

Diagnosics at Netflix

2018, Vancouver

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130 million members

streaming **140** million hrs/day

Presentation Roadmap

- Node.js Diagnostics at Netflix
- Progress on enterprise diagnostics tooling
- Future of Node.js debugging

Node.js Diagnostics at Netflix

| Diagnostics

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Observable code

- Chains errors via `VErrOr`
- Verbose error types like *RequestTimeoutError*
- Name our functions
- . . .

Observable code

name: RpcRequestError

message: "request failed: server error: user 'bob' is not authorized"

rpcMsgid: <unique identifier for this request>

rpcMethod: GetObject

cause:

name: RpcResponseError

message: "server error: user 'bob' is not authorized"

cause:

name: UnauthorizedError

message: "user 'bob' is not authorized"

rpcUser: "bob"

Observability opportunities

- Emphasis best practices
- Help users to detect mistakes

<https://github.com/nodejs/promise-use-cases>



Postmortem debugging

- Aborting instead of exiting to generate a core-dump
- Visibility into: stack trace, arguments scope variables
- Visibility into third-party modules
- Tools like *llnode* to analyze the core-dump

Postmortem debugging: example

Uncaught AssertionError: Assertion failed

```
FROM
Object.goog.asserts.DEFAULT_ERROR_HANDLER
(/apps/nodequark/etc/routes/node_modules/google-protobuf/google-protobuf.js:98:845
)
Object.goog.asserts.doAssertFailure_
(/apps/nodequark/etc/routes/node_modules/google-protobuf/google-protobuf.js:99:183
)
Object.goog.asserts.assert [as assert]
(/apps/nodequark/etc/routes/node_modules/google-protobuf/google-protobuf.js:99:385
)
jspb.BinaryWriter.writeUInt32
(/apps/nodequark/etc/routes/node_modules/google-protobuf/google-protobuf.js:277:30
9)
Function.prototype.com.netflix.playapi.KeepAliveRequest.serializeBinaryToWriter
(/apps/nodequark/etc/routes/node_modules/playapi-proto-definition/build/generated/
source/proto/main/node/events/keep_alive_request_pb.js:275:12)
```

Postmortem debugging: example

```
js:      <anonymous> (as jspb.BinaryWriter.writeUint32)
        file:
/apps/nodequark/etc/routes/node_modules/google-protobuf/google-protobuf.js
        posn: line 277
        this: 143ea6ce0351 (JSObject: <anonymous> (as jspb.BinaryWriter))
        arg1: 400000000 (SMI: value = 4)           <- field number
        arg2: ffffffff300000000 (SMI: value = -61)  <- value
```

Postmortem debugging

- Inspecting the last state of the process
- High visibility
- Provides observability in third-party modules

Postmortem debugging opportunities

- More accessible tools
- Cross platform support

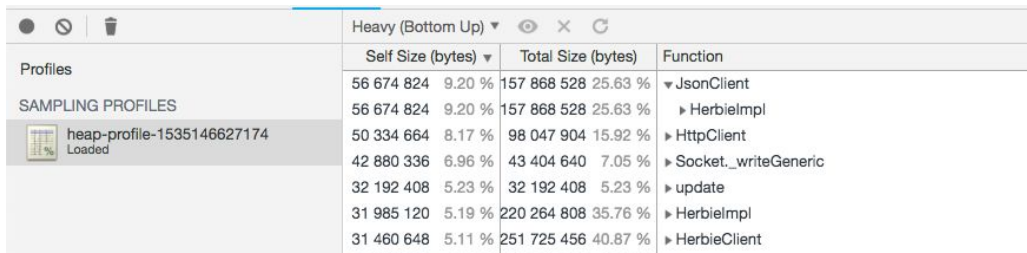


Memory analysis

- Identifying memory leaks
- Identifying inefficient memory usage
- Low overhead (useable in production)
- Via <https://github.com/v8/sampling-heap-profiler>*

