



Emerging Technologies

COMP 308
COMP-308
Summer 2023



Introduction to MEAN

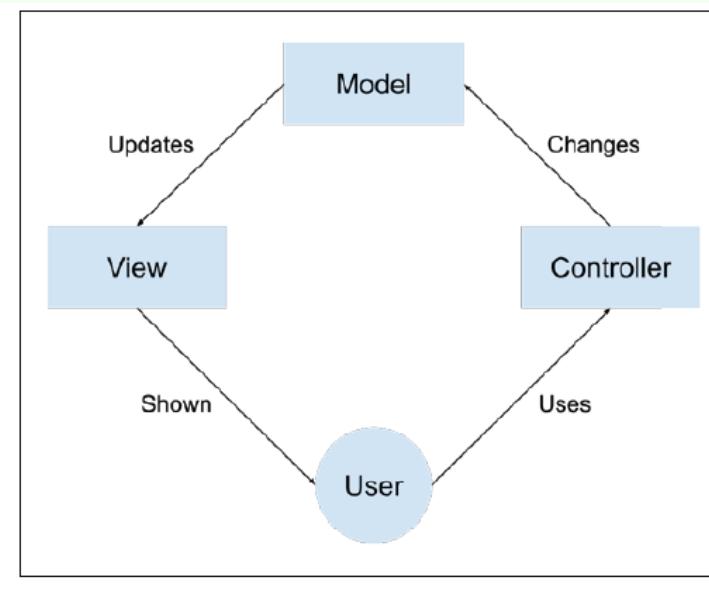
Objectives:

- ❑ Describe MEAN and MERN stack architecture.
- ❑ Install and run MongoDB.
- ❑ Install and run Node.js
- ❑ Create simple Node.js apps in Visual Studio Code



Three-tier web application development

- The **three-tier architecture** consists of three important layers: **data services**, **business logic**, and **presentation**.
- In the MVC paradigm, the logic, data, and visualization are separated into three types of objects:
 - **View** - handles UI
 - **Model** - handles the data manipulation
 - **Controller** - controls the model and view

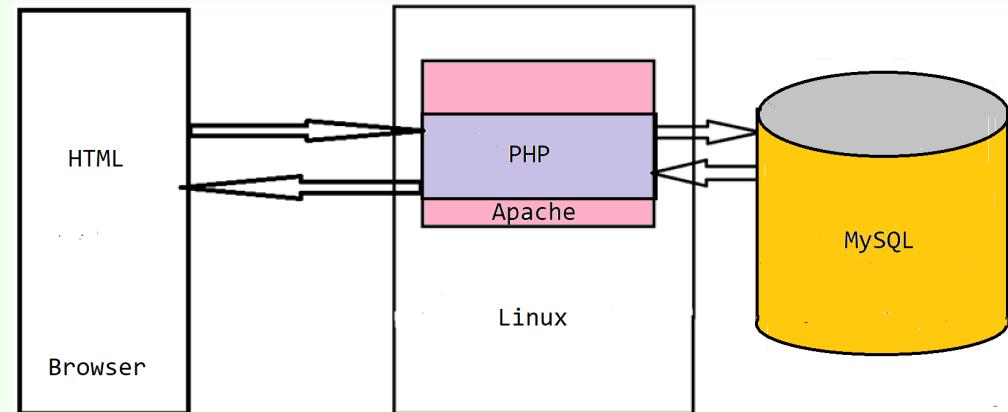




Web technology stacks - recap

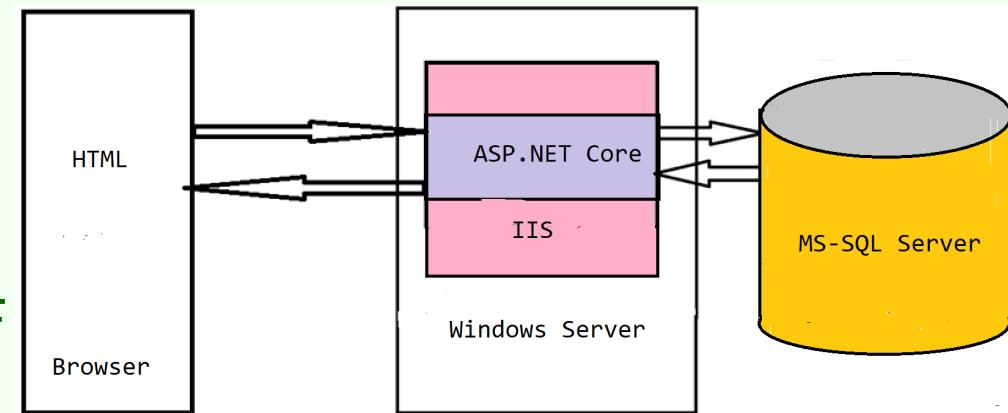
□ LAMP stack:

- Linux
- Apache
- MySQL
- PHP/Python/Perl



□ .NET (Core) stack:

- .NET (Core)
- IIS
- ASP.NET (Core)
- Web API and WCF
- MS-SQL Server



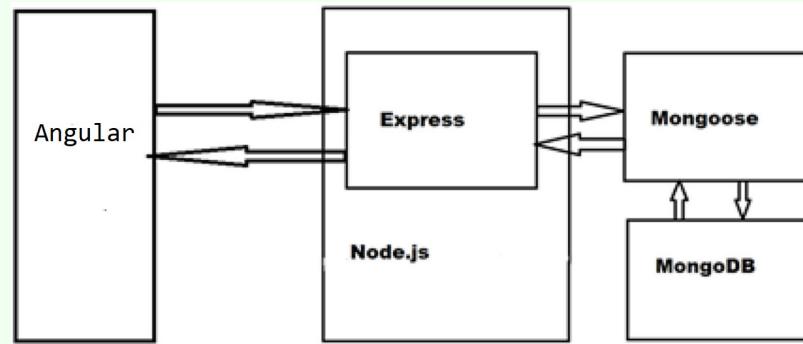
□ Other frameworks and tools (Django, Flask, etc.)

□ Each layer uses a **different knowledge base!**



MEAN Stack - recap

- MEAN is an abbreviation for **MongoDB**, **Express**, **AngularJS**, and **Node.js**.
- Uses **only JavaScript - driven solutions** to implement the different parts of a web application.
- Has the following advantages:
 - A **single language** is used throughout the application
 - All the parts of the application can **support and often enforce** the use of the **MVC architecture**
 - Serialization and deserialization of data structures is no longer needed because **data marshaling is done using JSON objects**.





MEAN Stack - recap

- **MongoDB** is a scalable NoSQL database that used a JSON-like data model with dynamic schemas.
- **Express** is a **lightweight node.js web application framework**, providing a robust set of features for building single and multi-page, and hybrid web application.
- **Node.js** is a **server side JavaScript execution environment** built on Google Chrome's V8 JavaScript runtime - helps in building highly scalable and concurrent applications rapidly.
- **Angular** is a JavaScript framework developed by Google - a complete solution for rapid **front end development**.



LAMP versus MEAN - recap

- Linux → Node.js (platform)
- Apache → Express.js (web server framework)
- MySQL → MongoDB (persistence layer)
- PHP or Python or Perl → Angular (User Interface)



Full-Stack JavaScript Advantages - recap

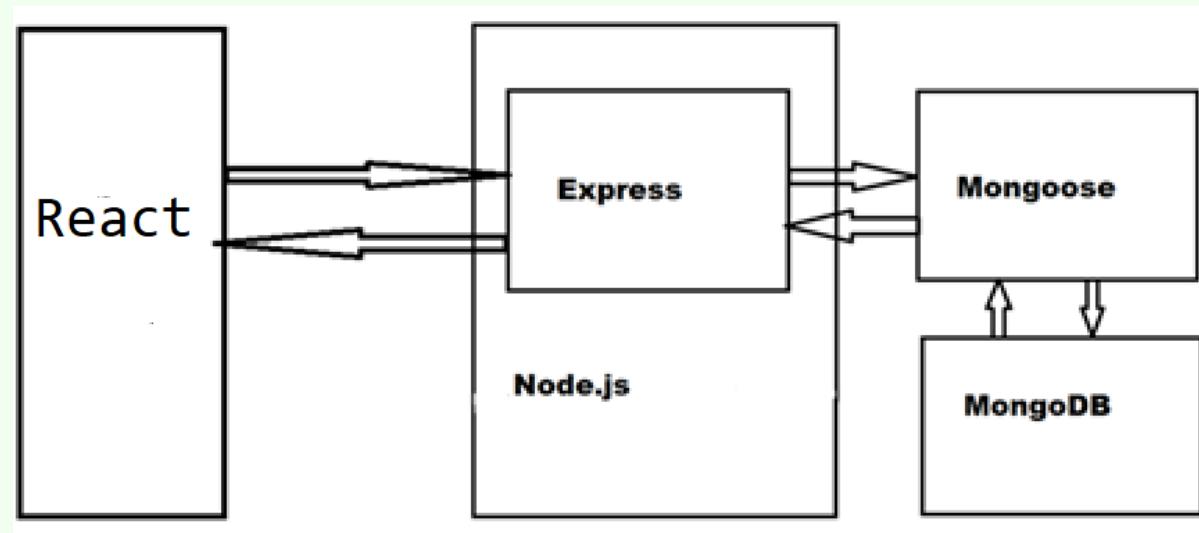
□ High Performance

- Increasing number of requests
- Reducing response time
- Non-blocking I/O - allows web server to handle more concurrent requests without requiring additional hardware or configuration
- Cross-platform (Windows, Linux, MacOS)
- One single programming language for the entire project



MERN Stack - recap

- ❑ MongoDB
- ❑ Express
- ❑ Node.js
- ❑ ReactJS is a JavaScript component-based **front-end library** maintained by Facebook – most popular for **front-end development**.





