Cloud-native Application Development: Your Enterprise at Start-up Speed

Digital business transformation allows companies to:
• Focus on the customer (and customer experience)
• Increase the speed of delivering value to the market
• Keep a tab on cost while doing the above

Key enablers for digital business transformation include:
• Cloud-native platforms and applications
• DevOps and continuous integration / continuous delivery methods
• An API-centric approach to applications
• Customizable tooling that fits your needs
• Low-risk technology investments that avoid lock-in

This paper sets out a strategy for the traditional enterprise to quickly launch digital business capabilities.

WHY CLOUD NATIVE?
What are some of the benefits of developing cloud-native applications optimized to run in the cloud? One is the ability to innovate and quickly release applications and features that deliver new product ideas. Developing cloud-optimized applications gives you the ability to try new technologies quickly and engage with users in different ways. And if the technology doesn’t fit your needs or deliver on its promise, you can bring down the application and experiment with something else, the fail-fast approach.
Another benefit is the ability to quickly scale to match the resource needs of unpredictable user demands. If you deploy a new feature and it becomes virally successful but the infrastructure fails to scale and support high traffic volume, you risk customers leaving and going to a competitor, possibly never to return.

Successful organizations in the digital world are building and deploying modern cloud-native applications using agile development principles. Some of these companies originated in the cloud, un-encumbered by traditional monolithic application designs. Their customer-facing applications were designed to take advantage of cloud technologies and optimized to run in the cloud. You want the same playing field.

YOUR CLOUD STRATEGY
If yours is a traditional brick-and-mortar company, you may have a lot invested in on-premises core systems that run your business, such as ERP systems with custom interfaces. Many of the customizations were built using monolithic architectural styles with complex interactions hard-coded into the application.

The great thing about these systems is that they hold a wealth of highly valuable customer data, including buying history and product preferences. For this reason, traditional businesses can’t completely change their business practices. But if done right, you can capitalize on your crown jewels by combining your core systems and historical data with new data sources for a unique customer perspective. Your valuable assets let you cross-sell and upsell. And the depth of customer knowledge being put to use is something that most new cloud-native businesses don’t have.

To use a cloud-native architectural strategy, you do need to deploy some applications on the cloud. But, depending on the nature of your business, migrating to a public cloud may not be feasible. There may be limitations due to investments in core systems, regulatory requirements, customer data sensitivity, contractual obligations, and so on.

But using a private cloud strategy, you can still build the foundation for your digital business. You can build and run your cloud applications on a platform with customized services that make your applications and services completely unique. Many call this type of private cloud an enterprise platform as a service (ePaaS). The platform hides infrastructure complexity to make it easier to run and deploy applications. It can also include services that administer and manage the underlying hardware, assist with application development, and arrange for runtime deployments.

For example, you may want to investigate various platforms: integration as a service, such as AWS, Azure, Google Cloud Platform, OpenStack; platform as a service such as CloudFoundry or Docker-based platforms such as Kubernetes; or container as a service, such as AWS EC2 Container Service.

Many companies make the mistake of putting off their cloud journey until they are certain of their platform choices. This results in valuable loss of time, misplaced effort, and higher overall cost in adopting a cloud-native approach. The wiser choice is a solution that is both platform and vendor agnostic and that supplies the freedom to move applications to any other platform and secure benefits out-of-the-box: the enterprise platform as a service.
NEW PLATFORM, NEW METHODS
An enterprise platform as a service (ePaaS) can configure and manage underlying infrastructure so you can maintain control over how your applications run in the cloud. These platforms also give you a fast path to newer technologies and methods that support agility and innovation:

Scalability and Containers
Cloud platforms use virtualization to auto scale and gracefully shut down resources on demand. Some use hypervisor virtualization to provision and share underlying resources. More recently, container virtualization has gained attention because containers are lighter weight and use resources more efficiently. Several containers can share an operating system (OS) and the hardware it sits on. These systems don’t pay the performance penalty of a hypervisor having to manage and allocate OS, memory, and CPU across virtual machines.

Continuous Delivery
Cloud-native organizations strive for a Continuous Delivery (CD) model in which developers quickly evaluate new technologies, and if successful, adopt the technology, incorporate it in their design, and deploy it on their cloud platform. Using continuous delivery, you can reduce development cycles to short sprints and incorporate small, incremental changes into an application on a regular and more frequent basis. Some companies deploy iterations several times a day. This model is far more agile than new-release development cycles of 12 to 18 months that involve checking code, testing the whole system, discovering errors, rewriting—and long delays for bringing products to market.

DevOps
A key aspect of continuous delivery is the concept of DevOps where development and operations teams work together to define and allocate the resources needed to build, test, and launch applications. The DevOps mentality helps automate software delivery and removes restrictive development and deployment processes so applications can be released more quickly.

Microservices
Adopting a continuous delivery process usually means adopting a new way of designing software applications. The concept here is to compose an application from a pool of smaller code pieces called microservices. These are loosely coupled, reusable, independently deployable components that are exposed and communicate with each other through APIs. The trend is to treat these APIs as products and manage them that way. Building something small and purpose-built lets you build faster and make changes quickly, even while the service is in use. Microservices can also be easily retired when no longer useful.

