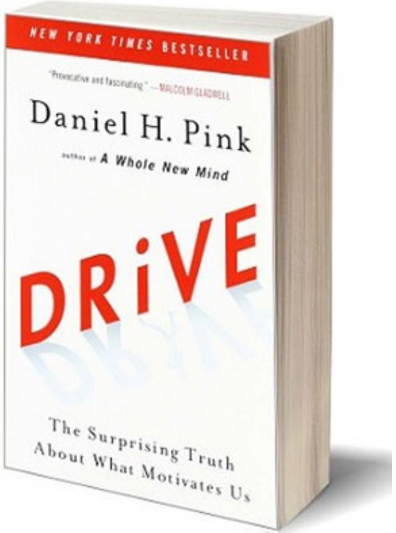
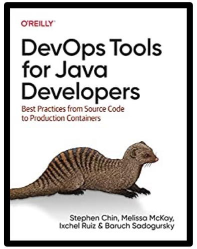
IMPROVING THE DEVELOPER EXPERIENCE WITH DEVELOPER PRODUCTIVITY ENGINEERING

LET'S TALK ABOUT MOTIVATION


NEW YORK TIMES BESTSELLER
"Provocative and fascinating." —MALCOLM GLADWELL
Daniel H. Pink
author of A Whole New Mind
DRiVE
The Surprising Truth About What Motivates Us

BARUCH SADOGURSKY - @JBARUCH

- Developer Productivity Advocate
- Gradle Inc
- Development -> DevOps -> #DPE

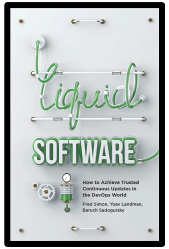


O'REILLY

DevOps Tools for Java Developers

Best Practices from Source Code to Production Containers

Stephen Chin, Melissa McKay, Ixchel Ruiz & Baruch Sadogursky



Liquid

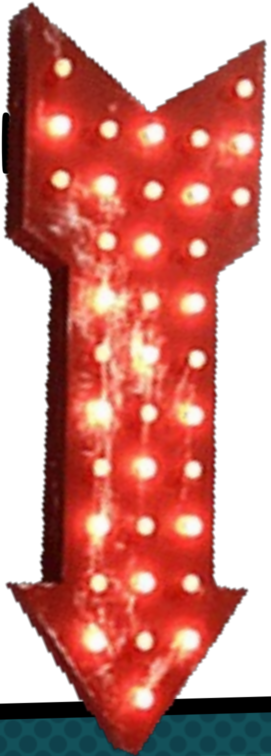
SOFTWARE

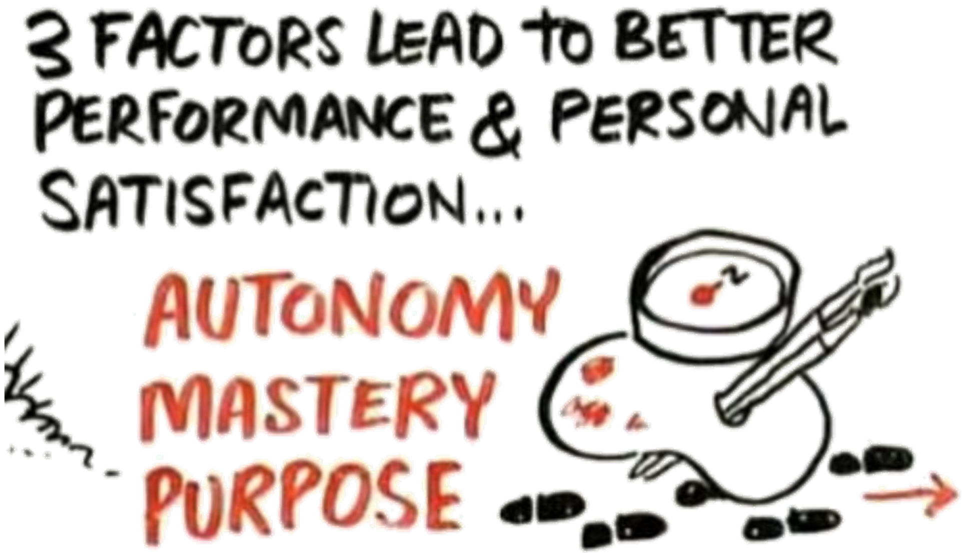
How to Achieve Trusted Continuous Updates in the DevOps World

Fred Simon, Yoav Landman, Baruch Sadogursky

SHOWNOTES

- speaking.jbaru.c
- Slides
- Video
- All the links!





3 FACTORS LEAD TO BETTER PERFORMANCE & PERSONAL SATISFACTION...

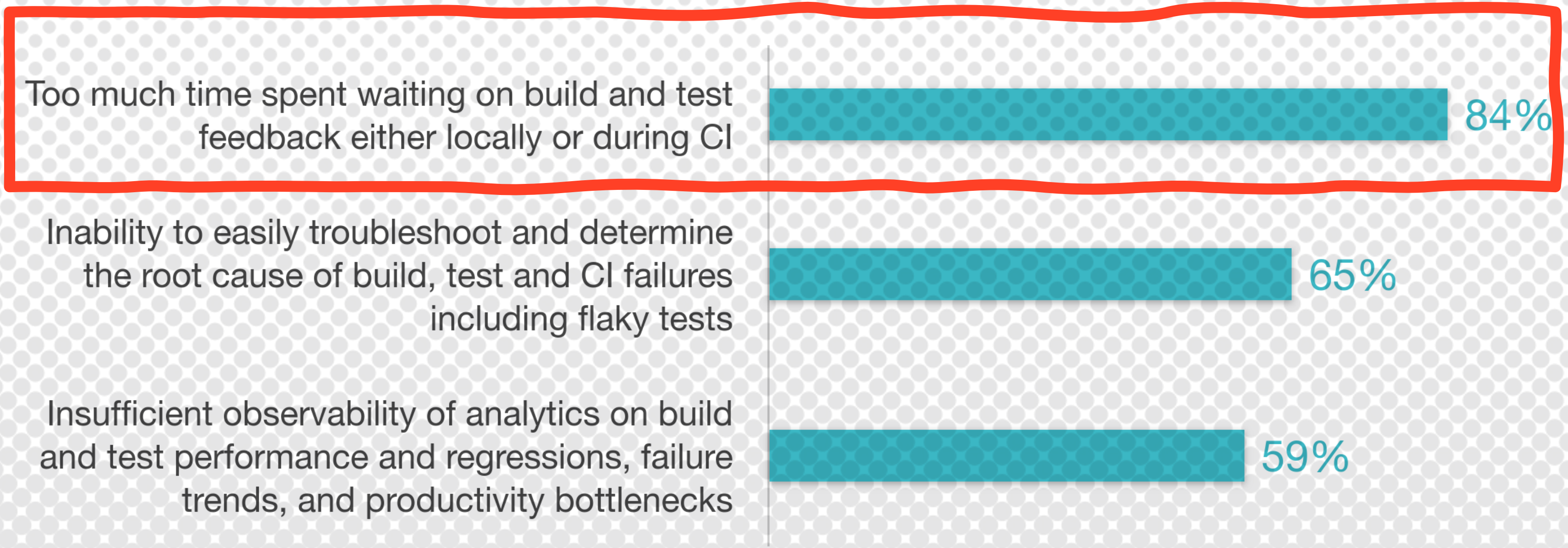
AUTONOMY
MASTERY
PURPOSE

DON'T RUIN THE FLOW

"THE BUILD TAKES FOREVER, I AM DISTRACTED TO DO OTHER THINGS AND THE CONTEXT SWITCH IS TERRIBLE"

Development Pains are Widespread

Which of the following challenges or pain points did your organization experience prior to implementing Developer Productivity Engineering?

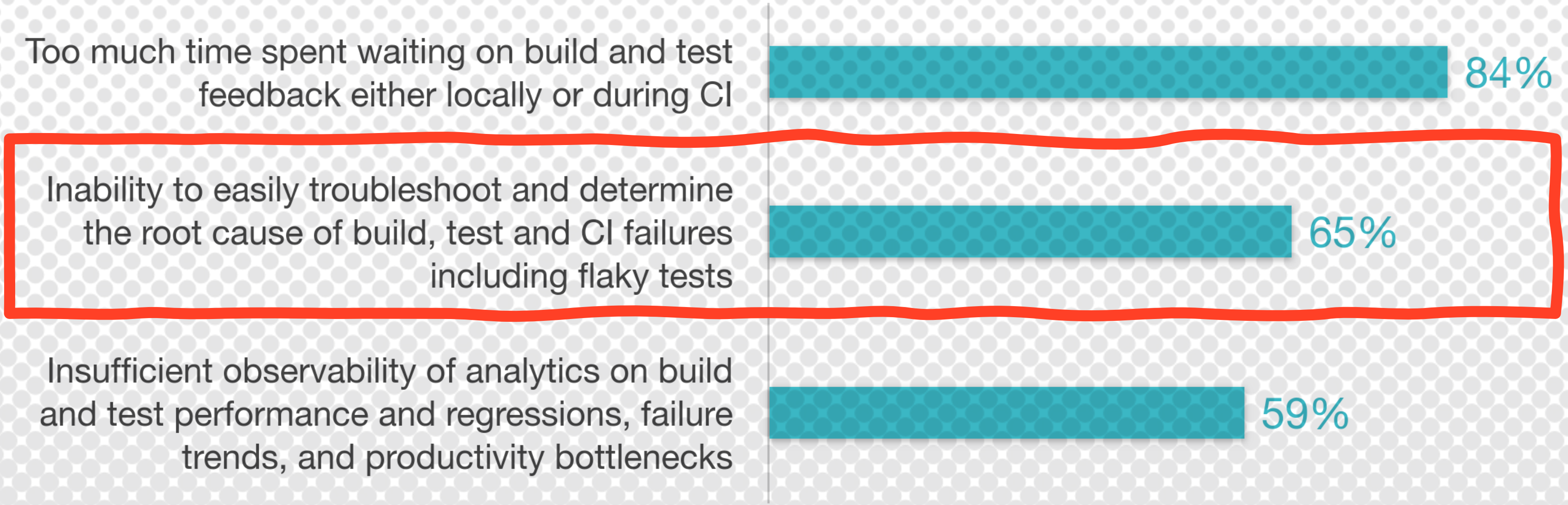


DON'T FRUSTRATE THE DEVELOPERS

"WE HAVE A FLANKY TEST, IT IS IRRELEVANT 99.5% OF THE TIME , BUT IT ALWAYS RUNS AND IT IS LAST IN THE SUITE"

Development Pains are Widespread

Which of the following challenges or pain points did your organization experience prior to implementing Developer Productivity Engineering?

