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Implementasi Backend Sistem Monitoring Returnable Package di PT Hino Motors Manufacturing Indonesia
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INTISARI

IMPLEMENTASI *BACKEND* SISTEM MONITORING RETURNABLE PACKAGE DI PT HINO MOTORS MANUFACTURING INDONESIA

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PT Hino Motors Manufacturing Indonesia masih mencatat pergerakan *returnable package* secara manual menggunakan dokumen kertas, sehingga rentan terhadap selisih data yang sulit ditelusuri dan berisiko menimbulkan permasalahan administratif dalam pemenuhan ketentuan Bea Cukai. Penelitian ini mengimplementasikan *backend* sistem monitoring *returnable package* berbasis web menggunakan ASP.NET Core dan SQL Server pada tujuh modul, termasuk kemampuan ekstraksi data otomatis dari dokumen logistik impor. Kualitas *backend* dievaluasi berdasarkan ISO/IEC 25010 melalui *black-box testing*, *load testing* menggunakan Apache JMeter dengan skenario 10–100 *virtual user* (VU), serta pengukuran *maintainability* menggunakan Microsoft Code Analysis. Hasil pengujian *fungsional* menunjukkan tingkat keberhasilan sebesar 100%. Enam dari tujuh fungsi *backend* tetap responsif dengan *response time* di bawah 1 detik hingga beban 100 VU, sedangkan fungsi Converter/Upload mengalami peningkatan *response time* pada beban tinggi akibat pola pemrosesan data satu per satu (*one-by-one processing*). Permasalahan tersebut diatasi melalui optimasi *batching*, yang berhasil menurunkan *response time* hingga 86% pada beban kritis. Seluruh *service* tergolong *high maintainability*, yang menunjukkan bahwa kode program memiliki tingkat keterpeliharaan yang baik, meskipun RealtimeStockService, DocumentConverterService, dan HandlingCostReportService menjadi prioritas perbaikan pada pengembangan selanjutnya. Hasil penelitian ini diharapkan dapat menjadi acuan bagi pengembangan sistem inventaris berbasis web di lingkungan manufaktur lainnya, khususnya dalam menjaga performa *backend* pada skenario dengan beban pengguna yang tinggi.

Kata kunci :ASP.Net, SQL server, returnable package, load testing

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ABSTRACT

BACKEND IMPLEMENTATION OF THE RETURNABLE PACKAGE MONITORING SYSTEM AT PT HINO MOTORS MANUFACTURING INDONESIA

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PT Hino Motors Manufacturing Indonesia still records returnable package movements manually using paper-based documents, making the records susceptible to data discrepancies that are difficult to trace and potentially leading to administrative issues in complying with Customs regulations. This study implements the backend of a web-based returnable package monitoring system using ASP.NET Core and SQL Server across seven modules, including automated data extraction from imported logistics documents. Backend quality is evaluated based on ISO/IEC 25010 through black-box testing, load testing using Apache JMeter with scenarios ranging from 10 to 100 virtual users (VU), and maintainability measurement using Microsoft Code Analysis. The functional testing results achieved a 100% success rate. Six of the seven backend functions remained responsive with a response time below 1 second under a load of up to 100 VU, while the Converter/Upload function experienced increased response time under high loads due to a one-by-one data processing pattern (one-by-one processing). This issue was addressed through batching optimization, which successfully reduced response time by up to 86% under the critical load. All services were classified as having high maintainability, indicating that the resulting code has good maintainability, although RealtimeStockService, DocumentConverterService, and HandlingCostReportService were identified as priorities for improvement in future development. The results of this study are expected to serve as a reference for the development of web-based inventory systems in other manufacturing environments, particularly in maintaining backend performance under high user loads.

Keyword: ASP.Net, SQL server, returnable package, load testing