

# Android 简介

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# 目标

- 大致了解 Android 历史和现状
- 大致了解 Android 系统架构 & 基本介绍
- 完成开发环境配置
- 完成第一个 Android 程序

# Android 历史&现状

# Android 历史

- 2003年 10 月 安迪·鲁宾 创建 Android 公司
- 2005年 7 月11日 被 Google 收购
- 2007年 11月 开源 Android & 成立开发手持设备联盟
- 2008年8月18 Android 获得联邦通讯委员会的批准
- 2008年9月 Google 发布 Android 1.0 & HTC G1
- 2010年末 超越塞班成为全球第一大智能手机操作系统
- 2017年3月 超越 windows, 成为全球第一大操作系统
- 2020年4月 除美国、加拿大、英国、挪威、丹麦、瑞士、科索沃、日本和澳大利亚外，占有率第一



# First Android

□ 2008年9月23日

第一台Android手机上市



HTC Dream (T-Mobile G1)

# Android版本历史 1.0

- 应用市场
- Widget
- 通知



# Android版本历史



# Android版本历史 1.5 CUPCAKE (2009)

- 新的版本命名规则
- 软键盘



# Android版本历史 1.6 DONUT (2009)



# Android版本历史 2.0 ECLAIR (2009)



# Android版本历史 2.2 FROYO (2010)



# Android版本历史 2.3 Gingerbread (2010)



# Android版本历史 3.0 HONEYCOMB (2011)



# Android版本历史 4.0 ICE CREAM SANDWICH (2011)



# Android版本历史 4.1 JELLY BEAN (2012)

## □ 黄油计划



# Android版本历史 4.4 KITKAT (2013)



# Android版本历史 5.0 LOLLIPOP (2014)

- ❑ Material Design
- ❑ ART VM
- ❑ 双卡支持

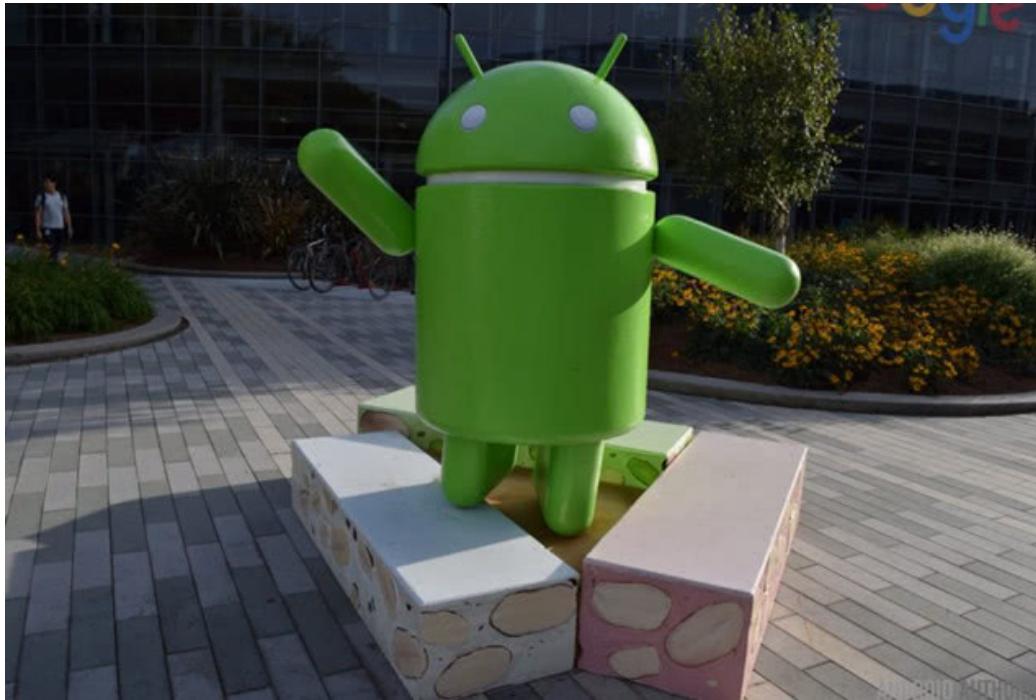


# Android版本历史 6.0 MARSHMALLOW (2015)

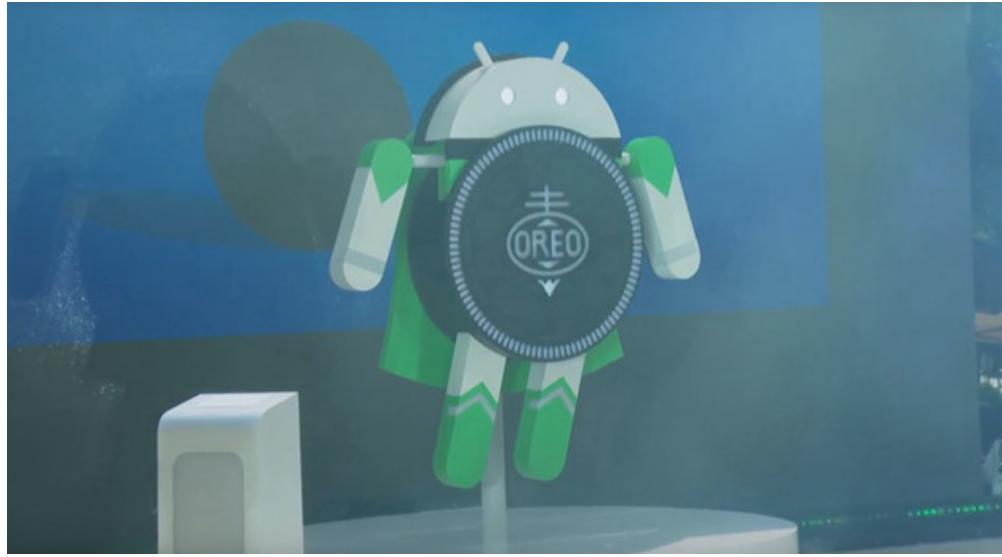
