MGateway Update 2024

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Company Name Change

- M/Gateway Developments Ltd is no more
- Now MGateway Ltd

- WebSite is still the same:
  - https://mgateway.com

Two More Years of Developments

- Lots going on as usual for those who keep track of what we're up to
  – Chris:
    - Interfaces and Language bindings for YottaDB and IRIS (and Cache for legacy users)
  – Me:
    - Front-end and Back-end Application tools and frameworks

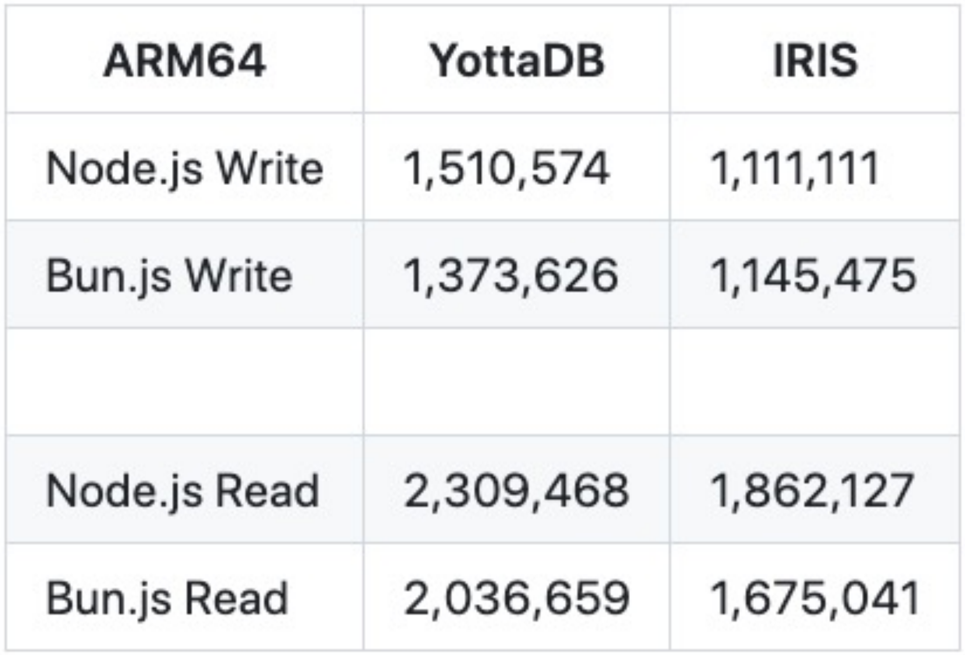
mg-dbx-napi Interface

- JavaScript interface for YottaDB, IRIS & Cache
  - Node.js and Bun.js

  - The fastest JavaScript to Database interface on the planet, by orders of magnitude

Example Performance

- On a standard Apple M1 Mac Mini:
  - Simple key/value create/read loop
  - Results shown in nodes per second:



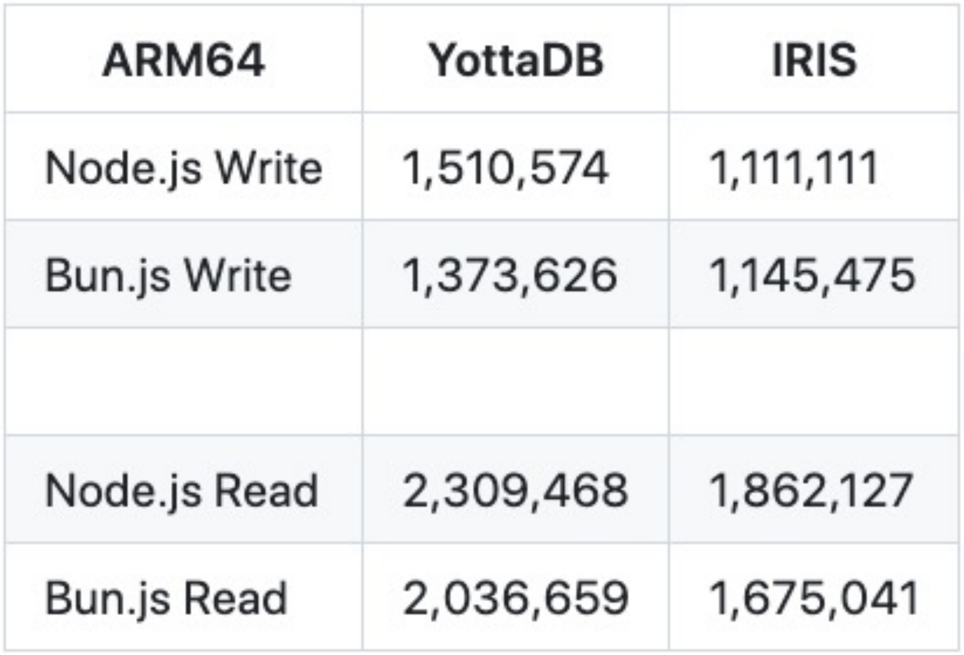
ARM64	YottaDB	IRIS
Node.js Write	1,510,574	1,111,111
Bun.js Write	1,373,626	1,145,475
Node.js Read	2,309,468	1,862,127
Bun.js Read	2,036,659	1,675,041

Example Performance

- On an Apple M3 MacBook Air:
  - Node.js + YottaDB:
    - Sets/writes: 2,000,000 /sec
    - Gets/reads: 3,000,000 /sec

Example Performance

- All comparisons were on M1 Mac Mini, so we'll use these as the reference:



