

Introduction to Full Stack Web Development



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Dept. of Computer Science
Faculty of Science and Technology

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Lecture Outline



- ✓ Full Stack Web Development
- ✓ Frontend Libraries & Frameworks
- ✓ Backend Frameworks
- ✓ What is Tech Stack
- ✓ 3NP Stack
- ✓ API(Application Programming Interface)
- ✓ REST API
- ✓ Course Logistics
- ✓ Node.js
- ✓ Postman

Full Stack Web Development



Full stack web development refers to the practice of developing both the **frontend (client-side)** and **backend (server-side)** components of a web application.

A **full stack developer** is proficient in both frontend and backend technologies, allowing them to handle the complete development process and work on all layers of a web application.

Frontend



- Frontend development focuses on creating the **user interface** and **user experience** of a website or web application.
- It involves designing and developing the visual elements and interactive components.

Technologies used in frontend development;

- **HTML:** provides the structure and content of a web page.
- **CSS:** is used to style and customize the appearance of HTML elements.
- **JavaScript:** enables interactivity and dynamic behavior on a webpage.

Frontend Libraries & Frameworks



Libraries:

- jQuery
- Bootstrap
- Tailwind CSS
- Material-UI
- Semantic UI
- Bulma
- Foundation

Frameworks:

1. React.js (JavaScript)
2. Angular (TypeScript)
3. Vue.js (JavaScript)
4. Ember.js (JavaScript)
5. Svelte (JavaScript)
- 6. Next.js**
(JavaScript/TypeScript)

Backend



Backend refers to the server-side of web development, which encompasses the underlying processes and infrastructure that power a website or web application.

Key points about backend development:

Server Logic: Backend developers write code that processes incoming requests, handles business logic, performs data operations, and generates appropriate responses.

Databases: Backend development involves working with databases to store and retrieve data

APIs (Application Programming Interfaces): Backend developers create APIs that define the rules and formats for communication between the frontend and backend.

Backend Frameworks



1. Express.js (JavaScript/Node.js)
2. Django (Python)
3. Ruby on Rails (Ruby)
4. Laravel (PHP)
5. Spring Boot (Java)
6. ASP.NET Core (C#/.NET)
7. Flask (Python)
8. Play Framework (Java/Scala)
- 9. NestJS (JavaScript/TypeScript/Node.js)**
10. Phoenix (Elixir)

What is Tech Stack



Tech stacks are **a combination of frontend and backend technologies.**

Popular Stacks

LAMP stack: Linux - Apache - MySQL - PHP

LEMP stack: Linux - Nginx - MySQL - PHP

MEAN stack: MongoDB - Express - AngularJS - Node.js

Django stack: Python - Django - MySQL

Ruby on Rails: JavaScript - Ruby - SQLite - Rails

3NP Stack



Consists of Node.js, NestJS, Next.js, and PostgreSQL.

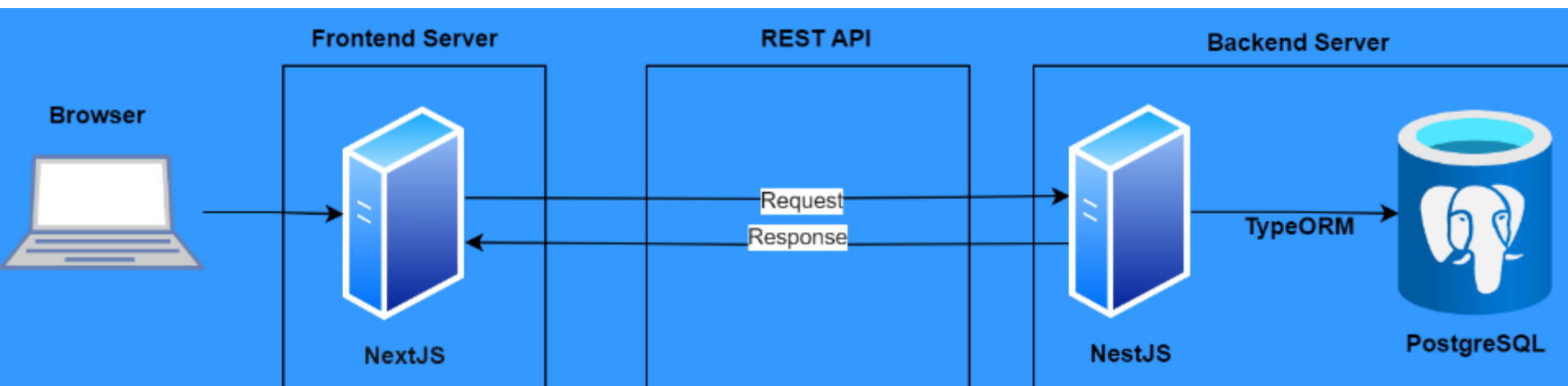
1.Node.js: Node.js is a JavaScript runtime environment that allows you to run JavaScript code on the server-side.

