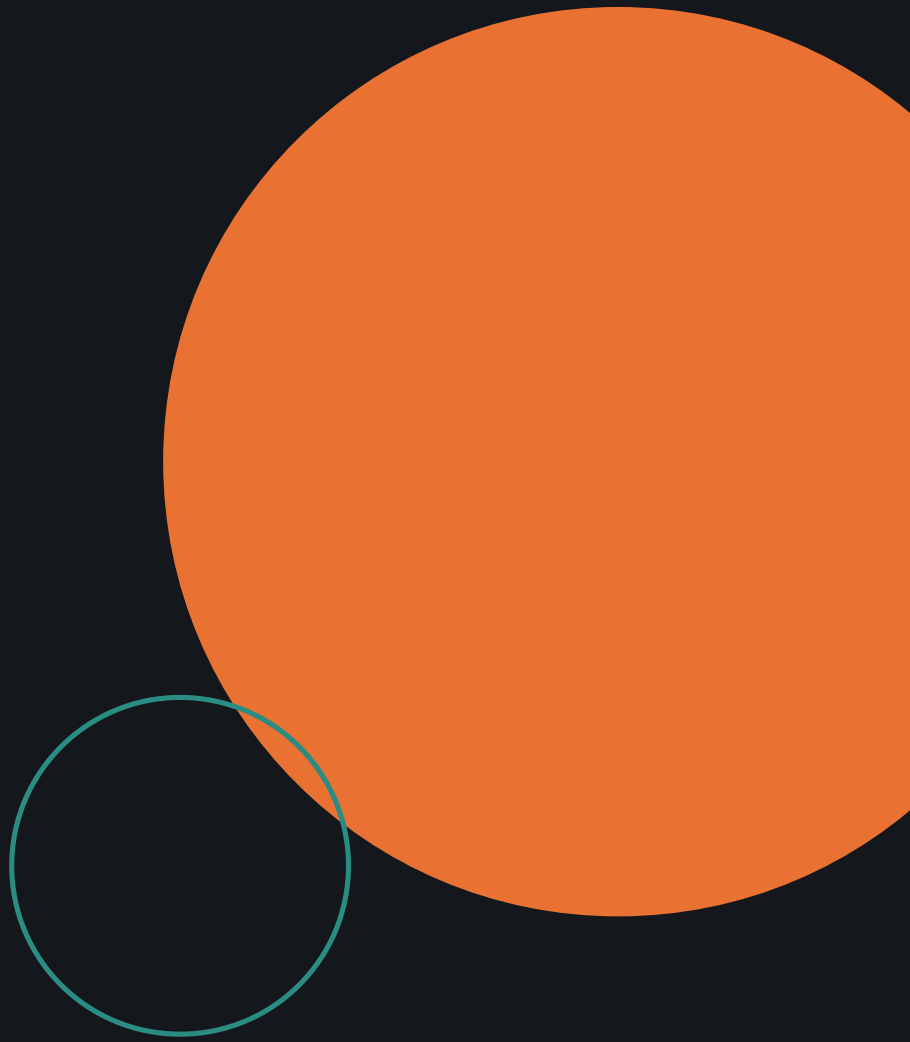
# PASOE: A Case Study

James Palmer

Vertu



# About James

- OpenEdge since 2003, still recovering
- Development Manager at Vertu Motors, wrangling a remote team of 10 engineers (and one very patient support engineer)
- On a mission to modernize everything and murder technical debt
- Will talk about PASOE for beer, apparently
- Has opinions about ABL nobody asked for
- Occasionally allowed near a stage to blow his own trumpet

