

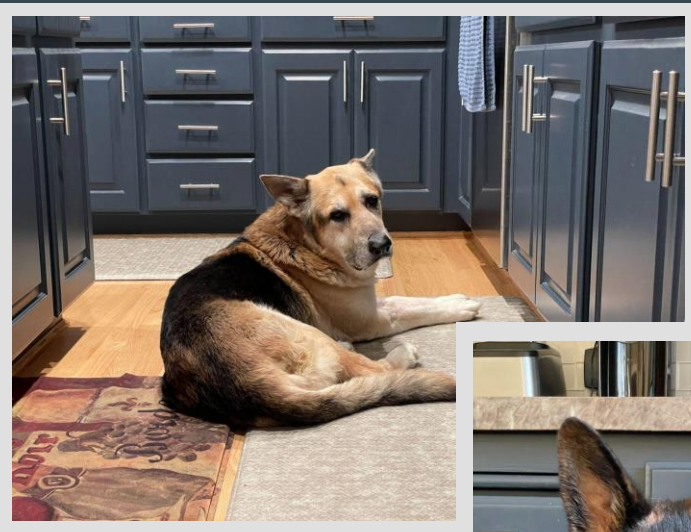
Don't lose your focus; focus management strategies in React

...

Rob Snow | Senior Frontend Developer

Who am I?

- Frontend engineer at Adobe
- Work on Open Source project, React Spectrum
 - A collection of React hooks that we use to build our design system
 - Stately hooks
 - Aria hooks
- Foster dad of some good boys



Sultan...



What is React-Aria?


What is React Aria and why is it useful?

- Aria primitives, hooks and components
 - useButton
 - useCombobox
 - FocusScope
- Cross browser and platform
 - Normalization
 - Bug fixes
- Heavily tested

Aria Primitives – hooks

```
function useButton(props, ref) {  
  return {  
    buttonProps: {  
      //... props to spread on button  
    }  
  };  
}
```

Aria Primitives – hooks usage

```
function Button(props, ref) {  
  let {  
    elementType: ElementType = 'button',  
  } = props;  
  
  let {buttonProps} = useButton(props, ref);  
  
  return (  
       
    <ElementType {...buttonProps} ref={domRef}>  
      {children}  
    </ElementType>  
  );  
}
```

We normalize across browsers and try to fix where there are bugs

	A	B	C	D
1	Type	Category	Project	Name
2	Bug	Browser	WebKit	Intl.NumberFormat formats ar-AE numbers differently from other browsers
3	Bug	Browser	WebKit	PointerDown not fired after PointerUp on disabled form element
4	Bug	Browser	WebKit	Safari on iOS fires "pointerenter" with mouse pointerType in addition to touch
5	Bug	Browser	WebKit	Safari/VoiceOver BUG: WAI-ARIA Listbox option with aria-labelledby announces as only "text"
6	Bug	Browser	WebKit	aria-modal="true" autofocuses the first focusable child when inside an iframe
7	Bug	Browser	WebKit	CSS hover and "pointer: fine" media queries do not evaluate to true with iOS 13.4 mouse support
8	Bug	Browser	WebKit	AX: Radiogroup orientation horizontal left and right arrow keys go the wrong way in RTL
9	Bug	Browser	WebKit	AX: Updating aria-hidden on a role="row" is not reflected in VoiceOver on iOS
10	Bug	Browser	WebKit	AX: Pointer events are not fired by VoiceOver inside iframe
11	Bug	Browser	WebKit	pointercancel event not fired on drag start
12	Bug	Browser	WebKit	Auto scroll on drag should be enabled on macOS
13	Bug	Browser	WebKit	Intl.DateTimeFormat incorrectly parses patterns with 'h' literal
14	Bug	Browser	Firefox	Mouse events not guaranteed to fire after pointer events
15	Bug	Browser	Firefox	[Bug] Talkback doesn't explicitly announce aria-disabled li element
16	Bug	Browser	Firefox	selectstart event does not fire for Select All command

High Quality

- iPads (touch and trackpad)
- iPhones
- Android phones
- Windows tablets
- Windows machines (touch and trackpad)
- MacOS
- Chrome 88+ on MacOS and Windows
- Firefox 85+ on MacOS and Windows
- Safari 13+ on MacOS
- Edge 88+ on Windows
- Safari 13+ on iOS and iPadOS
- Chrome 88+ on Android
- VoiceOver on MacOS in Safari and Chrome
- JAWS on Windows in Firefox and Chrome
- NVDA on Windows in Firefox and Chrome
- VoiceOver on iOS
- TalkBack on Android in Chrome

