



敏捷软件交付在谷歌内部实践揭秘和基于容器的技术实现

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caicloud
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最多的 ...



最多的 曾经工作过的工作单位



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最大的 ...



最大的 从头到脚的距离



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最长的 ...



最长的 工作年龄



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最高的 ...



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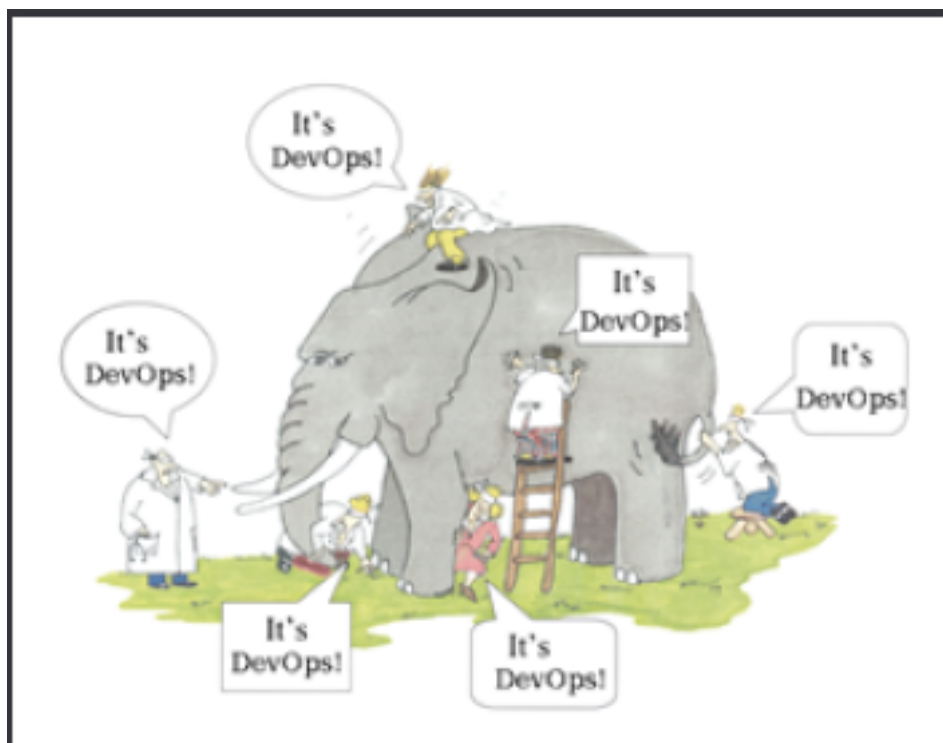
最高的 高音音域