Downloading MongoDB

The screenshot shows a web browser window with the URL mongodb.com/try/download/community. The page displays options for downloading MongoDB Community Server. On the left, there's a sidebar with links to MongoDB Atlas, MongoDB Enterprise Advanced, MongoDB Community Edition, MongoDB Community Server (which is highlighted in blue), and MongoDB Community Kubernetes Operator. Below that is a 'Tools' section. On the right, there are dropdown menus for 'Version' set to '6.0.5 (current)', 'Platform' set to 'Windows', and 'Package' set to 'msi'. At the bottom right is a green 'Download' button with a downward arrow, and a context menu with options 'Copy link', 'More Options', and an ellipsis.

Download MongoDB Community

mongodb.com/try/download/community

Centennial | Central Centennial | Home Centennial | Library eCentennial myCentennial

MongoDB Products Solutions Resources Company Pricing Sign In Try Free

MongoDB Atlas

MongoDB Enterprise Advanced

MongoDB Community Edition

MongoDB Community Server

MongoDB Community Kubernetes Operator

Tools

Waiting for www.google.ca...

Version
6.0.5 (current)

Platform
Windows

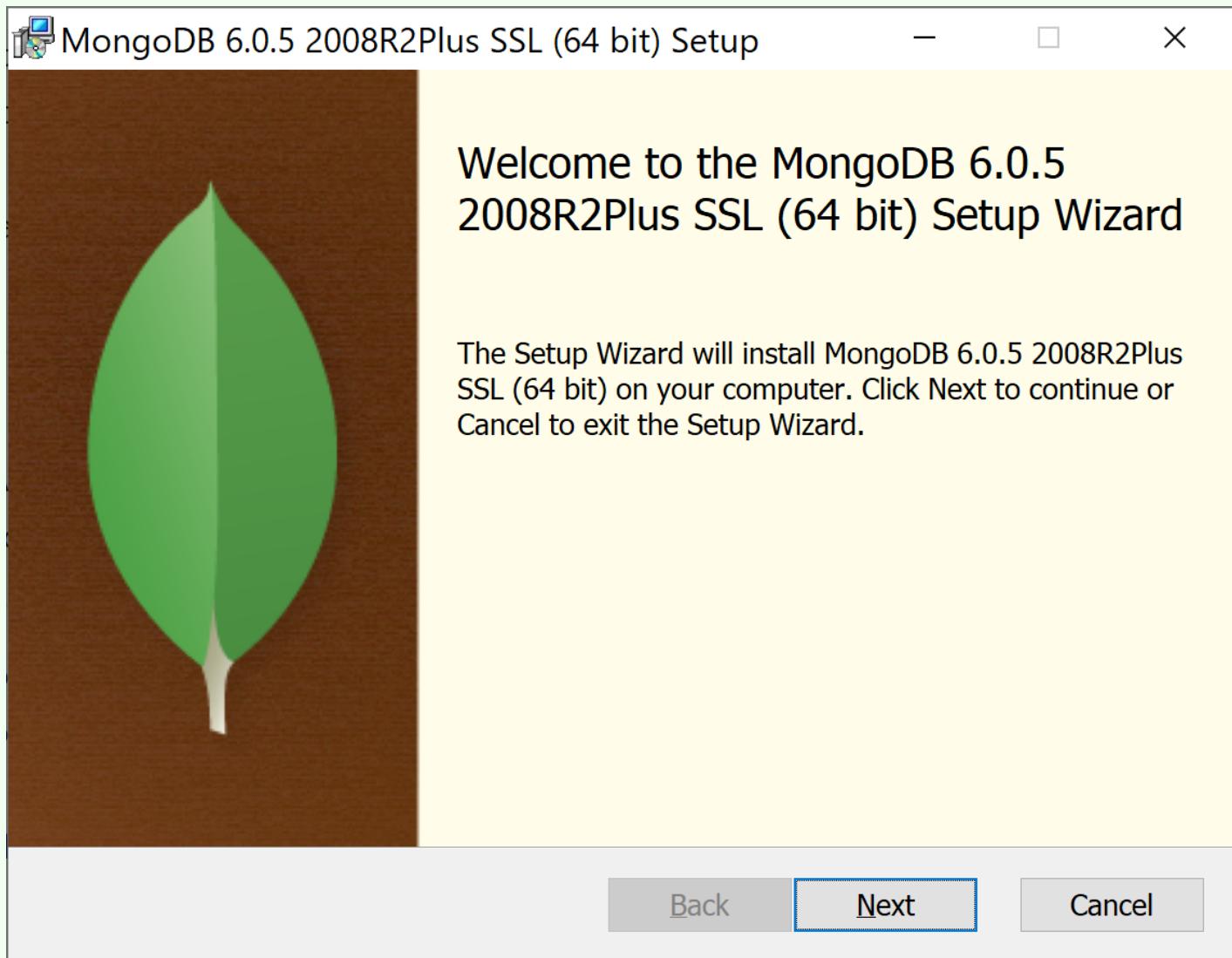
Package
msi

Download ↴

Copy link More Options ...



Installing MongoDB





Installing MongoDB

MongoDB 6.0.5 2008R2Plus SSL (64 bit) Setup

End-User License Agreement

Please read the following license agreement carefully

Server Side Public License
VERSION 1, OCTOBER 16, 2018

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I accept the terms in the License Agreement

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Installing MongoDB

MongoDB 6.0.5 2008R2Plus SSL (64 bit) Setup

Choose Setup Type

Choose the setup type that best suits your needs

Complete

All program features will be installed. Requires the most disk space. Re...

Custom

Allows users to choose which program features will be installed and where they will be installed. Recommended for advanced users.

The Mongo Shell must be installed separately for Windows installations.
[Download Now](#)

Back **Next** **Cancel**



Installing MongoDB

MongoDB 6.0.5 2008R2Plus SSL (64 bit) Service Cu... - X

Service Configuration

Specify optional settings to configure MongoDB as a service.

Install MongoDB as a Service

Run service as Network Service user

Run service as a local or domain user:

Account Domain: .

Account Name: MongoDB

Account Password:

Service Name: MongoDB

Data Directory: C:\Program Files\MongoDB\Server\6.0\data\

Log Directory: C:\Program Files\MongoDB\Server\6.0\log\

< Back Next > Cancel



Installing MongoDB

MongoDB Compass

Install MongoDB Compass

MongoDB Compass is the official graphical user interface for MongoDB.

