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Android Meets Docker

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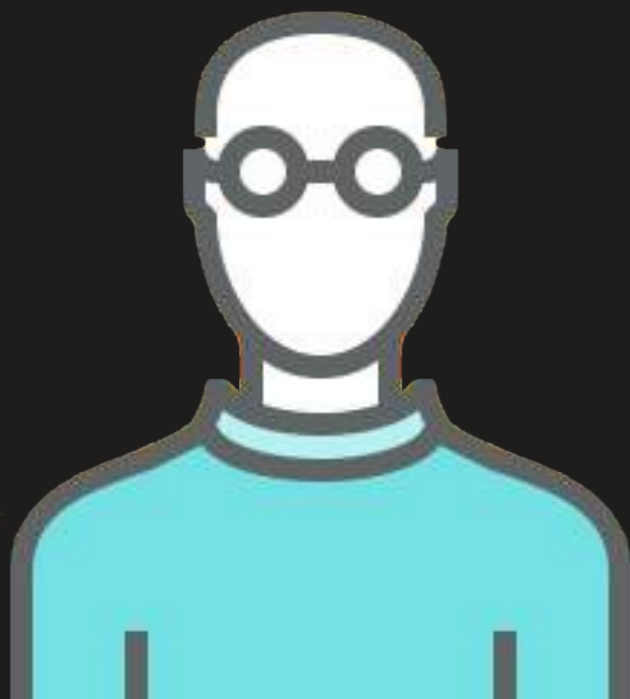
风靡欧洲超过70个城市



一个程序员的故事

```
git: command not found
```

```
gradle: command not found
```



```
SDK location not found. Define location with sdk.dir in the local.properties file or with an ANDROID_HOME environment variable.
```

```
No Java runtime present, requesting install.
```



