Streamlining .NET Data Access: Leveraging JSON for Data Operations in .NET

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Abstract : New features in .NET (6 and above) permit streamlined access to information residing in JSON-capable relational databases, such as SQL Server (2016 and above). Traditional methods of data access now comparatively involve unnecessary steps which compromise system performance. This work posits that the established ORM (Object Relational Mapping) based methods of data access in applications and APIs result in common issues, e.g., object-relational impedance mismatch. Recent developments in C# and .NET Core combined with a framework of modern SQL Server coding conventions have allowed better technical solutions to the problem. As an amelioration, this work details the language features and coding conventions which enable this streamlined approach, resulting in an open-source .NET library implementation called Codeless Data Access (CODA). Canonical approaches rely on ad-hoc mapping code to perform type conversions between the client and back-end database; with CODA, no mapping code is needed, as JSON is freely mapped to SQL and vice versa. CODA streamlines API data access by improving on three aspects of immediate concern to web developers, database engineers and cybersecurity professionals: Simplicity, Speed and Security. Simplicity is engendered by cutting out the "middleman" steps, effectively making API data access a whitebox, whereas traditional methods are blackbox. Speed is improved because of the fewer translational steps taken, and security is improved as attack surfaces are minimized. An empirical evaluation of the speed of the CODA approach in comparison to ORM approaches] is provided and demonstrates that the CODA approach is significantly faster. CODA presents substantial benefits for API developer workflows by simplifying data access, resulting in better speed and security and allowing developers to focus on productive development rather than being mired in data access code. Future considerations include a generalization of the CODA method and extension outside of the .NET ecosystem to other programming languages.

Keywords : API data access, database, JSON, .NET core, SQL server
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