

## **VxWorks - Real Time Operating System**

General Purpose Platform, VxWorks Edition, is a complete, flexible, optimized COTS development and run-time platform that works out of the box and across the enterprise. The platform provides a powerful, scalable development environment built on open standards and industry-leading tools; the industry's most trusted commercial-grade RTOS; and tightly integrated run-time technologies. This proven technology package comes wrapped in a 20+-year track record, an exceptional ecosystem of hardware and software partners, and the industry's most comprehensive support organization.

General Purpose Platform is an optimized develop and run solution for a range of devices, from A&D applications to networking and consumer electronics, robotics and industrial applications, precision medical instruments, and car navigation and telematics systems. The platform provides a robust foundation for companies that need to leverage their investment in proprietary intellectual property. It has been deployed successfully in millions of devices worldwide.

General Purpose Platform is based on the world's most widely adopted RTOS. Built on a highly scalable, deterministic, hard real-time kernel, VxWorks enables companies to scale and optimize their run-time environment using only the specific technologies required by their device. From the smallest footprint requirement to the highest performance level, VxWorks gives developers the flexibility to build their optimal solution quickly and easily while meeting cost, quality, and functionality requirements.

VxWorks supports POSIX and industry-standard protocols such as TIPC and IPv6, ensuring maximum code portability and interoperability. VxWorks 6.x is backward compatible with previous releases, so developers can leverage and reuse existing projects, intellectual property, BSPs, and drivers, as well as open-source applications. VxWorks includes frameworks for file systems, power management, and interconnectivity, in addition to comprehensive security capacities that begin at the core operating system level for absolute application and device security.

### **Application area of VxWorks**

- Consumer Devices
  - Automotive Industry
  - Industrial Automation
  - Network Applications
- and many more ...

## **Features of VxWorks Real Time Operating System**

- **VxWorks 6 enables hard real-time applications**
  - Kernel-mode execution for utmost flexibility and performance
- **Small footprint**
  - VxWorks has been deployed in digital cameras, wireless access points, mobile radio systems, aircraft systems, weapons guidance systems, and many other devices that require a small footprint to enable low memory usage.
- **VxWorks 6 enables protected applications**
  - Improved device robustness through memory protection and application isolation
- **VxWorks 6 provides easy migration from VxWorks 5.5**
  - Backward compatibility leverages existing VxWorks IP and developer experience
- **VxWorks 6 development enhanced by Workbench Development Suite**
  - Eclipse-based development suite with improved debugger speeds development
- **VxWorks 6 memory protection**
  - MMU-based real-time processes for user-mode applications
  - Protects kernel from applications, and apps from each other
- **VxWorks 6 shared libraries and shared data**
  - Shared libraries enable common code re-use and footprint savings
  - Shared data enable fast, simple IPC
- **VxWorks 6 message channels interprocess communication**
  - Enables IPC between real-time processes,
  - Transparent messaging across systems and Oses
- **VxWorks 6 error management**
  - Automatic detection and reporting for common memory errors
  - API to manage application errors
- **VxWorks 6 improved standards support**
  - Improved POSIX compliance in user-mode
  - IPv4/IPv6 dual-mode stack; approved for “IPv6 Ready” logo phase II
  - Open source industry standard TIPC protocol for IPC

## **Benefits for Student while working with VxWorks**

- **Basic Level:**

1. Working with small C language codes to get familiarize with environment
2. Develop small applications using C language
3. Work with different Real Time Analysis tools to get familiarize with WorkBench
4. Some advanced programming like Interprocess communication etc.
5. Get the conceptual knowledge of Real Time Systems

- **Middle Level:**

1. Development of Operating System or Kernel compilation.
2. Development of some advanced application to simulate using VxWorks Simulator
3. Designing of Board Support package
4. Designing of customized RTOS etc

- **Advanced Level:**

1. Get familiarize with different microcontroller architectures
2. Develop application for particular architecture
3. Porting of VxWorks Real Time Operating System on Target Board
4. Designing of Real Time Application for RTOS Etc.

