K8s Nemesis

API Design

Product description

A cloud-native service designed to enhance application scalability and performance in Kubernetes (K8s) environments, specifically targeting machine learning (ML) applications with unique scaling and resource requirements.

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Repo: https://github.com/Lokhmat/k8s_nemesis/tree/main

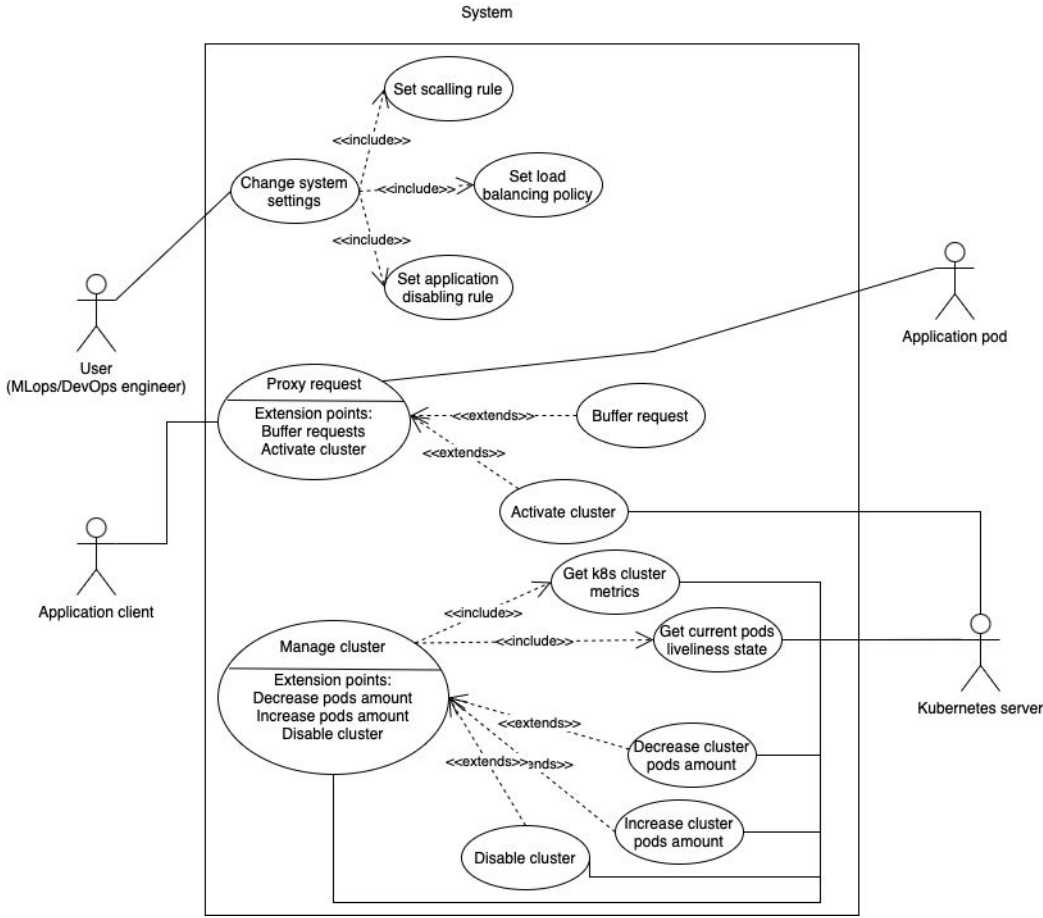
Link to API: https://github.com/Lokhmat/k8s_nemesis/tree/main/api

