

# Scratching an Itch

Running Policy in Hard To Reach Places With Wasm & OPA

*Charlie Egan - Styra*

@charlieegan3 [charlieegan3.com/talks/opa-wasm](https://charlieegan3.com/talks/opa-wasm)

# Hello.



**Charlie Egan**  
Developer Advocate @ Styra

<https://charlieegan3.com/talks/opa-wasm>



**Twitter**  
@charlieegan3

**Mastodon**  
hachyderm.io/@charlieegan3

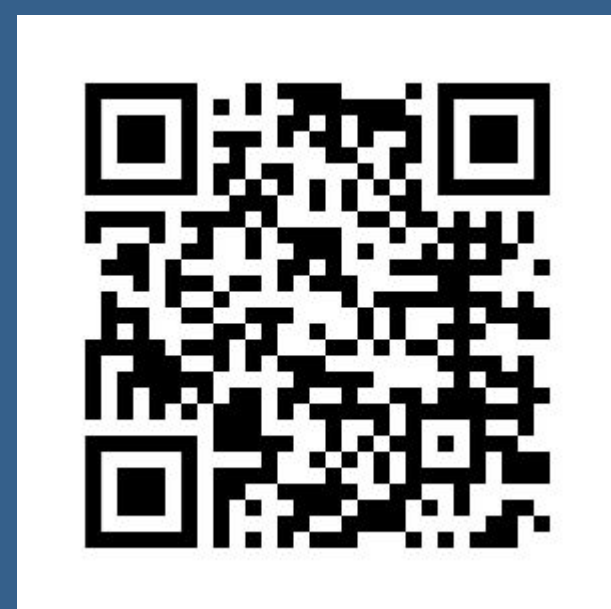
charlie@styra.com  
charlieegan3.com

# Styra

Original creators of Open Policy Agent (OPA, 'Oh-Pa').

OPA is now maintained by Styra and the CNCF community and is a CNCF Graduated Project.

## Styra DAS - The Policy Control Plane



<https://www.styra.com/styra-das/>

## Enterprise OPA An OPA distribution built for data at enterprise scale

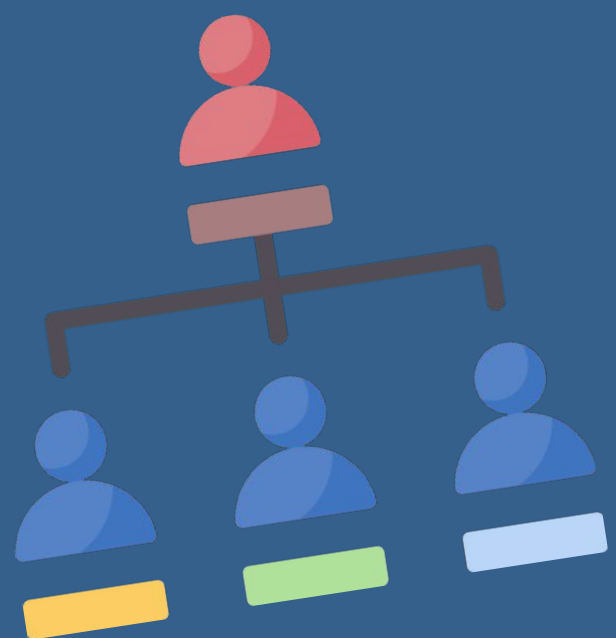


<https://www.styra.com/styra-das/>

# What are Policies?

(What I mean when I talk about policies)

# What are Policies?



“Only admins are allowed”

“Users in the human resources department can update salary information”



# What are Policies?

“Customers can’t book plane seats in row 13”



