CodeTantra

Introduction to Web Development and the MEAN Stack

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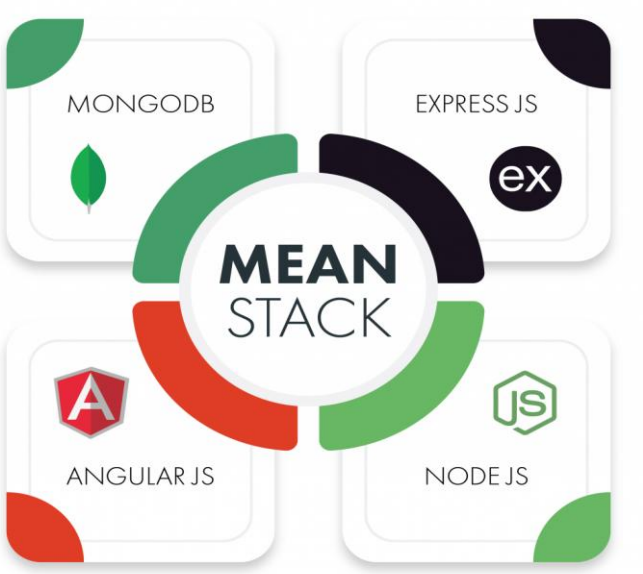
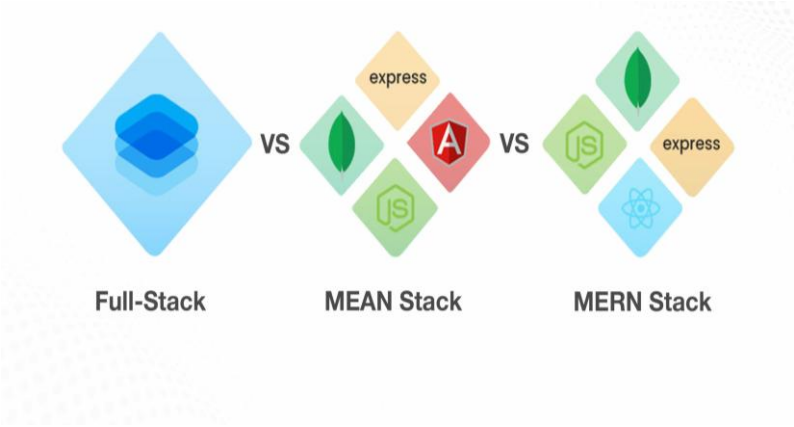


Overview of web development

What is Web Development?

- Web Development is the process of creating websites and web applications that run on the internet.
- It involves designing, building, and maintaining websites so that users can access them through a web browser.



Types of Web Development

- Frontend Development
- Backend Development
- Full Stack Development

FrontEnd Development

- Frontend development means building the visual and interactive part of a website or web application.
- Angular is a frontend framework developed by Google.
- It's used to build dynamic, single-page applications (SPAs) — meaning the page doesn't reload every time you click something.

Different Frontend Technologies

Technology	Type	Purpose
HTML	Markup Language	Structure
CSS	Styling Language	Design
React	Library	Component-Based UI
Angular	Framework	Full-Featured Frontend Development
vue.js	Framework	Fast & Compiled UI

Framework vs Library

- A framework is a complete structure or platform for building applications.
- It provides predefined architecture, tools, and rules for how your code should be organized and executed.
- **A framework gives you the full setup — it tells how to build your application.**

Examples: Angular, Django, Spring, Laravel, Vue.js

- A library is a collection of reusable code (functions, classes, or modules) that helps you perform specific tasks.

A library gives you tools — you decide how and when to use them.

Examples: React, jQuery, NumPy, Lodash

Restaurant Analogy

🏛️ Angular → Fine-Dining Restaurant

Everything is already planned and structured for you.
You just follow the menu and enjoy — the restaurant handles everything.
Angular works the same way — it gives a complete setup but with fixed rules.

🍕 React → Food Delivery Service

You choose what to order, from where, and how to mix things.
You get full freedom but must manage and arrange everything yourself.
React works the same way — it gives flexibility, but you build the structure.

Backend Development

- Backend development is the server-side part of a web application — it focuses on how the website works behind the scenes.
- It handles the logic, database interactions, authentication, and server configuration that users don't see directly.

Key Components of Backend Development

Server: It listens to client requests and responds accordingly.

Example: Node.js, Express.js, or Django act as backend servers.

Database: Stores, retrieves, and manages data.

Example: MongoDB, MySQL, PostgreSQL.

APIs (Application Programming Interfaces) :

They connect frontend and backend. The frontend calls an API to send or get data from the backend.

Example: REST APIs or GraphQL.

Different Backend Programming Languages

Backend Lanaguage	Backend Framework	Commonly used FrontEnd	How they Connect
JavaScript(Node.js)	Express.js, Nest.js	Angular, React, Vue	Communicate via REST APIs / JSON
Python	Django,Flask	React, Angular, Vue	Uses API endpoints (JSON) to send/receive data
PHP	Laravel, CodeIgniter	HTML, CSS, JS, React	Uses AJAX / APIs for dynamic content
Java	Spring Boot, JSP, Servlets	Angular, React	Connects via REST APIs / HTTP requests
C#(.NET)	ASP.NET Core	Angular, React	Connects using Web APIs/JSON Data
C++	Custom web servers / CGI	HTML, JS	Rarely used Directly for Web, but can serve Data through API's

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Web Development Process

- Planning → Define purpose, features, and layout.
- Designing → Create user interface (UI) and user experience (UX).
- Frontend Development → Build visible parts using HTML, CSS, JS.
- Backend Development → Set up database, server, and APIs.
- Testing → Check for bugs, performance, and security.
- Deployment → Host website on server (e.g., Vercel, AWS, etc.).
- Maintenance → Regular updates and performance optimization.

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Client-Server Arcitecture

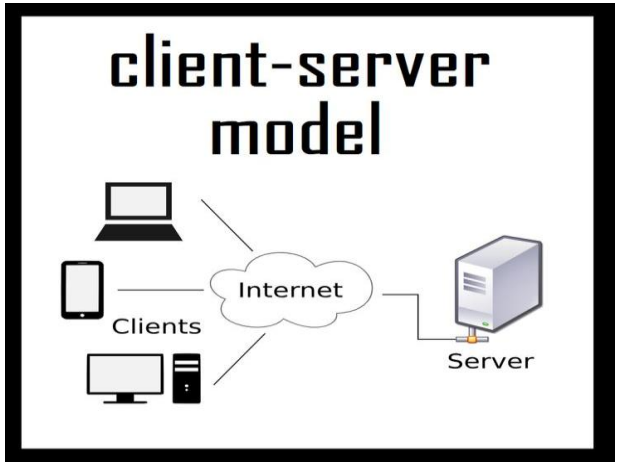
Client–Server Architecture is a network model that divides the system into two main parts:

Client: Sends request (like login, search, view data).

Server: Processes request using backend logic.

Database: Stores and retrieves data.

Response: Server sends result back to the client.



Key Technologies Used

Frontend	HTML,CSS,JS,Angular,React
Backend	Node.js,Express.js,Java(SpringBoot),Python(Django)
Database	MySQL,MongoDB,PostgreSQL
Version Control	Git,GitHub
Deployment	Vercel,Netlify,AWS,Heroku

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Java Full Stack vs MEAN Stack

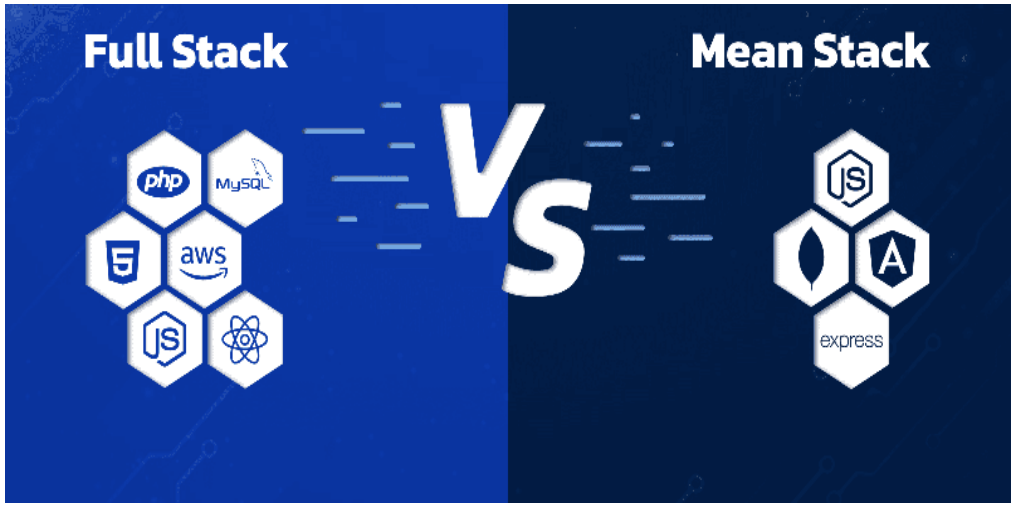
Backend Language:
- Java Full Stack → Uses Java with Spring Boot.
- MEAN Stack → Uses JavaScript with Node.js.

Frontend Framework:
- Java Full Stack → Can use Angular, React, or JSP.
- MEAN Stack → Uses Angular only.

Database Type:
- Java Full Stack → Uses SQL databases (MySQL, Oracle).
- MEAN Stack → Uses NoSQL database (MongoDB).

Learning Curve:
- Java Full Stack → Harder (multiple languages and tools).
- MEAN Stack → Easier (single language – JavaScript).

Best For:
- Java Full Stack → Enterprise and large-scale projects.
- MEAN Stack → Modern, fast, and real-time web apps.



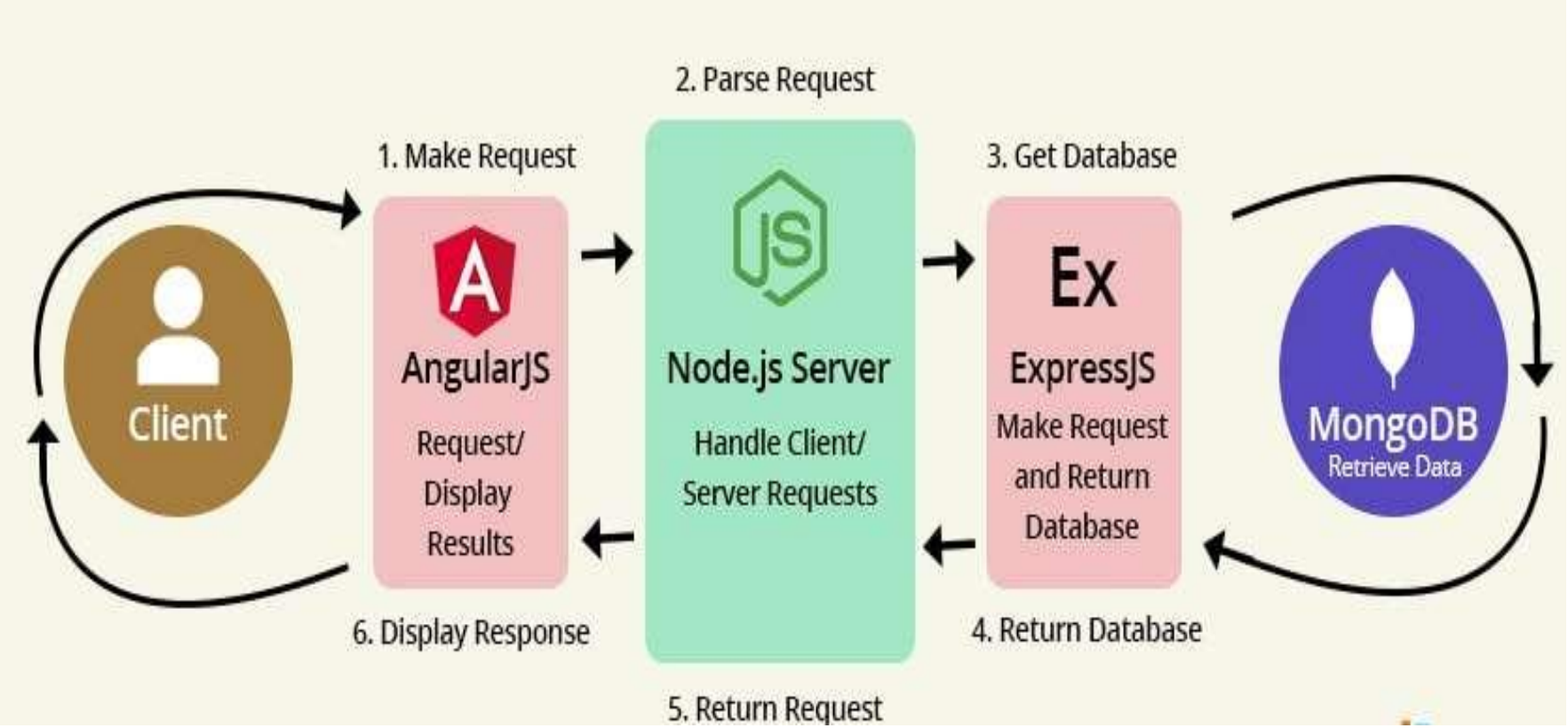
Introduction to the MEAN stack

- The MEAN stack is a popular full-stack JavaScript framework used to build dynamic web applications.
- It consists of four main technologies: MongoDB, Express.js, Angular, and Node.js.

