



person01.json

0	7B	22	6E	61	6D	65	22	3A	22	4D	61	78	69	6D	20	5A	61	6B	73	22
20	2C	22	62	69	72	74	68	64	61	79	22	3A	7B	22	79	65	61	72	22	3A
40	31	39	38	31	2C	22	6D	6F	6E	74	68	22	3A	36	2C	22	64	61	79	22
60	3A	31	32	7D	7D															

Signed Int little (select some data) - +

65 bytes out of 65 bytes

person01.json

0	7B	22	6E	61	6D	65	22	3A	22	4D	61	78	69	6D	20	5A	61	6B	73	22
20	2C	22	62	69	72	74	68	64	61	79	22	3A	7B	22	79	65	61	72	22	3A
40	31	39	38	31	2C	22	6D	6F	6E	74	68	22	3A	36	2C	22	64	61	79	22
60	3A	31	32	7D	7D															

Signed Int little (select some data) 65 bytes out of 65 bytes

person01.json

```
person01.json x
1 [{"name": "Maxim Zaks", "birthday": {"year": 1981, "month": 6, "day": 12}}]
```

Zeile 1, Spalte 2 Leerzeichen: 4 UTF-8 LF JSON

# Why are we using JSON?

Maxim Zaks

 @iceX33

# Overview

- Size
- Efficiency
- Random value access

person01.json

0	7B	22	6E	61	6D	65	22	3A	22	4D	61	78	69	6D	20	5A	61	6B	73	22
20	2C	22	62	69	72	74	68	64	61	79	22	3A	7B	22	79	65	61	72	22	3A
40	31	39	38	31	2C	22	6D	6F	6E	74	68	22	3A	36	2C	22	64	61	79	22
60	3A	31	32	7D	7D															

Signed Int little (select some data) 65 bytes out of 65 bytes

person01.json

```
person01.json x
1 [{"name": "Maxim Zaks", "birthday": {"year": 1981, "month": 6, "day": 12}}]
```

Zeile 1, Spalte 2 Leerzeichen: 4 UTF-8 LF JSON

person01.json

```
1 [{"name": "Maxim Zaks", "birthday": {"year": 1981, "month": 6, "day": 12}}]
```

0 0 Zeile 1, Spalte 2 Leerzeichen: 4 UTF-8 LF JSON

```
1 {"data":[{"type":"gif","id":"LbSyh00miorAY","slug":"week-dope-clever-LbSyh00miorAY","url":"http://giphy.com/gifs/week-dope-clever-LbSyh00miorAY",
"bitly_gif_url":"http://gph.is/2g0I889","bitly_url":"http://gph.is/2g0I889","embed_url":"http://giphy.com/embed/LbSyh00miorAY","username":"","
"source":"http://cheezburger.com/5716539392","rating":"g","content_url":"","source_tld":"cheezburger.com",
"source_post_url":"http://cheezburger.com/5716539392","is_indexable":0,"import_datetime":"2016-12-01 12:14:10","trending_datetime":"2017-04-08
14:45:01","images":{"fixed_height":{"url":"http://media3.giphy.com/media/LbSyh00miorAY/200.gif","width":"355","height":"200","size":"445470",
"mp4":"http://media3.giphy.com/media/LbSyh00miorAY/200.mp4","mp4_size":"59734","webp":"http://media3.giphy.com/media/LbSyh00miorAY/200.webp",
"webp_size":"516202"},"fixed_height_still":{"url":"http://media3.giphy.com/media/LbSyh00miorAY/200_s.gif","width":"355","height":"200","size":"44161"},
"fixed_height_downsampled":{"url":"http://media3.giphy.com/media/LbSyh00miorAY/200_d.gif","width":"355","height":"200","size":"101563",
"webp":"http://media3.giphy.com/media/LbSyh00miorAY/200_d.webp","webp_size":"76182"},"fixed_width":
{"url":"http://media3.giphy.com/media/LbSyh00miorAY/200w.gif","width":"200","height":"113","size":"161441",
"mp4":"http://media3.giphy.com/media/LbSyh00miorAY/200w.mp4","mp4_size":"28078","webp":"http://media3.giphy.com/media/LbSyh00miorAY/200w.webp",
"webp_size":"216782"},"fixed_width_still":{"url":"http://media3.giphy.com/media/LbSyh00miorAY/200w_s.gif","width":"200","height":"113","size":"15889"},
"fixed_width_downsampled":{"url":"http://media3.giphy.com/media/LbSyh00miorAY/200w_d.gif","width":"200","height":"113","size":"36266",
"webp":"http://media3.giphy.com/media/LbSyh00miorAY/200w_d.webp","webp_size":"31326"},"fixed_height_small":
{"url":"http://media3.giphy.com/media/LbSyh00miorAY/100.gif","width":"178","height":"100","size":"133531",
"mp4":"http://media3.giphy.com/media/LbSyh00miorAY/100.mp4","mp4_size":"22783","webp":"http://media3.giphy.com/media/LbSyh00miorAY/100.webp",
"webp_size":"175842"},"fixed_height_small_still":{"url":"http://media3.giphy.com/media/LbSyh00miorAY/100_s.gif","width":"178","height":"100",
"size":"12957"},"fixed_width_small":{"url":"http://media3.giphy.com/media/LbSyh00miorAY/100w.gif","width":"100","height":"57","size":"48224",
"mp4":"http://media3.giphy.com/media/LbSyh00miorAY/100w.mp4","mp4_size":"10596","webp":"http://media3.giphy.com/media/LbSyh00miorAY/100w.webp",
"webp_size":"78072"},"fixed_width_small_still":{"url":"http://media3.giphy.com/media/LbSyh00miorAY/100w_s.gif","width":"100","height":"57",
"size":"5202"},"downsized":{"url":"http://media3.giphy.com/media/LbSyh00miorAY/giphy-downsized.gif","width":"499","height":"281","size":"830048"},
"downsized_still":{"url":"http://media3.giphy.com/media/LbSyh00miorAY/giphy-downsized_s.gif","width":"499","height":"281","size":"83053"},
"downsized_large":{"url":"http://media3.giphy.com/media/LbSyh00miorAY/giphy.gif","width":"499","height":"281","size":"830048"},"downsized_medium":
{"url":"http://media3.giphy.com/media/LbSyh00miorAY/giphy.gif","width":"499","height":"281","size":"830048"},"original":
{"url":"http://media3.giphy.com/media/LbSyh00miorAY/giphy.gif","width":"499","height":"281","size":"830048","frames":"49",
"mp4":"http://media3.giphy.com/media/LbSyh00miorAY/giphy.mp4","mp4_size":"97727","webp":"http://media3.giphy.com/media/LbSyh00miorAY/giphy.webp",
"webp_size":"962374","hash":"7f1adb1fb368479eb7bef692d1592521"},"original_still":{"url":"http://media3.giphy.com/media/LbSyh00miorAY/giphy_s.gif",
"width":"499","height":"281","size":"83053"},"looping":{"mp4":"http://media3.giphy.com/media/LbSyh00miorAY/giphy-loop.mp4","mp4_size":"835080"},
"original_mp4":{"mp4":"http://media3.giphy.com/media/LbSyh00miorAY/giphy.mp4","mp4_size":"97727","width":"480","height":"270"},"preview":
{"mp4":"http://media3.giphy.com/media/LbSyh00miorAY/giphy-preview.mp4","mp4_size":"28906","width":"268","height":"150"},"downsized_small":
{"mp4":"http://media3.giphy.com/media/LbSyh00miorAY/giphy-downsized-small.mp4","mp4_size":"109196","width":"498","height":"280"},"preview_gif":
{"url":"http://media3.giphy.com/media/LbSyh00miorAY/giphy-preview.gif","width":"215","height":"121","size":"49084"},"preview_webp":
{"url":"http://media3.giphy.com/media/LbSyh00miorAY/giphy-preview.webp","width":"188","height":"106","size":"48192"}},{type":"gif",
"id":"qc1waqAag4tZC","slug":"nirvana-bored-kurt-cobain-qc1waqAag4tZC","url":"http://giphy.com/gifs/nirvana-bored-kurt-cobain-qc1waqAag4tZC",
"bitly_gif_url":"http://gph.is/10Pc3BM","bitly_url":"http://gph.is/10Pc3BM","embed_url":"http://giphy.com/embed/qc1waqAag4tZC","username":"","
"source":"http://kizetsu.tumblr.com/post/47321042041","rating":"g","content_url":"","source_tld":"kizetsu.tumblr.com",
"source_post_url":"http://kizetsu.tumblr.com/post/47321042041","is_indexable":0,"import_datetime":"2013-06-04 23:46:45",
"trending_datetime":"2017-04-08 14:30:02","images":{"fixed height":{"url":"http://media3.giphv.com/media/qc1waqAag4tZC/200.gif","width":"253",
```