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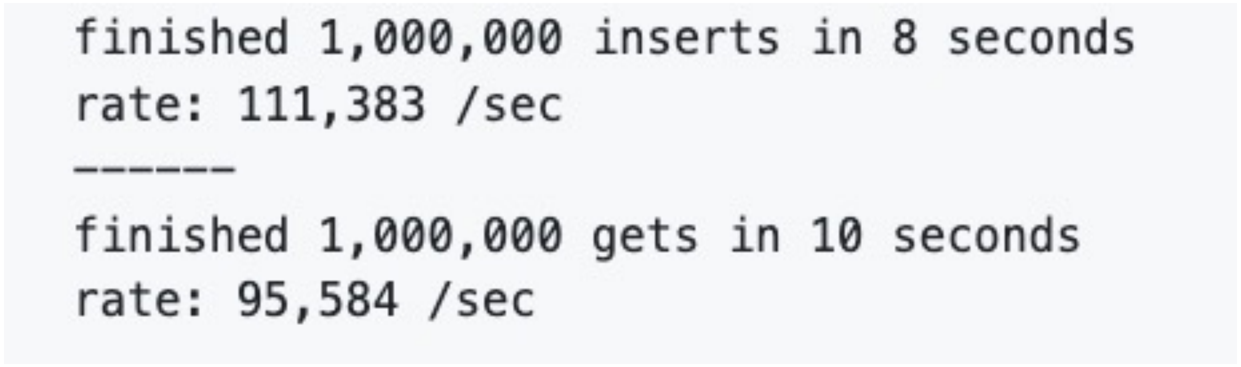
Comparisons

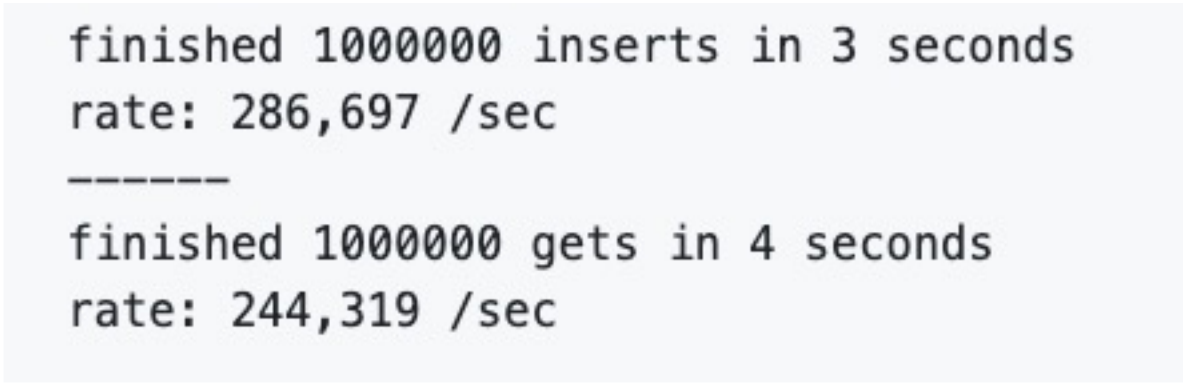
- InterSystems Native Node.js API for IRIS
  - – Network connection only available
  - – Synchronous only!



```
finished 1,000,000 inserts in 8 seconds
rate: 111,383 /sec
------
finished 1,000,000 gets in 10 seconds
rate: 95,584 /sec
```

Comparisons

- NodeM
  - Node.js / YottaDB



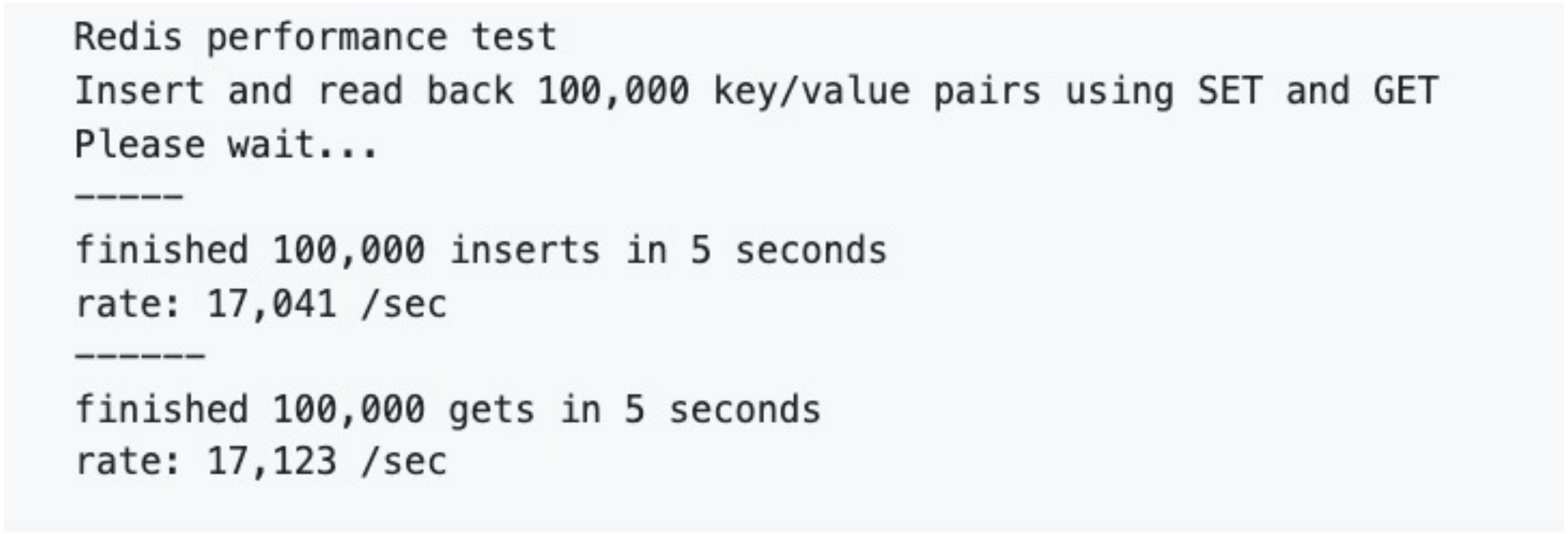
```
finished 1000000 inserts in 3 seconds
rate: 286,697 /sec
------
finished 1000000 gets in 4 seconds
rate: 244,319 /sec
```

Comparisons

- Redis
  - Supposed to be one of the fastest NoSQL databases available
  - Used extensively for high-performance data cacheing
  - How does it compare?

