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CloudNativeCon

Europe 2026

Open Policy Agent Intro & Deep Dive

Charlie Egan — Apple
Anders Eknert — Apple

Who We Are

Anders

Identity & Access Control

7 years of OPA

Charlie

K8s → x509 & Workload ID → OPA!

User → Contributor → Maintainer



Agenda

- Introduction to OPA and Rego
- How People Use OPA
- Recent and Upcoming Updates
- What's Next for our Project



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OPA Introduction



OPA Introduction

"Can this runner deploy to production?"

>_

```
ENV="production"
if [ "$ENV" == "production" ];
| then echo "Deployment allowed."
fi
```

"Only admins can delete users"

 python™

```
if user_role == "admin":
| # user deletion logic
```

"Changes to deploy/*yaml files must be approved by the prod-eng team"

≡GO

```
if strings.HasPrefix(path, "deploy/") {
| // logic for approval
}
```

OPA Introduction

"Can this runner deploy to production?"

"Only admins can delete users"

"Changes to deploy/*.yaml files must be approved by the prod-eng team"

Evaluate | Debug

```
approvals contains "prod-eng" if {  
  some file in input.changed  
  startswith(search: file, base: "deploy/")  
}
```

Evaluate | Debug

```
allow if {  
  input.method == "DELETE"  
  "admin" in input.user.roles  
}
```

Evaluate | Debug

```
allow if {  
  "prod" in input.runner.tags  
  input.target == "prod"  
}
```

OPA Introduction

```
Evaluate | Debug
└─ allow if {
    "prod" in input.runner.tags
    input.target == "prod"
  }

Evaluate | Debug
└─ allow if {
    input.method == "DELETE"
    "admin" in input.user.roles
  }

Evaluate | Debug
└─ approvals contains "prod-eng" if {
    some file in input.changed
    startswith(search; file, base: "deploy/")
  }
```





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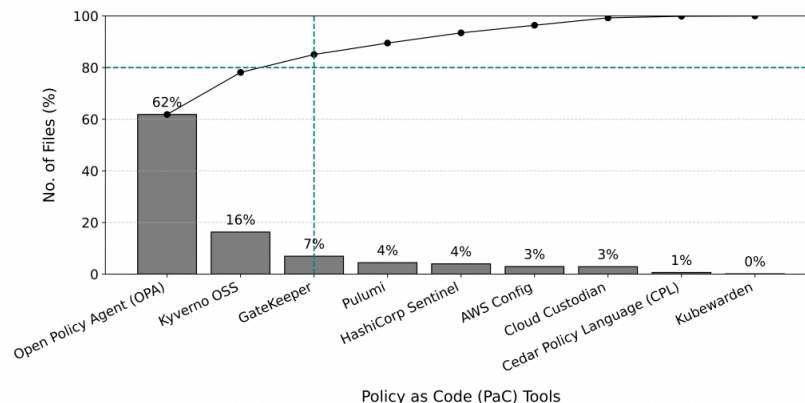
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How People Use OPA



OPA Everywhere

4.1.3. Result



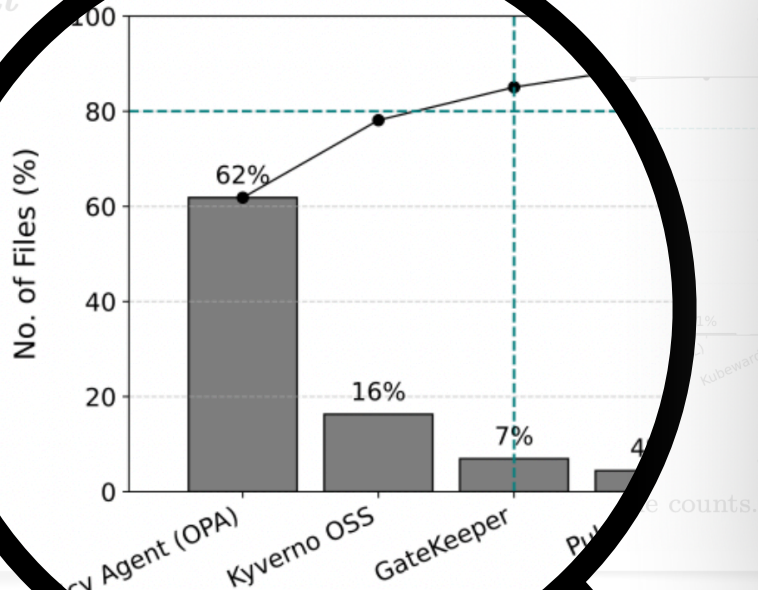
(a) Percentage of PaC usage based on file counts.

