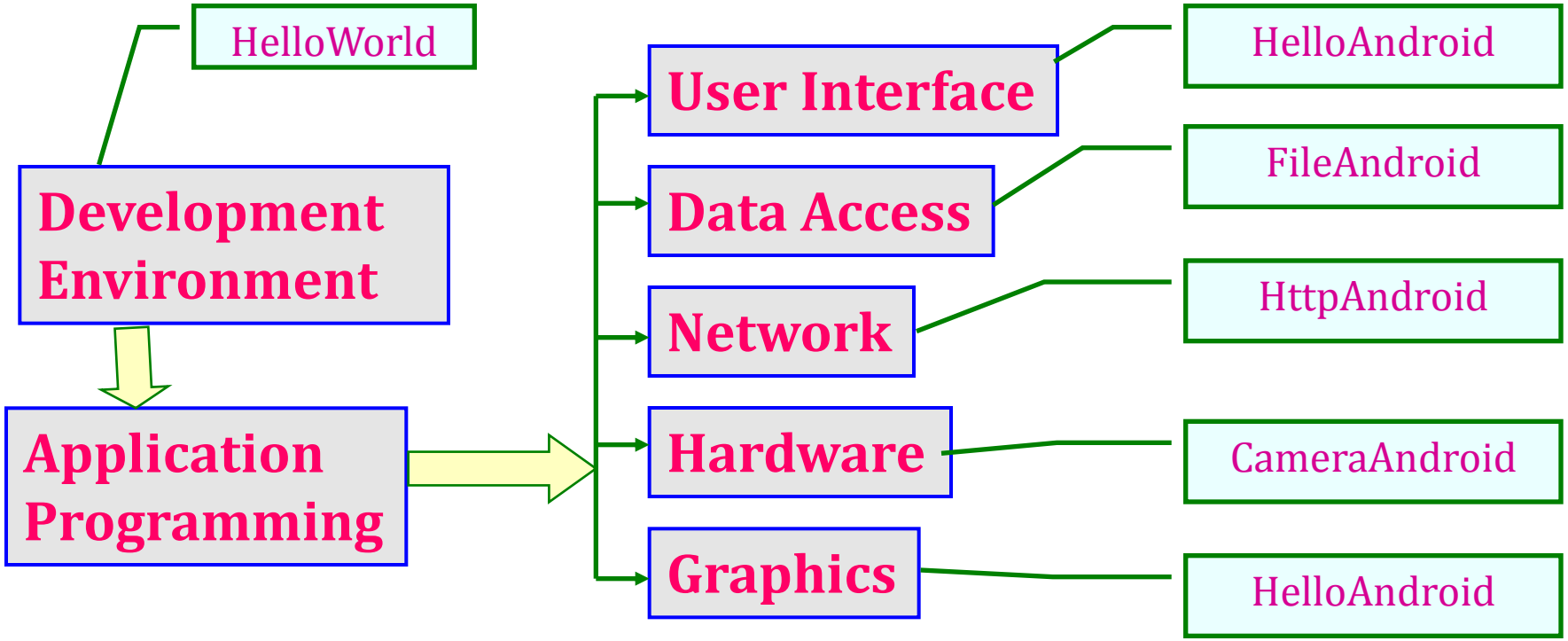
Android Development

SmartPhone Application

Outline

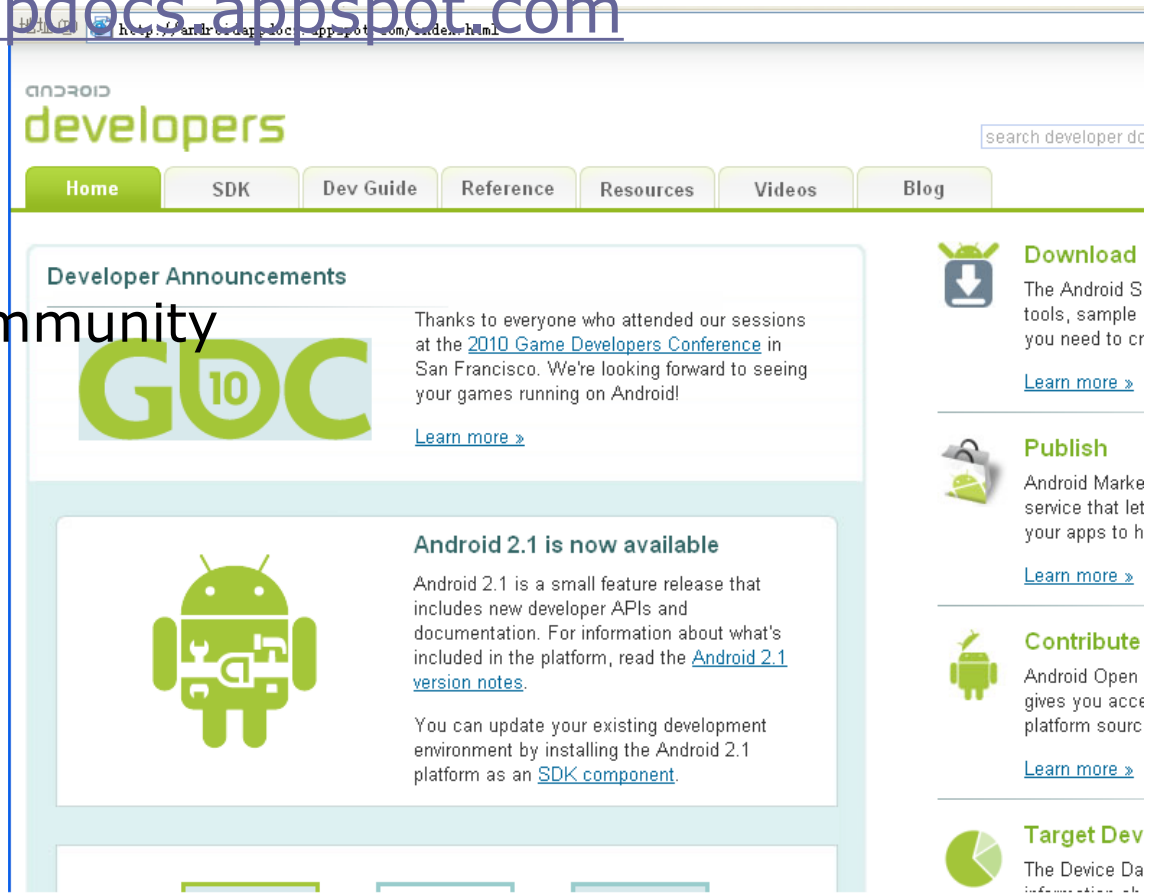

HelloWorld
Development Environment
Application Programming
User Interface
Data Access
Network
Hardware
Graphics
HelloAndroid
FileAndroid
HttpAndroid
CameraAndroid
HelloAndroid

课程结构

- Android Development Platform Overview：
  - Platform Introduction、Developer community
- Development Environment：
  - Setup Android Development Environment
- Application Program：
  - Program Structure
- Typical applications：
  - User Interface
  - Graphics
  - Data Access
  - Network
  - Hardware

Android Website

- http://developer.android.com
- http://androidappdocs.appspot.com
  - software
  - reference
  - Online help
  - Development community



1、Development platform

SmartPhone Application

The Open Handset Alliance

- Google announced the Open Handset Alliance and the Android platform in November of 2007, releasing the first beta version of the Android Software Development Kit (SDK) at the same time.
  - Within a matter of a few months, over 1 million people had downloaded versions of the SDK from Google's website.

OHA members

- The original Alliance members include:
  - handset manufacturers (HTC, LG, Motorola, Samsung), mobile operators (China Mobile Communications, KDDI, DoCoMo, Sprint/Nextel, T-Mobile, Telecom Italia, Telefonica),
  - semiconductor companies (Audience, Broadcom, Intel, Marvell, NVidia Qualcomm, SiRF, Synaptics),
  - software companies (Ascender, eBay, esmertec, Google, LivingImage, LiveWire, Nuance, Packet Video, SkyPop, SONiVOX), and
  - commercialization companies (Aplix, Noser, TAT, Wind River).