2.NestJS: NestJS is a **progressive** Node.js framework for building **efficient and scalable server-side applications** incorporates TypeScript for enhanced productivity.

3.Next.js: Next.js is a **React framework** for server-side rendering (SSR), static site generation (SSG), and client-side rendering (CSR).

4. PostgreSQL: PostgreSQL is a powerful open-source relational **database** management system.

3NP Stack



API(Application Programming Interface)



- is a set of defined **rules** that enable different applications to communicate with each other.
- It acts as an intermediary layer that processes data transfers between systems, letting companies **open their application** data and functionality to **external third-party** developers, business partners, and internal departments within their companies.

API protocols



- **SOAP (Simple Object Access Protocol):** Built with XML, SOAP enables endpoints to send and receive data through SMTP and HTTP.
- **XML-RPC (XML-Remote Procedure Call):** The XML-RPC protocol relies on a specific XML format to transfer data.
- **JSON-RPC:** Like XML-RPC, is a remote procedure call, but JSON (JavaScript Object Notation) is used instead of XML to transfer the data.
- **REST (Representational State Transfer):** REST is a set of web API architecture principles also known as a RESTful API—are APIs that adhere to certain REST architectural constraints.

REST API



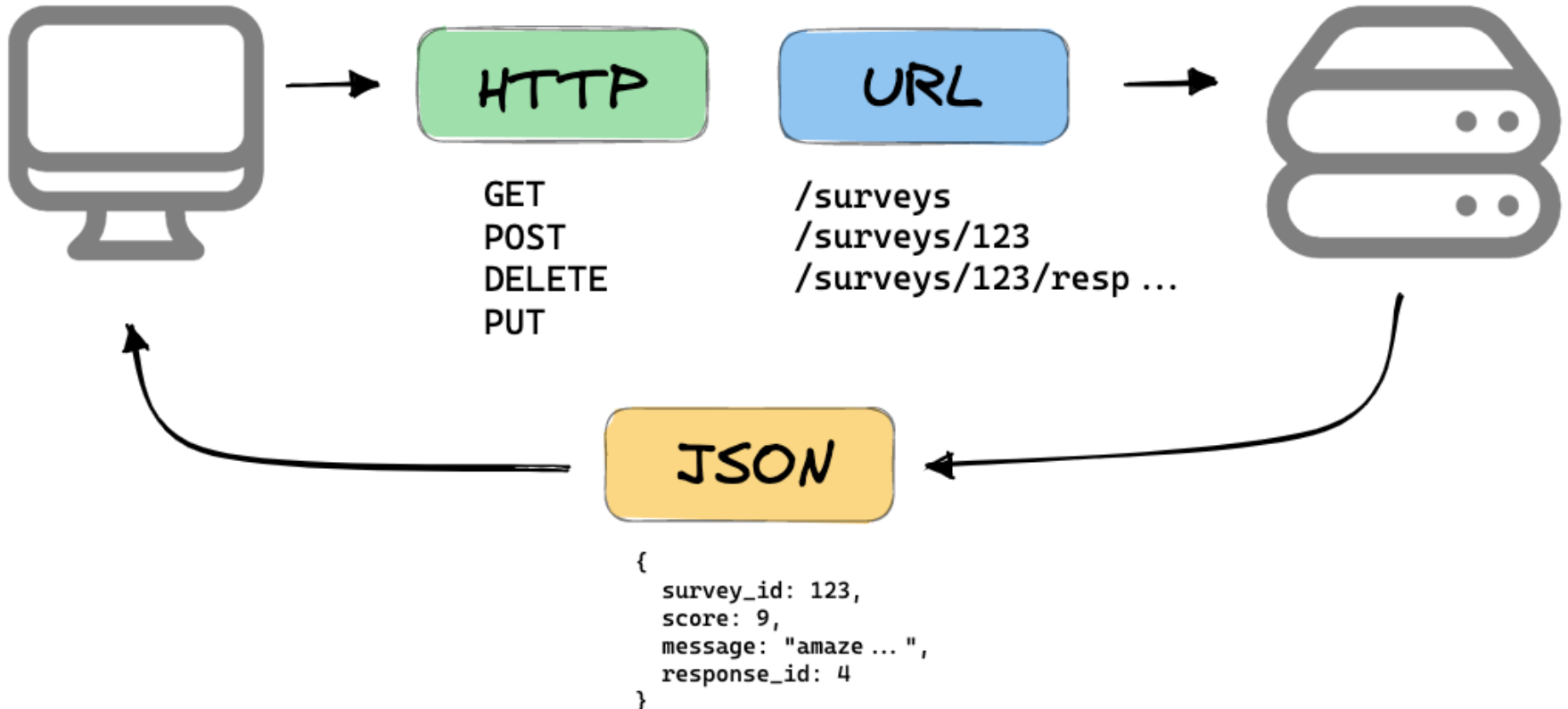
- First defined in 2000 by computer scientist Dr. Roy Fielding in his doctoral dissertation
- REST provides a relatively high level of flexibility and freedom for developers.
- This flexibility is just one reason why REST APIs have emerged as a common method for connecting components and applications in a **microservices** architecture.

