

## Office of Technology Strategies (TS), Architecture, Strategy & Design (ASD)

### A VA Executive's Guide to Microservices

#### INTRODUCTION

This TS Note discusses Microservices, a software architecture design in which complex applications are composed of small, independent processes communicating with each other using language-agnostic application program interfaces (API). This note will provide an overview of microservices, dive into "Brooks' Law," benefits and challenges, recent developments, as well as discuss how VA is implementing microservices and its impact within the Office of Information & Technology (OI&T).

#### OVERVIEW

An influential college reading requirement for many students learning to be project managers was the Mythical Man Month, by Fred Brooks, a project manager at International Business Machines (IBM). Also called the "Bible of Software Engineering," the central premise of the book was considered timeless - adding people to a "late software project, makes it later." In other words, adding more engineers to a project would not result in the earlier launch of an application. The theme of the book became so widely accepted that the central premise became known as "Brooks' Law." It now appears that Brooks' Law stands strongly challenged by the enterprise adoption of microservices. Microservices is a software architecture style that represents a radical paradigm shift in how global enterprises build and deliver software. Microservices break down large applications into small, independent processes that communicate with each other. This means that individual teams can develop and deploy code independently of each other. Also significant is that it permits scalability; that is, once the development

stage is complete, the product can be replicated at little or no additional cost.

While Google, Amazon, and Facebook have been running microservices for over a decade, enterprises were largely unable to benefit from its development and deployment speed until the recent positioning of the necessary building blocks.

#### BENEFITS

The benefits of microservices include agility, efficiency, resiliency, technology diversity, and revenue.

- **Agility:** Development processes that took months to develop, now take weeks. Functions are broken down and abstracted, with focus only on updating relevant pieces of an application.
- **Efficiency:** Microservices result in a more efficient use of code and infrastructure, with up to 50% cost reductions reported.
- **Resiliency:** Microservices result in improved systems performance, limited downtime, and seamless scalability on demand.
- **Technology Diversity:** Microservices allow for a mix of multiple computer languages, development frameworks, and data-storage technologies.
- **Revenue:** Faster iteration and less downtime mean increases in usability; in the private sector, all of this adds up to greater revenue. Successful enterprises will need to employ microservices in order to stay alive.

#### CHALLENGES

As with all technology breakthroughs,

# Technology Strategies

Defining OI&T's  
"To Be"  
Technology  
Vision



The TS office within OI&T's Architecture, Strategy & Design (ASD) interacts not only with the ASD pillar offices, but also with multiple stakeholders within OI&T and with strategic offices across the enterprise. TS works closely with IT and business owners to capture business rules and provide technical guidance as it relates to Data Sharing across the enterprise, specifically for interagency

microservices does not come without challenges and best practices. Most successful microservices start with an existing app and re-architect it. It appears to be much harder to design for microservices from scratch.

In addition, microservices require a large amount of coordination and infrastructure for deployment and this makes it less beneficial for on-premise software. On-premise software, also referred to as "shrink-wrapped" software is installed and runs on the premises of the building of the person or organization using it. As its name suggests, microservices is a solution for off-premise software that is deployed from a server farm or cloud, commonly referred to as software-as-a-service (SaaS). This can also be counted as a benefit, though, as enterprise applications move to cloud models.

Finally, since services are being redeployed regularly, it is important that an experienced operations team is responsible for managing microservices. For a distributed system, for example, consistency is not easily managed. A distributed system is a collection of independent computers that are connected through a network that

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enables computers to coordinate their activities and share resources.

### RECENT DEVELOPMENTS

The recent take-off of microservices is attributable to three recent developments: the result of the standardization of software containers, a standardized format for communications, and a scalable cloud infrastructure that is able to deliver resources on demand that are necessary to scale and operate services effectively.

With the transformation of software containers, developers around the world now build and deploy applications with containers. Software containers have created standardization that simplifies the software integration process. Standardization is also supported through the adoption of APIs as a standardized format for communications.

### MICROSERVICES AT VA

At VA's Office of Architecture, Strategy, and Design (ASD), engineer Mike Dance, Jr. calls microservices a "hot technology trend that we'll incorporate into the Enterprise Technology Strategy Plan (ETSP) and certainly in future versions of the Service-Oriented Architecture (SOA) Enterprise Design Pattern (EDP)." Dance explains that microservices will absolutely have an impact on VA's future IT infrastructure

through the use of distributed platforms for development, testing, and deployment.

The ETSP is a strategic document that helps define the "to be" enterprise technology vision. Key objectives already identified in the ETSP that support microservices are improving efficiency, increasing agility, reducing cost, and streamlining deployment. The ETSP Application Modernization Infrastructure gap is defined by the VA's current distributed computing environments as characterized as tightly coupled systems and would benefit from integrated design, ability to reuse existing IT investments, and industry standards.

