
CIT 4404 Mobile App Development

Topic1: Introduction to Android Platform

Dr. Fullgence Mwakondo

Institute of Computing and Informatics

Technical University of Mombasa

mwakondo@tum.ac.ke

Introduction to Android Technology

- Meaning of Android
- Android Versions
- Android Architecture
- Android Devices
- Android Studio Installation

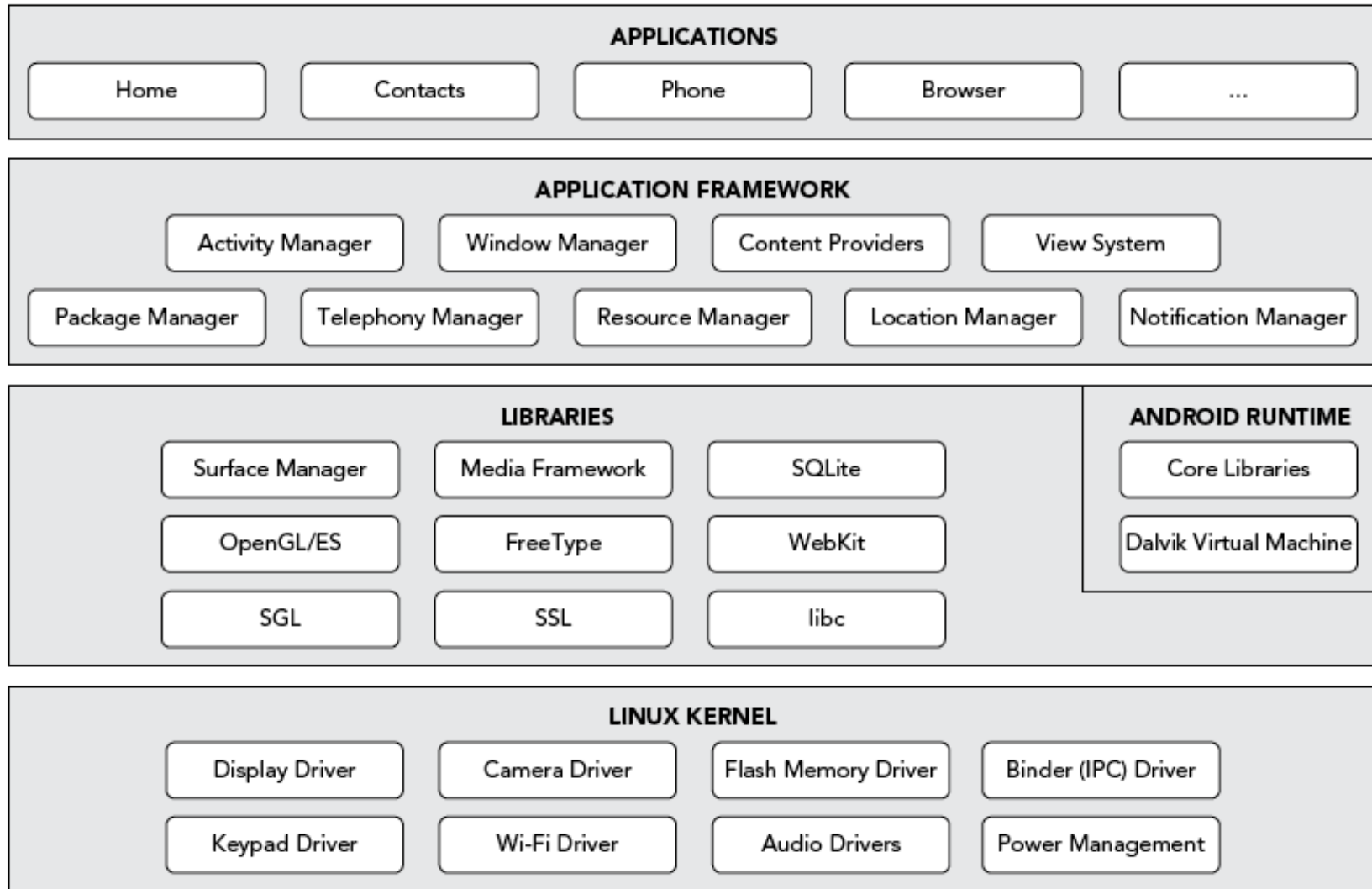
What is Android?

- Open software platform for mobile development
- Originally developed by a startup company named “Android”
- 2005 Google purchased the startup
- Powered by Linux operating system and Java technology
- Most of Android code is open source under the Apache 2 license i.e. an open Handset Alliance (OHA) project
- A complete stack – OS, Middleware, Applications
- Comes in many versions

Android Versions

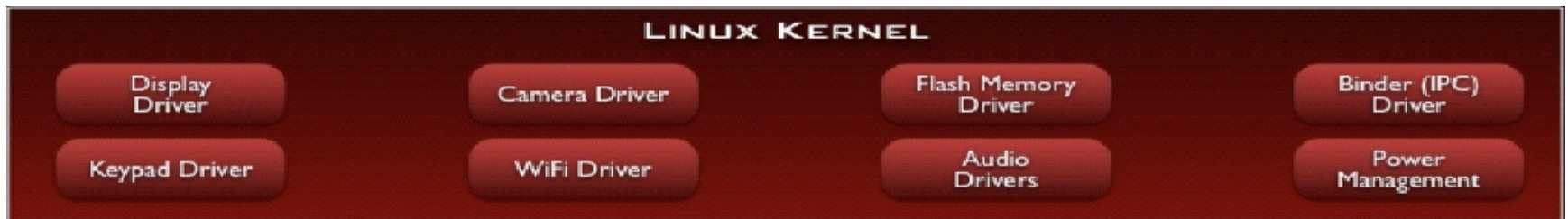
- 1.1: Feb 9, 2009; 1.5: April 30, 2009, Cupcake
- 1.6: Sep 15, 2009, Donut; 2.0/2.1: Oct 26, 2009, Eclair
- 2.2: May 20, 2010, Froyo; 2.3: Dec 6, 2010, Gingerbread
- 3.0/3.1/3.2: Feb 22, 2011, Honeycomb
- 4.0: Oct 8, 2011, Ice Cream Sandwich
- 4.1: July 9, 2012, Jelly Bean
- 4.4: Oct 31, 2013, KitKat
- 5.0: Nov 12, 2014, Lollipop
- 6.0: Oct 5, 2015, Marshmallow
- 7.0: Aug 22, 2016, Nougat
- 8.0: Aug 21, 2017, Oreo

Android Architecture



Linux Kernel

- Works as a HAL
- Device drivers
- Memory management
- Process management
- Networking



Libraries

- C/C++ libraries
- Interface through Java
- Surface manager – Handling UI Windows
- 2D and 3D graphics
- Media codecs, SQLite, Browser engine



Android Runtime

- Dalvik VM
 - Dex files
 - Compact and efficient than class files
 - Limited memory and battery power
- Core Libraries
 - Java 5 Std edition
 - Collections, I/O etc...



Application Framework



- API interface
- Activity manager – manages application life cycle.