- 权限控制的发力



# Android版本历史 7.0 NOUGAT (2016)



# Android版本历史 8.0 OREO (2017)



# Android版本历史 9.0 PIE (2018)

- 刘海屏
- 增强通知栏
- 最后一个甜品



# Android版本历史 10.0 – Q(2019)

- 折叠屏
- 隐私增强



# Android版本历史 11.0 (2020)

- 隐私功能
- 增加新功能和API（用于  
5G、共享、连接、媒体、  
NNAPI、生物识别等方面  
的 API ）





# 多版本会出现什么问题？



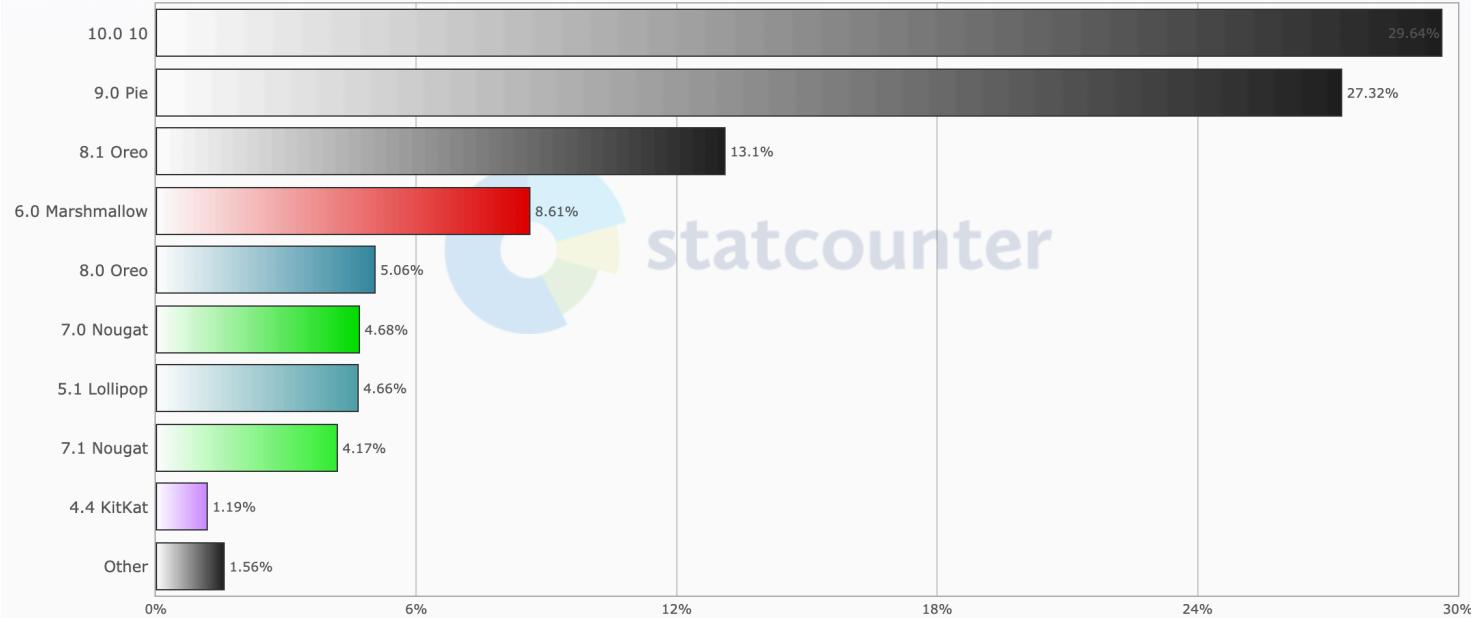
# Android生态现状

- 碎片化严重
  - 版本
  - 屏幕尺寸
  - 硬件能力
- Apps数量和下载量领先
- 领先势头还在增大

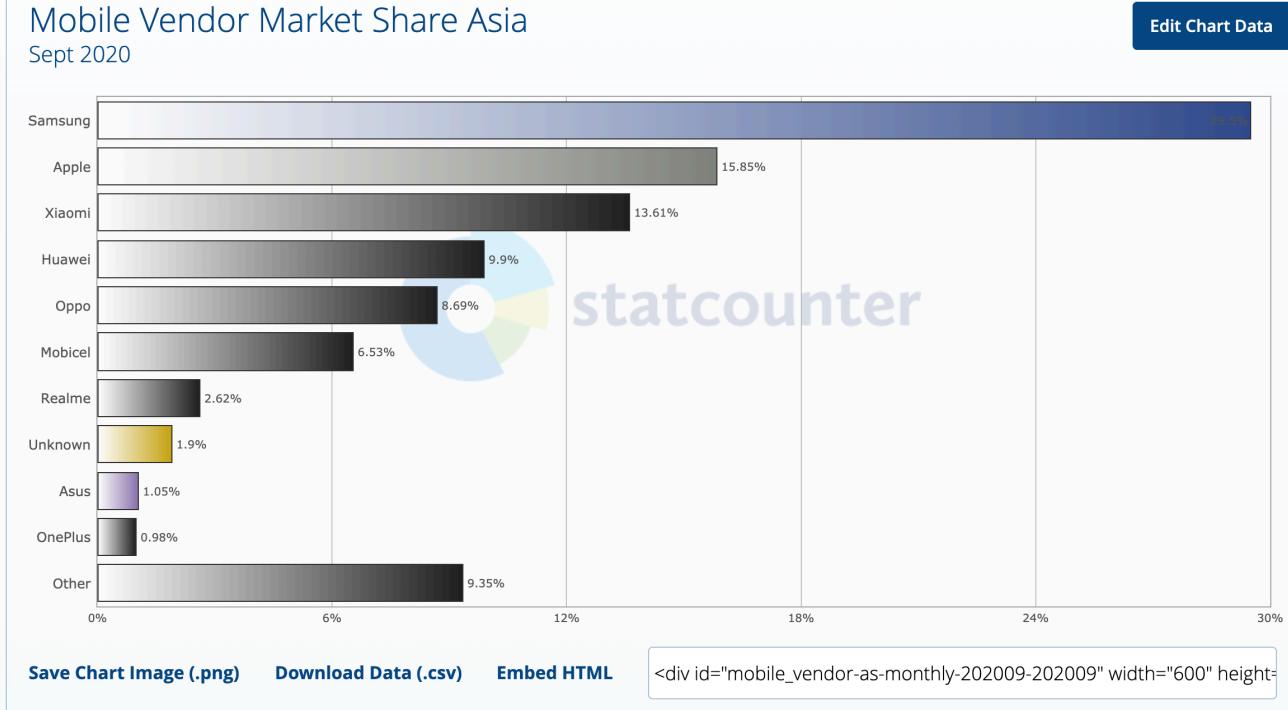
# 碎片化问题逐步解决

Mobile Android Version Market Share Asia  
Sept 2020

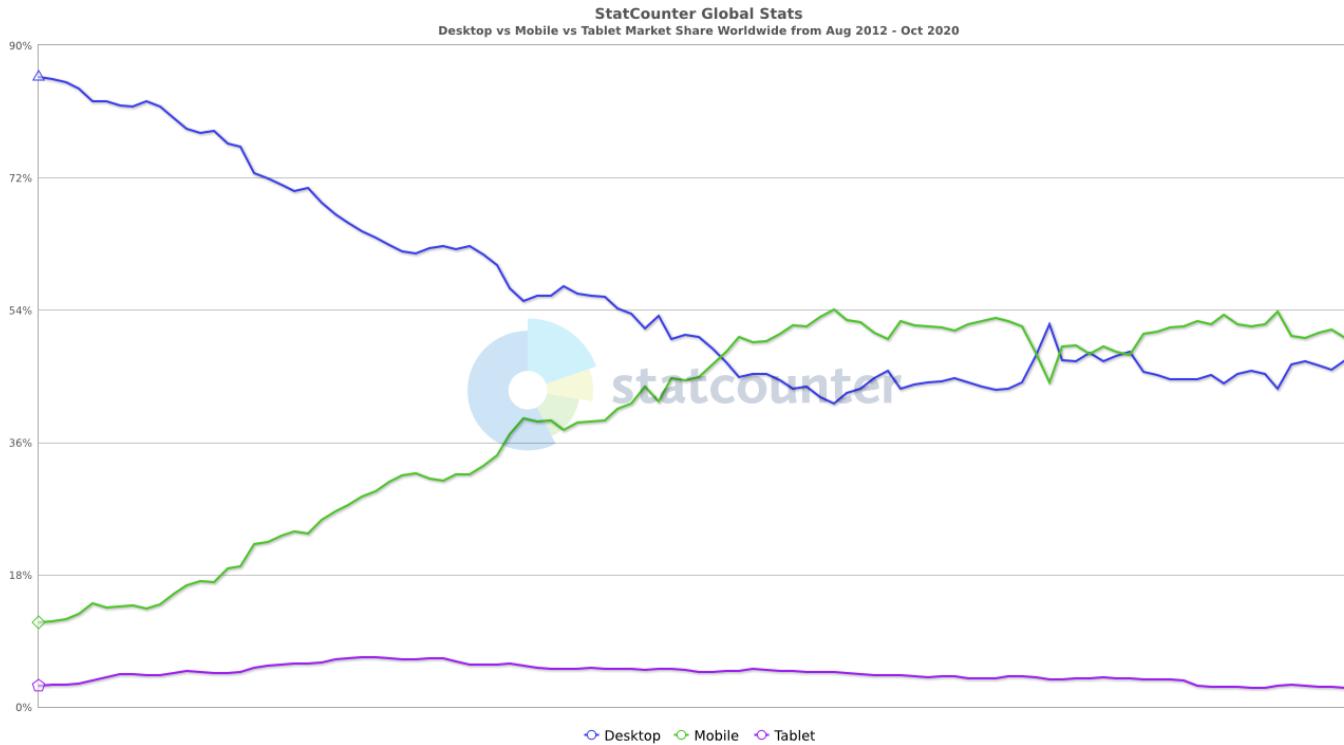
Edit Chart Data



# 碎片化问题逐步解决



# 移动端市场大有可为



# 移动端市场大有可为

2020 年移动市场报告

## 摘要

2040  
亿次

2019 年全球下载量

1200 亿  
美元

2019 年全球应用商店  
用户支出

3.7 小时

2019 年用户平均每天在  
移动设备上花费的时间

825%

2019 年将移动平台作为  
核心业务的企业的 IPO  
估值高于平均估值的  
百分比

60%

2019 年 95 后用户相对  
于年长用户对非游戏  
应用的参与度提升率

# Android系统架构

# 系统结构图

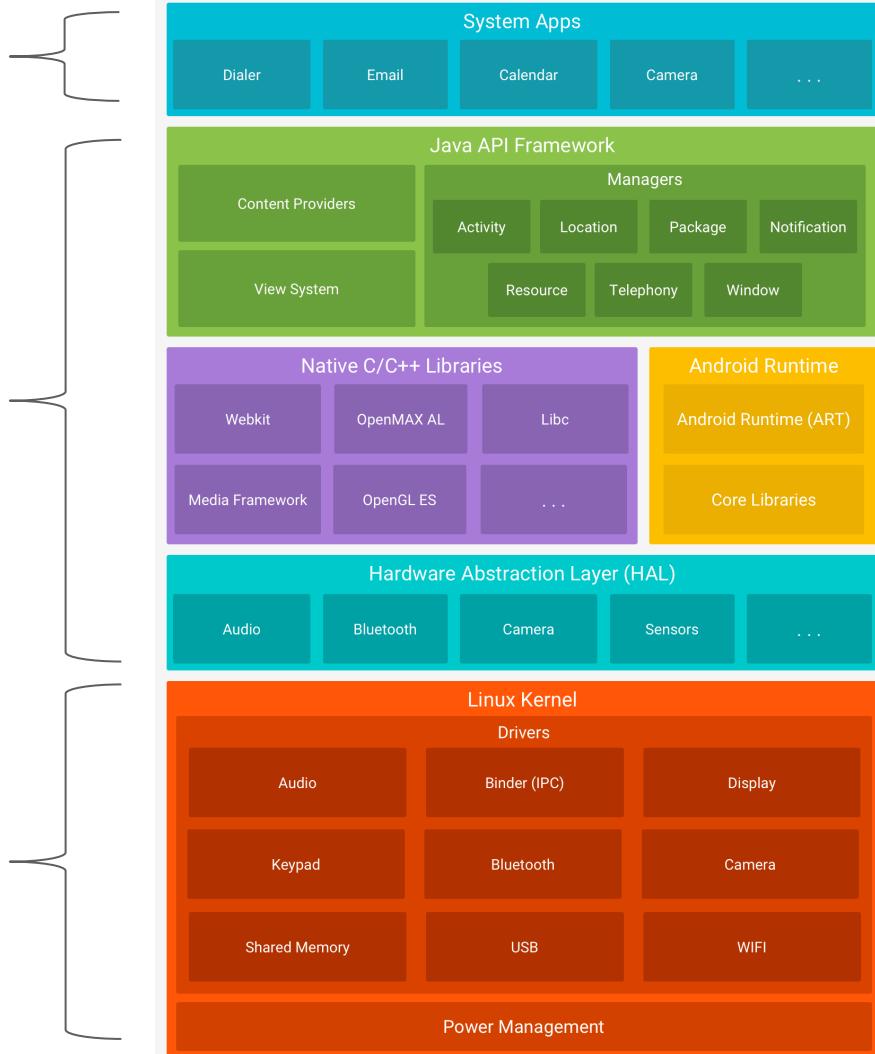
- ❑ Linux内核
- ❑ HAL
- ❑ Android Runtime
- ❑ C/C++ Libraries
- ❑ Java API Framework
- ❑ Apps

## Android应用

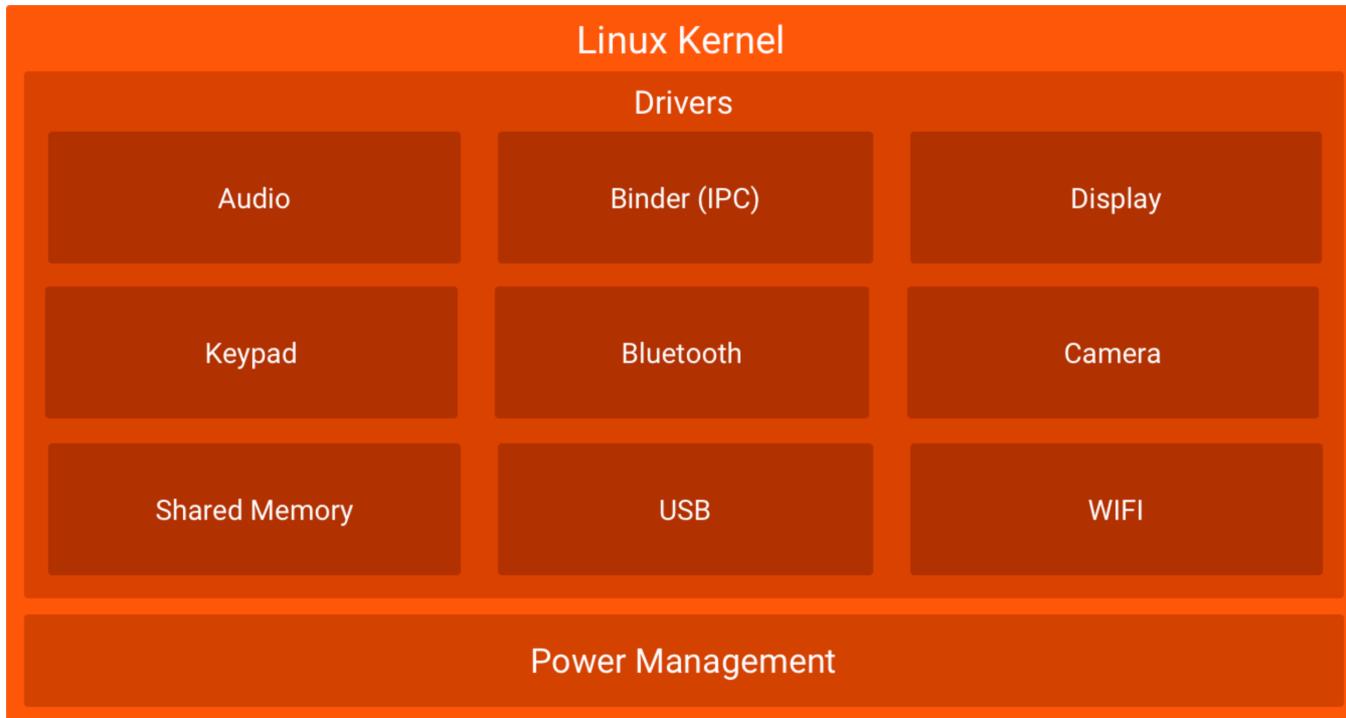
## Android系统

## Linux内核

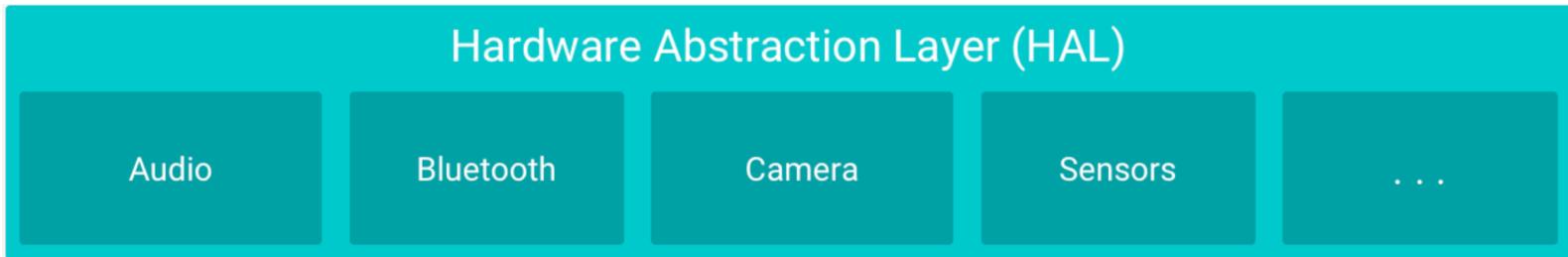
<https://developer.android.com/guide/platform?hl=zh-cn>