# Agenda



Applications / Architecture



The problems and solutions



The results



Next Steps



Questions

# Agenda


Applications / Architecture

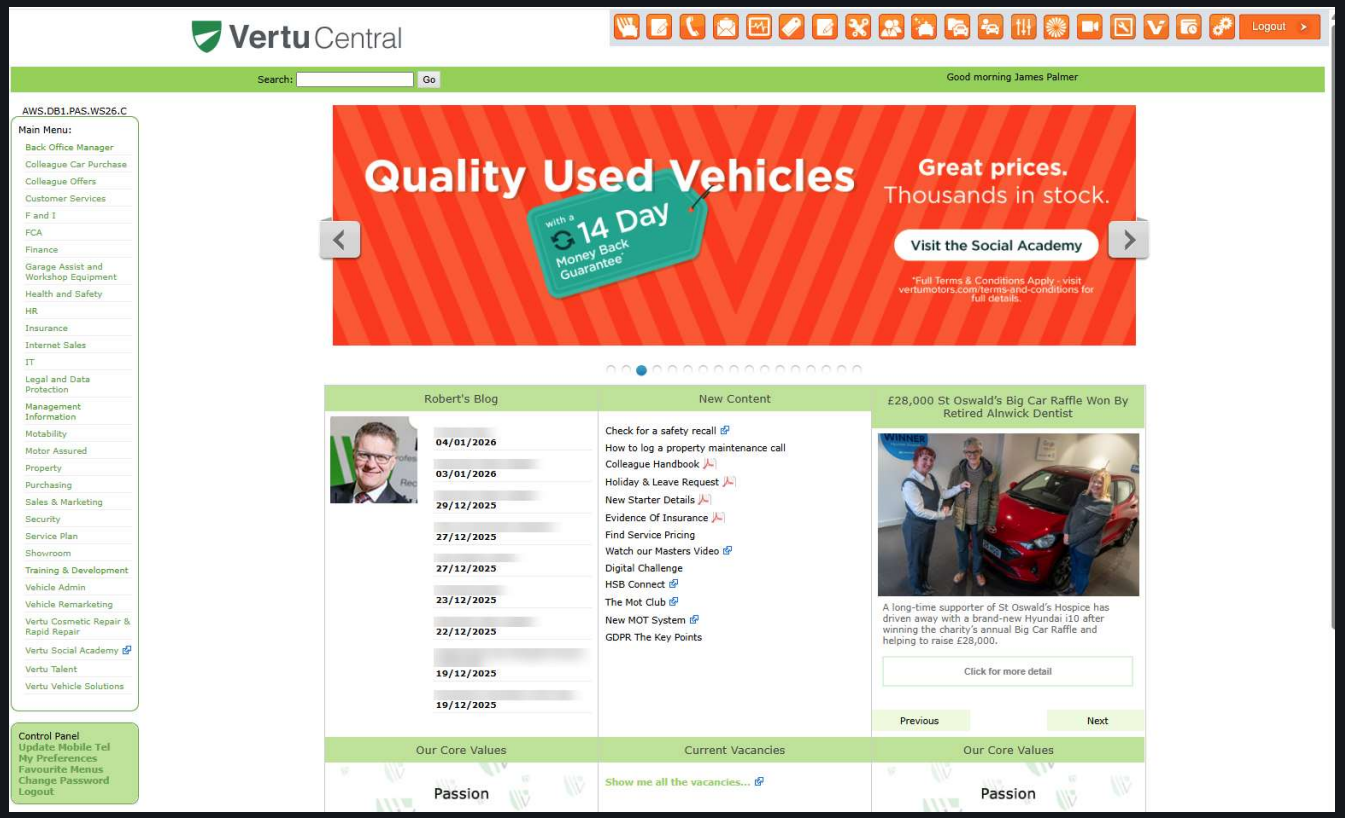

The problems and solutions


The results

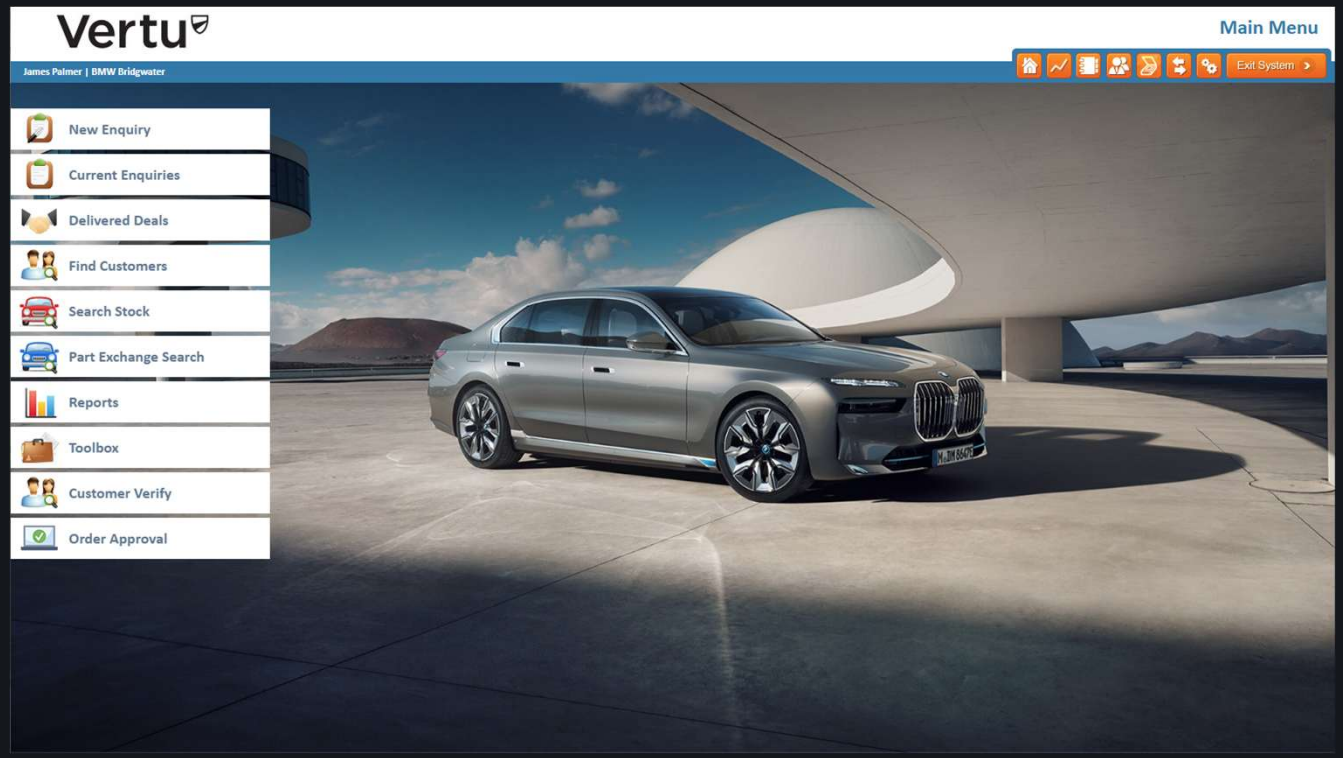

Next Steps


Questions

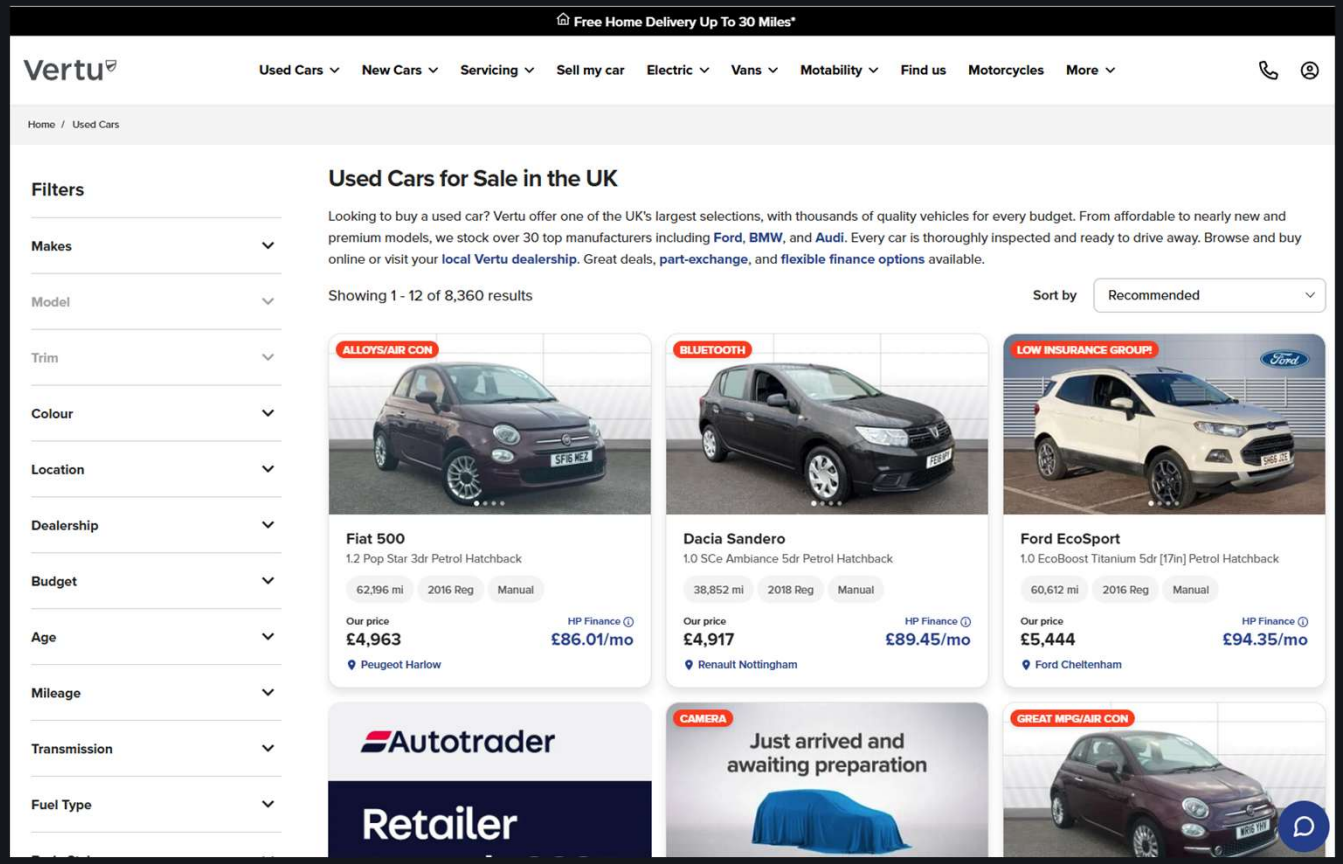
# Vertu Central



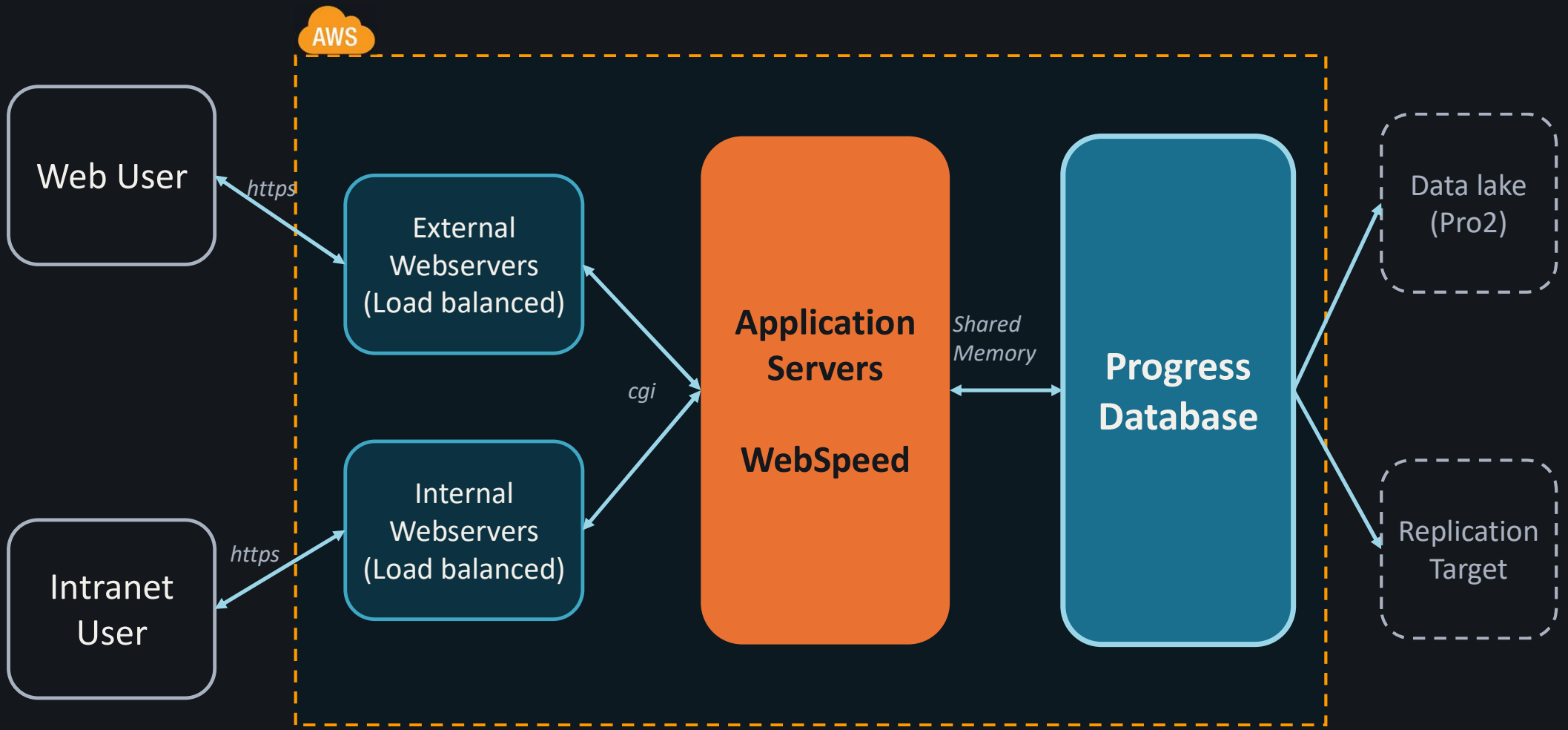
# Showroom


Vertu
Main Menu
James Palmer | BMW Bridgwater
Exit System
New Enquiry
Current Enquiries
Delivered Deals
Find Customers
Search Stock
Part Exchange Search
Reports
Toolbox
Customer Verify
Order Approval

# Website


Free Home Delivery Up To 30 Miles*
Vertu
