DYNA26

Jarvis and AI

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Jarvis (JSON and REST Service)

- Dyalog's open-source web service framework that lets you expose APL functions and data as modern web services over HTTP.
  - JSON mode - each endpoint maps directly to an APL function
  - REST mode - endpoints represent resources managed through standard HTTP methods like GET, POST, PUT, and DELETE.

Jarvis (JSON and REST Service)

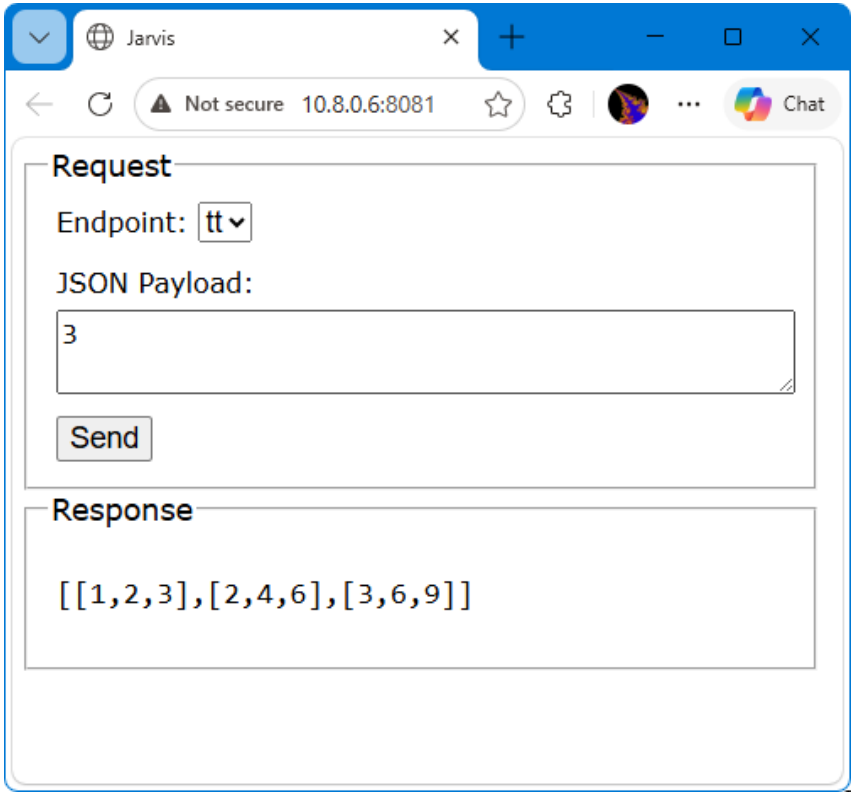
- Jarvis handles all the underlying details:
  - parsing requests
  - converting between JSON and APL data structures
  - formatting responses
- You can focus on writing APL while making your work accessible to any HTTP client, regardless of whether the consumer knows APL.

Jarvis

```
      tt←{⍺.×⍵⍳ω} ⍝ times table

      j←⎕Jarvis.Run 8081 ⍝ start Jarvis listening on port 8081
2026-04-20 @ 08.39.57.813 - Starting  Jarvis  1.22.3
2026-04-20 @ 08.39.57.815 - Local Conga v3.6 reference is #.Jarvis.[LIB]
2026-04-20 @ 08.39.57.822 - Jarvis starting in "JSON" mode on port 8081
2026-04-20 @ 08.39.57.826 - Serving code in #
2026-04-20 @ 08.39.57.828 - Click http://10.8.0.6:8081 to access web interface
```

Built-in Web Client



APL Client

```
      ]load HttpCommand
      
      (HttpCommand.GetJSON 'post' 'localhost:8081/tt' 3).Data
┌─────┬─────┬─────┐
│1 2 3│2 4 6│3 6 9│
└─────┴─────┴─────┘
      ↑(HttpCommand.GetJSON 'post' 'localhost:8081/tt' 3).Data
1 2 3
2 4 6
3 6 9
```

Other clients

```
PowerShell 7.6.0
PS C:\Users\brian> curl http://localhost:8081/tt?3
[[1,2,3],[2,4,6],[3,6,9]]
PS C:\Users\brian>
```

AI...

