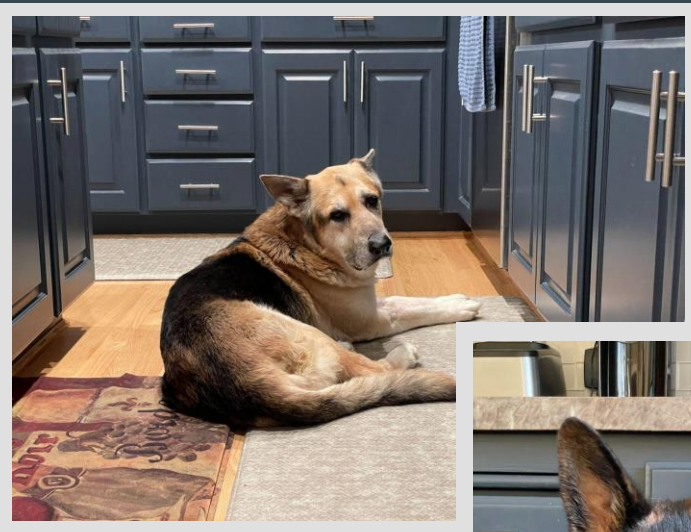# Don't lose your focus; focus management strategies in React

...

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 (rouch and trackpad)
- iPhones
- Android phones
- Windows tablets
- Windows machines (touch and trackpad)
- MacOS

