The Untapped Power of

Cloud Native Applications

Organizations that want to rapidly deliver new business capabilities have begun to build Cloud Native Applications (CNAs). These applications are proving to be attractive for several reasons. They have low costs associated with hosting, and capital expenditure can be minimized by exploiting a cloud-based opex model.

CNAs have obvious strengths. They are born in a scalable and ubiquitous cloud environment. They are then broken down into separate services which are -- taking advantage of a cloud framework -- deployed on several servers to enable redundancy. This makes them highly resilient from birth.

Thought of another way, CNAs are the result of assembling a number of standardized components across servers, with a Lego-like structure. Each component runs in its own container and is connected to others over a network. Services, components, compute capability and storage can be scaled at

will, eliminating the need for overprovisioning. The end result is a lightning-fast ability to deliver new business capabilities at rock bottom costs.

Now contrast this with conventional application development. Tradition monolithic applications assume that infrastructure is long lived. The process depends on resources like shared drives and clustered sessions that do not scale well. These applications often fail under high loads. Their development itself is an agonizing process: There are teams that operate in silos (see Figure 1 for teams required for monolithic application delivery) and time is lost trying to coordinate and communicate between them. Best practices, created with the best of intentions, begin to become bottlenecks and prevent the use of new technologies and processes.
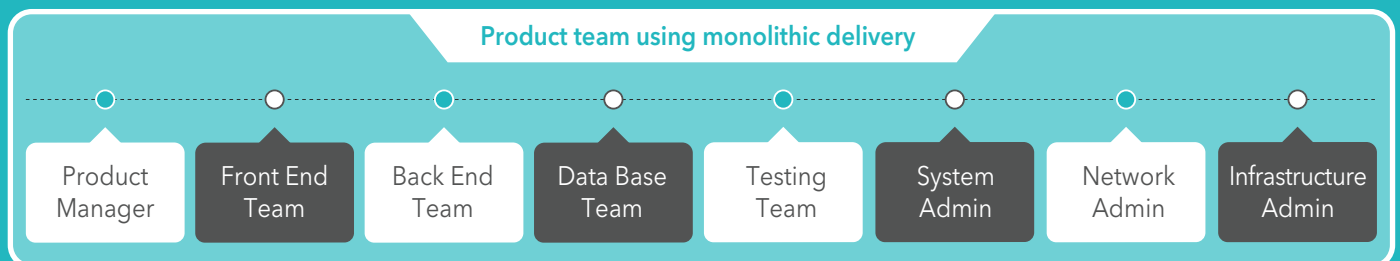
Product team using monolithic delivery

| Product Manager | Front End Team | Back End Team | Data Base Team | Testing Team | System Admin | Network Admin | Infrastructure Admin |

Figure 1

The challenges of Cloud Native Applications

Clearly, CNAs are trending with good reason. But their very strength – speed, flexibility, agility – increases the risk of things going away. For better control and reduced risk, cloud native architecture is used to facilitating more visibility and control of the environment. This counter-balances the risks.

The primary tools to gain visibility and control are feature-rich monitoring and data visualization. These are used to alert developers to deviations from normal behavior, investigate the issues and rectify components responsible for the aberration.

Amplifying the benefits of CNAs

Organizations aiming for CNAs would benefit from the use of the Twelve-Factor App design pattern. This pattern defines properties that CNAs should adopt to overcome numerous challenges. It recommends that CNAs should have:

- Version managed codebase

- Clearly defined and isolated dependencies

- Configuration injected at runtime

- Have independent build, release and run process

- Applications must run in a stateless process with horizontal salability and expose service via defined URL/API

- Application servers must be disposed in case of a malfunction

Faults are isolated so that other components remain unaffected. Circuit breakers are used to prevent the catastrophic failure of systems in the event of a component failure.

While CNAs eliminate the need for overprovisioning infrastructure and resources, it must be understood that this is made possible by avoiding storing of sessions, objects or cache in servers. By implication, servers must be created and destroyed quickly as per load in order to have 'just-right' infrastructure at any given point of time.

- Application logs must be treated as event streams

In addition, there are three overarching factors that impact CNA development/ deployment:

The Cloud Native Architecture: As briefly mentioned earlier, this architecture style creates independent applications that deliver atomic units of business values. The apps collaborate with other services through well-defined interfaces. As long as the interface remains the same, the individual application can evolve independently and deployed faster without affecting other applications.

