

# WEB DEVELOPMENT



LONGNDT

# SOFTWARE ARCHITECTURE STRATEGIES

## ❑ Monolithic

- Single codebase
- Simple for small apps

## ❑ Microservices

- Independent services
- Scalable for large systems

## ❑ Serverless

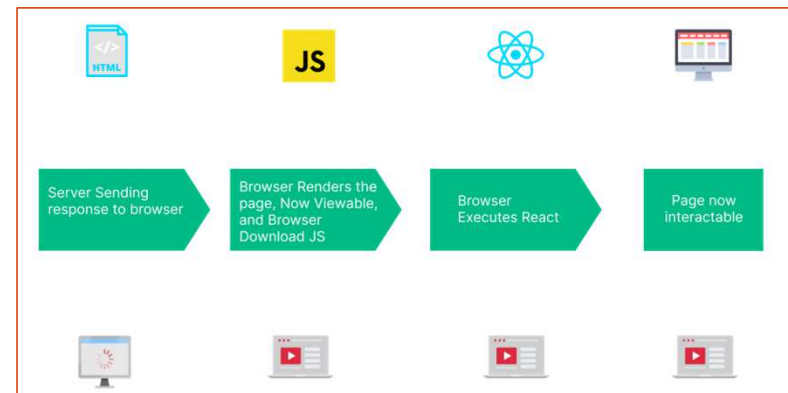
- Event-driven
- No server management



# WEB DEVELOPMENT ARCHITECTURE STRATEGIES

## ❖ Server-Side Rendering (SSR)

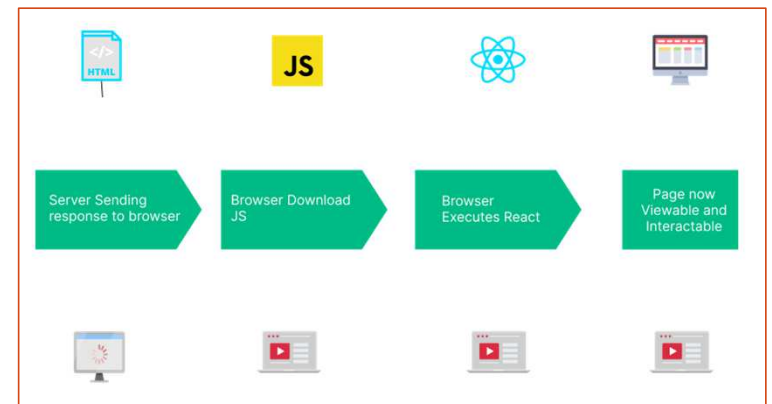
- Server renders HTML and sends it to client, reducing client-side processing
- Single project where front-end & back-end are tightly coupled
- Examples:
  - *JavaScript*: ExpressJS, NestJS
  - *Java*: Spring MVC, Spring Boot
  - *.NET*: .NET MVC, .NET Core
- Typical websites:
  - Amazon
  - New York Times
  - LinkedIn



# WEB DEVELOPMENT ARCHITECTURE STRATEGIES

## ❖ Client-Side Rendering (CSR or Single-Page App)

- Front-end communicates with back-end via APIs, rendering occurs on client
- Separate projects for front-end & back-end
- Examples:
  - *Front-end*: ReactJS, Angular, VueJS, NextJS, SvelteKit, Remix
  - *Back-end*: ExpressJS, NestJS, Spring Boot, Laravel, .NET Core, Flask
- Typical websites:
  - *ReactJS*: Facebook, Instagram, Netflix
  - *Angular*: Trello, Paypal
  - *VueJS*: Gitlab, Xiaomi, Alibaba



# WEB DEVELOPMENT ARCHITECTURE STRATEGIES

	Server-Side Rendering (SSR)	Client-Side Rendering (CSR)
Advantages	Better SEO	Less load on server
	Fast initial loading	Better UI/UX
Disadvantages	Frequent server requests	Slower initial load
	Slower time-to-interactive	SEO challenges



