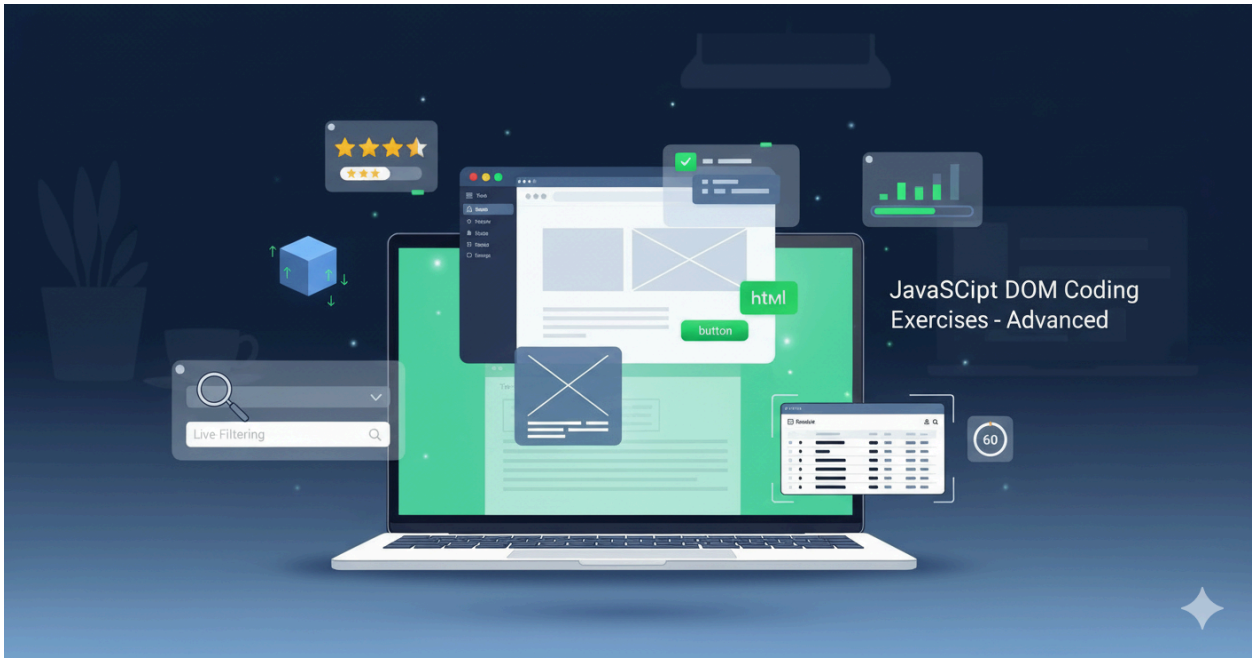
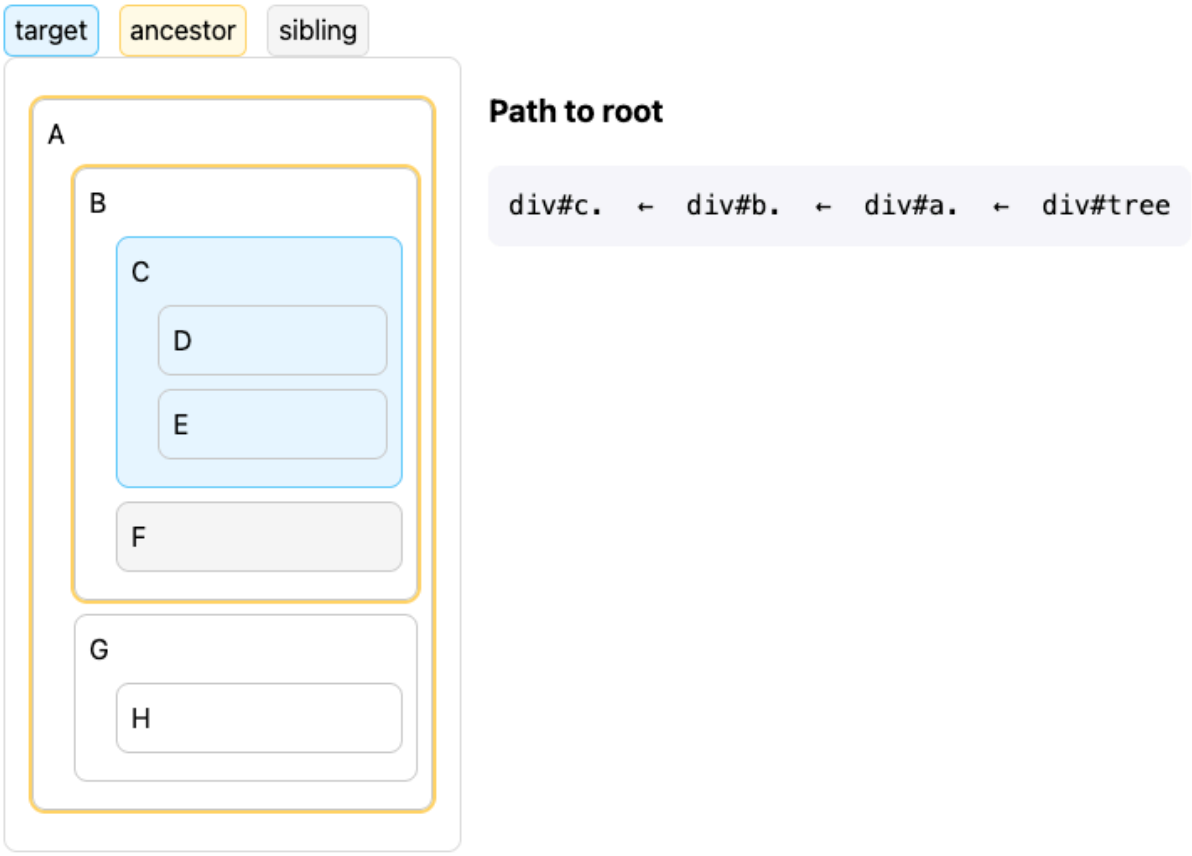


21) DOM Traversal Visualizer

JS DOM Exercise 21 — Traversal & closest()

Click any element in the left tree. We will highlight *target*, its *ancestors*, and its *siblings*, and display the path to root.