An Empirical Study of Policy-as-Code Adoption in Open-Source Software Projects

Patrick Loic Foalem, Foutse Khomh, Leuson Da Silva, Ettore Merlo
Montreal

OPA Everywhere

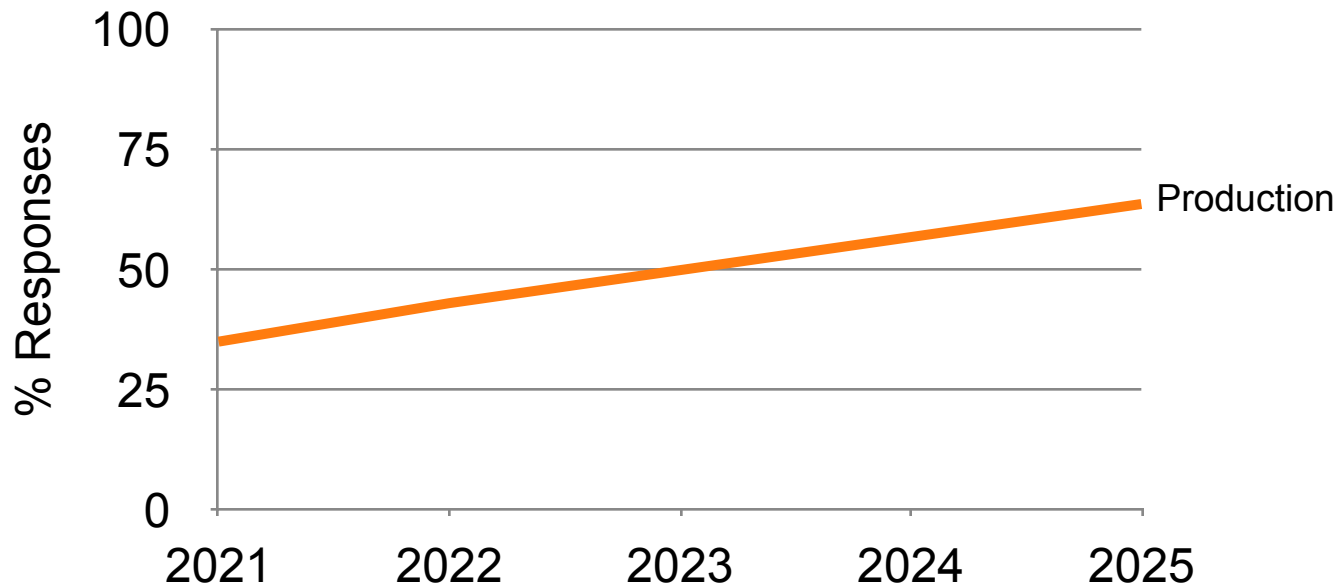
4.1.3. Result



70%

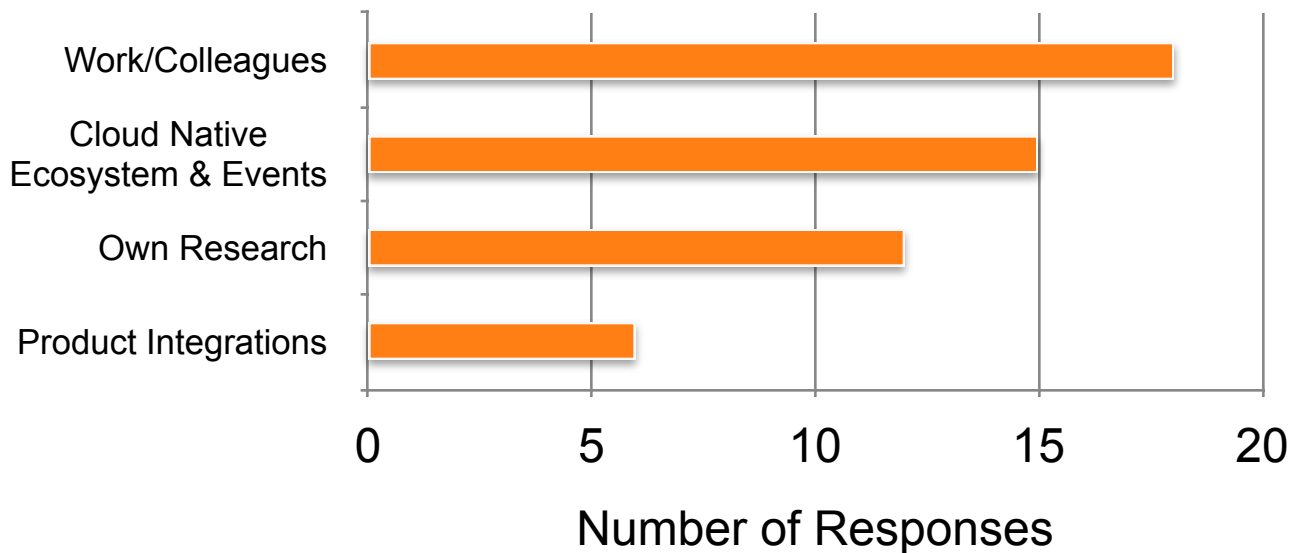
of public policy files
written in Rego

OPA Everywhere, in Production



Using data from 2025 Survey Question:
“What stage of production is your most advanced use case for OPA?”

OPA Grows via Human Connections



Using data from 2025 Survey Question:
“How did you first find out about OPA?” (qualitative data summary)



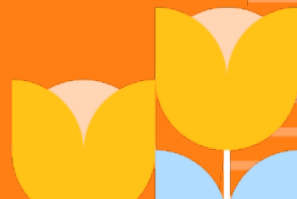
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Rego Language Updates



Rego Language Updates

Improvements v0 → v1

Rego v0

Evaluate | Debug

```
package authz
```

Evaluate | Debug

```
allow = counts(reasons) == 0
```

Evaluate | Debug

```
reasons[message] {  
  startswith(search: input.path, base: "/users/")  
  input.method == "DELETE"  
  {role| role := input.roles[_]} & {"admin"} == set()  
  message = "you must be admin to delete users"  
}
```

Rego v1

Evaluate | Debug

```
package authz
```

Evaluate | Debug

```
allow if counts(reasons) == 0
```

Evaluate | Debug

```
reasons contains "you must be admin to delete users" if {  
  startswith(search: input.path, base: "/users/")  
  input.method == "DELETE"  
  not admin in input.roles  
