1.11 Reusable TeslaCounter Component

Tesla's speed and external temperature controls should be reusable components, so I'll make them a generic Counter component that allows for other metadata such as step, minimum, maximum, and title and units (mph / degrees).

Also, unlike the components we have created so far, we need an action to change the state value in response to user input (button click, checkbox selection, etc.). Let's look at how to handle events that occur in a subcomponent.

Create the `src/components/TeslaCounter` directory as before, create a `TeslaCounter.js` file in it, and enter the following code:

```
import React from 'react';
import PropTypes from 'react';
import './TeslaCounter.css';
const TeslaCounter = (props) => (
  <div className="tesla-counter">
    <p className="tesla-counter__title">{props.initValues.title}</p>
    <div className="tesla-counter__container cf">
      <div className="tesla-counter__item">
        <p className="tesla-counter__number">
          { props.currentValue }
          <span>{ props.initValues.unit }</span>
        </p>
        <div className="tesla-counter__controls">
          <button
            onClick={(e) => props.increment(e, props.initValues.title)}
            disabled={props.currentValue >= props.initValues.max}
          >
          </button>
          <button
            onClick={(e) => props.decrement(e, props.initValues.title)}
            disabled={props.currentValue <= props.initValues.min}
          >
          </button>
        </div>
      </div>
    </div>
  </div>
);
TeslaCounter.propTypes = {
  currentValue: PropTypes.number,
  increment: PropTypes.func,
  decrement: PropTypes.func,
  initValues: PropTypes.object
}
export default TeslaCounter;
```

Let's think about what we want here. Each time you click and change the speed and temperature, you must update the state so that the value is reflected between the maximum and minimum values.

Since the component only needs to update its own state, `TeslaBattery` passes the callback (`increment` , `decrement`) to the `TeslaCounter` each time it needs to update its state. You can use the `onClick` event on a button to notify the event. The callback passed by `TeslaBattery` calls `setState()` and the app is updated.

We will implement a callback that will be passed by `TeslaBattery` in a few moments.

1.11.1 TeslaCounter Component Style

Let's implement the style first. Create a `TeslaCounter.css` file in the `src/components/TeslaCounter` directory and specify the following styles. Since the code is long and omitted here, let's check the source code

```css
.tesla-counter {
  float: left;
  width: 230px;
}
.tesla-counter__title {
  letter-spacing: 2px;
  font-size: 16px;
}
...
```

1.11.2 Import TeslaCounter Component in TeslaBattery Container

Now, we will implement `callback` in `TeslaBattery` and pass it to the `TeslaCounter` component.

First, add `import` to use the `TeslaCounter` component in `TeslaBattery.js` .

