



# Navigating New Frontiers: Mapping NeSI's progress with the new Open OnDemand Training Environment

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# NeSI in a nutshell:

## Core Services



High Performance Computing & Data Analytics



Consultancy



Training



Data Services

## Disciplines Supported



Biology



Engineering



Astronomy



Physics



Chemistry



Computer Science



Medical Science



Earth Science



Social Science



Mathematics



## Shared infrastructure



Māui



Mahuika

>160 million  
CPU core hours  
available per year

>1.3  
petaflops  
peak performance

>130  
GB/s  
IO bandwidth

Data replicated in Auckland. National research network provided by REANNZ.



24 PB  
in tiered data storage



8  
managed endpoints across the  
National Data Transfer Platform,  
linking New Zealand institutions  
to NeSI's HPC platform and other  
endpoints around the world.

# Scene Setting: What to expect

- **Scaling Digital Training:** Scaling out digital skills training remains a perennial challenge—it requires supporting a community of trainers, institutional support, quality materials, and a dedicated platform to conduct the training.
- **Our Aim:** To empower researchers by providing the necessary computational resources and expertise, making training environments easily accessible and scalable.
- **Cloud Infrastructure Choices:** Leveraging cloud infrastructure has been key.
- **New Capabilities:** Providing more flexibility and repeatability in delivering training workshops.
- **Outcomes and Next Steps:** We've already run numerous workshops using this approach and received valuable feedback to improve further. We hope to share some of these gems with you!

# Why?

- **Scalability & Customization:** Training environment can be tailored to different skill levels and scalable to accommodate multiple learners simultaneously, ensuring flexibility for various training needs. Ease of software setup; minimizing discrepancies and troubleshooting time during workshops.
- **Hands-on Experience:** It provides a safe platform for New Zealand based researchers to experiment, make mistakes, and troubleshoot in real-time, which reinforces learning through practical application - all while having the freedom to do this independently, without us as intermediaries!
- **Controlled Learning Space:** A dedicated training environment allows for the creation of a controlled and consistent space for learners and trainers to practice skills without impacting live systems or production environments.

# Internal project: NeSI's training environment

- Started off as a learning experience for NeSI
  - Applying repeatable code using Ansible and Terraform
  - A way to provide training outside of NeSI
- Delivered over 23 training events using the new training environment
- Technology used
  - Open OnDemand, Keycloak
- Tooling
  - Terraform, Ansible, Github action
  - launch, use, and destroy pattern

# Use Case

- Choices made, use of our new Cloud infrastructure
  - What we can do now that couldn't do before
- Infrastructure as code
- Repeatability
- Enabling researchers - anyone being able to spin up a training environment

## Download files

You need to download some files to follow this lesson.

1. Download [shell-lesson-data.zip](#) and move the file to your Desktop.
2. Unzip/extract the file. **Let your instructor know if you need help with this step.** You should end up with a new folder called `shell-lesson-data` on your Desktop.

## Install software

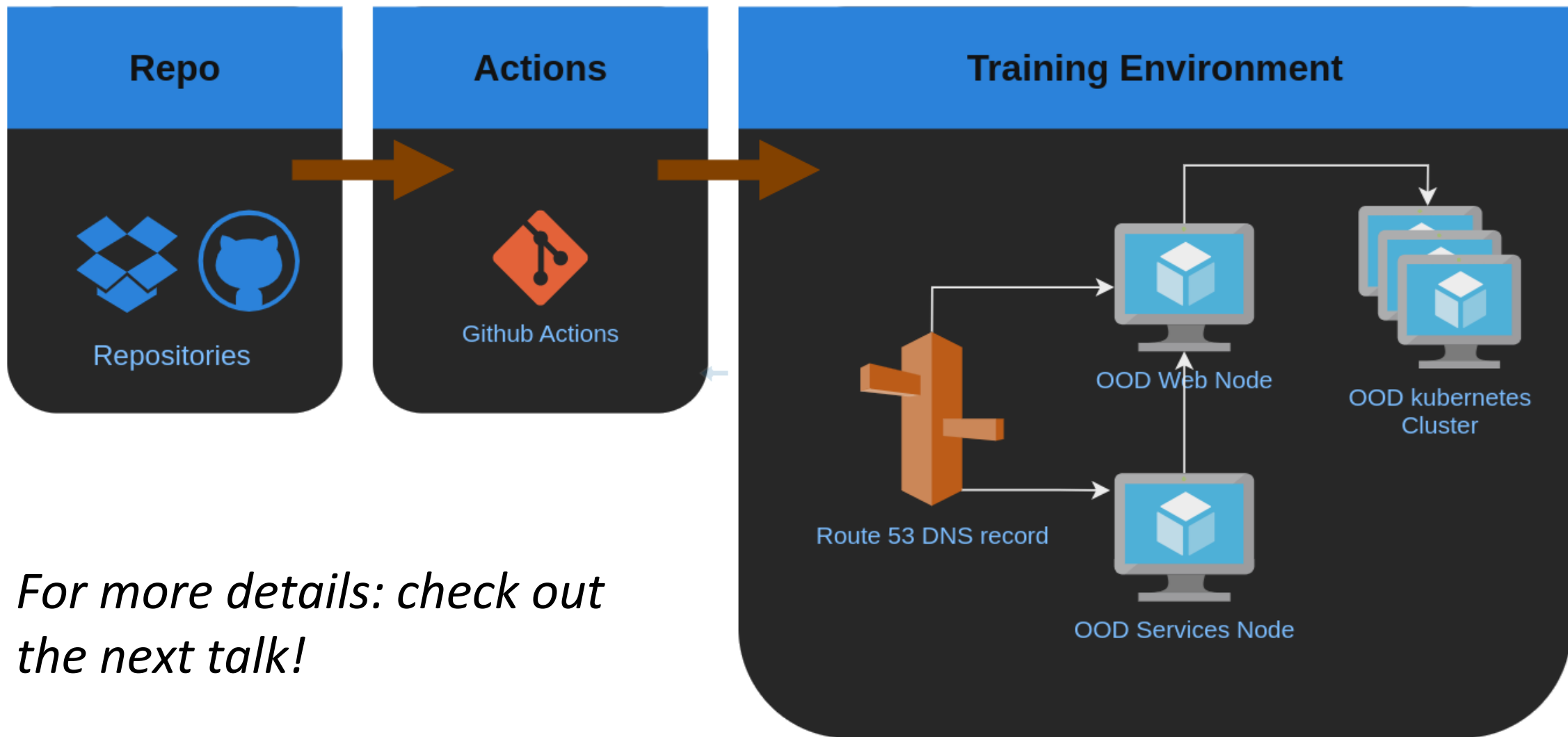
If you do not already have the shell software installed, you will need to [download and install](#) it.

