NodeJS Dasar

Agenda

- Pengenalan NodeJS
- Pengenalan Concurrency
- NodeJS Architecture
- Menginstall NodeJS
- NodeJS REPL
- Standard Library
- Dan lain-lain

Zlib

Zlib

- Zlib adalah standard library yang digunakan untuk melakukan kompresi menggunakan Gzip
- https://nodejs.org/docs/latest-v22.x/api/zlib.html
- https://nodejs.org/dist/latest-v16.x/docs/api/zlib.html

Kode: Zlib Compress

Kode : Zlib Decompress

```
import zlib from "zlib";
import fs from "fs";

const source = fs.readFileSync( path: "zlib.mjs.txt");
const result = zlib.unzipSync(source);
console.info(result.toString());
```

```
JS zlib-decompress.mjs ×
   belajar-nodejs-dasar-main > JS zlib-decompress.mjs > ...
                             import fs from "fs";
                             import zlib from "zlib";
                             const source = fs.readFileSync("zlib-compress.mjs.txt");
                             console.info(source.toString());
                             const result = zlib.unzipSync(source);
                             console.info(result.toString());
                                                                                                                                                                                                                                                                                                                                                                                                                               > zsh - b
     PROBLEMS
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asroni@asronis-MacBook-Air belajar-nodejs-dasar-main % node zlib-decompress.mjs
      }@A@ E@@bªM@
                                                 @n@@'P@(dfk0oJYw@@@7\
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     import fs from "fs";
     import zlib from "zlib";
     const source = fs.readFileSync("zlib-compress.mjs");
     const result = zlib.gzipSync(source);
     fs.writeFileSync("zlib-compress.mjs.txt", result);
```

o asroni@asronis-MacBook-Air belajar-nodejs-dasar-main %

Console

Console

- Console adalah standard library yang sudah sering kita gunakan
- Secara global, object console bisa kita gunakan tanpa harus melakukan import module, dan console melakukan print text nya ke stdout
- Namun jika kita juga bisa membuat object Console sendiri jika kita mau
- https://nodejs.org/docs/latest-v22.x/api/console.html
- https://nodejs.org/dist/latest-v16.x/docs/api/console.html

Kode: Console

```
console.mjs
       import {Console} from "console";
       import fs from "fs";
       const logFile = fs.createWriteStream( path: "application.log");
       const log = new Console({
           stdout: logFile,
           stderr: logFile
      }});
       log.info("Hello world")
       log.error("Ups");
```

```
belajar-nodejs-dasar-main > ≡ application.log
                                                     belajar-nodejs-dasar-main > JS console.mjs > ...
                                            Hello World
                                                             import {Console} from "console";
      Hello World
                                                             import fs from "fs";
         (index)
                     Values
                                                             const file = fs.createWriteStream("application.log");
                      'Asroni'
         firstName
         lastName
                      'Sukirman'
                                                             const log = new Console({
                                                                 stdout: file,
                                                                 stderr: file,
                                                             })
                                                       11
                                                             log.info("Hello World");
                                                       12
                                                             log.error("Hello World");
                                                       13
                                                             const person = {
                                                                 firstName : "Asroni",
                                                                 lastName : "Sukirman",
                                                             log.table(person);
                                                       21
```

JS console.mjs X

≡ application.log ×

Worker Threads

Worker Threads

- Worker Threads adalah standard library yang bisa kita gunakan untuk menggunakan thread ketika mengeksekusi JavaScript secara paralel
- Worker Threads sangat cocok ketika kita membuat kode program yang butuh jalan secara paralel, dan biasanya kasusnya adalah ketika kode program kita membutuhkan proses yang CPU intensive, seperti misalnya enkripsi atau kompresi
- Cara kerja Worker Threads mirip dengan Web Worker di JavaScript Web API
- https://nodejs.org/docs/latest-v22.x/api/worker_threads.html
- https://nodejs.org/dist/latest-v16.x/docs/api/worker_threads.html

Kode: Main Thread

```
worker-main.mjs
       import {threadId, Worker} from "worker_threads";
       const worker1 = new Worker( filename: "./worker.mjs");
       const worker2 = new Worker( filename: "./worker.mjs");
       worker1.addListener( event: "message", listener: function (message) {
           console.info( data: `thread-${threadId} receive message : ${message}`);
     △});
       Dworker2.addListener( event: "message", listener: function (message) {
           console.info( data: `thread-${threadId} receive message : ${message}`);
     台});
       worker1.postMessage( value: 10);
       worker2.postMessage( value: 10);
```

