Department of Artificial Intelligence and Machine Learning
B.Tech. Sem: V Subject: Full Stack Development Laboratory (DJS22AML504)

Experiment 10

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Experiment No:- 10

Aim:- Create an application to demonstate NodeJS function

Theory:-

Node JS is powerful event driven, non-blocking I/O model for building scalable applications.

It is particularly well suited for building web server.

- Synchronous Functions:- Functions that block the execution through, until they are completed.
- Asynchronous Function:- Functions that given independently without blocking the main program flow.
- Callback:- Functions that are passed as argument and give executed once the asynchronous task is complete.
- Promise:- A more modern way to have asynchronous operation
- Arrow function:- Short syntax for writing function in Javascript

```
function printMessage(){
    console.log("Hello")
}
printMessage();

function async_function(){
    console.log("Starting async");
    setTimeout(() => {
        console.log("Async operation");
    }, 2000);
}

asyncFunction();

function (callback){
    setTimeout(() => {
        const data = "filtered data";
        callback(data)
    }, 3000);

function display(data){
    console.log("Data recevied", data)
}
function data(displayData);
```

Conclusion:- Thus, we have various operation with feature function given by NodeJs & we implemented the same as asm.

Aim	**Create an application to demonstrate Node.js Functions**
Software	VS Code
Pre-requisite	Active internet connection
Code	**server.js**

```
const express = require('express');
const path = require('path');
const cors = require('cors'); // Import cors
const app = express();

app.use(cors()); // Enable CORS for all routes
app.use(express.json()); // Middleware to parse JSON requests

// Serve the HTML file on the root route
app.get('/', (req, res) => {
   res.sendFile(path.join(__dirname, 'index.html'));
});

// Middleware Functions

// Request Logging Middleware (Regular Function)
function logRequest(req, res, next) {
   console.log(`${req.method} request to ${req.url}`);
   next();
}
app.use(logRequest);

// Error Handling Middleware (Arrow Function)
const errorHandler = (err, req, res, next) => {
   console.error('Error:', err.message);
   res.status(500).json({ error: 'An error occurred', message: err.message });
};

// Utility Functions

// Formatting Response (Regular Function)
function formatResponse(data) {
   return { success: true, timestamp: new Date(), data };
}

// Generating Random Data (Arrow Function)
const generateRandomId = () => Math.floor(Math.random() * 1000);

// Route Handling Functions

// Sample "database" (array)
let items = [];
```

```
// Create Item (POST) - Regular Function
app.post('/items', (req, res) => {
   const newItem = { id: generateRandomId(), ...req.body };
   items.push(newItem);
   res.json(formatResponse(newItem));
});

// Read All Items (GET) - Anonymous Function
app.get('/items', function (req, res) {
   res.json(formatResponse(items));
});

// Read Single Item (GET by ID) - Arrow Function
app.get('/items/:id', (req, res) => {
   const item = items.find(i => i.id == req.params.id);
   if (item) {
      res.json(formatResponse(item));
   } else {
      res.status(404).json({ error: 'Item not found' });
   }
});

// Update Item (PUT) - Asynchronous Function with Try-Catch
app.put('/items/:id', async (req, res) => {
   try {
      const index = items.findIndex(i => i.id == req.params.id);
      if (index === -1) throw new Error('Item not found');

      items[index] = { ...items[index], ...req.body };
      res.json(formatResponse(items[index]));
   } catch (error) {
      res.status(404).json({ error: error.message });
   }
});

// Delete Item (DELETE) - Callback with Promise
app.delete('/items/:id', (req, res) => {
   return new Promise((resolve, reject) => {
      const index = items.findIndex(i => i.id == req.params.id);
      if (index !== -1) {
         const deletedItem = items.splice(index, 1);
         resolve(formatResponse(deletedItem[0]));
      } else {
         reject(new Error('Item not found'));
      }
   })
   .then(response => res.json(response))
```