内容

- Devops 简介
- Google CI/CD 实践
- 容器云简介
- 基于容器构建 CI/CD 系统

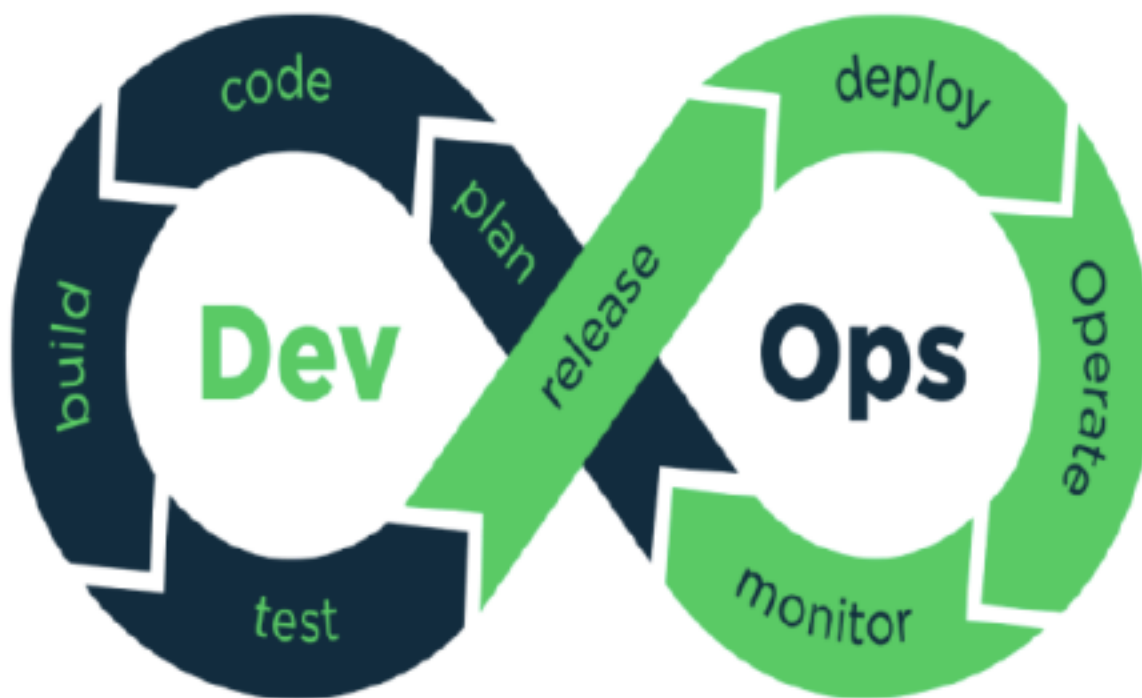


Devops 为何物?



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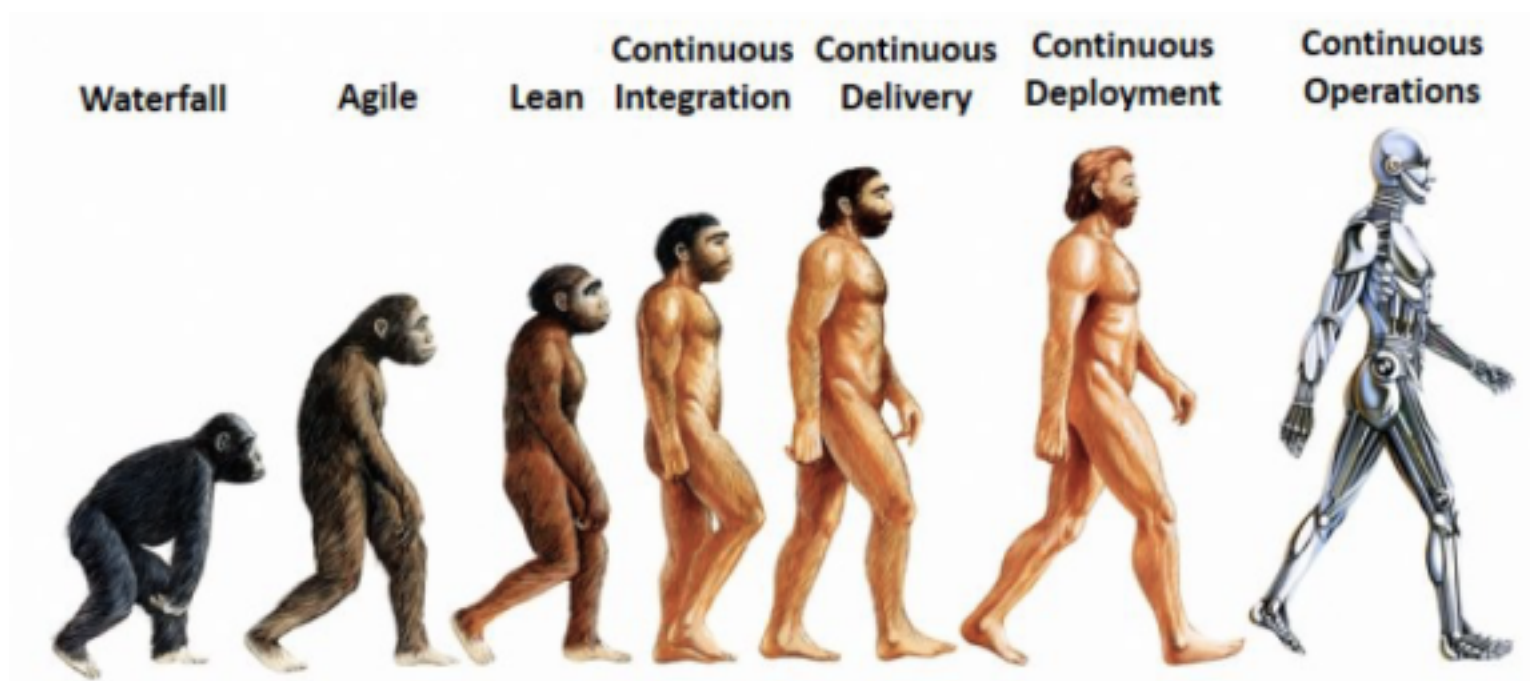
- Devops = 文化 + 流程 + 工具