- The Alliance includes the major partners needed to deliver a platform for mobile phone applications in all of the major geographies.

Handset Manufacturers

MOTOROLA
htc smart mobility
SAMSUNG
LG Electronics

Mobile Operators

中国移动通信 CHINA MOBILE
Designing The Future KDDI
NTT DoCoMo
Sprint
TELECOM ITALIA
Telefónica
T-Mobile

open handset alliance

Software

Ascender Corporation
ebay
esmertec
Google
livewire
Living Image
NUANCE
pv
SkyPoP
SONiVOX sound that rocks.

Semiconductor

Audience
BROADCOM.
intel
MARVELL
NVIDIA.
QUALCOMM
SiRF
Synaptics
Texas Instruments

Commercialization

Aplix Corporation
noser
tat
WIND RIVER

Google Phone

- About 70 million smartphones were sold in 2007, but each brand has a different application environment.
- This is particularly true of Linux-based phones, where each handset vendor has had to assemble scores of pieces of third-party software to create a viable mobile phone platform.
- Java was supposed to help this situation, with J2ME and the wireless Java recommendations (CDC, CLDC, MIDP, JTWI, MSA, etc.) providing a common applications environment across handsets. Unfortunately, almost every handset that supports J2ME also support vendor-proprietary extensions that limit the portability of applications.

OHA and Android

- This alliance shares a common goal of fostering innovation on mobile devices and giving consumers a far better user experience than much of what is available on today's mobile platforms.
- By providing developers a new level of openness that enables them to work more collaboratively, Android will accelerate the pace at which new and compelling mobile services are made available to consumers.

