

Node JS

- ✓ Latest version of NODE JS is 21.7.2.
- ✓ Download node js from <https://nodejs.org/en> and install it. To check downloaded version type **node -v** in console.
- ✓ The Node.js installer includes the NPM(Node Package Manager). For version check **npm -v**.
- ✓ **NPM is the package manager** for the Node JS platform. It puts modules in place so that node can find them, and manages dependency conflicts intelligently.
- ✓ Node.js is an open source server environment.
- ✓ Node.js allows you to run JavaScript on the server.

REPL

REPL stands for

- **R Read**
 - **E Eval**
 - **P Print**
 - **L Loop**
- ✓ It represents a computer environment like a Windows console or Unix/Linux shell where a command is entered and the system responds with an output in an interactive mode.
 - ✓ The REPL feature of Node is very useful in experimenting with Node.js codes and to debug JavaScript codes.

It performs the following tasks –

- **Read** – Reads user's input, parses the input into JavaScript data-structure, and stores in memory.
- **Eval** – Takes and evaluates the data structure.
- **Print** – Prints the result.
- **Loop** – Loops the above command until the user presses **ctrl-c** twice.

Starting REPL

REPL can be started by simply running **node** on shell/console without any arguments as follows.

```
$ node
```

You will see the REPL Command prompt **>** where you can type any Node.js command –

```
$ node  
>
```

Simple Expression

Let's try a simple mathematics at the Node.js REPL command prompt –

```
$ node  
> 1 + 3  
4  
> 1 + ( 2 * 3 ) - 4  
3  
>
```

Use Variables

You can make use variables to store values and print later like any conventional script. If **var** keyword is not used, then the value is stored in the variable and printed. Whereas if **var** keyword is used, then the value is stored but not printed. You can print variables using **console.log()**.

```
$ node  
> x = 10  
10  
> var y = 10  
undefined  
> x + y  
20  
> console.log("Hello World")  
Hello World  
undefined
```

Multiline Expression

Node REPL supports multiline expression similar to JavaScript. Let's check the following do-while loop in action –

```
$ node  
> var x = 0  
undefined  
> do {
```

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```
... x++;  
... console.log("x: " + x);  
... }  
while ( x < 5 );  
x: 1  
x: 2  
x: 3  
x: 4  
x: 5  
undefined  
>
```

... comes automatically when you press Enter after the opening bracket. Node automatically checks the continuity of expressions.

Underscore Variable

You can use underscore () to get the last result –

```
$ node  
> var x = 10  
undefined  
> var y = 20  
undefined  
> x + y  
30  
> var sum = _  
undefined  
> console.log(sum)  
30  
undefined  
>
```

>.editor

- Type .editor to enter in editor mode (Block wise execution only)
- Entering editor mode (Ctrl+D to generate output, Ctrl+C to cancel)

```
const fun=(a,b)=>  
{console.log("Hello");  
return a+b;
```

```
}  
console.log("Addition is =",fun(10,20));
```

//Output:

Hello
Addition is = 30
Undefined

```
var t=55;  
undefined  
do{  
... t++  
... console.log(t);  
... } while(t<=60)  
56  
57  
58  
59  
60  
61  
undefined
```

REPL Commands

- **ctrl + c** – terminate the current command.
- **ctrl + c twice** – terminate the Node REPL.
- **ctrl + d** – terminate the Node REPL.
- **Up/Down Keys** – see command history and modify previous commands.
- **tab Keys** – list of current commands.
- **.editor** – enable editor mode to perform tasks
- **.help** – list of all commands.
- **.break** – exit from multiline expression.
- **.clear** – exit from multiline expression.
- **.save filename** – save the current Node REPL session to a file. (.save j1.js)
- **.load filename** – load file content in current Node REPL session. (.load j1.js)

To remove undefined error
`"repl.repl.ignoreUndefined = true"`

ignoreUndefined - if set to true, then the repl will not output the return value of command if it's undefined. Defaults to false.

Example

```
> 7=== "7"
false
> a=_+20
20
> 7=="7"
true
> console.log(_)
true
undefined
> _+30
NaN
> p=true
true
> d=_+29
30
```

Explanation

1	7 === "7"	false	Strict comparison (different types)
2	a = _ + 20	20	_ is false (false is 0, so 0 + 20 = 20)
3	7 == "7"	true	Loose comparison
4	console.log(_)	true, undefined	_ becomes true but console.log() returns undefined
5	_ + 30	NaN	undefined + 30 is NaN
6	p = true	true	Assigns true to p
7	d = _ + 29	30	_ is true, true is 1, so 1 + 29 = 30

Example

What will be the output of following code? Consider output Only after completion of loop. (undefined is ignored)

```
> t=2
> t = t+_
do{
  ... ++t;
  ... console.log(t);
...}while(t<10)
```

Output: 5 6 7 8 9 10

File System (fs) Module

- ✓ The 'fs' module of Node.js implements the File I/O operation.
- ✓ To include the File System module, use the require() method

The syntax for including the fs module in your application:

```
var fs=require("fs");
```

- ✓ Methods in the fs module can be synchronous as well as asynchronous.
- ✓ The **Asynchronous** function has a callback function as the last parameter which indicates the completion of the asynchronous function.
- ✓ Node.js developers prefer asynchronous methods over synchronous methods as asynchronous methods never block a program during its execution, whereas the latter does. We will discuss it later.

mkdirSync()

The **fs.mkdirSync()** method is used to create a directory Synchronously.

Syntax:

```
fs.mkdirSync( path, options )
```

Parameters: This method accept two parameters as mentioned above and described below:

- **path:** The path at which directory is to be created. It can be string, buffer, etc.
- **options:** It is an optional parameter which determines how to create directory like recursively, etc.

renameSync()

The **fs.renameSync()** method is used to synchronously rename a file at the given old path to the given new path. It will overwrite the destination file if it already exists.

Syntax:

```
fs.renameSync( oldPath, newPath )
```

Property Values:

- **oldPath:** It holds the path of the file that has to be renamed. It can be a string, buffer or URL.
- **newPath:** It holds the new path that the file has to be renamed to. It can be a string, buffer or URL.

writeFileSync()

The **fs.writeFileSync()** is a synchronous method.

The **fs.writeFileSync()** creates a new file if the specified file does not exist.

Syntax:

```
fs.writeFileSync( file, data, options )
```

readFileSync()

- ✓ The **fs.readFileSync()** method is an inbuilt application programming interface of the fs module which is used to read the file and return its content.
- ✓ In the **fs.readFileSync()** method, we can synchronously read files, i.e. we are telling node.js to block other parallel processes and do the current file reading process.

Syntax:

```
fs.readFileSync( path, options )
```

Parameters:

- **path:** It takes the relative path of the text file. The path can be of URL type. The file can also be a file descriptor. If both the files are in the same folder just give the filename in quotes.
- **options:** It is an optional parameter that contains the encoding and flag, the encoding contains data specification. Its default value is null which returns the raw buffer and the flag contains an indication of operations in the file. Its default value is 'r'.

appendFileSync()

- ✓ The **fs.appendFileSync()** method is used to synchronously append the given data to a file.
- ✓ A new file is created if it does not exist. The optional options parameter can be used to modify the behavior of the operation.

Syntax:

```
fs.appendFileSync( path, data, [options])
```

Parameters:

This method accepts three parameters as mentioned above and described below:

- **path:** It is a String, Buffer, URL or number that denotes the source filename or file descriptor that will be appended.
- **data:** It is a String or Buffer that denotes the data that has to be appended.
- **options:** It is a string or an object that can be used to specify optional parameters that will affect the output. It has three optional

unlinkSync()

- ✓ The **fs.unlinkSync()** method is used to synchronously remove a file or symbolic link from the filesystem.

- ✓ This function does not work on directories, therefore it is recommended to use `fs.rmdir()` to remove a directory.

Syntax:

```
fs.unlinkSync( path )
```

Parameters:

This method accepts one parameter as mentioned above and described below:

- **path:** It is a string, Buffer or URL which represents the file or symbolic link which has to be removed.

We expect that the `fs.readFile()/fs.readFileSync()` would get the data in text format, i.e., string data type but it returns a buffer object.

In Node.js, the `Buffer.toString()` method is used to decode or convert a buffer to a string, according to the specified character encoding type. Converting a buffer to a string is known as encoding, and converting a string to a buffer is known as decoding.

UTF-8 is the World Wide Web's most common character encoding.

```
fs.readFileSync("node/write.txt","utf-8");
```

or

```
data= fs.readFileSync("node/write.txt");  
console.log(data.toString());
```

If no encoding is specified, then the raw buffer is returned.

Write node Example with File system methods. (CRUD Operation)

1. To create folder
2. Create one file inside that folder
3. Append some data to that file.
4. Read data from the file
5. Rename that file
6. Delete File

```
var ps=require("fs");  
ps.mkdirSync("node");  
ps.writeFileSync("node/write.txt","Hello");  
ps.appendFileSync("node/write.txt","Hi");  
data=ps.readFileSync("node/write.txt");
```



```
console.log(data);  
console.log(data.toString()); //Or add "utf-8"  
  
//data=ps.readFileSync("node/write.txt","utf-8");  
  
ps.renameSync("node/write.txt"," node/readwrite.txt")  
ps.unlinkSync("node/readwrite.txt");
```

Read data from file and sort that data in ascending order using .sort() .