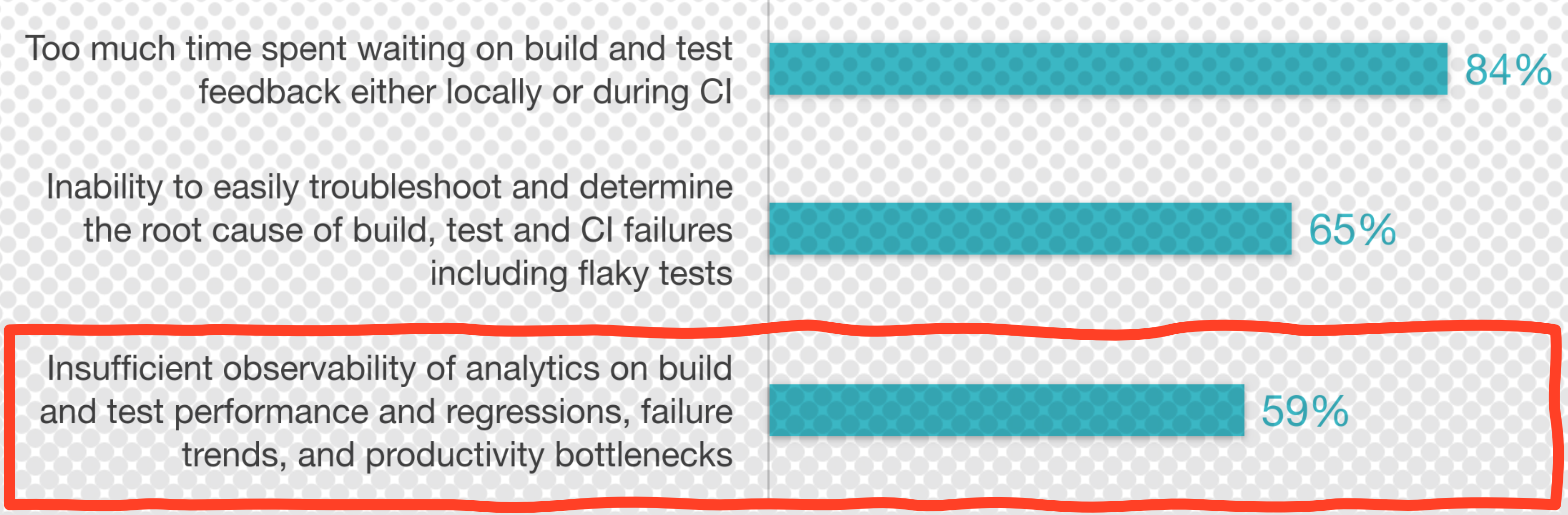


DON'T BOIL THE FROG

"I HAVE A FEELING THAT EVERYTHING IS SLOWER SOMEHOW…"

Development Pains are Widespread

Which of the following challenges or pain points did your organization experience prior to implementing Developer Productivity Engineering?



DEVELOPER PRODUCTIVITY :: A/M/P :: MOTIVATION

Autonomy	→	Tools and people aren’t in my way
Mastery	→	Tools and processes help me to excel
Purpose	→	I want to be *productive*, i.e. create the product

DEVELOPER PRODUCTIVITY ENGINEERING!

DEVELOPER PRODUCTIVITY ENGINEERING

Foster Faster Feedback

Collaborate through Effective Tooling

Embrace Rigorous Observability for Proactive Improvement

Eliminate Toil for Developers

Prioritize Automation and Eliminate Bottlenecks

Dedicated Organizational Mindset

Outcomes Over Output

TALK IS CHEAP, SHOW ME THE GOODS!

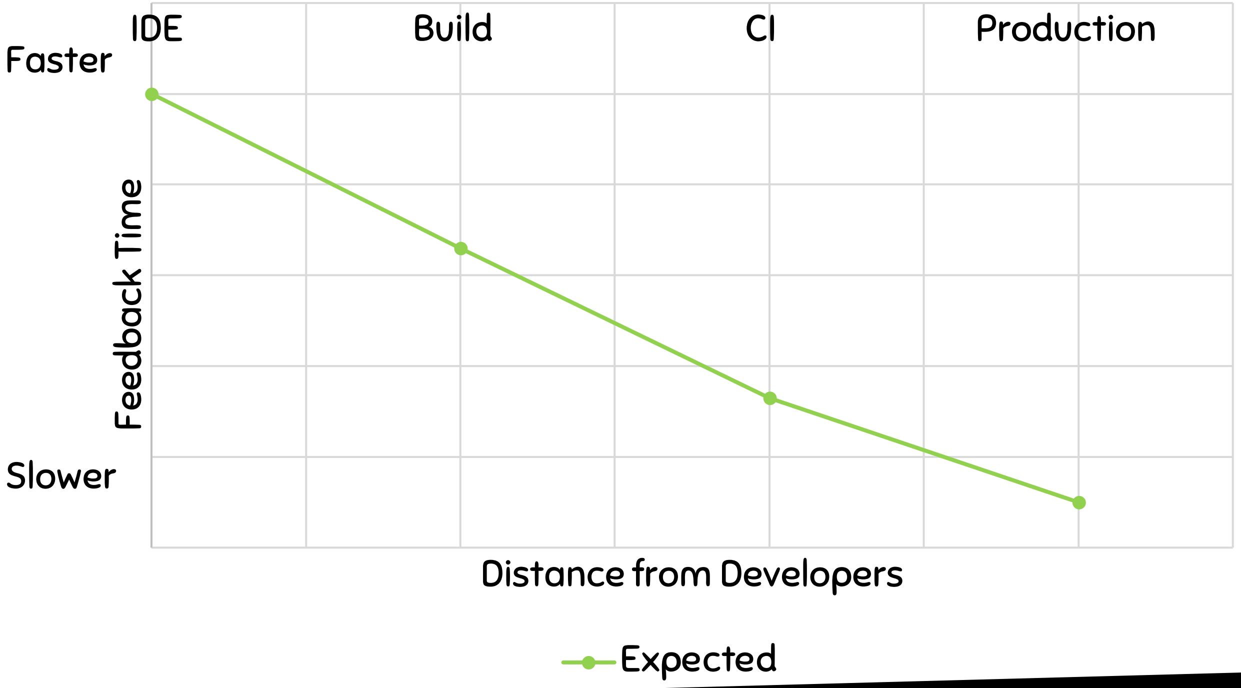
SMALL DPE IMPROVEMENTS MAKE A HUGE DIFFERENCE

- Generate code faster: Better IDE
- Test better: Testcontainers
- Enforce better code: Sonar
- Test more reliably: Flaky test detection
- Foster Faster Feedback:

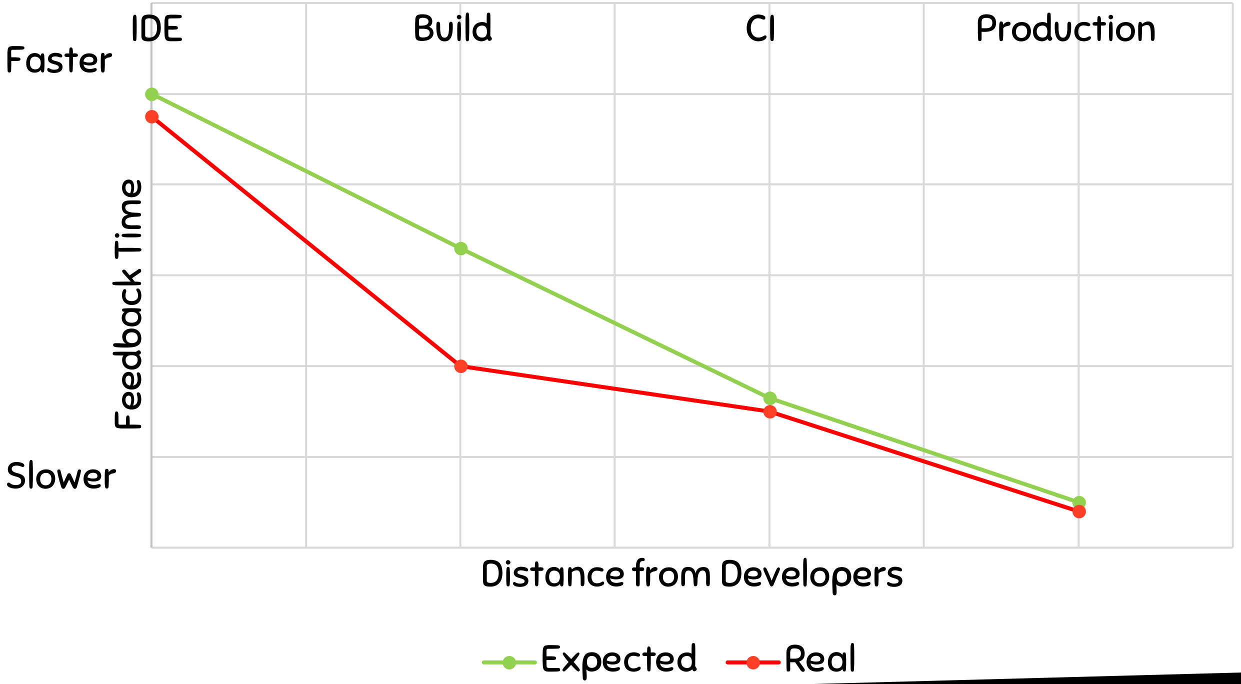
FEEDBACK EFFICIENCY

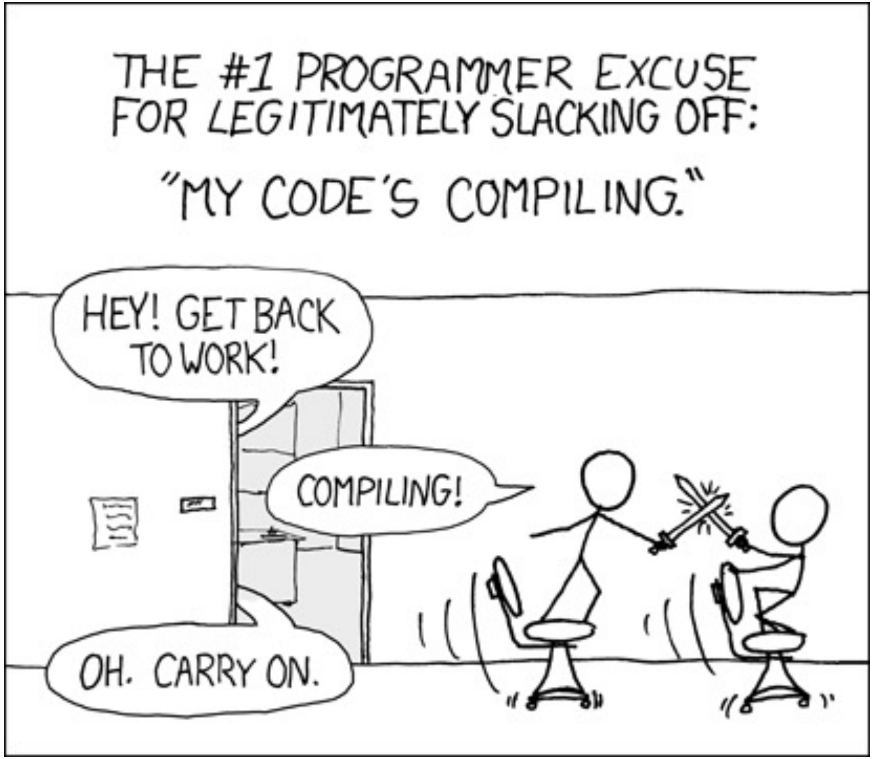
- IDE: Sub-seconds (I type, it marks it red)
- Build: Seconds
- CI: Minutes
- Production: Hours/Days

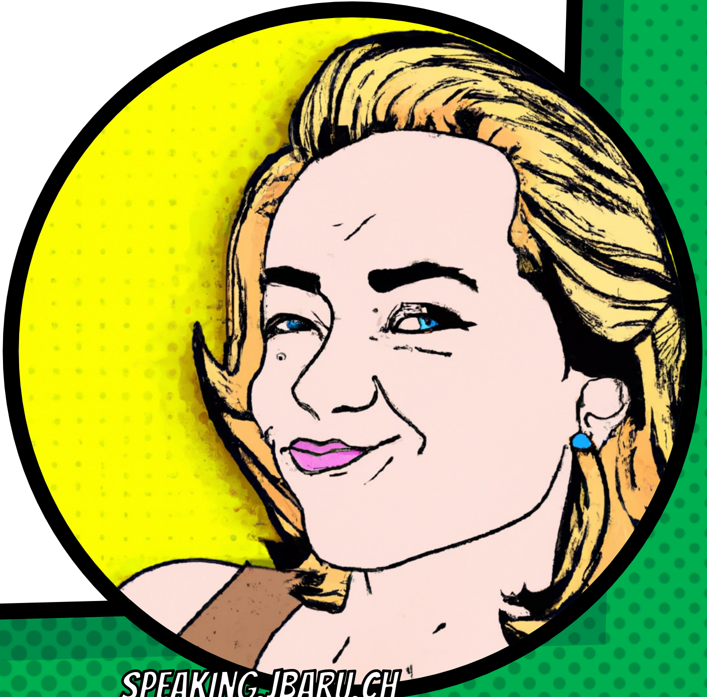
REVERSE DEPENDENCY ON DISTANCE FROM DEVELOPERS



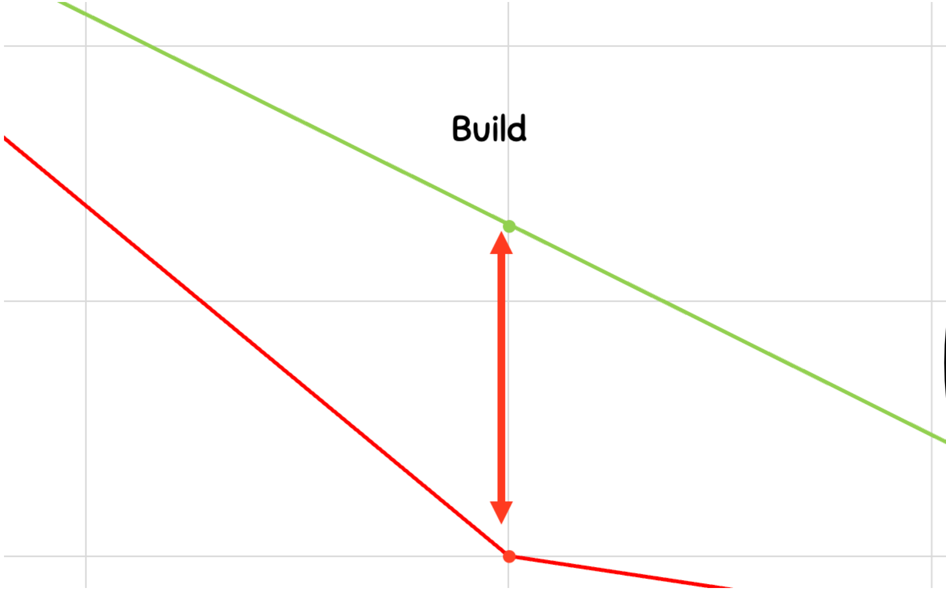
REVERSE DEPENDENCY ON DISTANCE FROM DEVELOPERS

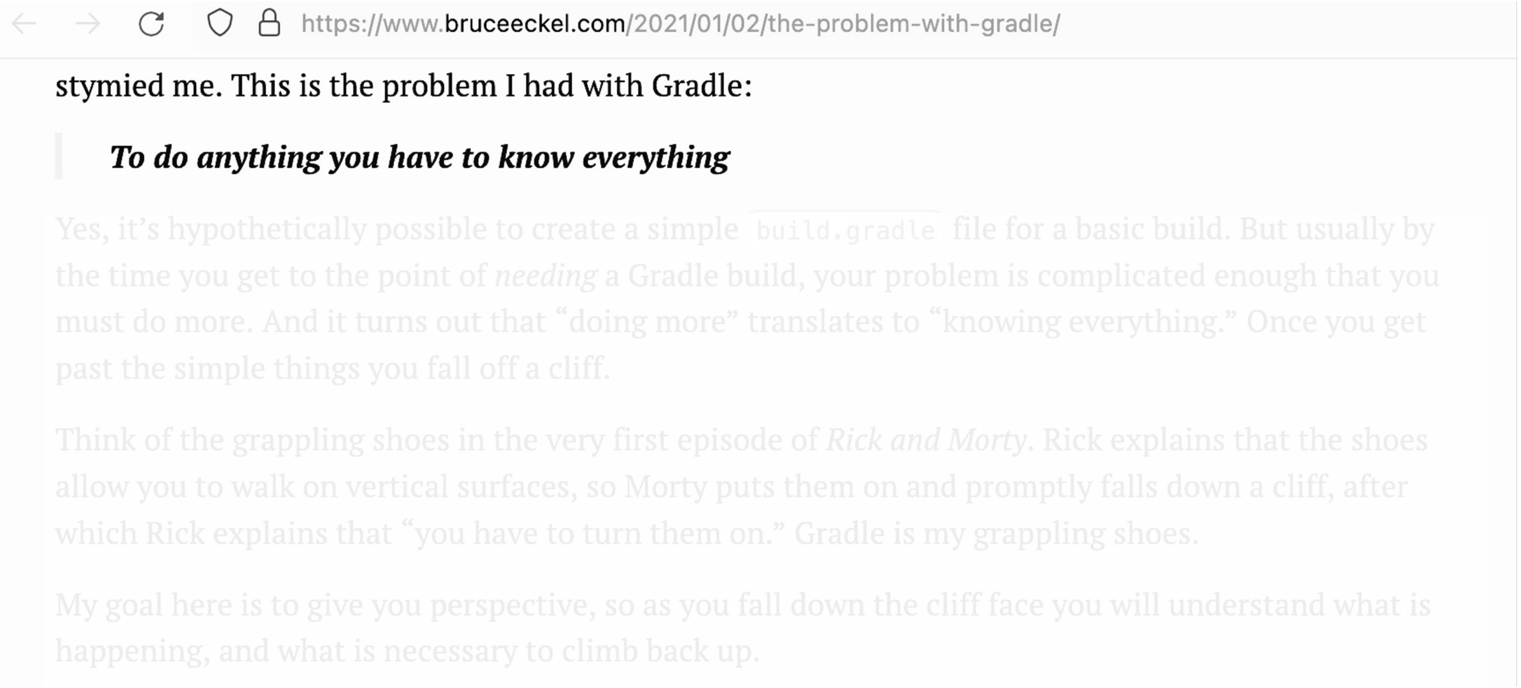



THE #1 PROGRAMMER EXCUSE FOR LEGITIMATELY SLACKING OFF:
"MY CODE'S COMPILING."
HEY! GET BACK TO WORK!
COMPILING!
OH. CARRY ON.