# WEB DEVELOPMENT ARCHITECTURE STRATEGIES

## ❖ Universal Web App (Isomorphic Web App)

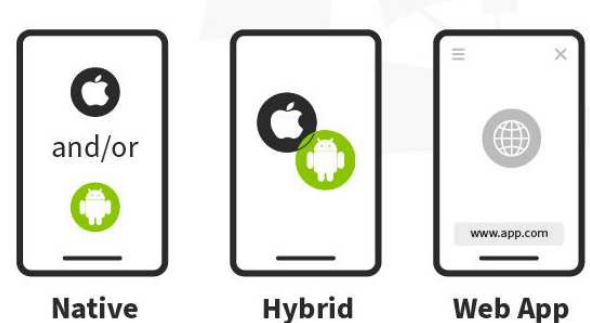
- Combine SSR & CSR to leverage advantages of both:
  - SSR: Better SEO, faster initial load, accessibility, social media preview
  - CSR: Rich interactivity, cost-effective rendering, easier maintenance
- Examples:
  - Next.js (React with SSR + CSR)
  - Nuxt.js (Vue with SSR + CSR)
  - Angular Universal
- Use cases:
  - SSR: Admin dashboard, content-heavy site
  - CSR: Interactive user portals



# WEB DEVELOPMENT ARCHITECTURE STRATEGIES

## ❖ Hybrid web app

- Current trend combining web and native app features
- Differs from Universal Web Apps (focus on SSR/CSR) by targeting native mobile + web
- Advantages:
  - Multiple platforms: web, iOS, Android
  - Faster build time, Easier to update, online/offline support
- Examples:
  - React Native
  - Flutter
  - Ionic, Capacitor



# DATABASE FOR WEB APPLICATION

## ❖ SQL (Structured Query Language)

- Relational database

- Examples:

- MySQL
- SQL Server
- SQLite
- Oracle
- PostgreSQL
- CockroachDB

- Use cases:

- Financial systems
- E-commerce





# DATABASE FOR WEB APPLICATION

## ❖ NoSQL (Not Only SQL)

- Non-relational database
- Examples:
  - MongoDB
  - Neo4j
  - Cassandra
  - Couchbase
  - DynamoDB
- Examples:
  - Real-time analytics
  - Content management



# DATABASE FOR WEB APPLICATION

	SQL	No-SQL
<b>Data Model</b>	Tables with fixed rows and columns	Document, Key-value, Graph, etc.
<b>Schema</b>	Strict, predefined	Flexible, dynamic
<b>Scalability</b>	Vertical (upgrade hardware)	Horizontal (add servers)
<b>Joins</b>	Required	Not required
<b>Data to Object Mapping</b>	Requires ORM (e.g., Sequelize)	No ORM needed (e.g., Mongoose)



# FULL-STACK WEB TECHNOLOGIES

## ❑ MERN

- MongoDB: NoSQL database
- ExpressJS: middleware
- ReactJS: front-end
- NodeJS: back-end

## ❑ MEVN

- MongoDB: NoSQL database
- ExpressJS: middleware
- VueJS: front-end
- NodeJS: back-end

## ❑ MEAN

- MongoDB: NoSQL database
- ExpressJS: middleware
- Angular: front-end
- NodeJS: back-end

## ❑ PERN

- PostgreSQL: SQL database
- ExpressJS: middleware
- VueJS: front-end
- NodeJS: back-end

❖ **Why popular ?** Lightweight, JavaScript-based, strong community support



# CLOUD SERVICES FOR WEB DEPLOYMENT

- **AWS:** Comprehensive cloud platform (EC2, S3, Lambda)
- **Azure:** Microsoft' cloud platform
- **GCP:** Scalable cloud services
- **Firebase:** Real-time database, hosting, authentication
- **Netlify:** Static site hosting, serverless function
- **Render:** Simplified deployment for web apps
- **Vercel:** Optimized for frontend frameworks (Next.js)
- **Heroku:** Easy PaaS for small apps