Rest API has become the default standard for applications to publish their interfaces. Applications are registered and

discovered dynamically. Versioned and distributed configurations are used without the need for an application restart in case of configuration changes.

More recently, containers are becoming popular to deploy services in a light-weight manner. Cloud providers support container scheduling and deployment (upload, download, start, stop), often with open source tools that can help scale the process for a large number of containers (across hosts).

Cloud Support to Micro-service Architecture: Development teams use self-service infrastructure (IaaS) to develop, deploy and support applications. Continuous integration and continuous deployment (CI-CD) platforms are ideal to automate build, test and deploy (code) in any environment. Backing services like DB, message queue, mail service are also created using self-service (PaaS). Support services like on-demand scaling, health management, log analysis and dynamic routing is

also provided by cloud. In sum, developers have adequate control to rapidly respond to business needs using micro-services architecture.

The Process for Cloud Native Architecture: To implement micro-service architecture, teams are organized by application and use DevOps methodology. Here, the traditional monolithic style of development is broken. Teams consist of members with cross-functional capability and follow Agile/lean methodology for rapid development of application that delivers one business capability. The team is empowered to choose standards and protocols they determine are best. Since development is containerized, there is no impact on other parts of the application, instead, support teams expose infrastructure through services that are consumed for CI-CD and support (see Figure 2 for details on teams using micro-service delivery).
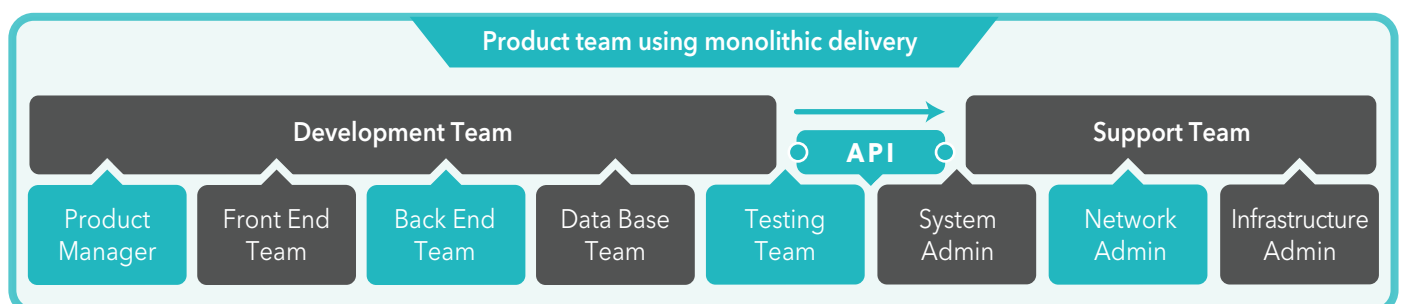

Figure 2

Micro-services help address many challenges posed by CNAs. They provide developers with the advantages of working in small teams that are ideal for a CI-CD/Agile world. They offer the option to use different protocols and languages making teams more productive and the applications more closely aligned with business demands. It is easier to implement change when business demands evolve. And best of all, with no technology lock in, organizations are free to create CNAs that businesses require rather than be dictated by what technology can achieve.

About the authors

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Satyajit is Principal Consultant in the AWS Practice at Wipro, which is part of the Service Transformation team at Wipro. With sixteen years of experience, Satyajit has defined and applied Enterprise architecture framework to migrate applications to AWS cloud for high availability, scalability and fault tolerance of the system applying Micro-Architecture solution paradigm. He has also been involved with CoE and Governance setup, defining best practices, policies and guidelines for Service implementations and also have lead large teams for solution delivery and execution. He was instrumental in defining Solution Architecture, Design and delivery of critical applications with stringent NFR requirements. He has experience across industry domains like manufacturing, finance, consulting, and government.

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Saksham Khandelwal is member of Innovation and thought leadership charter at Wipro. Prior to this, he was part of Innovation office at Chief Technology Office where he led various innovation initiatives. He is founder member of Cloud Innovation Council of India and life member of the Advanced Computing and Communications Society.

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