Comparisons

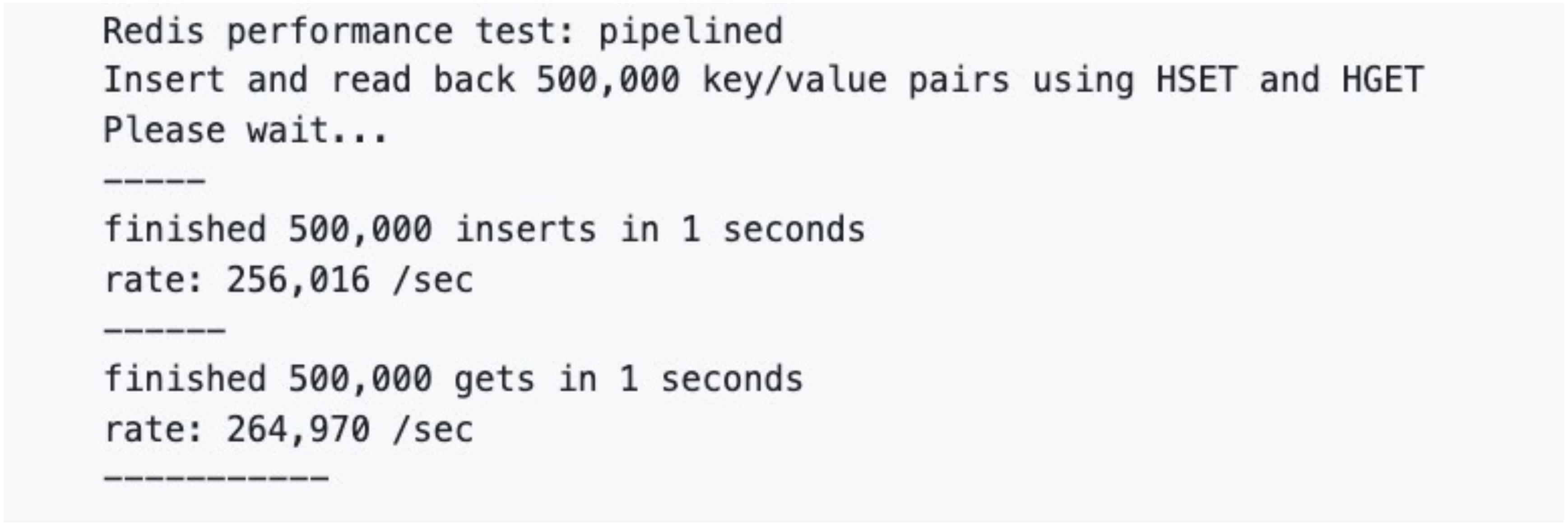
- Redis
  - Node.js / Official Redis Interface Package



```
Redis performance test
Insert and read back 100,000 key/value pairs using SET and GET
Please wait...
-----
finished 100,000 inserts in 5 seconds
rate: 17,041 /sec
------
finished 100,000 gets in 5 seconds
rate: 17,123 /sec
```

