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TECHNOLOGY
RADAR *NOV '16*

Our thoughts on the technology and trends that are shaping the future

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#TWTechRadar

We've decided to bring **consumer-driven contract testing** back from the archive for this edition even though we had allowed it to fade in the past. The concept isn't new, but with the mainstream acceptance of microservices, we need to remind people that consumer-driven contracts are an essential part of a mature microservice testing portfolio, enabling independent service deployments.

driven contract testing is a technique and an attitude that requires no special tool to implement. We love frameworks like Pact because they make proper contract

noticed a tendency for teams to focus on the framework rather than on the general practice. Writing Pact tests is not a guarantee that you are creating consumer-driven contracts; likewise, in many situations you should be creating good consumer-driven contracts even where no pre-built testing tool exists.

Teams are pushing for automation across their environments, including their development infrastructure. **Pipelines as code**

_____, _____, _____ and Concourse are examples that allow usage of this

_____ can be used to treat the deployment pipeline as code—versioned and tested.

way to expose business capabilities to both external and internal developers. APIs promise the ability to experiment quickly with new business ideas by

APIs as a product, even when the consumer is an internal system. Teams that build APIs should understand the needs of their customers and make the product compelling to them. Products are also improved, maintained and supported over the long term. They should have an owner who advocates for the customer and strives for continual improvement. Products are actively maintained and supported, easy

orientation is the missing ingredient that makes the

an agile business built on a platform of APIs.

In a number of countries, we see government agencies

information (PII). The increased use of public cloud

protect the data entrusted to them by their users while also respecting all relevant laws. The European Union has some of the most progressive privacy laws, and

within the European Union. That forces organizations

HTTP Strict Transport Security (**HSTS**) is a now widely supported policy that allows websites to protect themselves from downgrade attacks. A downgrade attack in the context of HTTPS is one that can cause users of your site to fall back to HTTP rather than HTTPS, allowing for further attacks such as man-in-the-middle attacks. With HSTS, the server sends a header that informs the browser that it should only use HTTPS to access the

this easy-to-implement feature should be added to any site using HTTPS. Mozilla's _____ can help identify

that improve security and privacy. When implementing HSTS, it is critical to verify that all resources load properly over HTTPS, because once HSTS is turned on,

PLATFORMS *continued*

Apache's Cassandra

of data, often using hundreds of nodes split over multiple worldwide locations. It's a great tool and we like it, but too often we see teams run into trouble using it. We recommend using **Cassandra carefully**. Teams often misunderstand the use case for Cassandra, attempting to use it as a general-purpose data store when in fact it is optimized for fast reads on large data sets based

complexity and some rough edges, so unless you absolutely need the scaling it provides, a simpler solution is usually better. If you don't need Cassandra's

just be choosing it out of _____. Careful use of Cassandra will include extensive automated testing, and we're happy to recommend CassandraUnit as part of your testing strategy.

Electron is a solid framework for building native desktop clients using web technologies such as HTML, CSS and JavaScript. Teams can leverage their web know-how to deliver polished cross-platform desktop clients without spending time learning another set of technologies.

The hype seems to have peaked for blockchain and

scale announcements in this area slowing to a trickle,

Ethereum, is making good progress and is worth watching. Ethereum is a public blockchain with a built-in programming language that allows "smart contracts" to be built into it. These are algorithmic movements of "ether" (the Ethereum cryptocurrency) in response to activity happening on the blockchain. R3Cev, the consortium

concept on Ethereum. Ethereum has been used to build

heist of $150m worth of Ether demonstrates that the blockchain and cryptocurrencies are still the Wild West of the technology world.

In the **HoloLens**
usable AR headset. Not only is it a beautiful piece of industrial design and an eminently comfortable device to wear, but it also clearly demonstrates the promise of AR for the enterprise via its gorgeous optics and deep Windows 10 integration. We expect HoloLens to be

application functionality to our clients in the near term, and we look forward to its evolution as it gains broader traction.

IndiaStack
of transforming India from a data-poor to a data-rich country. The stack emphasizes layered innovation by specifying a minimal set of APIs and encourages the rest of the ecosystem to build custom applications on top of these APIs. Aadhaar serves as one of the foundation layers, providing authentication services for more than a billion Indian citizens. In addition, there are services to provide paperless transactions through digital signatures

consent layer (_____) to securely provide Aadhaar details

initiative to bring digital innovation, and the design principles behind IndiaStack could be used as a change agent for other regions/countries.

