Operating Systems

0107451, 0107461

Dr. Naeem Odat

Department of Computer and Communications Engineering

Chapter 1. Introduction

1.4 The Operating System Zoo

1. Mainframe Operating Systems

Mainframes are room-sized computers with huge I/O capabilities.
Mainframe OS offer three kind of services:

1. Batch: routine-jobs without user interaction. Example insurance company claims or reporting of sales for a chain of stores.
2. Transaction processing: small requests like check processing or airline reservations, but thousands are needed to be handled in a second.
3. Timesharing: multiple remote users run jobs at once. Like querying a big database.

Examples of mainframe OSs are OS/390 and Linux.

2. Server Operating Systems

Run on servers to serve multiple users at once over a network. Servers provide print, file or web services.
Examples are; Solaris, FreeBSD, Linux and Windows Server 201x.

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3. Multiprocessor Operating Systems

Systems with multiple connected CPUs are called parallel computers, multicomputers, or multiprocessors. Even in a single chip there are multicores. These systems need an operating system that can tackle the communication, connectivity and consistency. The hard part in such systems is to design suitable applications that can make use of this capabilities.
Examples are; Windows and Linux.

4. Personal Computer Operating Systems

Support multiprogramming and provide good support for a single user. Used for word processing games, Internet access,....
Examples are; FreeBSD, Linux, Windows 7, Windows 8, and Apple's OS X.

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5. Handheld Computer Operating Systems

Tablets, smartphones, PDA are the best known handheld computers. The operating system of these devices should be able to deal with many sensors like cameras, GPS, etc.
Examples are; Android, Apple's iOS.

6. Embedded Operating Systems

Embedded systems generally do not run user installed software. Applications run from ROM. It is found in microwave oven, TV sets, cars, DVD players, etc. No need for protection between applications and it is simpler than handheld devices OSs.
Examples are; Embedded Linux, QNX and VxWorks.

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7. Sensor-Node Operating Systems

The sensors are small battery-powered computers with built-in radios. A sensor runs real operating system and usually it is not accessible by user to download some app from the Internet.
TinyOS is a well known operating system for sensor-nodes.

8. Real-Time Operating Systems

Real-time systems are having time as a key parameter. Two types of real-time systems are there:

1. Hard real-time system: where missing the deadline has a fatal or expensive consequences. Like car assembly line in a car factory.
2. Soft real-time system: missing a deadline in such system is accepted while it is not desirable and doesn't result in permanent damage.

Embedded systems, smartphones and real-time systems are overlapped. While embedded systems and smartphones are intended for customers, real-time systems are for industrial use.
eCos is a real-time OS.

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9. Smart Card Operating Systems

The smallest and primitive OS found in a credit-card-sized smart card. A CPU and a small amount of ROM are there. Power and memory is the main constraint of these systems. These kind of cards are powered by contacts with the reader or by inducing the needed power. Some of them have a Java Virtual Machine that interprets Java applets. Some have multiple programs (Java applets) run at the same time which means a scheduler is needed.