



AmericanAirlines 

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Mainframes, MonoRepos and Modus Operandi

Phillip Knezevich



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How many lines of code in Google's source repository?





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Where is the itch in your Devops scratch?





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About me



[@BigApplePK](https://twitter.com/@BigApplePK)

Phillip Knezevich

Originally From Australia

Senior Manager of Architecture and Platform Services
9 Years

Developer Background
Loves Open Source

Scratching my head as to when CLI came back into vogue!

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Fun Facts

The World's Largest Airline

6,700 flights

run daily with 7 regional
carriers under the American
Eagle banner

350 destinations

across 50 countries and
5 continents

93 years old

First established in 1926

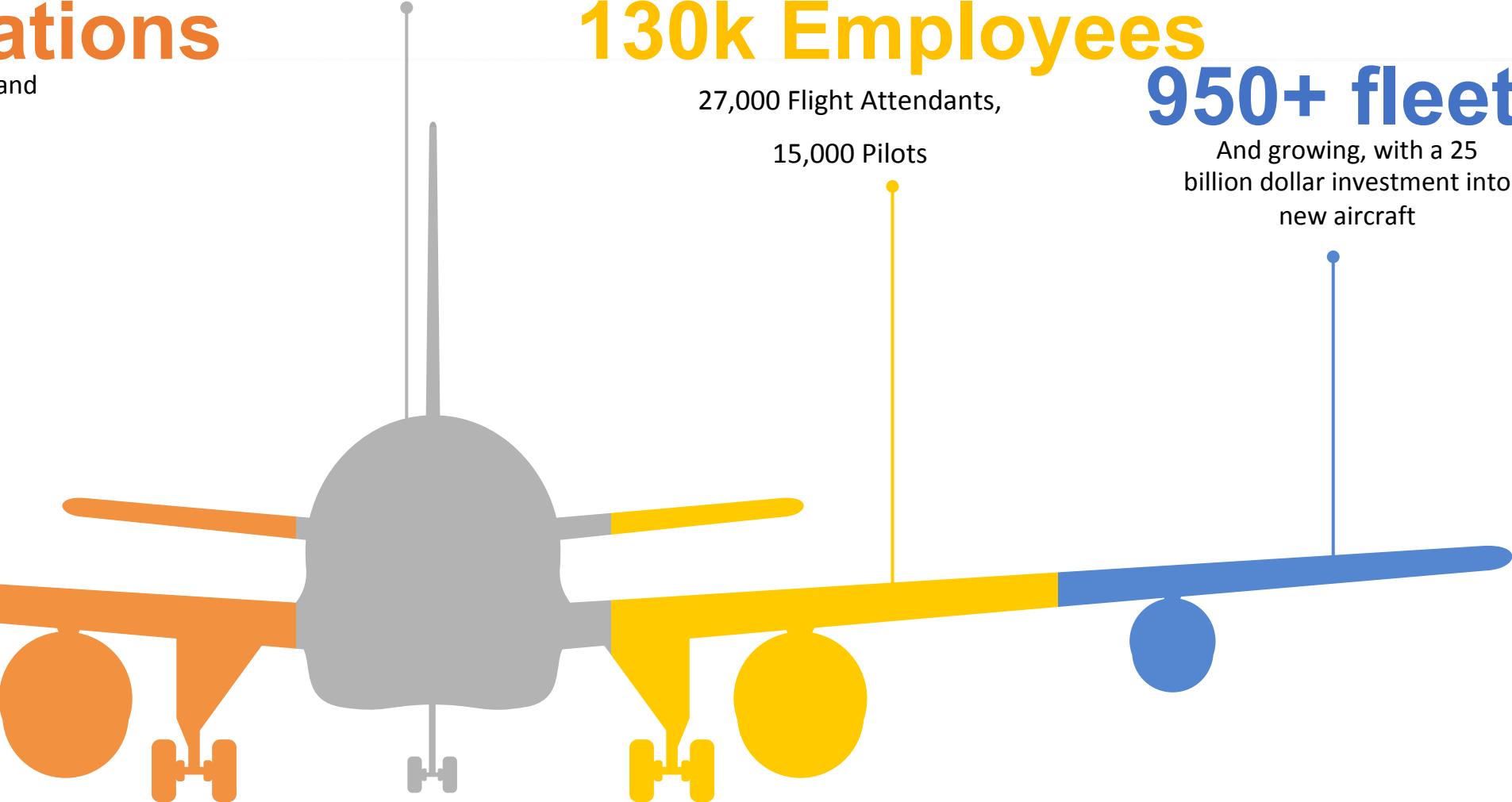
130k Employees

27,000 Flight Attendants,

15,000 Pilots

950+ fleet

And growing, with a 25
billion dollar investment into
new aircraft



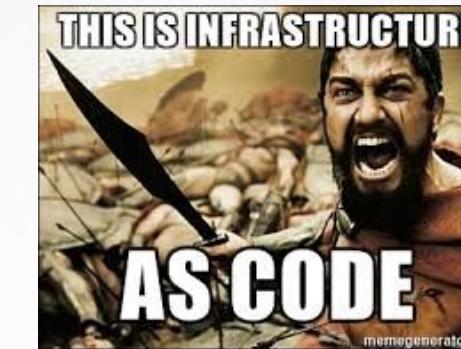
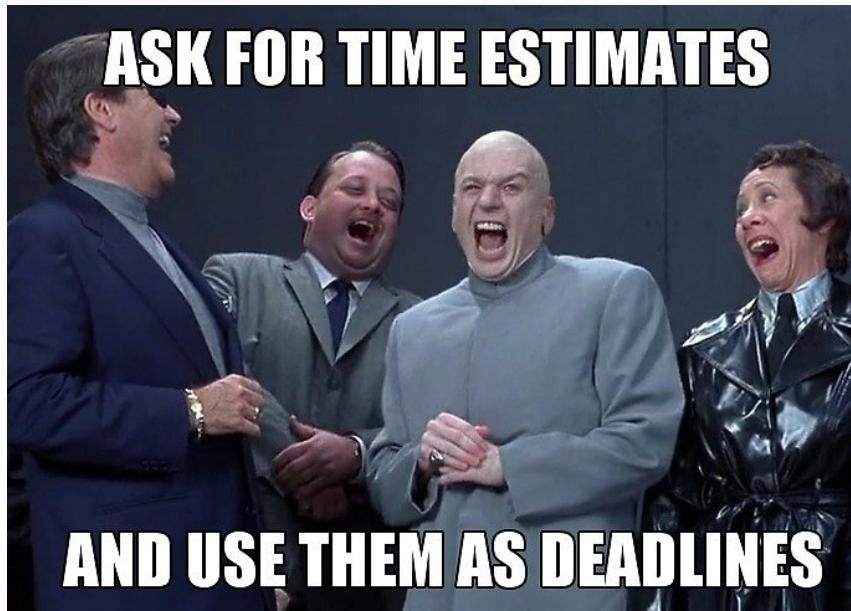
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Why I picked 3 subjects as one...



