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How We Use Istio and OPA for Authorization

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What is Authorization

Definition

Authorization is to verify if an **identity** has the **permission** to do something.

Common Approaches

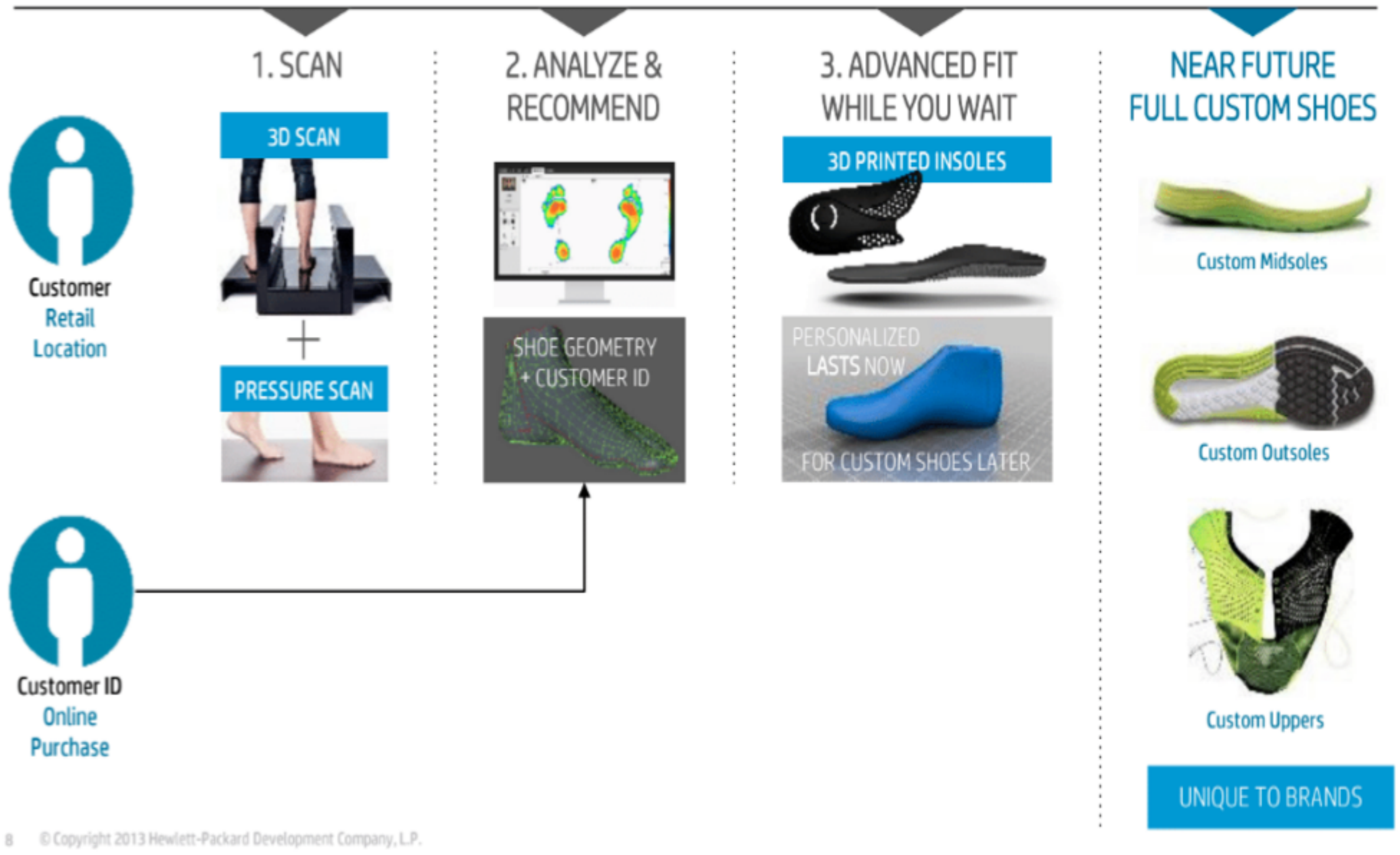
Role-based access control

- Grant access by roles
- Coarse-grained
- Kubernetes RBAC, service account and role binding
- May cause role explosions

Policy/Attributes-based access control

- Grant access by policies
- Fined-grained
- AWS IAM Policies
- Policy is hard to write

