ANDROID OVERVIEW

- ❑ Open source mobile native platform governed by Open Handset Alliance (OHA) and led by Google

- ❑ It has been widely embraced both by Original Equipment Manufacturers (OEMs) and by app developers due to its openness

- ❑ Android is highly customizable because of which OEMs can modify and distribute their own flavors

- ❑ It is a software stack for mobile devices includes OS, middleware and key applications

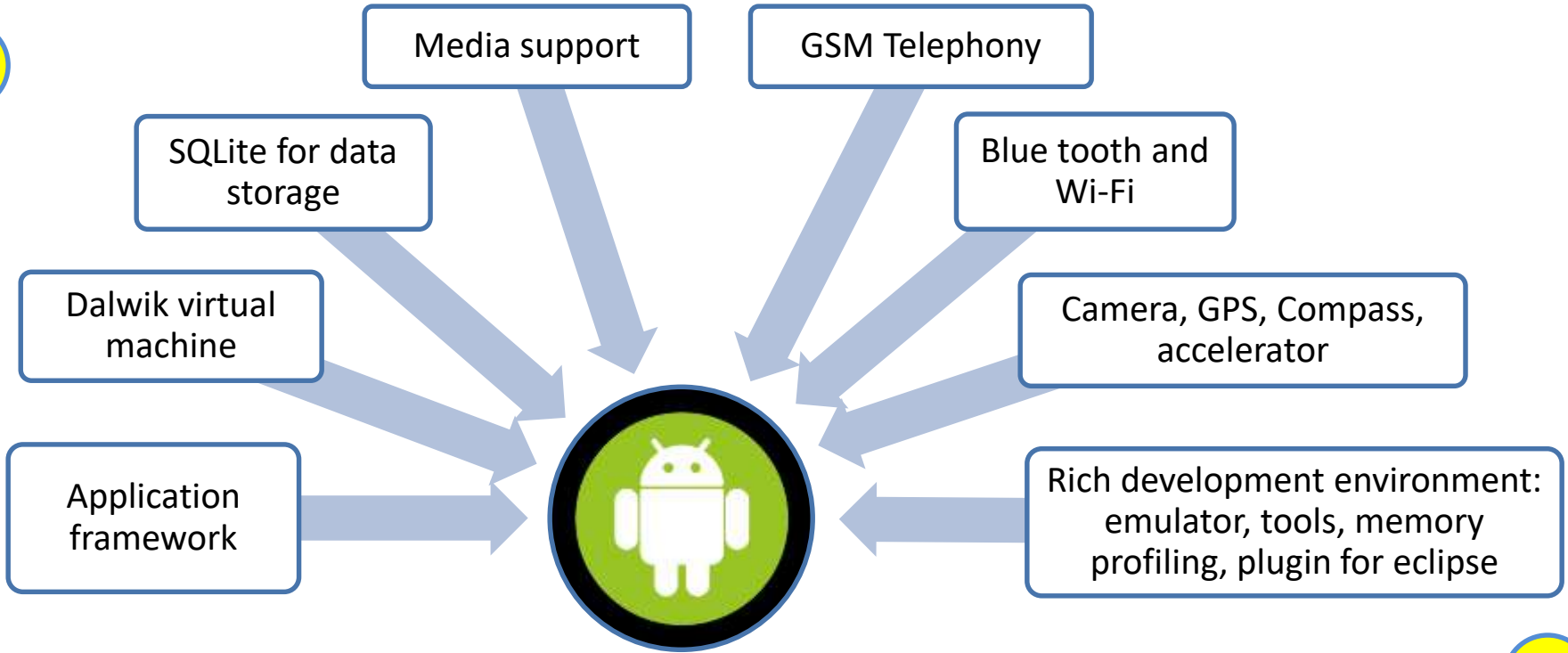- ❑ Android SDK includes tools and API to develop mobile app using java

Why android?