Used Cars
New Cars
Servicing
Sell my car
Electric
Vans
Motability
Find us
Motorcycles
More
Home / Used Cars
Filters
Makes
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Trim
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Location
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Looking to buy a used car? Vertu offer one of the UK's largest selections, with thousands of quality vehicles for every budget. From affordable to nearly new and premium models, we stock over 30 top manufacturers including Ford, BMW, and Audi. Every car is thoroughly inspected and ready to drive away. Browse and buy online or visit your local Vertu dealership. Great deals, part-exchange, and flexible finance options available.
Showing 1 - 12 of 8,360 results
Sort by
Recommended
ALLOYS/AIR CON
Fiat 500
1.2 Pop Star 3dr Petrol Hatchback
62,196 mi
2016 Reg
Manual
Our price
£4,963
HP Finance
£86.01/mo
Peugeot Harlow
BLUETOOTH
Dacia Sandero
1.0 SCe Ambiance 5dr Petrol Hatchback
38,852 mi
2018 Reg
Manual
Our price
£4,917
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Renault Nottingham
LOW INSURANCE GROUP!
Ford EcoSport
1.0 EcoBoost Titanium 5dr [17in] Petrol Hatchback
60,612 mi
2016 Reg
Manual
Our price
£5,444
HP Finance
£94.35/mo
Ford Cheltenham
Autotrader
Retailer
CAMERA
Just arrived and awaiting preparation
GREAT MPG/AIR CON