- Chome 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

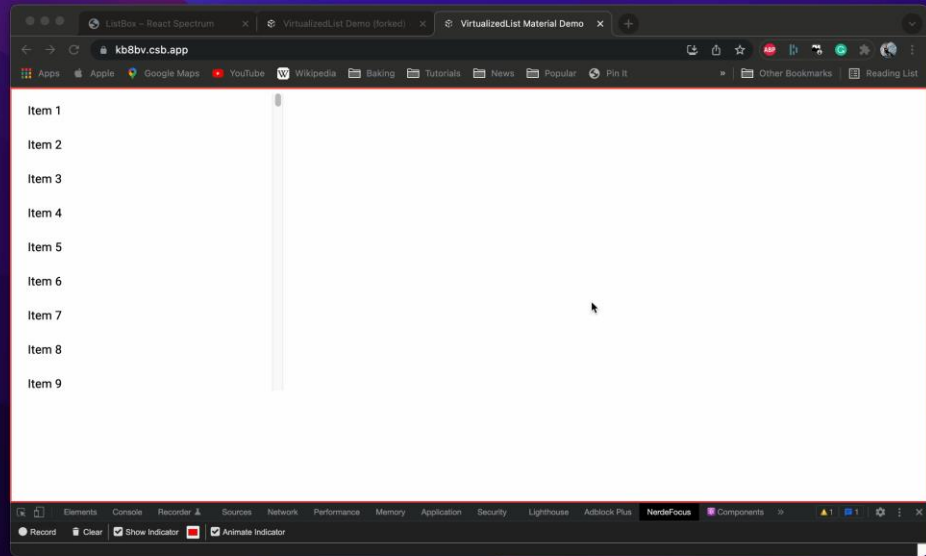# TreeWalker

Radio Group arrow direction bug
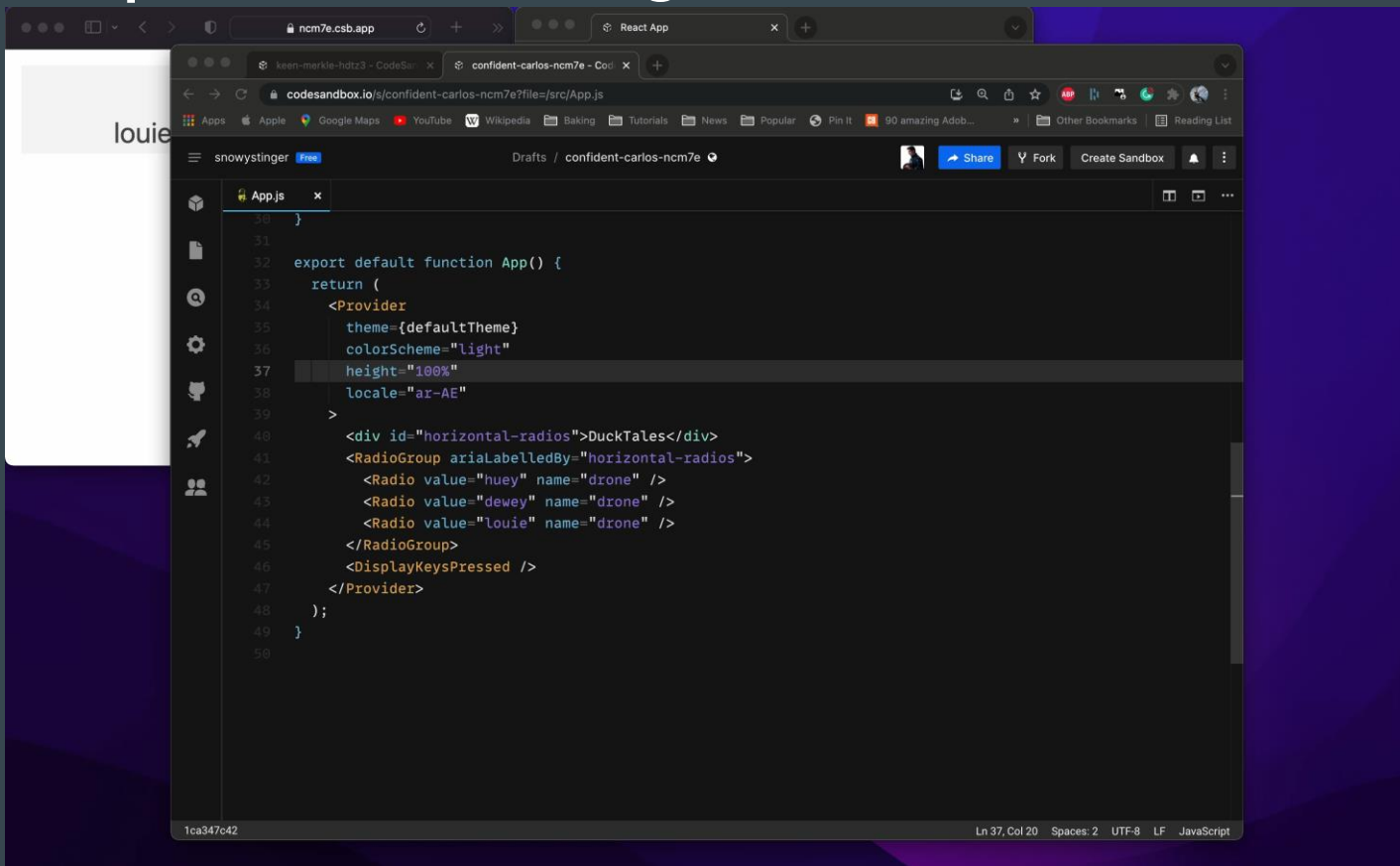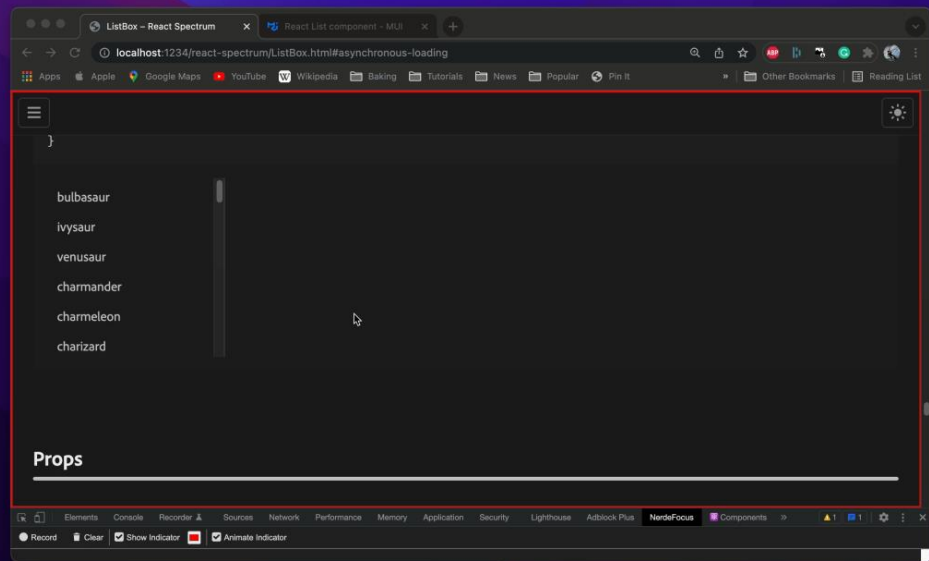
Collection Hooks

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