❑ Open-source, customizable OS

❑ Larger community and developer

❑ Rich development Environment

❑ Reduce cost of development and complexity

❑ Inter app integration

FEATURES OF ANDROID

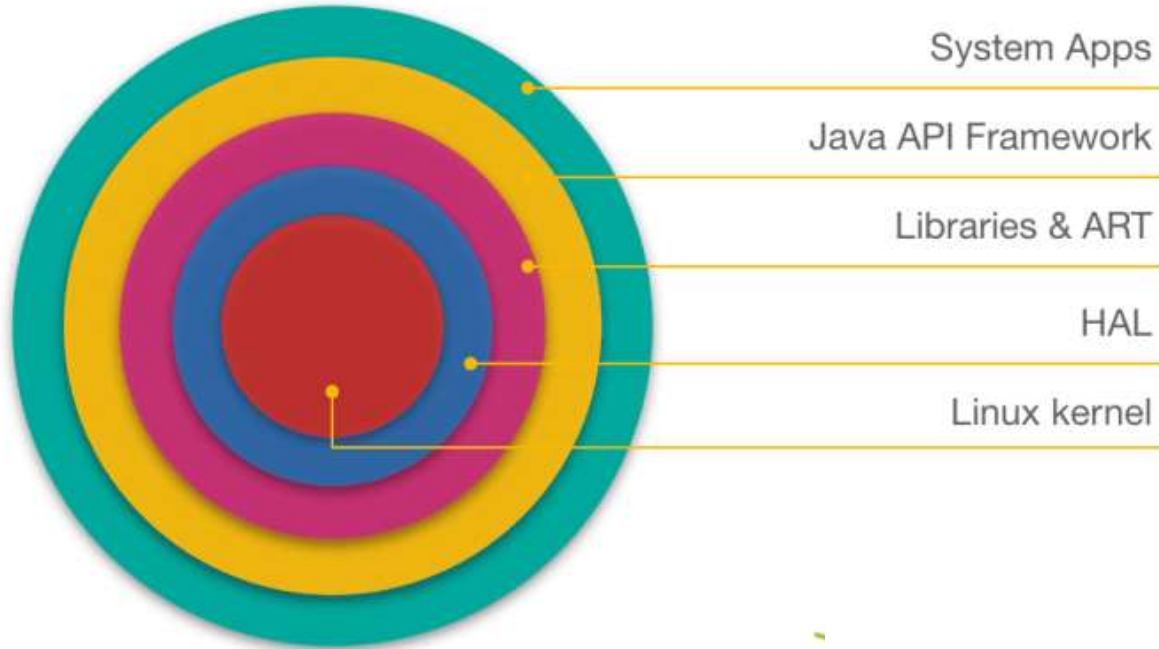Media support

GSM Telephony

SQLite for data storage

Blue tooth and Wi-Fi

Dalwik virtual machine

Camera, GPS, Compass, accelerator

Application framework

Rich development environment: emulator, tools, memory profiling, plugin for eclipse