Kode: Worker Thread

```
worker.mjs
       import {parentPort, threadId} from "worker_threads";
       parentPort.addListener( event: "message", listener: function (message) {
           for (let i = 0; i < message; i++) {</pre>
               console.info( data: `thread-${threadId} send message ${i}`);
               parentPort.postMessage(i);
           parentPort.close();
     △})
```

```
belajar-nodejs-dasar-main > JS worker-main.mjs > ...
                                                                                                   belajar-nodejs-dasar-main > JS worker.mjs > ...
                                                                                                          import {threadId, parentPort} from "worker threads";
       import {threadId, Worker} from "worker_threads";
                                                                                                          parentPort.addListener("message", (message) => {
      const worker1 = new
                                 ("./worker.mjs");
                                                                                                               for (let i = 0; i < message; i++) {
      const worker2 = new
                                 ("./worker.mjs");
                                                                                                                   console.info(`Thread-${threadId} send message ${i}`);
      worker1.addListener("message", (message) => {
           console.info(`Thread-${threadId} receive from worker 1 : ${message}`);
      worker2.addListener("message", (message) => {
          console.info(`Thread-${threadId} receive from worker 2 : ${message}`);
PROBLEMS OUTPUT DEBUG CONSOLE TERMINAL
                                                          POSTMAN CONSOLE
                                                                                                                                                   > zsh - belajar-nodejs-dasar-n
⊳asroni@asronis-MacBook-Air belajar-nodejs-dasar-main % node worker-main.mjs
Thread-1 send message 0
Thread-0 receive from worker 1:0
Thread-0 receive from worker 1:1
Thread-0 receive from worker 1: 2
Thread-0 receive from worker 1:3
Thread-0 receive from worker 1: 4
Thread-0 receive from worker 1 : 5
Thread-0 receive from worker 1: 6
Thread-0 receive from worker 1 : 7
Thread-0 receive from worker 1:8
Thread-0 receive from worker 1:9
Thread-2 send message 0
Thread-0 receive from worker 2: 0
Thread-0 receive from worker 2:1
Thread-0 receive from worker 2:2
Thread-0 receive from worker 2:3
Thread-0 receive from worker 2: 4
Thread-0 receive from worker 2:5
Thread-0 receive from worker 2 : 6
Thread-0 receive from worker 2: 7
Thread-0 receive from worker 2:8
Thread-0 receive from worker 2:9
Thread-1 send message 1
Thread-1 send message 2
Thread-1 send message 3
Thread-1 send message 4
Thread-1 send message 5
Thread-1 send message 6
Thread-1 send message 7
Thread-1 send message 8
Thread-1 send message 9
Thread-2 send message 1
Thread-2 send message 2
```

JS worker.mjs X

JS worker-main.mjs ×

Thread-2 send message 3

HTTP Client

https://css-tricks.com/hookbin-capture-inspect-http-requests/

HTTP Client

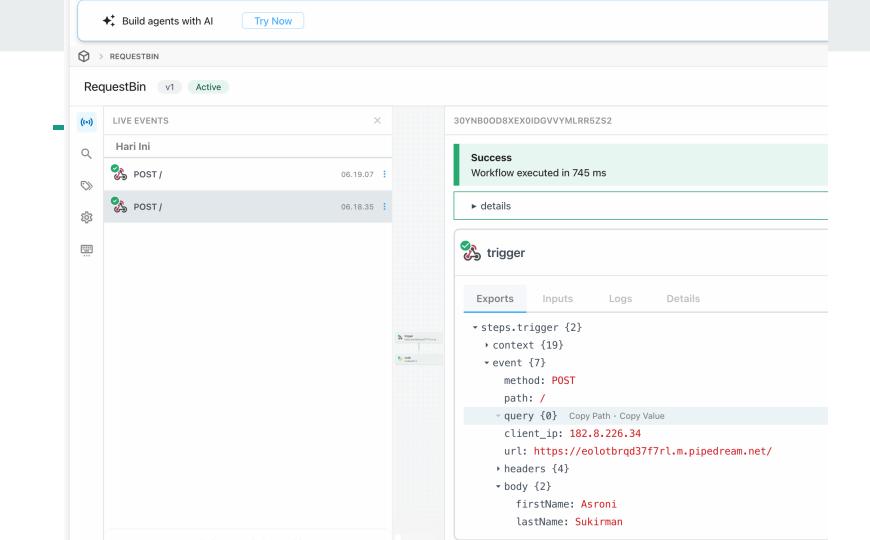
- NodeJS juga memiliki standard library untuk HTTP
- Salah satu fitur di module HTTP adalah HTTP Client, dimana kita bisa melakukan simulasi HTTP Request menggunakan NodeJS
- Terdapat 2 jenis module HTTP di NodeJS, HTTP dan HTTPS
- https://nodejs.org/docs/latest-v22.x/api/http.html
- https://nodejs.org/dist/latest-v16.x/docs/api/http.html
- https://nodejs.org/docs/latest-v22.x/api/https.html
- https://nodejs.org/dist/latest-v16.x/docs/api/https.html

