



Managing customization in UI library

How to allow customization with complex components
The example of MUI

Alexandre Fauquette





- **3.2M** Weekly downloads on npm
- **83k** Stars on GitHub
- **2.6k** Open-source contributors



The **wikidata** for **food**

- **2.7M** products



Some context

The screenshot displays the Material UI website with a dashboard layout. The main content area on the left features the headline "Move faster with intuitive React UI tools" and a sub-headline "MUI offers a comprehensive suite of UI tools to help you ship new features faster. Start with Material UI, our fully-loaded component library, or bring your own design system to our production-ready components." Below this is a "Get started" button and a code snippet: `npm install @mui/material @emotion/...`

The dashboard on the right includes several widgets:

- Task Card:** A blue card titled "Check the docs for getting every component API" with a progress bar at 60% and is assigned to Michael Scott.
- Calendar:** A calendar for May 2022 with the 25th highlighted.
- Music Player:** A player for "Ultraviolet" by Basement - Beside Myself with playback controls.
- Temperature:** A vertical slider showing a temperature range from 25°C to 50°C.
- Buttons:** Two "Buy now" buttons, one solid blue and one outlined.
- Code Snippets:** A row of buttons for "React", "TypeScript", and "CSS", and a row of toggle switches for "React" and "Javascript".
- List Item:** A list item with the number "1" and the text "Use the sx prop to add these properties:" followed by a sub-item "Margin Top".
- Footer:** A section titled "Fonts" with the text "Typefaces used in this branding project." and a "Hacks" section below it.

Some context



Internal tools or MVP

Ne montr...
label ▼ valeur: nutriscore-grade-a ★

MODIFIER LES FILTRES

Le produit a-t-il ce label ?

NUTRISCORE A 

[Voir des exemples label](#)





NON (N) OUI (O)

IGNORER (K)

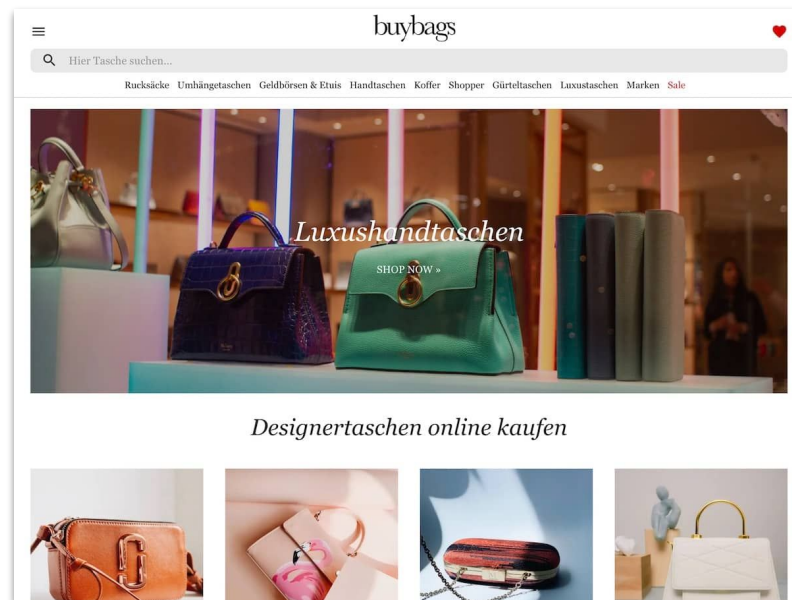
Some context



Internal tools or MVP



Final product





Some context

Internal tools or MVP

Final product

Work out of the box





Some context

Internal tools or MVP

Final product

Work out of the box



Beginner friendly





Some context

Internal tools or MVP

Final product

Work out of the box



Beginner friendly



Customisable





Some context

Internal tools or MVP

Final product

Work out of the box



Beginner friendly



Customisable



Let's go on an adventure



Basic customization



Buttons should be green

```
button {background-color: 'green'}
```





Basic customization



Buttons should be green

```
button {background-color: 'green'}
```



Disabled buttons should be red

```
button.disabled {background-color: 'red'}
```