IT IS SLOW!




https://www.bruceeckel.com/2021/01/02/the-problem-with-gradle/

stymied me. This is the problem I had with Gradle:

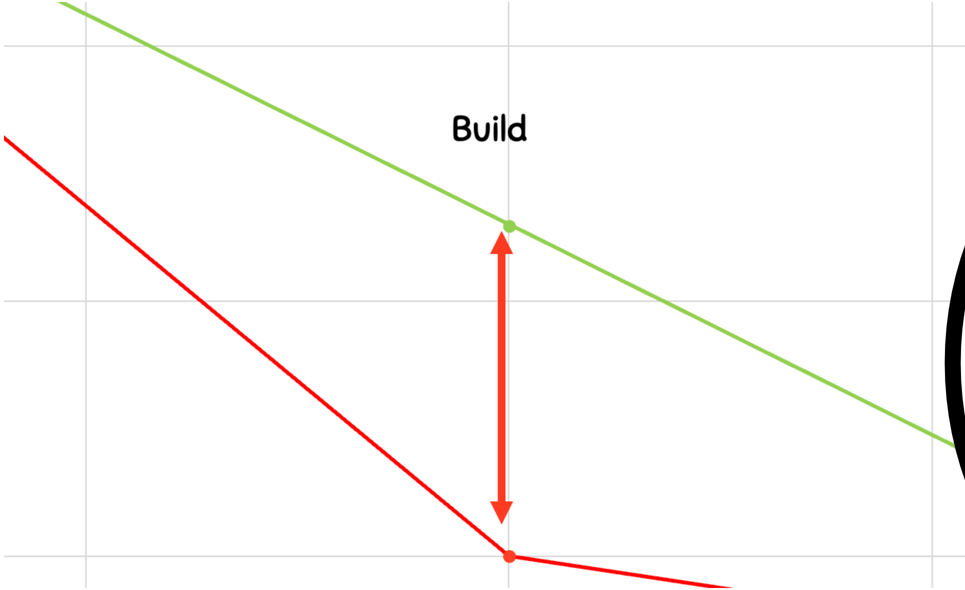
> ***To do anything you have to know everything***

Yes, it's hypothetically possible to create a simple `build.gradle` file for a basic build. But usually by the time you get to the point of *needing* a Gradle build, your problem is complicated enough that you must do more. And it turns out that "doing more" translates to "knowing everything." Once you get past the simple things you fall off a cliff.

Think of the grappling shoes in the very first episode of *Rick and Morty*. Rick explains that the shoes allow you to walk on vertical surfaces, so Morty puts them on and promptly falls down a cliff, after which Rick explains that "you have to turn them on." Gradle is my grappling shoes.

My goal here is to give you perspective, so as you fall down the cliff face you will understand what is happening, and what is necessary to climb back up.

IT IS SLOW AND THE DEVELOPERS HAVE NO IDEA WHY!



WHAT IS BUILD?

- Project setup
- Downloading the Internet
- Artifact generation: Compilation, packaging, etc
- Tests
- Artifact deployment

WHAT CAN GO WRONG?

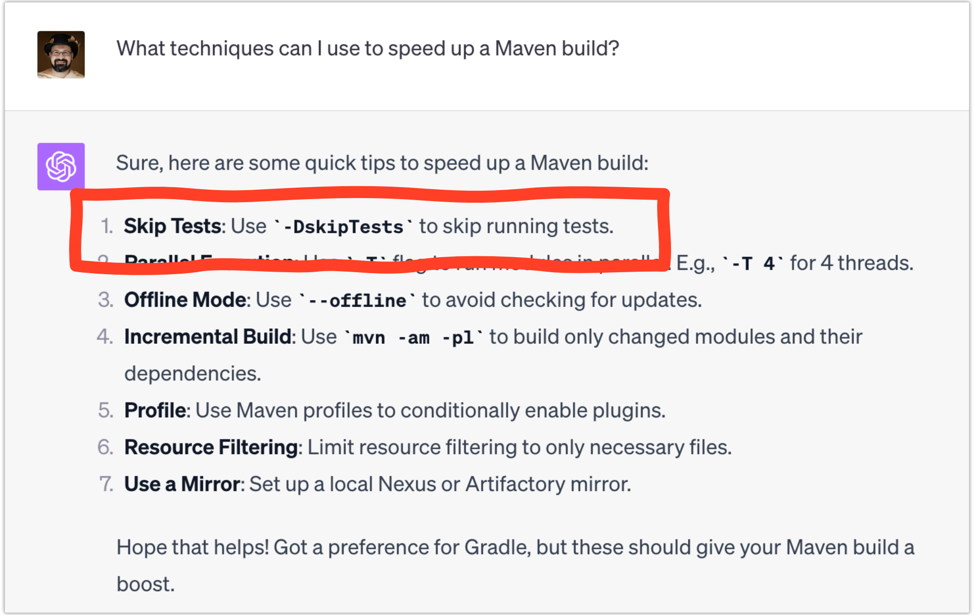
- Project setup
- Downloading the Internet
- Artifact generation: Compilation, packaging, etc
- Tests
- Artifact deployment

WHEN CAN IT GO WRONG?

AT ANY TIME.

THE BUILD FRUSTRATES THE DEVELOPERS

LET'S ASK CHATGPT



What techniques can I use to speed up a Maven build?

Sure, here are some quick tips to speed up a Maven build:

1. **Skip Tests**: Use `-DskipTests` to skip running tests.
2. **Parallel Execution**: Use `-T` flag to run modules in parallel. E.g., `-T 4` for 4 threads.
3. **Offline Mode**: Use `--offline` to avoid checking for updates.
4. **Incremental Build**: Use `mvn -am -pl` to build only changed modules and their dependencies.
5. **Profile**: Use Maven profiles to conditionally enable plugins.
6. **Resource Filtering**: Limit resource filtering to only necessary files.
7. **Use a Mirror**: Set up a local Nexus or Artifactory mirror.

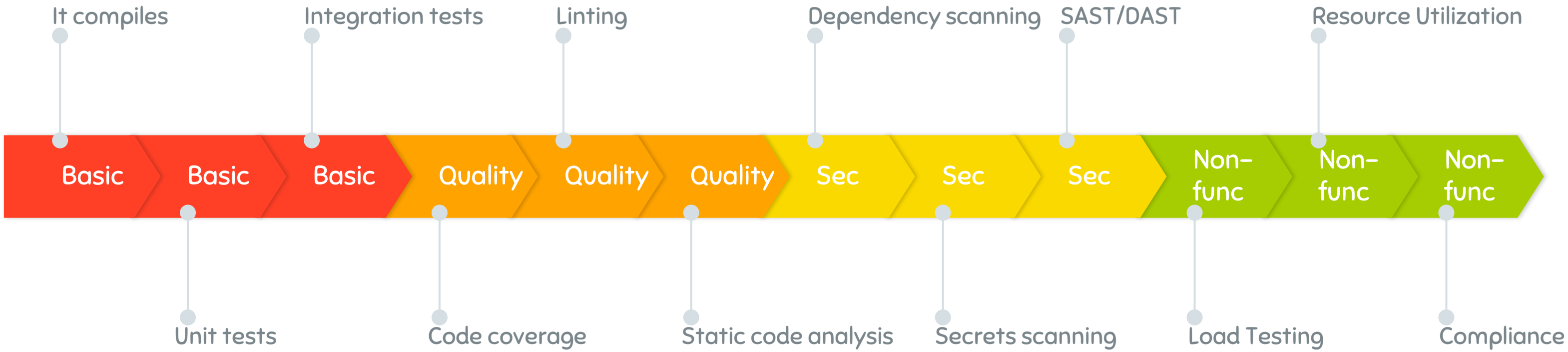
Hope that helps! Got a preference for Gradle, but these should give your Maven build a boost.

WHAT THE ACTUAL F*CK?!

- Skipping tests defeats the purpose of the build!
- How about skipping compilation?
- We want faster feedback, not less feedback

WHAT FEEDBACK DO WE WANT?

CI/CD PIPELINE QUALITY GATES



It compiles
Integration tests
Linting
Dependency scanning
SAST/DAST
Resource Utilization

