

The WebMOOS Framework

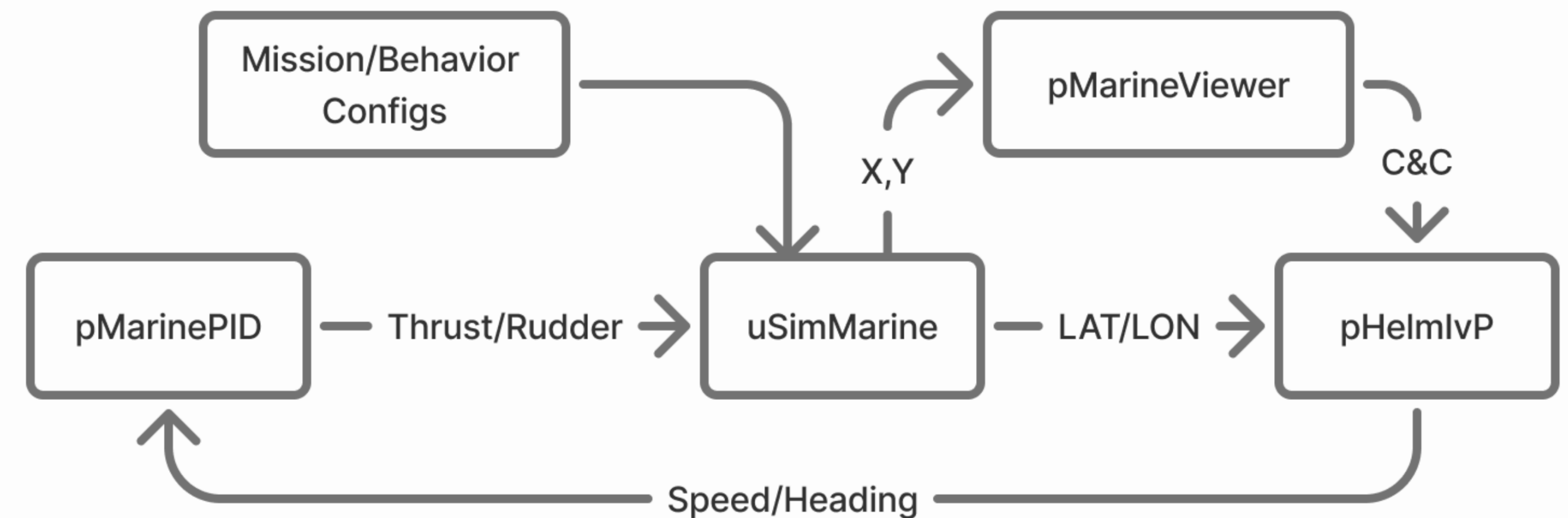
MATHEW SCHWARTZMAN | MAY 2025

Toward standard interfaces for high-level
Autonomy Simulation with MOOS-IvP

ABSTRACT

Digital simulation of robotic systems is a near-universal need in the development of new autonomy. That need is exponentially increased in the case of oceanographic engineering, which remains one of the most expensive applications of the technology. While many modern robotics simulators aim to implement high-fidelity physics engines and 3D graphics, this paper highlights the conversely lightweight toolset used in the MOOS-IvP ecosystem for high-level and multi-vehicle simulation. Additionally we evaluate a modular container stack, WebMOOS, containing an API and other microservices that serve a set of standard interfaces for new engineers and scientists.