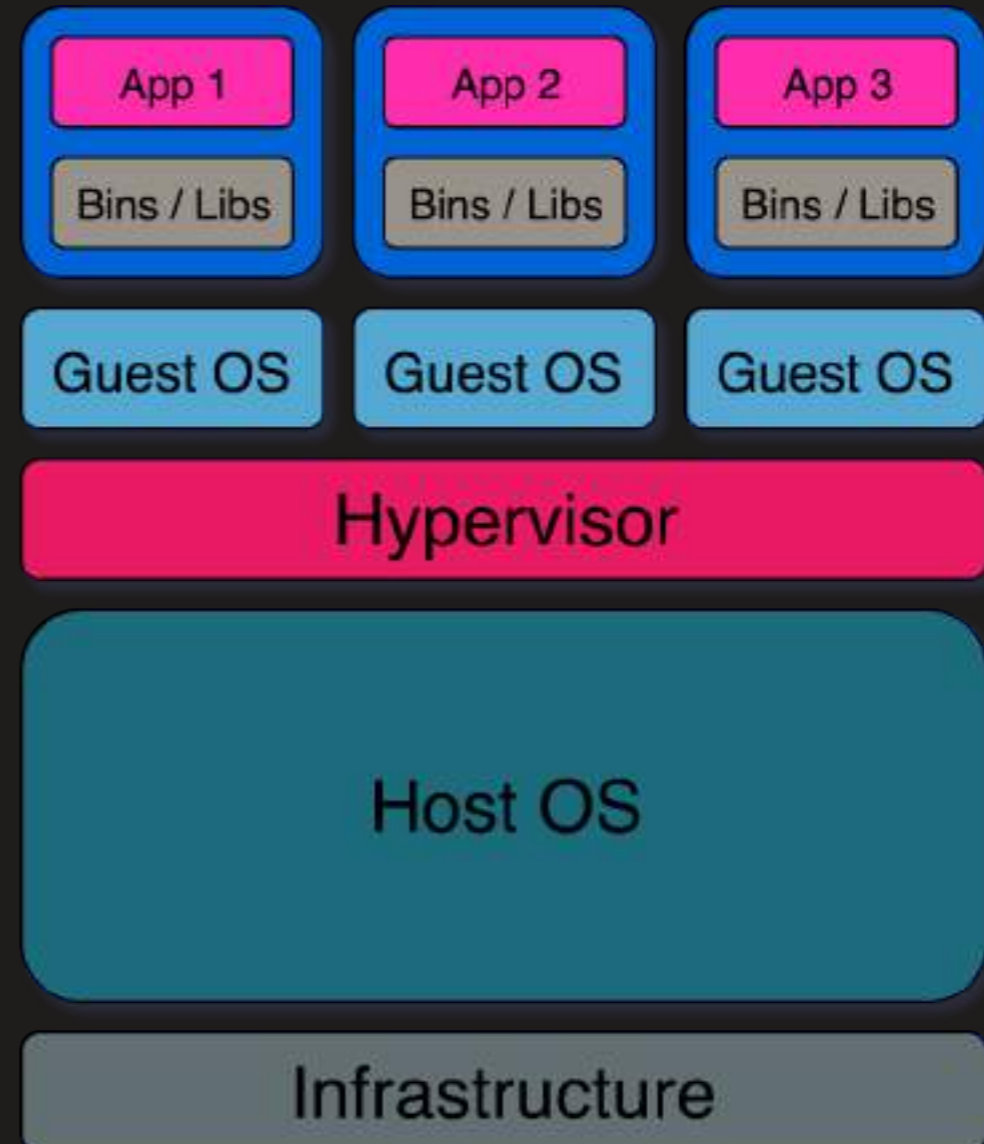
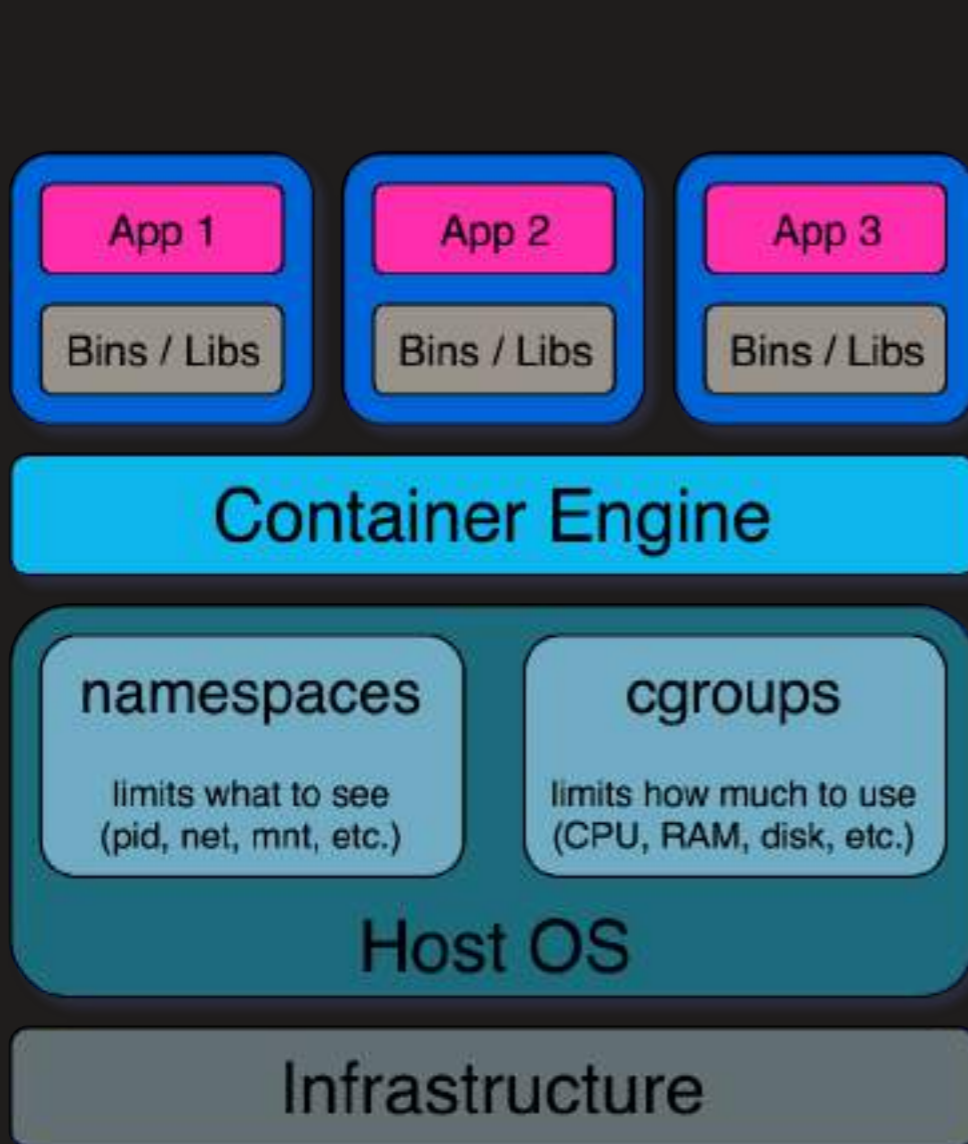
Pain in the Admin

