

Engage 2018

#engageug

# TIPS AND TRICKS: DOMINO AND JAVASCRIPT DEVELOPMENT MASTERCLASS

Paul Withers, Intec Systems Ltd

With thanks to John Jardin, Agilit-e



# PAUL WITHERS

ICS Developer, Intec Systems

OpenNTF Board Member

IBM Lifetime Champion

@paulswithers



Notes  
Developer

XPages  
Developer

Java Developer

Microservices  
Developer



# JOHN JARDIN

CTO, Agilit-e and Ukuvuma  
IBM Champion (Cloud and ICS)  
Guy who head bangs to Chainsmokers  
@JohnJardinCodes



# AGENDA

- Introduction
- Container Clustering
- ReactJS
- Domino as a datastore and API Gateway
- What about scheduled tasks?
- Microservices For Domino



# INTRODUCTION





# THIS SESSION?

## IS NOT:

- How to write your app using XYZ JavaScript framework and package it in the NSF
- A first step in ultimately migrating away from a Notes and Domino ecosystem

## IS:

- About using Domino as the datastore and master API Gateway for a microservice architecture
- About embracing new tools and technologies
- About a shift in mind-set



# DOMINO THE MONOLITH?

Domino for Directory Management

Domino TLS

Domino HTTP Server / Port 1352

NoSQL Data Store (NSF)

UI, MVC and Data (NSF)

Domino languages for workflow (LS / SSJS)

nupdate for indexing

Domino replication / clustering

Standard templates for auditing (log.nsf etc.)

Domino SMTP for mail routing



# THE REALITY

LDAP as an alternative for Directory Management

[nginx](#) / IBM HTTP Server on top of Domino

ODBC / JDBC / LEI / agents processing flat files

Web Services / agents to connect externally

UI and MVC in an XPages NSF, data in another NSF

Lotus Workflow for BPM

LEI / Notrix for scheduling

Third-party tools for better auditing (incl. OpenLog)

Export to data warehouse / NotesSQL for reporting

Mail routing via non-Domino SMTP server





# MUTATO NOMINE DE TE FABULA NARRATUR

*Philosophically, there are similarities to a microservice architecture, just differences of scale*

- Custom workflow around ERP processes
- Custom integration for multiple non-Domino systems
- Configuration pulled from external systems



# CHANGE YOUR THINKING

## Pros

- Greater flexibility
- Best of breed
- Increased standardisation

## Cons

- Code for failure
- Step outside comfort zone
- More integration points



# DEMO



**I Am Developer**

@iamdeveloper

Follow



2018 - we have no hover boards but we do have 2.1 million JavaScript todo app demos.

