NOAA Cloud Pathfinder Proposal

Project Details:

Name: Oceanography at-sea Information System (OASIS)

Lead Developer:
Maureen Taylor (maureen.taylor@noaa.gov)
NOAA Fisheries / NEFSC / Information Technology Division (ITD)

Project Partners:
Chris Melrose (chris.melrose@noaa.gov)
NOAA Fisheries / NEFSC / Oceanography Branch (OCB)

Joshua Moser (joshua.moser@noaa.gov)
NOAA Fisheries / NEFSC / Project Management Branch (PMB)

Proposed Start and End date:
September 2021 – March 2022.

Project description:
The Oceans and Climate Branch (OCB) of the Northeast Fisheries Science Center (NEFSC) supports multiple surveys on the Northeast U.S. continental shelf yearly to understand the long-term changes in ocean conditions and to relate these changes to resource species and ecosystem dynamics. OCB provides conductivity, temperature and depth (CTD) instruments to all NEFSC cruises for the measurement of water column profiles of temperature and salinity. Approximately 2000 CTD casts are performed each year from 5-10 NEFSC surveys. Plankton samples are routinely collected simultaneously with the CTD cast in order to monitor the distribution and abundance of larval fish and zooplankton. This long data time series provides oceanographic context to other NEFSC programs, supports numerous research activities inside and outside of NOAA, and is incorporated into scientific advice for managers (https://www.fisheries.noaa.gov/new-england-mid-atlantic/science-data/noaas-long-history-water-column-sampling-northeast).

The **O**ceanography **a**t-**s**ea **I**nformation **S**ystem (OASIS) is a C# .NET desktop application that was initially developed and deployed in 2017 to support the data collection described here. Its core functions are to collect operations metadata and to perform preliminary processing and quality control of oceanographic sampling from deployed CTD instruments and from a variety of plankton nets. OASIS uses SFTP to transfer output data files from ship-to-shore, and scheduled network jobs perform nightly back-up using on premise servers. There are no proprietary or confidential data included in the file uploads. OCB reviews the preliminary data allowing them to provide near-real-time support and feedback to an ongoing survey, thus ensuring the quality of the data while also optimizing ship time. The preliminary near-real-time data are also shared externally with academic partners who ingest the data into oceanographic models. Due to security concerns with using SFTP and shared drives to provide access, cloud data storage is an alternative that should be explored with a proof of concept project. This project would also serve as a first step toward migrating application development to the Cloud.

Project technical & learning objectives:
The learning objective of this project is to refactor the existing application code to incorporate Cloud object storage technology. The developer will research existing APIs and SDKs that support uploading

files directly to bucket storage. Using appropriate access controls, the technical objective is to continue to provide daily access to the uploaded files both to OCB and to their external collaborators while using a more robust storage platform. Total storage should not exceed 2GB per month. Access rates will vary throughout the project duration with the highest rates occurring while the ships running OASIS are in the field. File versioning will be required to protect against data loss. There is also interest in learning how to deploy and test the application in a Cloud hosted Windows server instance. As part of this effort, the team will become more skilled at understanding the spectrum of available Cloud services and projecting their costs. A rough estimate for a 6-month project is $1.5k. This would be a significant learning opportunity for the developer, a functional improvement to how OASIS data are stored and accessed, and a process improvement for external partners wishing to have easy access to the preliminary data.

Estimated Timeline:

Working collaboratively with OCB, the Data and Development Branch (DDB) and the Project Management Branch (PMB) of the NEFSC are actively working on the next major OASIS software version with the goal of a phased deployment starting in the late Fall 2021. Key components of the software specific to OCB field operations will have been developed and tested by then to successfully conduct their Fall Ecosystem Monitoring Cruise. Software development and testing will continue into early 2022 in order to deprecate SFTP usage and to eventually migrate to Cloud storage. It is anticipated that the full release will be deployed on the spring resource survey which typically departs in early March. Project risks include competing demands for the developer's time, varying ship schedules, and establishing a suitable test environment for OCB to use in order to report bugs and to provide honest feedback. Fall back plans will include the continued use of shared folders for temporary data access.

Outreach

The knowledge gained and lessons learned will be shared throughout the NEFSC via the PMB and through the various existing "communities of practice" where NEFSC developers and project managers come together to collaborate. All work will be documented for the PMB and the application code will be available to share. This project will provide examples and practical lessons for others to follow and to leverage in their work. The team will continue to explore ways to improve applications development and data delivery. Progress and impediments will be routinely communicated internally and externally. This opportunity is viewed as an essential first step toward staying current with emerging trends in software development and data storage. As our collective knowledge and skills grow, it is highly likely that more projects will be initiated to expand upon the small but significant success.