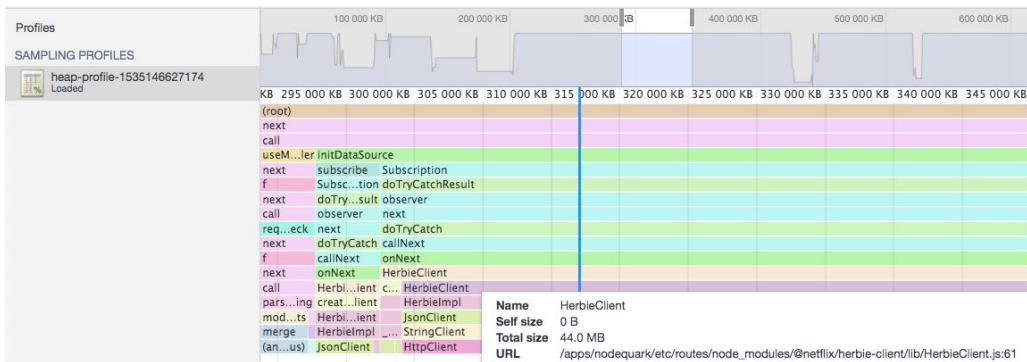
**different than Heap Snapshot*

Memory analysis



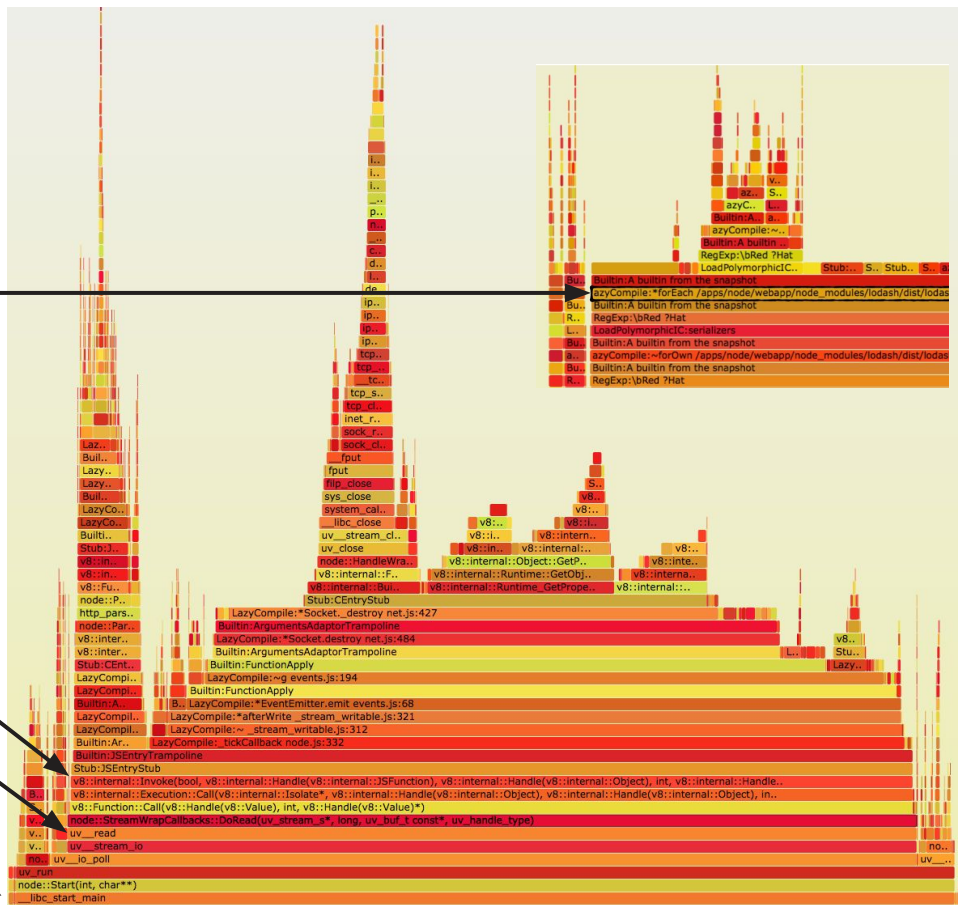
Profiles	Self Size (bytes)	Total Size (bytes)	Function
SAMPLING PROFILES			
heap-profile-1535146627174 Loaded			
	56 674 824 9.20 %	157 868 528 25.63 %	▼ JsonClient
			▶ HerbieImpl
	50 334 664 8.17 %	98 047 904 15.92 %	▶ HttpClient
	42 880 336 6.96 %	43 404 640 7.05 %	▶ Socket_writeGeneric
	32 192 408 5.23 %	32 192 408 5.23 %	▶ update
	31 985 120 5.19 %	220 264 808 35.76 %	▶ HerbieImpl
	31 460 648 5.11 %	251 725 456 40.87 %	▶ HerbieClient

Sampling Heap Profiler



CPU Profiling with Linux Perf

- JavaScript
- V8
- libuv
- libc



Progress on diagnostics

Evolution of enterprise tooling

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Netflix contributions

- **30+** Pull Requests in **Node.js Core** and **V8**
- **25+** Pull Requests in **lnode**
- via Matheus (*mmarchini*)

Diagnostics highlights

- New `CodeEventListener` API in V8
 - Restored CPU Profiling via Linux Perf (`linux-perf`)
- Ilnode 2.0 (Windows support, JS API, v10.x support, etc.)
- New Promise events (`multipleResolves`)

Node 10.x at Netflix

On some services:

nodejs.heapUsed	-60.8%	PASS
nodejs.rss	-66.5%	PASS
node.cpu.usage	-33.1%	PASS
container.process.memory.usage	-3.6%	PASS
container.cpu.usage	-32.8%	PASS
nq.requestLatency.90th.percentile	-59.5%	PASS
nq.requestLatency.99.5th.percentile	-50.7%	PASS
nq.requestLatency.99th.percentile	-59.0%	PASS
nq.requestLatency.95th.percentile	-65.0%	PASS

You are awesome, thank you!

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Tooling Support Tiers

- Identify first-class citizen tools for Node.js
- Tools in Tier 2 and above works for all LTS release

<https://github.com/nodejs/node/blob/master/doc/guides/diagnostic-tooling-support-tiers.md>

Diagnostic Matter

- Full observability in production
- Accessible and maintained tools

**Make Node.js to the best
enterprise-grade runtime**

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Thank You!

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