Applications



- Built in and user apps
- Can replace built in apps

Android Devices in the Market

- SmartPhones
- Tablets
- Smartwatches
- Internet TVs
- Automobile
- E-Reader Devices

Android Development Tools & Installation

- Android Studio:
<http://developer.android.com/sdk/index.html>
 - Android SDK
- Java SE Development Toolkit 8:
www.oracle.com/technetwork/java/javase/downloads/jdk8-downloads-2133151.html
- As of 2021, the Android SDK and Java Development Kit (JDK) are a part of Android Studio
- As a result, once a developer downloads Android Studio, it can function in the background, and they don't have to take the pain to download two separate applications



Android Studio

The Official IDE for Android

Android Studio provides the fastest tools for building apps on every type of Android device.

World-class code editing, debugging, performance tooling, a flexible build system, and an instant build/deploy system all allow you to focus on building unique and high quality apps.

DOWNLOAD ANDROID STUDIO 2.0
FOR WINDOWS (1166 MB)

[Read the docs](#) [See the release notes](#)



[Features](#) [Latest](#) [Resources](#) [Videos](#) [Download Options](#)



Download the Android SDK Tools

Before downloading, you must agree to the following terms and conditions.

Terms and Conditions

This is the Android Software Development Kit License Agreement

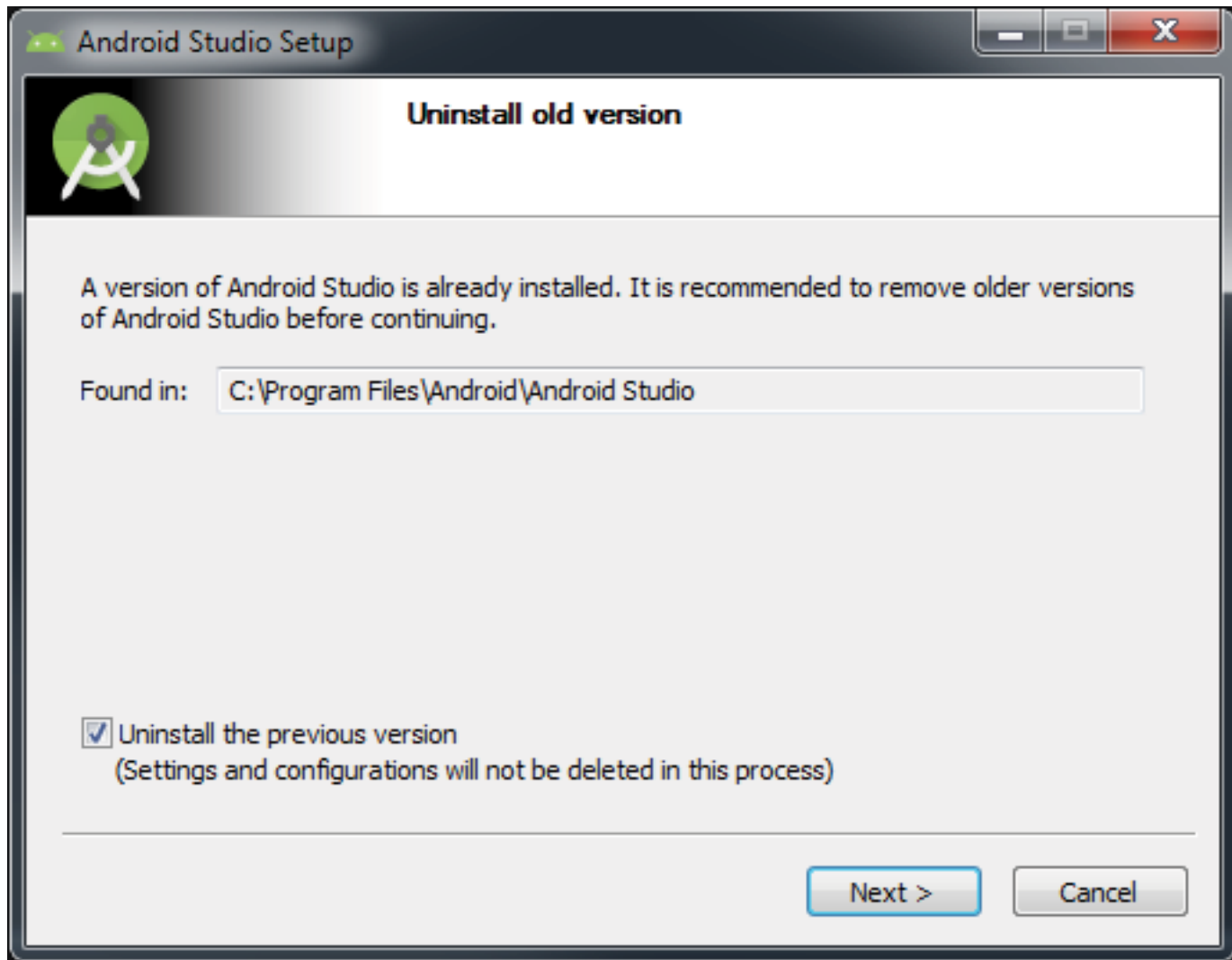
1. Introduction

1.1 The Android Software Development Kit (referred to in the License Agreement as the "SDK" and specifically including the Android system files, packaged APIs, and Google APIs add-ons) is licensed to you subject to the terms of the License Agreement. The License Agreement forms a legally binding contract between you and Google in relation to your use of the SDK.

