Mobius
2023 Spring

Как Google победил фрагментацию в Android

Кирилл Розов

Тинькофф

Кирилл Розов

- 👉 Staff Software Engineer в Тинькофф
- 👉 10+ лет в Android разработке
- 👉 Живу в Гродно, Беларусь
- 👉 Предпочтения: Kotlin, KMM, Coroutines, Compose

Android Broadcast

Современные тренды Android разработки в одном месте

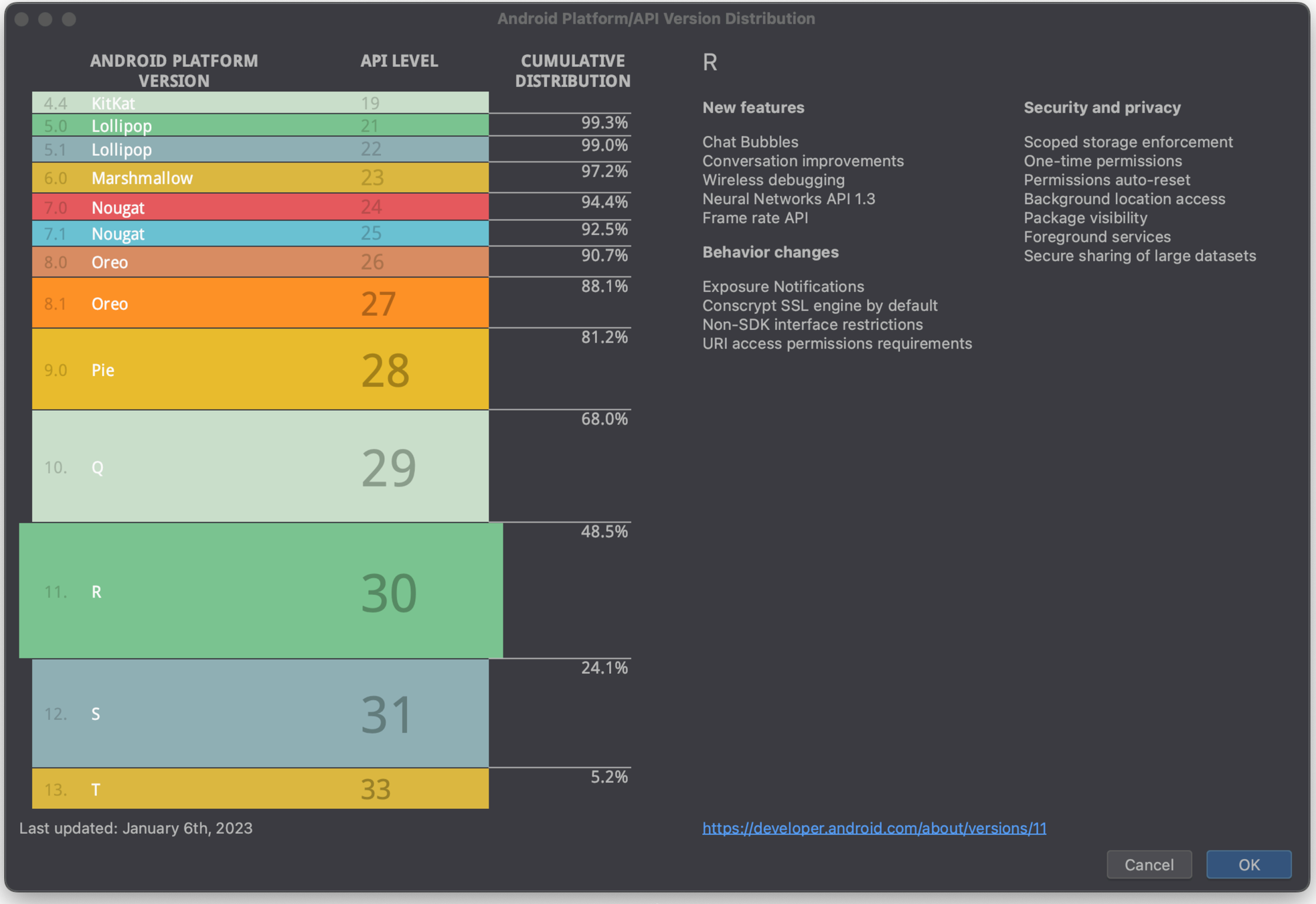
androidbroadcast.dev

@android_broadcast

@androidBroadcast

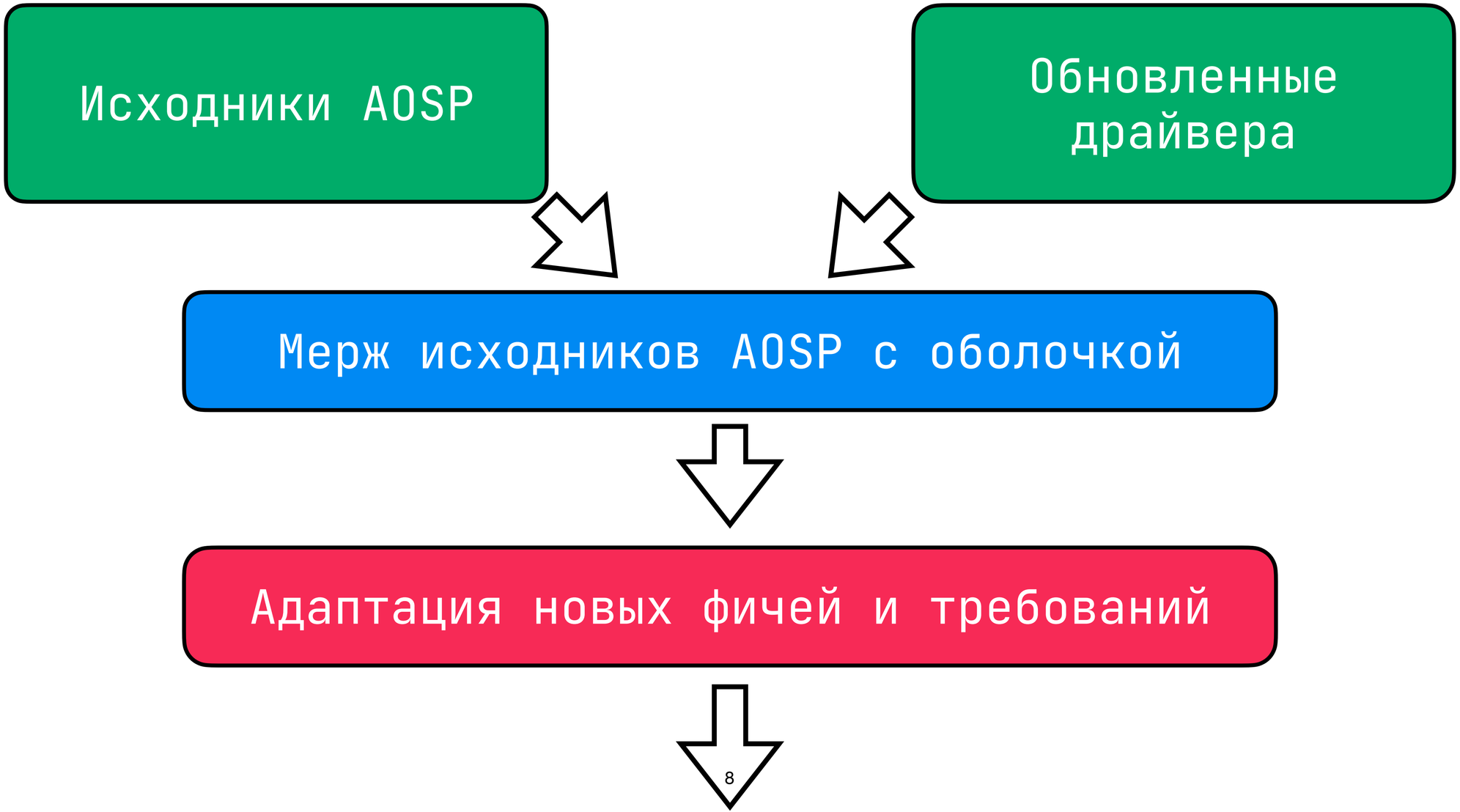
Фрагментация в Android - *ситуация когда на рынке одновременно присутствует большое количество устройств, работающих на разных версиях ОС и с разными модификациями от производителей*

Galaxy S III (GT-I930
GT-I9500
SM-G900
Nexus 5 (Nexus 5
Galaxy S III (GT-I819
XT1032
GT-S758
XT1033
Galaxy S Duos (GT
C2104
C230
SM-G7102
Moto X (XT1058)
Nokia X
GT-I9060
ST26
D550
C1905
SM-T211
Q7A+
Lenovo A369i
GT-S7580
GT-I9190
GT-S727
XT918
D6503
Z130
S5E
XT920
R821
LG-P
XT925
MS3A
W370
R83
A7S
C20
XT1031
K01
K00Z
LT30p
A12
AD6
One
SM-T310
U9200


Android Platform/API Version Distribution
ANDROID PLATFORM VERSION
API LEVEL
CUMULATIVE DISTRIBUTION
4.4 KitKat 19
5.0 Lollipop 21 99.3%
5.1 Lollipop 22 99.0%
6.0 Marshmallow 23 97.2%
7.0 Nougat 24 94.4%
7.1 Nougat 25 92.5%
8.0 Oreo 26 90.7%
8.1 Oreo 27 88.1%
9.0 Pie 28 81.2%
10. Q 29 68.0%
11. R 30 48.5%
12. S 31 24.1%
13. T 33 5.2%
Last updated: January 6th, 2023
R
New features
Chat Bubbles
Conversation improvements
Wireless debugging
Neural Networks API 1.3
Frame rate API
Behavior changes
Exposure Notifications
Conscrypt SSL engine by default
Non-SDK interface restrictions
URI access permissions requirements
Security and privacy
Scoped storage enforcement
One-time permissions
Permissions auto-reset
Background location access
Package visibility
Foreground services
Secure sharing of large datasets
https://developer.android.com/about/versions/11
Cancel
OK