Basic customization



Buttons should be green

```
button {background-color: 'green'}
```



Disabled buttons should be red

```
button.disabled {background-color: 'red'}
```



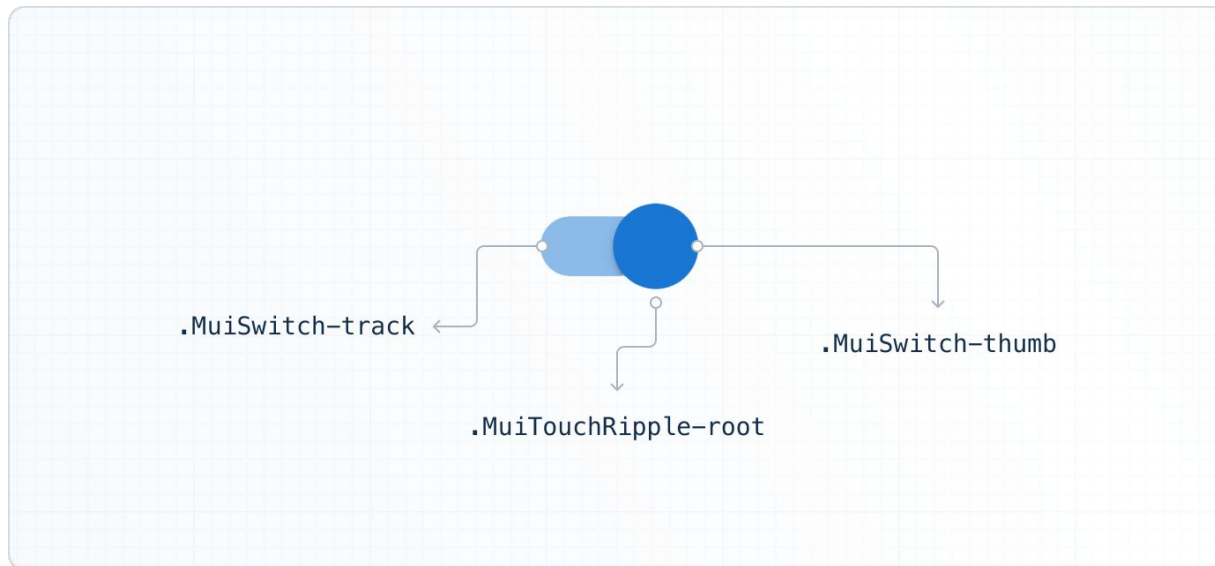
This one should be orange

```
button.disabled.special-one {background-color: 'orange'}
```





Basic customization





Basic customization



I can click on disabled button

```
<button disabled />
```





Basic customization



I can click on disabled button

```
<button disabled />
```



Can you add an icon?

```
<Button endIcon={<SendIcon />} />
```



[Get started >](#)