No more downloading/  
installing software!



“The environment has got  
this covered!”

## Introduction to Unix Shell (SWC lesson)



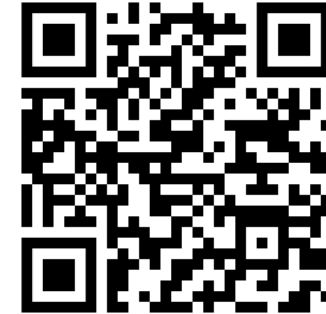
*For more details: check out the next talk!*

# NeSI training environment

- Training Environment Git Repo
  - <https://github.com/nesi/training-environment>
  - MK docs version: <https://nesi.github.io/training-environment/>



**Github**



**MK docs**













**NOTICE:** Each user is restricted to one running session (app) at a time. If you need to restart a session, e.g. to run a different app, first delete your existing session via [My Interactive Sessions](#), wait for 1 minute (important) for the old session to be deleted and then launch a new one.



NeSI Training Environment

### Training Course Apps

 <b>ML101</b> System Installed App	 <b>ML102</b> System Installed App	 <b>RNA-Seq</b> System Installed App	 <b>scRNA-Seq</b> System Installed App
 <b>RStudio</b> System Installed App	 <b>Intermediate shell for bioinformatics</b> System Installed App	 <b>Containers workshop</b> System Installed App	 <b>Introduction to Nextflow Workshop</b> System Installed App
 <b>code-server app</b> System Installed App	 <b>Python</b> System Installed App	 <b>Introduction to Shell ( for bioinformatics)</b> System Installed App	 <b>RStudio-IndigiData</b> System Installed App

### Active interactive sessions [view all \(1\)](#)

RNA-Seq (rnaseq-tjv6dmb) **2 cores** | Running

Host: 10.1.0.47



Created at: 2024-10-16 09:03:47 NZDT

Time Used: 4 hours and 50 minutes

Session ID: 1ee3307f-fbb3-4b2a-bcaf-55d251be4015



Interactive Apps
Desktops
Desktop
Servers
Containers workshop
Intermediate shell for bioinformatics
Introduction to Nextflow Workshop
Introduction to Shell ( for bioinformatics)
ML101
ML102
Python
code-server app
<b>RNA-Seq</b>
RStudio
RStudio-IndigiData
scRNA-Seq

## RNA-Seq

This app will launch [RStudio Server](#) for the RNA-Seq workshop.

