This chapter introduces the .NET Micro Framework; we will discuss its history, motivation, goals, and architecture. We will take a look at where the .NET Micro Framework fits in the story of Microsoft’s offerings for embedded development, and we will learn about the benefits and limitations of the .NET Micro Framework. Finally, the chapter provides a technical overview of the .NET Micro Framework.

What Is the .NET Micro Framework?
The Microsoft .NET Micro Framework is a small and efficient .NET runtime environment used to run managed code on devices that are too small and resource-constrained for Windows CE and the .NET Compact Framework.

The .NET Micro Framework enables you to write embedded applications for small, connected, embedded devices with Visual Studio and C#. The .NET Micro Framework, .NET Compact Framework, and full .NET Framework are so similar that you can now use the same development tools and language that you use to build desktop and smart device (PDA and smartphone) applications to develop applications for microcontrollers. The .NET Micro Framework also provides an extensible hardware emulator for rapid prototyping and debugging.

The .NET Micro Framework requires no underlying operating system. A scaled-down version of the Common Language Runtime (TinyCLR) sits directly on the hardware, so the framework is often called a bootable runtime. The runtime has a small footprint; it uses only a few hundred kilobytes of RAM, and it does not require the processor to have a memory management unit (MMU). Therefore, the .NET Micro Framework can run on small and inexpensive 32-bit processors without consuming a lot of power.

.NET Micro Framework History
Let’s take a look at the history and versions of the .NET Micro Framework:

- Smart Personal Object Technology (SPOT) started at Microsoft Research in 2001. David Massarenti developed the first proof-of-concept version of a scaled-down and ECMA-compliant CLR, the TinyCLR.
- Smart watches first shipped in 2004 (see Figure 1-1) and Microsoft TV set top boxes in 2005. However, both smart watches and Microsoft TV set top boxes based on SPOT have been discontinued.
- The .NET Micro Framework 1.0 on Sumo robots (see Figure 1-2), which included a Sumo robot emulator, was presented at the 2006 Mobile and Embedded Developers Conference (MEDC); the conference also featured a Sumo robot contest.
In February 2007, the .NET Micro Framework 2.0, with a customizable emulator, was released. Some development boards (see Figure 1-3) and devices (see Figure 1-4) were available, and others followed in 2007. You will learn more about the available development boards and hardware platforms in the next chapter.

In 2007, Microsoft presented Windows SideShow, which is based on the .NET Micro Framework, and hardware manufacturers started shipping Windows SideShow-capable devices (see Figure 1-5).

Later in 2007, Service Pack 1 for the .NET Micro Framework 2.0 was released.

In February 2008, Microsoft released the .NET Micro Framework 2.5.

In October 2008, Microsoft released the .NET Micro Framework 3.0.

Figure 1-1. A smart watch

Figure 1-2. A sumo robot

Figure 1-3. A .NET Micro Framework development board