

Message Pack Protocol

Protocol and Libraries

Agenda

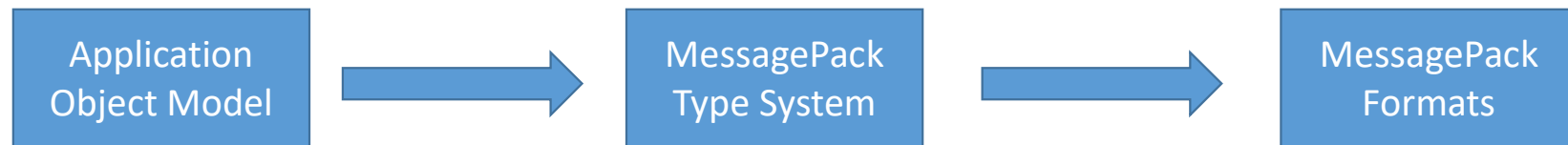
- Protocol Overview
- Protocol Description
- Type System
- Types Formats
- Libraries
- Demo

Protocol overview

- Binary Format
- Type system
- Type Formats family

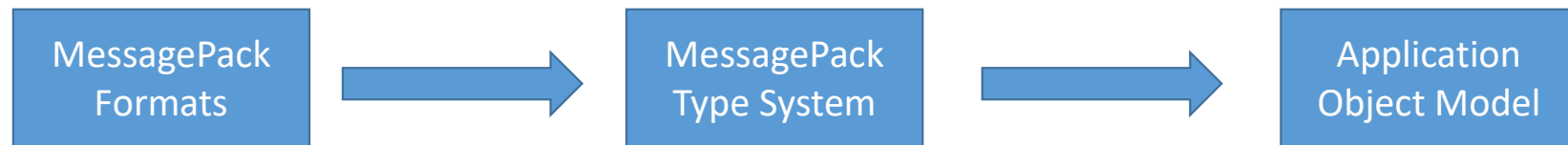
Protocol Description

Serialization



Protocol Description

Deserialization



Type system

Type	Size (bytes)	Description
Integer	$-(2^{63})$ upto $(2^{64})-1$	Its not a string its not a Boolean... it's a integer
Nil	1	Represents null
Boolean	1	It's a Boolean... no news here
Float		represents a IEEE 754 double precision floating point number including NaN and Infinity
String	$(2^{32})-1$	UTF-8 string
Binary	$(2^{32})-1$	Byte array
Map	Number of elements $(2^{32})-1$	Key value pairs
Extension types (1)	[0, 127]	Application types
Extension Types (2)	[-128, -1]	Reserved predefined types
Array	Number of elements $(2^{32})-1$	

Type System Formats

Int Family

uint 8

uint 16

uint 32

uint 64

int 8

int 16

int 32

int 64

fixint

Negative fixint

Float Family

float 32

float 64

boolean Family

bool

nil Family

nil

binary Family

bin 8

bin 16

bin 32

string Family

fix string

string 8

string 16

string 32

array Family

fix array

array 16

array 32

Maps Family

Fix map

map 16

map 32

extensions Family

Fix ext 1

Fix ext 2

Fix ext 4

fix ext 8

fix ext 16

ext 8

ext 16

ext 32

Type Frames

legend



One Byte of information



Variable size of information in 8 bits segments

Type Frames

Nil and Bools

Type	Value	bytes
NIL	nil	<div>0xc0</div>
Bool	True	<div>0xc2</div>
	False	<div>0xc3</div>

Type Frames

int

Type	Value	bytes
fix Positive int	7 bit positive integer	<div>0zzzzzzz</div>
Fix Negative int	7 bit negative integer	<div>111zzzzz</div>

Type	Value	bytes
Uint 8	8 bit positive integer	<div>0xcc</div> <div>zzzzzzzz</div>
Uint 16	16 bit big-endian unsigned integer	<div>0xcd</div> <div>zzzzzzzz</div> <div>zzzzzzzz</div>
Uint 32	32-bit big-endian unsigned integer	<div>0xce</div> <div>zzzzzzzz</div> <div>zzzzzzzz</div> <div>zzzzzzzz</div> <div>zzzzzzzz</div>
Uint 64	64-bit big-endian unsigned integer	<div>0xcf</div> <div>zzzzzzzz</div> <div>zzzzzzzz</div> <div>zzzzzzzz</div> <div>zzzzzzzz</div> <div>zzzzzzzz</div>