SAMSUNG
9:30
5G
Coffee with Robin in 30 min
10:00 - 11:00 AM 68°F
Tue 4
68°
8:16
Tuesday, April 6
CP 31
23:55
Москва
Current
-8°
11:00 AM
12°
2:00 PM
9°
YOTAPHONE
10:08
htc

Как вендоры обновляли ОС



Фрагментация на iOS

Она есть, хоть и меньше

- 👉 Единая ОС
- 👉 Один производитель устройств
- 👉 Единый производитель ОС и устройств на ней
- 👉 Разработчик ОС целит всю разработку на последнюю версию ОС

Проверка версии Android

```
if (Build.VERSION.SDK_INT ⩾ VERSION_CODES.LOLLIPOP) {
    // КОД для Android 5.0 Lollipop и выше
} else if (Build.VERSION.SDK_INT ⩾ VERSION_CODES.ICE_CREAM_SANDWICH) {
    // КОД для Android 4.X
} else if (Build.VERSION.SDK_INT ⩾ VERSION_CODES.HONEYCOMB) {
    // КОД для Android 3.X
} else {
    // КОД для всех остальных поддерживаемых версий Android
}
```

Android Support Library

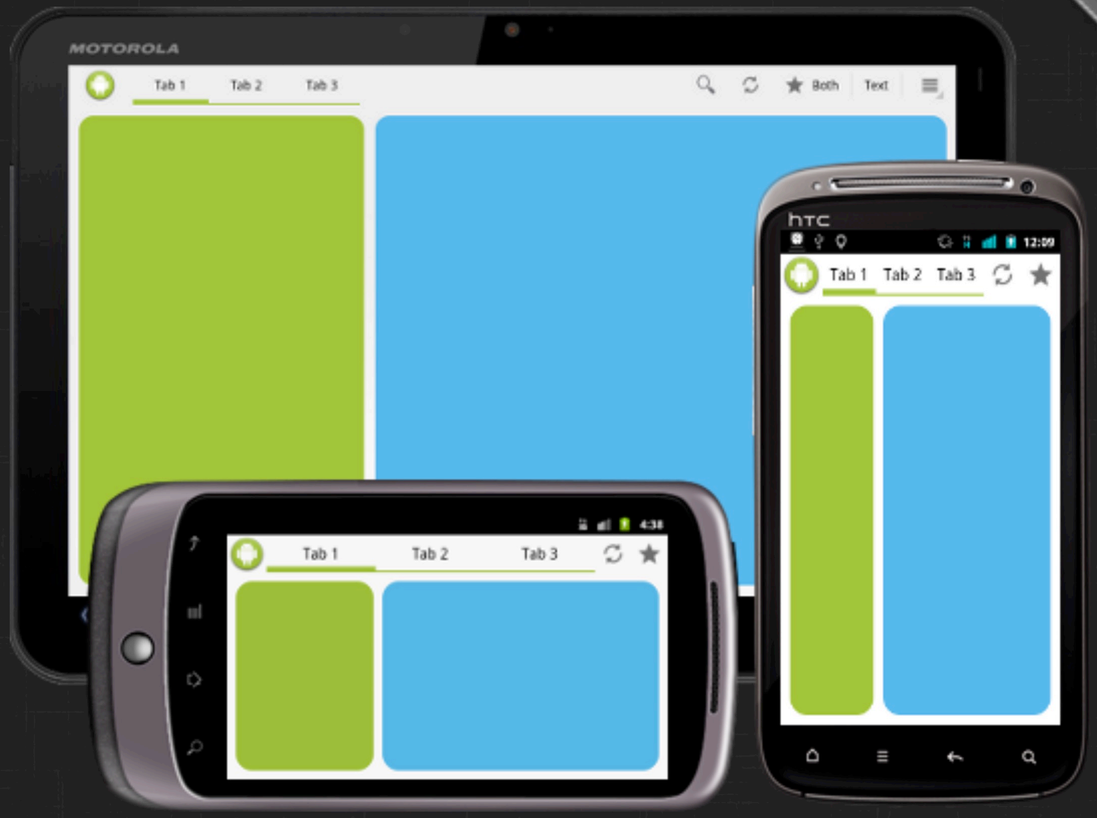
Самая простая заплатка

ActionBarSherlock

ActionBarSherlock is an extension of the support library designed to facilitate the use of the action bar design pattern across all versions of Android with a single API.

The library will automatically use the native action bar when appropriate or will automatically wrap a custom implementation around your layouts. This allows you to easily develop an application with an action bar for every version of Android from 2.x and up.

Download v4.4.0 : Zip Tarball More...



Fork me on GitHub

Usage

Interaction with the action bar is provided through a single API by calling `getSupportActionBar()`. The methods provided by this interface mirror those of the native action bar exactly.

Enabling support is as simple as extending your activities from one of the 'Sherlock' base activities and declaring a theme in your manifest file.

Theming

A single theme can be used to style the action bar to match the look and feel of your application.

If you need to customize the look for a phone or tablet, Android's powerful resource filtering can still be leveraged.

Learn More »

Samples

View screenshots and descriptions of the three sample applications which are bundled with the project as well as open source applications who chose to implement the library.

Each project links to its source so you can investigate their code for reference.

Learn More »

Resources

Frequently Asked Questions
Common pitfalls and their solutions.

Help & Support
Places to go when you need assistance with implementatio

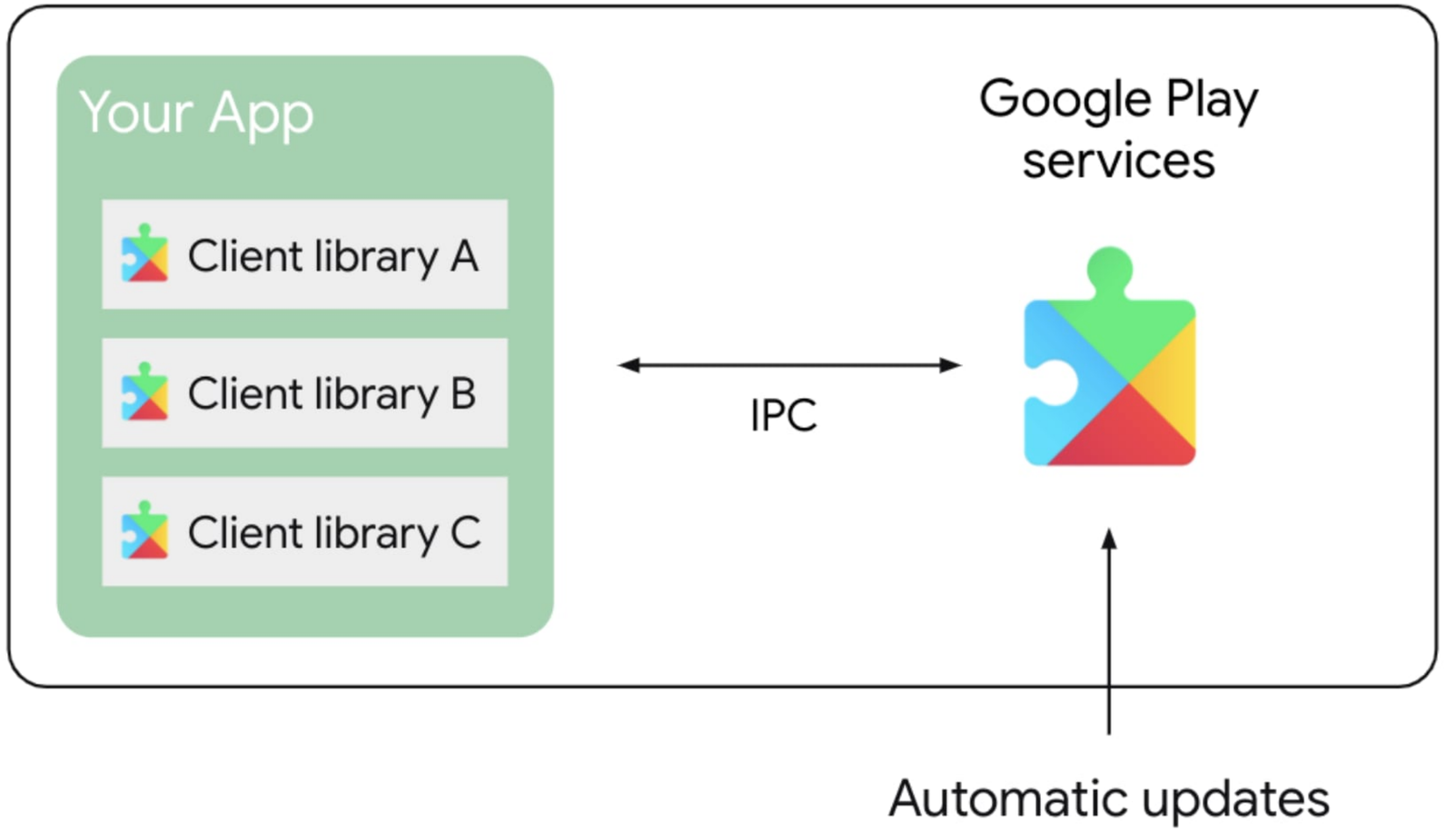
Development
Contribute to the libary.


verizon
Google
Apps
Mon
FEB 28
Dinner with Dad
Tomorrow, Mar 1
Laura's Birthday
Grocery Store
Pick Up Dry Cleaning
Pride and Prejudice
Browser
Gmail
Music
YouTube
Talk
Maps
Camera
My Apps
3:59

Android Jetpack

Jetpack is a suite of libraries to help developers follow best practices, reduce boilerplate code, and write code that works consistently across Android versions and devices so that developers can focus on the code they care about.