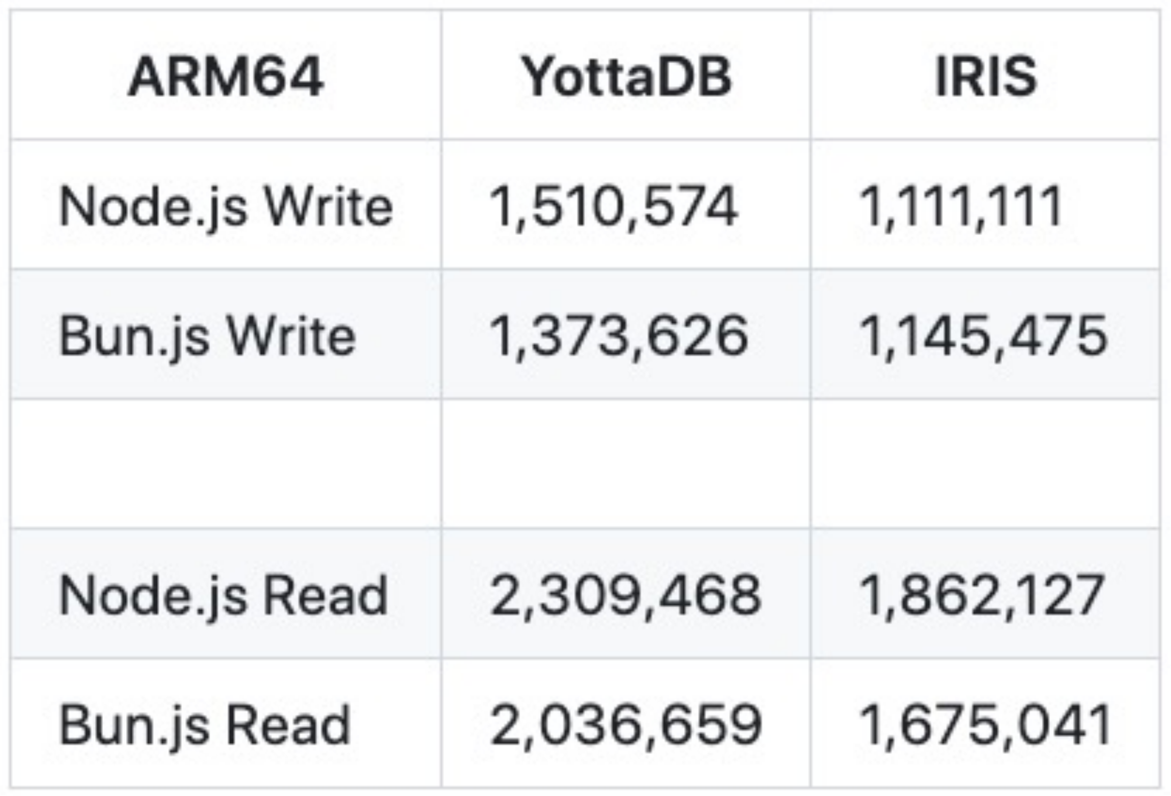
Comparisons

- Redis
  - Pipelined requests



```
Redis performance test: pipelined
Insert and read back 500,000 key/value pairs using HSET and HGET
Please wait...
-----
finished 500,000 inserts in 1 seconds
rate: 256,016 /sec
------
finished 500,000 gets in 1 seconds
rate: 264,970 /sec
-----------
```

mg-dbx-napi



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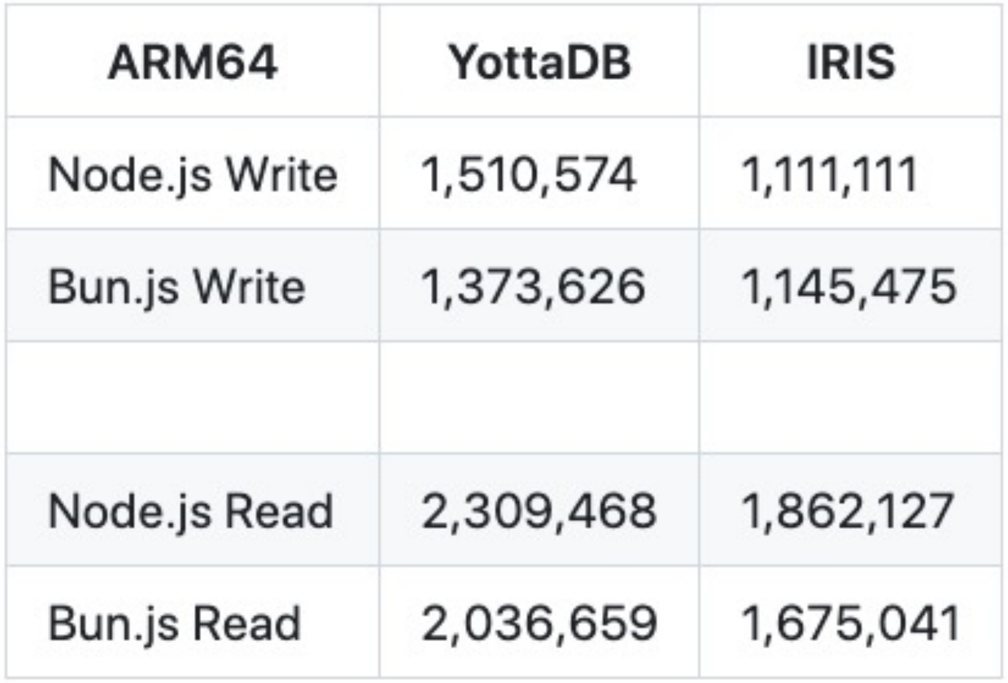
Why would you want to use anything else?

mg-dbx-napi



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For Global Storage applications, there's no benefit in using IRIS

You can try it out!

- Our *mg-showcase* Repository
- https://github.com/robtweed/mg-showcase

- Two Dockerfiles you can build and run on your hardware:
  - – One includes YottaDB
  - – One includes the IRIS Community Edition

mg-showcase Containers

- Also include all our other main JavaScript interfaces and frameworks which I'll be covering in this presentation

- No excuse not to try our technologies out
- All you need is Docker
- You'll be up and running in just a few minutes

Our Other Interfaces: Reminder

- Python: mg_python
- Ruby: mg_ruby
- PHP: mg_php
- Go: mg_go

- Work identically on YottaDB, IRIS and Cache

Language Interfaces

- All essentially work the same way
  - Same/equivalent APIs
- Network or in-process API connection
- Access to:
  - M Globals
  - M functions/procedures
  - IRIS/Cache Classes and SQL
- All support YottaDB transactions

YottaDB Integration: reminder

- Process Window: *mg_pwind*

- Access to crypto libraries from YottaDB
- Access from YottaDB to:
  - IRIS/Cache Globals, functions, procedures
  - IRIS/Cache Classes
  - IRIS/Cache Transactions

mg_web

- Becoming a key and very important product:

What is *mg_web*?

- Web Server Add-on for the industrial-strength Web Servers:
  - NGINX
  - Apache
  - IIS

What does *mg_web* do?

- Designed to interface these Web Servers with YottaDB, IRIS or Cache
  - Directly via network or API connection:
    - API (in-process) connection for highest levels of performance
  - Indirectly via a Node.js server process and *mg-dbx-napi*

What is *mg_web* for?

- Designed primarily to support REST APIs
  - Direct connection:
    - Business logic in M / ObjectScript
    - Data storage in Globals or Classes
  - Indirect connection:
    - Business logic in JavaScript
    - *** Data Storage as persistent Objects / JSON ***:
      - Abstracted via our *glsdb* package

mg_web is so much more!

