

**Y**andex

# Binary formats 1

SequenceFile, Avro

# Inefficiencies of text formats

- › To parse "100500"
  - › iterate over characters: '1', '0', '0', '5', '0', '0'
  - › convert them to digits: 1, 0, 0, 5, 0, 0
  - › fold into the result:  $1*100000 + 0*10000 + 0*1000 + 5*100 + 0*10 + 0*1$
- › Not as fast as simple copying

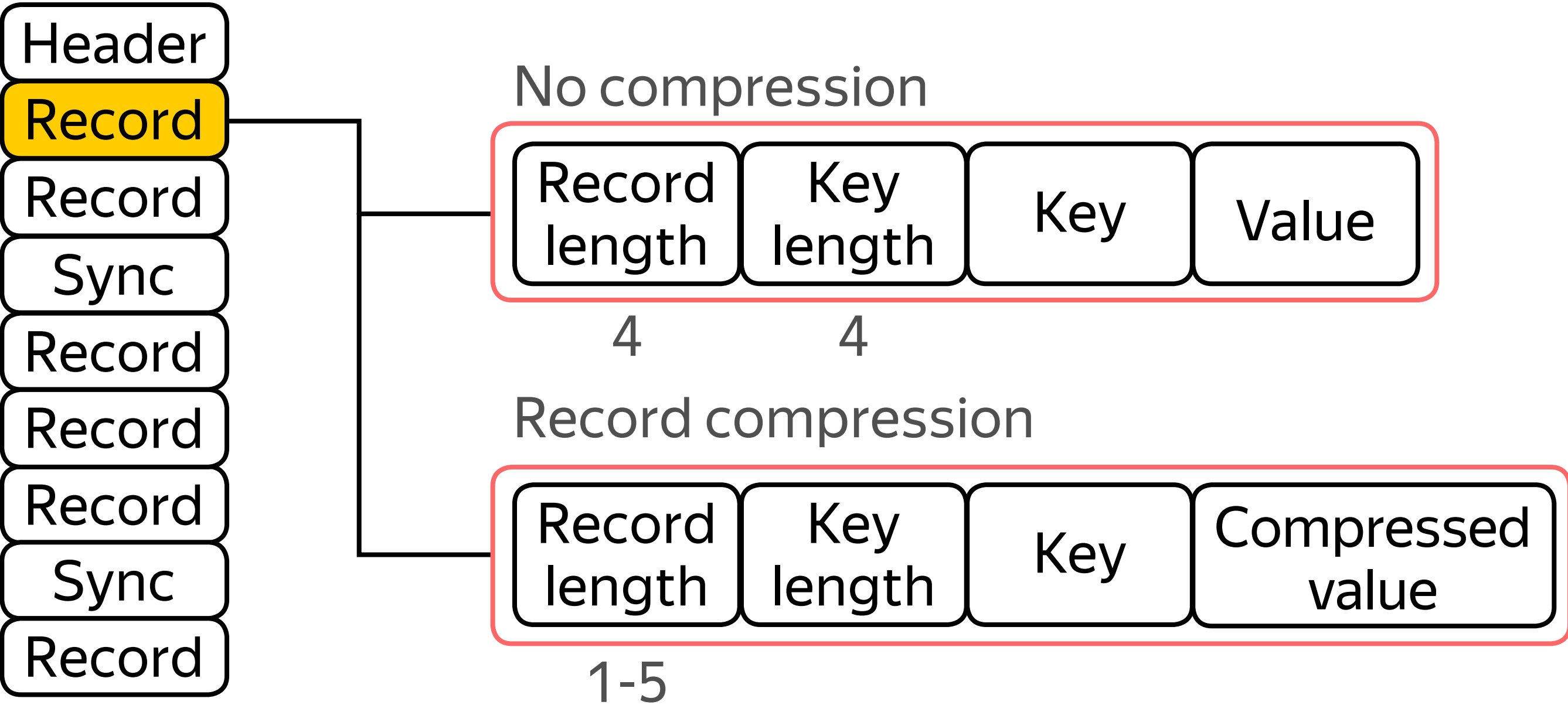
# SequenceFile

- › First binary format implemented in Hadoop
- › Stores sequence of key-value pairs
- › Java-specific serialization/deserialization

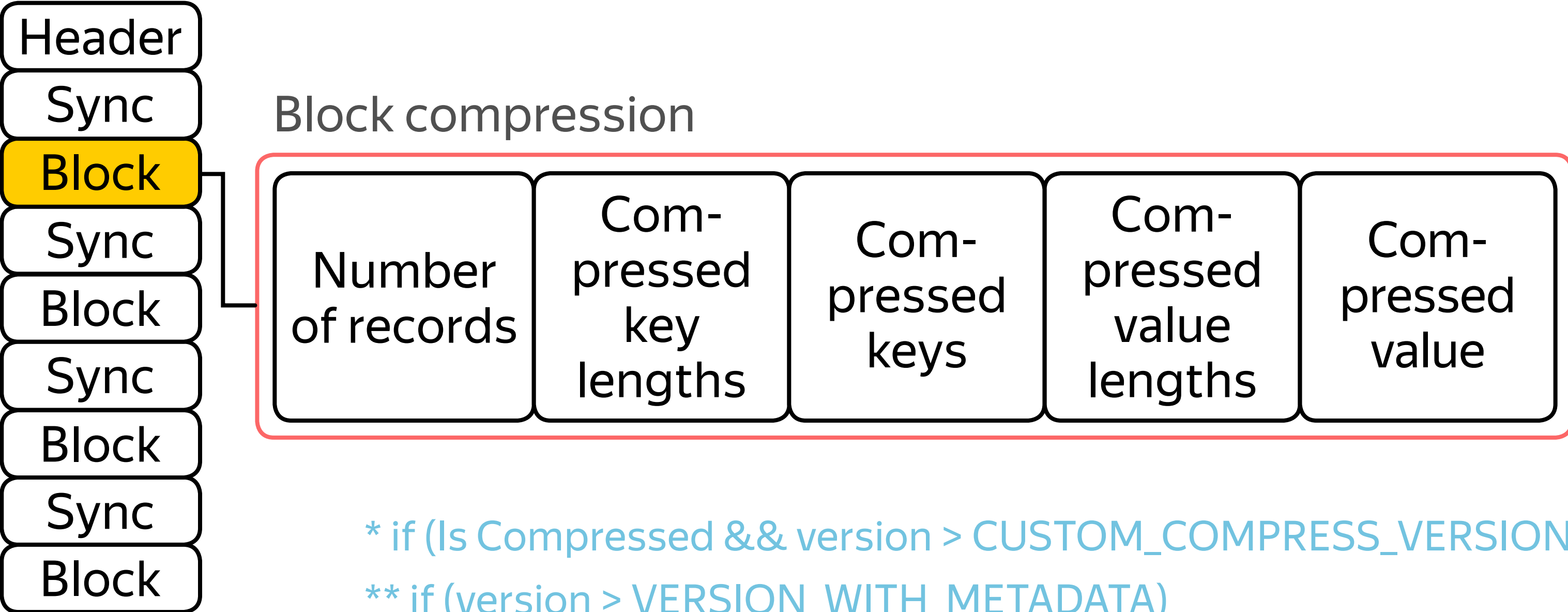
# SequenceFile

Header
4 bytes - 'SEQ' + VERSION
Text - Key Class Name
Text - Value Class Name
Boolean - Is Compressed
Boolean - Is Block Compressed
Text - Compress Codec Class Name*
Metadata**
16 bytes - Sync Marker

## Without block compression



## Without block compression



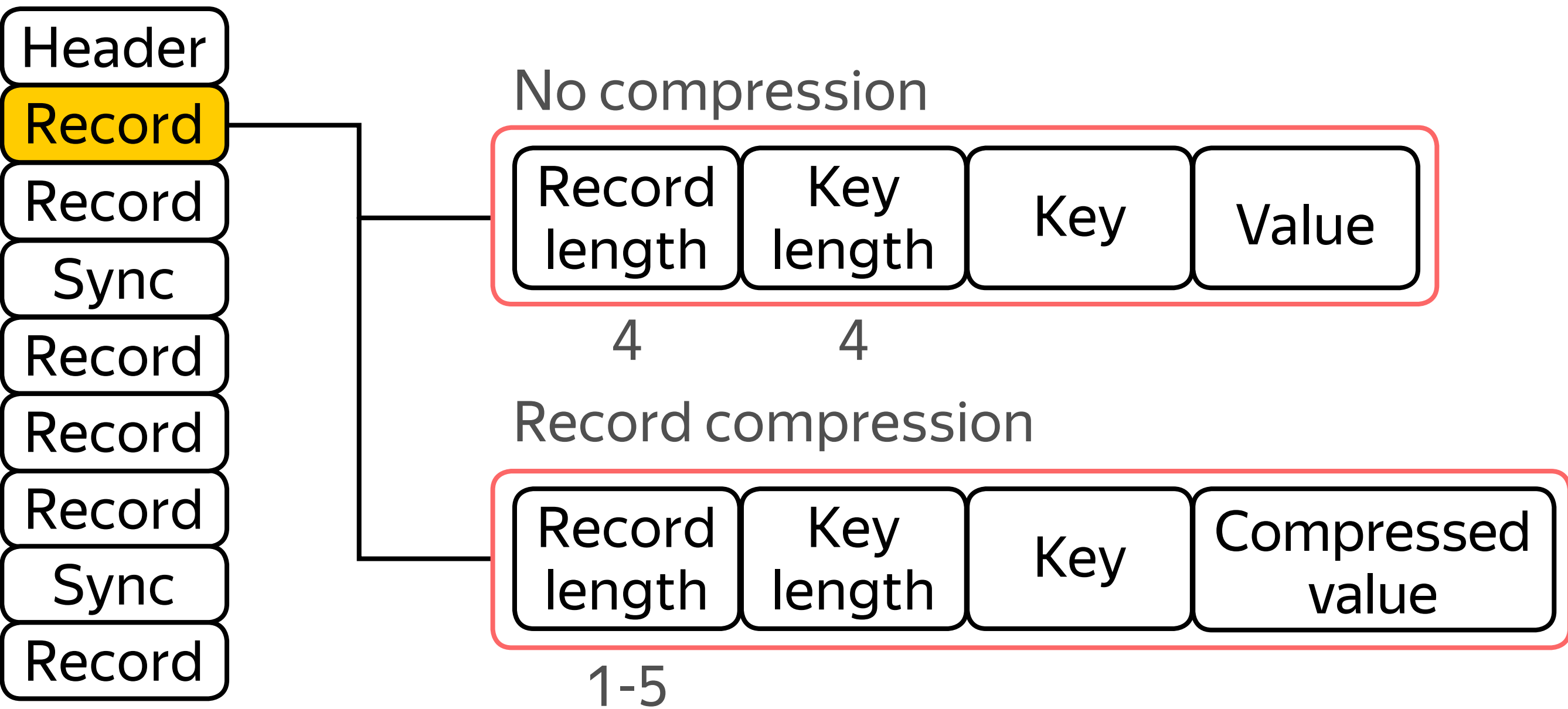
\* if (Is Compressed && version > CUSTOM\_COMPRESS\_VERSION)