Features

EVOLUTION OF ANDROID

Donut
1.6

Froyo
2.2-2-2.3

Honeycomb
3.0-3.2.6

Jellybean
4.1-4.3.1

Lollipop
5.0-5.1.1

Nougat
7.0-7.1.2

1.0

Cupcake
1.5

Eclair
2.0-2.5

Gingerbread
2.3-2.3.7

Icecream sandwich
4.0-4.0.4

Kitkat
4.4 -4.4.4

Marshmallow
6.0-6.0.1

Courtesy: Edureka

Android platform follows a layered architecture approach

System Apps
Java API Framework
Libraries & ART
HAL
Linux kernel

tutorial.eyehunts.com
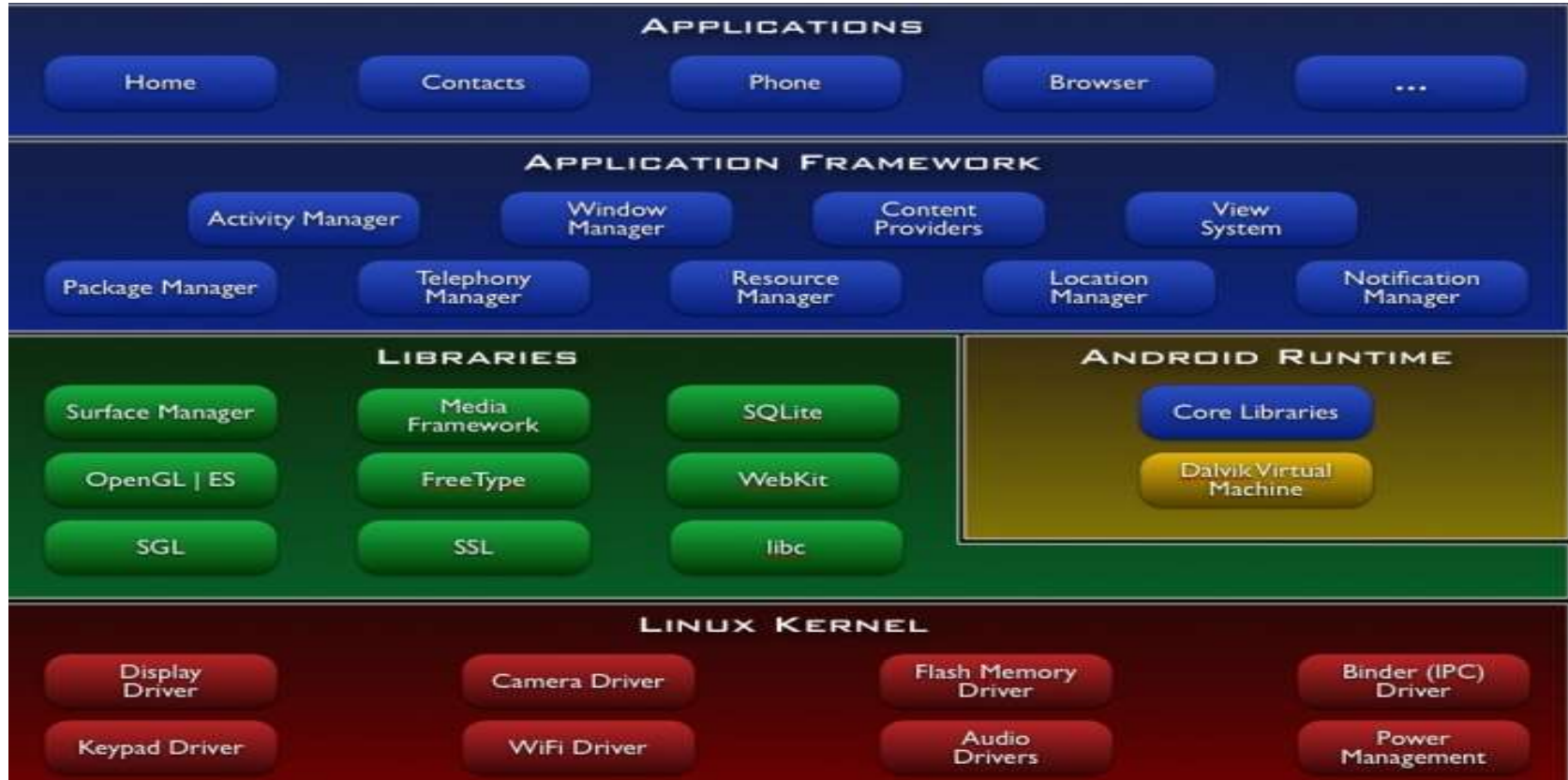
❑ It never really interacts with the users and developers, but heart of the system

❑ Acts as an abstraction layer between the hardware and the rest of the Android software stack

❑ Provides the core operating system infrastructure such as

  ▪ memory management
  ▪ process management
  ▪ security model
  ▪ networking, and
  ▪ various device drivers

❑ Written in C and C++, and responsible for rendering windows and drawing surfaces of various apps on the screen

- **Media** library provides media codecs for audio and video

- **SQLite** library provides support for native data storage

- **OpenGL** (Open Graphics Library) for 3d rendering

- **SGL** (Scalable Graphics Library) for 2D rendering

- **FreeType** library is used for rendering fonts, and

- **WebKit** library is a browser engine for the Android browser

❑ Designed to run apps in a constrained environment that has limited capacity in terms of battery, processing, and memory

❑ It has two key components –

1. **Dalvik Virtual Machine(DVM)**

2. **Core libraries**

❑ DVM runs the executable files of an app

❑ DVM enables every Android application to run in its own process, with its own instance of the Dalvik virtual machine

❑ Core libraries are written in Java, and comprise core Java libraries such as Utility, Collections, and IO

❏ It is a collection of APIs for an Android developer

❏ Written in Java

❏ It is available as Android Software Development Kit (SDK) that comes along with the Android Developer Tools (ADT)

- **Window manager** manages windows and drawing surfaces

- **Content providers** provide the mechanism to exchange data among apps

- **Package manager** keeps a tab on the apps installed on the device

- **Telephony manager** enables app to leverage phone capabilities of the device

- **Resource manager** is used to store the resources of an app such as bitmaps, strings, layouts, and other artwork

- **View system** contains UI building blocks such as buttons, check boxes, and layouts, and also performs the event management