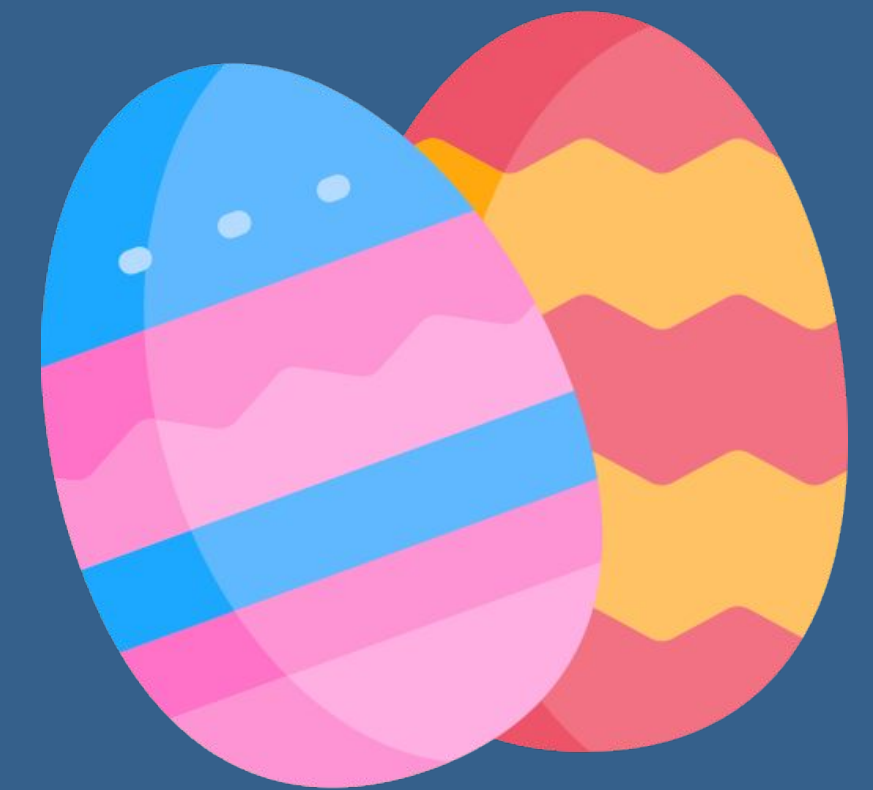
# What are Policies?

“The product can only be sold between January 1st and the first Sunday after the full Moon that occurs on or after the spring equinox”



# What are Policies?

“The product can only be sold between January 1st and the first Sunday after the full Moon that occurs on or after the spring equinox”