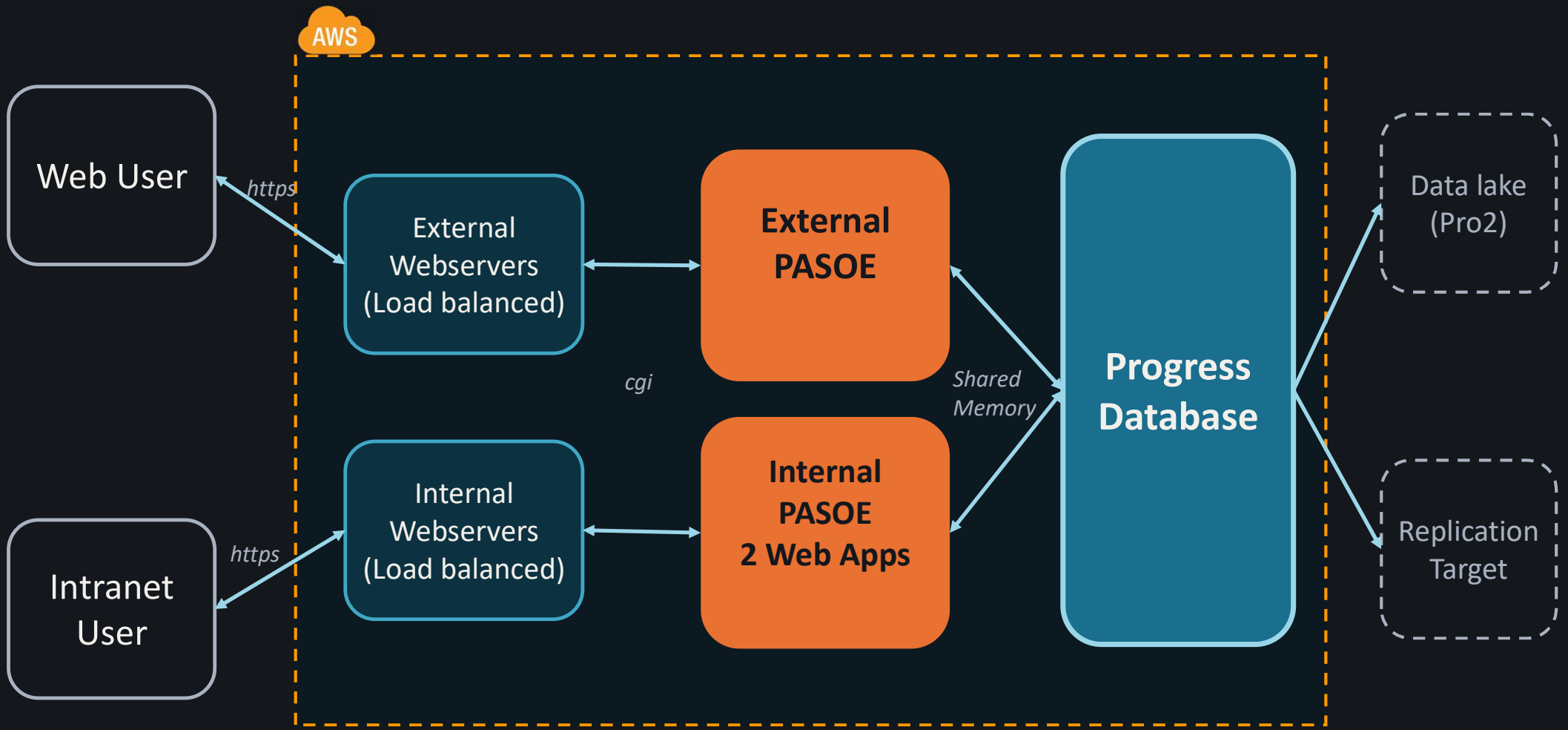
# The old Architecture



# Where I came into the picture – Jan 2022

- One attempt made
- One PASOE instance worked ok
- As soon as second switched on, everything dies
- Business now very nervous
- Lack of understanding of cause

# The failed new Architecture



# Business Requirements

| Remain on 11.7 | Performance | Availability | Transparency |
| --- | --- | --- | --- |
| • Too much risk to upgrade version and infrastructure in one go<br>• Can also do one app at a time | • SEO favours quick response times<br>• Massive cost for outages | • Hot switch for problems<br>• Little to no outage | • Users should see no difference<br>• Functionality consistent |

# Likely cause of failure

- Difficult due to lack of logs
- Experience tells me likely memory leaks
  - Doesn’t take a genius!
- Also, possible configuration challenges
  - More on this later