```
//string format  
var ps=require("fs");  
ps.writeFileSync("s1.txt","50 -1 99 100 20 0 56 78 59");  
data=ps.readFileSync("S1.txt","utf-8");  
data=data.split(" ");  
d = data.sort((a,b)=>a-b);  
console.log(d);
```

Output:

```
[  
  '-1', '0', '20',  
  '50', '56', '59',  
  '78', '99', '100'  
]
```

```
//integer format  
var ps=require("fs");  
ps.writeFileSync("s1.txt","10 50 -1 99 100 140 20 0 56 78 59");  
data=ps.readFileSync("S1.txt","utf-8");  
data=data.split(" ");  
d=data.sort((a,b)=>a-b);  
let p=[];  
for(i=0;i<d.length;i++){  
  p[i]=parseInt(d[i]);  
}console.log(p)
```

Output:

```
[  
  -1, 0, 10, 20, 50,  
  56, 59, 78, 99, 100,  
  140  
]
```

Write a node.js script to copy contents of one file to another file. Data should be fetched from Source.txt and insert to destination.txt.

```
var fs=require("fs");  
fs.writeFileSync("source.txt","ABC");  
data=fs.readFileSync("Source.txt","utf-8");  
fs.writeFileSync("destination.txt",data);  
data1=fs.readFileSync("destination.txt","utf-8");  
console.log(data1);
```

Output:

ABC

Asynchronous Programming Using Callbacks

- ✓ Asynchronous programming is an approach to running multiple processes at a time without blocking the other part(s) of the code.
- ✓ There are some cases that code runs (or must run) after something else happens and also not sequentially. This is called asynchronous programming.
- ✓ Callbacks make sure that a function is not going to run before a task is completed but will run right after the task has completed. It helps us develop asynchronous JavaScript code and keeps us safe from problems and errors.
- ✓ In JavaScript, the way to create a callback function is to pass it as a parameter to another function, and then to call it back right after something has happened or some task is completed.

How to create a Callback?

To understand what I've explained above, let me start with a simple example. We want to log a message to the console but it should be there after 3 seconds.

```
const message = function() {  
  console.log("This message is shown after 3 seconds");  
}  
setTimeout(message, 3000);
```

- ✓ There is a built-in method in JavaScript called “setTimeout”, which calls a function or evaluates an expression after a given period of time (in milliseconds).
- ✓ So here, the “message” function is being called after 3 seconds have passed. (1 second = 1000 milliseconds)
- ✓ In other words, the message function is being called after something happened (after 3 seconds passed for this example), but not before. So the message function is an example of a callback function.

JavaScript setInterval() Method: The setInterval() method repeats a given function at every given time interval.

JavaScript setTimeout() Method: This method executes a function, after waiting a specified number of milliseconds.

What is an Anonymous Function?

Alternatively, we can define a function directly inside another function, instead of calling it. It will look like this:

```
setTimeout(function() {  
    console.log("This message is shown after 3 seconds");  
}, 3000);
```

As we can see, the callback function here has no name and a function definition without a name in JavaScript is called as an “anonymous function”. This does exactly the same task as the example above.

Callback as an Arrow Function

If you prefer, you can also write the same callback function as an ES6 arrow function, which is a newer type of function in JavaScript:

```
setTimeout(() => {  
    console.log("This message is shown after 3 seconds");  
}, 3000);
```

Callback examples

Display content on browser after 5 seconds

```
<html>  
  <head>  
  
  </head>  
  <body>  
    <p id="id"></p>  
    <script>  
      setTimeout(myfun,5000);  
      function myfun()  
      {  
        document.getElementById("id").innerHTML="LUU";  
      }  
    </script>  
  </body>  
</html>
```

Display addition of two numbers on browser using callback function

```
<html>  
<body>
```

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```
<p id="demo"></p>
<script>
  function mydisplay(sum)
  {
    document.getElementById("demo").innerHTML="<b>" + sum + "</b>";
  }
  function mycals(num1,num2,mycallback)
  {
    sum=num1+num2;
    mycallback(sum);
  }
  mycals(13,15,mydisplay);
</script>
</body>
</html>
```

Initialize two variables and increment both the variables and display the addition of both the variables at interval of 1 second.

```
<html>
<body>
  <p id="p1"></p>
  <script>
    function add(a,b)
    {
      document.getElementById("p1").innerHTML=(a+b);
    }
    a=2;
    b=5;
    setInterval(()=>{add(++a,++b);},1000);
  </script>
</body>
</html>
```

OR

```
<html>
<body>
```

```

<p id="p1"></p>
<script>
  let a = 2, b = 5;
  setInterval(() => document.getElementById("p1").innerHTML = ++a + ++b, 1000);
</script>
</body>
</html>

```

Write code to increase the font size at interval of 1000 ms and it should stop increasing when the font size reaches to 50px. This task should be performed when you click on “Increase” button on browser. (Default font size = 15px)

```

<html>
<body>
  <p id="p1"> Hello</p>
  <button onclick="fun1()">Increase</button>
  <script>
    font=15;
    function fun(font)
    {
      document.getElementById("p1").style.fontSize=font+"px";
    }
    function fun1()
    {
      setInterval(()=>{
        if(font<=50){fun(font++);}
      },1000);
    }
  </script>
</body>
</html>

```

// Without using button

```

<html>
<body>
  <p id="demo" style="color:blue"></p>
  <script>
    size = 15;
    function add() {
      demo.innerHTML = "hello";
    }
  </script>

```

```
demo.style.color="red";
demo.style.fontSize=size;
if (size <= 50) {
    size++;
}
}
setInterval(add, 1000);
</script>
</body>
</html>
```

Write code to perform the tasks as asked below.