Report: https://github.com/Lokhmat/k8s_nemesis/blob/main/task_10_slides.pdf

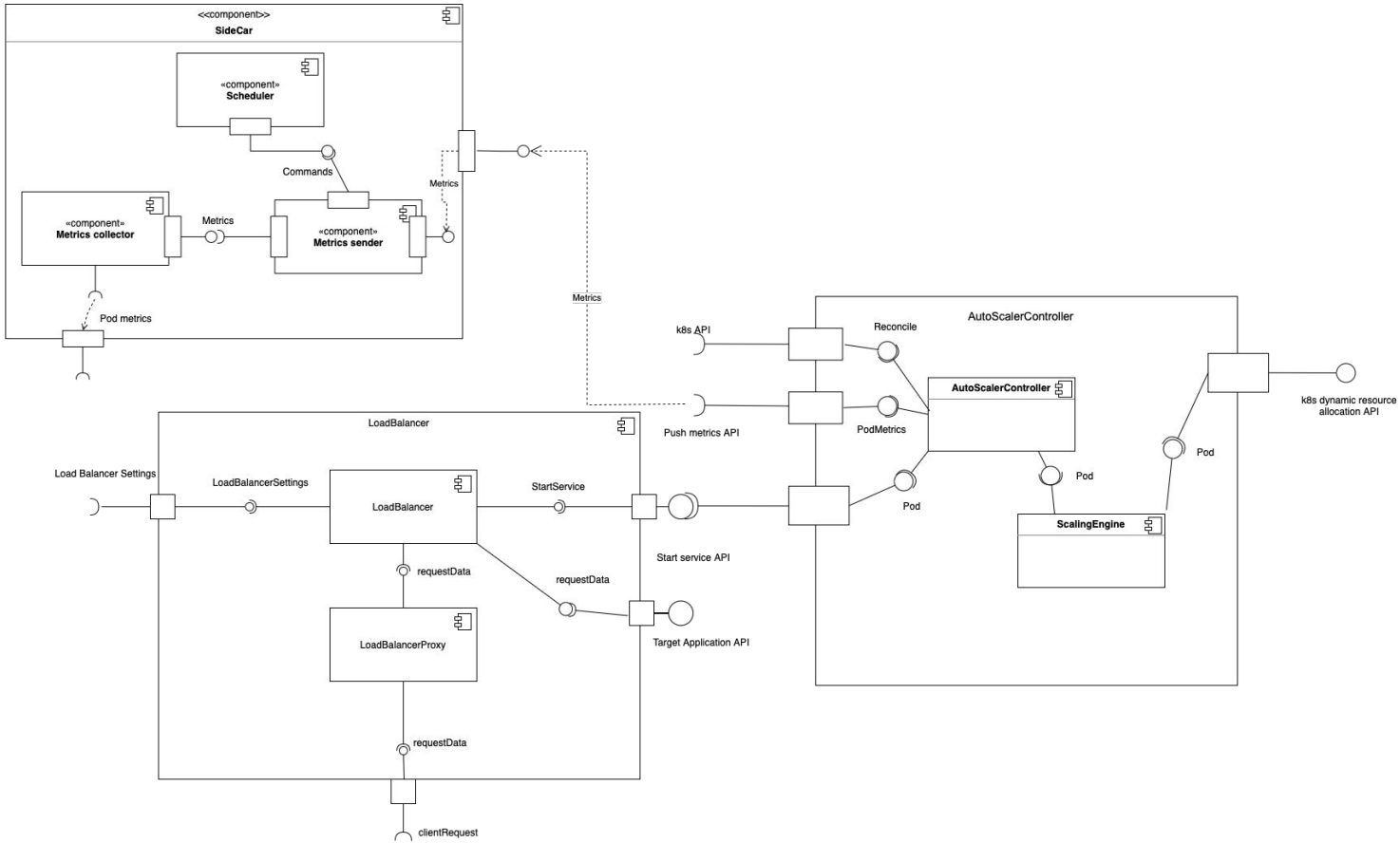
Use case diagram or event flow

Textual use case scenarios:

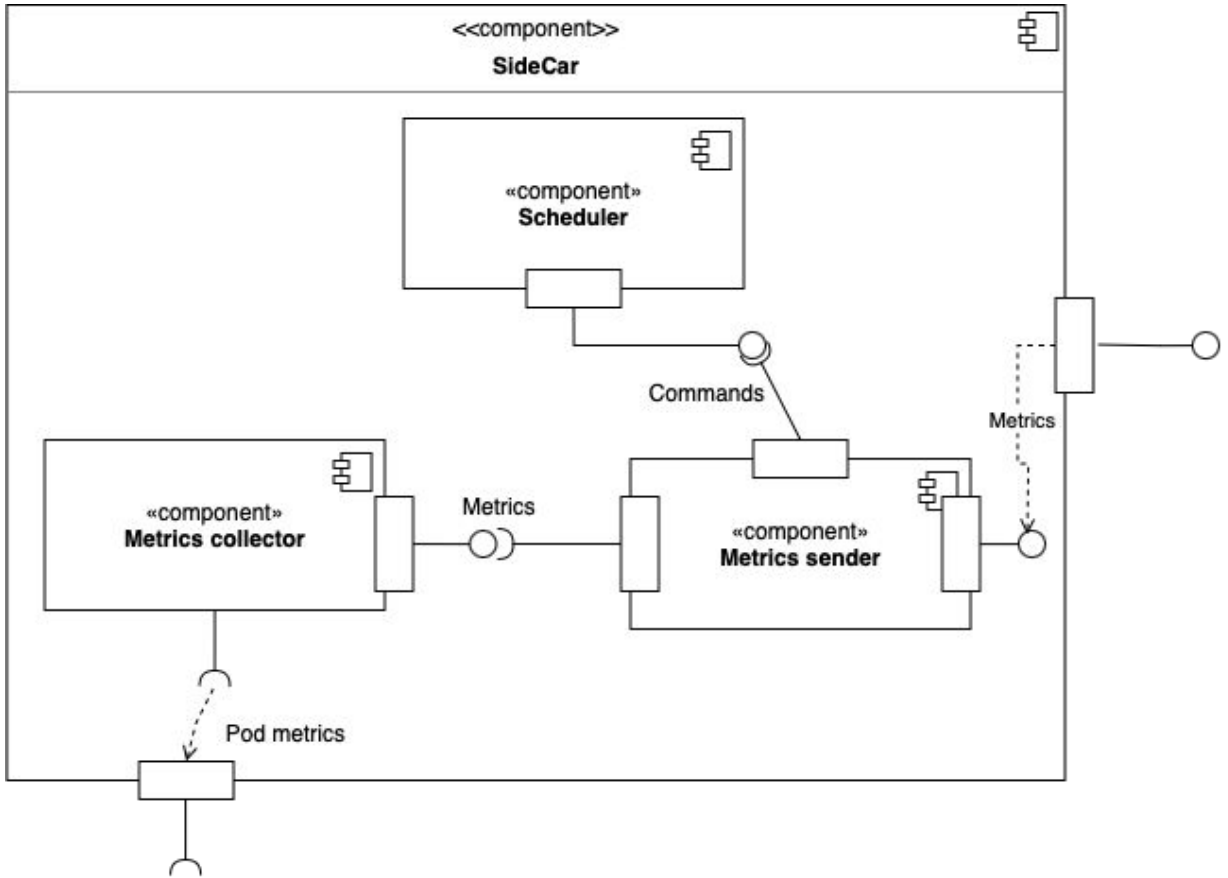
https://github.com/Lokhmat/k8s_nemesis/blob/main/final_task_materials/textual_use_cases.md