- Not limited to REST interfacing
- Behaviour can be adapted by writing "shims"
- As a result, it can emulate pretty much any other Web Interface for YottaDB, IRIS or Cache

mg_web and WebLink

- WebLink was InterSystems' original web gateway before CSP
  - Many legacy systems out there still use it
- InterSystems no longer support *WebLink* on IRIS
- *mg_web's WebLink* shim makes *mg_web* behave identically to the WebLink interface
- InterSystems have endorsed and supported its use for its major WebLink user, allowing them to migrate to IRIS

mg_web

- At least one group within the VA who use WebLink are assessing *mg_web* to allow migration to IRIS

mg_web

- If you use WebLink (eg with WebLink Developer)
- And if you need to migrate to IRIS
- … then *mg_web* is the solution you need
- You could even use it to migrate to YottaDB instead!

mg_web

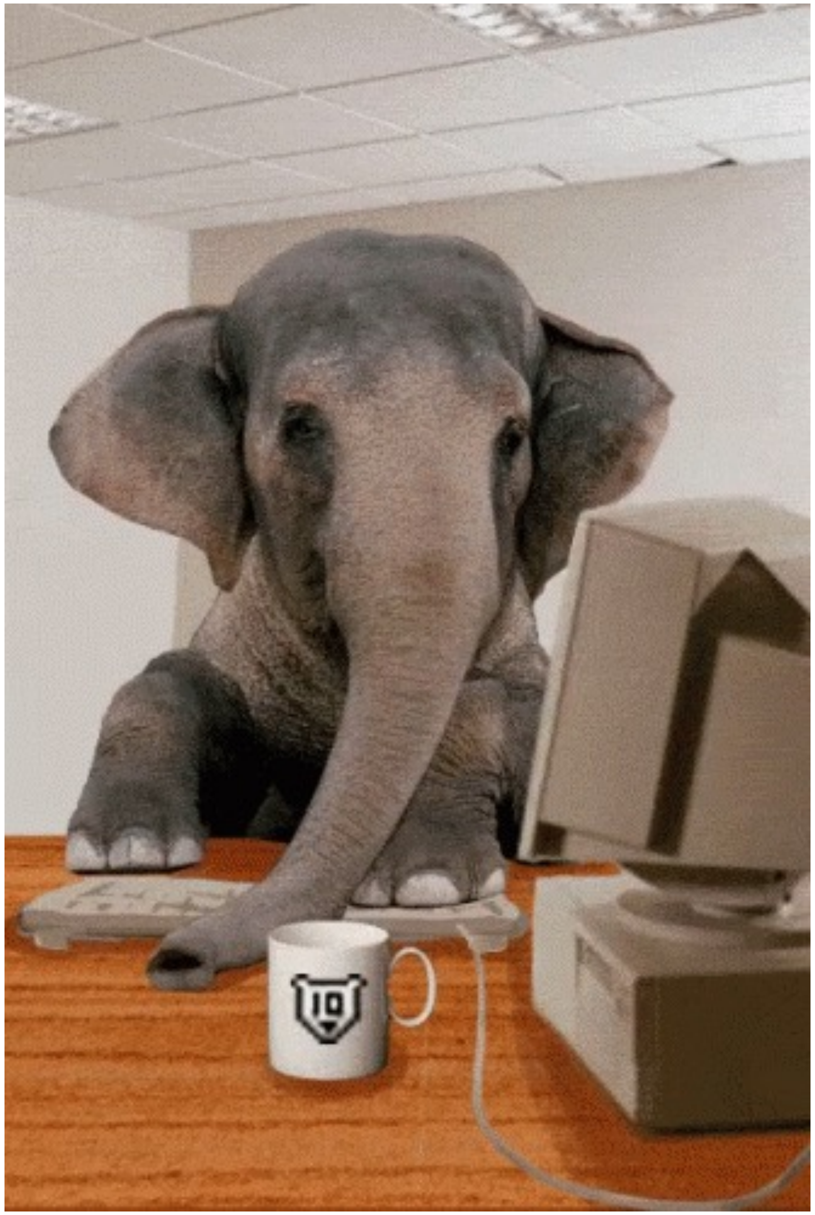
- Completely stateless, just like WebLink
- Modern architecture, making use of the capabilities built-in to NGINX, Apache and IIS.
- Create a pool of Web Server workers
- Excess traffic is queued by Web Server
- Can therefore support any number of concurrent users without any license issues

mg_web

- If you use *mgwsi* with GT.M or YottaDB:
  - *mgwsi* is now deprecated
  - You should migrate to *mg_web* and YottaDB
  - We can assist, if you pay for our support

