Simplicity Scales:

Rewriting to a Django Monolith and Monorepo

Rayan Daod Nathoo
ML Engineer @ Atinary Technologies

PyCon Italia 2026
Thursday May 28th, 15:20 - 16:05

ATINARY

My Intro - Rayan Daod Nathoo

- Machine Learning Engineer
- Previous experience in ML Research and Software Engineering
- MSc. Computer Science @ EPFL
- rayan.daodnathoo.com

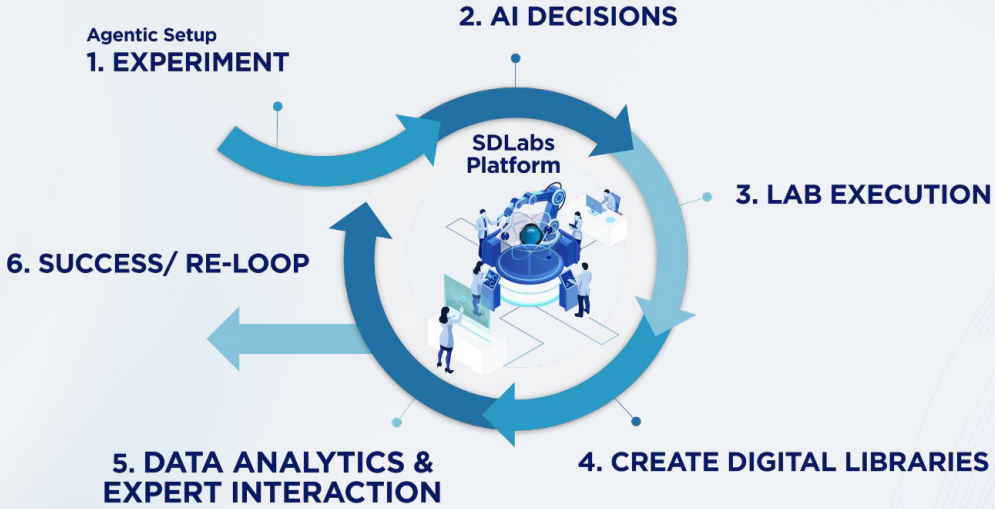
Our Company - Atinary Technologies

- Swiss-American startup founded in 2019
- Augmenting scientists with Physical AI and Robotics to accelerate R&D
- Multi-disciplinary team - ML, Chemistry, Software, …