Build: Click any nested element to highlight the target, its ancestors, and its siblings, and show the path to root.
Objectives: `closest`, parents/children/siblings, DOM introspection.
Steps: Open file → click around the left "tree" → watch highlights and path update.
Code (save as `exercise21_traversal.html`)

```
<!doctype html>
<html lang="en">
<head>
<meta charset="utf-8">
<title>DOM Traversal Visualizer</title>
<style>
```

```
  body{font:16px/1.5 system-ui,sans-serif;padding:1.5rem;}
  .layout{display:grid;grid-template-columns:1fr 1fr;gap:1rem;}
  .tree{border:1px solid #ddd;border-radius:.5rem;padding:1rem;}
  .box{border:1px solid
#ccc;border-radius:.5rem;padding:.5rem;margin:.5rem 0;}
  .box .box{margin-left:1rem;}
  .legend span{display:inline-block;margin-right:.5rem;padding:.15rem
.35rem;border-radius:.35rem;}
  .target{background:#e6f7ff;border-color:#5ac8fa;}
  .anc{outline:2px solid #ffd666;}
  .sib{background:#f9f9f9;}

pre{background:#f6f8fa;padding:.75rem;border-radius:.5rem;overflow:aut
o;max-height:300px;}
  .clickme{cursor:pointer;}
</style>
</head>
<body>
<h1>JS DOM Exercise 21 — Traversal & closest()</h1>
<p>Click any element in the left tree. We will highlight
<em>target</em>, its <em>ancestors</em>, and its <em>siblings</em>,
and display the path to root.</p>
<div class="legend">
  <span style="background:#e6f7ff;border:1px solid
#5ac8fa;">target</span>
  <span style="border:1px solid
#ffd666;background:#fffbe6;">ancestor</span>
  <span style="background:#f9f9f9;border:1px solid
#ddd;">sibling</span>
</div>
<div class="layout">
  <div class="tree" id="tree">
    <div class="box clickme" id="a">
```

```
      A
      <div class="box clickme" id="b">
        B
        <div class="box clickme" id="c">
          C
          <div class="box clickme" id="d">D</div>
          <div class="box clickme" id="e">E</div>
        </div>
        <div class="box clickme" id="f">F</div>
      </div>
      <div class="box clickme" id="g">
        G
        <div class="box clickme" id="h">H</div>
      </div>
    </div>
  </div>
  <div>
    <h3>Path to root</h3>
    <pre id="path"></pre>
  </div>
</div>

<script>
const tree = document.getElementById('tree');
const pathEl = document.getElementById('path');

function clearMarks(){
  tree.querySelectorAll('.target,.anc,.sib').forEach(el => {
    el.classList.remove('target','anc','sib');
  });
```

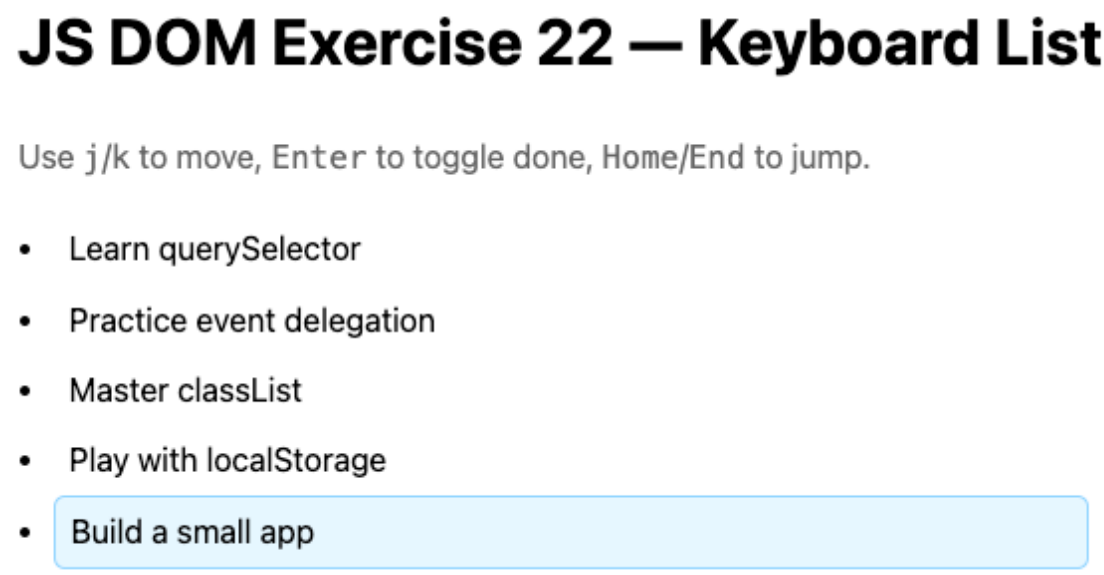
```
}


function describe(el){
  const id = el.id ? '#' + el.id : '';
  const cls = el.className ? '.' +
[...el.classList].filter(c=>!['target','anc','sib','clickme','box'].in
cludes(c)).join('.') : '';
  return el.tagName.toLowerCase() + id + cls;
}


tree.addEventListener('click', (e) => {
  const target = e.target.closest('.box');
  if (!target) return;
  clearMarks();
  target.classList.add('target');


  const parent = target.parentElement.closest('.box');
  if (parent){
    [...parent.children].forEach(ch => {
      if (ch !== target && ch.classList.contains('box'))
ch.classList.add('sib');
    });
  }


  const path = [];
  let cur = target;
  while (cur && cur !== tree){
    path.push(describe(cur));
    if (cur !== target) cur.classList.add('anc');
    cur = cur.parentElement.closest('.box');
  }
```

```
  path.push('div#tree');
  pathEl.textContent = path.join('  ←  ');
});
</script>
</body>
</html>
```

Breakdown: We use `closest('.box')` to snap to a box; walk ancestors and mark `.anc`; compute siblings from the parent; print a readable CSS-like path.

---

22) Keyboard Navigation List (j/k, Enter)



Build: Navigate a list with keyboard shortcuts; toggle done.
Objectives: Global key handling, focus management, active item state.
Steps: Press j/k or arrows; Enter toggles done; Home/End jump.
Code (save as `exercise22_keyboard_nav.html`)

```
<!doctype html>
<html lang="en">
<head>
```

```
<meta charset="utf-8">
<title>Keyboard Navigation (j/k, Enter)</title>
<style>
  body{font:16px/1.5 system-ui,sans-serif;padding:1.5rem;}
  ul{padding-left:1.1rem;max-width:520px;}
  li{padding:.35rem .5rem;border-radius:.35rem;cursor:pointer;}
  li.active{background:#e6f7ff;border:1px solid #91d5ff;}
  li.done{text-decoration:line-through;color:#888;}
  .hint{color:#666}
</style>
</head>
<body>
<h1>JS DOM Exercise 22 — Keyboard List</h1>
<p class="hint">Use <kbd>j</kbd>/<kbd>k</kbd> to move,
<kbd>Enter</kbd> to toggle done, <kbd>Home</kbd>/<kbd>End</kbd> to
jump.</p>
<ul id="list">
  <li data-id="1">Learn querySelector</li>
  <li data-id="2">Practice event delegation</li>
  <li data-id="3">Master classList</li>
  <li data-id="4">Play with localStorage</li>
  <li data-id="5">Build a small app</li>
</ul>

<script>
const items = [...document.querySelectorAll('#list li')];
let index = 0;
function setActive(i){
  items.forEach(li => li.classList.remove('active'));
  index = (i + items.length) % items.length;
  items[index].classList.add('active');
```

```
  items[index].scrollIntoView({block:'nearest'});
}
setActive(0);

document.addEventListener('keydown', (e) => {
  if (e.key === 'j' || e.key === 'ArrowDown') setActive(index+1);
  else if (e.key === 'k' || e.key === 'ArrowUp') setActive(index-1);
  else if (e.key === 'Home') setActive(0);
  else if (e.key === 'End') setActive(items.length-1);
  else if (e.key === 'Enter'){
    items[index].classList.toggle('done');
    console.log('Toggled item', items[index].dataset.id);
  }
});
</script>
</body>
</html>
```

