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Asynchronous function

In JavaScript, an asynchronous function is a function that operates asynchronously, meaning it can execute tasks concurrently with other parts of the program. This allows the program to continue executing other tasks while waiting for potentially time-consuming operations, such as fetching data from a remote server or reading files from disk, to complete. Asynchronous functions are commonly used in scenarios where tasks may take an unpredictable amount of time to finish, such as network requests or file I/O operations.

Here are the key aspects of asynchronous functions in JavaScript:

1. `async` **Keyword**: To define an asynchronous function, you use the `async` keyword before the function declaration. This keyword informs the JavaScript engine that the function will contain asynchronous operations and may use the `await` keyword inside its body.

```
async function myAsyncFunction() {
    // Asynchronous operations go here
}
```

2. `await` **Keyword**: The `await` keyword can only be used inside an asynchronous function. It is used to pause the execution of the function until a promise is settled (either fulfilled or rejected). When `await` is used with a promise, it waits for the promise to resolve and returns the resolved value.

```
async function fetchData() {
    const response = await fetch('https://example.com/data');
    const data = await response.json();
    console.log(data);
}
```

3. **Promises**: Asynchronous functions typically work with promises, which are objects representing the eventual completion or failure of an asynchronous operation. Promises are used to handle the result of asynchronous tasks in a structured and efficient manner.

```
function fetchData() {
    return fetch('https://example.com/data')
        .then(response => response.json())
        .then(data => {
```

```
            console.log(data);
        })
        .catch(error => {
            console.error('Error fetching data:', error);
        });
}
```

4. **Non-blocking Execution**: Asynchronous functions allow other parts of the program to continue executing while awaiting asynchronous tasks to complete. This non-blocking behavior helps prevent the program from becoming unresponsive during long-running operations.

Asynchronous functions are essential for handling tasks that involve waiting for external resources or operations, such as network requests, file I/O, timers, and more. They enable JavaScript programs to efficiently manage concurrency and improve responsiveness by executing tasks asynchronously.

The `await` keyword is used in asynchronous functions in JavaScript to pause the execution of the function until a promise is settled (either fulfilled or rejected). It allows you to write asynchronous code that looks and behaves more like synchronous code, making it easier to work with asynchronous operations.

Here's how the `await` keyword works:

1. **Usage Inside Async Functions**: The `await` keyword can only be used inside functions marked with the `async` keyword. When used inside an asynchronous function, `await` allows you to wait for a promise to resolve before continuing with the execution of the function.

```
async function fetchData() {
    const response = await fetch('https://example.com/data');
    const data = await response.json();
    console.log(data);
}
```

2. **Pausing Execution**: When an expression is followed by the `await` keyword, the function execution is paused at that line until the promise returned by the expression is settled. While waiting for the promise to settle, the JavaScript event loop is free to handle other tasks, ensuring that the program remains responsive.
3. **Promise Resolving**: When the promise is resolved (i.e., successfully fulfilled), the execution of the function resumes, and the resolved value of the promise is returned. If the promise is rejected, the `await` expression throws an error, which can be caught

using a `try...catch` block or handled using `.catch()` when dealing with promises directly.

4. **Error Handling**: When using `await`, it's common to wrap it in a `try...catch` block to handle any potential errors that might occur during the asynchronous operation. This allows you to gracefully handle errors without crashing the program.

```
async function fetchData() {
    try {
        const response = await fetch('https://example.com/data');
        const data = await response.json();
        console.log(data);
    } catch (error) {
        console.error('Error fetching data:', error);
    }
}
```

5. **Non-Blocking**: The `await` keyword makes asynchronous code appear synchronous without blocking the main thread. It ensures that other tasks can continue to execute while waiting for the asynchronous operation to complete, improving the overall responsiveness of the program.

Overall, the `await` keyword simplifies the handling of asynchronous operations in JavaScript by allowing you to write code that flows more naturally and is easier to understand, especially when dealing with promises and asynchronous functions.

In JavaScript, the `fetch` function is used to make asynchronous HTTP requests to fetch resources from the network. It provides a modern, Promise-based interface for working with network requests, allowing you to easily send requests and handle responses asynchronously.
