Karlsruhe Institute of Technology

IARIA

A Developer Portal for DevOps Environment

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COOPERATION & MANAGEMENT (C&M, PROF. ABECK), INSTITUTE OF TELEMATICS, DEPARTMENT OF INFORMATICS

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About Me

(1) Master's degree in computer science at the Karlsruhe Institute of Technology (KIT)

(2) Doctoral student at KIT with the following research interests
   (1) Systematic development of microservices-based applications
   (2) API management
   (3) DevOps and cloud technologies

Motivation

(1) Microservice-based applications are composed of distributed microservices in a cluster
   (1) Microservices are typically developed by multiple development teams
   (2) APIs can act as a contract between microservices

(2) Providing information about a microservice is crucial for the development
   (1) Manual updating of documentation can lead to data inconsistencies
   (2) Frequent changing developers and distributed teams can degrade the knowledge about microservices

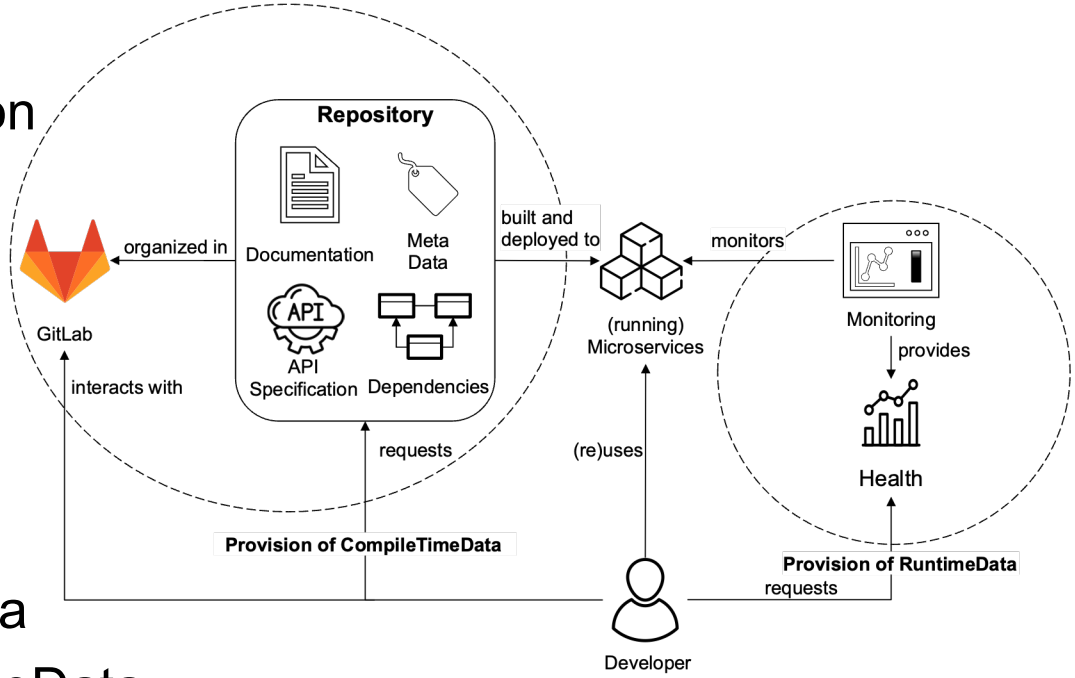
(3) Support of developers by providing a point of contact offering information about microservices
   (1) Automated solution are used to provide source-of-truth

Goal of the MicroserviceDeveloperPortal (MDP)

(1) Develop a microservice-based application
  (1) Following a systematic microservice engineering approach

(2) Support developers by providing necessary information of deployed microservices
  (1) Automated data collection (e.g., API, URL) using a CI/CD stage
  (2) Health monitoring

(3) Two capabilities
  (1) Provision of RuntimeData
  (2) Provision of CompileTimeData

