Microservices Bus Tutorial

Huabing Zhao

Agenda

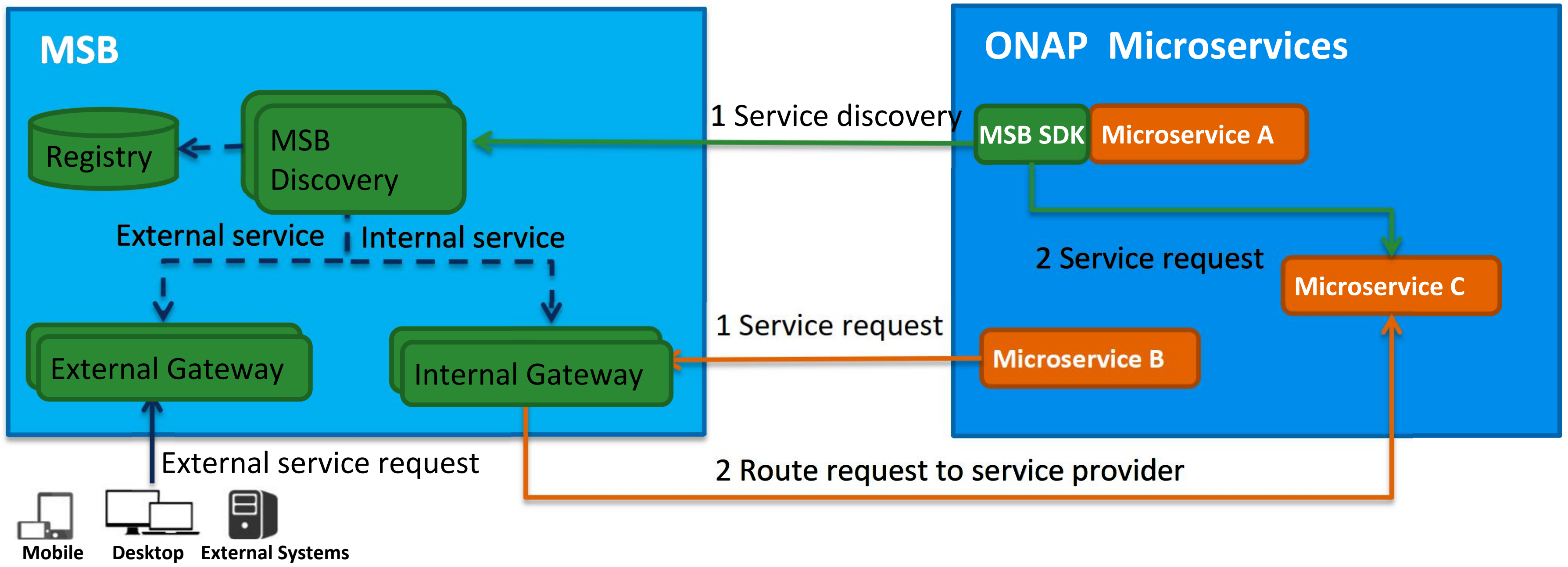
- ❑MSB Overview
- ❑Service Registration
- ❑Service Discovery
- ❑Example & Demo
- ❑How to integrate with MSB in Amsterdam

MSB Overview-Introduction

MSB(Microservices Bus) provide a comprehensive, end to end solution to support ONAP microservice architecture including service registration/discovery, external gateway, internal gateway, client SDK. It's a pluggable architecture so it can integrate with auth service provider to provide centralized Authentication & Authorization. MSB also provides a service portal to manage the REST APIs.