- **Add three buttons.**
- **Increase button to increase the fonts. It should stop increasing the fonts when the font size reaches to 200px or stop button is clicked.**
- **Decrease button to decrease the fonts. It should stop decreasing the fonts when the font size reaches to 20px or stop button is clicked.**
- **Stop button to stop increasing or decreasing the fonts.**
- **Increasing/decreasing interval is of 100 ms.**
- **(Default font size = 50px)**

```
<html>
<body>
  <p id="p1" style="font-size: 50px;"> Hello</p>
  <button onclick="inc()">Increase</button>
  <button onclick="dec()">Decrease</button>
  <button onclick="stop()">stop</button>
  <script>
    font=50;
    function fun(font)
    {
      document.getElementById('p1').style.fontSize=font+'px';
    }
    function inc()
    {
      test = setInterval(()=>{if(font<100){ fun(++font); } },100);
    }
    function dec()
    {
```

```
test =setInterval(()=>{if(font>15){ fun(--font);}},100);
}
function stop() { clearInterval(test); }
</script>
</body>
</html>
```

Node.js uses asynchronous programming!

A common task for a web server can be to open a file on the server and return the content to the client.

Here is how PHP or ASP handles a file request:

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.

Here is how Node.js handles a file request:

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 eliminates the waiting, and simply continues with the next request.

Asynchronous File system (Non-blocking concept)

- ✓ Asynchronous functions do not block the execution of the program and each command is executed after the previous command even if the previous command has not computed the result.
- ✓ The previous command runs in the background and loads the result once it has finished processing. Thus, these functions are called non-blocking functions.
- ✓ They take a callback function as the last parameter.
- ✓ Asynchronous functions are generally preferred over synchronous functions as they do not block the execution of the program whereas synchronous functions block the execution of the program until it has finished processing. Some of the asynchronous methods of fs module in NodeJS are:

❖ fs.readFile()
❖ fs.writeFile()
❖ fs.appendFile()

fs.writeFile() method

It is used to asynchronously write the specified data to a file. By default, the file would be replaced if it exists. The 'options' parameter can be used to modify the functionality of the method.

Syntax:

```
fs.writeFile( file, data,options, callback )
```

Parameters:

This method accepts four parameters as mentioned above and described below:

- **file:** It is a string, Buffer, URL or file description integer that denotes the path of the file where it has to be written. Using a file descriptor will make it behave similar to fs.write() method.
- **data:** It is a string, Buffer, TypedArray or DataView that will be written to the file.
- **callback:** It is the function that would be called when the method is executed.
 - **err:** It is an error that would be thrown if the operation fails.

appendFile() method

The fs.appendFile() method is used to asynchronously append the given data to a file. A new file is created if it does not exist. The options parameter can be used to modify the behavior of the operation.

Syntax:

```
fs.appendFile( path, data, options, callback )
```

Parameters:

This method accepts four parameters as mentioned above and described below:

- **path:** It is a String, Buffer, URL or number that denotes the source filename or file descriptor that will be appended to.
- **data:** It is a String or Buffer that denotes the data that has to be appended.
- **options:** It is a string or an object that can be used to specify optional parameters
- **callback:** It is a function that would be called when the method is executed.
 - **err:** It is an error that would be thrown if the method fails.

fs.readFile() method

It is an inbuilt method that is used to read the file. This method read the entire file into the buffer.

Syntax:

```
fs.readFile( filename, encoding, callback_function )
```

Parameters: The method accepts three parameters as mentioned above and described below:

- **filename:** It holds the name of the file to read or the entire path if stored at another location.
- **encoding:** It holds the encoding of the file. Its default value is 'utf8'.
- **callback_function:** It is a callback function that is called after reading of file. It takes two parameters:
 - **err:** If any error occurred.
 - **data:** Contents of the file.

Return Value: It returns the contents/data stored in file or error if any.

Example to understand difference between sync and async.

```
var fs = require('fs');
```

//Synchronous

```
fs.writeFileSync('test.txt', 'Hello World!')
```

```
console.log('Synchronous Write operation completed.');
```

```
console.log("Outside");
```

//Asynchronous

```
fs.writeFile('test1.txt', 'Hello World!', function (err) {  
  if (err)  
    console.log("Error Generated"+err);  
  else  
    console.log(err)  
    console.log('Asynchronous Write operation completed.');
```

});
console.log("Outside");

Output:

Synchronous Write operation completed.

Outside

Outside

Asynchronous Write operation completed.

