



The Digital Lab for Computational Science

Automated, Reproducible, Collaborative

Trustworthy products can only be developed based on experiments that are repeatable. It's often assumed that computational experiments can be easily reproduced because computers can run the same computation multiple times and deliver identical results. In practice however, code written by a researcher in one environment might deliver different results in a different environment, or perhaps not run at all. Add customized tools, specific protocols, and the increased usage of "single-use code", and it becomes apparent why reproducing the results of computational experiments is hugely challenging. With complex cloud and high performance computing environments, computational scientists need their own digital lab to manage increasing complexity.

The Code Ocean Digital Lab for computational science is a standards-based environment that allows researchers to collaborate more quickly, seamlessly, and effectively by preserving a record of the data and code of every result. The result is complete visibility, lineage, and exact reproducibility of every computational experiment.

The Digital Lab brings together three unique capabilities:

- 1 Code Ocean unifies pipelines, data science, and machine learning (ML) techniques in one environment.**
Combine different languages and computing approaches within a single experiment or build complex pipelines using the Code Ocean Visual Pipeline Builder.
- 2 Code Ocean's Open Science Library (OSL) is a direct connection between leading-edge computational research and the enterprise computational lab.**
With computational research from the world's leading journals – Nature, IEEE, Elsevier, and others – the OSL is a direct connection to vital research, ready to use pipelines, and useful Compute Capsule utilities. Code Ocean curates the most valuable content that is accessible by the Code Ocean Computational Laboratory for enterprise.

3 Code Ocean’s Compute Capsule technology guarantees reproducibility, automates DevOps tasks, and ensures no lock-in.

By encapsulating the essential triplet of reproducible research – environment, code, and data – the Compute Capsule is a standard computational element that guarantees reproducible results. Scientists choose from pre-configured and customizable computing environments, import a standard git repository, and select standard data files from internal or external sources. Once an experiment is ready to run, the underlying scripts and management of git, Docker, and Nextflow automation launch analysis into the cloud with a single click.

The Code Ocean Laboratory for Computational Science provides the standard digital laboratory that spans scientific disciplines, languages, and data sources and assists researchers in uncovering new insights faster and more efficiently. Case studies by Code Ocean customers demonstrate the benefits of a standard computational lab, including the ability to:

- Eliminate time wasted by computational scientists on computing setup and DevOps instead of focusing on research
- Guarantee that collaborators can reproduce research algorithms and analyses without fighting different environments, packages, or dependencies
- Create a single view across the entire science team to unify scientific efforts
- Control access to sensitive, protected patient data and organize valuable data assets in a standard repository
- Seamlessly share bioinformatics tools and complex pipelines to quickly equip bench scientists with the most advanced computational techniques

Code Ocean’s Digital Lab is designed to provide researchers with a single, digital space to create, organize, and share computational research.

Code Ocean standardizes the research workflow to create, track, and share computational experiments, including:

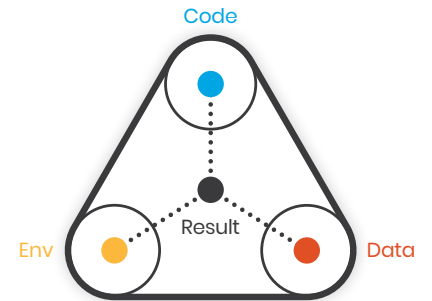
- Configurable environments for popular languages: R, Python, Matlab, C/C++,...
- Visual pipeline builder to create complex analysis pipelines from simple modules
- Single click launch into the cloud with configurable resources
- A centralized, reproducible repository for code, data, and results
- Sharing and access control for individuals and groups across data and projects



The Code Ocean Reproducible Compute Capsule: A New Container Technology Designed for Science

