



Adaptive Applications: Taking CX to the next level

A dbInsight brief for Couchbase

Trigger

The sudden emergence of Generative AI (gen AI) has raised the bar for Customer Experience (CX). With people able to interact with computers in natural language, they are expecting far more personalized experiences. Enterprises have gotten the message. According to a recent Deloitte survey, 56% of U.S. organizations have already begun implementing gen AI initiatives, with 35% of them currently piloting programs.

Adaptive Applications are apps that dynamically change their behavior in real-time. Although a new term, dynamic, responsive apps have been a staple of e-commerce and social networks since the era of Web 2.0. Adaptive applications are built using sophisticated models, Internet-scalable data platforms, and applications capable of dynamic behavior.

As gen AI has already captured the consumer imagination for how they interact with computers, it is similarly raising their expectations for having more human, personalized experiences with their digital destinations. gen AI has raised the urgency for taking adaptive applications to the next level.

Our Take

[Adaptive Apps are the new foundation of the digital customer experience](#)

While Adaptive Applications as a term is relatively new, the requirement for dynamic applications dates back to Web 2.0. The concept of a dynamic web application has evolved considerably since then. Starting with web pages that could respond on the fly to the user's keystrokes without requiring the user to refresh the page, the advent of Machine Learning (ML) made the dynamic experience more meaningful with the ability to adapt with the user's

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actions, such as promoting for next-best offers. The emergence of smartphones and other mobile devices moved the app literally out of the box. It brought the expectation that apps should become situationally aware, thanks to the smart device's capability to incorporate geolocation, time of day, weather, traffic, or other events or conditions. Rising to the occasion, dynamic apps were expected to be proactive right in the moment.

Gen AI takes the journey of dynamic web apps full circle with the ability to make the customer experience and personalization up close and personal. Gen AI has captured the public's imagination. In place of arbitrary forms-based keystrokes, customers can literally converse with their web or mobile apps just as Captain James T. Kirk of the Starship Enterprise did back on Star Trek. Gen AI responds with original content generated on the fly in a variety of forms. However, early gen AI content was frequently overly generic. This is where adaptive apps come in. **Adaptive apps build on gen AI by blending generated content with the context and relevance of transactional data.**

Why use Adaptive Apps?

There are numerous use cases for adaptive applications. Just a few familiar examples include:

- **E-commerce "next-best offers"** generates custom product descriptions based on the user's detailed profile, behavior, and external events. It presents these offers in real time while the customer is going through the purchasing process.
- **Streaming service content recommendations** that, like next-best offers, recommend similar content based on the customer's viewing history. It empowers the customer to act on them through scheduling when to watch the program, and follows up by automating tasks such as activating the home theater system; pausing it; and/or notifying the customer to "change the channels" when their favorite sports team is suddenly about to score.
- **Demand-based concert and event pricing** that presents situational offers. It applies them in specific geographical markets based on overall demand, the customer's artist or musical preferences, and/or social media activity or peer group memberships. AI brings it all together by learning the customer's preferences to deliver exactly the right offers at the right time. For instance, adaptive apps incorporating ML in combo with gen AI can identify the most devoted fans of specific artists or sports teams, and direct them to buying the best seats in the house while they are still available.
- **Smart Home System automation** that adjusts lighting, HVAC, and security settings based on occupancy and time of day or week.

- **Fitness and Health App workout plans** that create customized workout plans; dispenses nutrition advice; and triggers action by scheduling dental or medical appointments at the right times based on the individual's goals, progress, and routine.
- **Automated stock market trading** that calculates when to execute the best trades; short sales; and funds purchases based on market news, events, and the individual's investment goals.

What's needed under the hood?

Adaptive applications by design must support hyper-personalization and be context-aware. They must carry built-in intelligence to learn from user behavior and be highly configurable to adapt to different contexts and personas. And because they are designed to act as a smart companion anywhere, they must be able to act or react in real-time.