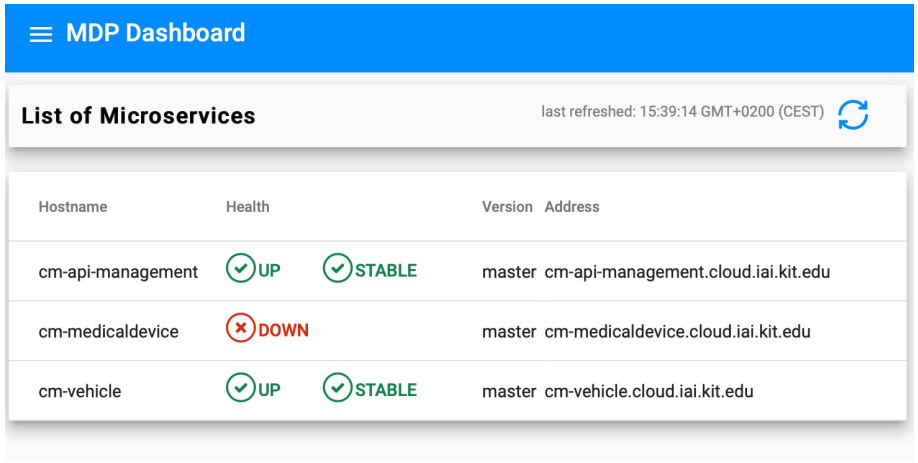


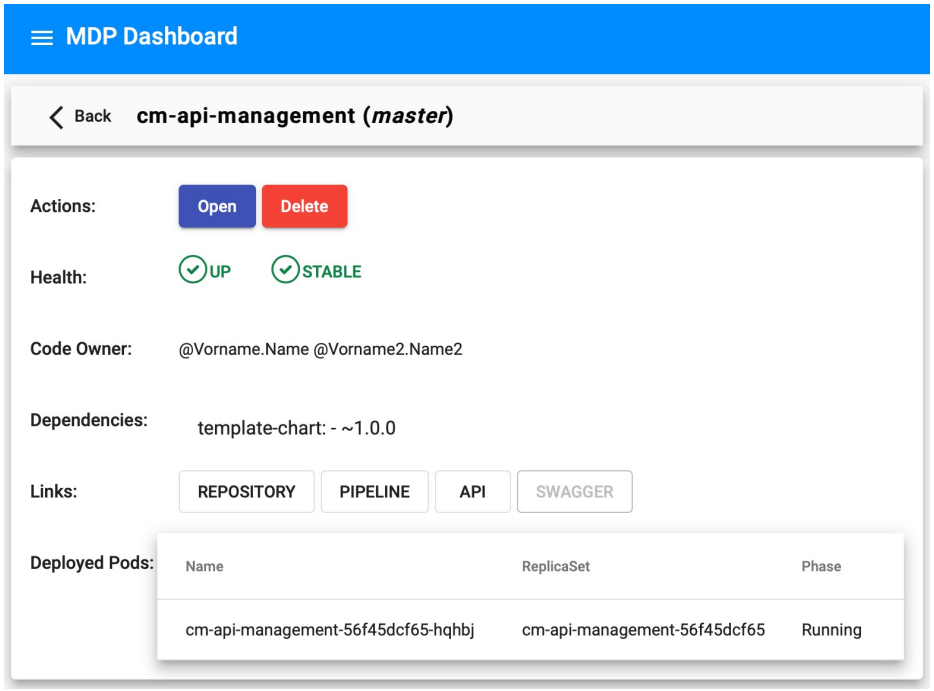
The MDP Dashboard

(1) Dashboards provides a list of registered microservices

(2) Selected service provides more detailed information and actions

  (1) Hostname, health, version, address, code owner, Helm dependencies, links, and Kubernetes Pods