LLMs and APL

- Exponential Improvement
  - Understanding/Explaining APL
  - Generating APL
- Context is Important
  - The more context, the better the result (generally)
- Development Environment Integration
  - Using Claude with VS Code and DyalogScript

Motivation

- I know APL...
  - and I enjoy writing APL
- I (sort of) know HTML/CSS/JavaScript
  - and I find it tedious and error-prone to write partly due to my own limitations
- LLMs are good at generating HTML/CSS/JavaScript
  - but not as good (yet) at generating APL
- How close can I quickly get to a working web service using Jarvis and an LLM?

AI Goals

- Responsibly use AI internally
  - Automated testing / Generating tests
  - Assist development and documentation
  - Ownership doesn't transfer
- Help our customers responsibly use AI should they choose to
  - Learn/develop/demonstrate best practices
  - Provide tools and techniques – e.g. OpenAI OpenAPI

The Project

- Use an LLM to create a Wordle™-like web application
  - Use Jarvis as its server
  - Make it multi-user
  - I will supply the list of candidate words
  - Provide a "New Game" button
  - Congratulate the user if they guess the secret word
  - Console the user and tell them the secret word if they fail to guess it
  - Make it responsive to different form factors
  - Use a color scheme compatible with the dyalog.com website

The Prompt

- create a Wordle™-like web application
  - Use Jarvis as its server
  - Make it multi-user
  - I will supply the list of candidate words
  - Provide a "New Game" button
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LIVE DEMO TIME!

Why We're Not Doing a Live Demo

- Life is like a box of chocolates...
  You never know what you're gonna get.
  (Forrest Gump in Forrest Gump, 1994)
- You want another answer, ask another girl.
  (Tess McGill in Working Girl, 1988)

Why We're Not Doing a Live Demo

- LLMs are like a box of chocolates...
  You never know what you're gonna get.

- You want another answer, ask the LLM the same question.

Prompting the Prompt

Please improve the attached prompt. You can use the attached Jarvis source code for reference. Create a project plan from your results.

Hiccup 1 - Start.apls

H

Code snippet

```
⍝ 1. Load the Jarvis framework and our backend logic
]load Jarvis
]load WordleServer.apln

⍝ 2. Configure Jarvis parameters
config ← ⎕NS ''
config.Port ← 8080
config.Paradigm ← 'JSON'
config.CodeLocation ← WordleServer
config.SessionTimeout ← 60              ⍝ Keep sessions alive for 60 minutes
config.SessionUseCookie ← 1             ⍝ Automatically track users via browser c
config.SessionInitFn ← 'SessionInit'    ⍝ Call this when a new user connects
config.HTMLInterface ← '/path/to/your/frontend/folder' ⍝ **UPDATE THIS PATH**

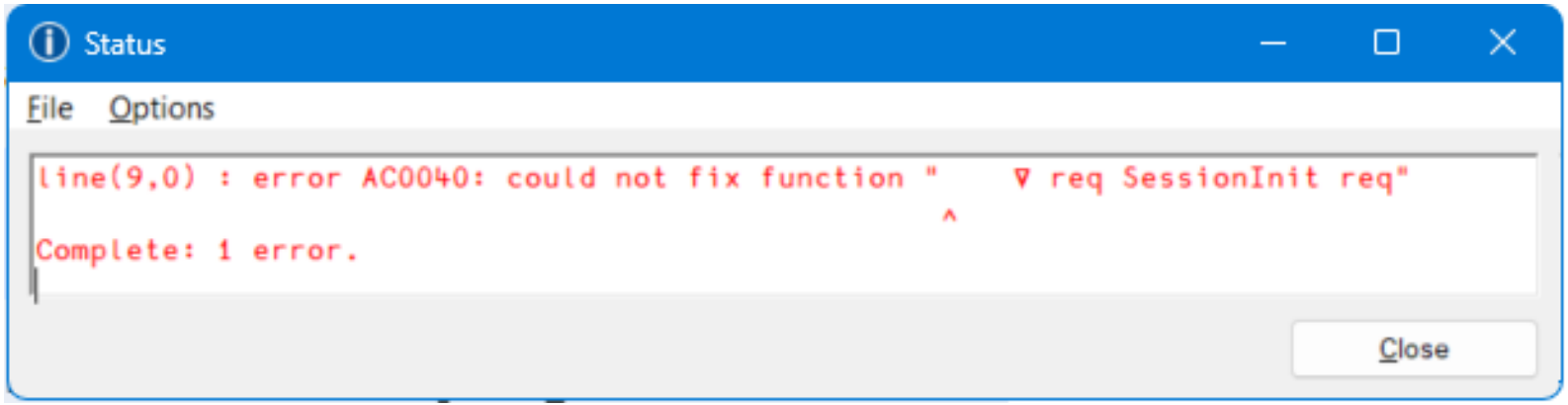
⍝ 3. Start the server
Jarvis.Run config
```