Example to understand **writeFile**, **appendFile**, **readFile**, **rename**, **unlink** methods.

```
fs = require("fs")  
fs.writeFile('test1.txt', 'Hello World!', (err) => {  
  if (err) { console.log("Error Generated"+err); }  
  else { console.log("Written"); }  
});  
  
fs.appendFile('test1.txt', '\nGood Morning!', (err) => {  
  if (err) { console.log("Error Generated"+err); }  
  else { console.log("Appended"); }  
});  
  
fs.readFile('test1.txt', "utf-8", (readErr, data) => {  
  if (readErr) { console.error("Error Generated: "+readErr) }  
  else { console.log(data); }  
})  
  
fs.rename('test1.txt', 'test2.txt', () => {console.log("Renamed")})
```

```
fs.unlink('test2.txt', unlinkErr => {  
  if (unlinkErr) { throw unlinkErr; }  
  else { console.log("Deleted")}  
});
```

```
console.log("Last sentence")
```

Output is dependent on time to be taken to complete the particular task.

Write a Node.js script that asynchronously writes data to a file named 'test1.js'.

If no error occurs during the writing process, the script should then append additional data to the same file.

Finally, it should read the content of the file, including the newly written and appended data, and display it in the console.

Or

Writing data to file, appending data to file and then reading the file data using using ES6 callback.

```
fs = require("fs")  
fs.writeFile('test1.txt', 'Hello World!', function (err) {  
  if (err) { console.log("Error Generated"+err); }  
  else{  
    fs.appendFile('test1.txt', '\nGood Morning!', function (err) {  
      if (err){ console.log("Error Generated"+err); }  
      else{  
        fs.readFile('test1.txt',"utf-8", (readErr, data) => {  
          if (readErr) console.log("Error Generated: "+readErr)  
          console.log(data);  
        });  
      }  
    });  
  }  
});
```

OR Use setTimeout to read data

```
fs = require("fs")
fs.writeFile('test1.txt', 'Hello World!', function (err) {
  if (err) console.log("Error Generated"+err);
  fs.appendFile('test1.txt', '\nGood Morning!', function (err) {
    if (err)
      console.log("Error Generated"+err);
  });
});
setTimeout(function() {
  fs.readFile('test1.txt',"utf-8", (readErr, data) => {
    if (readErr) console.log("Error Generated: "+readErr)
    console.log(data);
  });
},3000)
}
```

OS Module : Operating System

Get information about the computer's operating system:

- **arch():** Returns the operating system CPU architecture
- **freemem():** Returns the number of free memory of the system
 - **Return Value:** This method returns an integer value that specifies the amount of free system memory in bytes.
- **tmpdir():** Returns the operating system's default directory for temporary files
- **platform():** This method is an inbuilt application programming interface of the os module which is used to get the Operating system platform.
 - **Return Value:** This method returns a string that represents the operating system platform. The returned values can be one of these 'aix', 'android', 'darwin', 'freebsd', 'linux', 'openbsd', 'sunos', and 'win32'. This value is set at compile time.
- **hostname():** Returns the hostname of the operating system
 - **Return Value:** This method returns a string value that specifies the host name of the operating system.

The syntax for including the os module in your application:

```
var os=require("os");
```

Example:

```
var os=require("os");  
console.log(os.arch());  
console.log(os.hostname());  
console.log(os.platform());  
console.log(os.tmpdir());
```

Output:

```
x64  
ITICT406-182  
win32  
C:\Users\LJIET\AppData\Local\Temp
```

Write node.js script to create a folder named "AA" in temp folder. Also, create file named "temp.txt" inside "AA" folder. Now, check if available physical memory of the system is greater than 1 GB then write "Sufficient Memory" in the file, else write "Insufficient" in file.

```
var fs=require("fs");
```

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```
var os=require("os");

f = os.tmpdir();
freemem=os.freemem()/1024/1024/1024;

fs.mkdirSync(f+"/AA");

if(freemem > 1){
fs.writeFileSync(f+"/AA/temp.txt","Sufficient memory")
}
else{
  fs.writeFileSync(f+"/AA/temp.txt","Low memory")
}
```

Note:

os.freemem() = bytes,
os.freemem()/1024 = KB,
os.freemem()/1024/1024 = MB,
os.freemem()/1024/1024/1024 = GB

Write node.js script to create a folder named “AA” at temp folder. Also, create file named “temp1.txt” inside “AA” folder. Now, check platform is “win32” or not and print message accordingly in file.

