COLORADO
Governor's Office of Information Technology

Upskilling & Removing Siloes: OIT Cloud Developer/Engineer Training Programs

State: Colorado

Agency: Governor's Office of Information Technology

Category: Business Process Innovations

Project Title: Employee-driven Concept Removes Siloes & Expands Skills

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Contact: Brandi Simmons, Chief Communications Officer & PIO
brandi.simmons@state.co.us | 720.601.5470

Cody Scott, Senior Manager - Systems Infrastructure
cody.scott@state.co.us

One of the truths of information technology is that it constantly changes and at exponential rates. Individuals who want to learn more are challenged as they continue to support legacy applications even as new technologies are implemented. The Governor's Office of Information Technology (OIT) has a cloud-first policy guiding our agency project support, application modernization and tech debt remediation efforts. The OIT Cloud Operations team has worked to develop core competencies, security, governance, and an AWS (Amazon Web Services) operating model that can also be used for future multi-cloud scenarios. For OIT's seven-person cloud operations team, their expertise was siloed, with team members stretched thin due to the demands for their experience in answering or troubleshooting basic questions, making minor and low-risk resource changes to the cloud environment, etc.

In April 2021, one of our industrious and innovative Cloud Solutions Architects saw an opportunity to step outside the box and authored a concept paper outlining a desired future state to rectify the problem and a proposed path. We needed to scale solutions delivery, ongoing support and expand cloud knowledge and proficiency by training others in the organization.

With the support of the Director of Infrastructure Operations, the team began by identifying infrastructure operations team members who would start supporting our internal and agency customers' cloud projects. The curriculum for infrastructure cloud engineers was developed in mid-2021; one session was offered to cloud personnel who keep systems operating (KSO) in July 2021 and one for solutions delivery personnel in May 2022. These selected members would form the initial teams to support the AWS Cloud program at scale.

The infrastructure operations team is only one of many parts necessary to create a successful cloud program. We leveraged the initial cloud operations training framework and created a second, tailored training framework for application developers within OIT to support additional scaling and fluency. The new AWS training program, created and delivered between February and April 2023, immediately contributed to the acceleration of several agency projects.

The development and execution of cloud operations and AWS training programs demonstrate how one employee's innovation and leadership have made a transformative difference for State of Colorado personnel and the Coloradans they serve.

IDEA

Out-of-the-box training from any cloud provider covers the basics of using their platform and services suite. However, there's a critical gap. The training does not cover how OIT implements the cloud platform and services concerning security, compliance, governance and operational standards. In April 2021, Sean Clark, one of the team's Cloud Solutions Architects, devised a solution - let's develop and offer customized training. He wrote and submitted a Scaling Native Cloud Project Support concept paper detailing the problem, desired future state fundamentals, and more.

> The initial scope is intentionally small… with a small, agile, and management team (to) avoid getting bogged down. Let's try something, fail fast, learn, and iterate.
>
> *Scaling Native Cloud Project Support concept paper*

With the sponsorship of OIT's Senior Director - Infrastructure Operations and OIT's Senior Manager - Systems Infrastructure, and the support of the cloud operations team, Sean set about developing and delivering a cloud operations support training program. The training program was a success, and within 12 weeks, we had double our current staff immediately supporting cloud operations. The training was next offered to build the second solutions-focused team to complement the platform and KSO teams.

Based on feedback and project demands from the development community, Sean recognized the opportunity to leverage his initial cloud operations training framework and create a second, developer-focused training framework to support additional scaling and fluency for OIT developers. Sean created and delivered the Developing on AWS training program, which immediately contributed to the acceleration of several agency projects.

IMPLEMENTATION

Infrastructure Cloud Operations Training Program
In support of IT transformation and skills modernization for cloud operations in native AWS Cloud infrastructure and services, we had the following goals and desired outcomes:

Goals
- Increase infrastructure operations engagement and involvement in cloud operations support.
- Address a sharp increase in demand from OIT and agency customers for cloud solutions and support.
- Modernize staff skill sets and empower staff.
- Enhance the lives of Coloradans through technology to set OIT on a path to becoming a great public service technology organization.

Desired Outcomes
- Applicable to anyone regardless of AWS skill set and experience.
- Interactive, collaborative and engaging training experience.
- Preparation for certification and accreditation.
- Apply developed skills after training with continued support to cloud operations.
- Foster a sense of investment, community and belonging within our organization.

Developing an AWS Training Program

Based on feedback from OIT's DevSecOps Community and the larger OIT Community of Practice, we created an application development training framework to complement the cloud operations training in late 2022. We delivered the training to a group of developers in the spring with the following goals and desired outcomes.
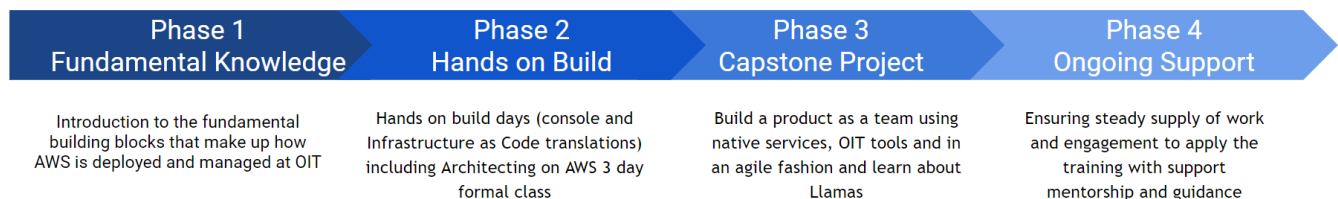
Goals
- Address the need for cloud platform knowledge and experience in our OIT development community.
- Provide training focused on a development role but useful in a broader context.
- Jumpstart developers on the use of a supported and operationally mature cloud platform
- Enhance the lives of Coloradans through technology to set OIT on a path to becoming a great public service technology organization.