Type Frames

int

Type	Value	bytes				
int 8	8 bit positive integer	0xd0	zzzzzzzz			
int 16	16 bit big-endian signed integer	0xd1	zzzzzzzz	zzzzzzzz		
int 32	32-bit big-endian signed integer	0xd2	zzzzzzzz	zzzzzzzz	zzzzzzzz	zzzzzzzz
int 64	64-bit big-endian signed integer	0xd3	zzzzzzzz	zzzzzzzz	zzzzzzzz	zzzzzzzz
			zzzzzzzz	zzzzzzzz	zzzzzzzz	zzzzzzzz

Type Frames

float

Type	Value	bytes				
float 32	32-bit floating point number in IEEE 754 single precision	0xca	zzzzzzzz	zzzzzzzz	zzzzzzzz	zzzzzzzz
float 64	64-bit stores a floating point number in IEEE 754 double precision	0xcb	zzzzzzzz	zzzzzzzz	zzzzzzzz	zzzzzzzz
			zzzzzzzz	zzzzzzzz	zzzzzzzz	zzzzzzzz

Type Frames

string

Type	Value	bytes				
fixstr	32-bit floating point number in IEEE 754 single precision	101xxxxx	zzzzzzzz			
string 8	stores a byte array whose length is upto $(2^8)-1$ bytes	0xd9	zzzzzzzz	data		
string 16	stores a byte array whose length is upto $(2^{16})-1$ bytes	0xda	yyyyyyyy	yyyyyyyy	data	
String 32	stores a byte array whose length is upto $(2^{32})-1$ bytes:	0xdb	yyyyyyyy	yyyyyyyy	yyyyyyyy	yyyyyyyy
			data			

yyyyyyyy – big-endian unsigned integer

zzzzzzzz – unsigned integer

Type Frames

string

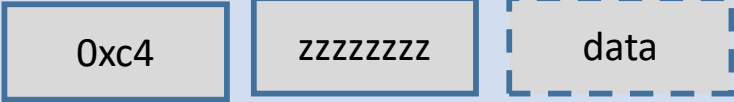


Type	Value	bytes				
fixstr	32-bit floating point number in IEEE 754 single precision	101xxxxx	zzzzzzzz			
string 8	stores a byte array whose length is upto $(2^8)-1$ bytes	0xd9	zzzzzzzz	data		
string 16	stores a byte array whose length is upto $(2^{16})-1$ bytes	0xda	yyyyyyyy	yyyyyyyy	data	
String 32	stores a byte array whose length is upto $(2^{32})-1$ bytes:	0xdb	yyyyyyyy	yyyyyyyy	yyyyyyyy	yyyyyyyy
			data			

yyyyyyyy – big-endian unsigned integer

zzzzzzzz – unsigned integer

Type Frames

bin

Type	Value	bytes
bin 8	stores a byte array whose length is upto $(2^8)-1$ bytes	
bin 16	stores a byte array whose length is upto $(2^{16})-1$ bytes	
bin 32	stores a byte array whose length is upto $(2^{32})-1$ bytes:	