MOOS APP PARADIGM



DESIGN TENETS

Modular

Swappable, containerized components without SPOF

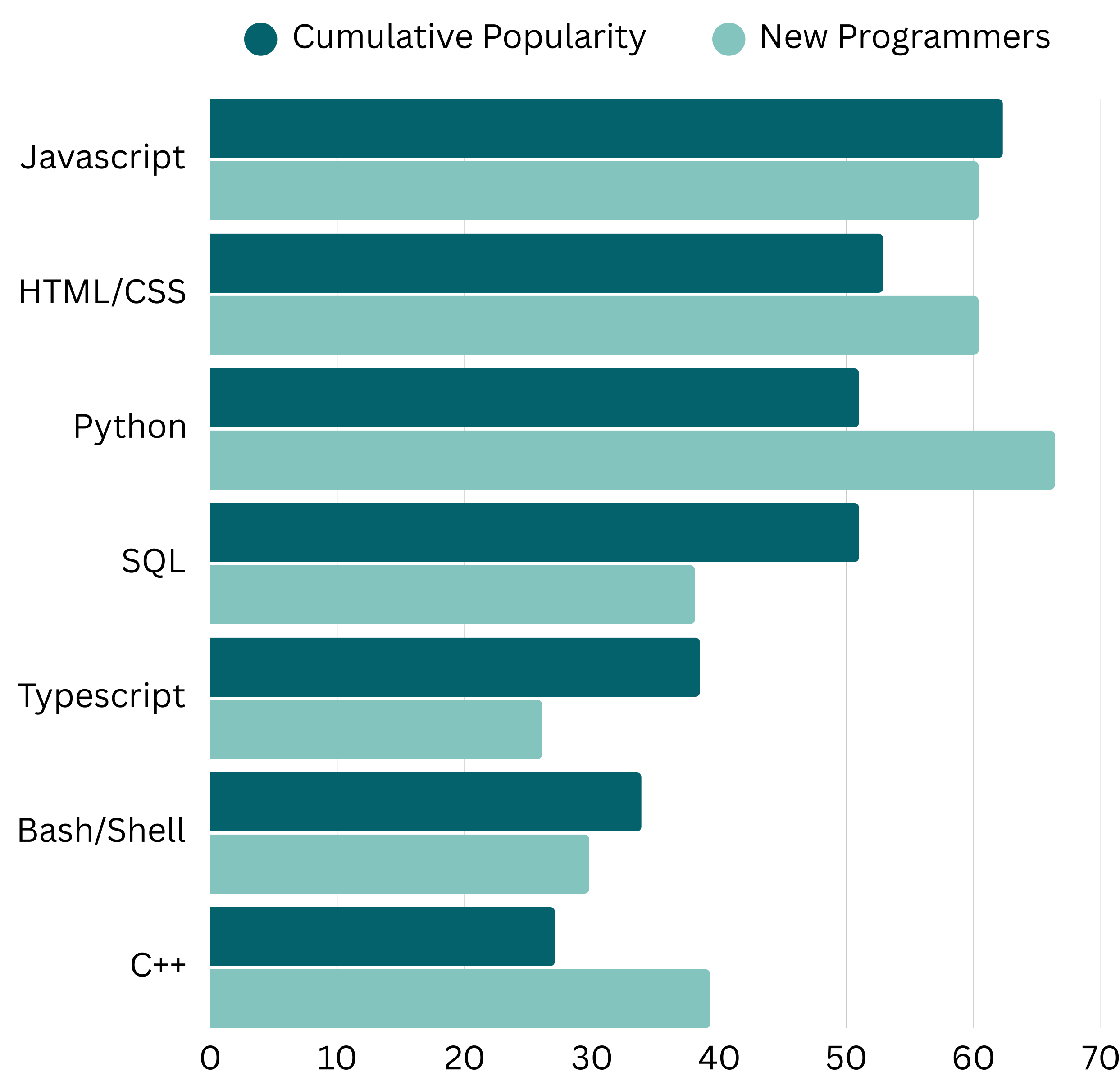
Mutable

Tests programmatically configured/enhanced

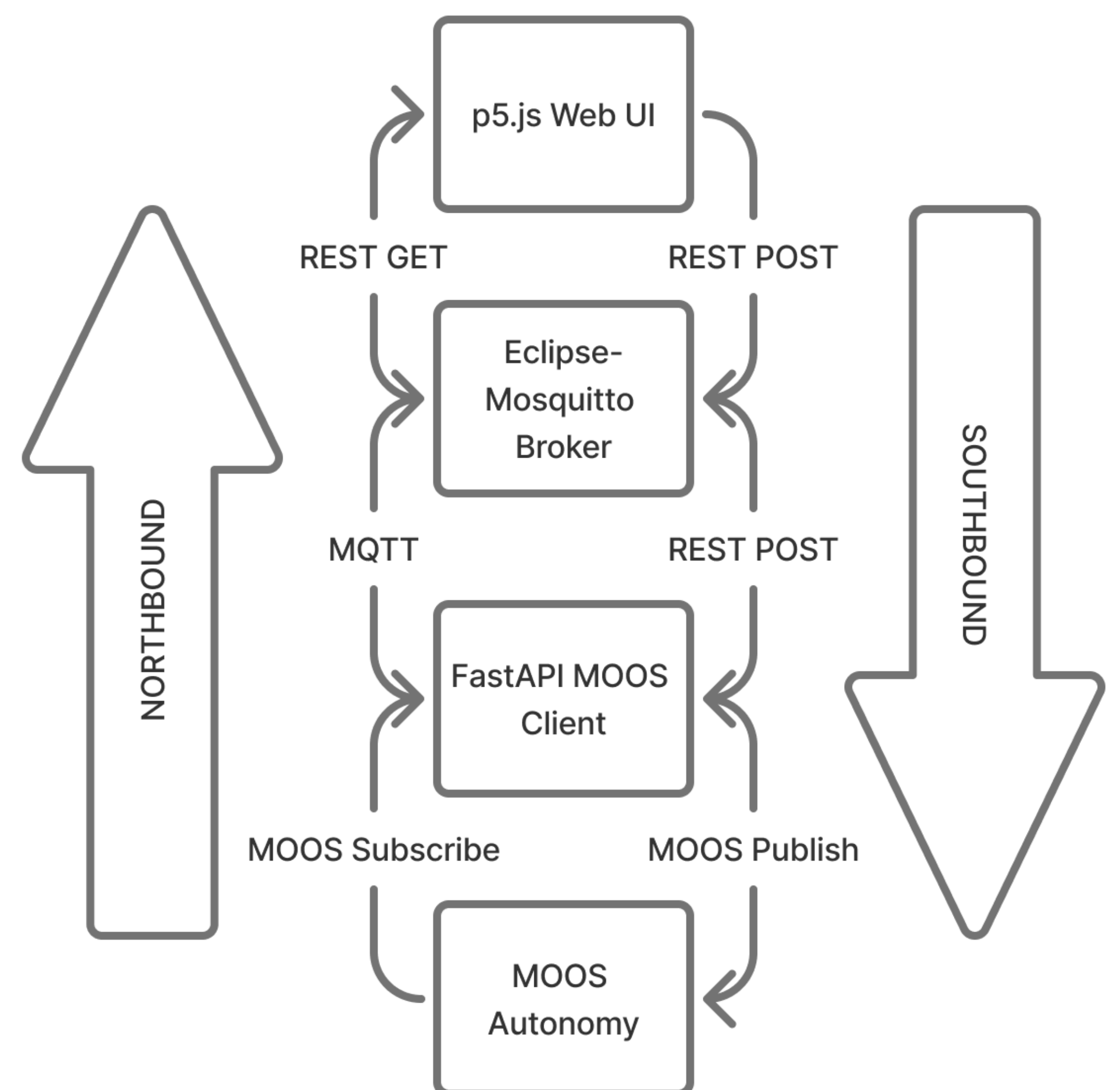
Faster-than-realtime

Can be run repeatedly and rapidly
30+ times faster than realtime

DESIGN JUSTIFICATION



MESSAGING ARCHITECTURE



FUTURE WORK

- More robust and feature-complete (while still thin and modular) UI built in modern web framework
- Deployment at upcoming NEREID Ocean Science Hackathon for comprehensive student beta-testing
- Collaboration with simulator developers for more flexible environments



KEY REFERENCES

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