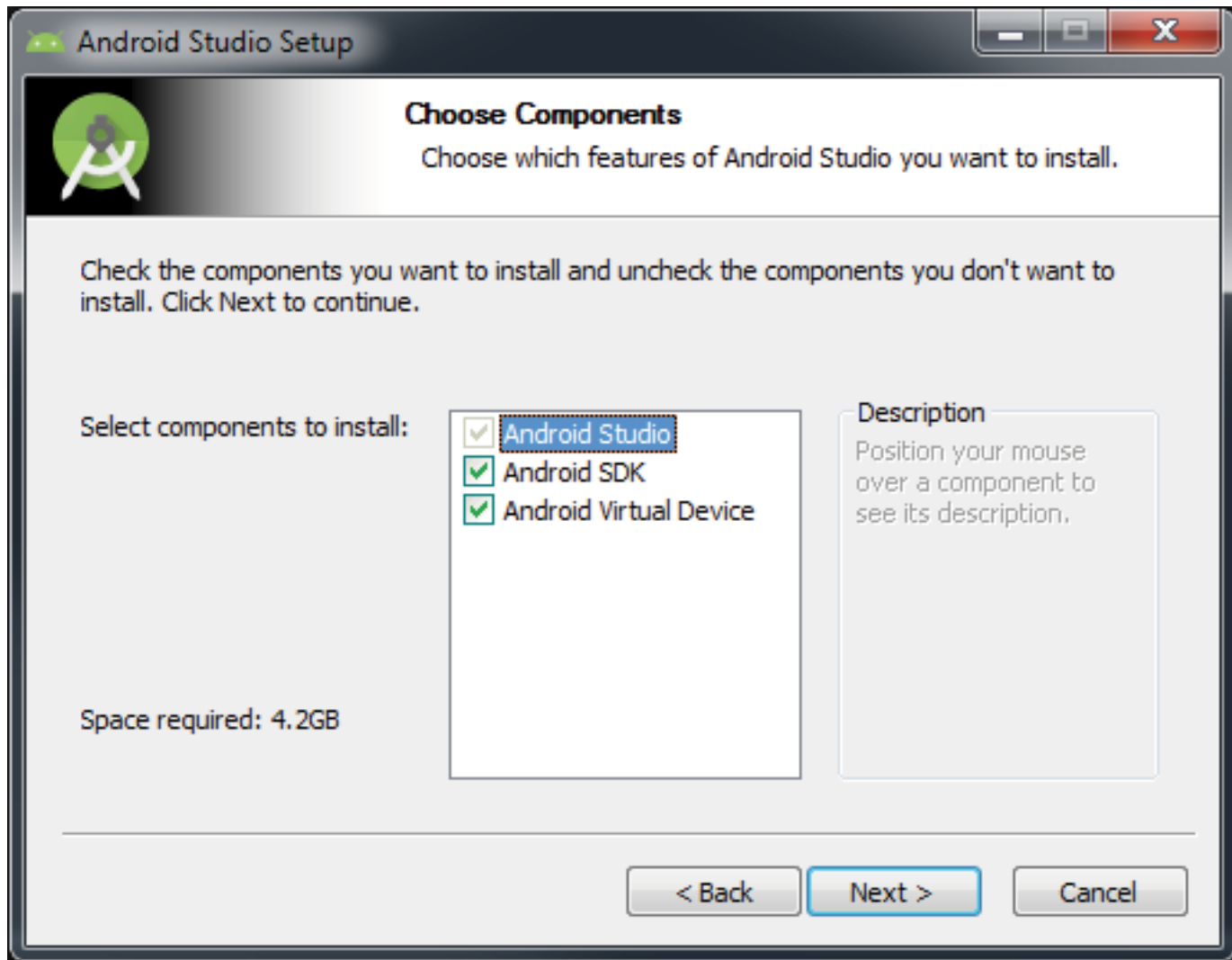
1.2 "Android" means the Android software stack for devices, as made available under the Android Open Source Project, which is located at the following URL: <http://source.android.com/>, as updated from time to time.

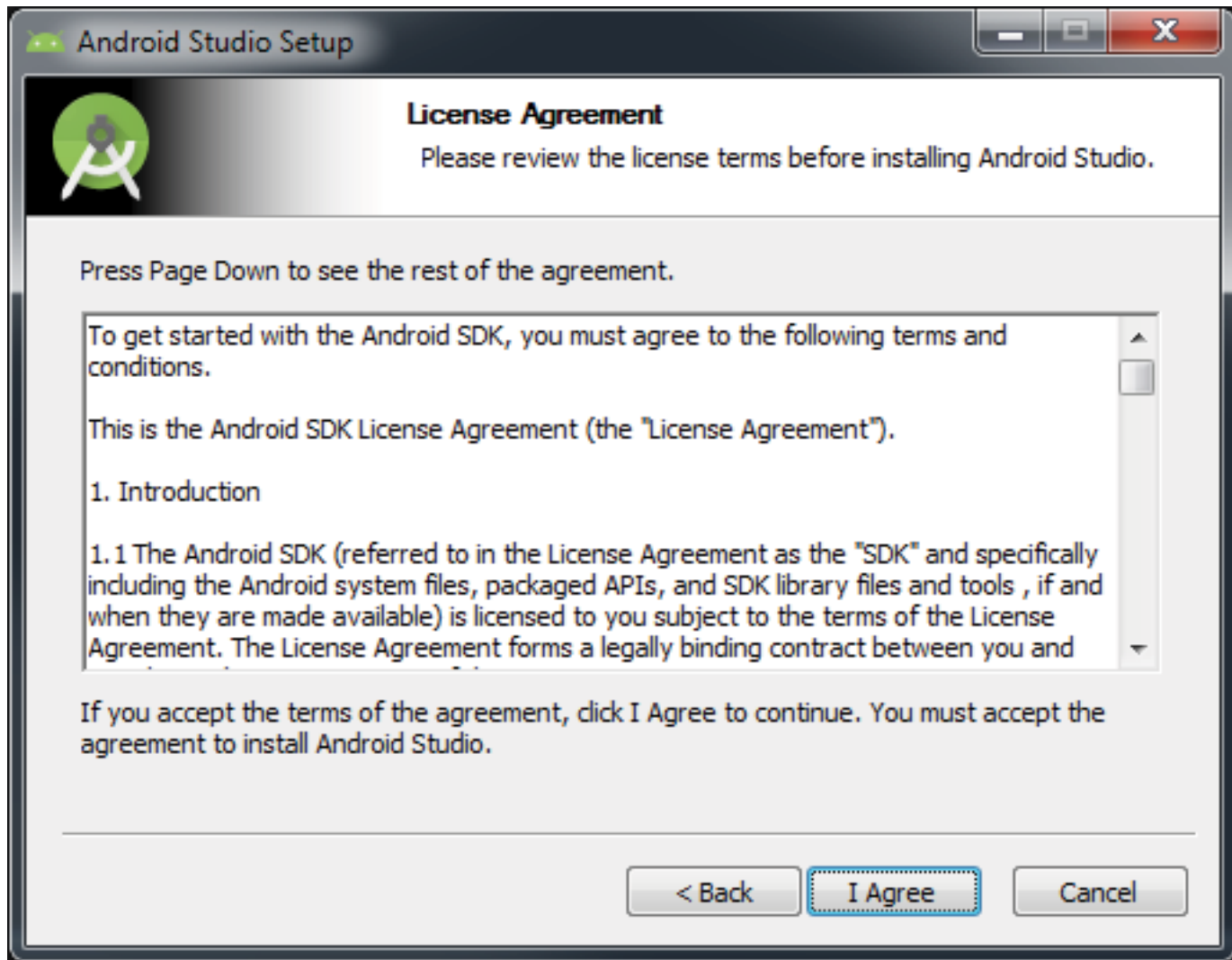
☐ I have read and agree with the above terms and conditions

