

Redux Toolkit (RTK)

The Smart Way to Manage Shared States

The Goal - Shared State

We want to create a global variable (shared state) that every component in our React app can read or update — but only in a controlled, predictable way.

- Slice:
 - `createSlice()` defines how that variable can change (the rules).
- Store:
 - `configureStore()` creates the place where it lives (the single shared container).

createSlice

createSlice: makes a small factory for one feature

Think of your React app as a house: Each room is a feature — kitchen, bedroom, bathroom — each has its own stuff and rules.

App Part Example “Feature” What it stores (state)

App Part	Example “Feature”	What It Stores (State)
Chat page	chatSlice	messages, selected user
User login	authSlice	username, token, status
Todo list	todoSlice	tasks, filters, progress

- `createSlice` **defines** how one part of your app's state behaves by bundling:
 - State — the data it manages
 - Reducers — how it changes
 - Actions — the commands that trigger changes

Example:

```
const chatSlice = createSlice({
  name: "chat",
  initialState: { messages: [] },
  reducers: {
    addMessage: (state, action) => { state.messages.push(action.payload); },
    clearMessages: (state) => { state.messages = []; }
  }
});
```

✓ Output:

- chatSlice.reducer → updates data
- chatSlice.actions → { addMessage(), clearMessages() }

So createSlice builds the logic for one topic/feature (like “chat” or “user”).

configureStore: builds the big factory that runs everything

It combines all your slices' reducers into one master store.

- It sets up:
 - all reducers (like chat, user, etc.)
 - useful defaults (middleware, DevTools)
 - the single global state container

Example:

```
const store = configureStore({  
  reducer: {  
    chat: chatSlice.reducer,  
    user: userSlice.reducer  
  }  
});
```

Why? Separation of Business logic & States

- `createSlice` → what happens when actions occur (business logic).
- `configureStore` → where everything lives and runs (states).

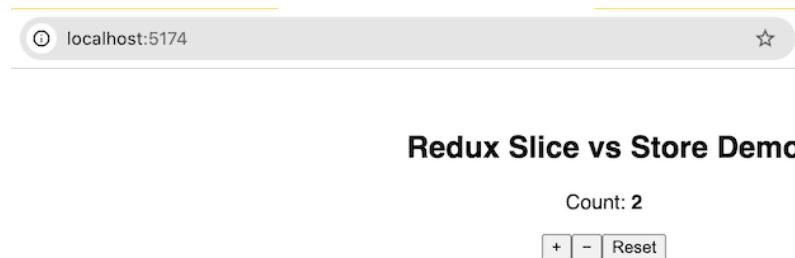
Together, they make Redux Toolkit both modular and easy — each slice is like one brain, and the store is the body connecting them all.

Example: count-app1

code/redux_toolkit/count-app1

```
npm install  
npm run dev
```

This example shows how to use slice/store to manage global states.



main

We use React Redux Provider to use store and slice:

```
import { Provider } from "react-redux";
```

The main Component (CounterApp) uses the store.

```
import React from "react";
import ReactDOM from "react-dom/client";
import { Provider } from "react-redux";
import { store } from "./store";
import CounterApp from "./CounterApp.jsx";

ReactDOM.createRoot(document.getElementById("root")).render(
  <Provider store={store}>
    <CounterApp />
  </Provider>
);
```

CounterSlice

We create counterSlice:

1. It has one state (value).
2. It has three reducer functions.

```
import { createSlice } from "@reduxjs/toolkit";

// A slice defines ONE feature's logic (state + reducers + actions)
const counterSlice = createSlice({
  name: "counter",
  initialState: { value: 0 },
  reducers: {
    increment: (state) => { state.value += 1; },
    decrement: (state) => { state.value -= 1; },
    reset: (state) => { state.value = 0; }
  }
});
```

- We export three slice actions to trigger the update.
- The default export function is the reducer.

```
// Export auto-generated actions
export const { increment, decrement, reset } = counterSlice.actions;

// Export the reducer for store
export default counterSlice.reducer;
```

store.js

Store combines all the reducers (we have only one in this example).

```
import { configureStore } from "@reduxjs/toolkit";
import counterReducer from "./counterSlice";

// The store combines ALL slices (features) into one global state
export const store = configureStore({
  reducer: {
    counter: counterReducer
  }
});
```

CounterApp

Trigger the Update

We import useSelector and useDispatch:

- We have three actions, increment/decrement/reset.

```
import { increment, decrement, reset } from "./counterSlice";
```

- dispatch is used to dispatch to trigger the action.

```
import React from "react";
import { useSelector, useDispatch } from "react-redux";

export default function CounterApp() {
  const dispatch = useDispatch();
```

```
<button onClick={() => dispatch(increment())}>+</button>
```

Retrieve the States

The count const is used to get the state value.

```
const counterSlice = createSlice({  
  name: "counter",  
  initialState: { value: 0 },
```

useSelector() subscribes the component to Redux state: so, when the value and React state count is updated, React redraws UI.

```
const count = useSelector((state) => state.counter.value);
```

```
return (
  <div style={{ fontFamily: "sans-serif", textAlign: "center", marginTop: "3em" }}>
    <h2>Redux Slice vs Store Demo</h2>
    <p>Count: <strong>{count}</strong></p>
    <button onClick={() => dispatch(increment())}>+</button>
    <button onClick={() => dispatch(decrement())}>-</button>
    <button onClick={() => dispatch(reset())}>Reset</button>
  </div>
);
}
```

Example: count-app2

code/redux_toolkit/count-app2

Counter with User Input

Update Redux state using arguments (payloads).