\*\* if (version > VERSION\_WITH\_METADATA)

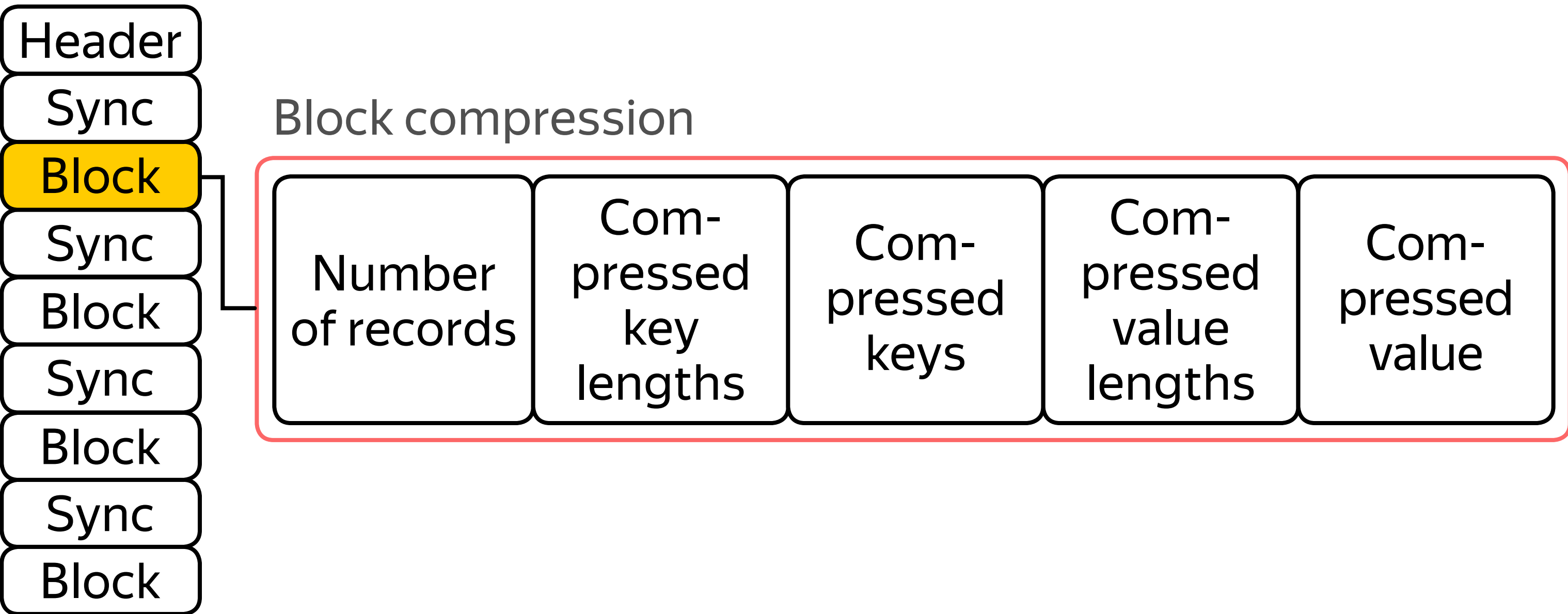
# SequenceFile

- › Space efficiency
- › Speed
- › Data types
- › Splittable
- › Extensibility

## Without block compression



## Without block compression



# SequenceFile

› Space efficiency

MODERATE TO GOOD

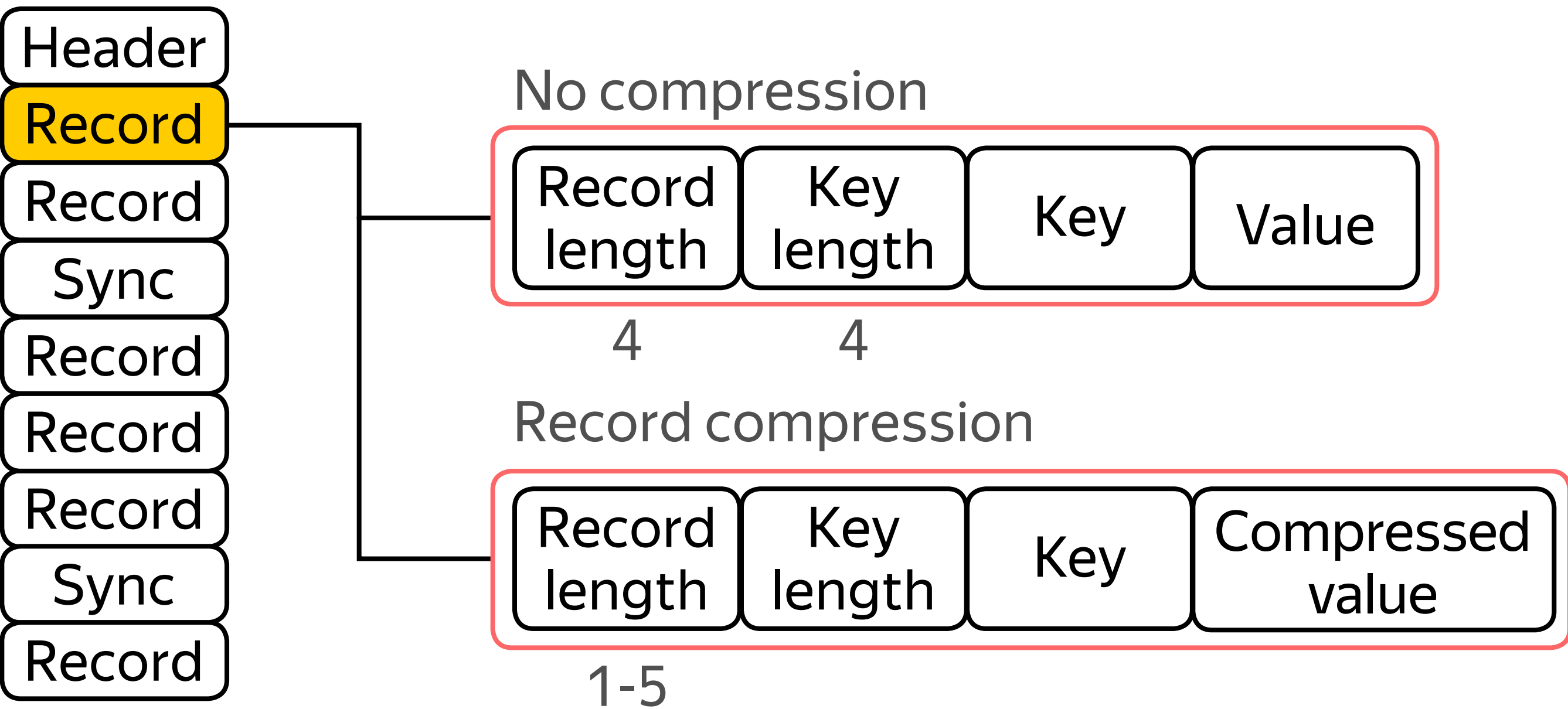
› Speed

› Data types

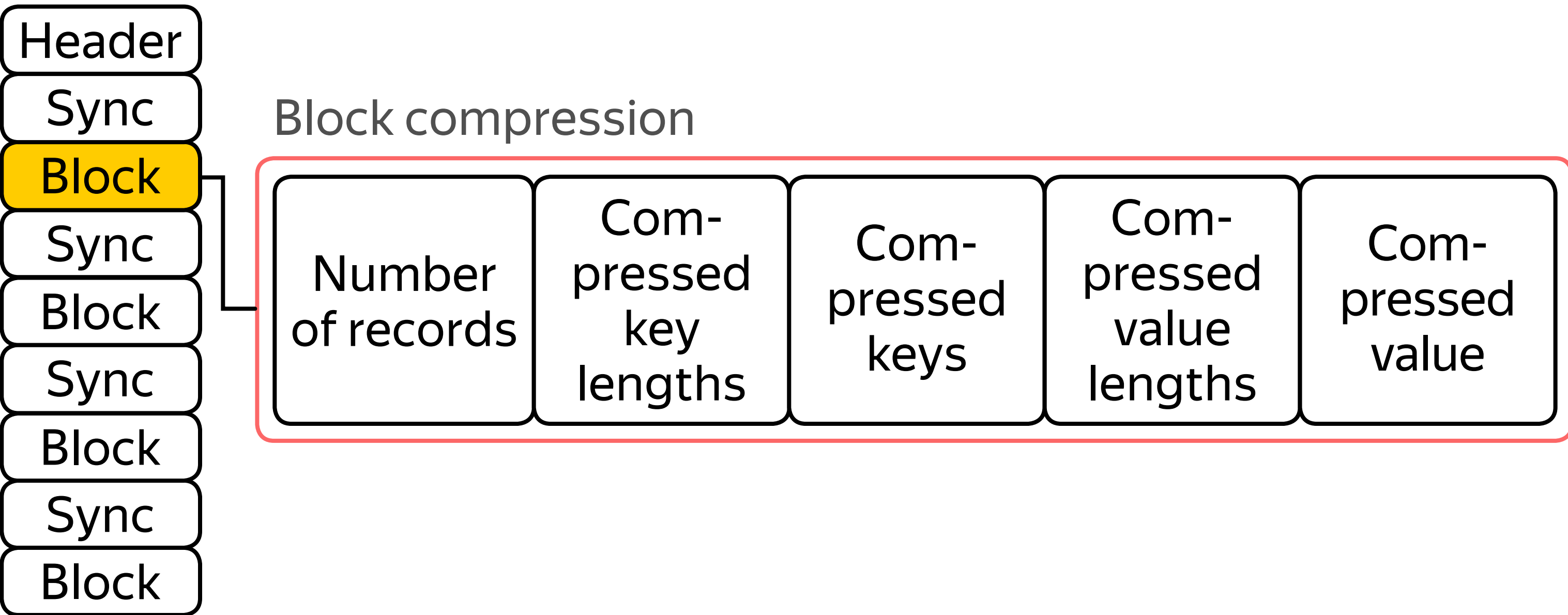