Android

- Android has the potential for removing the barriers to success in the development and sale of a new generation of mobile phone application software. Just as the the standardized PC and Macintosh platforms created markets for desktop and server software, Android, by providing a standard mobile phone application environment, will create a market for mobile applications—and the opportunity for applications developers to profit from those applications.
- Android is based on JAVA，The OS is Linux 2.6。
- **Android SDK** provide many devies drvier and API。

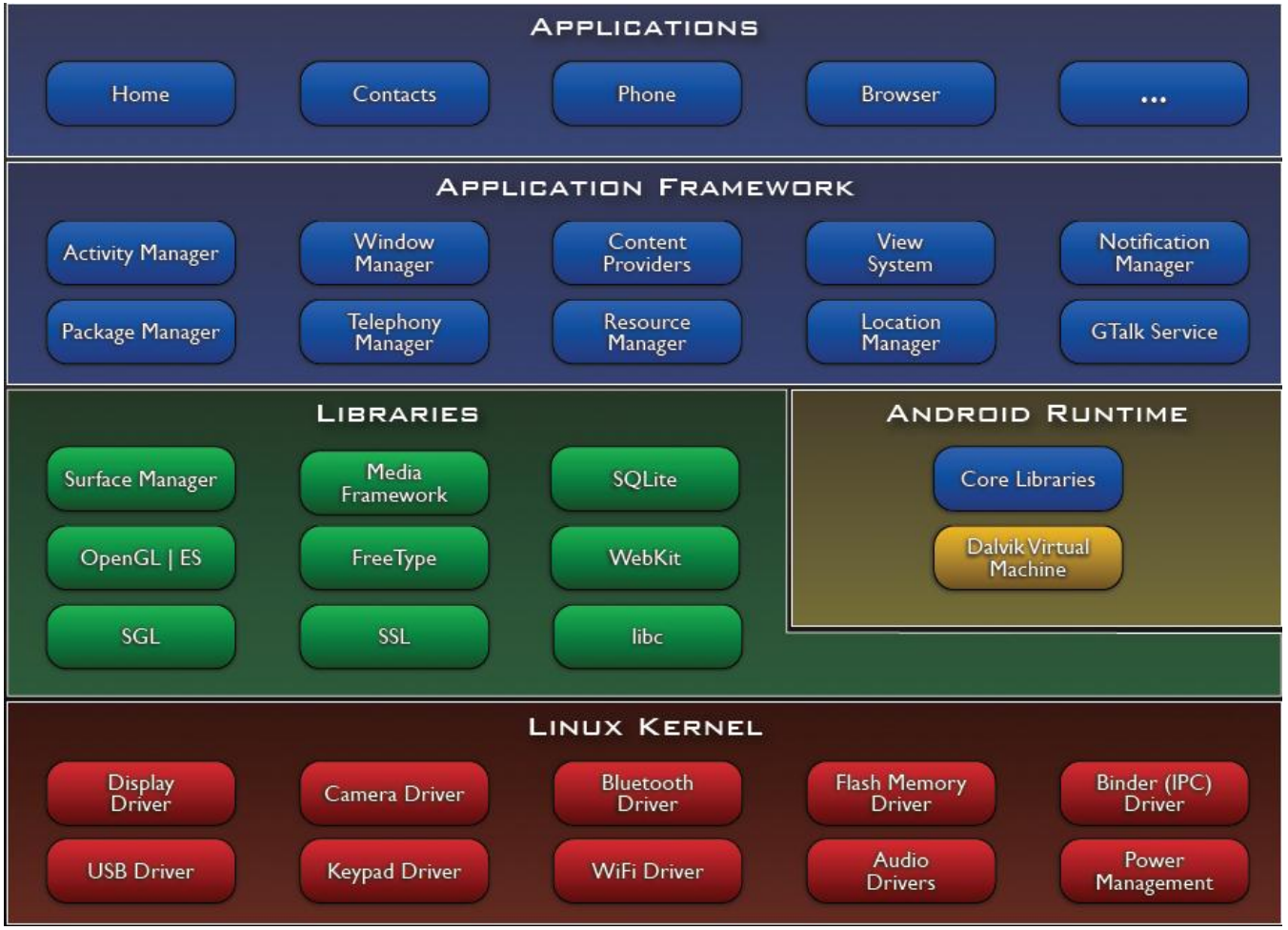
Features

- Android gives developers a way to develop unique, creative applications and get those applications in the hands of customers. Hundreds of thousands of Android mobile phone users are already there, looking for the next clever or useful application, and that application could be yours.

System environment

- OS for Android SDK：
  - Windows XP (32-bit) or Vista (32- or 64-bit)
  - Mac OS X 10.4.8 or later (x86 only)
  - Linux (tested on Linux Ubuntu Dapper Drake)

