



AmericanAirlines 

# DOES 2019

## Mainframes, MonoRepos and Modus Operandi

Phillip Knezevich

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The other day, I was looking at how many lines of code I had written for an Open Source Project I was working in.....

**Summary**

Date : 2019-10-16 09:19:10

Directory /Users/philippknezevich/Documents/dev/Project Montgomery

Total : 103 files, 19059 codes, 987 comments, 1300 blanks, all 21346 lines

[details](#)

**Languages**

language	files	code	comment	blank	total
JSON	6	12,520	0	3	12,523
JavaScript	80	6,152	855	1,196	8,203
Groovy	3	101	89	20	210
XML	4	89	5	11	105
Java	2	76	4	16	96
Batch	1	61	0	24	85
Objective-C	2	42	14	17	73
Properties	4	10	14	8	32
C++	1	8	6	5	19



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The other day, I was looking at how many lines of code I had written for an Open Source Project I was working in.....





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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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Why I picked 3 subjects as one...





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## About me



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

Phillip Knezevich

Senior Manager of Architecture and Platform Services  
10 Years

Originally From Australia

Developer Background  
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

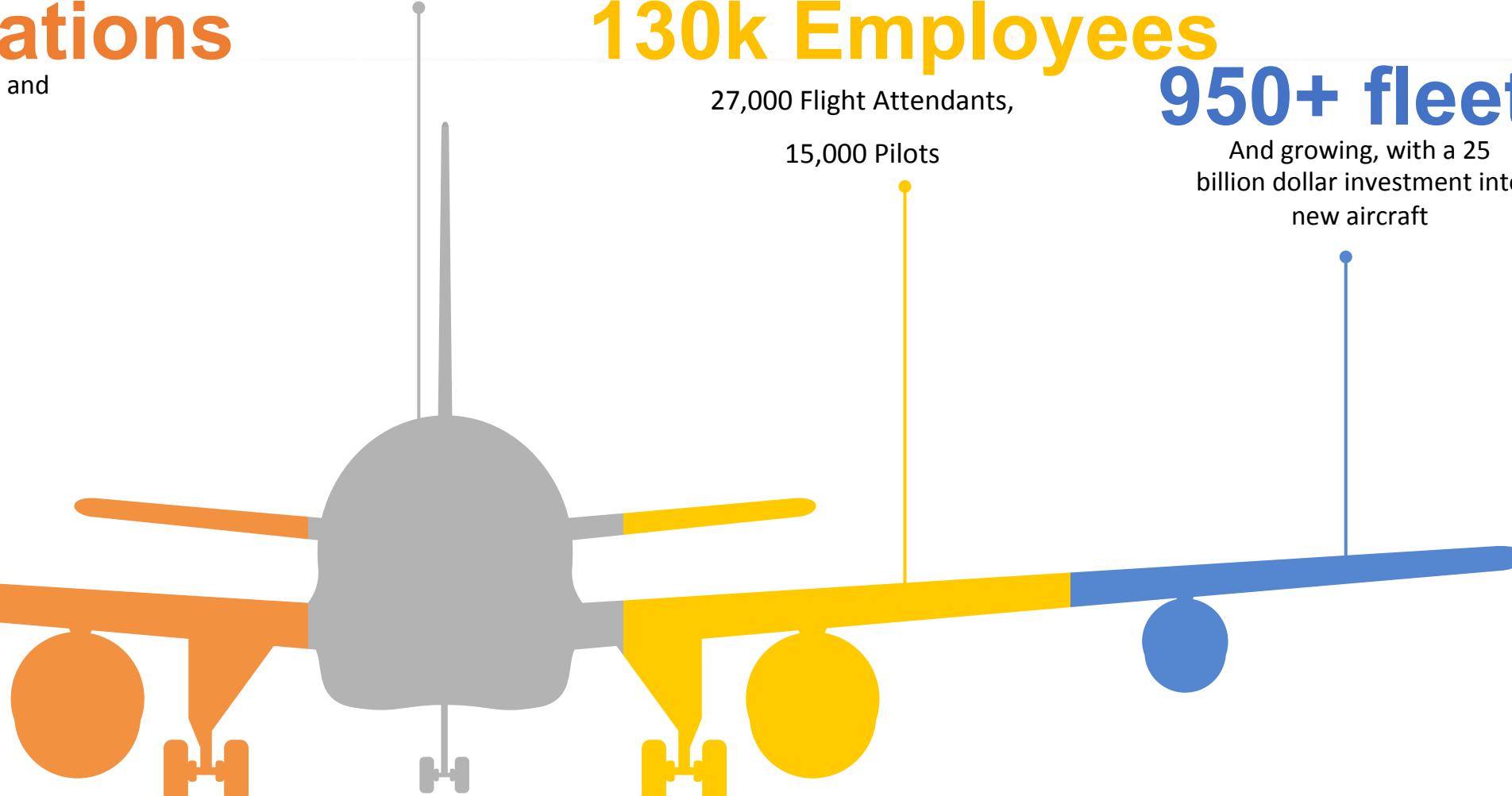
**130k Employees**

27,000 Flight Attendants,

15,000 Pilots

**950+ fleet**

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

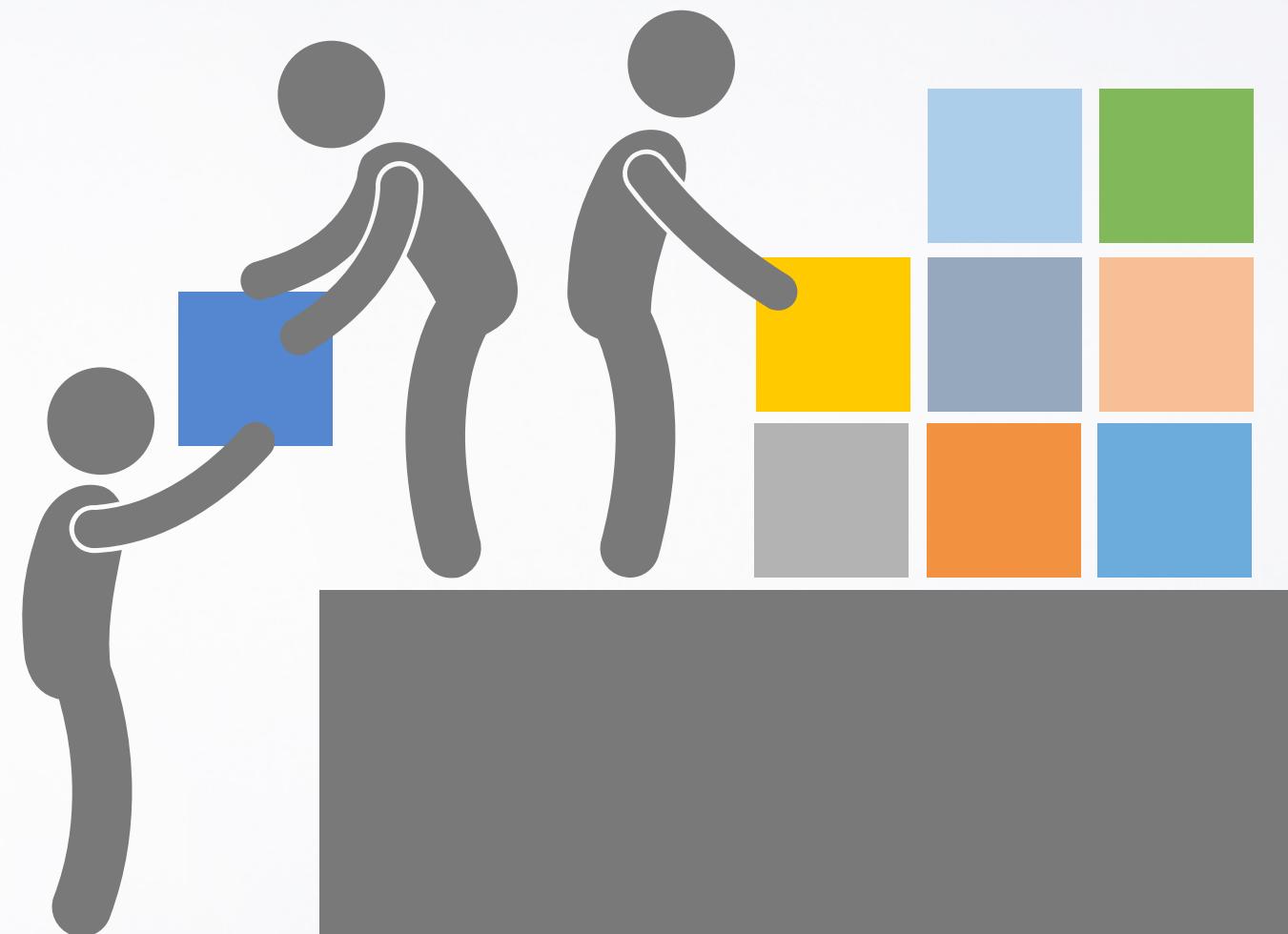


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## Shifting to a Devops culture



The Hero



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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

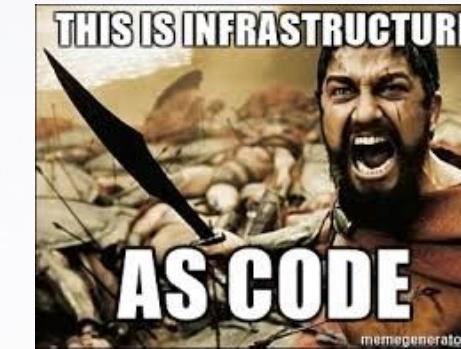
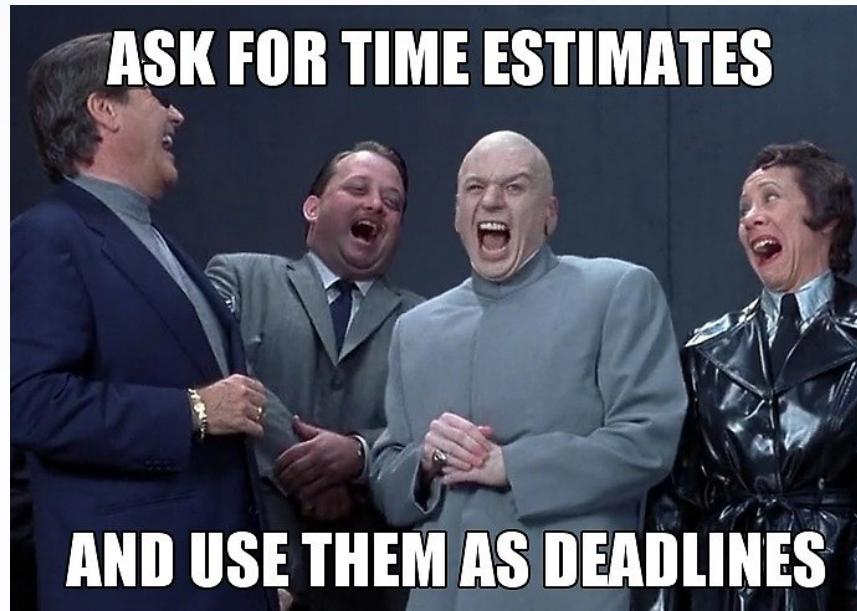
- Too many interruptions - can't focus
- Conflicting priorities - everything is a Priority one!
- **Too many meetings**
- No time for internal process improvements
- Too many different tools!
- Every reorg brings another process method.