yyyyyyyyy – big-endian unsigned integer

zzzzzzzz – unsigned integer

Type Frames

array


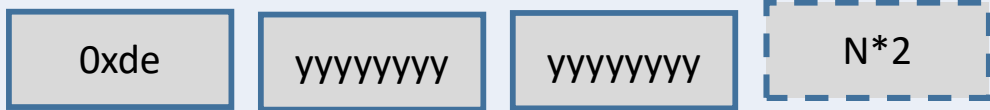
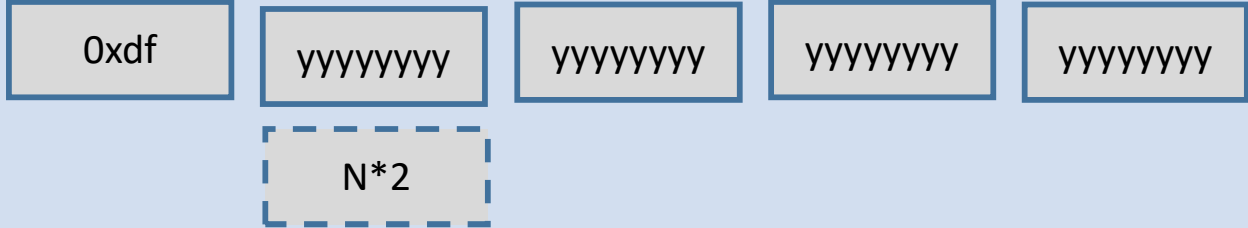
Type	Value	bytes				
fixarray	stores an array whose length is upto 15 elements	1001xxxx	data			
Array 16	stores an array whose length is upto $(2^{16})-1$ elements	0xdc	yyyyyyyy	yyyyyyyy	data	
array 32	stores an array whose length is upto $(2^{32})-1$ bytes:	0xdd	yyyyyyyy	yyyyyyyy	yyyyyyyy	yyyyyyyy

yyyyyyyy – big-endian unsigned integer
represent N elements

xxxxx – 4 bit uint represent N elements

Type Frames

map

Type	Value	bytes
fixmap	stores an array whose length is upto 15 elements	
map 16	stores a map whose length is upto $(2^{16})-1$ elements	
map 32	stores a map whose length is upto $(2^{32})-1$ bytes:	

yyyyyyyy – big-endian unsigned integer
represent N elements

xxxxx – 4 bit uint represent N elements

Type Frames

Extensions

Type	Value	Bytes			
fixext	stores an integer and a byte array whose length is 1 byte	0xd4	type	data	
fixext 2	stores an integer and a byte array whose length is 1 byte	0xd5	type	data	data
fixtext 4	stores a byte array whose length is upto $(2^{16})-1$ bytes	0xd6	type	4 bytes	
fixtext 8	stores a byte array whose length is upto $(2^{32})-1$ bytes:	0xd7	type	8 bytes	
fixtext 16	stores an integer and a byte array whose length is 16 bytes	0xd7	type	16 bytes	

Type Frames

Timestamp extension

Type	Value	Bytes
timestamp 32	stores the number of seconds that have elapsed since 1970-01-01 00:00:00 UTC in an 32-bit unsigned integer	<div>0xd6</div> <div>-1</div> <div>seconds</div> <div>seconds</div> <div>seconds</div> <div>seconds</div>
timestamp 64	stores the number of seconds and nanoseconds that have elapsed since 1970-01-01 00:00:00 UTC in 32-bit unsigned integers:	<div>0xd7</div> <div>-1</div> <div>Nanoseconds 30 bits</div> <div>seconds 34 bits</div>
timestamp 96	stores the number of seconds and nanoseconds that have elapsed since 1970-01-01 00:00:00 UTC in 64-bit signed integer and 32-bit unsigned integer	<div>0xc7</div> <div>12</div> <div>-1</div> <div>Nanoseconds 32 bits</div> <div>seconds 64 bits</div>

Libraries

- Almost one for every language out there - <https://msgpack.org/>
- C#
 - Code - <https://github.com/neuecc/MessagePack-CSharp/>
 - Nugets
 - - <https://www.nuget.org/packages/MessagePack/>
 - Facade implemented in house: look for: VisionBox.MessagePack
 - <https://git.intra.vision-box.com/lib/VB.MessagePack>
- Javascript - <https://github.com/msgpack/msgpack>
- Microsoft support for messagepack on signalR dotNet Core using:
 - C# - MessagePack-Csharp
 - Javascript - msgpack5