当配置很多台机器的时候...





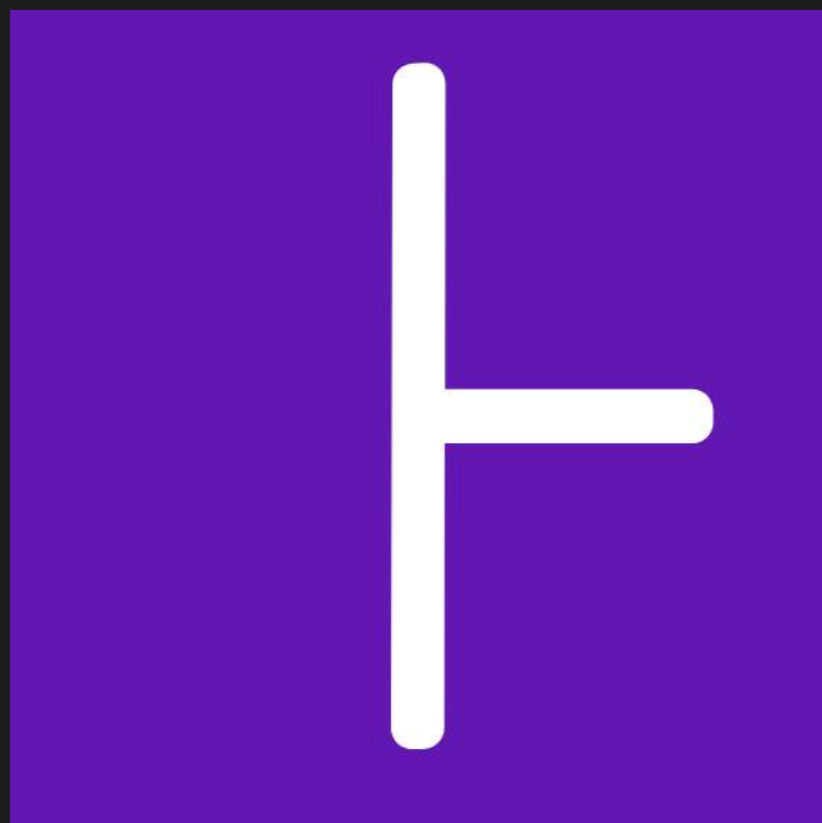
容器化 vs 虚拟化



为什么选择容器?

	Docker	Vagrant
资源隔离	低	高
支持的系统	Linux	*
启动 / 停止时间	秒级	分级
大小	MB	GB

把安卓容器化...



Infer - Facebook出品的静态分析工具，
可用于Java, Obj-C, C...

在容器里升级  Android SDK

AUFS不支持移动硬链接的操作



容器入门

- ▶ image *vs* container
- ▶ build *vs* pull
- ▶ 恭喜你入门了 🎉



Dockerfile 词典

- ▶ FROM - 父镜像
- ▶ RUN - 在一个新层里执行命令
- ▶ ENV - 设置环境变量
- ▶ ADD - 将文件拷贝到镜像
- ▶ EXPOSE - 监听指定的网络端口
- ▶ CMD - 容器默认的启动执行方法



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Dockerfile

```
FROM ubuntu:16.04
```

```
# support multiarch: i386 architecture
```

```
# install Java
```

```
# install essential tools
```

```
# install Qt
```

```
RUN dpkg --add-architecture i386 && \
```

```
    apt-get update -y && \
```

```
    apt-get install -y libncurses5:i386 libc6:i386 libstdc++6:i386
```

```
lib32gcc1 lib32ncurses5 lib32z1 zlib1g:i386 && \
```

```
    apt-get install -y --no-install-recommends openjdk-8-jdk && \
```

```
    apt-get install -y git wget zip && \
```

```
    apt-get install -y qt5-default
```