Breakdown: Maintain an `index`; `setActive` updates classes and scroll; `keydown` maps keys to actions.

---

23) Inline Editable Table with Validation

JS DOM Exercise 23 — Inline Editing

Click a cell to edit. Enter to save, Esc to cancel. Age must be 1–120.

Name	Age	City
Ava	31	Toronto
Noah	55	Ottawa
Mia	22	Calgary

Build: Click cells to edit; Enter saves, Esc cancels; age validated 1–120.
Objectives: In-place editors, `dataset`, cancel/commit flows.
Steps: Click a cell → edit → confirm/cancel; invalid ages turn red.
Code (save as `exercise23_inline_edit_table.html`)

```
<!doctype html>
<html lang="en">
<head>
<meta charset="utf-8">
<title>Inline Editable Table</title>
<style>
  body{font:16px/1.5 system-ui,sans-serif;padding:1.5rem;}
  table{border-collapse:collapse;min-width:520px;}
  th,td{border:1px solid #ddd;padding:.5rem .75rem;}
  td.editing{background:#fffbe6;}
  td.invalid{background:#ffd6d6;}
  .note{color:#666;margin:.5rem 0;}
</style>
</head>
<body>
```

```
<h1>JS DOM Exercise 23 — Inline Editing</h1>
<p class="note">Click a cell to edit. <kbd>Enter</kbd> to save,
<kbd>Esc</kbd> to cancel. Age must be 1–120.</p>
<table>
  <thead><tr><th>Name</th><th>Age</th><th>City</th></tr></thead>
  <tbody id="tb">
    <tr><td>Ava</td><td>31</td><td>Toronto</td></tr>
    <tr><td>Noah</td><td>26</td><td>Ottawa</td></tr>
    <tr><td>Mia</td><td>22</td><td>Calgary</td></tr>
  </tbody>
</table>

<script>
const tb = document.getElementById('tb');
let editing = null;

tb.addEventListener('click', (e) => {
  const td = e.target.closest('td');
  if(!td || td === editing) return;
  startEdit(td);
});

function startEdit(td){
  cancelEdit();
  editing = td;
  const old = td.textContent;
  td.dataset.old = old;
  td.classList.add('editing');
  const input = document.createElement('input');
  input.value = old;
  input.style.width = '100%';
```

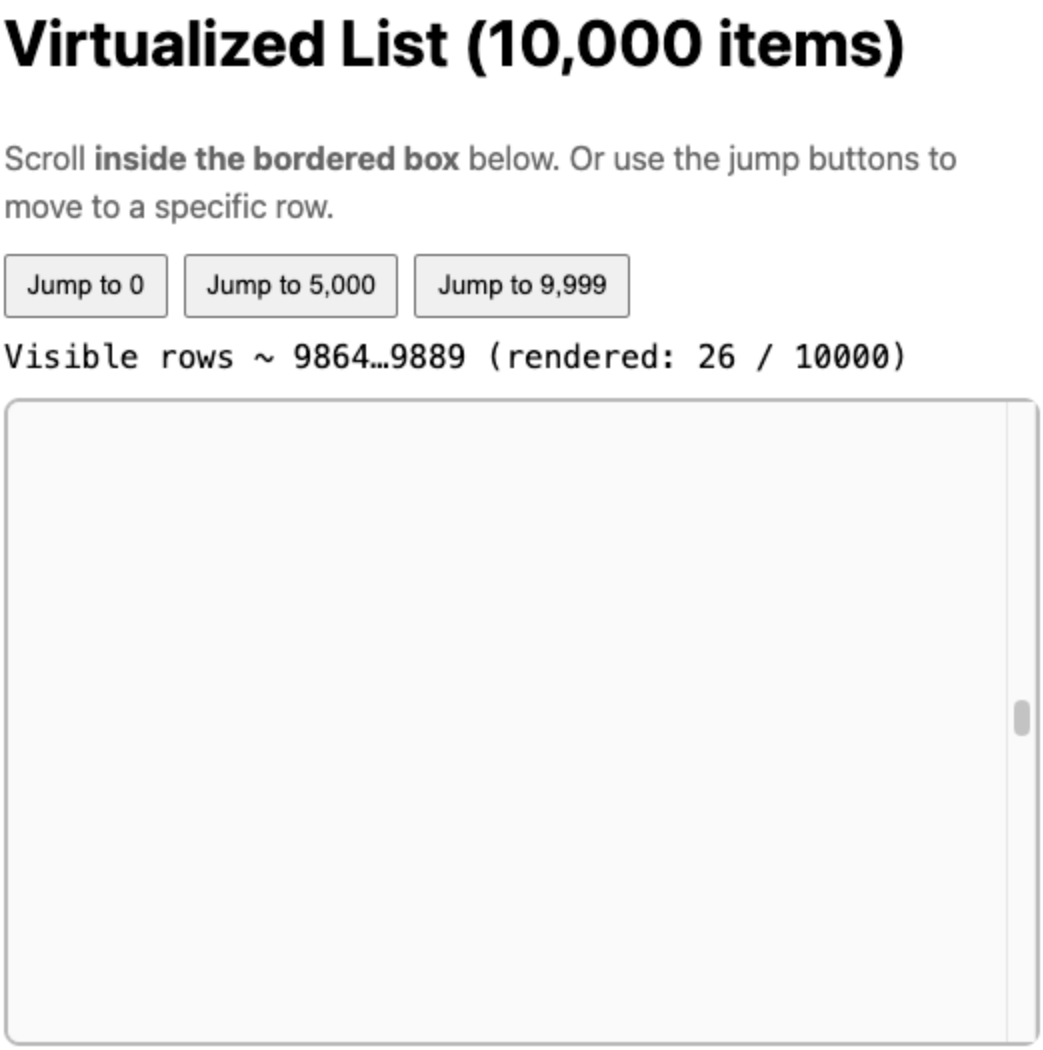
```
  td.textContent = '';
  td.appendChild(input);
  input.focus();
  input.select();

  input.addEventListener('keydown', (e) => {
    if (e.key === 'Enter') commit(td, input.value.trim());
    else if (e.key === 'Escape') cancelEdit();
  });
  input.addEventListener('blur', () => commit(td,
input.value.trim()));
}

function isValid(td, value){
  const index = [...td.parentElement.children].indexOf(td);
  if (index === 1){
    const n = Number(value);
    return Number.isInteger(n) && n >= 1 && n <= 120;
  }
  return value.length > 0;
}

function commit(td, value){
  if(!isValid(td, value)){
    td.classList.add('invalid');
    return;
  }
  td.classList.remove('invalid');
  td.textContent = value;
  td.classList.remove('editing');
  console.log('Changed cell', td.dataset.old, '→', value);
```

```
  editing = null;
}

function cancelEdit(){
  if(!editing) return;
  const td = editing;
  td.classList.remove('invalid','editing');
  td.textContent = td.dataset.old;
  editing = null;
}
</script>
</body>
</html>
```