FitStation Platform


1. SCAN
3D SCAN
PRESSURE SCAN
2. ANALYZE & RECOMMEND
SHOE GEOMETRY + CUSTOMER ID
3. ADVANCED FIT WHILE YOU WAIT
3D PRINTED INSOLES
PERSONALIZED LASTS NOW FOR CUSTOM SHOES LATER
NEAR FUTURE FULL CUSTOM SHOES
Custom Midsoles
Custom Outsoles
Custom Uppers
UNIQUE TO BRANDS
Customer Retail Location
Customer ID Online Purchase
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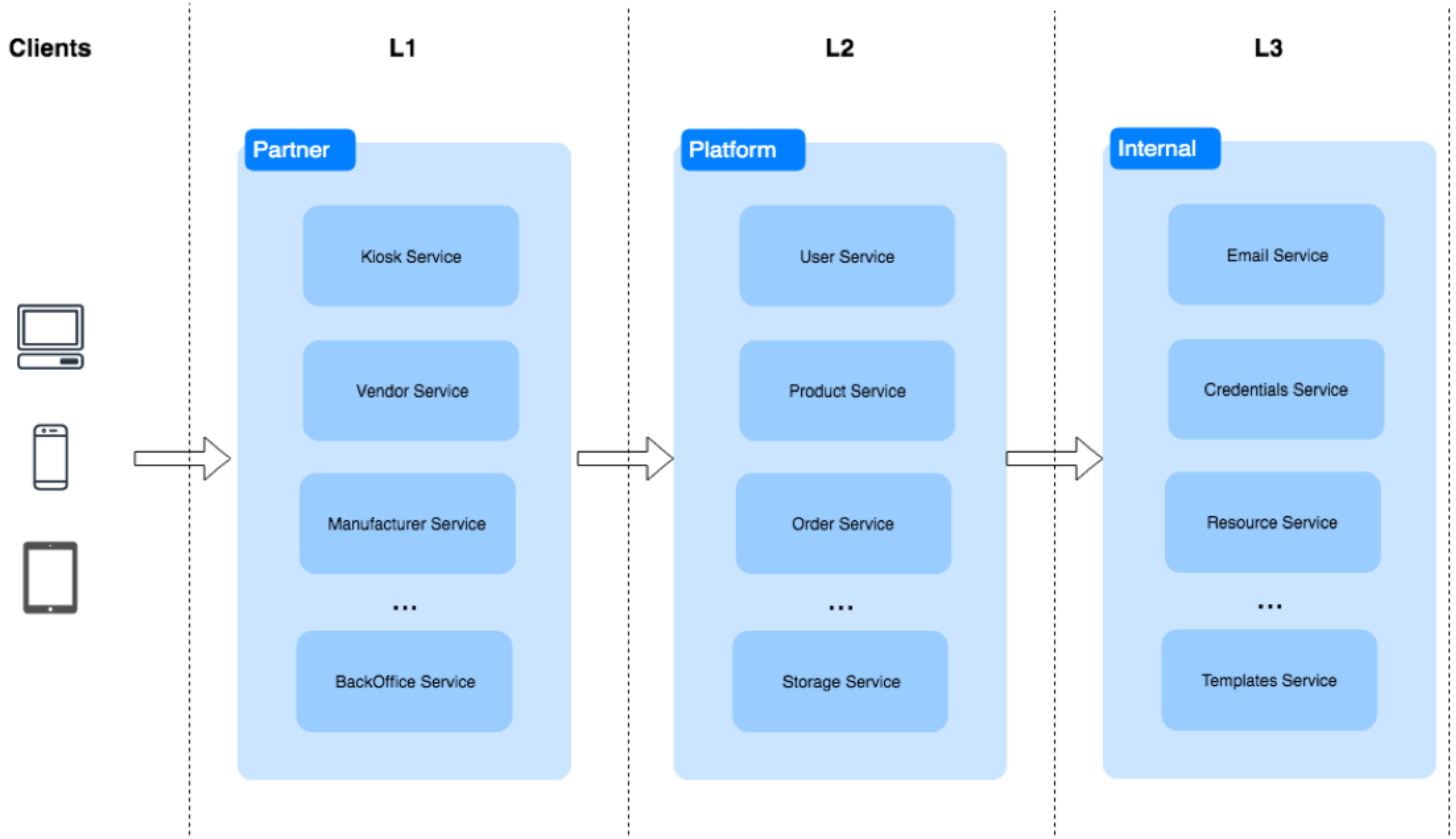
A Custom Shoe Platform

Partners

- 3D Foot Scanning
- Shoe brands
- Shoe retailers
- Shoe manufacturers
- 3D shoe recommendation
- Sports league