Basic
Basic
Basic
Quality
Quality
Quality
Sec
Sec
Sec
Non-func
Non-func
Non-func

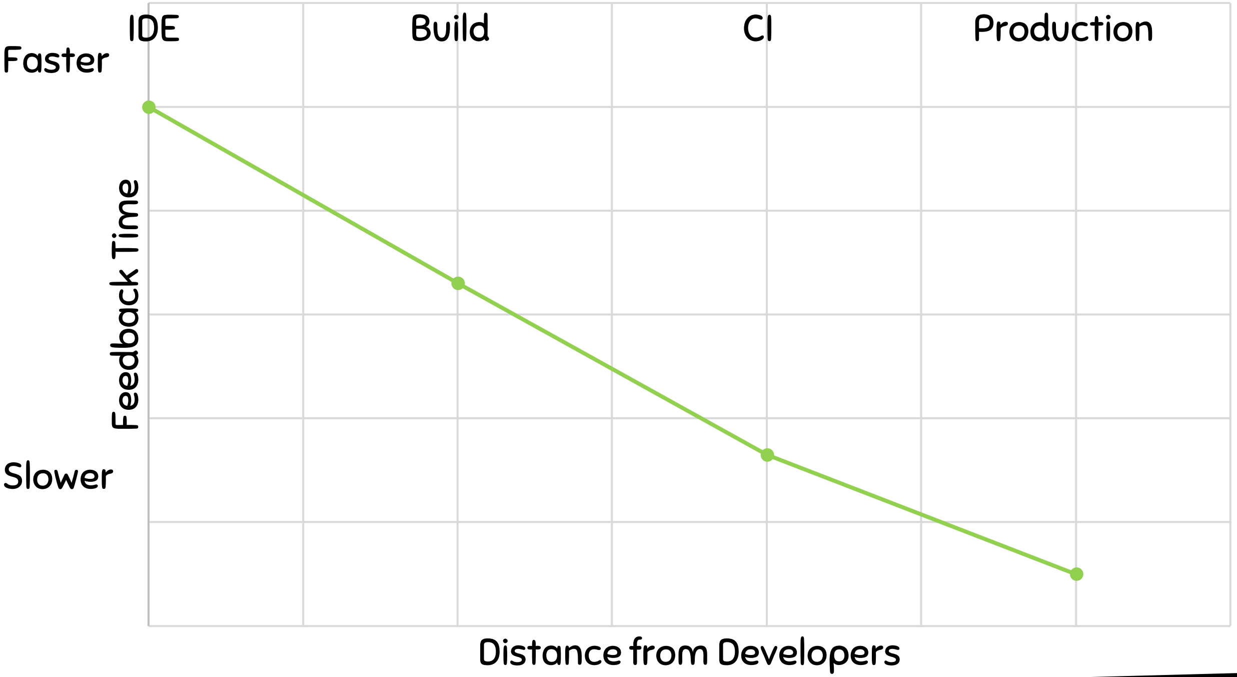
Unit tests
Code coverage
Static code analysis
Secrets scanning
Load Testing
Compliance

CI/CD? NOT GREAT, NOT TERRIBLE.

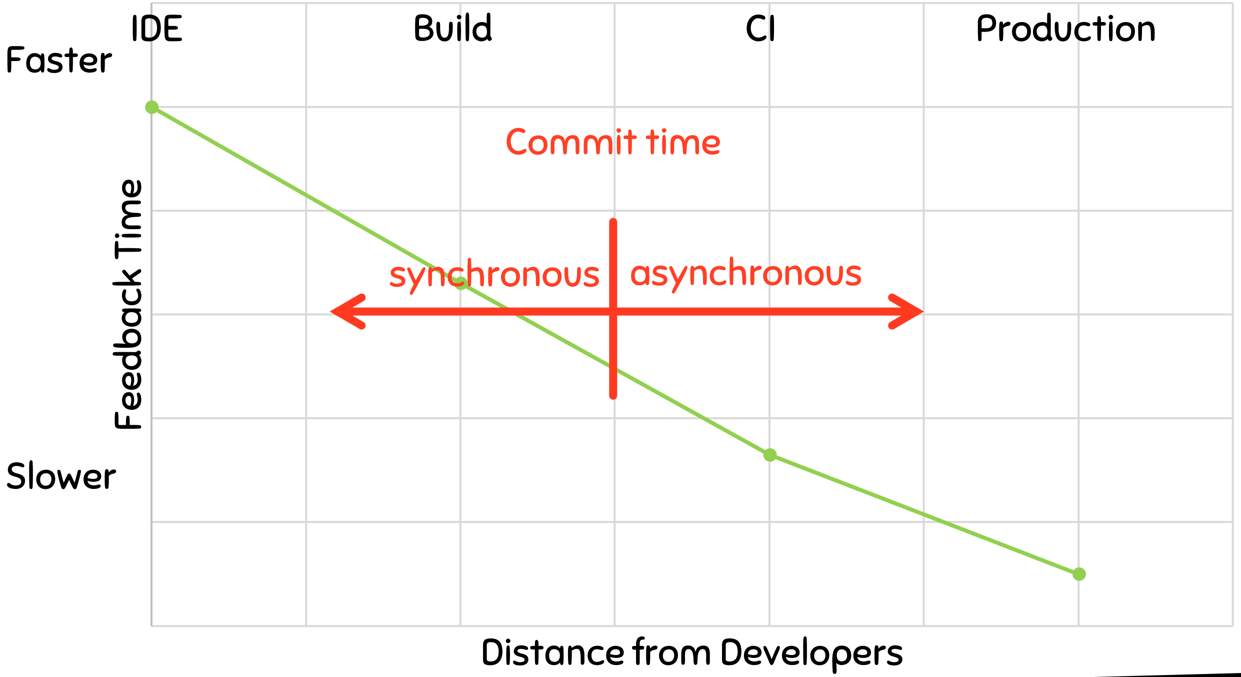
TWO TYPES OF FEEDBACK

ASYNCHRONOUS	× e.g., CI/CD × we never wait for it × results are distracting
SYNCHRONOUS	× e.g., build × we'll wait for it in the flow × we'll be pissed off when it's slow

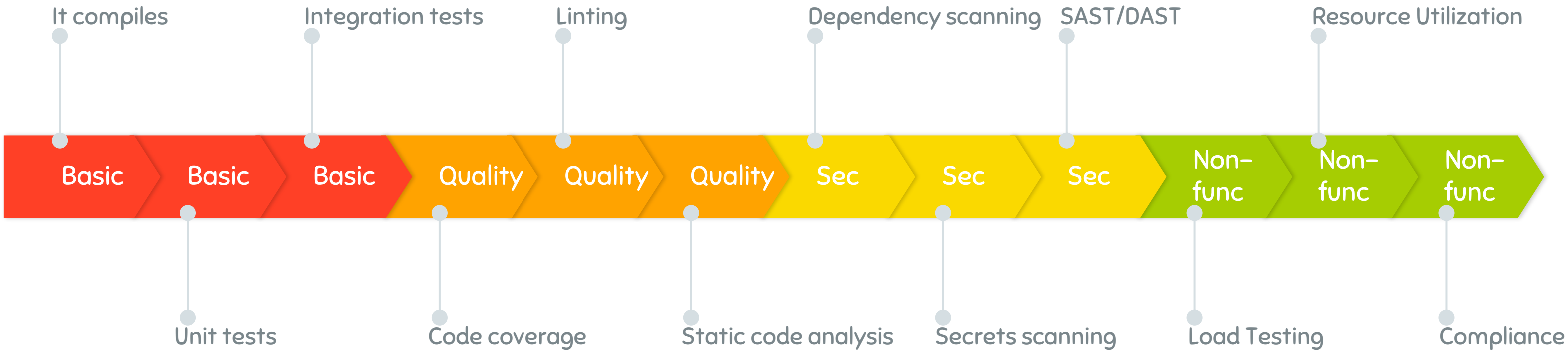
REVERSE DEPENDENCY ON DISTANCE FROM DEVELOPERS



REVERSE DEPENDENCY ON DISTANCE FROM DEVELOPERS



IDEAL BUILD TIME FEEDBACK



It compiles
Basic
Unit tests
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Code coverage
Quality
Linting
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Static code analysis
Quality
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Sec
Secrets scanning
Sec
SAST/DAST
Sec
Load Testing
Non-func
Resource Utilization
Non-func
Compliance
Non-func

BUT WON'T IT SLOW DOWN THE BUILD?!

DELIGHTFUL BUILD (PICK TWO):

- ☑ PROVIDES MAX FEEDBACK
- ☑ FAST

SKIP WHAT CAN BE SKIPPED
(BUT NO MORE!)

AVOIDANCE: INCREMENTAL BUILD

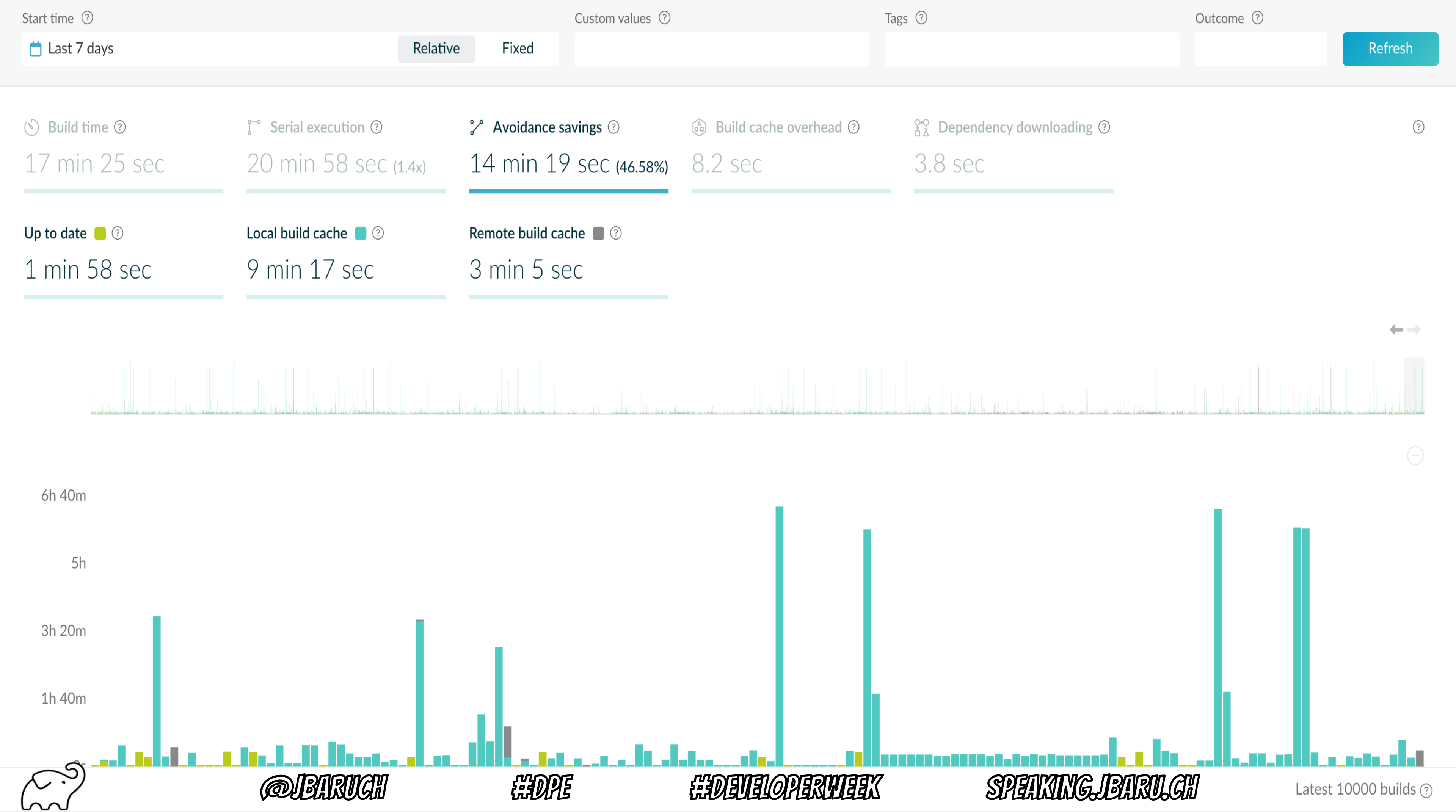
- Don’t build what didn’t changed
- Don’t build what isn’t affected