mg_web for Node.js Users

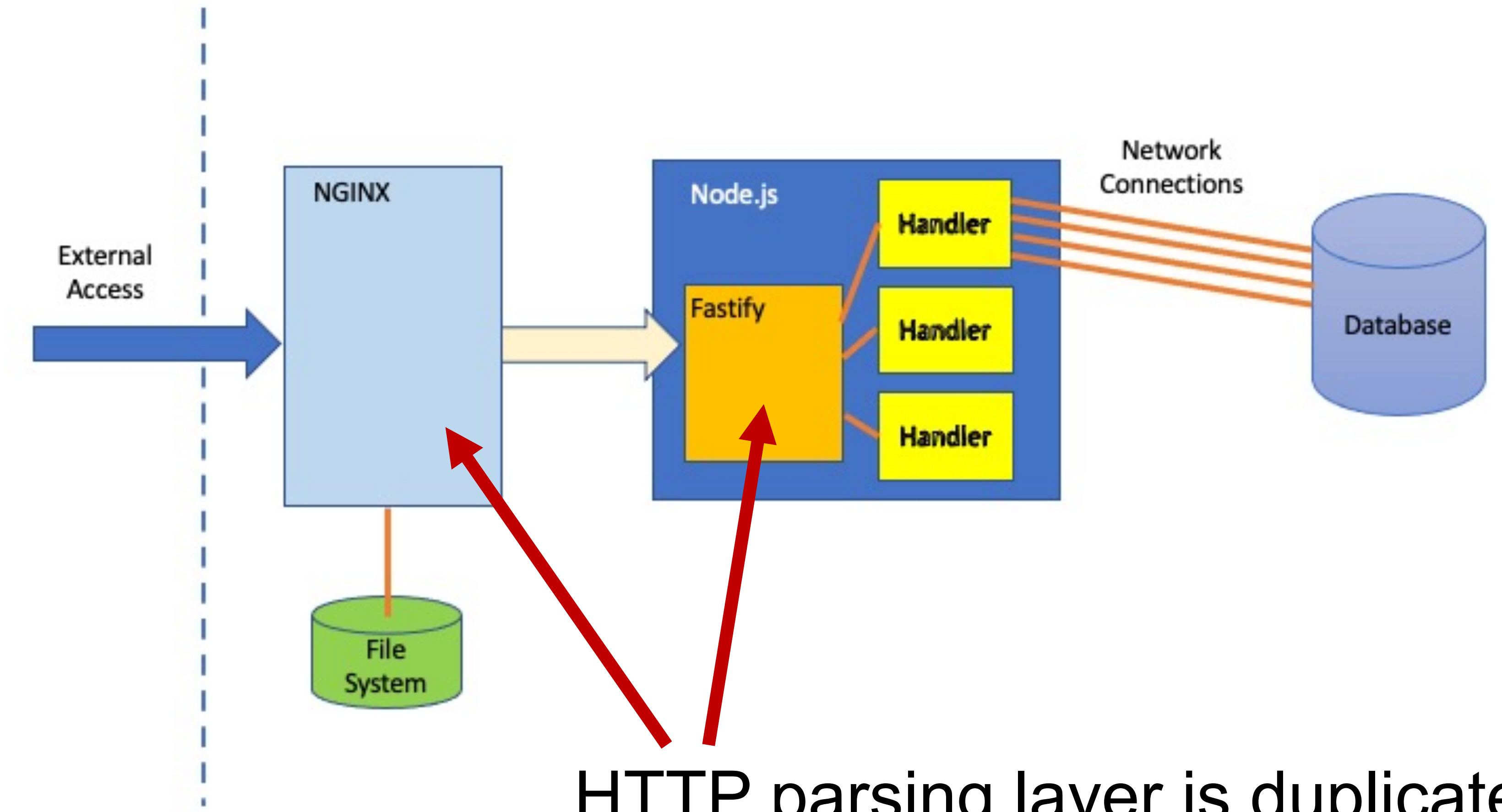
- The most common Node.js Web Framework is Express. Its performance is not great, and it's becoming outdated
- The fastest Node.js Web Framework is Fastify
  - Heavily promoted as the best thing since sliced bread



Security Advisory

- Always put a public-facing Node.js Web Framework behind a reverse proxy such as NGINX
  - Even Fastify officially (and very stongly) recommends this

The Elephant in the Room



HTTP parsing layer is duplicated

Performance Comparisons

- All performed on the same M1 Mac Mini, using a "do nothing" request/response
- Figures shown are the best I could obtain, using various configuration tweaks