Team based in Switzerland and US

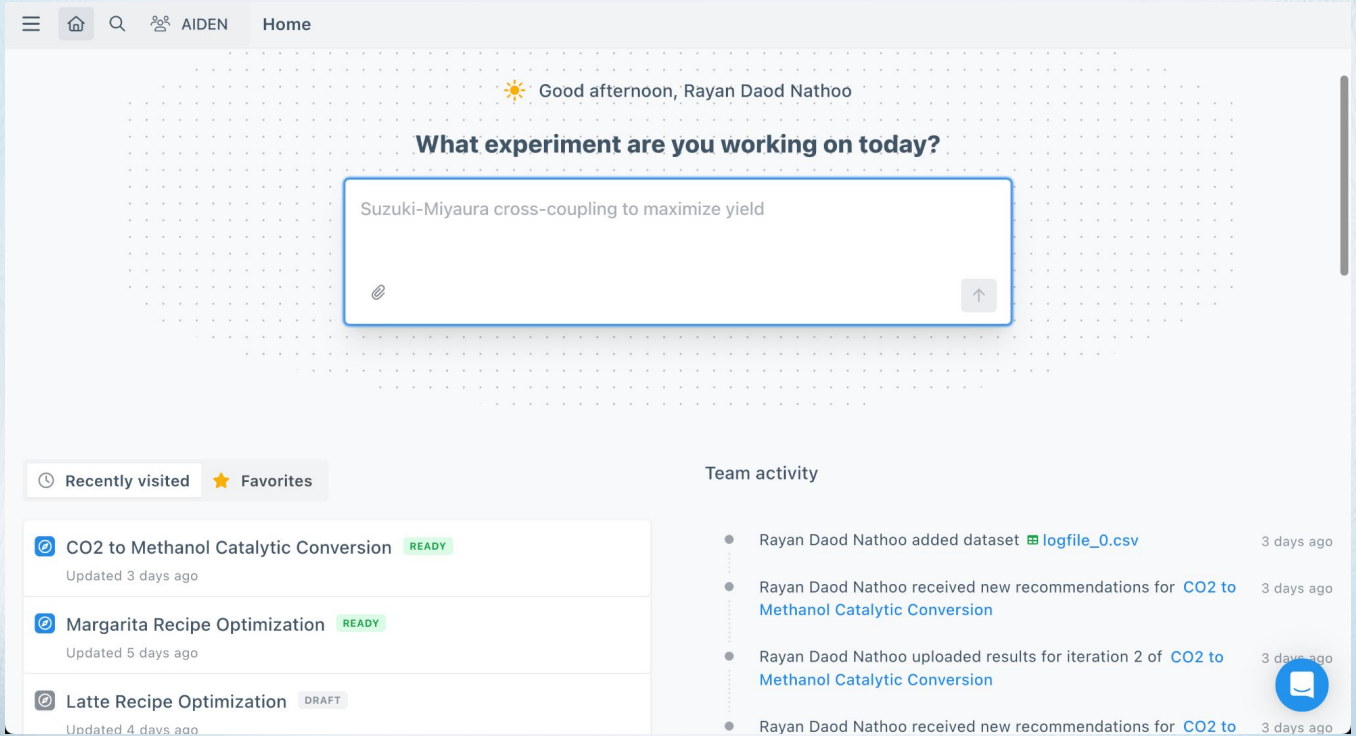
Laboratory in Boston

Our Software – SDLabs



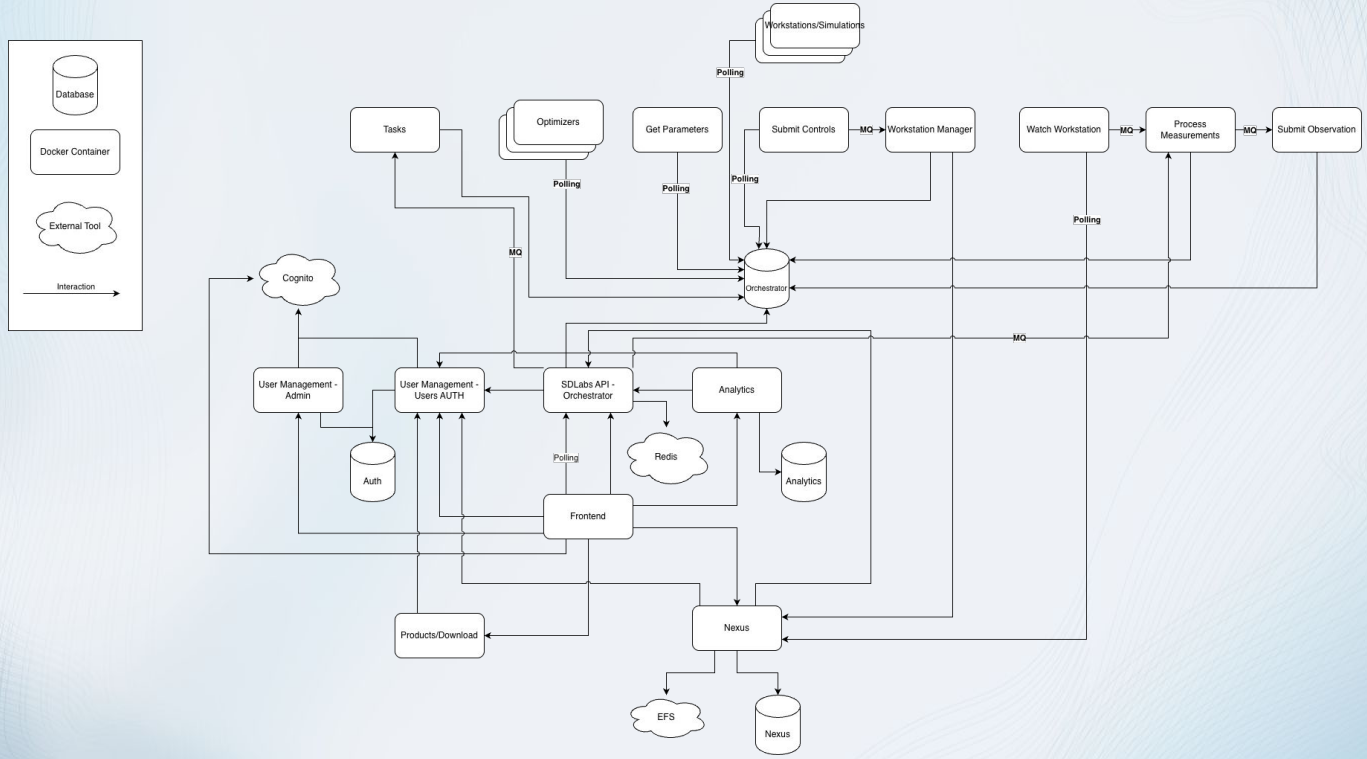
*Design, Make, Test, Analyze, Learn

Our Software – SDLabs



Flashback 1 year ago...

