Notes on Promises in JavaScript

Introduction

Promises in JavaScript are a powerful tool for managing asynchronous operations. They provide a way to handle the outcome (success or failure) of an asynchronous task once it completes. Promises simplify asynchronous programming and help avoid callback hell.

Basic Concepts

- **Promise**: A promise represents the eventual completion or failure of an asynchronous operation and its resulting value.
- **States**: Promises have three possible states: pending, fulfilled, or rejected.
  - **Pending**: Initial state, neither fulfilled nor rejected.
  - **Fulfilled**: The asynchronous operation completed successfully.
  - **Rejected**: The asynchronous operation failed or encountered an error.
- **Handlers**: **then ()** is used to handle the successful completion of a promise, while **.catch()** is used to handle any errors that occur during the promise execution.
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Creating Promises

- Promises are created using the **Promise** constructor, which takes a callback function with **resolve** and **reject** parameters.
- Inside the callback function, **resolve ()** is called when the operation succeeds, and **reject()** is called when it fails.
- Example:

```
const myPromise = new Promise((resolve, reject) => {
    // Asynchronous operation
    if (operationSuccessful) {
        resolve(result);
    } else {
        reject(error);
    }
});
```

Consuming Promises

- Promises are consumed using **.then()** and **.catch()** methods.
- **.then()** is used to handle the fulfillment of a promise, and **.catch()** is used to handle rejection.

- Example:

```
myPromise
    .then(result => {
        // Handle successful operation
    })
    .catch(error => {
        // Handle error
    });
```

Chaining Promises

- Promises can be chained together using multiple **.then()** calls.
- Each **.then()** receives the result of the previous promise and returns a new promise.
- Chaining allows sequential execution of asynchronous operations.
- Example:

```
fetch(url)
    .then(response => response.json())
    .then(data => {
        // Process data
    })
    .catch(error => {
        // Handle error
    });
```

Error Handling

- Errors within promise chains can be caught using **.catch()** at the end of the chain.
- If any promise in the chain is rejected, the control jumps to the nearest **.catch()** handler.
- Example:

```
myPromise
    .then(result => {
        // Handle success
    })
    .catch(error => {
        // Handle error
    });
```

Conclusion

Promises are an essential feature of modern JavaScript for managing asynchronous operations. Understanding how to create, consume, chain, and handle errors with promises is crucial for writing clean and efficient asynchronous code. Promises simplify asynchronous programming, making it easier to write and maintain complex applications.