› Splittable

› Extensibility

## Without block compression



## Without block compression



# SequenceFile

› Space efficiency

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› Speed

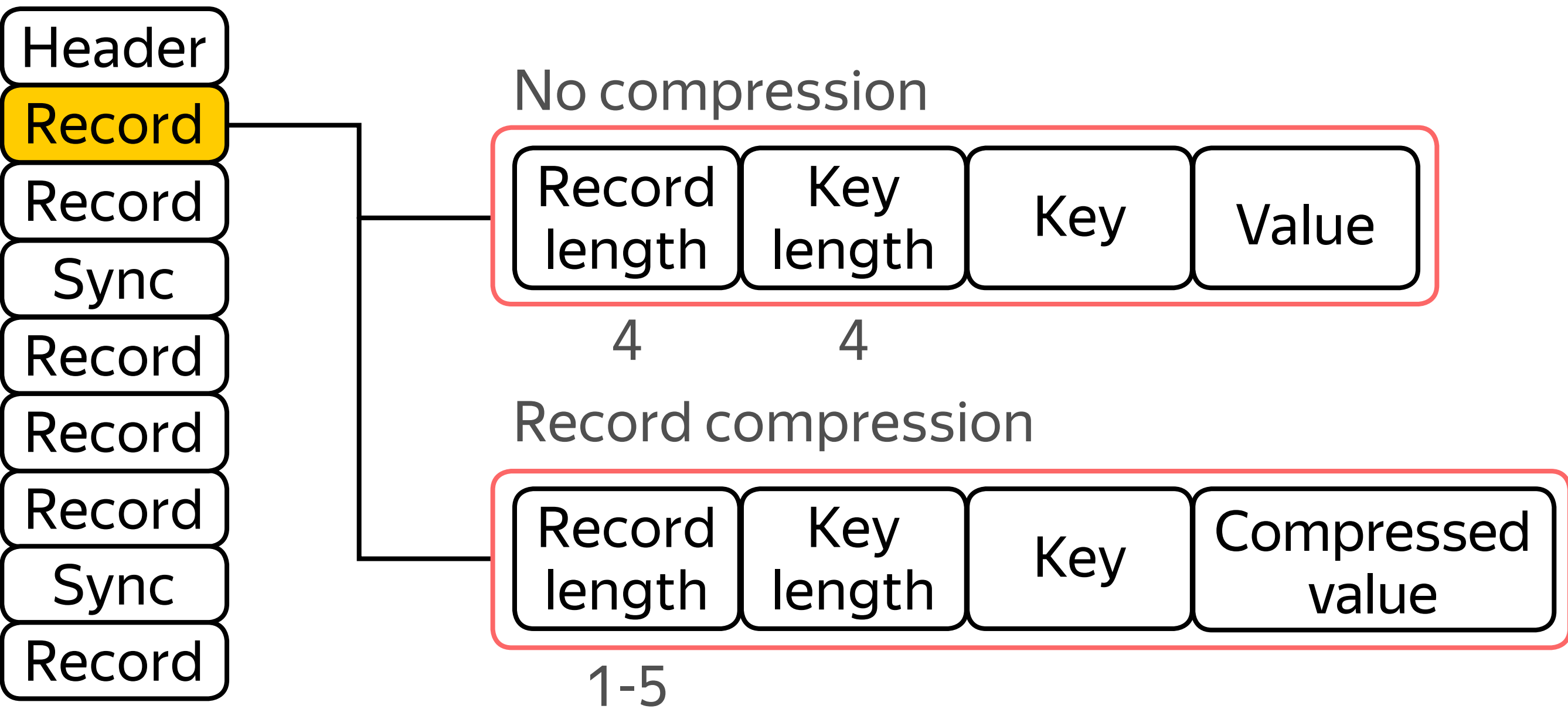
GOOD

› Data types

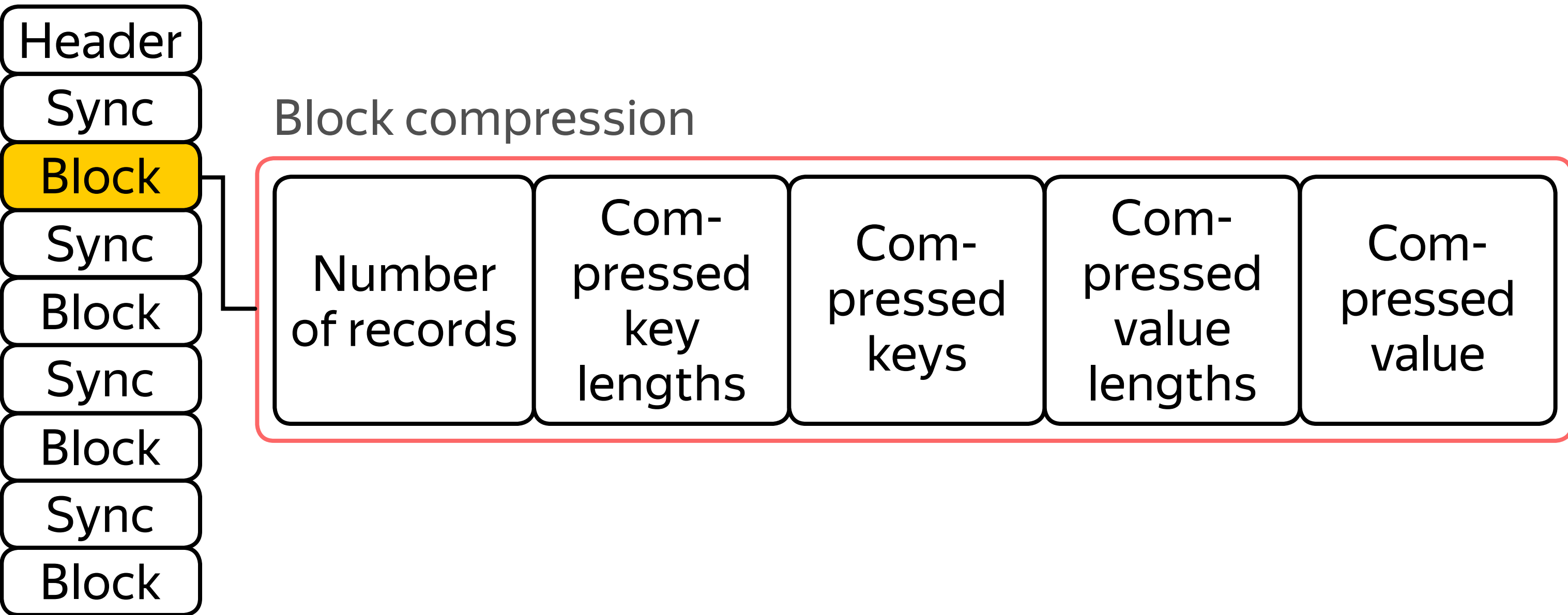
› Splittable

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## Without block compression