Basic customization



Style modification

=> CSS



Behavior modification

=> props



Level Up



Get started >



Level Up



Get started >



Trades, October 2020

<input type="checkbox"/>	Desk	Commodity	Filled Quantity	Trader Email	Quantity	Trader Name
<input type="checkbox"/>	D-7850	Milk	<div style="width: 38.02%; background-color: #f4a460;">38.02 %</div>	zog@kicculhiv.sa	90,348	Robert S
<input type="checkbox"/>	D-3867	Cotton No.2	<div style="width: 6.7%; background-color: #d9534f;">6.7 %</div>	vitit@fafli.ng	98,337	Jane Mil
<input type="checkbox"/>	D-5406	Milk	<div style="width: 68.67%; background-color: #f4a460;">68.67 %</div>	av@jojilup.com	99,614	Ellen Go
<input type="checkbox"/>	D-143	Soybean Oil	<div style="width: 62.089%; background-color: #f4a460;">62.089 %</div>	to@iw.at	50,173	Christine
<input type="checkbox"/>	D-9429	Cocoa	<div style="width: 21.749%; background-color: #d9534f;">21.749 %</div>	ketofcav@wode...	26,562	Victor G
<input type="checkbox"/>	D-2294	Coffee C	<div style="width: 61.367%; background-color: #f4a460;">61.367 %</div>	tedabiv@fivhu.aw	2,019	Francisc
<input type="checkbox"/>	D-2299	Cocoa	<div style="width: 45.83%; background-color: #f4a460;">45.83 %</div>	ral@pe.sg	100,001	Rhoda S
<input type="checkbox"/>	D-2577	Coffee C	<div style="width: 61.68%; background-color: #f4a460;">61.68 %</div>	rifedzib@hap.fi	71,548	Evan Co
<input type="checkbox"/>	D-3419	Soybeans	<div style="width: 43.145%; background-color: #f4a460;">43.145 %</div>	nakum@gib.ec	4,821	Barry Fr



Level Up



```
const rows = [
  { id: 0, name: "Fauquette", role: "dev"},
  { ... }
]

const columns = [
  { field: 'name'},
  { field: 'role'},
]

return
<div className='grid-container'>
  <DataGrid
    rows={rows}
    columns={columns}
  />
</div>
```



Level Up

- Paginating
- Filtering
- Sorting
- Selecting
- Editing
- Exporting
- Grouping
- Rendering
- ...ing

Challenges



Internal code structure



Documentation



Consistent interface

First issue



First issue



I'm looking at how to sort columns in filter panel by alphabetical order

Trades, October 2020

<input type="checkbox"/> Desk	Commodity	Trader Name	Trader Email	Quantity	Filled Quant
<input type="checkbox"/> Quantity			hr	2,435	80.616
<input type="checkbox"/> id			id@zaplev...	46,510	6.771
<input checked="" type="checkbox"/> Desk			bosur.vc	54,519	72.589
<input type="checkbox"/> Commodity		Hettie Fields	burin@mogmunoz...	94,348	56.57
<input type="checkbox"/> Trader Name		Leila Rodgers	pa@kuzu.vi	90,784	63.96
<input type="checkbox"/> Trader Email		concentrated O...	wi@setatcaw.pm	34,125	49.421
<input type="checkbox"/> Quantity		coffee	Cecilia Bush	33,511	8.021
<input type="checkbox"/> Filled Quantity		.14	Maude Hamilt...	20,839	99.688
<input type="checkbox"/> Is Filled		coffee	Bobby Bryant	21,037	28.06
<input type="checkbox"/> Status					
<input type="checkbox"/> Unit Price					
<input type="checkbox"/> Unit Price Currency					
<input type="checkbox"/> Sub Total					
<input type="checkbox"/> Fee Rate					
<input type="checkbox"/> Fee Amount					

The image shows a screenshot of a data table titled "Trades, October 2020". The table has columns for Desk, Commodity, Trader Name, Trader Email, Quantity, and Filled Quant. A filter panel is open over the table, showing a list of columns to be filtered. The "Quantity" column is selected in the filter panel, and a red arrow points to it. The filter panel also shows a search bar and a "Filter value" input field.



First issue

```
<DataGrid
  rows={rows}
  columns={columns}
  filterPanelColumnSelectOptionsOrder="asc"
/>
```

First issue



```
<DataGrid  
  rows={rows}  
  columns={columns}  
  filterPanelColumnSelectOptionsOrder="asc"  
/>
```





Solutions

- Headless (react-table, @mui/base)
- Composition (react-admin)
- Slots (@mui/...)






