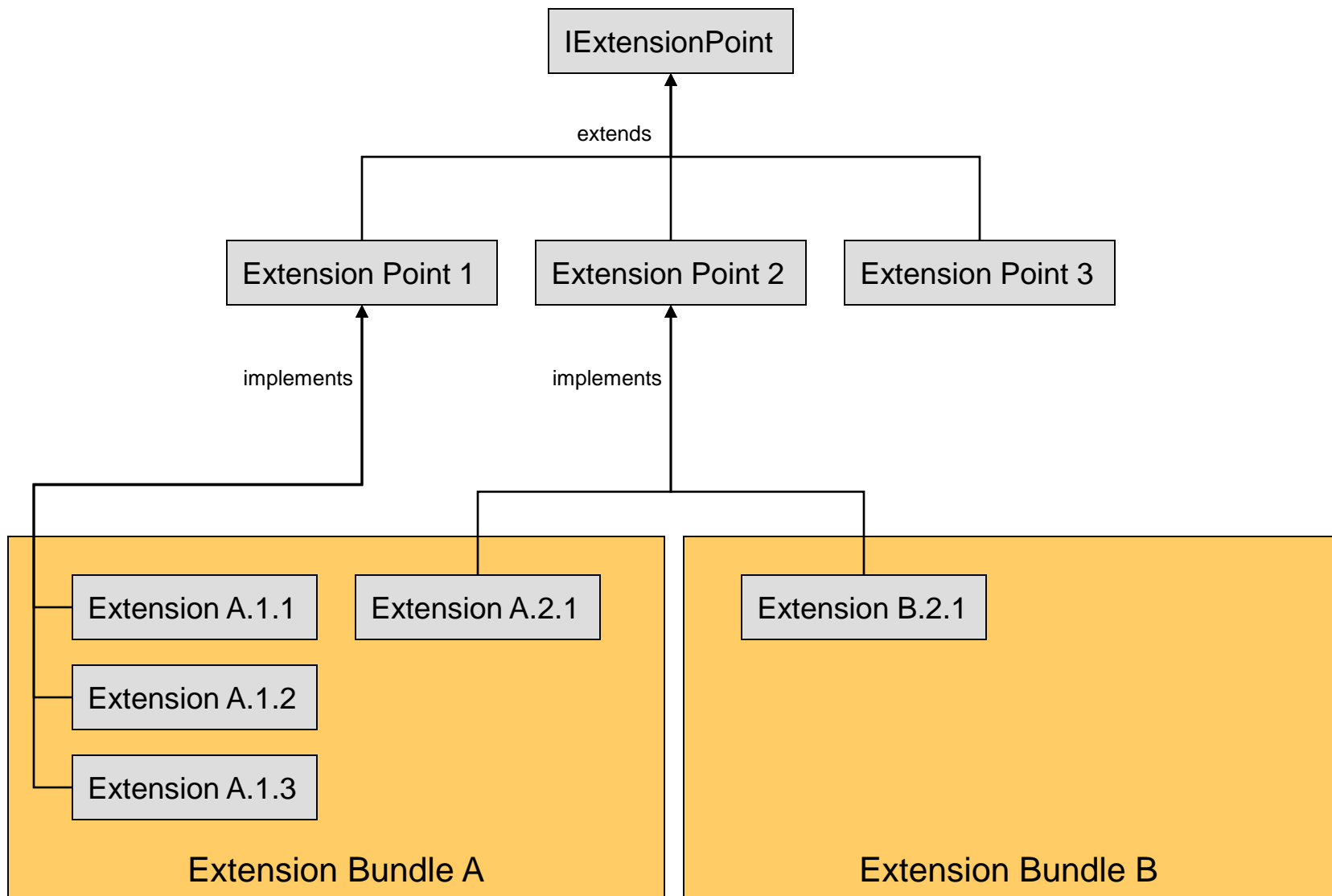
get
bytes

conversion

Field no longer
referenced: Garbage
collector frees memory

Time





Value States

Read

Byte Representation	Invalid	Invalid	Valid
Interpreted Representation	Invalid	Invalid	Valid
Converter	Invalid	Valid	Valid