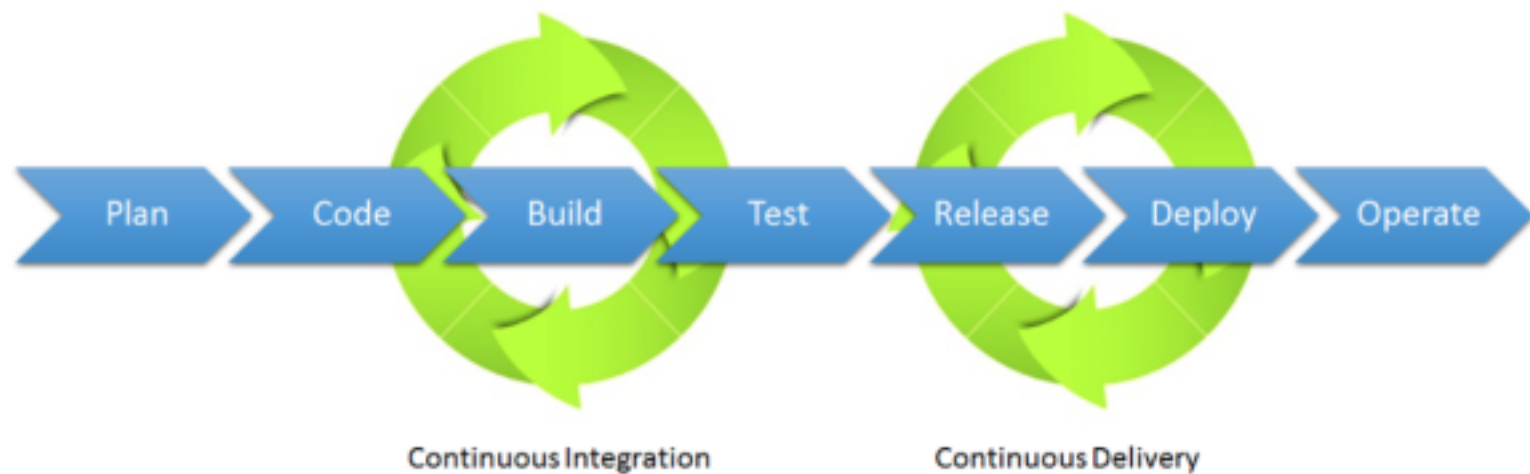
Devops 的好处与落地

- 好处
 - 快速业务迭代
 - 敏捷开发
 - 自动化运维
- 落地
 - 打造 Devops 团队
 - 构造 Devops 文化
 - 搭建自动化流程
 - Continuous Integration (CI)
 - Continuous Deployment/Delivery (CD)
 - Continuous Operations (CO)

从 Devops 到 CICD



CICD



- 总共的代码行数?
- 总共的测试实例个数?
- 每天构建的次数?

- 总共的代码行数?
 - 2,000,000,000
- How many test cases?
 - 150,000,000
- How many builds per day?
 - 800,000

- 平均每秒一次 commit
- Code submission rate 呈线性增长
- 测试用例数量呈线性增长
- 应对方案: Just in Time Scheduling (JIT)
 - Break a day into a sequence of milestones
 - As frequently as possible, depending on compute resource
 - Typically every 45 minutes
- 挑战?