Remove the problem (ex: react-table, @mui/base)

```
0 const {
1   getTableProps,
2   rows,
3   prepareRow,
4   state,
5   setGlobalFilter,
6   ...
7 } = useTable(
8   {
9     columns,
10    data,
11    defaultColumn, // Be sure to pass the defaultColumn option
12    filterTypes,
13  },
14  useFilters, // useFilters!
15  useGlobalFilter // useGlobalFilter!
16 }
17
```



Remove the problem (ex: react-table, @mui/base)

```
0 const {
1   getTableProps,
2   rows,
3   prepareRow,
4   state,
5   setGlobalFilter,
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7 } = useTable(
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9     columns,
10    data,
11    defaultColumn, // Be sure to pass the defaultColumn option
12    filterTypes,
13  },
14  useFilters, // useFilters!
15  useGlobalFilter // useGlobalFilter!
16 }
17
```

- Customization 
- Out of the box 
- Beginner friendly 

Provide basics components (ex: react-admin)



Posts

Settings ENGLISH

Posts Comments Tags

Search

COLUMNS ADD FILTER + CREATE EXPORT

>	<input type="checkbox"/>	Id	Title	Published at ↓	Nb comments	Com.	Views	Tags	
>	<input type="checkbox"/>	13	Fusce massa lorem, pulvinar a posuere ut...	12/1/2012	0	✓	222	Code Music	EDIT SHOW
>	<input type="checkbox"/>	12	Qui tempore rerum et voluptates	11/7/2012	0	✓	719		EDIT SHOW
>	<input type="checkbox"/>	11	Omnis voluptate enim similique est possi...	10/22/2012	0	✓	294	Code Photo	EDIT SHOW
>	<input type="checkbox"/>	10	Totam vel quasi a odio et nihil	10/19/2012	0	✓	721	Photo Sport	EDIT SHOW
>	<input type="checkbox"/>	9	A voluptas eius eveniet ut commodi dolor	10/16/2012	1	✓	143		EDIT SHOW
>	<input type="checkbox"/>	8	Culpa possimus quibusdam nostrum eni...	10/2/2012	0	✗	557	Music Sport	EDIT SHOW
>	<input type="checkbox"/>	7	Illum veritatis corrupti exercitationem se...	9/29/2012	0	✓	133	Code Photo	EDIT SHOW
>	<input type="checkbox"/>	6	Minima ea vero omnis odit officiis aut	9/5/2012	3		208	Photo Sport	EDIT SHOW
>	<input type="checkbox"/>	4	Maiores et itaque aut perspiciatis	8/12/2012	0	✗	685		EDIT SHOW
>	<input type="checkbox"/>	2	Sint dignissimos in architecto aut	8/8/2012	1	✓	563	Code Music	EDIT SHOW

Rows per page: 10 1-10 of 13 < 1 2 >



Provide basics components (ex: react-admin)

```
0 const App = () => (  
1   <Admin dataProvider={dataProvider}>  
2     <Resource name="users" list={ListGuesser} />  
3   </Admin>  
4 );
```



Provide basics components (ex: react-admin)

```
0 const App = () => (  
1   <Admin dataProvider={dataProvider}>  
2     <Resource name="users" list={ListGuesser} />  
3   </Admin>  
4 );
```



To override



Provide basics components (ex: react-admin)

```
0 import { List, Datagrid, TextField, DateField, BooleanField } from 'react-admin';
1
2 export const PostList = () => (
3   <List>
4     <Datagrid>
5       <TextField source="id" />
6       <TextField source="title" />
7       <DateField source="published_at" />
8       <TextField source="category" />
9       <BooleanField source="commentable" />
10    </Datagrid>
11  </List>
12 );
```



Provide basics components (ex: react-admin)