Old Architecture



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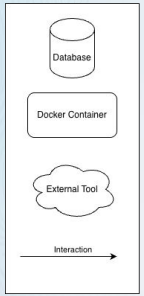
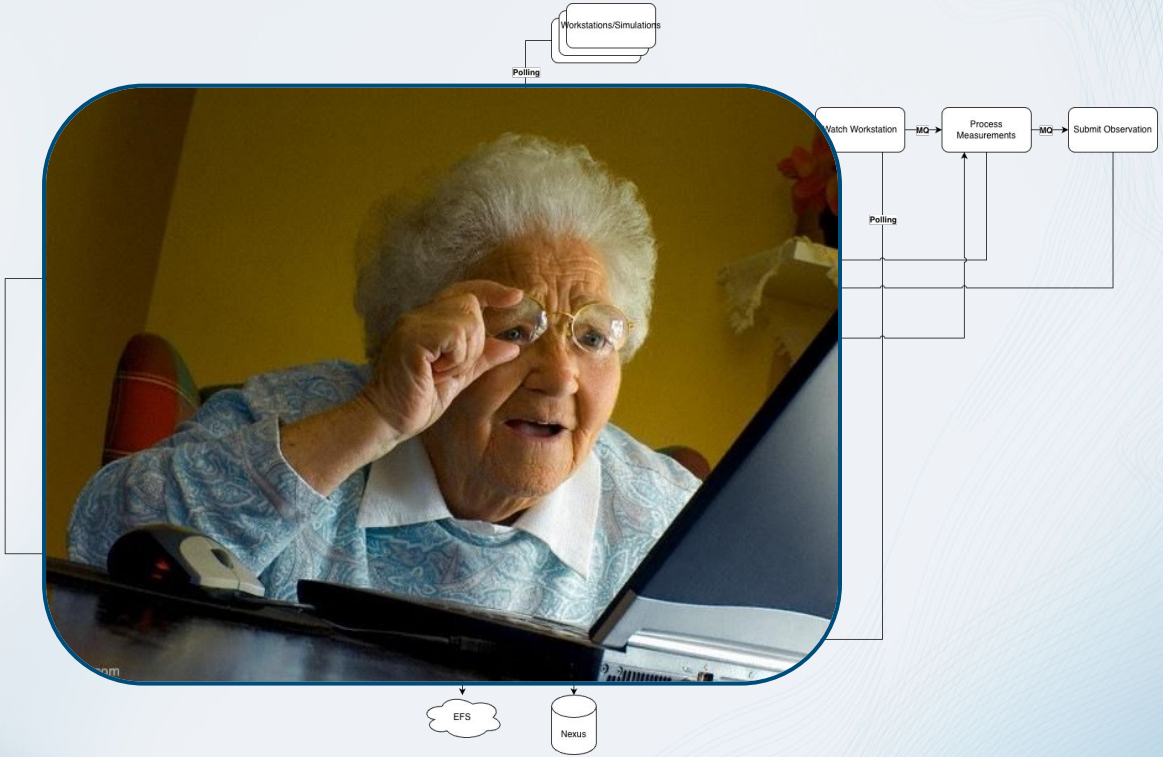
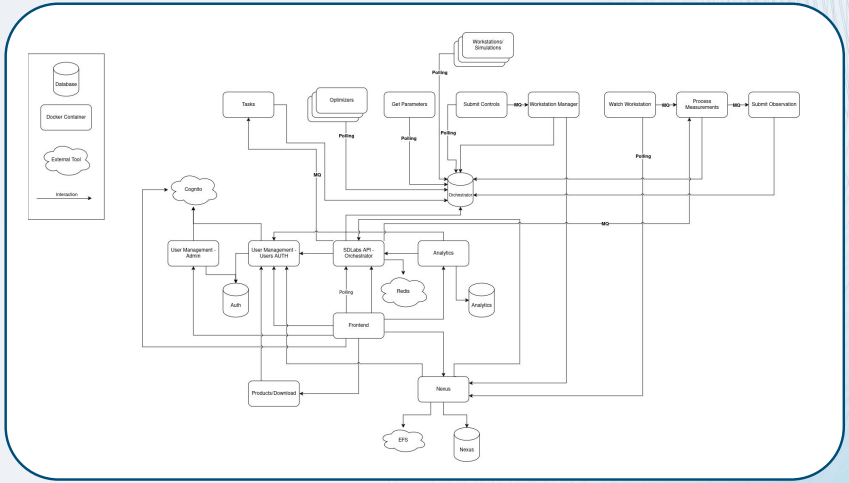




Old Architecture Issues

- 👎 Complex system
- 👎 Unclear ownership
- 👎 Coupled codebases
- 👎 Hard bug fixing process
- 👎 Hard release process
- 👎 Hard onboarding



Old architecture

We need to do something!

Spoiler Alert!

✅ Simpler system design

✅ Clearer ownership

✅ Easier bug hunts

✅ Faster release process

Infrastructure Cost	- 44%
Feature PRs	+ 55 %
Bug fix PRs	- 31 %

Agenda

1. The Questions We Asked
2. What We Built
    a. The Monolith
    b. The Monorepo
    c. The Local Environment
3. Results & Takeaways

1. The Questions We Asked

Refactor or Rewrite?