We also implement the callback functions `increment()` and `decrement()` , and the internal function `updateCounterState()` and bind it in the `constructor` . Then pass the `callback` function to the `TeslaCounter` component with `props` .

```js
...
constructor(props) {
    super(props);
    this.calculateStats = this.calculateStats.bind(this);
    this.statsUpdate = this.statsUpdate.bind(this);
```

```
      this.increment = this.increment.bind(this);
      this.decrement = this.decrement.bind(this);
      this.updateCounterState = this.updateCounterState.bind(this);

      this.state = {
        carstats: [],
        config: {
          speed: 55,
          temperature: 20,
          climate: true,
          wheels: 19
        }
      }
    }
  ...
  updateCounterState(title, newValue) {
      const config = { ...this.state.config };
      // update config state with new value
      title === 'Speed' ? config['speed'] = newValue : config['temperature'] = newValue;
      // update our state
      this.setState({ config });
    }
  increment(e, title) {
    e.preventDefault();
    let currentValue, maxValue, step;
    const { speed, temperature } = this.props.counterDefaultVal;
    if (title === 'Speed') {
      currentValue = this.state.config.speed;
      maxValue = speed.max;
      step = speed.step;
    } else {
      currentValue = this.state.config.temperature;
      maxValue = temperature.max;
      step = temperature.step;
    }
    if (currentValue < maxValue) {
      const newValue = currentValue + step;
      this.updateCounterState(title, newValue);
    }
  }
  decrement(e, title) {
    e.preventDefault();
    let currentValue, minValue, step;
    const { speed, temperature } = this.props.counterDefaultVal;
    if (title === 'Speed') {
      currentValue = this.state.config.speed;
      minValue = speed.min;
      step = speed.step;
    } else {
      currentValue = this.state.config.temperature;
      minValue = temperature.min;
      step = temperature.step;
    }
    if (currentValue > minValue) {
      const newValue = currentValue - step;
      this.updateCounterState(title, newValue);
    }
  }
...
render() {
    return (
    <form className="tesla-battery">
      <h1>Range Per Charge</h1>
```

```
          <TeslaCar wheelsize={config.wheels} />
          <TeslaStats carstats={carstats} />
          <div className="tesla-controls cf">

            <TeslaCounter
              currentValue={this.state.config.speed}
              initValues={this.props.counterDefaultVal.speed}
              increment={this.increment}
              decrement={this.decrement}
            />
            <div className="tesla-climate-container cf">
              <TeslaCounter
                currentValue={this.state.config.temperature}
                initValues={this.props.counterDefaultVal.temperature}
                increment={this.increment}
                decrement={this.decrement}
              />
            </div>
          </div>
          <TeslaNotice />
        </form>
      )
  }
}
```

1.11.3 TeslaBattery Container Style

An additional style is required for `TeslaBattery` as soon as the TeslaCounter
component is added. Open the `TeslaBattery.css` file and add the following:

```css
.tesla-climate-container {
  float: left;
  width: 420px;
  padding: 0 40px;
  margin: 0 40px 0 0;
  border-left: 1px solid #ccc;
  border-right: 1px solid #ccc;
}
.tesla-controls {
  display: block;
  width: 100%;
}
```

1.11.4 Default Value Props

Here, `initValues` passed to `TeslaCounter` is a constant value and is passed from
`App` which is a parent component of `TeslaBattery`.

Open `App.js` and pass the `counterDefaultVal` object to the `TeslaBattery`
component as follows:

```js
import React, { Component } from 'react';
import './App.css';
import Header from './components/Header/Header';
import TeslaBattery from './containers/TeslaBattery';
```

```
const counterDefaultVal = {
  speed: {
    title: "Speed",

    unit: "mph",
    step: 5,
    min: 45,
    max: 70
  },
  temperature: {
    title: "Outside Temperature",
    unit: "°",
    step: 10,
    min: -10,
    max: 40
  }
};
class App extends Component {
  render() {
    return (
      <div className="App">
        <Header />
        <TeslaBattery counterDefaultVal={counterDefaultVal}/>
      </div>
    );
  }
}
export default App;
```