The new breed of adaptive applications must work with data, media, presentation formats, and AI models in all their forms. Architecturally, there are many moving parts.

At the data tier, there is the requirement to draw on traditional data in all of its forms from structural (tabular) data to JSON document; key-value pairs; and geospatial data. Gen AI adds new ingredients to the data recipe by drawing on unstructured text; audio; images; and video. While data may be derived from a variety of sources, having a multipurpose database that can accommodate a variety of data types and support both operational row-based and analytic columnar processing will greatly simplify the data tier and deliver the best performance. And because of the deeper impact that gen AI brings to the customer experience, the issue of data trustworthiness becomes more crucial than ever.

The app tier must be context-driven. For instance, the difference between laptops and mobile devices are equally about footprint *and* context; a customer interacting on a mobile device will likely require more dynamic geospatial capability compared to somebody sitting with a laptop. Besides location and device, context can vary by network conditions, time of day, and past and present behaviors. To deliver the experience in the right context at the right time, adaptive applications must be highly connected, linking accounts to which the customer has granted access permissions. And for operating out at the edge, they must have the intelligence to respond locally when connections temporarily do down and automatically sync when the signal comes back.

The intelligence tier must be able to utilize AI models in all their forms. For instance, the advent of gen AI large language models (LLMs) does not displace "classic" ML models used for predictive or prescriptive functions or deep learning (DL) models employed for image or speech recognition. Gen AI complements ML and DL models.

Because adaptive applications are dynamic, they must be capable of orchestrating complex chains of tasks. While the need for orchestration is hardly new, gen AI raises the stakes because of the versatility and hyper-personalization that conversation and dynamic content brings to the customer experience, and as noted above, for data trustworthiness as well.

Takeaways

Adaptive applications do not require gen AI; however, gen AI makes adaptive applications essential. Capitalizing on the ability of gen AI to make the customer experience far more immediate and intimate, it requires applications that are by nature designed to be responsive; context-aware; and connected. These applications require the ability to work with data in all its forms.

Where does Couchbase play? For the data tier, Couchbase provides key capabilities that empower adaptive applications. At the front and back end, Couchbase supports the demanding performance, scale, and sophisticated intelligence that adaptive applications require. Native JSON data support contains the attributes that are essential for hyper-personalization, while its multipurpose access patterns (that also includes a SQL-like query language) makes Couchbase a logical platform for consolidating much of the data essential to adaptive applications for operational and analytic processing. Couchbase's columnar analytics complements operational processing with real-time metrics and calculated insights that, along with predictive models, make adaptive applications smarter.

For gen AI, Couchbase's vector data storage and indexing will enable Retrieval-Augmented Generation (RAG) approaches that make generative models more accurate, relevant, and current with your organization's business. Couchbase Capella delivers the scale and low-latency performance that these applications demand, while Couchbase Mobile extends adaptive applications out to the edge. Adaptive apps require developers to create them. That's where Capella iQ comes in; it helps developers expedite creation of this new breed of smart, situational, proactive, apps that will deliver the intimate, hyper-personalized experience that customers expect enterprises to deliver.

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About dbInsight

dbInsight LLC[®] provides an independent view on the database and analytics technology ecosystem. dbInsight publishes independent research, and from our research, distills insights to help data and analytics technology providers understand their competitive positioning and sharpen their message.

Tony Baer, the founder and principal of dbInsight, is a recognized industry expert on data-driven transformation. *Analytica* named him as a Top Cloud Influencer for 2022 for the fourth straight year. *Analytics Insight* named him one of the [2019 Top 100 Artificial Intelligence and Big Data Influencers](#). His combined expertise in both legacy database technologies and emerging cloud and analytics technologies shapes how technology providers go to market in an industry undergoing significant transformation. A founding member of The Data Gang, Baer is a frequent guest on *theCUBE* and other video and podcast channels.

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