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Incremental Refactoring

Pros

- Easier testing/rollback
- Preserves embedded knowledge
- Keeps product momentum

Complete Rewrite

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Cons

- Decomposition complexity & cognitive cost
- Hard to solve core architecture issue
- Slow results

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- Allows architecture changes
- Room for new tech stack
- Allows re-scoping the product

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- Long time-to-production
- Data migration

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Rewrite Playbook

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I - Simplify and don’t reinvent the wheel

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II - Apply clear project management

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III - Improve product along the way

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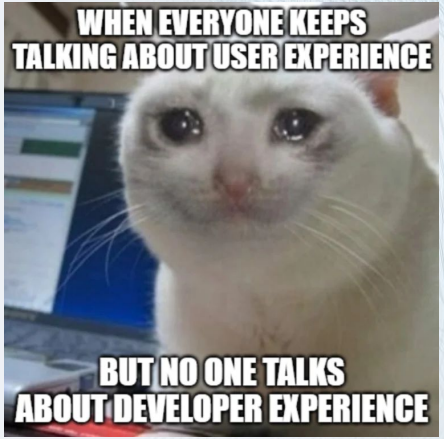
I - Simplify and don’t reinvent the wheel

II - Apply clear project management

III - Improve product along the way

IV - Prioritize developer experience



Product Requirements

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1. Serving up to 1k customers
    - B2B SaaS, high availability

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    - ML systems, robots, data sources
3. Shorter release cycles
    - ~ Every 2 weeks

Do we even keep Python?

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Yes.

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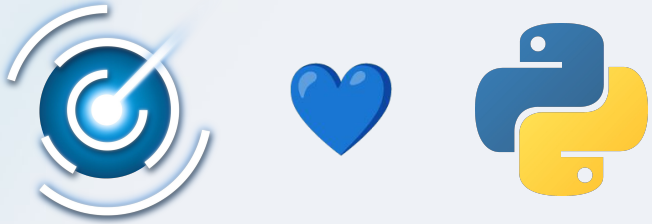
Yes.

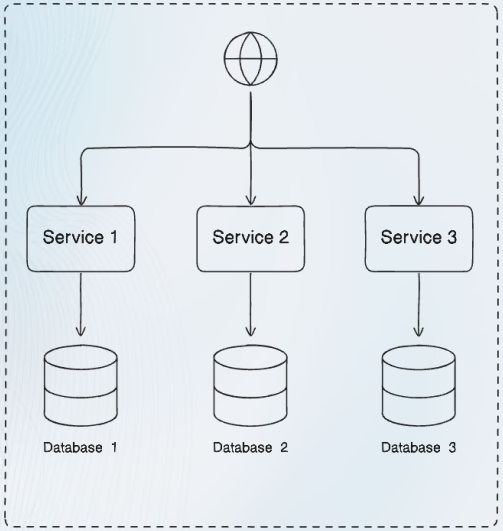
- Existing team already had experience in it
- Plan is to blend in even more ML and DS features in the future



2. What We Built

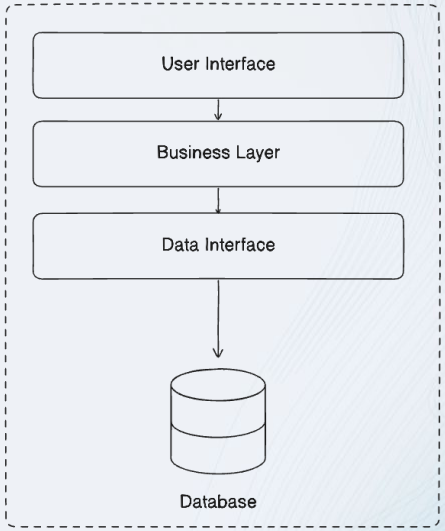
a. The Monolith

Microservices vs. Monolith



Microservices

vs.



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- Cross-team coordination becomes complex over time