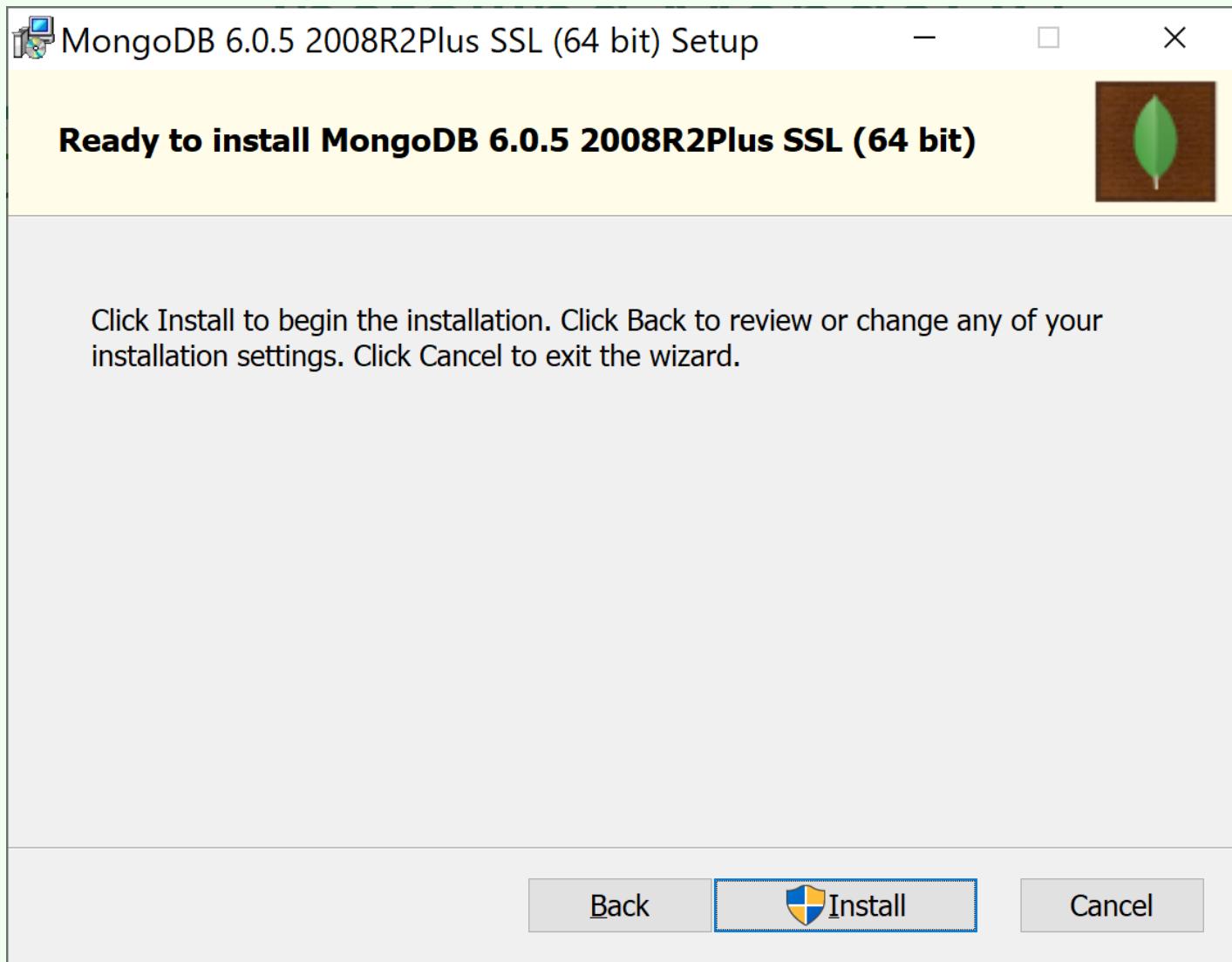
By checking below this installer will automatically download and install the latest version of MongoDB Compass on this machine. You can learn more about MongoDB Compass [here](#).

Install MongoDB Compass

Back Next Cancel



Installing MongoDB



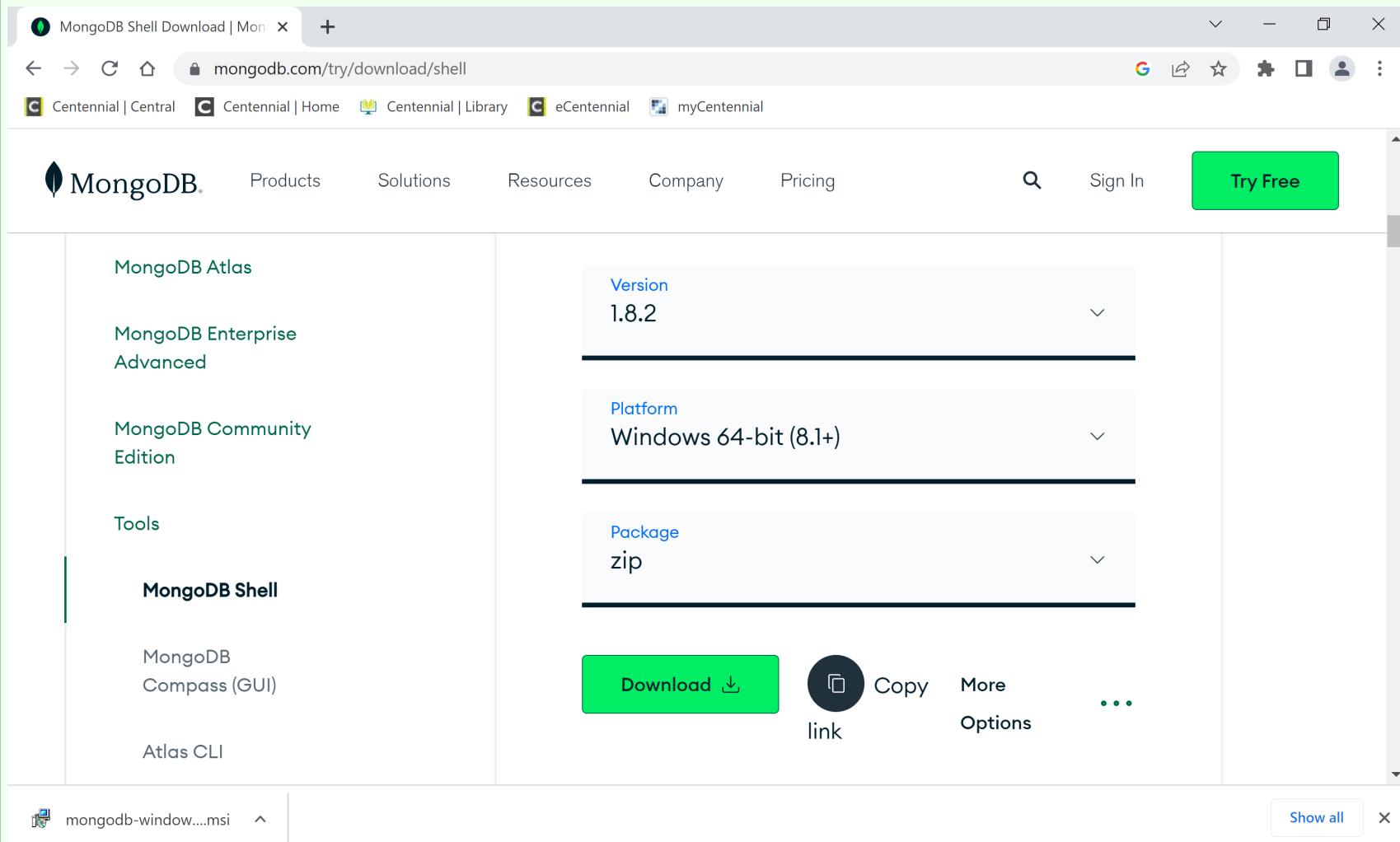


Installing MongoDB

The screenshot shows the MongoDB Compass application interface. On the left, there's a sidebar with a dark green header labeled "Compass". Below it are two buttons: "New connection +", "Saved connections" (with a star icon), and "Recents" (with a circular arrow icon). The main area has a light gray background. At the top right of the main area is a "FAVORITE" button with a star icon. The central part of the screen is titled "New Connection" and contains the instruction "Connect to a MongoDB deployment". Below this is a "URI" field with the value "mongodb://localhost:27017". To the right of the URI field is a "Edit Connection String" button with a blue toggle switch. At the bottom of the main area are three buttons: "Save", "Save & Connect" (highlighted with a green border), and "Connect". A small callout box at the bottom left of the main area says "New to Compass and don't have a cluster? If you don't already have a cluster, you can create one for free using [MongoDB Atlas](#)". There is also a "CREATE FREE CLUSTER" button.



