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| **Description** | An innovative cloud application provisioning tool that provides advanced mission resource visibility, ease of use, and up to 50% cost savings in the AWS C2S environment. |
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| **Submitter Company** | Axios |
| **Focus Item** | September Focus Item |

# Needs

C2S developers require a streamlined tool to simplify resource allocation, management, and monitoring of mission workloads. Cloud Services Providers deliver powerful fee-for-service capabilities which enable users to easily access computing resources. The complexity required to efficiently utilize those resources however, can inhibit a developer from implementing their project in a straight forward and cost effective manner. AWS’ overly complicated auto-scaling feature, for example, typically isn’t used because of the complexity in implementing:

* Custom Threshold Metrics - Service Request Roles
* Launch Configurations - Auto Scaling Groups
* Alarm Creation - Policy Creation

More commonly, a developer will statically over provision resources to guarantee functionality.

Zephyrus’ primarily design goal is to abstract and simplify dynamic resource allocation and load balancing by hiding AWS’ inherent complexity. The added benefit of elegantly applying dynamic resource control, results in significant (up to 50%) AWS cost reductions.

# Approach

Zephyrus was developed under internal IRAD to explore cloud agnostic resource allocation, workload load balancing, and cost containment in anticipation of the governments cloud processing initiatives. In addition to greatly simplifying C2S resource provisioning, saving valuable labor hours, Axios also successfully implemented dynamic load balancing to efficiently distribute mission processing loads. Our Zephyrus financial results also show up to 50% cost savings in the C2S environment over a stock C2S environment.

Taking into account the current shortcomings of the AWS services, Zephyrus’ primarily design goal is to facilitate dynamic resource allocation while hiding its inherent complexity, dynamically “right-sizing” workloads & providing visibility in a cloud agnostic environment.

# Benefits

Zephyrus's primarily goal is to facilitate the use of cloud services by hiding its inherent complexity. After an initial configuration in which a Virtual Machine (VM) image is defined and adapted for a specific cloud service provider, users will be able to create, modify, remove, and launch tasks without having to know how they are executed in the cloud. To accomplish this goal, Zephyrus provides a web application with configuration, tasking, and visualization pages. Each page is designed to minimize cloud services knowledge requirements. The configuration page allows administrators to configure the system’s cluster behavior. Users can monitor the system’s health information through the visualization page.

Benefits:

* Cloud Agnostic Resource Allocation tool (supporting AWS, Azure, Google, etc.)
* Load Balancing between VMs
* Dynamic Allocation of Resources
* Tremendous cost savings
* Process Visibility
* Ease of use compared to AWS

With support from our GED Seven Hills program, Axios tested the Zephyrus concept on a multi-user mission application and compared operational costs. We ran two different scenarios and show the cost comparison in the table below. The first scenario provides resources for up to 60 simultaneous users assuming a typical mission usage scenario, and consumption of On-Demand Instances. The second scenario assumes there is some a priori knowledge of the production environment, which would allow the user to purchase Reserved Instances at a reduced cost in comparison to On-Demand Instances. In both cases we can see a cost saving of almost 50% when the Zephyrus framework manages the cloud resources.

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| Service | AWS | Zephyrus/AWS | AWS | Zephyrus/AWS |
| Scenario | Up to 60 users (On-Demand Instances) | Up to 60 user (On-Demand Instances) | Up to 60 users (Reserved Instances) | Up to 60 users (Reserved Instances) |
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| ECS | $9,876.84 | $3,567.25 | $6,449.74 | $3,035.56 |
| EBS |  |  | $515.29 | $403.37 |
| RDS | $0.00 | $556.32 | $0.00 | $365.38 |
| Other costs | $0.00 | $0.00 | $0.00 | $0.00 |
| Monthly Total | $9,876.84 | $4,123.57 | $6,965.03 | $3,804.31 |

# Competition

There is no direct competition to the Zephyrus resource allocation and monitoring tool as a cloud agnostic resource management and monitoring tool. The AWS C2S environment offers some primitive tools to create custom metrics and add alarms & policies to govern processes, but AWS does not deliver a comprehensive and easy to use solution for dynamically managing workloads in the C2S environment.