**Burnout**



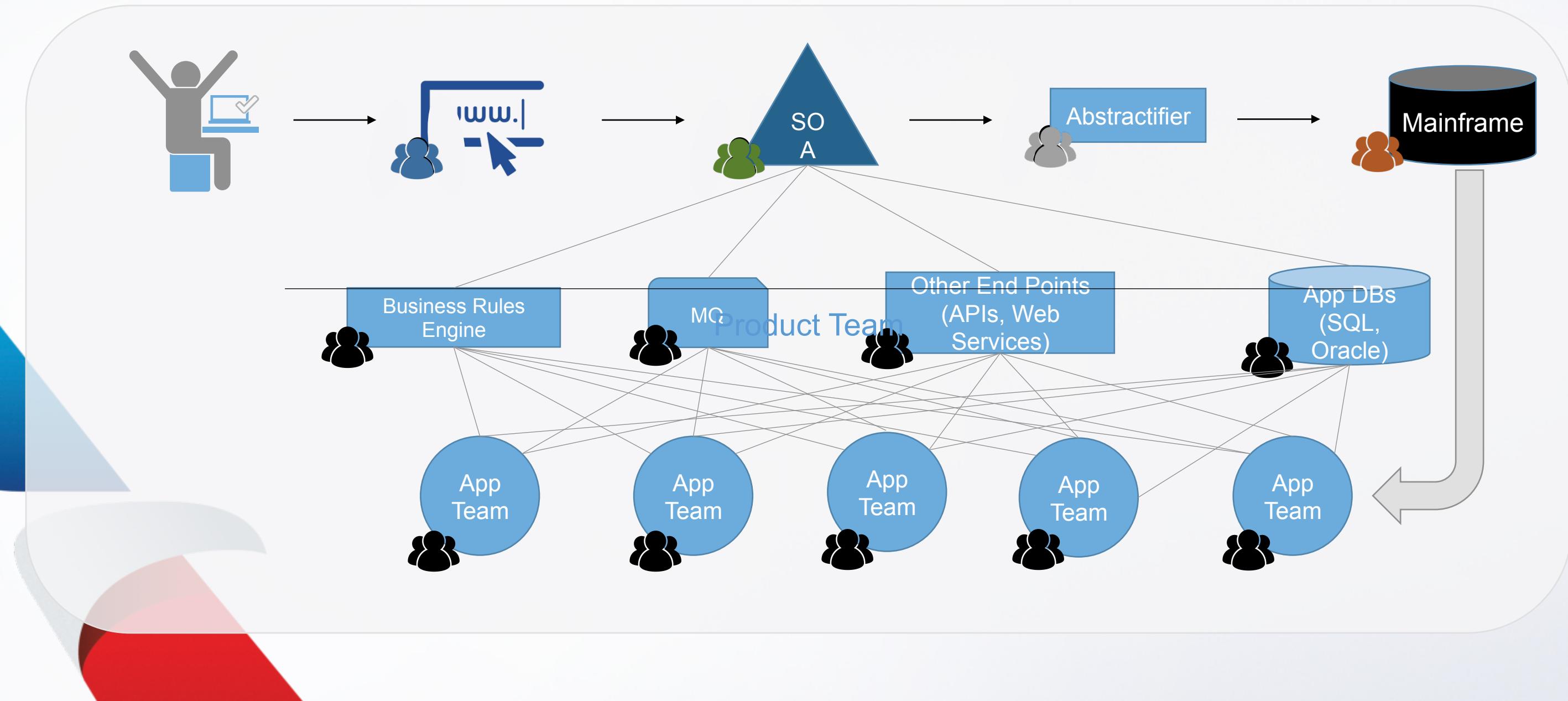
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IT Humor goes a long, long, way.....