Breakdown: Replace a cell with an `<input>` while editing; use column index to validate age; support commit/cancel.

---

24) Virtualized List (10,000 rows)



Build: Efficiently render only the visible slice of a huge list.
Objectives: Windowing, `scrollTop`, translateY, avoiding reflow.
Steps: Scroll to see rows update smoothly.
Code (save as `exercise24_virtualized_list.html`)

```
<!doctype html>
<html lang="en">
<head>
<meta charset="utf-8">
<title>Virtualized List (10,000 items) — Fixed Demo</title>
<style>
```

```
  body{font:16px/1.5 system-ui,sans-serif;padding:1.5rem;}

.controls{display:flex;gap:.5rem;align-items:center;margin-bottom:.5rem;flex-wrap:wrap}
  .viewport{height:320px;border:2px solid #bbb;border-radius:.5rem;overflow:auto;position:relative;background:#fafafa}
  .spacer{height:0;}
  .inner{position:absolute;left:0;right:0;will-change:transform;}
  .row{height:24px; line-height:24px; padding:0 .5rem; border-bottom:1px solid #eee; background:#fff;}
  .row:nth-child(even){background:#fdfdfd;}
  .hint{color:#666;margin:.25rem 0 .75rem}
  .stat{font-family:ui-monospace, SFMono-Regular, Menlo, monospace;}
  button{padding:.4rem .6rem}
</style>
</head>
<body>
  <h1>Virtualized List (10,000 items)</h1>
  <p class="hint">Scroll <strong>inside the bordered box</strong> below. Or use the jump buttons to move to a specific row.</p>

  <div class="controls">
    <button data-jump="0">Jump to 0</button>
    <button data-jump="5000">Jump to 5,000</button>
    <button data-jump="9999">Jump to 9,999</button>
    <span class="stat" id="range"></span>
  </div>

  <div class="viewport" id="vp" aria-label="Virtualized list viewport">
    <div class="spacer" id="spacer"></div>
```

```
    <div class="inner" id="inner"></div>
  </div>

<script>
const total = 10000;     // total rows
const itemHeight = 24;   // px per row (match .row height + borders)
const buffer = 6;        // extra rows above/below for smoother
scrolling

const vp = document.getElementById('vp');
const inner = document.getElementById('inner');
const spacer = document.getElementById('spacer');
const rangeLabel = document.getElementById('range');

// 1) make the container scrollable as if it had 10k items
spacer.style.height = (total * itemHeight) + 'px';

// 2) render only what's visible + buffer
function render(){
  const scrollTop = vp.scrollTop;
  const height = vp.clientHeight;

  // figure out the slice of rows we need
  const start = Math.max(0, Math.floor(scrollTop / itemHeight) -
buffer);
  const end = Math.min(total, Math.ceil((scrollTop + height) /
itemHeight) + buffer);

  // position the slice at the right height
  inner.style.transform = `translateY(${start * itemHeight}px)`;
```

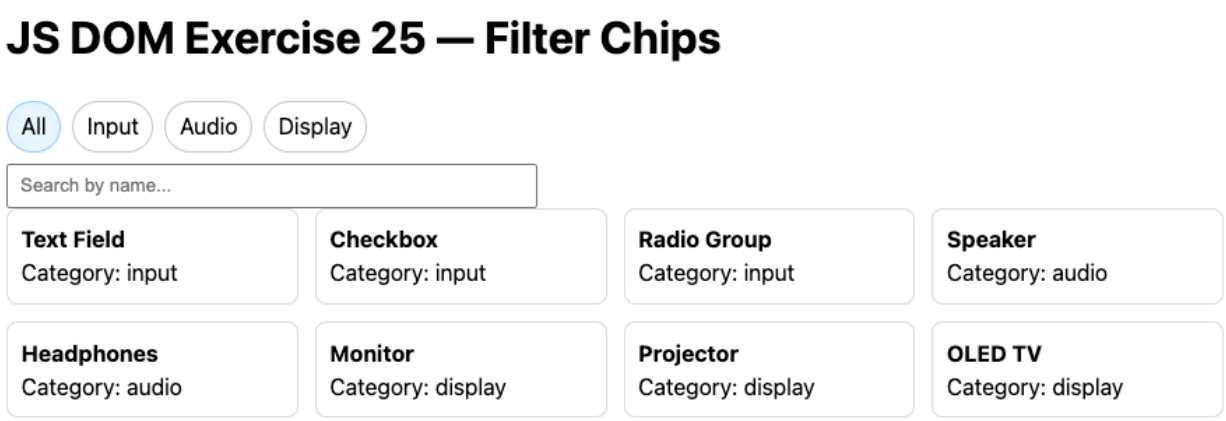
```
  // paint the slice
  inner.innerHTML = '';
  for(let i=start; i<end; i++){
    const div = document.createElement('div');
    div.className = 'row';
    div.textContent = 'Row #' + i;
    inner.appendChild(div);
  }

  // update status
  rangeLabel.textContent = `Visible rows ~ ${start}…${end-1}
(rendered: ${end - start} / ${total})`;
}

// 3) handle scrolling
vp.addEventListener('scroll', render);

// 4) initial paint
render();

// 5) jump helpers
document.querySelectorAll('button[data-jump]').forEach(btn => {
  btn.addEventListener('click', () => {
    const i = Number(btn.getAttribute('data-jump'));
    // scroll the viewport so that row i is at the top
    vp.scrollTop = i * itemHeight;
    render();
  });
});
</script>
</body>
```

```
</html>
```

Breakdown: A big spacer sets total height; we translate the inner slice and render only what's visible.