person01.json

```
1 [{"name": "Maxim Zaks", "birthday": {"year": 1981, "month": 6, "day": 12}}]
```

Zeile 1, Spalte 2 Leerzeichen: 4 UTF-8 LF JSON

```
1  {  
2      "name": "Maxim Zaks",  
3      "birthday": {  
4          "year": 1981,  
5          "month": 6,  
6          "day": 12  
7      }  
8  }
```

The image shows a code editor window with a dark theme. The title bar at the top reads "person02.json". On the left side, there is a vertical toolbar with icons for file operations (a folder icon), search (a magnifying glass), and other functions. The main area of the editor displays a JSON object with line numbers 1 through 8 on the left. The JSON content is: `{ "name": "Maxim Zaks", "birthday": { "year": 1981, "month": 6, "day": 12 } }`. The text is color-coded: strings are in orange, numbers in green, and punctuation in white. At the bottom of the editor, there is a status bar with a purple background, showing "0" errors and "0" warnings on the left, and a smiley face icon on the right.

person02.json

0	7B	0A	09	22	6E	61	6D	65	22	3A	22	4D	61	78	69	6D
16	20	5A	61	6B	73	22	2C	0A	09	22	62	69	72	74	68	64
32	61	79	22	3A	7B	0A	09	09	22	79	65	61	72	22	3A	31
48	39	38	31	2C	0A	09	09	22	6D	6F	6E	74	68	22	3A	36
64	2C	0A	09	09	22	64	61	79	22	3A	31	32	0A	09	7D	0A
80	7D															

Signed Int little (select some data)