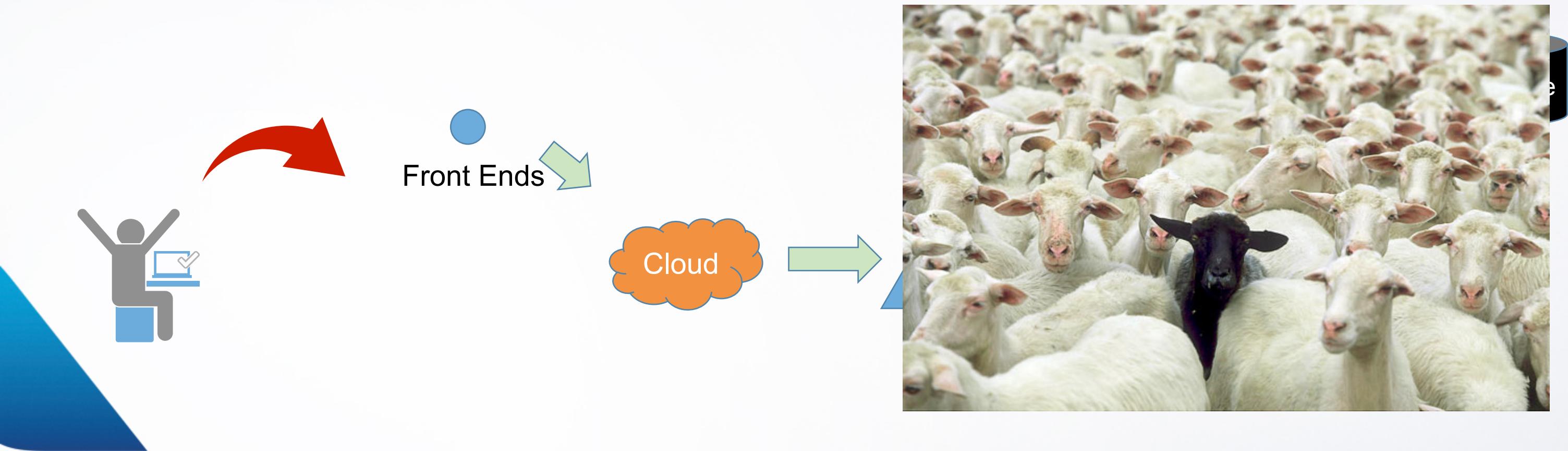
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Modus Operandi – from "projects" to "products"



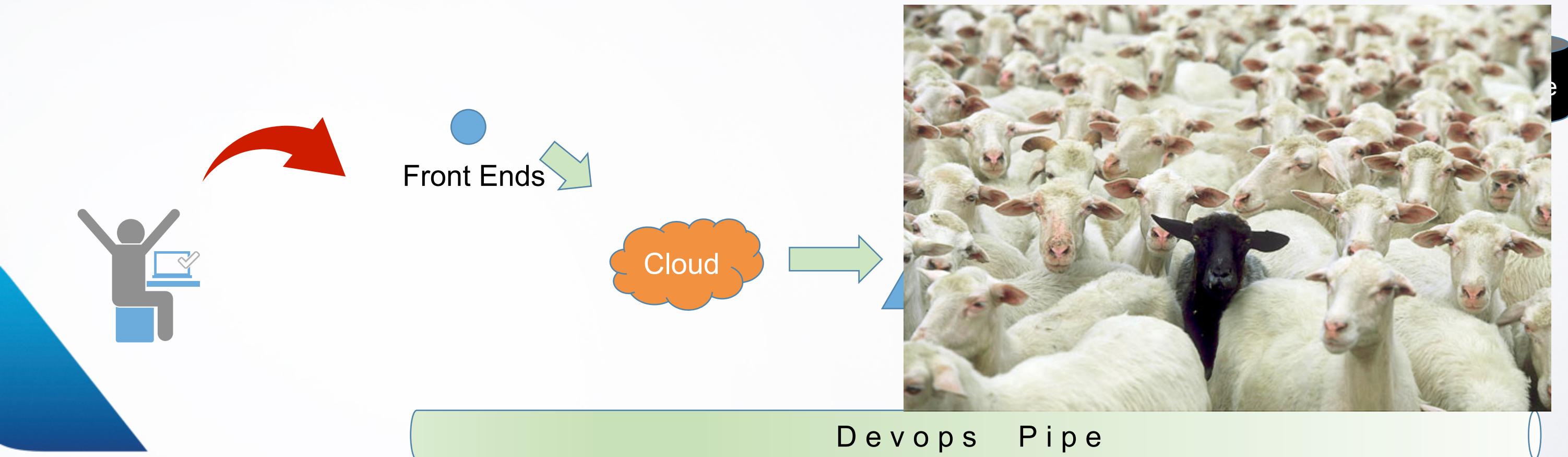
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Product Teams – because it makes sense



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Product Teams – because it makes sense



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## Mainframe Devops



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## Building Automation



Writing test cases for mainframe can be unusable in different scenarios & use cases

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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...