Components



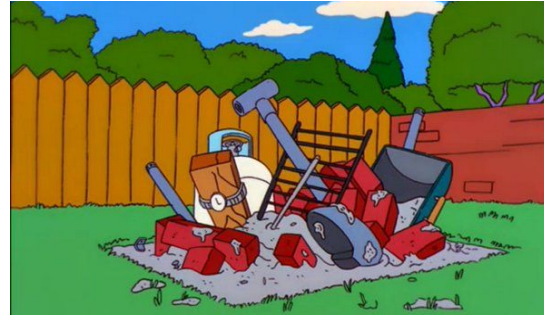
Providers



Provide basics components (ex: react-admin)



Provide basics components (ex: react-admin)





Provide basics components (ex: react-admin)

```
0 <FormControl variant="standard">
1   <InputLabel {...}>Age</InputLabel>
2   <Select {...>
3     <MenuItem value={10}>Ten</MenuItem>
4     {...}
5   </Select>
6 </FormControl>
7
8 <FormControl variant="standard">
9   <InputLabel {...>Name</InputLabel>
10  <TextField {...} />
11 </FormControl>
12
```



Provide basics components (ex: react-admin)

```
0 <FormControl variant="standard">
1   <InputLabel {...}>Age</InputLabel>
2   <Select {...>
3     <MenuItem value={10}>Ten</MenuItem>
4     {...}
5   </Select>
6 </FormControl>
7
8 <FormControl variant="standard">
9   <InputLabel {...>Name</InputLabel>
10  <TextField {...} />
11 </FormControl>
12
```

A visual representation of the rendered form. It features two stacked components. The top component is a 'Select' dropdown with the label 'Age' and a downward arrow on the right. Below it is a 'Text Field' with the label 'Name'.



Provide basics components (ex: react-admin)

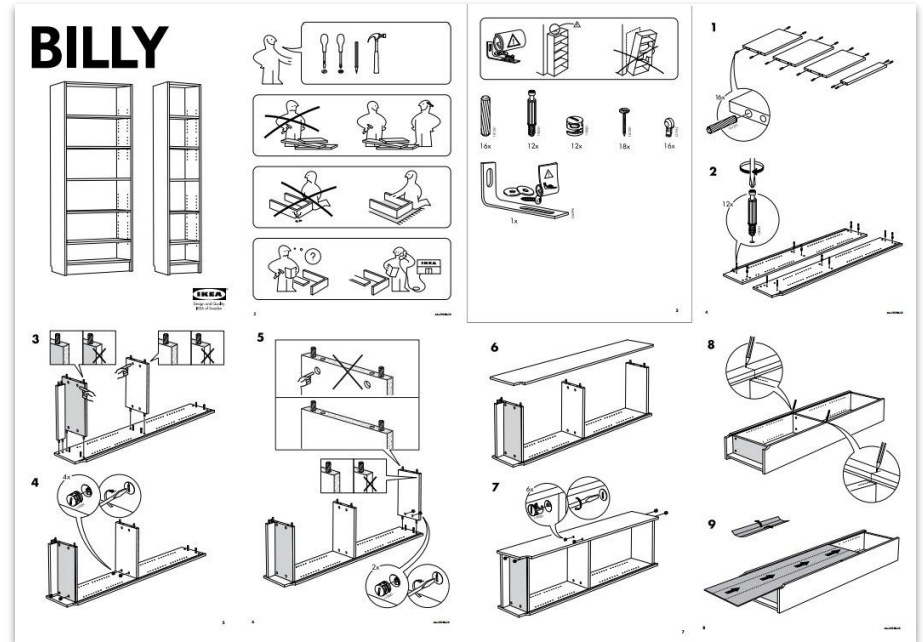
```
0 <FormControl variant="standard">
1   <InputLabel {...}>Age</InputLabel>
2   <Select {...>
3     <MenuItem value={10}>Ten</MenuItem>
4     {...}
5   </Select>
6 </FormControl>
7
8 <FormControl variant="standard">
9   <InputLabel {...}>Name</InputLabel>
10  <TextField {...} /> ← This is already a FormControl
11 </FormControl>
12
```