Android的系统架构



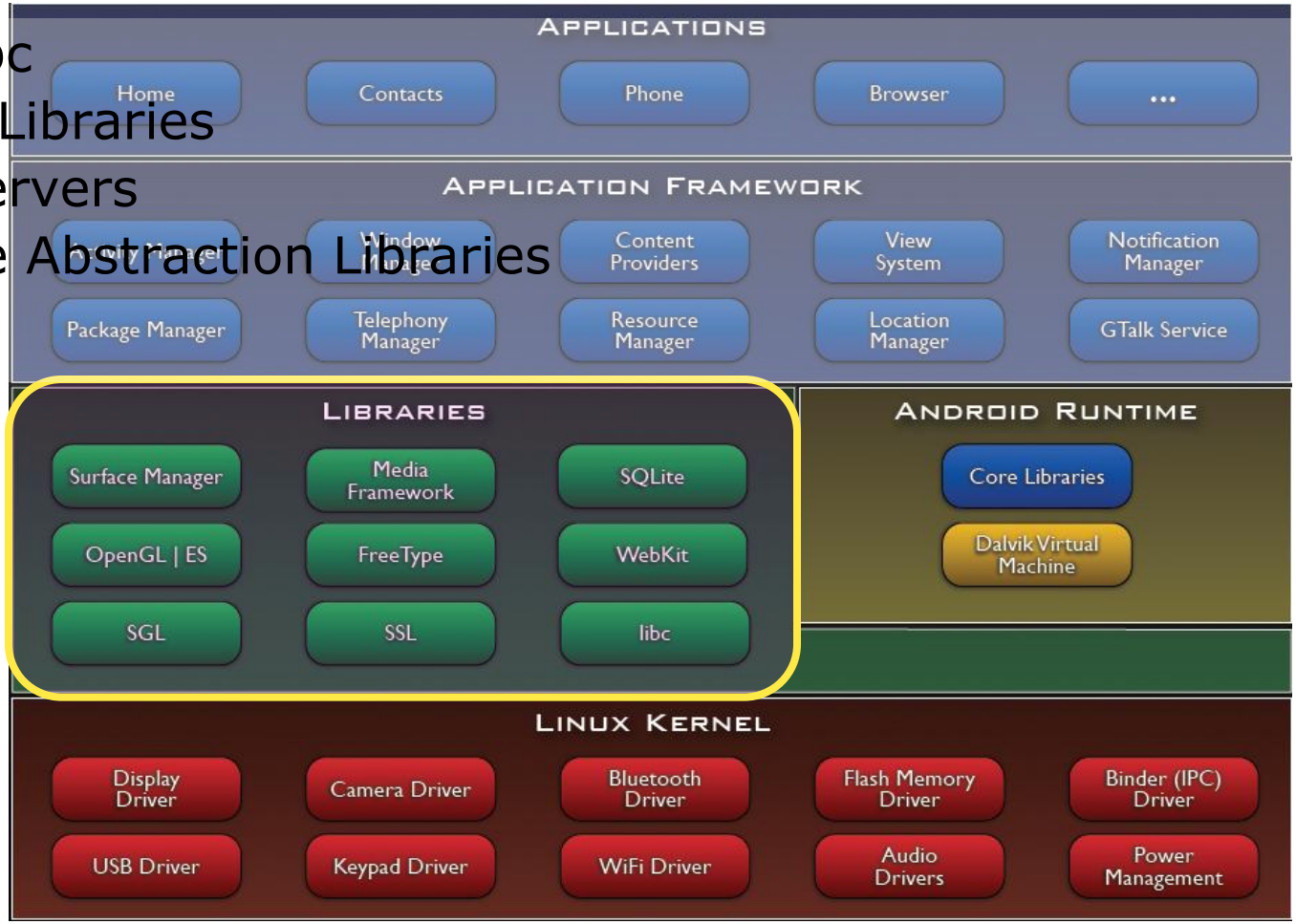
- An Android system is a stack of software components. At the bottom of the stack is Linux – Linux 2.6 with approximately 115 patches. This provides basic system functionality like process and memory management and security.
- Also, the kernel handles all the things that Linux is really good at such as networking and a vast array of device drivers, which take the pain out of interfacing to peripheral hardware.

Linux Kernel

- Android base on Linux kernel，but not Linux

Libraries

- Bionic Libc
- Function Libraries
- Native Servers
- Hardware Abstraction Libraries



Libraries

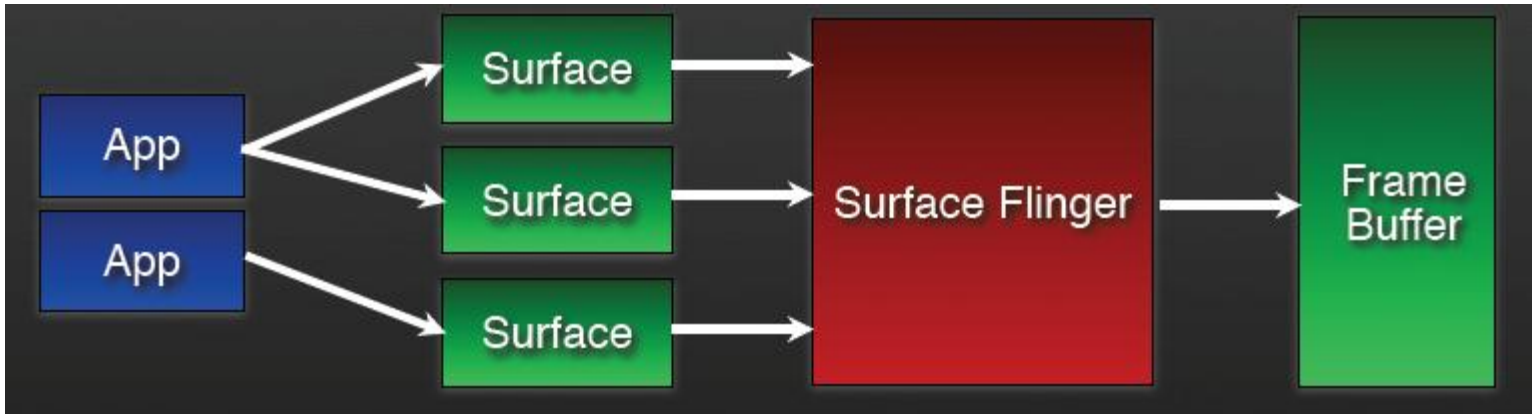
- C/C++ libraries：
  - media：MPEG4 H.264 MP3 JPG PNG .....
  - WebKit/LibWebCore
  - SQLite database
  - 2D，3D graphics library