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



Eliminated manual testing, saving 30 hours per build via automation

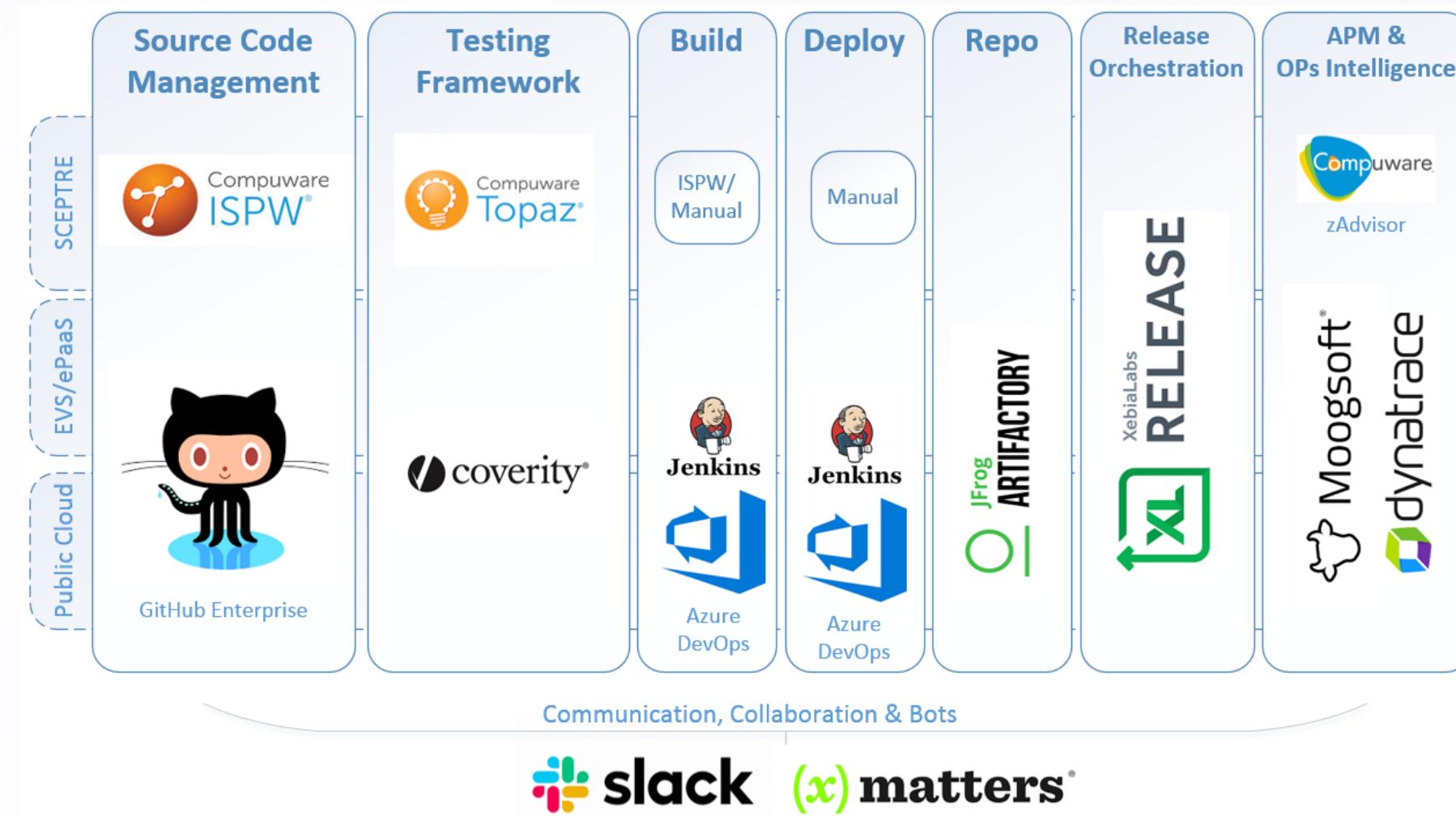


Improve the process first, promote the notion of open source / inner source, open trust and collaboration between developer communities

Trust in the fail fast process of DevOps

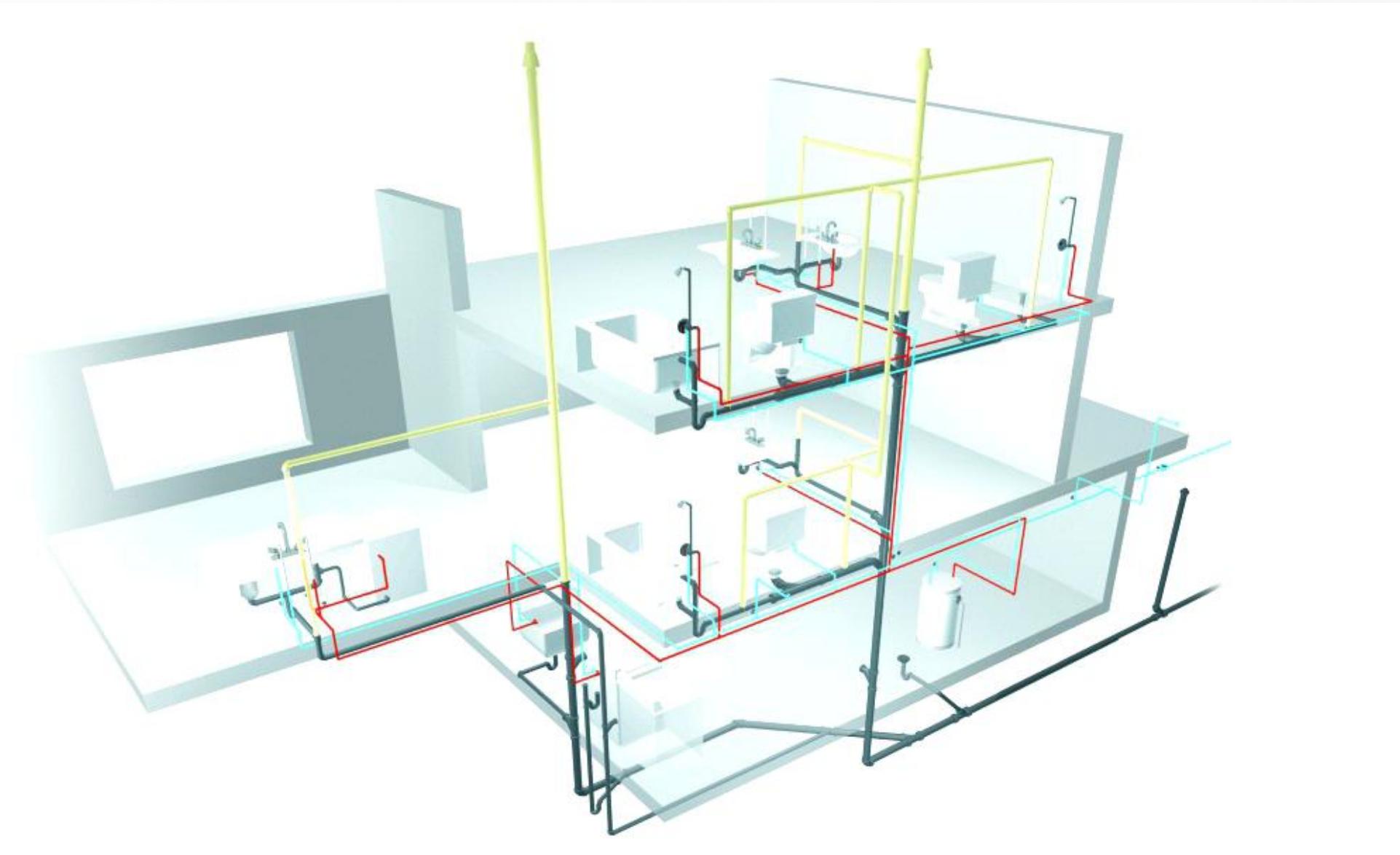
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The stack.....