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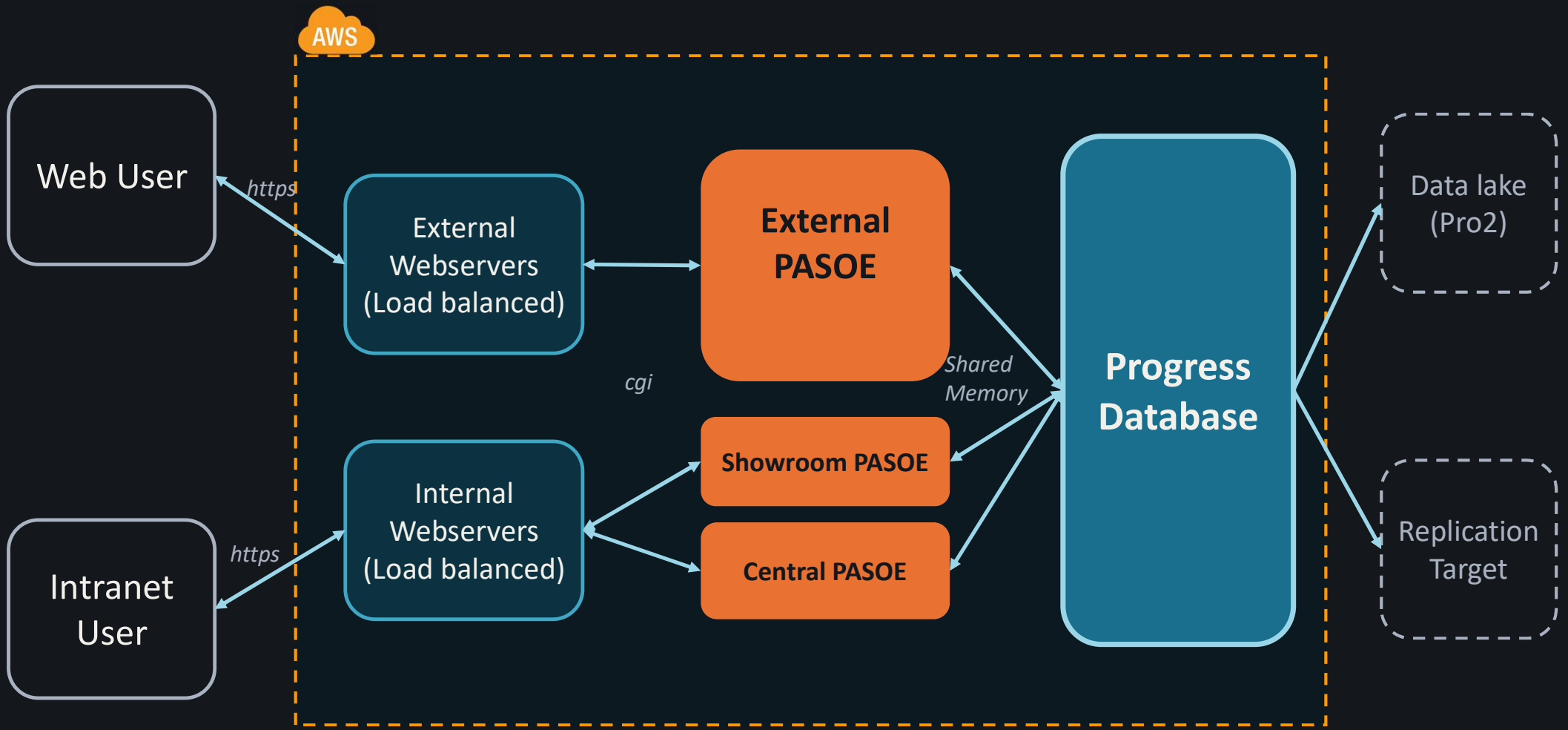


Questions

# First focus - architecture

- Showroom and Central on one instance
- Overloaded the instance
- Lack of flexibility both in planning and on failure
- Couldn’t meet the “one app at a time” requirement
- Future maintenance challenges

# The new working Architecture



# Next focus - visibility

- Very little visibility of system health
- No visibility at all of PASOE health
- Monitoring needed
- Our solution: ProTop subscription from White Star Software




Current Connections
connections
80
60
40
20
0
9/2
9/3
9/4
9/5
9/6
9/7
9/8
9/9
9/10
9/11
Current Connections
Max Connections
Current Sessions
45
40
35
30
25
20
Sessions
Memory Usage
3.9 GiB
2.9 GiB
2.0 GiB
1000 MiB
0 MiB
memory used
Memory per Session
600 MiB
500 MiB
400 MiB
300 MiB
200 MiB
100 MiB
0 MiB
Average Memory
Minimum Memory
Maximum Memory
Reads
150
100
50
0
Reads
Read Errors
Writes
100
75
50
25
0
Writes
Write Errors
Requests
50
40
30
20
10
0
Requests
Times out
Waits

# Memory Leaks

| | |
|---|---|
| Always been there but exacerbated by PASOE | • Multi-session agent persists |
| 2 stage approach: | • What we know<br>• What we don't know – later down the line |
| PDF Include | • Persistent procedure handle tidy |
| Objects not being disposed of when programs error | • Make use of FINALLY |

# OS-COMMAND

| | |
|---|---|
| Shelling out to cURL all over the place | • Process forks<br>• Memory duplication |
| Just switch to OpenEdge.Net calls right? | • Wrong – don't always work in 11.7 |
| 2 stage approach again | • Something?!<br>• Switch to OpenEdge.Net, or even .Net Core calls once on 12.x |
| The "Something" was hard to track down | • Set sessions per agent to 2 |

