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

`void foo(string_view);`
`vector<char8_t> vec = get_some_unicode();`
`foo(string_view{vec.data(), vec.size()});`
	`void foo(string_view);`
	`vector<char8_t> vec = get_some_unicode();`
	`foo(vec);`

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 `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<ranges::ContiguousRange R>
basic_string_view(const R& r)
requires ranges::SizedRange<R>
    -> basic_string_view<iter_value_t<iterator_t<R>>>;
```

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`