### **Benefits for Researchers**

1. Research persons can works with VxWorks for developing high level applications.
2. Research persons can develop Device Drivers for their specific device using WorkBench
3. Research persons can work on different projects using VxWorks and WorkBench.
4. **Few of the Projects which have already been completed using VxWorks :**
  - Mobby talk and Mobby talk 253 Phones build on VxWorks
  - Tornado Advanced RADAR/MAP Display Information System(TARDIS)
  - Unmanned Space Vehicle build by CIRA
  - Mobile Broadcasting Corporation developed Handheld receivers MohaBO for nationwide broadcasting.
  - NASA Mars Rovers and many more.
5. **Few Projects that can be done using VxWorks**
  - Cellular Base Station
  - USB Peripheral like PC Peripheral with Real Time Voltage, Current and Temperature Sensor
  - Surveillance System
  - Medical Imaging system and many more

## **Technical Specification**

### **Hard real time operating system-VxWorks**

- Real-time process (RTP) user space environment
- Backward-compatibility with VxWorks 5.5 and all previous versions of VxWorks 6.x
- Kernel scalability and performance tuning using VxWorks Source Build
- State-of-the-art memory protection and memory management
- Error management
- Message channels IPC, including support for multiprocessor and multi-OS messaging using TIPC, and Wind River Multi-OS IPC (MIPC)
- Full support for JTRS SCA AEP 2.2.2 and certified conformance to POSIX IEEE Std. 1003.13-2003 PSE52 (achieved in VxWorks 6.4)
- Dual-mode IPv4/IPv6 network stack, with IPv6 Ready Logo Certification
- Wind River PPP
- Wind River USB
- TrueFFS (flash file system)
- dosFs (FAT-compatible file system)
- Highly reliable file system (HRFS) with configurable commit Points
- High-speed interconnect framework with PCI and local bus Support
- VxMP
- VxWorks target shell
- Broad processor and BSP support

## **Workbench/Tool Chain**

### **Eclipse-based development environment**

- Multiple-target OS support, including support for VxWorks 5.5, VxWorks 6.x,
- Target processor support for PowerPC, Intel Architecture, ARM, MIPS, and ColdFire  
Powerful multicore debugger with on-chip debugging
- VxWorks host shell
- Dynamic printf() debugging
- VxWorks 6.x Kernel Configurator
- VxWorks Source Build configuration tool
- VxWorks Core Dump Analysis
- Multitarget launch
- Integrated VxWorks Simulator
- Integrated run-time analysis tools
- System Viewer
- Performance Profiler

- Memory Analyzer
- Data Monitor
- Code Coverage Analyzer
- Optimizing compilers
- Wind River Compiler for VxWorks
- Wind River GNU Compiler

## Hardware Support

### **ARM Architecture**

ARM 9 , 9E, 11

### **Intel Architecture**

Pentium family (Pentium, Pentium II, Pentium III, Pentium 4, Pentium M)

### **Intel XScale Architecture**

IXP4xx, 2xxx

### **MIPS Architecture**

MIPS 4Kx, 5Kx , tx49xx ,24KEc ,BCM SB1 (1250, 1125, 1122, 1121),BCM SB1a (1480, 1455, 1280, 1255, 1155) ,RM9000GL