Components of the MEAN Stack

- MongoDB: A NoSQL database that stores application data in a flexible, JSON-like format called BSON.
- Express.js: A web application framework for Node.js designed to build robust APIs and web applications quickly.
- Angular: A front-end framework maintained by Google, used to create interactive and dynamic web interfaces.
- Node.js: A JavaScript runtime environment that allows developers to run JavaScript on the server side.

Architecture of MEAN Stack



Architecture of MEAN Stack

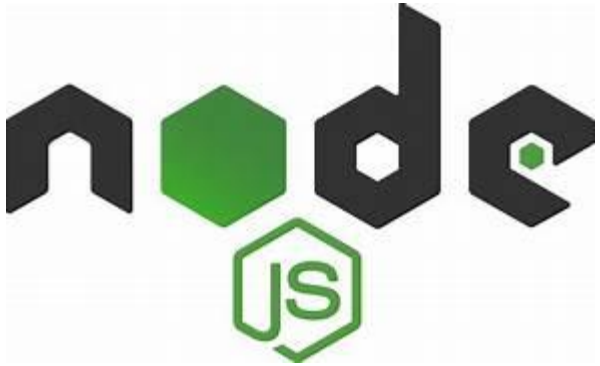
- The client sends a request through the browser, like clicking a button or submitting a form.
- AngularJS sends the request to the server to fetch or store data.
- Node.js receives and handles the request coming from AngularJS.
- Node.js forwards the request to Express.js for further processing.
- Express.js communicates with MongoDB to get or store the required data.
- MongoDB retrieves the data and sends it back to Express.js.
- Express.js returns the data to the Node.js server.
- Node.js sends the response back to AngularJS.
- AngularJS displays the received data or result to the client in the browser.
- The overall flow is: Client → AngularJS → Node.js → Express.js → MongoDB → Express.js → Node.js → AngularJS → Client.

Benefits of Using MEAN Stack

- **Full JavaScript Stack:** Developers can use JavaScript throughout the entire application, reducing context-switching and making code more reusable and maintainable.
- **Modern & Scalable:** Each component is designed for performance and scalability, making MEAN suitable for building cloud-ready and enterprise-grade web applications.
- **Efficient Development:** With a unified language, teams can collaborate more effectively and new developers can ramp up quickly.

Setting up the development environment

[Node JS Installation Pdf]
[MongoDB Installation Pdf]
[Angular Setup Pdf]



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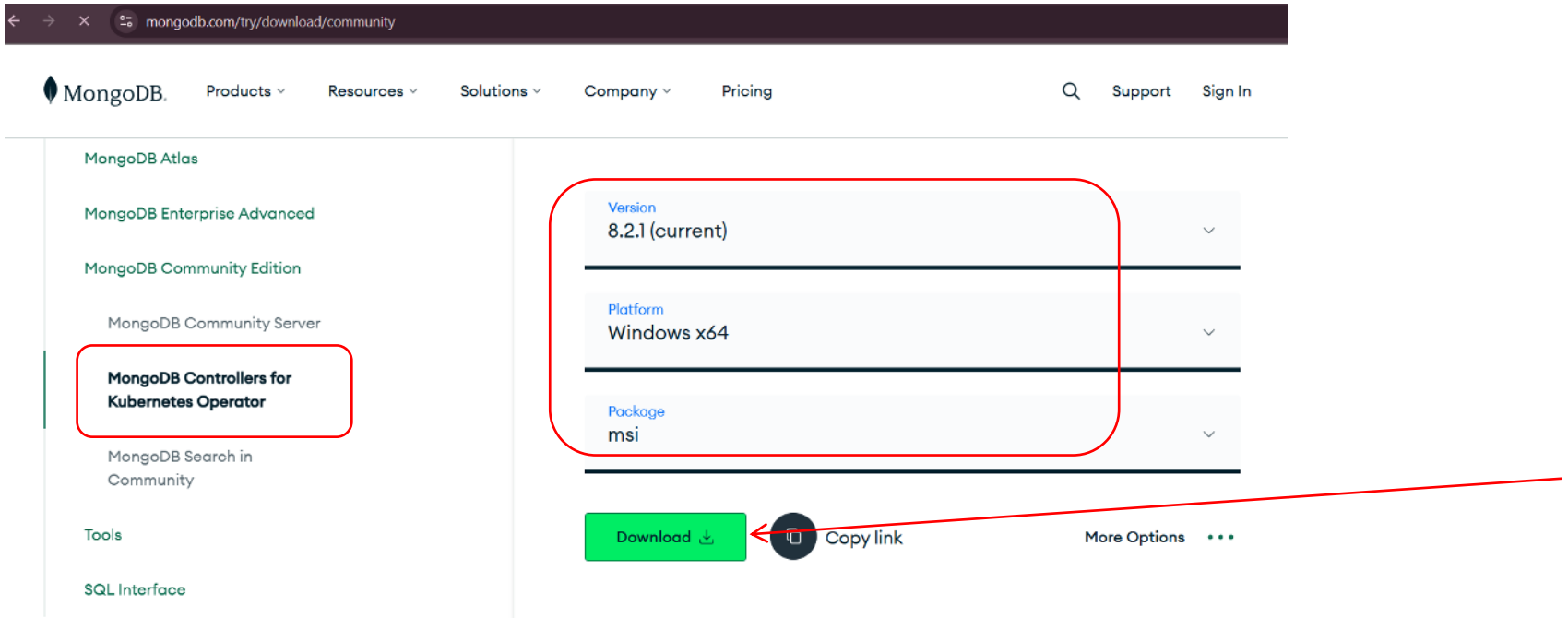
MongoDB Installation Guide

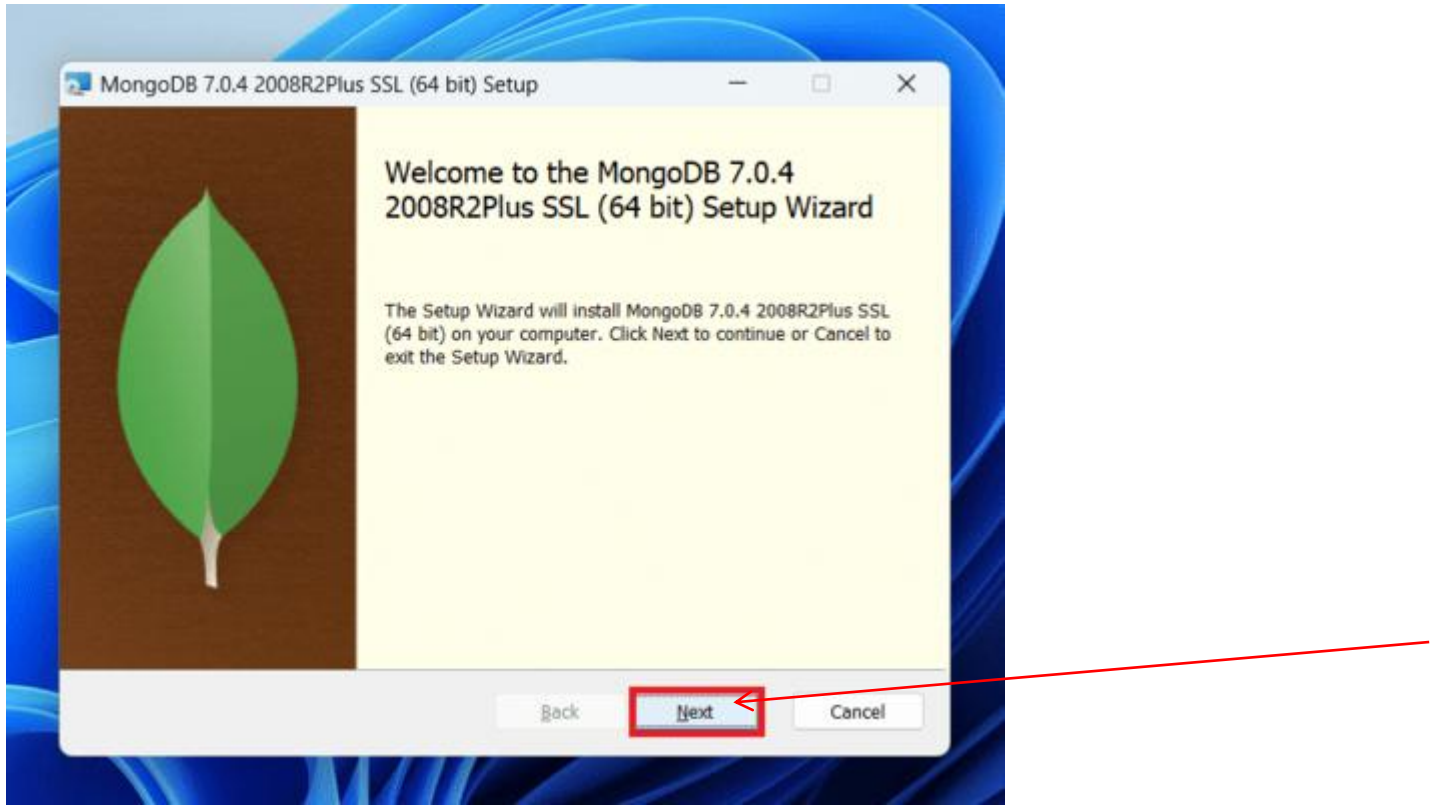
Download MongoDB Community Server

Go to the MongoDB Download Center to download the MongoDB Community Server.