Function Libraries

- WebKit
  - Base on WebKit
  - Support CSS、Javascript、DOM、Ajax
- Multimedia Framework
  - Base on PacketVideo OpenCORE platform
- SQLite
  - database

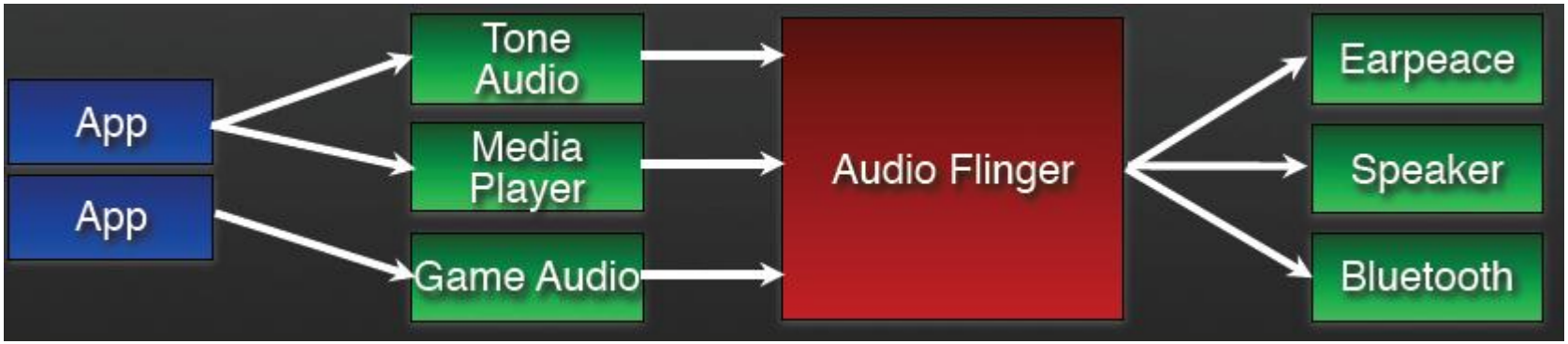
Native Servers-Surface

- 2D、3D surface

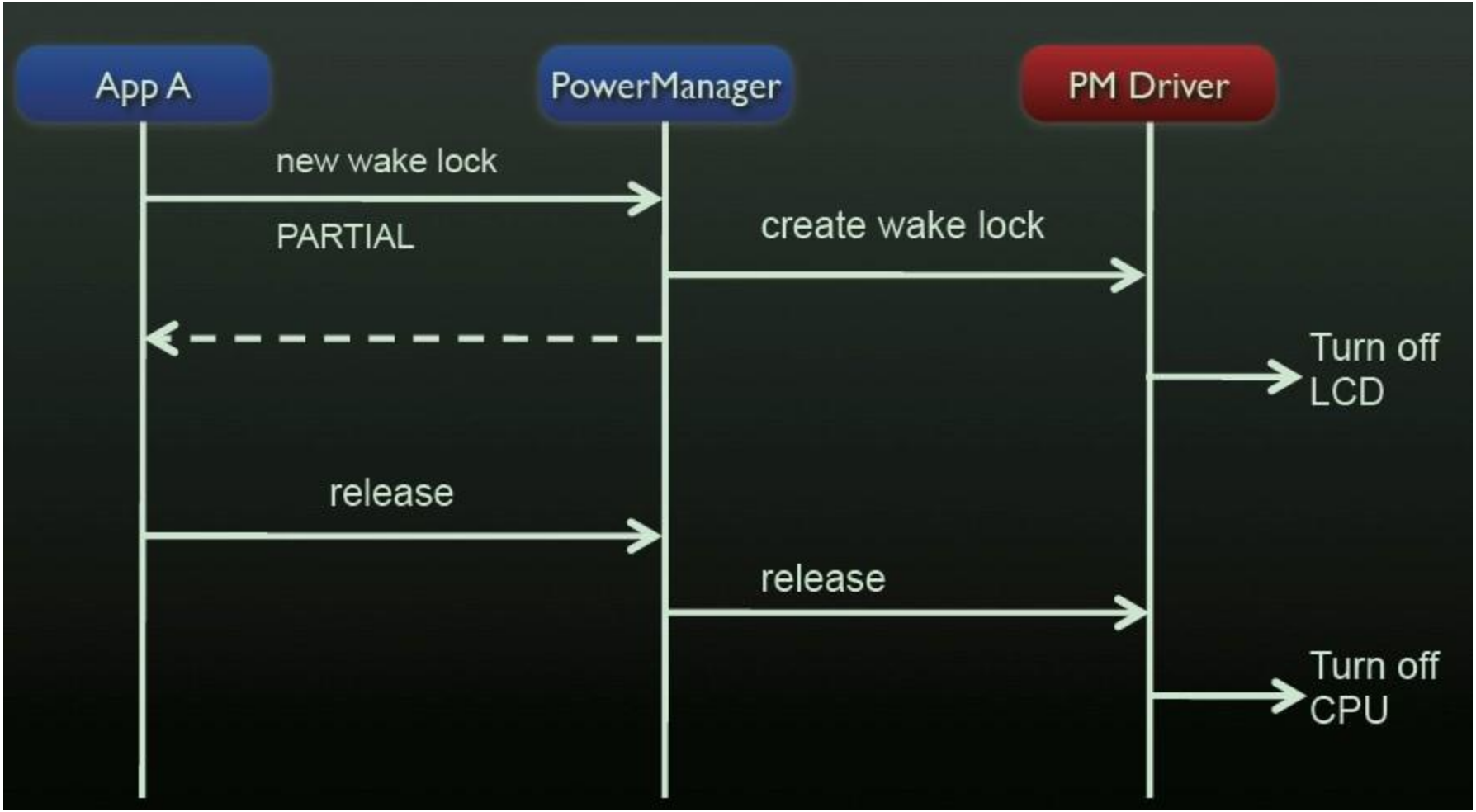


Native Servers-Audio

- Audio



Android PM in Action

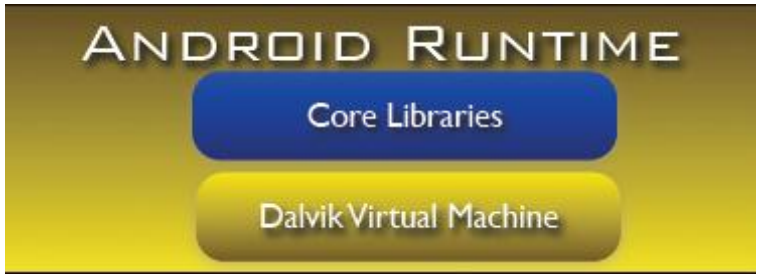


Hardware Abstraction Libs

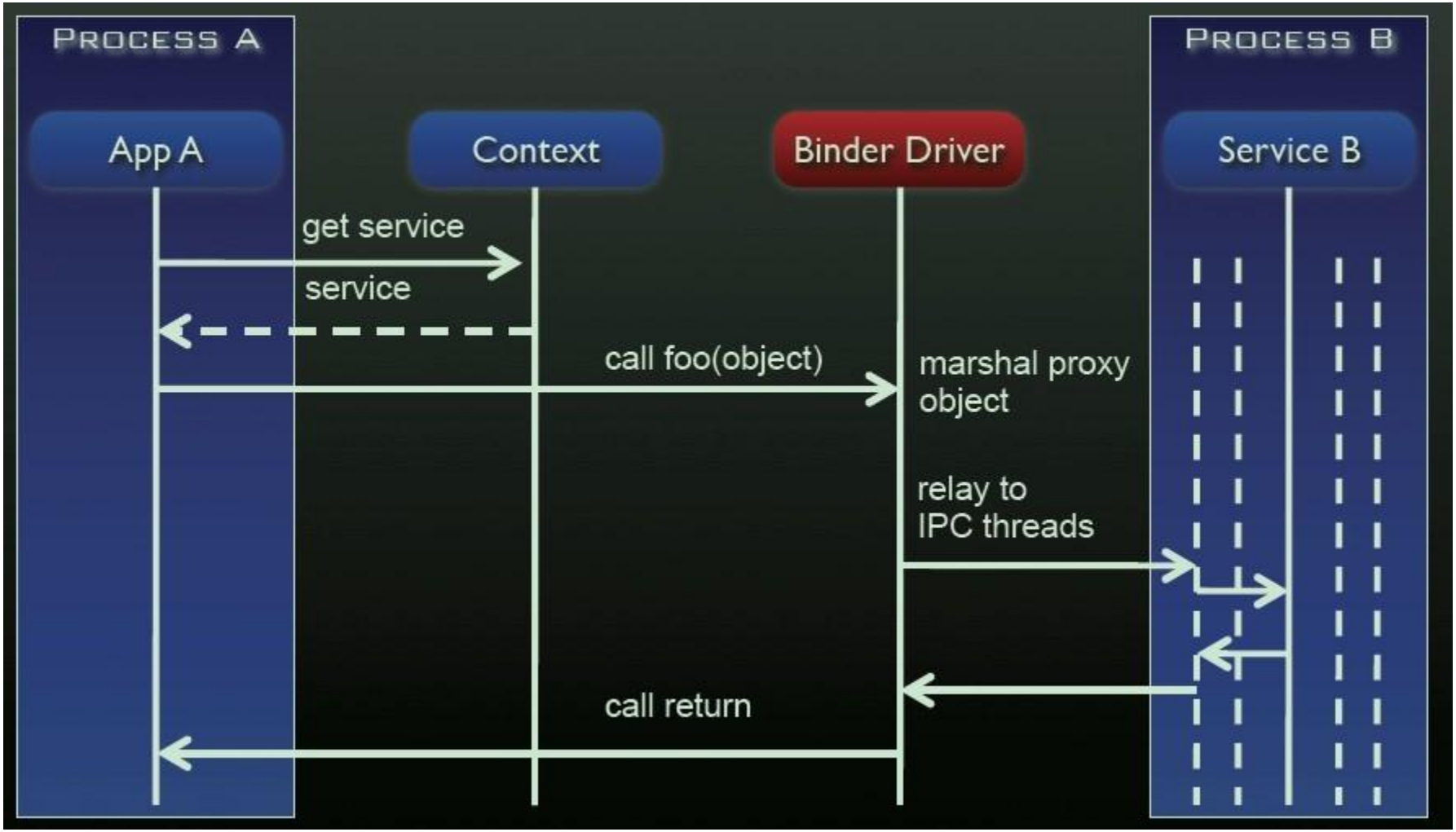
- User space C/C++ library layer

Andoid Runtime

- Application Development Language：Java
- Dalvik virtual machine
  - instruction: Dalvik Excutable
- Java libraries
  - Java is compiled into an executable file for Dalvik (dex format)



Binder in Action



Operating Environment

- Dalvik virtual machine depends on the Linux kernel
- Can run multiple Dalvik virtual machines simultaneously
- Each Android application executes its Dalvik Executable file(.dex) on its own Dalvik VM.
  - Dx-compiles Java file into dex file.