基于数据的深度优化： AI + 测试！

- 如何减少需要运行的测试案例数量？
 - 150,000,000 → 63,000
 - 150,000,000 all tests to 5,500,000 affected tests
 - 5,500,000 affected tests vs 63,000 “likely to fail tests”
- 如何提炼出对开发者有益的可执行建议？
 - “You are 97% likely to cause a breakage because you are editing a Java source file modified by 15 other developers in the last 30 days”
 - 更多 code review、更多检查、静态分析、更多测试覆盖

谷歌 CI 测试系统: TAP (Test Anything Protocol)

- 每一个 commit 称为一个 CL (Change List)
- TAP 定期对 milestone 进行测试，并通过看板、通知展现结果

Current Status

Grid

Tool Log

Coverage

Project Maintenance

Project Health (beta)

History

Failed/Broken view

Target name

Search target

<< Home

< Previous

CLA

3000794

> 3000802

Close

Showing 12 of 1196 targets: Failed / Broken

Remove all filters

Changed/and subset time:

XN07H

XN07J

XN07K

XN07L

XN07M

XN07N

XN07O

XN07P

XN07Q

XN07R

XN07S

XN07T

XN07U

XN07V

XN07W

XN07X

XN07Y

XN07Z

XN08A

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XN08C

XN08D

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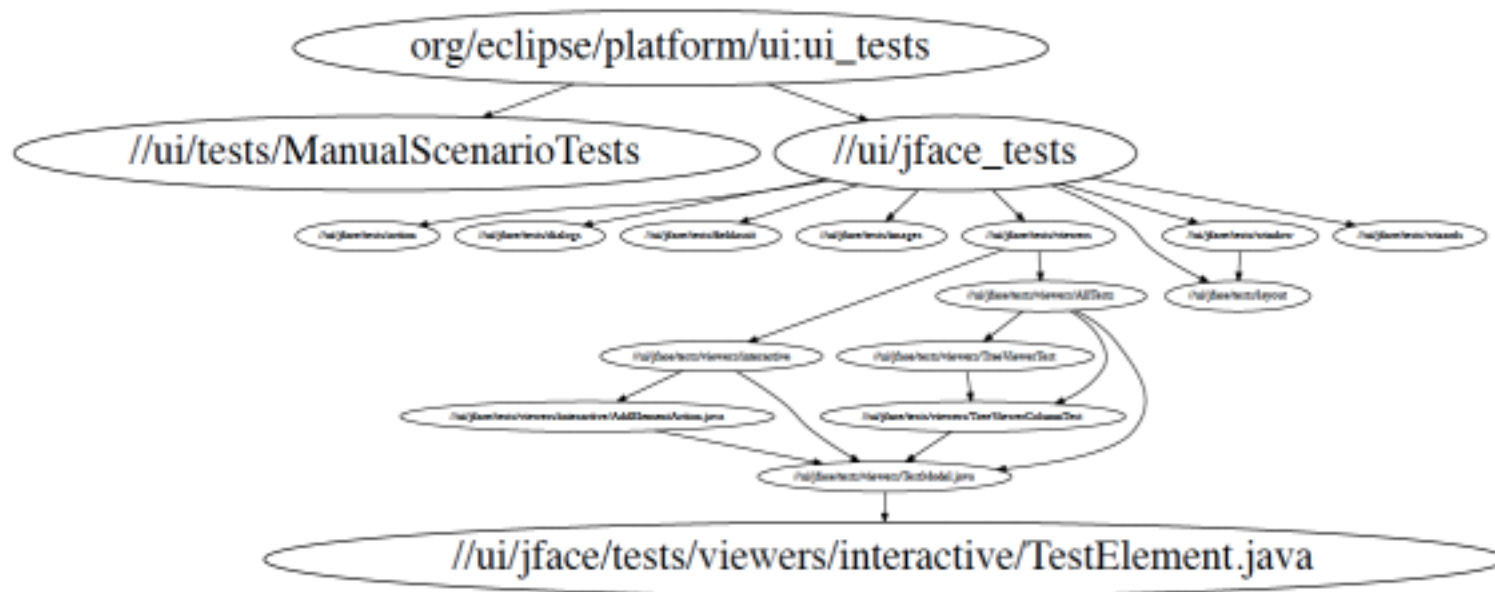
谷歌 CI 测试系统: TAP (Test Anything Protocol)