So if you started out questioning, "Is nothing sacred anymore?" with the challenge to Brooks' Law, it is reassuring now to know that the benefits of microservices will ultimately reduce costs for VA, while improving efficiency and services.

If you have any questions about microservices, don't hesitate to ask TS ([askTS@va.gov](mailto:askTS@va.gov)) for assistance or more information.

Check out earlier TS Note editions [here](http://www.techstrategies.oit.va.gov/docs_ctsnotes.asp). ([http://www.techstrategies.oit.va.gov/docs\\_ctsnotes.asp](http://www.techstrategies.oit.va.gov/docs_ctsnotes.asp)).

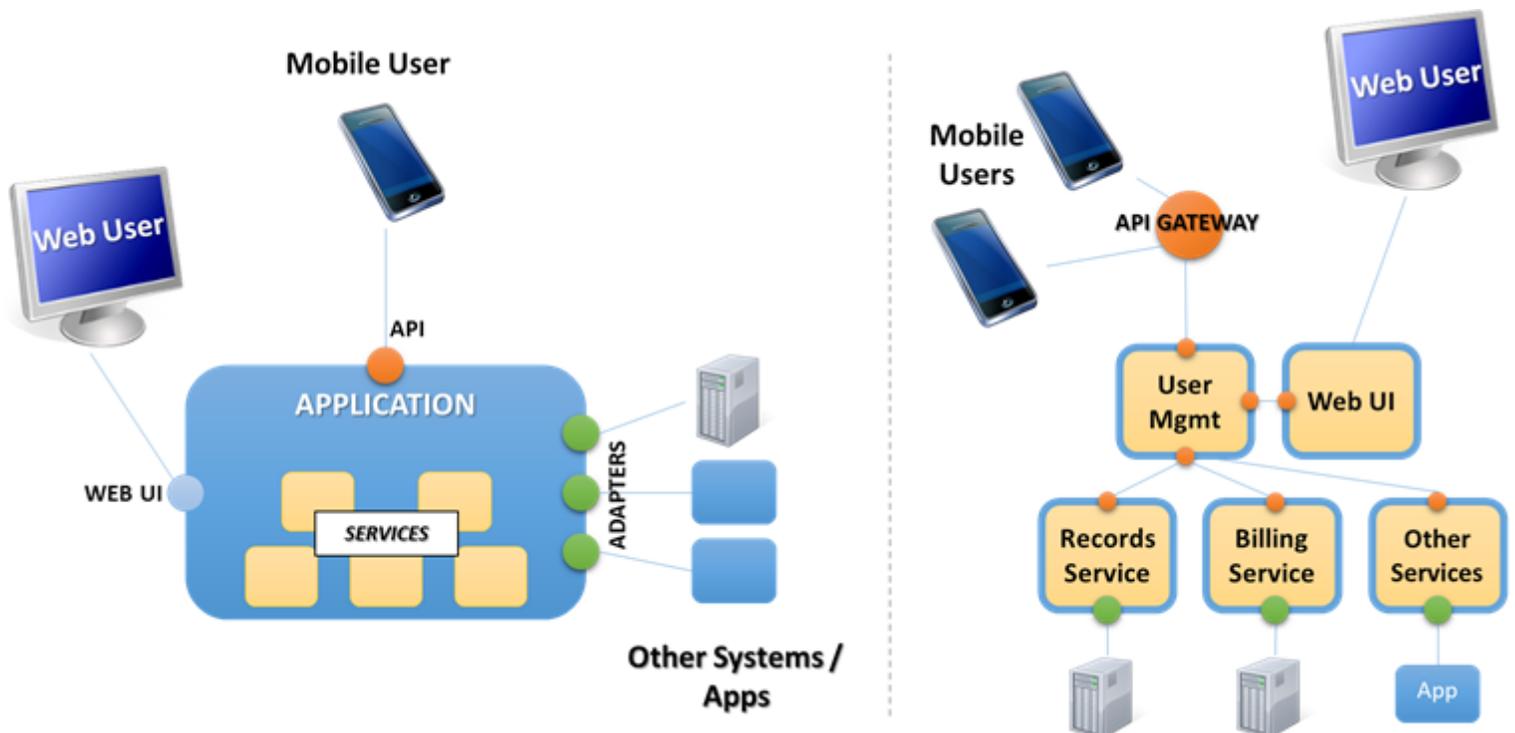


Figure 1: "Monolithic" Application Architecture (L) and Microservices Architecture (R)