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# SequenceFile

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MODERATE TO GOOD

- › Speed

GOOD

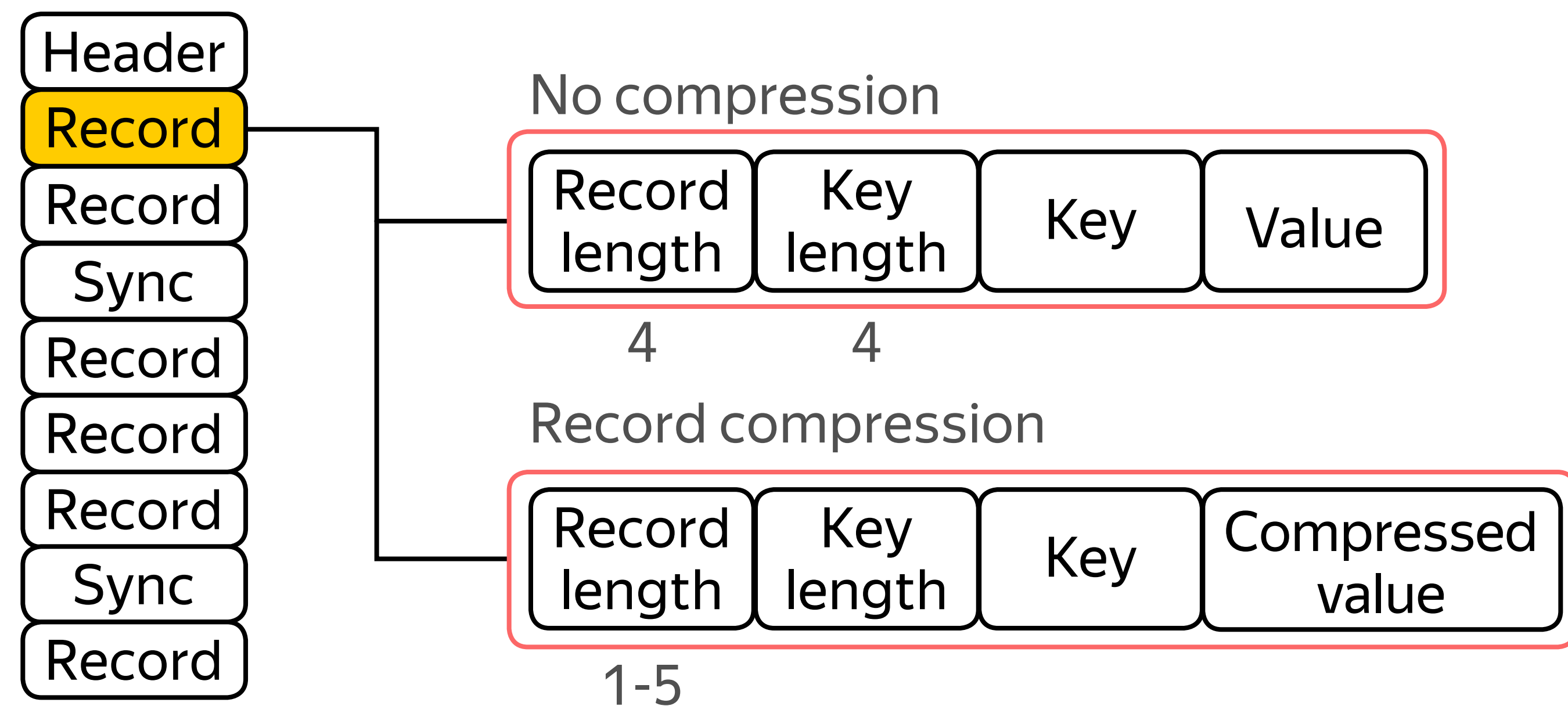
- › Data types

ANY W/ SER./DESER. CODE

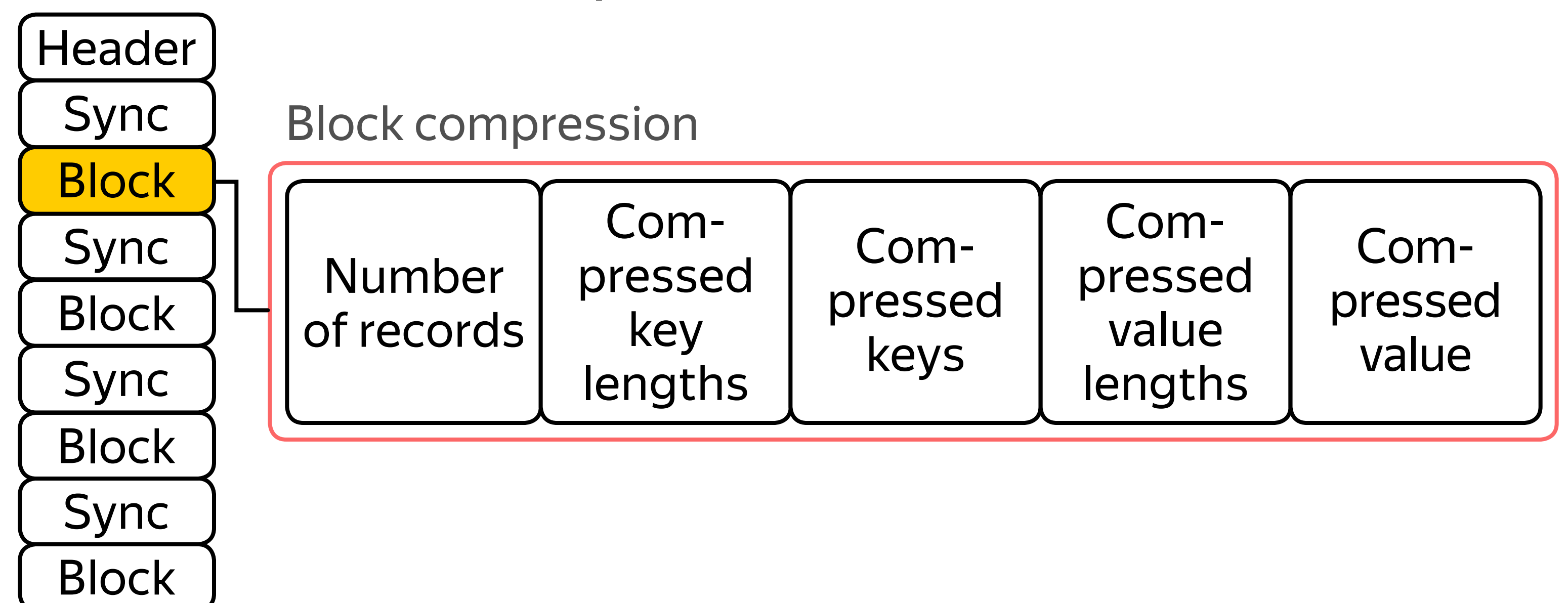
- › Splittable

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## Without block compression