Install mongosh



MongoDB Shell Download | Mon x +

mongodb.com/try/download/shell

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MongoDB Products Solutions Resources Company Pricing Sign In Try Free

MongoDB Atlas

MongoDB Enterprise Advanced

MongoDB Community Edition

Tools

MongoDB Shell

MongoDB Compass (GUI)

Atlas CLI

Version 1.8.2

Platform Windows 64-bit (8.1+)

Package zip

Download

Copy link More Options ...

mongodb-windows.msi



MongoDB bin folder

The screenshot shows a Windows File Explorer window with the following details:

- Path:** This PC > Local Disk (C:) > Program Files > MongoDB > Server > 6.0 > bin
- File Explorer View:** Name, Date modified, Type, Size
- Items in the bin folder:**

Name	Date modified	Type	Size
InstallCompass.ps1	3/8/2023 5:45 PM	Windows PowerS...	2 KB
mongod.cfg	3/8/2023 5:45 PM	Configuration So...	1 KB
mongod.exe	3/8/2023 7:06 PM	Application	55,071 KB
mongod.pdb	3/8/2023 7:06 PM	Program Debug ...	825,668 KB
mongos.exe	3/8/2023 6:30 PM	Application	34,035 KB
mongos.pdb	3/8/2023 6:30 PM	Program Debug ...	463,300 KB
mongosh.exe	5/5/2023 11:08 PM	Application	68,138 KB
mongosh_crypt_v1.dll	5/5/2023 11:08 PM	Application exte...	20,546 KB

- Left sidebar:** Quick access, OneDrive, This PC, 3D Objects, Desktop, Documents, Downloads, Music, Pictures, Videos, Local Disk (C:), Network.
- Bottom left:** 8 items
- Bottom right:** View icons (grid, list, details, large icons, small icons).



MongoDB bin folder

```
C:\Program Files\MongoDB\Server\4.4\bin>dir
Volume in drive C is BOOTCAMP
Volume Serial Number is B27F-0A43

Directory of C:\Program Files\MongoDB\Server\4.4\bin

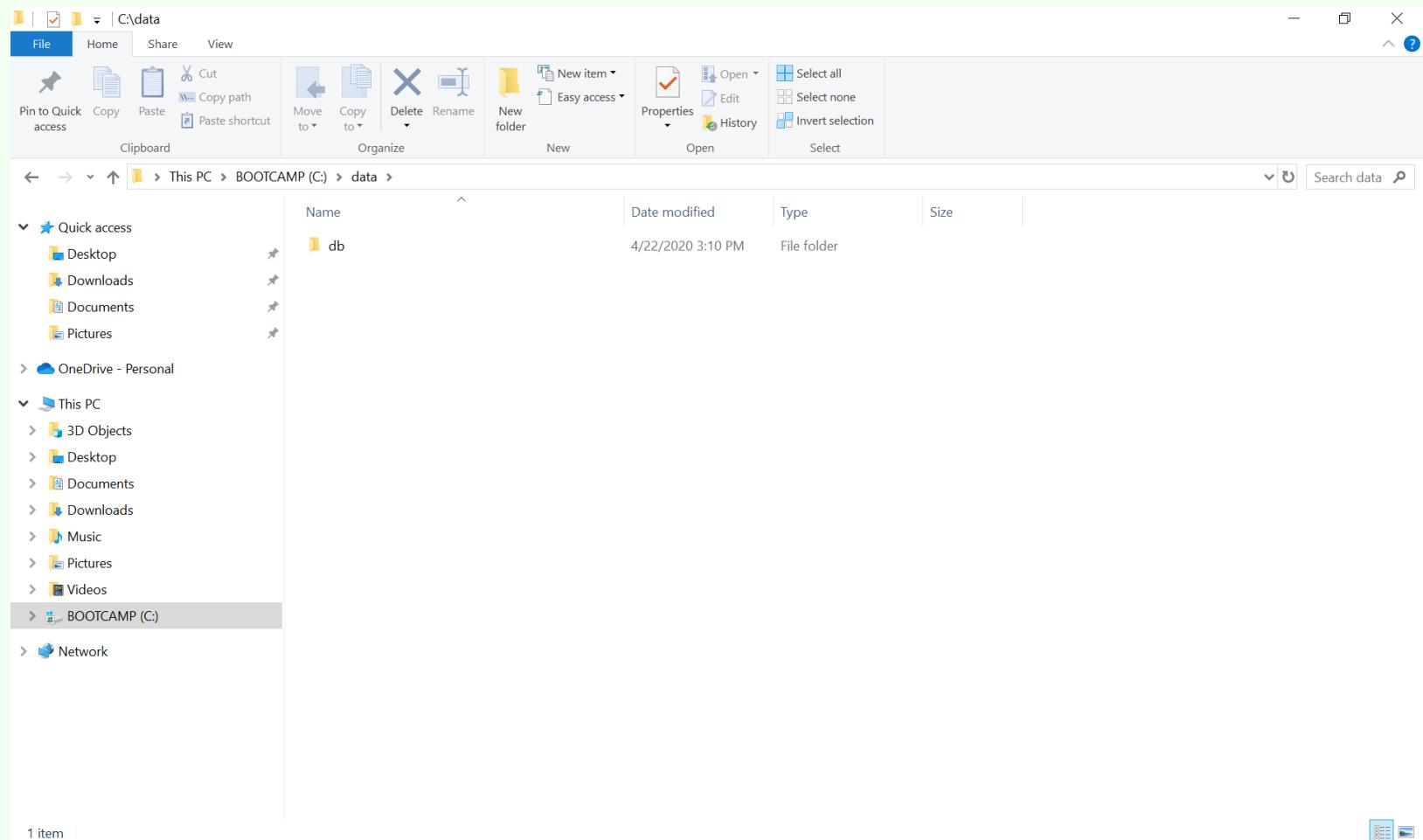
01/21/2021  06:52 PM    <DIR>          .
01/21/2021  06:52 PM    <DIR>          ..
12/22/2020  12:29 AM           1,558 InstallCompass.ps1
12/21/2020  11:59 PM        21,613,056 mongo.exe
12/21/2020  11:18 PM           570 mongod.cfg
12/22/2020  12:24 AM        38,308,864 mongod.exe
12/22/2020  12:24 AM        387,690,496 mongod.pdb
12/21/2020  11:58 PM        27,293,184 mongos.exe
12/21/2020  11:58 PM        261,132,288 mongos.pdb
                           7 File(s)   736,040,016 bytes
                           2 Dir(s)  16,956,497,920 bytes free

C:\Program Files\MongoDB\Server\4.4\bin>
```



MongoDB default folder for files

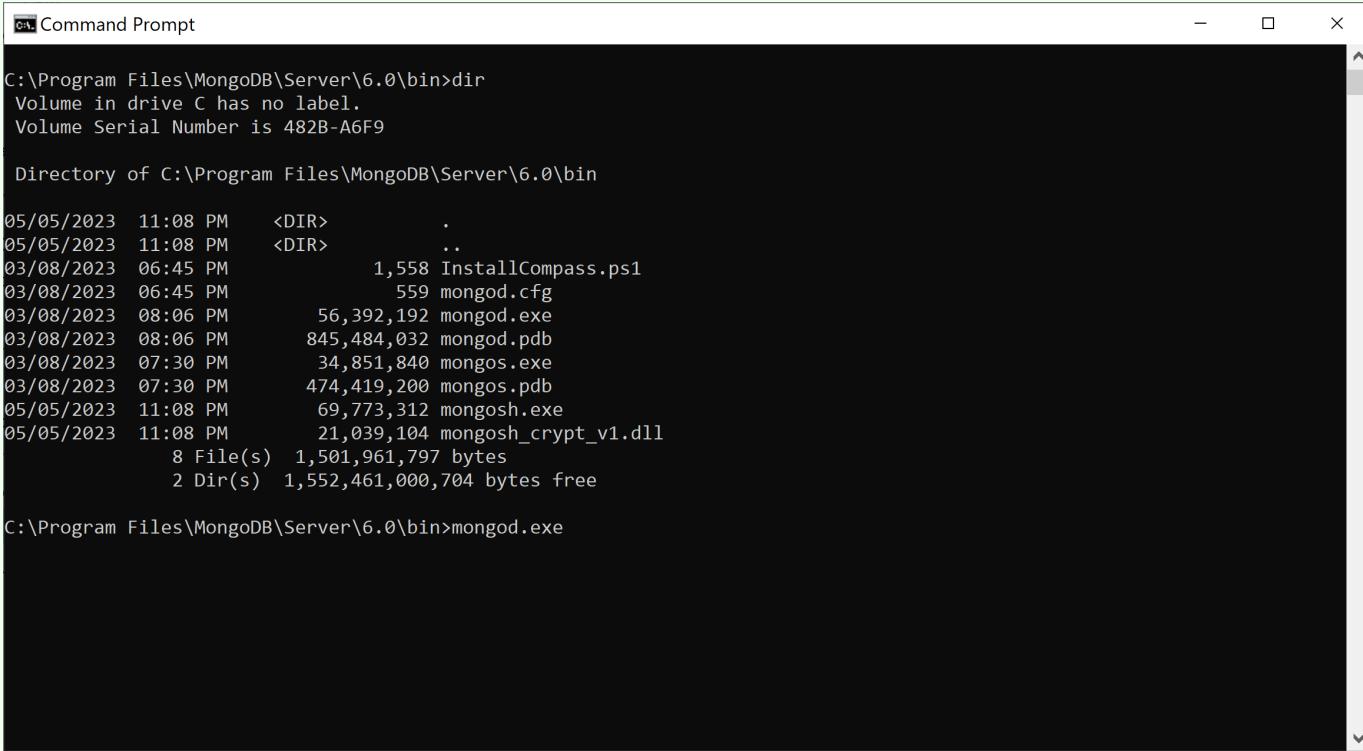
- Create MongoDB default folder to store its files - on Windows, the default location is **C:\data\db**:





Running MongoDB

- Open the command prompt and execute the following command:
"C:\Program Files\MongoDB\Server\6.0\bin\mongod.exe", or run **mongod** from the **bin** directory:



```
C:\> Command Prompt

C:\Program Files\MongoDB\Server\6.0\bin>dir
Volume in drive C has no label.
Volume Serial Number is 482B-A6F9

Directory of C:\Program Files\MongoDB\Server\6.0\bin

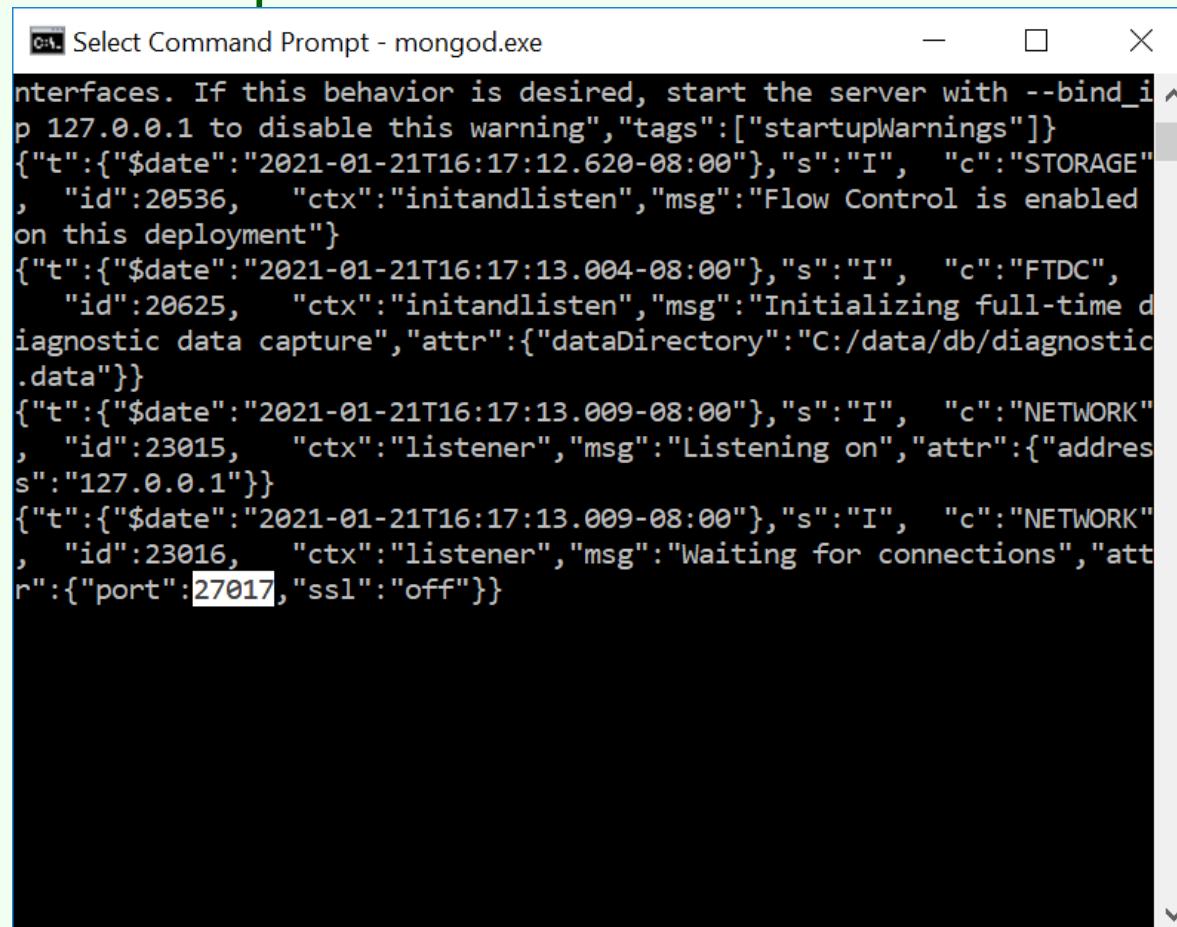
05/05/2023  11:08 PM    <DIR>      .
05/05/2023  11:08 PM    <DIR>      ..
03/08/2023  06:45 PM           1,558 InstallCompass.ps1
03/08/2023  06:45 PM           559 mongod.cfg
03/08/2023  08:06 PM          56,392,192 mongod.exe
03/08/2023  08:06 PM          845,484,032 mongod.pdb
03/08/2023  07:30 PM          34,851,840 mongos.exe
03/08/2023  07:30 PM          474,419,200 mongos.pdb
05/05/2023  11:08 PM          69,773,312 mongosh.exe
05/05/2023  11:08 PM          21,039,104 mongosh_crypt_v1.dll
                           8 File(s)  1,501,961,797 bytes
                           2 Dir(s)  1,552,461,000,704 bytes free

C:\Program Files\MongoDB\Server\6.0\bin>mongod.exe
```



Running MongoDB

- The main **MongoDB service** will start listening to the default 27017 port:



```
interfaces. If this behavior is desired, start the server with --bind_ip 127.0.0.1 to disable this warning", "tags": ["startupWarnings"]}] {"t": {"$date": "2021-01-21T16:17:12.620-08:00"}, "s": "I", "c": "STORAGE", "id": 20536, "ctx": "initandlisten", "msg": "Flow Control is enabled on this deployment"} {"t": {"$date": "2021-01-21T16:17:13.004-08:00"}, "s": "I", "c": "FTDC", "id": 20625, "ctx": "initandlisten", "msg": "Initializing full-time diagnostic data capture", "attr": {"dataDirectory": "C:/data/db/diagnostic.data"}}, {"t": {"$date": "2021-01-21T16:17:13.009-08:00"}, "s": "I", "c": "NETWORK", "id": 23015, "ctx": "listener", "msg": "Listening on", "attr": {"address": "127.0.0.1"}}, {"t": {"$date": "2021-01-21T16:17:13.009-08:00"}, "s": "I", "c": "NETWORK", "id": 23016, "ctx": "listener", "msg": "Waiting for connections", "attr": {"port": 27017, "ssl": "off"}}}
```



Using the MongoDB shell

- ❑ MongoDB shell allows to you to interact with your server instance using the command line.
- ❑ To start the shell, navigate to the MongoDB bin folder and run the **mongosh** service as follows:

```
C:\Command Prompt
C:\Program Files\MongoDB\Server\6.0\bin>dir
Volume in drive C has no label.
Volume Serial Number is 482B-A6F9

Directory of C:\Program Files\MongoDB\Server\6.0\bin

05/05/2023  11:08 PM    <DIR>      .
05/05/2023  11:08 PM    <DIR>      ..
03/08/2023  06:45 PM            1,558 InstallCompass.ps1
03/08/2023  06:45 PM            559 mongod.cfg
03/08/2023  08:06 PM            56,392,192 mongod.exe
03/08/2023  08:06 PM            845,484,032 mongod.pdb
03/08/2023  07:30 PM            34,851,840 mongos.exe
03/08/2023  07:30 PM            474,419,200 mongos.pdb
05/05/2023  11:08 PM            69,773,312 mongosh.exe
05/05/2023  11:08 PM            21,039,104 mongosh_crypt_v1.dll
                           8 File(s)  1,501,961,797 bytes
                           2 Dir(s)  1,552,461,000,704 bytes free

C:\Program Files\MongoDB\Server\6.0\bin>mongosh.exe
```



Using the MongoDB shell

```
mongosh mongodb://127.0.0.1:27017/?directConnection=true&serverSelectionTimeoutMS=2000
Using MongoDB:      6.0.5
Using Mongosh:      1.8.2

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

-----
The server generated these startup warnings when booting
2023-05-05T23:18:57.352-04:00: Access control is not enabled for the database. Read and write access to data and configuration is unrestricted
2023-05-05T23:18:57.353-04:00: This server is bound to localhost. Remote systems will be unable to connect to this server. Start the server with --bind_ip <address> to specify which IP addresses it should serve responses from, or with --bind_ip_all to bind to all interfaces. If this behavior is desired, start the server with --bind_ip 127.0.0.1 to disable this warning
-----
-----
Enable MongoDB's free cloud-based monitoring service, which will then receive and display metrics about your deployment (disk utilization, CPU, operation statistics, etc).

The monitoring data will be available on a MongoDB website with a unique URL accessible to you and anyone you share the URL with. MongoDB may use this information to make product improvements and to suggest MongoDB products and deployment options to you.

To enable free monitoring, run the following command: db.enableFreeMonitoring()
To permanently disable this reminder, run the following command: db.disableFreeMonitoring()
-----
Warning: Found ~/.mongorc.js, but not ~/.mongoshrc.js. ~/.mongorc.js will not be loaded.
You may want to copy or rename ~/.mongorc.js to ~/.mongoshrc.js.
test>
```



Testing the database

- To test your database, run the following command:

> db.courses.insert({title: "COMP-308 Emerging Technologies"}).