Hiccup 1 - Start.apls

- DyalogScript (.apls) files run in TTY (terminal mode) and don't have a session by default
- Without a session the `]load` user command isn't available
- Jarvis isn't directly `]load`-able
- Where is WordleServer.apln?
- DyalogScripts exit after execution

Hiccup 2

```
      ]load /dyna26/gemini/1/WordleServer.apln
#.WordleServer
```



Hiccup 2 - `SessionInit`

SessionInit uses req as both left and right arguments - that's not allowed.

Loading...

```
⍝ 1. Load the Jarvis framework and our backend logic
]load Jarvis
]load WordleServer.apln
```

```
⍝ 1. Load the Jarvis framework and our backend logic
      ]load /git/jarvis/source/jarvis
#.Jarvis
      ]load /dyna26/gemini/1/WordleServer.apln
#.WordleServer
```

Configure

```
⍝ 2. Configure Jarvis parameters
config ← ⎕NS ''
config.Port ← 8080
config.Paradigm ← 'JSON'
config.CodeLocation ← WordleServer
config.SessionTimeout ← 60              ⍝ Keep sessions alive for 60 minutes
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config.HTMLInterface ← '/path/to/your/frontend/folder' ⍝ **UPDATE THIS PATH**
```

Configure

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⍝ 2. Configure Jarvis parameters
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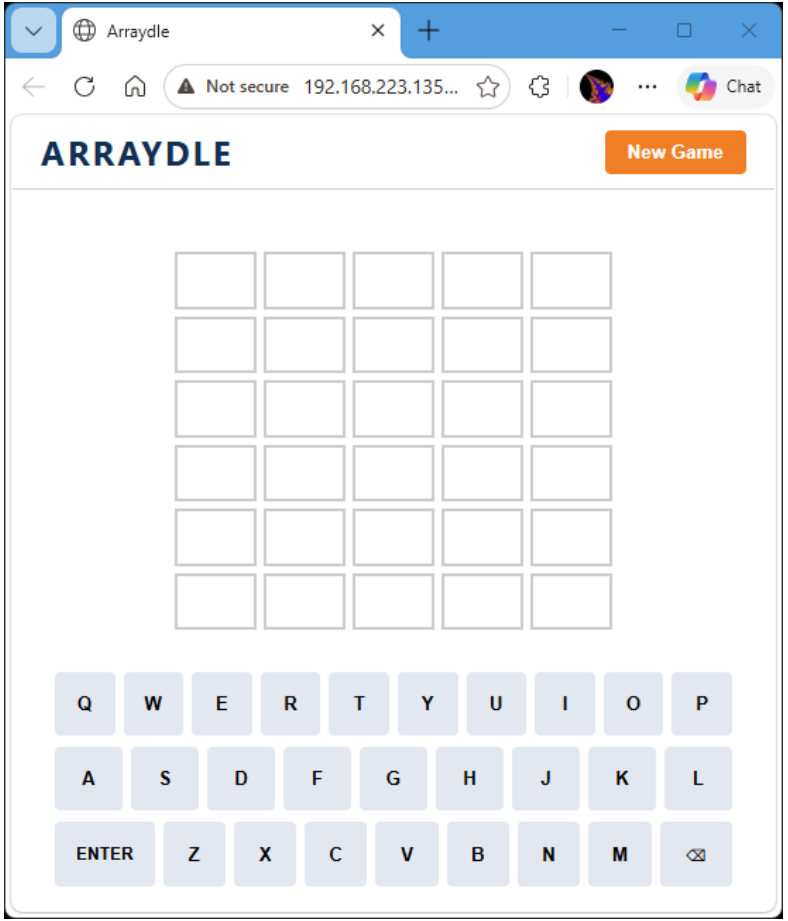
     config.HTMLInterface ← '/dyna26/gemini/1/' ⍝ **UPDATE THIS P
```

Start your engines...