- 每一个测试在BUILD文件中定义
 - Eg. tensorflow/cc/BUILD

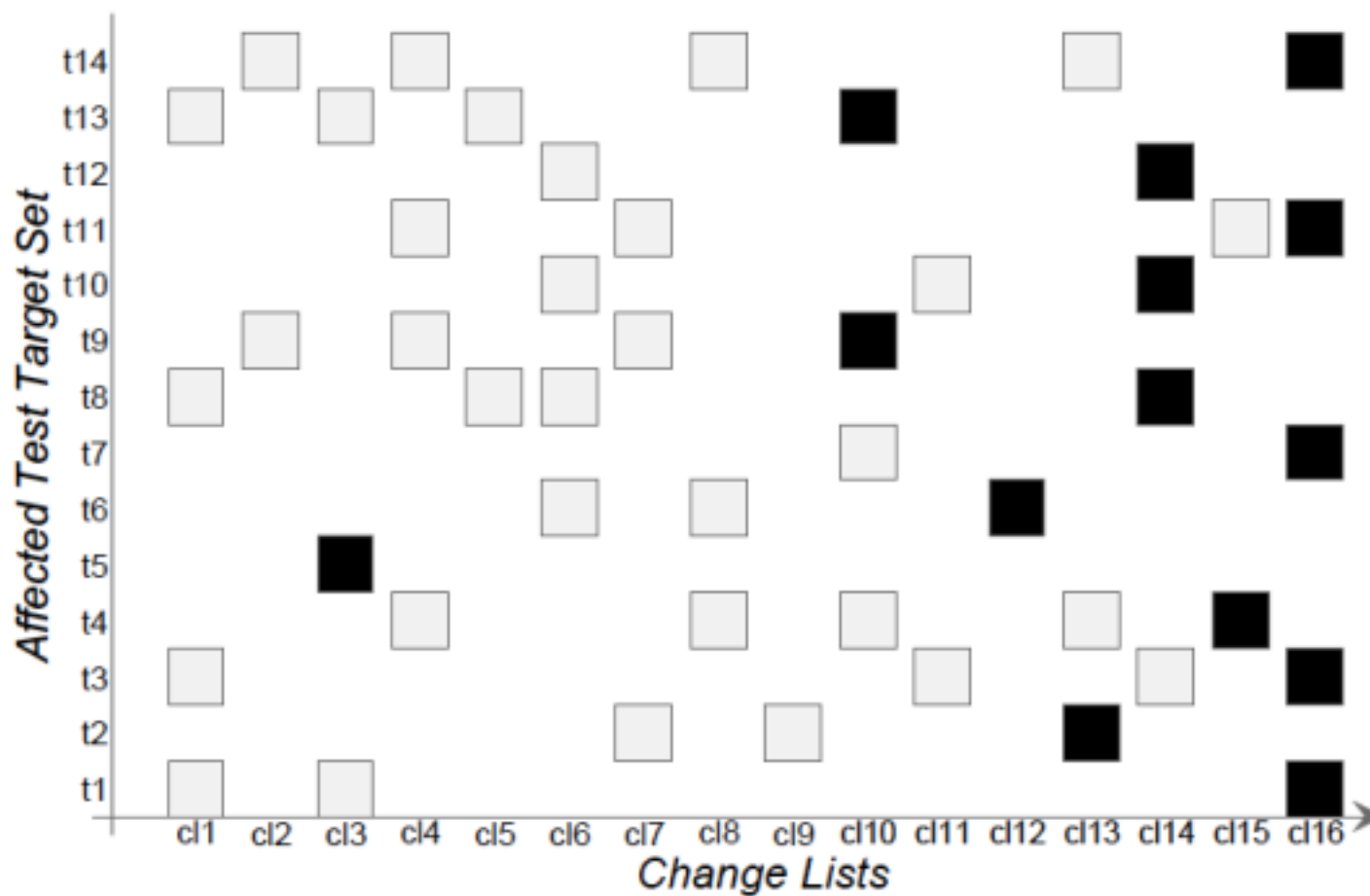
```
package(  
    default_visibility = ["//visibility:public"],  
)  
tf_cc_test(  
    name = "framework_gradients_test",  
    srcs = ["framework/gradients_test.cc"],  
    deps = [  
        ":cc_ops",  
        ":grad_op_registry",  
        ":grad_ops",  
        ":gradients",  
        ":testutil",  
        "//tensorflow/core:all_kernels",  
        "//tensorflow/core:core_cpu_internal",  
        "//tensorflow/core:framework",  
        "//tensorflow/core:test",  
        "//tensorflow/core:test_main",  
        "//tensorflow/core:testlib",  
    ],  
)
```

