Message Pack Protocol

Protocol and Libraries

Agenda

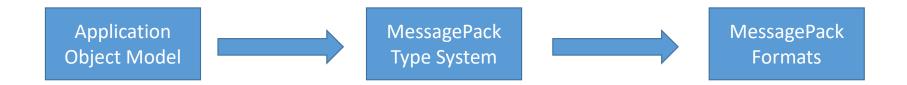
- Protocol Overview
- Protocol Description
- Type System
- Types Formats
- Libraries
- Demo

Protocol overview

- Binary Format
- Type system
- Type Formats family

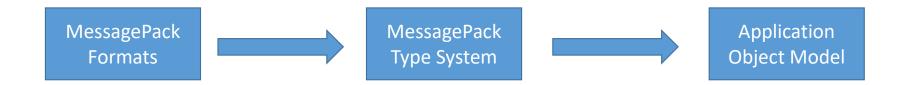
Protocol Description

Serialization



Protocol Description

Deserialization



Type system

Туре	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
Мар	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

array Family

fix array

array 16

array 32

string Family

fix string

string 8

string 16

string 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 B

One Byte of information

data

Variable size of information in 8 bits segments

Nil and Bools

Туре	Value	bytes
NIL	nil	0xc0
Bool	True	0xc2
	False	0xc3

int

Туре	Value	byte	S
fix Positive int	7 bit positive integer		Ozzzzzz
Fix Negative int	7 bit negative integer		111zzzzz

Туре	Value	bytes					
Uint 8	8 bit positive integer	Охсс	ZZZZZZZZ				
Uint 16	16 bit big-endian unsigned integer	0xcd	ZZZZZZZZ	ZZZZZZZZ			
Uint 32	32-bit big-endian unsigned integer	Охсе	ZZZZZZZZ	ZZZZZZZZ	ZZZZZZZZ	ZZZZZZZZ	
Uint 64	64-bit big-endian unsigned integer	Oxcf	ZZZZZZZZ	ZZZZZZZZ	ZZZZZZZZ	ZZZZZZZZ	
Onic 04			ZZZZZZZZ	ZZZZZZZZ	ZZZZZZZZ	ZZZZZZZZ	

int

Туре	Value	bytes
int 8	8 bit positive integer	0xd0 zzzzzzzz
int 16	16 bit big-endian signed integer	0xd1 zzzzzzzz zzzzzzzzzz
int 32	32-bit big-endian signed integer	Oxd2 zzzzzzz zzzzzzz zzzzzzz
	64-bit big-endian signed integer	Oxd3 zzzzzzzz zzzzzzzzzzzzzzzzzzzzzzzzzzz
int 64		ZZZZZZZZZ ZZZZZZZZ ZZZZZZZZZZZZZZZZZZZ

Type Frames float

Туре	Value	bytes
float 32	32-bit floating point number in IEEE 754 single precision	Oxca zzzzzzz zzzzzzz zzzzzzz
	64-bit stores a floating point number in IEEE 754 double precision	Oxcb zzzzzzzz zzzzzzz zzzzzzzz
float 64	·	ZZZZZZZZZZZZZZZZZZZZZZZZZZZZZZZZZZZZZZZ

string

Туре	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	Oxda yyyyyyyy yyyyy data
String 32	stores a byte array whose length is upto (2^32)-1 bytes:	Oxdb yyyyyyyy yyyyyyy yyyyyyy yyyyyyy yyyyyy

yyyyyyy – big-endian unsigned integer

zzzzzzzz – unsigned integer

string

Туре	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	Oxda yyyyyyyy yyyyy data
String 32	stores a byte array whose length is upto (2^32)-1 bytes:	Oxdb yyyyyyyy yyyyyyy yyyyyyy yyyyyyy yyyyyy