High-level Architecture



L1 Authorization

Requirements

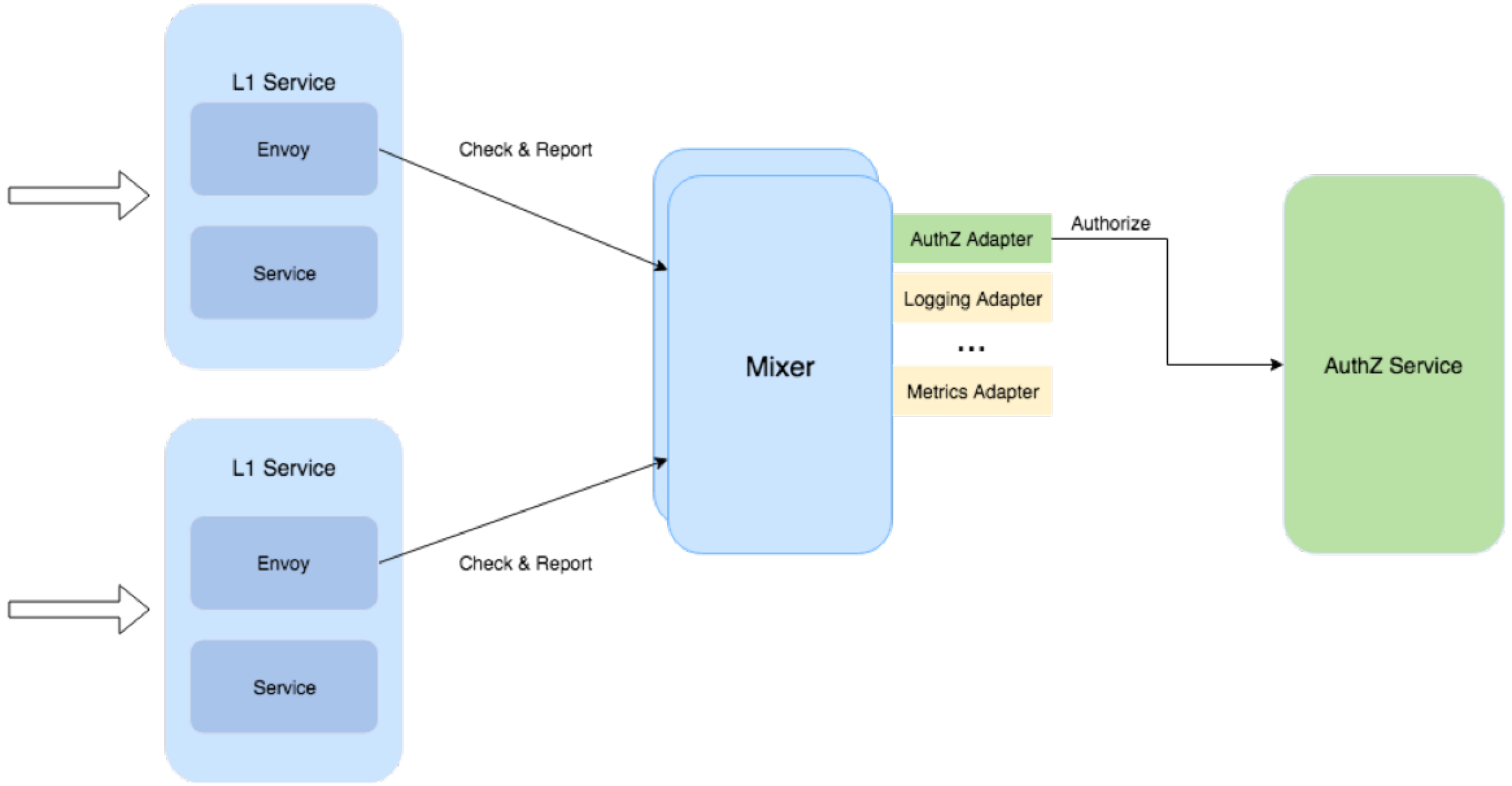
- Enforced role-based access control in infrastructure layer

Design considerations

- L1 services has common requirements for role-based access control

- L1 services are mostly from 3rd party, we can’t enforce access control in code layer