从上亿到百万：从全部测试中找出 Affected Tests

- Graph 建模
- Reserve dependency 搜索
- Distance: 从代码文件到一个测试用例的最短路长度



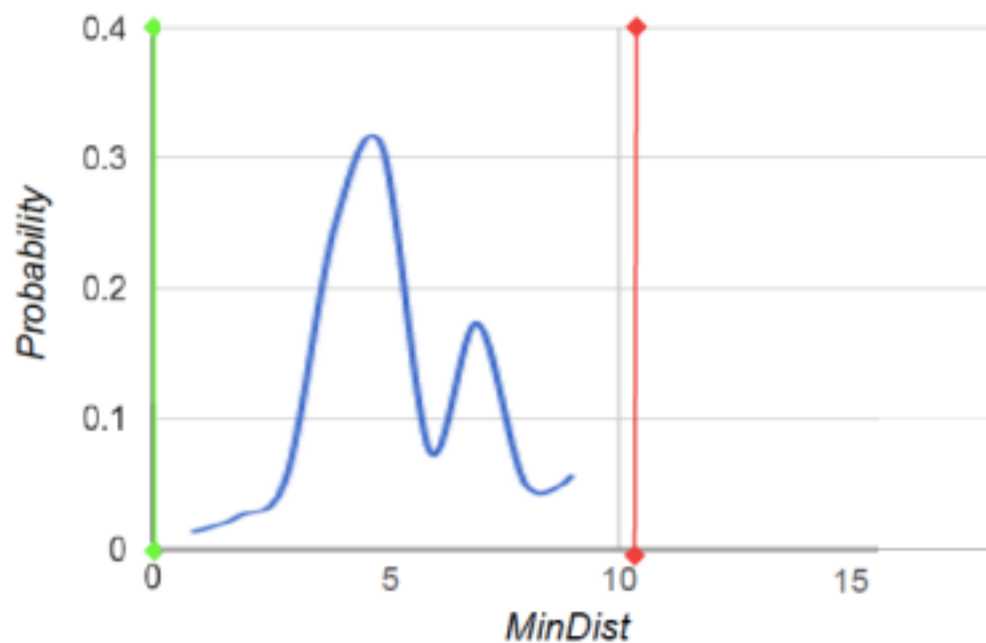
从上亿到百万：从全部测试中找出 Affected Tests



从百万到几万：数据说话！

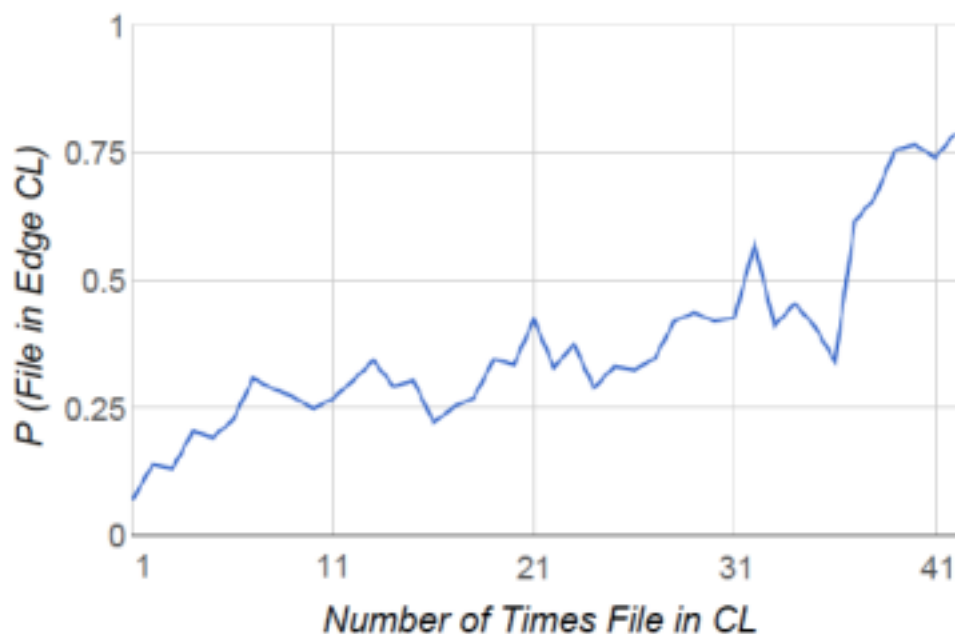
- 谷歌所有测试案例中只有 1% 的测试案例在历史上 **FAIL** 过
- 不同的测试案例失败的可能性极其不同
- 不同的 **CL** 特点对测试案例的影响截然不同