Now, when you click Speed and Temperature, you can see that the changed values are updated and re-rendered in the state object through the `React Developer Tool`.
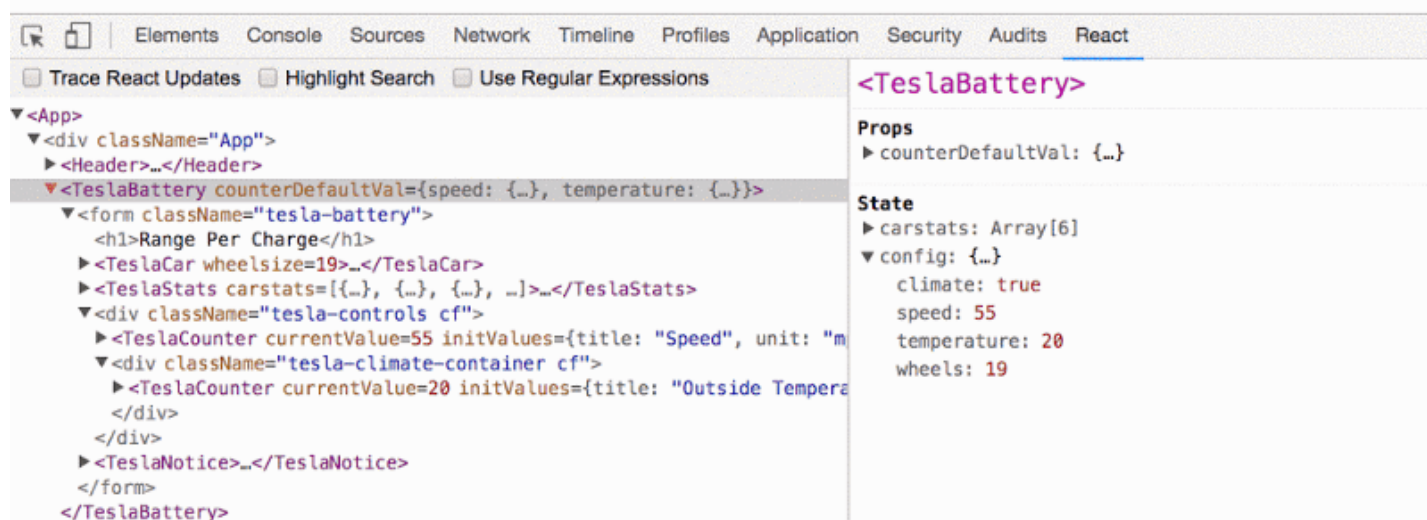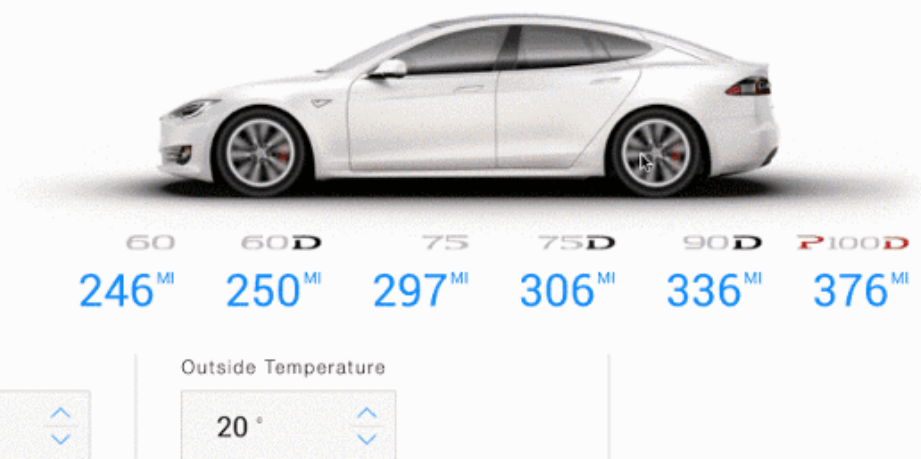
```
export function getModelData() {
    return {
      '60': {
        19: {
          on: {
            speed: {
              45: {
                 '-10': 224,
                 '0': 255,
                 '10': 287,
                 '20': 289,
                 '30': 287,
                 '40': 258
              },
              50: {
                 '-10': 211,
                 '0': 238,
                 '10': 264,
                 '20': 267,
                 '30': 267,
                 '40': 244
              },
              55: {
                 '-10': 198,
                 '0': 221,
                 '10': 242,
                 '20': 246,
                 '30': 245,
                 '40': 228
              },
              60: {
                 '-10': 184,
                 '0': 204,
                 '10': 222,
                 '20': 225,
                 '30': 226,
                 '40': 212
              },
              65: {
                 '-10': 170,
                 '0': 187,
                 '10': 202,
                 '20': 206,
                 '30': 208,
                 '40': 195
              },
              70: {
                 '-10': 156,
                 '0': 172,
                 '10': 185,
                 '20': 189,
                 '30': 190,
                 '40': 179
              },
            }
          },
          off: {
            speed: {
```

```
        45: {
          '-10': 297,
          '0': 312,

          '10': 318,
          '20': 325,
          '30': 329,
          '40': 333
        },
        50: {
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          '0': 283,
          '10': 288,
          '20': 294,
          '30': 298,
          '40': 304
        },
        55: {
          '-10': 245,
          '0': 256,
          '10': 261,
          '20': 267,
          '30': 269,
          '40': 277
        },
        60: {
          '-10': 221,
          '0': 231,
          '10': 236,
          '20': 242,
          '30': 243,
          '40': 252
        },
        65: {
          '-10': 200,
          '0': 209,
          '10': 214,
          '20': 219,
          '30': 222,
          '40': 230
        },
        70: {
          '-10': 181,
          '0': 189,
          '10': 194,
          '20': 199,
          '30': 202,
          '40': 209
        },
      }
    }
  },
  21: {
    on: {
      speed: {
        45: {
          '-10': 220,
          '0': 251,
          '10': 283,
          '20': 285,
          '30': 282,
          '40': 284
        },
```

```
      },
      50: {
        '-10': 208,
        '0': 234,

        '10': 260,
        '20': 262,
        '30': 262,
        '40': 240
      },
      55: {
        '-10': 194,
        '0': 216,
        '10': 238,
        '20': 241,
        '30': 240,
        '40': 224
      },
      60: {
        '-10': 180,
        '0': 199,
        '10': 217,
        '20': 220,
        '30': 221,
        '40': 208
      },
      65: {
        '-10': 166,
        '0': 183,
        '10': 198,
        '20': 202,
        '30': 203,
        '40': 191
      },
      70: {
        '-10': 152,
        '0': 167,
        '10': 180,
        '20': 184,
        '30': 185,
        '40': 174
      },
    }
  },
  off: {
    speed: {
      45: {
        '-10': 292,
        '0': 307,
        '10': 314,
        '20': 320,
        '30': 324,
        '40': 328
      },
      50: {
        '-10': 265,
        '0': 278,
        '10': 283,
        '20': 289,
        '30': 293,
        '40': 298
      },
      55: {
        '-10': 240,
```

```
          '0': 251,
          '10': 256,
          '20': 261,