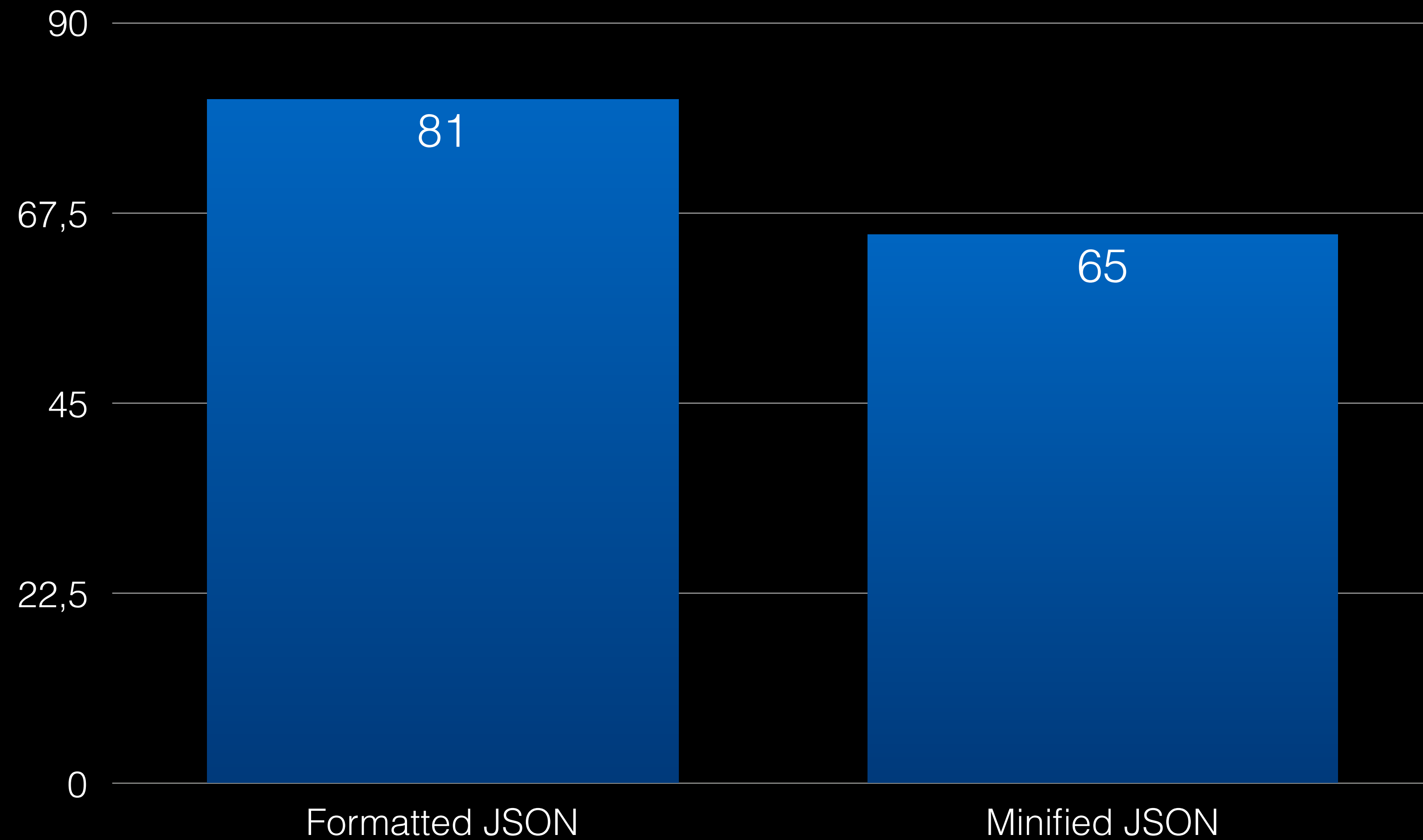
0 bytes out of 81 bytes

person02.json

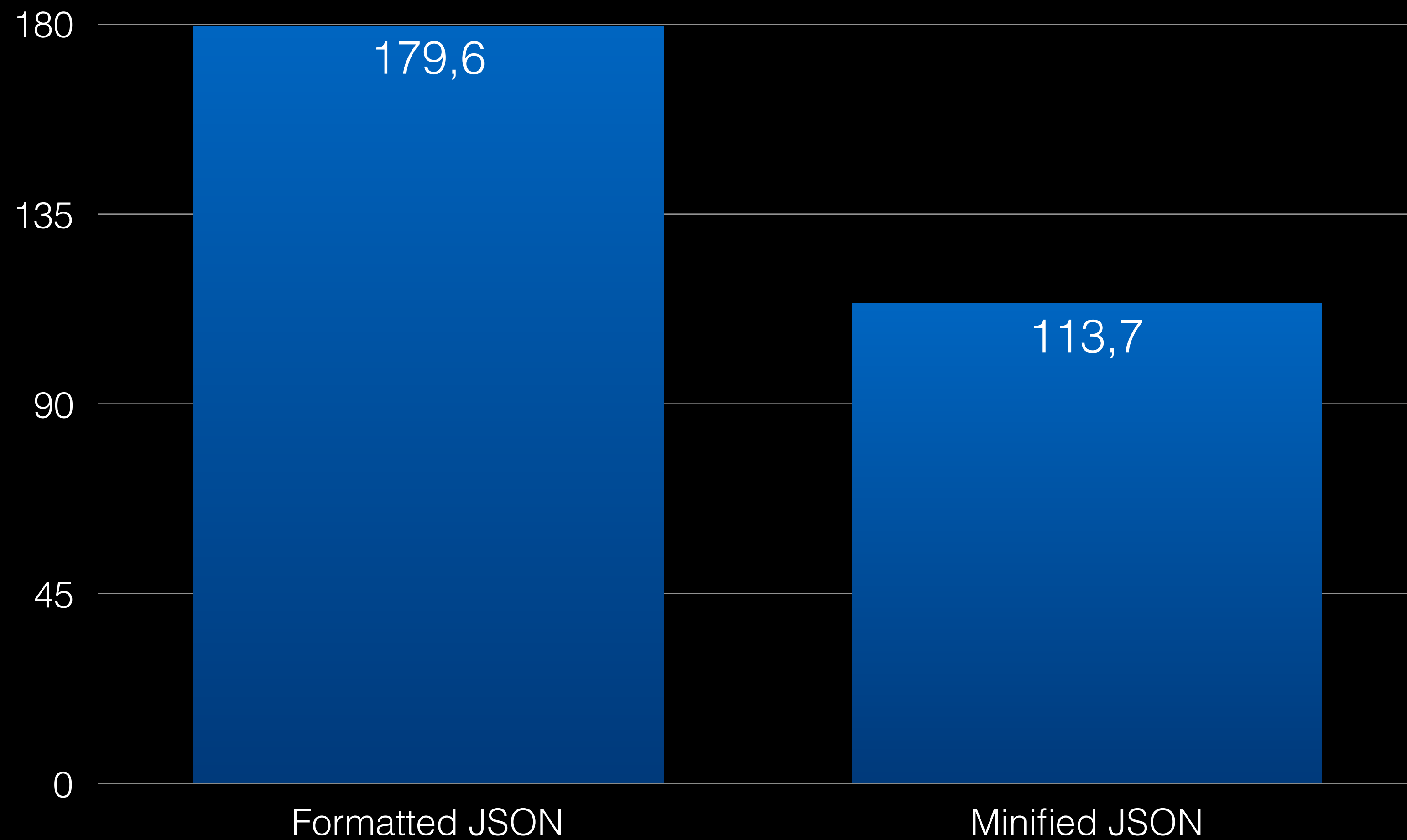
```
1 {
2   "name": "Maxim Zaks",
3   "birthday": {
4     "year": 1981,
5     "month": 6,
6     "day": 12
7   }
8 }
```

0 0 0

# Person JSON size in byte



# Giphy 25 trending gifs as JSON in KB



can we do better?



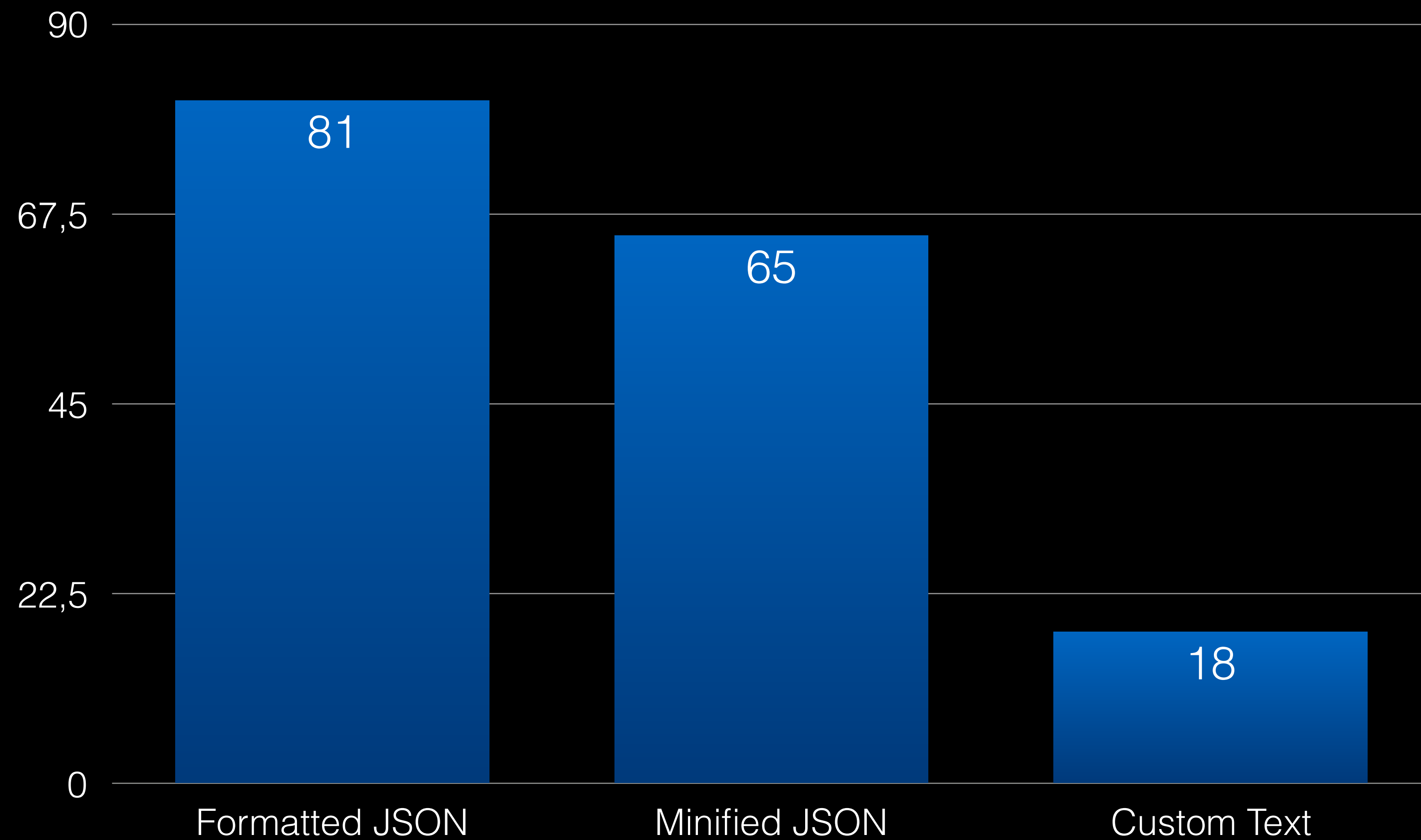
date = 8 characters      name = 10 characters

19810612Maxim Zaks

=

18 bytes

# Person data size in byte





can we do better?