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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



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

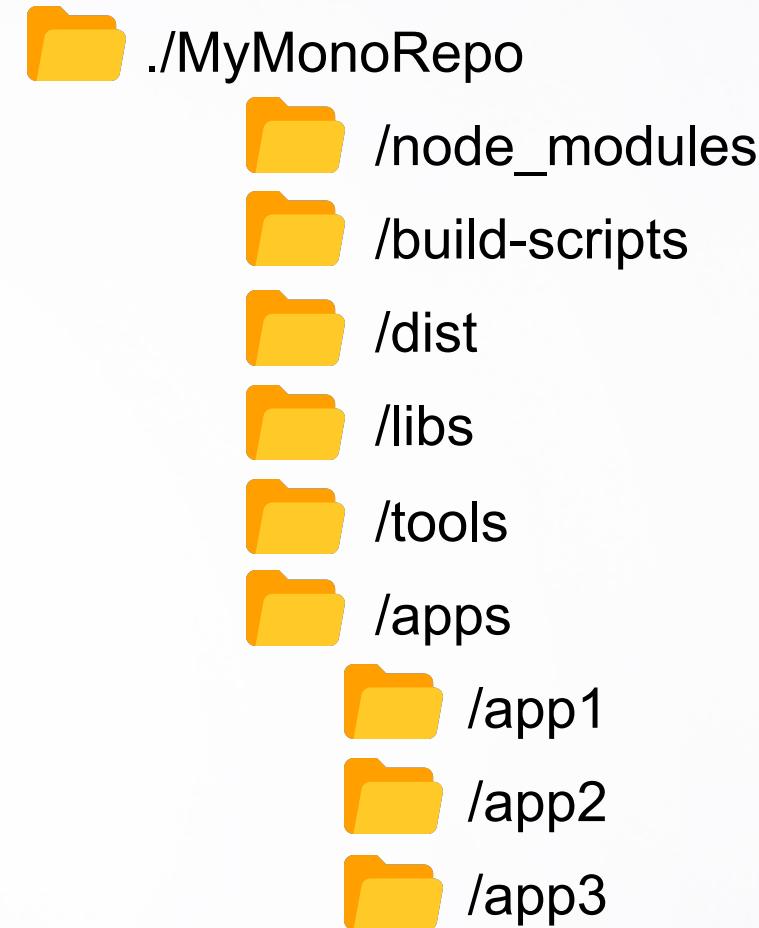
Experimentation with a smaller subset of applications that have notoriety for software challenges

- ✓ 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



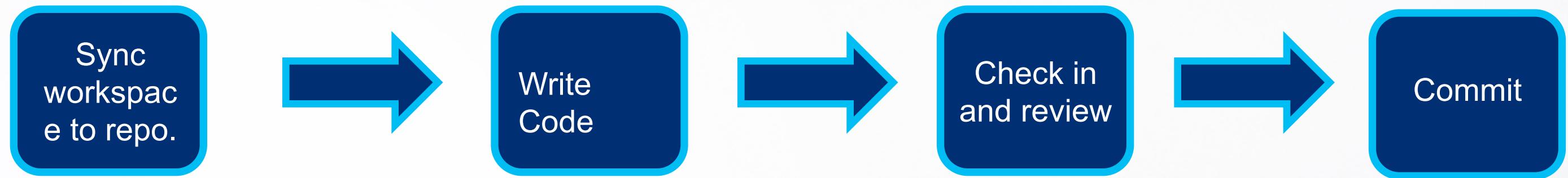
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## Workspace to Repo



