



# DREAM Legacy

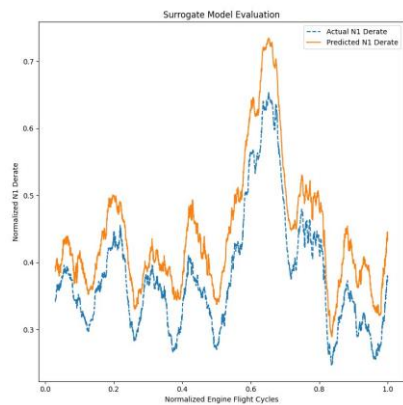
- Neural Net Modeling of N1 Derate and EGTM

OAT

Altitude

TOGW

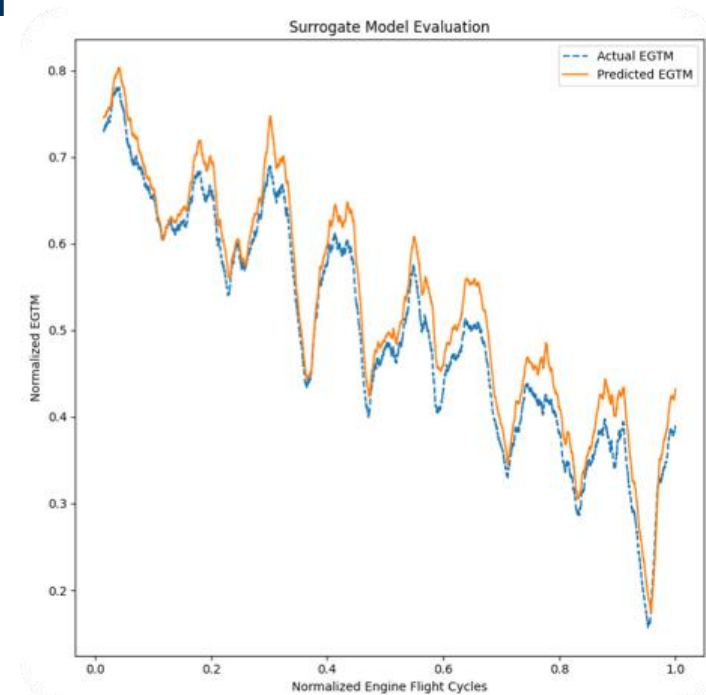
Runway Length



N1 Derate

Past Cycles

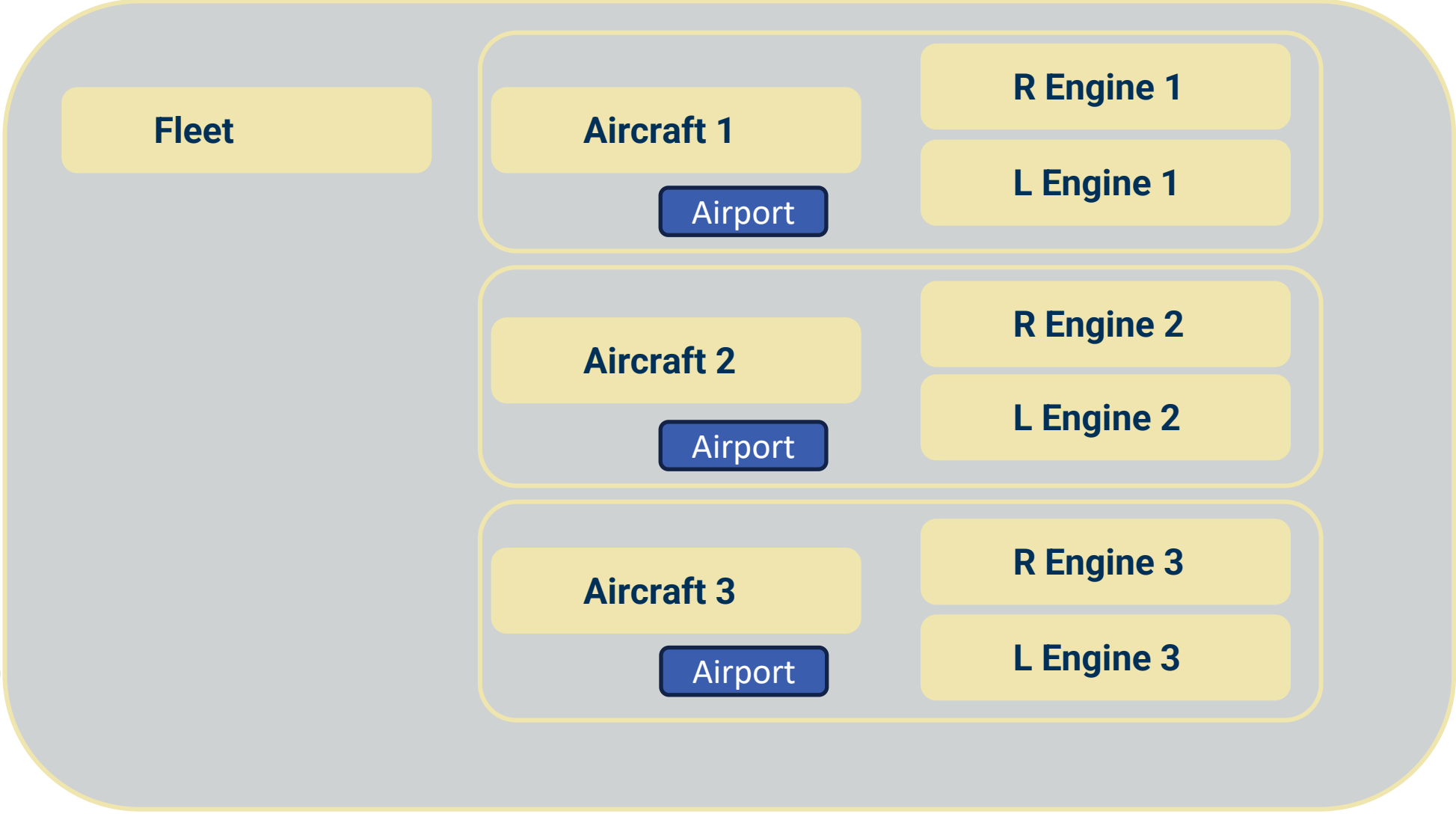
Predicted EGTM



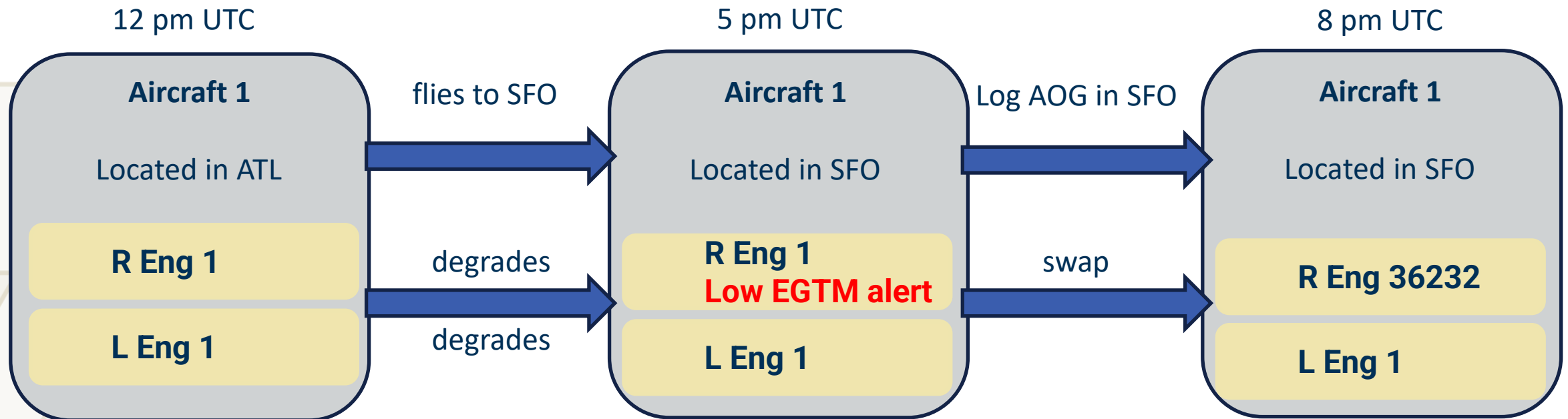
# Codebase Refactoring

- Object-oriented in Python
- Code clarity
  - Naming schemes using units, everything documented with git logs concise
  - Reduced lines of code by ~60 percent
- Improved performance
  - An 8-hour, multi-computer simulation now runs in only a few hours
- Scalable fleets
  - Able to fully replicate a Delta-like 737-800 fleet, easily scalable for the future to other dash numbers, other engines, other planes
- Scalable scheduling logic
  - Able to simulate operations with a schedule that changes depending on logic
- More airports
  - Over 80 airports in North and Central America now represented

# Modular Object-Oriented Code



# Modular Object-Oriented Code Example



Now Aircraft 1 has a different engine and will continue to use airport information to degrade its engines while flying to its destinations.

# Handover for next Grand Challenge

- Github Repo to be shared
- README.md containing rules and explanation of functions
- Hosted on my student account
- [https://github.gatech.edu/mgraham46/Delta\\_Engine\\_MRO/tree/main](https://github.gatech.edu/mgraham46/Delta_Engine_MRO/tree/main)

## Delta Engine Degredation Model

*Created by ASDL's SoS Grand Challenge D.R.E.A.M. in Spring 2024 Repackaged by M. Graham Macy in Summer 2024*

### Intro

This repository contains functions that are meant to simulate engine degradation and engine swapping within a flight operational framework. Data from Delta TechOps Propulsions Team has been used with permission in order to create a neural net model for engine degradation. Using airplane location, the engine degradation model can "degrade" a simulated engine by keeping track of its flight cycles on life-limited parts (LLPs), and increasing its EGT (exhaust gas temperature) with respect to engine cycle and environmental effects at point of takeoff.

### How to use this code

This code may be used to simulate aircraft of fleets of aircraft flying to different locations, incurring maintenance costs and AOG time (aircraft on ground), burning fuel, and spending time in the air. One may wish to visualize engine degradation of a specific engine or a whole fleet of engines. One may wish to alter a flight schedule or operational policy and note the effects on engine degradation. Since this code is meant to be a base model, one may also build upon this code in order to create fleets of different aircraft, use a different engine degradation model, or create unique flight policies.

### Rules for Changing this Code

#### How to write a commit:

- Change **ONLY ONE THING AT A TIME**
- Commit the change with a short message explaining the change in **PRESENT TENSE**
- Give a short explanation **WHY** the change is being made.