          '30': 264,
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        },
        60: {
          '-10': 217,
          '0': 226,
          '10': 231,
          '20': 236,
          '30': 238,
          '40': 247
        },
        65: {
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          '0': 204,
          '10': 209,
          '20': 214,
          '30': 217,
          '40': 225
        },
        70: {
          '-10': 177,
          '0': 184,
          '10': 189,
          '20': 194,
          '30': 197,
          '40': 204
        },
      }
    }
  }
},
'60D': {
  19: {
    on: {
      speed: {
        45: {
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          '0': 258,
          '10': 291,
          '20': 293,
          '30': 292,
          '40': 264
        },
        50: {
          '-10': 215,
          '0': 242,
          '10': 269,
          '20': 271,
          '30': 272,
          '40': 250
        },
        55: {
          '-10': 201,
          '0': 224,
          '10': 247,
          '20': 250,
          '30': 251,
          '40': 235
        },
```

```
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              '40': 217
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            65: {
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              '10': 207,
              '20': 211,
              '30': 213,
              '40': 201
            },
            70: {
              '-10': 158,
              '0': 175,
              '10': 189,
              '20': 193,
              '30': 195,
              '40': 185
            },
          }
        },
        off: {
          speed: {
            45: {
              '-10': 301,
              '0': 317,
              '10': 323,
              '20': 330,
              '30': 336,
              '40': 339
            },
            50: {
              '-10': 275,
              '0': 288,
              '10': 294,
              '20': 301,
              '30': 306,
              '40': 311
            },
            55: {
              '-10': 249,
              '0': 260,
              '10': 266,
              '20': 273,
              '30': 278,
              '40': 283
            },
            60: {
              '-10': 225,
              '0': 236,
              '10': 241,
              '20': 248,
              '30': 251,
              '40': 258
            },
            65: {
              '-10': 204,
```

```
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        '20': 225,

        '30': 229,
        '40': 236
      },
      70: {
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        '30': 207,
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    }
  }
},
21: {
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        '30': 288,
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      },
      50: {
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        '0': 238,
        '10': 264,
        '20': 267,
        '30': 267,
        '40': 246
      },
      55: {
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        '0': 220,
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        '20': 246,
        '30': 246,
        '40': 230
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        '30': 227,
        '40': 212
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      65: {
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        '0': 186,
        '10': 202,
        '20': 206,
        '30': 208,
        '40': 196
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      70: {
        '-10': 155,
```

```
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            '10': 184,
            '20': 188,

            '30': 190,
            '40': 181
          },
        }
      },
      off: {
        speed: {
          45: {
            '-10': 297,