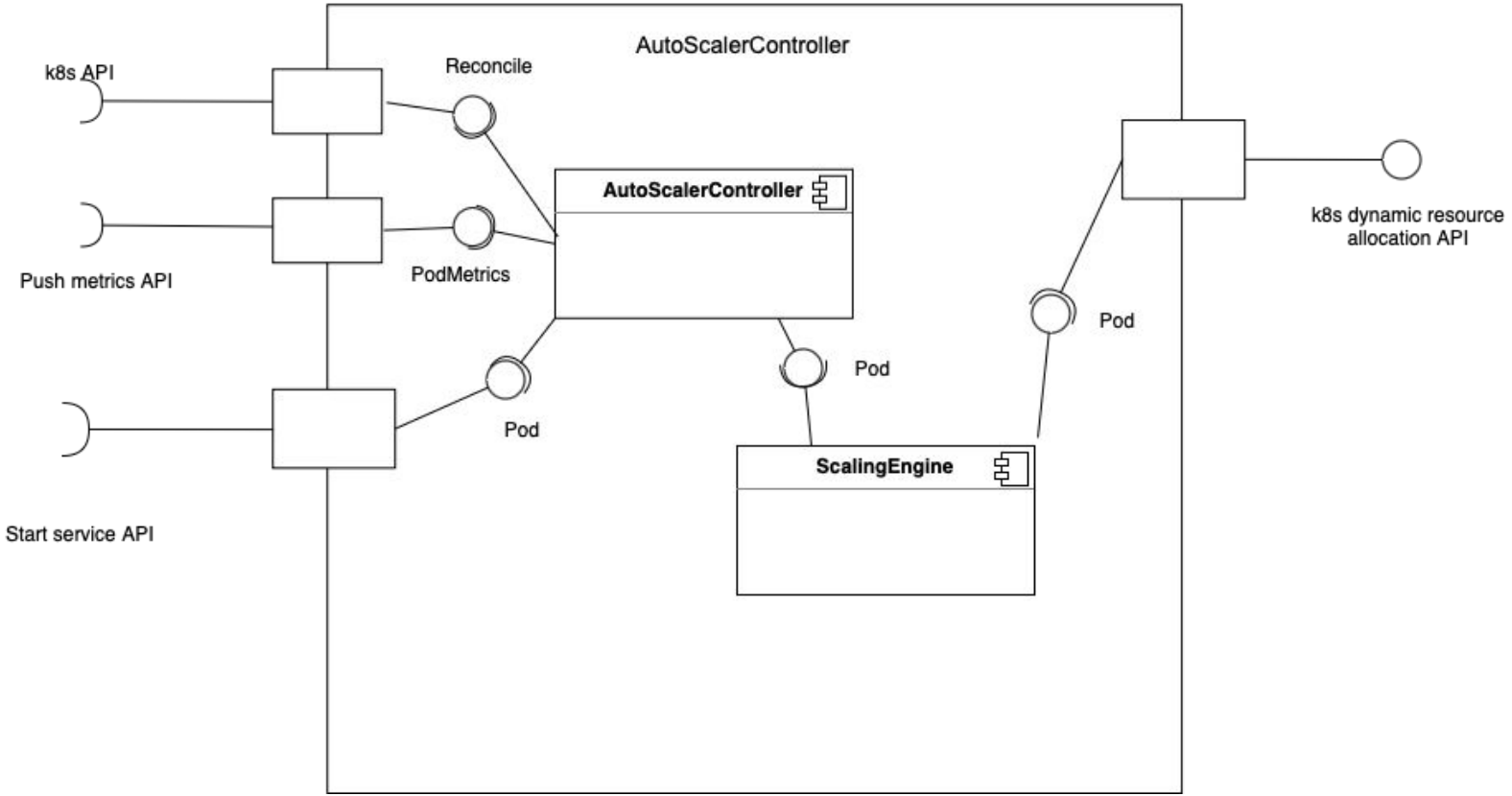
Service diagram



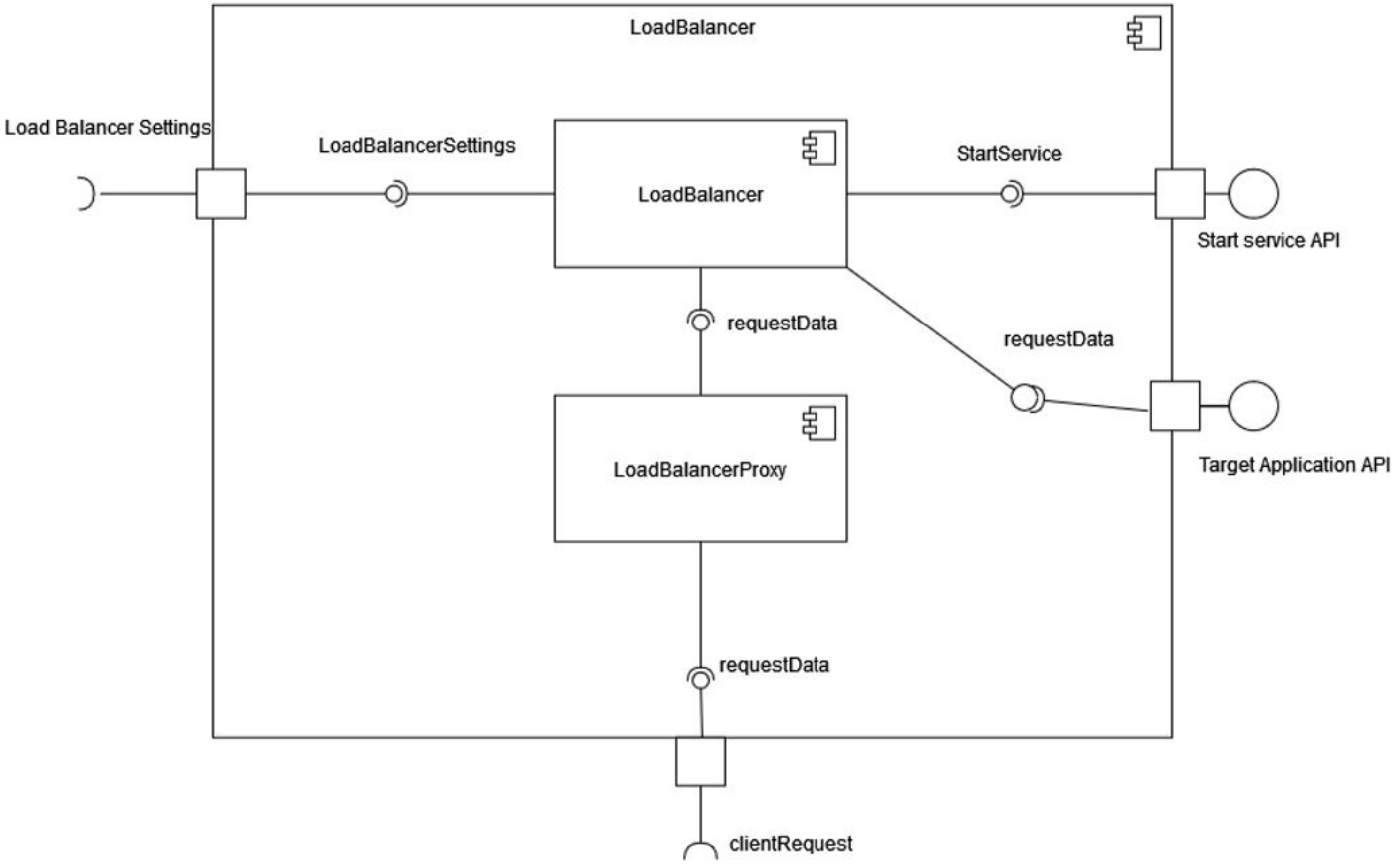
Service diagram - SideCar



Service diagram - AutoScalerController



Service diagram - LoadBalancer



API usage Autoscaler

Steps for accomplishing these use cases - Set application disabling rule, Set scaling rule, Set load balancing rule:

1. List CRs - first handler in list [GET for CRs in namespace]
2. If there is a CR for the desired deployment - update it (set needed rule) [PATCH or PUT]
3. Else create it [POST]
4. Now you can see it change by [GET by name]