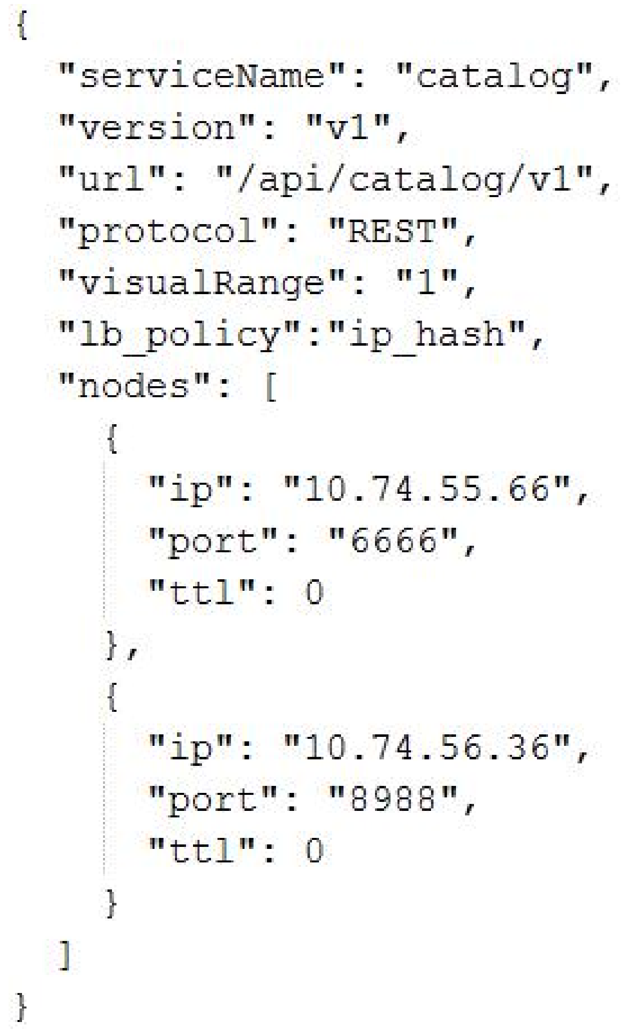
MSB doesn’t depend on a specific environment. It can work in bare metal, virtual machine or containerized environment.

MSB Overview-Components



- Registry
  Service information storage, MSB leverage Consul as service registry.
- MSB Discovery
  Provides REST APIs for service discovery and registration
- Service Gateway
  Provide service request routing, load balancing and centralized Auth. It can be deployed as external Gateway or Internal Gateway.
- MSB SDK
  Java SDK for point to point communication

Service Endpoint Information Model



```
{
  "serviceName": "catalog",
  "version": "v1",
  "url": "/api/catalog/v1",
  "protocol": "REST",
  "visualRange": "1",
  "lb_policy":"ip_hash",
  "nodes": [
    {
      "ip": "10.74.55.66",
      "port": "6666",
      "ttl": 0
    },
    {
      "ip": "10.74.56.36",
      "port": "8988",
      "ttl": 0
    }
  ]
}
```

Attribute	Description
serviceName	Service Name
version	Service Version
url	the actual URL of the service to be registered
protocol	supported protocols: 'REST', 'UI', 'HTTP','TCP'
visualRange	Visibility of the service. External(can be accessed by external systems):0 Internal(can only be accessed by ONAP microservices):1
path	The customized publish path of this service. If path parameter is specified when registering the service, the service will be published to api gateway under this path. Otherwise, the service will be published to api gateway using a fixed format: api/{serviceName} /{version}. The customized publish path should only be used for back-compatible.
lb_policy	Load balancing method, Currently two LB methods are supported, round-robin and ip-hash.
enable_ssl	True if the registered service is based on https. False if the registered service is based on http.
nodes	ip: the ip of theservice instance node port: the port of the service instance node ttl: time to live, this parameter is reserved for later use