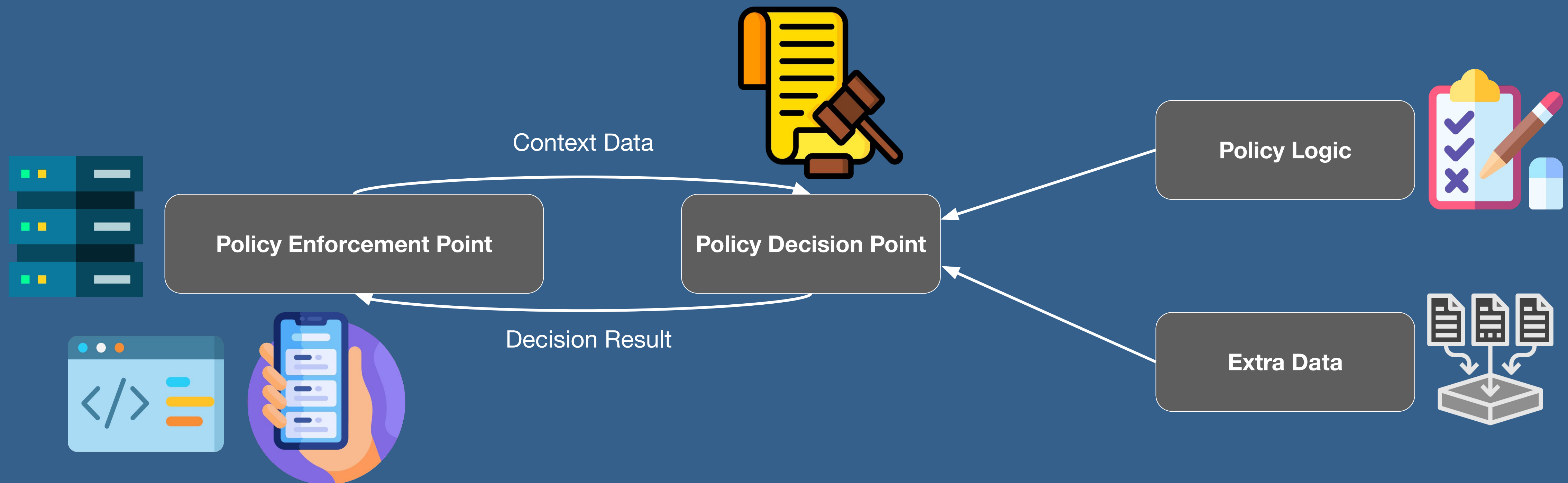
# Businesses are built on policies



# What is Policy Evaluation?

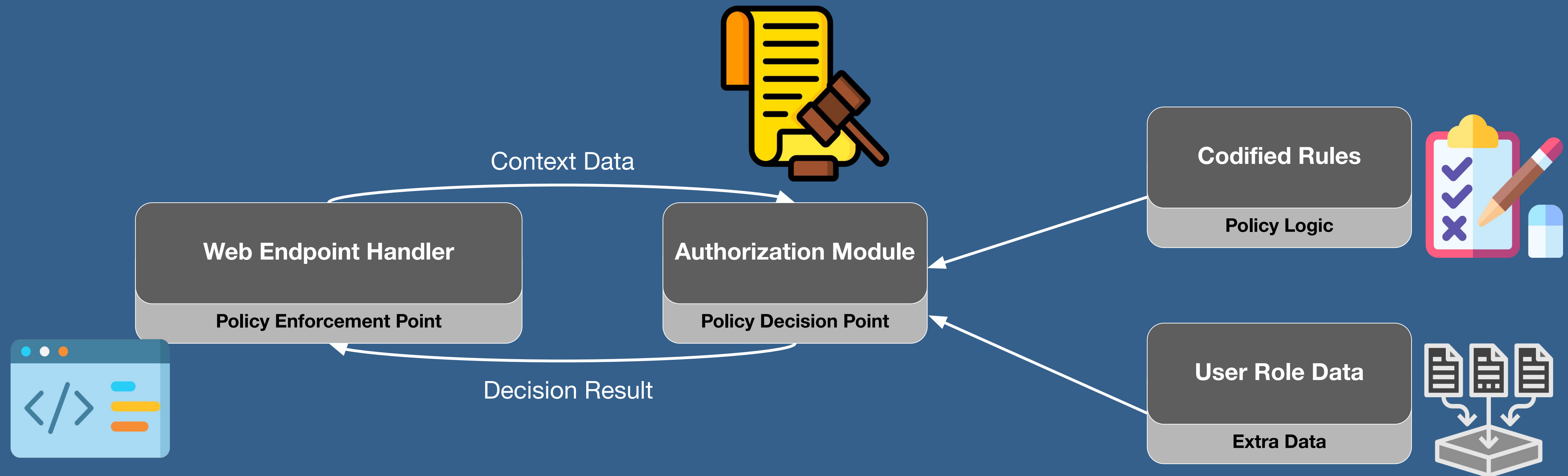