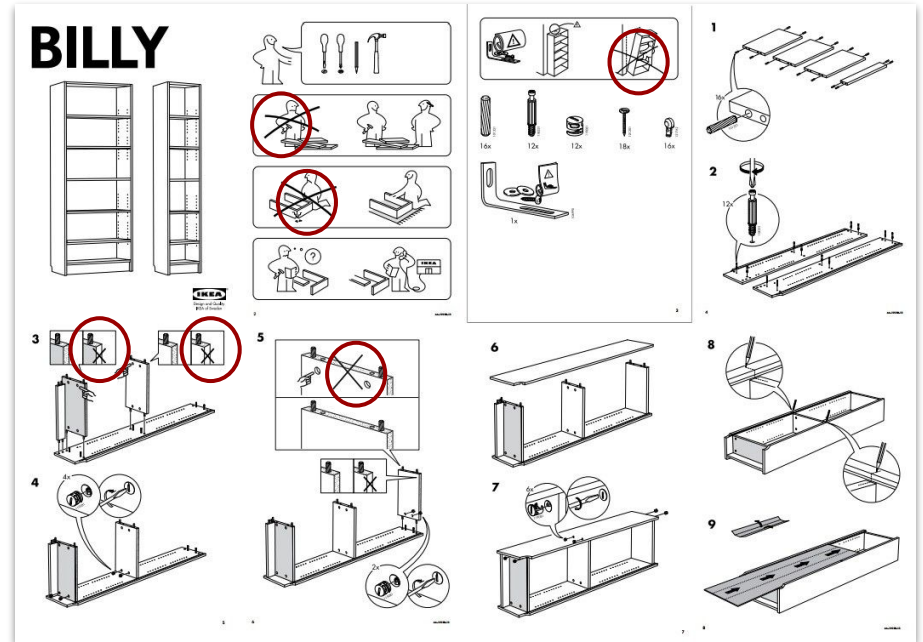
Provide basics components (ex: react-admin)

```
0 <FormControl variant="standard">
1   <InputLabel {...}>Age</InputLabel>
2   <Select {...>
3     <MenuItem value={10}>Ten</MenuItem>
4     {...}
5   </Select>
6 </FormControl>
7
8 <TextField {...} label='Name' variant="standard" />
9
10
11
12
```

Provide basics components (ex: react-admin)



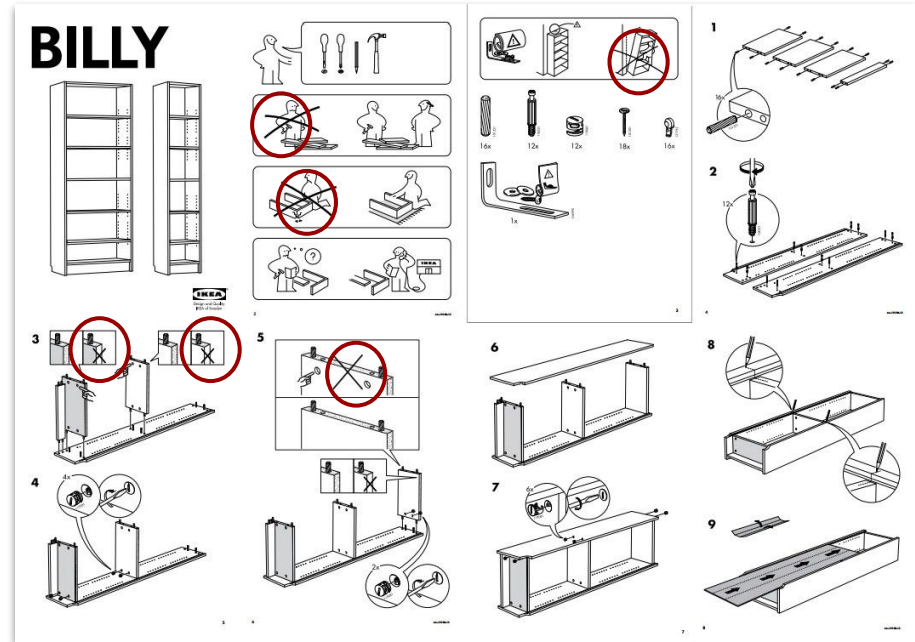
Provide basics components (ex: react-admin)