API usage Autoscaler

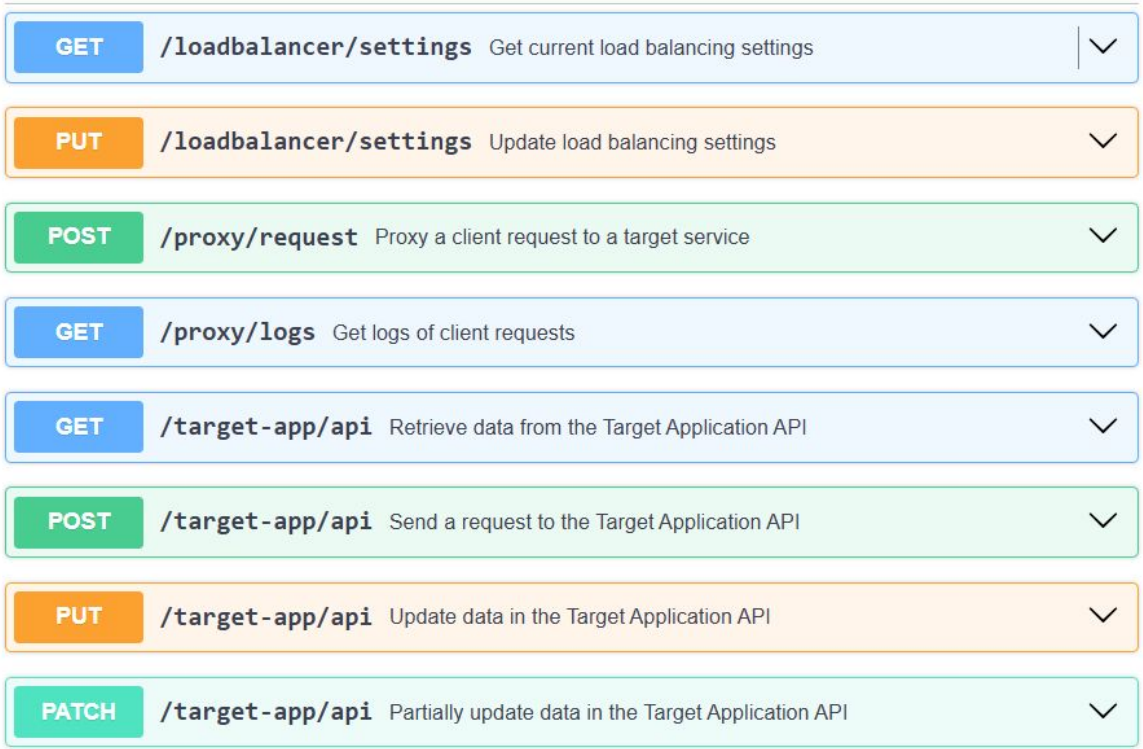
This is api for “Get k8s cluster metrics” and “Get k8s pods liveness state” use cases in which sidecars use this handler to send metrics to autoscaler:

1. Sidecar collects metrics and calls /metrics [POST]

API usage LoadBalancer

1. Proxy request
    - GET Get logs of proxied requests
    - POST Proxy a request to a target service
    - POST Send a request directly to the Target Application API
    - GET Retrieve data from the Target Application API
    - PATCH Partially update data in the Target Application API
    - PUT Update data in the Target Application API

2. Set Load balancing policy
    - GET Get current load balancing settings
    - PUT Update load balancing settings



Solution stack

Implementation

- API definition: OpenAPI
- Connection server for API: go standard library
- App framework: go standard library
- Serialization/state format: json

Testing tools: pytest

Operations

- App initializer: -
- Code build: Makefile
- CI/CD pipeline gitlab: CI/CD
- Delivery method: Kubernetes package
- Logging & monitoring: ELK stack(either one already available in project or new one specifically for load balancer)