- To retrieve the course object, execute the following command:

> db.courses.find()

```
Command Prompt - mongo

The monitoring data will be available on a MongoDB website with a unique URL accessible to you
and anyone you share the URL with. MongoDB may use this information to make product
improvements and to suggest MongoDB products and deployment options to you.

To enable free monitoring, run the following command: db.enableFreeMonitoring()
To permanently disable this reminder, run the following command: db.disableFreeMonitoring()

---
> db
test
> db.courses.insert({title: "COMP-308 Emerging Technologies"})
WriteResult({ "nInserted" : 1 })
> db.courses.find()
{ "_id" : ObjectId("600a1be2c0ae7dbc0c473511"), "title" : "COMP-308 Emerging Technologies" }
> -
```



MongoDB Compass

The screenshot shows the MongoDB Compass application window. The title bar reads "MongoDB Compass - Connect". The menu bar includes "Connect", "View", and "Help". The left sidebar has sections for "New Connection", "Favorites", and "Recents". The main area is titled "New Connection" with a "FAVORITE" button. It contains fields for "Hostname" (localhost), "Port" (27017), and "SRV Record" (disabled). An "Authentication" dropdown is set to "None". A "CONNECT" button is at the bottom right. To the right of the connection form is a sidebar with a "Paste connection string" link, a "New to Compass and don't have a cluster?" section (with a "CREATE FREE CLUSTER" button), and a "How do I find my username and password?" section.

New to Compass and don't have a cluster?

If you don't already have a cluster, you can create one for free using [MongoDB Atlas](#).

CREATE FREE CLUSTER

How do I find my username and password?

If your mongod instance has authentication set up, you'll need the credentials of the MongoDB user that is configured on the project.



MongoDB Compass

MongoDB Compass - localhost:27017

Connect View Help

Local

HOST
localhost:27017

CLUSTER
Standalone

EDITION
MongoDB 4.4.3 Community

Filter your data

> admin

> config

> local

> test

+

Databases Performance

CREATE DATABASE

Database Name	Storage Size	Collections	Indexes
admin	20.0KB	0	1
config	4.0KB	0	2
local	20.0KB	1	1
test	20.0KB	1	1

> MongoSH Beta

Add Documents

The screenshot shows the MongoDB Compass interface connected to the database 'test' and collection 'courses'. The left sidebar lists databases (admin, config, local, test) and collections (courses). The main area displays the 'test.courses' collection with the following details:

- DOCUMENTS: 1
- TOTAL SIZE: 64B
- AVG. SIZE: 64B
- INDEXES: 1
- TOTAL SIZE: 20.0KB
- AVG. SIZE: 20.0KB

The 'Documents' tab is selected, showing a single document:

```
_id: ObjectId("600a1f3768da4bf78a9f1d02")
title: "COMP-308 Emerging Technologies"
```

Below the document list are buttons for ADD DATA, FILTER, VIEW, and various grid options. A status bar at the bottom indicates 'Displaying documents 1 - 1 of 1'.

Add Documents

The screenshot shows the MongoDB Compass interface connected to the database 'test' and collection 'courses'. The interface includes a sidebar for managing databases and collections, and a main panel for viewing and interacting with the data.

Local
HOST: localhost:27017
CLUSTER: Standalone
EDITION: MongoDB 4.4.3 Community

MongoDB Compass - localhost:27017/test.courses

Connect View Collection Help

test.courses Documents

test.courses

Documents Aggregations Schema Explain Plan Indexes Validation

ADD DATA FILTER OPTIONS FIND RESET ...

Displaying documents 1 - 2 of 2 < > C REFRESH

	_id	title
1	600a1f3768da4bf78a9f1d02	"COMP-308 Emerging Technologies"
2	600a2124ce2b6957e0d8e627	"Neural Networks"

Course actions: Edit, Duplicate, Delete

> MongoSH Beta



Installing Node.js

The screenshot shows a web browser window with the URL nodejs.org/en/download/current. The page title is "Download | Node.js". The main content is titled "Downloads" and indicates the "Latest Current Version: 20.1.0 (includes npm 9.6.4)". It features two tabs: "LTS" (Recommended For Most Users) and "Current" (Latest Features). Under the LTS tab, there are links for "Windows Installer" (node-v20.1.0-x64.msi), "macOS Installer" (node-v20.1.0.pkg), and "Source Code" (node-v20.1.0.tar.gz). Under the Current tab, there are links for "Windows Installer (.msi)" (node-v20.1.0-x64.msi), "Windows Binary (.zip)" (node-v20.1.0-x64.zip), and "macOS Installer (.pkg)" (node-v20.1.0.pkg). A dropdown menu for the Windows installer shows options for 32-bit, 64-bit, and ARM64, with 64-bit selected. The bottom navigation bar includes links for "mongosh-1.8.2-win32.zip" and "mongodb-windows-x64.msi".