---

25) Filter Chips + Search



Build: Filter cards by category chips and free-text search.
Objectives: `dataset`, stateful filters, rendering pipelines.
Steps: Toggle chips (All/Input/Audio/Display); type to filter by name.
Code (save as `exercise25_filter_chips.html`)

```
<!doctype html>
<html lang="en">
<head>
<meta charset="utf-8">
<title>Filter Chips by Category + Search</title>
<style>
  body{font:16px/1.5 system-ui,sans-serif;padding:1.5rem;}
  .chips{display:flex;flex-wrap:wrap;gap:.5rem;margin-bottom:.5rem;}
  .chip{padding:.35rem .6rem;border:1px solid
```

```
#ccc;border-radius:999px;cursor:pointer;}
  .chip.active{background:#e6f7ff;border-color:#91d5ff;}

.grid{display:grid;grid-template-columns:repeat(auto-fill,minmax(180px
,1fr));gap:.75rem;}
  .card{border:1px solid #ddd;border-radius:.5rem;padding:.6rem;}
  input{padding:.4rem .5rem;max-width:360px;width:100%;}
</style>
</head>
<body>
<h1>JS DOM Exercise 25 — Filter Chips</h1>
<div class="chips" id="chips">
  <span class="chip active" data-cat="all">All</span>
  <span class="chip" data-cat="input">Input</span>
  <span class="chip" data-cat="audio">Audio</span>
  <span class="chip" data-cat="display">Display</span>
</div>
<input id="search" placeholder="Search by name..." autocomplete="off">
<div class="grid" id="grid"></div>

<script>
const data = [
  {name:'Text Field', cat:'input'}, {name:'Checkbox', cat:'input'},
  {name:'Radio Group', cat:'input'}, {name:'Speaker', cat:'audio'},
  {name:'Headphones', cat:'audio'}, {name:'Monitor', cat:'display'},
  {name:'Projector', cat:'display'}, {name:'OLED TV', cat:'display'}
];

const grid = document.getElementById('grid');
const chips = document.getElementById('chips');
const search = document.getElementById('search');
```

```
let active = 'all';


function render(){
  grid.innerHTML = '';
  const q = search.value.trim().toLowerCase();
  data.filter(item => (active==='all'||item.cat===active) && (!q ||
item.name.toLowerCase().includes(q)))
      .forEach(item => {
        const d = document.createElement('div');
        d.className='card';
        d.innerHTML = `<strong>${item.name}</strong><div>Category:
${item.cat}</div>`;
        grid.appendChild(d);
      });
}
render();


chips.addEventListener('click', (e) => {
  const chip = e.target.closest('.chip');
  if(!chip) return;
  chips.querySelectorAll('.chip').forEach(c =>
c.classList.remove('active'));
  chip.classList.add('active');
  active = chip.dataset.cat;
  render();
});
search.addEventListener('input', render);
</script>
</body>
</html>
```

Breakdown: Maintain `active` category state; filter pipeline combines category + query; render cards.

---

26) FormData Builder with JSON & Query Preview

Build: Add key/value rows, then preview as JSON and query string.
Objectives: `FormData`, serializing, table→data mapping.
Steps: Add pairs → Preview → see JSON and a=b&c=d.
Code (save as `exercise26_formdata_builder.html`)

```
<!doctype html>
<html lang="en">
<head>
<meta charset="utf-8">
<title>FormData Builder + JSON/Query Preview</title>
<style>
  body{font:16px/1.5 system-ui,sans-serif;padding:1.5rem;}
```

```
  .row{display:flex;gap:.5rem;margin:.5rem 0;}
  input{padding:.4rem;}
  button{padding:.4rem .6rem;}

pre{background:#f6f8fa;padding:.75rem;border-radius:.5rem;overflow:aut
o;}
  table{border-collapse:collapse;min-width:420px;margin-top:.5rem;}
  th,td{border:1px solid #ddd;padding:.35rem .5rem;}
</style>
</head>
<body>
<h1>JS DOM Exercise 26 — Build FormData</h1>
<div class="row">
  <input id="key" placeholder="Key">
  <input id="val" placeholder="Value">
  <button id="add">Add Pair</button>
  <button id="clear">Clear</button>
</div>
<table>
  <thead><tr><th>Key</th><th>Value</th></tr></thead>
  <tbody id="tbody"></tbody>
</table>
<div class="row">
  <button id="preview">Preview JSON & Query</button>
</div>
<h3>JSON</h3>
<pre id="json"></pre>
<h3>Query string</h3>
<pre id="qs"></pre>

<script>
```