```
var fs=require("fs");
var os=require("os");

f = os.tmpdir();
p = os.platform();

if(p == "win32"){
  fs.writeFileSync(f+"/AA/temp1.txt","You are working on windows 32 bit")
}
else{
  fs.writeFileSync(f+"/AA/temp.txt","You are working on windows 64 bit")
}
```

Path Module

The Path module provides a way of working with directories and file paths.

The syntax for including the path module in your application:

```
var os=require("path");
```

Mehod	Description
basename()	Returns the last part of a path
dirname()	Returns the directories of a path
extname()	Returns the file extension of a path

Example:

```
var pm=require("path");
path=pm.dirname("D:/LJ/abc.html");
console.log(path);
path=pm.basename("D:/LJ/abc.txt");
console.log(path);
ext = pm.extname("D:/LJ/abc.txt")
console.log(ext);
path=pm.parse("D:/LJ/abc.html");
console.log(path);
```

Output:

```
D:/LJ
abc.txt
.txt
{
  root: 'D:/',
  dir: 'D:/LJ',
  base: 'abc.html',
  ext: '.html',
  name: 'abc'
}
```

Write node.js script to check whether the file extension is .txt or not.

```
var pm=require("path");
path=pm.parse("D:/LJ/abc.html");
if(path.ext == ".txt"){
  console.log("Text Document");
}else{
  console.log("Not a text Document");
}
```

Output:

```
Not a text Document
```


What will be the root and name values for the path “/LJ/abc.html”?

```
var pm=require("path");  
path=pm.parse("/LJ/abc.html");  
console.log(path);  
console.log("root: "+path.root+"\nname: "+path.name);
```

Output:

```
{ root: '/', dir: '/LJ', base: 'abc.html', ext: '.html', name: 'abc' }
```

```
root: /
```

```
name: abc
```

HTTP Module

HTTP module allows Node.js to transfer data over the Hyper Text Transfer Protocol (HTTP). To include the HTTP module, use the `require()` method:

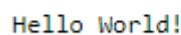
```
var http = require('http');
```

Node.js as a Web Server

- ✓ The HTTP module can create an HTTP server that listens to server ports and gives a response back to the client.
- ✓ Use the `createServer()` method to create an HTTP server.
- ✓ If the response from the HTTP server is supposed to be displayed as HTML, you should include an HTTP header with the correct content type:

Example:

```
var http = require('http');
//create a server object:
http.createServer(function (req, res) {
  res.write('Hello World!'); //write a response to the client
  res.end(); //end the response
}).listen(3120); //Server listening on port
```

Add an HTTP Header

Name	MIME type
HyperText Markup Language (HTML)	text/html
Cascading Style Sheets (CSS)	text/css
JavaScript	application/javascript
JavaScript Object Notation (JSON)	application/json
JPEG Image	image/jpeg
Portable Network Graphics (PNG)	image/png

```
var http = require('http');
http.createServer(function (req, res) {
  res.writeHead(200, {'Content-Type': 'text/html'});
  res.write('<h1>Hello World!</h1>');
  res.end();
}).listen(8180);
```



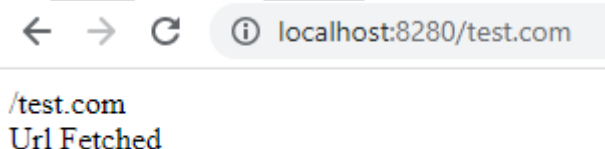
The first argument of the `res.writeHead()` method is the status code, 200 means that all is OK, the second argument is an object containing the response headers.

Request Url

The function passed into the `http.createServer()` has a `req` argument that represents the request from the client, as an object (`http.IncomingMessage` object).

This object has a property called "url" which holds the part of the url that comes after the domain name:

```
var http = require('http');
http.createServer(function (req, res) {
  res.writeHead(200, {'Content-Type': 'text/html'});
  res.write(req.url);
  res.end("Url Fetched");
}).listen(8280);
```



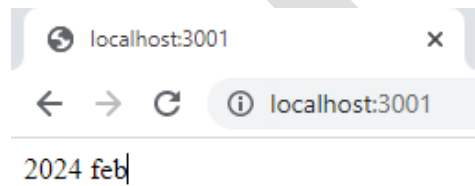
Get the query string

We can fetch the values from url query string as mentioned below using URL module.

- 1) Add **static url** in code and request server to display data of query string in browser.

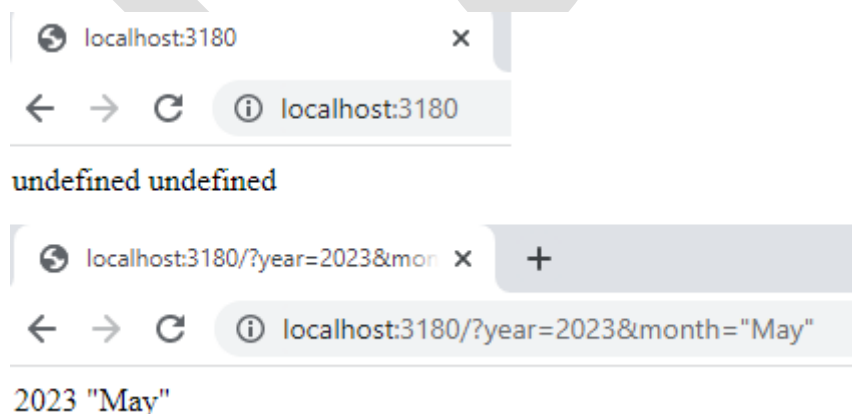
```
var http = require('http');
var url = require('url');
```

```
var addr="http://localhost:8080/default.html?year=2024&month=feb";
http.createServer(function (req, res) {
  res.writeHead(200, {'Content-Type': 'text/html'});
  /*Use the url module to get the querystring*/
  var q = url.parse(addr, true).query;
  /*Return the year and month from the query object:*/
  var txt = q.year + " " + q.month;
  res.end(txt);
}).listen(3001);
```



2) Add query string in url in a browser and request server to display data.