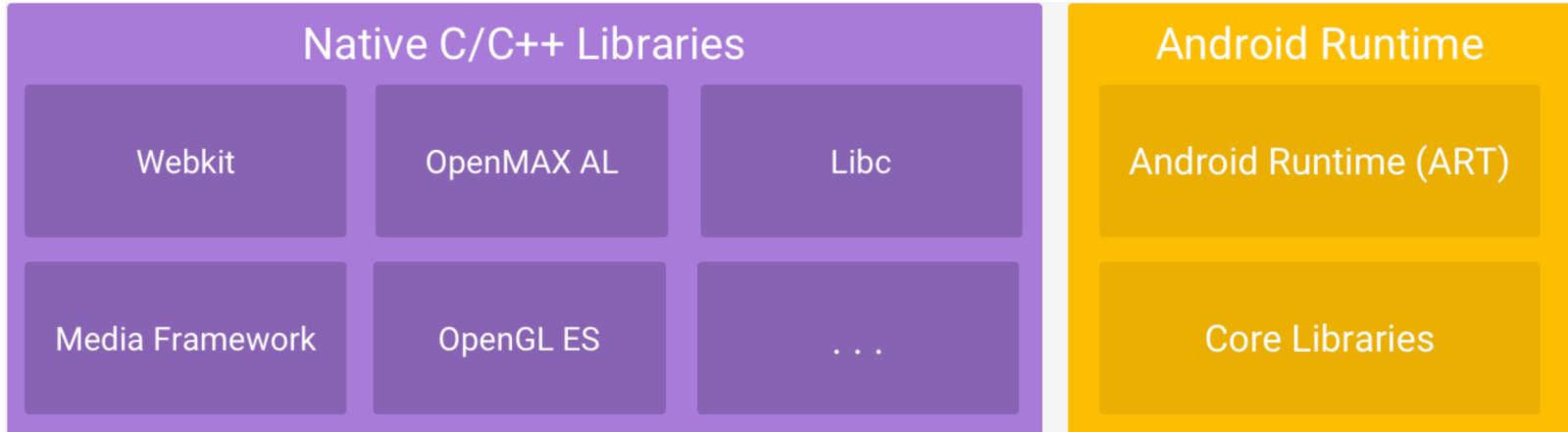
# Linux内核



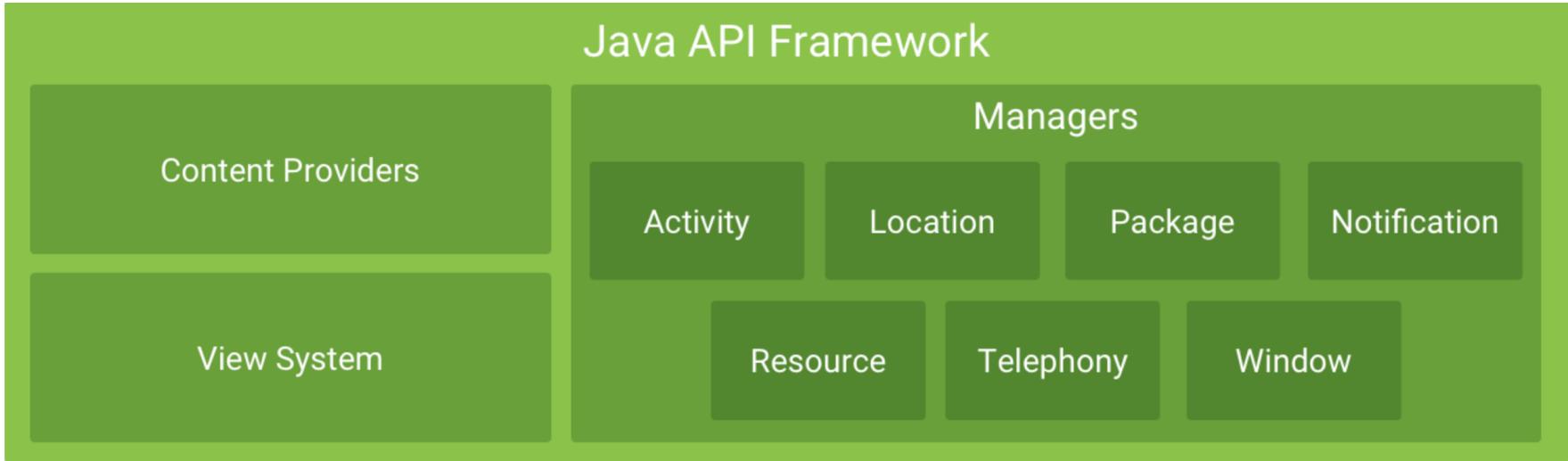
# HAL硬件抽象层



# Native Libraries & ART



# Framework



# System Apps

## System Apps

Dialer

Email

Calendar

Camera

...

# 搭建 Android 开发环境

# Android 开发环境

- ❑ JDK
- ❑ Android Studio
- ❑ Android SDK
- ❑ Gradle

# Java SDK

- ❑ 什么是JDK
- ❑ 为什么需要 JDK

# 什么是 JDK

## JDK - Java Development Kit

Developer 

### Development Tools

java, javac, JShell, javadoc, jar, jdeps, JConsole, VisualVM,  
JFR, JPDA, JVM TI, IDL, Java DB, Debugging Tools, Deployment Tools, Monitoring Tools

## JRE - Java Runtime Environment

Java App Users 

Java API, Runtime Libraries, Byte Code Verifier,  
Libraries: User Interface (Swing, JavaFx, Sound, Image I/O .....),  
Integration Libraries (JDBC, RMI, . . . ), Serialization, Netowrking,  
lang and util libraries (Math, Collections, Concurrency, Logging, ...).....

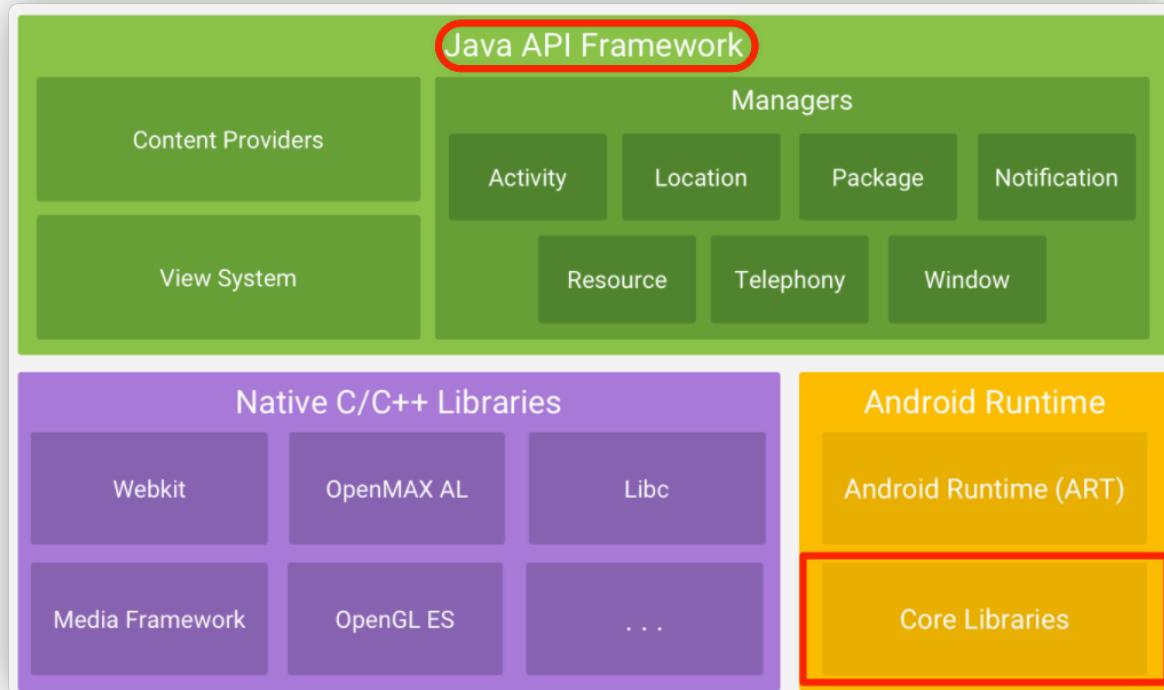
## JVM - Java Virtual Machine

Java Interpreter, JIT, Garbage Collector, Thread Synchronization,  
Class Loader Subsystem

JDK = JRE + Development Tools

JRE= JVM + Libraries

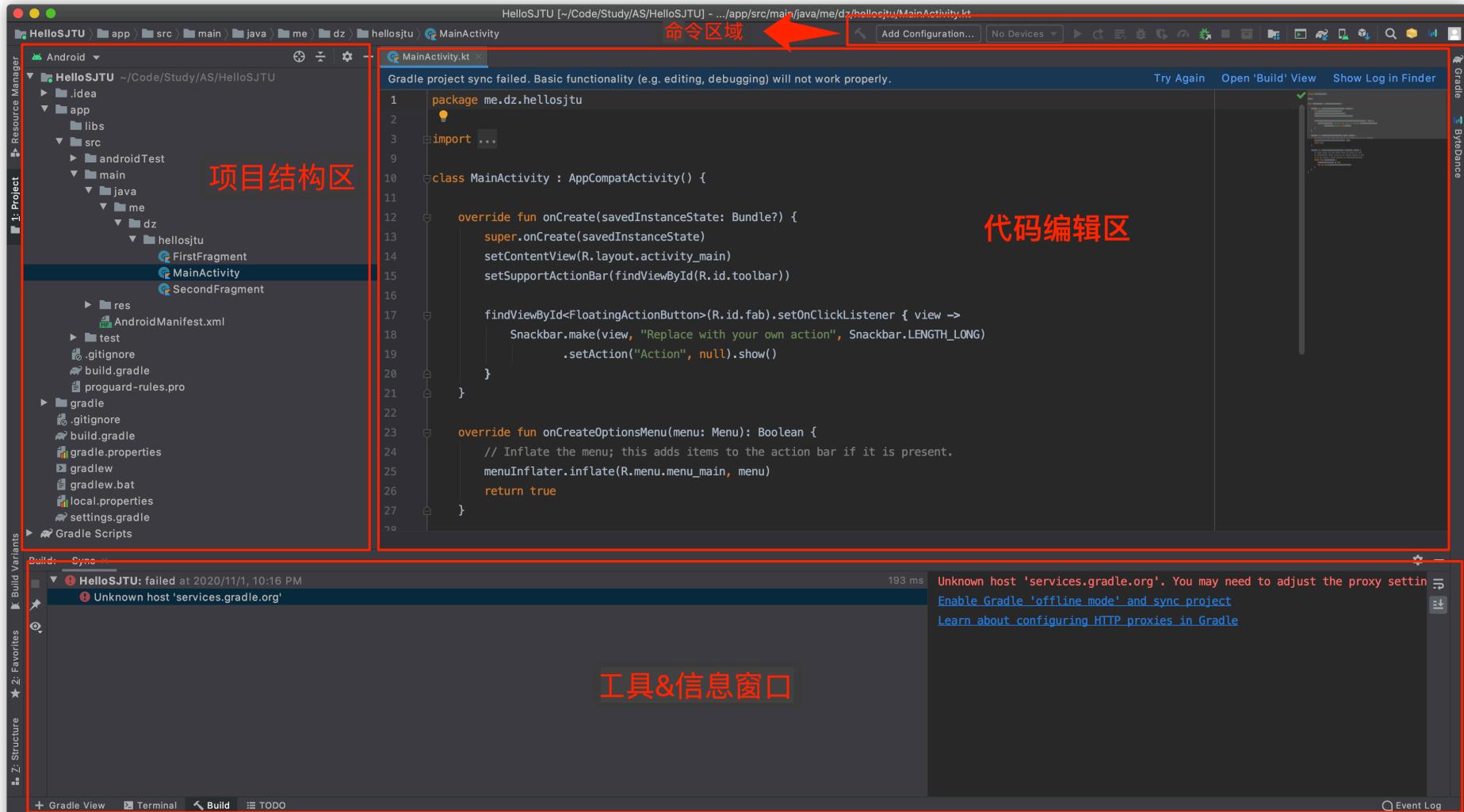
# 为什么需要 JDK



# Android 开发工具

- ❑ Android Studio
  - ❑ 基于 IntelliJ IDEA
  - ❑ Gradle 构建
  - ❑ Android 开发工具
  - ❑ Android 调试工具
  - ❑ 插件支持