1981 = 4 characters = 4 bytes

or

1981 = Int16 = 2 bytes

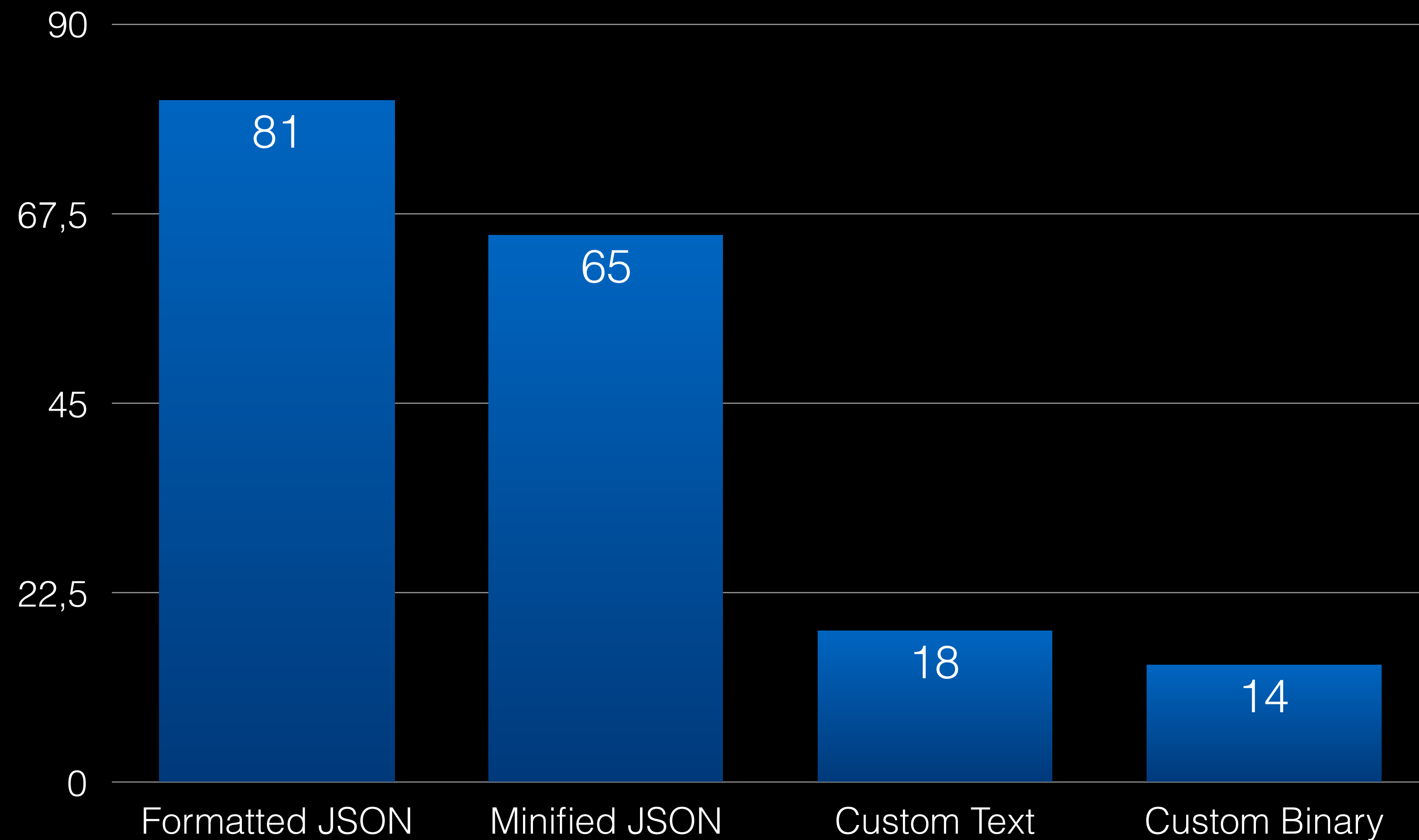
date = 4 bytes      name = 10 characters

19810612Maxim Zaks

=

14 bytes

# Person data size in byte



custom binary serialisation?





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## Comparison of data serialization formats

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This is a **comparison of data serialization formats**, various ways to convert complex objects to sequences of bits. It does not include markup languages used exclusively as document file formats.

**Contents** [\[hide\]](#)

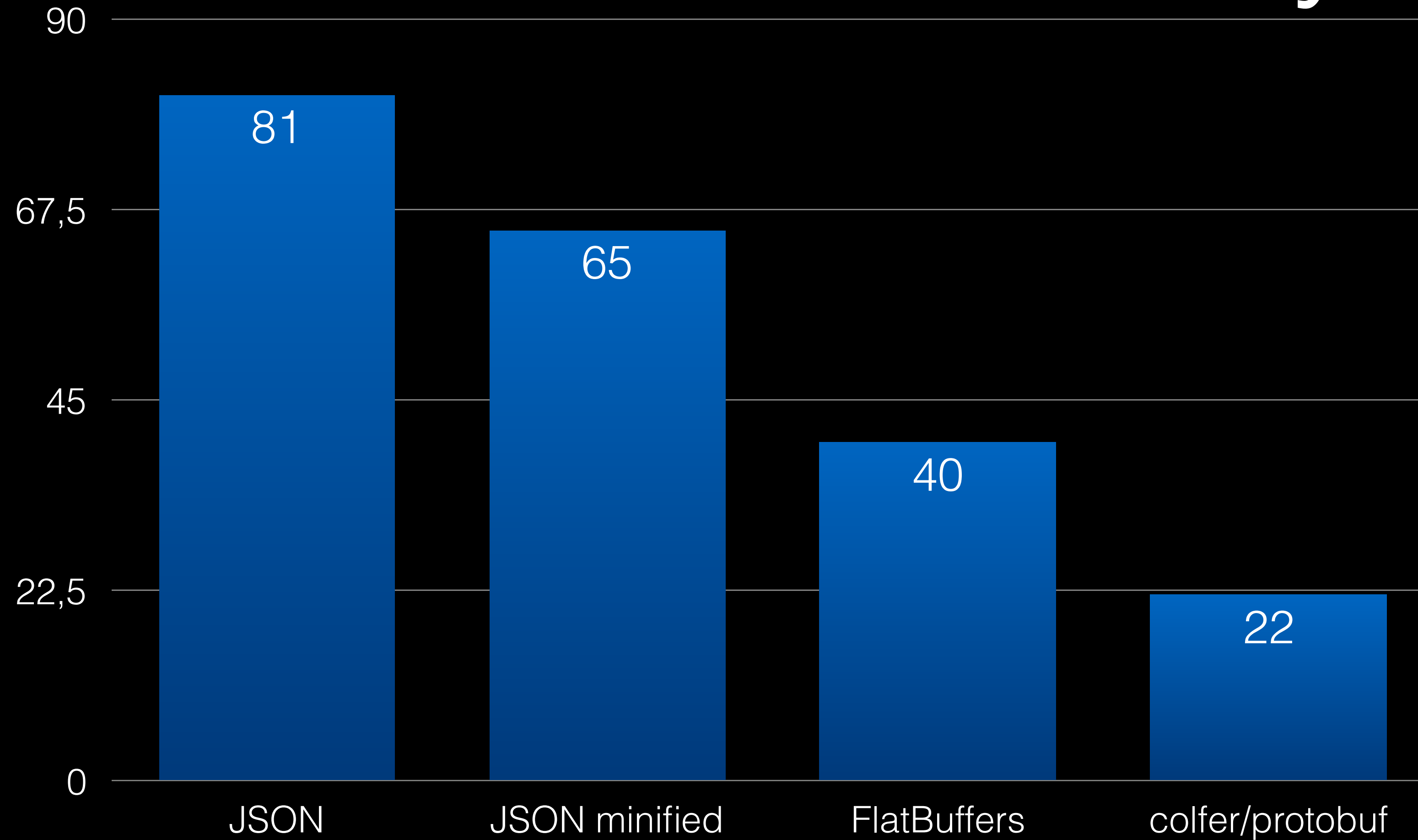
- 1 Overview
- 2 Syntax comparison of human-readable formats
- 3 Comparison of binary formats
- 4 See also
- 5 References
- 6 External links