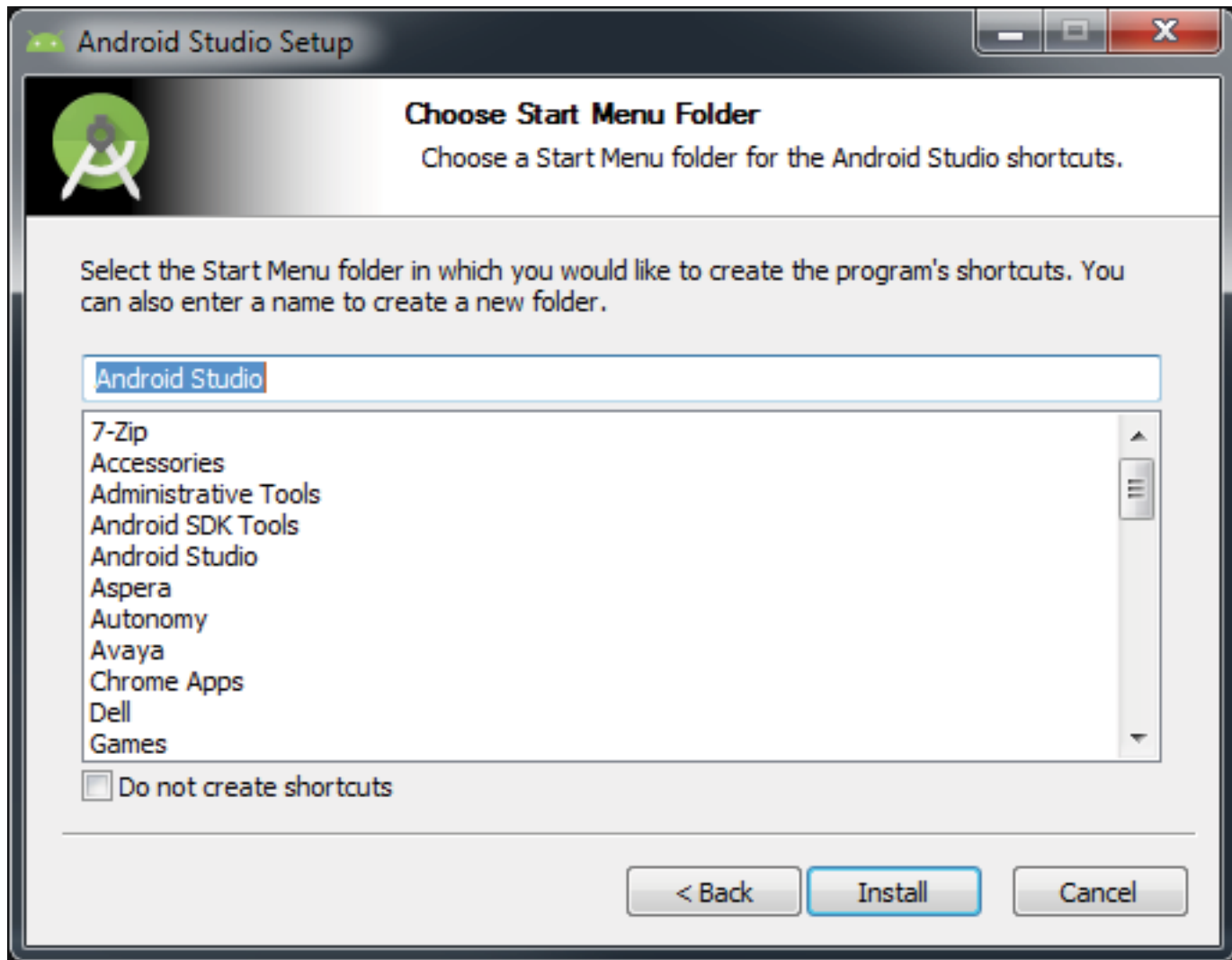
DOWNLOAD ANDROID STUDIO 2.0 FOR WINDOWS (1166 MB)