FocusScope

Aria primitive – FocusScope Component

- Commonly used in Dialogs, Menus, Popovers
- Can contain focus within the scope
- Can restore focus when unmounted
- Supports autofocus
- Supports programmatic focus
- Allows nesting
- Supports React Portals

Containing and restoring focus

```
    </Button>
    <Button autoFocus variant="cta" onPress={() => alertSave(close)}>
      Save
    </Button>
  </ButtonGroup>
  <Content>
    <Form>
      <TextField label="Name" />
      <Checkbox>Make private</Checkbox>
    </Form>
  </Content>
</Dialog>
  )}
</DialogTrigger>
);
}
```

Set Profile

FocusManager

FocusManager – uses and limitations

- Used to focus next/previous/first/last element in scope
- Used to implement a roving tab index
- Used in or out of a FocusScope
- FocusScope Limitation: requires all nodes to be in the DOM

TreeWalker

The screenshot shows the MDN Web API page for the `TreeWalker` interface. The browser's address bar shows the URL `developer.mozilla.org/en-US/docs/Web/API/TreeWalker`. The page has a dark theme. On the left, there is a sidebar with a 'Table of contents' link, 'Related Topics' (Document Object Model, TreeWalker), and a list of properties and methods. The main content area has a large heading 'TreeWalker' and a paragraph explaining that the `TreeWalker` object represents the nodes of a document subtree and a position within them. It also mentions that a `TreeWalker` can be created using the `Document.createTreeWalker()` method. Below this is a section titled 'Properties' with a note that the interface doesn't inherit any property. It lists two properties: `TreeWalker.root` (Read only) and `TreeWalker.whatToShow` (Read only), each with a brief description. At the bottom, there is a table with three columns: 'Constant', 'Numerical value', and 'Description'.

TreeWalker - Web APIs | MDN

developer.mozilla.org/en-US/docs/Web/API/TreeWalker

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► [Table of contents](#)

TreeWalker

The **TreeWalker** object represents the nodes of a document subtree and a position within them.

A **TreeWalker** can be created using the [Document.createTreeWalker\(\)](#) method.

Properties

This interface doesn't inherit any property.

TreeWalker.root Read only

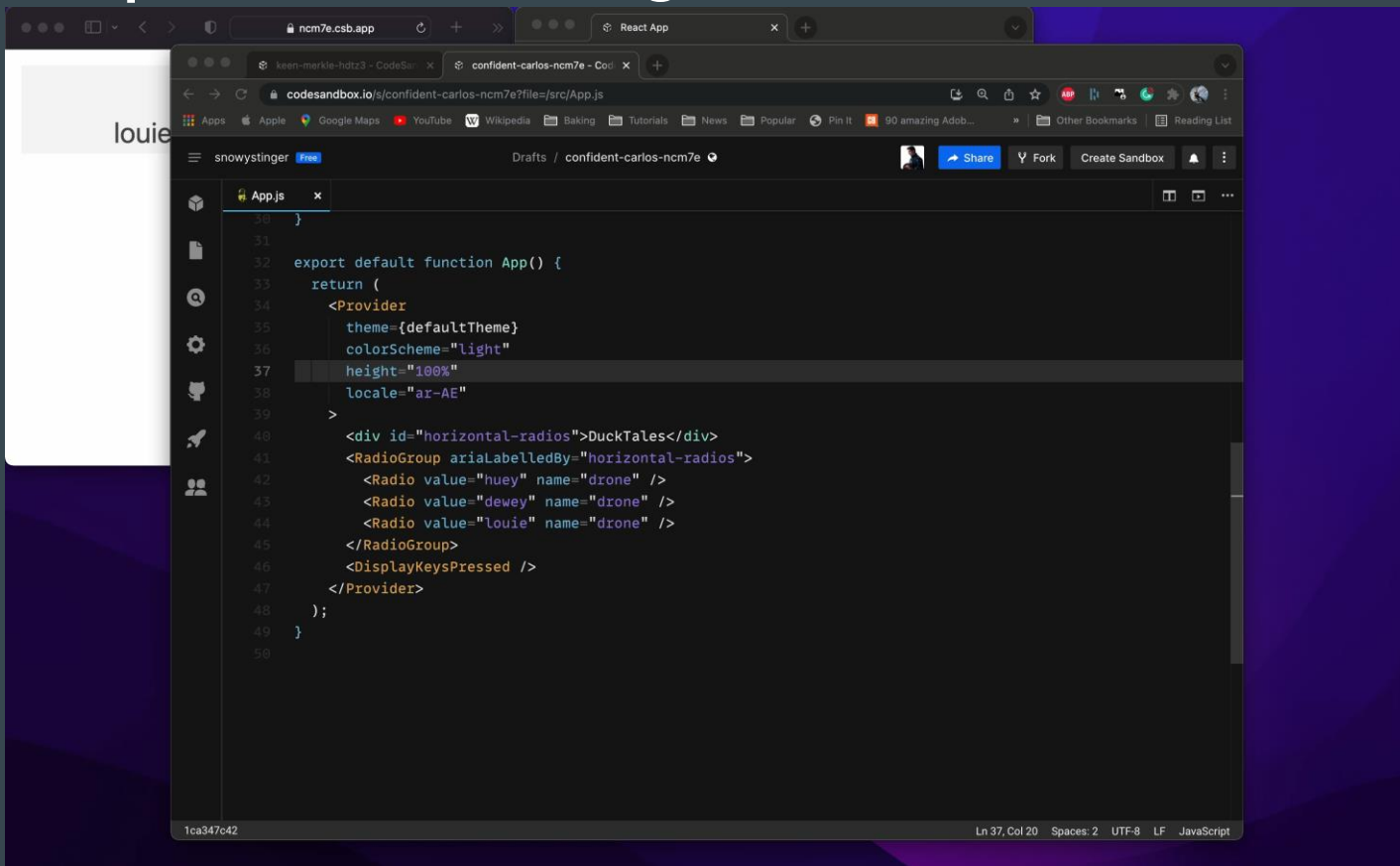
Returns a [Node](#) representing the root node as specified when the **TreeWalker** was created.