REST API



CLIENT

SERVER



REST API



GET	/photo	Lists all the photos in the database
DELETE	/photos/{photoid}	Deletes a photo based on their id
POST	/pic	Creates a photo
PUT	/photos/{photoid}	Method to update a photo
GET	/photos/{photoid}	Retrieves a photo based on their id

[The list of main HTTP methods]

Course Logistics



- Node.js : <https://nodejs.org/en/download>
- Visual Studio Code : <https://code.visualstudio.com/>
- Postman: :
https://www.postman.com/downloads/?utm_source=postman-home
- PostgreSQL : <https://www.postgresql.org/download/>

Node.js



- Node.js is an open source server environment
- Node.js is free and runs on various platforms (Windows, Linux, Unix, Mac OS X, etc.)
- Node.js uses JavaScript on the server
- Same engine that powers the Google Chrome browser.
- Node.js uses **asynchronous** programming

PHP or ASP handles a file request	Node.js handles a file request
<ol style="list-style-type: none">1. Sends the task to the computer's file system.2. Waits while the file system opens and reads the file.3. Returns the content to the client.4. Ready to handle the next request.	<ol style="list-style-type: none">1. Sends the task to the computer's file system.2. Ready to handle the next request.3. When the file system has opened and read the file, the server returns the content to the client.

Node.js



NPM Ecosystem: Node.js has a vibrant and extensive ecosystem known as the Node Package Manager (NPM).

- NPM is a **package manager** that allows developers to easily install and manage third-party libraries and modules.
- It provides **access to a vast collection of reusable modules** that can be easily integrated into Node.js applications, saving development time and effort.
- NPM provides a command-line interface (CLI) that allows developers to interact with the NPM ecosystem.

Postman



- Postman is a popular collaboration platform and **API development tool** that simplifies the process of designing, testing, and documenting APIs.
- Postman acts as an API client, allowing developers to send HTTP requests to APIs and receive responses. It supports various HTTP methods like **GET, POST, PUT, DELETE**, etc., enabling developers to interact with different endpoints of an API.
- Postman provides a graphical user interface (GUI) that allows developers to easily build and customize requests.



References

1. W3Schools Online Web Tutorials, URL: <http://www.w3schools.com>
2. Node.js, URL: <https://nodejs.org/en/>
3. Next.js, URL: <https://nextjs.org/>



Thank You!