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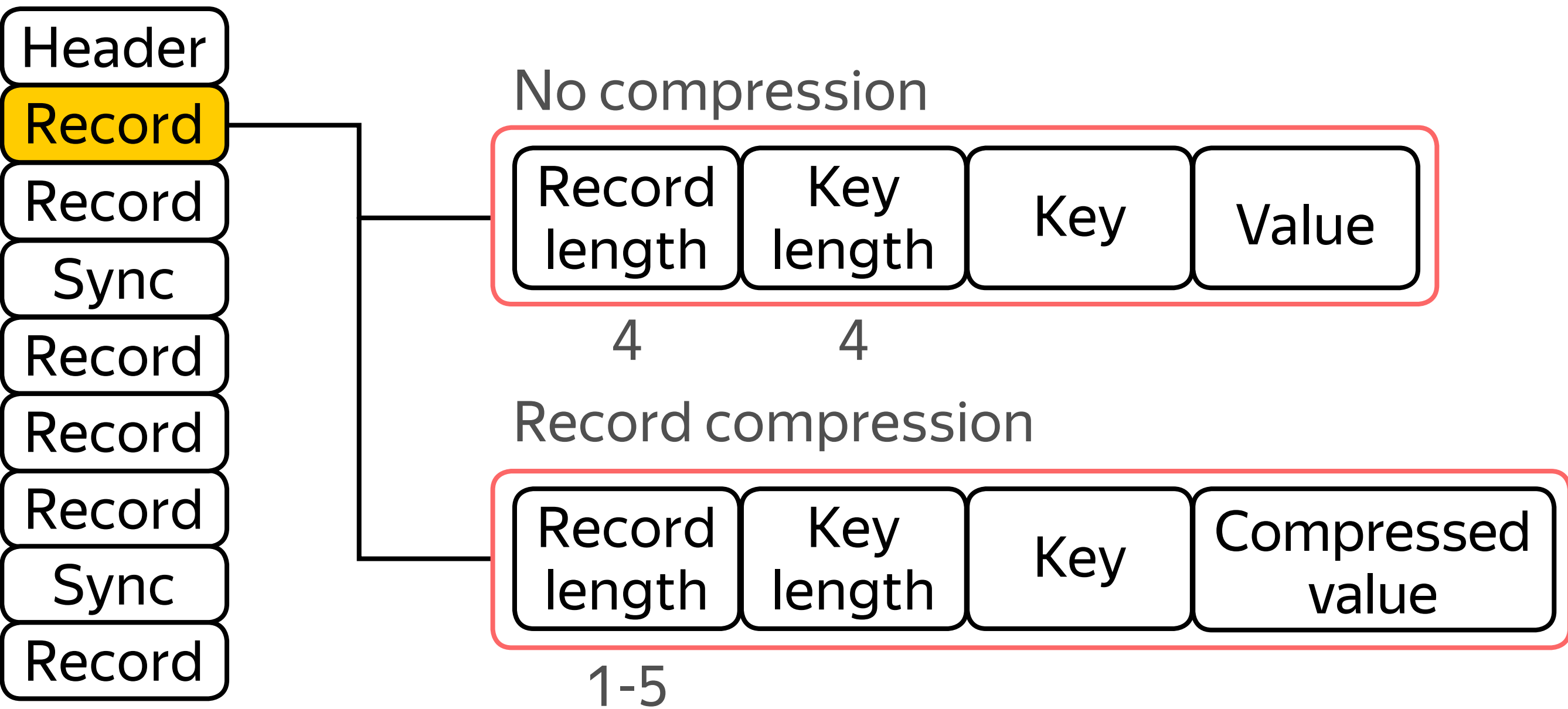
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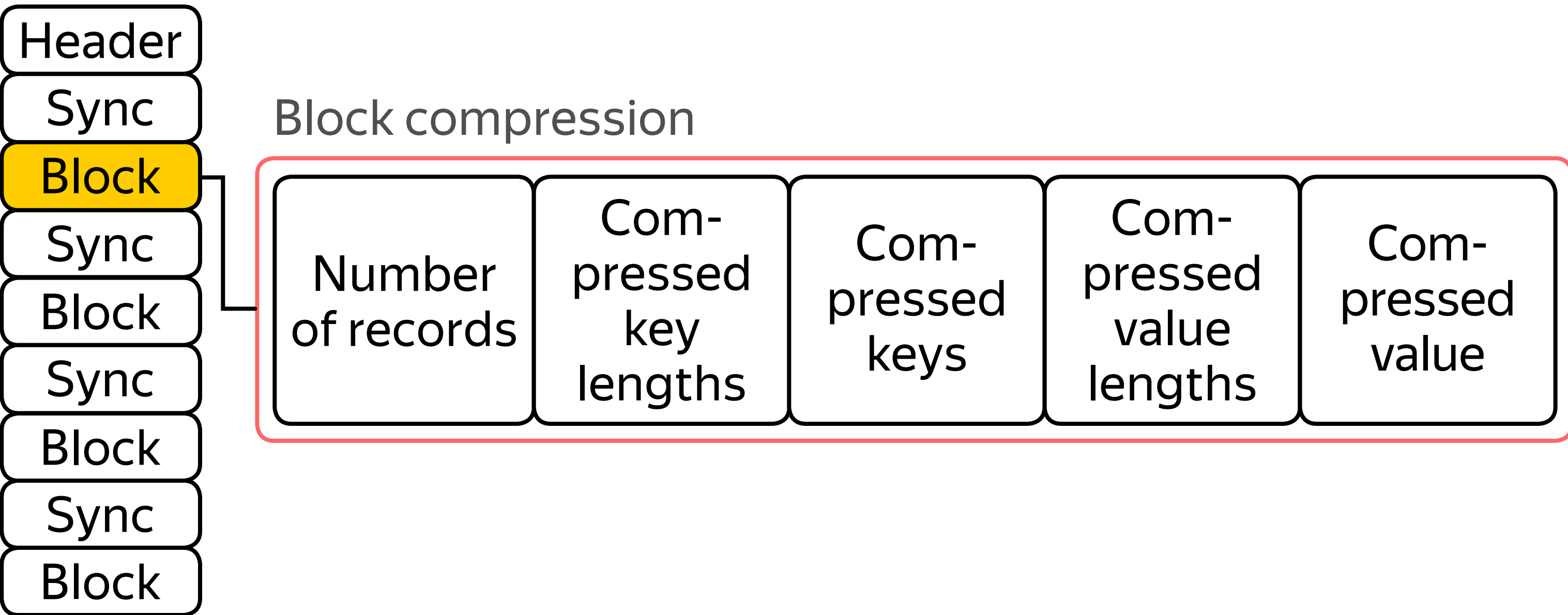
SPLITTABLE

› Extensibility

## Without block compression



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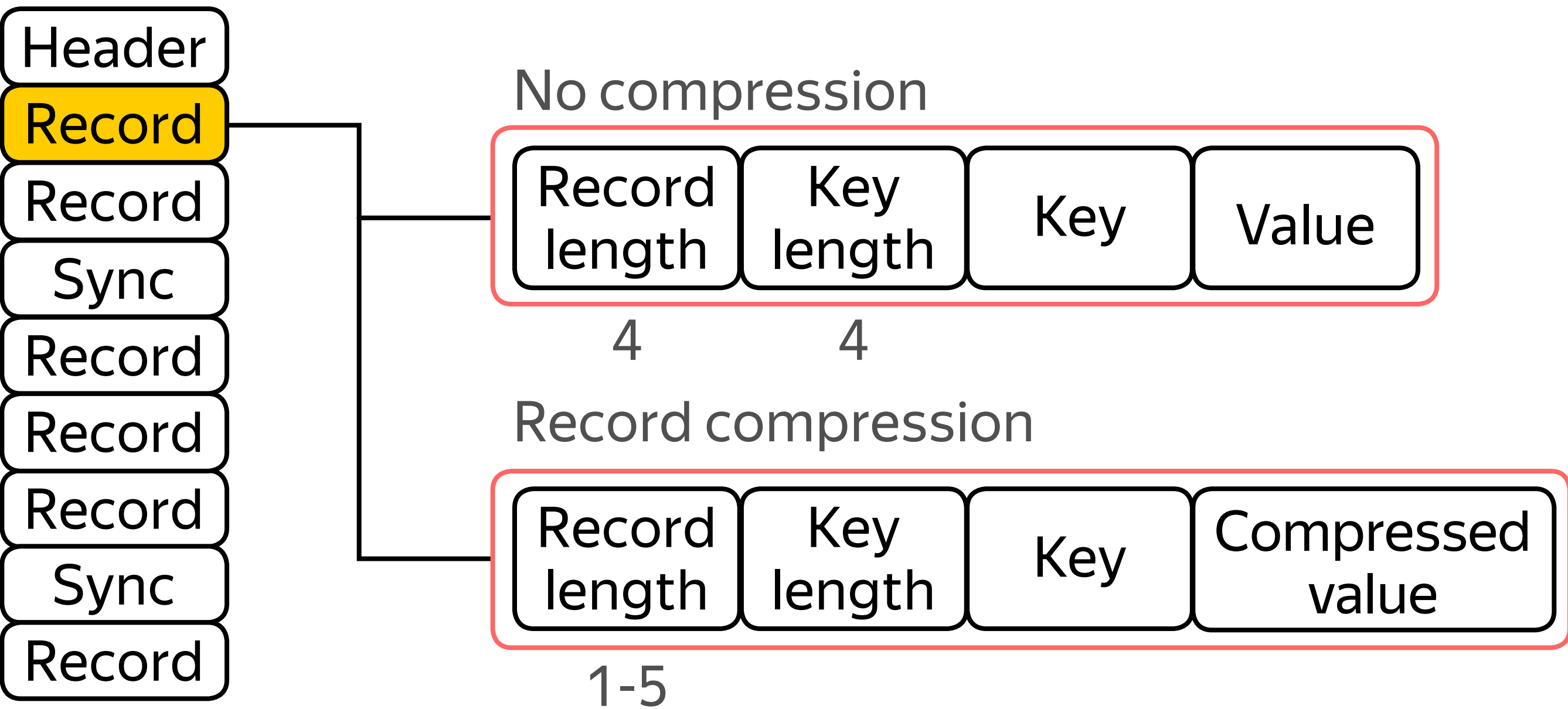
› Splittable