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IT Humor goes a long, long, way.....



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The IT Industry is changing fast, and it's hard to keep up...

5 Problems



01

IT is **disconnected** from the business and vision.



02

Leadership is tracking activities **not the results**.



03

Project funding is fundamentally **broken**.



04

Business feels IT is solving its own problems, **not delivering more** (cost center view as opposed to profit center)



05

IT feels like a **black box** to the business.

TEAM PAIN

- Too many interruptions - can't focus
- Conflicting priorities - everything is a Priority one!
- **Too many meetings**
- No time for internal process improvements
- Too many different tools!
- Every reorg brings another process method.

Burnout

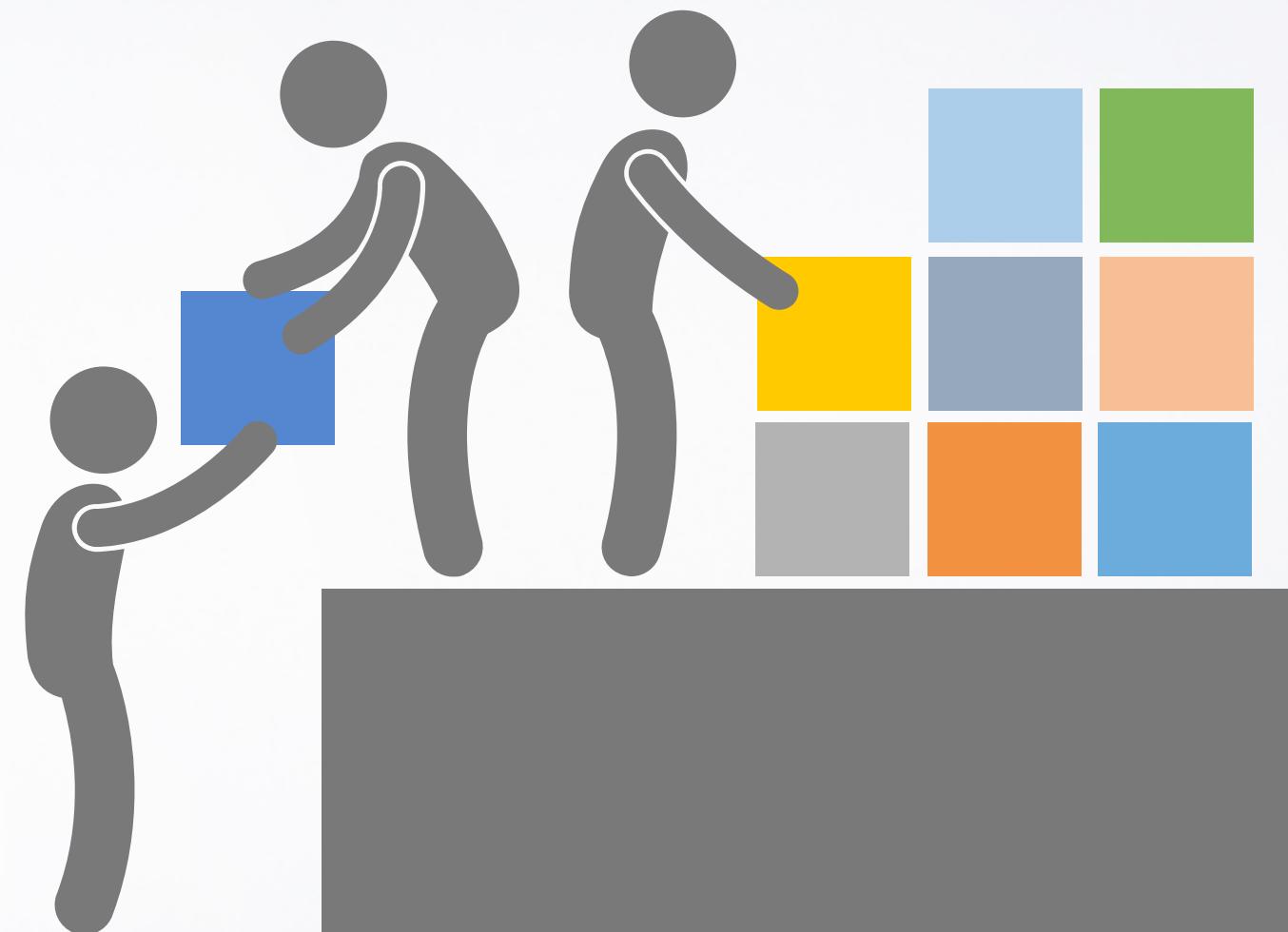


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Shifting to a Devops culture