# What is Policy Evaluation?

In a generic sense...



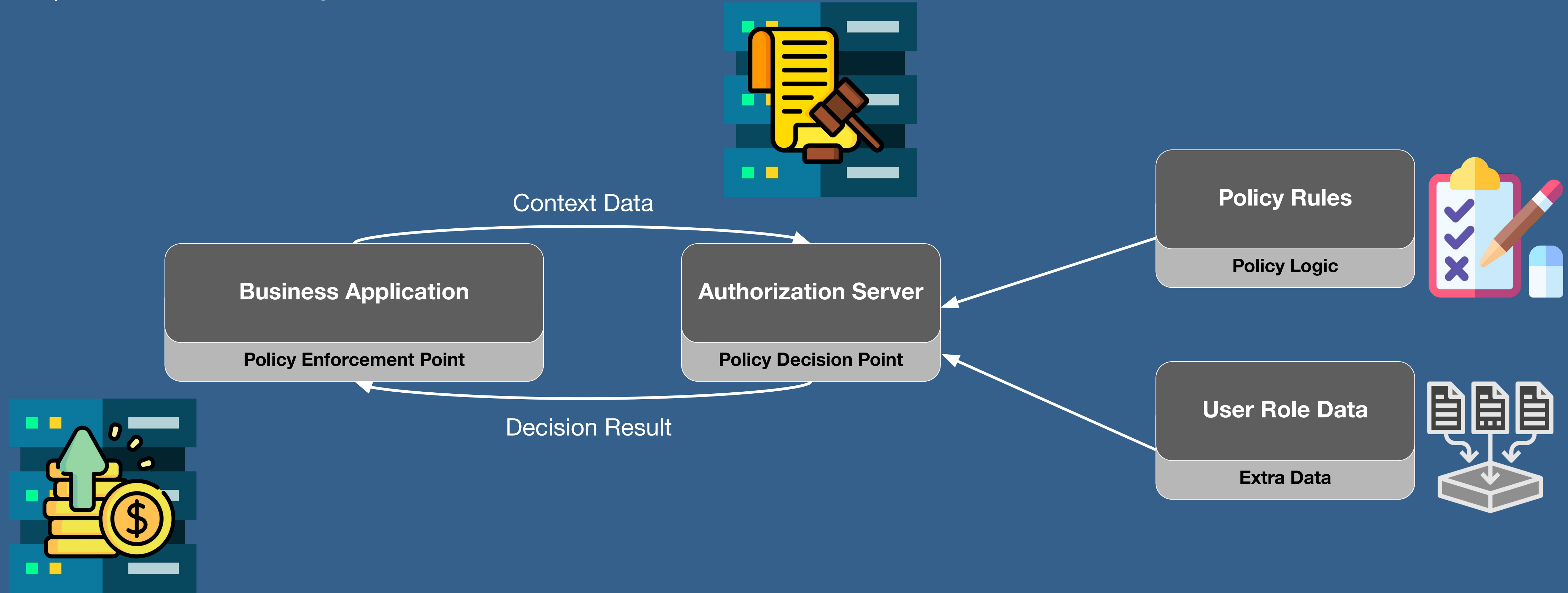
# What is Policy Evaluation?