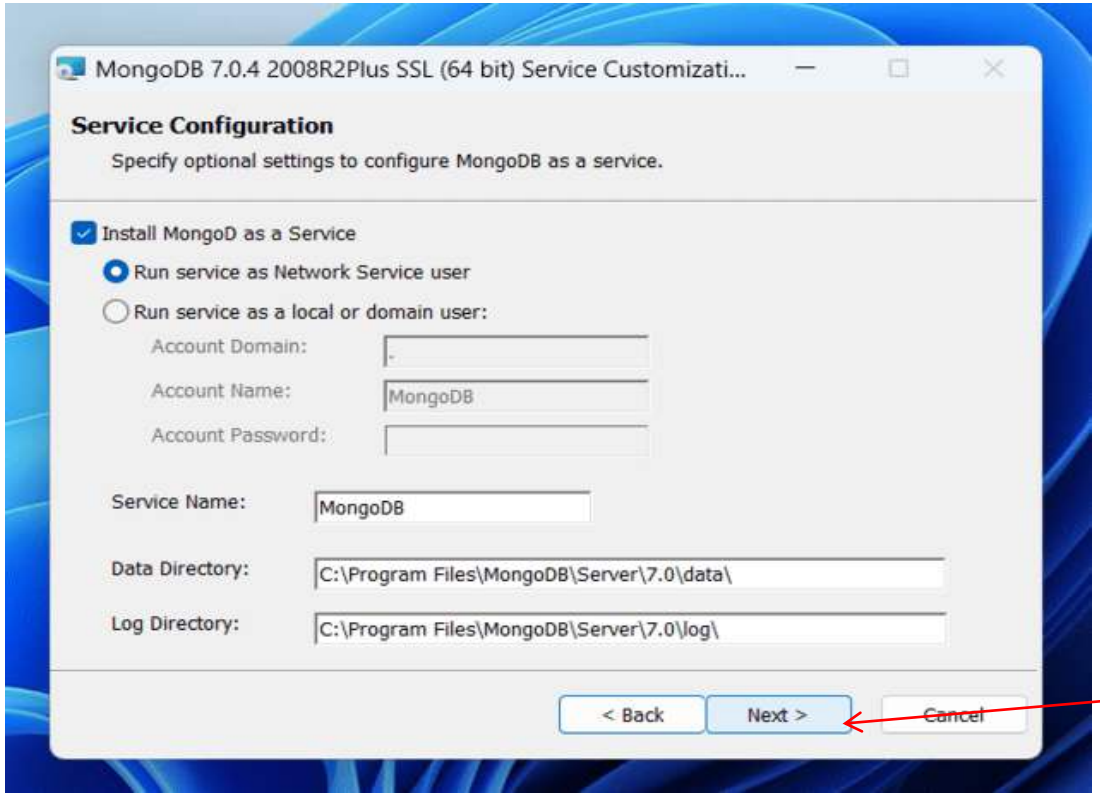
Install MongoDB

When the download is complete open the msi file and click the next button in the startup screen:



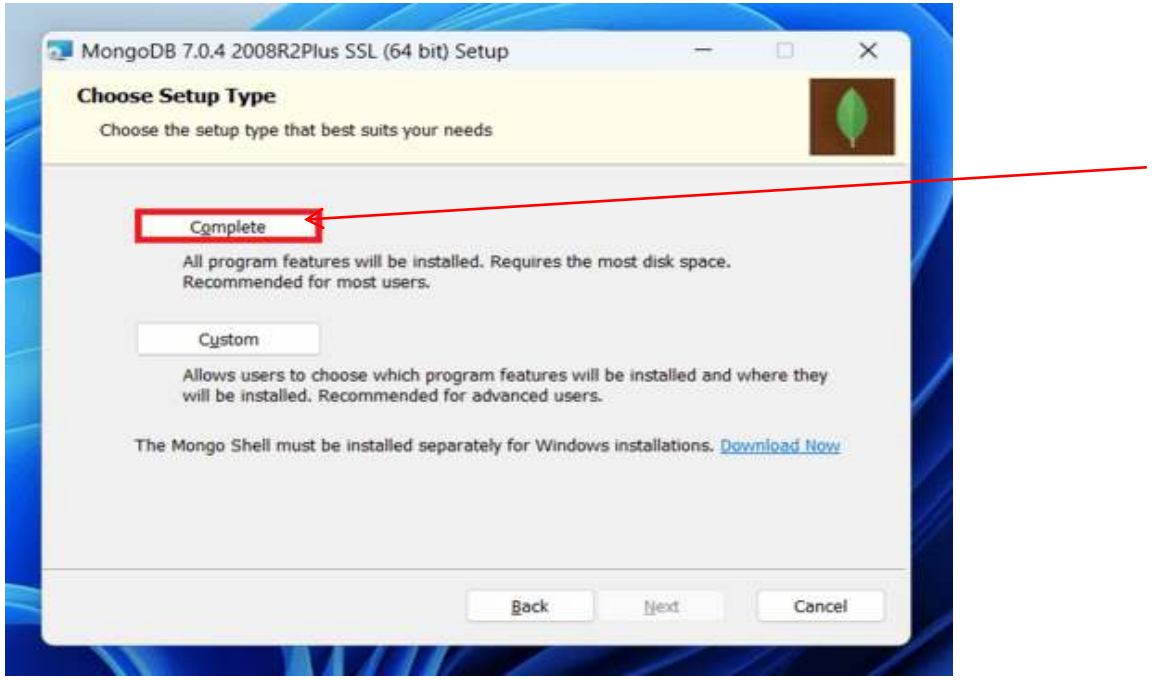
Install MongoDB

Now accept the End-User License Agreement and click the next button:



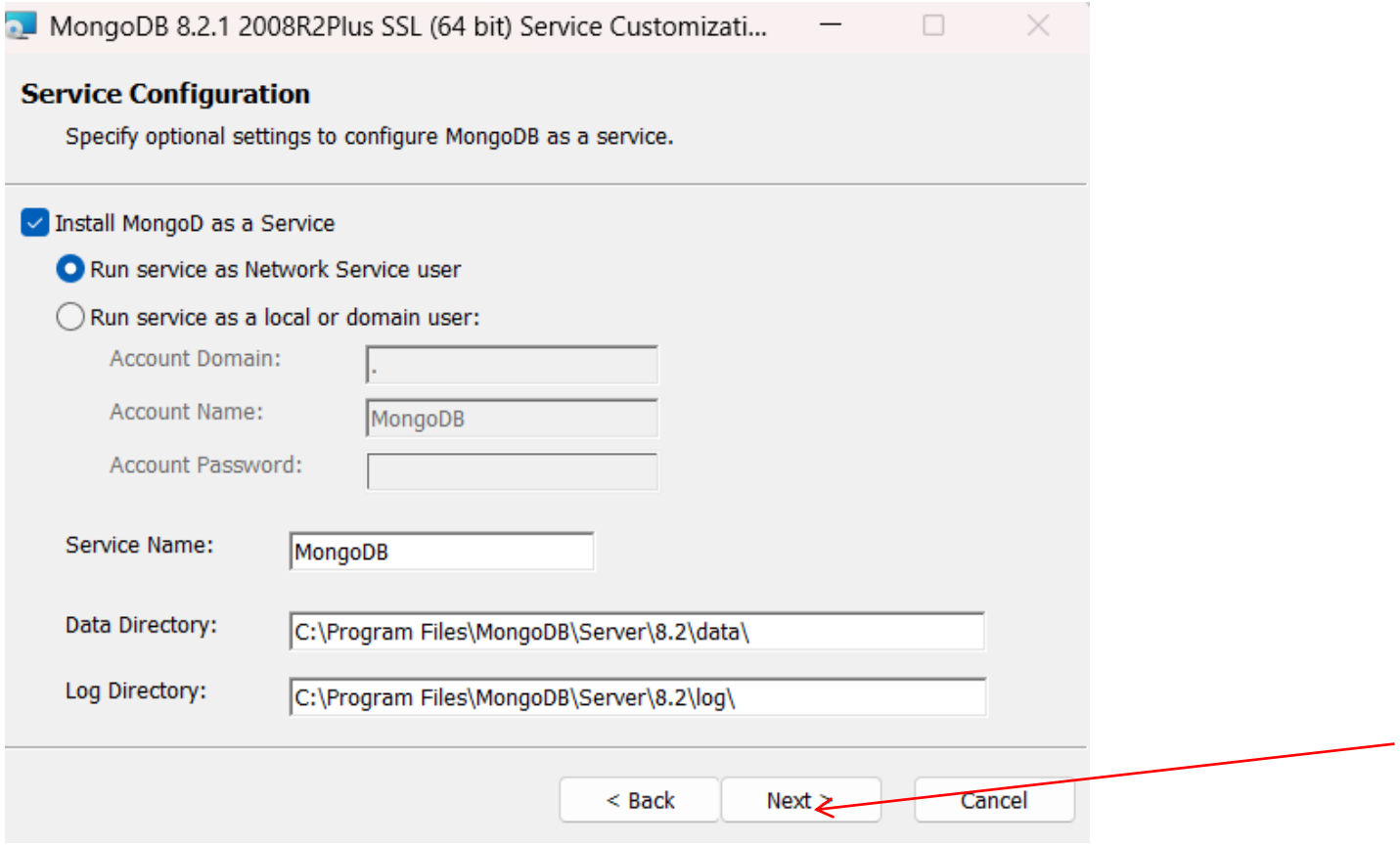
Configure MongoDB Service

- Now select the complete option to install all the program features.
- Here, if you can want to install only selected program features and want to select the location of the installation, then use the Custom option.