### Overview [\[edit\]](#)

Name	Creator-maintainer	Based on	Standardized?	Specification	Binary?	Human-readable?	Supports references?	Schema-IDL?	Standard APIs	Supports Zero-copy operations
<a href="#">Apache Avro</a>	Apache Software Foundation	N/A	Yes	<a href="#">Apache Avro™ 1.8.1 Specification</a>	Yes	No	N/A	Yes (built-in)	N/A	N/A
<a href="#">Argdata</a>	Nuxi, the Netherlands	YAML	Yes	<a href="#">Argdata binary encoding</a>	Yes	No	No	No	No	Yes
<a href="#">ASN.1</a>	ISO, IEC, ITU-T	N/A	Yes	ISO/IEC 8824; X.680 series of ITU-T Recommendations	Yes (BER, DER, PER, OER, or custom via ECN)	Yes (XER, GSER, or custom via ECN)	Partial <sup>f</sup>	Yes (built-in)	N/A	N/A
<a href="#">Bencode</a>	<a href="#">Bram Cohen</a> (creator) <a href="#">BitTorrent, Inc.</a> (maintainer)	N/A	Yes	<a href="#">Part of BitTorrent protocol specification</a>	Partially (numbers and delimiters are ASCII)	No	No	No	No	N/A
<a href="#">Binn</a>	<a href="#">Bernardo Ramos</a>	N/A	Yes	<a href="#">Binn Specification</a>	Yes	No	No	No	No	Yes
<a href="#">Bond</a>	Microsoft	N/A	No	<a href="#">Bond IDL Specification</a>	Yes	Yes (JSON, XML)	No	Yes	No	N/A
<a href="#">BSON</a>	MongoDB	JSON	Yes	<a href="#">BSON Specification</a>	Yes	No	No	No	No	N/A
<a href="#">Candle Markup</a>	<a href="#">Henry Luo</a>	XML, JSON, JavaFX	Yes	<a href="#">Candle Markup Reference</a>	No	Yes	Yes (XPointer, XPath)	Yes (Candle Pattern Reference)	Yes (XQuery, XPath)	N/A
<a href="#">Cap'n Proto</a>	<a href="#">Kenton Varda</a>	N/A	No	<a href="#">Cap'n Proto Encoding Spec</a>	Yes	Partial <sup>h</sup>	Yes	Yes	No	Yes
<a href="#">CBOR</a>	<a href="#">Carsten Bormann</a> , <a href="#">P. Hoffman</a>	JSON (loosely)	Yes	<a href="#">RFC-7049</a>	Yes	No	Yes through tagging	No	No	Yes
<a href="#">Colfer</a>	<a href="#">Pascal de Kloe</a>	N/A	No	<a href="#">Specification Wiki</a>	Yes	No	No	Yes	No	Yes
<a href="#">Comma-separated values (CSV)</a>	RFC author: <a href="#">Yakov Shafranovich</a>	N/A	Partial (myriad informal variants used)	<a href="#">RFC 4180</a> (among others)	No	Yes	No	No	No	No
<a href="#">Cython</a>	<a href="#">Robert Bradshaw</a>	N/A	Yes	<a href="#">Cython Specification</a>	Yes	No	No	Partial	Yes	N/A

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- [Create a book](#)
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- [Add links](#)

# Size in bytes



```
{  
  "name": "Maxim Zaks",  
  "birthday": {  
    "year": 1981,  
    "month": 06,  
    "day": 12  
  }  
}
```

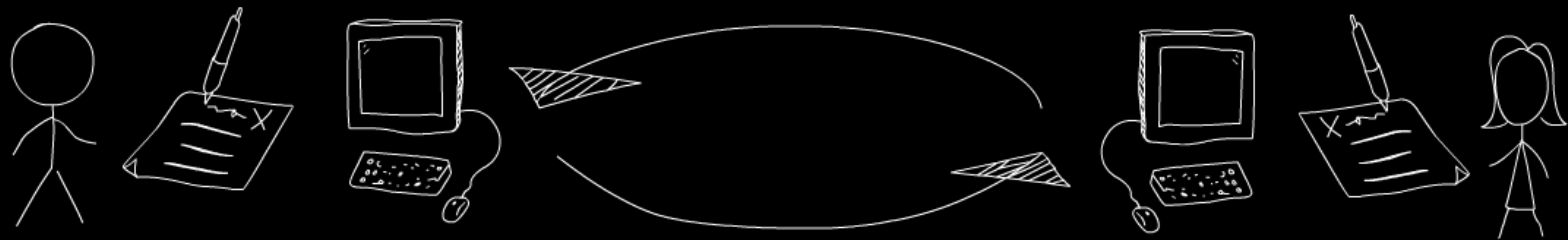
<https://www.youtube.com/watch?v=Ve9POqZJymw>