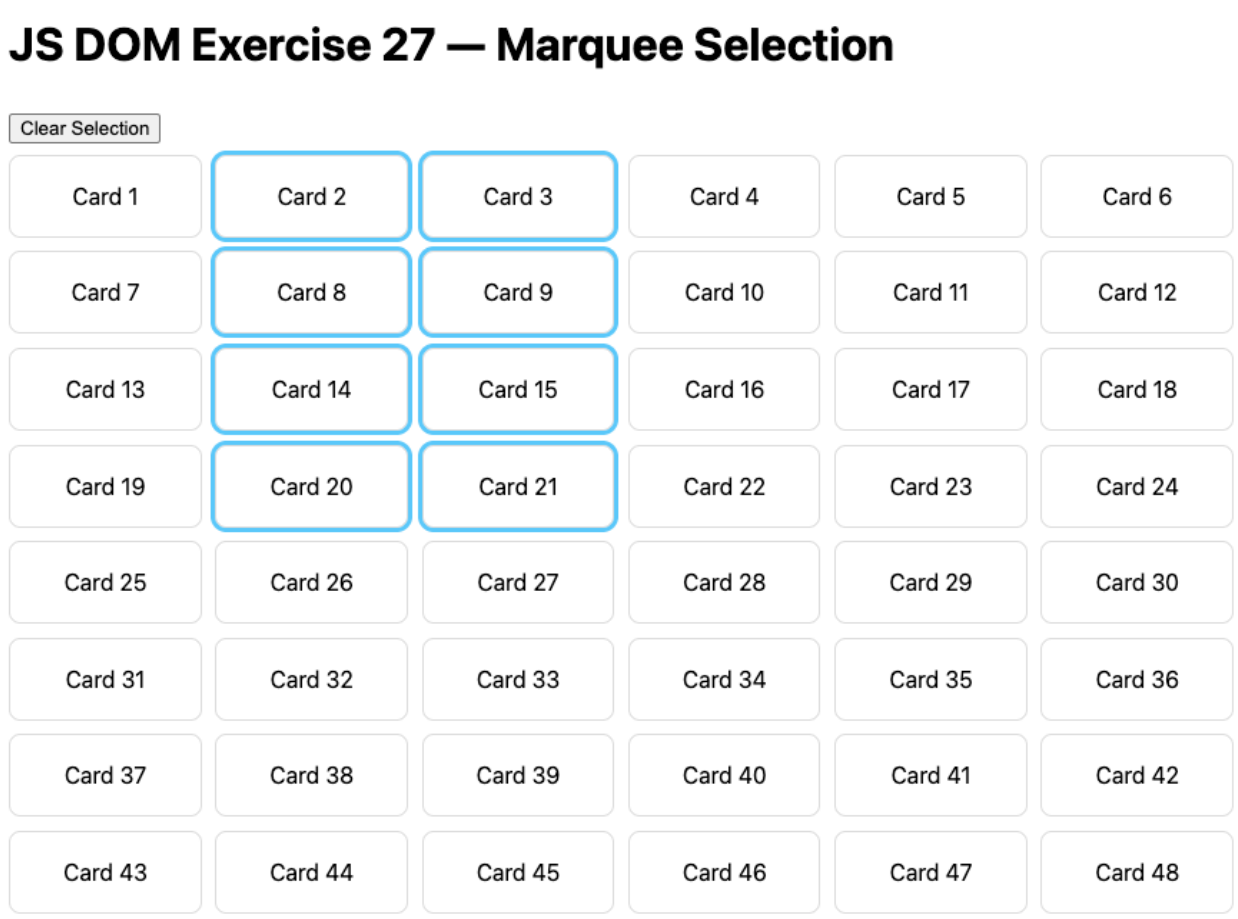
```
const tb = document.getElementById('tbody');
document.getElementById('add').addEventListener('click', () => {
  const k = document.getElementById('key').value.trim();
  const v = document.getElementById('val').value;
  if(!k) return;
  const tr = document.createElement('tr');
  tr.innerHTML = `<td>${k}</td><td>${v}</td>`;
  tb.appendChild(tr);
  document.getElementById('key').value='';
document.getElementById('val').value='';
});

document.getElementById('clear').addEventListener('click', () =>
tb.innerHTML='');

document.getElementById('preview').addEventListener('click', () => {
  const fd = new FormData();
  [...tb.querySelectorAll('tr')].forEach(tr => {
    const [k,v] = [...tr.children].map(td => td.textContent);
    fd.append(k, v);
  });
  const obj = {};
  fd.forEach((v,k)=>{
    if (obj[k] !== undefined){
      obj[k] = Array.isArray(obj[k]) ? [...obj[k], v] : [obj[k], v];
    } else obj[k] = v;
  });
  document.getElementById('json').textContent =
JSON.stringify(obj,null,2);
  const qs = [...fd.entries()].map(([k,v]) =>
encodeURIComponent(k)+'='+encodeURIComponent(v)).join('&');
  document.getElementById('qs').textContent = qs;
```

```
});
</script>
</body>
</html>
```

Breakdown: Table rows → `FormData` → object & query; repeated keys become arrays.

---

27) Drag-to-Select (Marquee) on a Grid



Build: Click-drag a selection rectangle to select multiple cards.
Objectives: Pointer math, bounding-box intersection, class toggling.
Steps: Mouse down, drag across cards, release; clear selection via button.
Code (save as `exercise27_drag_select.html`)

```
<!doctype html>
<html lang="en">
<head>
<meta charset="utf-8">
<title>Drag-to-Select Cards (Marquee)</title>
<style>
  body{font:16px/1.5
system-ui,sans-serif;padding:1.5rem;user-select:none;}

.grid{display:grid;grid-template-columns:repeat(auto-fill,minmax(120px
,1fr));gap:.6rem;position:relative;}
  .card{border:1px solid
#ddd;border-radius:.5rem;padding:1rem;text-align:center;background:#ff
f;}
  .card.selected{outline:3px solid #5ac8fa;}
  .marquee{position:fixed;border:2px dashed
#91d5ff;background:rgba(230,247,255,.3);pointer-events:none;display:no
ne;}
  .actions{margin:.5rem 0;}
</style>
</head>
<body>
<h1>JS DOM Exercise 27 — Marquee Selection</h1>
<div class="actions"><button id="clear">Clear Selection</button></div>
<div class="grid" id="grid"></div>
<div class="marquee" id="marquee"></div>

<script>
const grid = document.getElementById('grid');
const marquee = document.getElementById('marquee');

// Create 48 cards
```