No User Access to the object

<<create>> no arguments

Set specification

Set byte value

User has Access

Write

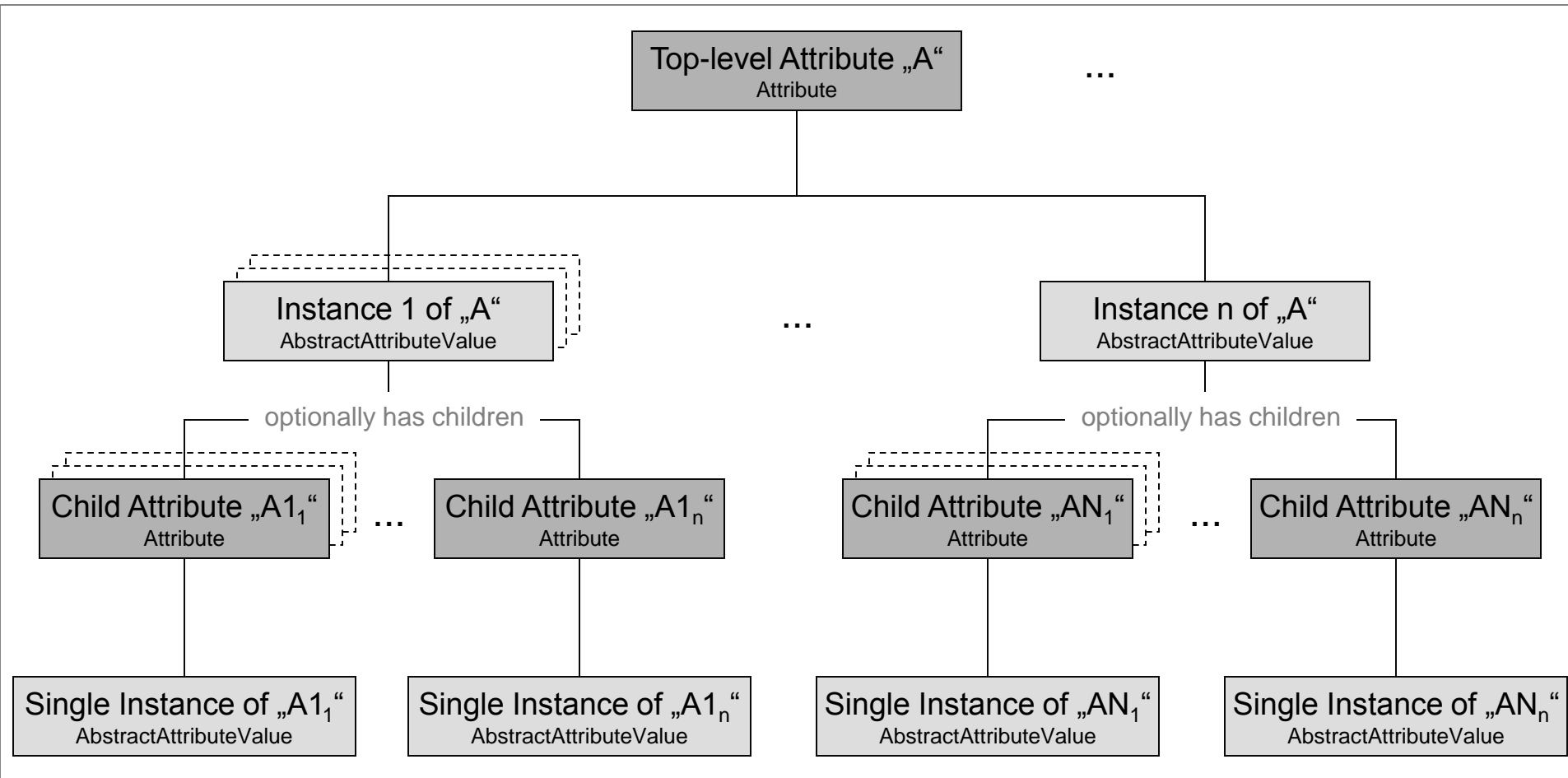
Byte Representation	Invalid	Valid	Valid
Interpreted Representation	Valid	Valid	Valid
Converter	Invalid	Valid	Valid