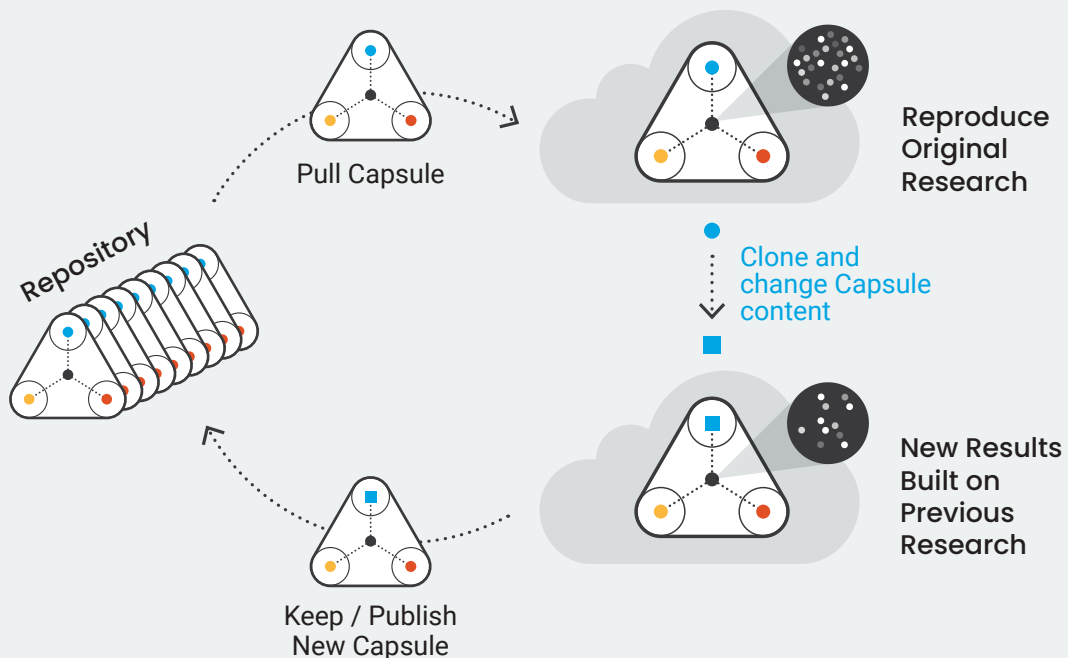
Code Ocean's Reproducible Compute Capsule is a self-contained computational experiment with computing environment, code, data, version history, and results. Capsule results are guaranteed to be reproducible today or years from now. No more fighting with custom computing environments across an organization or out-of-date packages.

The Compute Capsule does not lock up your code or data. Founded on an open standards format and built on F.A.I.R. principles, the entire contents of Compute Capsules can be exported to other environments such as git repositories and Docker files.



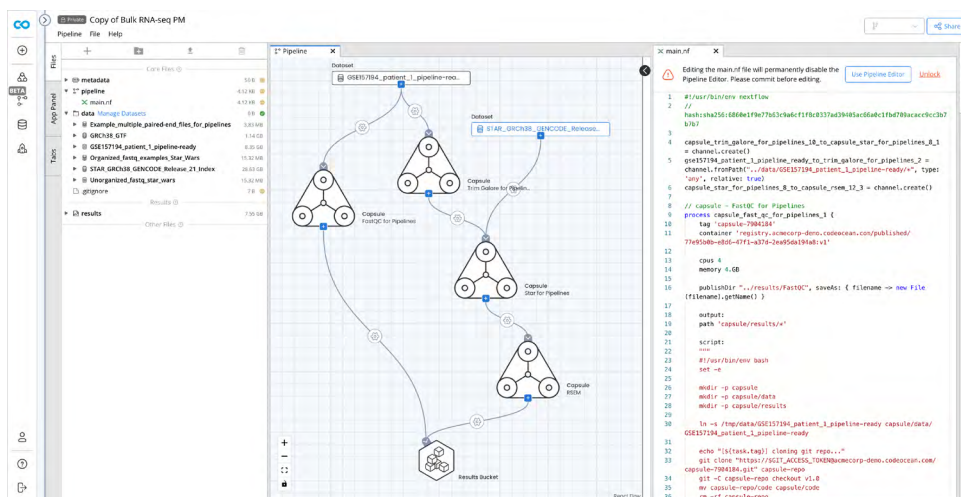
How It Works

Compute Capsules, our foundational container for science, help the coding scientist combine bioinformatic pipelines and secondary analysis in one place.



The First Visual Pipeline Builder to Simplify the Creation of Complex Workflows

Creating complex pipelines often involve complex scripting and deep knowledge of cloud batch services. Code Ocean has developed a simple interface to build complex workflows. With a simple drag and drop interface, pipelines built using the automated Nextflow script builder are packaged as reproducible Capsules that are launched onto **AWS Batch** with a single click. In addition, Code Ocean provides reference pipelines and pipeline modules that can be combined, modified, and customized.



The Open Science Library: Publish Computational Research with Guaranteed Reproducibility

Browse through the Open Science Library to view the wide and ever-expanding range of research available from Code Ocean’s community of researchers in academia, leading publications, and independent researchers. Each computational experiment is complete with source code, data, and results – all ready to run on AWS.

The Code Ocean Reproducible Compute Capsule is the only portable, holistic scientific container with the essential triplet of reproducible research: code, data, and computing environment. Version control and computing infrastructure are automated and sharing a reproducible experiment with colleagues is just one click away.

Take the Next Step

Request a Demo

Browse the Open Science Library