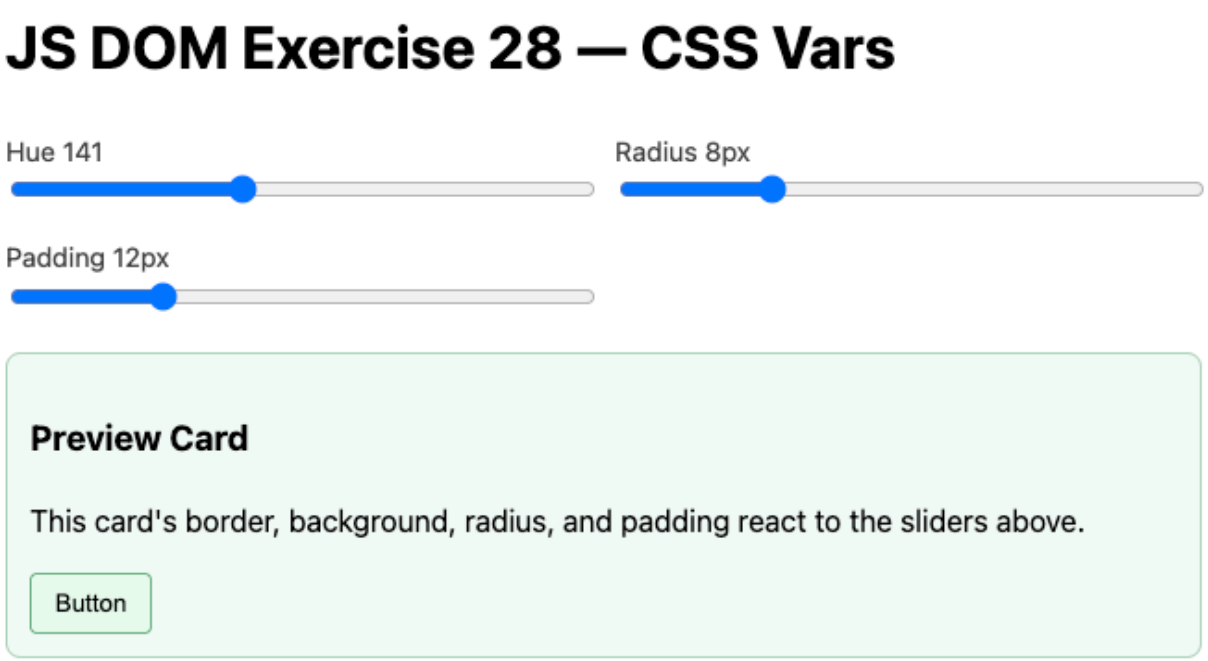
```
for (let i=1;i<=48;i++){
  const d = document.createElement('div');
  d.className='card'; d.textContent='Card '+i;
  grid.appendChild(d);
}

let start = null;
function rectFromPoints(a,b){
  const x = Math.min(a.x,b.x), y = Math.min(a.y,b.y);
  const w = Math.abs(a.x-b.x), h = Math.abs(a.y-b.y);
  return {x,y,w,h};
}

document.addEventListener('mousedown', (e)=>{
  start = {x:e.clientX,y:e.clientY};
  marquee.style.display='block';
  marquee.style.left=start.x+'px'; marquee.style.top=start.y+'px';
  marquee.style.width='0px'; marquee.style.height='0px';
});

document.addEventListener('mousemove', (e)=>{
  if(!start) return;
  const r = rectFromPoints(start, {x:e.clientX,y:e.clientY});
  marquee.style.left=r.x+'px'; marquee.style.top=r.y+'px';
  marquee.style.width=r.w+'px'; marquee.style.height=r.h+'px';

  const mrect = marquee.getBoundingClientRect();
  document.querySelectorAll('.card').forEach(card => {
    const crect = card.getBoundingClientRect();
    const overlap = !(mrect.right < crect.left || mrect.left >
crect.right || mrect.bottom < crect.top || mrect.top > crect.bottom);
```

```
    card.classList.toggle('selected', overlap);
  });
});

document.addEventListener('mouseup', ()=>{
  start = null; marquee.style.display='none';
});

document.getElementById('clear').addEventListener('click', () => {

document.querySelectorAll('.card').forEach(c=>c.classList.remove('sele
cted'));
});
</script>
</body>
</html>
```

Breakdown: We draw a fixed-position rectangle and check overlap with each card’s bounding box as you drag.

---

28) CSS Variables Playground



Build: Sliders control hue, radius, and padding using CSS custom properties.
Objectives: Update CSS variables via JS, live styling.
Steps: Drag sliders and watch the card and button restyle live.
Code (save as `exercise28_css_vars_playground.html`)

```
<!doctype html>
<html lang="en">
<head>
<meta charset="utf-8">
<title>CSS Variables Playground</title>
<style>
  :root{
    --hue: 210;
    --radius: 12px;
    --pad: 12px;
  }
  body{font:16px/1.5 system-ui,sans-serif;padding:1.5rem;}

.controls{display:grid;grid-template-columns:repeat(auto-fit,minmax(220px,1fr));gap:.75rem;margin-bottom:1rem;}
```

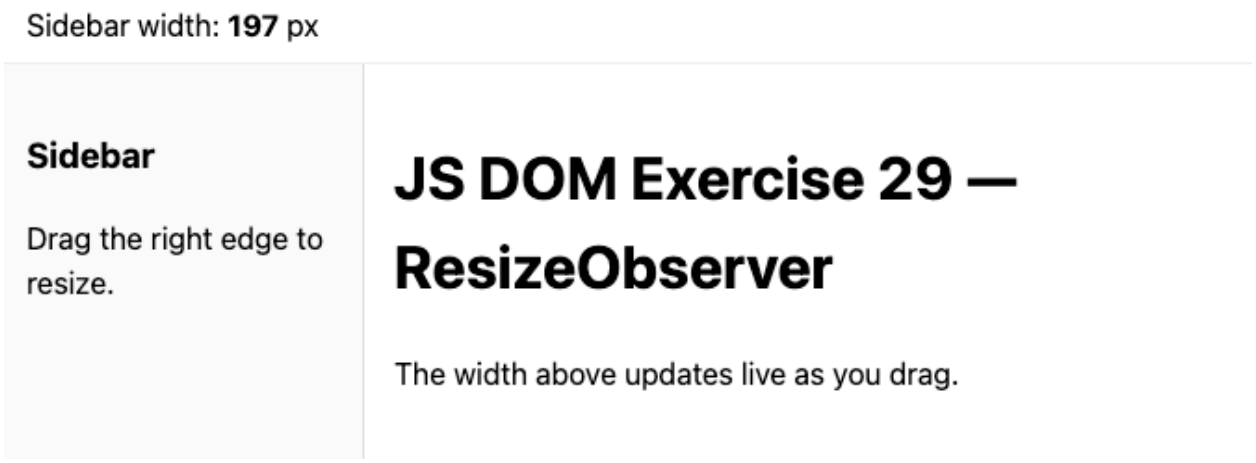
```
  .card{border:1px solid hsl(var(--hue) 30%
75%);border-radius:var(--radius);padding:var(--pad);background:hsl(var
(--hue) 50% 97%);}

  .btn{padding:.5rem .8rem;border-radius:calc(var(--radius) /
2);border:1px solid hsl(var(--hue) 30% 55%);background:hsl(var(--hue)
80% 95%);}

  label{display:block;font-size:.9rem;color:#444}

  input[type=range]{width:100%;}

</style>

</head>

<body>

<h1>JS DOM Exercise 28 — CSS Vars</h1>

<div class="controls">

  <div><label>Hue <span id="hval">210</span></label><input id="hue"
type="range" min="0" max="360" value="210"></div>

  <div><label>Radius <span id="rval">12</span>px</label><input
id="radius" type="range" min="0" max="32" value="12"></div>

  <div><label>Padding <span id="pval">12</span>px</label><input
id="pad" type="range" min="0" max="48" value="12"></div>

</div>

<div class="card">

  <h3>Preview Card</h3>

  <p>This card's border, background, radius, and padding react to the
sliders above.</p>

  <button class="btn">Button</button>

</div>


<script>

const root = document.documentElement.style;

const hue = document.getElementById('hue');

const radius = document.getElementById('radius');

const pad = document.getElementById('pad');
```

```
function sync(){
  root.setProperty('--hue', hue.value);
  root.setProperty('--radius', radius.value + 'px');
  root.setProperty('--pad', pad.value + 'px');
  document.getElementById('hval').textContent = hue.value;
  document.getElementById('rval').textContent = radius.value;
  document.getElementById('pval').textContent = pad.value;
}
[hue, radius, pad].forEach(i => i.addEventListener('input', sync));
sync();
</script>
</body>
</html>
```

Breakdown: Tie range inputs to CSS variables on `:root` for live theming.

