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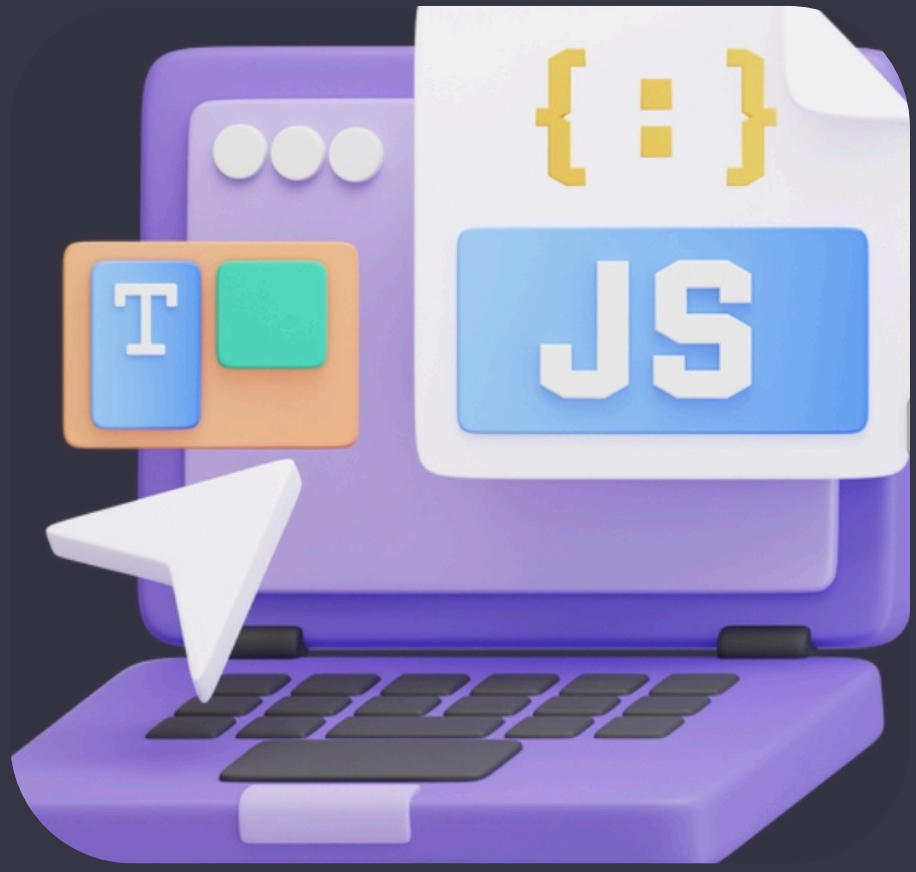
Web APIs

Web APIs are interfaces that allow web applications to communicate with external services or data sources over the internet.



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REST API

- REST APIs use standard HTTP methods & are stateless. They typically return data in JSON or XML format.
- Used for web services, where resources are accessed via URLs. Commonly used for CRUD operations on data.
- **Example:** GitHub API, Twitter API.

```
fetch('https://api.github.com/users/octocat')
  .then(response => response.json())
  .then(data => console.log(data))
  .catch(error => console.error('Error:', error));
```

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SOAP API

- SOAP is a protocol that uses XML for message format & typically relies on HTTP or SMTP for message negotiation & transmission.
- Enterprise-level applications requiring security, reliability, and formal contracts (WSDL).
- **Example:** Payment gateways, financial services APIs.

```
const soap = require('soap');
const url = 'https://www.example.com/service?wsdl';
soap.createClient(url, (err, client) => {
  if (err) throw err;
  client.MyFunction({param: 'value'}, (err, result) => {
    if (err) throw err;
    console.log(result);
  });
});
```

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GraphQL API

- GraphQL allows clients to request exactly the data they need, and nothing more. It uses a single endpoint and provides more flexibility compared to REST.
- When you need efficient querying of complex datasets, or when working with mobile applications where bandwidth is a concern.
- **Example:** Facebook's GraphQL API, Shopify API.

```
const { request, gql } = require('graphql-request');
const query = gql`
  {
    user(login: "octocat") {
      name
      bio
    }
  }
`;
request('https://api.github.com/graphql', query)
  .then(data => console.log(data))
  .catch(error => console.error('Error:', error));
```

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WebSockets API

- WebSockets enable real-time, two-way communication between client and server over a single, long-lived connection.
- Real-time applications like chat applications, live sports updates, and online games.
- **Example:** Slack API, trading platforms.

```
const socket = new WebSocket('wss://example.com/socket');
socket.onopen = () => {
  console.log('Connected');
  socket.send(JSON.stringify({type: 'subscribe', channel: 'news'}));
};
socket.onmessage = event => {
  console.log('Message from server', event.data);
};
socket.onclose = () => {
  console.log('Disconnected');
};
```

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OAuth APIs

- OAuth is a protocol that allows third-party applications to grant limited access to user accounts on an HTTP service, typically used for authentication and authorization.
- Used for single sign-on (SSO) and authorization across different services.
- **Example:** Google OAuth 2.0, Facebook Login API.

```
const axios = require('axios');
const token = 'your_oauth_token';
axios.get('https://api.example.com/userinfo', {
  headers: { Authorization: `Bearer ${token}` }
})
.then(response => console.log(response.data))
.catch(error => console.error('Error:', error));
```

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Batch API

- Batch APIs allow clients to make multiple API calls in a single HTTP request, often improving performance by reducing the number of network requests.
- When a client needs to perform multiple actions at once or when working with large datasets.
- **Example:** Facebook Graph API batch requests.

```
fetch('https://graph.facebook.com/v11.0', {
  method: 'POST',
  headers: { 'Content-Type': 'application/json' },
  body: JSON.stringify({
    batch: [
      { method: 'GET', relative_url: 'me' },
      { method: 'GET', relative_url: 'me/friends' }
    ],
    access_token: 'your_access_token'
  })
})
  .then(response => response.json())
  .then(data => console.log(data))
  .catch(error => console.error('Error:', error));
```

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