TreeWalker.whatToShow Read only

Returns an `unsigned long` being a bitmask made of constants describing the types of [Node](#) that must be presented. Non-matching nodes are skipped, but their children may be included, if relevant. The possible values are:

Constant	Numerical value	Description
	1281667200	

Radio Group arrow direction bug

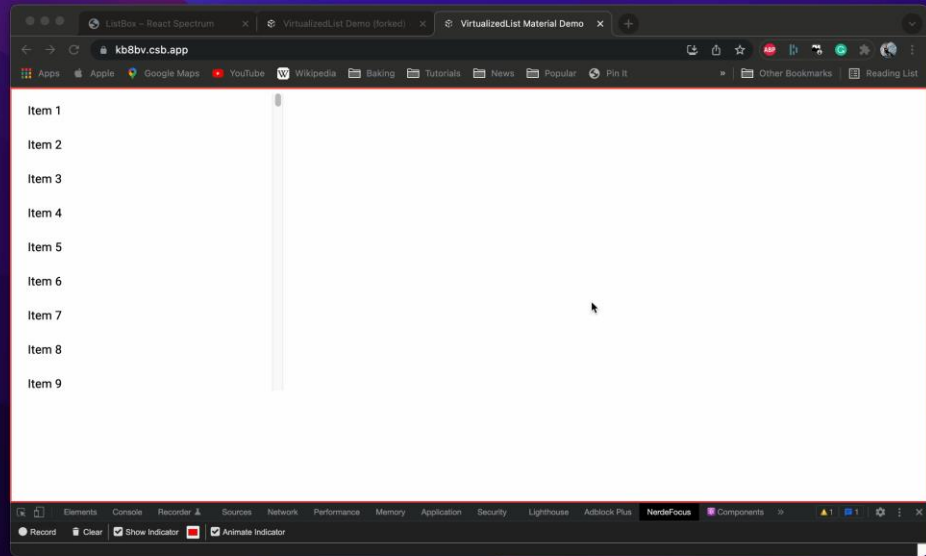


Collection Hooks

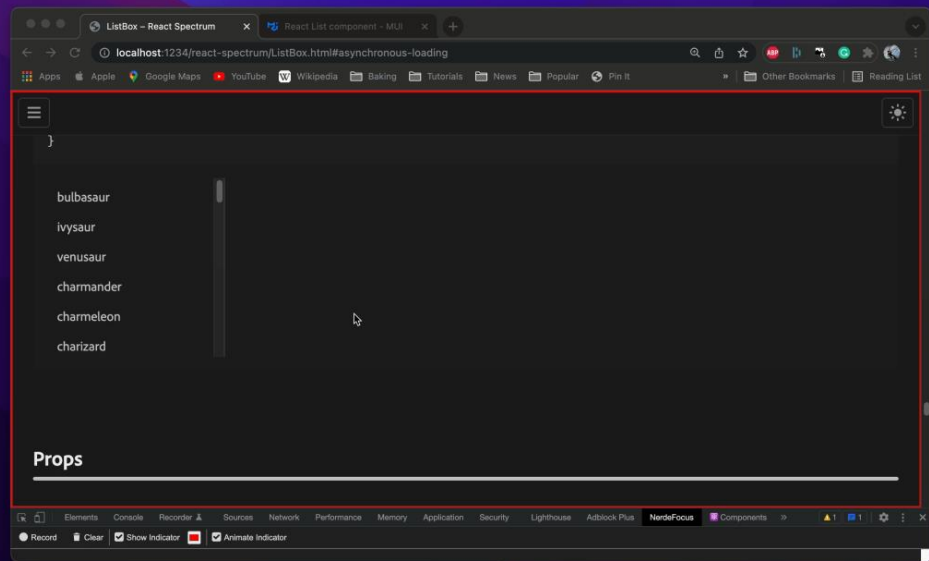
Collection Hooks – uses and limitations

- Commonly used with lists, tables, trees
- Solves:
 - Losing focus when a section is collapsed
 - Virtualizers
 - Losing focus when element scrolls out of view
 - Restoring focus when element scrolls back into view
- Limitation: depends on our Collection API

Losing focus



Keeping Focus



Collection Hooks in React Aria

- Top Level
 - useTable
 - useMenu
 - useListBox
 - useCombobox
- Lower level (not documented yet)
 - useSelectableCollection
 - useSelectableItem
 - useGrid
 - Virtualizer

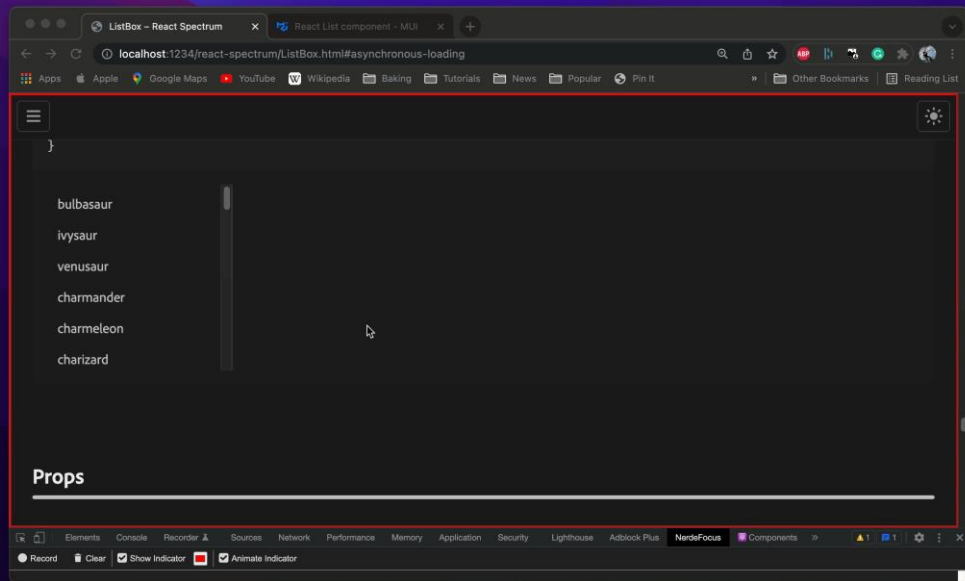
useSelectableCollection

- Collection has or contains focus
- Track focused item by a key
- Focus first or last depending on direction
- Keyboard navigation
- Typeahead lookups