}
```



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Rego Language Updates

String Interpolation: Why it's Needed

Evaluate | Debug

```
str1 := sprintf(  
  format: "hello %v",  
  values: ["kubekon!"],  
)
```



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Rego Language Updates

String Interpolation: Why it's Needed

```
Evaluate | Debug
str1 := sprintf(
  format: "%#q",
  values: ["hello"],
)
```

```
Evaluate | Debug
str2 := sprintf(
  format: "%T",
  values: [{1}],
)
```

```
Evaluate | Debug
str3 := sprintf(
  format: "%d %d %#[1]x %d",
  values: [10, 100, 1000],
)
```



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Rego Language Updates

81%

OPA users who work where
languages with **string
interpolation** are used

Many policies don't need complicated formatting directives

Rego Language Updates

String Interpolation

Evaluate | Debug

```
deny contains "${input.username}'s role '{role}' is not allowed" if {  
  |   not role in allowed_roles  
}
```

Evaluate

```
default role := "guest"
```

Evaluate | Debug

```
role := input.role
```

Evaluate

```
allowed_roles := ["admin", "employee"]
```



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Rego Language Updates

String Interpolation

Evaluate | Debug

```
deny contains sprintf(format: "%s's role %q is not allowed", values: [username, role]) if {  
  | not role in allowed_roles  
}
```