https://css-tricks.com/hookbin-capture-inspect-http-requests/

Kode: HTTP Client

```
# http-client.mjs
       import https from "https";
       const url = "https://hookb.in/1gmgywgrLLfd6N0061k8";
       const request = https.request(url, options: {
           method: "POST",
           headers: {
               "Content-Type": "application/json",
               "Accept": "application/json",
          callback: function (response : IncomingMessage ) {
           response.addListener(event: "data", listener: function (data) {
               console.info( data: `Receive : ${data.toString()}`)
          })
     △});
```

```
The unique URL to trigger this workflow is:
https://eodxx6cjw7u0bw2.m.pipedream.net
           See Code Examples
const body = JSON.stringify( value: {
       firstName: "Eko",
       lastName: "Khannedy",
△});
 request.write(body);
 request.end();
```



HTTP Server

HTTP Server

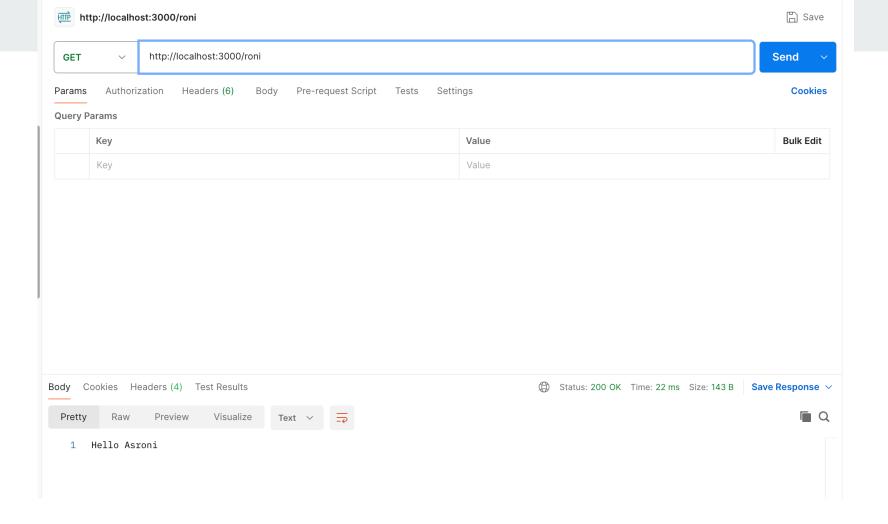
- Standard Library HTTP juga tidak hanya bisa digunakan untuk membuat HTTP Client, tapi juga bisa digunakan untuk membuat HTTP Server
- Untuk kasus sederhana, cocok sekali jika ingin membuat HTTP Server menggunakan standard library NodeJS, namun untuk kasus yang lebih kompleks, direkomendasikan menggunakan library atau framework yang lebih mudah penggunaannya
- https://nodejs.org/dist/latest-v16.x/docs/api/http.html

