

CとRust

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<https://github.com/takumak/split-benchmark>

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Cの典型的な苦手分野：パーサー

```
char **split(const char *text, const char delimiter)
{
    const char *s, *p;
    char **vstr;
    int i;

    vstr = malloc(sizeof(*vstr) * strlen(text));
    i = 0;

    for (s = p = text; *p; p++) {
        if (*p == delimiter) {
            vstr[i++] = strdup(s, p - s);
            s = p + 1;
        }
    }

    vstr[i++] = strdup(s, p - s);
    vstr[i] = NULL;

    return vstr;
}
```

↖
おそい

"de:ad:be:ef:01:23"



split()



"de",
"ad",
"be",
"ef",
"01",
"23"

Cの典型的な苦手分野：パーサー

```
char **split(const char *text, const char delimiter)
{
    const char *s, *p;
    char **vstr;
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    vstr = malloc(sizeof(*vstr) * strlen(text));
    i = 0;

    for (s = p = text; *p; p++) {
        if (*p == delimiter) {
            vstr[i++] = strdup(s, p - s);
            s = p + 1;
        }
    }

    vstr[i++] = strdup(s, p - s);
    vstr[i] = NULL;

    return vstr;
}
```

← Q. こんなコード書かんでしょ？

A. よくあります

参考文献：g_strsplit (glib)

```
2393 gchar**
2394 g_strsplit (const gchar *string,
2395             const gchar *delimiter,
2396             gint max_tokens)
2397 {
2398     GSList *string_list = NULL, *slist;
2399     gchar **str_array, *s;
2400     guint n = 0;
2401     const gchar *remainder;
2402
2403     g_return_val_if_fail (string != NULL, NULL);
2404     g_return_val_if_fail (delimiter != NULL, NULL);
2405     g_return_val_if_fail (delimiter[0] != '\0', NULL);
2406
2407     if (max_tokens < 1)
2408         max_tokens = G_MAXINT;
2409
2410     remainder = string;
2411     s = strstr (remainder, delimiter);
2412     if (s)
2413     {
2414         gsize delimiter_len = strlen (delimiter);
2415
2416         while (--max_tokens && s)
2417         {
2418             gsize len;
2419
2420             len = s - remainder;
2421             string_list = g_slist_prepend (string_list,
2422                                           g_strndup (remainder, len));
2423             n++;
2424             remainder = s + delimiter_len;
2425             s = strstr (remainder, delimiter);
2426         }
2427     }
```

<https://github.com/GNOME/glib/blob/glib-2.25.7/glib/gstrfuncs.c#L2394>
<https://developer.gimp.org/api/2.0/glib/glib-String-Utility-Functions.html#g-strsplit>

g_strsplit ()

<code>gchar**</code>	<code>g_strsplit</code>	<code>(const gchar *string, const gchar *delimiter, gint max_tokens);</code>
----------------------	-------------------------	--

Splits a string into a maximum of *max_tokens* pieces, using the given *delimiter*. If *max_tokens* is reached, the remainder of *string* is appended to the last token.

As a special case, the result of splitting the empty string "" is an empty vector, not a vector containing a single string. The reason for this special case is that being able to represent a empty vector is typically more useful than consistent handling of empty elements. If you do need to represent empty elements, you'll need to check for the empty string before calling `g_strsplit()`.

string: a string to split.

delimiter: a string which specifies the places at which to split the string. The delimiter is not included in any of the resulting strings, unless *max_tokens* is reached.

max_tokens: the maximum number of pieces to split *string* into. If this is less than 1, the string is split completely.

Returns: a newly-allocated `NULL`-terminated array of strings. Use `g_strfreev()` to free it.

Rustの場合

```
fn main() {  
    let a = "de:ad:be:ef:01:23";  
    for i in a.split(":") {  
        println!("{}", i);  
    }  
}
```

はい

"de:ad:be:ef:01:23"