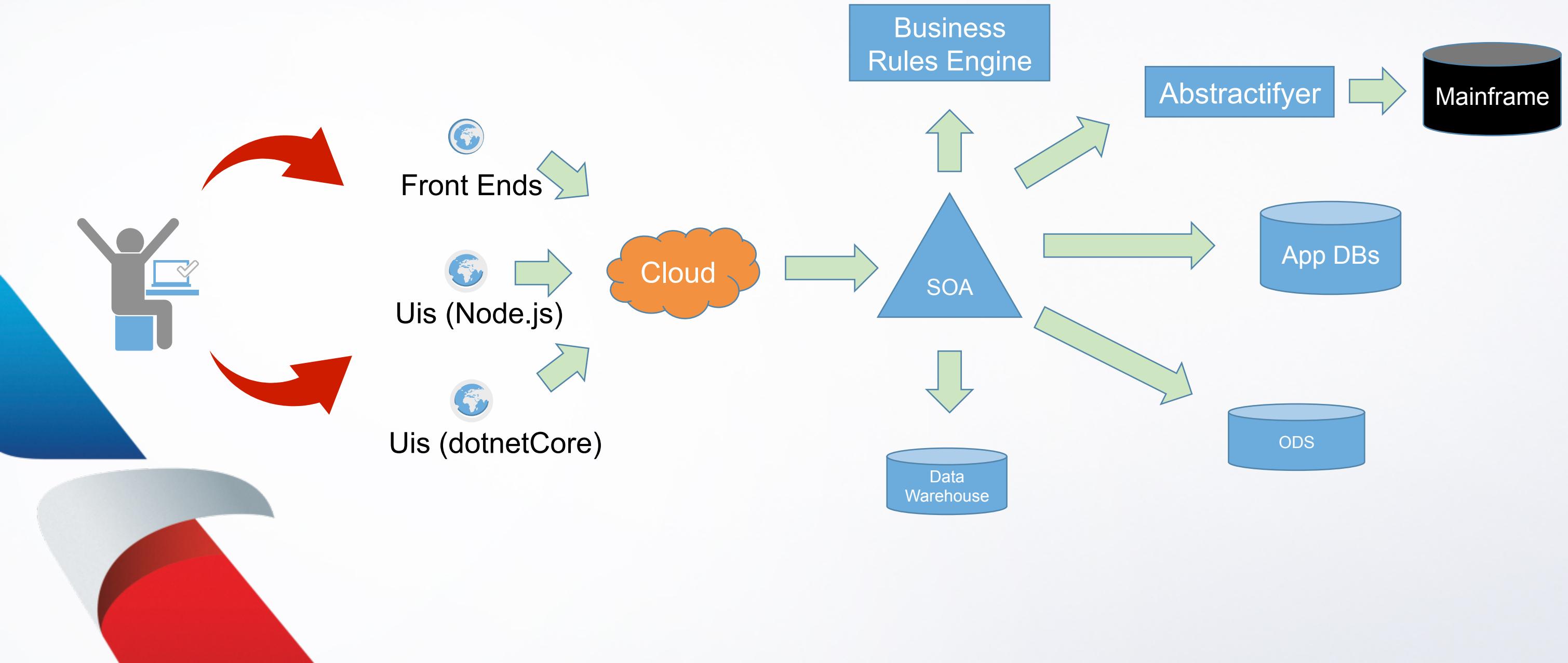


The Hero



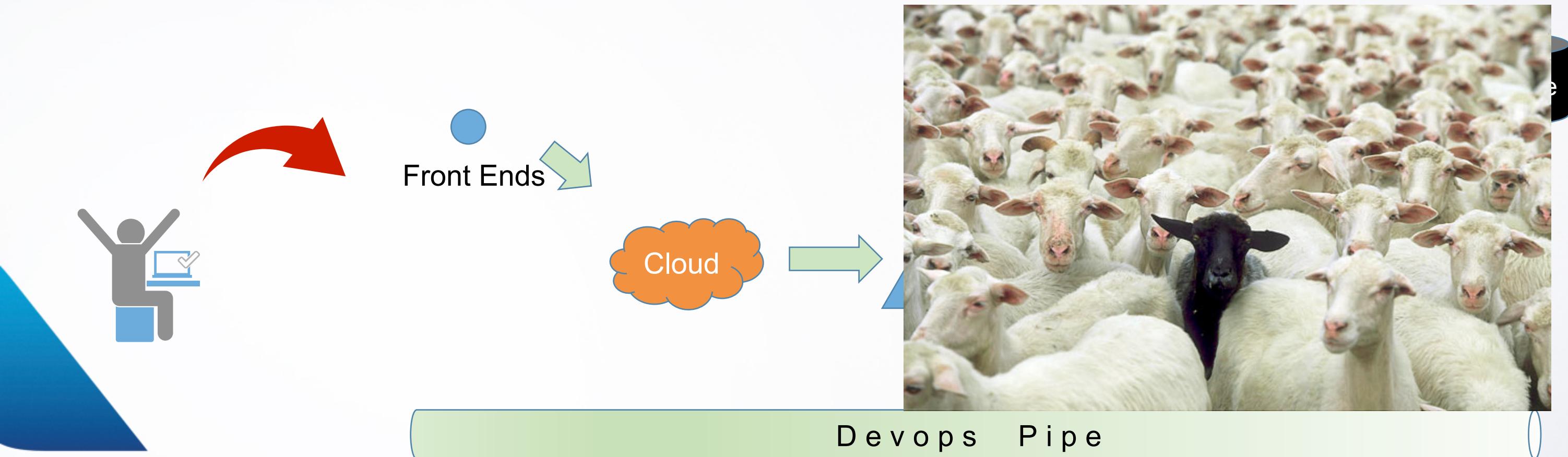
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A complicated SDLC – curse those architects!