<https://developer.android.com/studio>



# Android SDK

## ❑ SDK Platforms (API)

- ❑ 有版本区分

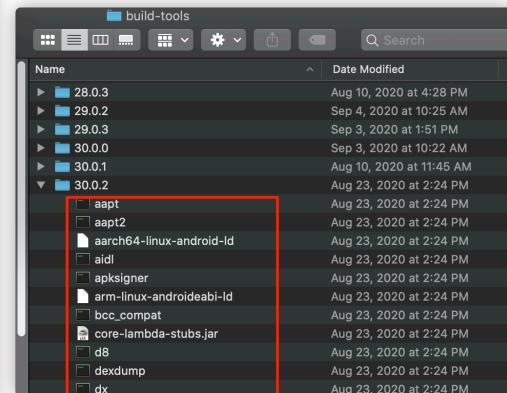
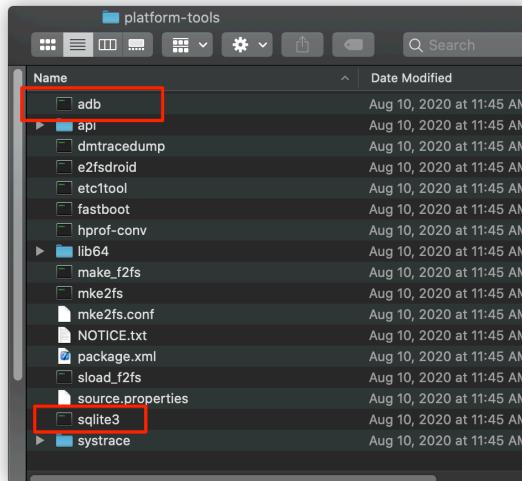
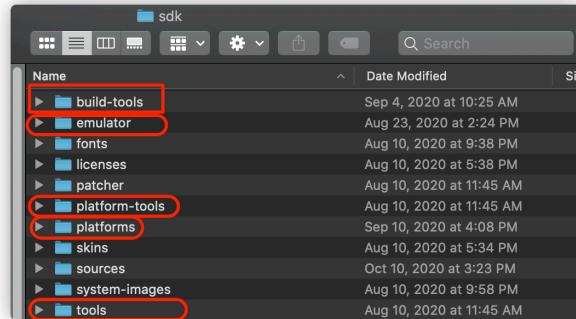
## ❑ Build-Tools

- ❑ aapt,aidl,d8,apksigner

## ❑ Platform-Tools

- ❑ Adb, sqlite

## ❑ Emulator



# Gradle

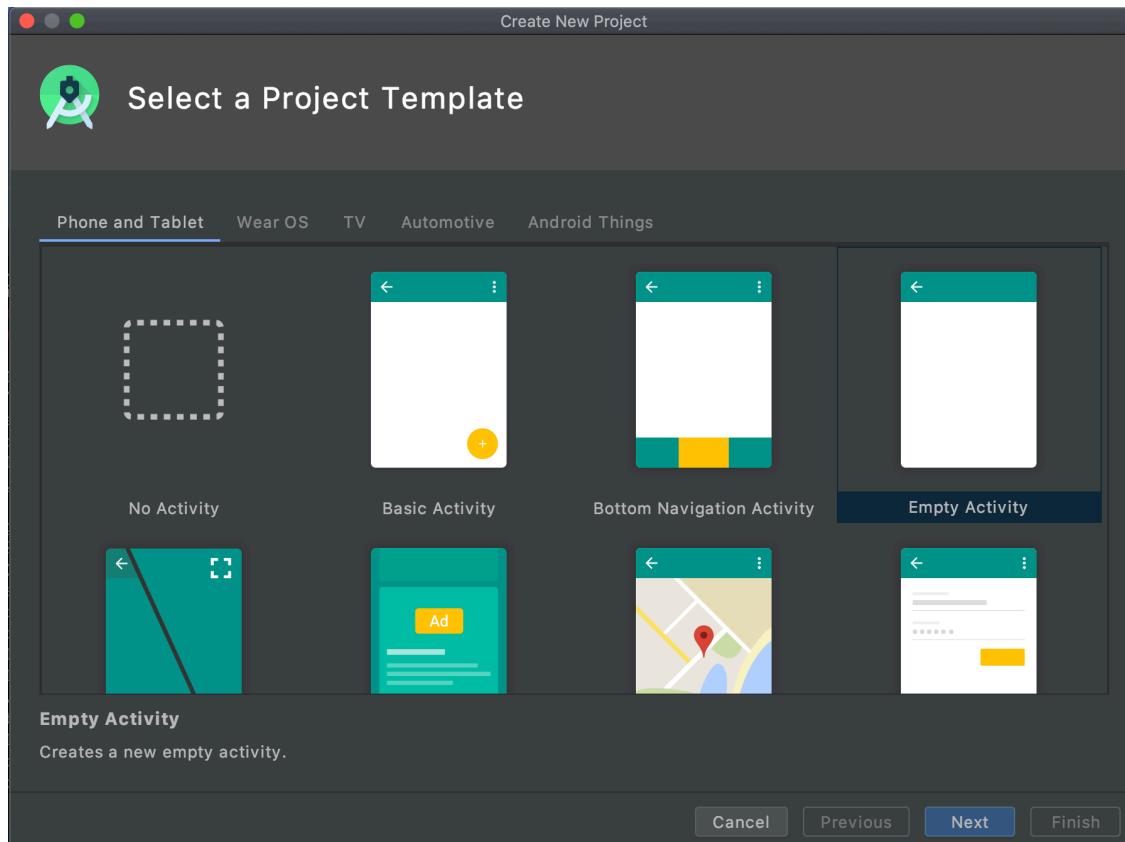
- ❑ 什么是 Gradle
- ❑ 下载安装 Gradle
- ❑ gradle配置

# 开发第一个 Android应用程序

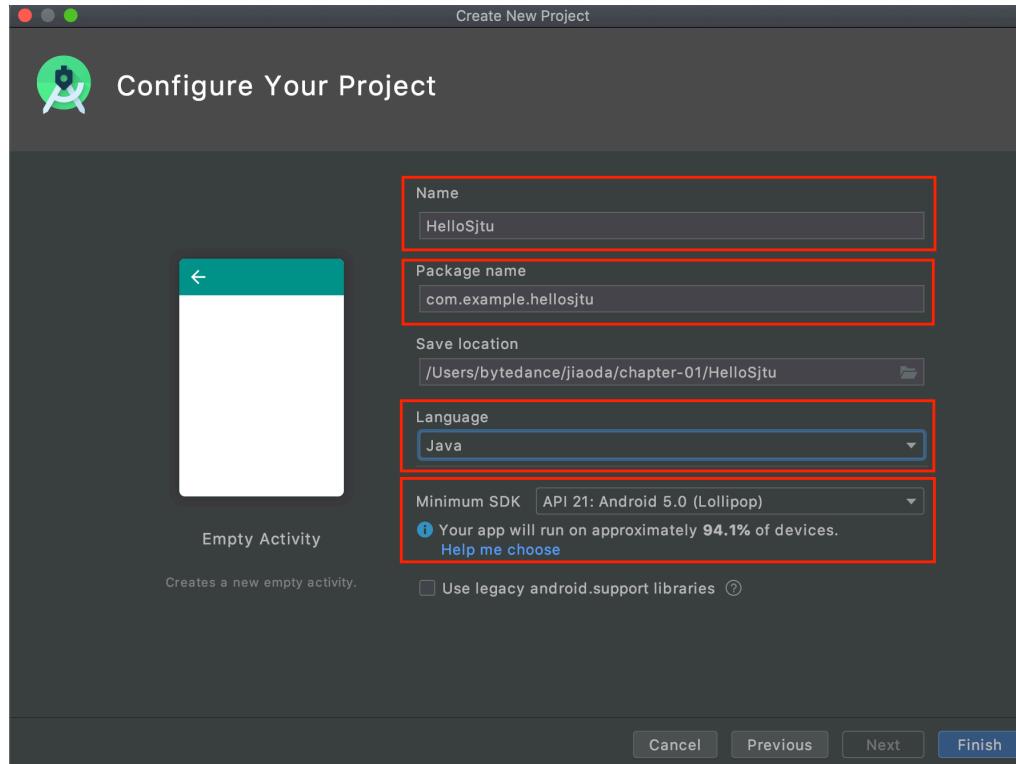
# 实战

- ❑ 第一个 Android 程序
- ❑ adb
- ❑ Git

# 创建第一个Android应用



# Project Configure



# 系统如何区分应用的？

- Package Name
  - apk在系统中的唯一标识
- 签名
  - 验证apk是否来自同一个开发者
- 两个机制同时使用就确保了开发者对于apk的所有权

# 关于版本号的三个概念

- ❑ Min SDK version
  - ❑ 能跑的最小手机版本号（一般为15左右）
- ❑ Compile SDK version
  - ❑ 编译打包用的版本号（一般越新越好）
- ❑ Target SDK version
  - ❑ 应用运行时的行为表现

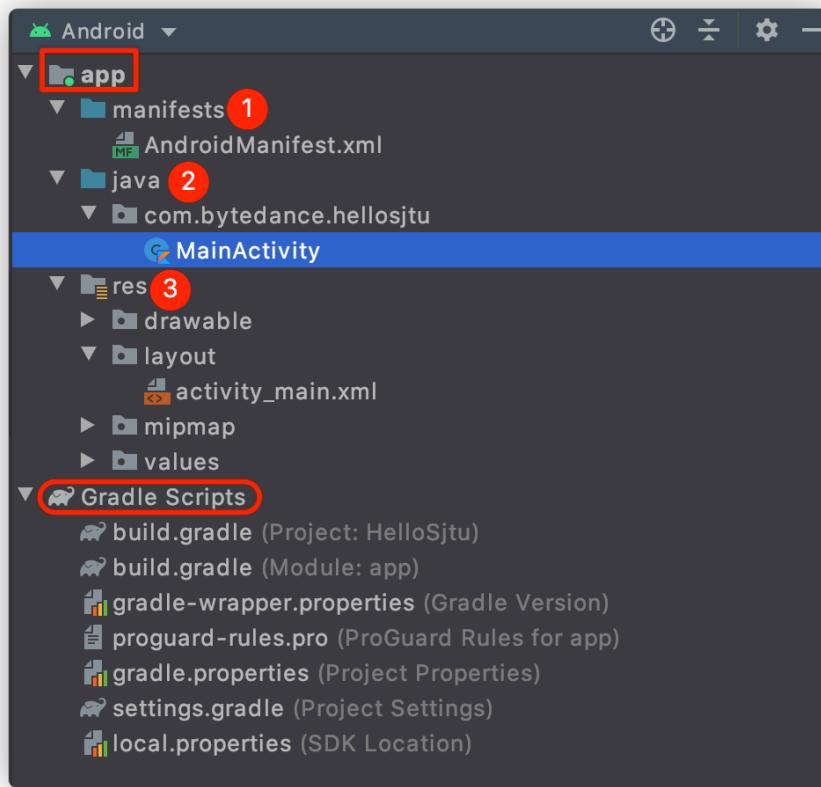
# App 代码结构

## ❑ app

- ❑ manifests
- ❑ Java
- ❑ res

## ❑ gradle scripts

- ❑ build.gradle (Project)
- ❑ build.gradle (Module)
- ❑ gradle-wrapper
- ❑ .....



# Android 四大组件

- ❑ Activity
  - ❑ Android 应用的页面
- ❑ Service
  - ❑ 运行在后台，比如后台下载任务
- ❑ Content Provider
- ❑ Broadcast Receiver

# Manifest

The screenshot shows the Android Studio interface with the project structure on the left and the code editor on the right. The code editor displays the `AndroidManifest.xml` file for the `MainActivity`.

```
<?xml version="1.0" encoding="utf-8"?>
<manifest xmlns:android="http://schemas.android.com/apk/res/android"
    package="com/bytedance.hellosjtu"> ①

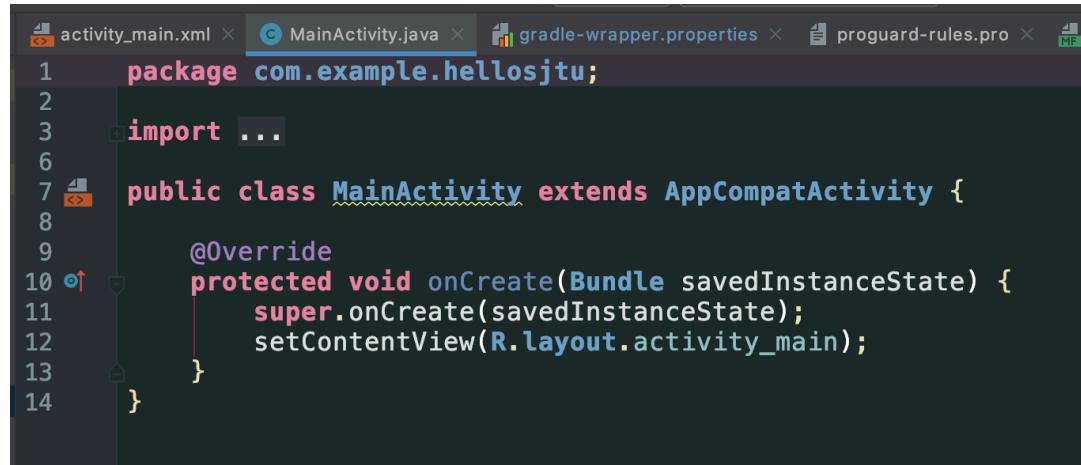
    <application
        android:allowBackup="true"
        android:icon="@mipmap/ic_launcher" ②
        android:label="HelloSjtu"
        android:roundIcon="@mipmap/ic_launcher_round"
        android:supportsRtl="true"
        android:theme="@style/AppTheme">

        <activity android:name=".MainActivity">
            <intent-filter>
                <action android:name="android.intent.action.MAIN" />
                <category android:name="android.intent.category.LAUNCHER" /> ③
            </intent-filter>
        </activity>
    </application>
</manifest>
```

Annotations are present in the code:

- Annotation 1: Surrounds the `package="com.bytedance.hellosjtu"` declaration.
- Annotation 2: Surrounds the `android:icon="@mipmap/ic_launcher"` attribute.
- Annotation 3: Surrounds the `<category android:name="android.intent.category.LAUNCHER" />` element within the `<intent-filter>` block.