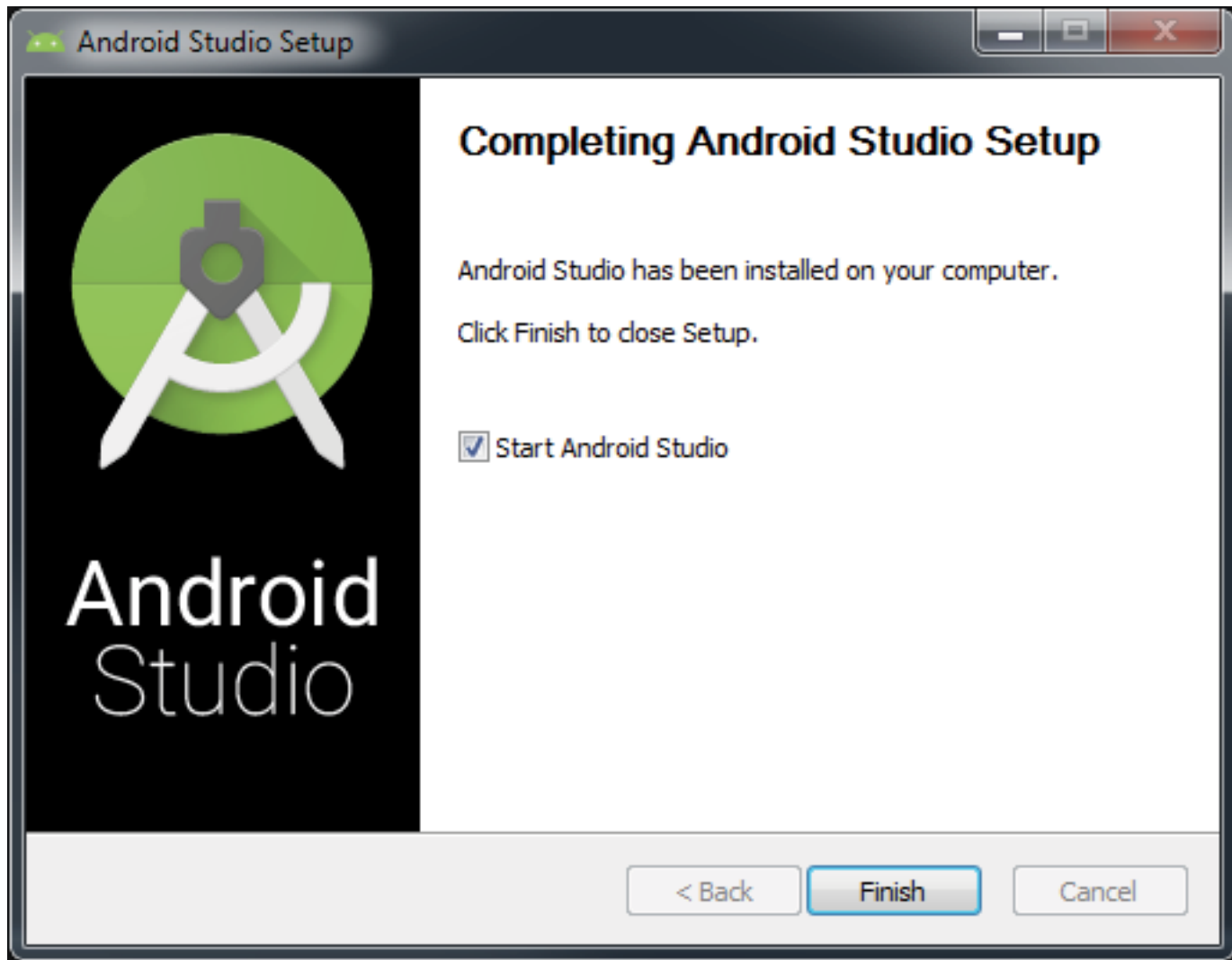


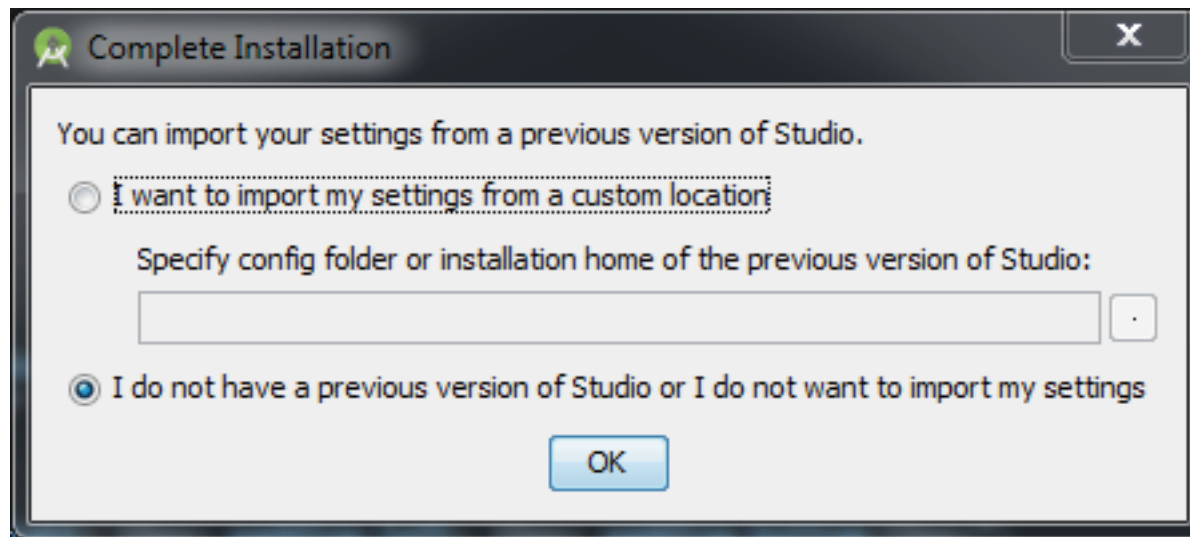














Install Type

Choose the type of setup you want for Android Studio:

☒ Standard

Android Studio will be installed with the most common settings and options.
Recommended for most users.

☐ Custom

You can customize installation settings and components installed.

Previous

Next

Cancel

Finish








Welcome to Android Studio

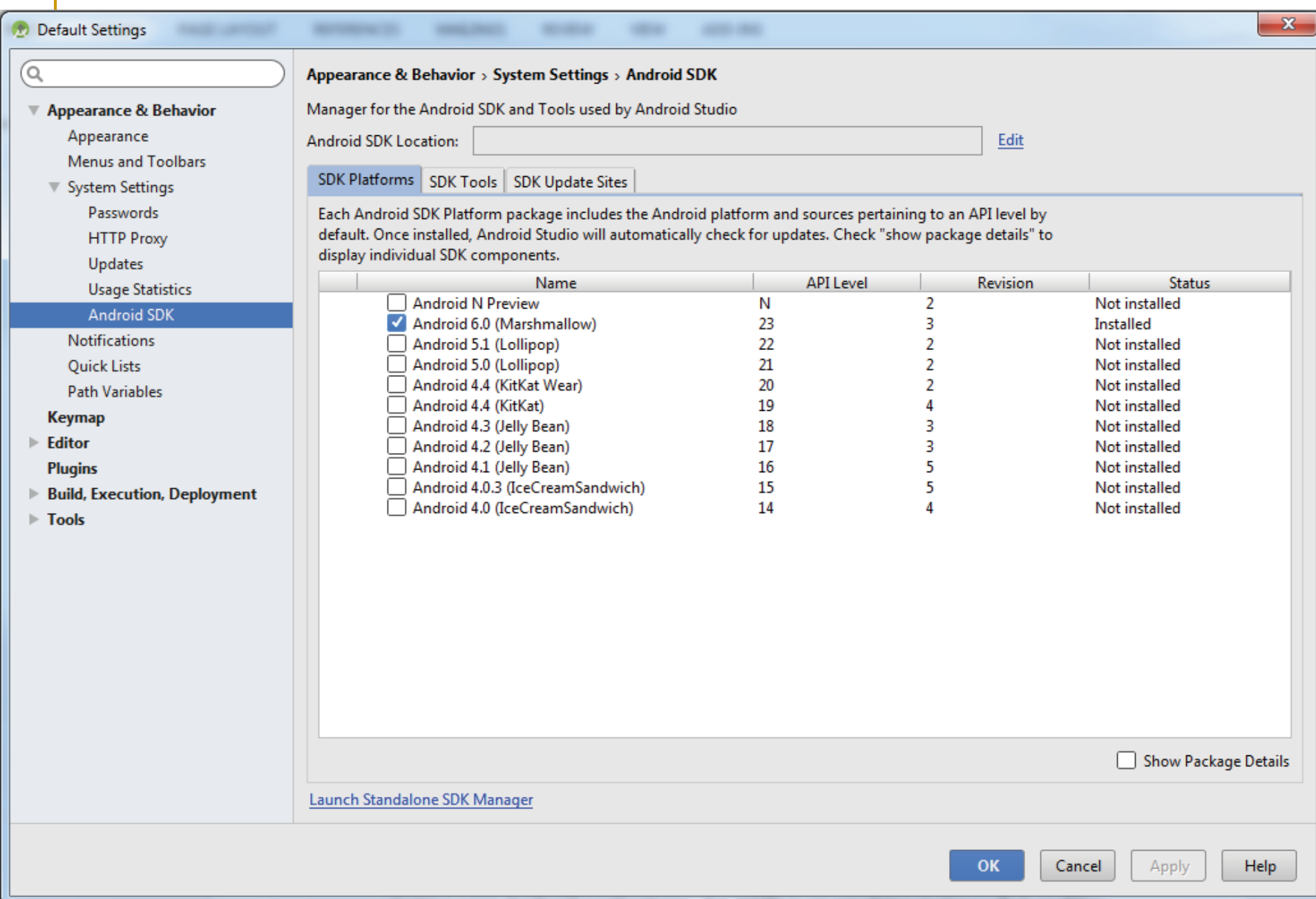


Android Studio

Version 2.0

-  Start a new Android Studio project
-  Open an existing Android Studio project
-  Check out project from Version Control ▾
-  Import project (Eclipse ADT, Gradle, etc.)
-  Import an Android code sample

 Configure ▾  Get Help ▾





License Agreement

Android Studio

Licenses

▼ android-sdk-preview-license



Android SDK Platform N, rev 2

To get started with the Android SDK Preview, you must agree to the following terms and conditions. As described below, please note that this is a preview version of the Android SDK, subject to change, that you use at your own risk. The Android SDK Preview is not a stable release, and may contain errors and defects that can result in serious damage to your computer systems, devices and data.

This is the Android SDK Preview License Agreement (the "License Agreement").

