State of Michigan
Department of Technology, Management and Budget

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Project Narrative

The State of Michigan is committed to a digital transformation that drives efficiencies to deliver modern, high-quality, high-value technology solutions for our citizens and connect customers to services. High performance and reliability are expected.

The State of Michigan's container services has enabled agencies to easily adopt DevSecOps processes. These new technology practices enabled the State of Michigan to optimize enterprise-wide business, financial and technical services through emerging technologies.

Within the last year, the State of Michigan fully embraced DevSecOps using a Container ecosystem. This provides a competitively priced service offering that meets customers' expectations and supports the industry move towards the more efficient DevSecOps method for rapid-release delivery of applications.

Containers provide a framework to build cloud-native applications that can be migrated between clouds with minimal effort. This supports the move towards a Hybrid Cloud environment allowing for a more flexible, efficient, and cost-effective solution as well as the ability to burst workloads to the cloud on demand.

Orchestration and automation within the Container ecosystem allow for application Continuous Integration and Continuous Delivery (CI/CD), deployment, and management at scale to be more efficient and productive. These qualities of a Container allow for faster time to market and a cost savings for infrastructure and code development.

Containerization of applications at the State of Michigan offers many advantages to development and operational teams including:

- DevSecOps-native application platform results in reduced deployment time for new services.
- Faster development and promotion through Dev/Test/Prod environments.
- Automated deployment pipelines promote visibility, approval tracking, and integration of secure application development lifecycle (SADLC) into the lifecycle process.
- Reduced dependency on provisioning of traditional infrastructure.
- Simplified maintenance and upgrades of applications.
- Scalability of resources (instances of a container can scale vertically and horizontally automatically to handle load).

Idea

The Michigan Department of Health and Human Services (MDHHS) has been fighting the COVID-19 pandemic since the beginning of January 2020. Between April 2020 and July 2020, the state increased professional staff from about 100 to 1,000 and added approximately 10,000 volunteers to assist with contact tracing.

Contact tracing is a process that can help slow the spread of infectious diseases by investigating infections and tracking down others who have been exposed. The state's efforts included trying to reach people by phone who ignore calls from unfamiliar numbers which lowered results of identifying and isolating COVID-19 victims.

To address the problem, MDHHS and DTMB partnered to change the way business is done. This project moved the State of Michigan from traditional processes to DevSecOps using Container technology. Moving to this technology assisted Michigan local health departments increase the success rate of contact tracing efforts by adding a text feature. Sending a text message identifies the caller / number and allows citizens to know that the contact was not spam.

Container technology at the State of Michigan is the future for application development **while addressing a major priority of Digital Government/Digital Services and meeting a DTMB Strategic Goal of "Responsible Use of Taxpayer Revenue"**. It gives our agency partners the flexibility, speed and security that allows them to get business done without negative impact from infrastructure teams.

Embracing a DevSecOps mindset and implementing Containers fostered better synergy between, MDHHS, technical developers and infrastructure engineers within the State of Michigan.

Michigan's IT strategic plan has a clear vision for improving the experience of conducting business with state government. This project has increased momentum for emerging IT solutions. Through collaboration and hard work this strategic plan will positively impact the lives of every Michigan resident, business, and visitor for years to come.

Tangible results include but not limited to the following:

- Faster time to market
    - Improved Developer productivity and development pipeline
    - Enhanced security throughout the lifecycle
    - Containers are lightweight and start in less than a second
    - Improve customer experience
- Environment independence
    - Greater resource efficiencies and density

    - Isolation of application from the host system and from each other
    - Increased portability
    - Improved security to adhere fully to security policies
- Disaster recovery using hybrid cloud
    - Shift workloads from on-premises to public and private cloud networks
- Reduced support need
    - Operational simplicity
- Tighter deployment integrations
    - More consistency with development and operations
    - Leaner deployment processes using CI/CD pipeline
- Technology modernization
    - Repeatable processes for developers and infrastructure using similar CI/CD pipelines
    - Consistency leveraging automation to build and execute in different environments

Implementation

The State of Michigan used Agile and Dev**Sec**Ops Methodology to break down the barriers between the development side of the house and the operations side of the house; to work hand and hand through the product lifecycle. It also adds security to development and operations earlier in the process (i.e., start security earlier in a project or initiative).

The current Red Hat OpenShift Container Platform was delivered in partnership with MDHHS solution architects, developers and the DTMB CTO's architects. This was accomplished with an on-premises ecosystem running on hyper-converged infrastructure that includes Disaster Recovery (DR) using Cloud services.

The State purchased high performance SMS Short Code (difficult to be spoofed) and used the same phone number identifier across all programs with contact tracing efforts to maintain consistency.