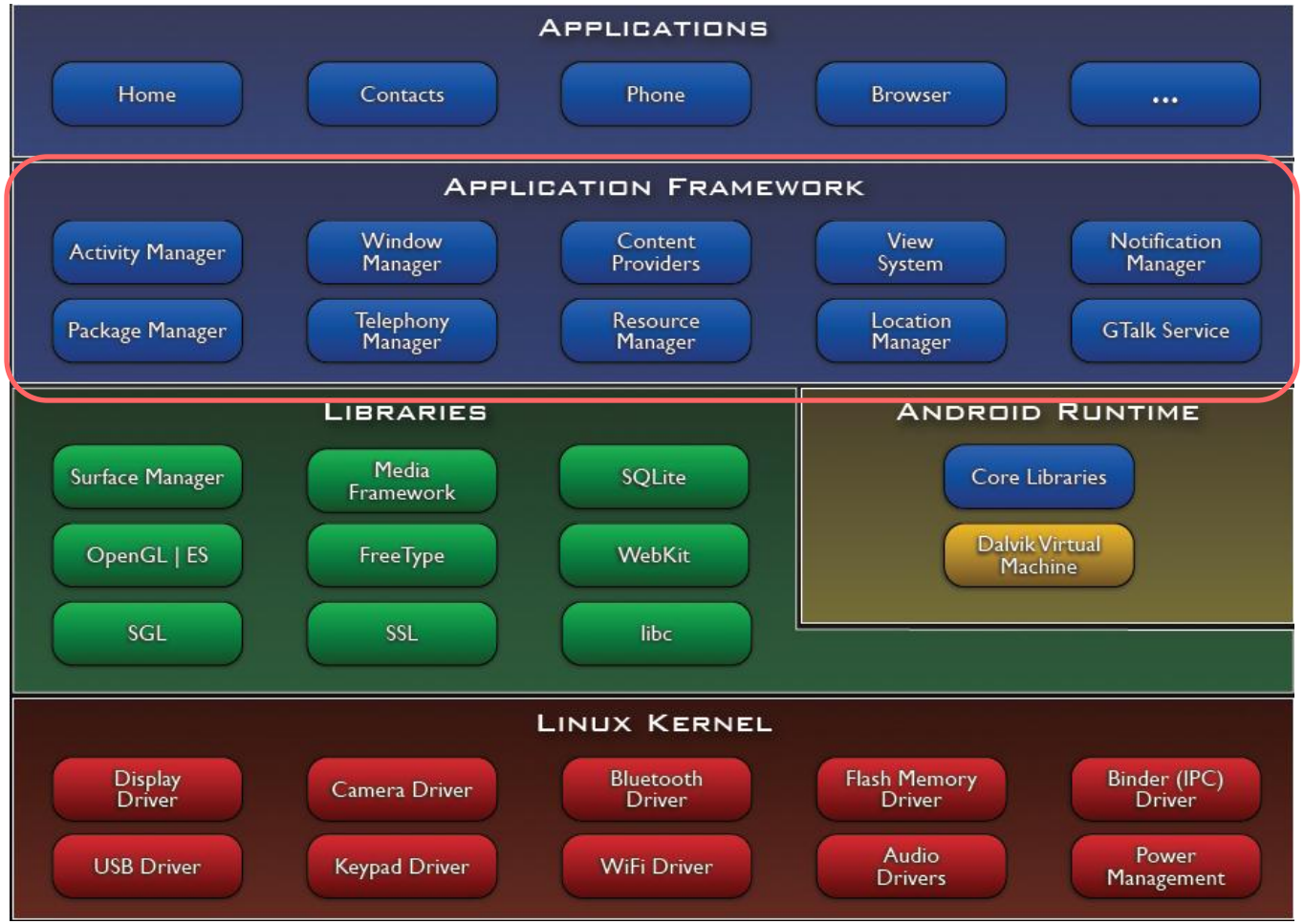
Dalvik Virtual Machine

- Android custom implementation virtual machine
  - Provides application portability and runtime consistency
  - Runs optimized file format (.dex) and Dalvik bytecode
  - Java .class / .jar files converted to .dex at build time
- Designed for embedded environment
  - Supports multiple virtual machine processes per device
  - Highly CPU-optimized bytecode interpreter
  - Efficiently Using runtime memory
- Core Libraries
  - Core APIs for Java language provide a powerful, yet simple and familiar development platform