yyyyyyy – big-endian unsigned integer

zzzzzzzz – unsigned integer

bin

Туре	Value	bytes
bin 8	stores a byte array whose length is upto (2^8)-1 bytes	0xc4 zzzzzzzz data
bin 16	stores a byte array whose length is upto (2^16)-1 bytes	0xc5 уууууууу data
bin 32	stores a byte array whose length is upto (2^32)-1 bytes:	Oxc6 yyyyyyyy yyyyyyy yyyyyyy yyyyyyy yyyyyy

yyyyyyy – big-endian unsigned integer

zzzzzzzz – unsigned integer

array

Туре	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 yyyy data
array 32	stores an array whose length is upto (2^32)-1 bytes:	Oxdd yyyyyyyy yyyyyyy yyyyyyy yyyyyyy yyyyyy

yyyyyyy – big-endian unsigned integer represent N elements

xxxxx – 4 bit uint represent N elements

map

Туре	Value	bytes
fixmap	stores an array whose length is upto 15 elements	1000xxxx N*2
map 16	stores an map whose length is upto (2^16)-1 elements	0xde yyyyyyyy yyyyyy N*2
map 32	stores a map whose length is upto (2^32)-1 bytes:	Oxdf yyyyyyyy yyyyyyy yyyyyyy yyyyyyy

yyyyyyy – big-endian unsigned integer represent N elements

xxxxx – 4 bit uint represent N elements

Type Frames Extensions

Туре	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

Timestamp extension

Туре	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	Oxd6 -1 seconds seconds seconds
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:	0xd7 Nanoseco seconds ands 30 bits Nanoseco seconds ands 34 bits
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	0xc7 12 -1 Nanoseco seconds nds 32 bits 64 bits

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 <a href="https://github.com/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, 0x34,0x12,0x34,0x12,0x34,0x12,0x34,0x12,0x34,0x12,0x34,0x12,0x34,0x12,0x34,0x12,0x34,0x12,0x34,0x12,0x34,0x12,0x34,0x12,0x34,0x12,0x34,0x12,0x34,0x12,0x34,0x12,0x34,0x12,0x34,0x12,0x34,0x12,0x34,0x12,0x34,0x12,0x34,0x12,0x34,0x12,0x34,0x12,0x34,0x12,0x34,0x12,0x34,0x12,0x34,0x12,0x34,0x12,0x34,0x12,0x34,0x12,0x34,0x12,0x34,0x12,0x34,0x12,0x34,0x12,0x34,0x12,0x34,0x12,0x34,0x12,0x34,0x12,0x34,0x12,0x34,0x12,0x34,0x12,0x34,0x12,0x34,0x12,0x34,0x12,0x34
```

Map

0x85

5x2 elements

Id

0x64

0x49

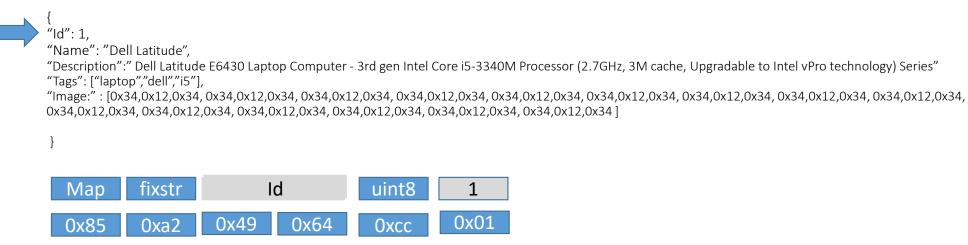
fixstr

0xa2

Map

0x85

Dec	Нх	Oct	Html	Chr	Dec	Нх	Oct	Html Ch	ır_
64	40	100	@	0	96	60	140	`	
65	41	101	A	A	97	61	141	6#97;	a
66	42	102	B	В	98	62	142	6#98;	b
67	43	103	C	C	99	63	143	6#99;	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#71;	G	103	67	147	g	a
72	48	110	6#72;	H	104	68	150	h	h
73	49	111	6#73;	I	105	69	151	6#105;	1
74	4A	112	6#74;	J	106	6A	152	j	j
75	4B	113	6#75;	K	107	6B	153	6#107;	k
76	4C	114	6#76;	L	108	6C	154	l	1
77	4D	115	G#77;	M	109	6D	155	m	m
78	4E	116	6#78;	N	110	6E	156	6#110;	n
79	4F	117	6#79;	0	111	6F	157	o	0
80	50	120	6#80;	P	112	70	160	p	p
81	51	121	Q	Q	113	71	161	q	d
82	52	122	R	R	114	72	162	6#114;	r
83	53	123	6#83;	S	115	73	163	@#115;	3
84	54	124	T	T	116	74	164	t	t
85	55	125	6#85;	U	117	75	165	u	u
86	56	126	V	A	118	76	166	v	V
87	57	127	£#87;	M	119	77	167	6#119;	TOT
88	58	130	6#88;	X	120	78	170	6#120;	X
89	59	131	Y	Y	121	79	171	6#121;	Y
90	5A	132	Z	Z	122	7A	172	6#122;	Z
91	5B	133	[[123	7B	173	6#123;	-
92	5C	134	6#92;	1	124	7C	174	6#124;	1
93	5D	135	@#93;	1	125	7D	175	}	}
94	5E	136	6#94;	A	126	7E	176	6#126;	~
95	5F	137	_		127	7F	177	6#127;	DEI