Performance Comparisons

- NGINX alone:
  - 200,000 requests/sec using 4 workers

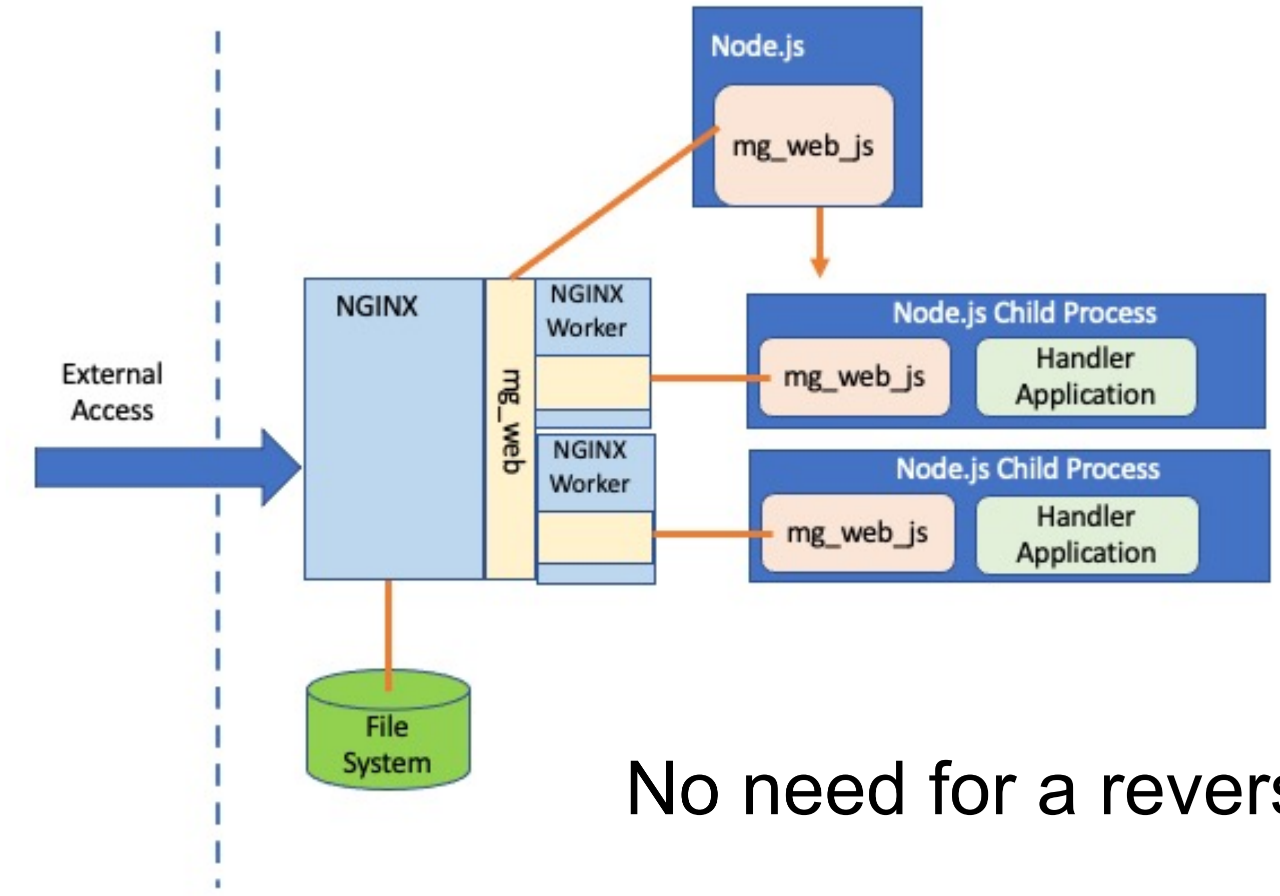
Performance Comparisons

- NGINX alone:
  - – 200,000 requests/sec using 4 workers
- Fastify alone:
  - – 50,000 requests/sec

Performance Comparisons

- NGINX alone:
  - 200,000 requests/sec using 4 workers
- Fastify alone:
  - 50,000 requests/sec
- Fastify proxied with NGINX:
  - 21,000 requests/sec

mg_web.js and NGINX



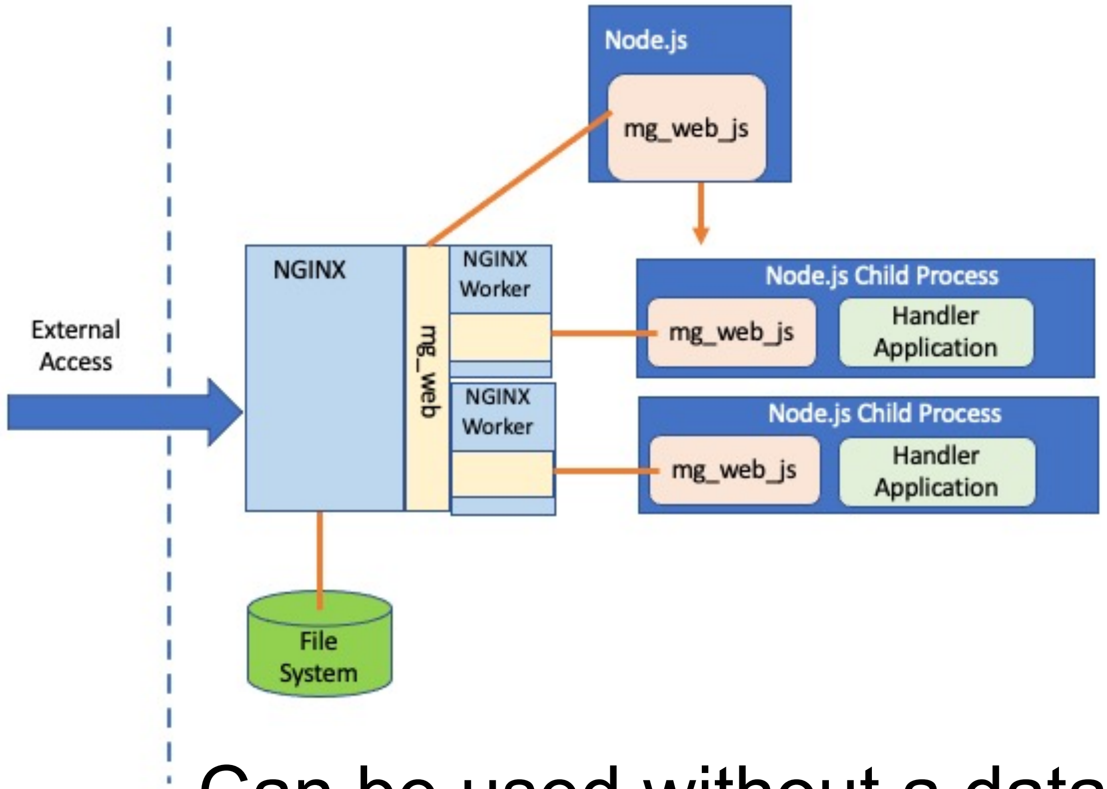
No need for a reverse proxy

Performance of NGINX + mg_web.js

- Same do-nothing request/response:

- 64,000 requests/sec
  - 3 X Fastify + NGINX proxy !