Evaluate

```
default username := ""
```

Evaluate | Debug

```
username := input.username
```

Evaluate

```
default role := "guest"
```

Evaluate | Debug

```
role := input.role
```

Evaluate

```
allowed_roles := ["admin", "employee"]
```



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Rego Language Updates

Upcoming OR Keyword

“

Boolean operators: to make policies more readable, allow easier refactorings (changing from an AND to an OR currently requires big refactorings)

2022 User Comment

”

“

*Please provide OR and NOT operator i.e
"input.namespace == "kube-system" OR
input.namespace == "default"*

2021 User Comment

”



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Rego Language Updates

Upcoming OR Keyword

Today

OR logic is encoded with additional rules

Evaluate | Debug

```
package example
```

Evaluate | Debug

```
allow if {  
  is_employee  
  input.action == "read"  
}
```

Evaluate | Debug

```
allow if {  
  is_customer  
  input.action == "read"  
}
```

Future

Simple rule indirections can be inlined

```
package example
```

```
allow if {  
  is_employee or is_customer  
  input.action == "read"  
}
```

New Keyword!
Coming Soon!



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Learning & Documentation



Improving the OPA Documentation and Website

2021 & 2022 Surveys

“
The official documentation
is very brief on some
topics
”

“
Clearer docs with **more
examples** rather than
descriptions
”

“
Better documentation/
support around use
cases
”

“
more examples. project
really lacks any production
ready examples.
”

“
[add more] **examples** in
documentation, it is
quite difficult to use now
”

“
Official documentation
needs more detail
”

“
Documentation is great, but
it's not well organized for
a newbie
”

“
tutorial from the most basic
use cases to advanced
ones. The current
examples are very thin”

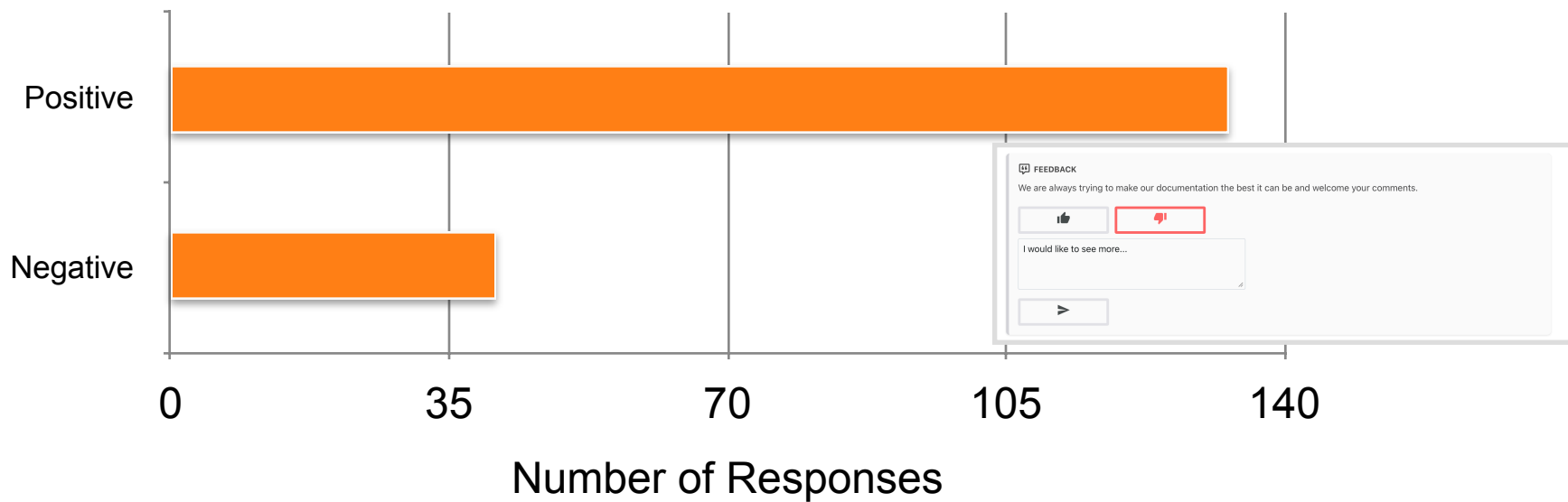
Improving the OPA Documentation and Website

