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2-TIER VS 3-TIER APPLICATION ARCHITECTURE: *COULD THE WINNER BE 2-TIER?*

- In today's world, most applications are built as web apps, which have 3-tiers.
- The 2-tiered application that directly accesses the database is, in some cases, a better option.
- When paired with NitroAccelerator, the 2-tiered architecture is a more easily secured, lower cost alternative that should be seriously considered when starting a new project

You are confronted with what feels like an infinite combination of choices to make when building a new application. One of the most fundamental choices is whether the application will use a 2- or 3-tier architecture. This choice really comes down to whether to split out the business and data logic into separate tiers. For web applications, the decision is made for you. However, when building a stand-alone application there is a choice to be made.

The fundamental choice is whether the client application directly accesses the database, or indirectly accesses it by executing code on an intermediate application server. When selecting an architecture there are many things to consider, such as:

- Security
- Cost
- Ease of development
- Ease of maintenance
- Performance
- Deployment

Of course, the relative importance of each consideration varies based on the application's target uses and environment.

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2 TIER VS 3 TIER

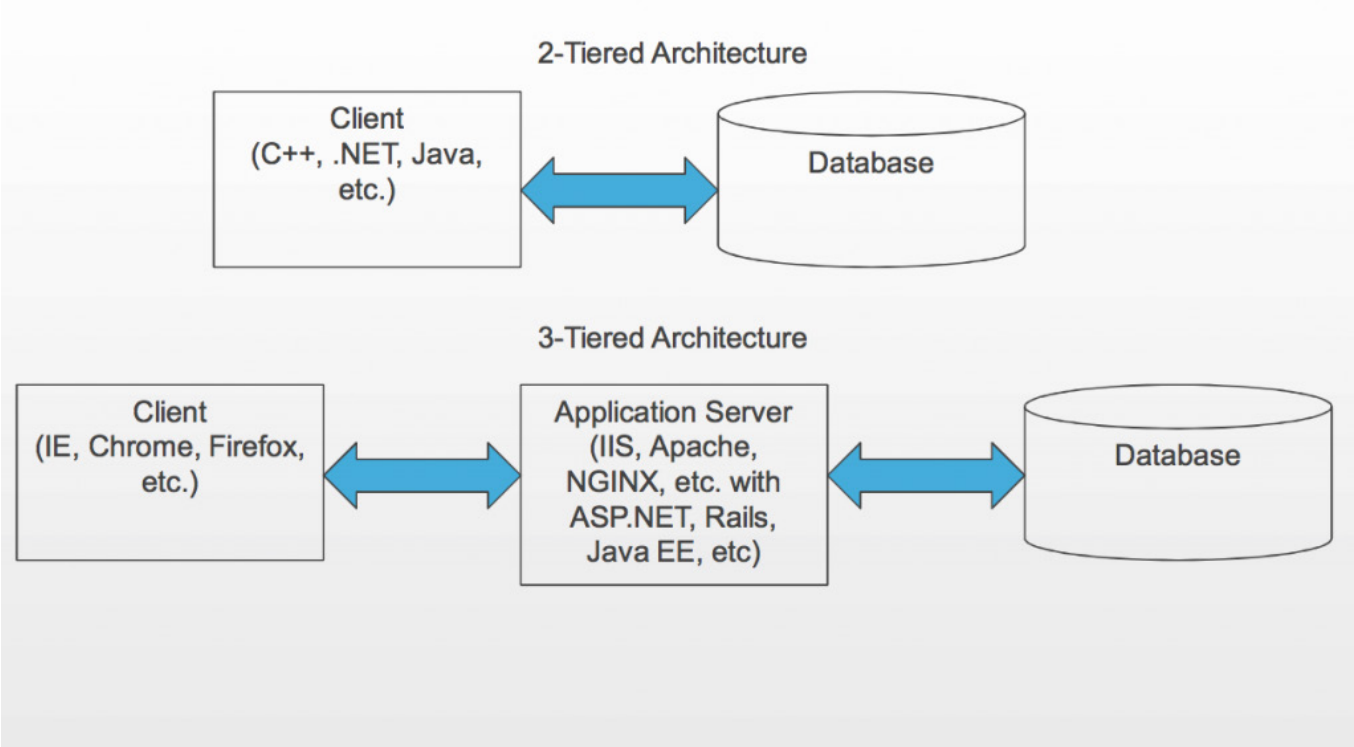

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Table 1: Design considerations for multi-tier application architectures

