The Drawer War: A Research Project on the Applications of Unity's ECS

GAM400 – Team Tacks Evasion

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Introduction

- Built tools using ECS
- Abstracted away the ECS, enabling easier use
- Work more productively

Our Physics Engine

"It doesn't have to be correct, it has to look correct"
- Dongho Lee, 2023

Objects Should Transfer Energy

Objects Should Move Correctly

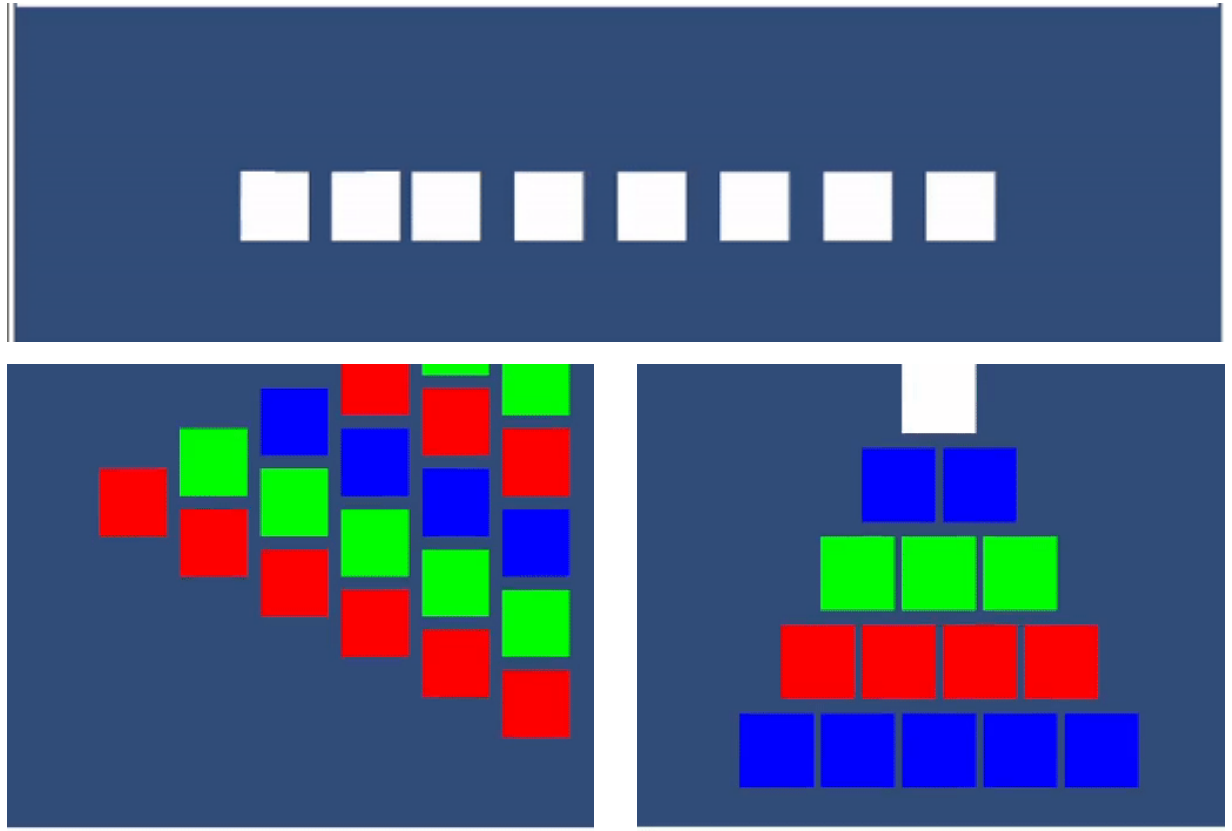
Objects Should Stay Correctly

- Calculations should be very accurate to stay still!
- Erin Catto, Allen Chou, Kevin Yu

Let Us Show You Just How Bad ECS Physics Is

Things you can't build in ECS built-in physics:

- Newton's Cradle
- Tower
- Pyramid

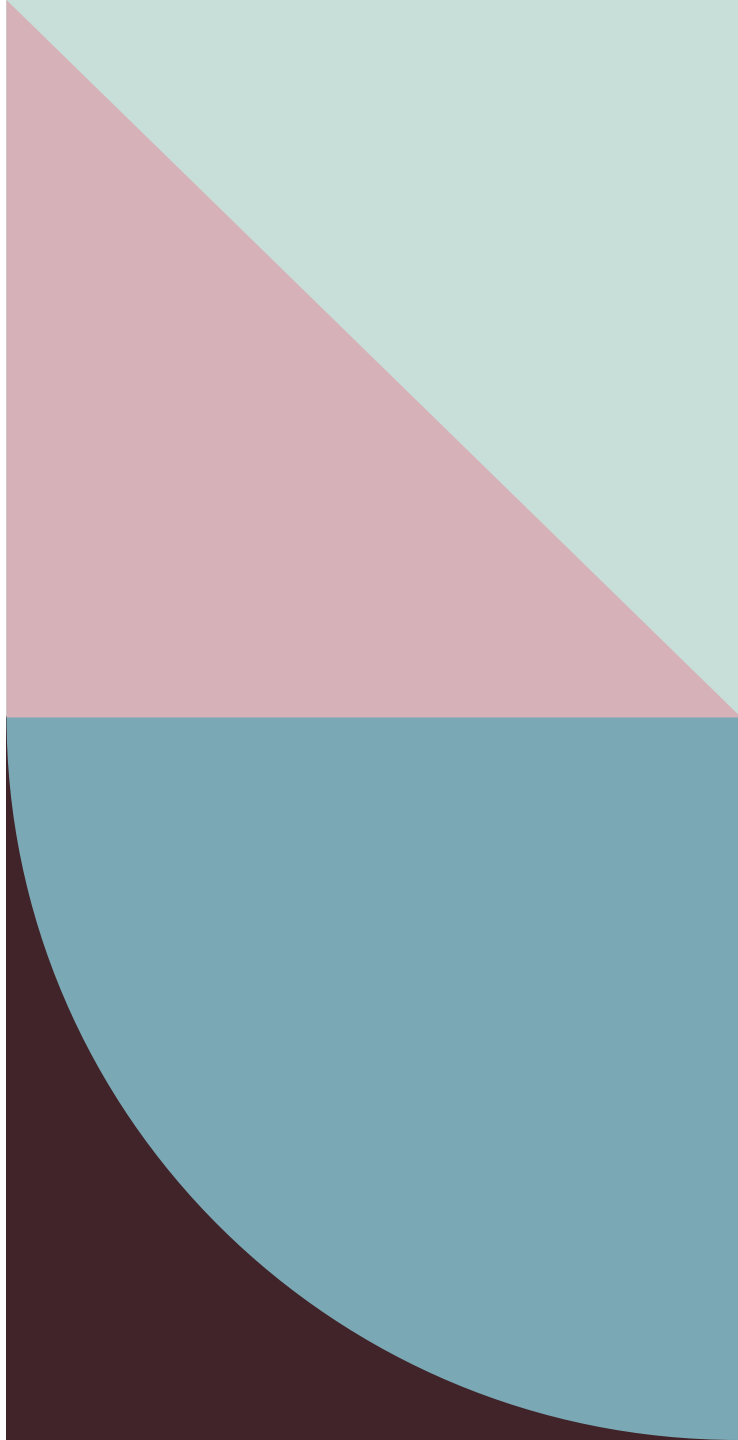


Our Physics Engine Is Not Just Good, It Is Better

- Demo time!

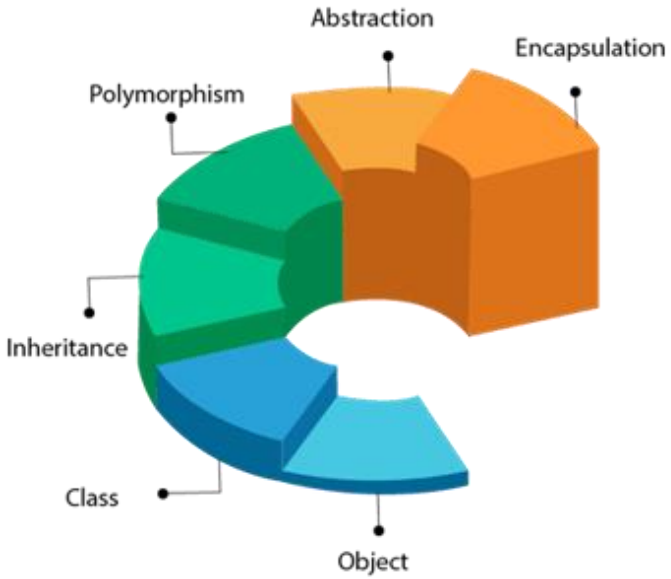
AI Goals

- Robust and Expandable Framework
- AI Movement Behaviors
- PERFORMANCE!!!