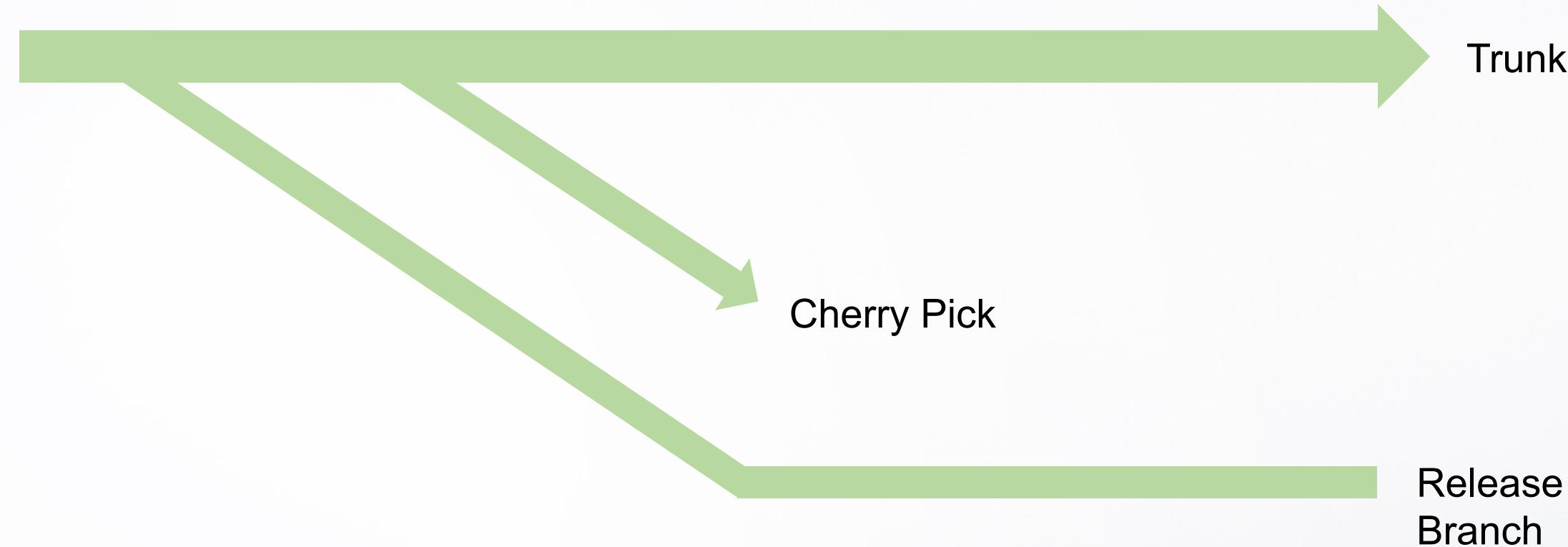
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## Workflow



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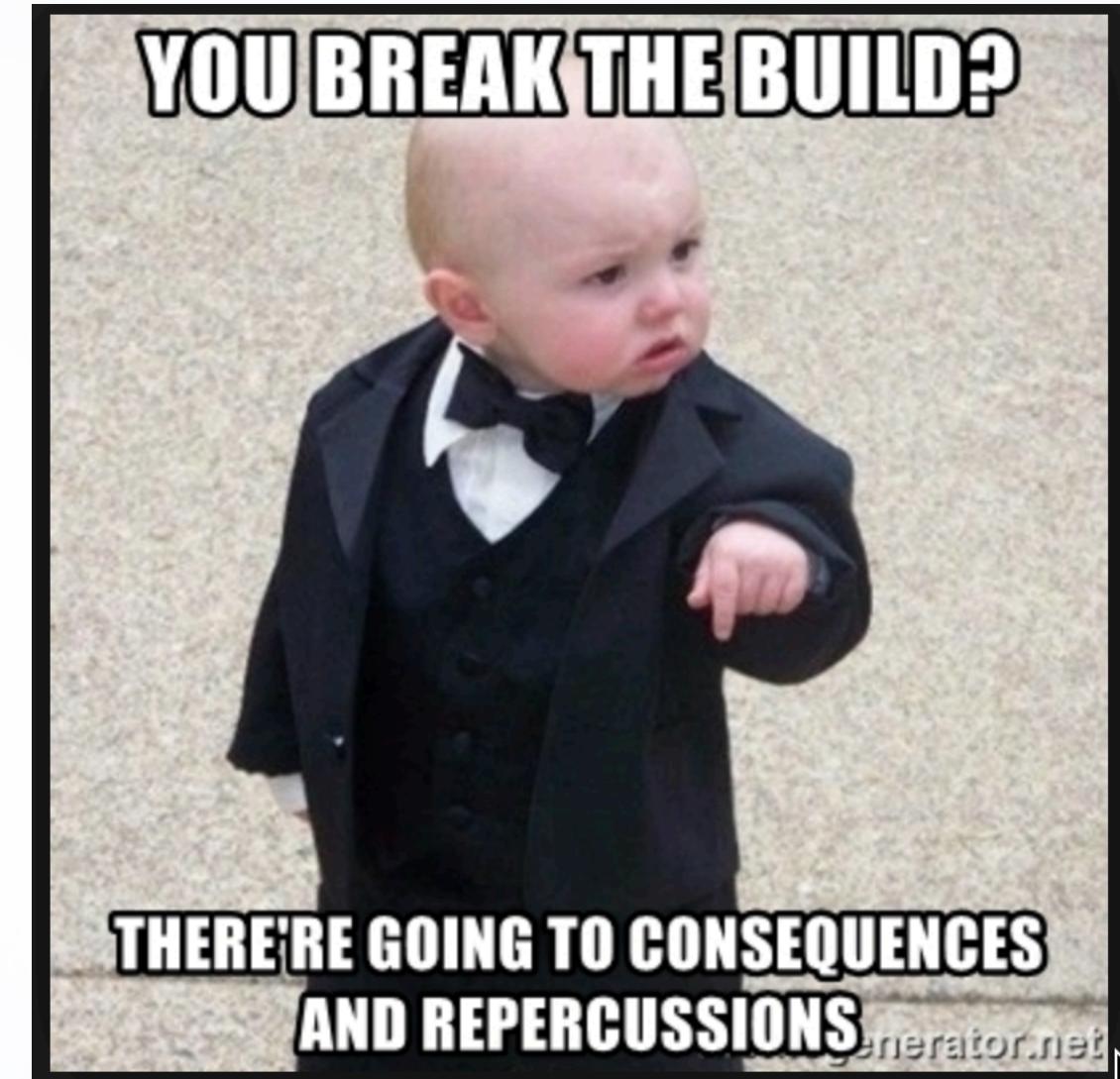
**Release one or many**