Get started using Jetpack Watch video

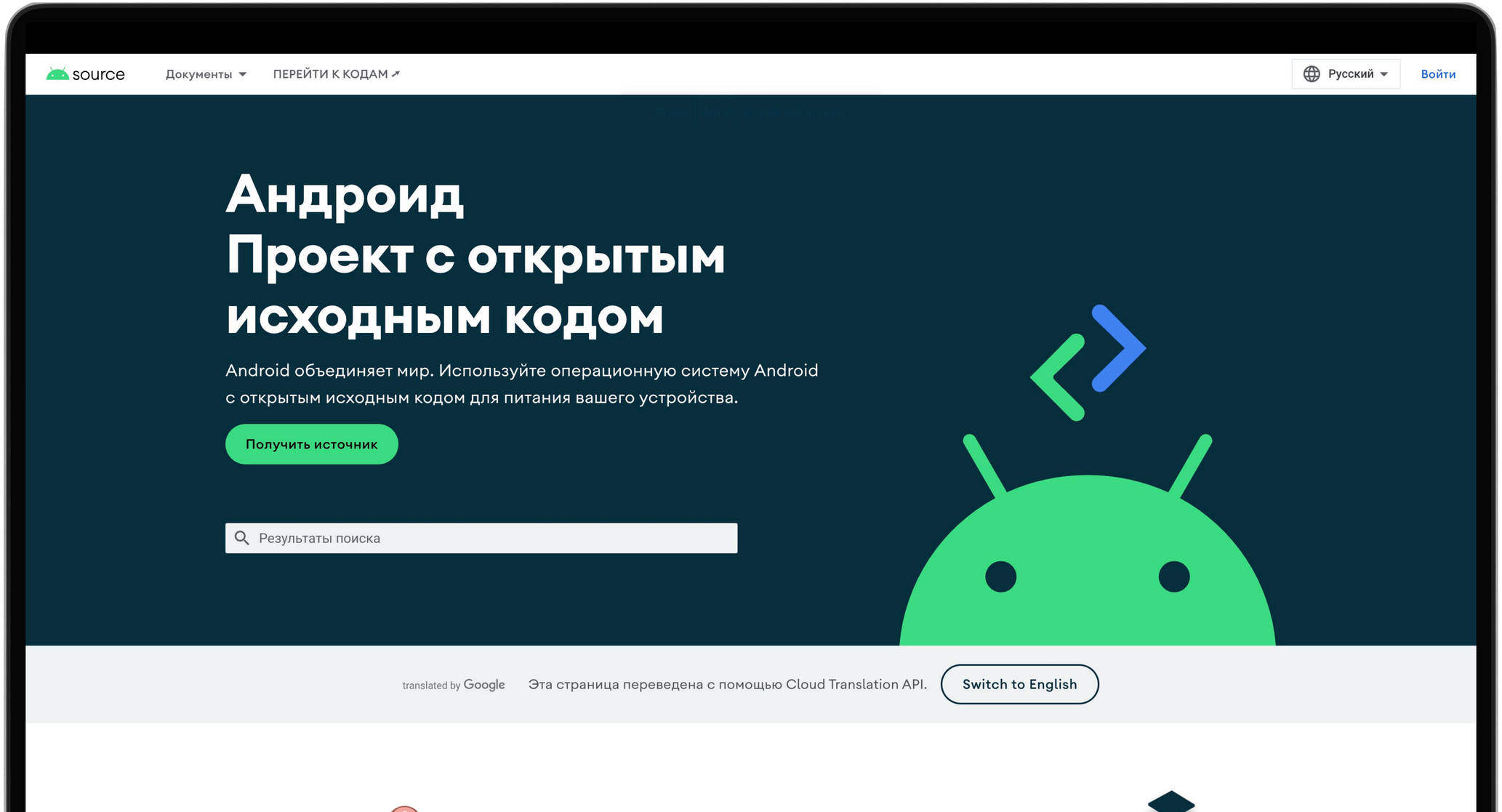

Your App
Client library A
Client library B
Client library C
IPC
Google Play services
Automatic updates

Особенности Google Play Services

- 👉 Есть на любом устройстве с Google Play
- 👉 Регулярно обновляются
- 👉 Имеют самые широкие права на устройстве
- 👉 Все руководства Android разработки содержат отсылки

AOSP

Android Open Source Project



AOSP

Android Open Source Project

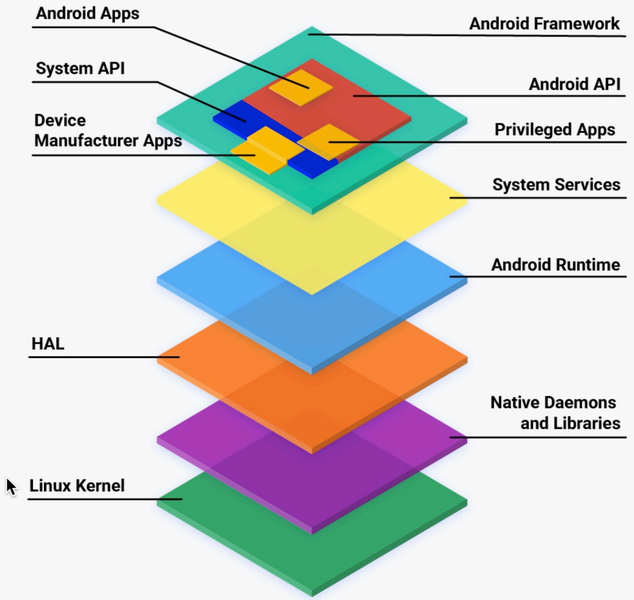
source Документы ПЕРЕЙТИ К КОДАМ Результаты поиска Русский Войти

О проекте Android с открытым исходным кодом

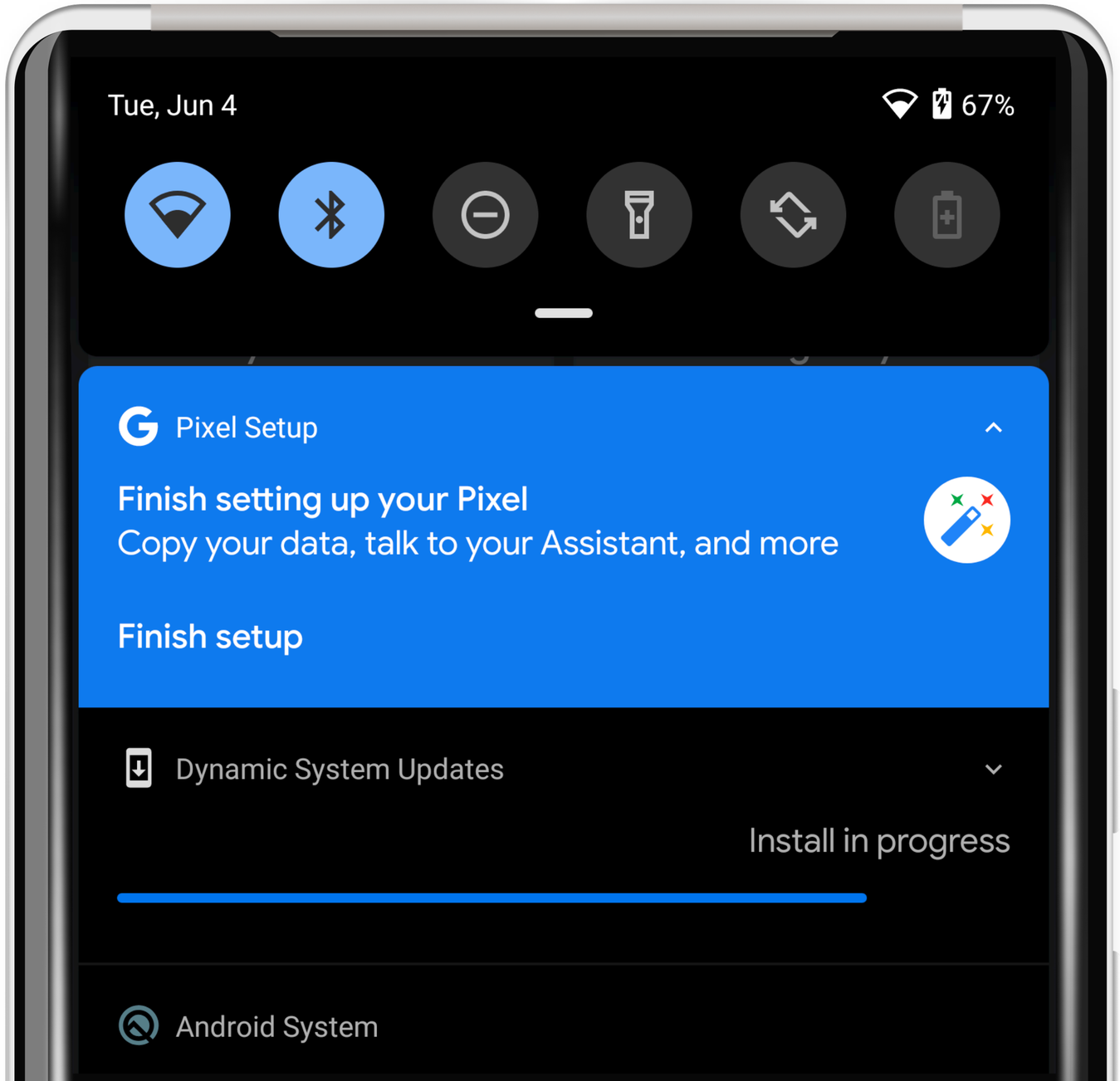
Android — это операционная система с открытым исходным кодом для мобильных устройств и соответствующий проект с открытым исходным кодом, возглавляемый Google. Этот сайт и репозиторий Android Open Source Project (AOSP) предлагают информацию и исходный код, необходимые для создания пользовательских вариантов ОС Android, переноса устройств и аксессуаров на платформу Android, а также обеспечения соответствия устройств требованиям совместимости, поддерживающим экосистему Android. здоровая и стабильная среда для миллионов пользователей.