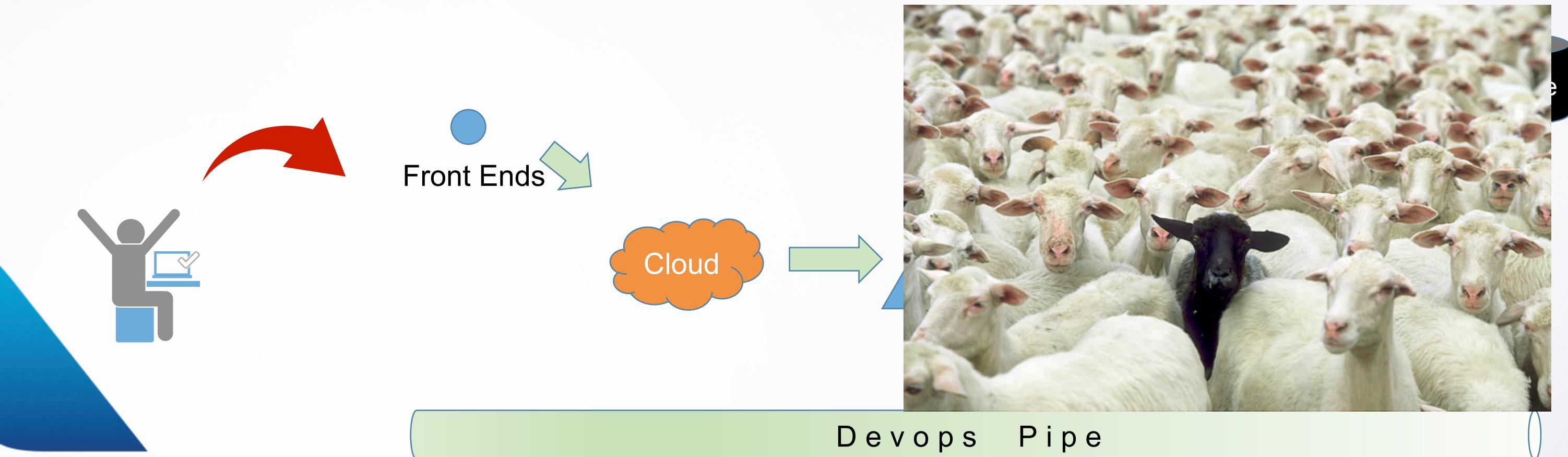
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Product Teams – because it makes sense



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Product Teams – because it makes sense



$$\text{Monorepo} = * n^{\text{product_teams}}$$

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Mainframe Devops





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Building Automation



Existing Mainframe processes & code work fine but has lots of manual effort.

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Building Automation



Result: Unique, custom, non-reusable automation

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Building Automation

Don't automate too much, too fast, with fancy tools... licensing tools is tricky: you may purchase too little or too many.

The toothpaste is:

Limited to certain forms of tube

Harder to clean and maintain

Unnecessary dependencies (power supply, location – hard to move)



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Building Automation

Improve the process first, use simple or existing tools (open source, inner source)..