User has Access

<<create>> Interpreted value

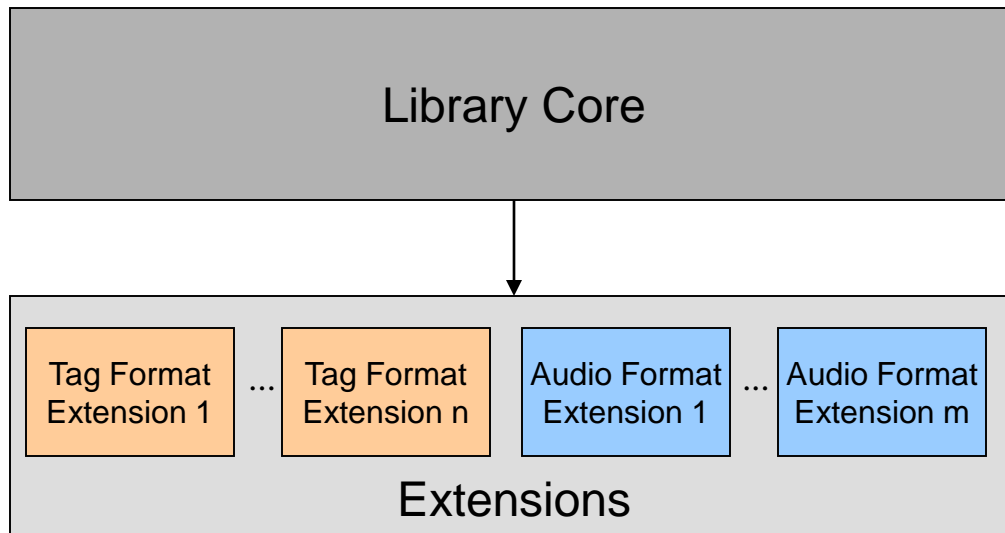
Set specification

Attribute Hierarchy

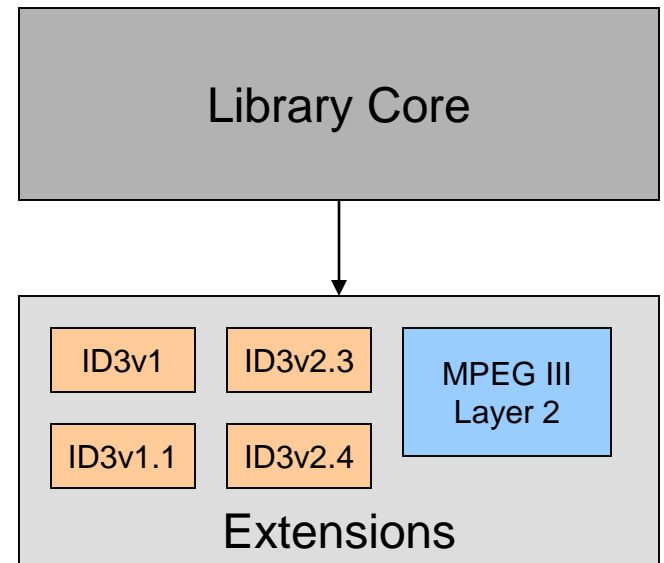


Library Structure

Basic concept



Extensions contained in v0.5 bundle



Audio Composition Structure

Audio Composition (physical medium)

Meta Data (optional)

Tag 1

Attribute A (Instance 1)

...

Attribute B

Child B1

Child B2

...

Attribute A (Instance 2)

...

Tag n

Attribute C

Attribute D

Attribute E

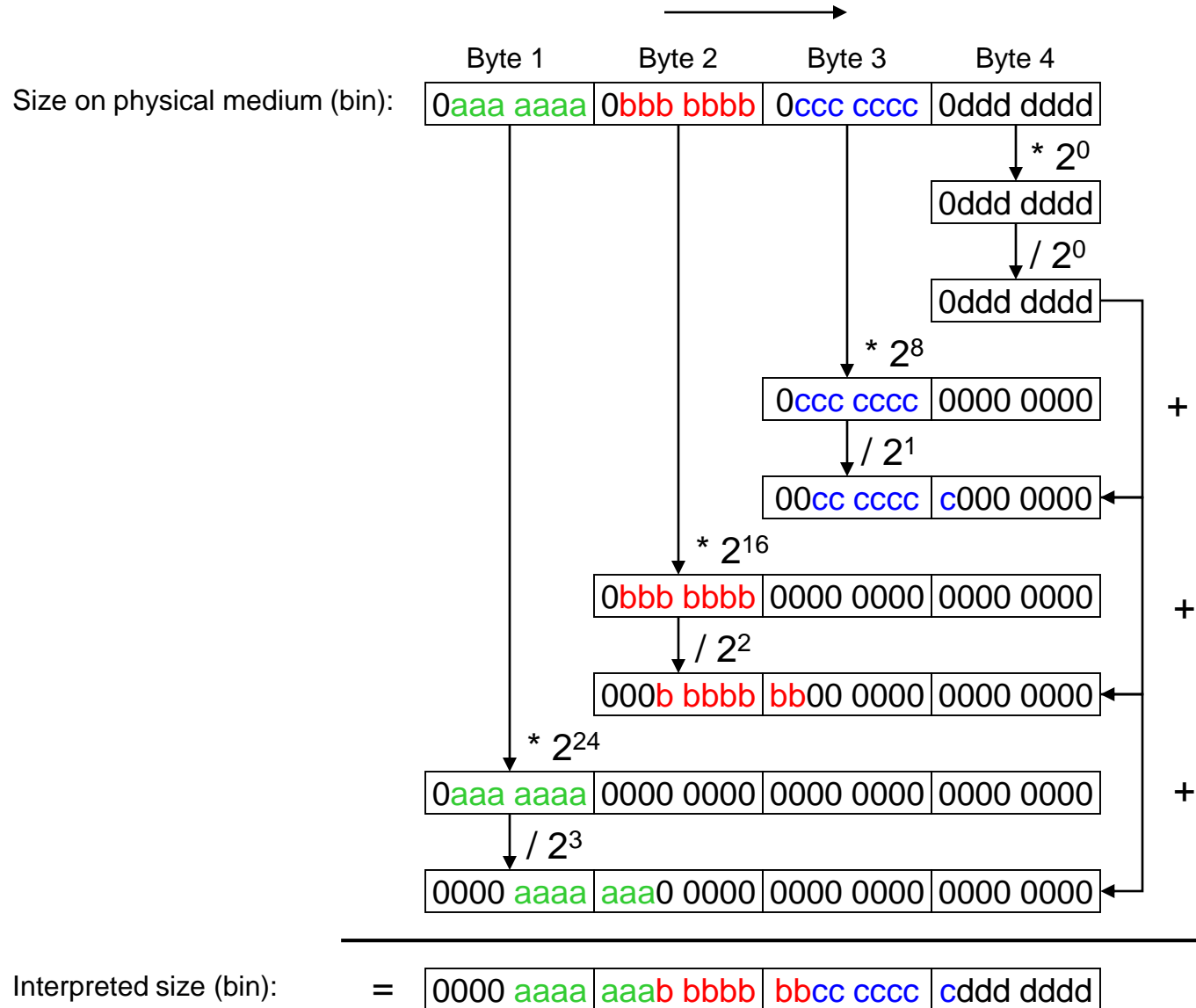
Attribute F

...