Как проект с открытым исходным кодом, цель Android состоит в том, чтобы избежать любой центральной точки отказа, в которой один игрок отрасли может ограничивать или контролировать инновации любого другого игрока. С этой целью Android представляет собой полнофункциональную операционную систему производственного качества для потребительских товаров с настраиваемым исходным кодом, который можно портировать практически на любое устройство, и общедоступной документацией, доступной для всех (на английском языке на сайте source.android.com и на Упрощенный китайский на source.android.google.cn).

Так же, как вы можете вносить свой вклад в код AOSP , вы также можете вносить свой вклад в документацию AOSP — и нам нужен ваш вклад! Гибкость Android и постоянно меняющаяся кодовая база означают, что этому сайту нужны ваши отзывы, чтобы контент оставался свежим, точным и актуальным для разработчиков Android. Мы рекомендуем вам проверить журнал изменений

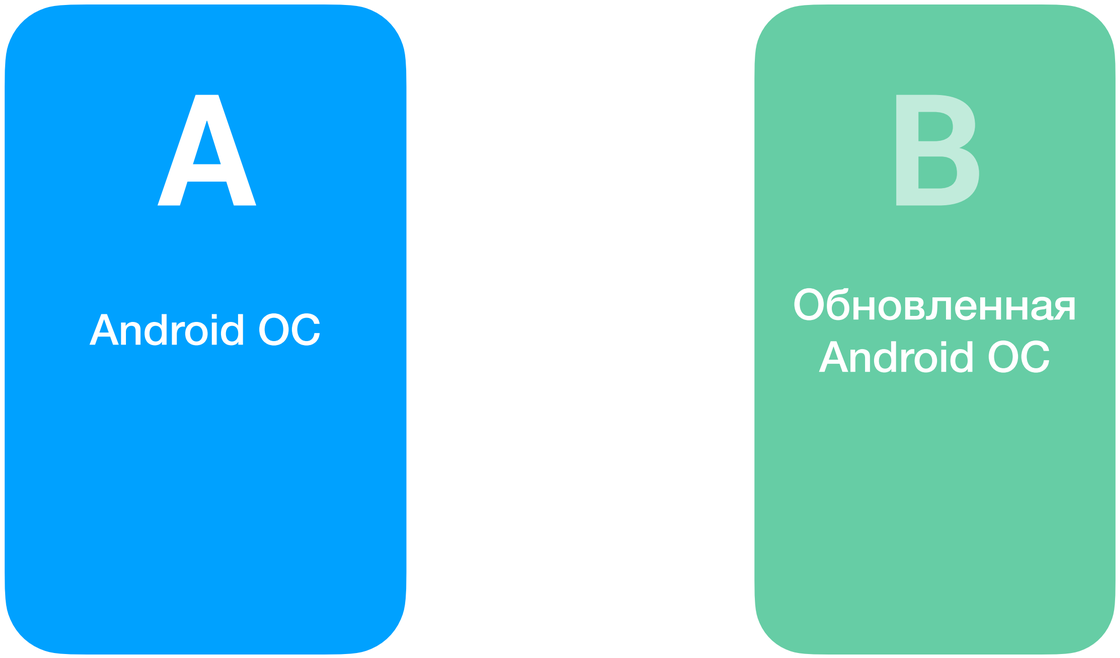



Systemupdate wird installiert
71%


Tue, Jun 4
67%
Pixel Setup
Finish setting up your Pixel
Copy your data, talk to your Assistant, and more
Finish setup
Dynamic System Updates
Install in progress
Android System

A/B обновления

A/B обновления

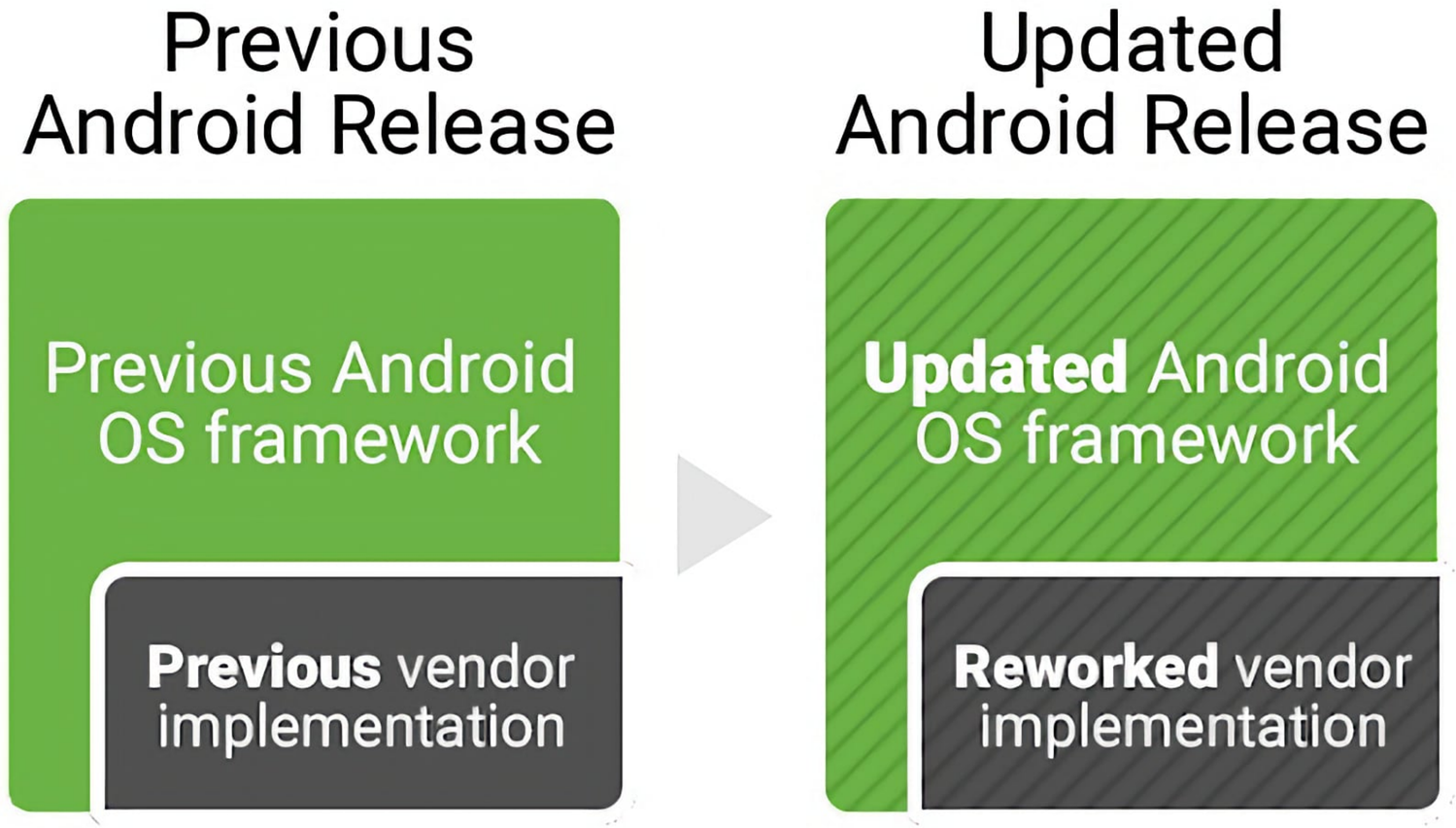


A/B обновления

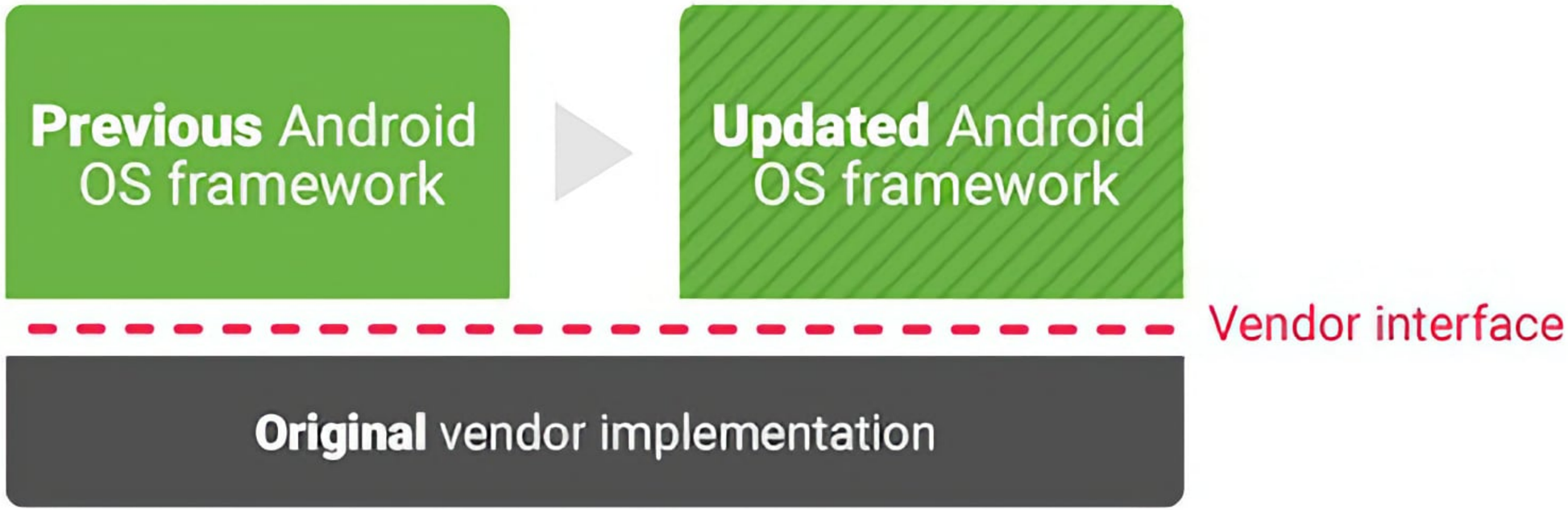
Direct Boot


7:00
TUESDAY, 16 AUGUST
Unlock for all features and data
Unlock for all features and data