---

29) ResizeObserver + Resizable Sidebar



Build: Drag a handle to resize a sidebar; width readout updates via `ResizeObserver`.
Objectives: Pointer tracking, CSS bounds, `ResizeObserver`.
Steps: Drag the sidebar edge; watch the width display update.
Code (save as `exercise29_resize_observer.html`)

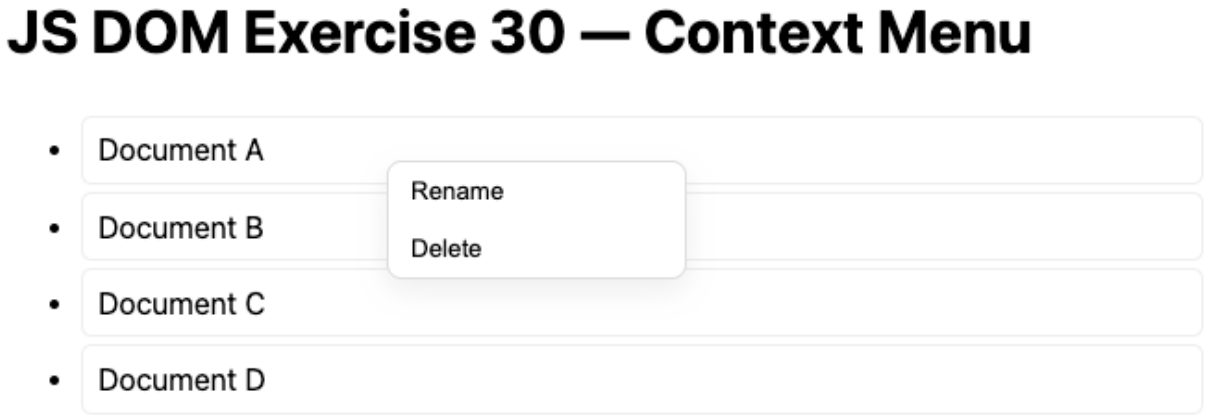
```
<!doctype html>
<html lang="en">
<head>
<meta charset="utf-8">
<title>ResizeObserver + Resizable Sidebar</title>
<style>
  body{font:16px/1.5 system-ui,sans-serif;margin:0;}
  .app{display:flex;min-height:100vh;}

.sidebar{width:280px;min-width:160px;max-width:600px;border-right:1px
solid #ddd;position:relative;background:#fafafa;}

.handle{position:absolute;right:-4px;top:0;width:8px;height:100%;curso
r:col-resize;}
  .main{flex:1;padding:1rem;}
  .meta{padding:.5rem 1rem;border-bottom:1px solid
#eee;background:#fff;}
</style>
</head>
<body>
<div class="meta">Sidebar width: <strong id="w">–</strong> px</div>
<div class="app">
  <aside class="sidebar" id="sb">
    <div class="handle" id="h"></div>
    <div style="padding:1rem;">
      <h3>Sidebar</h3>
      <p>Drag the right edge to resize.</p>
    </div>
  </aside>
  <main class="main">
    <h1>JS DOM Exercise 29 – ResizeObserver</h1>
    <p>The width above updates live as you drag.</p>
```

```
  </main>
</div>

<script>
const sb = document.getElementById('sb');
const h = document.getElementById('h');
const out = document.getElementById('w');
let startX, startW;
h.addEventListener('mousedown', (e)=>{
  startX = e.clientX; startW = sb.offsetWidth;
  document.addEventListener('mousemove', onMove);
  document.addEventListener('mouseup', onUp, {once:true});
});
function onMove(e){
  const dx = e.clientX - startX;
  let w = Math.min(600, Math.max(160, startW + dx));
  sb.style.width = w + 'px';
}
function onUp(){ document.removeEventListener('mousemove', onMove); }

const ro = new ResizeObserver(entries => {
  for (const entry of entries){
    out.textContent = Math.round(entry.contentRect.width);
  }
});
ro.observe(sb);
</script>
</body>
</html>
```

Breakdown: Observe the sidebar element's content box; drag logic clamps width between min/max.

---

30) Custom Context Menu (Rename/Delete)



Build: Right-click a list item to open a custom menu at cursor; rename/delete actions.
Objectives: `contextmenu` event, absolute positioning, outside-click/escape close.
Steps: Right-click items → choose rename/delete → click elsewhere to close.
Code (save as `exercise30_context_menu.html`)

```
<!doctype html>
<html lang="en">
<head>
<meta charset="utf-8">
<title>Custom Context Menu</title>
<style>
  body{font:16px/1.5 system-ui,sans-serif;padding:1.5rem;}
  li{padding:.35rem .5rem;border:1px solid
#eee;border-radius:.35rem;margin:.25rem 0;}
  .menu{position:fixed;background:#fff;border:1px solid
#ddd;border-radius:.5rem;box-shadow:0 6px 16px
rgba(0,0,0,.08);display:none;min-width:160px;z-index:10;}
  .menu button{display:block;width:100%;text-align:left;padding:.5rem
```

```
.75rem;border:0;background:none;cursor:pointer;}
  .menu button:hover{background:#f5f5f5;}
</style>
</head>
<body>
<h1>JS DOM Exercise 30 — Context Menu</h1>
<ul id="list">
  <li>Document A</li>
  <li>Document B</li>
  <li>Document C</li>
  <li>Document D</li>
</ul>

<div class="menu" id="menu" role="menu">
  <button data-action="rename">Rename</button>
  <button data-action="delete">Delete</button>
</div>

<script>
const list = document.getElementById('list');
const menu = document.getElementById('menu');
let targetItem = null;

list.addEventListener('contextmenu', (e) => {
  const li = e.target.closest('li'); if(!li) return;
  e.preventDefault();
  targetItem = li;
  menu.style.left = e.clientX + 'px';
  menu.style.top = e.clientY + 'px';
  menu.style.display = 'block';
```

```
});

document.addEventListener('click', (e) => {
  if (!menu.contains(e.target)) menu.style.display = 'none';
});

document.addEventListener('keydown', (e) => {
  if (e.key === 'Escape') menu.style.display='none';
});

menu.addEventListener('click', (e) => {
  const btn = e.target.closest('button'); if(!btn) return;
  const action = btn.dataset.action;
  if (action === 'rename' && targetItem){
    const name = prompt('New name:', targetItem.textContent);
    if (name) targetItem.textContent = name;
  } else if (action === 'delete' && targetItem){
    targetItem.remove();
  }
  menu.style.display = 'none';
});
</script>
</body>
</html>
```

Breakdown: Suppress the default menu; position our menu at `clientX/Y`; close on click outside or `Esc`.