Inside a single application...



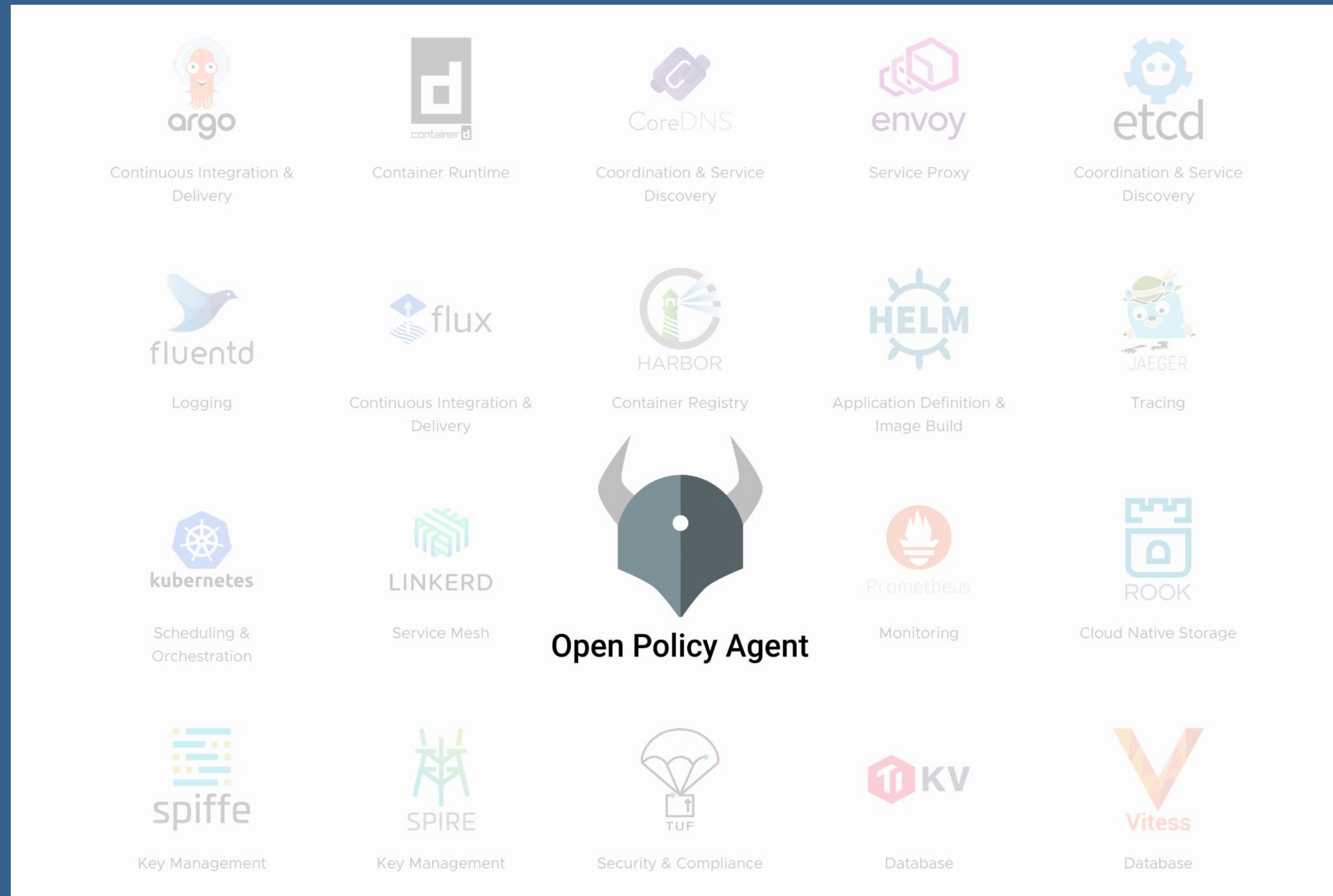
# What is Policy Evaluation?