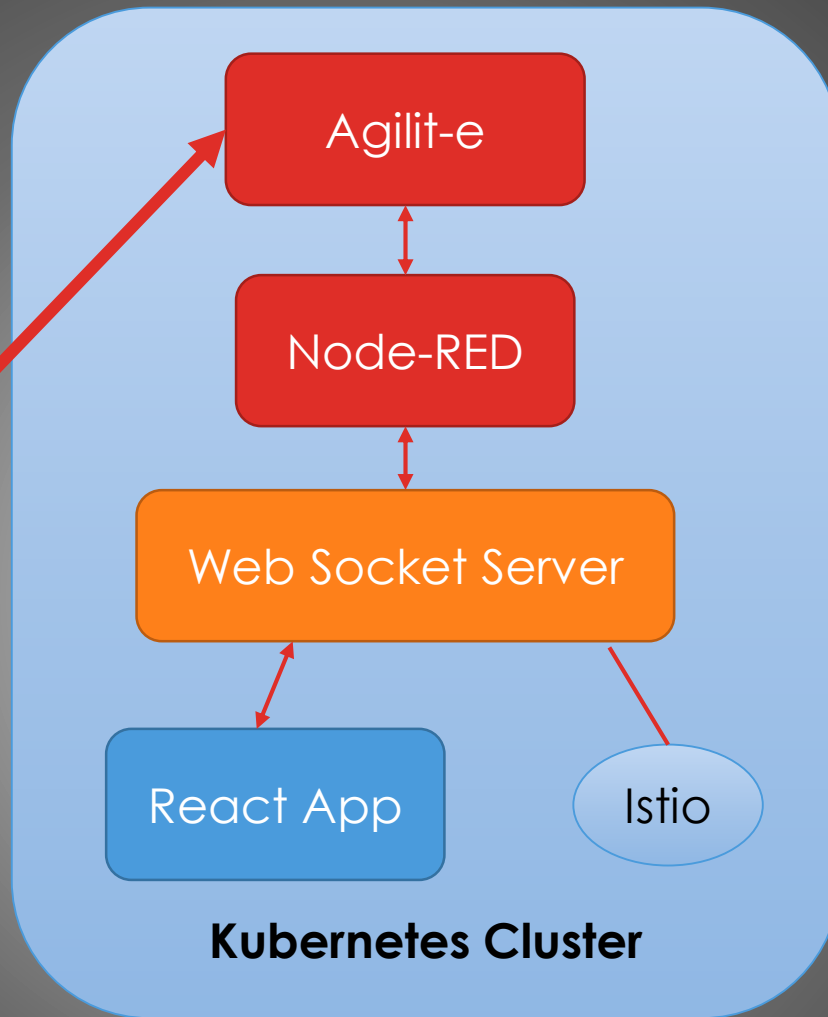
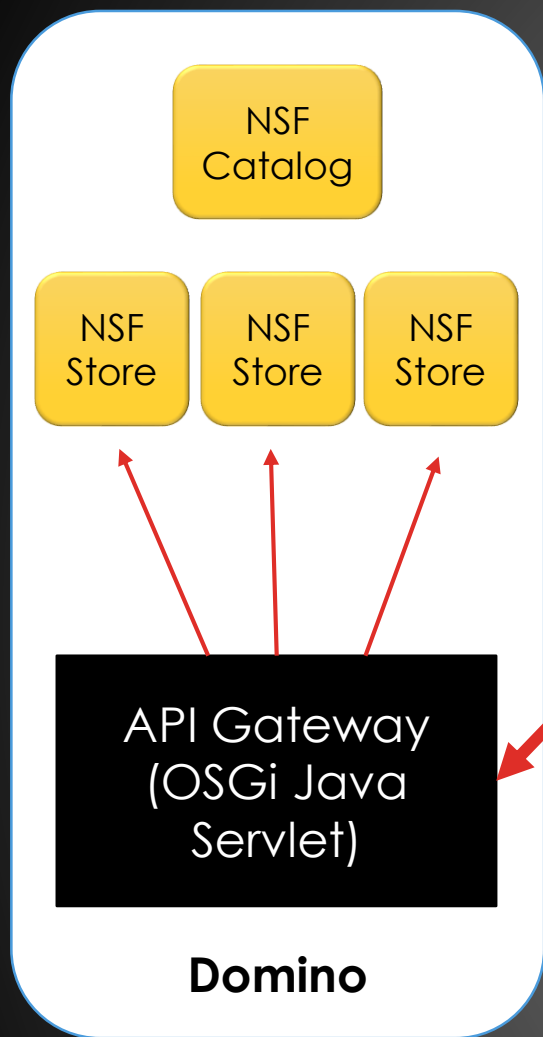
2:20 am - 2 May 2018



AGILIT-E

IBMCHAMPION





# CONTAINER CLUSTERING





# A DIFFERENT APPROACH

- Don't build 3<sup>rd</sup> party technologies into Domino
- Have these technologies exist as a sidecar to a Domino environment
- Each technology or service existing independently as a container
- All communication occurs using APIs



# A DIFFERENT APPROACH CONT.

- Example 1: ReactJS User Interface
  - Develop React UI using NodeJS and Webpack
  - In Domino, create API Endpoints for all relevant calls or use DAS
  - Deploy React App as a standalone container
- Example 2: Web Socket Server
  - Create Web Socket Server using socket.io and NodeJS
  - In Domino, include socket.io for client-side communication
  - Create Web Socket events for all relevant communication
  - Deploy Web Socket Server as standalone container



# CONTAINER CLUSTERING

- Cluster all relevant containers using Kubernetes
- Run Kubernetes as a sidecar to your Domino environment
- IBM Cloud Private provides enterprise-level container management using Kubernetes
- Minikube can be used for development and testing environments (low availability)
- Inject new services and containers into cluster as and when needed
- Manage integration, security, testing and more with Istio