DESIGN CONSIDERATION	DESCRIPTION	WINNER
Security	The topic of security is a tough one because arguments can be made for both 2 and 3 tiers. In practice, the 3-tier architecture has the potential for better security, but it frequently ends up less secure if great care isn't taken during development. This potential vulnerability is due to the fact that the application server is a giant, complex stack of technology, and each piece in that stack is a potential vehicle for attack. A 2-tier approach, however, can simplify the architecture. In this case, the application authenticates to and communicates directly with the database. Although direct access to the data may sound unsafe, database access is more easily secured than an app server, and this approach also reduces the attack surface area and is one less boundary to be concerned about. While this one topic could be covered in a book, 2-tier wins out as the most straightforward way to secure your data.	2-tier
Cost	2-tier applications are generally easier to build, and because of their lower complexity are less expensive all around.	2-tier

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Ease of Maintenance	Although part of cost consideration, ease of maintenance is worth analyzing separately. Keeping the client up-to-date in a 2-tier architecture can be a trouble point that is not an issue with most 3-tier designs. However, with a 3-tier architecture, keeping the application tier up to date is much more difficult in the long run. For example, sometimes security patches required to keep the application tier secure are not compatible with your code and require you to make potentially extensive code changes.	2-tier
Performance	Performance in a 2-tier architecture is more sensitive to the hardware the client is running on, as well as the speed of the network connection.	3-tier
Deployment	In a 3-tier architecture, users typically point their browsers to the application server to start using the application. However, the setup of that environment can be considerably more complex than setting up a database for the users to connect to and making the installer for the client available.	3-tier for end users; 2-tier from an initial configuration and setup perspective

As can be seen from the table above, a 2-tier architecture has some compelling advantages. Although any of these points can be argued, and some come down to subjective preference, there's no arguing that 2-tier applications can be easier to build and cheaper and easier to deploy. However, when the Internet is involved, the performance of a 2-tier application can suffer. Because more data needs to be transferred to the client in a 2-tier architecture, the speed of the network can have a significant impact on the performance of the application.

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While the table above is a high-level view of the design considerations and arguments involved when deciding the architecture of your application, there are additional factors to take into account when implementing a SQL Server solution.

The speed and performance of the network has been a limiting factor in the past in SQL Server environments. Now, installing NitroAccelerator on the database server and clients allows 2-tier applications to run at speeds comparable to local area networks, making this option a serious one that warrants some consideration.

Regardless of your choice of overall architecture, there are some fundamentals to adhere to when leveraging SQL Server in your environment. Skipping the obvious database design and maintenance issues that are outside the scope of this article, there are several important items, beyond simply tuning T-SQL, for application developers to consider while implementing their code, including the following:

- Avoid using Multiple Active Result Sets (MARS). This is an option that allows multiple queries to be run against a single connection at the same time. It is extremely chatty and destroys performance on slower or congested networks. Instead, use connection pooling and more than one connection for queries that must happen simultaneously.
- To speed up processing of large datasets, use asynchronous processing.
- For connections that process large datasets, request 32K packets.
- When requesting data that is unchanging, cache it locally.

Although often dismissed out of hand, 2-tier applications can be a more interactive and cost-effective architecture that is easily secured and deployed across the enterprise when paired with NitroAccelerator. There are a lot of decisions to be made to build your next application; consider NitroAccelerator part of your essential toolkit.

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