RBAC enforced with Mixer



AuthZ Adapter

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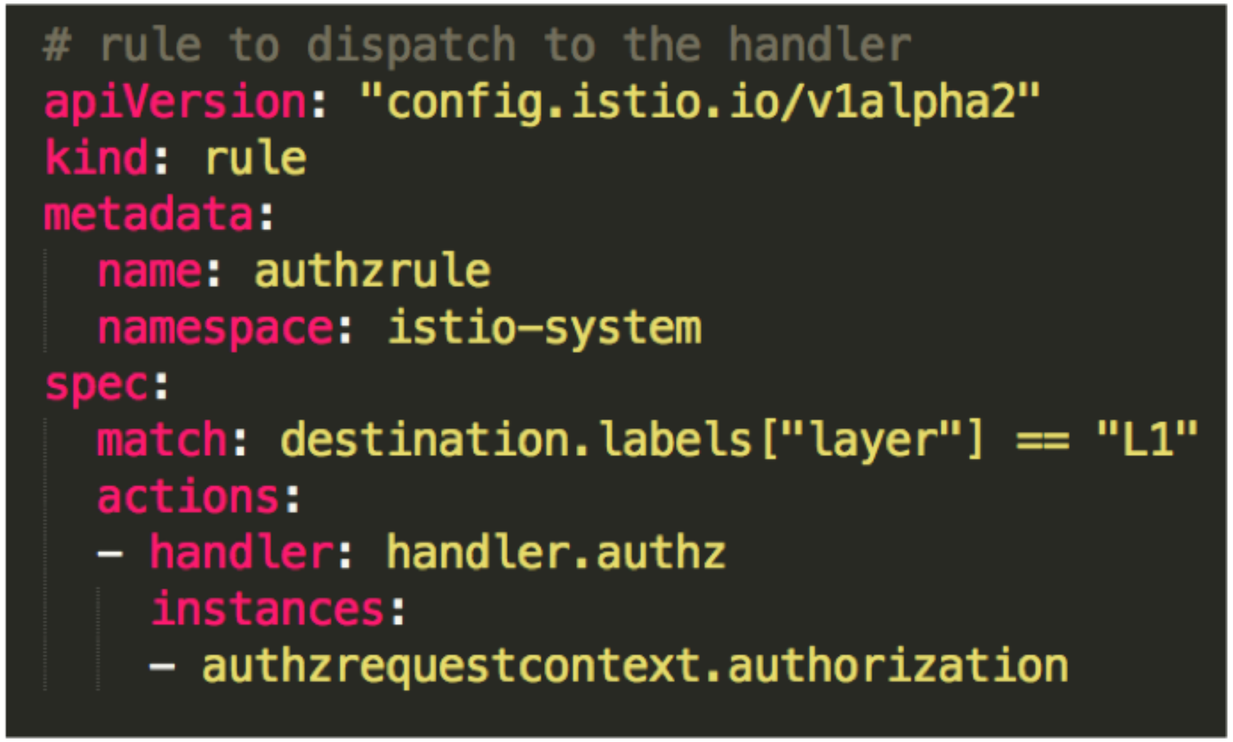
Adapter rule