Trust in the fail fast process of DevOps



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Building Automation

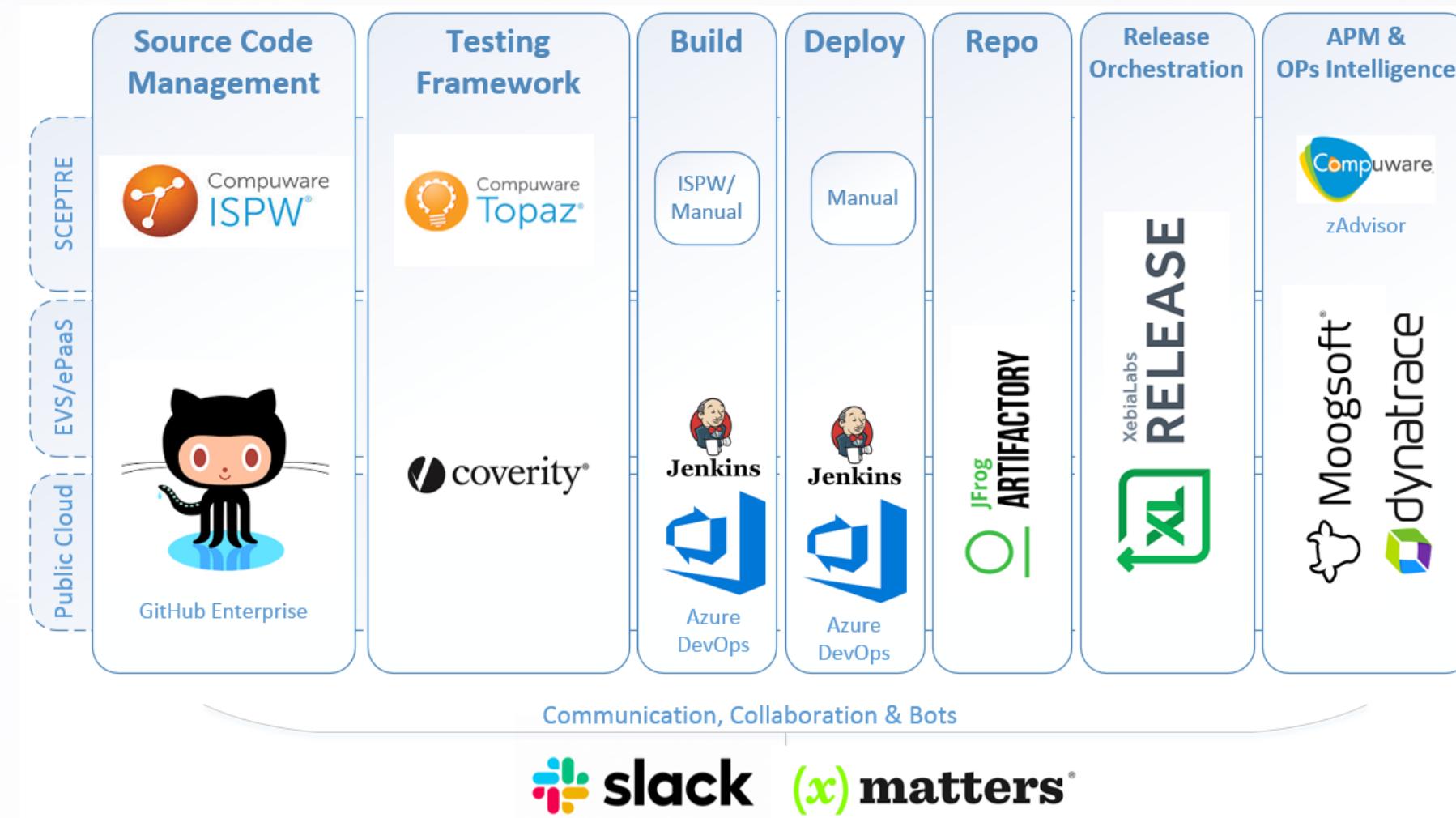
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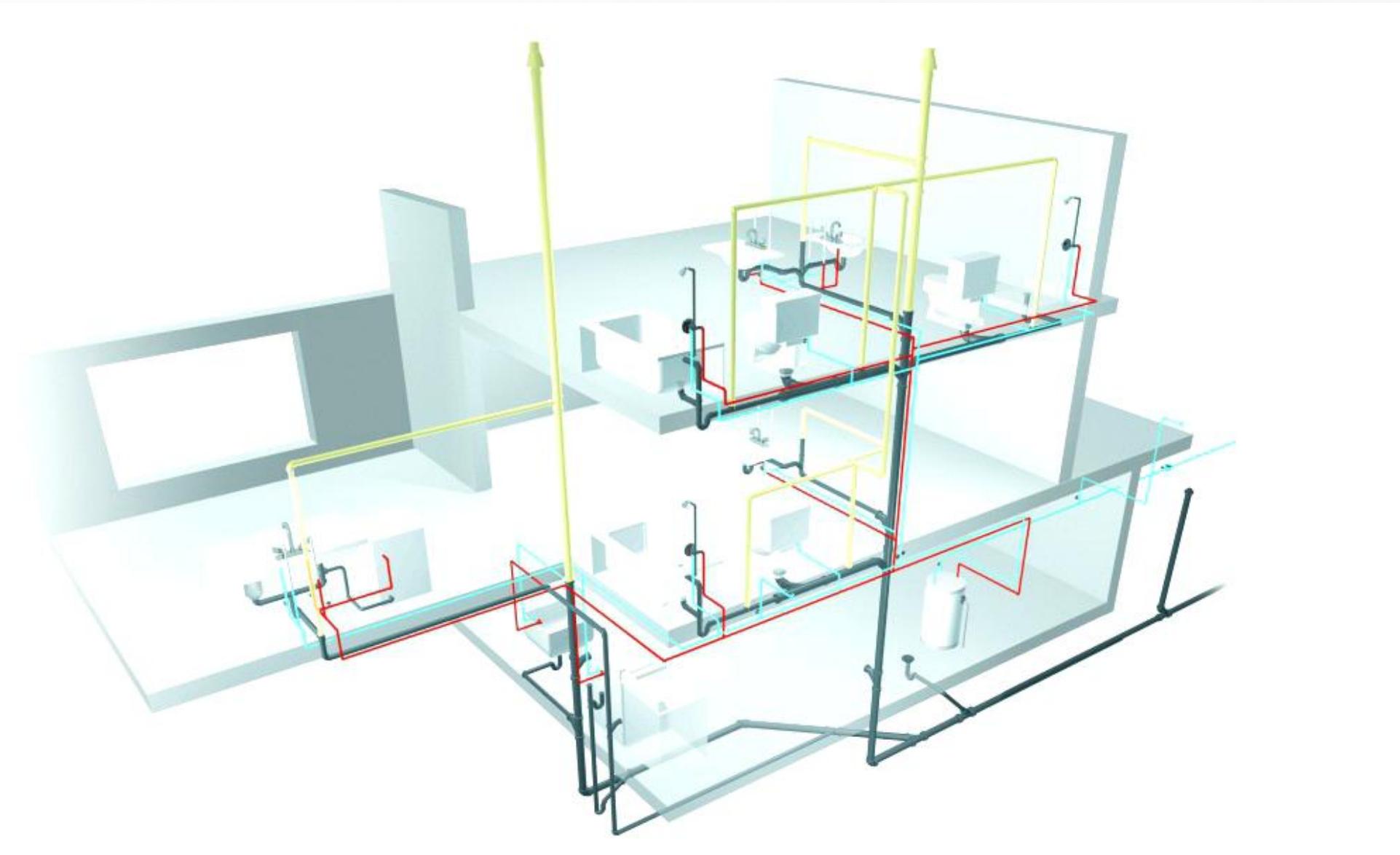
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The stack.....



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Bifurcating pipes





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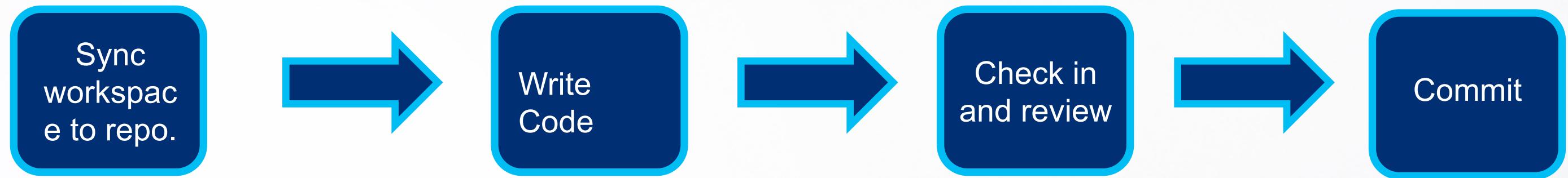


One **build** to rule them all,
One **build** to find them,
One **build** to compile them all
and with devops **bind** them