```
var http = require('http');
var url = require('url');
http.createServer(function (req, res) {
  res.writeHead(200, {'Content-Type': 'text/html'});
  var q = url.parse(req.url, true).query;
  var txt = q.year + " " + q.month;
  res.end(txt);
}).listen(3180);
```



Write a Node.js script to create a web server that performs the following tasks:

1. **Serve an HTML page with two links: Home ("/") and About ("/about").**
2. **Display appropriate HTML content for both the Home and About pages.**
3. **If the user accesses any other URL, display a plain text message: "Page not found".**

```
var h=require("http");
var server=h.createServer(
  function(req,res)
  {
    if(req.url=="/")
    {
      res.writeHead(200,{"content-type":"text/html"});
      res.write("<h1> Home page </h1><div><ul><li><a href='/'>Home</a></li><li><a href='/about'>About</a></li></ul>");
      res.end();
    }
    else if(req.url=="/about")
    {
      res.writeHead(200,{"content-type":"text/html"});
      res.write("<h1> About Page </h1>");
      res.end();
    }
    else
    {
      res.writeHead(404,{"content-type":"text/plain"});
      res.write("Page not found");
      res.end("\nPlease check the url");
      /* res.write("Bye");*/ //displays nothing if you add any content after res.end and
      //throws an error
    }
  });
server.listen(5051);
```

Write node.js script to print “Welcome to Home Page” with two links containing two pages named as “About Us” and “Contact Us” on home page of server. If user request for About Us page it should display “Welcome to LJ University” in bold font-style with blue color and if user request for Contact Us page it should display “Email:abc@ljinstitutes.edu.in” in italic font-style with red color if any other request is requested it shows “Page not found” message in plaintext.

```

const http = require('http');
const server = http.createServer((req, res) => {
  if (req.url === '/') {
    res.writeHead(200, { 'Content-Type': 'text/html' });
    res.end(`
      <h1>Welcome to Home Page</h1>
      <a href="/about">About Us</a><br><a href="/contact">Contact Us</a>
    `);
  } else if (req.url === '/about') {
    res.writeHead(200, { 'Content-Type': 'text/html' });
    res.end(`<h1 style="color: blue; font-weight: bold;">Welcome to LJ University</h1>`);
  } else if (req.url === '/contact') {
    res.writeHead(200, { 'Content-Type': 'text/html' });
    res.end(`<h2 style="color: red; font-style: italic;">Email: abc@ljinstitutes.edu.in</h2>`);
  } else {
    res.writeHead(404, { 'Content-Type': 'text/plain' });
    res.end("Page not found");
  }
});

server.listen(3000, () => {console.log("Server started");});

```

Write a Node.js script to create a server that responds with JSON data when accessed from a browser.

```

var http=require("http");
var server=http.createServer(
  function(req,res)
  {
    if(req.url=="/")
    {
      const a={"Name":"ABC", "Age":35};
      res.writeHead(200,{"content-type":"application/json"});
      res.write("Thank you..!");
      res.write(JSON.stringify(a));
      res.end();
    }
  });
server.listen(6001);

```

Output: Thank you..!{"Name":"ABC", "Age":35}

Write Node.js program that serves a simple HTML file from a static URL on a web server. When you access the URL in a browser, it will read the HTML file and display its content using **URL module.**

```
var h=require("http");
var fs=require("fs");
var url=require("url");
var addr="http://localhost:6051/1.html";
var server=h.createServer(
  function(req,res)
  {
    var q=url.parse(addr,true);
    data=fs.readFileSync("."+q.pathname);
    res.writeHead(200,{"content-type":"text/html"});
    res.write(data);
    res.end();
  });
server.listen(6051);
```

Create 1.html file with any random content.

Write a Node.js program to create a web server that serves a simple HTML file. When a user requests the URL in a browser, the server should read the HTML file using **URL module and send its content as the HTTP response.**

```
var h=require("http");
var fs=require("fs");
var url=require("url");
var server=h.createServer(
  function(req,res)
  {
    var q=url.parse(req.url,true);
    data=fs.readFileSync("."+q.pathname);
    res.writeHead(200,{"content-type":"text/html"});
    res.write(data);
    console.log(data);
    res.write("<h1> hello</h1>")
    res.end();
  });
server.listen(6055);
```

NOTE:

You need "." when constructing a **dynamic file path** from req.url (or similar sources), because:

1. **req.url includes / at the beginning**
2. If req.url = "/1.html", then "1.html" works, but "/1.html" (absolute path) does not.
3. "." + req.url ensures the path remains relative: "./1.html".

Write a Node.js program to create a web server that serves a simple HTML file. When a user requests the URL in a browser, the server should read the HTML file and send its content as the HTTP response. (Without url module)

```
var h=require("http");
var fs=require("fs");
h.createServer(
  function(req,res)
  {
    data=fs.readFileSync("1.html");
    res.writeHead(200,{"content-type":"text/html"});
    res.write(data);
    res.write("<h1> hello</h1>")
    res.end();
  }).listen(6055);
```

In below example res.write() is used after res.end(), which is not allowed.