# Java-Activity



A screenshot of an Android Studio code editor. The tab bar at the top shows five files: activity\_main.xml, MainActivity.java (which is currently selected), gradle-wrapper.properties, proguard-rules.pro, and build.gradle. The code editor displays the following Java code:

```
1 package com.example.hellosjtu;
2
3 import ...
6
7 public class MainActivity extends AppCompatActivity {
8
9     @Override
10    protected void onCreate(Bundle savedInstanceState) {
11        super.onCreate(savedInstanceState);
12        setContentView(R.layout.activity_main);
13    }
14}
```

# Res-Layout

The screenshot shows the Android Studio interface with the project `HelloSJTU2` open. The `activity_main.xml` layout file is selected in the Project Structure sidebar. The main area displays the XML code for the layout:

```
<?xml version="1.0" encoding="utf-8"?>
<androidx.constraintlayout.widget.ConstraintLayout
    xmlns:android="http://schemas.android.com/apk/res/android"
    xmlns:app="http://schemas.android.com/apk/res-auto"
    xmlns:tools="http://schemas.android.com/tools"
    android:layout_width="match_parent"
    android:layout_height="match_parent"
    tools:context=".MainActivity">

    <TextView
        android:layout_width="wrap_content"
        android:layout_height="wrap_content"
        android:text="Hello SJTU"
        android:textSize="40sp"
        app:layout_constraintBottom_toBottomOf="parent"
        app:layout_constraintLeft_toLeftOf="parent"
        app:layout_constraintRight_toRightOf="parent"
        app:layout_constraintTop_toTopOf="parent" />

</androidx.constraintlayout.widget.ConstraintLayout>
```

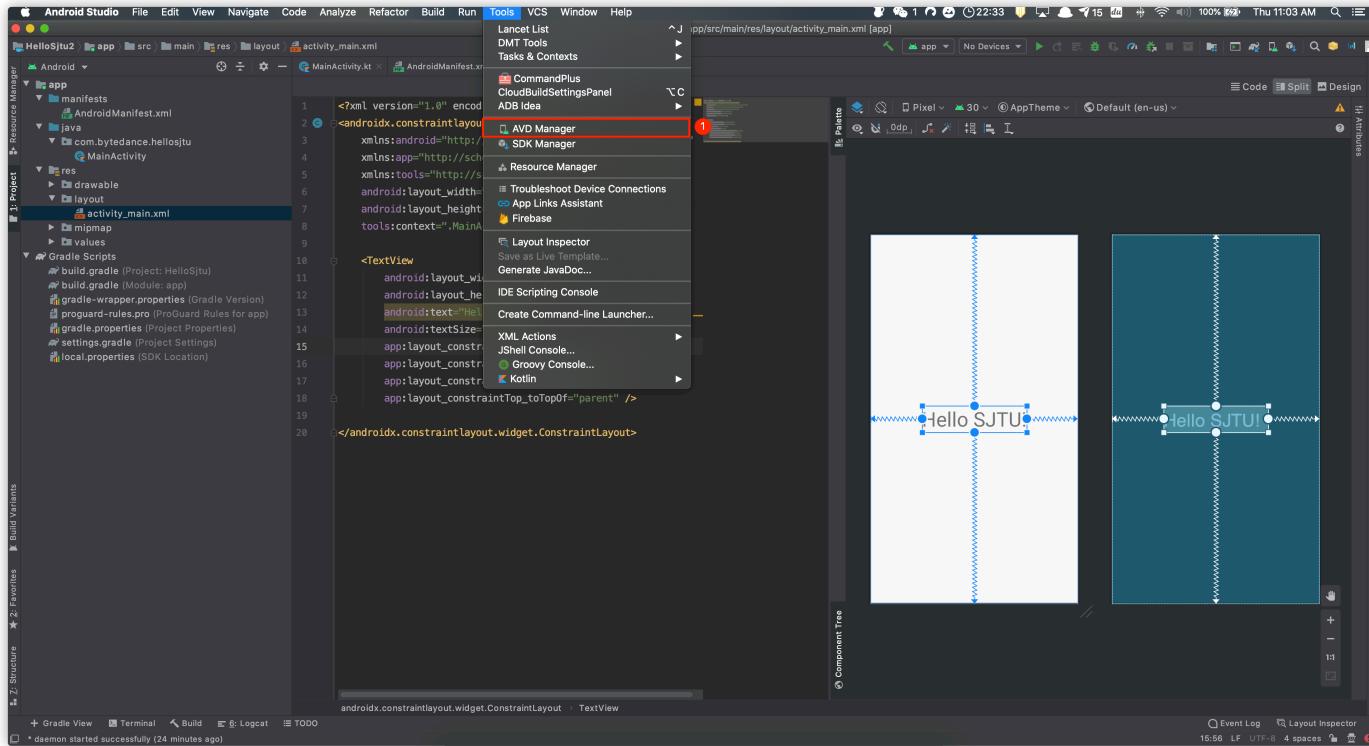
The XML code defines a `ConstraintLayout` with a single `TextView` child. The `TextView` has its text set to "Hello SJTU" and its text size to 40sp. It is constrained to the parent's bottom, left, right, and top edges. The entire layout is constrained to the parent's width and height.

The right side of the interface shows the visual representation of the layout in the `Design` tab. It consists of two vertical columns: a white column on the left and a dark blue column on the right. A red box highlights the `Design` tab in the top right corner. Another red box highlights the `ConstraintLayout` container in the visual editor. The `Component Tree` panel on the far right shows the hierarchy of the layout components.

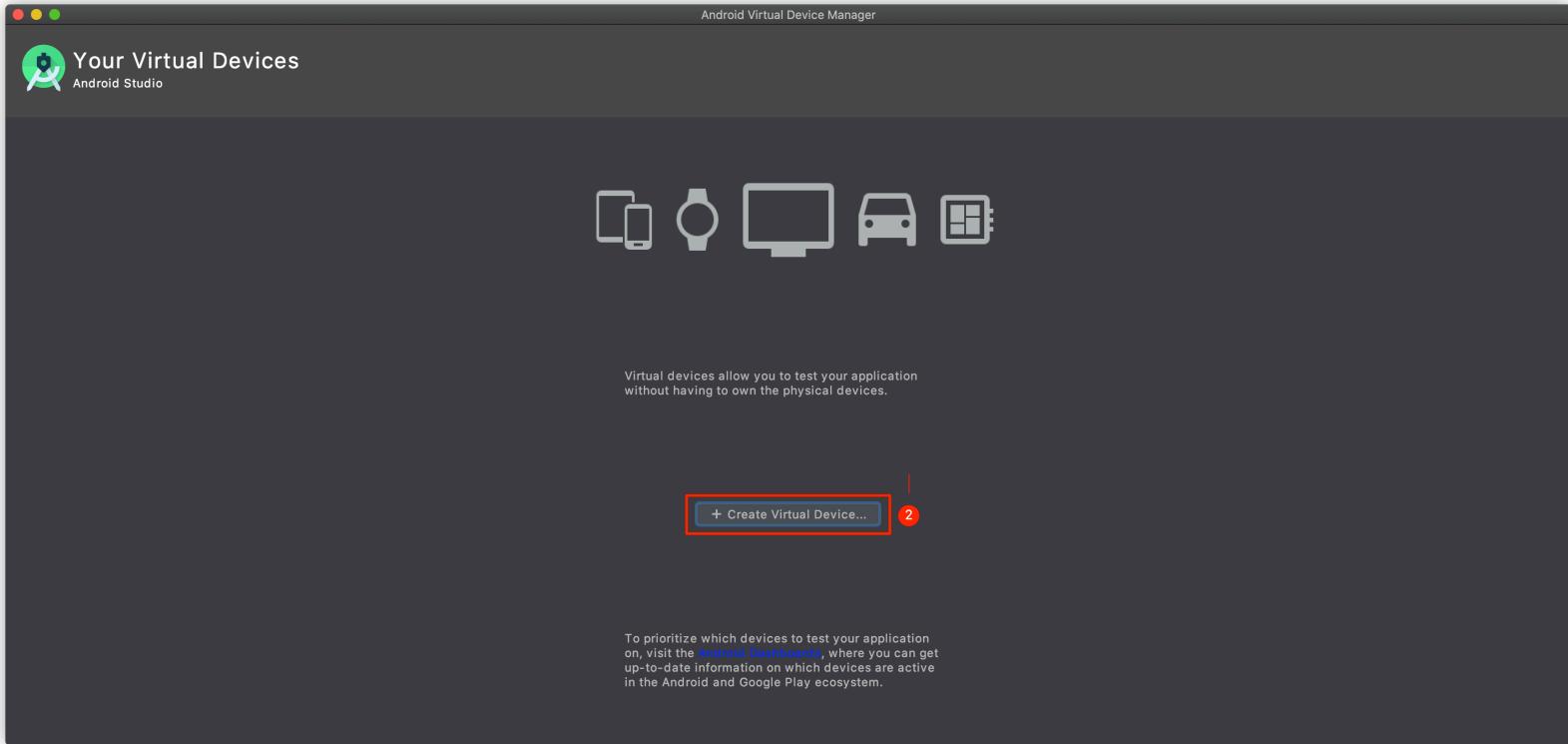
# 运行虚拟机

- 如果没有Android手机也不要担心,  
可以使用虚拟机
- Android Studio -> Tool  
-> AVD-Manager  
->Create Virtual Device