1. Introduction

1.1 The Android SDK Preview (referred to in the License Agreement as the "Preview" and specifically including the Android system files, packaged APIs, and Preview library files, if and when they are made available) is licensed to you subject to the terms of the License Agreement. The License Agreement forms a legally binding contract between you and Google in relation to your use of the Preview.

1.2 "Android" means the Android software stack for devices, as made available under the Android Open Source Project, which is located at the following URL: <http://source.android.com/>, as updated from time to time.

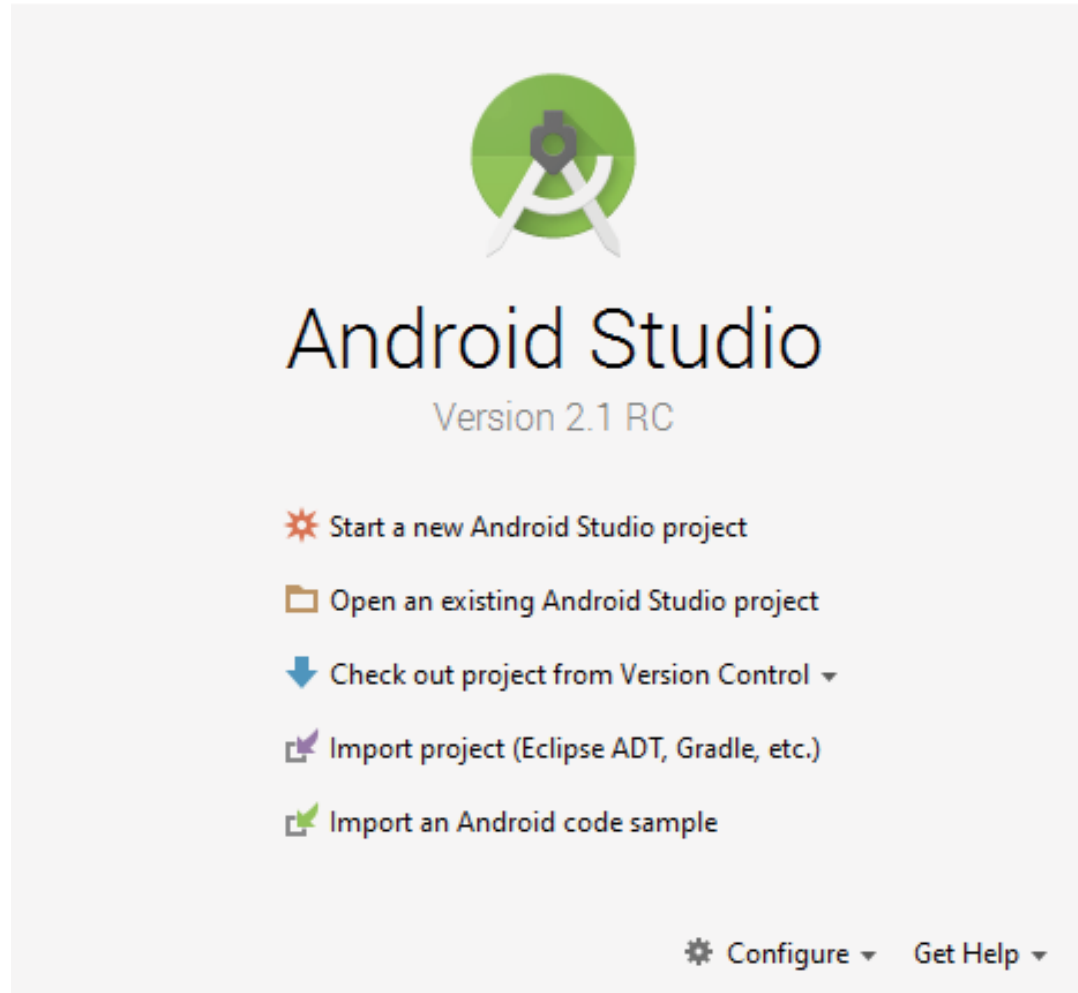
1.3 "Google" means Google Inc., a Delaware corporation with principal place of business at 1600 Amphitheatre Parkway, Mountain View, CA 94043, United States.

2. Accepting the License Agreement

2.1 In order to use the Preview, you must first agree to the License Agreement. You may not use

☐ Decline ☒ Accept


Start Android Studio so that the Welcome screen is visible. Click Start a New Android Studio Project. You see the Create New Project Wizard.



Set up a HelloWorld project. Type Chapter1Helloworld in the Application Name field

Set target Android devices. Accept default, click next

Create New Project

 Target Android Devices

Select the form factors your app will run on

Different platforms may require separate SDKs

☒ Phone and Tablet

Minimum SDK

Lower API levels target more devices, but have fewer features available.
By targeting API 18 and later, your app will run on approximately **74.3%** of the devices that are active on the Google Play Store.
[Help me choose](#)