SPLITTABLE

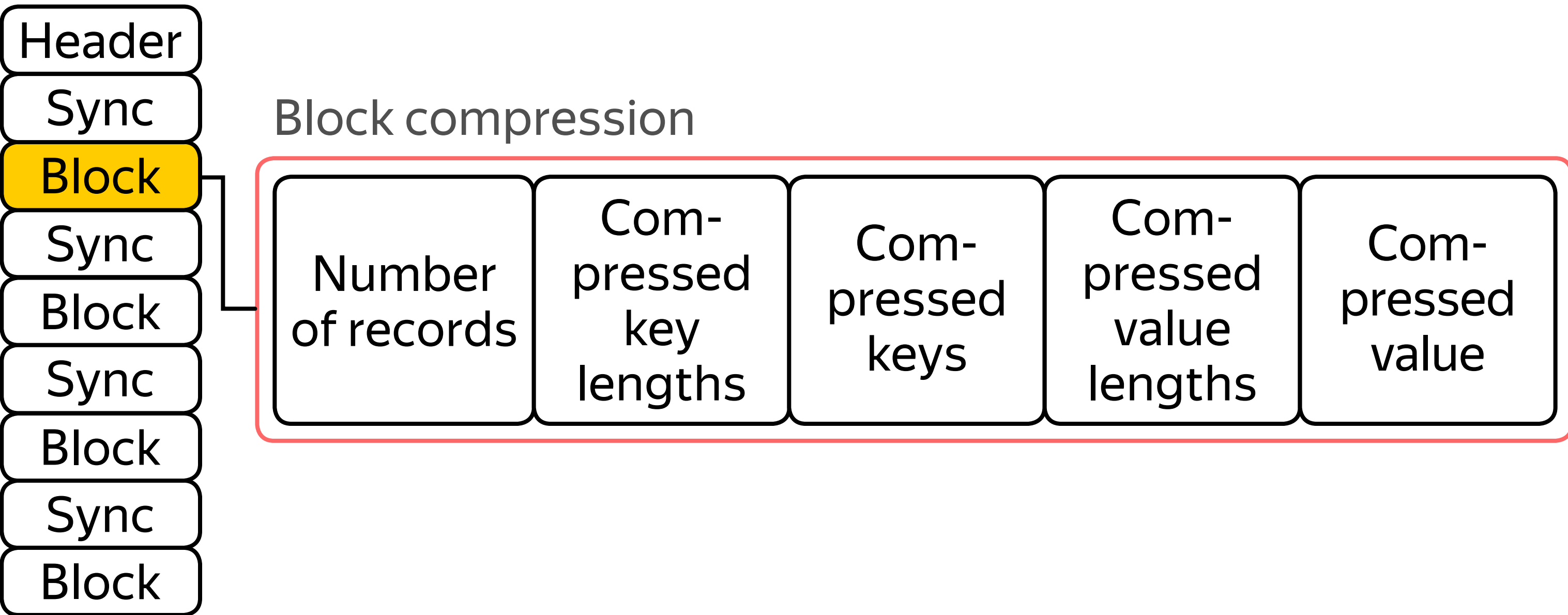
› Extensibility

NO

## Without block compression



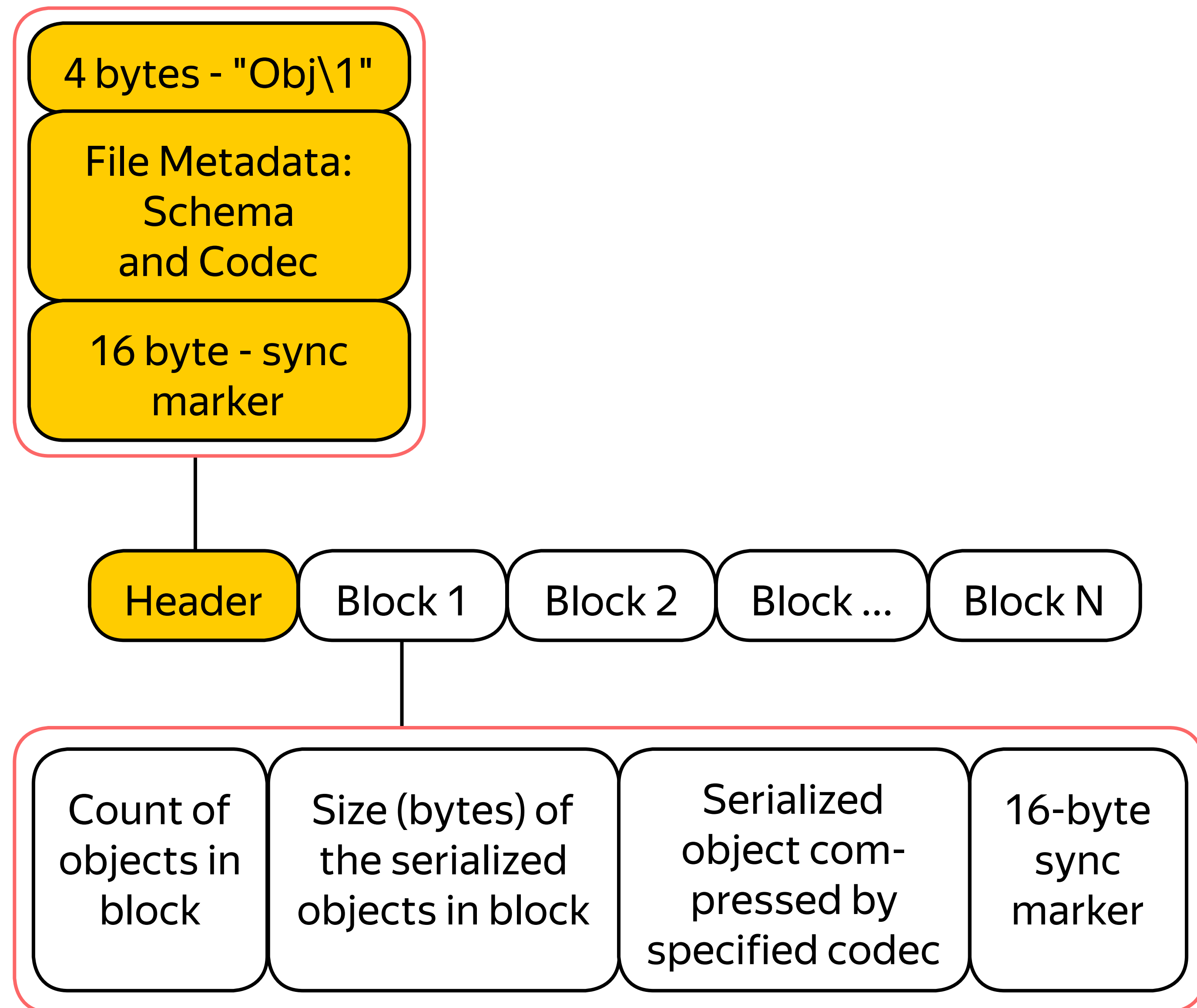
## Without block compression



# Avro

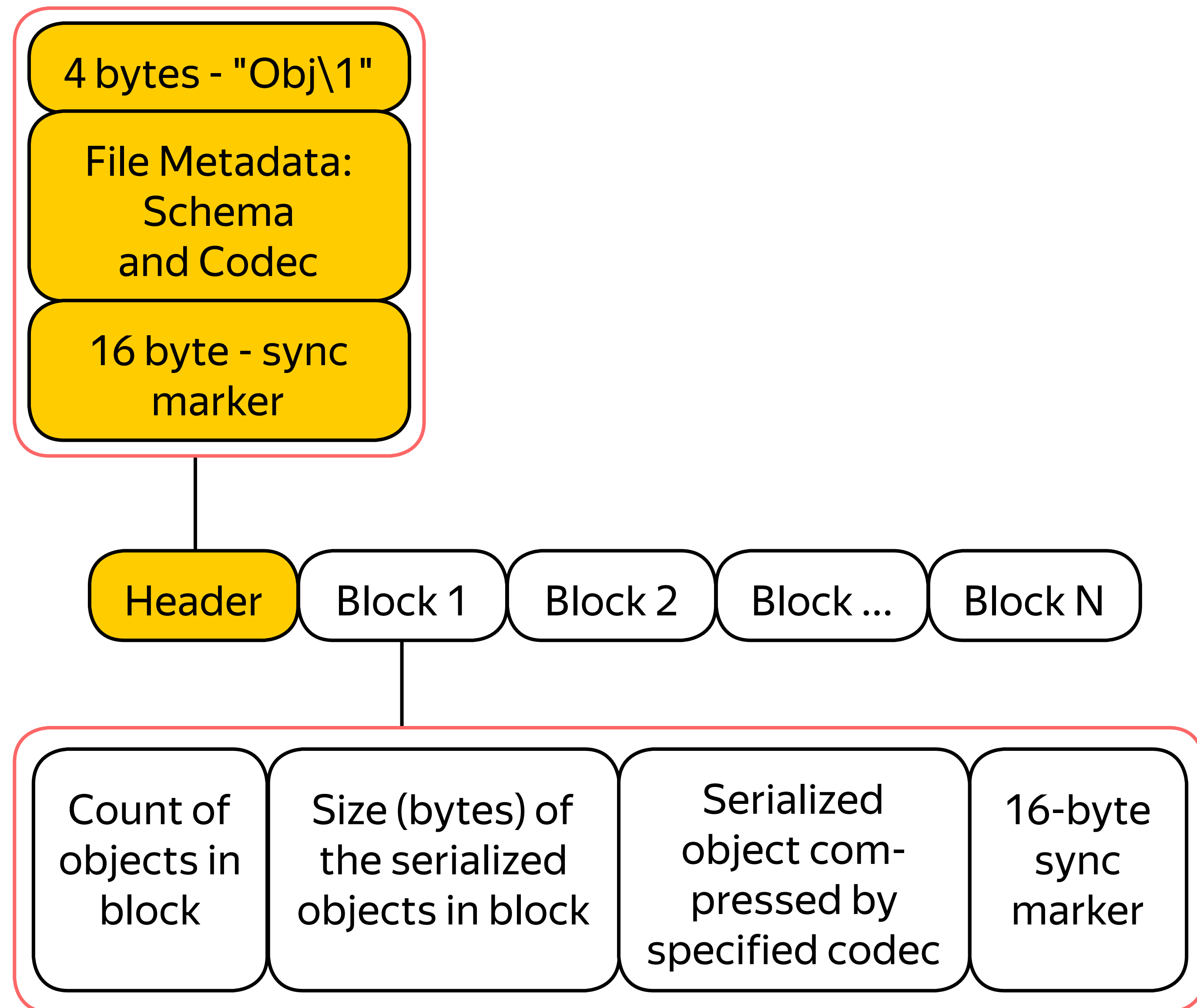
- › Both format & support library
- › Stores objects defined by the schema
  - › specifies field names, types, aliases
  - › defines serialization/deserialization code
  - › allows some schema updates
- › Interoperability with many languages