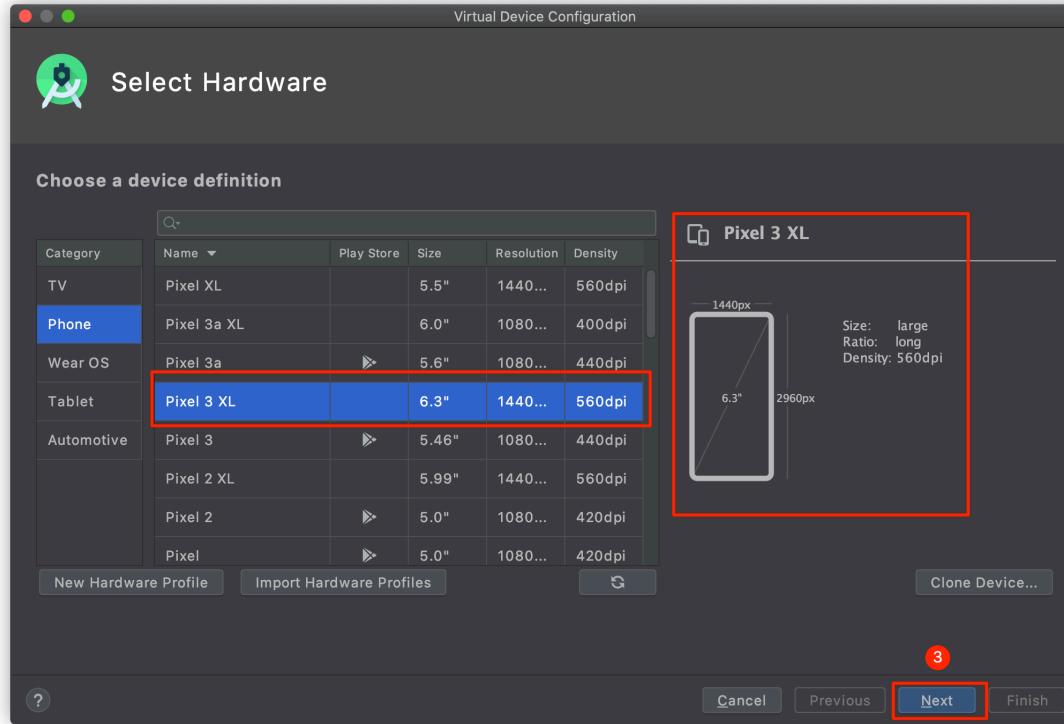
# 创建虚拟机



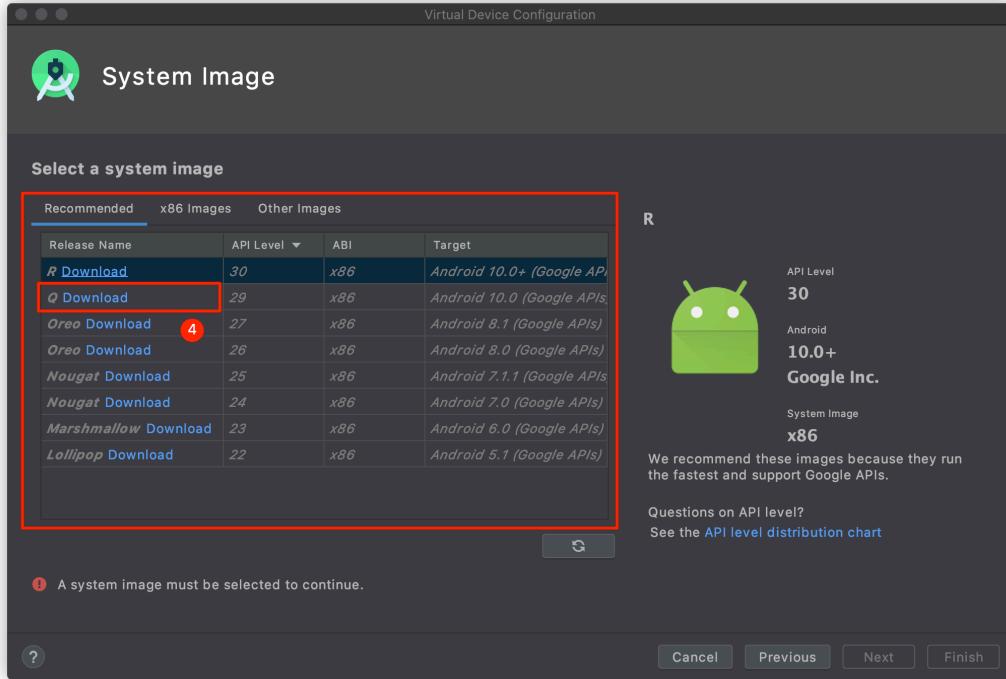
# 创建虚拟机



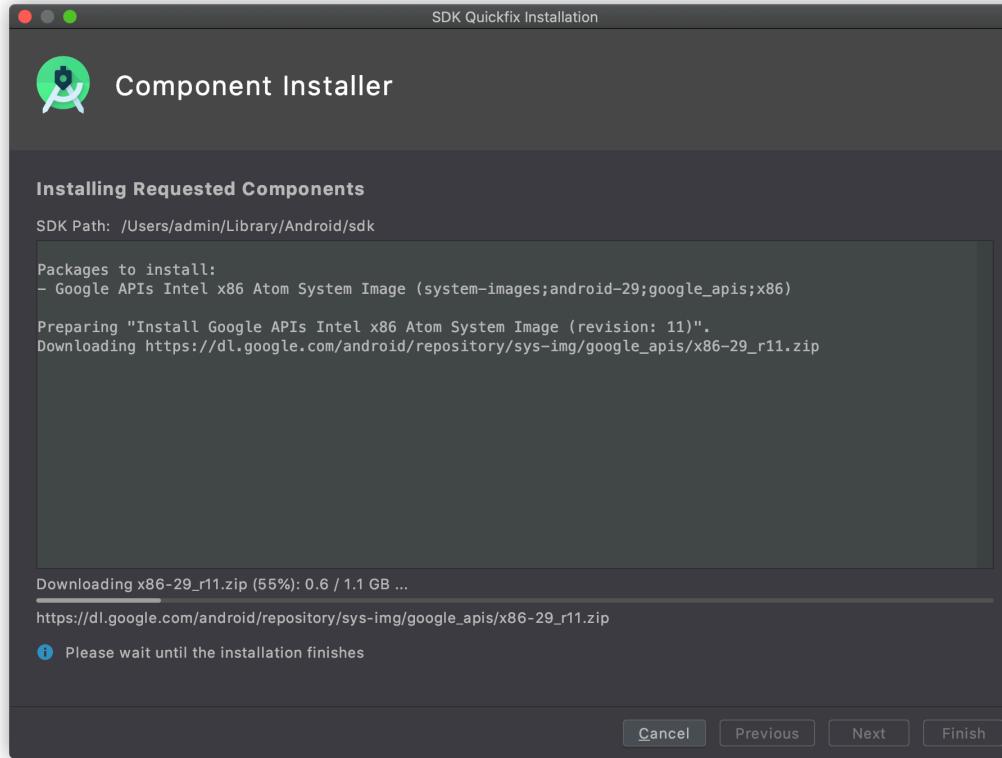
# 创建虚拟机



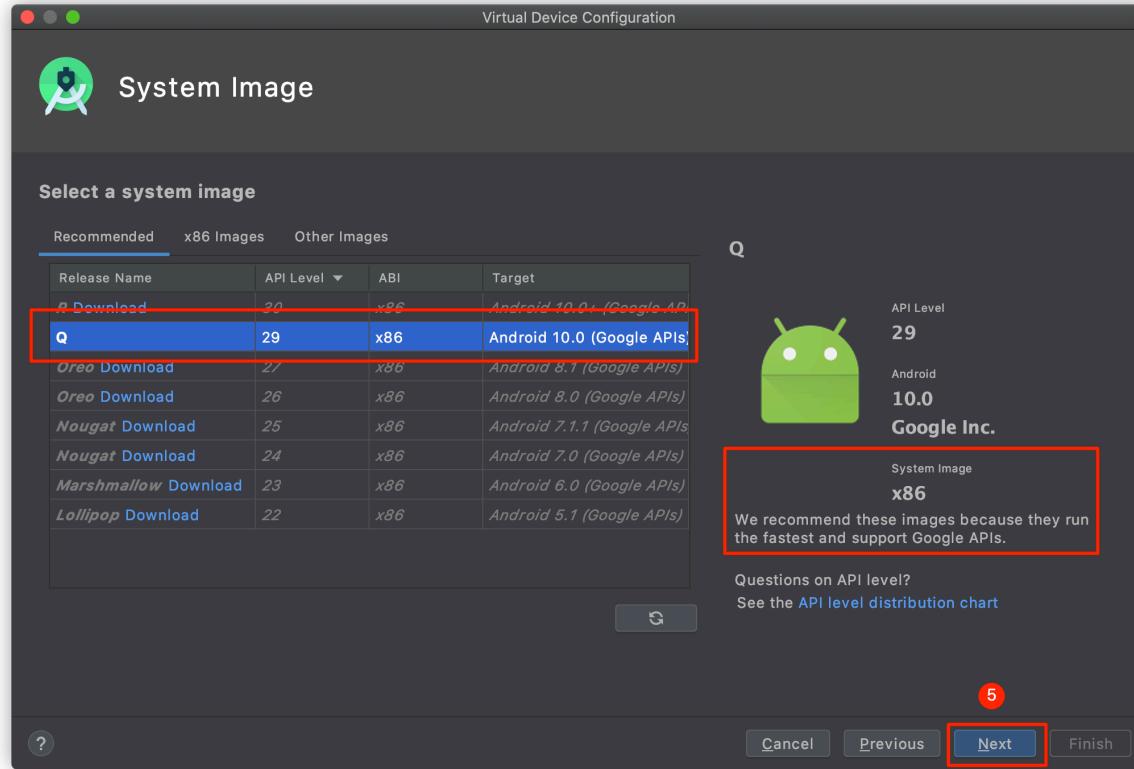
# 下载 Android 镜像



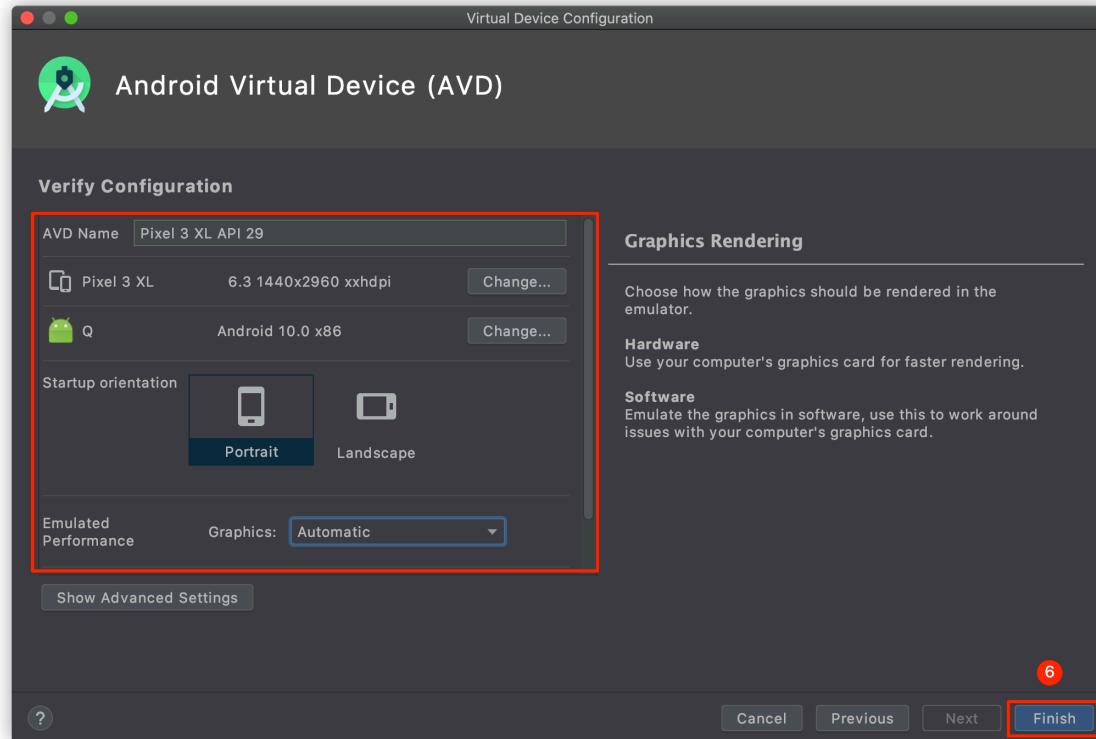
下载中...