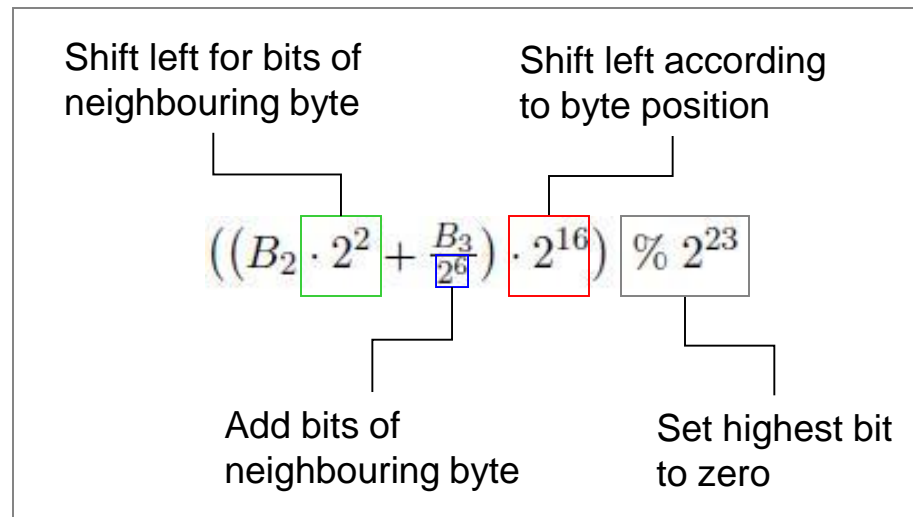
Attribute X

Audio Data

ID3v2 Size Interpretation After Reading



Formula for retrieving ID3v2 size to write



Writing –

processBytesBeforeWrite()

Attribute payload bytes

GroupingProcessing
(v2.3, v2.4)

Group
ID

Attribute payload bytes

CompressionProcessing
(v2.3, v2.4)

Decompressed
size

Group
ID

Attribute payload bytes

C

EncryptionProcessing
(v2.3, v2.4)

Decompressed
size

Encryption
method

Group
ID

Attribute payload bytes

E

C

MergeByteProcessing
(v2.3, v2.4)

UnsynchronisationProcessing
(all versions)

Decompressed
size

Encryption
method

Group
ID

Attribute payload bytes

U

U

U

U

E

C

Reading –

processBytesAfterRead()

Attribute payload bytes

GroupingProcessing
(v2.3, v2.4)

Group
ID

Attribute payload bytes

CompressionProcessing
(v2.3, v2.4)

Decompressed
size

Group
ID

Attribute payload bytes

C

EncryptionProcessing
(v2.3, v2.4)

Decompressed
size

Encryption
method

Group
ID

Attribute payload bytes

E

C

MergeByteProcessing
(v2.3, v2.4)

UnsynchronisationProcessing
(all versions)