```
"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"],
Dec Hx Oct Html Chr Dec Hx Oct Html Chr
                 64 40 100 @ 0
                                                      fixstr
                                                                            Name
  Map
          fixstr
                 65 41 101 6#65; A
                                  97 61 141 6#97;
                 66 42 102 @#66; B
                                  98 62 142 6#98;
                                                b
                                                                        0x61
                                                               0x4E
                 67 43 103 C C
                                  99 63 143 4#99;
                                                                                 0x6d
                                                                                          0x65
  0x85
          0xa2
                                                      0xa4
                 68 44 104 D D
                                 100 64 144 6#100;
                                 101 65 145 @#101;
                 69 45 105 6#69; E
                 70 46 106 F F
                                 102 66 146 6#102;
                 71 47 107 6#71; G
                                 103 67 147 @#103;
                 72 48 110 6#72; H
                                 104 68 150 6#104;
                                 105 69 151 6#105;
                 73 49 111 6#73; I
                 74 4A 112 6#74; J
                                 106 6A 152 @#106;
                 75 4B 113 6#75; K
                                 107 6B 153 6#107; k
                 76 4C 114 6#76; L
                                 108 6C 154 @#108;
                 77 4D 115 6#77; M
                                 109 6D 155 @#109; 10
                 78 4E 116 6#78; N
                                 110 6E 156 @#110; n
```

111 6F 157 @#111; 0

113 71 161 6#113; 4

115 73 163 @#115; 3

116 74 164 @#116; 5

117 75 165 u u

118 76 166 v 7

119 77 167 6#119;

120 78 170 6#120;

123 7B 173 4#123;

124 7C 174 |

125 7D 175 }

126 7E 176 ~

121 79 171

122 7A 172

95 5F 137 6#95; _ |127 7F 177 6#127; DEL

112 70 160 @#112;

114 72 162 6#114;

79 4F 117 6#79; 0

80 50 120 6#80; P

81 51 121 6#81; 0

82 52 122 6#82; R

83 53 123 6#83; \$

84 54 124 6#84; T

85 55 125 6#85; U

86 56 126 V V

87 57 127 6#87; 1

89 59 131 4#89; Y

90 5A 132 @#90; Z

92 5C 134 \ \

93 5D 135 6#93;]

94 5E 136 6#94; ^

91 5B 133 6#91;

58 130 X X

"ld": 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"], Id fixstr Name fixstr uint8 Map 0x4E 0x61 0x01 0xa4 0x6d 0x65 0x49 0x64 0x85 0xa2 Oxcc fixstr **Dell Latitude** 0xad 0x64 0x6c 0x6c 0x65 0x20 0x69 0x74 0x75 0x74

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"Description":" Dell Latitude E6430 Laptop Computer - 3rd gen Intel Core i5-3340M Processor (2.7GHz, 3M cache, Upgradable to Intel vPro technology) Series"
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Id
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                                     0x01
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                              0xcc
 fixstr
                                          Dell Latitude
 Oxad
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             Description
 fixstr
 0xab
```

