

EXPERIMENT - 8

Enable **real-time communication** via WebSockets

In this experiment, we added **real-time communication** to our Budget Tracker app using **Socket.IO**, which is based on **WebSockets**.

- **WebSockets** allow the server and multiple clients (browsers) to **send data to each other instantly** without refreshing the page.
- **Socket.IO** is a Node.js library that makes WebSocket communication simple and reliable.
- When a user adds a transaction, the **server receives the data** and **broadcasts it to all connected clients**.
- This means every user sees the updated transaction list **immediately**, creating a **real-time experience**.
- The experiment also demonstrates **bi-directional communication**:
 - Client → Server: Sends new transactions
 - Server → All Clients: Updates transaction lists in real-time

Outputs :

```
PS C:\Users\Bajaj\OneDrive\Documents\budget-tracker\server> npm install socket.io
added 18 packages, removed 8 packages, changed 9 packages, and audited 397 packages in 10s
50 packages are looking for funding
  run `npm fund` for details
found 0 vulnerabilities
PS C:\Users\Bajaj\OneDrive\Documents\budget-tracker\server> |
```

```

PS C:\Users\Bajaj\OneDrive\Documents\budget-tracker\server> npm run dev

> budget-tracker@1.0.0 dev
> nodemon server.js

[nodemon] 3.1.10
[nodemon] to restart at any time, enter `rs`
[nodemon] watching path(s): *.*
[nodemon] watching extensions: js,mjs,cjs,json
[nodemon] starting `node server.js`
[dotenv@17.2.3] injecting env (3) from .env -- tip: 🌀 suppress all logs with { quiet: true }
(node:13276) [MONGODB DRIVER] Warning: useNewUrlParser is a deprecated option: useNewUrlParser has no effect since Node.js Driver version 4.0.0 and will be removed in the next major version
(Use `node --trace-warnings ...` to show where the warning was created)
(node:13276) [MONGODB DRIVER] Warning: useUnifiedTopology is a deprecated option: useUnifiedTopology has no effect since Node.js Driver version 4.0.0 and will be removed in the next major version
🚀 Server running on port 5000
✅ MongoDB connected

```

index.html

```

<!DOCTYPE html>
<html lang="en">
<head>
  <meta charset="UTF-8">
  <title>Budget Tracker - Real-Time</title>
  <script src="https://cdn.socket.io/4.7.2/socket.io.min.js"></script>
</head>
<body>
  <h1>Budget Tracker - Real-Time</h1>

  <form id="transactionForm">
    <input type="text" id="type" placeholder="Type (income/expense)" required>
    <input type="number" id="amount" placeholder="Amount" required>
    <button type="submit">Add Transaction</button>
  </form>

  <ul id="transactions"></ul>

  <script>
    const socket = io(); // connects to the same server

    // Listen for updates from server
    socket.on("updateTransactions", (data) => {
      const ul = document.getElementById("transactions");
      const li = document.createElement("li");
      li.textContent = `Type: ${data.type}, Amount: ${data.amount}`;
      ul.appendChild(li);
    });

    // Handle form submission
    document.getElementById("transactionForm").addEventListener("submit", (e) => {
      e.preventDefault();
      const type = document.getElementById("type").value;
      const amount = parseFloat(document.getElementById("amount").value);
      socket.emit("newTransaction", { type, amount });

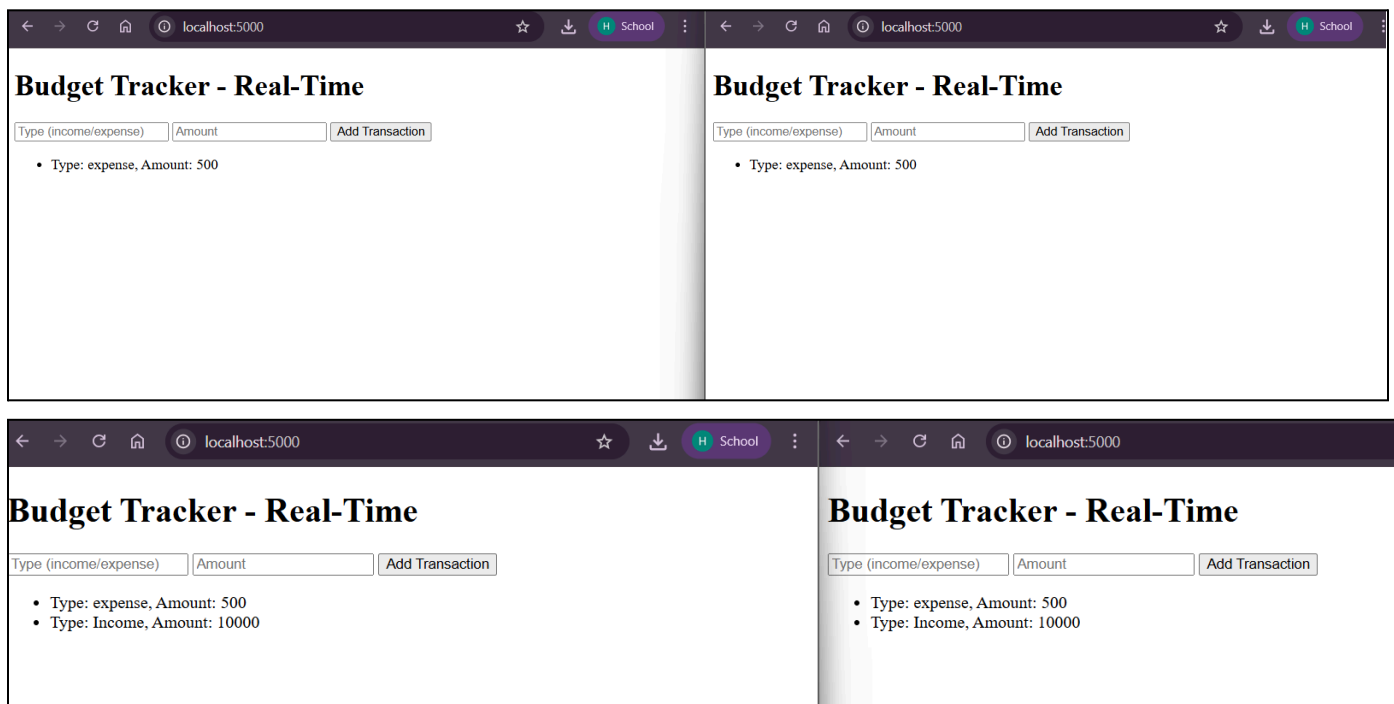
      // Clear inputs
      document.getElementById("type").value = "";
      document.getElementById("amount").value = "";
    });
  </script>
</body>

```

Budget Tracker - Real-Time

Type (income/expense) Amount Add Transaction

- Type: expense, Amount: 500



Key Outcome:

When a transaction is added in one browser tab, it appears **instantly** in other tabs without refreshing, proving that **real-time updates** are working perfectly.