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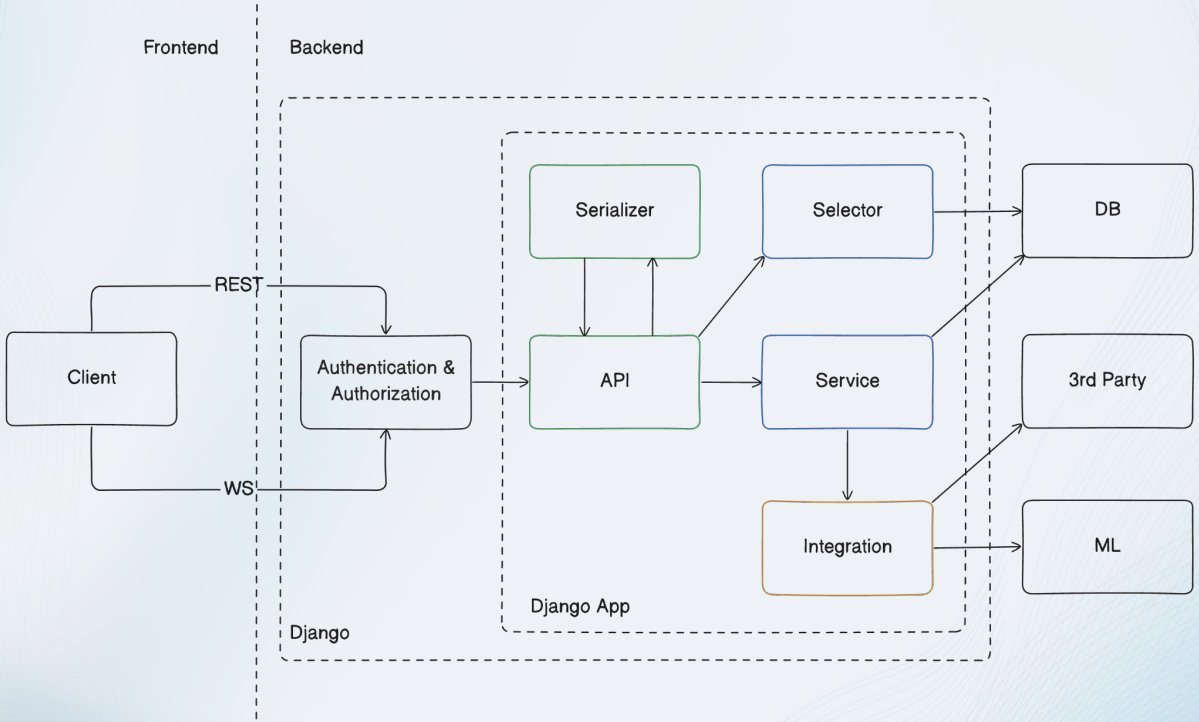