Обновления без Treble

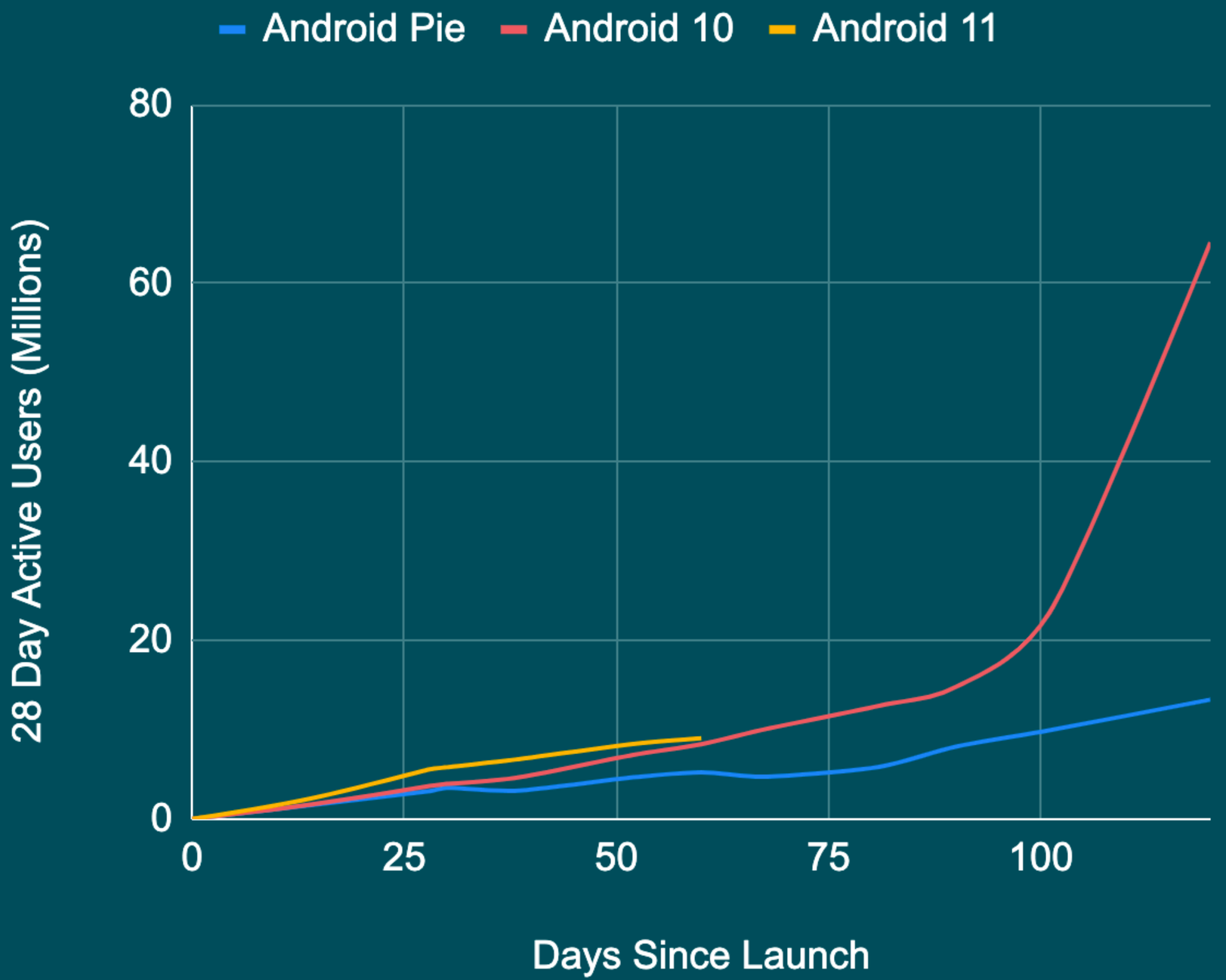


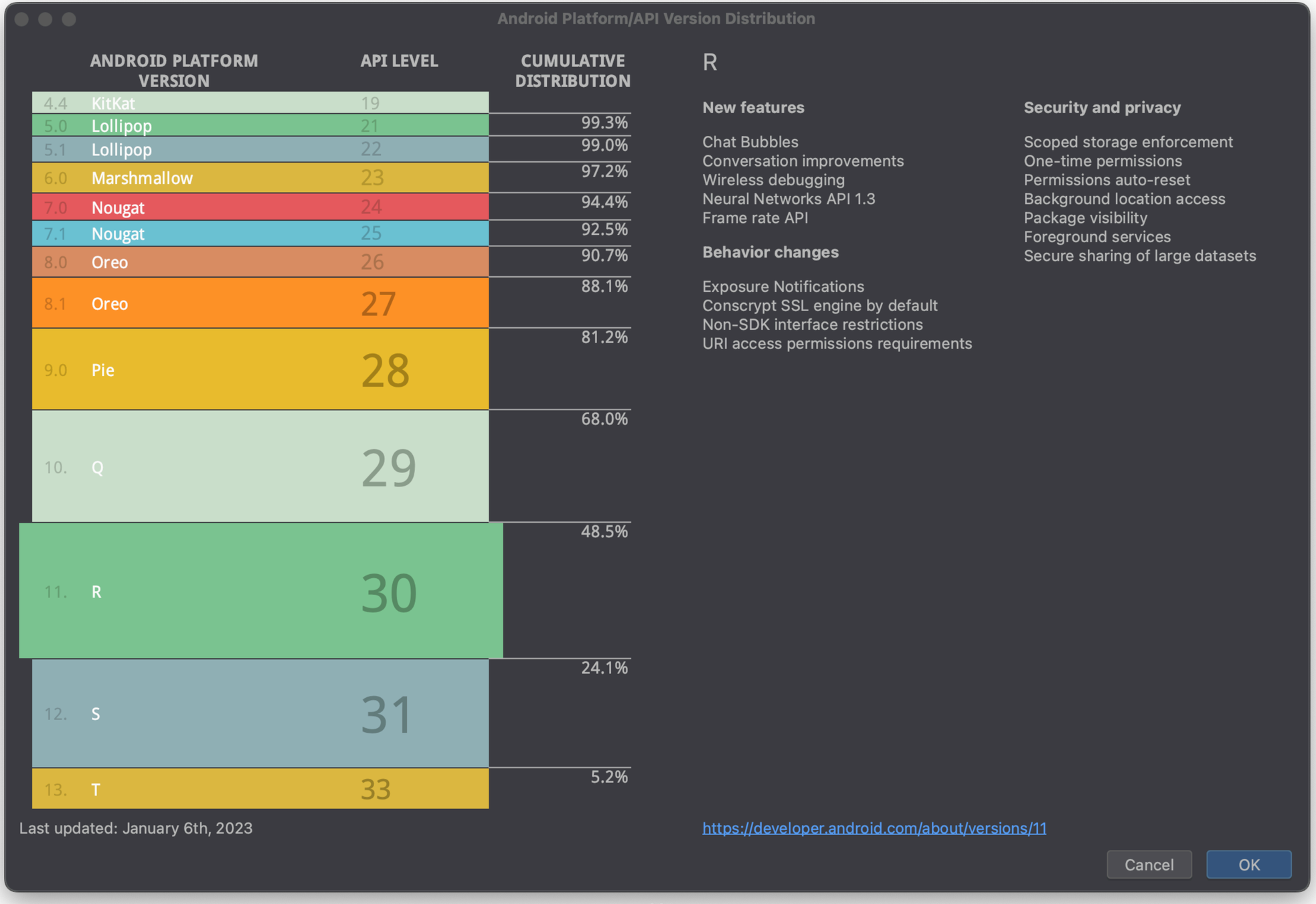
Обновления с Treble



Что дал Treble

- 👉 Независимость низкоуровненого софта (драйверов) от Android фреймворка
- 👉 Упрощение обновления ОС для производителей
- 👉 Generic System Images (GSI)
  Чистый образ Android, который можно поставить на любое устройство с поддержкой Treble
- 👉 Поддержка для всех Android устройств
  Требование является обязательным для всех устройств, которые выходят с Android 8.0 и новее