mg_web.js and NGINX



Can be used without a database
as a faster alternative to Fastify + Proxy

mg_web_router

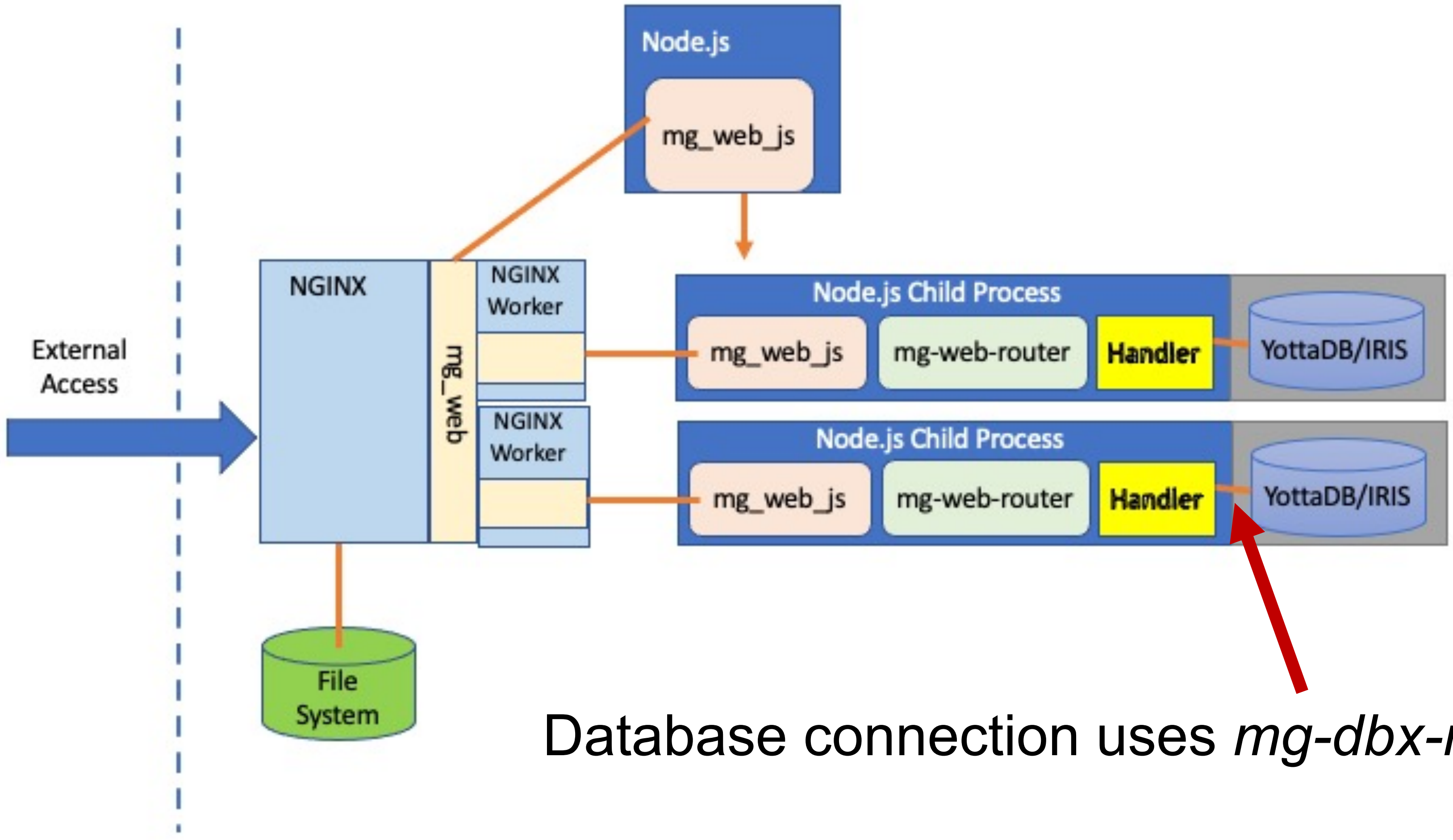
- Express-like router for *mg_web*
- https://github.com/robtweed/mg_web_router

```
router.get('/mgweb/helloworld', (Request, ctx) => {

  return {
    payload: {
      hello: 'world 123',
    }
  };

});
```

mg_web with YottaDB or IRIS



Database connection uses *mg-dbx-napi*

Performance with/without Database

- Without database (do-nothing)
  - 64,000 requests/sec

- With YottaDB (response read from database):
  - 58,000 requests/sec

Typical Fastify + DB Performance

- Fastify (*without NGINX proxy*)
  - Standalone: 50,000 requests/sec
- MongoDB
  - 9,000 requests/sec

mg_web: Fastest Node.js Web Framework

- *mg_web* + NGINX accessing YottaDB is faster than Fastify running standalone without an NGINX Proxy!

REST Server for M Developers

- Pre-built packaged framework
  - *mgweb-server*
  - Available as:
    - Native application
    - Pre-built Docker Container

mgweb-server

- All written in standard M code
- Define REST API Routes
- Connect Routes to Handler Functions:
  - – M globals, functions, procedures
  - – IRIS/Cache Classes & SQL
- *** In-built mapping between M arrays/globals and JSON ***

More information

- Visit our Web Site
  - www.mgateway.com

MetaStatic

- Our WebSite has been re-written using our very latest technology:
  – MetaStatic
  – A syntax and builder script to allow easy maintenance of a modern web site by non-technical people
    - All that's needed is a basic understanding
      – HTML/XML tags and attributes
      – Markdown
      – Editing text files using any favourite editor

The Problem

- Many clubs, societies, small organisations need a web site that is modern and responsive:
  - ie it works on both desktop and mobile devices and alters the layout automatically based on available screen size
- People tasked with maintaining the site typically have little or no technical skills, but know what content they want to use
- Often done in their spare time

What to use?

- Modern Front-end framework such as React, Vue, Angular?
  - Requires serious technical knowledge to build AND maintain
  - So any downstream maintenance will require technical resource

What to use?

- A pre-built template such as W3 Schools or SB Admin
  - Requires a lot of laborious and error-prone work to maintain content
  - Requires detailed CSS knowledge to make changes to UI behaviour if you need to do more than provided by the template
  - Too time-consuming
  - May require on-going technical resource

What to use?

- A subscription-based system + Content Management System, eg:
  - Wordpress
  - Squarespace
  - WIX
    - Locks you in.
    - Expensive
    - Fine if the available templates fit your needs

MetaStatic

- Splits the tasks:
  - One-off technical task to deconstruct a template into re-usable building-blocks represented by Meta Tags (+ attributes to control them)

MetaStatic

- Splits the tasks:
  - Content held in simple text files using Markdown syntax
  - Categorisation simply using naming conventions

  - No CMS to learn or database to learn and maintain

MetaStatic

- Splits the tasks:
  - – Site design and maintenance:
    - Describe using Meta Tag building blocks
    - No programming at all
      - – Tags + attribute values to control behaviour
- Then run MetaStatic build script to create a single HTML file:
  - – Essentially a custom version of a template such as SB Admin

Performance

- All content files are pulled in at build time
- Single HTML file that includes any custom CSS and JavaScript
- No heavyweight JS framework to load

- Sub-second load times
- Try out our web site and see for yourself!

More information

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