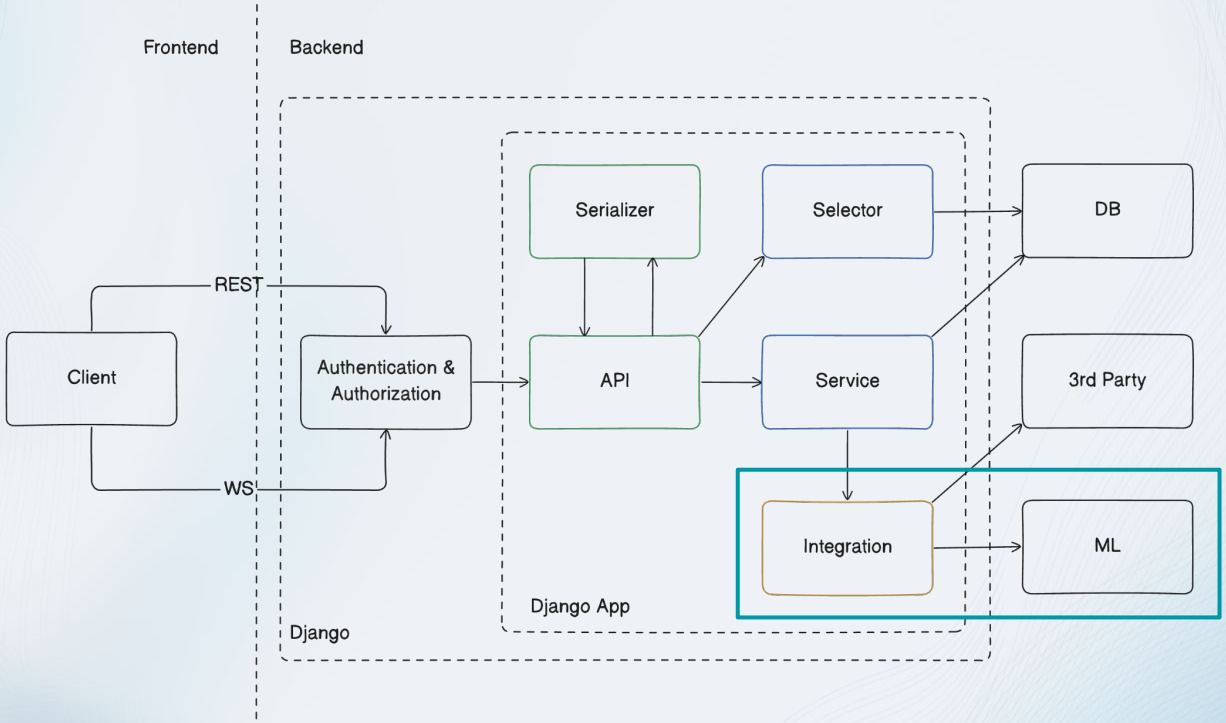
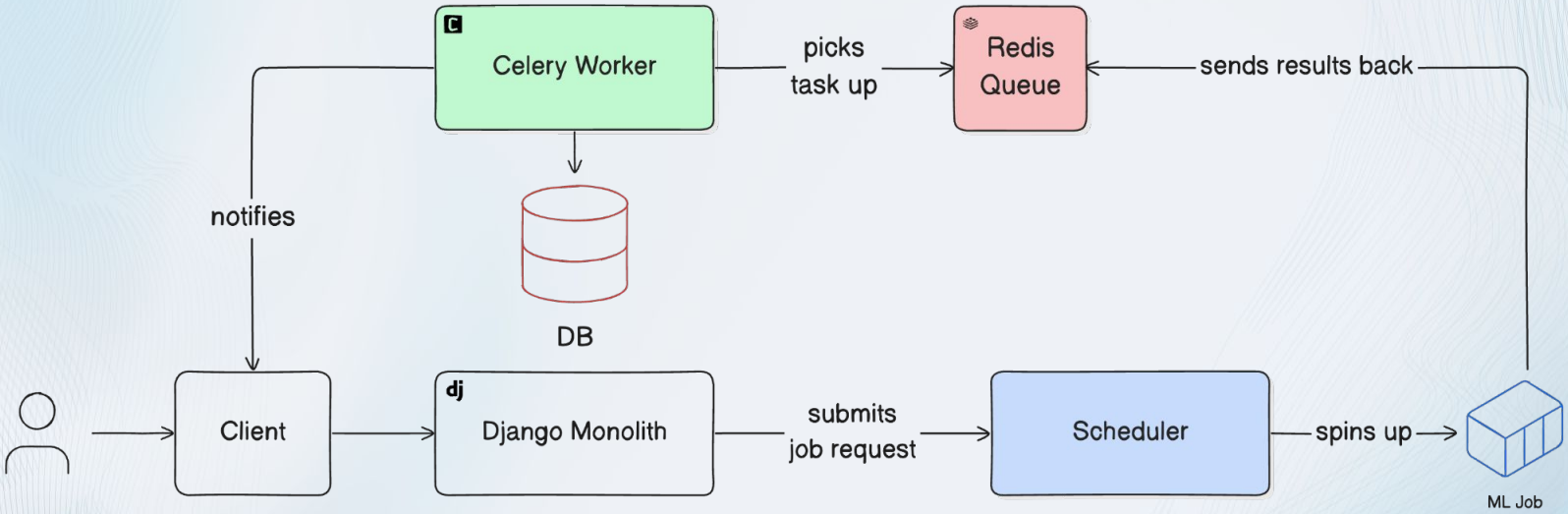
Django Monolith Architecture