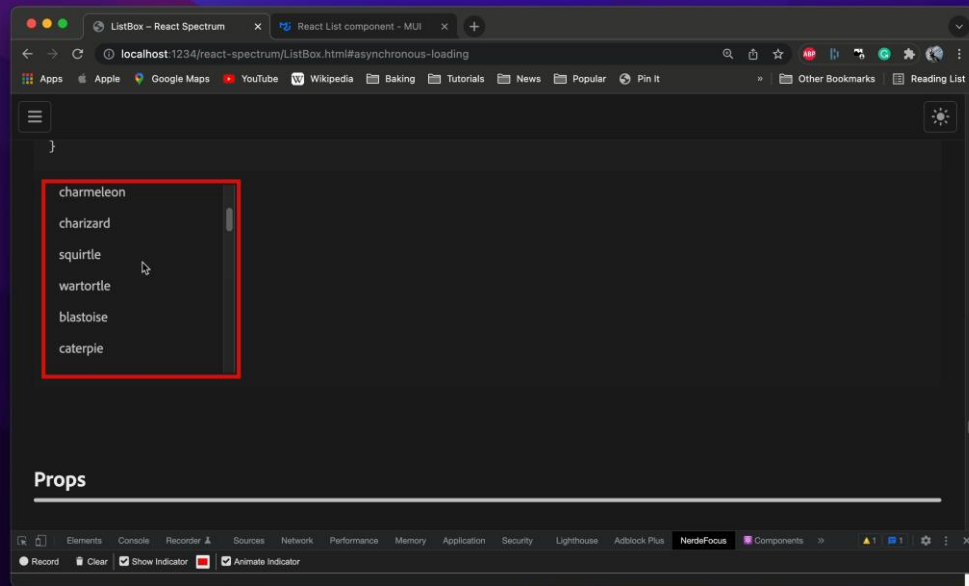- Keyboard navigation
- Typeahead lookups

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
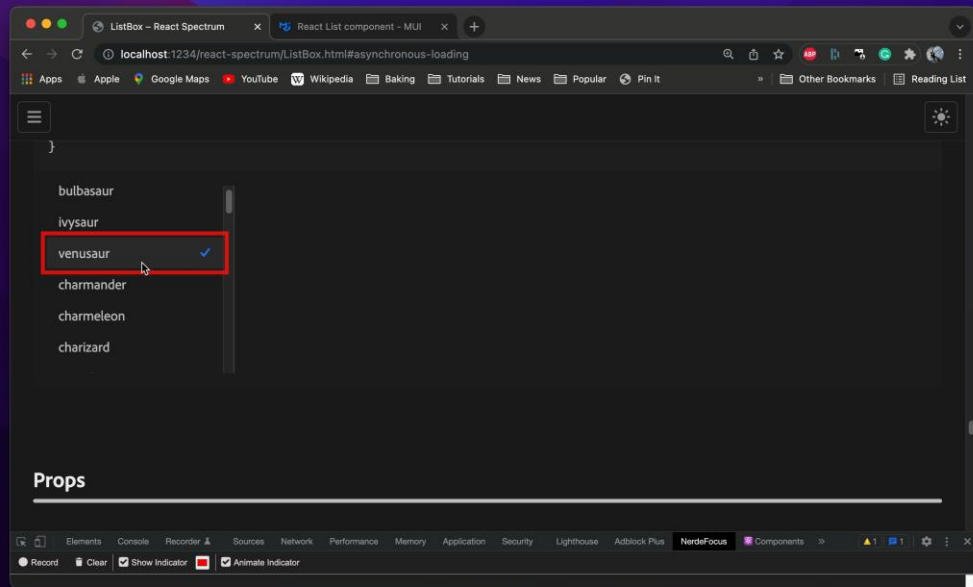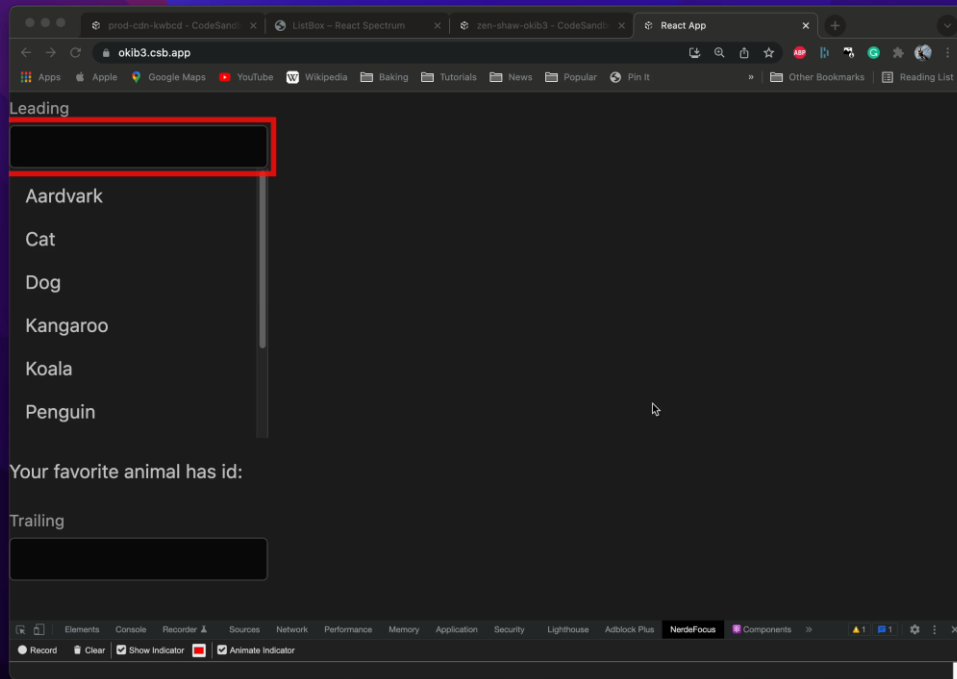
Put focus on the collection