Nuance Mix is a framework for natural language processing from the company that created the speech-

creation of grammars that allow for free-form user

to understand. The outcomes are responses to user input that identify the user's intents and interaction

the ones used to train it, but over time it can start to identify meaning from more divergent phrasing. Though it is still in beta, the accuracy from early exploration has been compelling, and the eventual product is one to watch for application forms that

including mobile, IoT, AR, VR and interactive spaces.

OpenVR

will likely keep growing in importance. Much of the VR

Though it is not open source, it is free via the license.

_____, while truly open source, doesn't seem to have as much adoption yet. If you're going to develop a VR application and target as many devices as possible—and not use Unity or Unreal

pragmatic solution right now.

PLATFORMS *continued*

Tarantool is an open source NoSQL solution that combines database and cache into one entity and provides APIs for writing application logic in Lua
and disk-based engines are supported, and users can

on their use cases. The data itself is stored in MessagePack format and uses the same protocol to communicate between clients and server. Tarantool supports write-ahead logs, transactions and asynchronous master-master replication. We are happy with the architectural decision of embracing single-writer policy and cooperative multitasking to handle concurrent connections.

Hype surrounding machine intelligence has reached

and tools are waiting to be discovered among all the **wit.ai**, a SaaS platform that allows developers to create conversational interfaces using natural language processing (NLP). Wit works with either text or speech inputs, helps developers manage conversational intent and allows custom business logic to be implemented using JavaScript. The system is free for commercial and noncommercial use and encourages

must agree to let Wit use your data in order to improve the service and for its own analysis, so read the terms and conditions carefully. Another contender in this space is the _____, but it's available only in limited preview form as of this writing. As with most

quickly, so it's worth keeping an eye on.

We are seeing too many organizations run into trouble as they attempt to use their **CMS as a platform** for delivering large and complex digital applications. This is often driven by the vendor-fueled hope of bypassing unresponsive IT organizations and enabling the business

TOOLS

Babel.js has become the default compiler for writing next-generation JavaScript. Its ecosystem is really taking plugin system. It allows developers to write ES6 (and even ES7) code that runs in

compatibility for older browsers, and with very little

build-and-test systems, which makes integration with

software that has become the main driver of ES6 (and ES7) adoption and innovation.

When combining modern techniques and architecture styles, such as microservices, _____ and QA in production, development teams need increasingly sophisticated monitoring. Simply looking a graphs of

and many teams collect application and business-

Grafana makes it easy to create useful and elegant dashboards for data from a number of sources. A

graphs to be synchronized, which helps with spotting correlations in the underlying data. The templating system that is being added shows a lot promise and will likely make managing sets of similar services even

default choice in this category.

Machine images have become a staple of modern deployment pipelines, and there are a number of

of its comprehensive feature set and the positive experiences we've had with it, we recommend **Packer** over the alternatives. We also recommend against trying to write custom scripts to do what Packer does out of the box.