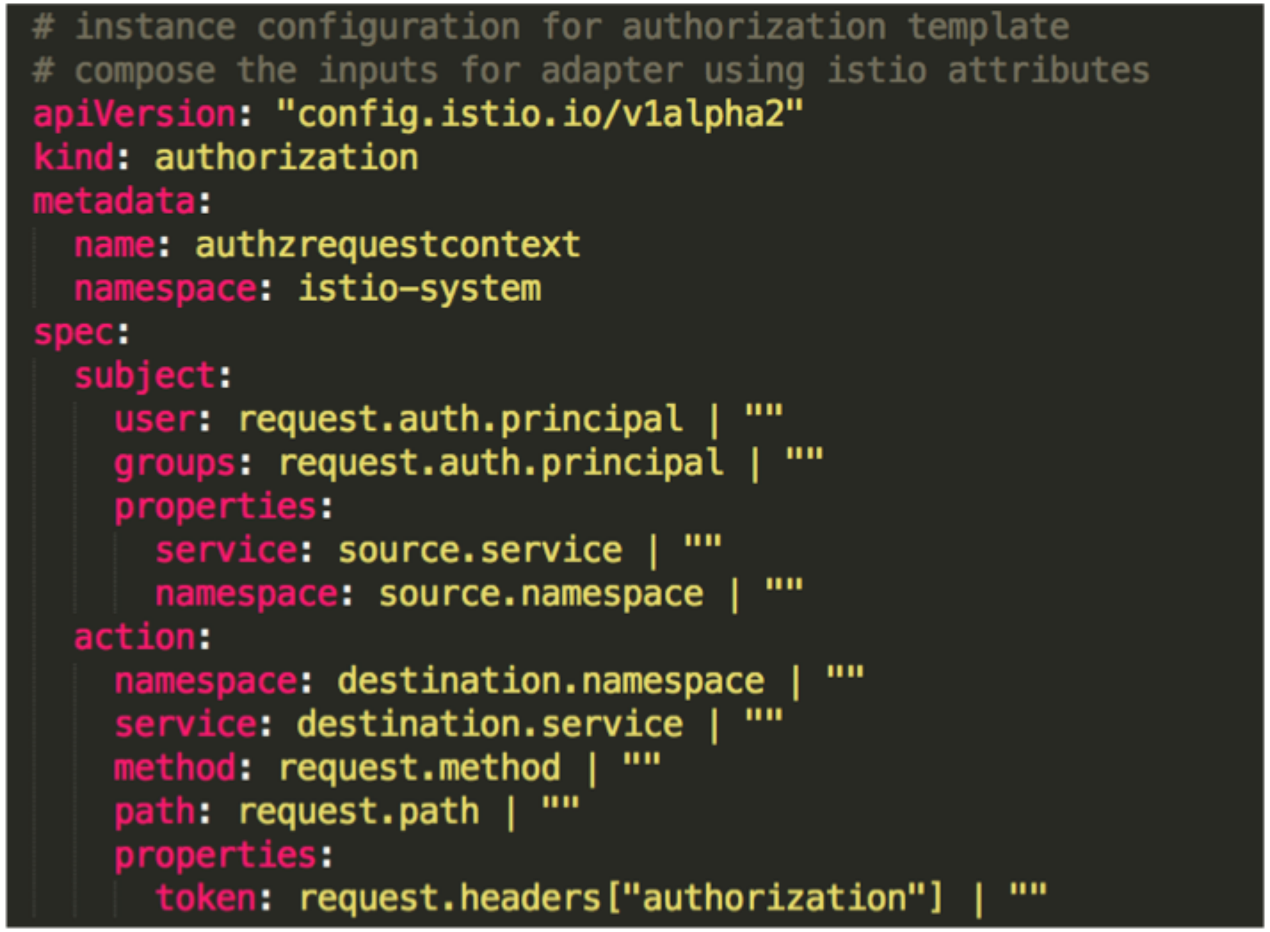


```
# rule to dispatch to the handler
apiVersion: "config.istio.io/v1alpha2"
kind: rule
metadata:
  name: authzrule
  namespace: istio-system
spec:
  match: destination.labels["layer"] == "L1"
  actions:
  - handler: handler.authz
    instances:
    - authzrequestcontext.authorization
```

- Services are labeled with the layer they’re in
- Only requests to the service with the layer equals ”L1” will be handled by AuthZ adapter

AuthZ Adapter

Authorization template



```yaml
# instance configuration for authorization template
# compose the inputs for adapter using istio attributes
apiVersion: "config.istio.io/v1alpha2"
kind: authorization
metadata:
  name: authzrequestcontext
  namespace: istio-system
spec:
  subject:
    user: request.auth.principal | ""
    groups: request.auth.principal | ""
    properties:
      service: source.service | ""
      namespace: source.namespace | ""
  action:
    namespace: destination.namespace | ""
    service: destination.service | ""
    method: request.method | ""
    path: request.path | ""
    properties:
      token: request.headers["authorization"] | ""
```

- Leverage RESTful API in Permission definition. Each RESTful API as a permission
- Extracts token, service, namespace, method and path from istio.