- **Location manager** deals with location awareness capabilities

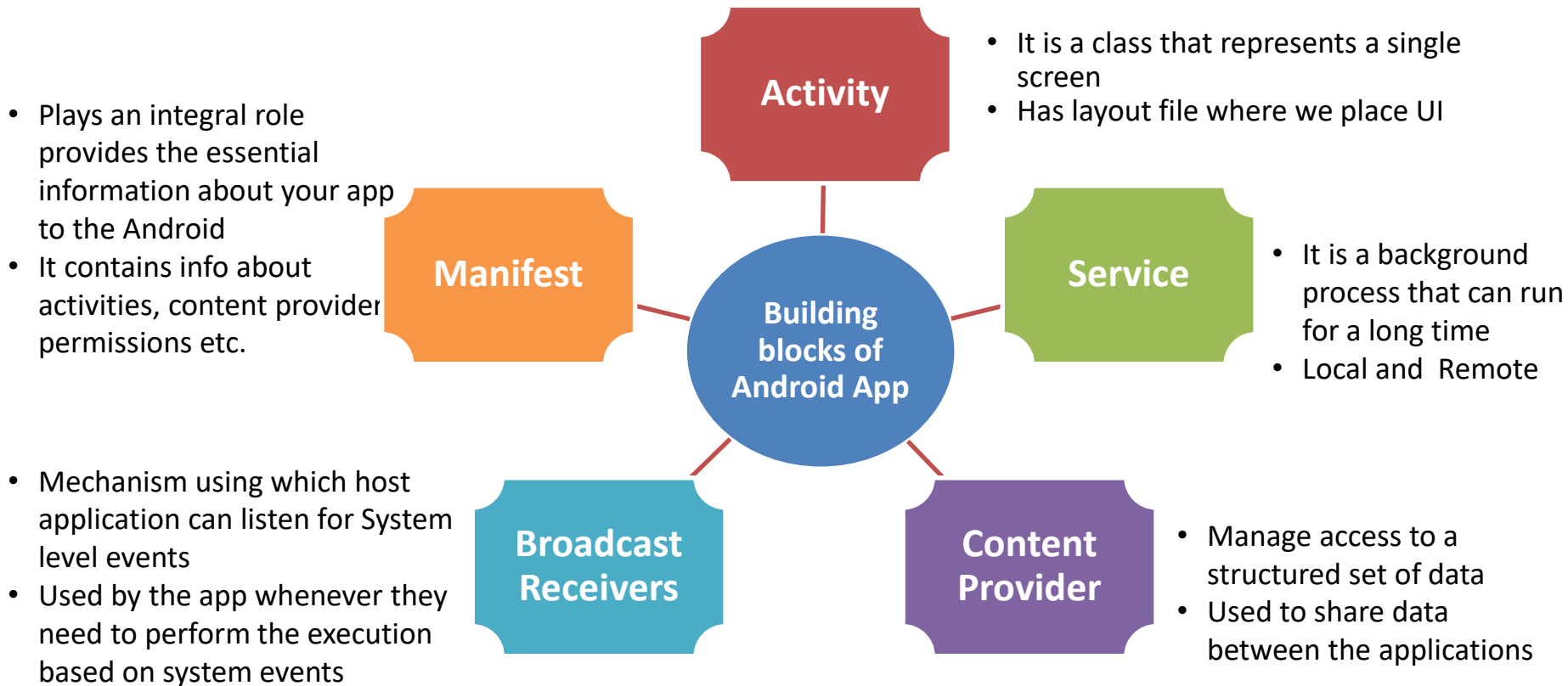- **Notification manager** deals with notifications on mobile devices

APPLICATION LAYER

❑ Topmost layer that contains all the apps installed on the device

❑ Uses all the layers below it for proper functioning of these mobile app

ANDROID ARCHITECUTRE

Activity

- It is a class that represents a single screen
- Has layout file where we place UI

Service

- It is a background process that can run for a long time
- Local and Remote

Content Provider

- Manage access to a structured set of data
- Used to share data between the applications

Broadcast Receivers

- Mechanism using which host application can listen for System level events
- Used by the app whenever they need to perform the execution based on system events

Manifest

- Plays an integral role provides the essential information about your app to the Android
- It contains info about activities, content provider permissions etc.