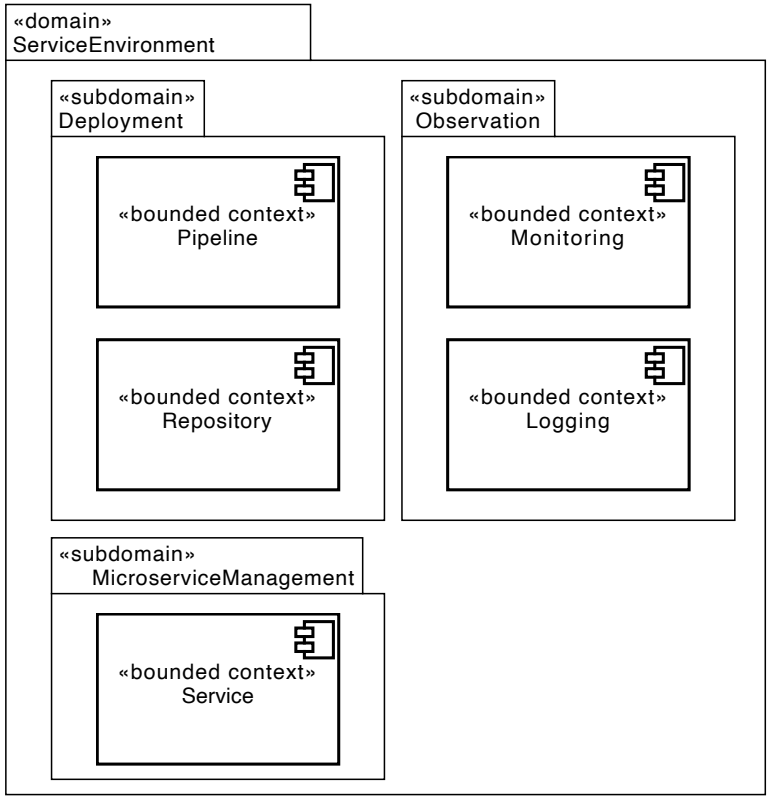


Domain ServiceEnvironment

(1) New domain to place the MDP and extract application-agnostic logic
   (1) GitLab as bounded context Repository
   (2) GitLab CI/CD pipeline as bounded context Pipeline

(2) Bounded contexts implemented as domain microservices
   (1) Service stores microservice information (e.g., version)
   (2) Monitoring stores health data (e.g., up, down)

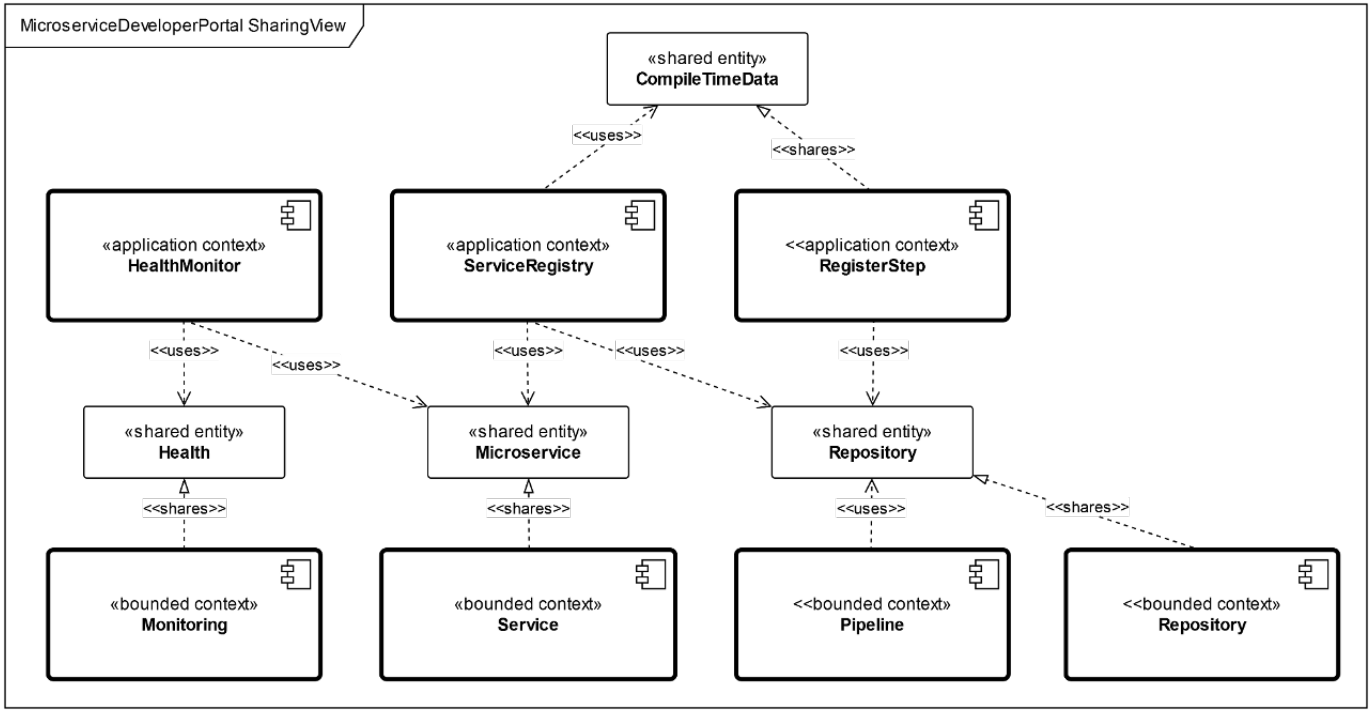
(3) Domain microservices provide Create, Read, Update, and Delete (CRUD) operations