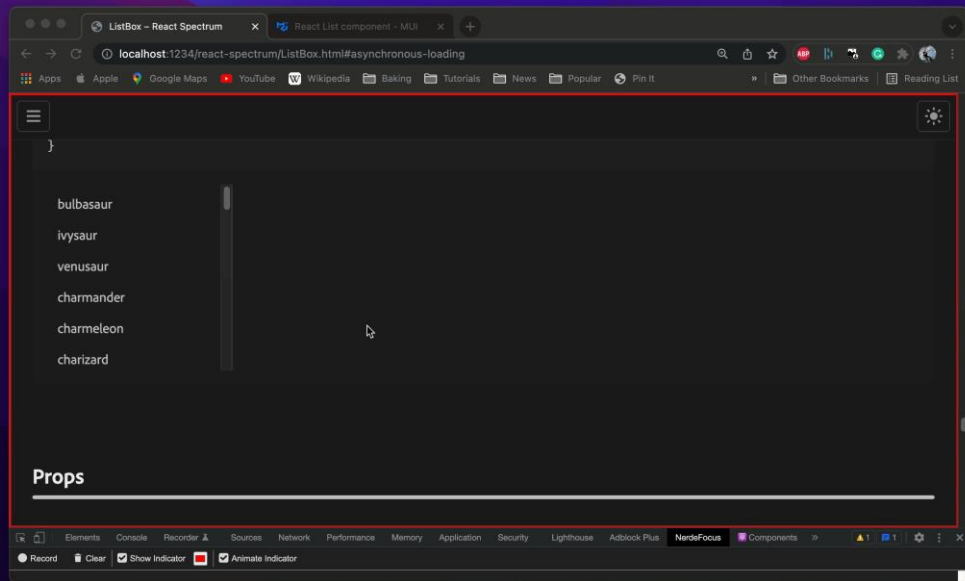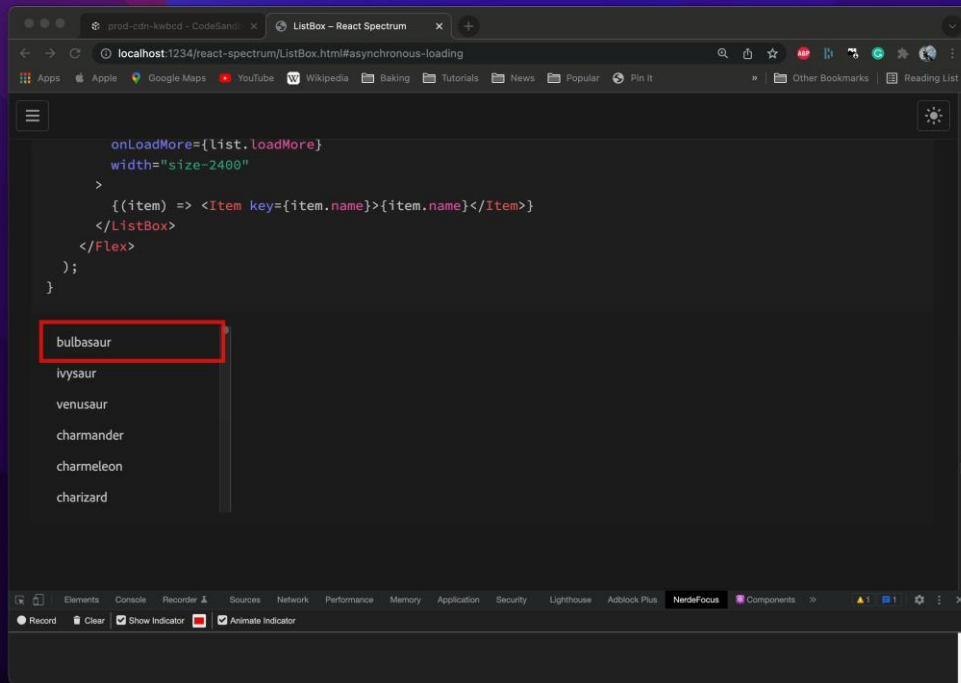
Restore focus to the item

# Auto scroll focused item back into view
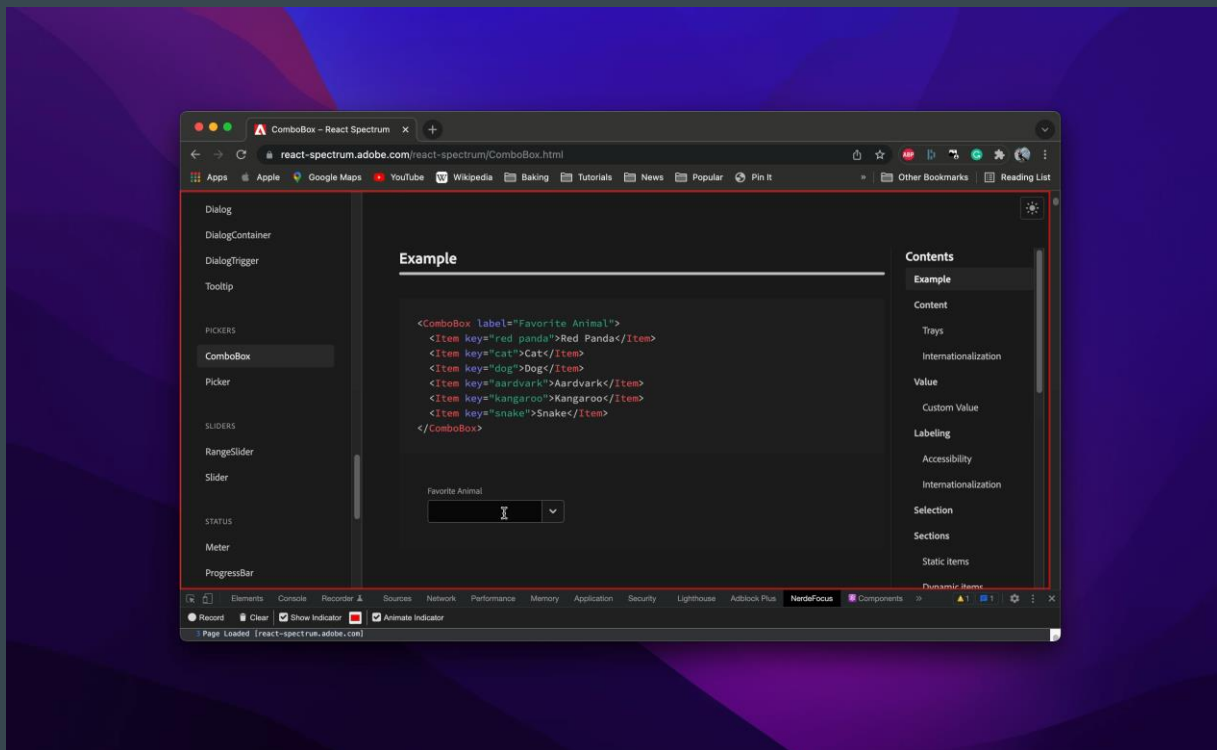
Tabbing into a collection

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>
```