Dockerfile

```
# download and install Gradle
ENV GRADLE_VERSION 4.2.1
RUN cd /opt && \
    wget -q https://services.gradle.org/distributions/gradle-${
{GRADLE_VERSION}}-bin.zip && \
    unzip gradle*.zip && \
    ls -d */ | sed 's/\/*$//g' | xargs -I{} mv {} gradle && \
    rm gradle*.zip

# download and install Kotlin compiler
ENV KOTLIN_VERSION 1.1.51
RUN cd /opt && \
    wget -q https://github.com/JetBrains/kotlin/releases/download/v${
{KOTLIN_VERSION}}/kotlin-compiler-${{KOTLIN_VERSION}}.zip && \
    unzip *kotlin*.zip && \
    rm *kotlin*.zip
```



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Dockerfile

```
# download and install Android SDK
ENV ANDROID_SDK_VERSION 3859397
RUN mkdir -p /opt/android-sdk && cd /opt/android-sdk && \
    wget -q https://dl.google.com/android/repository/sdk-tools-linux-  
{ANDROID_SDK_VERSION}.zip && \
    unzip *tools*linux*.zip && \
    rm *tools*linux*.zip

# set the environment variables
ENV JAVA_HOME /usr/lib/jvm/java-8-openjdk-amd64
ENV GRADLE_HOME /opt/gradle
ENV KOTLIN_HOME /opt/kotlinc
ENV ANDROID_HOME /opt/android-sdk
ENV PATH ${PATH}:${GRADLE_HOME}/bin:${KOTLIN_HOME}/bin:${ANDROID_HOME}/tools:$  
{ANDROID_HOME}/platform-tools:${ANDROID_HOME}/tools/bin:${ANDROID_HOME}/emulator
ENV _JAVA_OPTIONS -XX:+UnlockExperimentalVMOptions -XX:+UseCGroupMemoryLimitForHeap
# WORKAROUND: for issue https://issuetracker.google.com/issues/37137213
ENV LD_LIBRARY_PATH ${ANDROID_HOME}/emulator/lib64:${ANDROID_HOME}/emulator/lib64/qt/lib
```




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Dockerfile

```
# accept the license agreements of the SDK components
ADD license_accepter.sh /opt/
RUN /opt/license_accepter.sh $ANDROID_HOME

# install and configure SSH server
ADD banner.net /etc/
ADD authorized_keys /tmp/
EXPOSE 22
RUN apt-get update -y && \
    apt-get install -y openssh-server supervisor locales && \
    ...
ADD supervisord.conf /etc/supervisor/conf.d/
CMD ["/usr/bin/supervisord"]
```