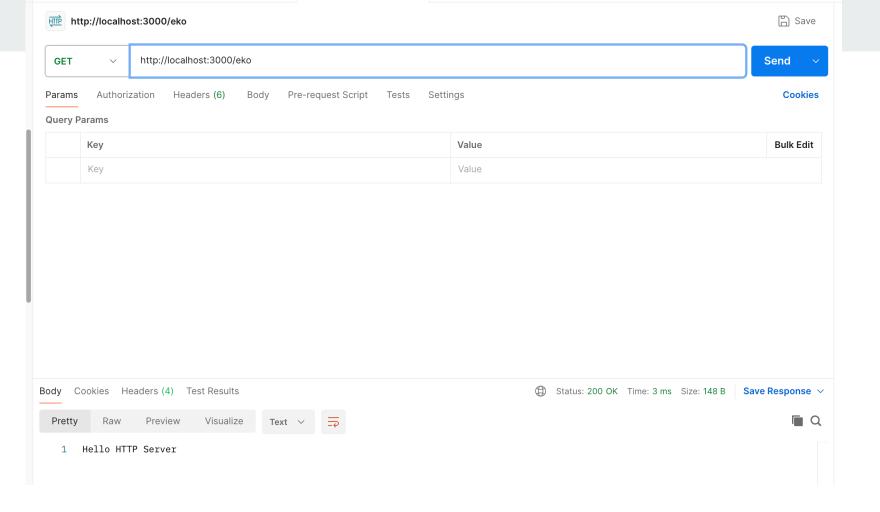
Kode: Simple HTTP Server

```
http-server.mjs
       import http from "http";
       |const| server = http.createServer( requestListener: (request: IncomingMessage , response: ServerResponse) \Rightarrow {
           response.write( chunk: "Hello World");
           response.end();
      }});
       server.listen( port: 3000);
```

Kode: Request Response HTTP Server

```
# http-server.mjs
       import http from "http";
       \texttt{Gconst} server = \texttt{http.createServer}( requestListener: (request : IncomingMessage , response : ServerResponse ) \Rightarrow {
           request.addListener( event: "data", listener: function (data) {
                   response.setHeader( name: "Content-Type", value: "application/json");
                   response.write(data);
                   response.end();
               response.write( chunk: "Hello World");
               response.end();
       server.listen( port: 3000);
```





Cluster

Cluster

- Seperti yang dijelaskan di awal, bahwa NodeJS itu secara default dia berjalan single thread, kecuali jika kita membuat thread manual menggunakan worker thread, tapi tetap dalam satu process
- NodeJS memiliki standard library bernama Cluster, dimana kita bisa menjalankan beberapa process NodeJS secara sekaligus
- Ini sangat cocok ketika kita menggunakan CPU yang multicore, sehingga semua core bisa kita utilisasi dengan baik, misal kita jalankan process NodeJS sejumlah CPU core
- https://nodejs.org/dist/latest-v16.x/docs/api/cluster.html

Cluster Primary dan Worker

- Di dalam Cluster, terdapat 2 jenis aplikasi, Primary dan Worker
- Primary biasanya digunakan sebagai koordinator atau manajer untuk para Worker
- Sedangkan Worker sendiri adalah aplikasi yang menjalankan tugas nya

Kode: Cluster Primary

```
acluster.mjs
      import cluster from "cluster";
       import http from "http";
       import os from "os";

    import process from "process";

      if (cluster.isPrimary) {
           for (let i = 0; i < os.cpus().length; i++) {</pre>
               cluster.fork();
           cluster.addListener( event: "exit", listener: function (worker : Worker ) {
               console.info( data: `Worker ${worker.id} is exited`);
```

Kode: Cluster Worker

```
if (cluster.isWorker) {
    const server = http.createServer( requestListener: (request : IncomingMessage , response : ServerResponse ) ⇒ {
         response.write( chunk: `Response from process ${process.pid}`);
         response.end();
         process.exit();
                                                                                                                worker : 25902
                                                                                                                Worker-12 is exit
                                                                                                                worker: 25905
    server.listen( port: 3000);
                                                                                                                Worker-13 is exit
                                                                                                                worker: 25909
    console.info( data: `Start cluster worker ${process.pid}`);
                                                                                                                Worker-14 is exit
                                                                                                                worker: 25910
                                                                                                                Worker-15 is exit
                                                                                                                worker: 25911
                                                                                                                Worker-16 is exit
                                             \leftarrow \rightarrow C
                                                                      http://localhost:3000
                                                                                                                worker: 25914
                                                                                                                Worker-17 is exit
                                             Response from process 25902
                                                                                                                worker : 25918
                                                                                                                Worker-18 is exit
                                                                                                                worker: 25919
                                                                                                                Worker-19 is exit
                                                                                                                worker : 25920
```

Materi Selanjutnya

Materi Selanjutnya

- NPM (Node Package Manager)
- NodeJS Unit Test
- ExpressJS
- NodeJS Database
- Dan lain-lain