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            '10': 319,
            '20': 326,
            '30': 331,
            '40': 335
          },
          50: {
            '-10': 270,
            '0': 283,
            '10': 289,
            '20': 296,
            '30': 301,
            '40': 306
          },
          55: {
            '-10': 244,
            '0': 256,
            '10': 261,
            '20': 268,
            '30': 272,
            '40': 278
          },
          60: {
            '-10': 221,
            '0': 231,
            '10': 236,
            '20': 242,
            '30': 246,
            '40': 253
          },
          65: {
            '-10': 199,
            '0': 209,
            '10': 214,
            '20': 220,
            '30': 223,
            '40': 231
          },
          70: {
            '-10': 180,
            '0': 188,
            '10': 193,
            '20': 200,
            '30': 202,
            '40': 210
          },
        }
      }
    },
```

```
      '75': {
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          on: {
            speed: {
              45: {
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                '0': 309,
                '10': 347,
                '20': 350,
                '30': 347,
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              },
              50: {
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                '0': 288,
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                '30': 323,
                '40': 295
              },
              55: {
                '-10': 240,
                '0': 267,
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                '20': 297,
                '30': 297,
                '40': 276
              },
              60: {
                '-10': 222,
                '0': 246,
                '10': 268,
                '20': 272,
                '30': 273,
                '40': 257
              },
              65: {
                '-10': 205,
                '0': 227,
                '10': 245,
                '20': 250,
                '30': 252,
                '40': 236
              },
              70: {
                '-10': 189,
                '0': 206,
                '10': 224,
                '20': 228,
                '30': 230,
                '40': 216
              },
            }
          },
          off: {
            speed: {
              45: {
                '-10': 359,
                '0': 377,
                '10': 385,
                '20': 393,
                '30': 398,
```

```
            '40': 403
          },
          50: {
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            '0': 342,
            '10': 349,
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            '30': 360,
            '40': 368
          },
          55: {
            '-10': 296,
            '0': 309,
            '10': 316,
            '20': 323,
            '30': 326,
            '40': 335
          },
          60: {
            '-10': 268,
            '0': 280,
            '10': 286,
            '20': 292,
            '30': 295,
            '40': 305
          },
          65: {
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            '0': 253,
            '10': 259,
            '20': 265,
            '30': 268,
            '40': 278
          },
          70: {
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            '10': 234,
            '20': 241,
            '30': 244,
            '40': 253
          },
        }
      }
    },
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        speed: {
          45: {
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            '30': 342,
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          50: {
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```