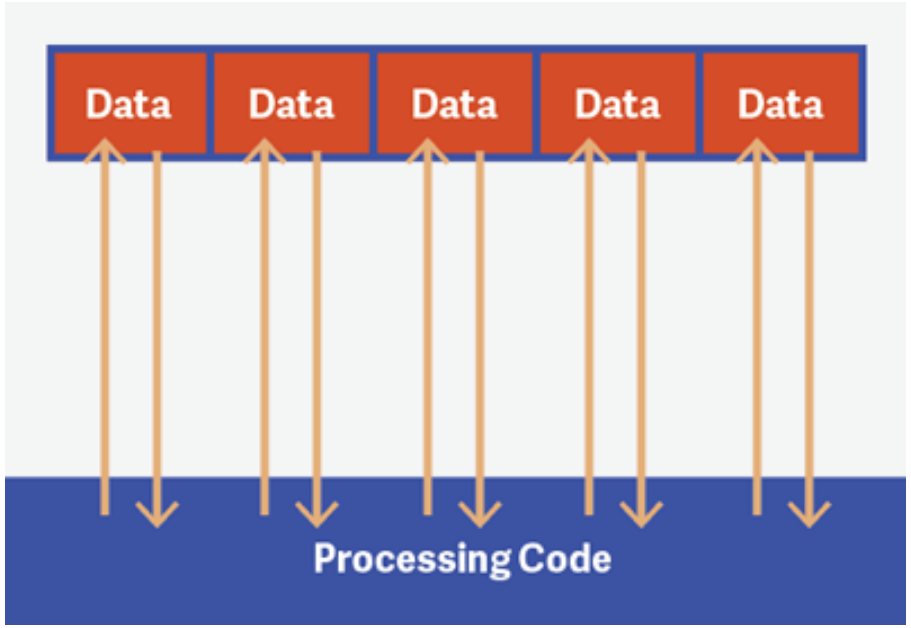
Getting The Best of Both Worlds

Object Oriented Programming



- Abstraction of ideas
- Organization of code

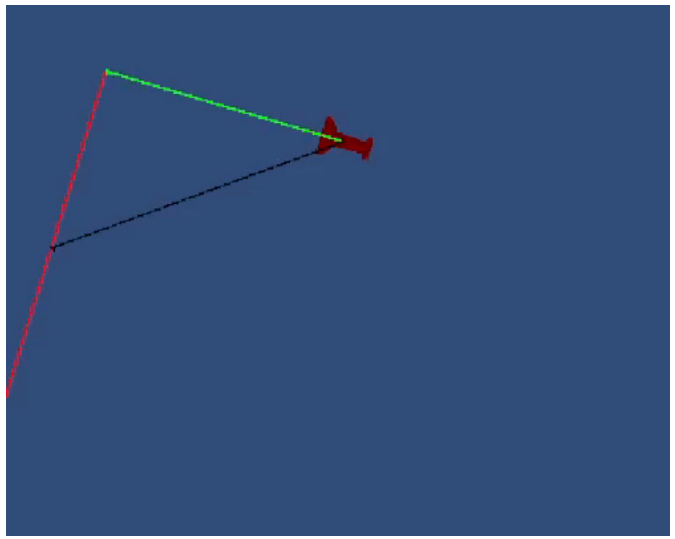
Data Oriented Programming



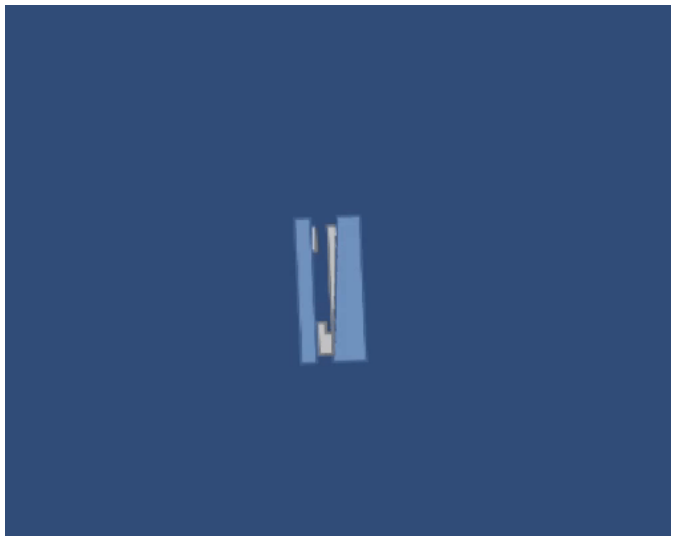
- Linear layout of data
- Performance

Enemies can Seek, Wander, and Tether

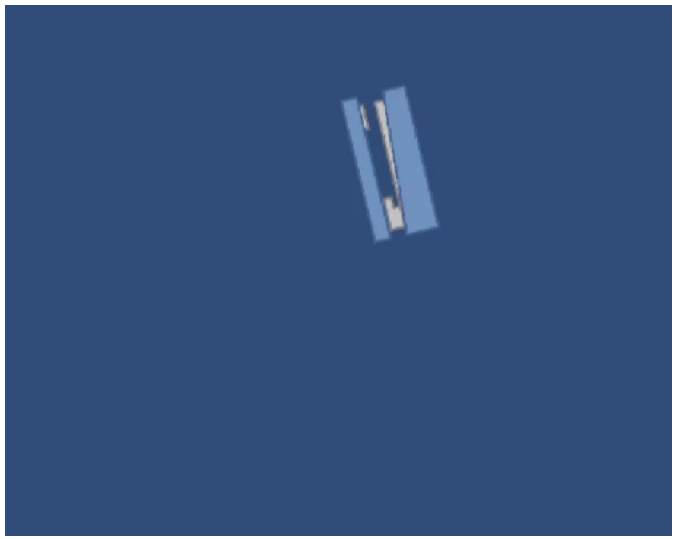
Seek

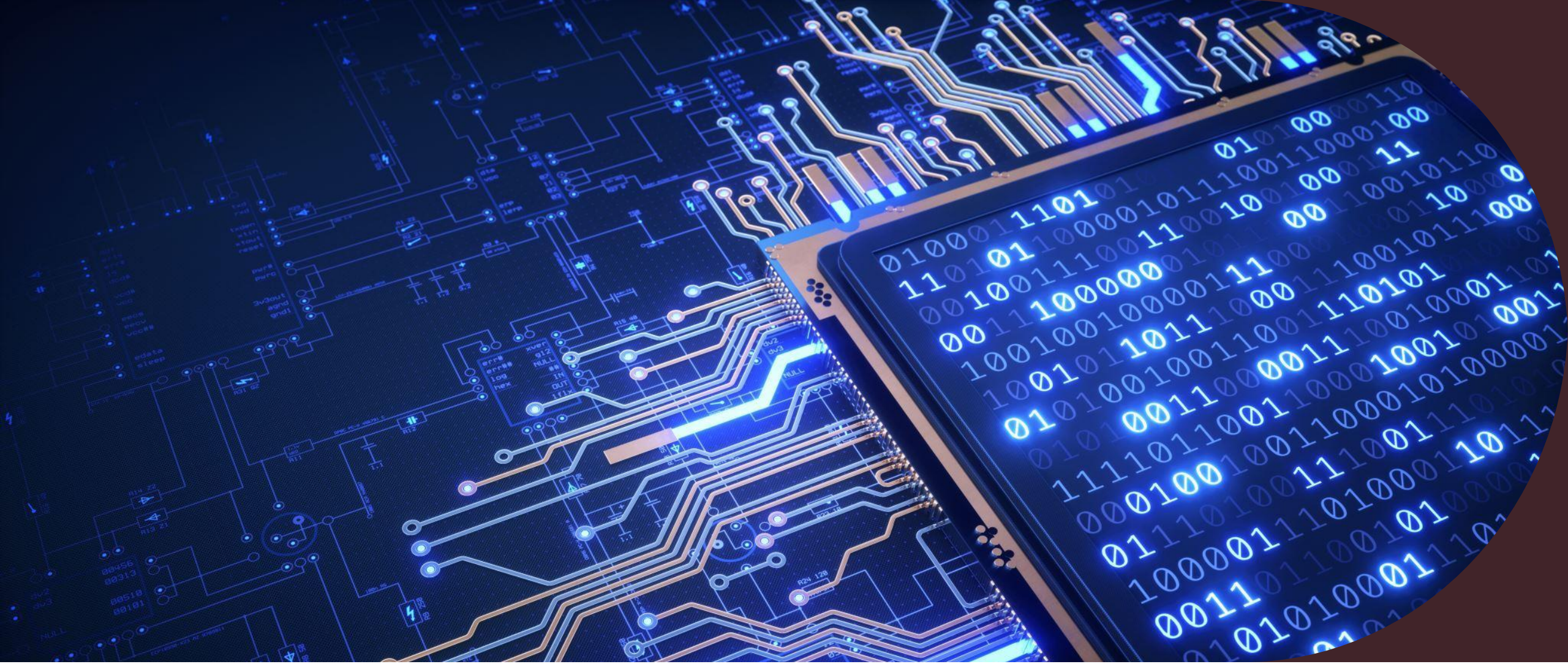


Wander



Tether





Performance Demo

Risks and Mitigations

- Unity ECS has poor documentation
  - Communicate with David
  - Look at ECS's siblings
- Physics engine is not performant
  - Algorithmic improvements (broad phase, sleeping etc.)
  - Tighter coupling with ECS
- AI does not have much to show
  - Demonstrate backend capabilities with performance test
  - Demonstrate expandability by adding a variety of AI behaviors

Findings and Conclusion

Thank You!