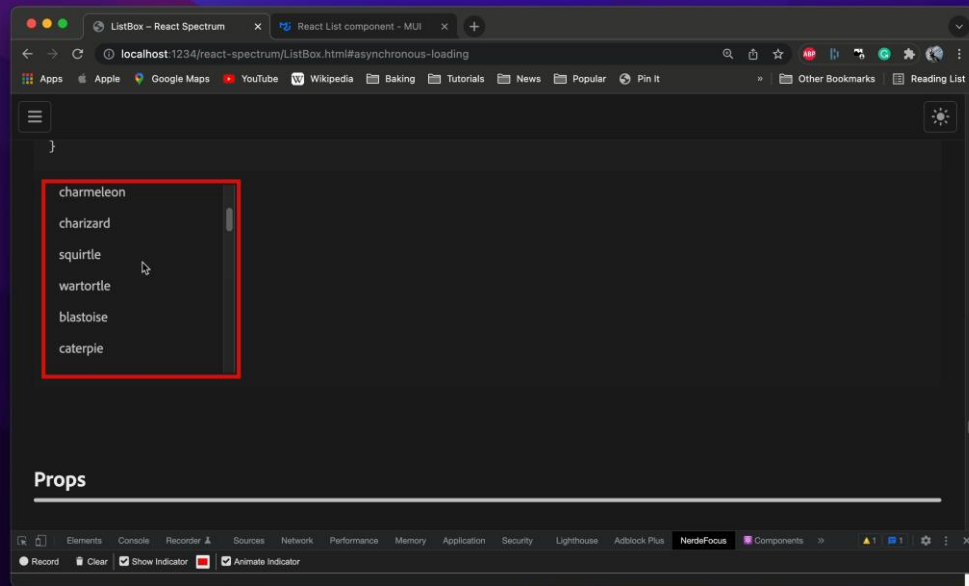
Virtualizers

- Strategy
 - When item is scrolled out of view, put focus on the collection
 - When item is scrolled into view, restore focus
 - Auto scroll focused key back into view when tabbing back into the collection