LTS
Recommended For Most Users

Current
Latest Features

Windows Installer
node-v20.1.0-x64.msi

macOS Installer
node-v20.1.0.pkg

Source Code
node-v20.1.0.tar.gz

Windows Installer (.msi)
node-v20.1.0-x64.msi

Windows Binary (.zip)
node-v20.1.0-x64.zip

macOS Installer (.pkg)
node-v20.1.0.pkg

32-bit 64-bit ARM64

32-bit 64-bit ARM64

64-bit / ARM64

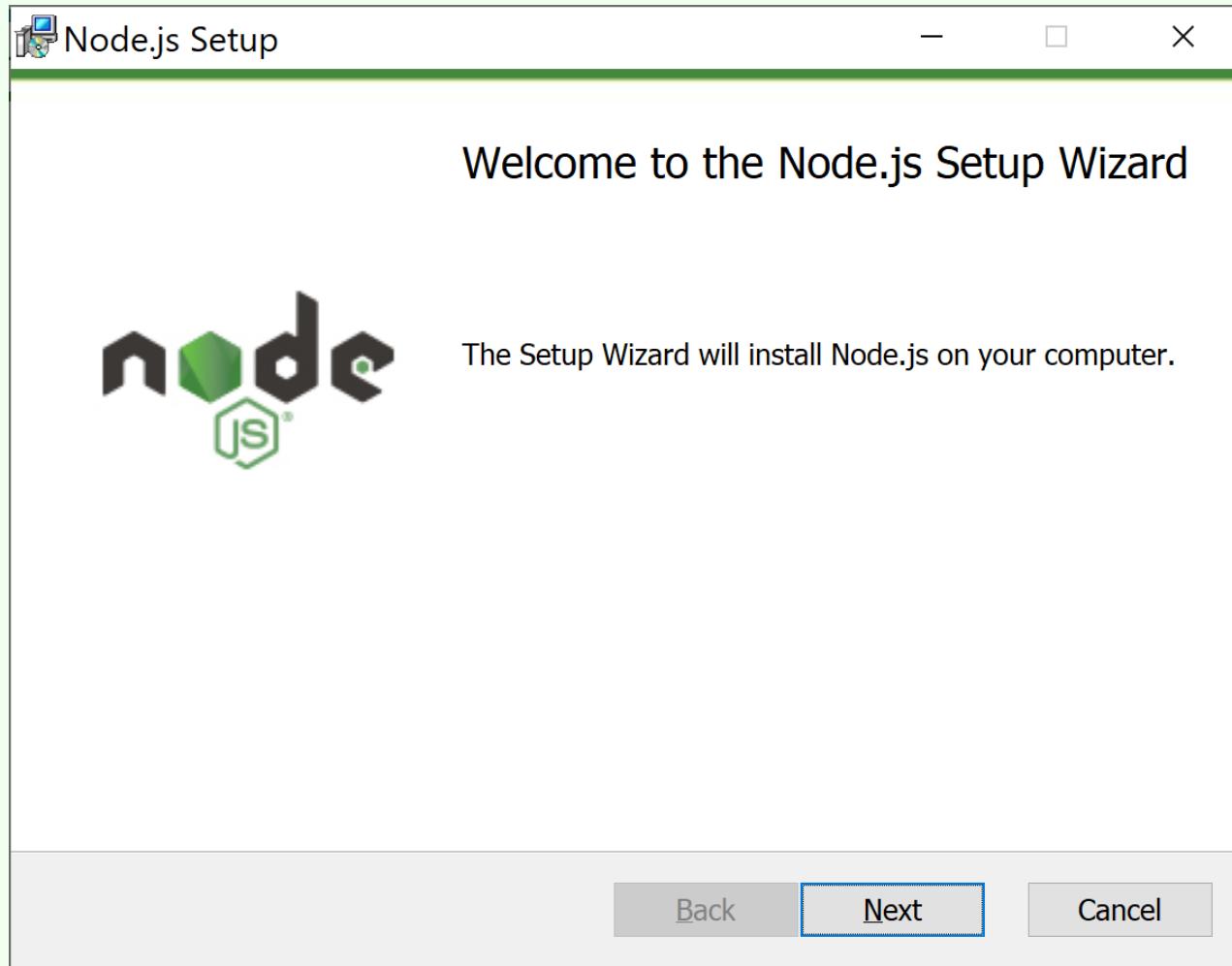
mongosh-1.8.2-win32.zip

mongodb-windows-x64.msi



Installing Node.js

- Install 64bit node-v20.1.0-x64.msi file.





Installing Node.js

 Node.js Setup

End-User License Agreement

Please read the following license agreement carefully



Node.js is licensed for use as follows:

Copyright Node.js contributors. All rights reserved.

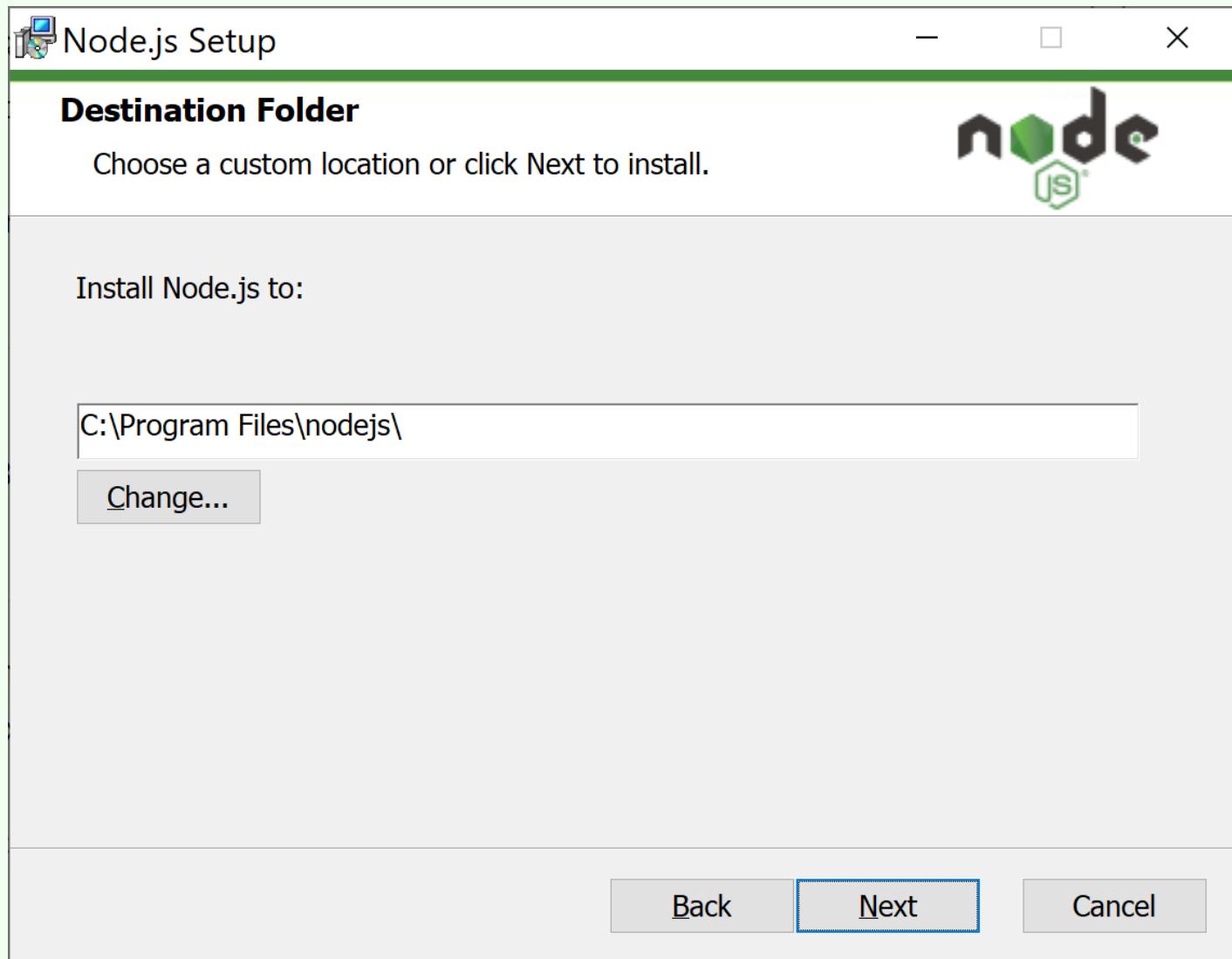
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Installing Node.js





Installing Node.js

 Node.js Setup

Custom Setup

Select the way you want features to be installed.



Click the icons in the tree below to change the way features will be installed.

- Node.js runtime
- corepack manager
- npm package manager
- Online documentation shortcuts
- Add to PATH

Install the core Node.js runtime (node.exe).

This feature requires 67MB on your hard drive.

[Browse...](#)

[Reset](#)

[Disk Usage](#)

[Back](#)

[Next](#)

[Cancel](#)



Installing Node.js

 Node.js Setup

Tools for Native Modules

Optionaly install the tools necessary to compile native modules.



Some npm modules need to be compiled from C/C++ when installing. If you want to be able to install such modules, some tools (Python and Visual Studio Build Tools) n...

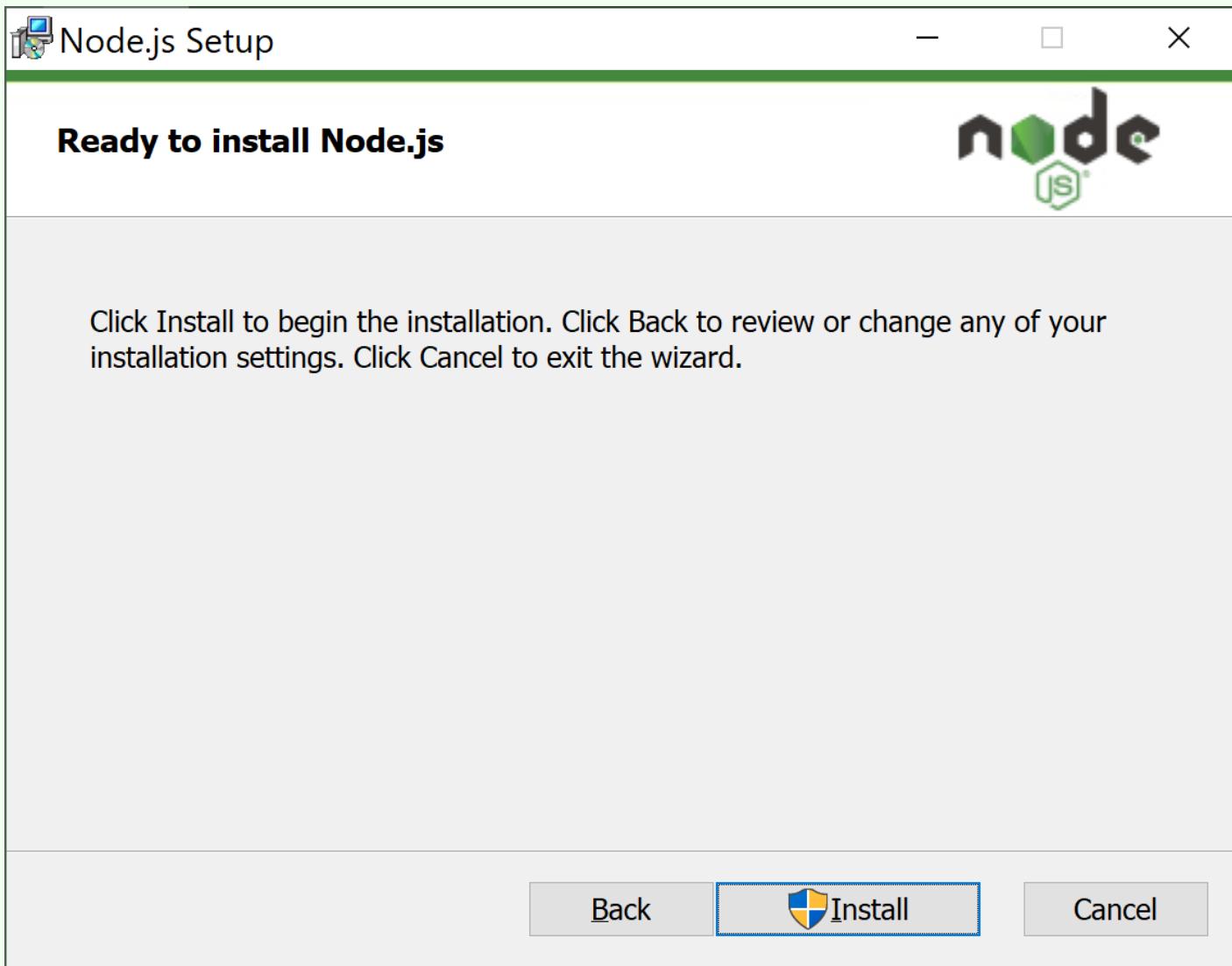
Automatically install the necessary tools. Note that this will also install Chocolatey.
The script will pop-up in a new window after the installation completes.