Android Pie
Android 10
Android 11
80
60
40
20
0
28 Day Active Users (Millions)
0
25
50
75
100
Days Since Launch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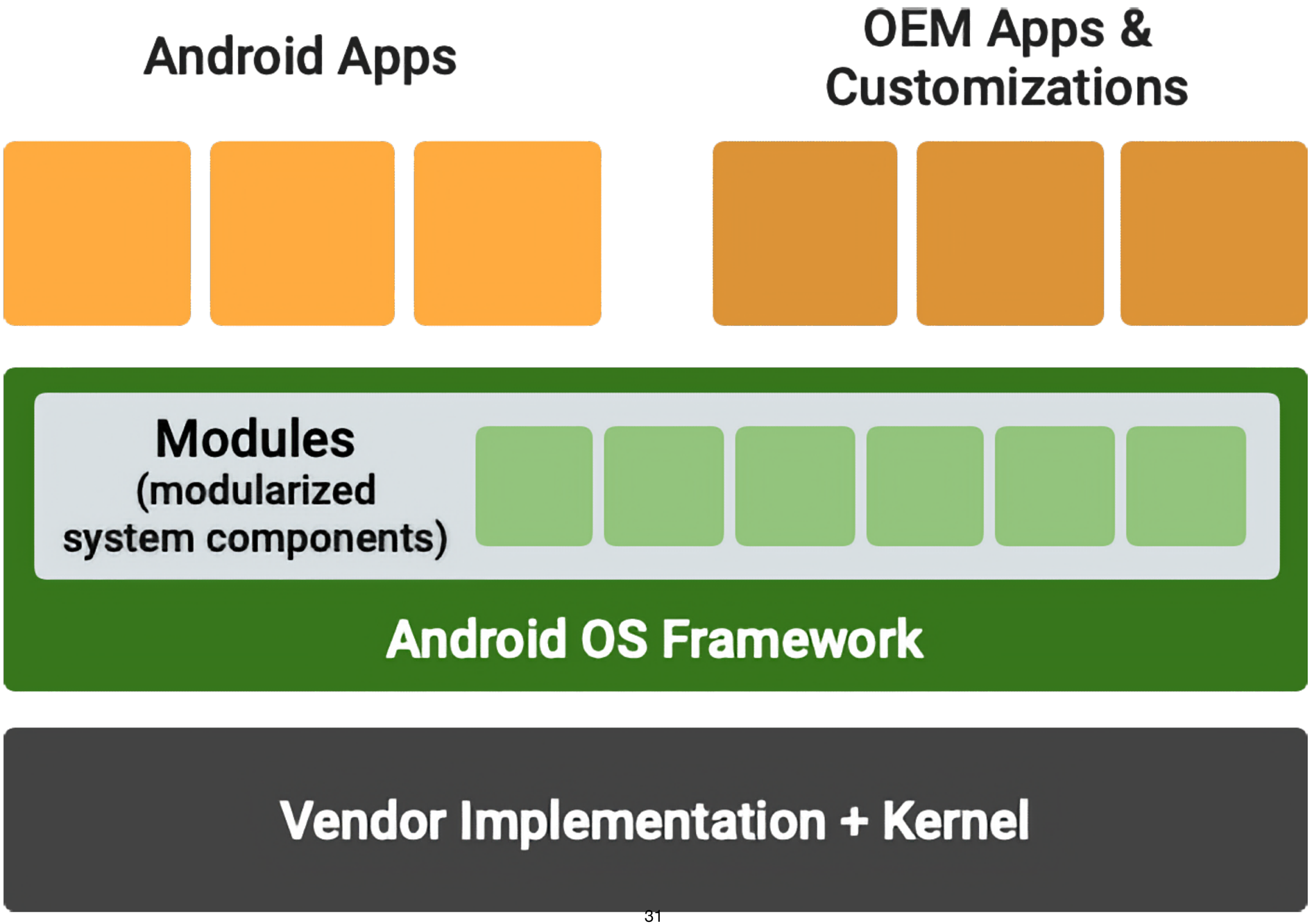
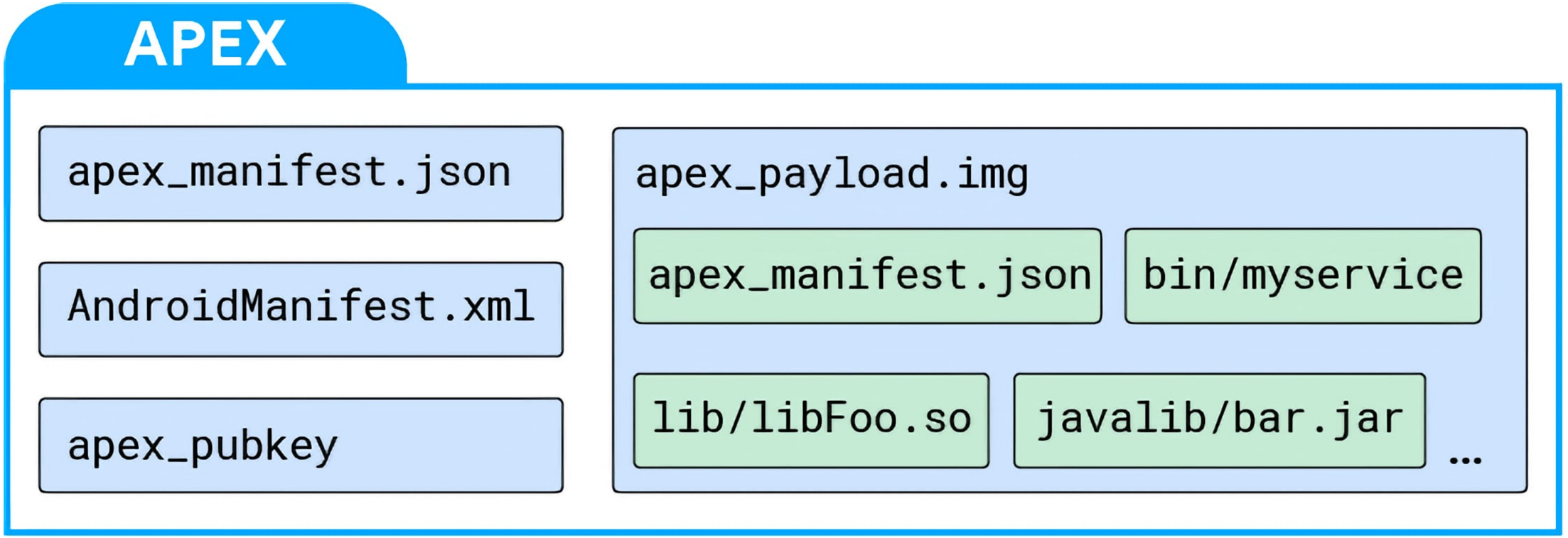
8.1 Oreo 27 88.1%
9.0 Pie 28 81.2%
10. Q 29 68.0%
11. R 30 48.5%
12. S 31 24.1%
13. T 33 5.2%
Last updated: January 6th, 2023
R
New features
Chat Bubbles
Conversation improvements
Wireless debugging
Neural Networks API 1.3
Frame rate API
Behavior changes
Exposure Notifications
Conscrypt SSL engine by default
Non-SDK interface restrictions
URI access permissions requirements
Security and privacy
Scoped storage enforcement
One-time permissions
Permissions auto-reset
Background location access
Package visibility
Foreground services
Secure sharing of large datasets
https://developer.android.com/about/versions/11
Cancel
OK


Android Apps
OEM Apps &
Customizations
Modules
(modularized
system components)
Android OS Framework
Vendor Implementation + Kernel

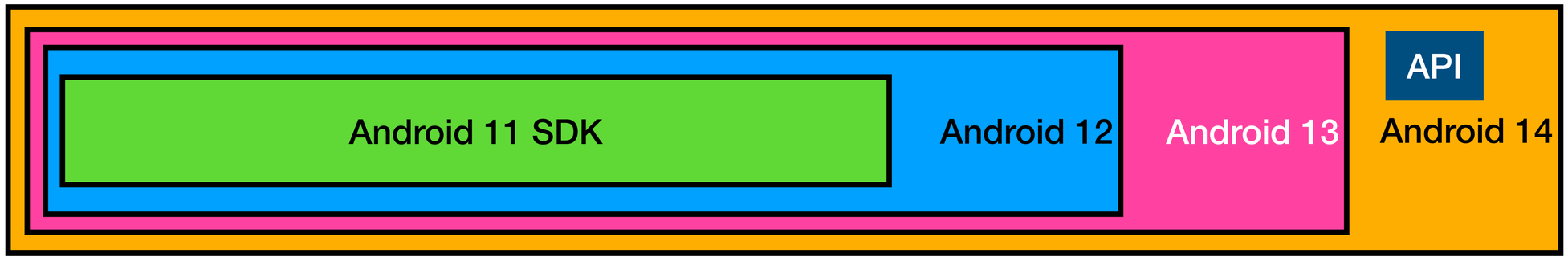
Android Mainline Modules

B Android 13

- 👉 Conscrypt
- 👉 DNS Resolver
- 👉 Documents UI
- 👉 ExtServices
- 👉 Media
- 👉 ModuleMetadata
- 👉 Network Stack
- 👉 Permission Controller
- 👉 Time Zone Data
- 👉 adbd
- 👉 CellBroadcast
- 👉 IPSce/IKEv2
- 👉 MediaProvider
- 👉 NN API Runtime
- 👉 SDK Extensions
- 👉 Statsd
- 👉 Tethering
- 👉 Wi-Fi
- 👉 ART
- 👉 Device Scheduling
- 👉 AdServices
- 👉 AppSearch
- 👉 Bluetooth
- 👉 On Device Personalization Runtime
- 👉 UWB