```
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        '30': 291,
        '40': 271
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        '-10': 218,
        '0': 241,
        '10': 262,
        '20': 266,
        '30': 267,
        '40': 251
      },
      65: {
        '-10': 201,
        '0': 222,
        '10': 239,
        '20': 244,
        '30': 246,
        '40': 231
      },
      70: {
        '-10': 184,
        '0': 203,
        '10': 218,
        '20': 223,
        '30': 224,
        '40': 211
      },
    }
  },
  off: {
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      45: {
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        '30': 392,
        '40': 397
      },
      50: {
        '-10': 320,
        '0': 336,
        '10': 343,
        '20': 350,
        '30': 354,
        '40': 361
      },
      55: {
        '-10': 290,
        '0': 303,
        '10': 309,
        '20': 316,
        '30': 319,
        '40': 329
      },
```

```
          60: {
            '-10': 262,
            '0': 274,

            '10': 279,
            '20': 286,
            '30': 288,
            '40': 299
          },
          65: {
            '-10': 237,
            '0': 247,
            '10': 253,
            '20': 259,
            '30': 262,
            '40': 272
          },
          70: {
            '-10': 214,
            '0': 223,
            '10': 229,
            '20': 235,
            '30': 238,
            '40': 247
          },
        }
      }
    }
  },
  '75D': {
    19: {
      on: {
        speed: {
          45: {
            '-10': 227,
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            '40': 323
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          50: {
            '-10': 262,
            '0': 296,
            '10': 328,
            '20': 332,
            '30': 332,
            '40': 305
          },
          55: {
            '-10': 246,
            '0': 274,
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            '20': 306,
            '30': 307,
            '40': 287
          },
          60: {
            '-10': 228,
            '0': 253,
            '10': 276,
            '20': 280,
            '30': 283,
```

```
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      },
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        '-10': 211,
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        '40': 246
      },
      70: {
        '-10': 194,
        '0': 214,
        '10': 231,
        '20': 236,
        '30': 238,
        '40': 226
      },
    }
  },
  off: {
    speed: {
      45: {
        '-10': 368,
        '0': 387,
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        '40': 415
      },
      50: {
        '-10': 335,
        '0': 351,
        '10': 359,
        '20': 367,
        '30': 374,
        '40': 380
      },
      55: {
        '-10': 304,
        '0': 318,
        '10': 325,
        '20': 334,
        '30': 339,
        '40': 346
      },
      60: {
        '-10': 275,
        '0': 288,
        '10': 294,
        '20': 303,
        '30': 307,
        '40': 316
      },
      65: {
        '-10': 249,
        '0': 261,
        '10': 267,
        '20': 275,
        '30': 279,
        '40': 289
      },
```

```
            70: {
                '-10': 225,
                '0': 236,

                '10': 242,
                '20': 250,
                '30': 253,
                '40': 263
            },
        }
    }
},
21: {
    on: {
        speed: {
            45: {
                '-10': 273,
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                '10': 351,
                '20': 354,
                '30': 352,
                '40': 318
            },
            50: {
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                '0': 291,
                '10': 323,
                '20': 326,
                '30': 327,
                '40': 300
            },
            55: {
                '-10': 241,
                '0': 269,
                '10': 296,
                '20': 300,
                '30': 301,
                '40': 281
            },
            60: {
                '-10': 223,
                '0': 248,
                '10': 270,
                '20': 275,
                '30': 277,
                '40': 259
            },
            65: {
                '-10': 206,
                '0': 228,
                '10': 247,
                '20': 252,
                '30': 254,
                '40': 240
            },
            70: {
                '-10': 189,
                '0': 209,
                '10': 225,
                '20': 230,
                '30': 232,
                '40': 221
            },
```

```
          }
        },
        off: {
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    }
   }
  }
```

1.11.5 Virtual DOM

What a single-page application can give us is a seamless user experience and smooth interaction.

In our app, car model values are updated without having to reload the entire page.

every time the user changes speed or temperature. Even if you need to connect to the server to get the data. To provide this user experience, you need to know which part of the `DOM` you need to update when changes or interactions occur.

Each JavaScript framework uses a different strategy: `Ember` uses `data-binding`, `Angular1` uses dirty checking, and `React` uses Virtual DOM.

In React, the first time the component's rendering method is called, it prints a `virtual DOM` model, rather than the actual `DOM` element itself. The `virtual DOM` is a JavaScript data structure that represents the appearance of `DOM`. React then takes this model and creates the actual `DOM` element.

Then, whenever the component's state changes (eg, `setState` is called), the rendering method of the component is called and a new `virtual DOM` is created, and this new `virtual DOM` is replaced with the previous `virtual DOM`. The result of this comparison is to show the actual `DOM` changes and the `DOM` will be 'patched' with the changes and the screen will change.

> *The car model information does not change yet as the speed and temperature change. This will eventually be implemented later.*