Adding Policies to your apps with Open Policy Agent framework

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Problem

Chasing the rabbit:

- Policies
- Configuration
- but also product plans and features

Challenge

At Spacelift:

- We build a Infra-as-a-Code SaaS for power users.
- We need a safe and flexible way for users to customize the Spacelift

Potential solutions

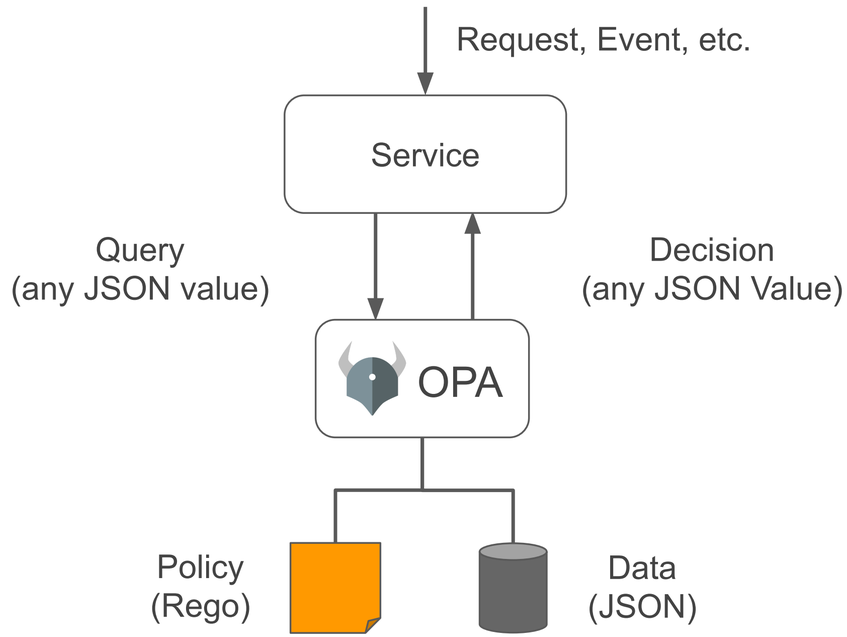
- Endless forms
- Markup language

Potential solutions

- Scripting language embedded

Open Policy Agent

1. Policy-as-a-Code
2. Query/transformation language (rego)
3. Works on loosly structured input & data
4. With JSON support



Demo

play.openpolicyagent.org

Demo

Input:

```
{
  "session": {
    "login": "wojciech12",
    "teams": ["DevOps"],
    "member": true
  }
}
```

Demo

Input:

```
{
  "request": {
    "remote_ip": "string - IP of the user trying to log in",
    "timestamp_ns": "number - current Unix timestamp in nanoseconds"
  },
  "session": {
    "login": "string - username of the user trying to log in",
    "member": "boolean - is the user a member of the account",
    "name": "string - full name of the user trying to log in - may be empty",
    "teams": ["string - names of teams the user is a member of"]
  }
}
```

Demo

Policy:

```
package talk_opa
teams := input.session.teams

admin { teams[_] == "DevOps" }
allow { teams[_] == "Engineering" }
deny  { not input.session.member }
```

Rego

- Declarative;
- Supports arbitrarily nested documents (e.g. graphs);
- Readable and easier for non-programmers*;

Rego

- You can run the custom code safe:
  - non Turing-complete - no loops or conditionals;
  - guaranteed to terminate;
  - ensures that queries are correct and unambiguous.
- Build-in functions

Demo

Data - global values:

```
{
  "maintenance": false,
  "region": "eu-west-1"
}
```

Golang & OPA

- Golang lib - embed OPA
- Golang SDK - high level API

See docs

Golang & OPA

Let's dive into the code.

Golang & OPA

```
var (
    unsafeBuiltins = map[string]struct{}{
        "http.send":          {},
        "opa.runtime":        {},
        "rego.parse_module": {},
        "time.now_ns":        {},
        "trace":              {},
    }
)
```

```
rego.UnsafeBuiltins(unsafeBuiltins)
```

Lessons learnt

Open Policy Agent:

- easily integrates with Golang
- implement policy-as-a-code in a safe way

Lessons learnt

Rego requires some time to master:

- examples and docs
- policy testing

Lessons learnt

Watch out:

- You load input to memory to evaluate policy

Ecosystem

Kubernetes Admission Control

Terraform Policy

Container Network Authorization with Envoy

Authorization for Java Spring Security

Styra Declarative Authorization Service

Container Network Authorization with Istio (at the Edge)

Strimzi (Apache Kafka on Kubernetes)

Kafka Topic Authorization

Custom Application Authorization

Permit.io

HTTP API Authorization in PHP

Fairwinds Insights Configuration Validation Software

Kubescape Kubernetes security posture scanner

Kubernetes Authorization

Ceph Object Storage Authorization

OPAL (Open Policy Administration Layer)

SPIRE

AWS CloudFormation Hook

Slides and code:

github.com/wojciech12

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Hiring

(Go) Backend and Frontend developers
with a passion for building tools
for other engineers.