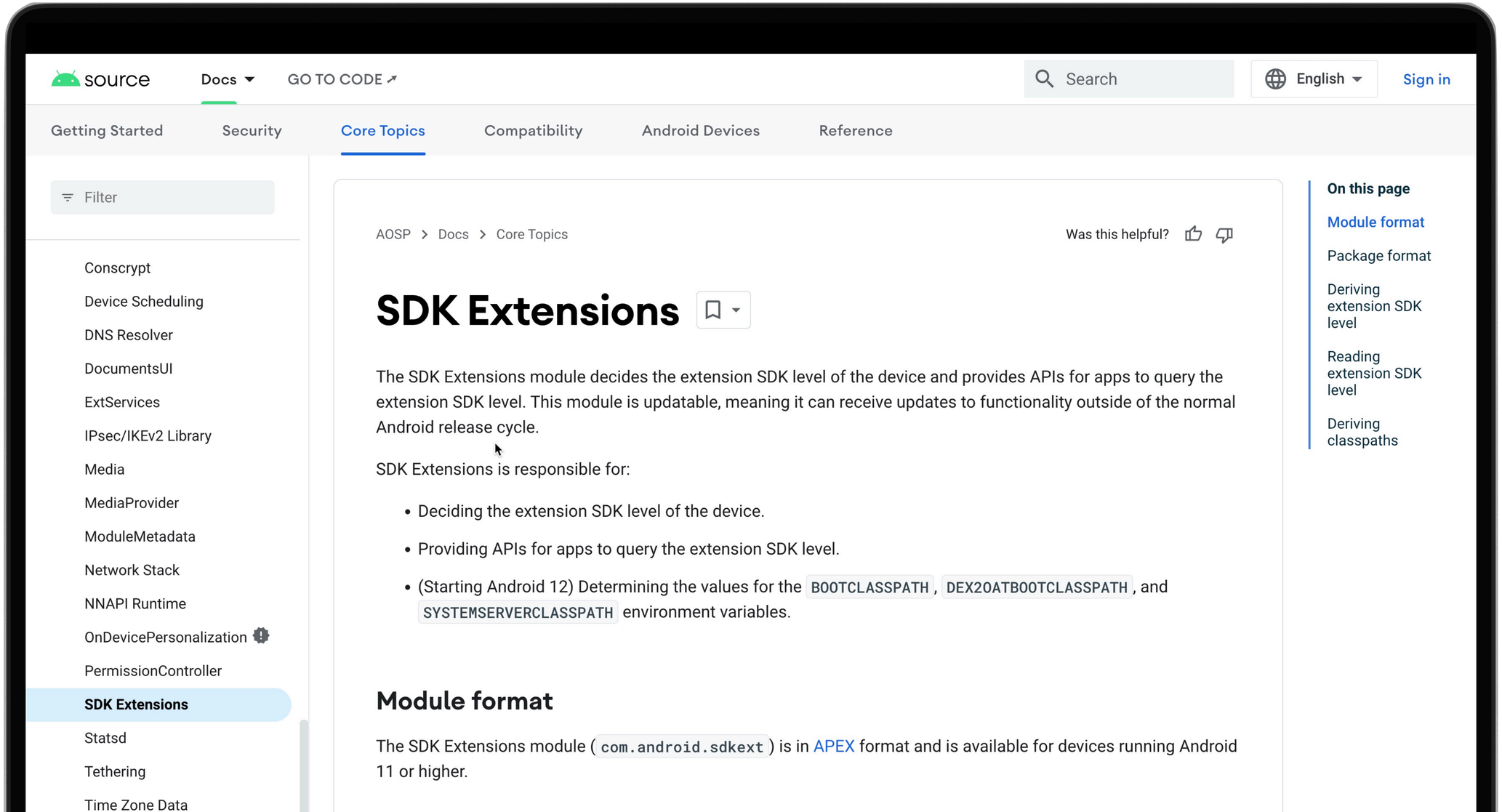

APEX
apex_manifest.json
AndroidManifest.xml
apex_pubkey
apex_payload.img
apex_manifest.json
bin/myservice
lib/libFoo.so
javalib/bar.jar
...

Структура Android SDK



SDK Extensions Mainline Module

Android 11



ACTION_PICK_IMAGES

Added in API level 33

Also in R Extensions 2

```
public static final String ACTION_PICK_IMAGES
```

Activity Action: Allow the user to select images or videos provided by system and return it. This is different than `Intent#ACTION_PICK` and `Intent#ACTION_GET_CONTENT` in that

- the data for this action is provided by the system
- this action is only used for picking images and videos
- caller gets read access to user picked items even without storage permissions

Callers can optionally specify MIME type (such as `image/*` or `video/*`), resulting in a range of content selection that the caller is interested in. The optional MIME type can be requested with `Intent#setType(String)`.

If the caller needs multiple returned items (or caller wants to allow multiple selection), then it can specify `MediaStore#EXTRA_PICK_IMAGES_MAX` to indicate this.

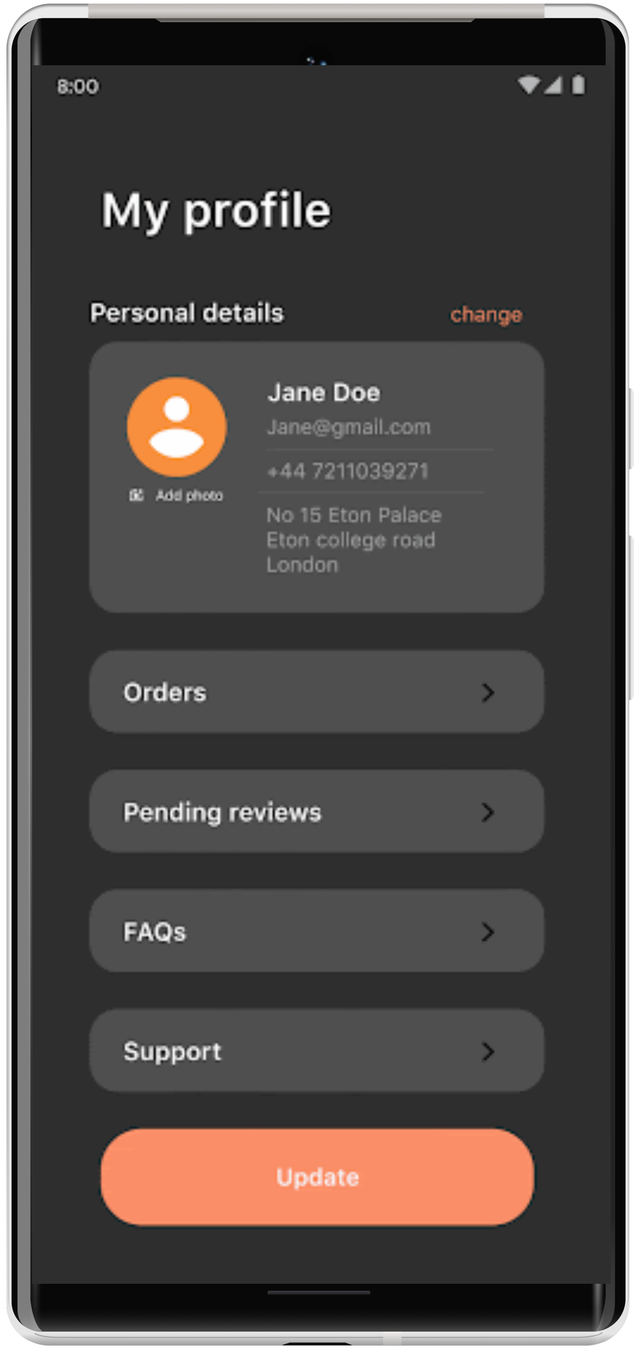
When the caller requests multiple selection, the value of `MediaStore#EXTRA_PICK_IMAGES_MAX` must be a positive integer greater than 1 and less than or equal to `MediaStore#getPickImagesMaxLimit`, otherwise `Activity#RESULT_CANCELED` is returned.

Output: MediaStore content URI(s) of the item(s) that was picked. Unlike other MediaStore URIs, these are referred to as 'picker' URIs and expose a limited set of read-only operations. Specifically, picker URIs can only be opened for read and queried for columns in `PickerMediaColumns`.

Запуск Photo Picker

Android 13+

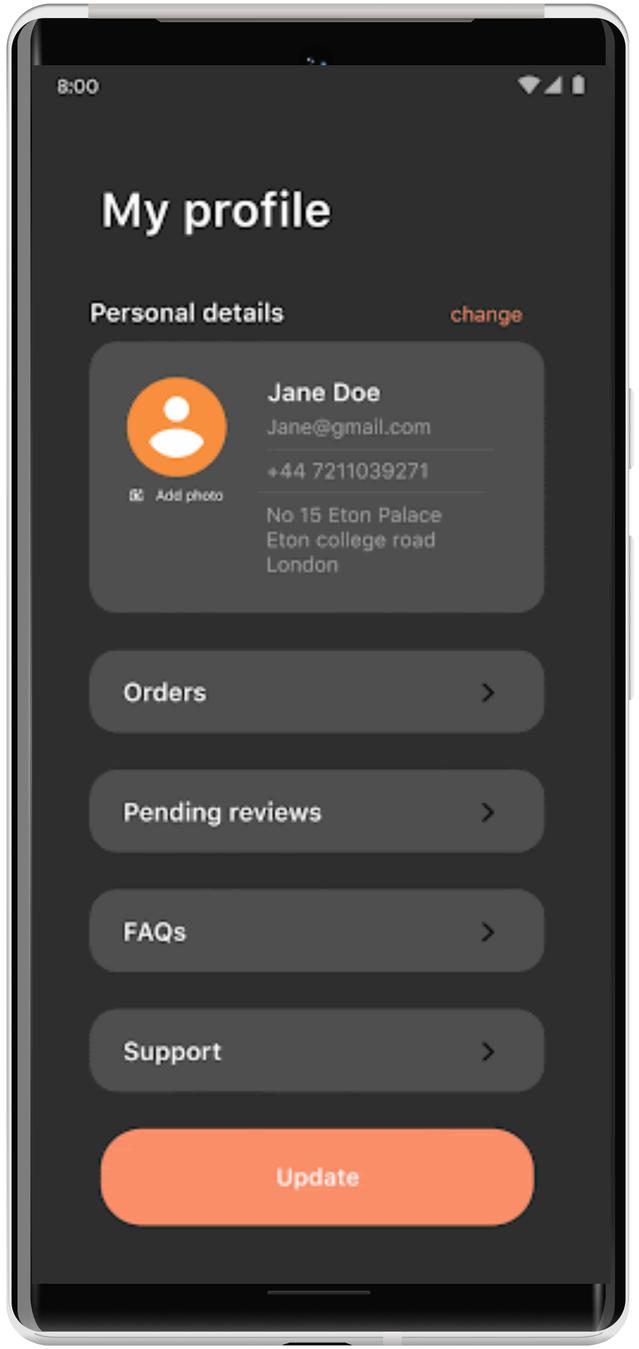
```
if (VERSION.SDK_INT ⩾ VERSION_CODES.TIRAMISU) {
    context.startActivity(
        Intent(MediaStore.ACTION_PICK_IMAGES)
    )
}
```