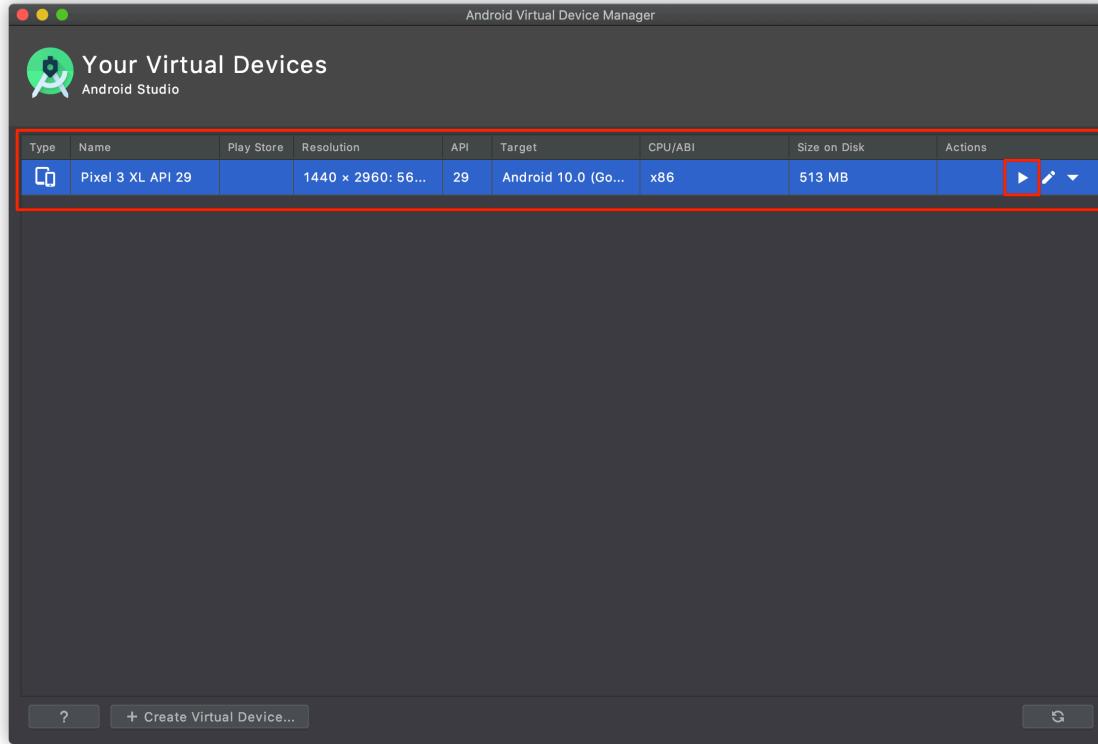
# 选择镜像



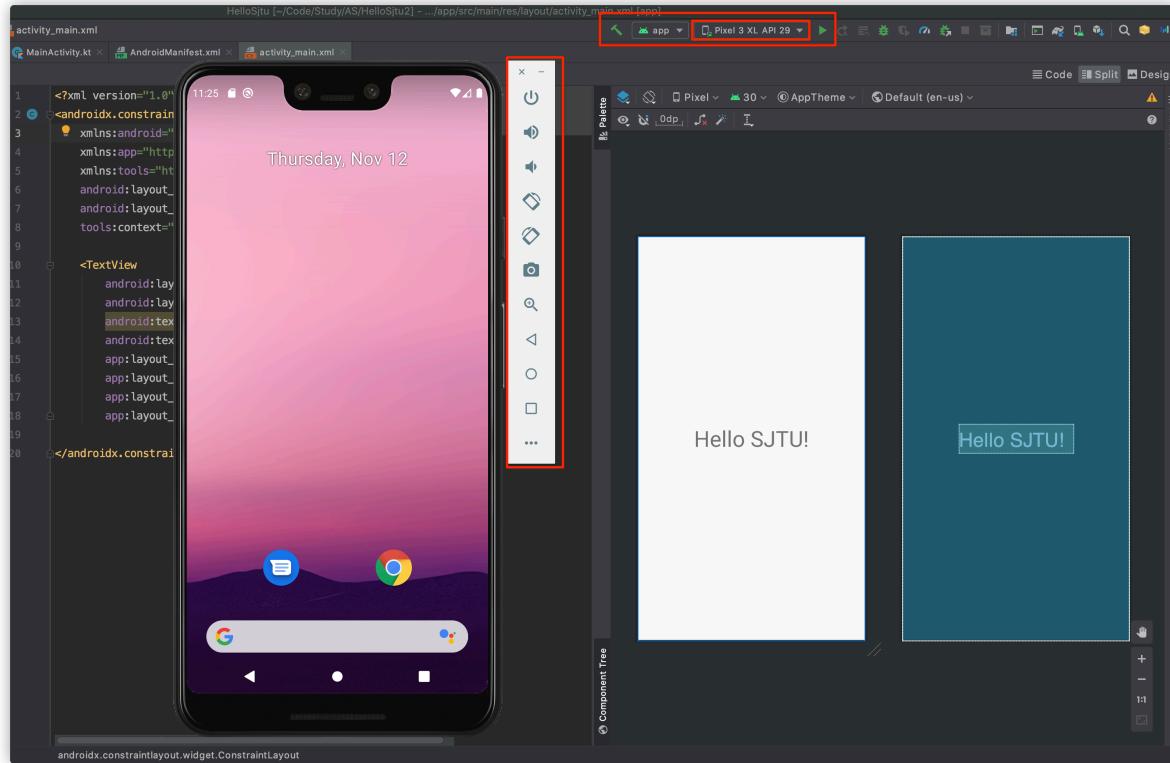
# 配置虚拟机属性



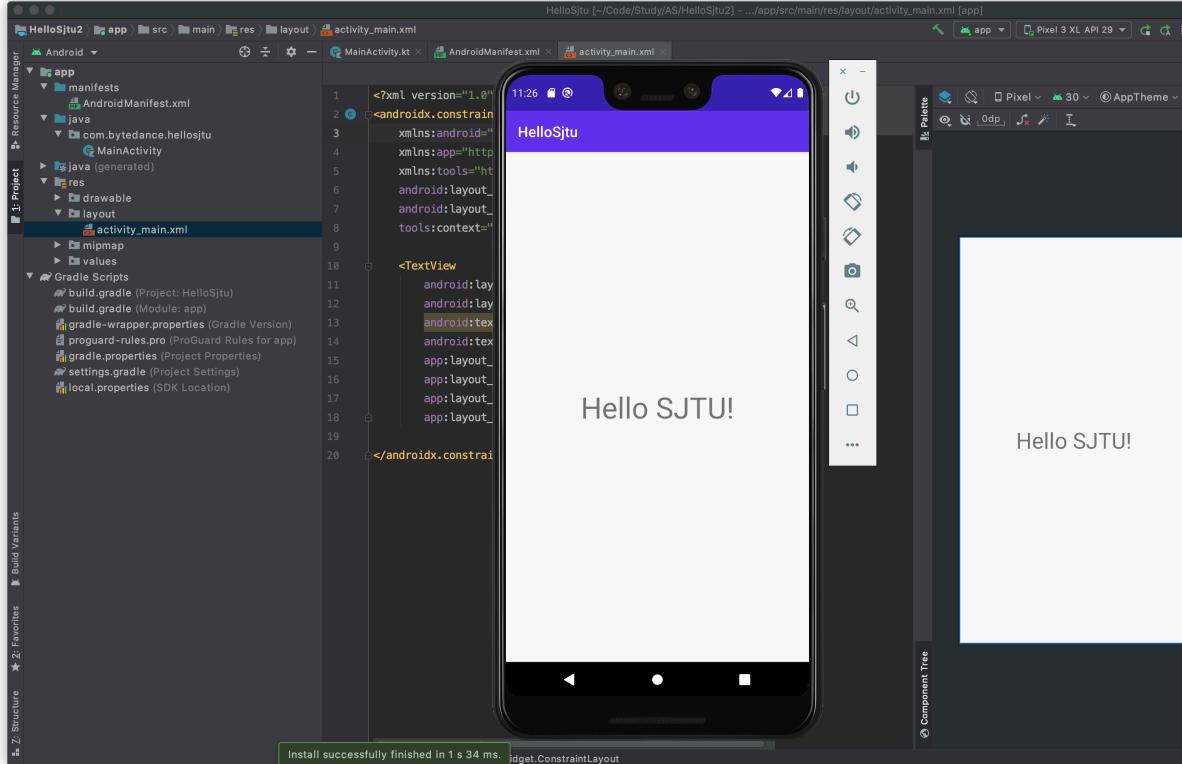
# 运行虚拟机



# 运行虚拟机



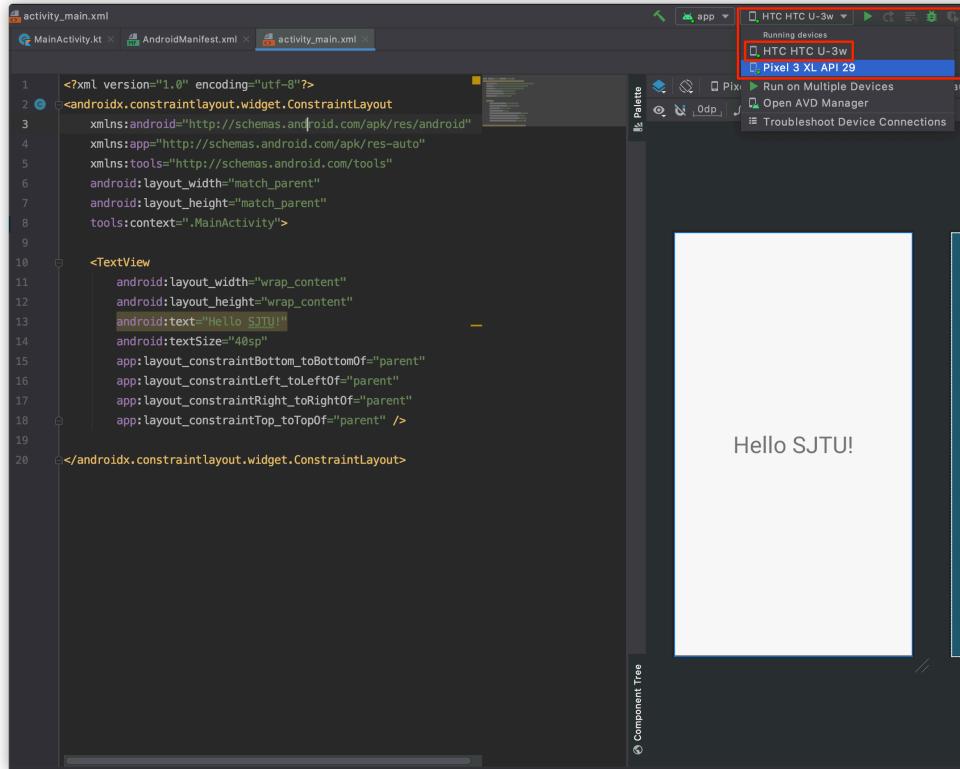
# 在虚拟机上运行我们的项目



# 在实机上运行App

- 把手机和电脑使用USB线连接
- 安装USB驱动(大部分情况不需要)
- 手机上开启“开发者模式”
  - 系统设置->系统->关于手机->build number ->连续点击5次（不同手机系统可能会有少许区别）
  - 系统设置->开发者选项->开启开发者选项 / USB调试
  - 第一次连接手机，会弹出是否允许调试的对话框，点击允许

# 在真机上运行我们的项目





恭喜你，第一个App成功运行啦！

# 必备技能 - 日志

The screenshot shows the Android Studio interface with the following details:

- Project Structure:** Shows the project directory structure with files like layout/activity\_main.xml, AndroidManifest.xml, test, .gitignore, app.iml, build.gradle, proguard-rules.pro, and gradle.
- Code Editor:** Displays the Java code for MainActivity. The code includes an onCreate() method that sets up a button and a text view, and logs "hello" and "world" messages.
- Logcat:** Shows the log output for the Emulator Pixel\_2\_XL\_AF device. The log entries are:

```
2019-01-17 00:22:09.774 21426-21426/bytedance.com.helloworld D/MainActivity: hello
2019-01-17 00:22:37.167 21426-21426/bytedance.com.helloworld D/MainActivity: world
2019-01-17 00:22:38.685 21426-21426/bytedance.com.helloworld D/MainActivity: world
2019-01-17 00:22:39.421 21426-21426/bytedance.com.helloworld D/MainActivity: world
2019-01-17 00:22:40.373 21426-21426/bytedance.com.helloworld D/MainActivity: world
2019-01-17 00:22:41.957 21426-21426/bytedance.com.helloworld D/MainActivity: world
2019-01-17 00:22:43.248 21426-21426/bytedance.com.helloworld D/MainActivity: world
```
- Logcat Filter:** The filter bar at the bottom of the Logcat window is set to "bytedance.com.helloworld" and "MainActivity". A red box highlights the "Show only selected applic..." checkbox.
- Bottom Navigation:** The navigation bar includes icons for Run, TODO, Logcat (which is highlighted with a red box), Profiler, Terminal, Build, Event Log, and Device File Explorer.