Service Registration –RESTFul API

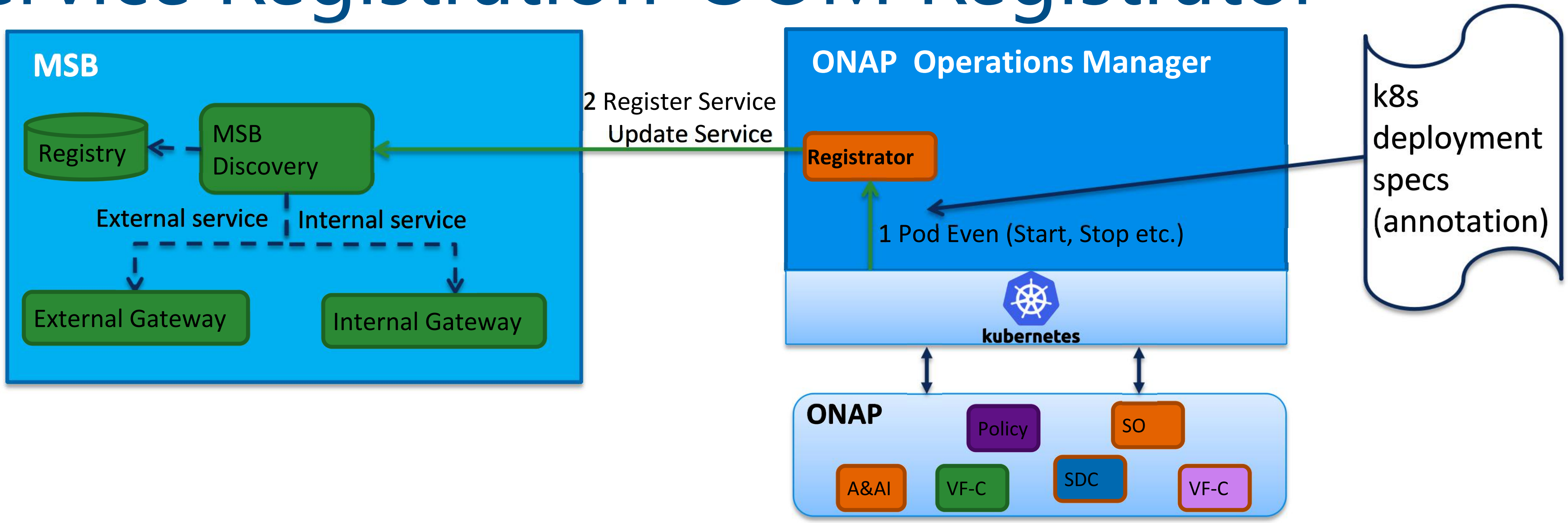
http method: POST
url: http://{msb_ip}:{msb_port}/api/microservices/v1/services

Example:

```
curl -X POST \
    -H "Content-Type: application/json" \
    -d '{"serviceName": "test", "version": "v1", "url": "/","protocol": "REST", "lb_policy":"round-robin","nodes":
    [ {"ip": "127.0.0.1","port": "9090"}]}' \
    "http://127.0.0.1:10081/api/microservices/v1/services”
```

THE LINUX FOUNDATION

Service Registration-OOM Registrator



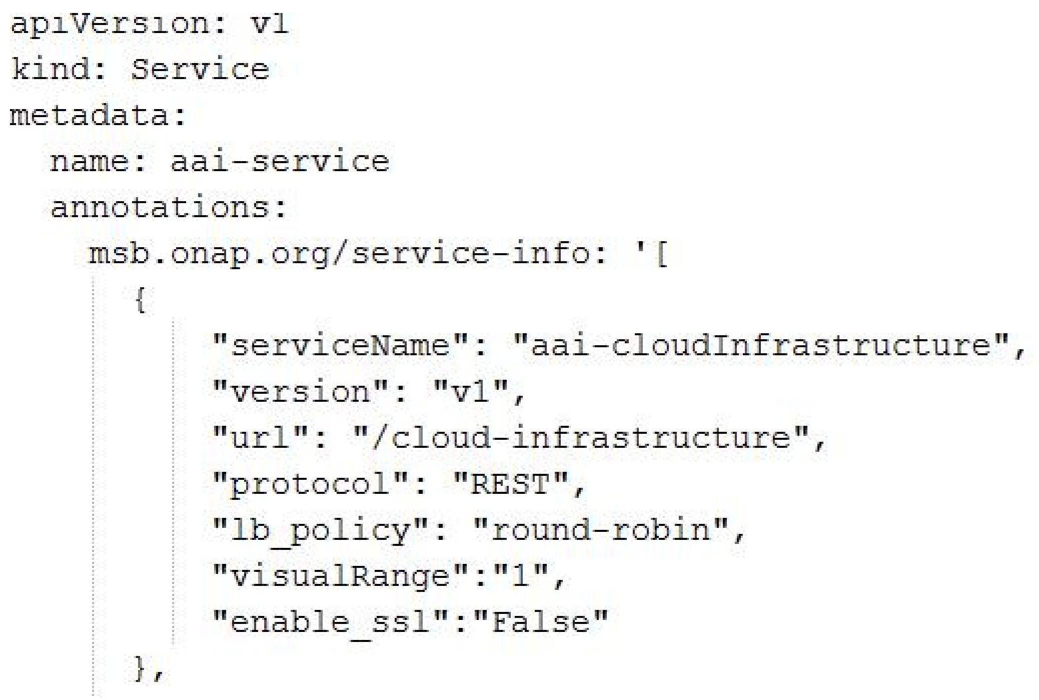
OOM Registrator can register service endpoints for the microservices deployed by OOM