The project to deliver the core Container platform took nine months to procure and implement. The COVID-19 Contact Tracing SMS/Text solution using the Container platform was delivered in two (2) days.

The State's container services platform executes on Red Hat OpenShift, a container orchestration platform with security best practices built in. Red Hat OpenShift Container Platform is running on two clusters with 170+ pods in pre-production and 130+ pods in production.

Full support for CI/CD pipelines brought together disparate teams creating automated approval gateways, security posturing, with auditability into an infrastructure as code delivery path reducing deployment timeframes to less than a week and in some cases hours (for established container "overwrite").

Cloud-native development methodologies increases application portability, removing vendor lock-in, either for the platform or compute engine. Kubernetes workloads can migrate between open-container initiative (OCI) compliant platforms on-prem or in any of the major public cloud providers. It also allows dynamic application scaling in response to load in an on-premises environment, with potential to burst to public cloud, as necessary.

MDHHS has containerized its entire Service Bus leveraging the DTMB Enterprise Container Platform, this includes integrations to MDHHS Eligibility System, Medicaid Management Information System (MMIS) and Center for Medicare and Medicaid Services (CMS) leverage MDHHS Service Bus.

Impact

The results of this project allowed for the acceleration of application development and infrastructure. By streamlining and improving traditional processes developers are not dependent on infrastructure teams. Standardizing on OpenShift Container Platform has given the State a competitive advantage. Compliance, latency, cost, and other factors have been addressed to meet MDHHS needs.

The State of Michigan DHHS agency was able to develop and deploy MDHHS SMS Outreach to support COVID-19 Contact Tracing efforts in the Container platform within a two-day time to market, saving $17,000 day one. Traditional application development would take an average of three weeks to complete. This saved an estimated $300,000 for the State of Michigan and our citizens.

Since implementing the new solution in July 2020, 592 volunteer and health department users have been onboarded who send text messages for contact tracing. Approximately 1 million citizens per month received text messages (1.274 million citizens during month of April 2021).

The State went from limitations, including trying to reach people by phone who ignore calls from unfamiliar number and identifying potential infections in a crowd to successful contact tracing with advanced text notification.

Using Container Services – Red Hat OpenShift achieves higher application density than server deployments, reducing hosting center footprint and power consumption beyond traditional virtualization technologies.

Container services has been a benefit to the IT organization and agencies by reducing the cost and administration overhead, improving system resiliency, and increasing the availability of critical applications like COVID-19 contact tracing.

Once the Container ecosystem was established, it fostered ongoing collaboration between the developers and infrastructure to monitor and capture metrics for improvement and streamlining processes for future growth.

Using Container technologies made it easier and faster to deploy the solution. The text message feature significantly improved the volume of answered phone calls made by local health department and volunteers with contact tracing efforts because people tend to read their texts. Other programs that are benefiting from this technology are:

- MDHHS modernized the Omnibus Budget Reconciliation Act (OBRA) application leveraging the Container platform. This program is used by the Office of Specialized Nursing Homes.

  The Omnibus Budget Reconciliation Act (OBRA) system evaluates and provides care for consumers with development disabilities. A Community Mental Health (CMH) agency performs an evaluation on the consumer and submits evaluation information for review.

- Platform for the next modernization of Michigan Disease Surveillance System (MDSS) will move to the Enterprise Container Services.

  The Michigan Disease Surveillance System (MDSS) is a web-based system that allows for the electronic capture of disease data for the tracking and case management of communicable disease. MDSS can receive electronic case reports using Health Level Seven (HL7) Clinical Document Architecture (CDA) for sharing data. Electronic reporting to MDSS fulfills the physician communicable disease reporting requirements and allows submitters to meet public health reporting requirements for federal programs such as Meaningful Use (MU) and the Quality Payment Program.

In 2020, DTMB was able to create an Enterprise Container Service offering, with attractive and competitive prices. OpenShift Container Platform has allowed the State of Michigan to offer consistent security, built-in monitoring, centralized policy management, and compatibility with Kubernetes container workloads. Kubernetes allows systems to automate application deployment, scaling, and operations. It is fast, enables self-service

provisioning, and integrates with a variety of tools. In other words, there is no vendor lock-in.

The interest in converting new ideas to an application quickly or modernizing traditional applications on a container platform makes this service appealing to our agency partners at the State of Michigan.

The Enterprise Container Service has allowed the State of Michigan to keep business on-premises with the added benefit of a white glove amenity from our knowledgeable technical team. This has been achieved by streamlining the interplay between Development, Security and Operations, enabling DTMB customers through process and culture to be successful.