Demo

```
{
  "Id": 1,
  "Name": "Dell Latitude",
  "Description": "Dell Latitude E6430 Laptop Computer - 3rd gen Intel Core i5-3340M Processor (2.7GHz, 3M cache, Upgradable to Intel vPro technology) Series"
  "Tags": ["laptop","dell","i5"],
  "Image": [0x34,0x12,0x34, 0x34,0x12,0x34, 0x34,0x12,0x34, 0x34,0x12,0x34, 0x34,0x12,0x34, 0x34,0x12,0x34, 0x34,0x12,0x34, 0x34,0x12,0x34,
0x34,0x12,0x34, 0x34,0x12,0x34, 0x34,0x12,0x34, 0x34,0x12,0x34, 0x34,0x12,0x34 ]
}
```



```
{  
  "Id": 1,  
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  "Image": " [0x34,0x12,0x34, 0x34,0x12,0x34, 0x34,0x12,0x34, 0x34,0x12,0x34, 0x34,0x12,0x34, 0x34,0x12,0x34, 0x34,0x12,0x34, 0x34,0x12,0x34, 0x34,0x12,0x34, 0x34,0x12,0x34, 0x34,0x12,0x34, 0x34,0x12,0x34, 0x34,0x12,0x34, 0x34,0x12,0x34, 0x34,0x12,0x34, 0x34,0x12,0x34 ]"  
}
```

Map

0x85

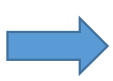
5x2 elements



```
{  
  "Id": 1,  
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  "Tags": ["laptop","dell","i5"],  
  "Image": [0x34,0x12,0x34, 0x34,0x12,0x34, 0x34,0x12,0x34, 0x34,0x12,0x34, 0x34,0x12,0x34, 0x34,0x12,0x34, 0x34,0x12,0x34, 0x34,0x12,0x34,  
0x34,0x12,0x34, 0x34,0x12,0x34, 0x34,0x12,0x34, 0x34,0x12,0x34, 0x34,0x12,0x34, 0x34,0x12,0x34 ]  
}
```


Map	fixstr	Id	
0x85	0xa2	0x49	0x64

Dec	Hx	Oct	Html	Chr	Dec	Hx	Oct	Html	Chr
64	40	100	@	@	96	60	140	`	`
65	41	101	A	A	97	61	141	a	a
66	42	102	B	B	98	62	142	b	b
67	43	103	C	C	99	63	143	c	c
68	44	104	D	D	100	64	144	d	d
69	45	105	E	E	101	65	145	e	e
70	46	106	F	F	102	66	146	f	f
71	47	107	G	G	103	67	147	g	g
72	48	110	H	H	104	68	150	h	h
73	49	111	I	I	105	69	151	i	i
74	4A	112	J	J	106	6A	152	j	j
75	4B	113	K	K	107	6B	153	k	k
76	4C	114	L	L	108	6C	154	l	l
77	4D	115	M	M	109	6D	155	m	m
78	4E	116	N	N	110	6E	156	n	n
79	4F	117	O	O	111	6F	157	o	o
80	50	120	P	P	112	70	160	p	p
81	51	121	Q	Q	113	71	161	q	q
82	52	122	R	R	114	72	162	r	r
83	53	123	S	S	115	73	163	s	s
84	54	124	T	T	116	74	164	t	t
85	55	125	U	U	117	75	165	u	u
86	56	126	V	V	118	76	166	v	v
87	57	127	W	W	119	77	167	w	w
88	58	130	X	X	120	78	170	x	x
89	59	131	Y	Y	121	79	171	y	y
90	5A	132	Z	Z	122	7A	172	z	z
91	5B	133	[[123	7B	173	{	{
92	5C	134	\	\	124	7C	174	|	
93	5D	135]]	125	7D	175	}	}
94	5E	136	^	^	126	7E	176	~	~
95	5F	137	_	_	127	7F	177		DEL