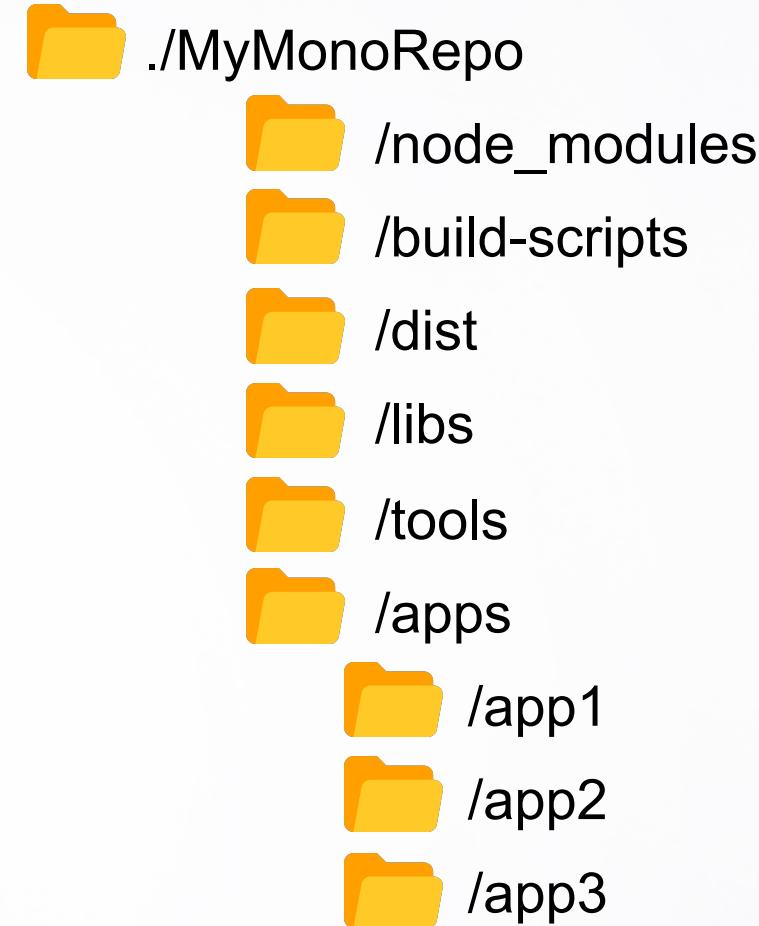
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Workflow



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Workspace to Repo



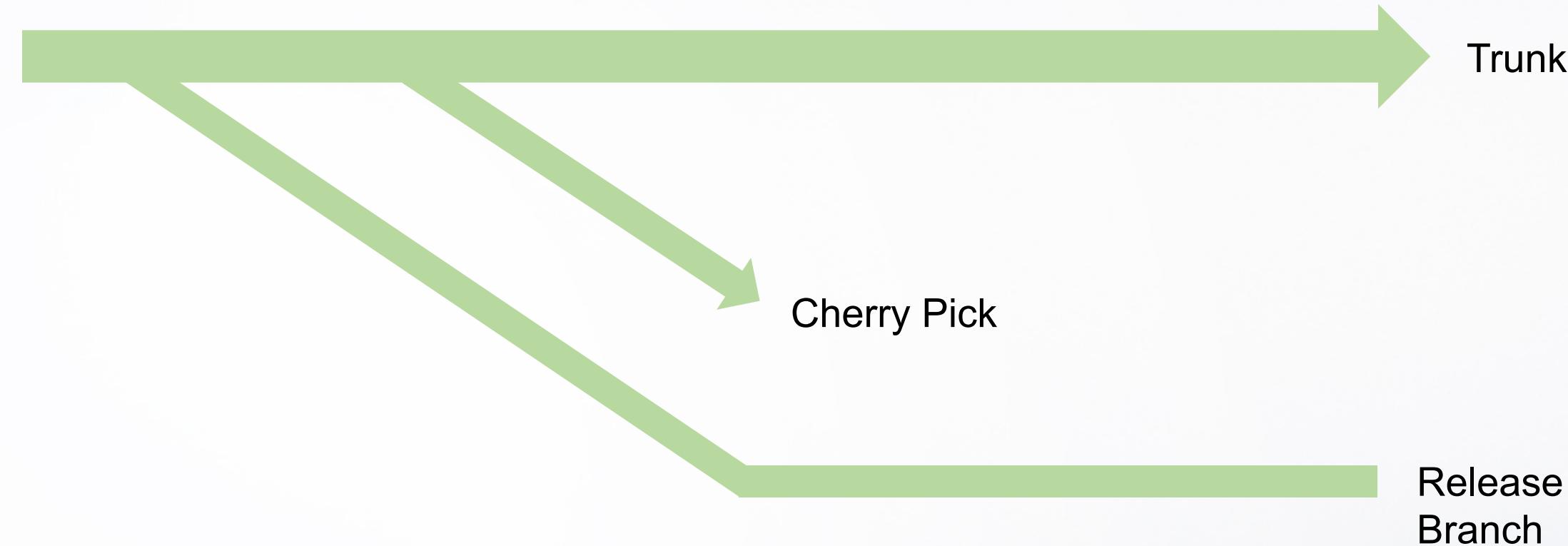
Can we seriously do this?!?! Experimenting with the monorepo...