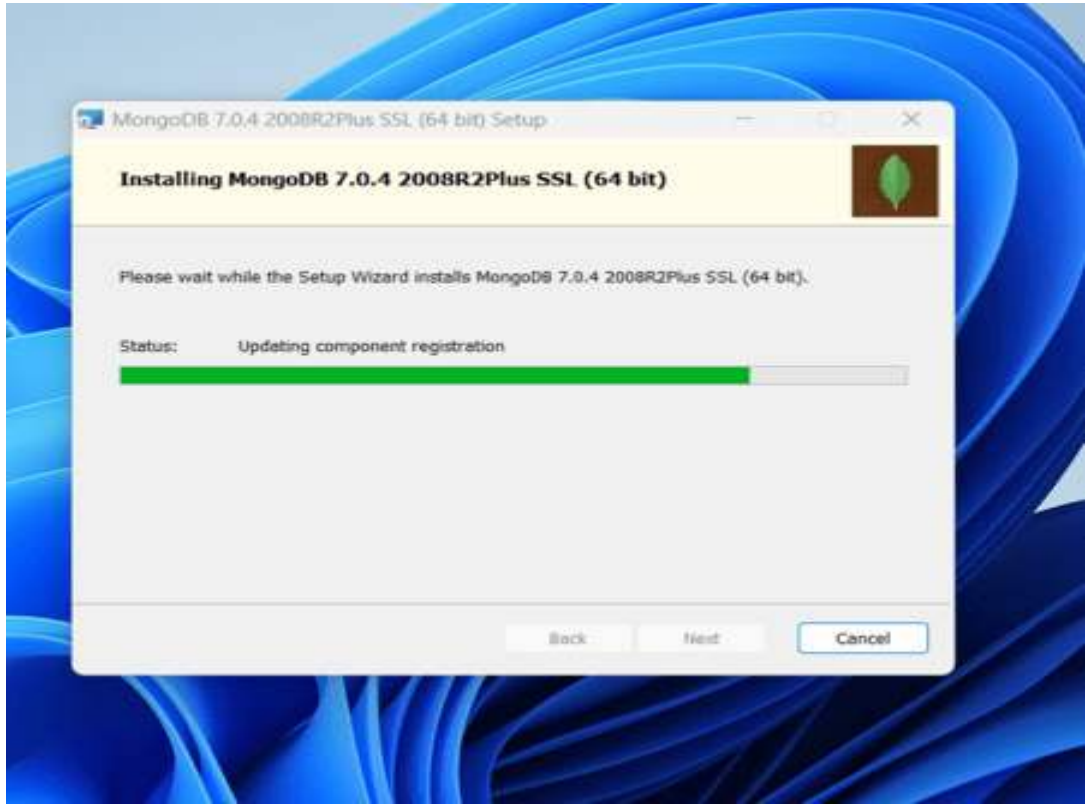


Configure MongoDB Service

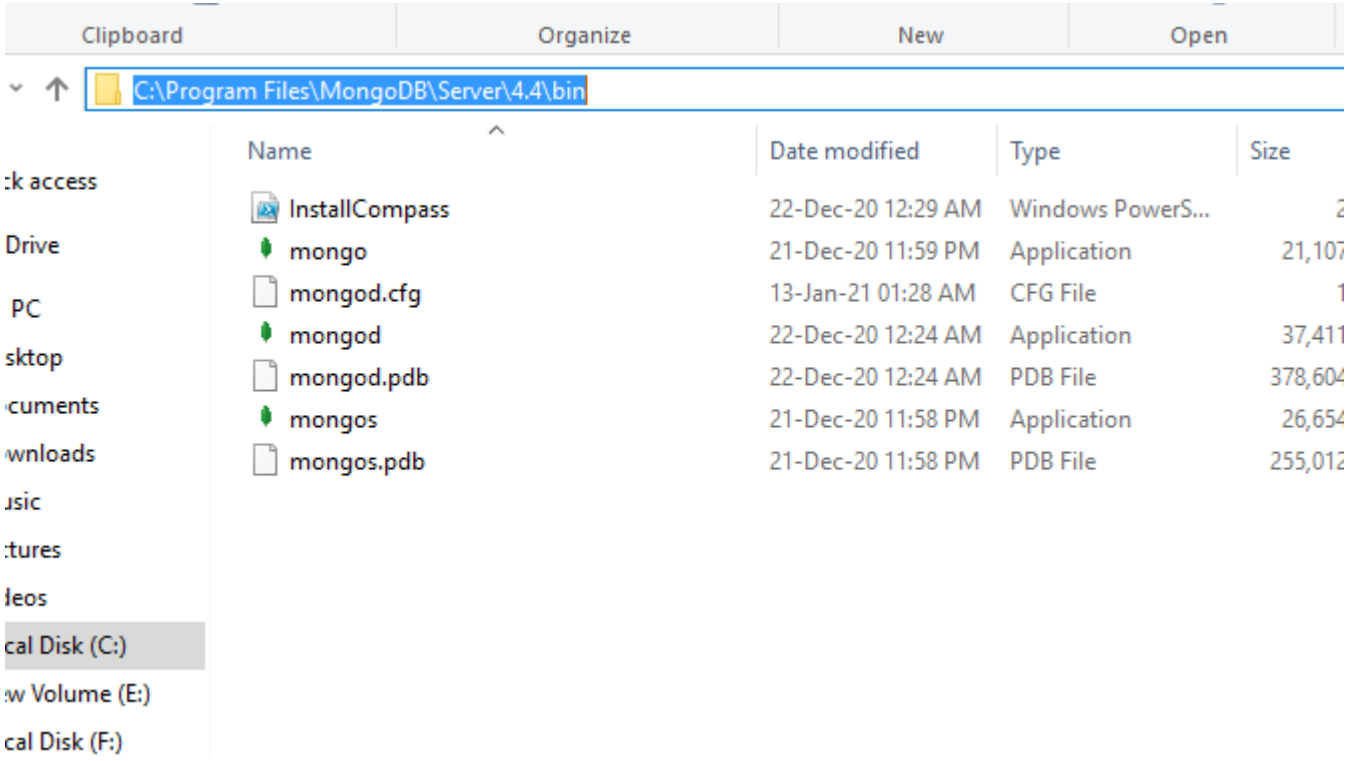
Select “Run service as Network Service user” and copy the path of the data directory. Click Next:



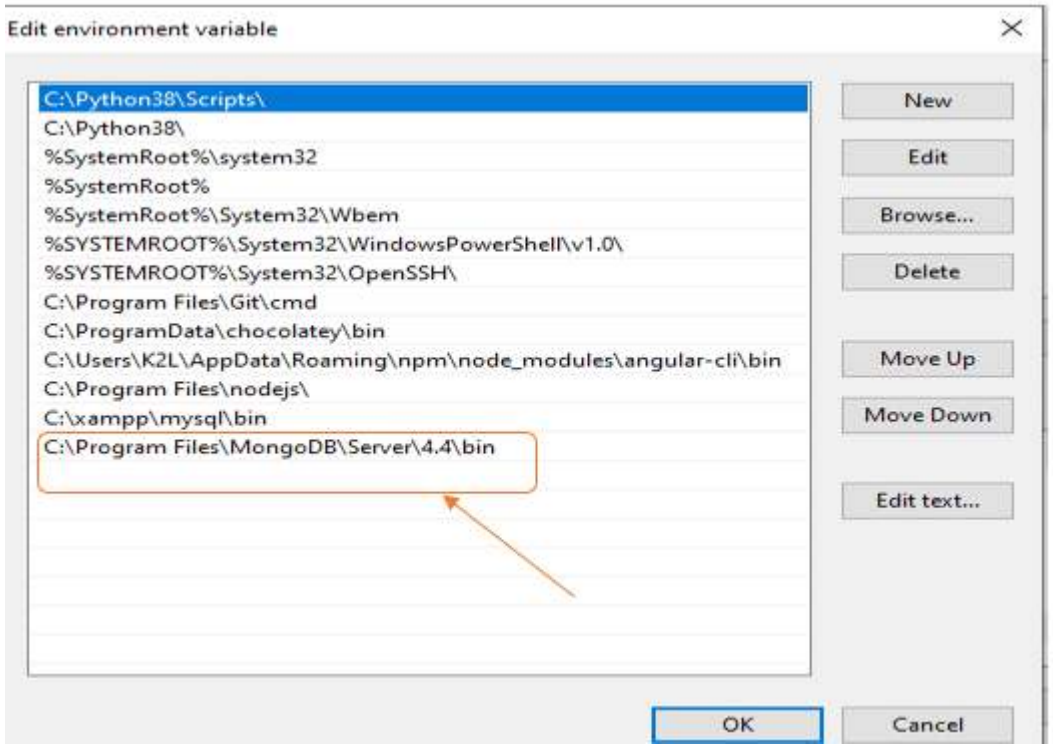
Configure MongoDB Service



Configure MongoDB Service



Configure MongoDB Service

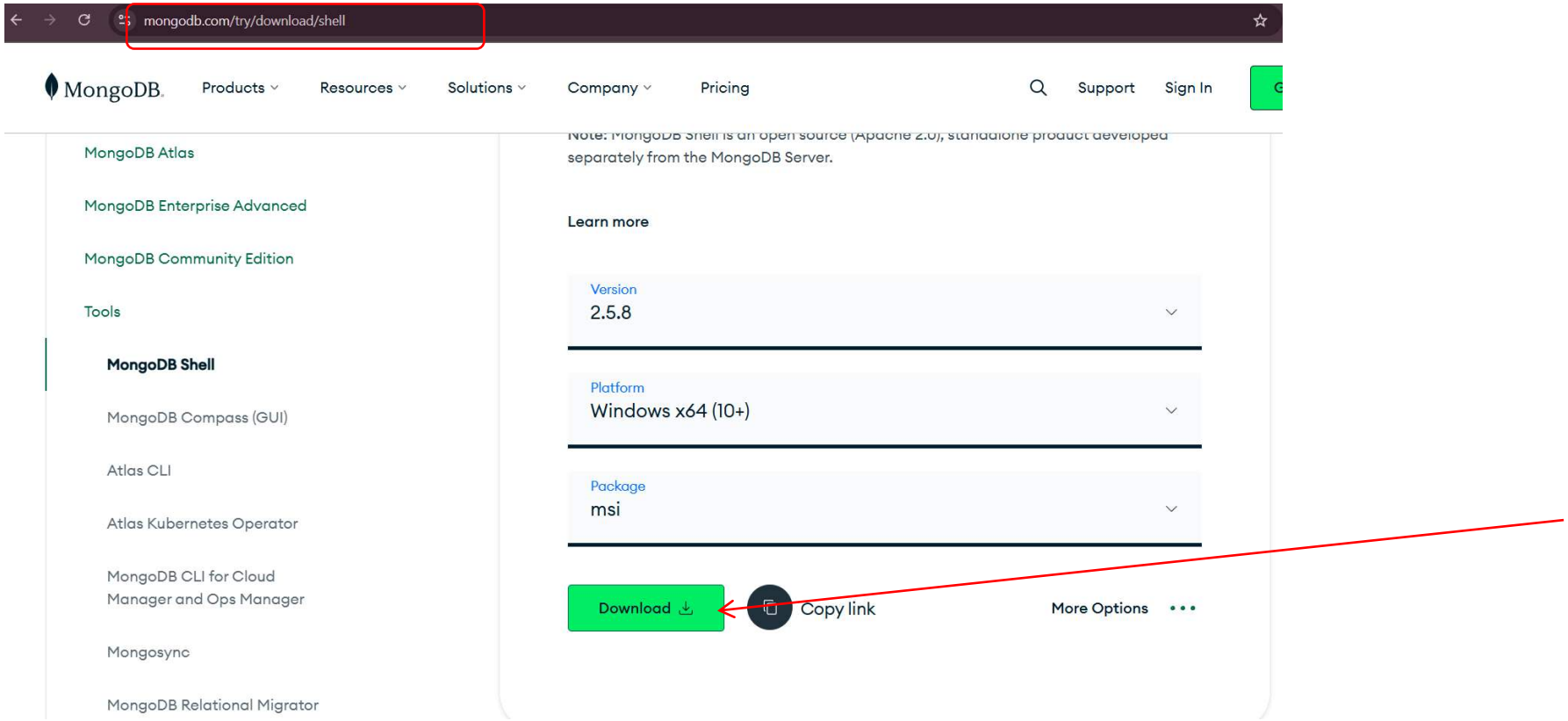


Verification of MongoDB

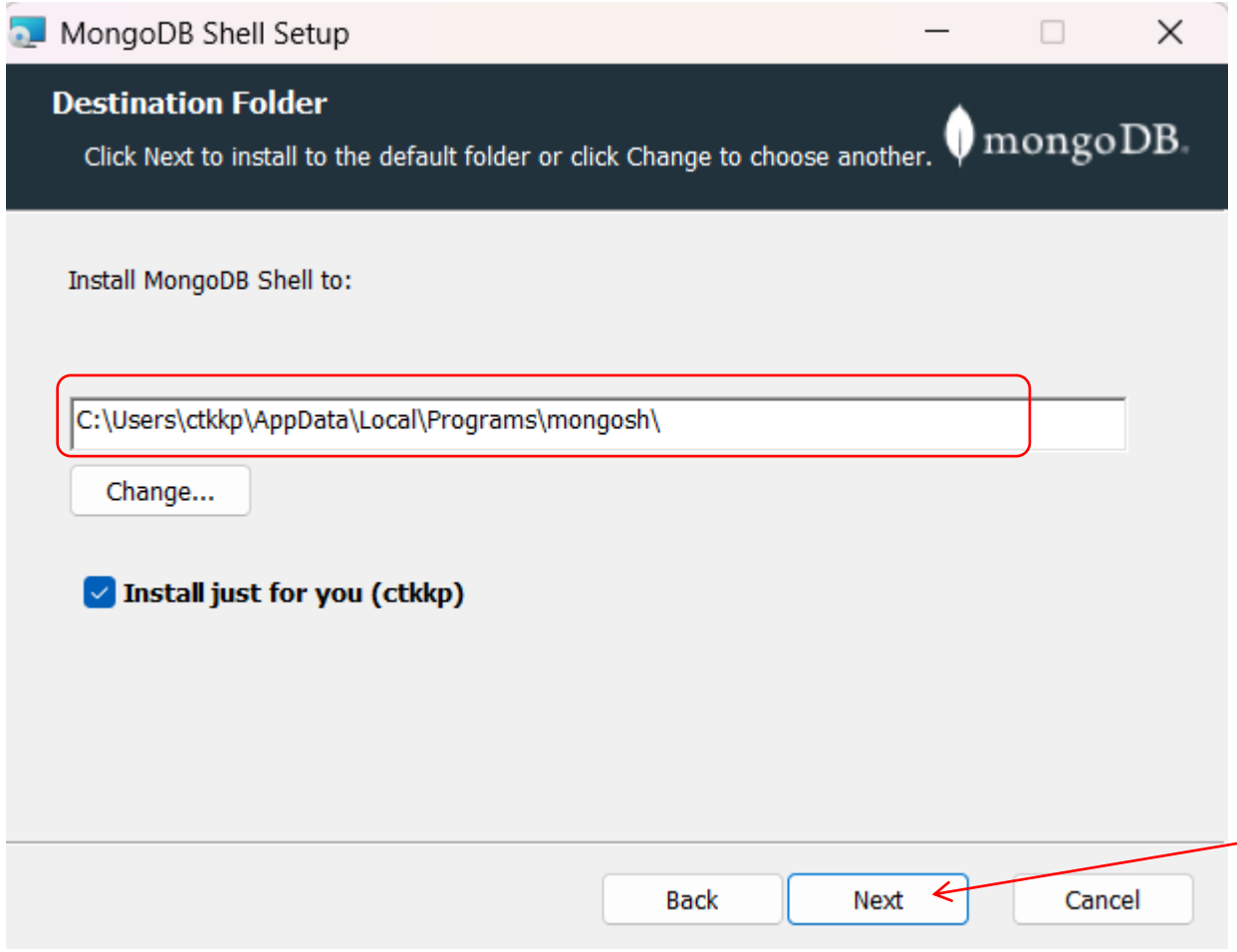
In MongoDB versions before 5.0, the Mongo Shell (mongo) was included automatically with the MongoDB installation.
But starting from MongoDB version 5.0 and later, the shell is no longer included by default.
Therefore, we need to install MongoDB Shell (mongosh) separately to interact with the MongoDB server using queries.

```
C:\Users\ctkkp>mongod
{"t":{"$date":"2025-10-30T15:25:31.325+05:30"},"s":"I",  "c":"-",        "id":8991200, "ctx":"thread1","msg":"Shuffling
initializers","attr":{"seed":52050253}}
{"t":{"$date":"2025-10-30T15:25:31.510+05:30"},"s":"I",  "c":"CONTROL",  "id":97374,   "ctx":"thread1","msg":"Automatica
lly disabling TLS 1.0 and TLS 1.1, to force-enable TLS 1.1 specify --sslDisabledProtocols 'TLS1_0'; to force-enable TLS
1.0 specify --sslDisabledProtocols 'none'"}
{"t":{"$date":"2025-10-30T15:25:31.534+05:30"},"s":"I",  "c":"NETWORK",  "id":4915701, "ctx":"thread1","msg":"Initialize
d wire specification","attr":{"spec":{"incomingExternalClient":{"minWireVersion":0,"maxWireVersion":27},"incomingInterna
lClient":{"minWireVersion":0,"maxWireVersion":27},"outgoing":{"minWireVersion":6,"maxWireVersion":27},"isInternalClient"
:true}}}
{"t":{"$date":"2025-10-30T15:25:31.540+05:30"},"s":"I",  "c":"CONTROL",  "id":5945603, "ctx":"thread1","msg":"Multi thre
ading initialized"}
{"t":{"$date":"2025-10-30T15:25:31.541+05:30"},"s":"I",  "c":"CONTROL",  "id":4615611, "ctx":"initandlisten","msg":"Mong
oDB starting","attr":{"pid":15472,"port":27017,"dbPath":"/data/db","architecture":"64-bit","host":"CT-022"}}
{"t":{"$date":"2025-10-30T15:25:31.542+05:30"},"s":"I",  "c":"CONTROL",  "id":23398,   "ctx":"initandlisten","msg":"Targ
et operating system minimum version","attr":{"targetMinOS":"Windows 7/Windows Server 2008 R2"}}
{"t":{"$date":"2025-10-30T15:25:31.542+05:30"},"s":"I",  "c":"CONTROL",  "id":23403,   "ctx":"initandlisten","msg":"Buil
d Info","attr":{"buildInfo":{"version":"8.2.1","gitVersion":"3312bdcf28aa65f5930005e21c2cb130f648b8c3","modules":[],"all
```

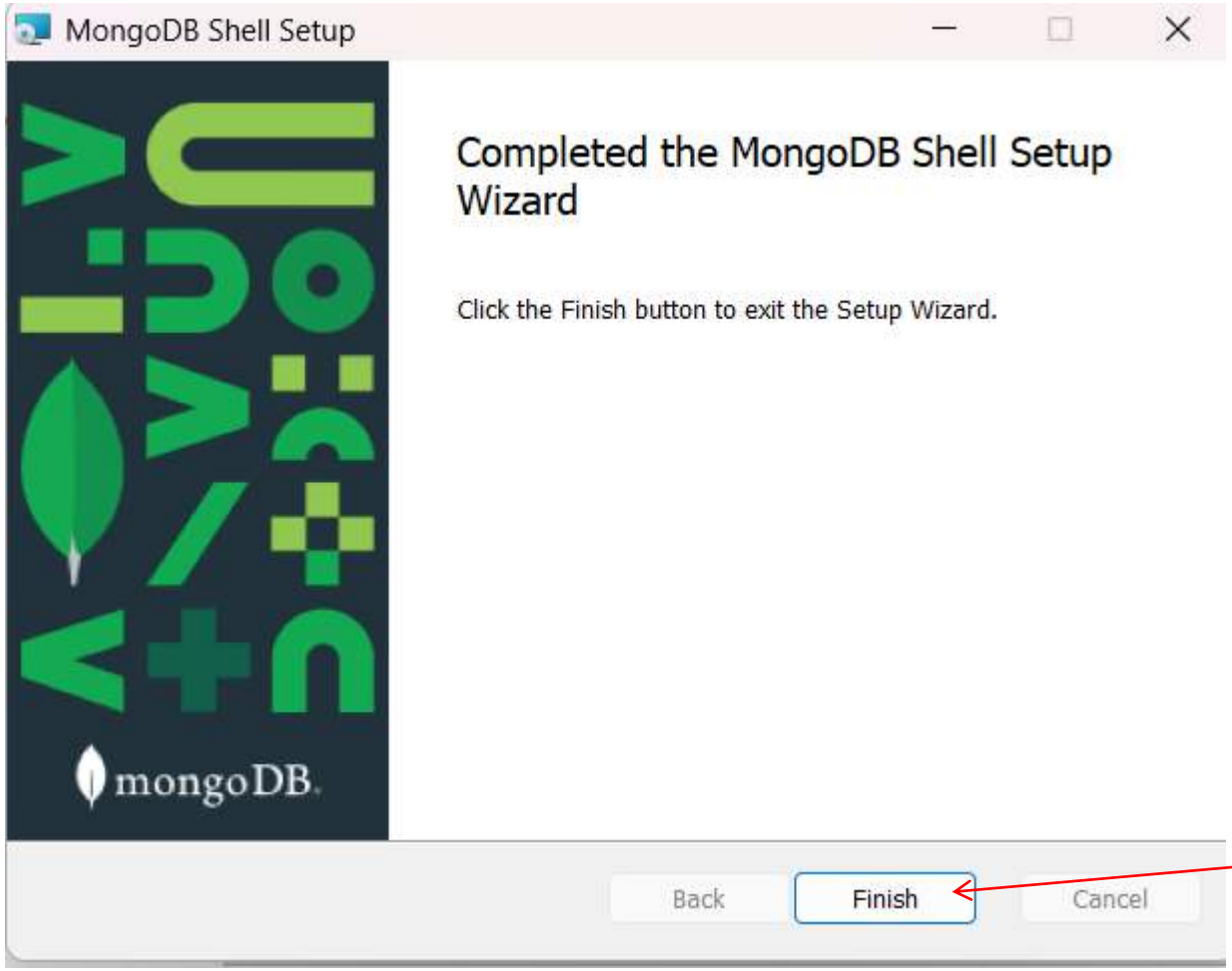
MongoShell Download



MongoShell Download



MongoShell Download



Verification of MongoShell

After successfully installing MongoDB Shell, open Command Prompt (CMD) and type either mongo or mongosh like below.

```
C:\Users\ctkkp>mongosh
Current Mongosh Log ID: 6903392166516c5ec0cebea3
Connecting to:          mongodb://127.0.0.1:27017/?directConnection=true&serverSelectionTimeoutMS=2000&appName=mongosh+2
.5.8
Using MongoDB:          8.2.1
Using Mongosh:          2.5.8

For mongosh info see: https://www.mongodb.com/docs/mongodb-shell/

------
   The server generated these startup warnings when booting
   2025-10-30T15:01:23.534+05:30: Access control is not enabled for the database. Read and write access to data and conf
iguration is unrestricted
------
```


Thank you

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Node Js Installation Guide

Installation Steps

Step1: Verify Node.js is Installed or Not

```
C:\Users\ctkkp>node -v
'node' is not recognized as an internal or external command,
operable program or batch file.
```

Step2: If node.js was not Installed Download the Installer.

- Go to the official Node.js website download page (https://nodejs.org/en/download).
- Choose the appropriate installer for your OS (Windows .msi, macOS .pkg, or Linux package).
- Prefer the Long Term Support (LTS) version for stability.
- Run the Installer
- Launch the downloaded installer file.
- Accept the license agreement and proceed.

