

1 Feb 2024

What is NodeJS

It is a JS runtime .

baby analogy

What is a runtime?

→ process (software)

Runtime is an environment which provides necessary infrastructure for ^{JS} code to execute

Browser is also a runtime.

what infra does the browser provide.

Browser provides apis so JS can manipulate a web page.

in the node runtime JS gets apis to access OS & file system etc .

Browser apis

Dom tree

CSSOM tree

XML HTTP request

timers .

Node JS apis (open source JS runtime).

access to OS

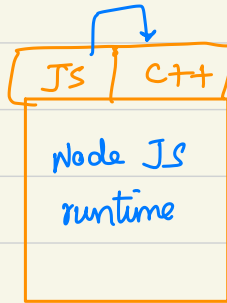
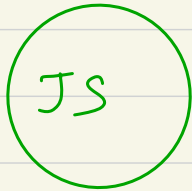
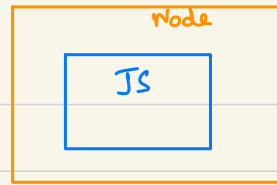
access to file system

timers

etc-.....

Infrastructure of Node JS

V8 engine, lib uv



V8 engine

libuv

DNS resolver lib

C-ares

other libraries as well.

take a look at the Node JS github.
go to node repo.

also enquire about web assembly

lib & src folder are imp

JS implementaⁿ C++ implementaⁿ

to access OS etc the lib folder
calls the src folder

ex hkdF calling internalBinding
crypto.js crypto_hkdF.cc.

node/lib/timers.js

lib/internals/timers.js

0ms is set to 1ms. *

promise is native part of JS. Just look at JS docs.

V8 engine

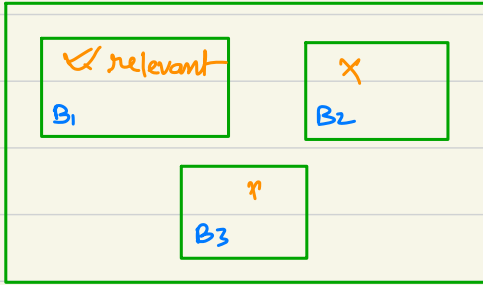
JIT compiles javascript. Using turbofan compiler
& ignition interpreter.

handles garbage collection, execution & memory management.



orinoco garbage collector

call stack - single threaded
heap memory



B₂, B₃ gets removed.

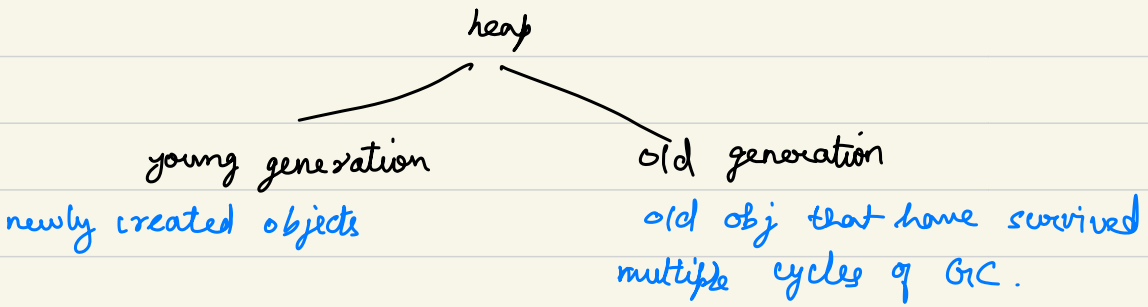
orinoco follows color coding

black
checked,
relevant
stuff

gray
checked
the stuff
but not
sure

white
haven't checked
maybe garbage
or maybe is
imp

orinoco starts with black boxes (black allocation). Instead of checking white boxes we check black boxes first & we don't need to do anything about it.



orinoco observed that most new objects die young compared to old objects.

Movement orinoco tries to remove objects from young gen if young obj survive 1 cycle of gc they get moved to old gen this leaves a vacancy in young gen called holes

orinow bias to minimize fragmentation. (space left in between)

Remembered set - to keep track of pointers when objects move from young to old gen.

how does it check survival - it checks if it is referred later in the program.

marking the black boxes is called premarking.

Compilation

1. Ignition
2. Turbofan.

c++ compiler flags. look up compiler optimizaⁿ

Turbofan was better than crankschaft as the optimization compiler.

ignition $\xrightarrow[\text{JS code}]{\text{converts}}$ Bytecode (lower level code)
Intermediate code

ignition creates a baseline simpler version.

then this bytecode goes to turbofan then it gets converted to machine code.