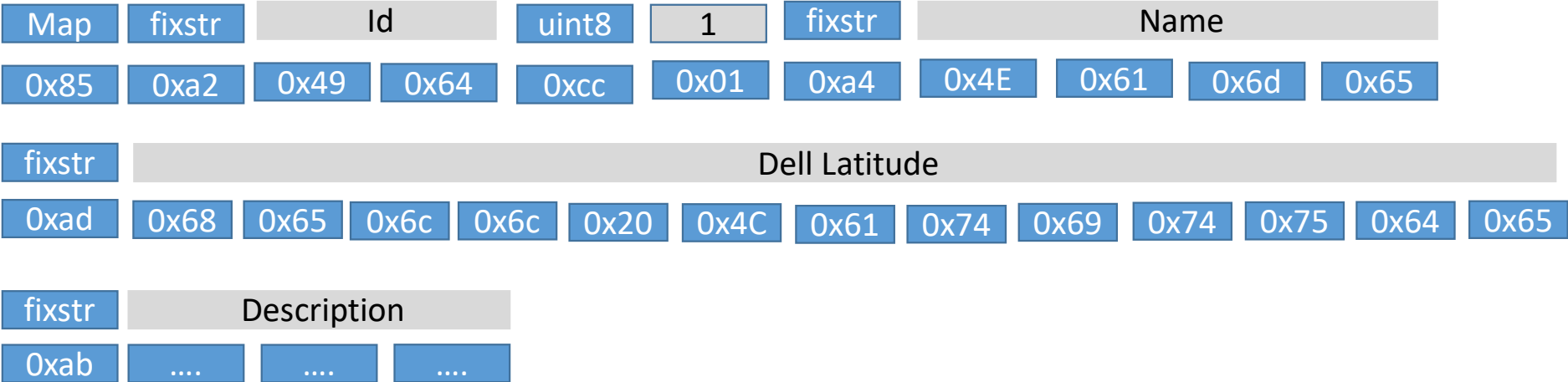



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0x34,0x12,0x34, 0x34,0x12,0x34, 0x34,0x12,0x34, 0x34,0x12,0x34, 0x34,0x12,0x34, 0x34,0x12,0x34 ]"  
  
}
```

Map	fixstr	Id		uint8	1
0x85	0xa2	0x49	0x64	0xcc	0x01

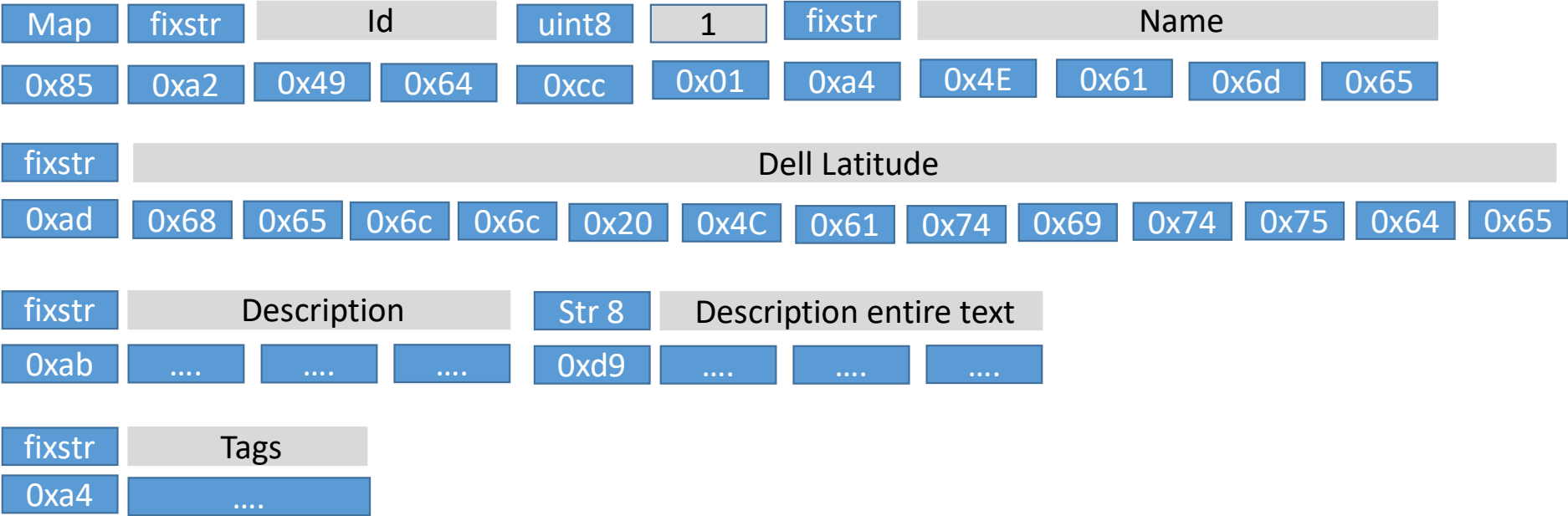



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}
```