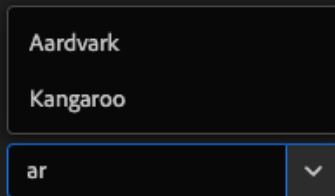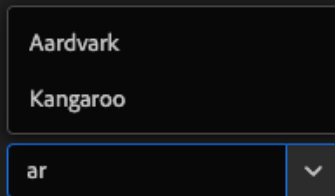
Navigating a listbox without focus

Combobox cont.

- ## aria-activedescendant

  - The aria-activedescendant attribute identifies the currently active element when focus is on a <u>composite</u> widget, <u>combobox</u>, <u>textbox</u>, <u>group</u>, or <u>application</u>

- ## 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>
```
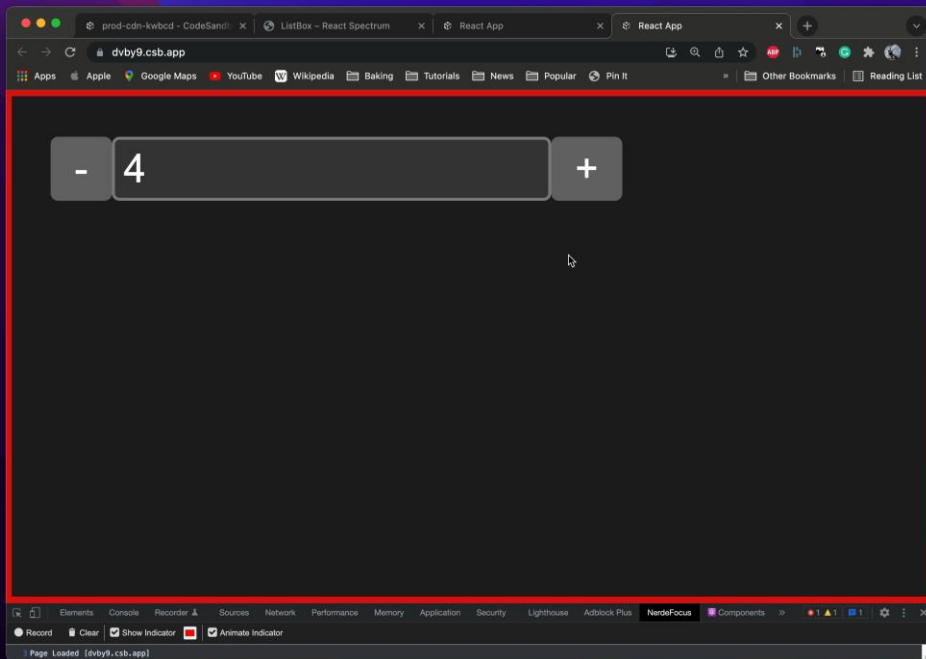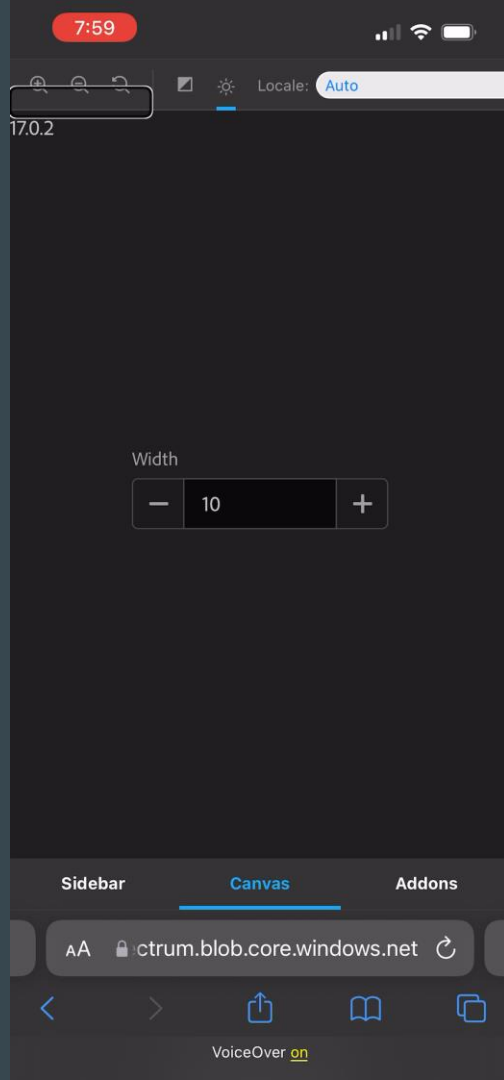
| Aardvark |
| Kangaroo |

| ar | ∨ |

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>
```