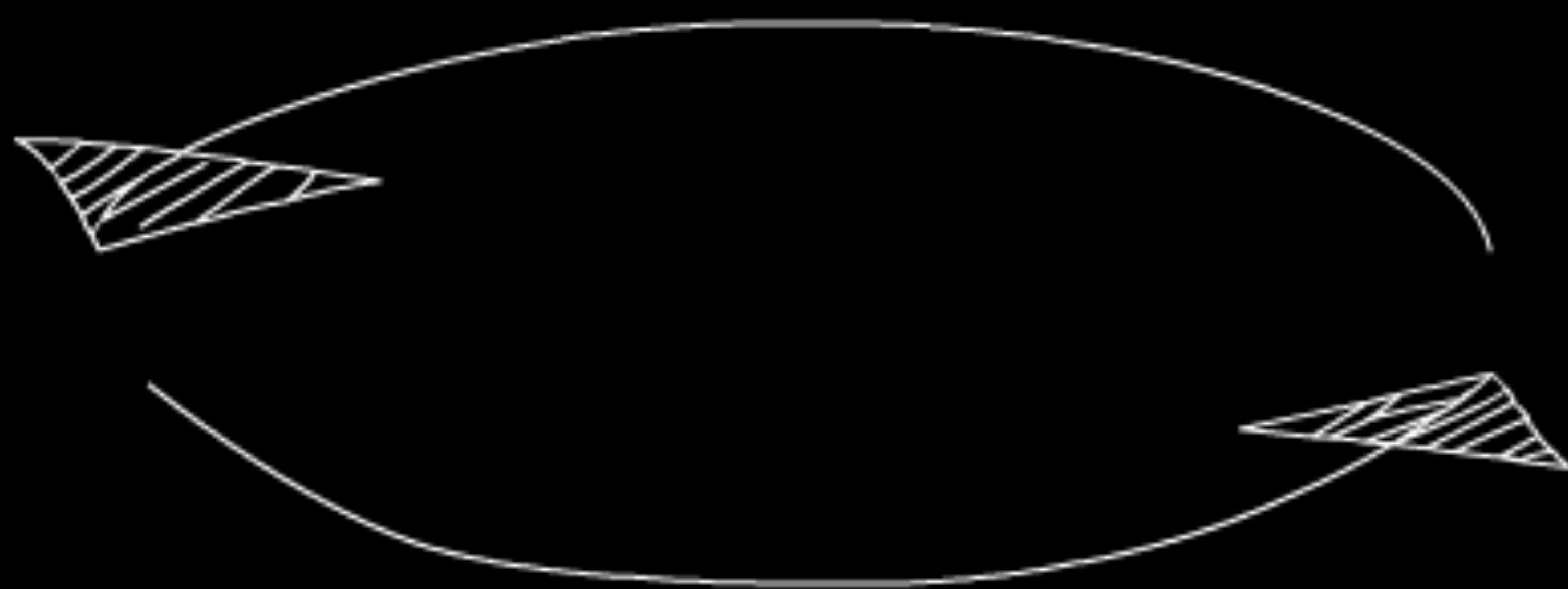
lets talk about performance

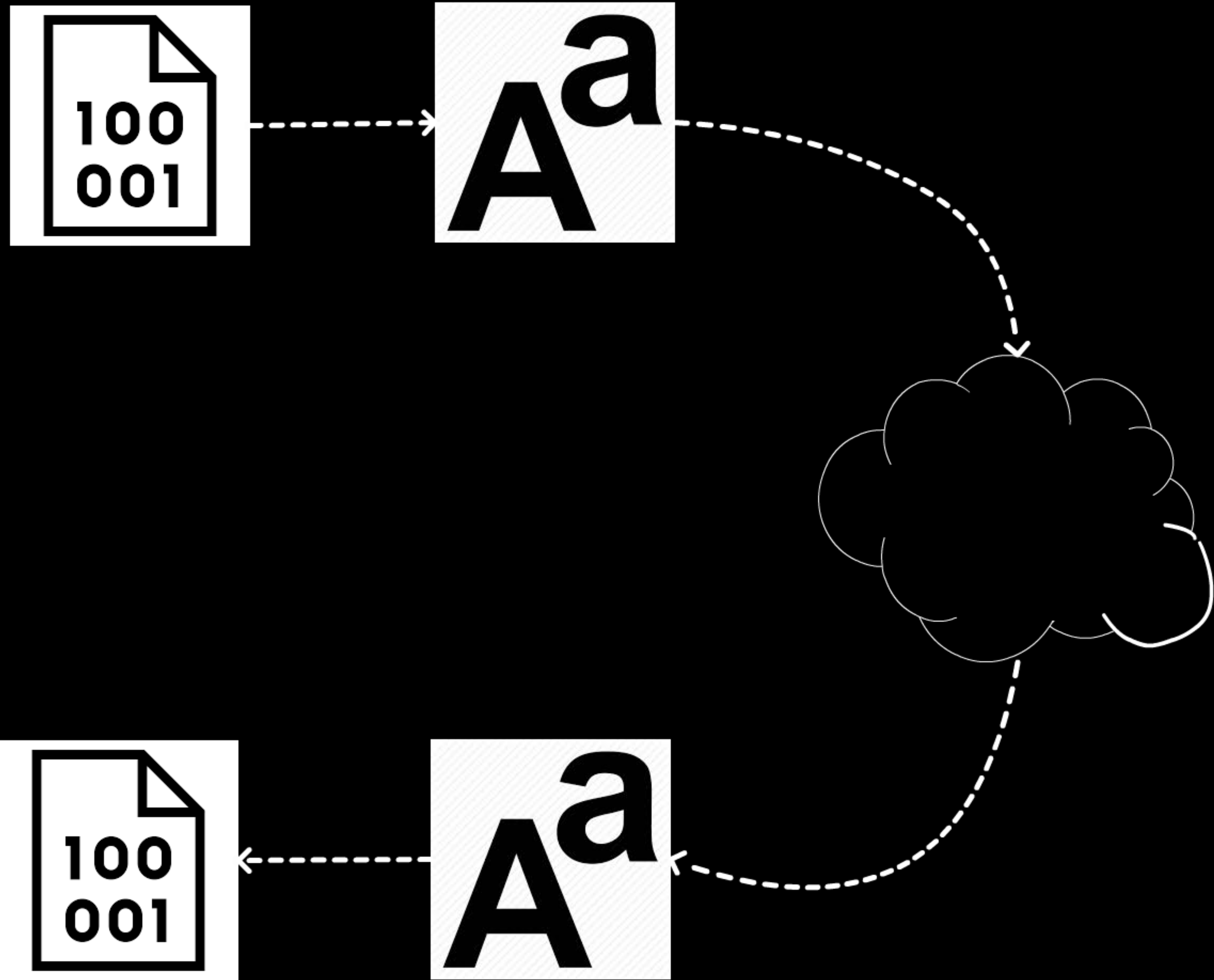




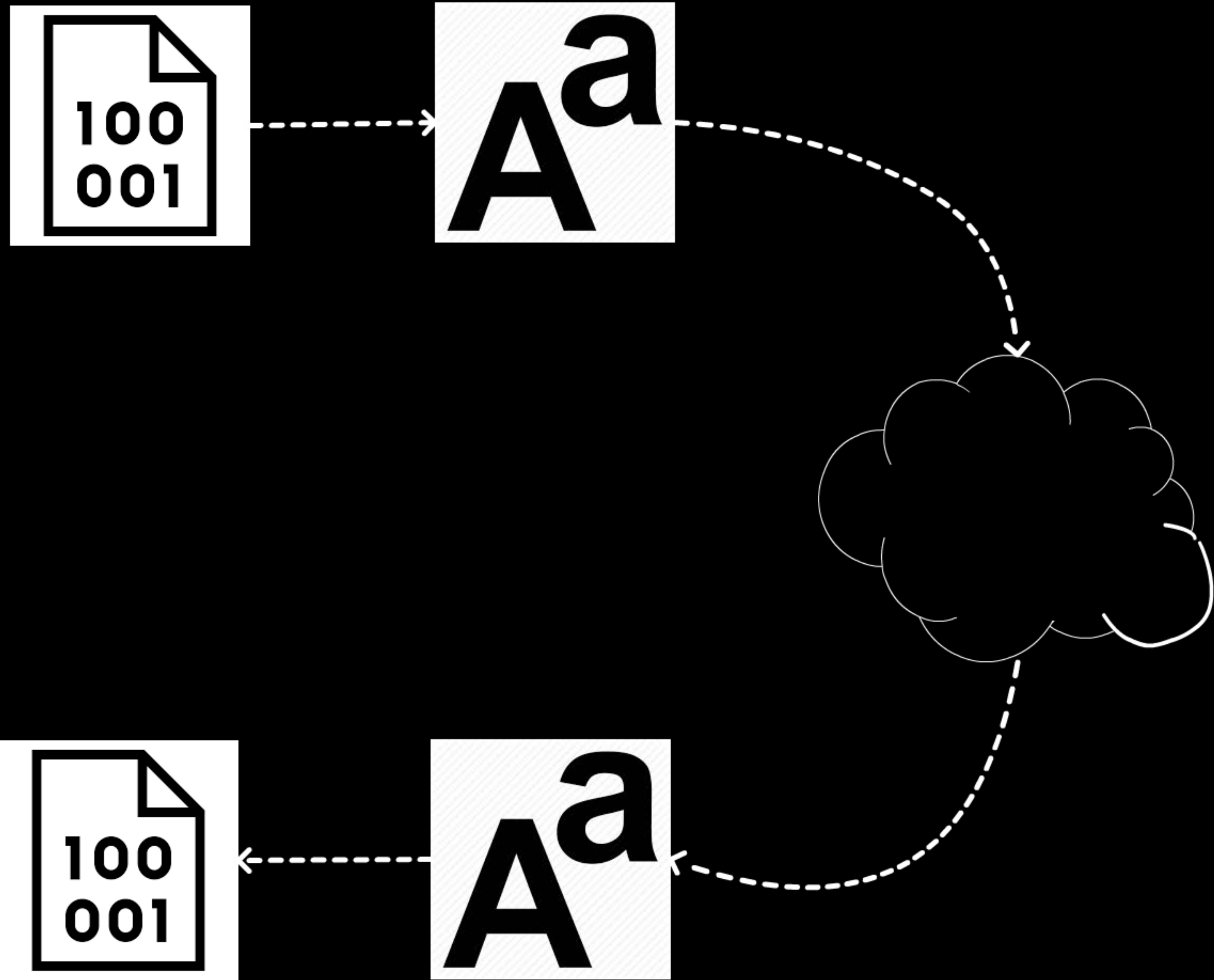
JSON is a  
text based format

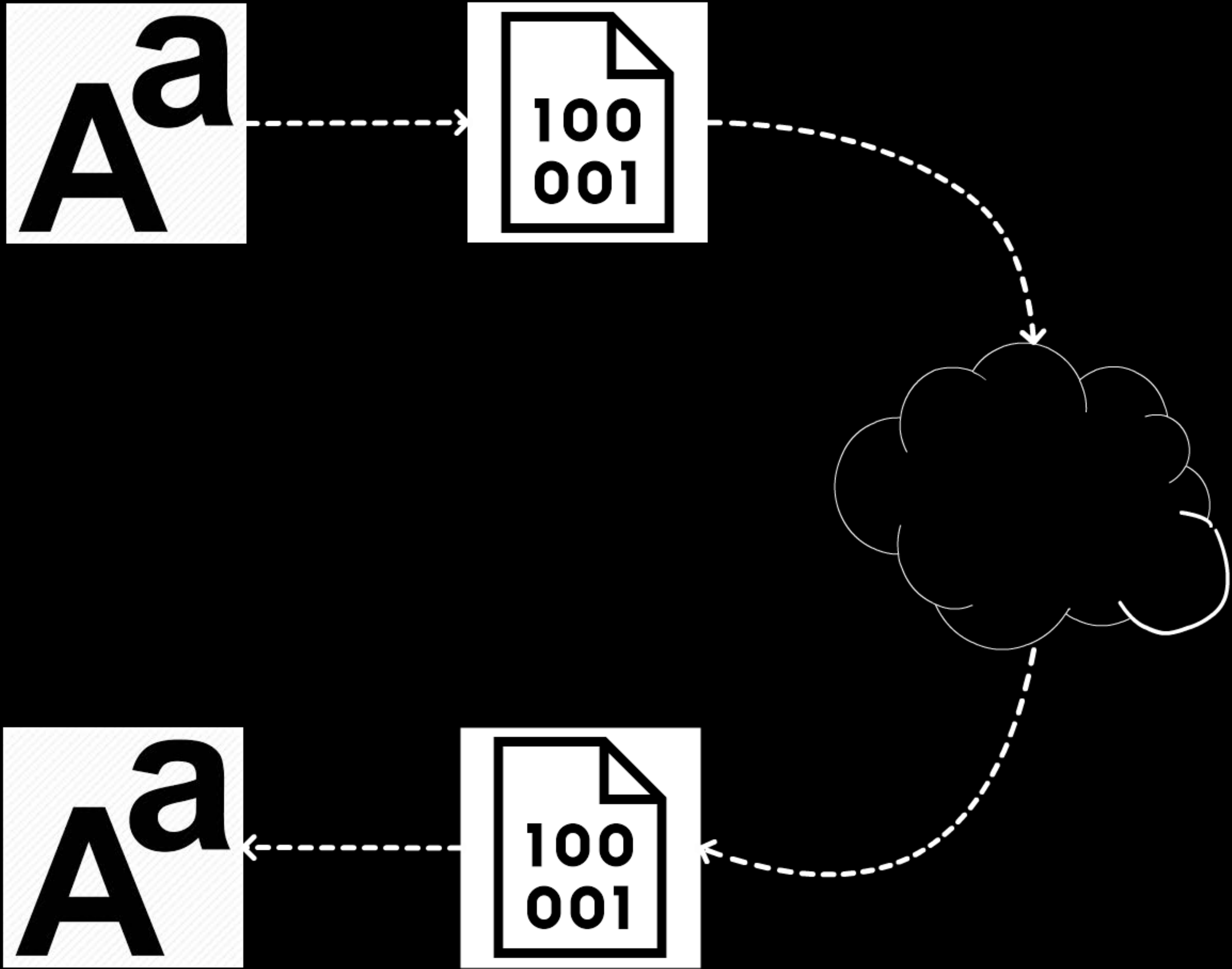


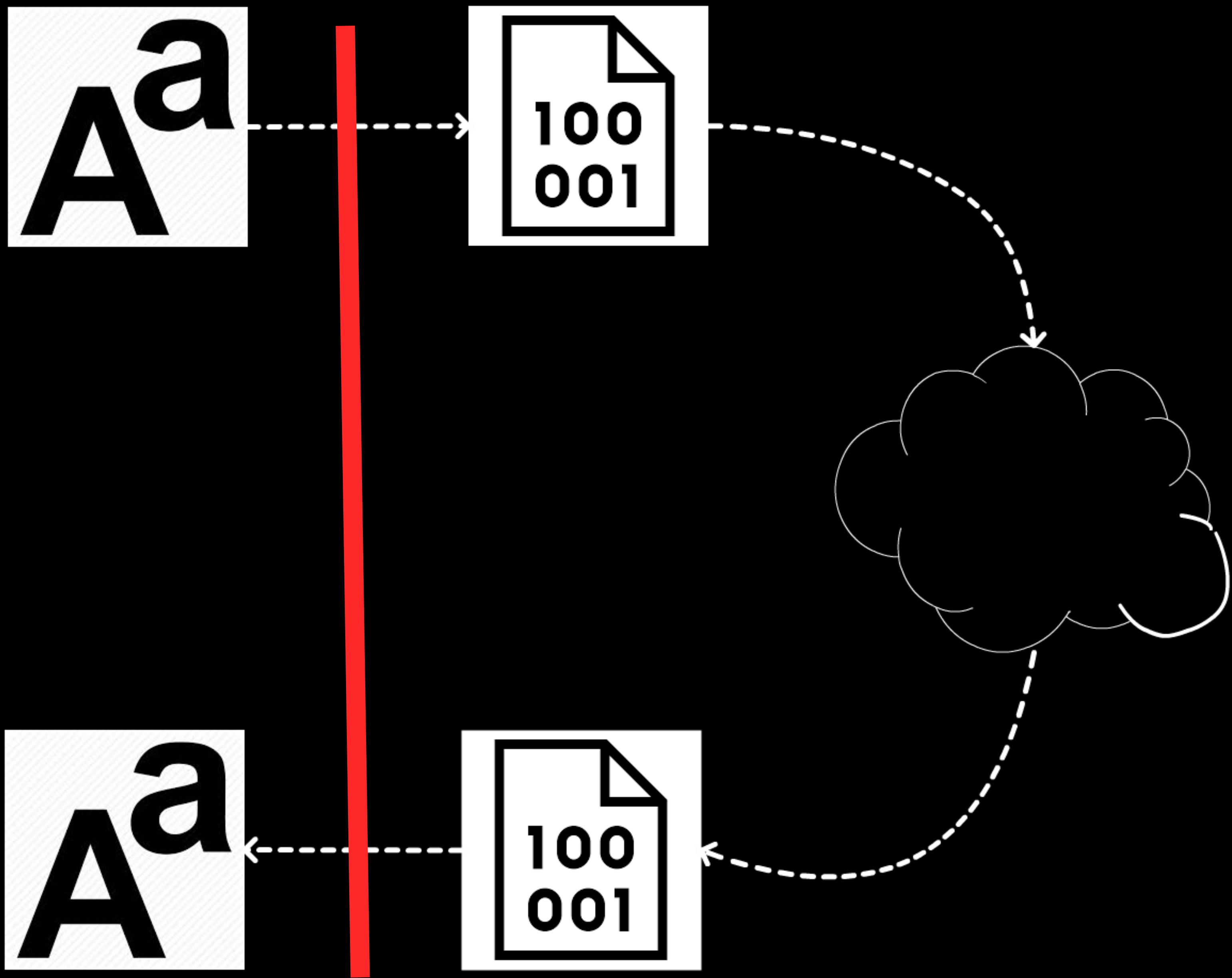




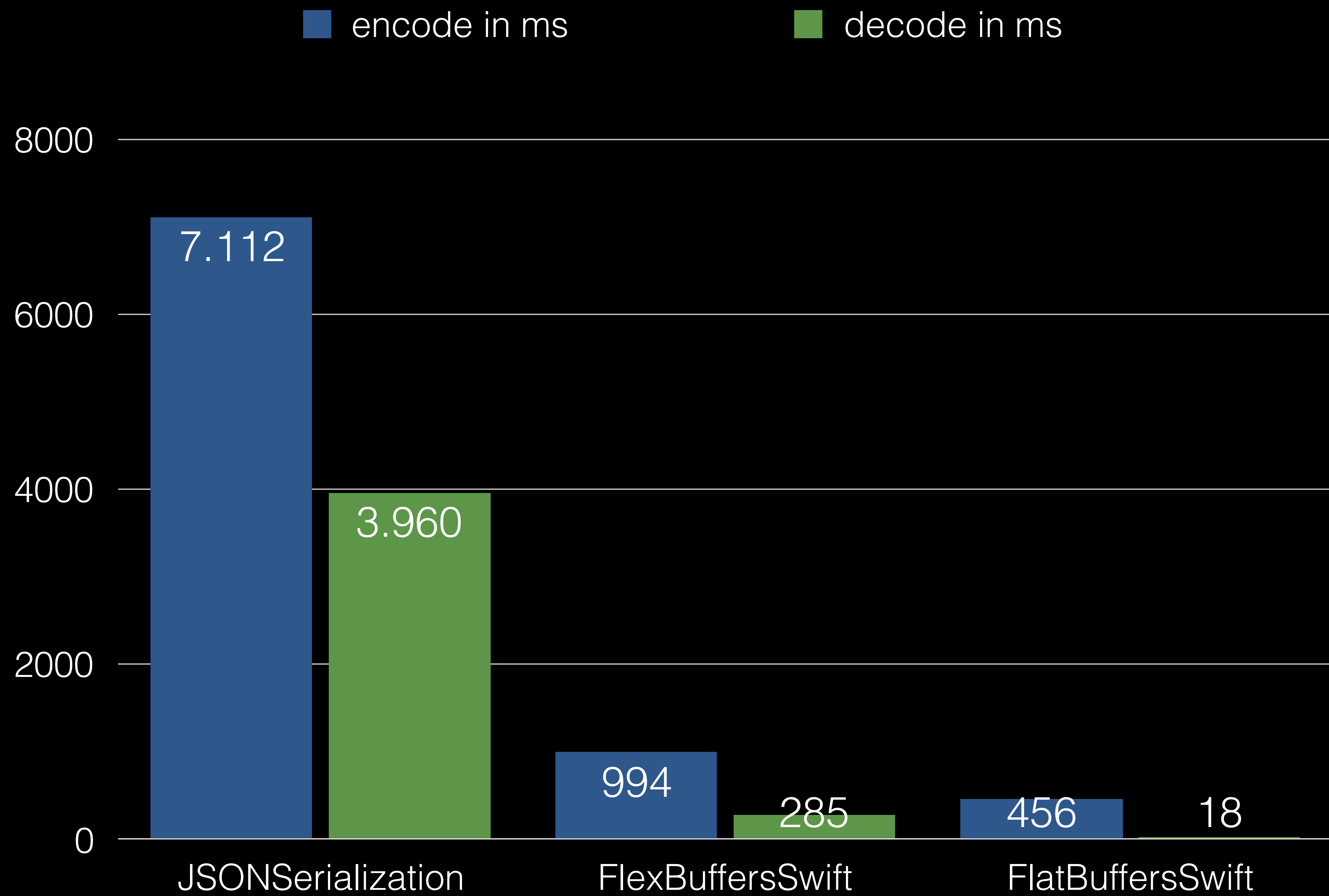












<https://github.com/mzaks/FlexBuffersSwift>

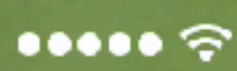
one more thing...



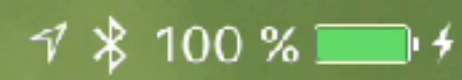
zero cost  
random value access

# FlatBuffers, FlexBuffers & Cap'nProto

let us access values directly out of  
the buffer



09:41



FindCityFB



Telefon



Mail




Safari



Musik

# Outlook

- Don't use JSON just out of convenience
- Human readable is a manner of tooling
- Imagine how much more responses our server could deliver if it took 200x less time to process a request
- I am open for questions
- ... and btw. I like to collaborate 🤗  @iceX33

# References

- All Gifs are powered by [giphy.com](http://giphy.com)
- Binary Visualiser „HEX Fiend“ by ridiculous\_fish <http://ridiculousfish.com/hexfiend/>
- [https://en.wikipedia.org/wiki/Comparison\\_of\\_data\\_serialization\\_formats](https://en.wikipedia.org/wiki/Comparison_of_data_serialization_formats)
- <https://github.com/pascaldekloe/colfer>
- <https://github.com/google/flatbuffers>
- <https://github.com/mzaks/FlatBuffersSwift>
- <https://github.com/mzaks/FlexBuffersSwift>
- <https://github.com/mzaks/FindCityFB>