Application Sharing View

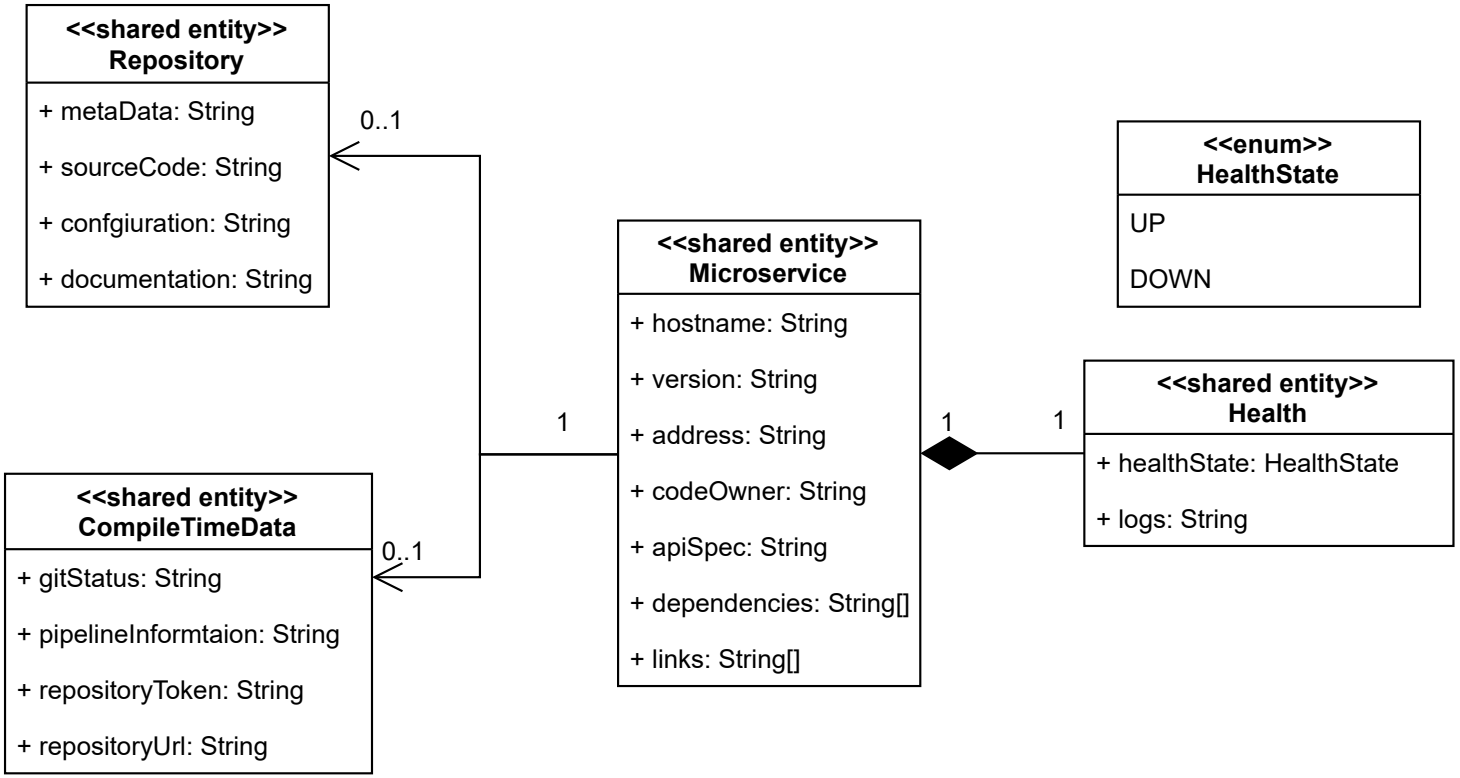
(1) Bounded contexts persist and share entities
   (1) Repository
   (2) Microservice
   (3) Health

(2) Application contexts create shared entities
   (1) Microservice
   (2) Health
   (3) CompileTimeData



Relation View

(1) The relation view captures the entities shared by the bounded contexts and sets them into relation