L2 Authorization

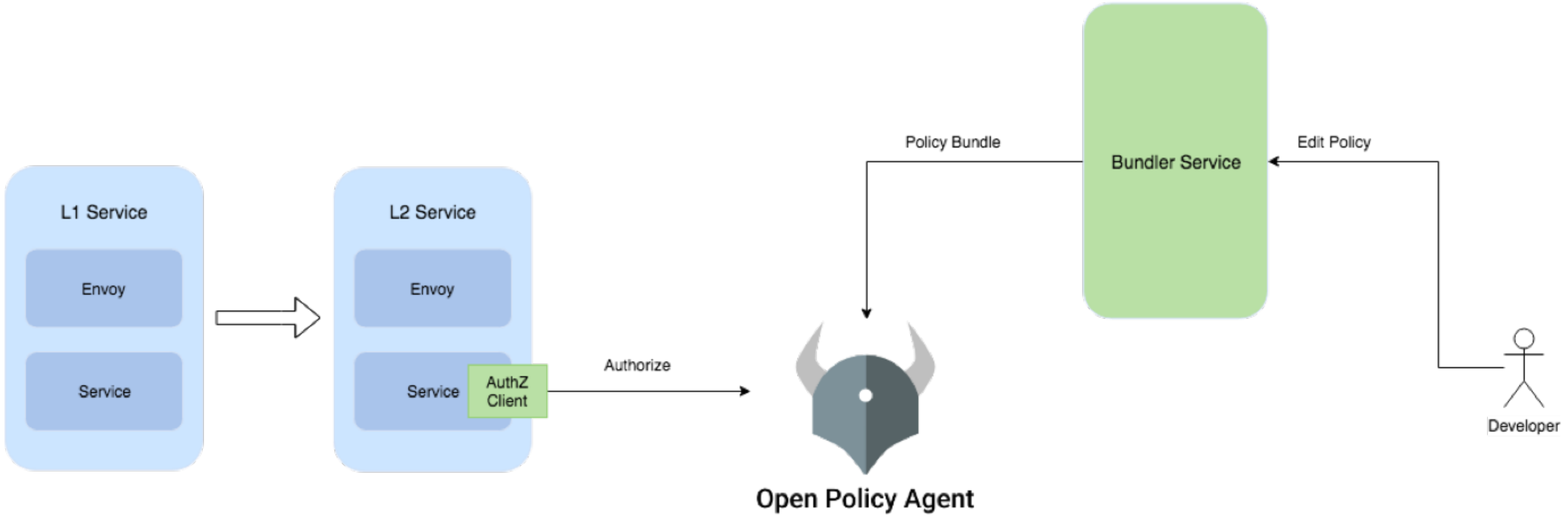
Requirements

- Fined-grained access control
- Externalized authorization logic from business logic
- Dynamic and configurable access control

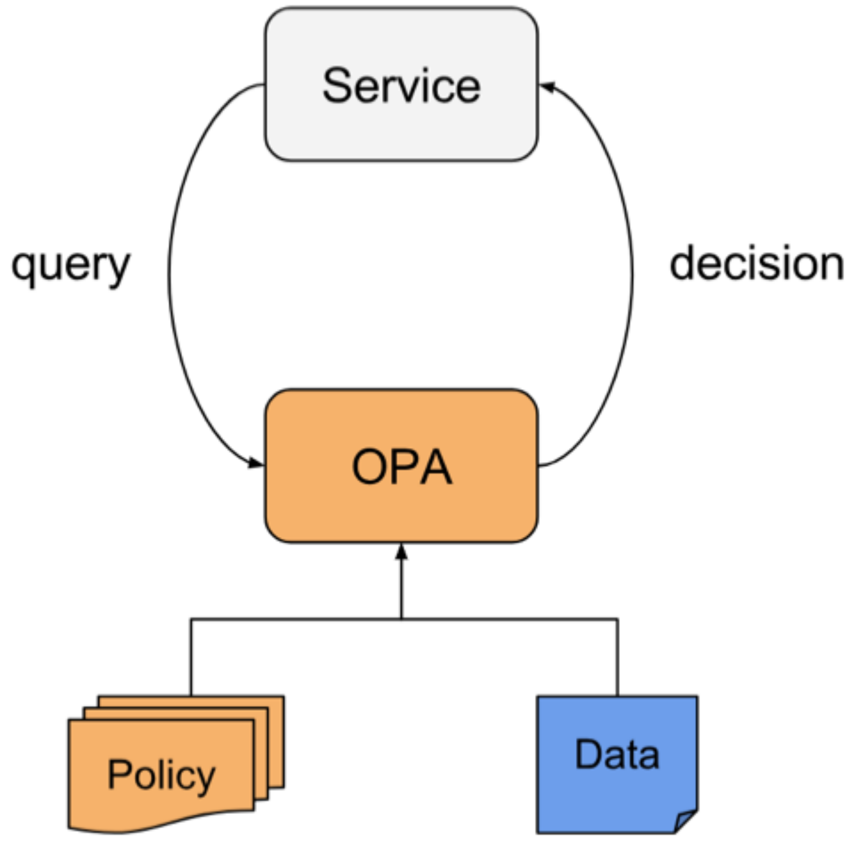
Design considerations

- L2 services are resources from different parties, resource access should be separated
- Different solutions may have different resource access policies
- Policies may change from time to time