- OOM deploy/start/stop ONAP components.
- Registrator watches the kubernetes pod event .
- Registrator registers service endpoint info to MSB. It also updates the service info to MSB when ONAP components are stopped/restarted/scaled by OOM

THE LINUX FOUNDATION

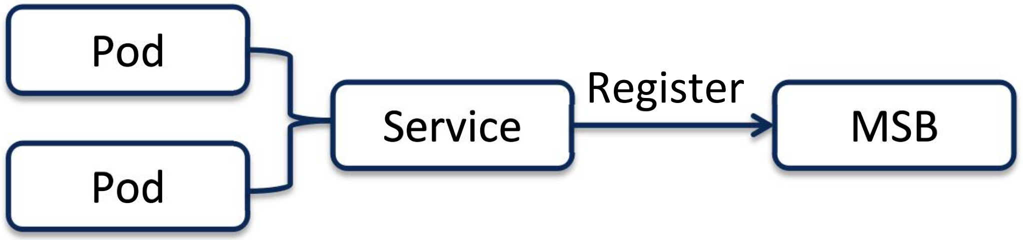
OOM Registrator-Service endpoint configuration

Use Kubernetes annotations to attach service endpoint metadata to objects.
Service endpoint can be defined at Pod level or Service level
Pod level: leverage the LB capabilities of MSB to distribute requests to multiple pods
Service level: MSB send the request to service(Cluster IP), K8s dispatch the request to the backend Pod

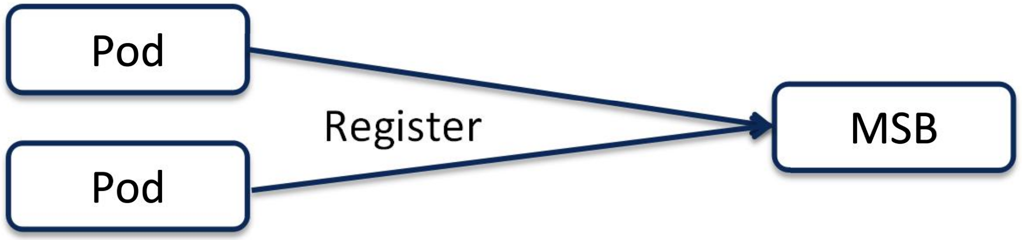


```
apiVersion: v1
kind: Service
metadata:
  name: aai-service
  annotations:
    msb.onap.org/service-info: '[
      {
          "serviceName": "aai-cloudInfrastructure",
          "version": "v1",
          "url": "/cloud-infrastructure",
          "protocol": "REST",
          "lb_policy": "round-robin",
          "visualRange":"1",
          "enable_ssl":"False"
      },
```