ADOPT   TRIAL   ASSESS   HOLD
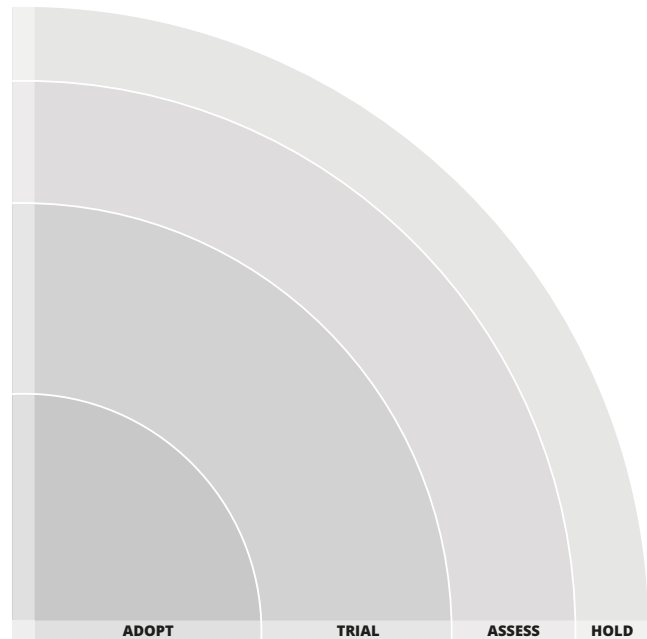
With the growth of interest in streaming data
architectures and the downstream data lakes they feed,
we have seen an increased reliance on "change data
capture" tooling to connect transactional data stores to
stream-processing systems. **Bottled Water** is a welcome
PostgreSQL's
write-ahead log into
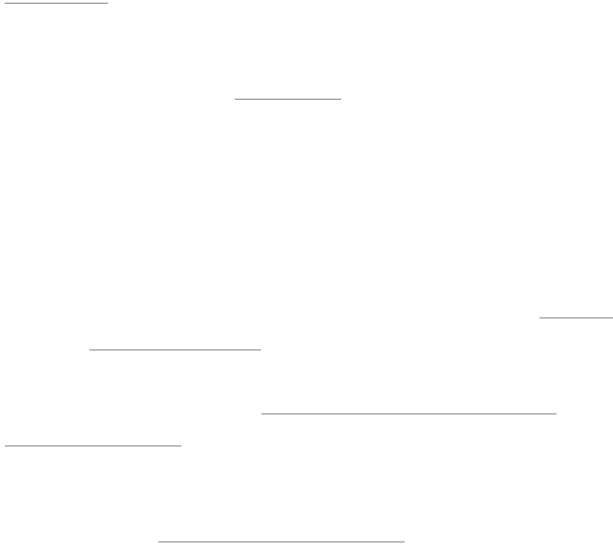
Some of our ThoughtWorks teams have had very positive experiences with **Phoenix**, a server-side web MVC framework written in Elixir. In addition to being streamlined and easy to use, Phoenix takes advantage of Elixir to be extremely fast. For some developers, Phoenix

Ruby and Rails. Although the ecosystem of libraries for Phoenix is not as extensive as for some more mature

success and growth of support for Elixir.

Quick and **Nimble** pairing for their unit tests. In the RSpec family

it provides very readable tests (with describe blocks) across Swift
asynchronous testing.

ECMAScript 2017—not to be confused with ES7 (a.k.a. ECMAScript 2016)—brings several noteworthy

to implement this standard fully in the summer of 2017, but the _____ JavaScript compiler already supports a number of the features today. If you make extensive use of JavaScript and your codebase is under active

build pipeline and begin using the supported features.

JuMP mathematical optimizations in Julia
called _____ and enables users to write solver-agnostic code in Julia. Currently supported solvers include _____, _____, Cbc, Clp, Couenne, CPLEX, _____, _____, _____, _____, Ipopt, _____, NLopt and SCS

to compute derivatives so users are not limited to the standard operators like sin, cos, log and sqrt but can also implement their own custom objective functions in Julia.

We have been intrigued by the **Physical Web** standard

beacons broadcast a URL—but the possibilities are

world, tying objects and locations into the digital realm. The current transport mechanism is Eddystone URLs

Although there are obvious security concerns with following randomly discovered links, we are most interested in use cases with customized clients where

Rapidoid is a collection of web framework modules, including a fast low-level HTTP server implemented

data structures provide Rapidoid an edge over other
Netty
Rapidoid has yet to implement a few features like built-in cache and SSL support; we suggest you check the roadmap for updates.

We are excited that the Redux paradigm has made its way to Swift-land in the form of **ReSwift**. We've

codebases once state and state changes are managed in a central place and common idiom. This also helps with

headsets, we believe there are many VR and AR scenarios that make sense in the browser, particularly

usage of **Three.js**, a powerful JavaScript visualization

as has the vibrant community supporting this open source project.

In the ever-changing world of front-end JavaScript frameworks, **Vue.js** has gained a lot of ground as a lightweight alternative to AngularJS. It is designed to

web interfaces around concepts like modularity,

learning barrier, which makes it interesting for junior developers and beginners. Vue.js itself is not a full-blown framework; it is focused on the view layer only and therefore is easy to integrate with other libraries or existing projects.

Widespread adoption of AR/VR as a collaboration and communication medium requires a modern and readily available video streaming platform. **WebRTC** is an emerging standard for real-time communication between browsers that enables video streaming within commonly available web technologies. The range of browsers that support this standard is increasing, but Microsoft and Apple have been slow to adopt WebRTC in their proprietary browsers. If momentum continues to build, WebRTC could form the future foundation for AR/VR collaboration on the web.

ThoughtWorks is a technology consultancy and community of passionate, purpose-led individuals. We help our clients put technology at the core of their business, and together