Experimentation with a smaller subset of applications that have notoriety for software challenges

- ✓ UI Projects only (Java, .NET and Mainframe to come later)
- ✓ 15+ apps
- ✓ 25+ shared packages
- ✓ 70+ contributing developers
- ✓ Single version of 90+ third-party dependencies (i.e., all 15 apps are being upgraded to Angular 7 simultaneously)
- ✓ One CI/CD pipeline with targeted build and release definitions for each app

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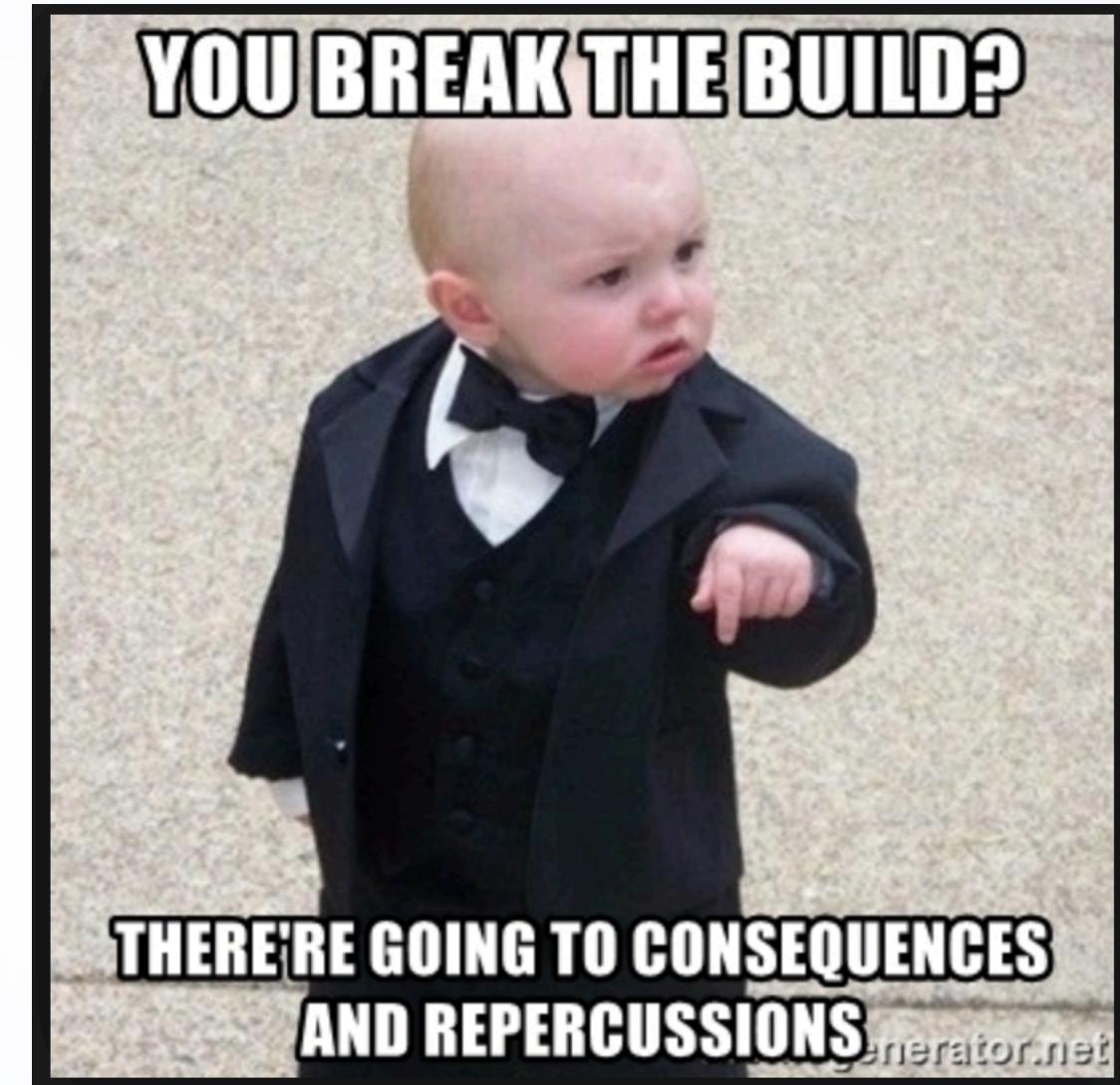
Release one or many





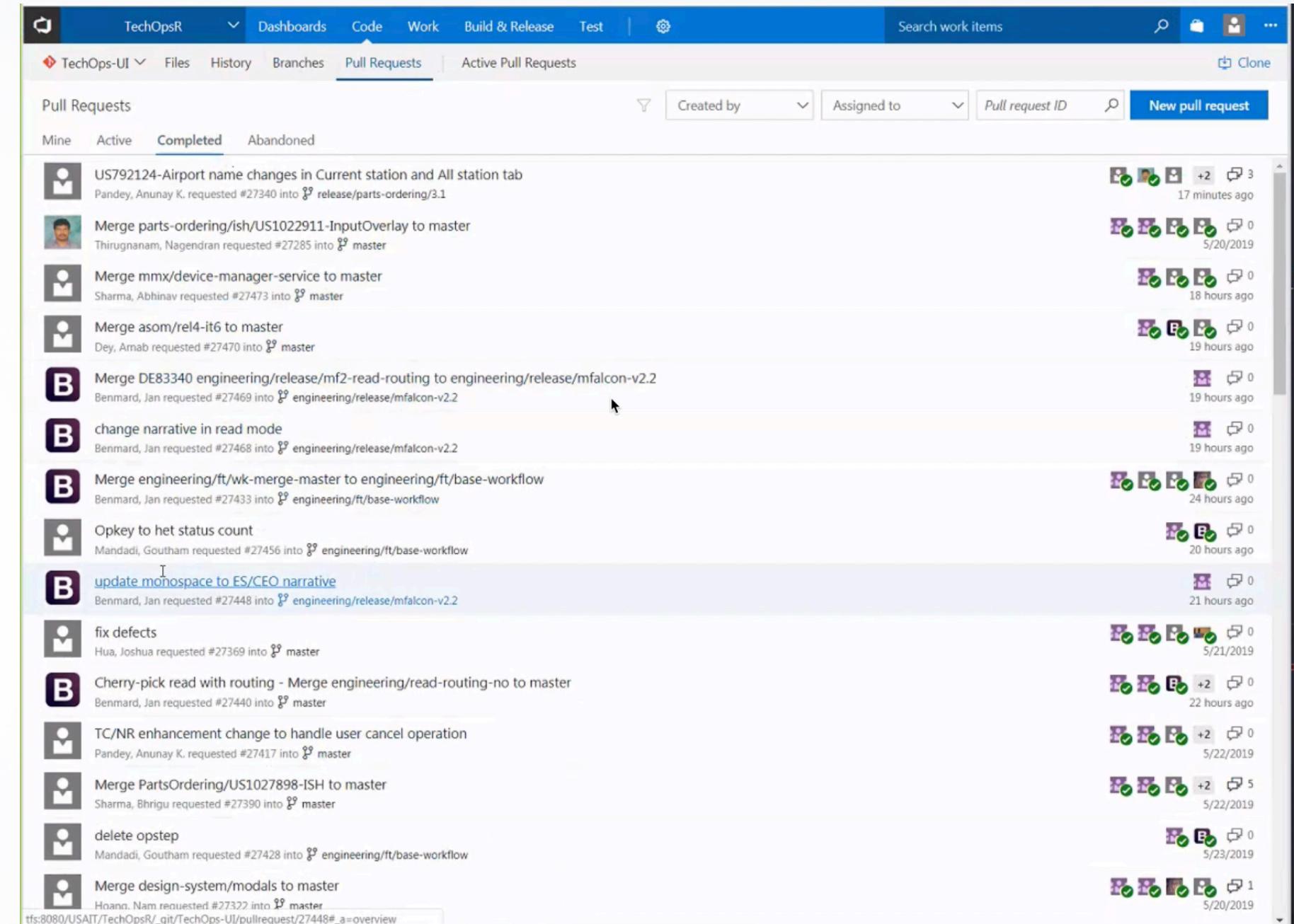
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Don't break the build