Register at service level

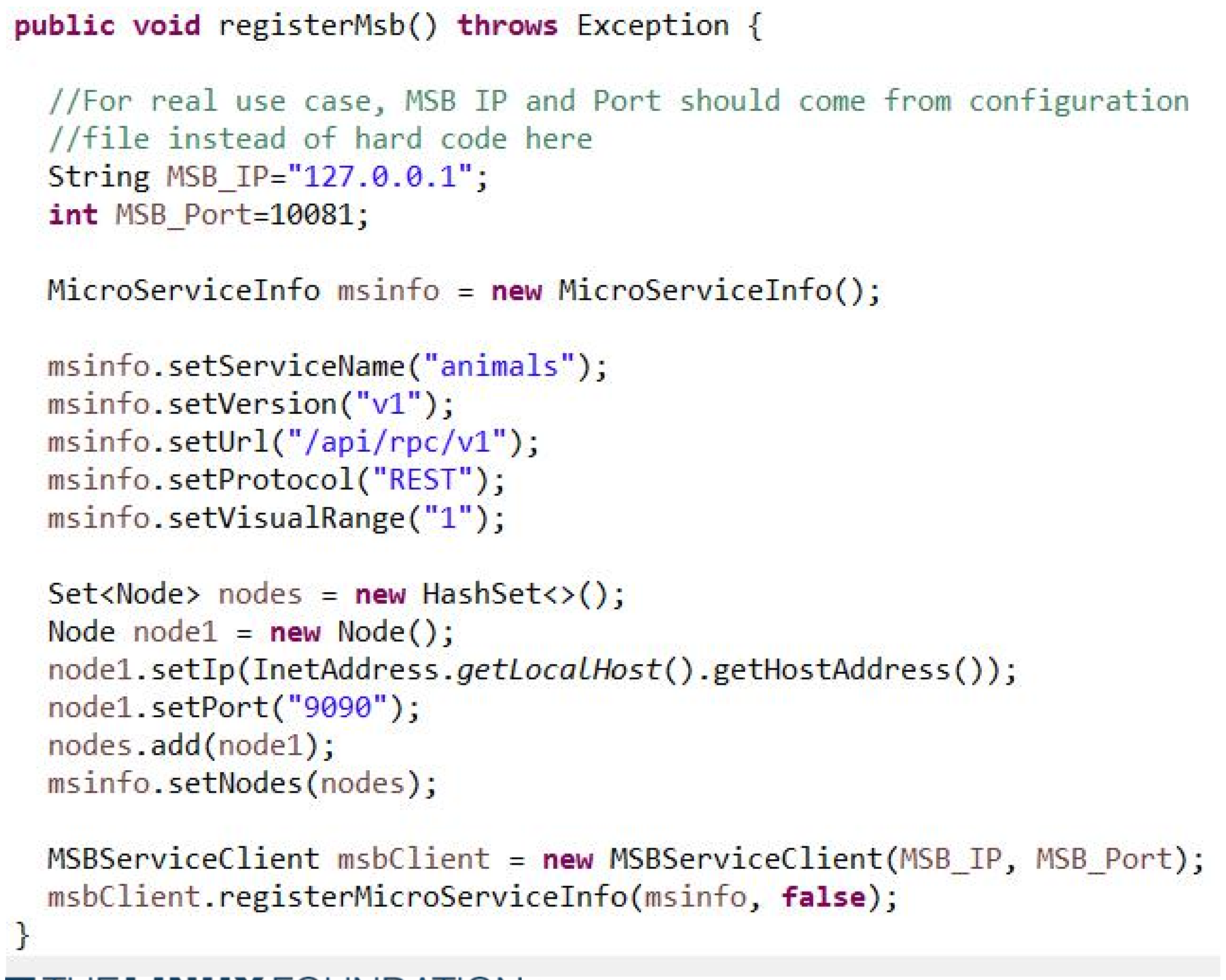


Register at pod level



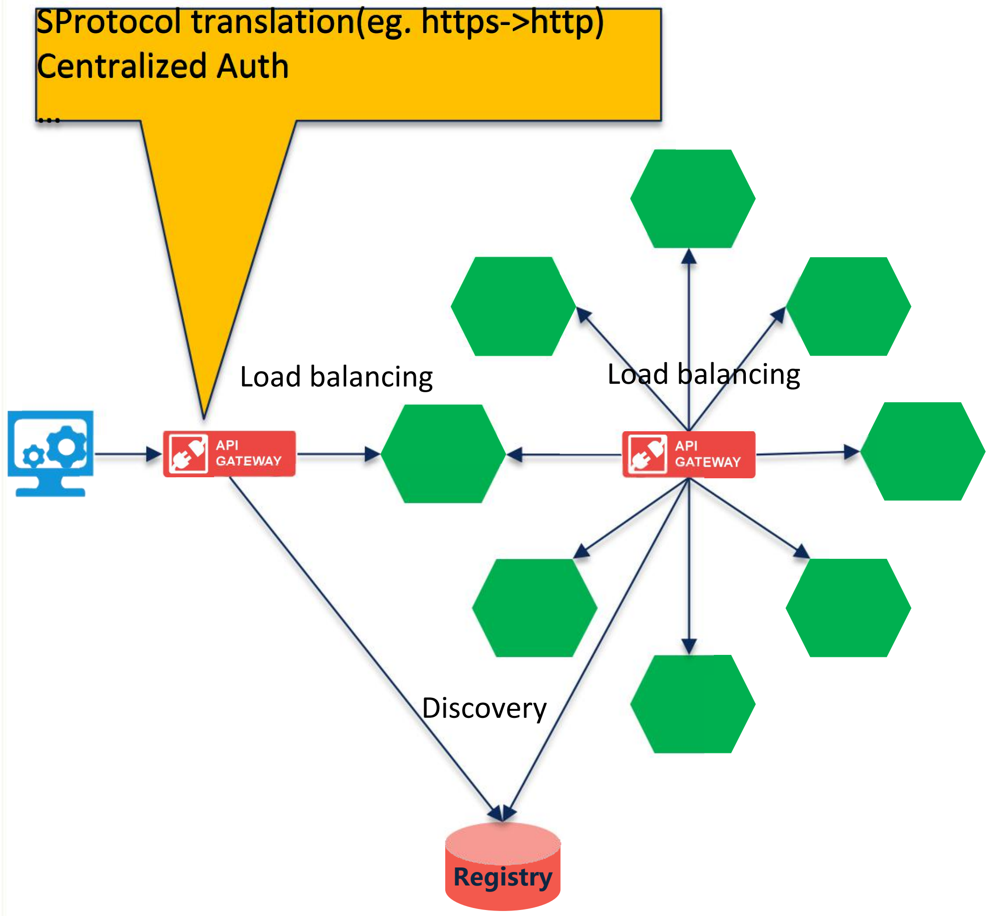
Service Registration-MSB SDK

Microservices can use SDK to register themselves to MSB.



```
public void registerMsb() throws Exception {

  //For real use case, MSB IP and Port should come from configuration
  //file instead of hard code here
  String MSB_IP="127.0.0.1";
  int MSB_Port=10081;

  MicroServiceInfo msinfo = new MicroServiceInfo();

  msinfo.setServiceName("animals");
  msinfo.setVersion("v1");
  msinfo.setUrl("/api/rpc/v1");
  msinfo.setProtocol("REST");
  msinfo.setVisualRange("1");

  Set<Node> nodes = new HashSet<>();
  Node node1 = new Node();
  node1.setIp(InetAddress.getLocalHost().getHostAddress());
  node1.setPort("9090");
  nodes.add(node1);
  msinfo.setNodes(nodes);

  MSBServiceClient msbClient = new MSBServiceClient(MSB_IP, MSB_Port);
  msbClient.registerMicroServiceInfo(msinfo, false);
}
```

Service Discovery-Gateway



External service gateway

❑Expose the services(Rest API, UI pages, etc.)which need to be accessed by external systems
❑Solve the cross-domain issue for web app
❑Protocol transformation/translation between external reques and internal service
❑Centralized Auth