Hours

Launch

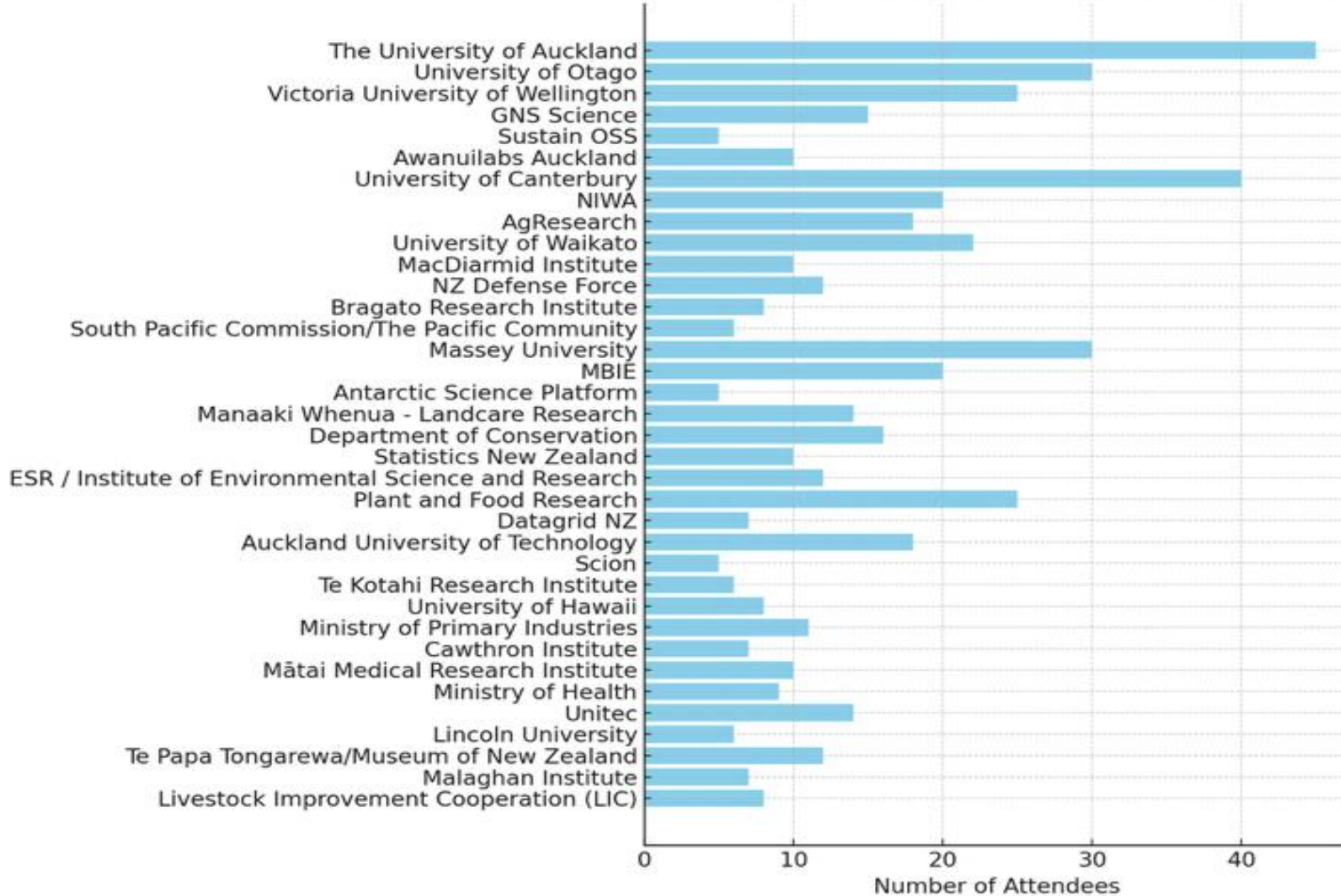
\* The RNA-Seq session data for this session can be accessed under the [data root directory](#).

# Workshops hosted so far...

- Machine Learning 101 (Scikit learn)
- Machine Learning 102: Image Analysis on NeSI
- Introduction to R
- Intermediate R
- Single Cell RNA Sequencing
- RNA Sequencing
- Introduction to Python
- Object Oriented Programming in Python
- Introduction to Next Flow Developer
- Introduction to Containers
- Introduction to Command Line

# Achievements & Highlights

# Institutional Affiliations of Attendees at NeSI Workshops



*\*approximate figures for attendees numbers*

# Feedback from our partners



“The NeSI training environment has already made a huge difference to how we run our online training workshops. Getting everyone logged in is now quick and easy, we save so much time on that alone. Having specific environments with all the resources loaded and ready to go means our workshops run smoothly. We can be confident that things will work as expected”

Dr Tyler Mcinnes  
Training Coordinator, Genomics Aotearoa

# Feedback from our team member



“No more hours of setting up redundant user accounts and having to explain how to use 2 Factor Authentication. On average (as a guess) 10-15 minutes per account saved.”

Matt Bixley  
Research Support Specialist, NeSI

# Learnings & Next Steps

- Importance of Versioning
- Improved UI
- Next steps:
  - Enabling machine learning training at Manaaki Whenua Landcare Research
    - *“We provide the environment, they do everything else!”*
  - Slurm environment
  - GPUs



Ngā mihi to the team behind this effort!





Please feel free to reach out to us at  
[training@nesi.org.nz](mailto:training@nesi.org.nz)

Thank you! 😊