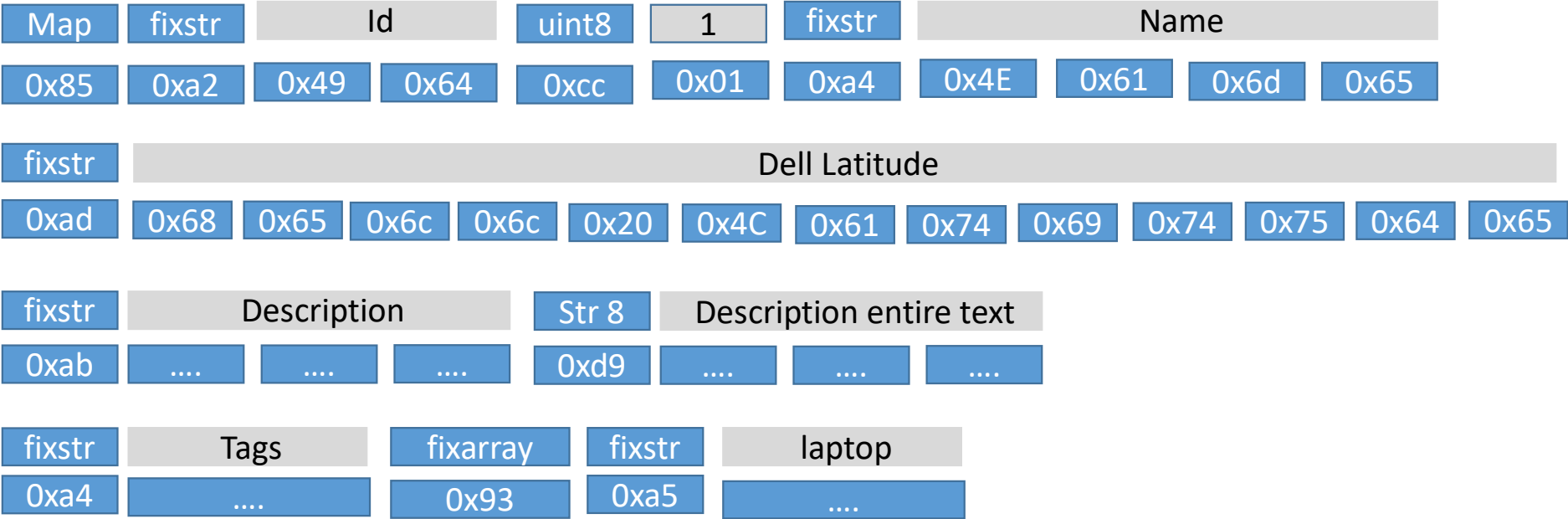


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{
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}
```





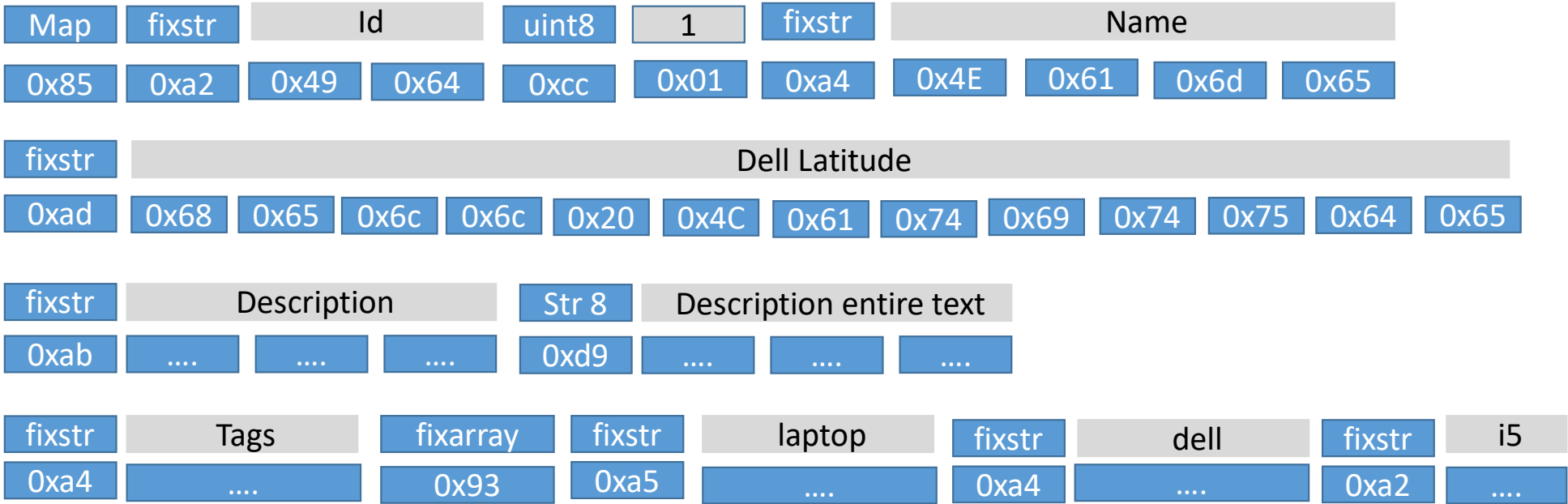
```
{
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}
```