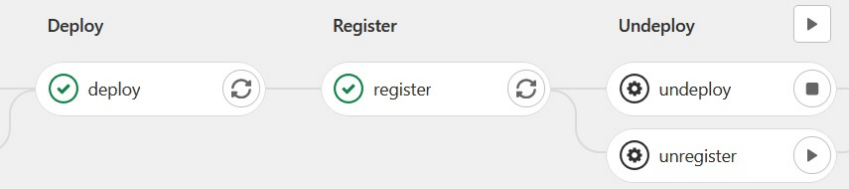
Microservice Registration Process

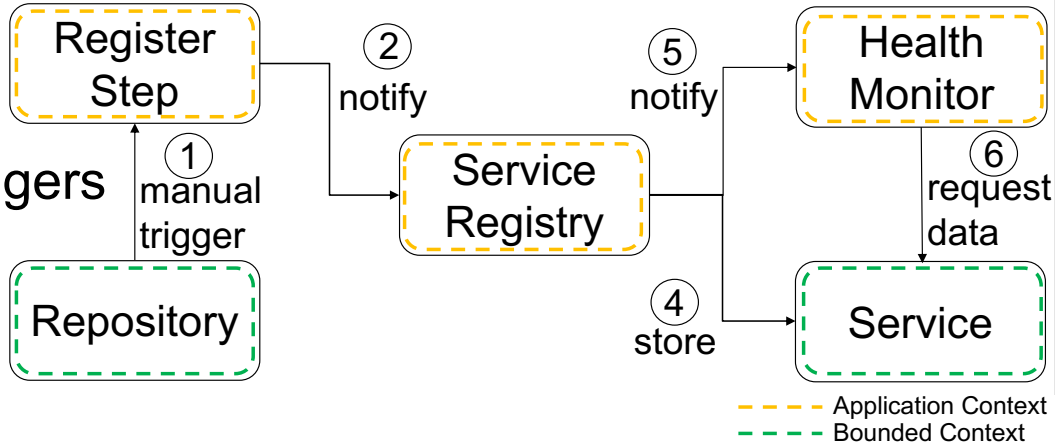
(1) Two stages added to a CI/CD pipeline (i.e., register, unregister)
  (1) Docker image executing Python scripts

(2) Registration of a microservice triggered by a commit
  (1) Executed after the deploy step notifying the ServiceRegistry

(3) The ServiceRegistry stores a new entity in domain microservice Service and triggers HealthMonitor

(4) Unregistration in parallel to undeploy stage



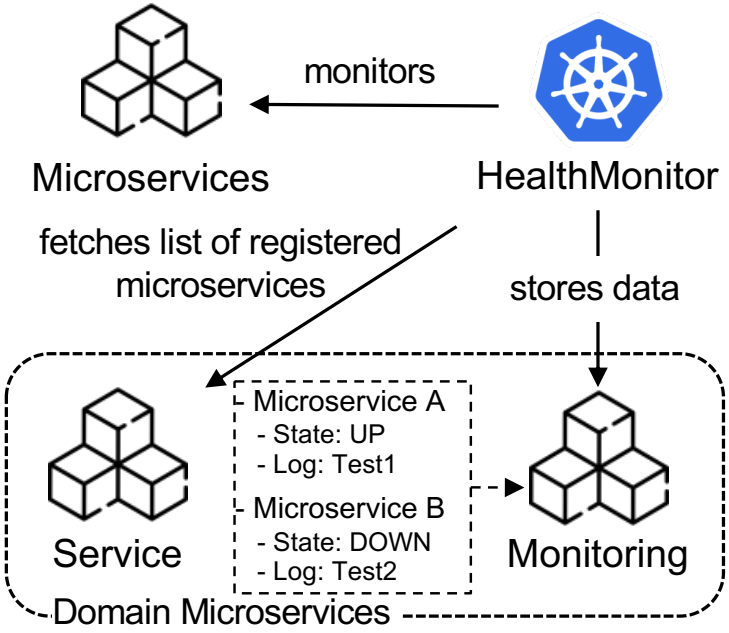


Health Monitor

(1) Implemented as a Kubernetes operator
   (1) Monitoring of Kubernetes Pod lifecycle (e.g., running, terminated)
   (2) Changes in pod lifecycle trigger an event

(2) HealthMonitor fetches a list of registered microservices from the domain microservice Service

(3) Health data is stored in the domain microservice Monitoring



Results and Outlook

(1) A reusable microservice-based application called MicroserviceDeveloperPortal to support developers
   (1) Providing CompileTimeData and RuntimeData to see the information about deployed microservice
   (2) Utilizing a CI/CD pipeline to automate data collection

(2) A domain ServiceEnvironment representing an environment in which microservices are developed and operated

(3) Extend the MDP with a focus on the management of APIs
   (1) Replace the HealthMonitoring mechanism

(4) Remodeling of the RegisterStep to be part of the domain ServiceEnvironment

Thank You for Your Attention