# Avro



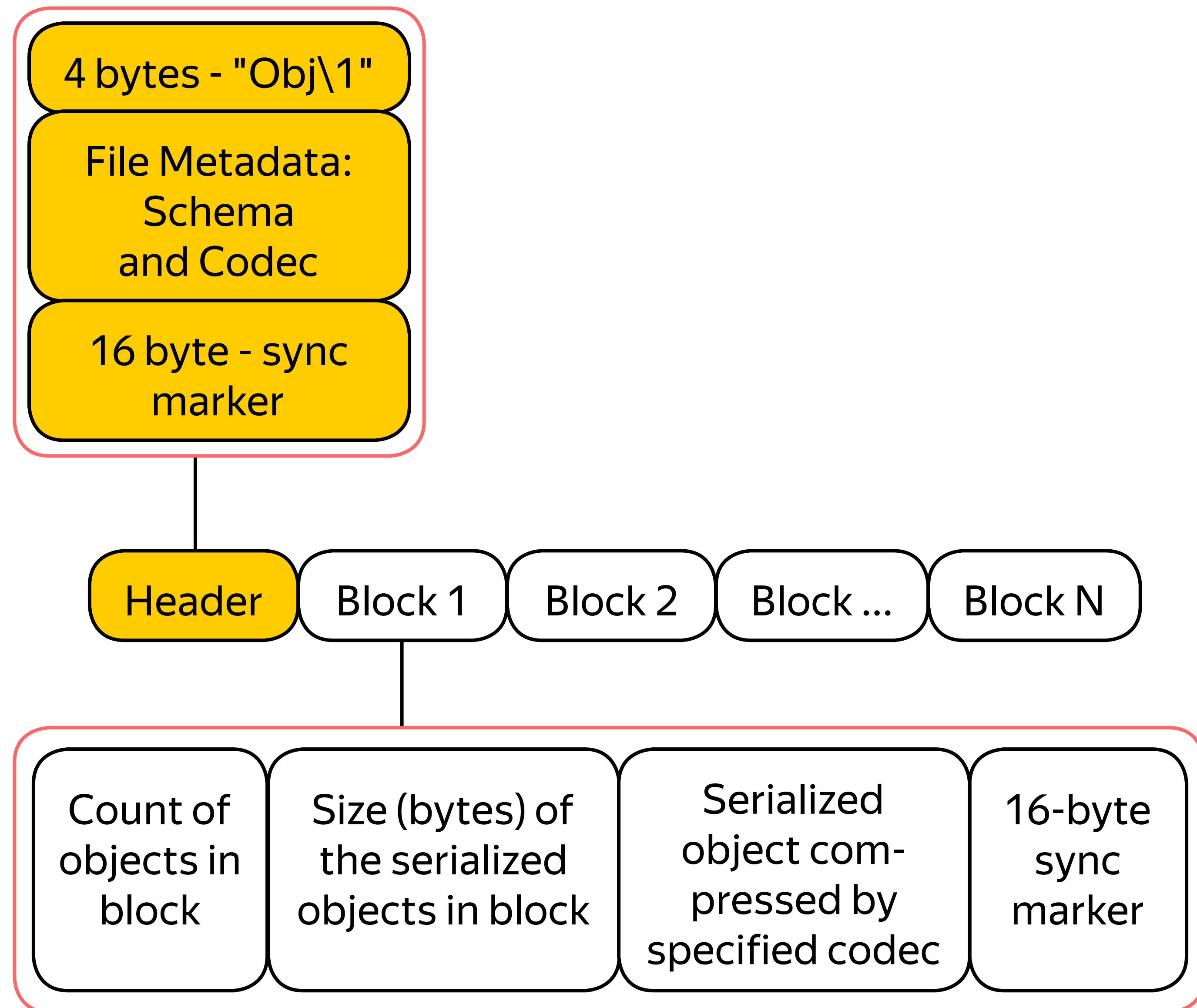
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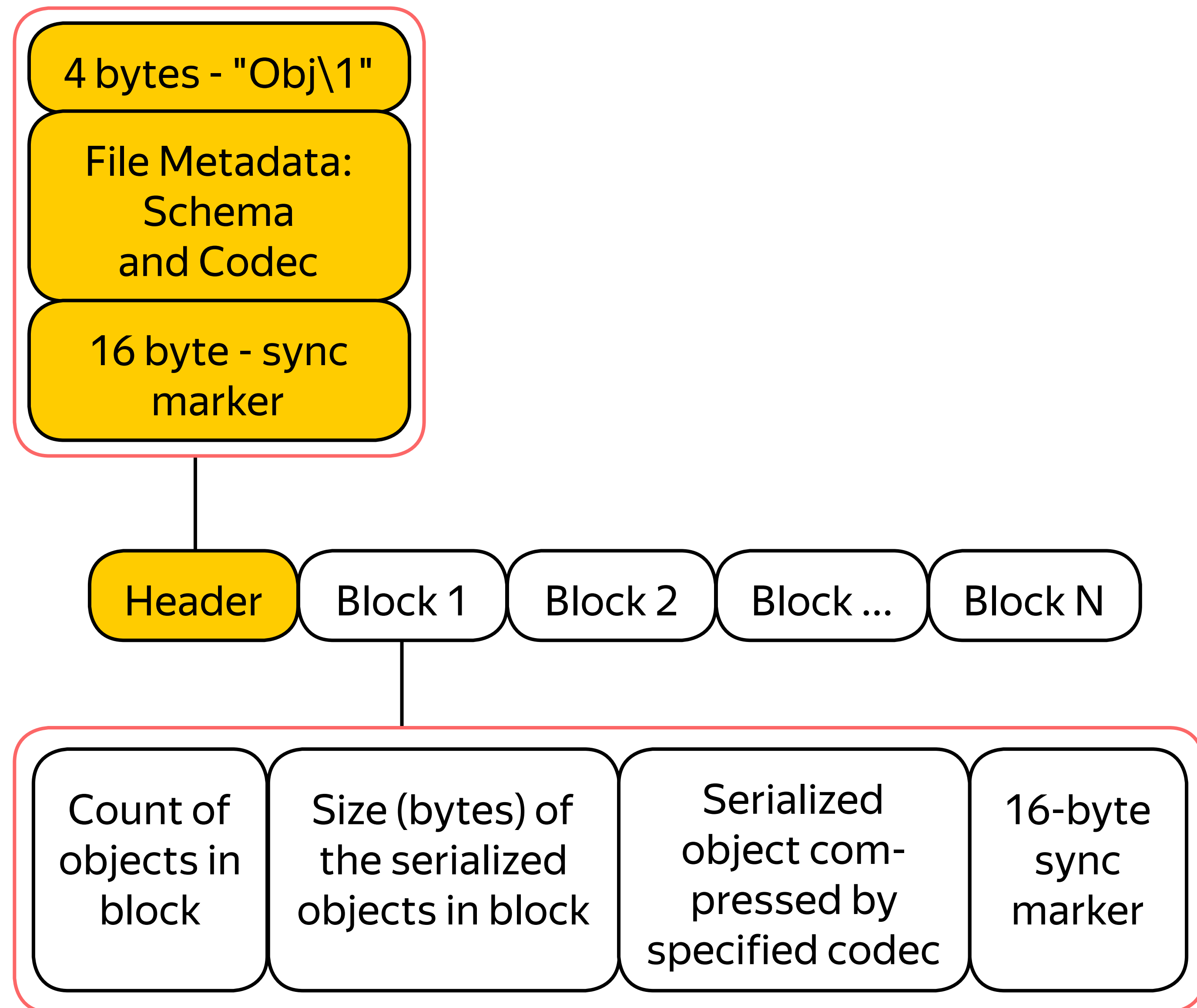
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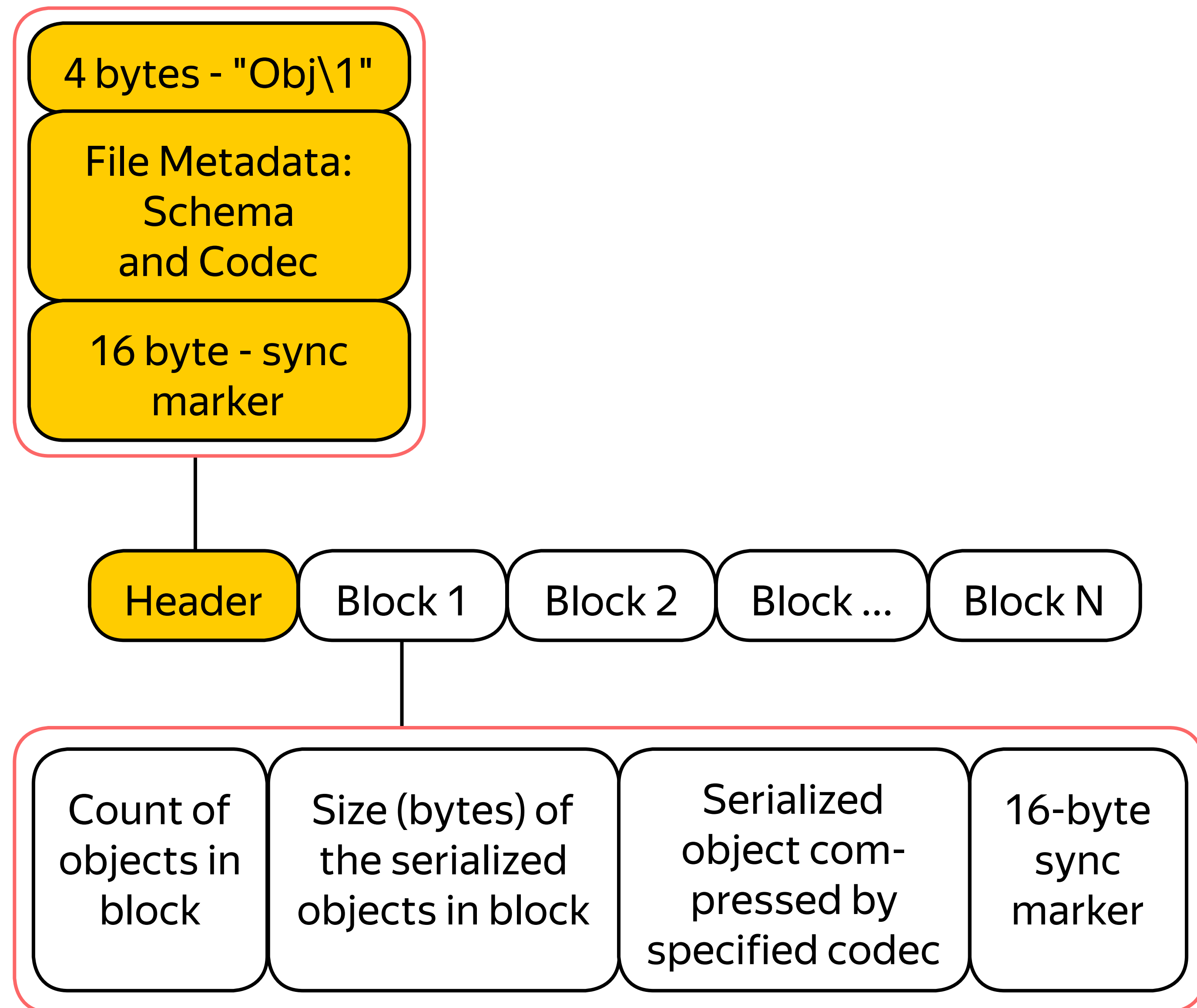
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MODERATE TO GOOD
- › Speed  
GOOD WITH CODEGEN
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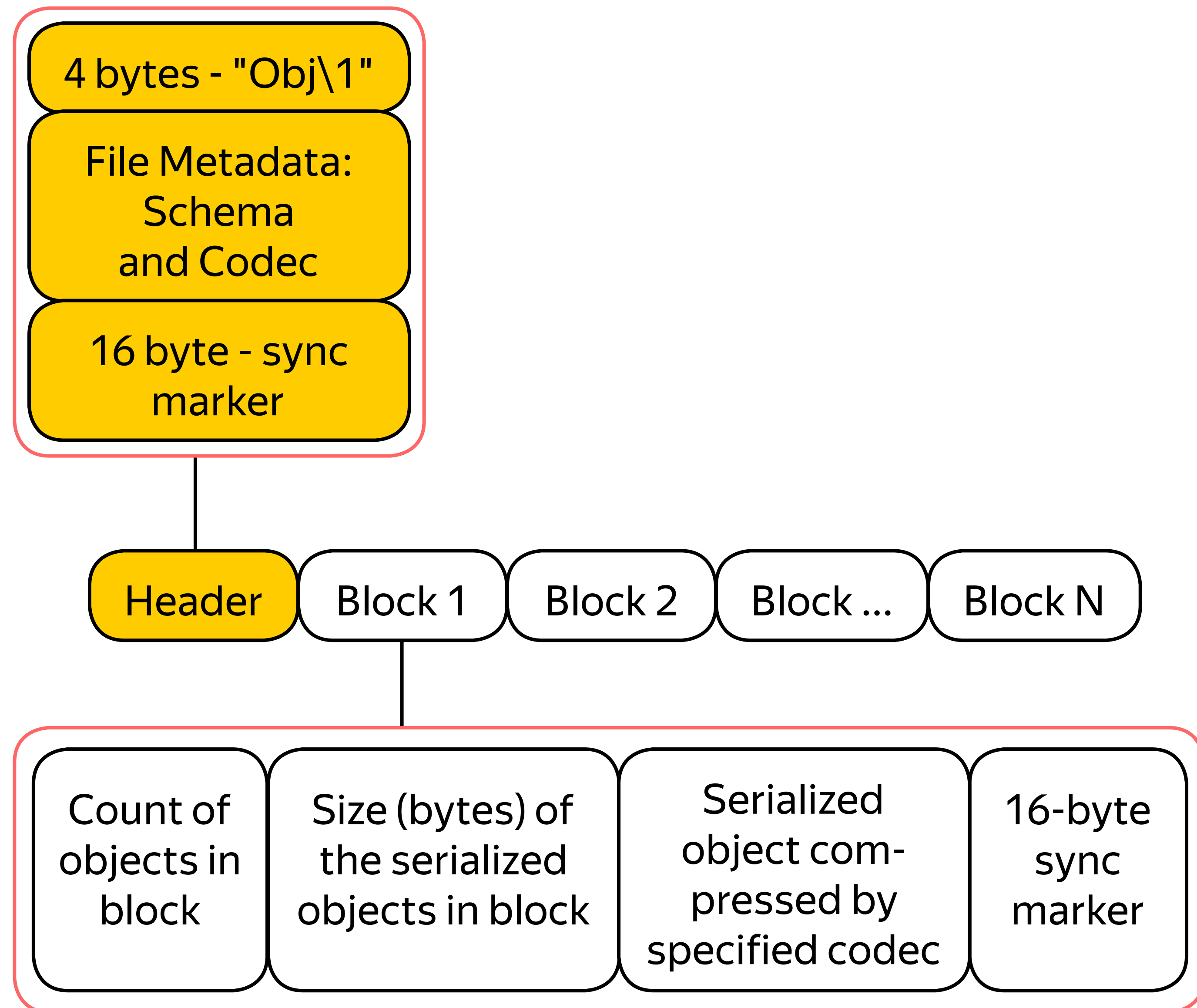
# Avro