DVM vs JVM

- DVM
  - Google
  - Dalvik excutable
- JVM
  - Sun
  - Java bytecode

Application Framework



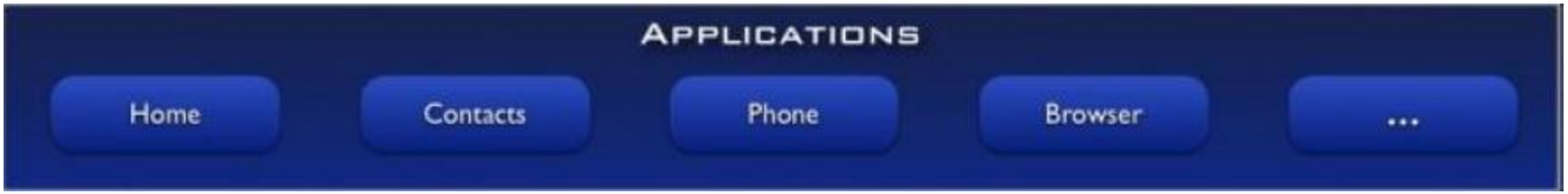
Applications Framework

- Activity manager
  - Manage activities
- Content Provider
  - Share data between applications
- Resource Manager
  - Resource Manager
- Notification Manager

- Views System
  - construct UI

Applications

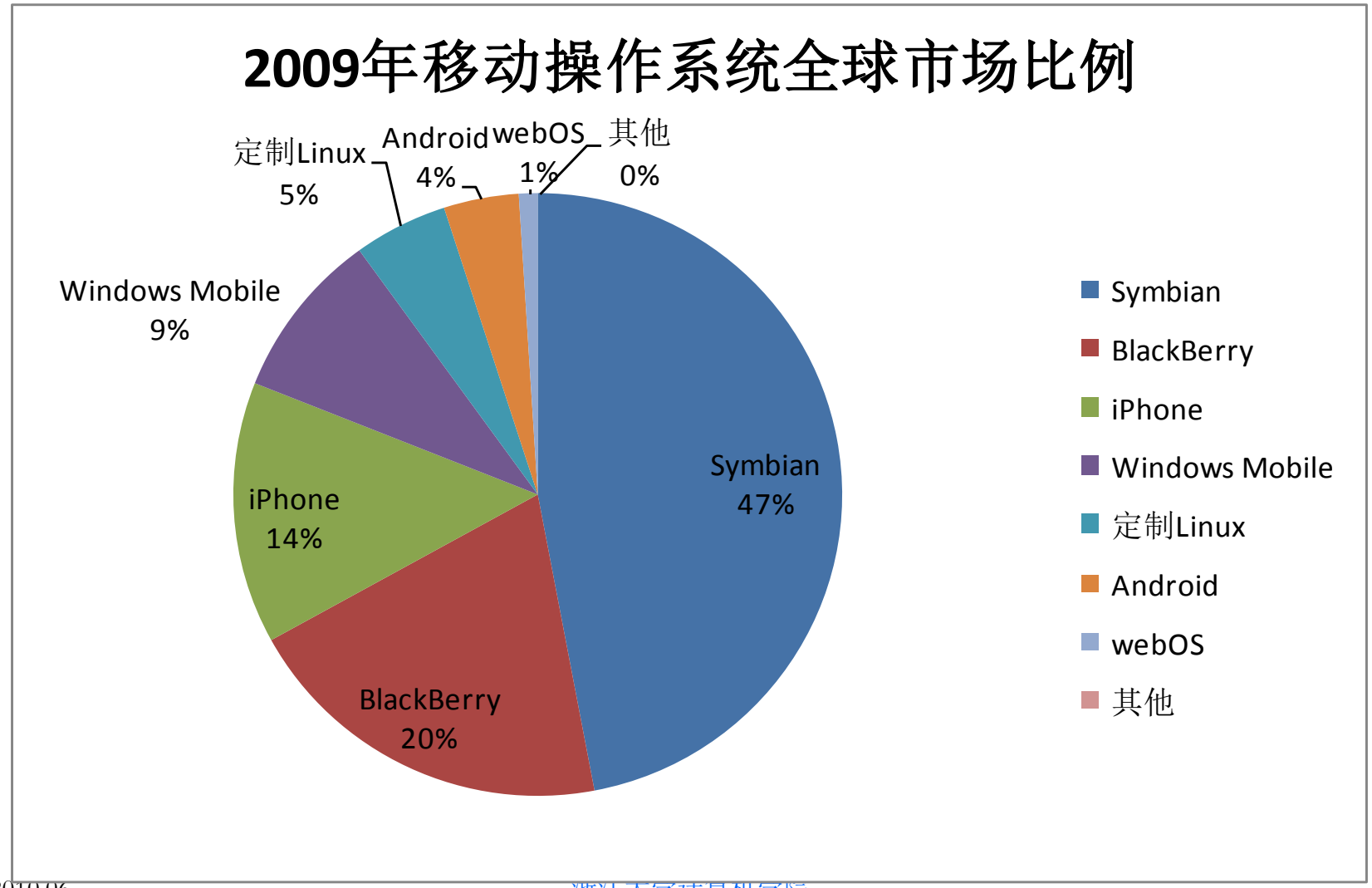
- JAVA program



Development

- JDK
- IDE – Eclipse
- Eclipse plug-in - ADT
- Software Development Kit (SDK)
- Android Emulator
- Debuger

2009 world market



Thank you!