# BENEFITS OF CONTAINER CLUSTERING

- High availability
- Seamless disaster recovery
- Horizontal and vertical scaling
- Continuous delivery
- No downtime during updates and upgrades
- CPU and Memory can be assigned and managed per container/container group



# REACTJS





# WHAT IS REACTJS

- A JavaScript library for building user interfaces
- React is NOT a framework
- React is the “V” of MVC (Model/View/Controller)
- HTML is placed in JavaScript classes to create Web Components
  - This is similar to Custom Controls in XPages
- React makes use of a Virtual DOM and Diffing



# PLATFORM AGNOSTIC

- React exists as a platform-agnostic solution
- Webpack and Babel compile React to a single JS file
- The "create-react-app" module provides all required build tools
- A typical React dev environment:
  - Atom/VS Code (Editor)
  - NodeJS
  - ExpressJS
  - Webpack



# DOMINO AS A DATASTORE AND API GATEWAY



# DOMINO REST OPTIONS

DAS (Domino Access Services)

validation / visibility concerns – REST, not API Gateway

XAgents

`viewState="nostate"`

allows caching in applicationScope

SmartNSF

written using Domain Specific Language

**ODA Starter Servlet**

develop in Eclipse, local Domino server

development and deployment *without Domino Designer*

allows powerful caching for better performance

**Newsflash: Domino 10 brings NodeJS, dominoDB, LoopBack, (Node-RED)**



# REST VS API

API-first approach means

- Greater control
- More planning up-front
- Longer *initial* development lifecycle
- Increased portability
- Better separation between database and interface
- Easier extensibility into other systems

Code for failure and “bad data” – ON BOTH SIDES

- Missing parameters
- Invalid enums





# REST VS API CONT.

## Security considerations

- How to restrict access to apps: API key, OAuth?
- Use header / query params correctly
- Secure e.g. scheduled endpoints differently
- Additional logging of transactions?

## Be careful what you expose

- Should your “status” field be editable
- Or just set via workflow methods



# REST PERFORMANCE

REST = *stateless*, servlet = *stateful*

Cache with...

- ConcurrentHashMap (think `applicationScope`)
- Google Guava Caches (better management)
- Cache Server (e.g. memcache, Ehcache)



# DOCUMENTATION

Swagger / Open API Specification is standard  
Swagger Editor [online](#), local node.js app or Docker  
[OpenAPI 3.0](#) released July 2017

Samples not yet updated

[Swagger 2.0](#) has many examples

[Swagger Hub](#) or tools like [Mermade](#) will convert  
(between the 2)

[Swagger UI](#) allows testing against actual server

[Swagger mock server](#) can be created for UI dev



# CREATING A SWAGGER DEFINITION

Write as YAML or JSON

YAML – no quotes around strings, no commas, no curly braces

operationIds can be added

If used, required on all for that path

Use enums for options

OpenAPI 3.0 allows examples, but **clarify and add value**

“Framework for good documentation”, does not guarantee good documentation



# TESTING

Various REST service tools are available

— ~~Postman (Electron desktop app)~~

— ~~RestClient plugin for Firefox~~

**JUST USE NODE-RED!**



# HTTP REQUEST TYPES

GET – Read data (No body data allowed)

POST – Submit data (Read/Write)

PUT – Replacing entire document data

PATCH – Minor update to existing data

PATCH not enabled by default on Domino

DELETE – Deleting Records (No body data allowed)





# HTTP STATUS CODES

1xx – Received and understood, stand by...

2xx – Received, understood and accepted

3xx – Redirecting

4xx – You did something wrong!

5xx – We did something wrong!

