

Project: ISO JTC1/SC22/WG21: Programming Language C++
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 Audience: LEWG, LWG
 Issues:

Fix istream_view, Rev0

This paper fixes a fundamental design problem with the current helper function `std::ranges::istream_view<>()` that cause multiple inconsistencies and unnecessary code overhead when declaring `istream_view` objects.

Tony Table:

Before	After
<code>std::ranges::istream_view<int> v{mystream}</code> <code>// ERROR</code>	<code>std::ranges::istream_view<int> v{mystream}</code> <code>// OK</code>
<code>std::ranges::istream_view<int>(mystream)</code> <code>// OK</code>	<code>std::ranges::istream_view<int>(mystream)</code> <code>// still OK</code>
<code>// using input stream for wchar_t:</code> <code>std::ranges::istream_view<int>{mywstream}</code>	<code>// using input stream for wchar_t:</code> <code>std::ranges::wistream_view<int>{mywstream}</code> <code>// or:</code> <code>std::views::istream<int>(mywstream)</code>
<code>// using input stream for other char type:</code> <code>std::ranges::istream_view<int>{u8stream}</code>	<code>// using input stream for other char type:</code> <code>std::views::istream<int>(u8stream)</code>

Rev0:

First initial version.

Motivation

The current definition of `std::ranges::istream_view()` breaks several basic conventions:

- This would be the first type called `basic_xyz` that has a corresponding symbol `xyz` that is not a type.
- This would be the only symbol `xyz_view` that is not a view type, but a function (usually, we have corresponding adaptors in namespace `std::views` as functions).

It hinders to declare an `istream_view` just as follows:

```
std::istringstream mystream{"0 1 2 3 4"};
std::ranges::istream_view<int> v{mystream}; // ERROR
```

Instead, the programmer has to implement:

```
std::istringstream mystream{"0 1 2 3 4"};
std::ranges::basic_istream_view<int, char> v{mystream};
```

It also confuses programmers because using `{}` to create a temporary `istream` view does not compile (and yields an even more confusing error message):

```
for (int val : std::ranges::istream_view<int>{mystream}) { // ERROR
...
}
```

Instead, the programmer has to implement

```
    for (int val : std::ranges::istream_view<int>(mystream)) {  
or:  
    for (int val : std::ranges::basic_istream_view<int, char>(mystream)) {  
        ...  
    }
```

Therefore, this paper proposes to fix this design mistake so that we follow the usual conventions. The fix should be a defect against C++20.

In addition, this view is the only type `xyz_view` without a adaptor in namespace `std::view`. So I propose to add it.

Open Issues

We have to decide whether also to support other char types with a corresponding convenience function: `wistream_view`, `u8istream_view`, `u16istream_view`, `u32istream_view`

In C++20, currently, We have full support for `char`, `wchar_t`, `char8_t`, `char16_t`, and `char32_t` only for:

- `basic_string`
- `basic_string_view`
- `streampos`

We only have support for `char` and `wchar_t` for

- `basic_istream`, `basic_ostream`, `basic_iostream`
- `basic_istringstream`, `basic_ostringstream`, `basic_stringstream`
- `basic_stringbuf`
- `basic_filebuf`
- `basic_streambuf`
- `basic_format`

As this feature belongs to the stream area, I propose only to standardize types `istream_view` and `wistream_view`.

Backward Compatibility

With the proposed fix, code using

```
    for (int val : std::ranges::istream_view<int>(mywstream)) {  
        ...  
    }
```

will still compile and work.

Code using this view for wide strings:

```
    for (int val : std::ranges::istream_view<int>(mywstream)) {  
        ...  
    }
```

will no longer compile, but can easily be converted to:

```
    for (int val : std::ranges::wistream_view<int>(mywstream)) {  
        ...  
    }
```

or to:

```
    for (int val : std::views::istream<int>(mywstream)) {  
        ...  
    }
```

Code using this view for UTF strings:

```
for (int val : std::ranges::istream_view<int>(ustream)) {  
    ...  
}
```

will no longer compile, but can easily be converted to:

```
for (int val : std::ranges::basic_istream_view<int, char8_t>(ustream)) {  
    ...  
}
```

or to:

```
for (int val : std::views::istream<int>(ustream)) {  
    ...  
}
```

I don't assume that much code like that is written yet. And the way to perform the fix is easy.

Overall consistency is far more worth because otherwise programmers using char streams have to pay a significant price (plus confusion due to inconsistent design).

Proposed Solution

In **24.2 Header <ranges> synopsis [ranges.syn]**

replace

```
template<class Val, class CharT, class Traits>  
basic_istream_view<Val, CharT, Traits> istream_view(basic_istream<CharT, Traits>& s);
```

by

```
template<class Val>  
using istream_view = basic_istream_view<Val, char>;  
  
template<class Val>  
using wistream_view = basic_istream_view<Val, wchar_t>;
```

In **24.6.5.1 Overview [range.istream.overview]**

insert after paragraph 1 before the example:

```
The name views::istream<T> denotes a customization point object (16.3.3.3.6). Given a type T and a subexpression E of type U, the expression views::istream<T>(E) is expression-equivalent to basic_istream_view<T, typename U::char_type, typename U::traits_type>(E).
```

In **24.6.5.2 Class template basic_istream_view [range.istream.view]**

strike:

```
template<class Val, class CharT, class Traits>  
basic_istream_view<Val, CharT, Traits> istream_view(basic_istream<CharT, Traits>& s);  
Effects: Equivalent to: return basic_istream_view<Val, CharT, Traits>(s);
```

Feature Test Macro

This should be a defect against C++20. Do we need a new feature test macro and if so where?

Acknowledgements

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Forgive me if I forgot anybody.