Dockerfile 最佳实践

- ▶ 单一职责原则

 - 用 compose 来编排多个服务

- ▶ 最小化层数

 - 层 = 过渡层镜像, 支持缓存

- ▶ 大小很重要, 用好现有资源

 - 在不同的步骤(层)安装和卸载程序会增加镜像大小

- ▶ 可读性

在容器中升级 Android SDK 的解决方案

将 Android SDK 卷挂载到容器上

- ▶ 最小化
- ▶ 柔性化
- ▶ 数据持久化
- ▶ 共享

不同的解决方案

- ▶ 挂载 Android SDK 卷
- ▶ 用 BTRFS 储存驱动
- ▶ 为每个 Android API 等级创建一个不同的镜像



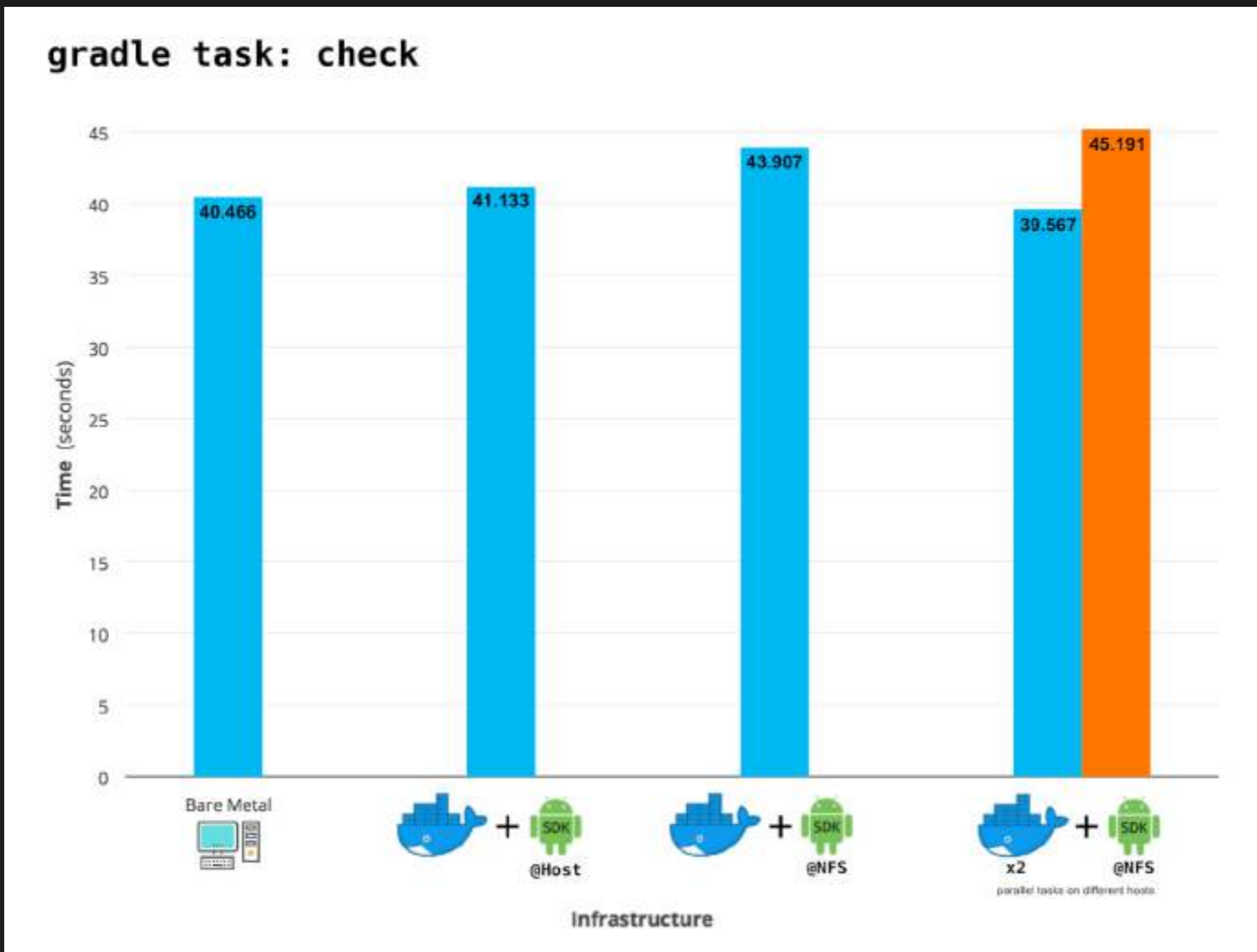
NFS 网络文件系统

✓ 单一地方管理

? 性能

⚠ 不能并行写 / 修改

基准测试



性能比较

2 构建类型, 107 单元测试 (x2 = 214), 2 自动化界面测试
`./gradlew clean check :demo:connectedAndroidTest`

本地部署容器 (缓存的 AndroidSDK)

6 分 48.0 秒

第三方 CI 方案 (没有优化)

> 10 分



安卓设备

- ▶ ARM 模拟器
- ▶ x86 模拟器 (需要 KVM)
- ▶ USB (需要特权模式, [🚫 macOS](#))
- ▶ WIFI
- ▶ Genymotion 云

 性能

2 UI 自动化测试

ARM 模拟器 @ 	2 分 4.615 秒
x86 模拟器 @  (运行于 Linux)	23.497 秒
Genymotion	25.335 秒



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Out of Memory 内存溢出

Killed

```
Process 'Gradle Test Executor 1' finished with non-zero exit value 137  
Gradle build daemon disappeared unexpectedly (it may have been killed or may have crashed)
```

```
java.lang.OutOfMemoryError
```

```
* What went wrong:  
Execution failed for task ':docker:testDebugUnitTest'.  
> Process 'Gradle Test Executor 1' finished with non-zero exit value 1
```

内存很重要!!!