As part of a distributed system...



# Open Policy Agent?

# Open Policy Agent: Intro



Already use OPA?  
Add your company here!



# Open Policy Agent: Intro

Domain specific Policy Language  
(Rego)

```
1 package authz
2
3 default allow := false
4
5 allow {
6   input.role == "admin"
7 }
8
```



Policy Server



Language SDKs

Via Native SDK



Via Wasm SDKs



OPA!

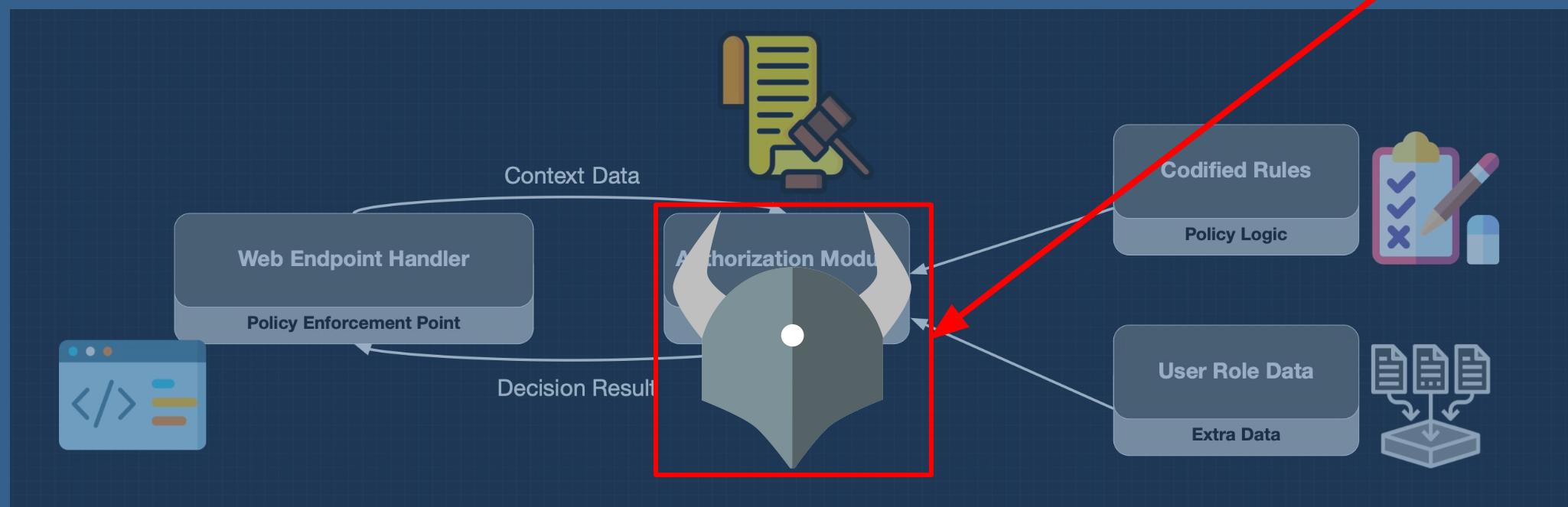


# Open Policy Agent: Rego

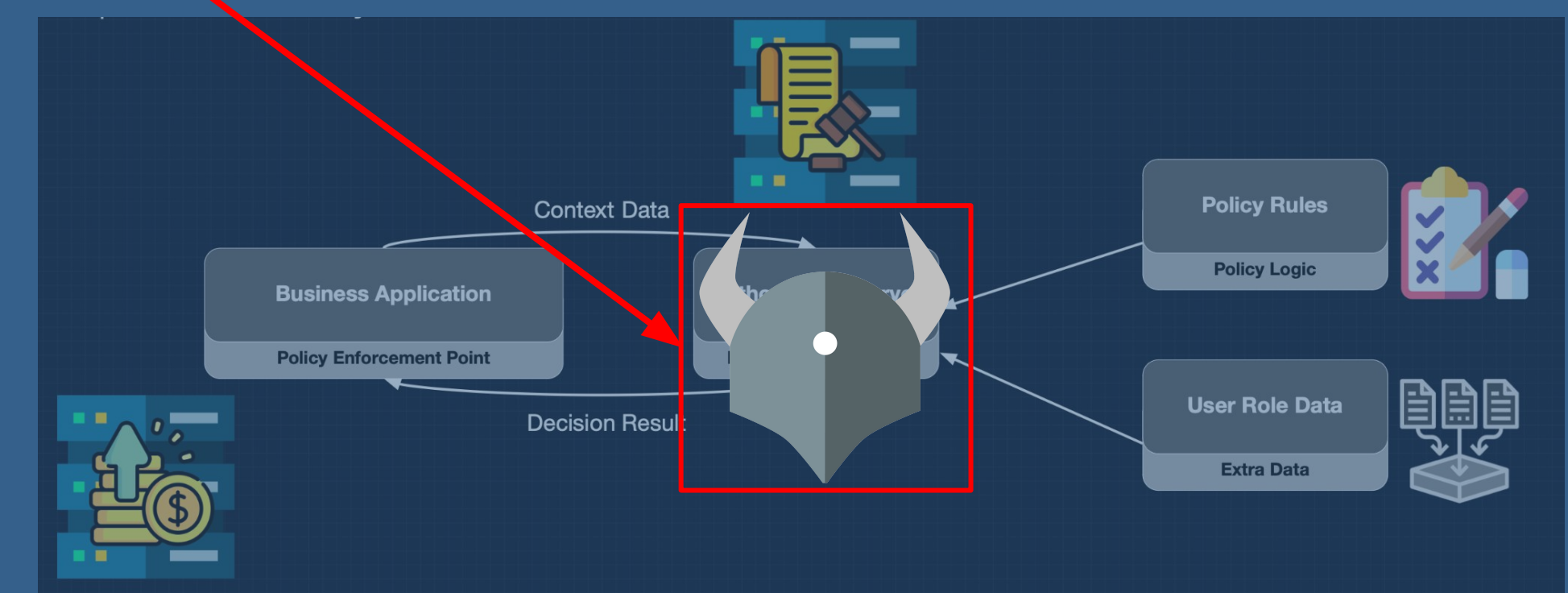
## Rego

```
1 package authz
2
3 default allow := false
4
5 allow {
6   input.role == "admin"
7 }
8
```

## Embedded




## Distributed / Server invoked




# Open Policy Agent: Rego

```
1 package authz
2
3 default allow := false
4
5 allow {
6     input.role == "admin"
7 }
8
```

```
{
  "role": "admin"
}
```



```
{
  "role": "developer"
}
```





# Open Policy Agent: Rego

```
1 package authz
2
3 email_pattern := `^\S+@\S+\.\S+$`
4
5 deny[message] {
6     not regex.match(email_pattern, input.email)
7     message := sprintf("Email must match pattern %v.", [email_pattern])
8 }
9
10 deny[message] {
11     endswith(input.email, "@example.com")
12     message := "Email domain 'example.com' not permitted"
13 }
14
15 deny[message] {
16     input.email != lower(input.email)
17     message := "Email characters must be all lowercase"
18 }
19
```

```
{
  "email": "First Last@example.com"
}
```



```
[
  "Email characters must be all lowercase",
  "Email domain 'example.com' not permitted",
  "Email must match pattern `^\S+@\S+\.\S+$`."
]
```

# Open Policy Agent: Rego

<https://play.openpolicyagent.org/p/VIDtOzzxX8>



# Get Good.

New Linter for Rego from Styra, now v0.8.0!