思想 1: 距离被修改源代码文件“足够远”的测试不会被break



- 距离 CL 中修改的源代码文件 “10 hop” 以上的测试从未break
 - 测试用例的执行频率根据 CL 中被修改源代码文件的距离进行智能调整

思想 2: 被修改越频繁的源代码约容易造成测试breakage



- 一个月内代码文件被修改超过30次以上有50%概率会造成测试breakage
 - 开发者提交代码时，根据修改文件的历史修改次数进行警告和更严格的测试

思想3：不同语言类型造成测试breakage的概率不同

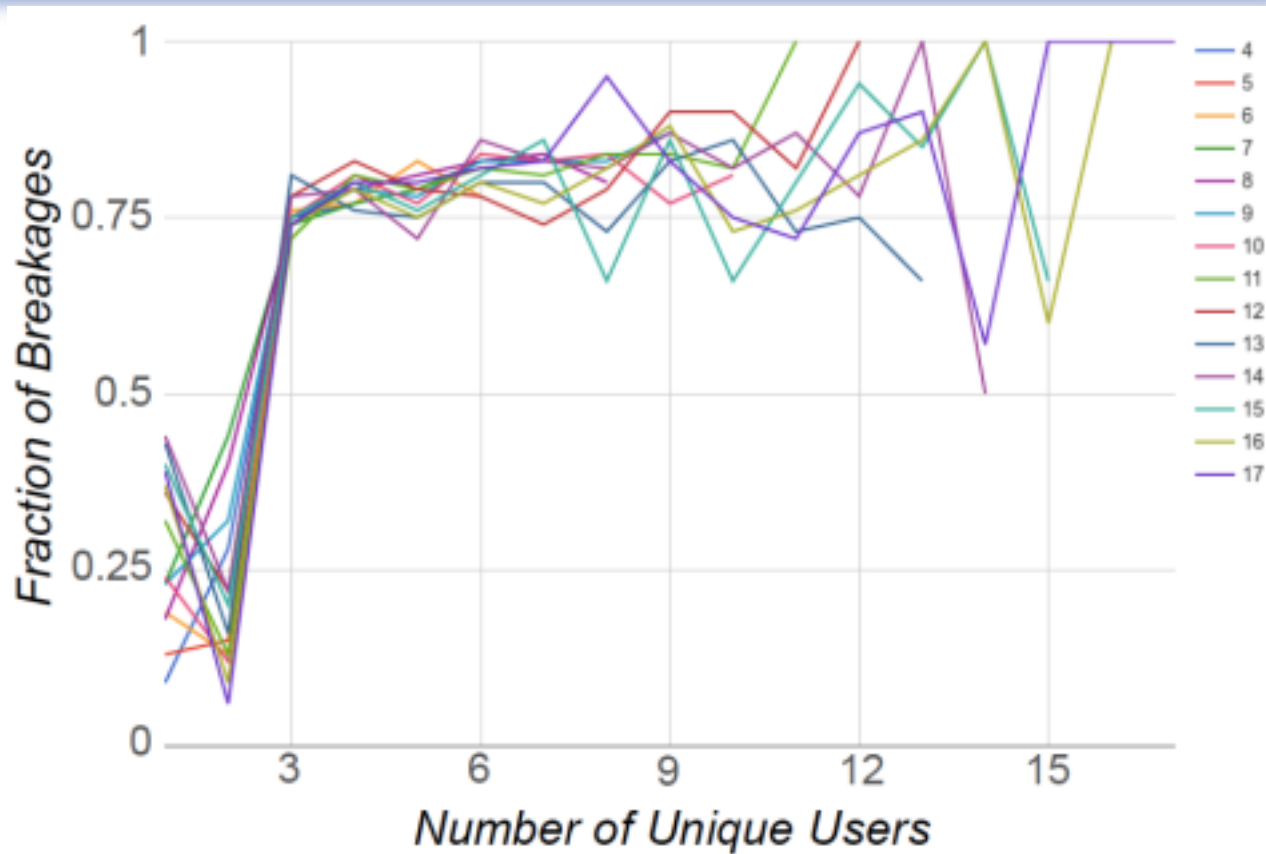
- 猜猜？
- hpp
- mr
- cpp
- cc
- BUILD
- JAVA
- Js
- xml
- 根据 CL 中涉及的不同语言对不同的测试采用不同频率的执行，并给出开发者警告

思想4: 不同的作者造成test breakage的概率不同

USER ID	Total Commits	Breakages
userabz	182	59 (31.4%)
userabc	1,382	196 (14.2%)
userxyz	1,564	214 (13.7%)
product1-release	42	39 (92.9%)
product2-dev	319	68 (21.3%)
product3-rotation	302	47 (15.6%)
product4-releaser	263	40 (15.2%)
product5-releaser	442	63 (14.3%)
product6-releaser	526	66 (12.5%)
product7-releaser	784	87 (11.1%)
product8-releaser	2,254	226 (10%)

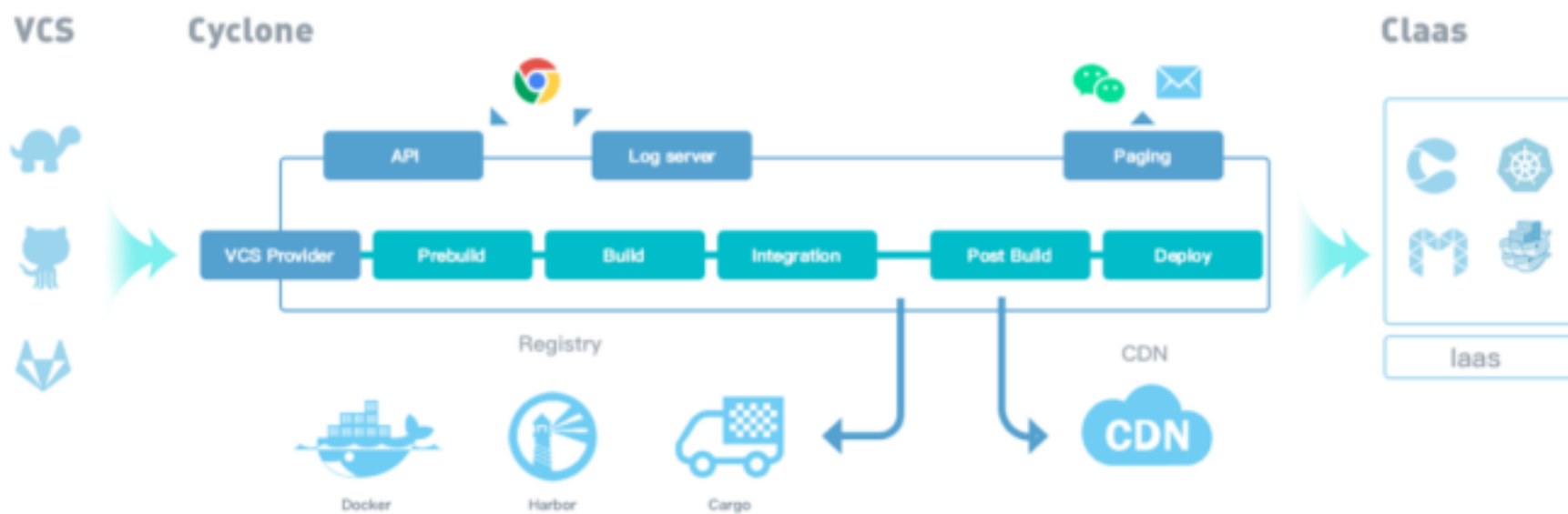
- 不作为绩效考评标准！
- 开发者提交代码时给出对应的警告，对不同的作者所提交的 CL 采用不同频率的测试

思想5: 一个源代码文件被修改的人数不同造成测试 breakage 的概率不同



- 观察?
- 操作?

基于容器的 CICD 系统





caicloud
才云

Thanks !