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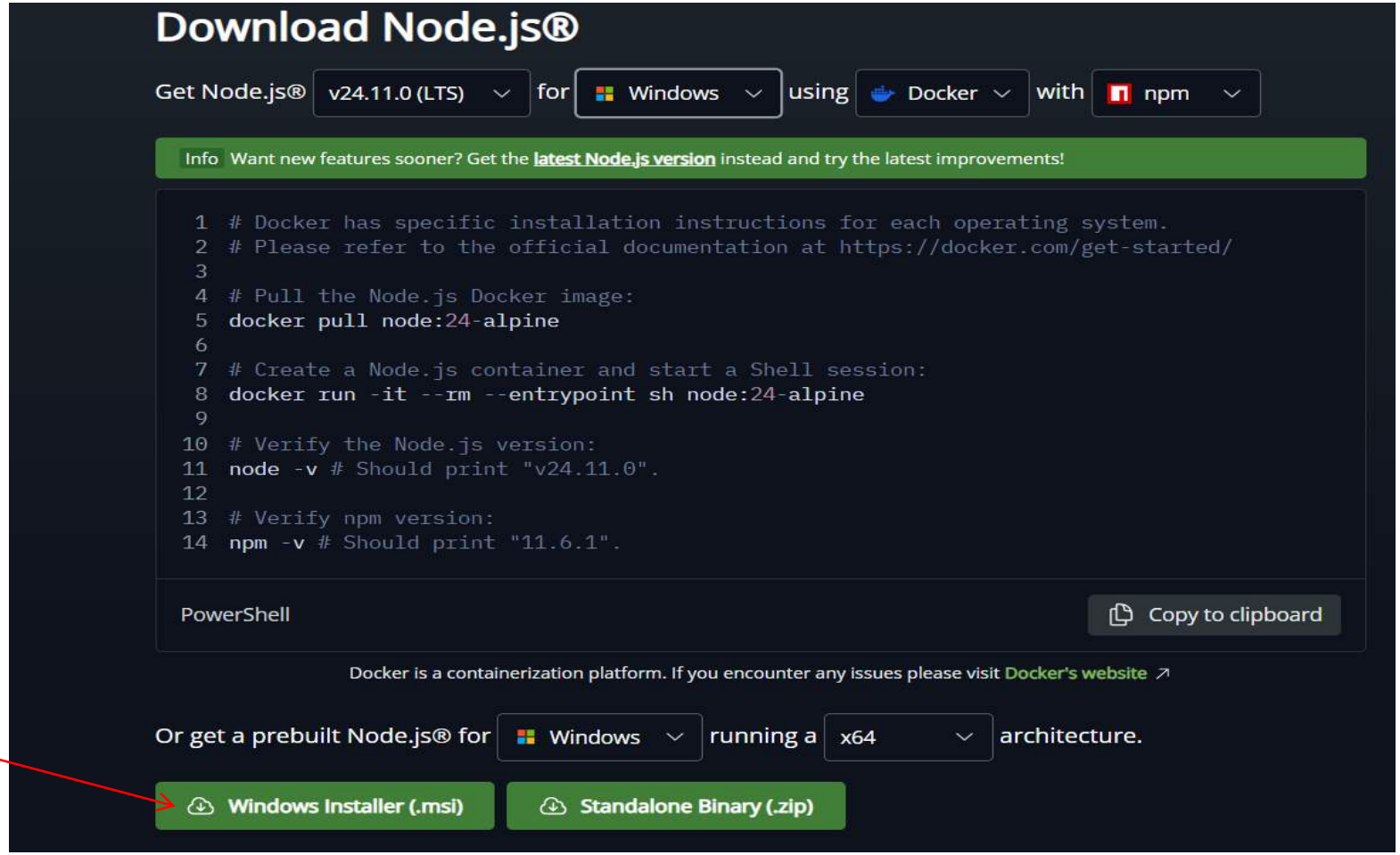
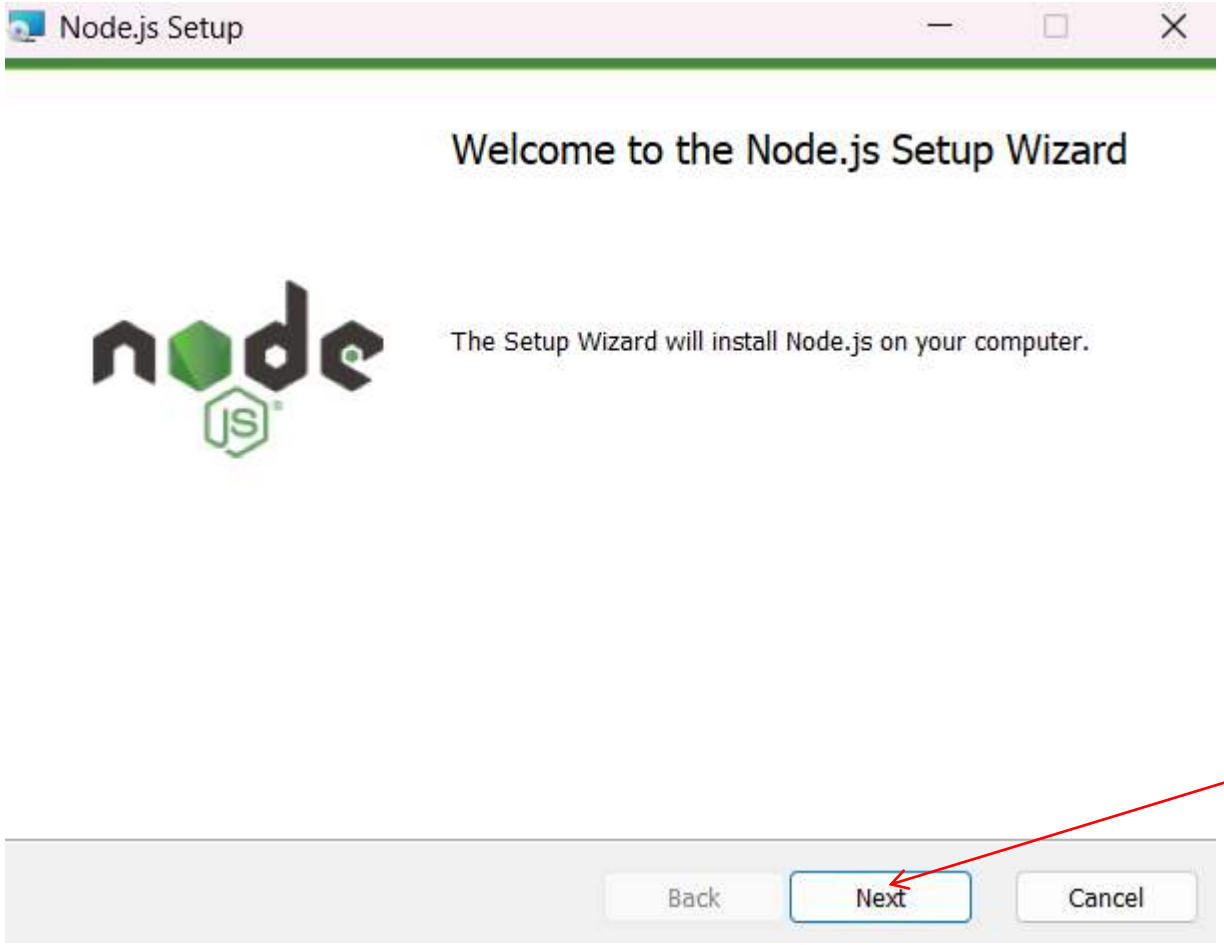
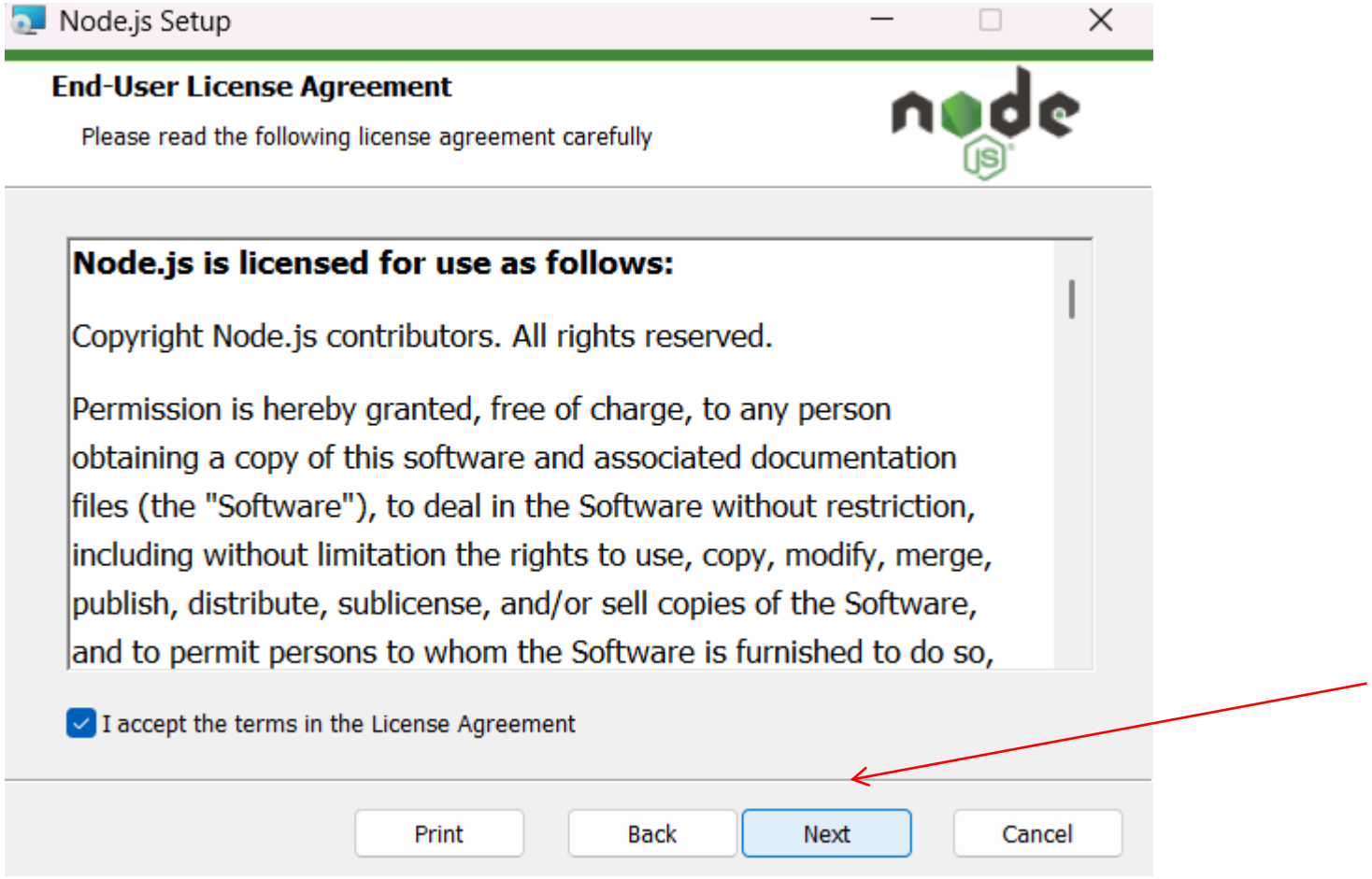
Run the Installer