<https://github.com/StyraInc/regal>

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@charlieegan3

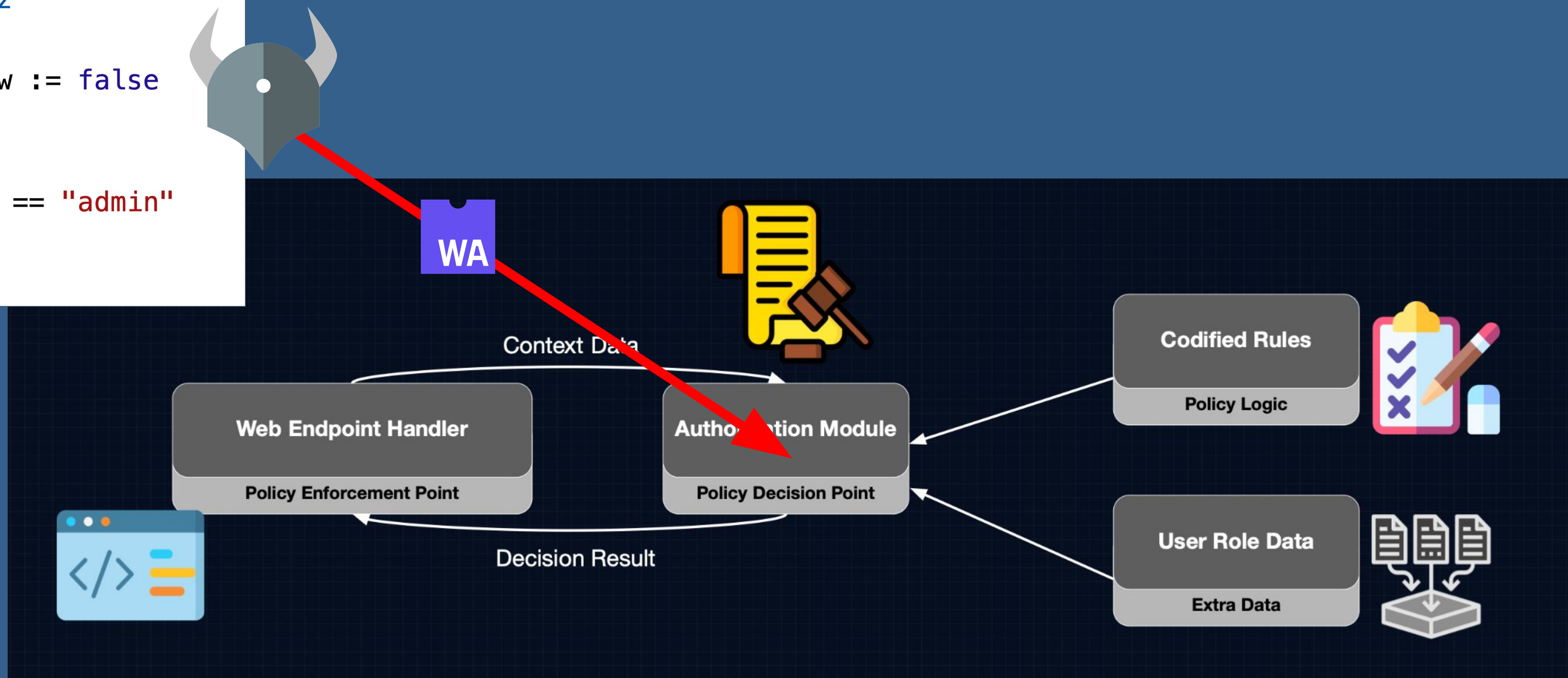
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# Open Policy Agent: Wasm

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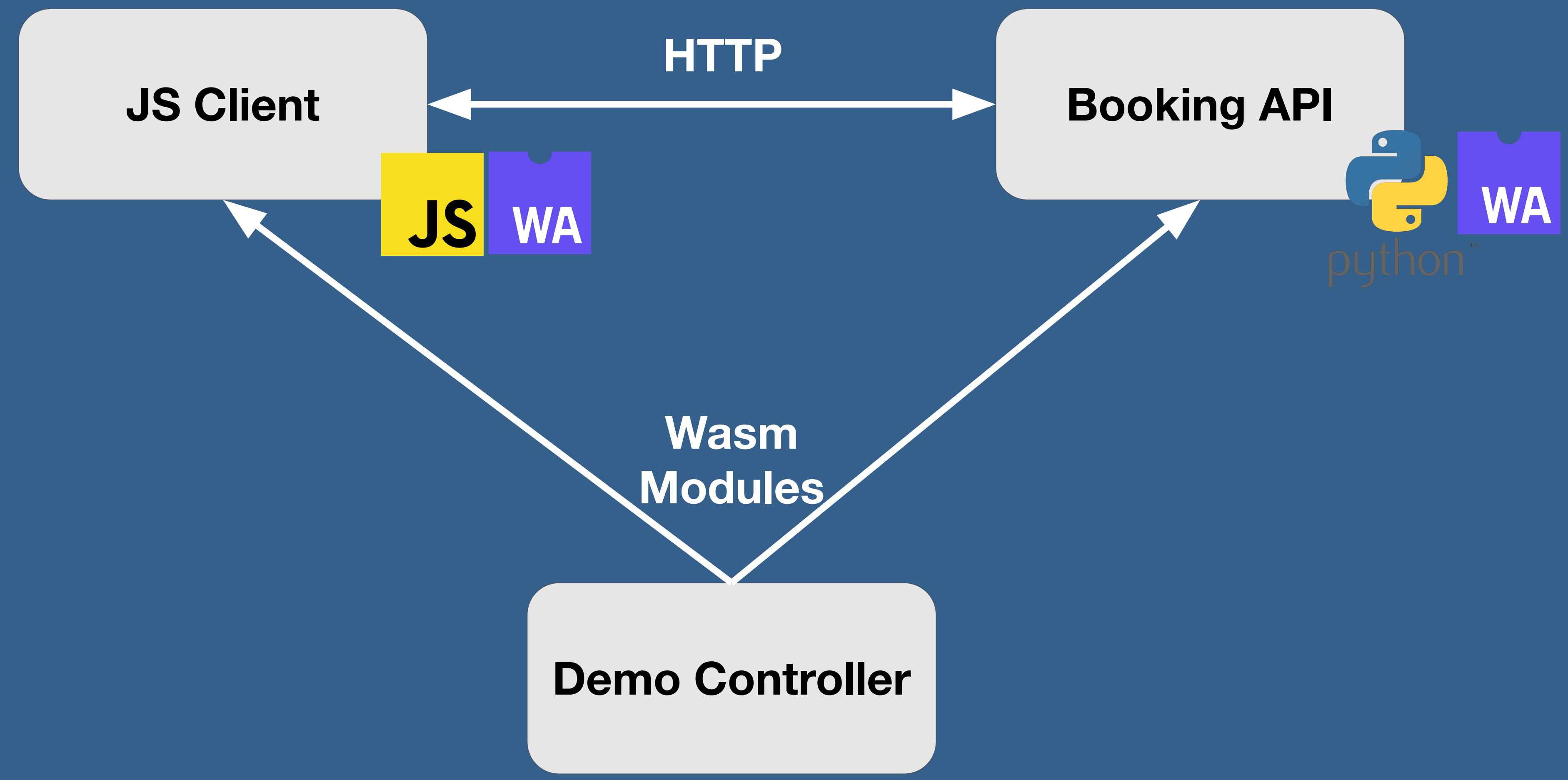




