

REENGINEERING ARSITEKTUR *BACKEND* WEBSITE *EXECUTIVE INFORMATION SYSTEM* (EIS) UNIVERSITAS PENDIDIKAN GANESHA

Oleh

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ABSTRAK

Sistem Executive Information System (EIS) Undiksha yang dibangun dengan arsitektur monolitik menghadapi kendala performansi akibat struktur database yang tidak memiliki relasi antar tabel, sehingga seluruh beban pemrosesan data analitik (OLAP) bertumpu pada lapisan aplikasi dan menyebabkan query menjadi sangat berat. Penelitian ini bertujuan merancang dan mengimplementasikan arsitektur backend modular melalui pendekatan reengineering dengan memisahkan frontend dan backend menjadi dua layanan independen. Pengembangan dilakukan menggunakan metode Scrum melalui lima sprint, menghasilkan dua komponen utama yaitu layanan ETL (Extract, Transform, Load) untuk memigrasikan dan mentransformasi data dari database relasional ke database NoSQL dengan memanfaatkan caching layer untuk data yang jarang berubah, serta layanan RESTful API sebagai jembatan konsumsi data analitik bagi sisi frontend yang dilengkapi mekanisme autentikasi SSO dan JWT. Hasil pengujian menunjukkan sistem mampu menangani 49.450 permintaan dengan throughput 393 RPS dan tingkat kegagalan 0.28% pada beban 1.800 pengguna simultan, serta mencapai efisiensi ukuran response hingga $\pm 73\%$ dibandingkan sistem lama. Dengan demikian, arsitektur yang dikembangkan terbukti efektif meningkatkan efisiensi, skalabilitas, dan kestabilan sistem EIS Undiksha dalam menangani data analitik yang kompleks.

Kata Kunci: Reengineering, Executive Information System, ETL, RESTful API,

Caching, Scrum, OLAP

**REENGINEERING OF THE BACKEND ARCHITECTURE OF THE
EXECUTIVE INFORMATION SYSTEM (EIS) WEBSITE OF UNIVERSITAS
PENDIDIKAN GANESHA**

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ABSTRACT

The Executive Information System (EIS) of Undiksha, previously built on a monolithic architecture, faced significant performance issues due to a database structure lacking relational schema, which placed the entire burden of analytical data processing (OLAP) on the application layer and resulted in extremely heavy queries. This study aims to design and implement a modular backend architecture through a reengineering approach by separating the frontend and backend into two independent services. The development was carried out using the Scrum method across five sprints, producing two main components: an ETL (Extract, Transform, Load) service responsible for migrating and transforming data from a relational database to a NoSQL database with a caching layer for rarely changing data, and a RESTful API service acting as a data consumption bridge for the frontend layer equipped with SSO and JWT authentication mechanisms. Testing results demonstrated that the system was capable of handling 49,450 requests with a throughput of 393 RPS and a failure rate of 0.28% under a simulated load of 1,800 concurrent users, while also achieving a response size efficiency of up to $\pm 73\%$ compared to the previous system. Therefore, the developed architecture proved effective in improving the efficiency, scalability, and stability of the Undiksha EIS in handling complex analytical data needs.

Keywords: Reengineering, Executive Information System, ETL, RESTful API,

Caching, Scrum, OLAP