AVOIDANCE: INCREMENTAL BUILD SHORTCOMINGS

- × Relies on produced artifacts
- × Relies on architectural decisions

AVOIDANCE: CACHING

- Makes the build faster
- Makes the build faster for everybody
- Makes the build faster always
- Makes all parts of the build faster



Build time: 17 min 25 sec

Serial execution: 20 min 58 sec (1.4x)

Avoidance savings: 14 min 19 sec (46.58%)

Build cache overhead: 8.2 sec

Dependency downloading: 3.8 sec

Up to date 🟨: 1 min 58 sec

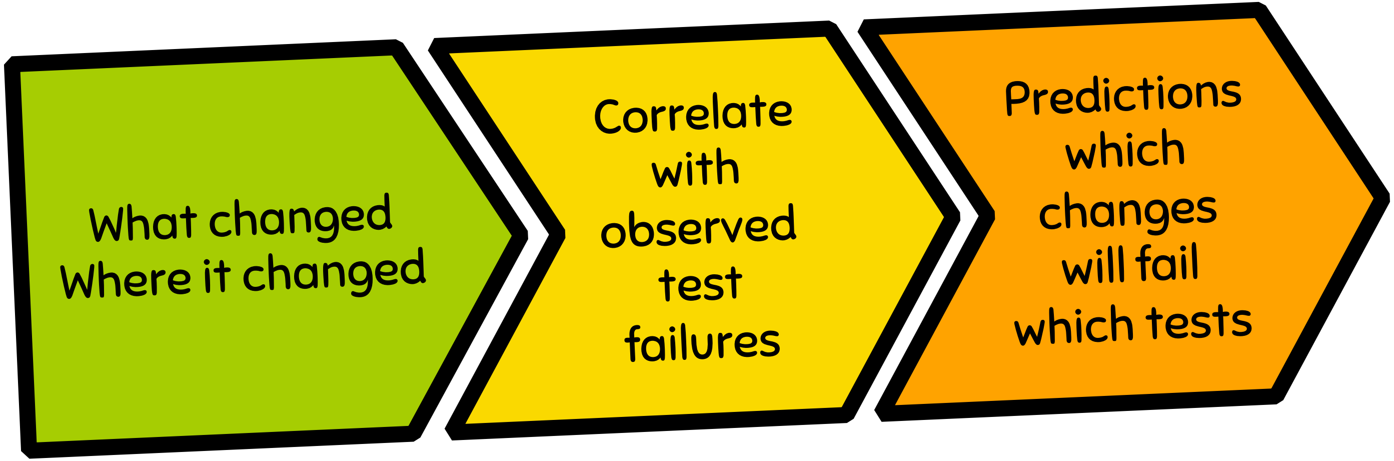
Local build cache 🟩: 9 min 17 sec

Remote build cache ■: 3 min 5 sec

AVOIDANCE: PREDICTIVE TEST SELECTION

- Learns de-facto code change effects
- Skips tests with
  high degree of confidence

PREDICTIVE TEST PREDICTION



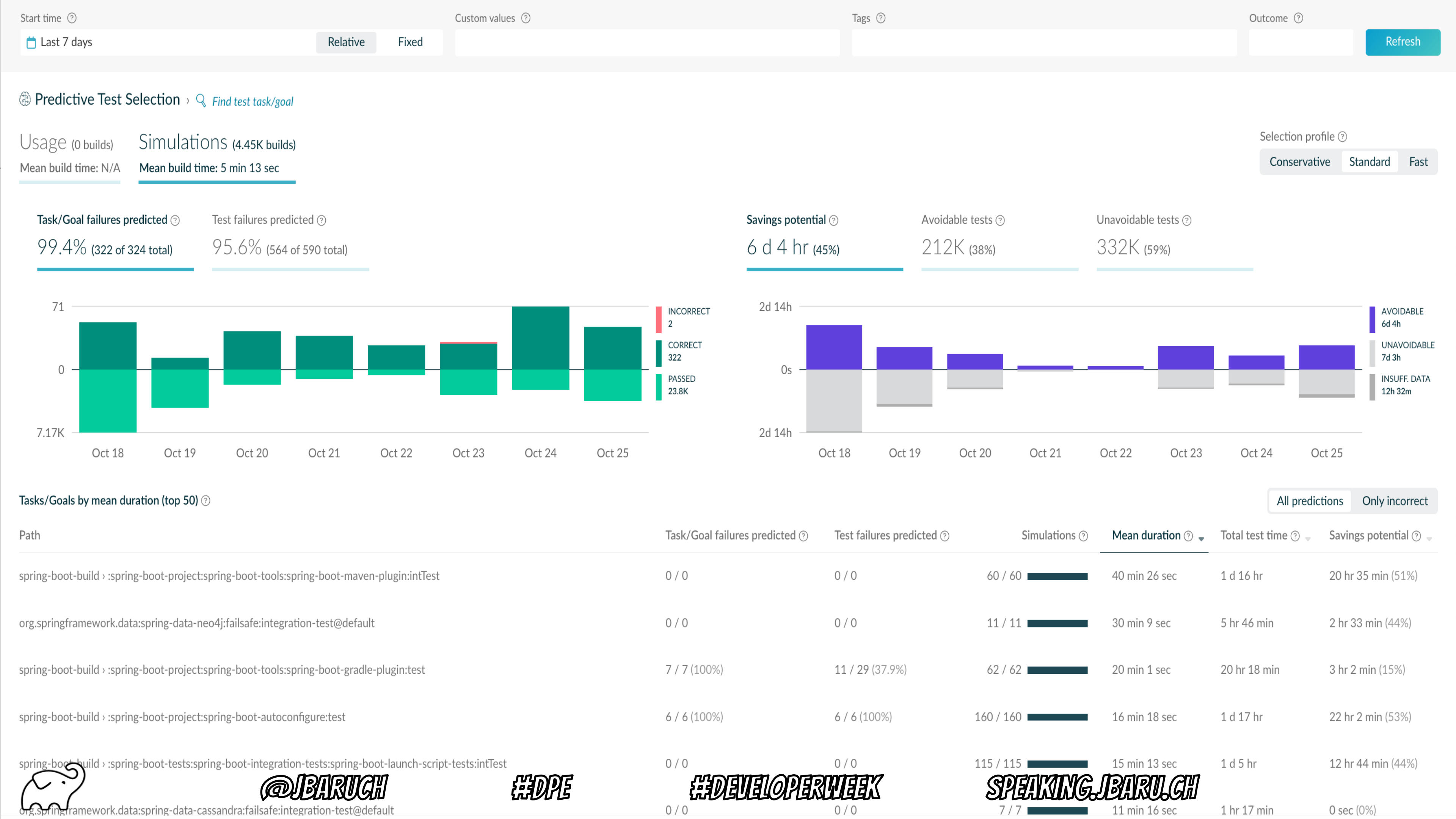
What changed
Where it changed

Correlate with observed test failures

Predictions which changes will fail which tests

BLACK MAGIC IN ACTION

- The more tests a project has, the less they break
- Refactorings in Java break tests less than in JavaScript



Start time ⓘ | Last 7 days | Relative | Fixed

Custom values ⓘ

Tags ⓘ

Outcome ⓘ

Refresh

Predictive Test Selection › *Find test task/goal*

Usage (0 builds)
Mean build time: N/A

Simulations (4.45K builds)
Mean build time: 5 min 13 sec

Selection profile ⓘ: Conservative | Standard | Fast

Task/Goal failures predicted ⓘ
99.4% (322 of 324 total)

Test failures predicted ⓘ
95.6% (564 of 590 total)

Savings potential ⓘ
6 d 4 hr (45%)

Avoidable tests ⓘ
212K (38%)

Unavoidable tests ⓘ
332K (59%)