Decompressed
size

Encryption
method

Group
ID

Attribute payload bytes

U

U

U

U

E

C

Example Flag Spec

Flag Bytes

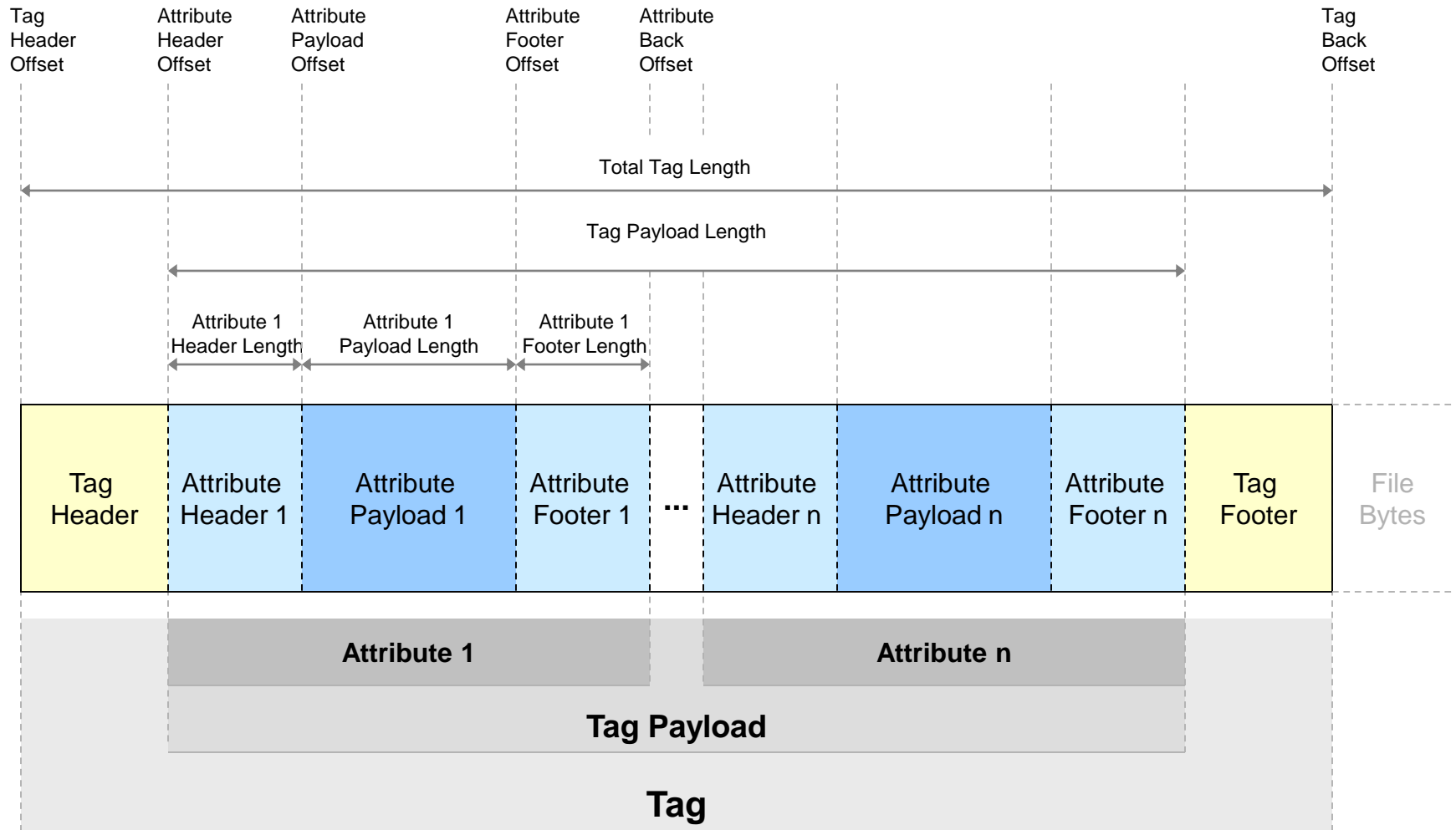
abc0 0000

Byte length = 1

Byte order = Big Endian

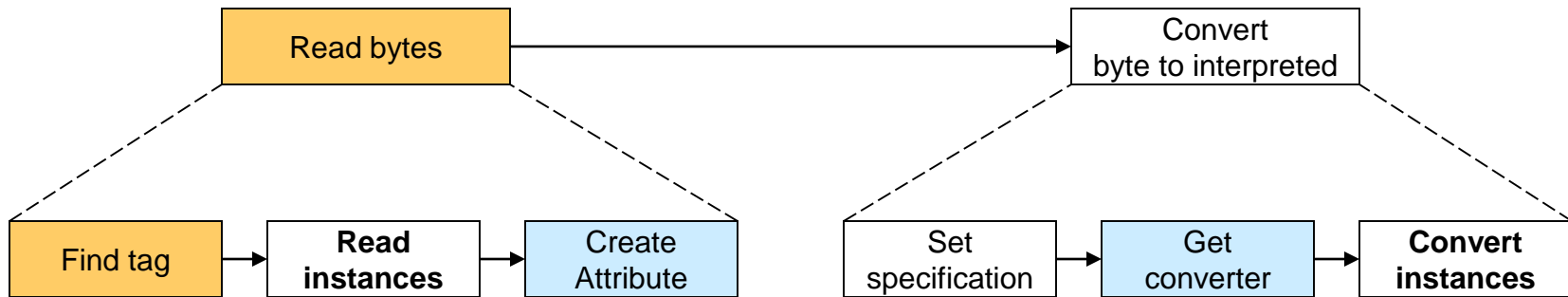
Flag	Bit Address
a = Compression	(1, 1)
b = Footer available	(1, 2)
c = Experimental	(1, 3)

Tag Structure



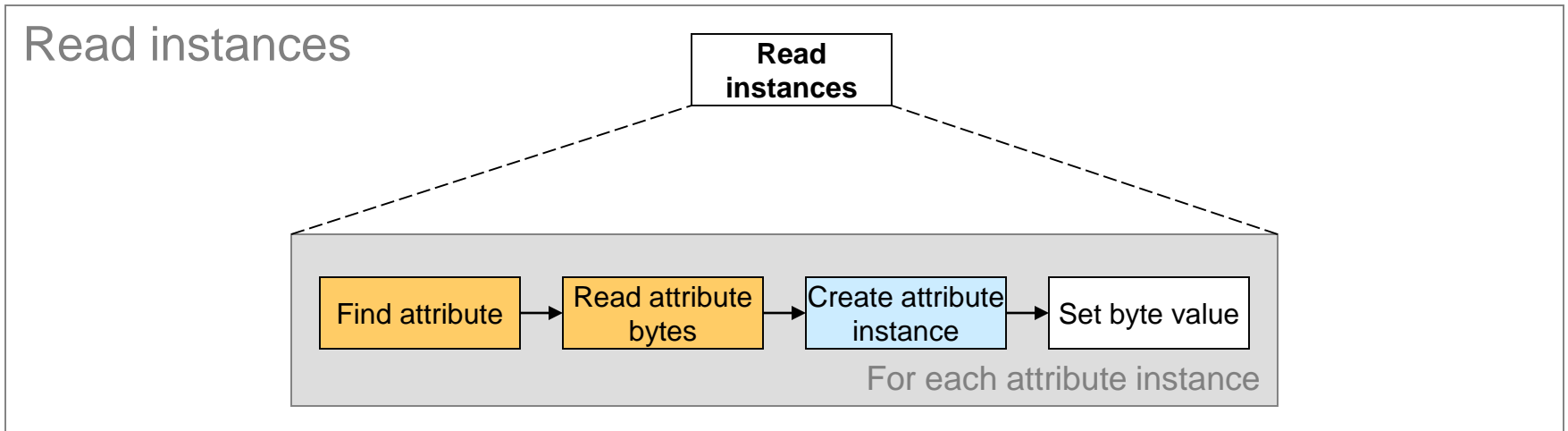
Read attribute





Read attribute



- : Object creation / retrieval
- : Access to physical medium
- : Other action
- : Action with sub-steps detailed on further figure