Building blocks of Android App

ANDROID

ENVIRONMENT SETUP

SNS COLLEGE OF TECHNOLOGY

(**An Autonomous Institution**)

Re-accredited by NAAC with A+ grade, Accredited by NBA(CSE, IT, ECE, EEE & Mechanical)
Approvedy by AICTE, New Delhi, Recognized by UGC, Affiliated to Anna University, Chennai

Department of MCA

ENVIRONMENT SETUP

Course: **Mobile Application Development**

Unit : I – Getting started with Mobility

Class / Semester: II MCA / III Semester

ENVIRONMENT SETUP - ANDROID

❑ Android application development on either of the following operating systems
  - Microsoft Windows XP or later version
  - Mac OS X 10.5.8 or later version with Intel chip
  - Linux including GNU C Library 2.7 or later

❑ Required tools to develop Android applications are freely available
  - Software Development Kit (SDK) Tools
  - Platform Tools
    - Android Studio
    - Eclipse IDE(Deprecated)

When we install the Android SDK into system, these tools get automatically installed

android	Manage Android Virtual Devices(AVD), create/update projects, & add-on components
ddms	Dalvik debug monitor server, provides services like message formation, call spoofing, capturing screenshot, exploring internal threads and file systems etc.
Draw 9-Patch	create a NinePatch graphic using a WYSIWYG editor
emulator	Used to test applications without using a physical device
mksdcard	Create a disk image that you can use with the emulator
proguard	Shrinks, optimizes, and obfuscates your code by removing unused code
Sqlite3	SQLite data files created and used by Android applications
Traceview	Provides a graphical viewer for execution logs saved by your application
Adb	Android Debug Bridge command line tool to communicate with an emulator instance

ANDROID EMULATOR

❏ It is an Android Virtual Device (AVD), represents a specific Android device

❏ We use this as a target device to execute and test our Android application on our PC

❏ Provides almost all the functionality of a real device like

- get the incoming phone calls and text messages
- gives the location of the device
- simulates different network speed
- simulates rotation and other hardware sensors
- It accesses the Google Play store

ANDROID EMULATOR

Requirements

- SDK Tools 26.1.1 or higher
- 64-bit processor
- Windows: CPU with UG support
- HAXM 6.2.1 or later

Installation

- select the Android Emulator component in the SDK Tools tab of the SDK Manager to install all components
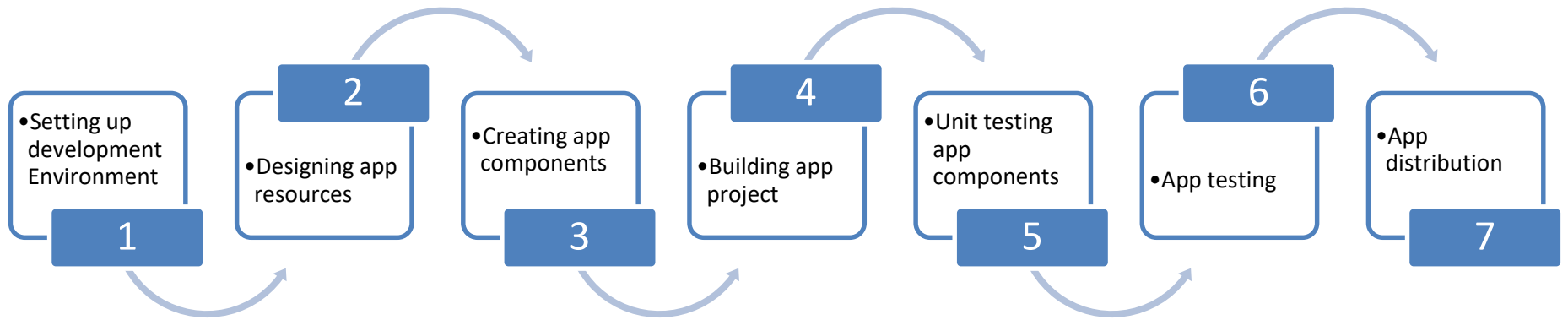
Run app

- Create an AVD by clicking **Tools > AVD Manager**
- Then select a hardware profile from **Select Hardware** page appears
- Select the system image for the particular API level
- Finally, **Verify Configuration** page appears then finish
- Run by choosing AVD on toolbar

ANDROID APP DEVELOPMENT FLOW

❑ IT uses Java for development, also supports C, C++, and Python

❑ Java Development Kit (JDK) is required for development, minimum version of JDK specified by Android is 1.5

2
- Setting up development Environment

1

- Designing app resources

3
- Creating app components

- Building app project

4

- Unit testing app components

5

- App testing

6

- App distribution

7

ANDROID APP DEVELOPMENT

❑ Besides the JDK, following components are required to set up the development environment

      1. **Android Software Development Kit (SDK).**

      2. **Eclipse Integrated Development Environment (IDE)**

      3. **Android Development Tools (ADT) plugin**

❑ Android SDK is a software development kit that comprises the required libraries to build Android apps, development tools, and an emulator to run the app

❑ Today, **Android studio** with rich set of features replaces IDE in app development

PROGRAMMING COMPONENTS

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