Tasks/Goals by mean duration (top 50) ⓘ

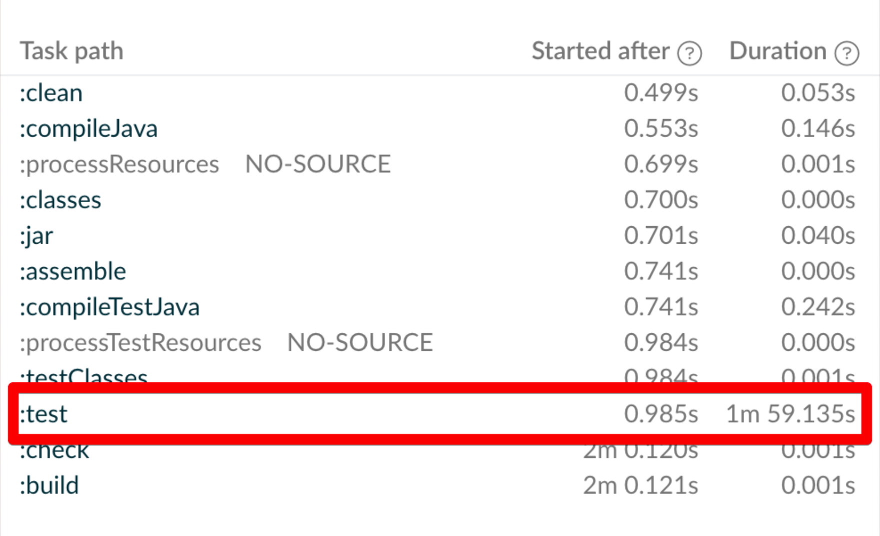
All predictions | Only incorrect

Path	Task/Goal failures predicted ⓘ	Test failures predicted ⓘ	Simulations ⓘ	Mean duration ⓘ	Total test time ⓘ	Savings potential ⓘ
spring-boot-build › :spring-boot-project:spring-boot-tools:spring-boot-maven-plugin:intTest	0 / 0	0 / 0	60 / 60	40 min 26 sec	1 d 16 hr	20 hr 35 min (51%)
org.springframework.data:spring-data-neo4j:failsafe:integration-test@default	0 / 0	0 / 0	11 / 11	30 min 9 sec	5 hr 46 min	2 hr 33 min (44%)
spring-boot-build › :spring-boot-project:spring-boot-tools:spring-boot-gradle-plugin:test	7 / 7 (100%)	11 / 29 (37.9%)	62 / 62	20 min 1 sec	20 hr 18 min	3 hr 2 min (15%)
spring-boot-build › :spring-boot-project:spring-boot-autoconfigure:test	6 / 6 (100%)	6 / 6 (100%)	160 / 160	16 min 18 sec	1 d 17 hr	22 hr 2 min (53%)
spring-boot-build › :spring-boot-tests:spring-boot-integration-tests:spring-boot-launch-script-tests:intTest	0 / 0	0 / 0	115 / 115	15 min 13 sec	1 d 5 hr	12 hr 44 min (44%)
org.springframework.data:spring-data-cassandra:failsafe:integration-test@default	0 / 0	0 / 0	7 / 7	11 min 16 sec	1 hr 17 min	0 sec (0%)

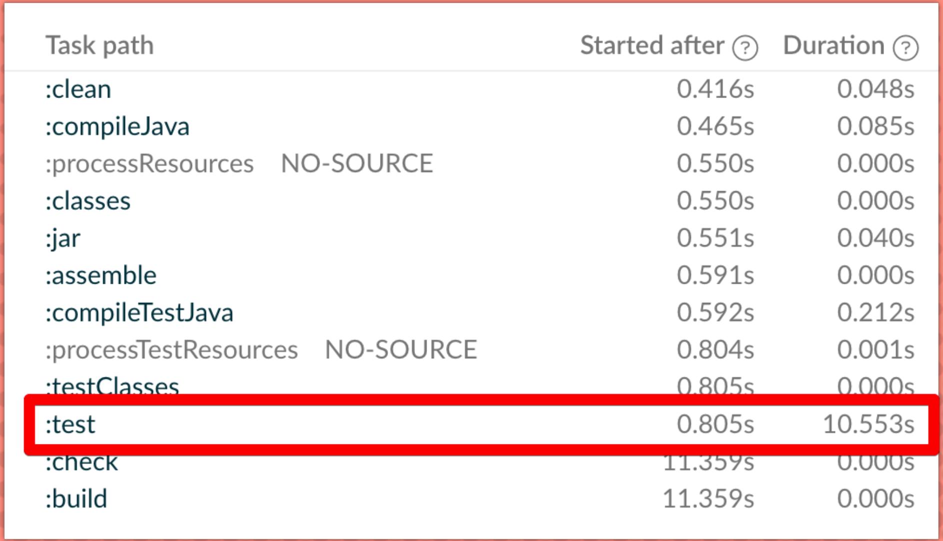
SPEED UP WHAT CAN’T BE SKIPPED

TEST PARALLELIZATION

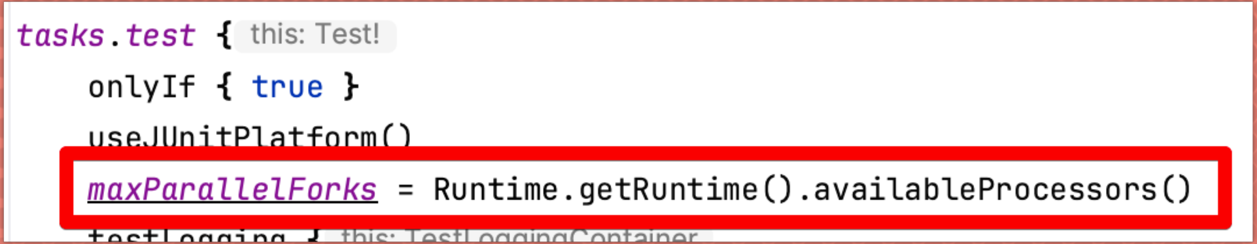
- Use max power of local machine
- (Yes, your boss should buy you the bleeding edge)



Task path		Started after	Duration
:clean		0.499s	0.053s
:compileJava		0.553s	0.146s
:processResources	NO-SOURCE	0.699s	0.001s
:classes		0.700s	0.000s
:jar		0.701s	0.040s
:assemble		0.741s	0.000s
:compileTestJava		0.741s	0.242s
:processTestResources	NO-SOURCE	0.984s	0.000s
:testClasses		0.984s	0.001s
:test		0.985s	1m 59.135s
:check		2m 0.120s	0.001s
:build		2m 0.121s	0.001s



Task path		Started after	Duration
:clean		0.416s	0.048s
:compileJava		0.465s	0.085s
:processResources	NO-SOURCE	0.550s	0.000s
:classes		0.550s	0.000s
:jar		0.551s	0.040s
:assemble		0.591s	0.000s
:compileTestJava		0.592s	0.212s
:processTestResources	NO-SOURCE	0.804s	0.001s
:testClasses		0.805s	0.000s
:test		0.805s	10.553s
:check		11.359s	0.000s
:build		11.359s	0.000s



```
tasks.test {  this: Test!
    onlyIf { true }
    useJUnitPlatform()
    maxParallelForks = Runtime.getRuntime().availableProcessors()
    testLogging {  this: TestLoggingContainer
```

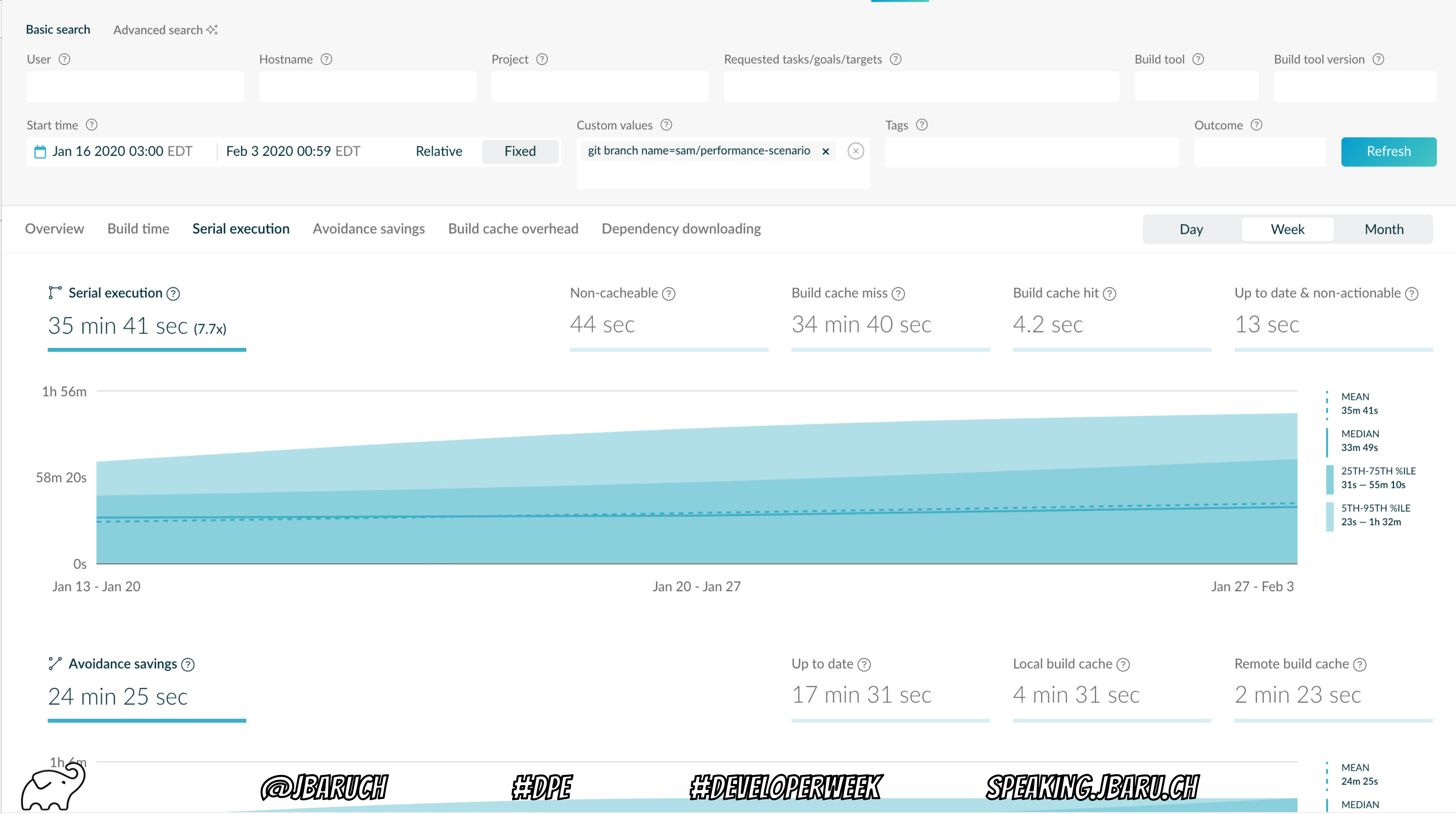
TEST DISTRIBUTION

- CI uses fan-out to speed-up tests
- Shouldn't you enjoy it for local tests?
- Use the cloud to distribute test load
- RUN ALL THE NEEDED TESTS!