Desired Outcomes
- Applicable to any developer regardless of AWS skill set and experience
- Interactive, collaborative, and engaging training experience
- Preparation for certification and accreditation
- Apply developed skills after training directly to active or backlogged projects.
- Foster a sense of investment, community, and belonging within our organization.

Infrastructure Cloud Operations and Developing on AWS Training Framework

We developed a four-phase framework for both training programs. Phases one through three lasted approximately eight weeks. Phase four is ongoing support as trained personnel begin to support project work.

Phase 1 Fundamental Knowledge	Phase 2 Hands on Build	Phase 3 Capstone Project	Phase 4 Ongoing Support
Introduction to the fundamental building blocks that make up how AWS is deployed and managed at OIT	Hands on build days (console and Infrastructure as Code translations) including Architecting on AWS 3 day formal class	Build a product as a team using native services, OIT tools and in an agile fashion and learn about Llamas	Ensuring steady supply of work and engagement to apply the training with support mentorship and guidance

A waterfall project management approach was used to build the framework, curriculum and training content as each phase builds on previous lessons. The time spent developing each training program was roughly 400 hours per program.

Infrastructure Cloud Operations and Developing on AWS Training Delivery

The OIT Cloud Operations team uses a combination of Scrum and Agile methodologies to identify, prioritize and execute work using the core tenants below. This approach was introduced to the trainees for hands-on build and capstone projects.

- Two-week sprint durations
- Sprint planning every two weeks
- A retrospective is held after every sprint planning session
- Continuous backlog grooming

The average weekly commitment for phases one through three was 22 hours per week per trainee for the first eight weeks. The following is a high-level summary of the approach per phase for each training program.

Phase 1 (Knowledge Management)

The main objective of this phase was to begin building basic knowledge of AWS and how it is used at OIT and to prepare trainees to be ready for the AWS Cloud Practitioner Certification exam. The training consisted of twice-weekly meetings to walk through prepared training material in slide decks and similar artifacts. Each session started with an interactive and competitive online trivia game related to the prior session's content to keep the training engaging and fun. All training sessions concluded with a collaborative knowledge check and discussion.

Phases 2 (Hands-on Build)

The objective of this phase was to give trainees hands-on experience by building an architecture, first via the console and second by translating the resources into infrastructure as code. This phase also includes a three-day architecting on AWS formal class.

Phase 3 (Capstone Project)

In this phase, the trainees work together to simulate a real-world sprint. They were tasked with building AWS resources via infrastructure as code to meet the deployment needs for a serverless application. Sprint planning and daily stand-up meetings were held to ensure they were on track to meeting the goal. Trainer(s) will serve as product owner, platform and application teams as part of the simulation. The capstone concluded with the trainees presenting a live demo— deploying the solution and application using build and release pipelines.

Phase 4 (Ongoing Support)

A focus on continued learning and ongoing support is critical. It's imperative that we not only provide a steady stream of work to keep acquired skills sharp but also provide needed support and mentorship for the trainees to execute work. As such, the following support channels were introduced:

- OIT Cloud Operations team office hours every Monday
- Calendar with personal office hours and time slots for mentorship

- Weekly touchpoints for assigned projects to review backlog, tasks and Q&A
- Dedicated Google chat rooms for each assigned project
- Project readiness reviews

IMPACT

14 people completed the *Cloud Operations* training and 17 completed the *Developing on AWS* training programs. Training sessions from both programs were recorded to allow additional staff to access the training content in a self-paced environment at their convenience.

OIT aims to be an employer of choice, and this training program greatly supports that goal. The training programs demonstrate OITs leadership's commitment to cultivating a culture that encourages professional growth and creates opportunities for advancement and change. This holistic approach to training doesn't produce engineers or developers that are only platform proficient, like many vendors used by agencies. Instead, graduates of these programs can securely and organizationally pursue new technologies with a significantly lower risk of creating unsupportable solutions.

The initial scope of our efforts was intentionally small. While not meant to be exclusive, the effort had to focus on smaller, agile and manageable teams to avoid becoming bogged down. Some of the immediate benefits upon the conclusion of the training programs were:

- Wait time for cloud operations project engagement was reduced from six weeks to one to two weeks.
- The bandwidth of cloud operations to support concurrent projects increased from eight to sixteen.
- Support of 14 projects from eight agencies.
- Portable and reusable curriculum, content and recorded training sessions are available to other OIT employees.
- The investment and cultivation expanded the community and increased cloud fluency among internal staff.

The development and execution of cloud operations and AWS training programs demonstrate how one employee's innovation and leadership have made a transformative difference for State of Colorado personnel and the Coloradans they serve. This project shows how OIT is stepping up for its employees and adopting new technologies the agencies want to use. It shows that we are investing in our people, cultivating a culture of collaboration, and adopting a proactive approach rather than a reactive catch-up perspective. It also shows how OIT leadership enables their employees to implement effective change and will support them throughout the project lifecycle.