Запуск Photo Picker

Android 11+

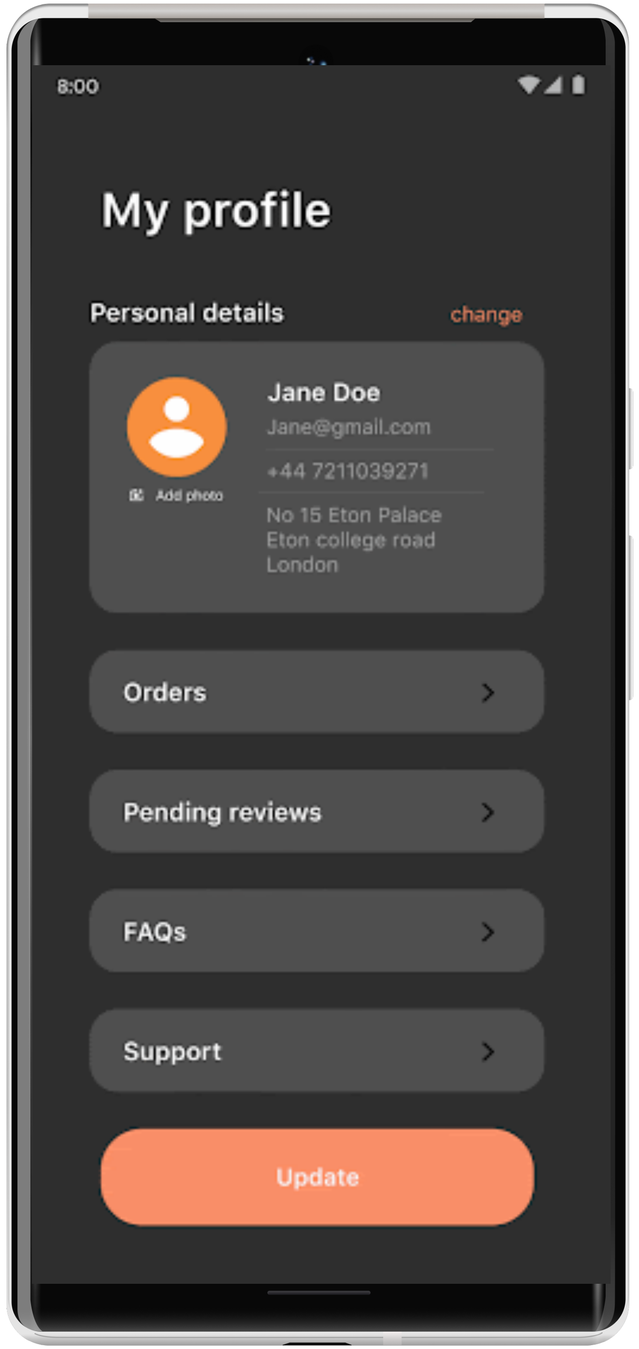
```
if (getExtensionVersion(VERSION_CODES.R) ⩾ 2) {
    context.startActivity(
        Intent(MediaStore.ACTION_PICK_IMAGES)
    )
}
```

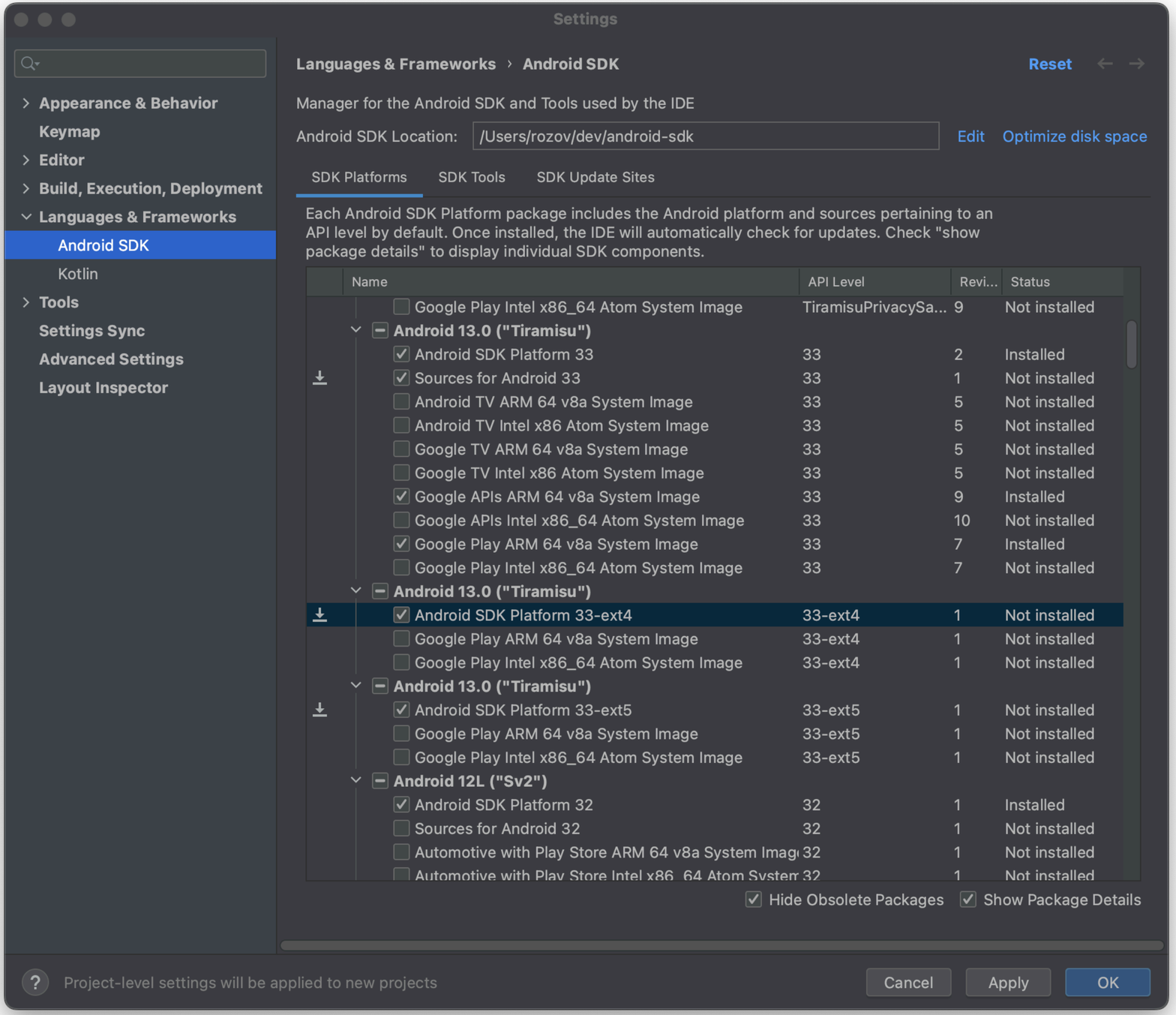


Запуск Photo Picker

Android 11+

```
if (BuildCompat.R_EXTENSION_INT ⩾ 2) {
    context.startActivity(
        Intent(MediaStore.ACTION_PICK_IMAGES)
    )
}
```




Settings
Appearance & Behavior
Keymap
Editor
Build, Execution, Deployment
Languages & Frameworks
Android SDK
Kotlin
Tools
Settings Sync
Advanced Settings
Layout Inspector
Languages & Frameworks › Android SDK
Reset
Manager for the Android SDK and Tools used by the IDE
Android SDK Location: /Users/rozov/dev/android-sdk
Edit
Optimize disk space
SDK Platforms
SDK Tools
SDK Update Sites
Each Android SDK Platform package includes the Android platform and sources pertaining to an API level by default. Once installed, the IDE will automatically check for updates. Check "show package details" to display individual SDK components.
Name
API Level
Revi...
Status
Google Play Intel x86_64 Atom System Image TiramisuPrivacySa... 9 Not installed
Android 13.0 ("Tiramisu")
Android SDK Platform 33 33 2 Installed
Sources for Android 33 33 1 Not installed
Android TV ARM 64 v8a System Image 33 5 Not installed
Android TV Intel x86 Atom System Image 33 5 Not installed
Google TV ARM 64 v8a System Image 33 5 Not installed
Google TV Intel x86 Atom System Image 33 5 Not installed
Google APIs ARM 64 v8a System Image 33 9 Installed
Google APIs Intel x86_64 Atom System Image 33 10 Not installed
Google Play ARM 64 v8a System Image 33 7 Installed
Google Play Intel x86_64 Atom System Image 33 7 Not installed
Android 13.0 ("Tiramisu")
Android SDK Platform 33-ext4 33-ext4 1 Not installed
Google Play ARM 64 v8a System Image 33-ext4 1 Not installed
Google Play Intel x86_64 Atom System Image 33-ext4 1 Not installed
Android 13.0 ("Tiramisu")
Android SDK Platform 33-ext5 33-ext5 1 Not installed
Google Play ARM 64 v8a System Image 33-ext5 1 Not installed
Google Play Intel x86_64 Atom System Image 33-ext5 1 Not installed
Android 12L ("Sv2")
Android SDK Platform 32 32 1 Installed
Sources for Android 32 32 1 Not installed
Automotive with Play Store ARM 64 v8a System Imag 32 1 Not installed
Automotive with Play Store Intel x86_64 Atom Syster 32 1 Not installed
Hide Obsolete Packages
Show Package Details
Project-level settings will be applied to new projects
Cancel
Apply
OK

Подлючение SDK Extensions

```
// build.gradle.kts
android {
    compileSdk = 33
    compileSdkExtension = 5
}
```

Проверка версий

```
val allExtensionVersions: Map<Int, Int> =
      SdkExtensions.getAllExtensionVersions()
```

```
// Реальное устройство Android 13
R_EXTENSION_INT = 5,
S_EXTENSION_INT = 5,
T_EXTENSION_INT = 5,
AD_SERVICES_EXTENSION_INT = 5,
```

```
// Эмулятор Android 12
R_EXTENSION_INT = 1,
S_EXTENSION_INT = 1,
```


android
14

Зачем нужны новые версии Android

- 👉 Улучшения фреймворка ОС
- 👉 Выделение новых Mainline модулей
- 👉 Поддержка новых стандартов
- 👉 Низкоуровневые изменения
- 👉 Новые API вне Mainline модулей
- 👉 Больше контроля для Google

Что ждет разработчика

- 👉 Android SDK как фундамент
- 👉 Android Jetpack - наше всё
- 👉 Меньше Compat API
- 👉 Независимость функционала от ОС