DON'T LET IT SLIDE

OBSERVE AND IMPROVE

- Measure local build times across time and environments
- Detect downfacing trends
- Find root causes and improve



User ?

Hostname ?

Project ?

Requested tasks/goals/targets ?

Build tool ?

Build tool version ?

Start time ?: Jan 16 2020 03:00 EDT – Feb 3 2020 00:59 EDT

Custom values ?: git branch name=sam/performance-scenario ×

Tags ?

Outcome ?

Serial execution ?

35 min 41 sec (7.7x)

Non-cacheable ? 44 sec

Build cache miss ? 34 min 40 sec

Build cache hit ? 4.2 sec

Up to date & non-actionable ? 13 sec

Avoidance savings ?

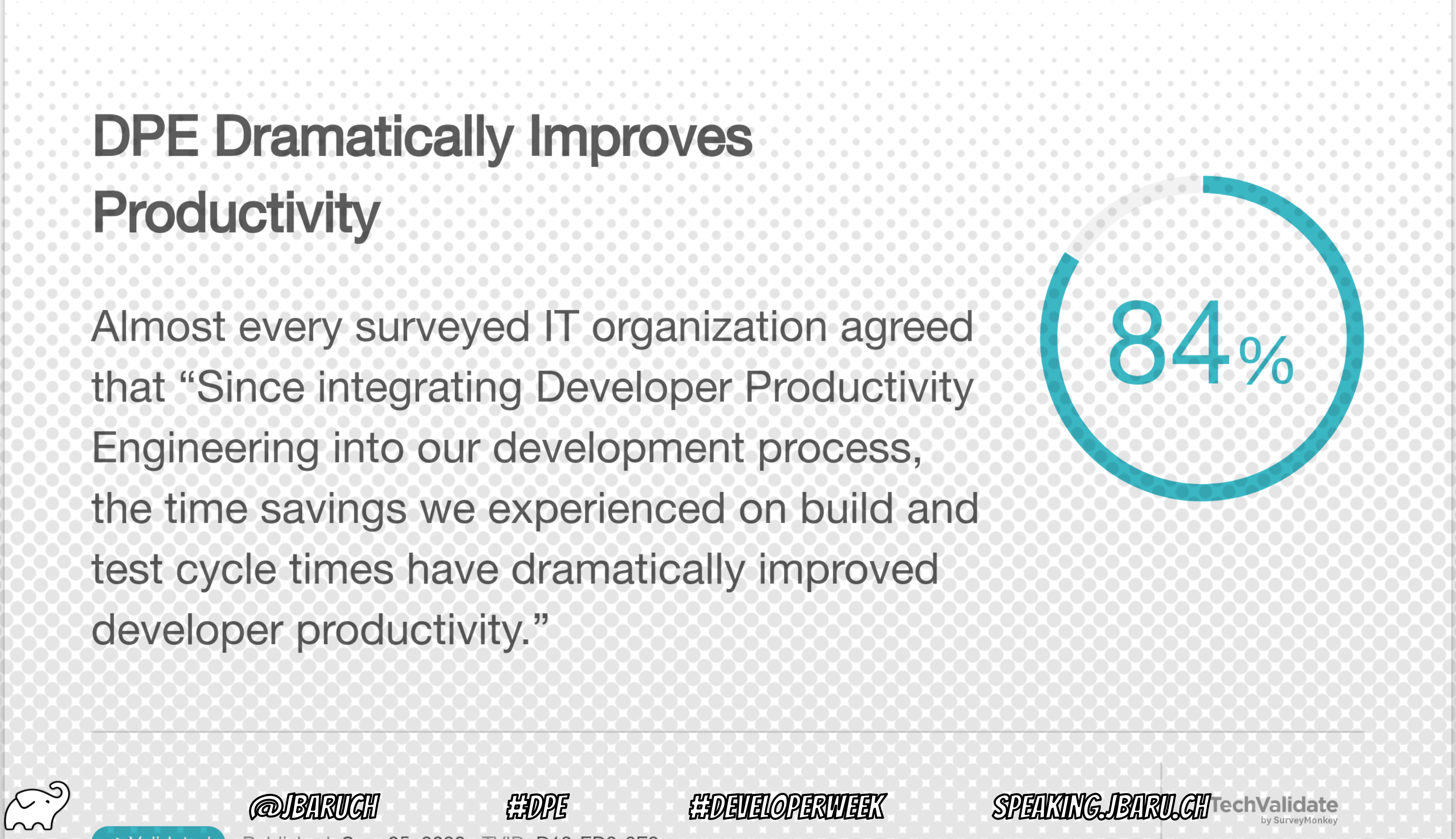
24 min 25 sec

Up to date ? 17 min 31 sec

Local build cache ? 4 min 31 sec

Remote build cache ? 2 min 23 sec

THE GAINS ARE REAL!

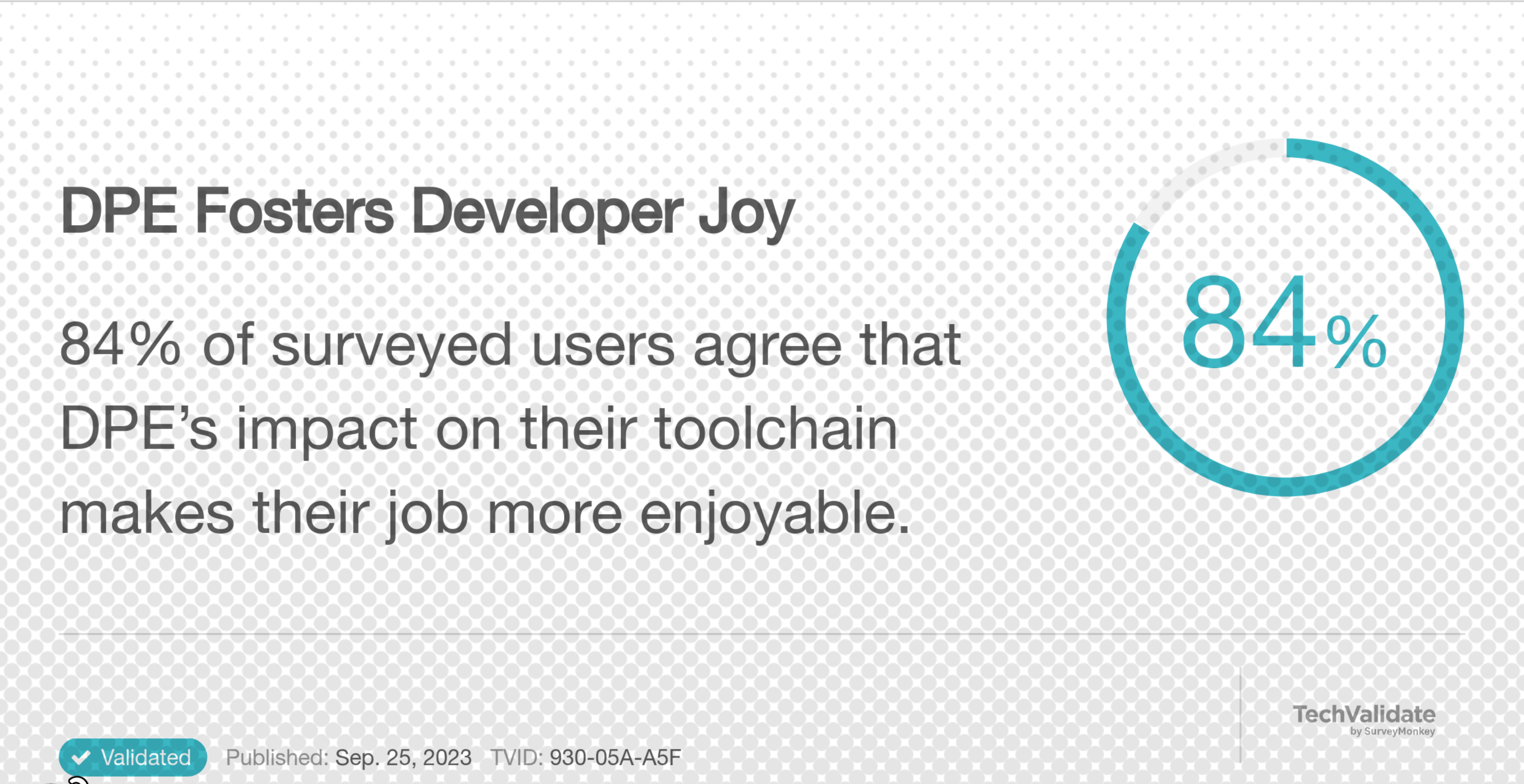


DPE Dramatically Improves Productivity

Almost every surveyed IT organization agreed that “Since integrating Developer Productivity Engineering into our development process, the time savings we experienced on build and test cycle times have dramatically improved developer productivity.”

84%

TechValidate
by SurveyMonkey



DPE Fosters Developer Joy

84% of surveyed users agree that DPE’s impact on their toolchain makes their job more enjoyable.

✓ Validated Published: Sep. 25, 2023 TVID: 930-05A-A5F

Q&A AND SOCIAL ADS

- @JBARUCH
- #DPE
- #DEVELOPERWEEK

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