```
⍝ 3. Start the server
Jarvis.Run config
```

```
⍝ 3. Start the server
      ]Jarvis.Run config
2026-04-24 @ 12.44.53.536 - Starting  Jarvis  1.22.4
2026-04-24 @ 12.44.53.628 - Conga copied from C:\Program Files\Dyalog\Dyal
2026-04-24 @ 12.44.53.632 - Local Conga v3.6 reference is #.Jarvis.[LIB]
2026-04-24 @ 12.44.53.653 - Jarvis starting in "JSON" mode on port 8080
2026-04-24 @ 12.44.53.659 - Serving code in #.WordleServer
2026-04-24 @ 12.44.53.665 - Click http://192.168.223.135:8080 to access we
```


Arraydle
Not secure 192.168.223.135...
Chat
ARRAYDLE
New Game
Q W E R T Y U I O P
A S D F G H J K L
ENTER Z X C V B N M ⌫

Hiccup 3

```
      j.Debug←1
11:VALUE ERROR: Undefined name: Payload
Guess[2] guess←1 ⍞C⍞req.Payload.guess ⍝ Force uppercase
                        ^

      req
#.[JSON object]
      ⎕JSON req
{"guess":"APPLE"}
      j.Stop
2026-04-24 @ 12.47.13.308 - Stopping server...
0  Server stopped
```

Hiccup 4

```
      j.Start

0  Server started

16:DOMAIN ERROR
Evaluate[4] pool←(~exact)/secret
                         ^
      secret
 YIELD
```

Hiccup 4

```
∇ res ← NewGame req
  ⍝ Endpoint: Reset the user's session state
  req.Session.Secret ← Dictionary[?≠Dictionary]
```

```
∇ r ← secret Evaluate guess; exact; pool; i
  ⍝ Core logic: Returns array of 0 (gray), 1 (yellow), 2 (green)
  exact ← secret = guess
```

Hiccup 4

I get the following error when submitting a guess
16:DOMAIN ERROR
Evaluate[4] pool←(~exact)/secret
∧

And then Gemini lost its mind...

Hiccup 4

Wouldn't it be easier to just do req.Session.Secret ← (?≡/Dictionary)⊃Dictionary

Hiccup 5

I'm getting
21:INDEX ERROR
Guess[16] state←(eval≡5⍴2)⊃'playing' 'won'
∧

Hiccup 6

Now I get

21:INDEX ERROR

Guess[27] res.secret←(state≢'playing')⊃''(req.Session.Secret)

^

Hiccup 7

It seems to be using the same secret word every time I click "New Game"

Enhancement 1

The front end should report anytime there is a response with an HTTP status that isn't 200

Hiccup 8

I get "Error starting game: 400 Bad Request (No Content-Type specified)" whenever I click on "New Game"

Enhancement 2

When the user submits a word that's not in the Dictionary, issue a message indicating so and do not count it as a guess.

Hiccup 9

the "Word not in dictionary" message persists even after a valid guess

Enhancement 2

Give the user higher praise proportional to the number of guesses it took him to find the secret word. If he runs out of guesses, give him a consoling, but encouraging message.

Takeaways

- Worthwhile?
  - I didn't modify a single line of HTML/CSS/JS myself
  - The APL framework it started with would have been easy to modify
- Trust but Verify
  - Test the results
- LLMs will benefit from being able to execute APL
  - VS Code/Claude/DyalogScript

Questions?