☐ Wear

Minimum SDK

☐ TV

Minimum SDK

☐ Android Auto

☐ Glass

Minimum SDK

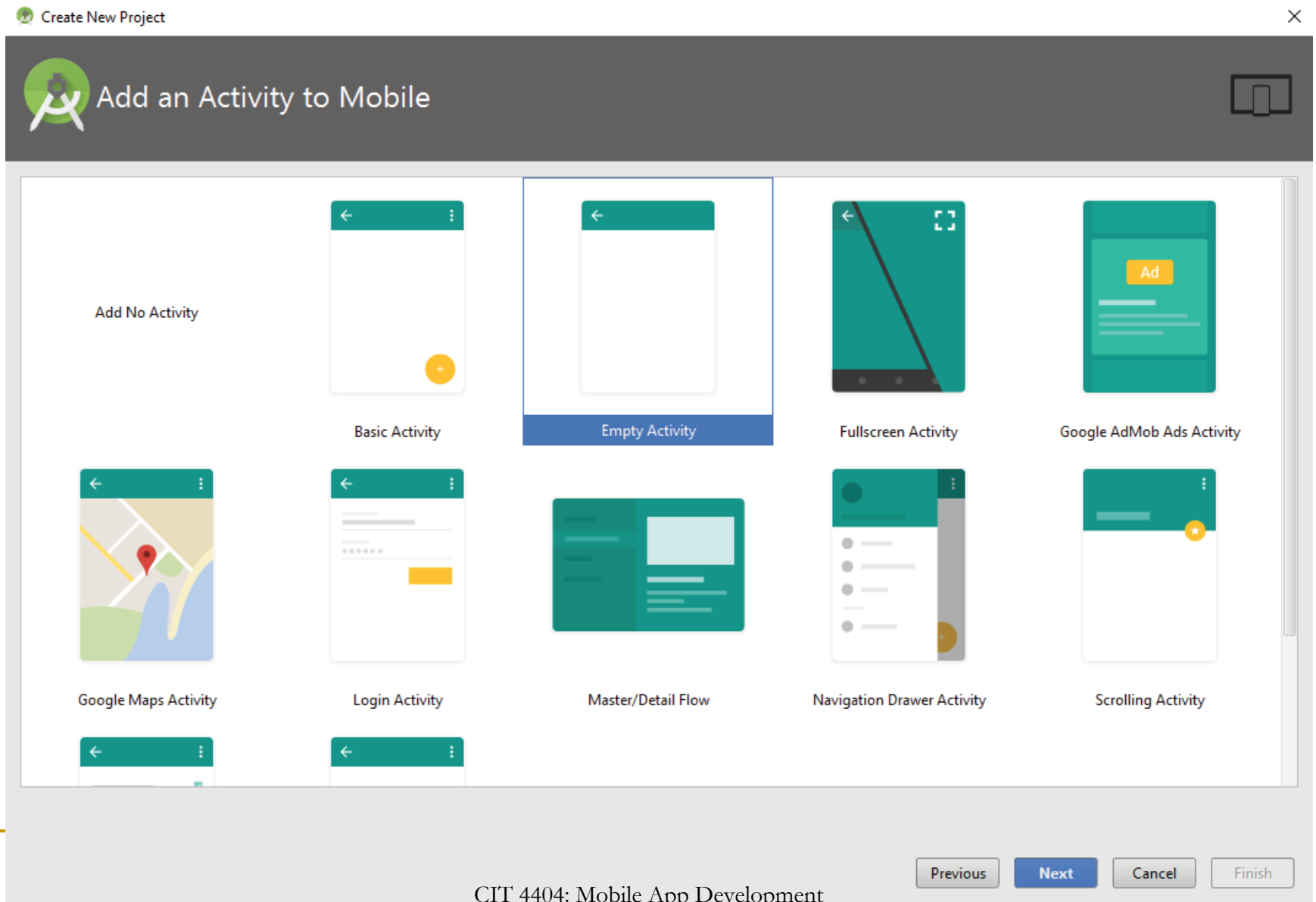
Previous

Next

Cancel

Finish

Add and Activity to Mobile. Accept default, click next

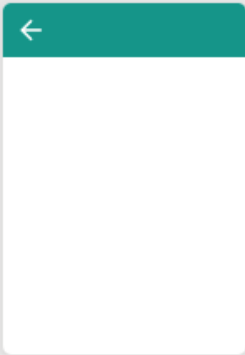


Customize the Activity. Accept default, click next

Create New Project



Customize the Activity



Empty Activity

Creates a new empty activity

Activity Name: MainActivity

☒ Generate Layout File

Layout Name: activity_main

The name of the activity class to create

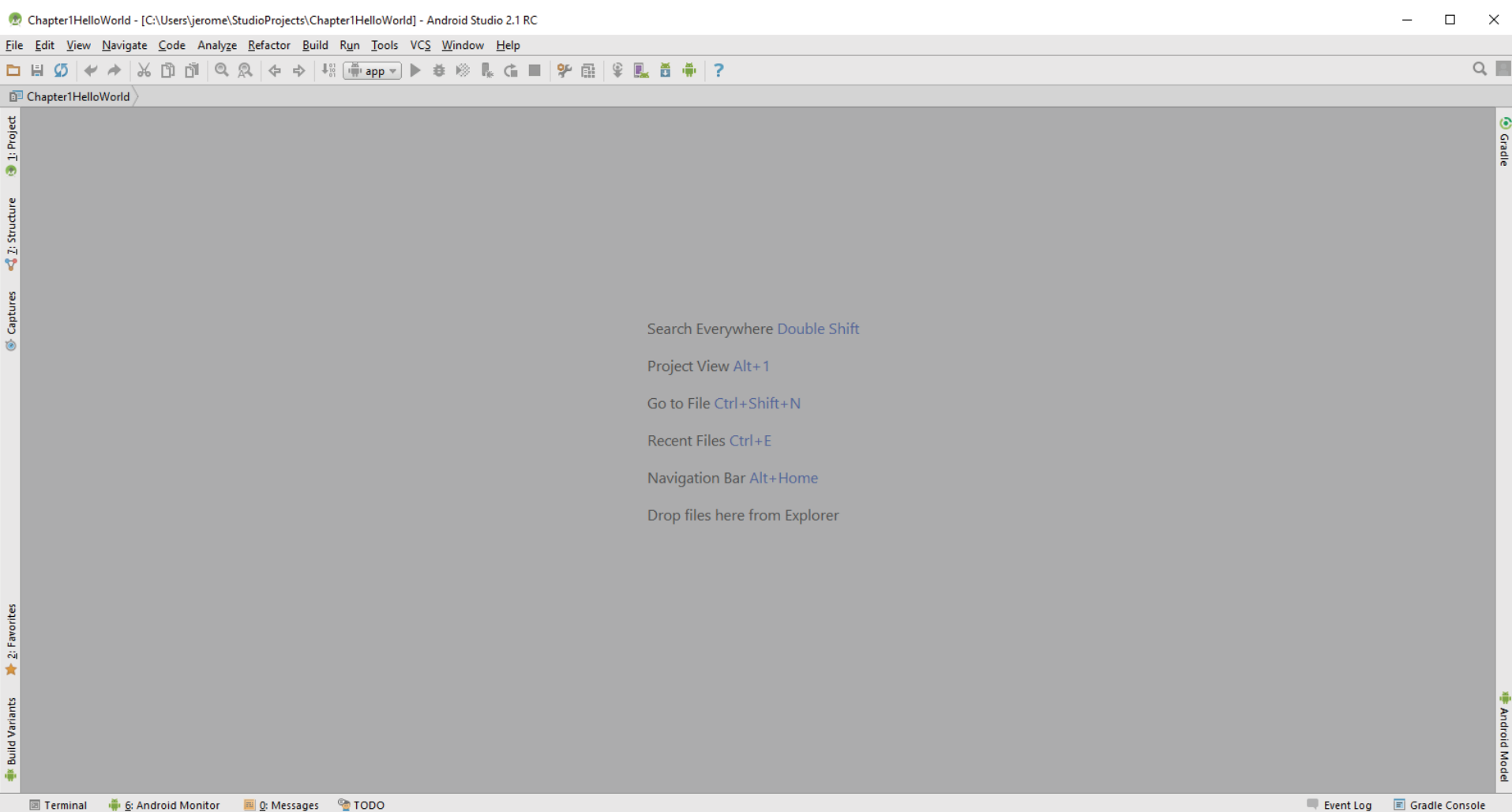
Previous

Next

Cancel

Finish

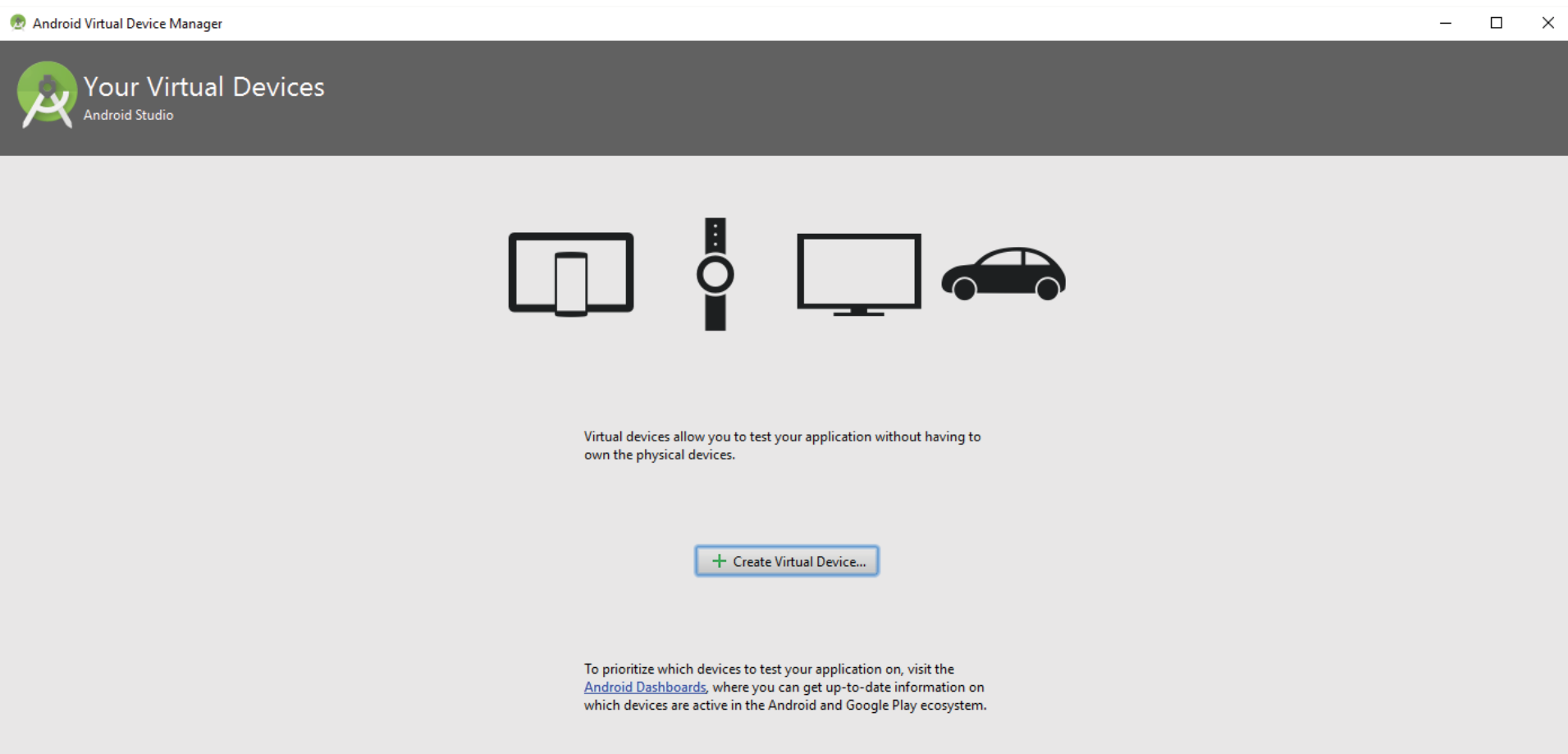
After clicking finish, shows the open Android Studio IDE



Creating Android Virtual Devices

- Android Studio offers an emulator for testing of Android apps
- Steps in creating AVD

Launch the AVD manager by selecting Tools => Android => AVD Manager.
Click the +Create Virtual Device button to create a new AVD



AVD configuration: select the Nexus 5x hardware profile and click next

Virtual Device Configuration



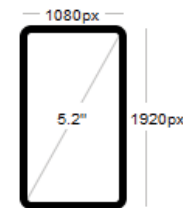
Select Hardware

Choose a device definition

Category	Name	Size	Resolution	Density
Phone	Nexus S	4.0"	480x800	hdpi
Tablet	Nexus One	3.7"	480x800	hdpi
Wear	Nexus 6P	5.7"	1440x2560	560dpi
TV	Nexus 6	5.96"	1440x2560	560dpi
	Nexus 5X	5.2"	1080x1920	420dpi
	Nexus 5	4.95"	1080x1920	xxhdpi
	Nexus 4	4.7"	768x1280	xhdpi
	Galaxy Nexus	4.65"	720x1280	xhdpi
	5.4" FWVGA	5.4"	480x854	mdpi
	5.1" WVGA	5.1"	480x800	mdpi
	4.7" WXGA	4.7"	720x1280	xhdpi
	4.65" 720p (Galaxy Nexus)	4.65"	720x1280	xhdpi
	4" WVGA (Nexus S)	4.0"	480x800	hdpi
	3.7" WVGA (Nexus One)	3.4"	480x800	hdpi
	3.7" FWVGA slider	3.7"	480x854	hdpi



Nexus 5X



Size: normal
Ratio: notlong
Density: 420dpi

New Hardware Profile

Import Hardware Profiles

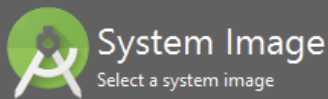


Clone Device...