See [Wikipedia](#)



# HTTP STATUS CODES CONT.

200 – OK

202 – Accepted for processing

302 – URL found but server is redirecting

400 – Bad request

401 – Unauthorised

403 – Forbidden

404 – Not found

405 – Method not allowed

500 – Internal server error



# WHAT ABOUT SCHEDULED TASKS?



# SCHEDULED TASKS

## Scheduled Agents

NSF only, language constraints (LS or Painful Java)

## DOTS

Server only, deployment constraints

**How about a different approach?**



# API + NODE-RED = FLEXIBILITY

## API

XAgent / SmartNSF / or REST endpoint

Use Xots for background processing

Node-RED – **Installable alongside Domino with NodeJS**

Scheduling of flows that includes Web APIs

Other schedulers would work, as long as they can call a Web API



# NODE-RED

An integration tool for wiring together APIs and online services

Available on IBM Cloud, local node.js app or Docker

Note: Docker containers not aware of host's "localhost" or other containers

Schedule tasks via Inject node (or Big Timer)

Additional nodes for e.g. Watson Services, Connections

Basic authentication can be set

Flows can be imported / exported as JSON



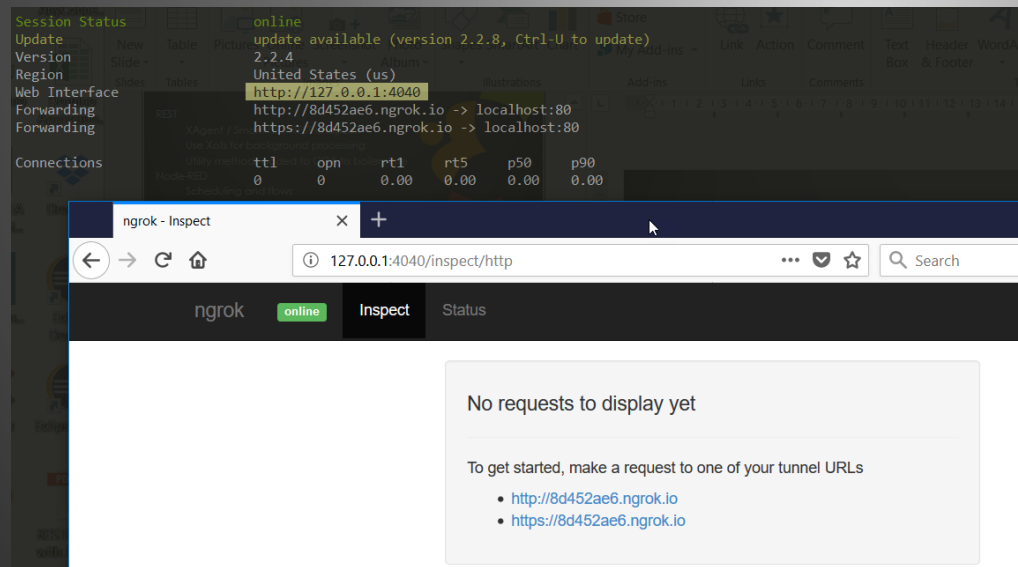


# INTEGRATING PRIVATE / PUBLIC

“Private” needs to be made “public”

ngrok provides secure tunnels

cmdr is a good console emulator for Windows



# MICROSERVICES FOR DOMINO



# MICROSERVICE PATTERNS

- Micro-Functions
- Breakdown functions into re-usable/modular code blocks
- Each function should do one thing and do it well
- Simplify and optimize the code within each function
- A function shouldn't contain more than 80-100 lines of code
- Develop "Pure Functions" whenever possible
- Easier to test for "code coverage"



# MICROSERVICE PATTERNS CONT.

- Micro-Services
- Define which micro-functions can become services to 3<sup>rd</sup> party platforms and applications
- Create API Endpoints that trigger your micro-functions
- Ensure a strong security layer for 3<sup>rd</sup> parties to interface with before triggering your services



# FUTURE IDEAS

- Add JUnit tests
- Add Node-RED test flows
- Extend Watson Workspace with Raspberry Pi to create ToDo via speech
- Split app to show one ToDo store at a time
- Create scheduler to post offline-created Todos
- Post ToDo from IoT flow if above a threshold
- Create Node-RED dashboards for Todos
- Update React app layout to fit nicely on mobile



# THANK YOU AND QUESTIONS?

Paul Withers

Intec Systems Ltd

<http://www.intec.co.uk/blog>

@paulswithers

<http://watsonwork.me/pwithers@intec.co.uk>

John Jardin

Agilit-e

Website: <https://www.agilite.io>

Blog: <http://bleedingcode.com>

Twitter: @JohnJardinCodes

