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Technical White Paper

Migrating to Microservices

Version 1.0

1 Overview

The purpose of this white paper is to discuss automation that can be applied by UniqueSoft tools to migrate code from a traditional service-oriented architecture to microservices.

2 Microservices

A microservices architecture allows applications to be composed from small, modular services in which each service has a single purpose and communicates through a well-defined, lightweight mechanism. In a monolithic application, any minor change requires building and deploying an entirely new application. Microservices, on the other hand, require little centralized management because they are independently deployable and scalable.

In a monolithic architecture, a single web application accesses multiple schemas on one or more databases. The code is typically organized by service area or layer of functionality (presentation, business logic, data access, etc.), and the dependencies are hardcoded in configuration files or in the code itself. In contrast, a microservice architecture has more granular web applications organized by business capability or subdomain. Each microservice maintains a single schema. The dependencies between microservices are managed by an API gateway which handles routing, service registration and discovery, configuration management, and load balancing.

Many organizations are planning or are in the process of migrating their systems from a SOA (service-oriented architecture) to a microservice-based architecture. This change transforms all layers of the architecture, requiring a redesign of the client-side user interface, the APIs, and the monolith applications. The resulting separation into areas of responsibility enabled by the microservices can reduce development and maintenance costs and increase scalability. However, this migration to microservices is typically very labor intensive when done manually.

3 Automating the Migration to Microservices

UniqueSoft has developed a tool to automate much of the migrating to a microservice architecture. This tool aids in the domain analysis by creating a decomposition of a component into appropriate microservice subdomains. It presents visualizations of the current architecture, analyzes the dependencies, and interactively proposes new architectures and allows user feedback and guidance. UniqueSoft tools also can automate the steps necessary for

the transformation and migration either by directly creating the new code or by extracting the business logic in the existing code as business rules.

Decomposition into microservices has four major steps:

- Identification and visualization of sub-domains and business capabilities.
- Decomposition of application data by sub-domain.
- Decomposition of application code by sub-domain (including the identification of cross-service http dependencies and microservice dependencies).
- Enforcement of microservice architectural patterns.

The technology transformation to a microservice technology stack also has four major steps:

- Database migration (if applicable).
- Container migration (e.g., using Tomcat, Docker, Prometheus, NGINX, Eureka, ...).
- Integration layer migration (e.g., using REST, Redis, RabbitMQ, ...).
- Presentation layer migration (e.g., using AngularJS).

By using the automated tools from UniqueSoft, the process of migration to microservices can be shortened from years of effort to months or weeks of effort.

4 Summary

UniqueSoft has created the only tools that can provide automated support for migrating a system to microservices. The process is an interaction between the tool and the domain experts, with the tool performing the deep analysis, architecture visualization, and much of the transformation.

D*Code has additional capabilities that are often useful for migration projects, such as the creation of test cases. Please contact UniqueSoft for more information.