Current Value: 0

Step:

1

+ Step

- Step

Set exact value:

e.g., 42

Set

Reset

counterSlice

States

The same slice with name "counter" and initial value 0.

```
const counterSlice = createSlice({  
  name: "counter",  
  initialState: { value: 0 },
```

It is accessed as follows:

```
// Inside the same createSlice  
setValue: (state, action) => {  
  const n = Number(action.payload);  
  if (!Number.isNaN(n)) state.value = n;  
},
```

```
const value = useSelector((state) => state.counter.value);
```

Argument Passing

We can get argument from the user through `action.payload`.

Without argument:

```
increment: (state) => { state.value += 1; },
```

With argument:

```
setValue: (state, action) => {
  const n = Number(action.payload);
  if (!Number.isNaN(n)) state.value = n;
},
```

The `createSlice` function: actions (triggers) are generated automatically.

```
import { createSlice } from "@reduxjs/toolkit";

const counterSlice = createSlice({
  name: "counter",
  initialState: { value: 0 },
  reducers: {
    setValue: (state, action) => {
      const n = Number(action.payload);
      if (!Number.isNaN(n)) state.value = n;
    },
    incrementBy: (state, action) => {
      const n = Number(action.payload) || 0;
      state.value += n;
    },
    decrementBy: (state, action) => {
      const n = Number(action.payload) || 0;
      state.value -= n;
    },
    reset: (state) => { state.value = 0; }
  }
});

export const { setValue, incrementBy, decrementBy, reset } = counterSlice.actions;
export default counterSlice.reducer;
```

CounterApp

We access the four actions from counterSlice:

```
import React, { useState } from "react";
import { useSelector, useDispatch } from "react-redux";
import { setValue, incrementBy, decrementBy, reset } from "./counterSlice";
```

We use selector for getting the state, and dispatch for updating the state.

```
export default function CounterApp() {
  const value = useSelector((s) => s.counter.value);
  const dispatch = useDispatch();
```

We create states for React UI.

```
const [step, setStep] = useState(1);
const [direct, setDirect] = useState("");
```

We use dispatch to trigger states (global variables) update using dispatch and action.

```
const onInc = () => dispatch(incrementBy(Number(step) || 0));
const onDec = () => dispatch(decrementBy(Number(step) || 0));
const onSet = () => dispatch(setValue(direct));
```

This is React UI:

```
return (
  <div className="card">
    <h2>Counter with User Input</h2>
    <p className="muted">Update Redux state using arguments (payloads).</p>
```

Current value is displayed:

```
<h3>Current Value: {value}</h3>
```

We get user input using `input`, and when users give a value, the value is updated using `setStep`.

```
const [step, setStep] = useState(1);
```

User's input is used to update the `step` state.

```
<div className="row">
  <label>Step:</label>
  <input
    type="number"
    value={step}
    onChange={(e) => setStep(e.target.value)}
  />
```

Step: + Step - Step

```
const onInc = () => dispatch(incrementBy(Number(step) || 0));
const onDec = () => dispatch(decrementBy(Number(step) || 0));
const onSet = () => dispatch(setValue(direct));
```

```
<button onClick={onInc}>+ Step</button>
<button onClick={onDec}>- Step</button>
```

1. incrementBy is the action to trigger the update: When you call incrementBy(5), it returns an action object like:

```
{ type: "counter/incrementBy", payload: 5 }
```

```
dispatch(incrementBy(Number(step) || 0));
```

2. dispatch() tells the Redux store: "Here's an action — go update the state.

The store looks at the action type ("counter/incrementBy") and runs the matching reducer from your slice.

```
incrementBy: (state, action) => {
  state.value += action.payload;
}
```

```
const value = useSelector((s) => s.counter.value);  
<h3>Current Value: {value}</h3>
```

3. React auto-updates the UI

- useSelector() subscribes the component to Redux state.
- When the state changes, React automatically re-renders the component, showing the new value — no manual refresh or setState needed.

Setting value follows the same pattern:

```
<div className="row">
  <label>Set exact value:</label>
  <input
    type="number"
    value={direct}
    onChange={(e) => setDirect(e.target.value)}
    placeholder="e.g., 42"
  />
  <button onClick={onSet}>Set</button>
  <button onClick={() => dispatch(reset())}>Reset</button>
</div>
```