**Generated MCQs**

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**Q1: What is the primary role of the V8 engine in the context of Node.js?**

A) To manage the event loop and asynchronous operations.

B) To provide a cross-platform runtime environment.

**C) To compile and execute JavaScript code outside the browser.**

D) To handle file system interactions and network requests.

**Correct Answer: C**

**Q2: How does Node.js handle multiple concurrent user requests efficiently despite running in a single process?**

A) By creating a new thread for each incoming request.

**B) Through an event-driven, non-blocking I/O model.**

C) By buffering all incoming data before processing.

D) By utilizing multiple V8 engines simultaneously.

**Correct Answer: B**

**Q3: Which characteristic allows Node.js applications to handle tasks like file uploads efficiently without significant processing delays?**

A) Highly scalable nature due to the event mechanism.

B) Single-threaded execution model.

**C) Absence of data buffering, processing data in chunks.**

D) Use of JavaScript for server-side applications.

**Correct Answer: C**

**Q4: How does the Node.js process model fundamentally differ from the traditional web server model as described in the text?**

A) Node.js uses a thread pool, while traditional servers use a single thread.

B) Node.js handles requests sequentially, while traditional servers handle them concurrently.

**C) Traditional servers dedicate a thread per request, while Node.js uses a single thread with an event loop for I/O.**

D) Traditional servers are asynchronous by default, while Node.js is synchronous.

**Correct Answer: C**

**Q5: What underlying C library does Node.js use internally to manage its event loop and provide asynchronous I/O capabilities?**

A) V8 Engine

**B) libuv**

C) NPM

D) ECMAScript

**Correct Answer: B**

**Q6: Why is Node.js considered advantageous for developers already proficient in frontend JavaScript?**

A) It automatically converts frontend code to backend code.

**B) It allows using the same language (JavaScript) for both client-side and server-side development.**

C) It eliminates the need for HTML and CSS in web applications.

D) It provides direct access to browser DOM elements on the server.

**Correct Answer: B**

**Q7: When setting up a Node.js development environment, which tool is typically included with the Node.js installation itself (since version 0.6.0)?**

A) A specific IDE like VS Code

B) The libuv library

**C) Node Package Manager (NPM)**

D) The V8 JavaScript Engine source code

**Correct Answer: C**

**Q8: In the provided Node.js web server example using the 'http' module, what is the purpose of the `response.writeHead(200, {'Content-Type': 'text/plain'});` line?**

A) To end the response and send it to the client.

B) To read the request headers from the client.

C) To write the main content ("Hello World") to the response body.

**D) To set the HTTP status code and content type header for the response.**

**Correct Answer: D**

**Q9: Which of the following APIs, commonly available in browser-based JavaScript, is typically absent in a Node.js environment?**

A) `console.log()`

B) `setTimeout()`

C) `JSON.parse()`

**D) `document.getElementById()`**

**Correct Answer: D**

**Q10: What is the primary function of the Node.js REPL environment?**

A) To package Node.js applications for deployment.

B) To install and manage external Node.js modules.

**C) To provide an interactive shell for executing JavaScript code snippets and debugging.**

D) To automatically compile TypeScript code into JavaScript.

**Correct Answer: C**

**Q11: In the context of Node.js asynchronous operations, what is a callback function?**

A) A function that blocks the execution until an I/O operation is complete.

**B) A function passed as an argument to another function, to be executed upon completion of a task (like I/O).**

C) A special function used only for handling errors in Node.js.

D) A built-in Node.js function for synchronous file reading.

**Correct Answer: B**

**Q12: Consider the blocking vs. non-blocking code examples for reading 'input.txt'. Why does the non-blocking example print "Program Ended" before the file content?**

A) The file reading operation failed, so it skipped printing the content.

**B) `fs.readFile` starts the file reading and immediately returns control, allowing subsequent code to execute while I/O happens asynchronously.**

C) The `console.log("Program Ended");` statement has higher priority in the event loop.

D) The blocking example uses an incorrect function call.

**Correct Answer: B**

**Q13: When using the Node.js FS module, why is the asynchronous method (`fs.readFile`) generally preferred over the synchronous method (`fs.readFileSync`)?**

A) Synchronous methods are deprecated in newer Node.js versions.

**B) Asynchronous methods do not block the main execution thread, improving performance for concurrent operations.**

C) Synchronous methods require manual error handling, while asynchronous methods handle errors automatically.

D) Asynchronous methods can read larger files than synchronous methods.

**Correct Answer: B**

**Q14: What is the primary purpose of the Node.js Buffer class?**

A) To manage the event queue for asynchronous operations.

**B) To interact with raw binary data streams (like file system or network operations).**

C) To store JavaScript string data more efficiently.

D) To provide utility functions for mathematical calculations.

**Correct Answer: B**

**Q15: Which method would you use to combine two separate Node.js Buffer instances into a single new Buffer?**

A) `buf.copy()`

B) `buf.concat()`

**C) `Buffer.concat()`**

D) `buf.write()`

**Correct Answer: C**

**Q16: In Node.js streams, which event is typically emitted when there is no more data to be read from a readable stream?**

A) `data`

B) `error`

C) `finish`

**D) `end`**

**Correct Answer: D**

**Q17: What does the term "piping" refer to in the context of Node.js streams?**

A) Writing data directly to the console output.

**B) Connecting the output of a readable stream directly to the input of a writable stream.**

C) Compressing stream data using the 'zlib' module.

D) Handling errors that occur during stream operations.

**Correct Answer: B**

**Q18: Based on the "Chaining the Streams" example, what is the role of `zlib.createGzip()`?**

A) It's a readable stream that reads the original file.

B) It's a writable stream that writes the decompressed file.

**C) It's a transform stream that compresses the data flowing through it.**

D) It's a duplex stream used for network communication.

**Correct Answer: C**

**Q19: According to the Web Application Architecture description, which layer is responsible for interacting directly with databases or other data sources?**

A) Client Layer

B) Server Layer

C) Business Layer

**D) Data Layer**

**Correct Answer: D**

**Q20: In the Node.js web server code that serves 'index.html', what module is used to parse the requested URL path?**

A) `http`

B) `fs`

**C) `url`**

D) `path`

**Correct Answer: C**

**Q21: What pattern does Node.js use for its event handling mechanism, where listener functions react to fired events?**

A) Singleton Pattern

B) Factory Pattern

**C) Observer Pattern**

D) Decorator Pattern

**Correct Answer: C**

**Q22: When using the `EventEmitter` class, which method is used to trigger or fire a specific named event?**

A) `.on()`

B) `.addListener()`

**C) `.emit()`**

D) `.removeListener()`

**Correct Answer: C**

**Q23: What is the purpose of the `fs.unlink(path, callback)` method in the Node.js FS module?**

A) To create a symbolic link to a file.

B) To read the contents of a file.

**C) To delete a file.**

D) To rename a file.

**Correct Answer: C**

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