# 必备技能 - adb

```
[bogon:~ houxiaomu$ adb shell  
[generic_x86:/ $ cd /sdcard  
[generic_x86:/sdcard $ ls -l  
total 40  
drwxrwx--x 2 root sdcard_rw 4096 2018-11-27 11:43 Alarms  
drwxrwx--x 3 root sdcard_rw 4096 2018-11-27 11:43 Android  
drwxrwx--x 2 root sdcard_rw 4096 2018-11-27 11:43 DCIM  
drwxrwx--x 2 root sdcard_rw 4096 2018-11-27 11:43 Download  
drwxrwx--x 2 root sdcard_rw 4096 2018-11-27 11:43 Movies  
drwxrwx--x 2 root sdcard_rw 4096 2018-11-27 11:43 Music  
drwxrwx--x 2 root sdcard_rw 4096 2018-11-27 11:43 Notifications  
drwxrwx--x 2 root sdcard_rw 4096 2018-11-27 11:43 Pictures  
drwxrwx--x 2 root sdcard_rw 4096 2018-11-27 11:43 Podcasts  
drwxrwx--x 2 root sdcard_rw 4096 2018-11-27 11:43 Ringtones  
generic_x86:/sdcard $ ]
```

# 必备技能 - git

- Git 是什么
- 安装
- 基本概念
- 基本使用
- 简单实战



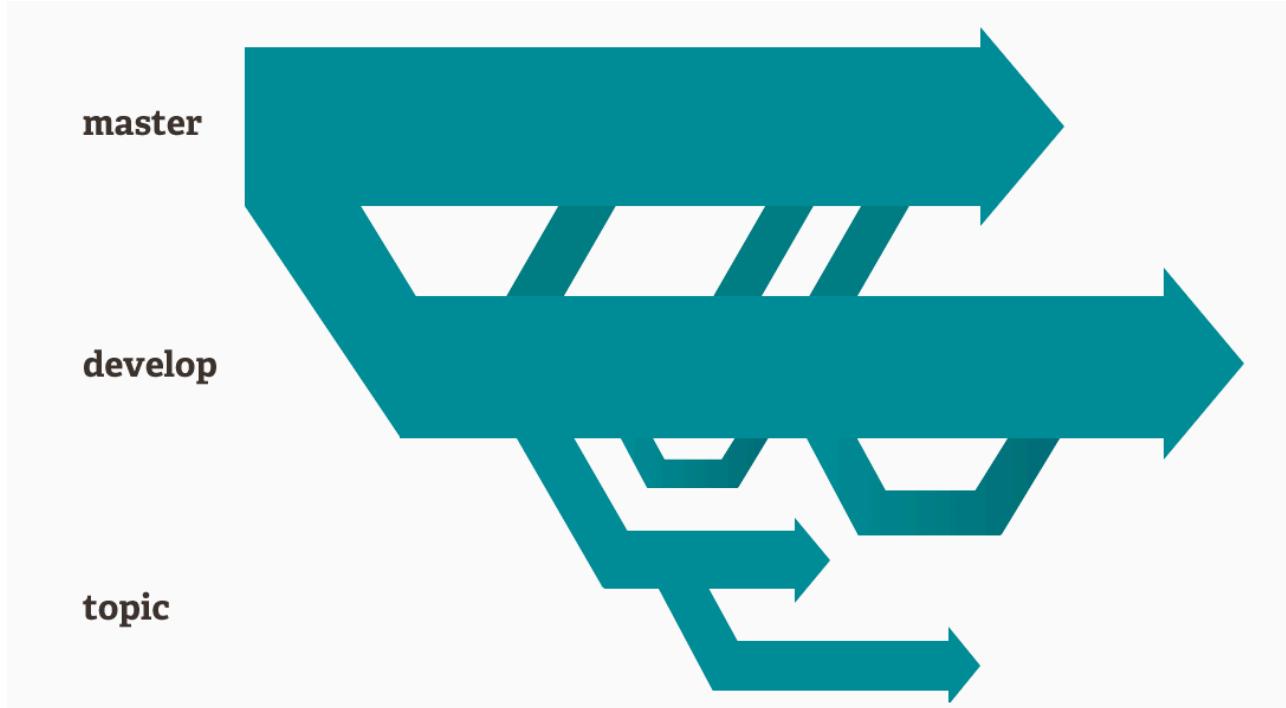
# Git-是什么

分布式版本控制软件

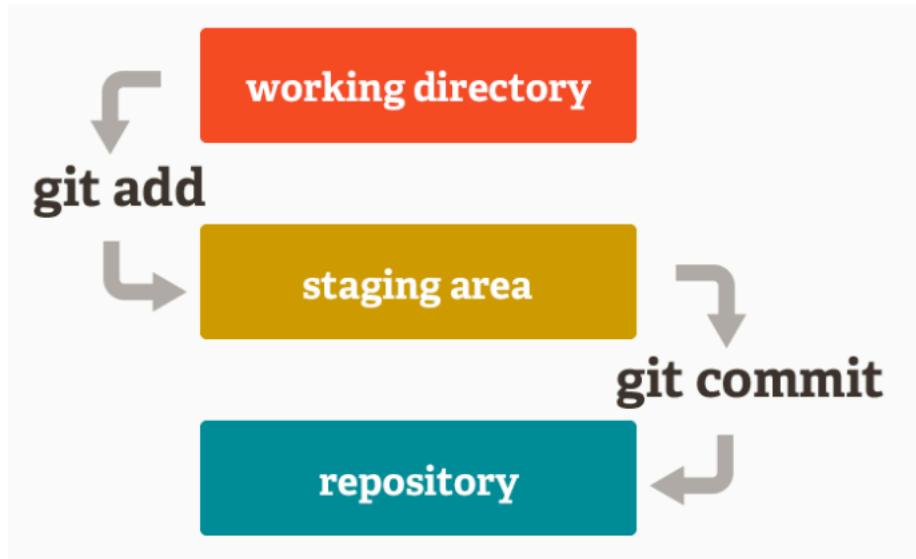
## Git-安装

- Mac: 命令行直接输入 git —version, 会提示直接安装
- 或: <https://git-scm.com/download/mac> 下载安装

# Git-基本概念 分支



# Git-基本概念 工作区&仓储区



# Git-基本使用

- git init 初始化当前目录为 git 目录
- git clone <url> 克隆一个仓库项目到本地
- git pull 从仓库更新代码
- git checkout <branch name> 切换分支
- git add <filename> 添加文件
- git commit 创建提交纪录
- git push origin <remote branch> 推送提交纪录到仓库

# Git-实战 [git init]

```
→ HelloSjtu ls -l
total 56
drwxr-xr-x  8 admin  staff  256 Nov 12 11:26 app
drwxr-xr-x  3 admin  staff   96 Nov 12 11:26 build
-rw-r--r--  1 admin  staff  642 Nov 12 10:38 build.gradle
drwxr-xr-x  3 admin  staff   96 Nov 12 10:38 gradle
-rw-r--r--  1 admin  staff 1162 Nov 12 10:38 gradle.properties
-rwxr--r--  1 admin  staff 5296 Nov 12 10:38 gradlew
-rw-r--r--  1 admin  staff 2260 Nov 12 10:38 gradlew.bat
-rw-r--r--  1 admin  staff  434 Nov 12 10:38 local.properties
-rw-r--r--  1 admin  staff   45 Nov 12 10:38 settings.gradle

→ HelloSjtu git commit -a
fatal: not a git repository (or any of the parent directories): .git
→ HelloSjtu git init
Initialized empty Git repository in /Users/admin/Code/Study/AS>HelloSjtu/.git/
```

# Git-实战 [git status]

```
..ode/TT/Tiktok (zsh) 361
→ HelloSjtu git:(master) ✘ ls -l
total 56
drwxr-xr-x  8 admin  staff   256 Nov 12 11:26 app
drwxr-xr-x  3 admin  staff    96 Nov 12 11:26 build
-rw-r--r--  1 admin  staff   642 Nov 12 10:38 build.gradle
drwxr-xr-x  3 admin  staff    96 Nov 12 10:38 gradle
-rw-r--r--  1 admin  staff  1162 Nov 12 10:38 gradle.properties
-rwxr--r--  1 admin  staff  5296 Nov 12 10:38 gradlew
-rw-r--r--  1 admin  staff  2260 Nov 12 10:38 gradlew.bat
-rw-r--r--  1 admin  staff   434 Nov 12 10:38 local.properties
-rw-r--r--  1 admin  staff    45 Nov 12 10:38 settings.gradle
→ HelloSjtu git:(master) ✘ git status
On branch master

No commits yet

Untracked files:
  (use "git add <file>..." to include in what will be committed)
    .gitignore
    .idea/
    app/
    build.gradle
    gradle.properties
    gradle/
    gradlew
    gradlew.bat
    settings.gradle

nothing added to commit but untracked files present (use "git add" to track)
→ HelloSjtu git:(master) ✘
```

# Git-实战 [git add]

```
→ HelloSjtu git:(master) ✘ git add .
→ HelloSjtu git:(master) ✘ git status
On branch master

No commits yet

Changes to be committed:
  (use "git rm --cached <file>..." to unstage)
    new file:  .gitignore
    new file:  .idea/.name
    new file:  .idea/codeStyles/Project.xml
    new file:  .idea/codeStyles/codeStyleConfig.xml
    new file:  .idea/gradle.xml
    new file:  .idea/jarRepositories.xml
    new file:  .idea/misc.xml
    new file:  .idea/runConfigurations.xml
    new file:  app/.gitignore
    new file:  app/build.gradle
    new file:  app/proguard-rules.pro
    new file:  app/src/main/AndroidManifest.xml
    new file:  app/src/main/java/com/bytedance/hellosjtu/MainActivity.kt
    new file:  app/src/main/res/drawable-v24/ic_launcher_foreground.xml
    new file:  app/src/main/res/drawable/ic_launcher_background.xml
    new file:  app/src/main/res/layout/activity_main.xml
    new file:  app/src/main/res/mipmap-anydpi-v26/ic_launcher.xml
```

# Git-实战 [commit]

```
→ HelloSjtu git:(master) ✘ git commit -a -m "first commit"
[master (root-commit) 0b2167f] first commit
 38 files changed, 860 insertions(+)
  create mode 100644 .gitignore
  create mode 100644 .idea/.name
  create mode 100644 .idea/codeStyles/Project.xml
  create mode 100644 .idea/codeStyles/codeStyleConfig.xml
  create mode 100644 .idea/gradle.xml
  create mode 100644 .idea/jarRepositories.xml
  create mode 100644 .idea/misc.xml
  create mode 100644 .idea/runConfigurations.xml
```

```
→ HelloSjtu git:(master) git status
On branch master
nothing to commit, working tree clean
→ HelloSjtu git:(master) █
```

```
commit 0b2167f38ff37f656a05d29584039882914c7de2 (HEAD -> master)
Author: daizheng.l <daizheng.l@bytedance.com>
Date:   Thu Nov 12 12:17:29 2020 +0800
```

first commit

(END)

# Git-实战 [branch]

```
→ HelloSjtu git:(master) git checkout -b sjtu
Switched to a new branch 'sjtu'
→ HelloSjtu git:(sjtu) git log
→ HelloSjtu git:(sjtu) █
```

```
commit 0b2167f38ff37f656a05d29584039882914c7de2 (HEAD -> sjtu, master)
Author: daizheng.l <daizheng.l@bytedance.com>
Date:   Thu Nov 12 12:17:29 2020 +0800

    first commit
(END)
```

```
→ HelloSjtu git:(sjtu) touch test_branch.text
→ HelloSjtu git:(sjtu) x git add .
→ HelloSjtu git:(sjtu) x git commit -a -m "test branch"
[sjtu 9db86bd] test branch
1 file changed, 0 insertions(+), 0 deletions(-)
create mode 100644 test_branch.text
→ HelloSjtu git:(sjtu) git log
```

```
commit a64c275c8e6c95ce3964ca593a7a5d809e077720 (HEAD -> sjtu)
Author: daizheng.l <daizheng.l@bytedance.com>
Date:   Thu Nov 12 12:21:37 2020 +0800

    test branch

commit 0b2167f38ff37f656a05d29584039882914c7de2 (master)
Author: daizheng.l <daizheng.l@bytedance.com>
Date:   Thu Nov 12 12:17:29 2020 +0800

    first commit
(END)
```

请各位同学自行练习尝试

# 资料速查手册

- ❑ Google Android官方中文站点

<https://developer.android.google.cn/>

- ❑ Android API速查

  - ❑ <https://developer.android.google.cn/reference/packages>

- ❑ Android View Api

  - ❑ <https://developer.android.com/reference/android/view/View>

## 现场练习

- 注册一个github账号（已有就可以跳过此步）
- 创建一个仓库
- 把练习代码上传到github仓库里



THANKS



# 参考资料

- ❑ [https://en.wikipedia.org/wiki/HTC\\_Dream](https://en.wikipedia.org/wiki/HTC_Dream)
- ❑ <https://developer.android.com/>
- ❑ <https://www.appannie.com/cn/insights/state-of-mobile-2020/>
- ❑ <https://git-scm.com/about>