Chapter 3

Linux Based Mobile Operating Systems

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ABSTRACT

In today’s mobile computing, Linux plays a significant role. The Linux kernel has been adopted by a variety of mobile operating systems to handle tasks such as device management, memory management, process management, networking, power management, application interface management, and user interface management. This chapter introduces Linux based mobile operating systems installed on various mobile devices. It first gives a brief introduction of the history of mobile Linux. Then, the chapter introduces the mobile Linux features that can be used to meet the mobile learning requirements. The last part of the chapter presents strategies on selecting a Linux based operating system for a particular mobile learning project.

INTRODUCTION

As an open source operating system, Linux plays an important role in mobile computing. This chapter first investigates the requirements by a mobile learning system. The requirement investigation to an operating system is carried out in three areas, the mobile learning infrastructure, the development of mobile learning course materials, and the mobile learning management. Traditionally, Linux operating systems have been widely used on servers, desktop and notebook computers to handle the tasks in mobile learning. This chapter focuses on the recently developed Linux based mobile operating systems used by mobile devices.

For mobile devices, it may not be feasible to use a full-blown version of a Linux operating system designed for servers and desktop computers. Instead, the Linux kernel has been modified for the mobile operating systems. In a mobile device,
the Linux kernel handles tasks such as device 
management, memory management, process 
management, networking, power management, 
application interface management, and user 
interface management. This chapter describes 
the features and functionalities provided by the 
Linux kernel and illustrates how a Linux based 
mobile operating system can provide solutions to 
the requirements from mobile devices.

The architectures of various Linux based mo-

bile operating systems are discussed in this chapter. 
The commonly available Linux operating systems 
such as Android, Palm webOS, Moblin, Ubuntu 
MID Edition, and Google Chrome are introduced. 
Based on the cost, usability, and flexibility, this 
chapter provides some recommendations on the 
selection of Linux mobile operating systems for 
different mobile devices.

BACKGROUND

Most of the mobile operating systems are UNIX 
based operating systems including Linux and 
iPhone (Robert Vamosi, 2009) which is derived 
from BSD UNIX. Linux distributions integrate 
the Linux kernel with other open source software 
to build various versions of Linux based open 
source operating systems. As the kernel of many 
mobile operating systems, Linux is known by its 
excellent flexibility and usability. More and more 
mobile device manufacturers commit to the open 
source approach. Mobile devices can benefit from 
Linux in the following areas:

• **Cost:** Since Linux is free for mobile de-
vice manufacturers, the cost to develop a 
mobile operating system is minimal. The 
manufacturers do not need to start their 
mobile operating system development pro-
cess from scratch. To fit the needs of their 
mobile devices, they can build their mobile 
operating systems around the free Linux 
kernel.

• **Usability:** Another strong point of Linux 
is its usability. Linux has been adopted by 
the PC industry for decades. The mobile 
deVICES powered by Linux can easily com-
municate with the PCs and network devic-
es installed on a Linux network. Also, the 
Linux powered mobile devices can share 
the application software and system man-
agement utilities developed for Linux. The 
embedded version of Linux is designed 
for the devices with limited resources. 
Therefore, the embedded Linux is ideal 
to be integrated into the mobile devices. 
Records have shown that Linux has been 
very successful in running embedded mo-

bile devices.

• **Flexibility:** A Linux based operating sys-
tem can be built to fit in a variety of de-
VICES depending on the available resources 
such as the CPU and RAM. It can also 
be built to consume only a little electric 
power. This feature is suitable for mobile 
deVICES since they in general have limited 

system resources.

• **Application Development:** One of the 
reasons for a mobile device manufacturer to 
be successful is the availability of applica-
tion software. If a Smartphone is supported 
by abundant application software, it will 
be appealing to various users. Application 
developers specifically like open source 
operating systems which can make their 
job easier. Therefore, for a mobile device 
manufacturer to have a competitive edge, 
adopting the open source approach is a 
winning strategy. Proprietary companies 
such as Apple have also realized the im-
portance of the open source approach. In 
2008, Apple launched the Apps Amuck 
project to post iPhone application source 
code every day for a month (Apps Amuck, 
2009). In such a way, iPhone application 
developers can get a quick start for their 
programs. To assist application develop-
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