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              Description
 fixstr
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 Oxab
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```

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"Id": 1,
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              Description
 fixstr
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 Oxab
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 fixstr
             Tags
 0xa4
```

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                                        Description entire text
 Oxab
                                0xd9
 fixstr
                        fixarray
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 0xa4
                         0x93
```

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                                        Description entire text
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 fixstr
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                                   fixstr
             Tags
                                              laptop
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                                   0xa5
                          0x93
```

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"Id": 1,
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Id
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                                               0xa4
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                       0x64
         0xa2
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 Oxad
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                     0x6c
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                                                            0x69
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                                                      0x74
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                                Str 8
                                        Description entire text
 Oxab
                                0xd9
 fixstr
                         fixarray
                                   fixstr
             Tags
                                               laptop
                                                          fixstr
                                                                      dell
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                                   0xa5
                          0x93
                                                          0xa4
```

```
"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"],
Id
                                               fixstr
                                                                   Name
         fixstr
  Map
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                                                       0x4E
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                                        0x01
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                                               0xa4
 0x85
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                        0x64
         0xa2
                                0xcc
 fixstr
                                            Dell Latitude
 Oxad
         0x68
               0x65
                     0x6c
                                  0x20
                                                                                0x64
                                                                                       0x65
                            0x6c
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                                                                   0x74
                                                                         0x75
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                                               0x61
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              Description
 fixstr
                                 Str 8
                                         Description entire text
 Oxab
                                 0xd9
 fixstr
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                                    fixstr
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             Tags
                                               laptop
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```

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"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"],
Id
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 Map
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         0xa2
                                0xcc
 fixstr
                                             Dell Latitude
 Oxad
        0x68
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                                  0x20
                                                                                 0x64
                                                                                       0x65
                            0x6c
                                                             0x69
                                                                    0x74
                                                                          0x75
                                         0x4C
                                                0x61
                                                      0x74
              Description
 fixstr
                                 Str 8
                                         Description entire text
 Oxab
                                 0xd9
 fixstr
                         fixarray
                                    fixstr
                                                                                           i5
             Tags
                                               laptop
                                                           fixstr
                                                                       dell
                                                                                  fixstr
 0xa4
                                    0xa5
                          0x93
                                                           0xa4
                                                                                  0xa2
 fixstr
            Image
 0xa5
```

```
"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"],
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                                                               0x61
                                        0x01
                                                                       0x6d
                                                                               0x65
                                               0xa4
 0x85
                0x49
                       0x64
                                Oxcc
         0xa2
 fixstr
                                             Dell Latitude
 Oxad
        0x68
               0x65
                     0x6c
                                                                                 0x64
                                                                                       0x65
                            0x6c
                                  0x20
                                                            0x69
                                                                   0x74
                                                                          0x75
                                         0x4C
                                                0x61
                                                      0x74
              Description
 fixstr
                                 Str 8
                                         Description entire text
 Oxab
                                 0xd9
 fixstr
                         fixarray
                                    fixstr
                                                                                           i5
             Tags
                                               laptop
                                                           fixstr
                                                                       dell
                                                                                 fixstr
 0xa4
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                                                           0xa4
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"Description":" Dell Latitude E6430 Laptop Computer - 3rd gen Intel Core i5-3340M Processor (2.7GHz, 3M cache, Upgradable to Intel vPro technology) Series"
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                        0x64
         0xa2
                                0xcc
 fixstr
                                             Dell Latitude
 Oxad
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                     0x6c
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                                                0x61
                                                      0x74
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 fixstr
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                                         Description entire text
 Oxab
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 fixstr
                         fixarray
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                                                                                           i5
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                                                                       dell
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