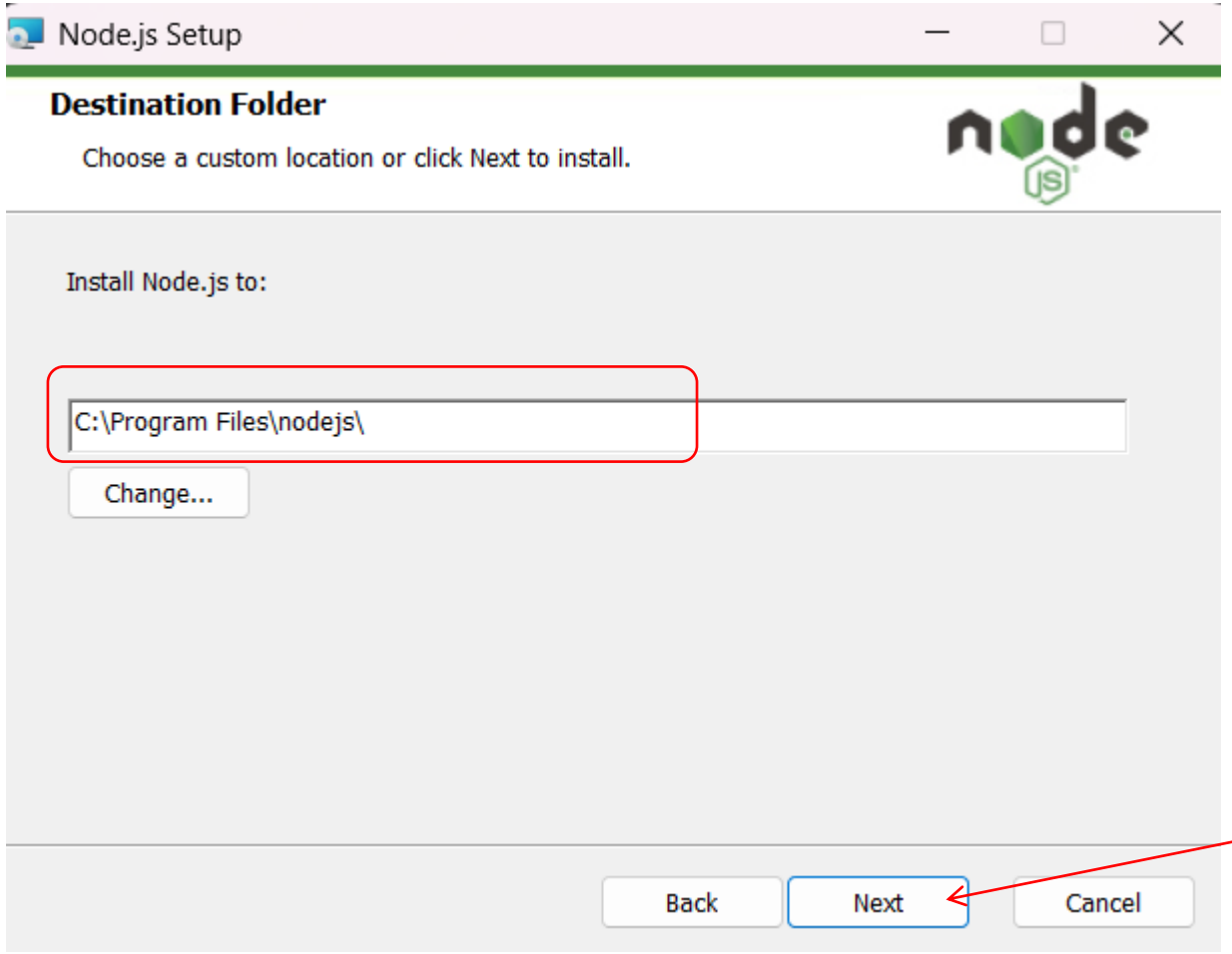
Run the Installer



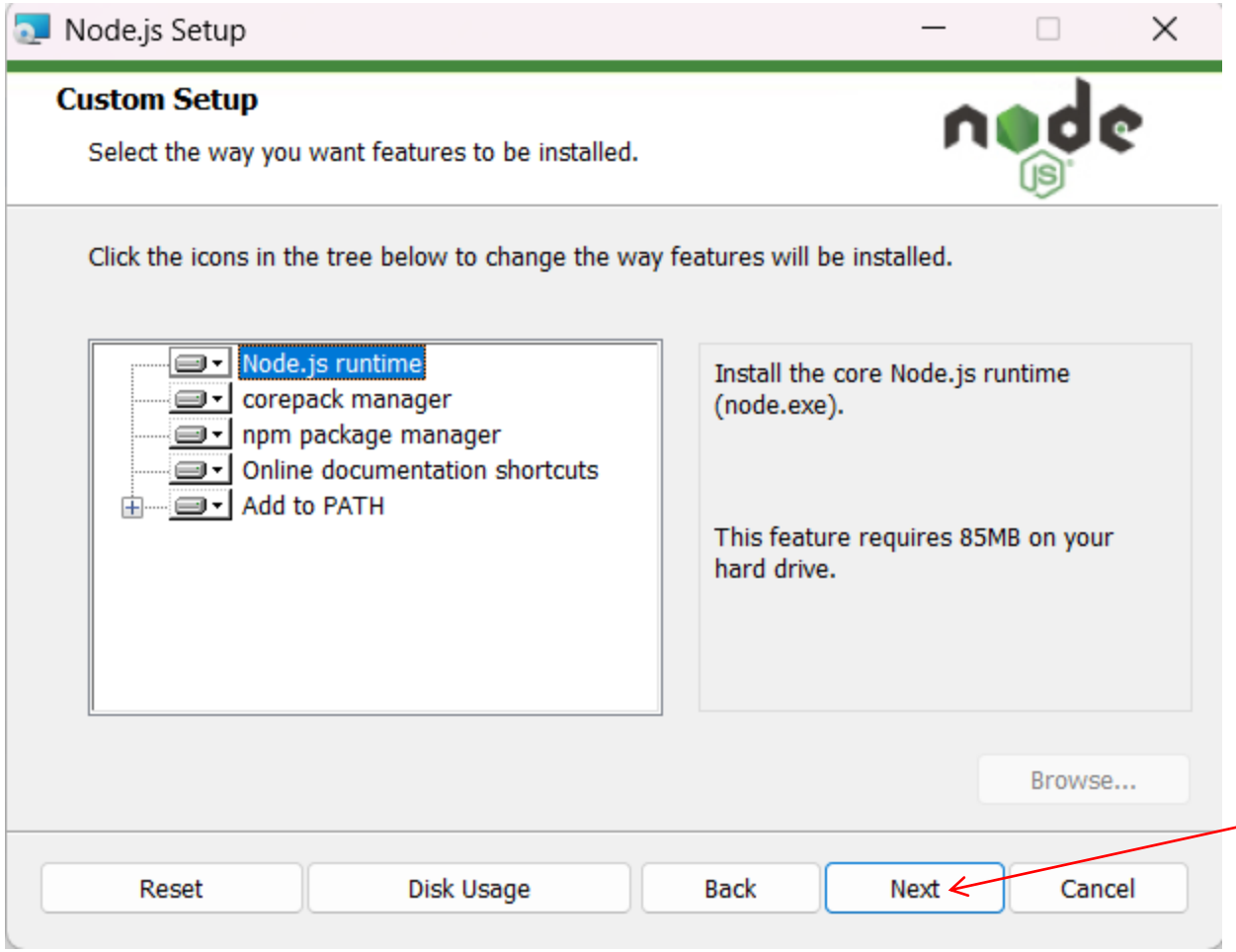
Run the Installer



Run the Installer



Run the Installer



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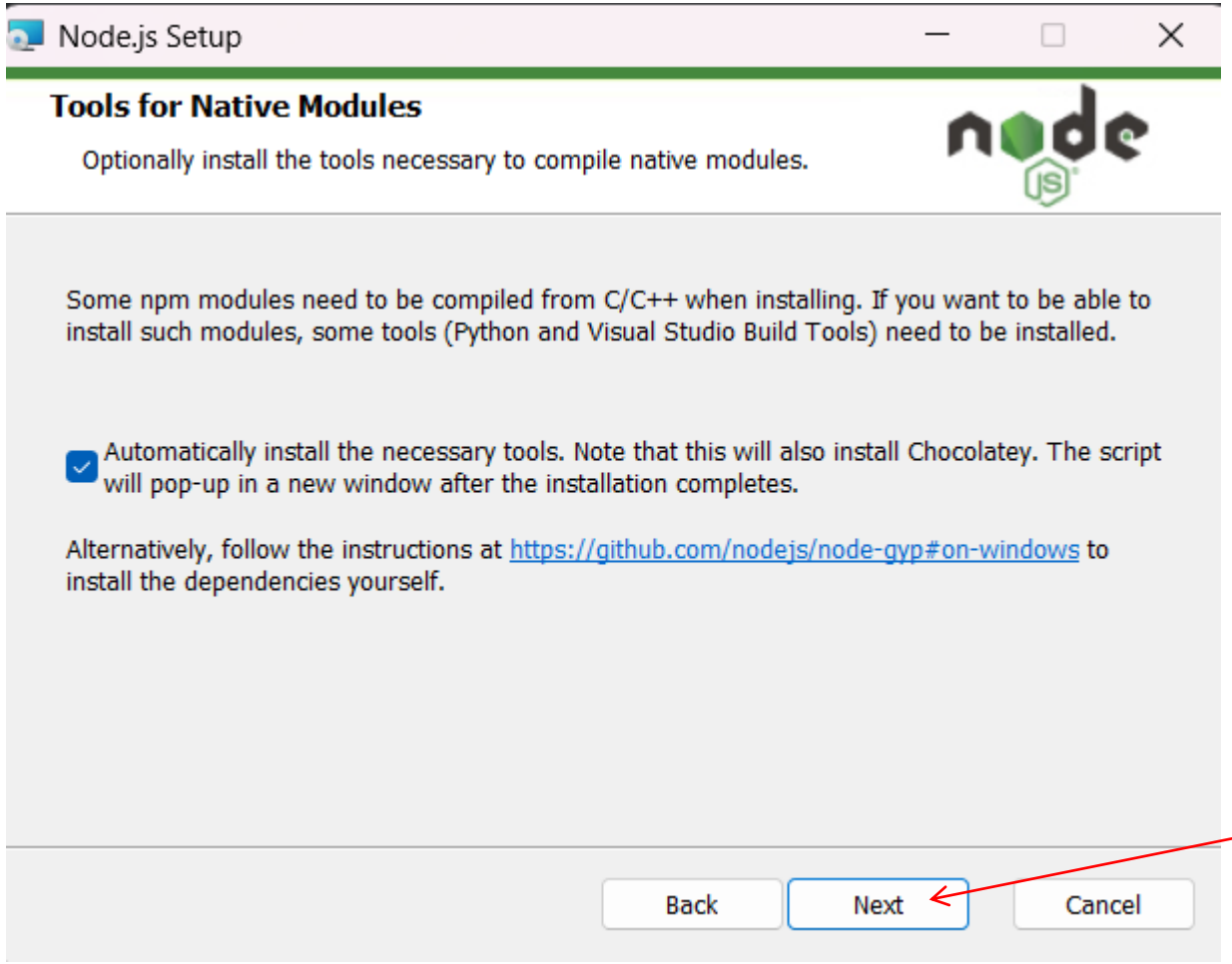

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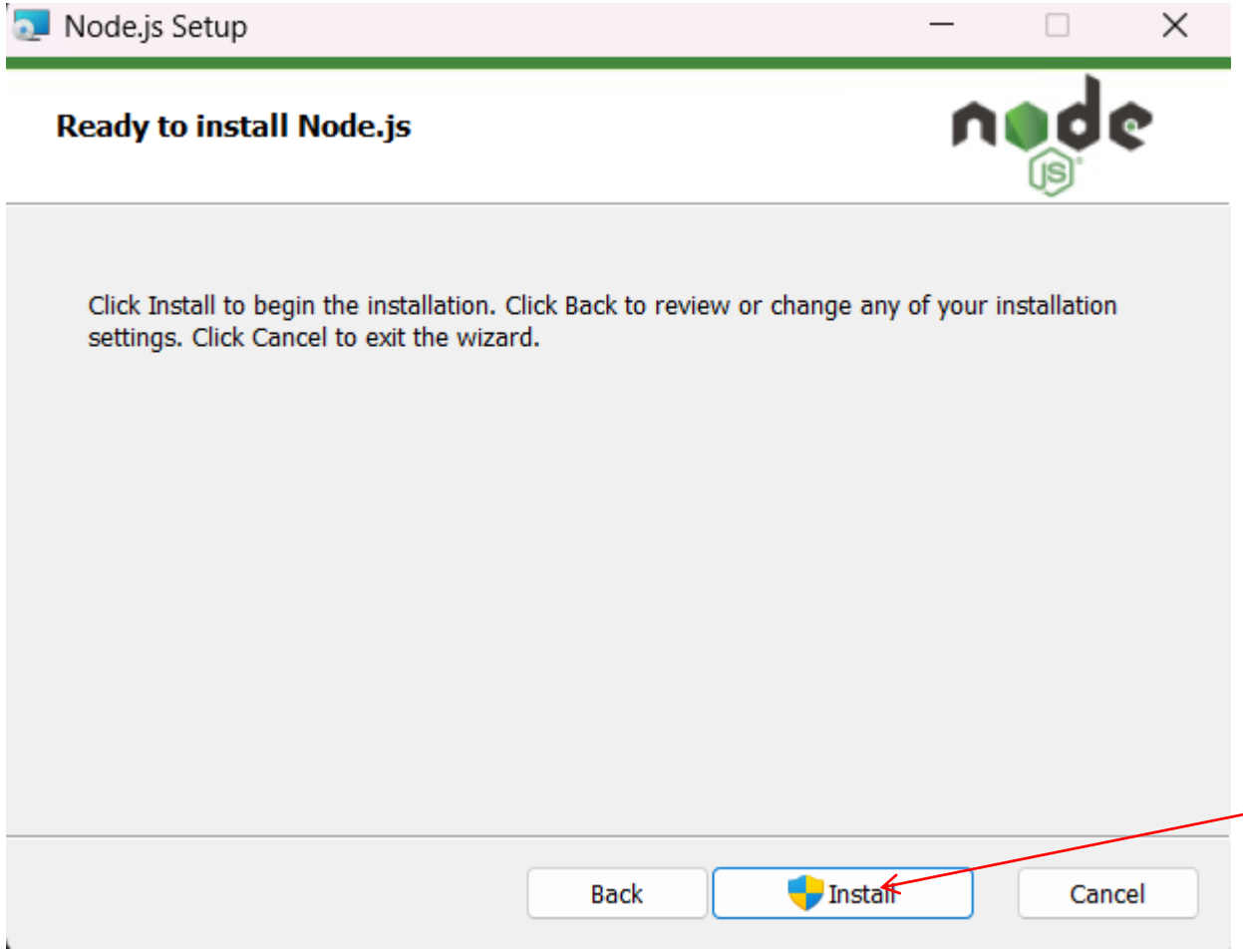