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Don't break the build



The screenshot shows a pull request dashboard with the following details:

- Header:** TechOpsR, Dashboards, Code, Work, Build & Release, Test, Settings, Search work items, Clone, ...
- Section:** Pull Requests, Active Pull Requests
- Filters:** Mine, Active, Completed (selected), Abandoned
- Columns:** Created by, Assigned to, Pull request ID, New pull request
- List:** A list of completed pull requests with their descriptions, creators, assignees, and creation dates.

Created by	Assigned to	Pull request ID	Date
Pandey, Anunay K.		#27340	17 minutes ago
Thirugnanam, Nagendran		#27285	5/20/2019
Sharma, Abhinav		#27473	18 hours ago
Dey, Amab		#27470	19 hours ago
Benmard, Jan		#27469	19 hours ago
Benmard, Jan		#27468	19 hours ago
Benmard, Jan		#27433	24 hours ago
Mandadi, Goutham		#27456	20 hours ago
Benmard, Jan		#27448	21 hours ago
Hua, Joshua		#27369	5/21/2019
Benmard, Jan		#27440	22 hours ago
Pandey, Anunay K.		#27417	5/22/2019
Sharma, Bhrigu		#27390	5/22/2019
Mandadi, Goutham		#27428	5/23/2019
Hoann, Nam		#27322	5/20/2019

URL: tfs:8080/USAIT/TechOpsR/_git/TechOps-UI/pullRequest/27448#a=overview

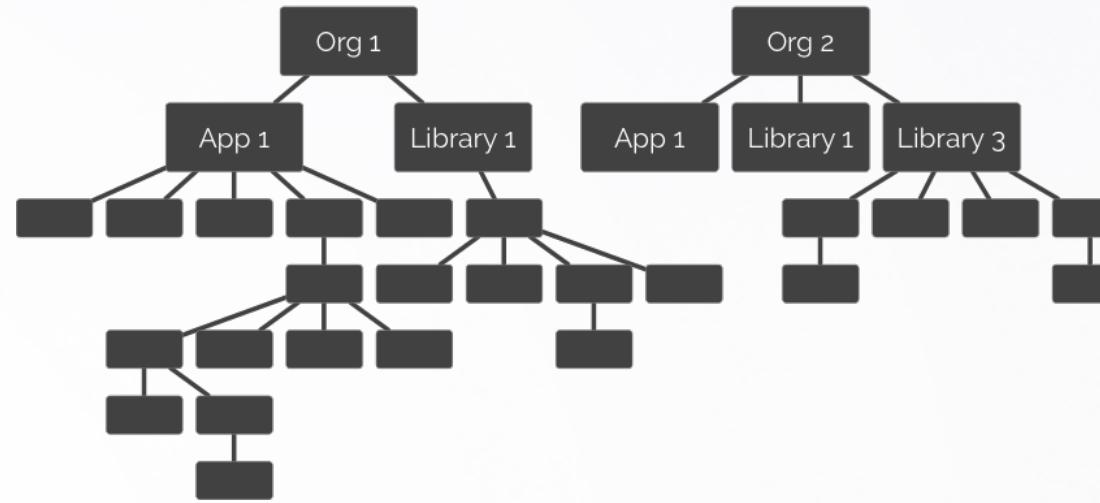
Successes

1. Consolidated all new UI development into the monorepo
2. Successfully upgraded UI components from legacy apps into the monorepo
3. Continually onboarding new developers
4. Have seen a dramatic increase in collaboration between development teams
5. Realizing the benefits of write once, use many principles

Challenges and Risk

1. Not enough test coverage to have complete confidence in changes to shared code
2. Struggling with feature toggling and decoupling releases from deployments
3. Still rely on external referencing for troubleshooting
4. Entire projects are still in polyrepos as a majority of our codebase has not been migrated

Extreme Monorepo



All applications and libraries of an organization exist in the same repository

- i. No dependency on internally published and/or versioned artifacts
- ii. Only a single version of each external dependency (Angular, etc.)
- iii. Atomic changes across the repository ensuring code executes after each commit
- iv. A **single CI/CD pipeline** against the repository with independently deployable build targets



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- ✓ Three different topics, one destination.
 - ✓ Moving to one repo, one pipeline, and to INCLUDE the mainframe
 - ✓ Trying to understand the right approach for your company
 - ✓ Building a model of transparency
 - ✓ Collaboration begins with trust
- 