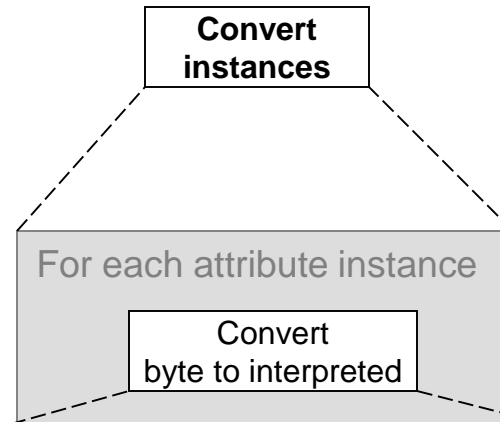
Read instances



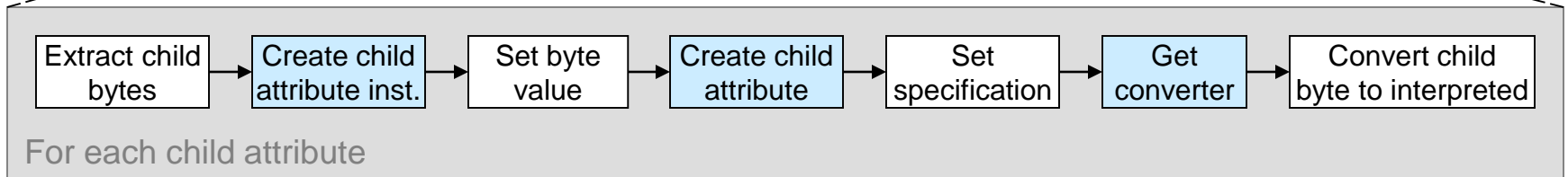
-  : Object creation / retrieval
-  : Access to physical medium
-  : Other action
-  : **Action with sub-steps detailed on further figure**

Convert instances (Reading)

Convert instances



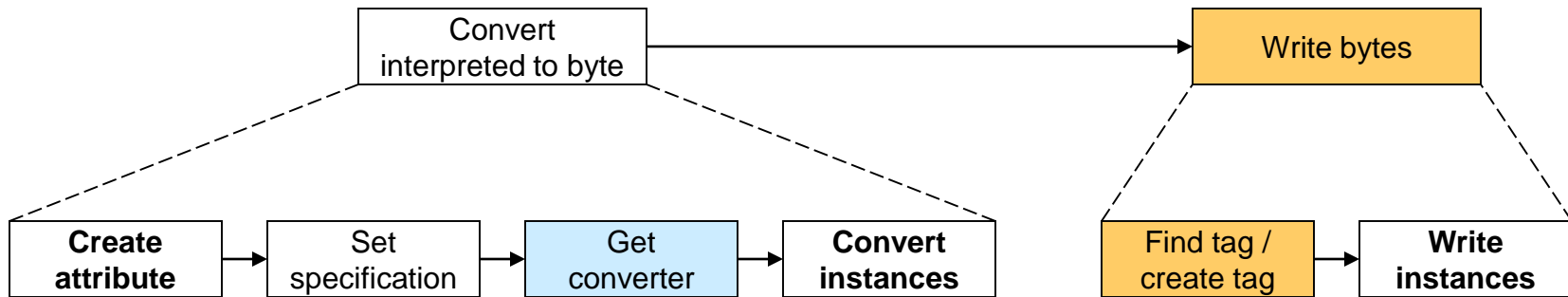
<For attributes with children only>







- : Object creation / retrieval
- : Access to physical medium
- : Other action
- : Action with sub-steps detailed on further figure