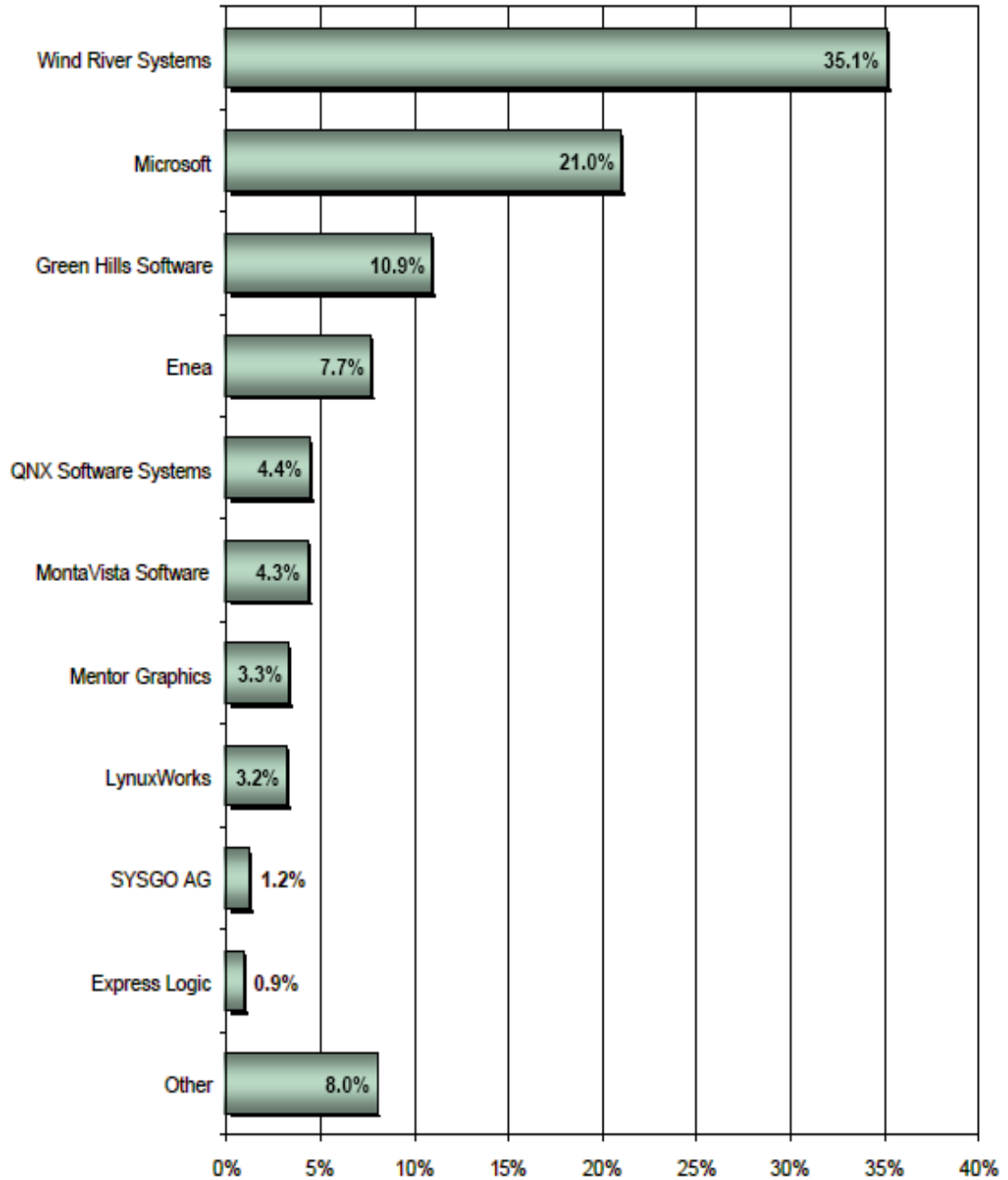
### **PowerPC Architecture**

PowerPC 40x ,44x ,60x ,7xx ,8xx ,74xx ,82xx ,83xx ,85xx ,52xx ,970

### **Renesas SuperH Architecture**

SuperH-4,4A

## Industry Market Share



## Different Industries using VxWorks

<u>Networking</u>	<u>Industrial &amp; Automotive</u>	<u>Aerospace &amp; Defense Defense</u>	<u>Digital Consumer</u>
Alcatel	ABB	BAE Systems	Alcatel
Cisco	Agilent	Boeing	BMW
EMC	GE	EADS	Ericson
Ericsson	HONDA	European Space Industry	Hewlet Packyard
Fujitsu	Honeywell	General Dynamics	Iwatsu
Hewlett-Packard	Mitsubishi	Harris	Kenwood
Huawei	National Instruments	Honeywell	Konica Minolta
Intel	Rockwell Automation	IAI	Matsushita
Juniper	Samsung	KHI	Motorola
Kyocera	Schneider	LG Innotake	Philips
LG Electronics	Siemens	Lockheed Martin	Samsung
Lucent	Tokyo Electron	L3	Sanyo
Marconi	Yaskawa	MHI	Sharp
Motorola	Yokogawa	NASA	Sony
NEC	Xanavi	Northrop Gruman	Sumitomo
Nokia		Raytheon	Thomson
Nortel		Thales	Toshiba
Siemens		Smith Aerospace	

And many many more companies are there.