

Range constructor for `std::string_view`

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1 Abstract

This paper proposes that `string_view` be constructible from any contiguous range of characters. The idea was extracted from P1206.

2 Tony tables

Before	After
<pre>void foo(string_view); vector<char8_t> vec = get_some_unicode(); foo(string_view{vec.data(), vec.size()});</pre>	<pre>void foo(string_view); vector<char8_t> vec = get_some_unicode(); foo(vec);</pre>

3 Motivation

While P1206 gives a general motivation for range constructors, it's especially important for `string_view` because there exist in a lot of codebases string types that would benefit from being convertible to `string_view`. For example, `llvm::StringRef`, `QByteArray`, `fbstring`, `boost::container::string` ...

Manipulating the content of a vector as a string is also useful.

Finally, this makes contiguous views operating on characters easier to use with `string_view`.

4 Design considerations

- instantiations of `basic_string` are specifically excluded because `std::basic_string` already provides a conversion operator and more importantly, strings with different `char_traits` should not be implicitly convertible
- Because `basic_string_view` doesn't mutate the underlying data, there is no reason to accept a range by something other than const lvalue reference.

- The construction is implicit because it is cheap and a contiguous range of character is the same platonic thing as a `string_view`.

5 Proposed wording

Change in `[string.view]` 20.4.2:

```
template<class charT, class traits = char_traits<charT>>
class basic_string_view {
public:
    [...]

    // construction and assignment
    constexpr basic_string_view() noexcept;
    constexpr basic_string_view(const basic_string_view&) noexcept = default;
    constexpr basic_string_view& operator=(const basic_string_view&) noexcept = default;
    constexpr basic_string_view(const charT* str);
    constexpr basic_string_view(const charT* str, size_type len);

    template <ContiguousRange R>
    requires ranges::SizedRange<R> && Same<iter_value_t<iterator_t<R>>, charT>
    constexpr basic_string_view(const R& r);

    template <ContiguousIterator It, Sentinel<It> End>
    requires Same<iter_value_t<It>, charT>
    constexpr basic_string_view(const It& begin, End end );

    [...]
};
```

Change in `[string.view.cons]` 20.4.2.1:

Add after 7

```
template <ranges::ContiguousRange R>
requires ranges::SizedRange<R> && Same<iter_value_t<iterator_t<R>>, charT>
constexpr basic_string_view(const R& r);
```

Effects: Constructs a `basic_string_view` over the `ContiguousRange` `r`.

Throws: If `data(r)` or `size(r)` throw

Remarks: This constructor shall not participate in overload resolution unless

- `is_array<R>` is false.
- `R` does not derive from an instantiation of `std::basic_string`
- `R` does not derive from an instantiation of `std::basic_string_view`

```
template <ContiguousIterator It, Sentinel<It> End>
```

```
requires requires Same<iter_value_t<It>>, charT>  
constexpr basic_string_view(const It& begin, End end );
```

Effects: Constructs a `basic_string_view` over the range `[begin, end)` .

Remarks: This constructor shall not participate in overload resolution unless

- It does not derive from an instantiation of `std::basic_string::iterator` or `std::basic_string::const_iterator`
- It does not derive from an instantiation of `std::basic_string_view::iterator` or `std::basic_string_view::const_iterator`
- It and `End` are not of the same type or `End` is not convertible to a pointer of `charT`