# Open Policy Agent: Wasm

- Fast feedback to users from client side validation
- Standardised validation logic across suite of related applications
  - Web, mobile, server + other OPA deployments
  - Run OPA in more places
- Improved performance for data intensive policies

# Demo



# Wasm in OPA

Past, Present, Future

# Wasm in OPA: Past

- 2018: Proof of concept
  - In response to challenges for some users in running a sidecar server
  - & adoption seen elsewhere (Envoy & CDNs like Cloudflare and Fastly)
- Proof of concept showed good performance improvements too
  - <https://blog.openpolicyagent.org/opa-v0-15-1-rego-on-webassembly-81c226c51be4>
- First official SDK was developed for Node
  - Targeting the Edge/CDN use case

# Wasm in OPA: Present

- Good support for building, distributing and evaluating Wasm policy bundles
- Official and community OPA Wasm SDKs for:
  - **Node JS**
  - .NET Core
  - **Python**
  - JVM
  - Rust
- Native Wasm Support for around 50% of Rego built-in functions
  - (Remainder are SDK dependent)

# Wasm in OPA: Future

- Candidates for further development (not on roadmap - yet!)
  - Investigate options for data sharing between Wasm threads
    - <https://github.com/open-policy-agent/opa/issues/3178>
  - Investigate integration with envoy-wasm filters
    - <https://github.com/open-policy-agent/opa/issues/3235>
  - Support OPA plugins implemented as Wasm modules
    - <https://github.com/open-policy-agent/opa/issues/3631>
  - Implementation of additional built-in functions in Rego or Language SDKs

(Interest from new contributors in this area would be very welcome :)

# Further Reading

All the links, slides etc.

<https://charlieegan3.com/talks/opa-wasm>

OPA Wasm Docs

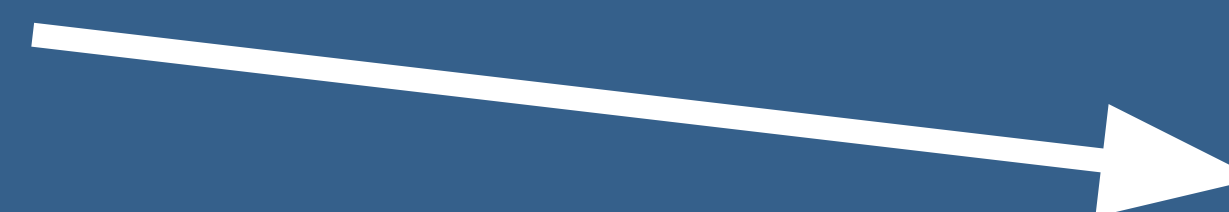
<https://www.openpolicyagent.org/docs/latest/wasm/>

'Awesome OPA' Wasm Items (including SDK links)

<https://github.com/anderseknert/awesome-opa#webassembly-wasm>

OPA PoC Blog (2019)

<https://blog.openpolicyagent.org/opa-v0-15-1-rego-on-webassembly-81c226c51be4>



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# Don't Forget

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