# OS-COMMAND - still

- The forking is no longer so much of an issue
- Still leaking memory
- It’s definitely not other code
- Workaround – weekly PASOE restart

# X-Frame-Options

- Tomcat defaults to DENY
- Apache set to SAMEORIGIN
- DENY wins – iFrames don’t work
- Eventually found it – anonymousLoginModel.xml in Spring Security
- Added this for each web app

```
<headers>
    <frame-options policy="SAMEORIGIN" />
</headers>
```

# Default file permissions

- Files created have wrong permissions
- System itself unable to access files it creates
- Clearly a UMASK problem, but it looks right
- Systemd defaults silently to 0022
- Update $DLC/servers/pasoe/bin/catalina.sh
  - UMASK=0002



# Agenda



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# Showroom

**Go-live 30th July 2025** › Worked straight from the off › Very few issues › Let’s forge ahead

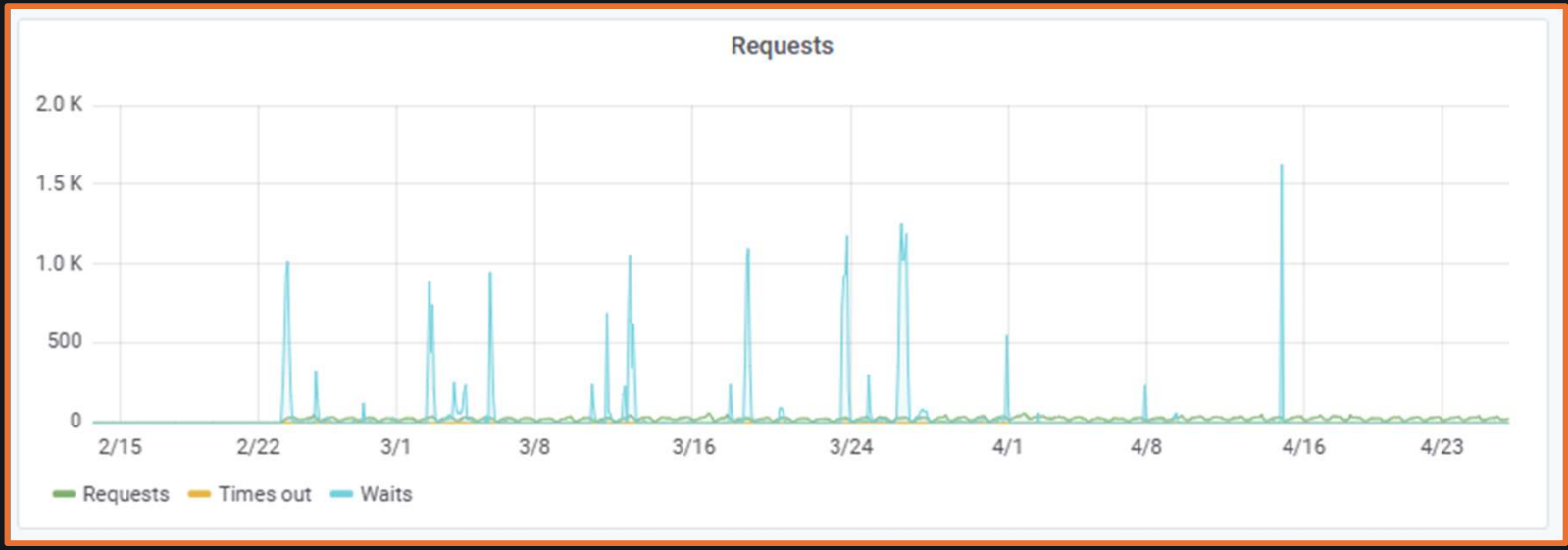
# Vertu Central

- Go-live 7th August 2025
- Immediate problems – failed back
- Combination of X-Frame-Options and UMASK
- Back to drawing board

- Next attempted Go-live 15th October 2025
- 28th October requests are back on WebSpeed
- Apache config reverted by AWS launching old Webserver image
- 4th November 2025 finally working properly

WWW

- Go-Live 23rd February 2026
- Hard cutover – couldn't easily go back
- About a month of unexplained queuing requests
- Grit teeth and work it out



# Solution

**Database disk IOPs throttled**

- Took the shackles off

**Heavy readers**

- War on bad queries
- Client-side caching of high churn tables

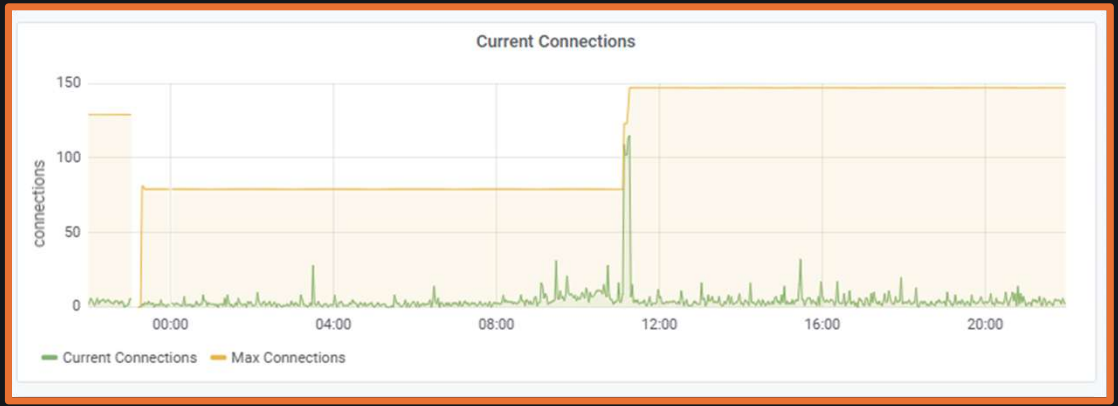
**Launching new agents causing slowdown**