Write attribute

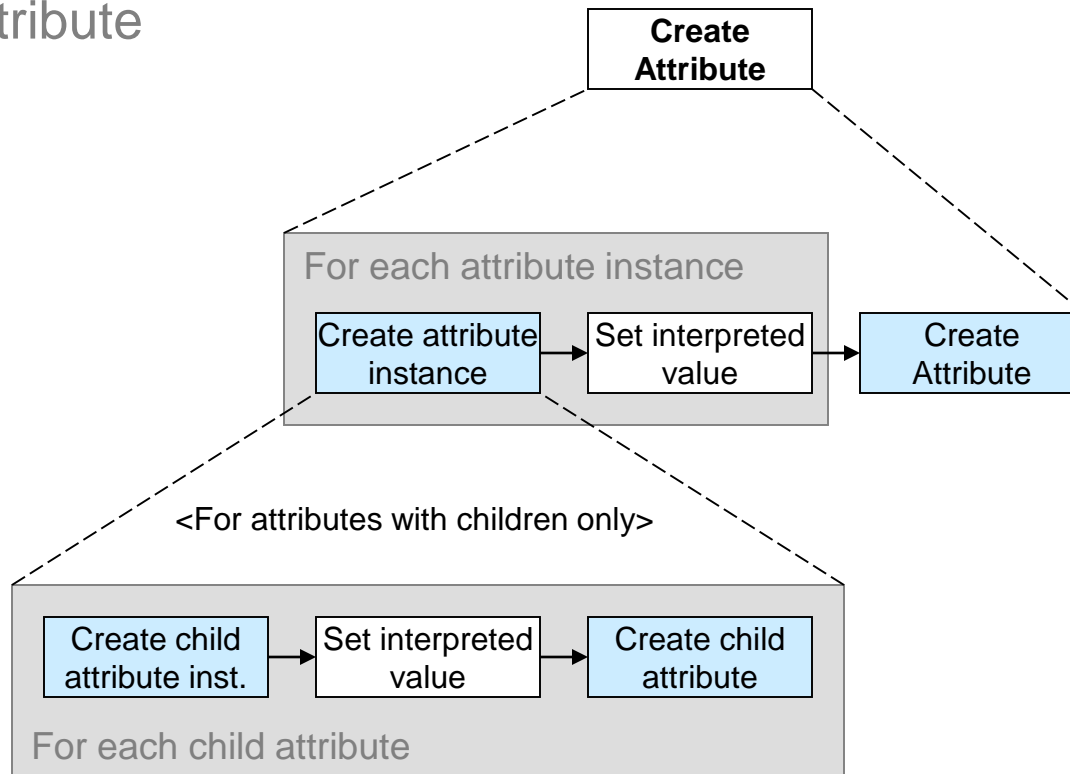
Write attribute



-  : Object creation / retrieval
-  : Access to physical medium
-  : Other action
-  : Action with sub-steps detailed on further figure

Create attribute (Writing)

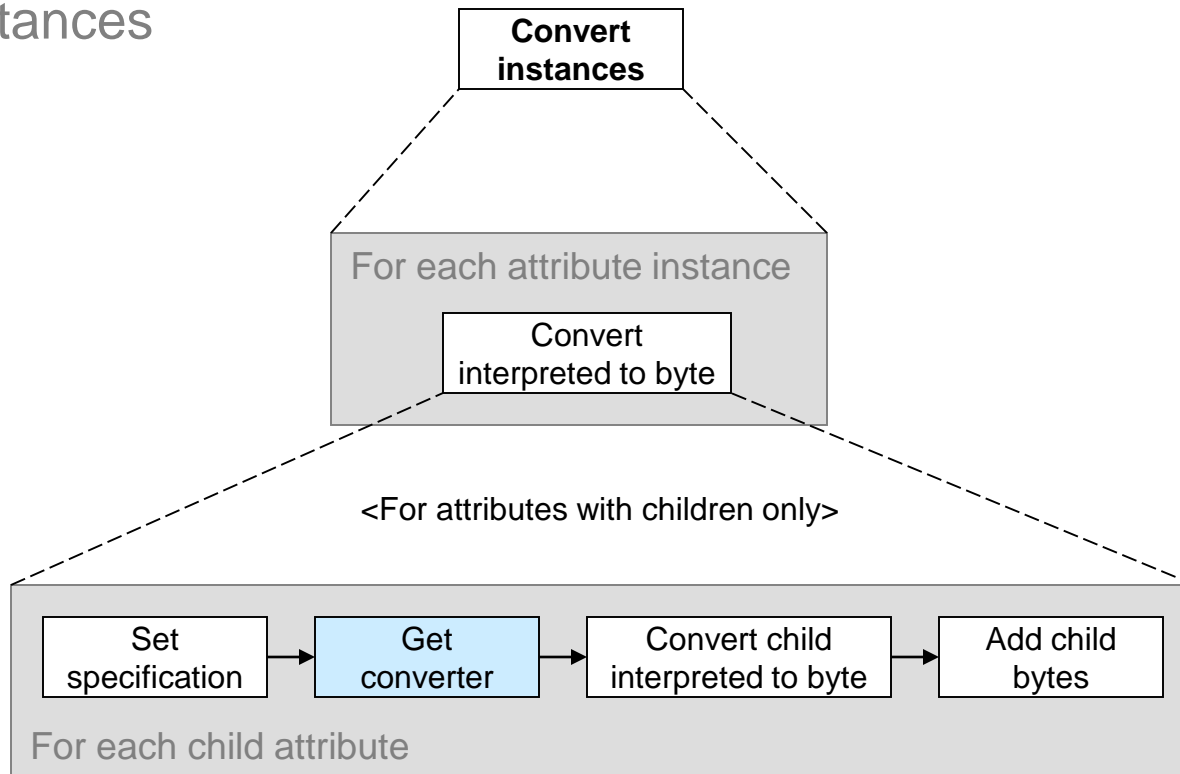
Create attribute







- : Object creation / retrieval
- : Access to physical medium
- : Other action
- : **Action with sub-steps detailed on further figure**

Convert instances (Writing)