These are all great benefits, but this new architectural model also brings challenges:

• You still need to integrate between services during development and at service runtime.
• Developers need to be even more concerned with the various data formats among services and with moving data reliably between them.
• With a potentially massive array of services and choreography between them, you need additional tools to remove complexity to ensure continuous delivery.
TOOLS FOR DIGITAL BUSINESS AGILITY

TIBCO BusinessWorks™ Container Edition is a new product in the TIBCO BusinessWorks product family. It is based on the same technology used by global companies to solve complex integration problems for traditional systems. It leverages TIBCO’s enterprise integration technologies known for ease-of-use and first-class dev tooling, but it’s specifically designed for developing integration applications in cloud-native environments.

With BusinessWorks Container Edition, integration services are lightweight and optimized to run inside containers—which helps lower investment risk because services are then truly cloud-native and vendor-agnostic. Applications built using BusinessWorks Container Edition can be moved to various cloud platforms without having to make changes or go back to design-time compilation. Further, it supplies easy-to-use integration tools for choreographing microservices in cloud-native applications and uses plug-ins that promote continuous delivery.

Without a tool like this, it would be much more difficult for developers to try new designs and incorporate new technologies. Every time developers compose services, they would need to write integration logic from scratch and worry about converting data formats between services, very time-consuming projects.

Companies that have to hire developers with specialized skills to do this work, risk developer turnover and inability to maintain and support applications during critical moments. In addition, software release cycles will be longer and new features delayed, which can put your organization at competitive risk.

Visual Designer

A key component of new BusinessWorks Container Edition is a visual designer, a design-time modeler that lets users drag, drop, and connect assets and activities to define integration logic. The Visual Designer reduces or removes the complexity of integrating and building microservices so you don’t need a full cast of developers to do this successfully. It’s like a canvas that lets you arrange various microservices, choreograph how they work together, and quickly turn ideas into products and revenue.

Projects can be developed quickly, and once developed, automated documentation makes it easy for others to understand the logic and make changes whenever necessary. The services are extensible, allowing other applications to attach to written APIs or leverage existing integration services.

The Visual Designer lowers the barrier to entry for small businesses with small crews of less specialized developers—as well as for brick-and-mortar businesses that need to maintain investments in traditional systems and have fewer resources to support new development techniques. With this tool, you can build integration applications easily. Updating software takes just days, not months, enabling more frequent software feature releases.

Within the Visual Designer:

- **Visual Mapper**: Microservices use a variety of data formats. The Visual Mapper defines how data is represented between services and makes it easy to relate a variable in one service to the corresponding variable in another. It understands data formats and makes the necessary transformation that results in developer productivity.

- **Conditional Workflows**: When building integration logic, developers create rules to model the conditional flows between services. Developers using the Visual Designer can insert transitions or arrows to indicate under what conditions a service starts and runs.
• Configuration Automation: You can’t deploy applications easily if you need to perform extensive configurations. The Visual Designer lets you configure, define, and pass variable values between services. These values are stored as global variables—and regardless of where they are running, they are available to all applications. This sharing simplifies configuration so developers don’t have to worry about tracking and updating services whenever changes are made to a particular service.

• Visual Testing: An automated test function is available for testing during development. With a click, developers can automatically run through the integration project to make sure it works during development. They can also launch a Swagger user interface that steps through the business logic to test and debug any errors found.

Plug-ins for Continuous Integration, Continuous Delivery
An Apache® Maven plug-in enables developers to build automations. Integration with the Jenkins server lets developers hook into tools and platforms that support continuous integration and automate build processes. The ability to use these build tools removes development complexities, improves operational efficiency, and reduces operational costs.

API Management
The microservices architectural style relies on APIs for communications between microservices. After creating or integrating microservices in BusinessWorks Container Edition, developers can publish the APIs they created directly into the TIBCO Mashery® API Management platform. When an API is published, a “stub” is created within the Mashery environment making the API visible to others. Product managers responsible for managing a given API can then layer on the required security and operational policies and enable access to the community of developers who will use it.

NATIVE SUPPORT FOR CONTAINER TECHNOLOGIES
BusinessWorks Container Edition provides out-of-the-box support for cloud-native platforms such as CloudFoundry; it makes runtime available as a customizable build-pack or as Docker images for more Docker friendly PaaS/ CaaS environments. This capability ensures that you can truly focus on functional business logic.

While providing rich TIBCO ActiveMatrix BusinessWorks™ functionality, the container edition platform also supports key tooling used in cloud-native environments, such as configuration management (using Spring Cloud Config or Consul), service discovery, client-side load-balancing, and circuit breaker patterns. When exposing and choreographing microservices with other components using APIs, BusinessWorks Container Edition ensures consistency and provides confidence that the underlying infrastructure will work whenever resources are deployed.

By aggregating log data and exporting it as event streams, status can be collected, tracked, and reported by management tools. Audit records can be exported and stored in a log management system for review and reporting. These practices all contribute to higher levels of availability, critical for keeping users happy and customers coming back. Using support from our key partners, BusinessWorks Container Edition applications can benefit from rich monitoring features provided by application performance management solutions of choice.
SUMMARY
To transform to digital business, requirements include development agility, web scale, and rapid innovation. Cloud-native architecture supports these capabilities. It requires your IT organization become a cloud service provider that enables development of modern business applications using a framework and fast choreography of microservices.

TIBCO BusinessWorks Container Edition lowers the barrier to entry for cloud native development allowing you to achieve agility and continuous delivery of innovations leading to success in a digital business world.

Learn more about the TIBCO BusinessWorks family at http://www.tibco.com/products/automation/application-integration/activematrix-businessworks