Alternatively, follow the instructions at <https://github.com/nodejs/node-gyp#on-windows> to install the dependencies yourself.

[Back](#) [Next](#) [Cancel](#)



Installing Node.js





Running Node.js

- Just run node from command prompt:

```
C:\>node
Welcome to Node.js v20.1.0.
Type ".help" for more information.
>
```



Running Node.js

- Create a JavaScript file `app.js` with this line:

```
console.log('Node.js is up and running!');
```

The screenshot shows the Visual Studio Code interface. On the left is the Explorer sidebar with a file tree containing an `app.js` file under `OPEN EDITORS`. The main area is a code editor with the following content:

```
JS app.js
1 console.log('Node.js is up and running!')
2 
```

Below the code editor is a tab bar with `PROBLEMS`, `OUTPUT`, `DEBUG CONSOLE`, and `TERMINAL`. The `TERMINAL` tab is selected, showing a PowerShell window with the command `node app` and its output:

```
PS C:\Classes\COMP308\Examples\2020\test> node app
Node.js is up and running!
PS C:\Classes\COMP308\Examples\2020\test> 
```

The bottom status bar indicates the file is `app.js - test - Visual Studio Code`, has `Ln 2, Col 1`, `Spaces: 4`, `UTF-8`, `CRLF`, and is using `Javascript (Babel)`.



Node.js prompt commands

```
C:\nodejs>node
> .help
.break      Sometimes you get stuck, this gets you out
.clear      Alias for .break
.editor     Enter editor mode
.exit       Exit the repl
.help       Print this help message
.load       Load JS from a file into the REPL session
.save       Save all evaluated commands in this REPL session to a file
>
```



Node Package Manager

- ❑ NPM is the best way to install, update, and remove Node.js modules
- ❑ NPM has the following main features:
 - A registry of packages to browse, download, and install third-party modules
 - A CLI tool to manage local and global packages
- ❑ NPM is installed during the Node.js installation process.



Using NPM

- NPM has two installation modes: **local** and **global**.
- The **default local mode** is used more often and installs the third-party packages in a local **node_modules** folder placed inside your application folder.
- It has no effect system-wise, and is used to install the packages your application needs, without polluting your system with unnecessary global files.
- The global mode is used to install packages you want Node.js **to use globally**.
- Will demonstrate the use of NPM by installing Express



Using NPM

- The global mode will usually install the packages in the C:\Users\%USERNAME%\AppData\Roaming\npm\node_modules folder, **making it available to any Node.js application running on the system.**
- To install a package using the npm run the following command:

npm install <Package Unique Name>

- Installing a module globally is similar to its local counterpart, but you'll have to add the -g flag as follows:

npm install -g <Package Unique Name>



Using NPM

- ❑ For example, to locally install Express, you'll need to **navigate to your application folder** and issue the following command:
npm install express
- ❑ NPM supports a wide range of semantic versioning, so to install a specific version of a package, you can use the **npm** install command as follows:

npm install <Package Unique Name>@<Package Version>

- ❑ For instance, to install the second major version of the Express package, you'll need to issue the following command:

npm install express@4.x



Using NPM

- **Removing a package using NPM**
- To remove an installed package, you'll have to navigate to your application folder and run the following command:

npm uninstall < Package Unique Name>

- NPM will then look for the package and try to remove it from the local node_modules folder.
- To remove a global package, you'll need to use the -g flag as follows:

npm uninstall -g < Package Unique Name>



Using NPM

- **Updating a package using NPM**
- To update a package to its latest version, issue the following command:
npm update < Package Unique Name>
- NPM will download and install the latest version of this package even if it doesn't exist yet.
- To update a global package, use the following command:
npm update –g < Package Unique Name>



Managing dependencies using the package.json file

- NPM allows you to use a **configuration file** named **package.json** in the root folder of your application.
- In your package.json file, you'll be able to **define various metadata properties of your application**, including properties such as the **name**, **version**, and **author** of your application.
- This is also where you **define your application dependencies**.



Managing dependencies using the package.json file

- The **package.json** file is basically a JSON file that contains the **different attributes you'll need to describe your application properties**.
- An application using the latest Express and Grunt packages will have a package. **json** file as follows:

```
{  
  "name" : "MERN",  
  "version" : "0.0.1",  
  "dependencies" : {  
    "express" : "latest",  
    "grunt" : "latest"  
  }  
}
```



Creating a package.json file

- While you can manually create a package.json file, an easier approach would be to use the **npm init** command.
- To do so, use your command-line tool and issue the following command:

\$ npm init

- NPM will ask you a few questions about your application and will automatically **create a new package.json file** for you.
- A sample process should look similar to the following screenshot:



Creating a package.json file

Command Prompt

```
C:\Classes\COMP308\Examples\Node>npm init
This utility will walk you through creating a package.json file.
It only covers the most common items, and tries to guess sensible defaults.

See `npm help json` for definitive documentation on these fields
and exactly what they do.

Use `npm install <pkg> --save` afterwards to install a package and
save it as a dependency in the package.json file.

Press ^C at any time to quit.
name: (Node) MEAN
Sorry, name can no longer contain capital letters.
name: (Node) mean
version: (1.0.0) 0.0.1
description: my mean app
entry point: (index.js) server.js
test command:
git repository:
keywords: MongoDB, Express, AngularJS, NodeJS
author: ilia nika
license: (ISC) MIT
About to write to C:\Classes\COMP308\Examples\Node\package.json:

{
  "name": "mean",
  "version": "0.0.1",
  "description": "my mean app",
  "main": "server.js",
  "scripts": {
    "test": "echo \"Error: no test specified\" && exit 1"
  },
  "keywords": [
    "MongoDB",
    "Express",
    "AngularJS",
    "NodeJS"
  ],
  "author": "ilia nika",
  "license": "MIT"
}

Is this ok? (yes) yes
```



Installing the package.json dependencies

- After creating your **package.json** file, you'll be able to install your application dependencies by navigating to your application's root folder and using the **npm** install command as follows:

npm install

- NPM will automatically detect your package.json file and will install all your application dependencies, placing them under a local **node_modules** folder.
- An alternative and sometimes better approach to install your dependencies is to use the following **npm** update command:

npm update



Updating the package.json file

- Another robust feature of the **npm install** command is the ability to **install a new package and save the package information as a dependency in your package.json file.**
- This can be accomplished using the **--save** optional flag when installing a specific package.
- For example, to install the latest version of Express and save it as a dependency, you can issue the following command:

npm install express --save



Creating Node.js Apps in VS Code

- Write a simple Node.js app in VS Code.
- See the video on eCentennial.
- Test Week 1 Examples
- Complete the Lab Session 1
- Complete Interactive Exercise 1



References

- Reference textbook
- <https://nodejs.org/en/>
- <http://expressjs.com/>
- <https://angular.io/>
- <https://www.mongodb.org/>
- <https://code.visualstudio.com/>