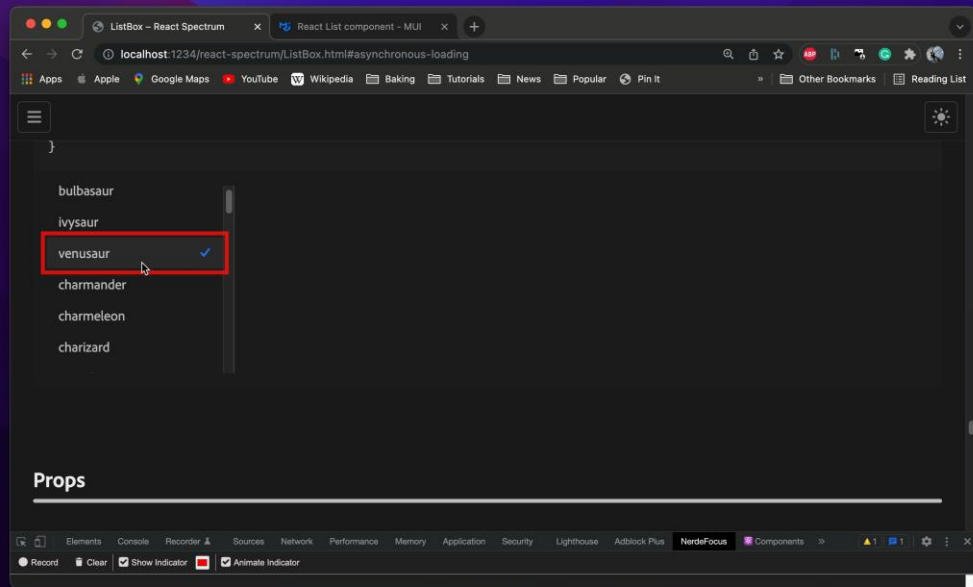
Put focus on the collection



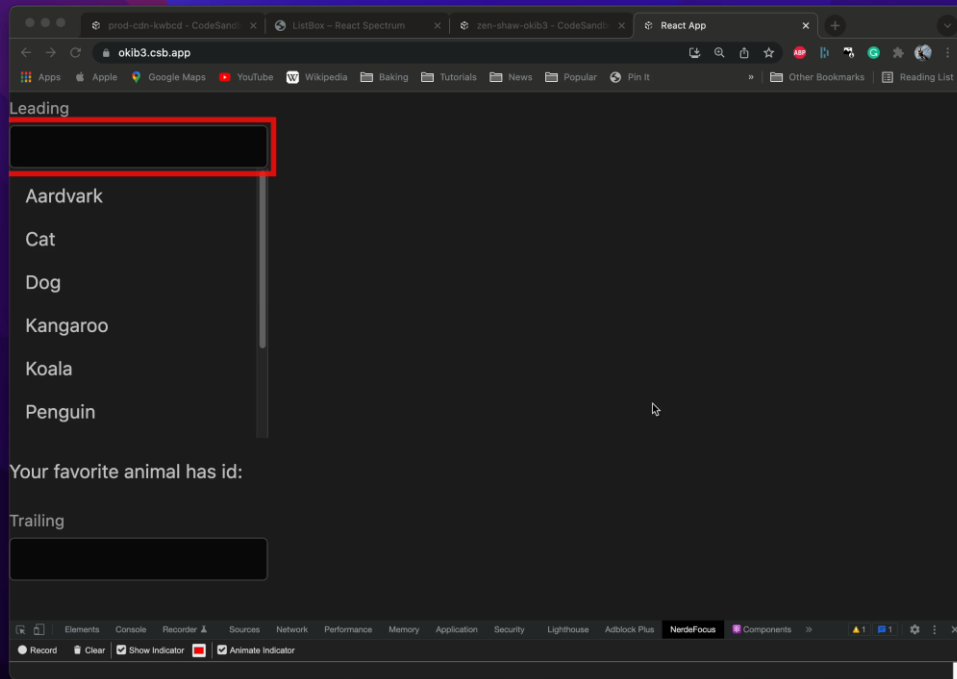
Restore focus to the item



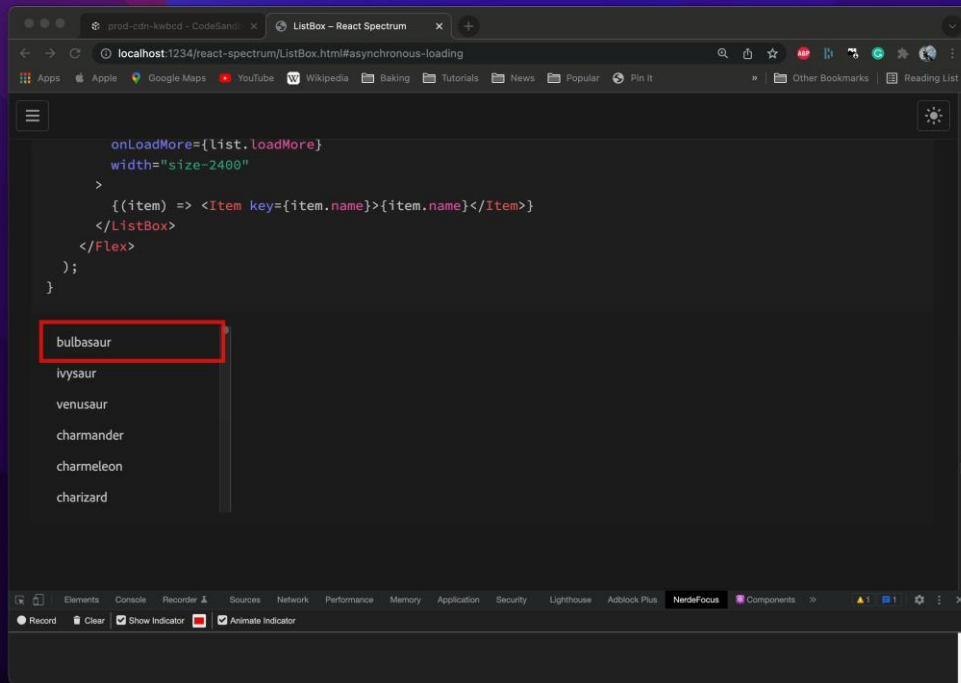
Auto scroll focused item back into view



Tabbing into a collection



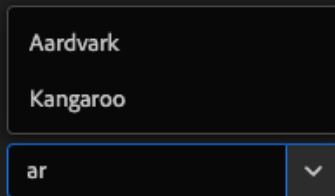
Typeahead lookup



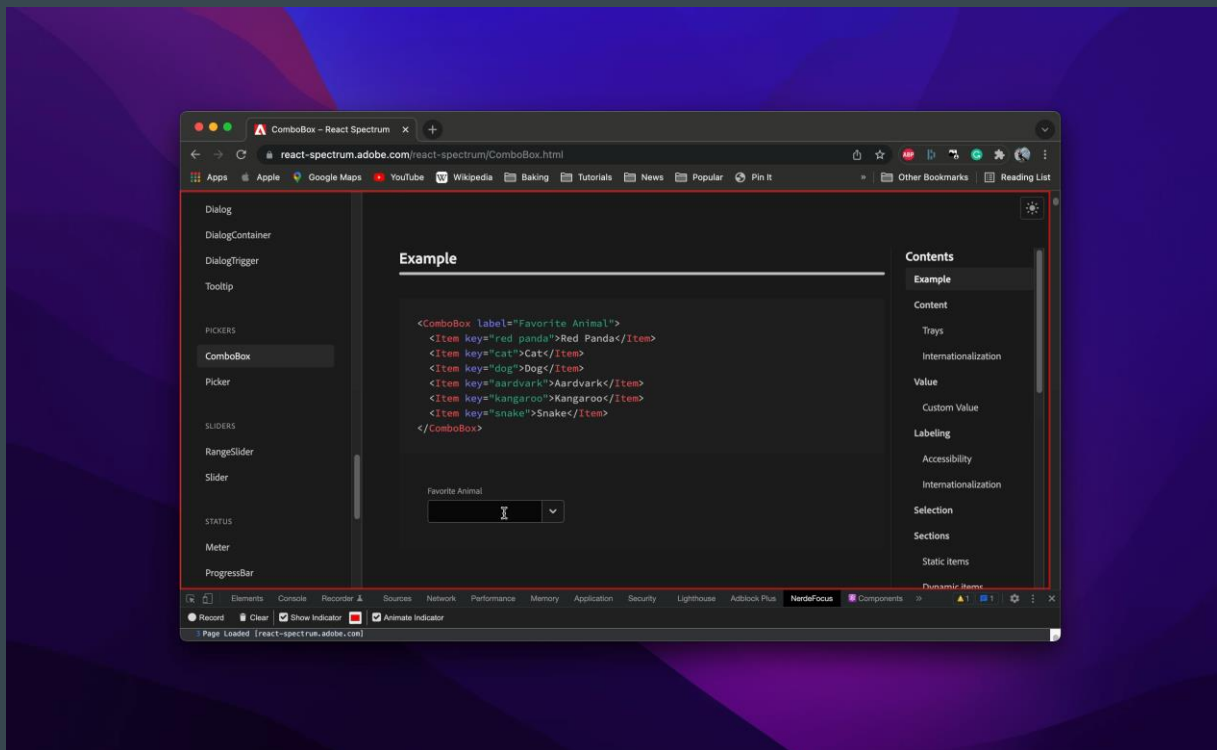
Combobox

- **aria-activedescendant**
 - The `aria-activedescendant` attribute identifies the currently active element when focus is on a composite widget, combobox, textbox, group, or application
- **aria-hidden**
 - Manage focus from input to popover

```
<ComboBox label="Favorite Animal" direction="top">  
  <Item key="red_panda">Red Panda</Item>  
  <Item key="cat">Cat</Item>  
  <Item key="dog">Dog</Item>  
  <Item key="aardvark">Aardvark</Item>  
  <Item key="kangaroo">Kangaroo</Item>  
  <Item key="snake">Snake</Item>  
</ComboBox>
```



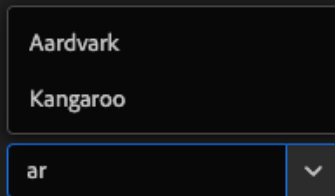
Navigating a listbox without focus



Combobox cont.

- aria-activedescendant
 - The aria-activedescendant attribute identifies the currently active element when focus is on a composite widget, combobox, textbox, group, or application
- aria-hidden
 - Manage focus from input to popover

```
<ComboBox label="Favorite Animal" direction="top">  
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  <Item key="kangaroo">Kangaroo</Item>  
  <Item key="snake">Snake</Item>  
</ComboBox>
```