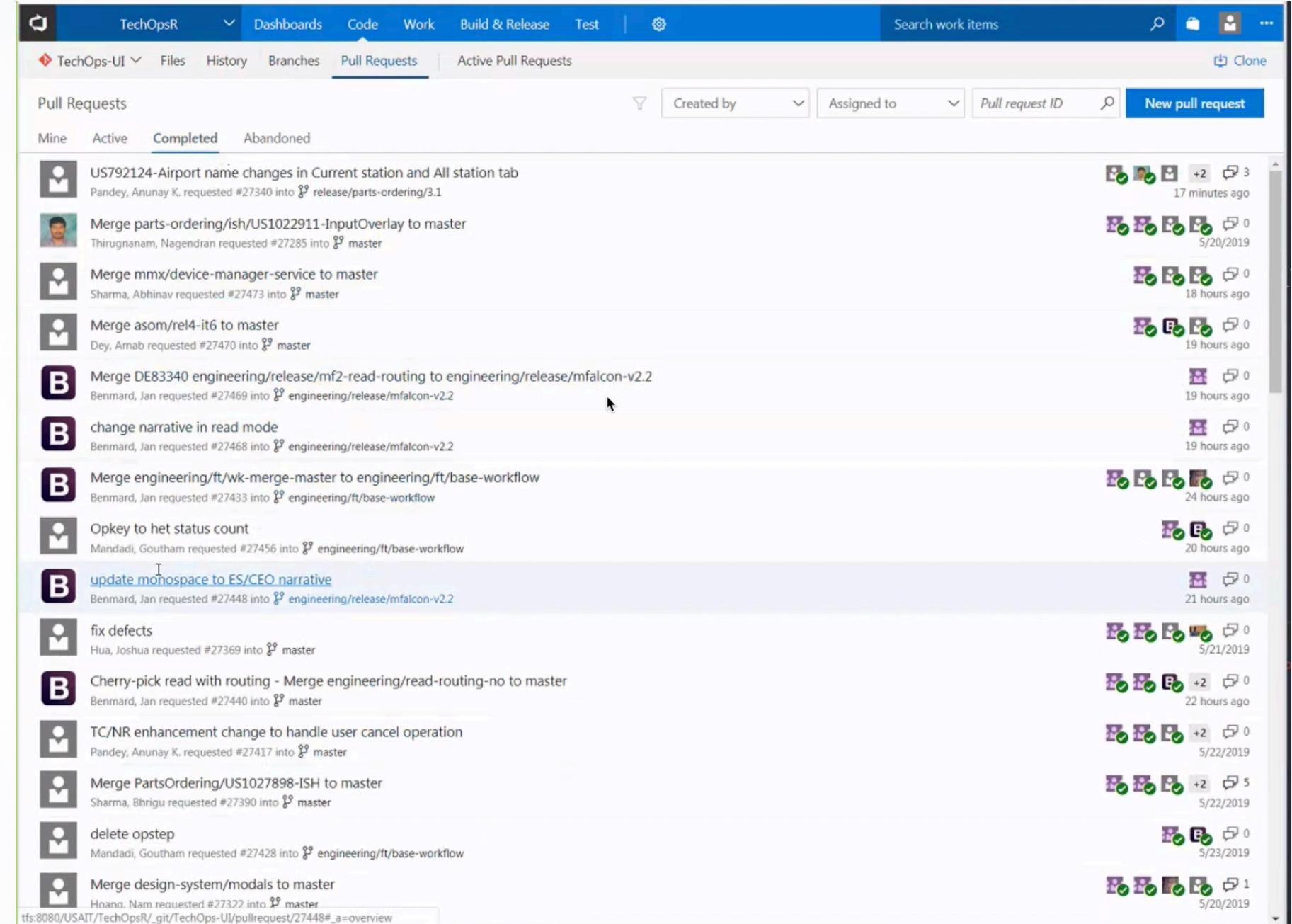
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Don't break the build



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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, Search work items, Clone, New pull request.
- 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, 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

## Results

- Consolidated all new UI development, unifying one source of truth
- Extensive codesharing (even from legacy apps) and reusability, simplifying dependency management
- Dramatic increase in collaboration between development teams – resulting in large scale refactoring, codebase modernization
- Continually onboarding new developers with flexible team boundaries and empowered ownership
- Realizing the benefits of write once, use many principles, code visibility, clear tree structure – implicit team namespacing, test bootstrapping easier to configure



**330x** times faster to deploy multi-application dependencies

250% increase in developer collaboration

4200 work hours regained by eliminating duplication

## Challenges and Risks

- Not enough test coverage to have complete confidence in changes to shared code
- Struggling with feature toggling and decoupling releases from deployments
- Still rely on external referencing for troubleshooting
- Entire projects are still in polyrepos as a majority of our codebase has not been migrated – can we expand this to the larger org?



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## Conclusions and take-aways

- ✓ 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
- 