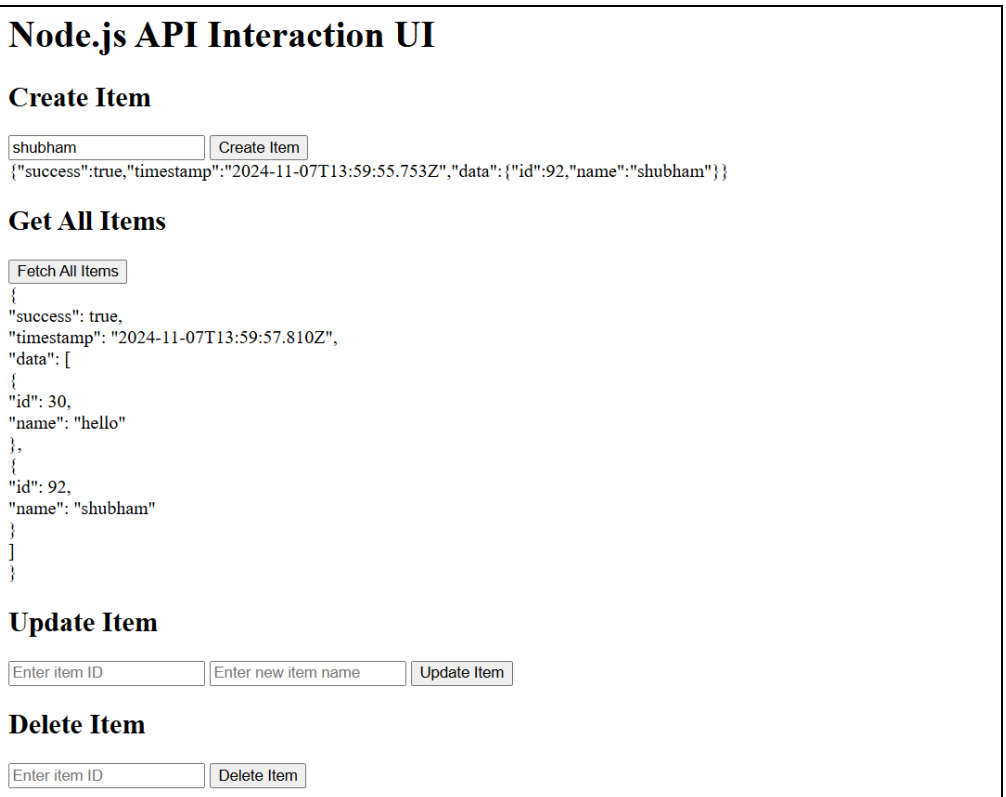
```
    .catch(error => res.status(404).json({ error: error.message }));
});

// Simulating Asynchronous Operations (Database call simulation)
app.get('/async-data', async (req, res, next) => {
    try {
        const data = await simulateAsyncDataFetch(); // Mock async function
        res.json(formatResponse(data));
    } catch (error) {
        next(error);
    }
});

// Simulate async data fetch (returns data after 2 seconds)
function simulateAsyncDataFetch() {
    return new Promise((resolve) => {
        setTimeout(() => {
            resolve({ message: 'Simulated database data', timestamp: new Date()
});
        }, 2000);
    });
}

// Use error handling middleware
app.use(errorHandler);

// Start the server
const PORT = 3000;
app.listen(PORT, () => console.log(`Server running on port ${PORT}`));
```

index.html

```
<!DOCTYPE html>
<html lang="en">
<head>
    <meta charset="UTF-8">
    <meta name="viewport" content="width=device-width, initial-
scale=1.0">
    <title>Node.js API UI</title>
</head>
<body>
    <h1>Node.js API Interaction UI</h1>

    <!-- Section for Creating a New Item -->
    <h2>Create Item</h2>
    <input type="text" id="createName" placeholder="Enter item name">
    <button onclick="createItem()">Create Item</button>
    <div id="createResult"></div>
```

```
    <!-- Section for Reading All Items -->
    <h2>Get All Items</h2>
    <button onclick="getAllItems()">Fetch All Items</button>
    <div id="allItems"></div>

    <!-- Section for Updating an Item -->
    <h2>Update Item</h2>
    <input type="number" id="updateId" placeholder="Enter item ID">
    <input type="text" id="updateName" placeholder="Enter new item
name">
    <button onclick="updateItem()">Update Item</button>
    <div id="updateResult"></div>

    <!-- Section for Deleting an Item -->
    <h2>Delete Item</h2>
    <input type="number" id="deleteId" placeholder="Enter item ID">
    <button onclick="deleteItem()">Delete Item</button>
    <div id="deleteResult"></div>

    <!-- JavaScript for Making API Calls -->
    <script>
        const apiBase = 'http://localhost:3000';

        // Function to Create an Item
        async function createItem() {
            const name = document.getElementById('createName').value;
            const response = await fetch(`${apiBase}/items`, {
                method: 'POST',
                headers: { 'Content-Type': 'application/json' },
                body: JSON.stringify({ name })
            });
            const result = await response.json();
            document.getElementById('createResult').innerText =
JSON.stringify(result);
        }

        // Function to Get All Items
        async function getAllItems() {
            const response = await fetch(`${apiBase}/items`);
            const items = await response.json();
            document.getElementById('allItems').innerText =
JSON.stringify(items, null, 2);
        }

        // Function to Update an Item
        async function updateItem() {
            const id = document.getElementById('updateId').value;
```

```
            const name = document.getElementById('updateName').value;
            const response = await fetch(`${apiBase}/items/${id}`, {
                method: 'PUT',
                headers: { 'Content-Type': 'application/json' },
                body: JSON.stringify({ name })
            });
            const result = await response.json();
            document.getElementById('updateResult').innerText =
JSON.stringify(result);
        }

        // Function to Delete an Item
        async function deleteItem() {
            const id = document.getElementById('deleteId').value;
            const response = await fetch(`${apiBase}/items/${id}`, {
                method: 'DELETE'
            });
            const result = await response.json();
            document.getElementById('deleteResult').innerText =
JSON.stringify(result);
        }
    </script>
</body>
</html>
```

Result	
Conclusion	Thus, we have successfully performed conditional rendering in a React application by demonstrating how server-side operations can be integrated with client-side interactions. This experiment covered CRUD operations and showcased the use of various function types in Node.js, including regular functions, arrow functions, and async functions. By building a simple UI in HTML, we enabled interaction with a Node.js API to create, read, update, and delete items, effectively simulating a full-stack web application without the need for a database. This practical experience enhances understanding of handling HTTP requests and responses in a web application.