```

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}

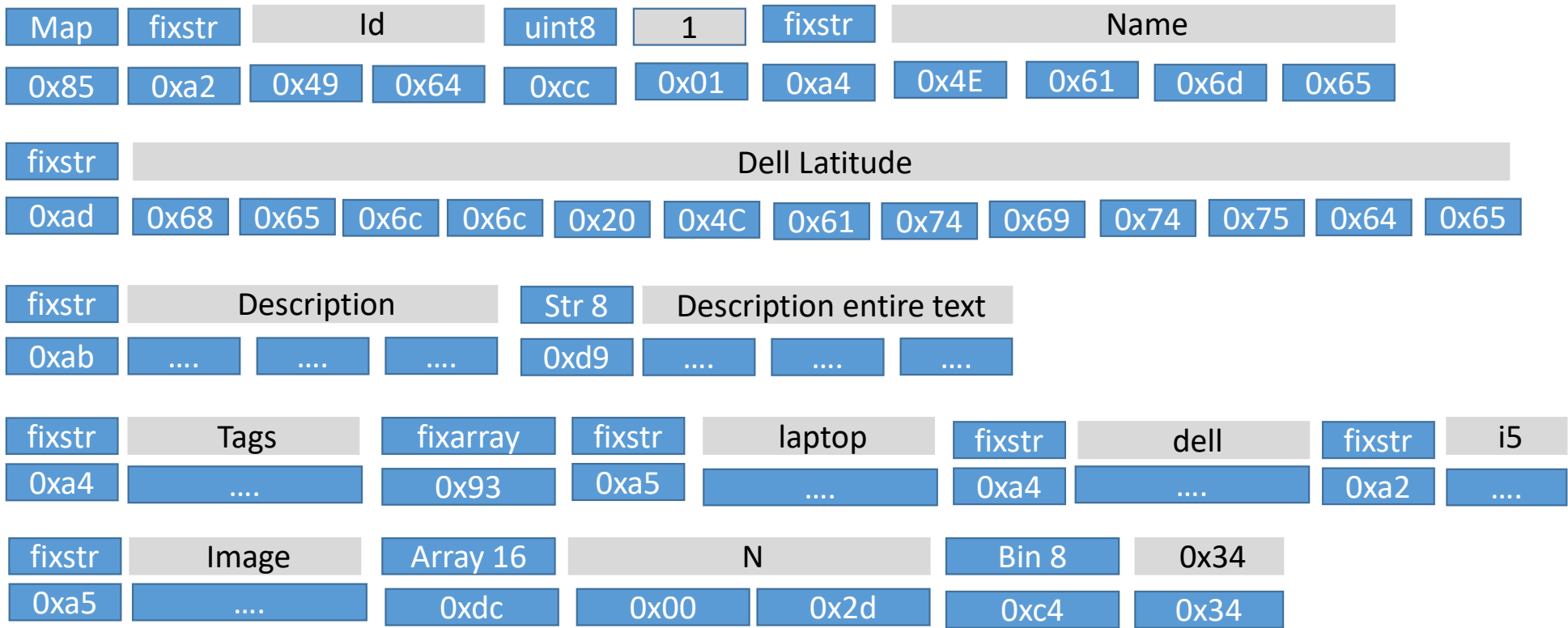
```




```

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}

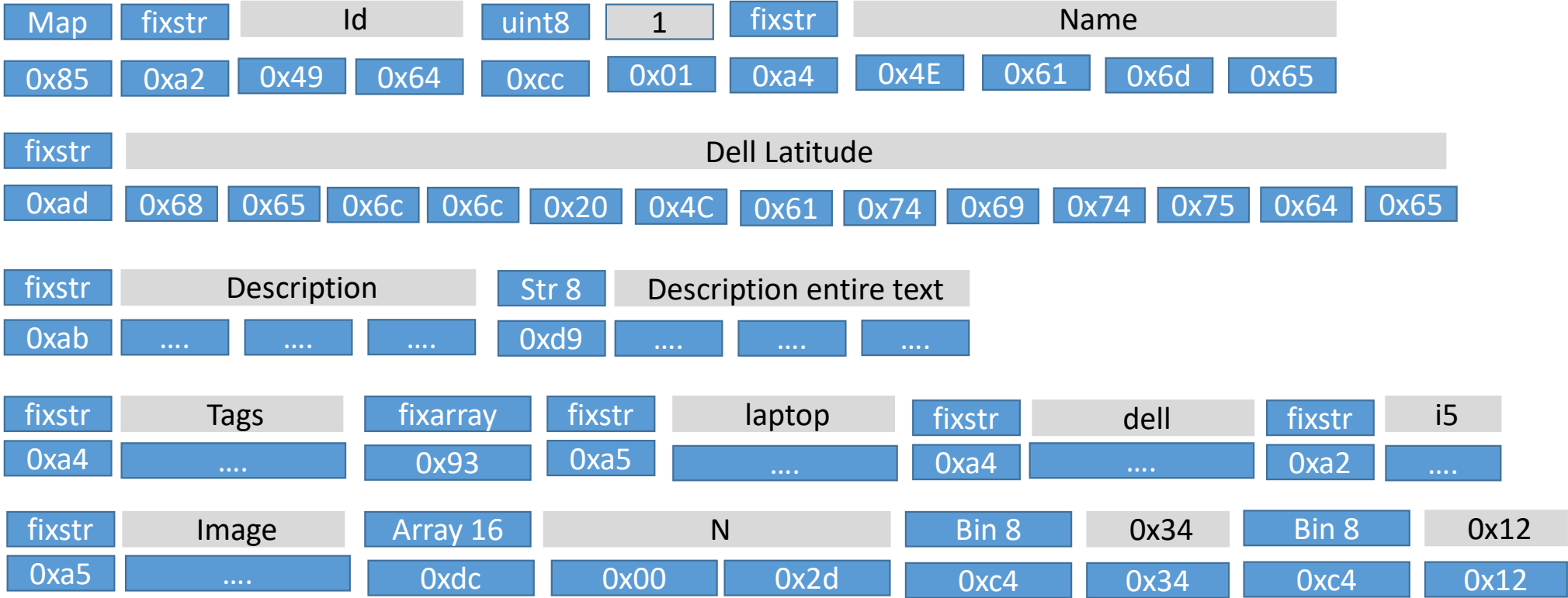
```



```

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  "Image": " [0x34,0x12,0x34, 0x34,0x12,0x34, 0x34,0x12,0x34, 0x34,0x12,0x34, 0x34,0x12,0x34, 0x34,0x12,0x34, 0x34,0x12,0x34, 0x34,0x12,0x34, 0x34,0x12,0x34, 0x34,0x12,0x34, 0x34,0x12,0x34, 0x34,0x12,0x34, 0x34,0x12,0x34, 0x34,0x12,0x34, 0x34,0x12,0x34, 0x34,0x12,0x34 ]
}

```



Q&A