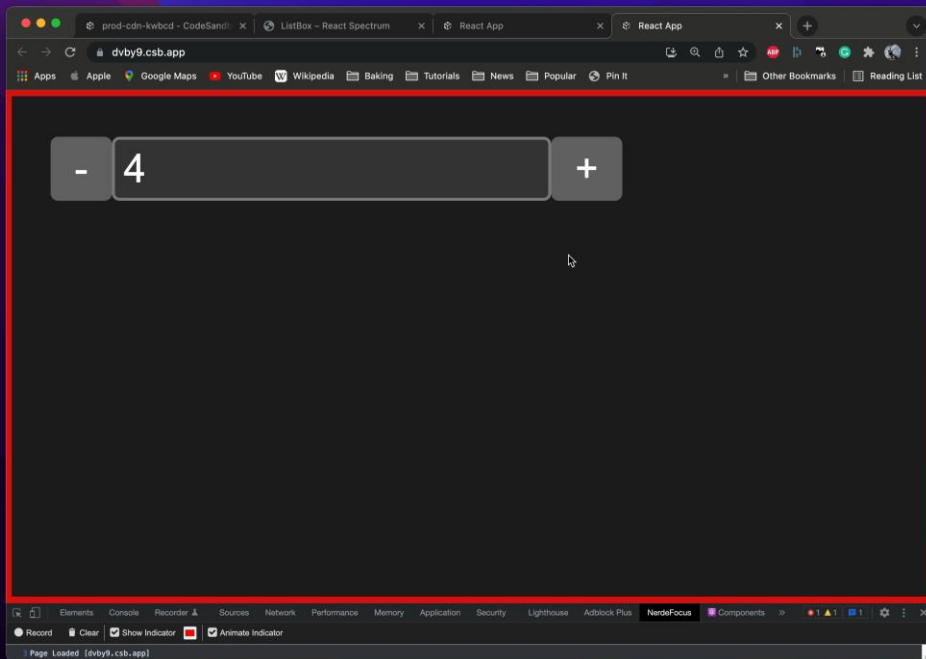


Portals for ScreenReaders

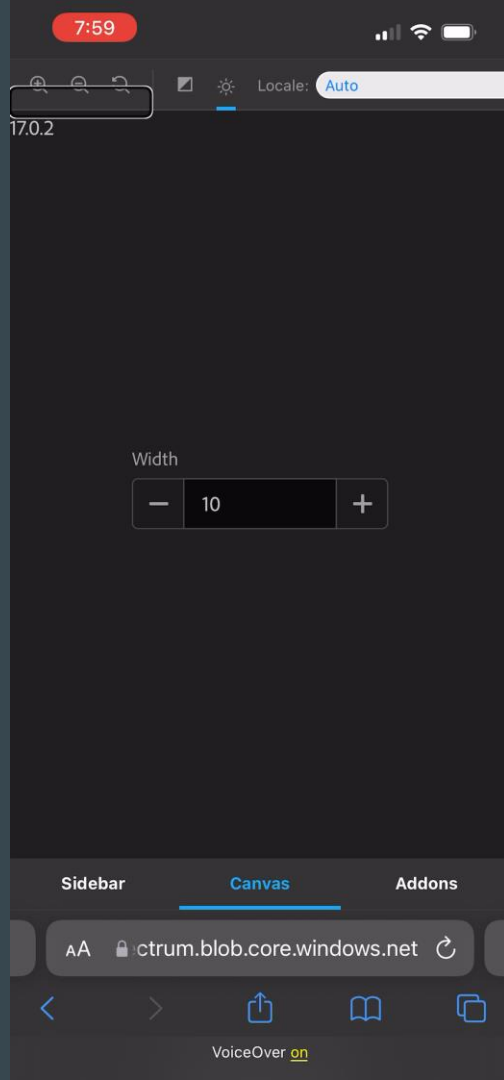
```
<body>
  <h1 aria-hidden>Example</h1>
  <div id="input">
    <ComboBoxInput />
  </div>
  <div aria-hidden>Rest of the document...</div>
  <div id="popover">
    <ComboBoxMenu />
  </div>
</body>
```


Edge Case

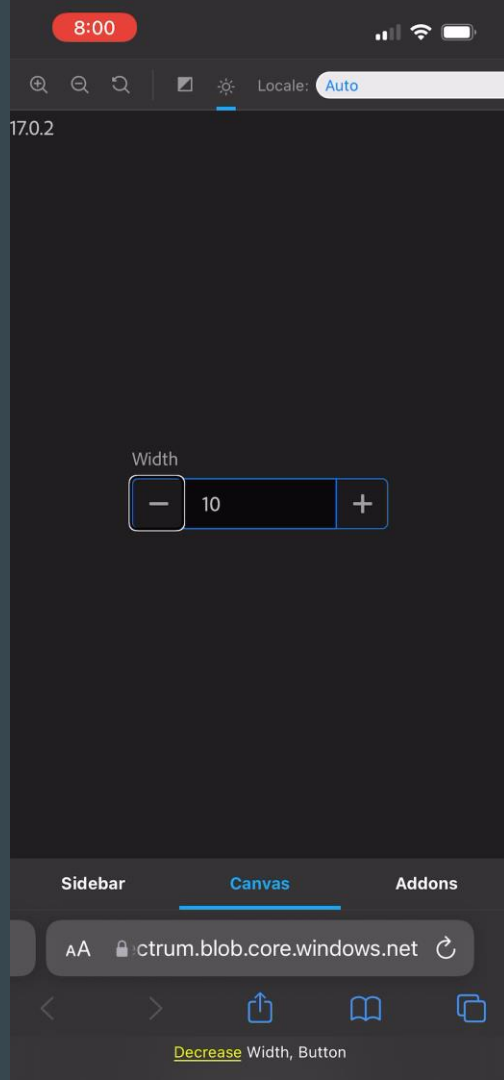
- NumberField



Mobile testing #1



Mobile fixed



Links and docs

- React Aria hook documentation: <https://react-spectrum.adobe.com/react-aria/index.html>
- Focus specific hooks source: <https://github.com/adobe/react-spectrum/tree/main/packages/%40react-aria/focus/src>
- TreeWalker API docs: <https://developer.mozilla.org/en-US/docs/Web/API/TreeWalker>
- Example RadioGroup: <https://codesandbox.io/s/prod-cdn-kwbcd?file=/src/App.js>

Thanks for coming!