JVM 很傻，很天真，它不懂容器 (以前的版本)

<code>_JAVA_OPTIONS</code>		<code>-XX: +UnlockExperimentalVMOptions -XX: +UseCGroupMemoryLimitForHeap</code>
退出代码	<code>137 = 128 + 9 = SIGKILL = Killed</code>	<code>1 = SIGHUP = Hangup</code>
说明	被内核的 OOM 杀手干掉了	JVM 结束了该程序并退出



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SSH

- ▶ 设置环境变量

`/root/.ssh/environment`

- ▶ 授权

`/root/.ssh/authorized_keys`



Jenkins 环境变量

▶ 全局 Global

Configure System -> Global properties -> Environment variables

▶ 节点 Node

Manage Nodes -> Configure Node -> Node Properties -> Environment variables

▶ 任务 Job

Configure Job -> Build -> Build Step -> Execute shell

Plugin: Environment Injector -> Inject variables to the build process / as a build step


还能做得更好些吗?

Gradle 包分发



Gradle

services.gradle.org/distributions/

 gradle-4.0.1-src.zip	07-Jul-2017 14:07 +0000	21.34M
 gradle-4.0.1-bin.zip	07-Jul-2017 14:07 +0000	64.40M
 gradle-4.0.1-all.zip	07-Jul-2017 14:07 +0000	85.89M
 gradle-3.5.1-src.zip	16-Jun-2017 14:06 +0000	20.65M
 gradle-3.5.1-bin.zip	16-Jun-2017 14:06 +0000	69.91M
 gradle-3.5.1-all.zip	16-Jun-2017 14:06 +0000	90.71M
 gradle-4.0-src.zip	14-Jun-2017 15:06 +0000	21.26M
 gradle-4.0-bin.zip	14-Jun-2017 15:06 +0000	64.40M
 gradle-4.0-all.zip	14-Jun-2017 15:06 +0000	85.83M
 gradle-3.5-src.zip	10-Apr-2017 13:04 +0000	20.58M
 gradle-3.5-bin.zip	10-Apr-2017 13:04 +0000	69.93M
 gradle-3.5-all.zip	10-Apr-2017 13:04 +0000	90.68M

Gradle 包分发镜像服务器

- ▶ 定义于 `gradle/wrapper/gradle-wrapper.properties`
- ▶ 安装到 `~/.gradle/wrapper/dists`
- ▶ SSL 证书 - 需要被 Java keystore 信任
- ▶ `/etc/hosts`

```
#Sat Jun 17 13:32:16 CEST 2017
distributionBase=GRADLE_USER_HOME
distributionPath=wrapper/dists
zipStoreBase=GRADLE_USER_HOME
zipStorePath=wrapper/dists
distributionUrl=https\://services.gradle.org/distributions/gradle-3.3-all.zip
```



做到极致了吗?

Gradle 缓存

- ▶ 不要把时间浪费在下载上
- ▶ `~/ .gradle/caches/`

披露与机器有关的问题

▶ 字符编码问题

```
expected:<Hall[]chen> but was:<Hall[ö]chen>
```

▶ 硬编码的时区

```
expected: 2099-12-31T00:00:00.0000+0200  
but was : 2099-12-31T00:00:00.0000+0000
```

▶ 文件及路径

```
File#listFiles() -> File[] (sort order depends on OS)
```

其它移动开发方面的应用

- ▶ 集成测试
 - ▶ 生产 / 测试服务器
 - ▶ 不稳定的网络
 - ▶ 复杂的设置/部署
 - ▶ 容器化
 - ▶ 轻轻松松搭环境
- ▶ Serverless 无服务器架构 (Kotlin, Swift)
 - ▶ 重复利用 📱 代码
 - ▶ 移动工程师也能写后台 / 前端了!

求贤若渴

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谢谢!



 thyrlan
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Docker Image
[https://github.com/
thyrlan/AndroidSDK](https://github.com/thyrlan/AndroidSDK)



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