```
const http = require('http');
const server = http.createServer((req, res) => {
  res.writeHead(200, { 'Content-Type': 'text/html' });
  res.end('<h1>Welcome to Home Page</h1>');
  res.write("hello")
});
server.listen(3000);
```

res.end() sends the response and **closes the connection**.
res.write("hello") **after res.end()** causes an error:
Error [ERR_STREAM_WRITE_AFTER_END]: write after end

Nodemon

Nodemon is a popular tool that is used for the development of applications based on [node.js](#). It simply restarts the node application whenever it observes the changes in the file present in the working directory of your project.

To carry out the installation of Nodemon in your node.js-based project use the following steps for your reference.

```
npm install -g nodemon
```

To check version

```
Nodemon -v
```

Once nodemon is installed it might throw an error. We need delete the file as mention in error. Below is the file path.

```
C:/user/LJENG (This will be different) /Appdata/Roaming/npm/nodemon.ps1 (Follow the path and delete nodemon.ps1 file)
```

```
npm list -g command is used to check the path.
```

For example, if we created one file named “first.js” which contains code as below

```
var http = require('http');  
http.createServer(function (req, res) {  
  res.writeHead(200, {'Content-Type': 'text/html'});  
  res.write('<h1>Hello World!</h1>');  
  res.end();  
}).listen(8180);
```

To run the file use below command

```
nodemon first.js
```

If we make any changes in the **first.js** file, it will automatically be reflected and the server will restart and the latest output will be displayed on the browser.

JSON Processing Examples

Write node JS script to write an array of objects with properties name and age in a file named **student.txt**. Then read the file and display the object on console.

```
const student =
[
  {
    name: "ABC",
    age: 30
  },
  {
    name: "XYZ",
    age: 32
  }
]
var ps=require("fs");

ps.writeFileSync("student.txt",JSON.stringify(student));
data=ps.readFileSync("student.txt","utf-8");

b=JSON.parse(data); // To access values of properties
console.log(b);
```

Output:

```
[ { name: 'ABC', age: 30 }, { name: 'XYZ', age: 32 } ]
```

Create JSON object which contains array of objects. Calculate perimeter of square and perimeter of circle by using side value and diameter value respectively. Write object as well as perimeter values of square and circle in shape.txt file.

```
const shape =
[
  {
    name: "circle",
    diameter: 8
  },
  {
    name: "square",
    side: 10
  }
]
```

```
const shape =
[
  {
    name: "circle",
    diameter: 8
  },
  {
    name: "square",
    side: 10
  }
]
var ps=require("fs");
ps.writeFileSync("shape.txt",JSON.stringify(shape));
data=ps.readFileSync("shape.txt","utf-8");
b=JSON.parse(data);

var perimeter = (b[0].diameter/2) * 3.14 * 2 ; //2*3.14*r (here r=diameter/2)
console.log(perimeter);
var peri = (b[1].side) *4 ; //4*side
console.log(peri);

ps.appendFileSync("shape.txt","\nPerimeter of circle = "+ perimeter+ "\nPerimeter of square
= "+ peri);
```

Output:
[{"name":"circle","diameter":8},{"name":"square","side":10}]
Perimeter of circle = 25.12
Perimeter of square = 40

Write node js script and json to perform below tasks.

1. Write below object in txt file named **s2.txt**
{d:{a:10,b:20,c:[30,10]}}
2. Read data from the same file and perform the below tasks.
 - a. addition of a and b.
 - b. subtraction of 2nd element of c and b. (Must be positive value)
 - c. multiplication of elements of c.
3. Add the Output of addition, subtraction and multiplication below the object in s2.txt file.

```
var fs=require("fs");
const data ={d:{a:10,b:20,c:[30,10]}}

fs.writeFileSync("s2.txt",JSON.stringify(data)+"\n");
data1=fs.readFileSync("S2.txt","utf-8");
console.log(data1)
data1=JSON.parse(data1);
add=data1.d.a+data1.d.b;
sub=Math.abs(data1.d.c[1]-data1.d.b);
mul=data1.d.c[1]*data1.d.c[0];
console.log(add,sub,mul)
fs.appendFileSync("s2.txt",add+"\n"+sub+"\n"+mul)
```