- New site released May 2025
- Improved interactive Rego examples
- Brings many new specific examples for:
 - Built-in functions
 - Keywords
- Based on Docusaurus to aid developer and new contributor experience

The screenshot displays the Open Policy Agent (OPA) website interface. The top navigation bar includes links for Docs, Resources, Projects, Ecosystem, and Play. The left sidebar lists various topics, with 'Token Verification' highlighted. The main content area shows the 'verify_es256' example, which includes a Rego policy snippet for JWT verification and a detailed explanation of the two-step process: verifying the token signature and then decoding the payload for further checks. The example also includes a 'JWKS Verify' section with a similar two-step process. The bottom of the page mentions an example for verifying tokens using an X.509 Certificate.

New website showing detailed built-in examples

Improving the OPA Documentation and Website



Positive vs Negative feedback since the launch of the new site

Improving Into the Future...

1 in 4

Users report using LLM chatbots to learn Rego

Improving Into the Future...

OPA user feedback about LLM use:

What's working?

- People can sometimes draft and convert Rego with LLMs
- LLMs can read and explain basic policies to new users

What we can improve?

- LLMs often use features from other languages by mistake
- LLMs generate outdated Rego

```
Evaluate | Debug  
package example  
  
import rego.v1 # no longer needed
```

AI generated Rego regularly imports `rego.v1`, which hasn't been required for **14 releases...**

Improving Into the Future...

What we can do:

- Make the OPA documentation and examples easier for LLM consumption
- Ensure Regal linter is available from LLM coding assistants to guide correct generation

How you can help us:

- Be careful when using LLMs to generate Rego
- Give us feedback and input on how you feel the AI-assisted Rego experience can be improved



Improving Into the Future...



**OPA is a security tool
and a line of defence for your systems and data**

The most secure way to use our project
is to learn about it and use the best dev tools!



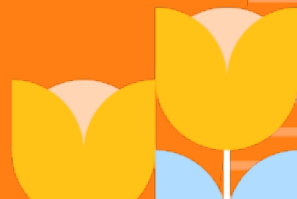
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Project Updates



Regal Updates



- Your opinionated but friendly companion tool for Rego development
- Started out as a linter — now also a language server, debugger and much more
- Updates
 - IntelliJ support!
 - More linter rules added — now 107 in total
 - Most features from the Language Server Protocol (LSP) implemented
 - Performance — lints hundreds of policies in less than a second

Regal Updates



- Your opinionated but friendly companion tool for Rego development
- Started out as a linter — now also a language server, debugger and much more
- Planned
 - Find references
 - Rename
 - AI tools integrations

Project Updates: OPA Control Plane (OCP)

New open source project providing a centralized control plane for Open Policy Agent!

Recent updates include:

- AWS S3 data source support
- Intermediate Representation (IR) and WebAssembly build targets
- Configurable bundle revisions
- Upcoming: Configurable bundle build optimizations

Project Updates: Gatekeeper and Conftest

- OPA Gatekeeper. 2 releases since last KubeCon (v3.22.0, v3.21.0)
 - `gator bench` — New command to perform benchmarks on policies
 - `gator policy` — Discover and install policies from the **gatekeeper-library**
- Conftest. Rego checks for Infrastructure as Code
 - Improvements to output formatting and pre-commit hooks

Next Steps for You!

New Users

Visit the Rego Playground

play.openpolicyagent.org

Install Regal and vscode-opa

Sign-up for our Slack

slack.openpolicyagent.org

Sporadic Users

Read the release notes

Update OPA deployments



Update Regal (Locally and CI)

Regular Users

Give a presentation on OPA or
your policies internally

Share your product or project on
the OPA ecosystem or
company on ADOPTERS.md

Contribute to OPA, scratch an
itch or pick up an issue



Leave Feedback



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