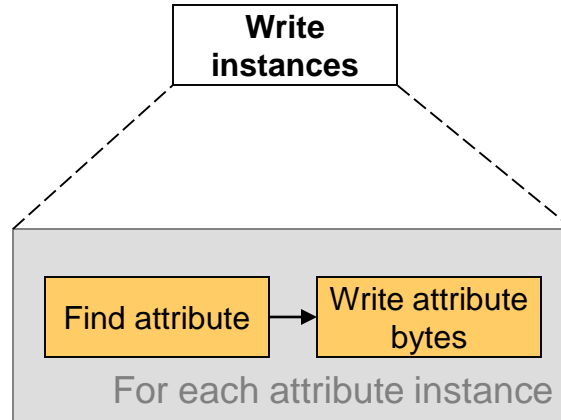
Convert instances







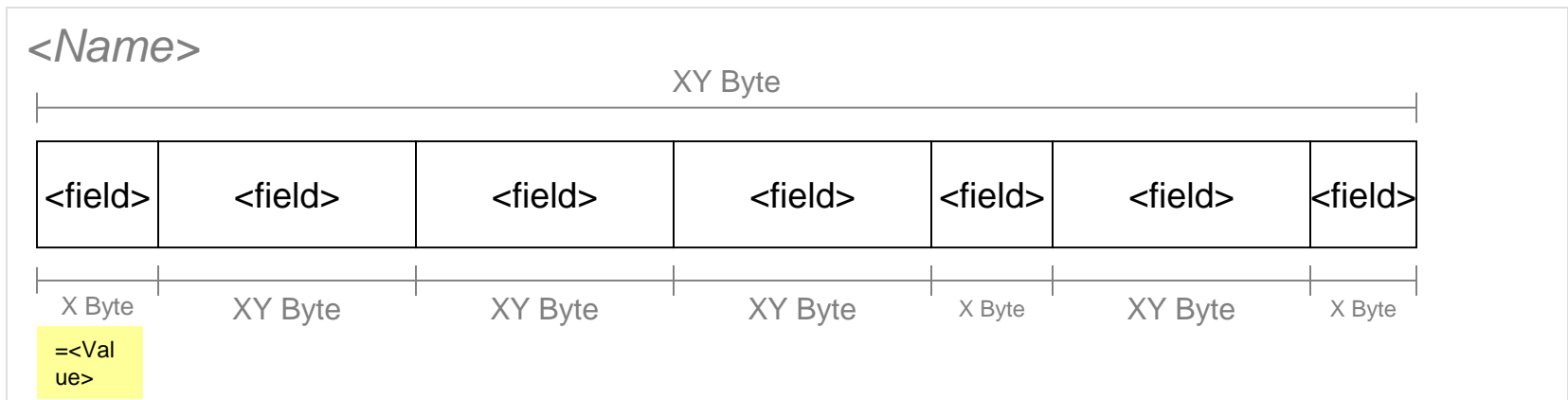
-  : Object creation / retrieval
-  : Access to physical medium
-  : Other action
-  : Action with sub-steps detailed on further figure

Write instances

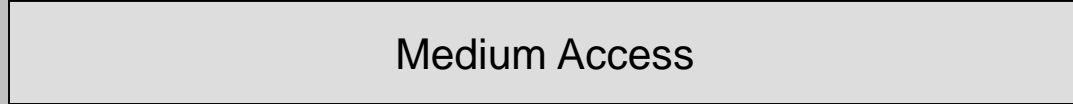
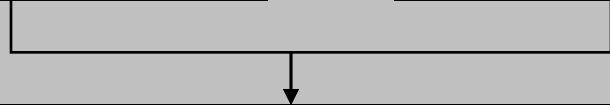
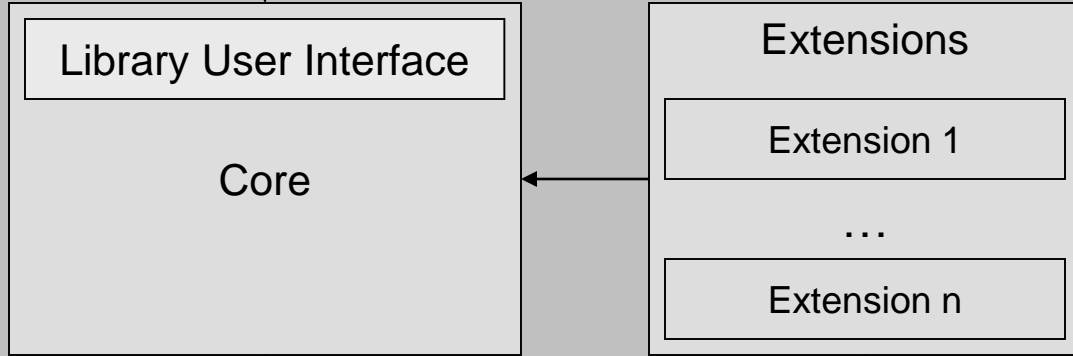
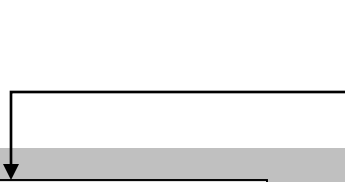
Write instances



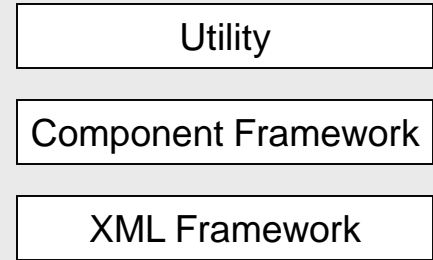
-  : Object creation / retrieval
-  : Access to physical medium
-  : Other action
-  : **Action with sub-steps detailed on further figure**



Application Layer (User)



jMeta



Cross-functional

ALT

Template



Hallo