Provide basics components (ex: react-admin)

- Customization
- Out of the box
- Beginner friendly



Provide slots (ex: MUI)





Provide slots (ex: MUI)



```
<Button  
  endIcon={SendIcon}  
/>
```



Provide slots (ex: MUI)



```
<DataGrid  
  FilterPanel={CustomFilterPanel}  
/>
```



Provide slots (ex: MUI)

```
• • •  
  
<DataGrid  
  slots={{  
    filterPanel: CustomFilterPanel  
  }}  
>
```



Provide slots (ex: MUI)

```
<DataGrid
  slots={{
    filterPanel: CustomFilterPanel
  }}
/>
```

	Columns	Operator	Value
×	Rating	>	2
×	And	is not	United States
×	And	is not empty	

+ ADD FILTER






Provide slots (ex: MUI)

```
• • •  
  
<DataGrid  
  slotProps={{  
    filterPanel: {  
      columnsSort: "asc",  
    }  
  }}  
</>
```



Provide slots (ex: MUI)

```
  
  
<DataGrid  
  slotProps={{  
    filterPanel: {  
      columnsSort: "asc",  
    }  
  }}  
</>
```

- Customization 
- Out of the box 
- Beginner friendly 



Which one is the best?

Customization



Headless

Composition

Slots



Dev Exp

Do not choose





Do not choose

```
const CustomFilterPanel = (props) => {
  const { filterItemsProps, addItem } = useFilterPanel(props);

  return <div>
    {filterItemsProps.map(
      (itemProps) => <FilterItem {...itemProps} />
    )}
    <button onClick={addItem}>Add Filter</button>
    <button onClick={props.close}>Close</button>
  </div>
}

<DataGrid
  slots={{
    filterPanel: CustomFilterPanel
  }}
/>
```

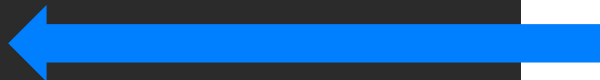


Do not choose

```
const CustomFilterPanel = (props) => {
  const { filterItemsProps, addItem } = useFilterPanel(props);

  return <div>
    {filterItemsProps.map(
      (itemProps) => <FilterItem {...itemProps} />
    )}
    <button onClick={addItem}>Add Filter</button>
    <button onClick={props.close}>Close</button>
  </div>
}

<DataGrid
  slots={{
    filterPanel: CustomFilterPanel
  }}
/>
```



slots

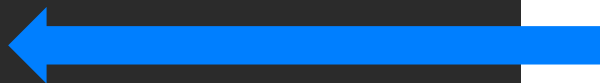


Do not choose

```
const CustomFilterPanel = (props) => {  
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  return <div>  
    {filterItemsProps.map(  
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    )}  
    <button onClick={addItem}>Add Filter</button>  
    <button onClick={props.close}>Close</button>  
  </div>  
}  
  
<DataGrid  
  slots={{  
    filterPanel: CustomFilterPanel  
  }}  
>
```



headless



slots



Do not choose

```
const CustomFilterPanel = (props) => {  
  const { filterItemsProps, addItem } = useFilterPanel(props);  
  
  return <div>  
    {filterItemsProps.map(  
      (itemProps) => <FilterItem {...itemProps} />  
    )}  
    <button onClick={addItem}>Add Filter</button>  
    <button onClick={props.close}>Close</button>  
  </div>  
}  
  
<DataGrid  
  slots={{  
    filterPanel: CustomFilterPanel  
  }}  
>
```

headless

sub-components

slots

Thanks