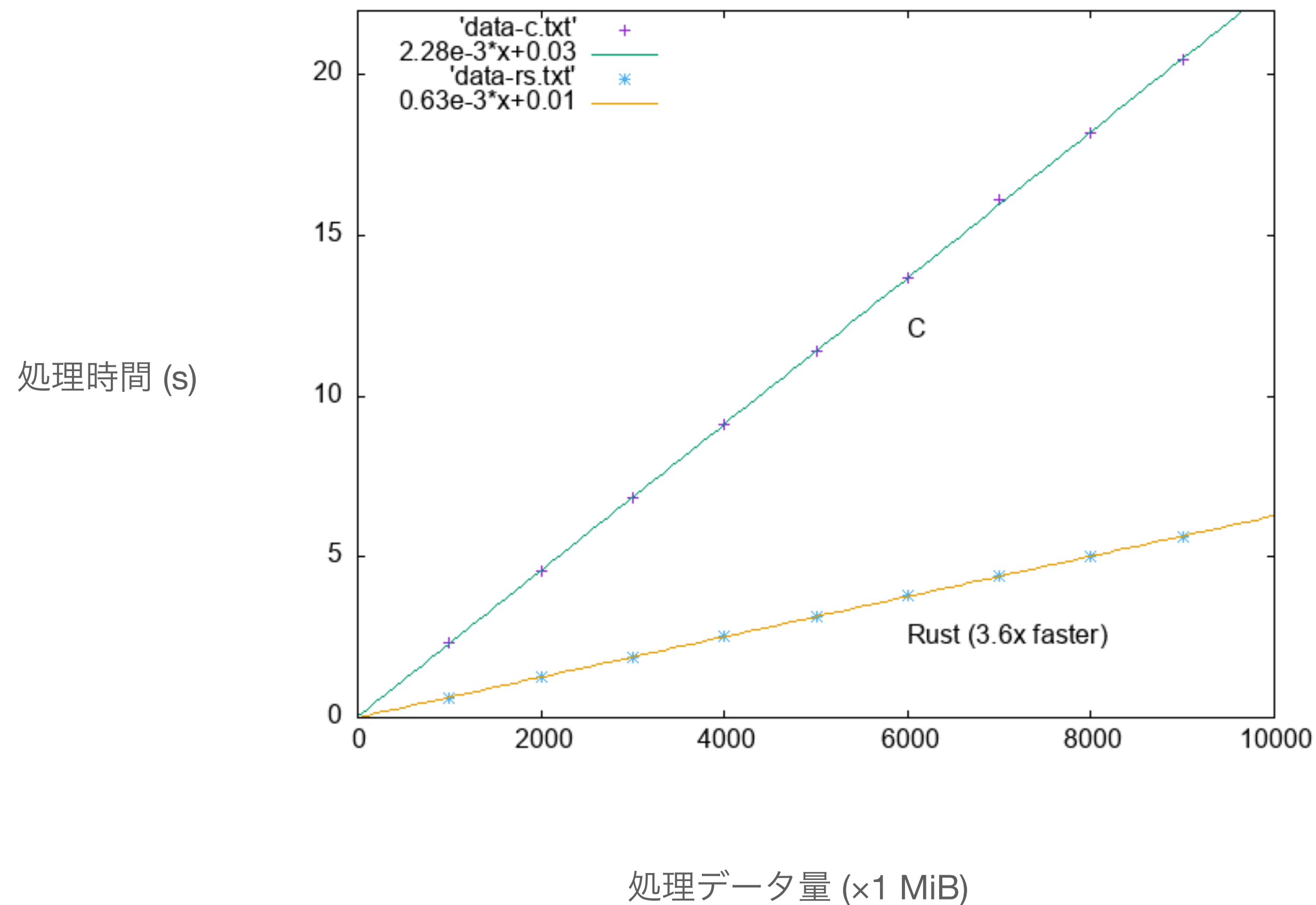
split()



"de",
"ad",
"be",
"ef",
"01",
"23"

ベンチマーク

<https://github.com/takumak/split-benchmark>



- データはChaCha8Rng同一シードで生成
- Cはg_strsplit相当の実装 (strndup)
- Rustはstd::str::Split
- Cは全部コピーしてるので当然遅い
- 条件がフェアじゃないが
「この言語ではこう書くことが多い」
を比べている
- これは極端な例
 - 極端な結果になるように色々調整している
 - 一般にはC, C++よりRustのほうがちょっと遅くなりがち
- (AArch64 Macで測定、古いCore i5は2.6xだった)

ライフタイム

```
1 fn firstline<'a>(text: &'a str) -> &'a str {
2     let bytes: &'a [u8] = text.as_bytes();
3     for (i, c) in bytes.iter().enumerate() {
4         if *c == b'\n' {
5             return unsafe {
6                 std::str::from_utf8_unchecked(&bytes[..i]) }
7         }
8     }
9     return text
10 }
11
12 fn main() {
13     let two_lines = "foo\nbar";
14     let first = firstline(two_lines);
15     println!("{:?} {:?}", two_lines, two_lines.as_ptr());
16     println!("{:?} {:?}", first, first.as_ptr());
17 }
```

```
$ cargo run
Compiling demo v0.1.0 (/Volumes/work/kawai/demo)
Finished dev [unoptimized + debuginfo] target(s) in 0.39s
Running `target/debug/demo`
"foo\nbar" 0x1049a1f12
"foo" 0x1049a1f12
```

"foo\nbar"



firstline()



"foo"

ライフタイム

```
1  fn firstline<'a>(text: &'a str) -> &'a str {
2      let bytes: &'a [u8] = text.as_bytes();
3      for (i, c) in bytes.iter().enumerate() {
4          if *c == b'\n' {
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6                  std::str::from_utf8_unchecked(&bytes[..i]) }
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12 fn main() {
13     let two_lines = "foo\nbar";
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```

```
$ cargo run
Compiling demo v0.1.0 (/Volumes/work/kawai/demo)
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Running `target/debug/demo`
"foo\nbar" 0x1049a1f12
"foo" 0x1049a1f12
```

- `'a`で第一引数`text`とローカル変数`bytes`と返り値の生存区間が同じであると宣言している(ライフタイムという)
- `firstline`の呼び出し元(`main`)は引数と返り値が同じ区間で生存していないといけないとわかる
- `firstline`は生存区間を宣言することで、引数をコピーせず、参照を返すことができる
- Cでは`main`と`firstline`が互いを信頼しないので、`firstline`は`malloc`してコピーする実装が普通である
- ライフタイムのチェックはビルド時に行う
 - つまり参照カウンタのCoWより速い

まとめ

カプセル化と高速は
トレードオフじゃなかった

おわり