ABAC enforced with OPA

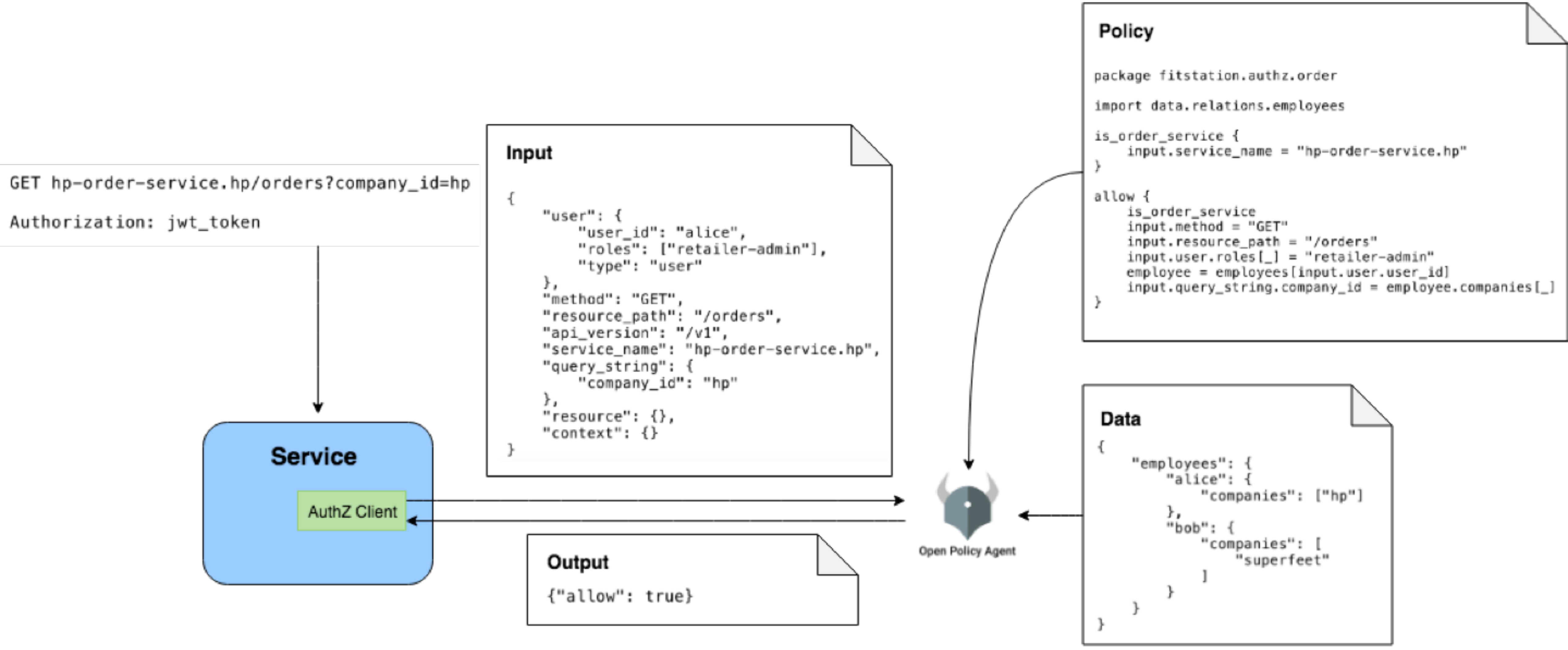


Open Policy Agent



- A general-purpose Authorization engine that loads your policy data and rules and make a decision
- Policy data is JSON format files
- Policy rule is written in declarative language REGO
- Query data is a JSON payload

OPA Policy Example



```
GET hp-order-service.hp/orders?company_id=hp

Authorization: jwt_token
```

Input

```
{
    "user": {
        "user_id": "alice",
        "roles": ["retailer-admin"],
        "type": "user"
    },
    "method": "GET",
    "resource_path": "/orders",
    "api_version": "/v1",
    "service_name": "hp-order-service.hp",
    "query_string": {
        "company_id": "hp"
    },
    "resource": {},
    "context": {}
}
```

Policy

```
package fitstation.authz.order

import data.relations.employees

is_order_service {
    input.service_name = "hp-order-service.hp"
}

allow {
    is_order_service
    input.method = "GET"
    input.resource_path = "/orders"
    input.user.roles[_] = "retailer-admin"
    employee = employees[input.user.user_id]
    input.query_string.company_id = employee.companies[_]
}
```