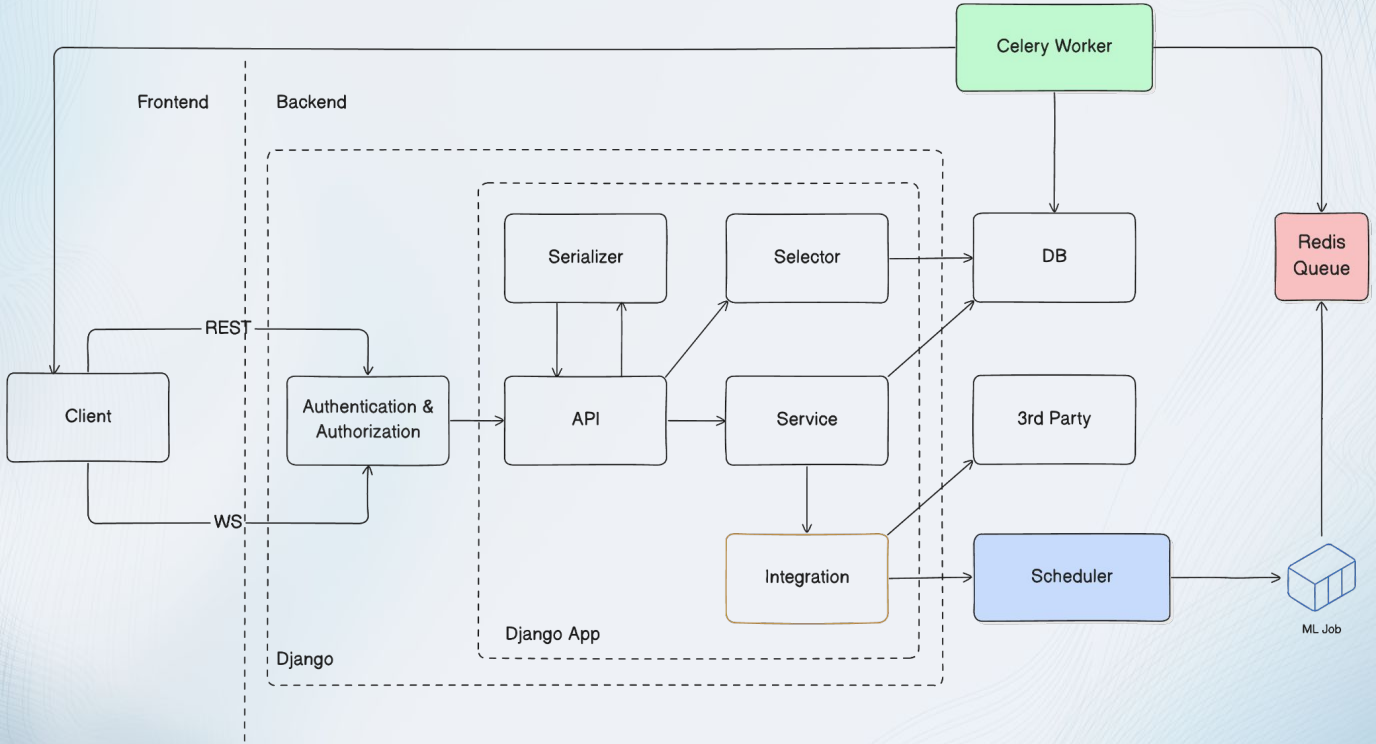
Django Monolith Architecture



Asynchronous ML Jobs



Django Monolith + Asynchronous ML Jobs



b. The Monorepo

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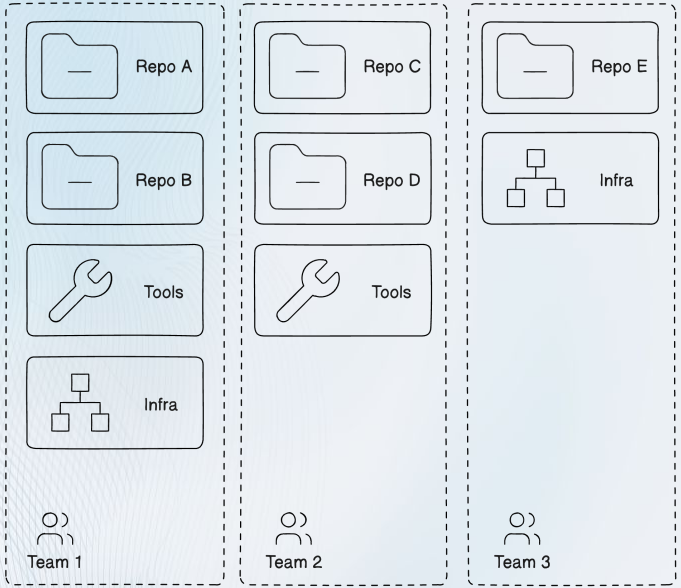

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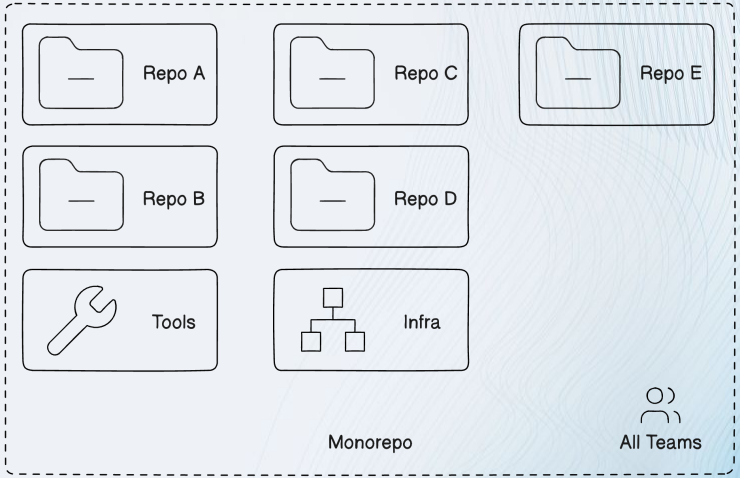

Multiple repositories

One Monorepo

Multi-repo vs. Monorepo

Multi-repo

Monorepo

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Pros

- Clear ownership boundaries (in theory)
- Independent versioning
- Simple access control

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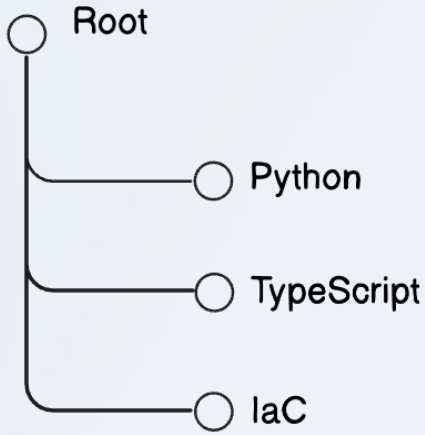
Monorepo Implementation