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JSON-LIKE
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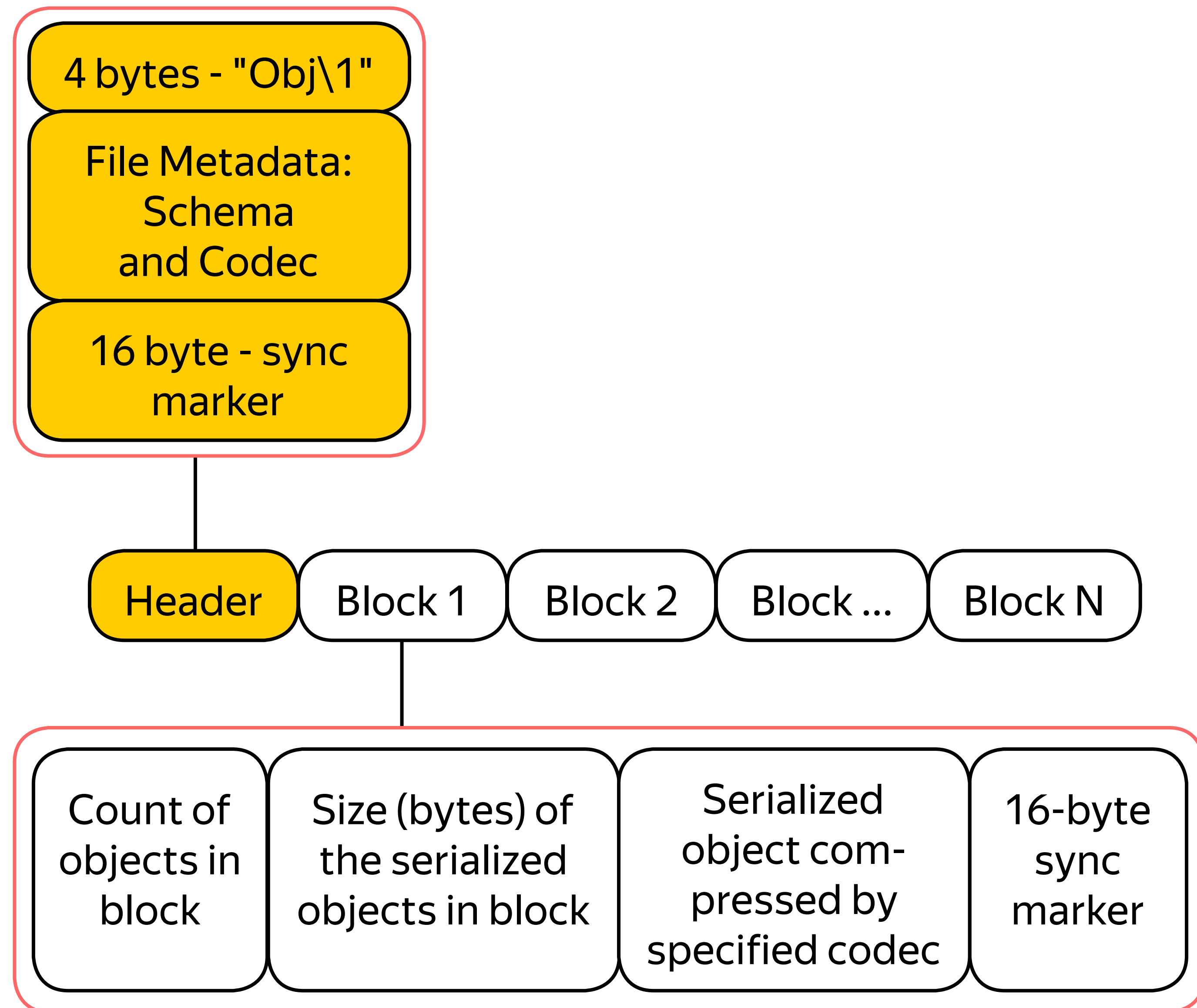
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- › Extensibility  
YES



**BigDATA**team