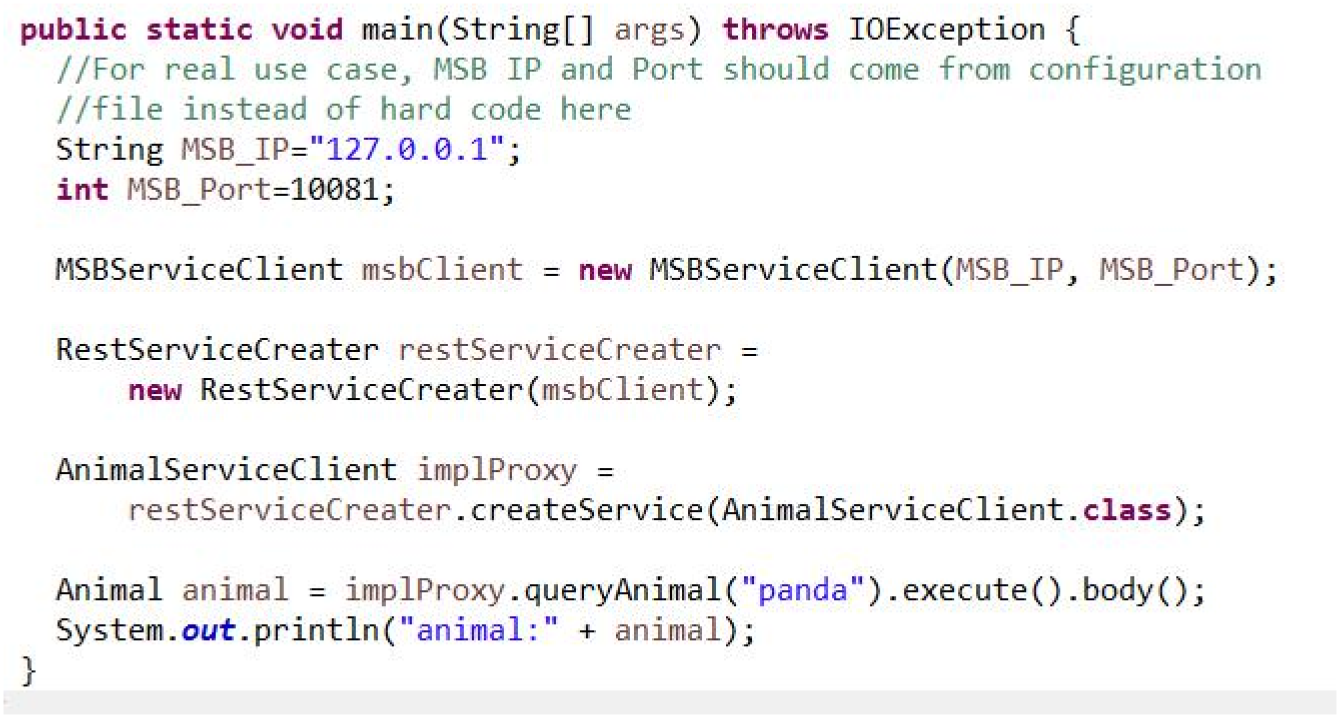
Internal API gateway

❑Routing and load balancing of the API calls within the system
❑Minimize the codes modification for service consumer

Both the external and internal gateway can be deployed as a cluster(multiple instances) to avoid single point of failure

Service Discovery-MSB SDK

Microservices can use SDK to MSB SDK to discovery and access other microservices within ONAP.



```
public static void main(String[] args) throws IOException {
  //For real use case, MSB IP and Port should come from configuration
  //file instead of hard code here
  String MSB_IP="127.0.0.1";
  int MSB_Port=10081;

  MSBServiceClient msbClient = new MSBServiceClient(MSB_IP, MSB_Port);

  RestServiceCreater restServiceCreater =
      new RestServiceCreater(msbClient);

  AnimalServiceClient implProxy =
      restServiceCreater.createService(AnimalServiceClient.class);

  Animal animal = implProxy.queryAnimal("panda").execute().body();
  System.out.println("animal:" + animal);
}
```

Example & Demo

❑ Start MSB services

1. Run the Consul dockers.

```
sudo docker run -d --net=host --name msb_consul consul agent -dev
```

2. Run the MSB dockers.

Login the ONAP docker registry first: docker login -u docker -p docker nexus3.onap.org:10001

```
 sudo docker run -d --net=host --name msb_discovery nexus3.onap.org:10001/onap/msb/msb_discovery
sudo docker run -d --net=host -e "ROUTE_LABELS=visualRange:1" --name
msb_internal_apigateway nexus3.onap.org:10001/onap/msb/msb_apigateway
```

❑Explore the MSB portal.

http://127.0.0.1/msb

❑ Use MSB SDK to register/access services

https://gerrit.onap.org/r/gitweb?p=msb/java-sdk.git;a=tree;f=example;h=1c331f86cbcbdb8cc2935d8ac41169da1a523ec5;hb=refs/heads/master

THE LINUX FOUNDATION

How to integrate with MSB in Amsterdam

- ❑ Register the service endpoints to the wiki page
- ❑ Use annotations to attach service endpoint metadata to Kubernetes pod or service objects
- ❑ Use MSB SDK/Internal API Gateway to access services

Useful resources

https://wiki.onap.org/display/DW/ONAP+Services+List

https://wiki.onap.org/display/DW/MSB+Test+Environment+Setup

https://wiki.onap.org/display/DW/Microservice+Bus+API+Documentation