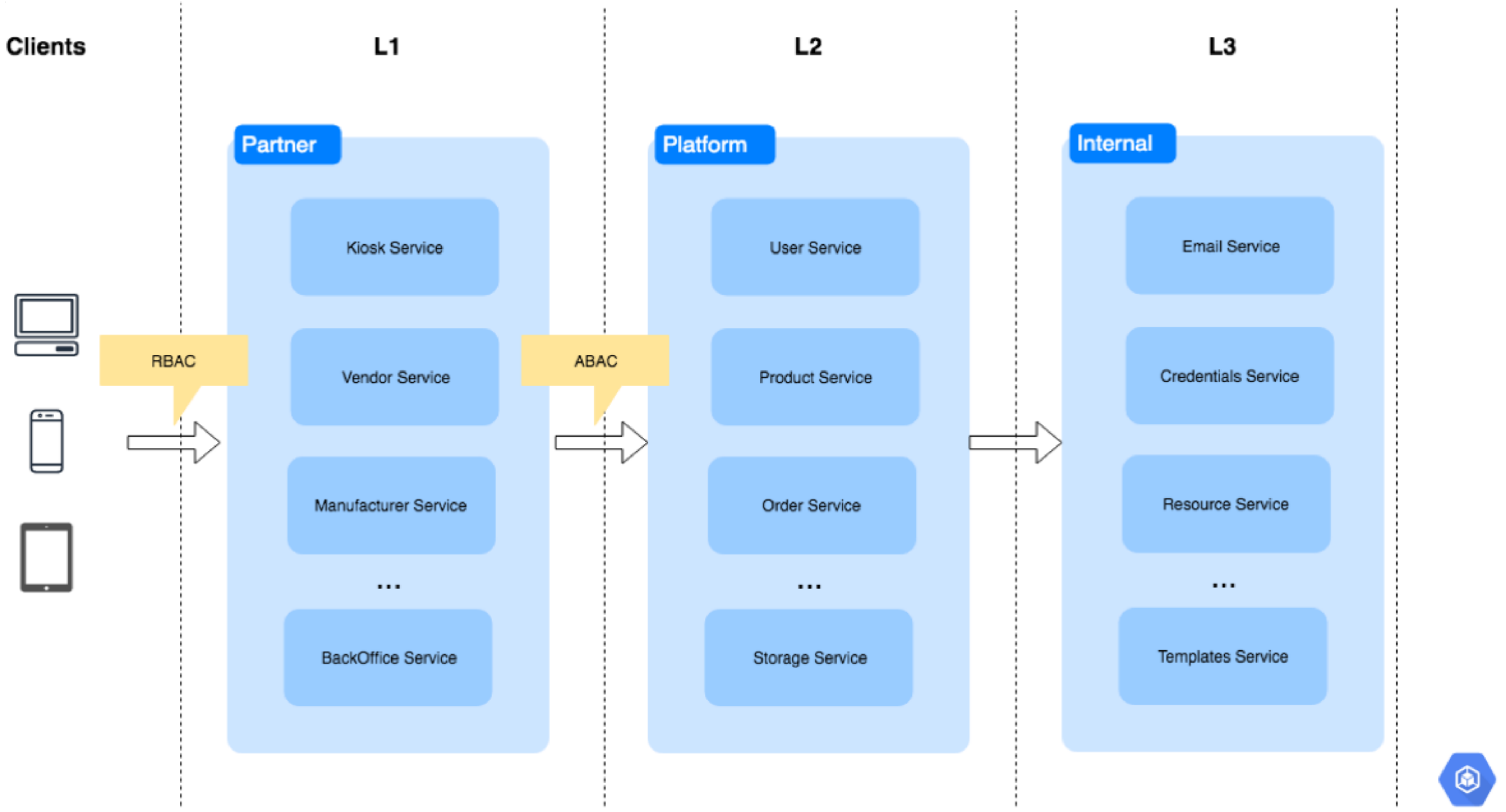
Data

```
{
    "employees": {
        "alice": {
            "companies": ["hp"]
        },
        "bob": {
            "companies": [
                "superfeet"
            ]
        }
    }
}
```

Output

```
{"allow": true}
```

Overview



Clients
L1
L2
L3
RBAC
ABAC
Partner
Kiosk Service
Vendor Service
Manufacturer Service
...
BackOffice Service
Platform
User Service
Product Service
Order Service
...
Storage Service
Internal
Email Service
Credentials Service
Resource Service
...
Templates Service

Thank You!