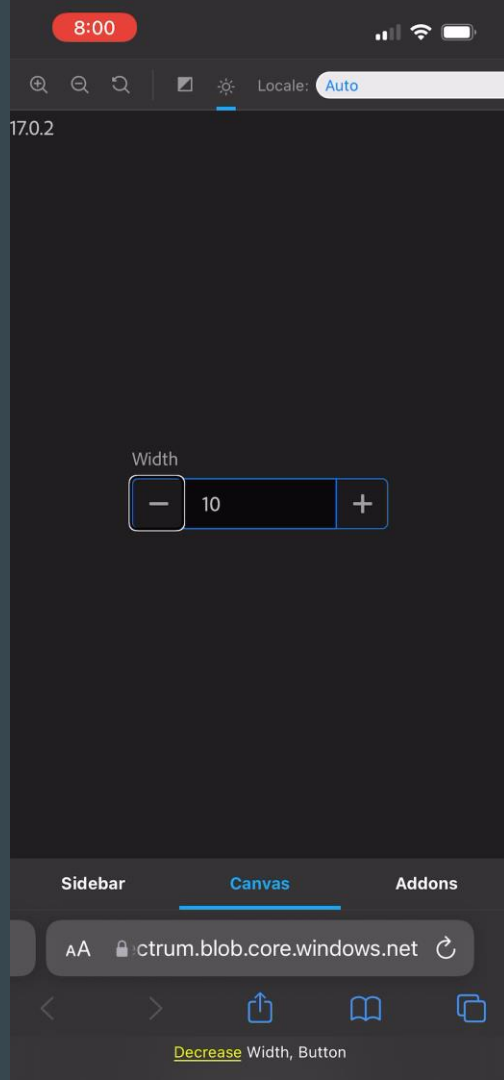
Edge Case

- NumberField

Mobile testing #1

Mobile fixed

Locale: Auto

17.0.2

Width

$-$ 10 $+$

Sidebar   **Canvas**   Addons

AA 🔒 ctrum.blob.core.windows.net ↻

Decrease Width, Button

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!