System image: select and install the latest option. Click the x86 Images tab, select N from the list of images, then click Next

Virtual Device Configuration

×



Recommended **x86 Images** Other Images

Release Name	API Level ▾	ABI	Target
N	N	x86_64	Android 6.X
N Download	N	x86	Android 6.X
Marshmallow	23	x86	Android 6.0
Marshmallow	23	x86_64	Android 6.0
Lollipop Download	22	x86_64	Android 5.1
Lollipop Download	22	x86	Android 5.1
Lollipop Download	21	x86_64	Android 5.0 (with Google APIs)
Lollipop Download	21	x86	Android 5.0 (with Google APIs)
Lollipop Download	21	x86	Android 5.0
Lollipop Download	21	x86_64	Android 5.0
KitKat Download	19	x86	Android 4.4
Jelly Bean Download	18	x86	Android 4.3
Jelly Bean Download	17	x86	Android 4.2
Jelly Bean Download	16	x86	Android 4.1
Gingerbread Download	10	x86	Android 2.3.3

N



API Level

N

Android

**Android Open
Source Project**

System Image

x86_64

Recommendation

Consider using a system image with Google APIs to enable testing with Google Play Services.

Questions on API level?

See the [API level distribution chart](#)



Accept default, click Finish

Virtual Device Configuration



Android Virtual Device (AVD)

Verify Configuration

AVD Name

Nexus 5X API N



Nexus 5X

5.2" 1080x1920 420dpi

Change...

N

Android 6.X x86_64

Change...

Startup size and orientation

Scale:

Auto

Orientation:



Portrait



Landscape

Emulated Performance

Graphics:

Auto

Device Frame

☒ Enable Device Frame

Show Advanced Settings

AVD Name

The name of this AVD.

Recommendation

Consider using a system image with Google APIs to enable testing with Google Play Services.

Launching your first Android App

- By default, when you create a new application in Android Studio, it creates a Hello World application.
- Steps on launching the app

Select Run ➡ Run app from the Android Studio menu bar. You should see the Select Deployment Target dialog shown below:

