Node.js Mini Project Report

Project Title: Real-Time Chat Application using Node.js and Socket.io

Submitted by: Igwegbe Emmanuel Chibueze

Date: May 2025

1. Project Description

This project is a real-time chat application built using Node.js, Express.js, and Socket.io. The app allows multiple users to connect and exchange messages in real-time through a web interface. It serves as a demonstration of Node.js’s asynchronous, event-driven capabilities and real-time communication via WebSockets.

2. Objectives

- To build a scalable web application using Node.js.
- To implement real-time two-way communication with Socket.io.
- To understand the asynchronous behavior of Node.js.
- To practically demonstrate Node.js's use in modern web development.

3. Technologies Used

Technology	Purpose
Node.js	Server-side JavaScript runtime
Express.js	Simplifies HTTP server creation and routing
Socket.io	Real-time, bidirectional communication
HTML/CSS	Frontend user interface
JavaScript	Client-side interactivity

4. Features

- Real-time message broadcasting to all connected clients.
- Simple user interface for sending and receiving messages.
- Uses WebSockets for low-latency communication.
- Scalable server setup with Express and Socket.io.

5. How It Works

1. When a user visits the site, they are served an HTML page by Express.
2. A WebSocket connection is opened between the client and the server.
3. When a user sends a message:
   - The client emits a `chat message` event.
   - The server listens for the event and broadcasts it to all clients.
4. All clients receive the message in real-time without reloading the page.

7. How to Run

1. Install Node.js and npm.
2. Extract the project zip and open terminal inside the folder.
3. Run:

```
npm install express socket.io
node server.js
```

4. Visit http://localhost:3000 in your browser.

8. Scalability Potential

- User authentication
- Chat rooms
- Storing chat history in a database
- Mobile responsive design
- Deployment to cloud platforms

9. Conclusion

This real-time chat application demonstrates the power of Node.js and Socket.io for building modern, real-time web applications. It highlights the simplicity and efficiency of asynchronous I/O and event-driven programming, core to Node.js.