# Launching agents - slowdown

When there's a spike in requests – new agents launched

Can be slow

Results in a backlog of unserviced requests






# Launching agents - solution

- Prelaunch more agents – numInitialAgents
- Uses more resources, generally, but avoids the pauses
- Ran the logs through Claude for more insights
- Identified weak firewall rules risking bot attacks

# Timeline


Jan 2022
Came into the picture
30 Jul 2025
Showroom go-live
15 Oct 2025
Central, next attempt
23 Feb 2026
WWW go-live
2022 to 2025
Code base review for memory leaks, OS-COMMAND investigations, infrastructure review, AWS bedding in, etc.
7 Aug 2025
Central go-live, failed back
4 Nov 2025
Central finally working properly

# Agenda



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Questions

# Scripting

**All instances have to be easily redeployable**

When changing Progress version particularly

Moving to v12 especially

Scripted deployments means just changing the DLC

And any other things that change between versions

# Solving OS-COMMAND forever

Will have to wait until v12

Use OpenEdge.Net calls

Or .Net Core?

All new calls use a class that’s switchable between cURL and OpenEdge.Net

Memory Profiling

Another OE12 feature

Maybe there’s other memory leaks we missed

# Monitoring and Responding

- Monitoring to prevent future problems
- Monitoring to respond to developing problems
- Alerts

# Hot off the press!

Claude agent scan of entire code base
October 2026

Asked it to identify all objects/handles that aren’t always tidied up

It found ~150 sites we missed!

New project started to eliminate those

# Final configuration

| | | |
|---|---|---|
| **numInitialAgents** | = maxAgents | Prelaunch the maximum number of agents, avoids the pauses |
| **Sessions per agent** | 2 | At 1 there is no benefit over WebSpeed. At 2, persistent agents cut set up and tear down costs |
| **UMASK** | 0002 | $DLC/servers/pasoe/bin/catalina.sh (systemd defaults to 0022) |
| **X-Frame-Options** | SAMEORIGIN | anonymousLoginModel.xml (Spring Security), added for each web app |
| **Database disk IOPS** | Temporary | Raised as a workaround, mostly reduced again after tuning queries to select the right indexes |
| **PASOE restart** | Weekly | Workaround while the memory leak remains |

# Takeaways

1

## Visibility first

You can’t fix what you can’t see. Monitor before you migrate, not after it breaks.

2

## Tidy code, tidy memory

The leaks were always there. PASOE just made them impossible to ignore.

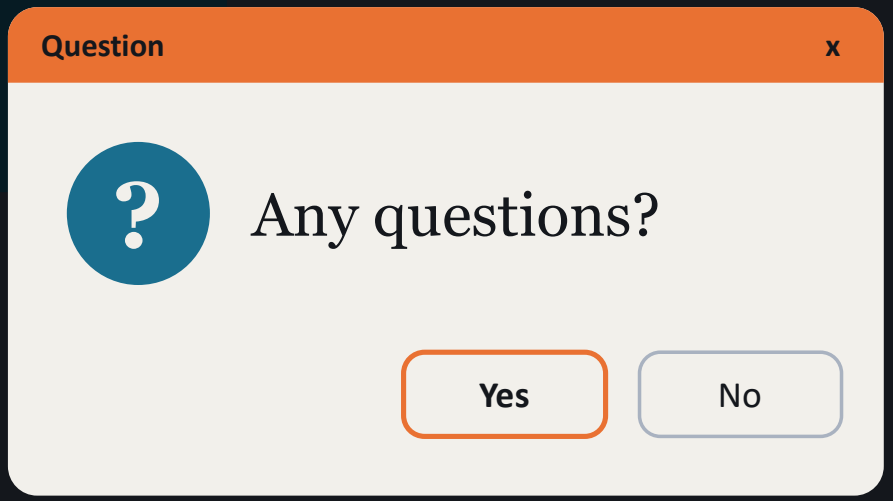
3

## Patience!

These things can take a while. Central: 7 August to 4 November. WWW: a month of unexplained queuing.

questions.p

```
1  MESSAGE "Any questions?"
2      VIEW-AS ALERT-BOX QUESTION
3      BUTTONS YES-NO
4      UPDATE lAnswer AS LOGICAL.
```



# Thank you


## James Palmer

Vertu

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**GitHub** github.com/jdpjamesp




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