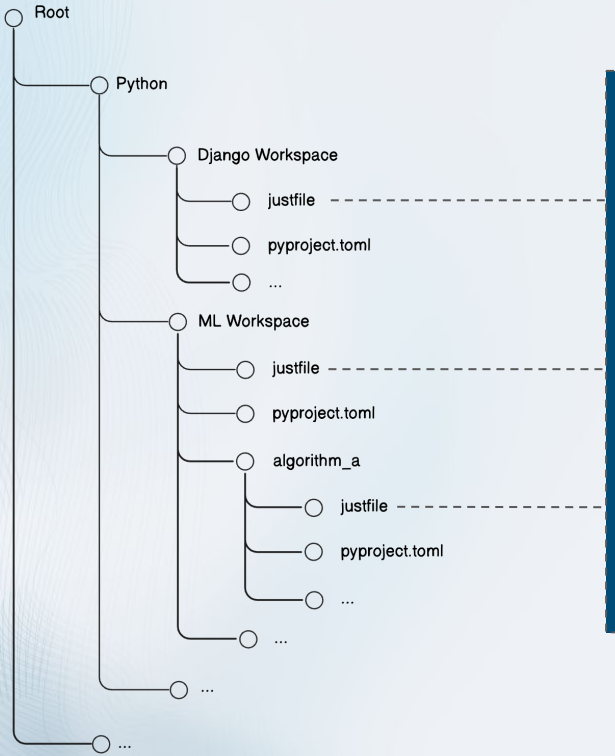


One folder per programming language

Monorepo Implementation

One uv workspace per deployable unit

Monorepo Implementation




```
# justfile

lint:
    just .. lint [django|ml|...]


type:
    just .. type [django|ml|...]


test *pytest_flags:
    just .. test [django|ml|...] {{pytest_flags}}

...
```

Monorepo Impact on ML Team

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Faster adoption of best practices

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c. The Local Environment

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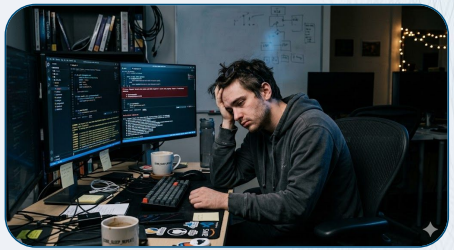
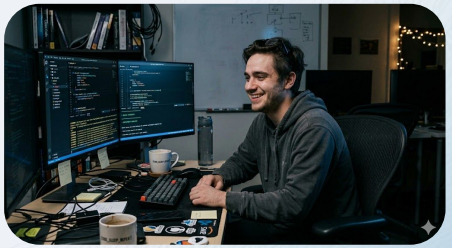
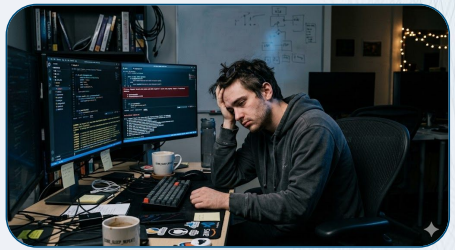


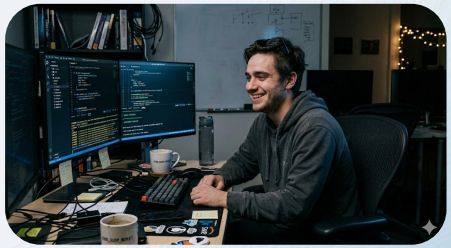


c. The Local Environment

Goals:

- Run everything locally
- Speed up feature development
- Facilitate bug fixing
- Increase feeling of product ownership





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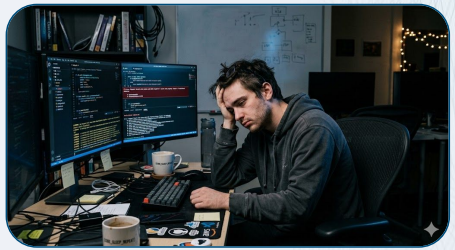

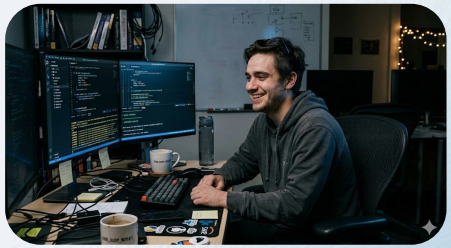

How?

- Mocking parts of the system
- Single start and stop commands
- But: keep writing tests!

3. Results & Takeaways

Results

✅ Simpler system design

✅ Clearer ownership

✅ Easier bug hunts

✅ Faster release process

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Feature PRs	+ 55 %
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🧬 Staying up to date with product state

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⚡ Agentic coding setup

🎓 Cross-team learning

🧬 Staying up to date with product state

🔬 Integration tests easier to add and maintain

Takeaways

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2. Simplify if possible

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2. Simplify if possible
3. Prioritize standard frameworks

Takeaways

1. There is no one-size fits all
2. Simplify if possible
3. Prioritize standard frameworks
4. Re-evaluate your situation from time to time

Thank you for listening!

Feel free to use our **monorepo template** for your own projects!

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