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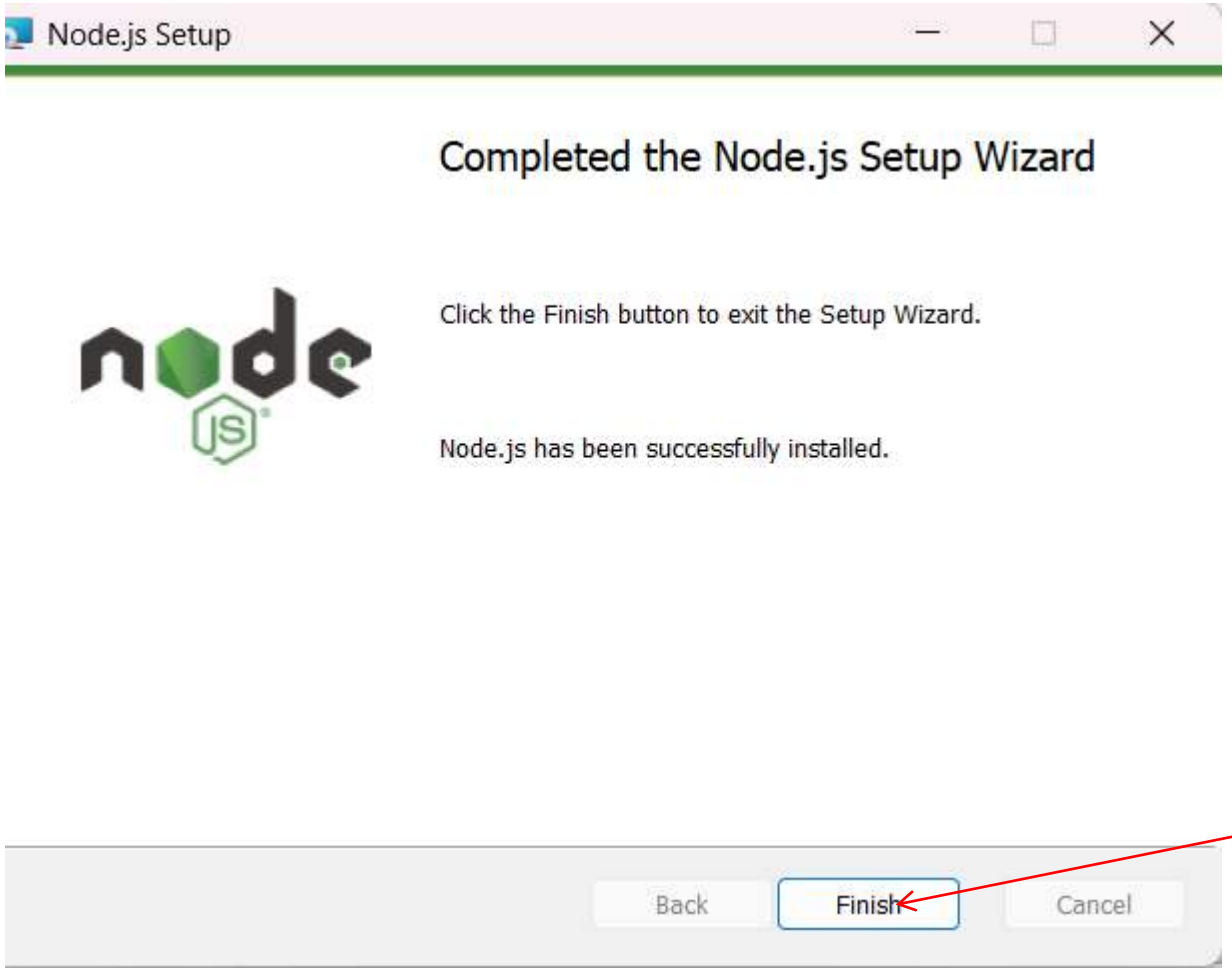


Verify Node.js and npm Installation

Open your command line terminal (Command Prompt on Windows, Terminal on macOS/Linux).

```
Microsoft Windows [Version 10.0.26100.6584]
(c) Microsoft Corporation. All rights reserved.

C:\Users\ctkkp>node -v
v24.11.0

C:\Users\ctkkp>npm -v
11.6.1

C:\Users\ctkkp>
```

These commands display the installed versions, confirming successful installation.

Angular CLI Setup

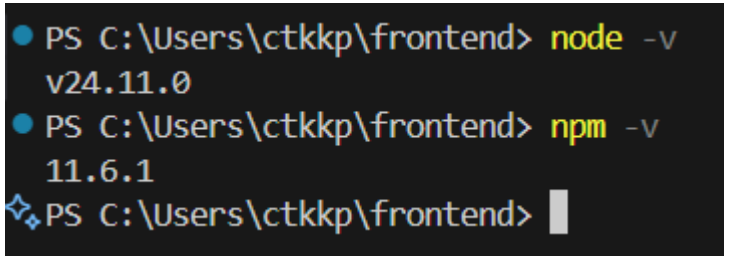
Prerequisites

- Install Node.js (use the LTS version). This includes npm.
- A code editor — VS Code recommended.
- Optional but helpful: Git, Chrome (with DevTools), Postman or Insomnia for API testing.

Install Angular CLI

Check versions:

node -v
npm -v
ng version



Open a terminal (PowerShell / CMD on Windows, Terminal on macOS / Linux):
install globally (you may need sudo on macOS/Linux)

npm install -g @angular/cli

Create a new Angular project

Create a folder and run ng new:

create a project named my-app

ng new my-app

The CLI will ask:

Add Angular routing? → Yes if you want built-in routing.

Stylesheet format? → choose CSS / SCSS / SASS / LESS / Stylus as you prefer.

This generates the full project structure.

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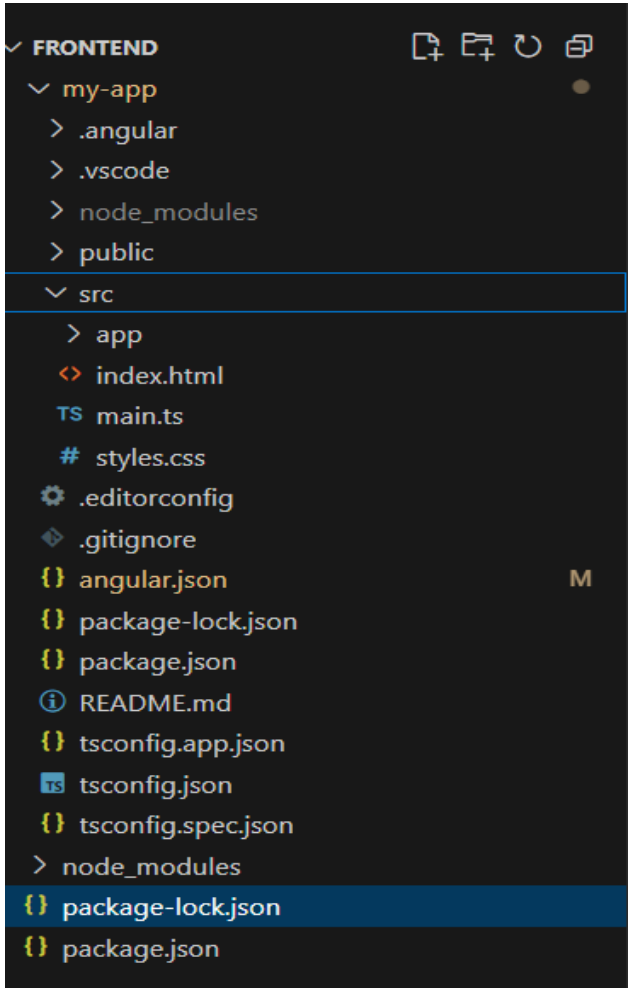
Project structure

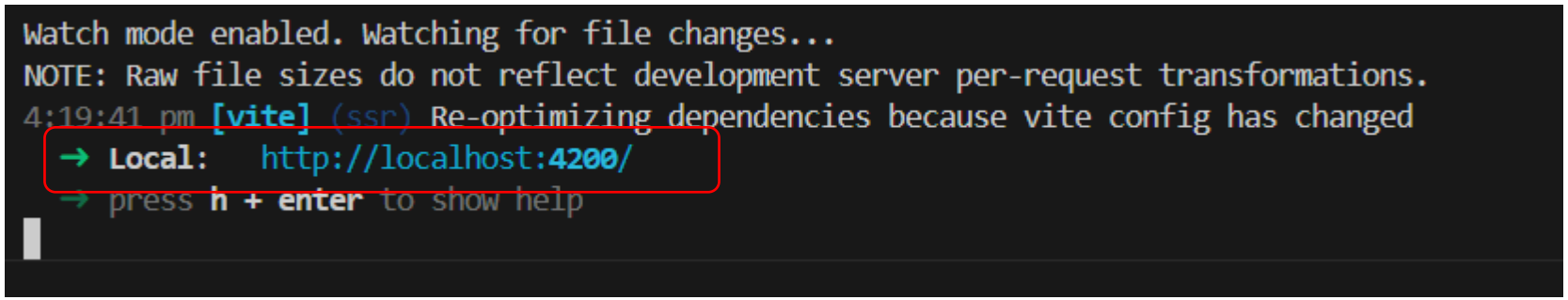
Important files/folders:

- src/ — app source
  - app/ — your components, modules, services
  - main.ts — app bootstrap
  - index.html — main HTML
  - styles.[ext] — global styles
- angular.json — CLI project config
- package.json — dependencies & scripts
- tsconfig.json — TypeScript config

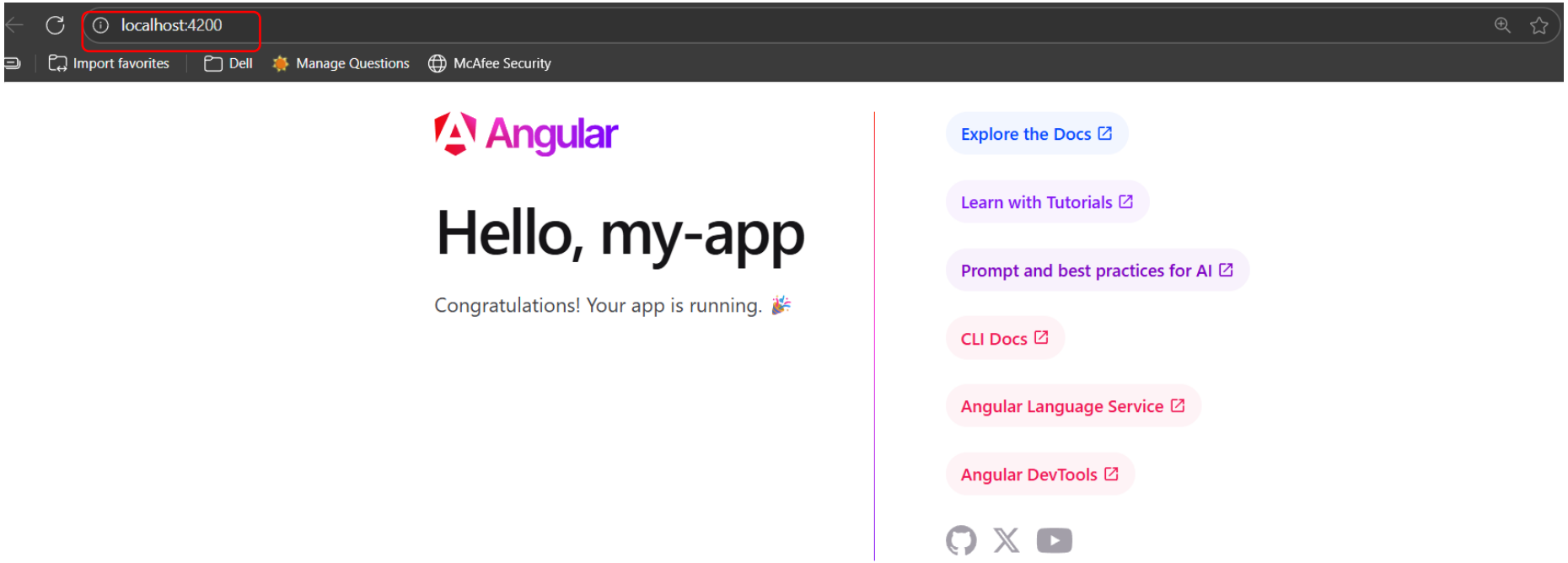


Serve the app (dev server)

Create a folder and run ng new:
cd my-app
ng serve
or with host/port
ng serve --open --port 4200



Serve the app (dev server)



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